CAMBRIDGE SYSTEMATICS

Regional Bus Staging, Layover, and Parking Location Study

final

report

prepared for

Metropolitan Washington Council of Governments

prepared by

Cambridge Systematics, Inc.

& Sabra, Wang & Associates, Inc.

March 7, 2015

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1.0 Introduction

1.1 STUDY PURPOSE

The purpose of this study is to analyze the need for bus staging, layover, and parking locations in the District of Columbia (D.C.) and Arlington County. The first part of the study reviewed the existing conditions and future growth and demand for motorcoach services, and the second part summarizes the site screening, selection, and evaluation process. Two basic types of sites are investigated: (1) on-street locations for staging commuter buses prior to the beginning of afternoon service, and (2) off-street locations for parking or layover of buses. Ultimately, this report concludes with a list of recommended sites for further investigation and advancement by the motorcoach operators and agency stakeholders.

Motorcoach buses are an important component of the Metropolitan Washington transportation system, serving a variety of purposes from intra-regional commute trips headed to major employers in D.C. and Arlington, Virginia to tour buses visiting the nation's capital. These buses help reduce automobile trips within the regional core, removing long-distance trips from the area road system. However, the lack of centralized parking, layover, and curbside stops has led to negative traffic and air quality impacts that need to be addressed.

As noted in the District Department of Transportation (DDOT) 2011 Motorcoach Action Plan, there are five distinct types of motorcoach services provided in D.C. on a regular basis:[1]

- **Commuter** - regional transit service that transports workers to and from D.C.'s key employment centers. More than 300 buses operate daily bringing workers to major job centers in D.C. and Arlington, particularly focused on major federal job sites such as Capitol Hill and the Pentagon. This service is primarily during the A.M. and P.M. peak periods with buses serving designated curbside stop locations, often co-located with Metrobus. The four primary commuter bus operators in the region include: Maryland Transit Administration (MTA), Potomac and Rappahannock Transportation Commission (PRTC), Loudoun County, and Martz.
- **Tour/Charter** - chartered to bring tour groups into D.C. either on day trips or as part of a multi-day itinerary. Nearly one-third of visitors to D.C. attractions are estimated to take motorcoach buses. This service is typically restricted to a chartered group and includes bus trips made by school, church, and other visitor groups to the area. Tour buses often make multiple

[1] *DDOT. (2011). Motorcoach Action Plan.*

stops in D.C. and Arlington, transporting passengers between attractions as part of their itinerary.

- **Intercity** - a low-cost regional transportation alternative with point to point service between key destinations. Union Station services the largest share of intercity bus locations, due to its close proximity to Metrorail, Metrobus, and Amtrak rail services. Other locations that serve intercity bus service routes include: Chinatown, Dupont Circle, Columbia Heights, Rosslyn, and Arlington.
- **Sightseeing** - scheduled hop-on/hop-off service between D.C.'s key attractions. These buses serve tourists with scheduled service along routes connecting the major tourist attractions. Lack of curbside stop locations has led to passenger boarding and alighting in travel lanes, raising safety concerns. Plans are underway to introduce a National Mall route of the D.C. Circulator service that will also need to be accommodated. The current top companies for sightseeing buses are Open Top, Double Decker, and Old Town Trolley.
- **Shuttle Services** - vehicles used to transport employees between an organization's multiple office sites or students between campuses. Stop locations for these services are typically near building entrances, but lack of curbside space can lead to localized traffic impacts.

1.2 KEY ISSUES

These different types of motorcoach services share some common issues and challenges:

- **Curbside Loading and Unloading Locations**. The lack of sufficient curbside space near major attractors for motorcoach buses, as well as occasional conflicts with existing public transit services and at bus stops leads to traffic impacts and safety concerns when buses must board/alight passengers in travel lanes.
- **Staging and Layover**. Particularly for afternoon commuter bus operations, operators need a centralized staging location to allow buses sufficient time to reach the first boarding stop location given unreliable traffic conditions. The lack of curbside layover locations can lead to buses circling downtown blocks or parking illegally.
- **Mid-Day Parking and Storage**. Commuter buses traveling long distances to the region's core employment areas need mid-day parking before the return trip in the afternoon. Tour buses also need parking locations near the tourist attractions centered on the National Mall. Currently, in D.C., these buses can park at Union Station, which is routinely at capacity, or at Robert F. Kennedy Memorial Stadium (RFK Stadium), or at Buzzard Point. These latter two locations are considered less desirable because of the lack of facilities for bus

operators. In Arlington, some motorcoach parking is available in Pentagon City, Crystal City, Rosslyn, and Ballston.

- **Routing**. Motorcoach buses can have a significant negative impact on local, neighborhood streets. DDOT publishes a Motorcoach Operators Guide that includes a map of preferred streets for bus routing. The location of a motorcoach parking facility must be selected with direct access to attractions to minimize deadheading costs, and along designated streets for buses.
- **Traffic and Air Quality Impacts**. Motorcoach buses provide benefits to the region in terms of reduced automobile traffic, but they can have significant localized negative impacts related to traffic congestion and emissions. Both D.C. and Arlington have addressed the issue of bus idling through regulations that limit the amount of time a bus engine can remain running while the bus is parked. Mid-day parking will help reduce some of the issues associated with buses circling downtown blocks waiting to pick-up passengers. Identifying additional curbside drop-off locations will help to reduce traffic delays when buses stop in travel lanes.

1.3 PREVIOUS STUDIES AND PLANS

Before beginning analysis, the team examined previous studies and plans that have been completed and are relevant to regional bus operations and parking in the area. The literature reviewed came from a variety of agencies: DDOT, Virginia Department of Transportation (VDOT), Virginia Department of Rail and Public Transportation (Virginia DRPT), National Park Service (NPS), Commonwealth Transportation Board (CTB),[2] National Coalition to Save Our Mall, PRTC, Loudoun County, and the George Mason School of Public Policy. These studies examined a range of different types of bus service into the region, including Commuter Buses, Tour/Charter Buses, Fixed Route Bus Services, Intercity Buses, and Sightseeing Buses, and are summarized in Table 1.1 on the next page. A detailed summary of the previous studies is provided in Appendix A.

[2] *The CTB is an 18-member transportation board appointed by the governor of Virginia to establish administrative policies for Virginia's transportation system. The CTB also allocates funding to specific projects, locates routes, and provides funding for airports, seaports, and public transportation.*

Table 1.1 Previous Studies Reviewed

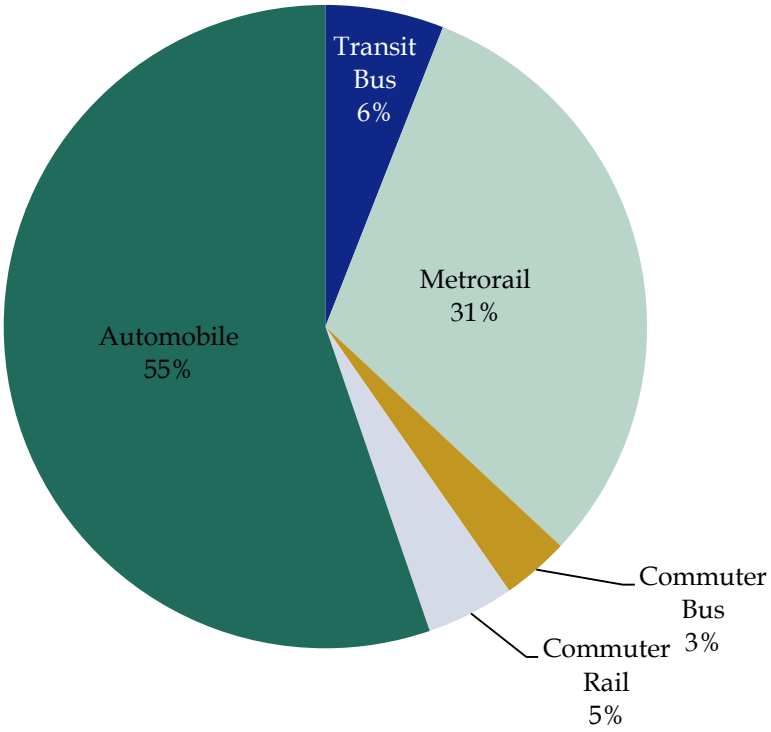
Date	Agency	Study Title	Type of Bus Service
2014	National Coalition to Save our Mall	National Mall Underground Parking Demand Study	Tour/Charter Bus
2014	Commonwealth Transportation Board	FY 2015 Rail and Public Transportation Improvement Program	Commuter Bus
2013	Virginia DOT	Virginia Statewide Intercity Bus Study	Intercity Bus
2013	National Park Service	NPS Tour Bus Operations Analysis	Tour/Charter Bus
2013	District Department of Transportation	Circulator Implementation Plan – National Mall Route	Fixed Route Bus Service
2013	District Department of Transportation	Motorcoach Operators Guide	Tour/Charter Bus
2011	District Department of Transportation	District of Columbia Motorcoach Action Plan	Regional Commuter Bus, Tour/Charter Bus, Intercity Bus, Sightseeing Bus
2011	District Department of Transportation	Policies to Manage Intercity Curbside Bus Operations	Intercity Bus
2011	Potomac and Rappahannock Transportation Commission	Transit Development Plan: Fiscal Years 2012-2017	Commuter Bus
2011	Loudoun County	Transit Development Plan: Fiscal Years 2012-2017	Commuter Bus
2011	D.C. Circulator	D.C. Circulator Transit Development Plan	Fixed Route Bus Service
2011	Virginia DRPT	I-95 Corridor Transit and TDM Plan	Commuter Bus
2010	District Department of Transportation	Commuter Bus Management Plan Update	Commuter Bus
2009	Virginia DRPT	I-66 Transit and TDM Study	Commuter Bus
2008	George Mason University School of Public Policy	A Review of Access and Circulation on the National Mall in Washington, D.C.	Tour/Charter Bus

2.0 Overview of Regional Bus Activity

2.1 Existing Demand

Existing regional bus activity serving the D.C. core and Arlington is presented in the following figures and tables. According to the Metropolitan Washington Council of Governments (COG)'s 2009 central employment core cordon counts, approximately 3 percent of weekday AM peak period trips to the core are were made via commuter bus, equivalent to 15,700 trips. Figure 2.1 illustrates the 2009 mode share of peak period trips into the Core. Between 2009 and 2013, that share of commuter bus trips increased to 18,700 (4% of total) weekday AM peak period trips made via commuter bus. Between 2009 and 2013 cordon counts, the number of total inbound commuter bus trips increased 19 percent.

Figure 2.1 COG Central Employment Core Cordon Counts – 2009 Mode Share



The COG counts also found that a significantly greater percentage of commuter bus passengers destined to the D.C. core originated in Virginia rather than Maryland. The counts found that 30 percent of commuter bus trips crossed the D.C. cordon line, while the other 70 percent of commuter bus trips passed the Virginia/Arlington line. The imbalance could be partly due to the higher share of commuter rail trips from Maryland.

Additional motorcoach volume data collected by COG for DDOT in 2012 identifies type of bus as well as primary entry points into D.C. The count occurred during a single six-hour period across 13 key entry points throughout D.C., and results are shown in Figure 2.2. COG observed approximately 1,900 motorcoaches entering D.C. in the six-hour study period, with approximately 1,100 expected to require parking. This level of demand compares to an estimated supply of 611 bus parking spaces within D.C.[3] The three entry points with the highest volume of motorcoaches observed between 6 am and 12 pm were Kenilworth Avenue (DC 295) with an average of 305 motorcoaches, the Theodore Roosevelt Bridge with an average of 258 motorcoaches, and the 14th Street Bridge with an average of 245 motorcoaches.[4]

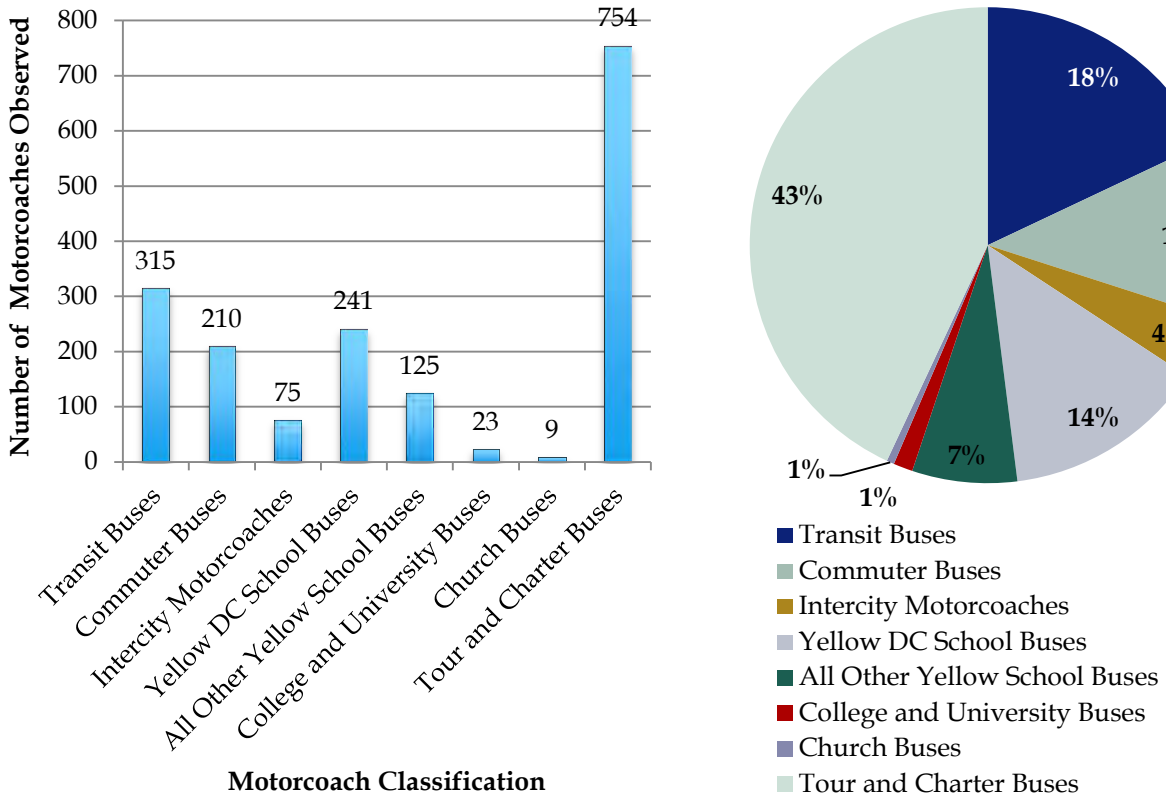
Of the motorcoaches COG observed during their study period, 210 were commuter buses. Other studies have observed similar ranges of commuter bus activity into the D.C. core, ranging between 200 and 300 on a daily basis.

Transit buses crossing the core cordon include Fairfax Connector, Arlington Transit, and Metrobus services throughout Arlington and D.C. These services provide connection to Metrorail stations and Union Station (MARC, VRE, and Amtrak) as well as key destinations throughout the area. They represent 18 percent of total motorcoach volume into D.C. The share of tour and charter buses varies by month of year and time of day. For example, according to the DDOT 2011 Motorcoach Action Plan, April and May show the highest demand for these services, while typically most of the tour bus drop-off and pick-up activity occurs during the midday.

[3] *District of Columbia Motorcoach Volume Data, Final Report, Prepared By: The District Department of Transportation, 9/6/2012*

[4] *This number refers to the motorcoach volume observed only on the 14th Street Bridge express lanes – those that continue onto I-395 – and does not include the motorcoaches in local lanes which exit at 14th Street.*

Figure 2.2 D.C. Motorcoach Volume Data, 2012[5]



[5] *District of Columbia Motorcoach Volume Data, DDOT (2012),*

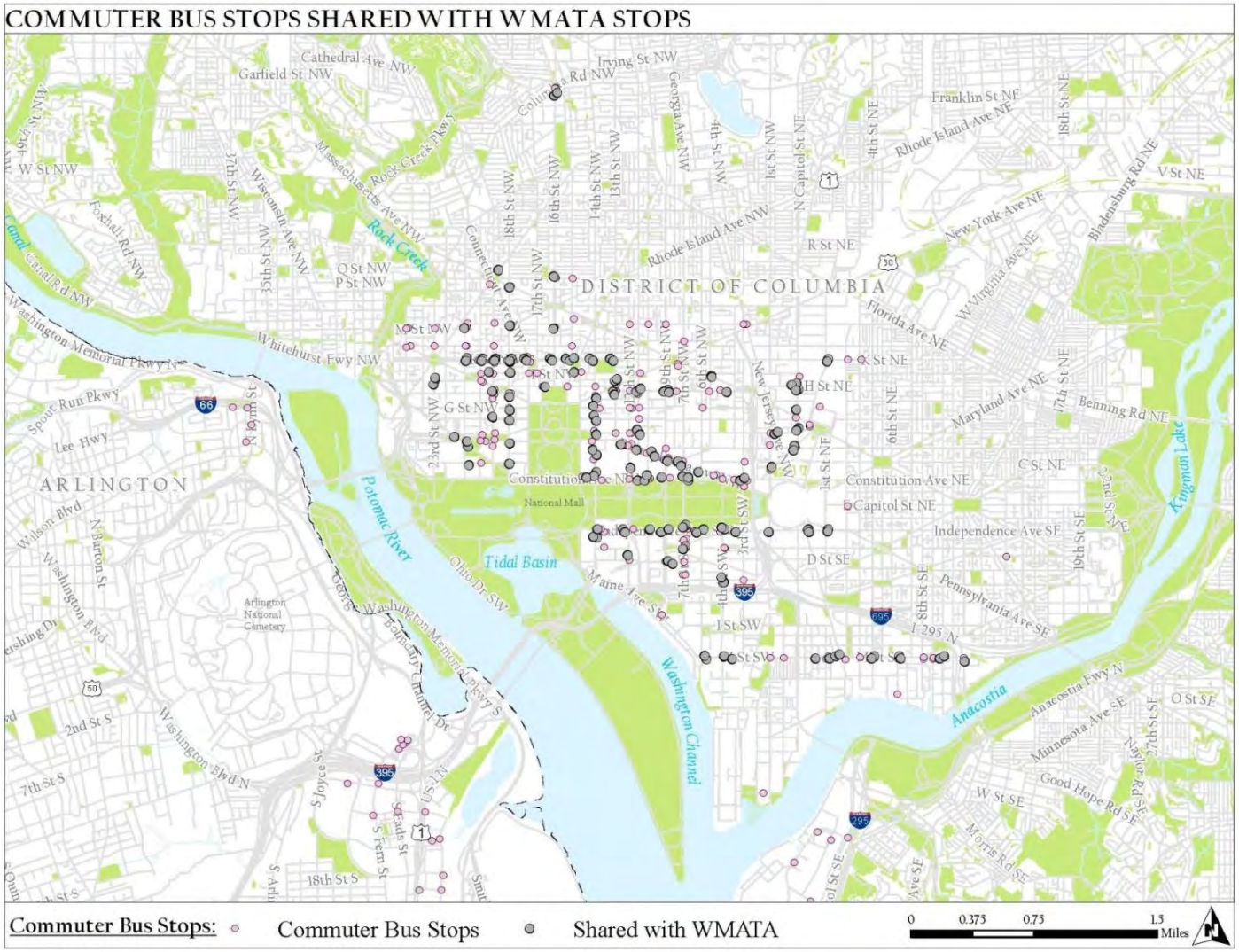
2.2 BUS STOPS

Washington Metropolitan Area Transit Authority (WMATA) and other bus operators serve approximately 11,000 bus stops in D.C. and surrounding areas of Virginia and Maryland. In D.C., around 150 of these stops are approved for sharing with commuter bus services according to the DDOT Commuter Bus Management Plan. As shown in Figure 2.3, there are about 200 stops located in and around the D.C. core area and approximately three-fourths of these are shared Metrobus stops. Capacity and other issues are not likely to be as much of an issue for the one-fourth of the stops that are not shared and are used by commuter buses only. However according to WMATA's *Guidelines for the Design and Placement of Transit Stops*,[6] many of these locations do not have signs for the commuter services due to restrictions along the block faces.

As discussed later the frequency of commuter and WMATA services at the shared stops may cause capacity issues, especially during peak time periods. Note that other tour/charter, sightseeing, and shuttle services may also encroach on these stops particularly at peak tourist seasons given the lack of staging and pick-up drop-off capacity around popular attractions such as the National Air and Space Museum. The DDOT 2011 Motorcoach Action Plan found that existing on-street weekday parking demands peak in April with a demand of 743 vehicles (59 buses). Weekend parking for buses also peaks in April with a demand of 76 buses. Special events such as festivals or parades can see increases in demand up to 1,258 vehicles or 116 buses.[7]

6 WMATA. (2009). Guidelines for the Design and Placement of Transit Stops. http://www.wmata.com/pdfs/planning/WMATA%20Guidelines-Design%20and%20Placement%20of%20Transit%20Stops.pdf
7 DDOT. (2011). Motorcoach Action Plan. Pages 50-52.

Figure 2.3 Commuter Bus Stops Shared with Metrobus Stops



Source: District Commuter Bus Management Plan

2.3 PARKING

Existing motorcoach parking locations are illustrated in Figure 2.4. The figure indicates both on-street/curbside parking as well as off-street parking.

An inventory of bus parking spaces in the study area shows the total number of spaces by type of parking location, summarized in Table 2.1 and detailed in Table 2.2. By far, the majority of parking is located in bus parking lots, primarily at RFK Stadium. Bus parking is shared by all motorcoaches and in most cases are first come, first serve. About 100 of these spaces are provided at RFK Stadium which charges a $40.00 daily fee to park. The RFK lot has an additional 400 spaces only open for excess demand and special events for which the Washington Convention and Sports Authority charges.

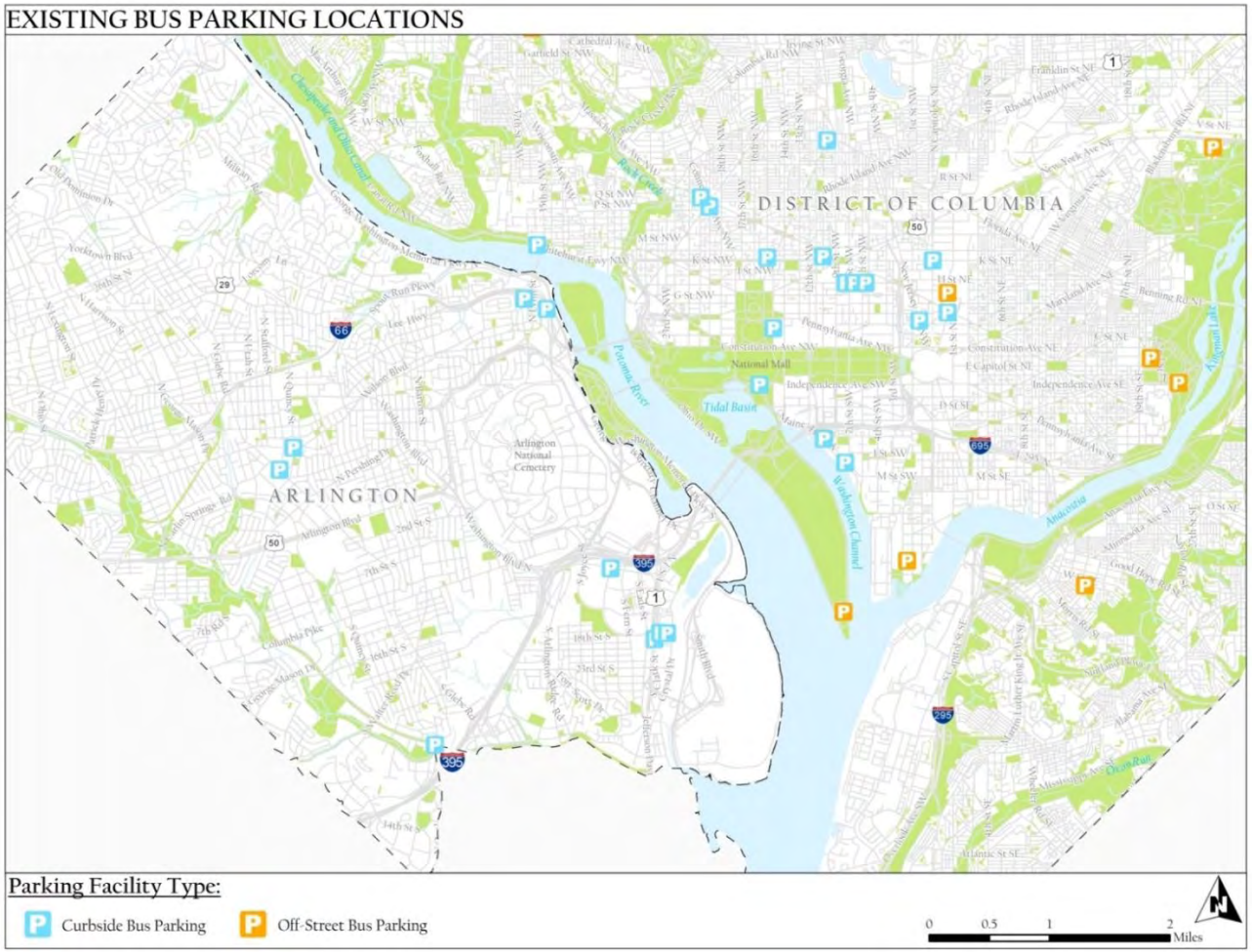
Many of these spaces may be appropriate for Tour/Charter services but inappropriate for Commuter services, although some MTA contract commuter operators lease midday parking from RFK stadium they are thinking about making other arrangements in the Fall of 2014. Union Station Parking Garage has approximately 20 spaces at a $20/day charge (Down from 100 in 2011), and Buzzard Point has 80 spaces at a cost of $20 for up to 3 hours or $50/day. All other sites with significant capacity (greater than 20 spaces) are restricted to site visitors (e.g. the National Zoo and the National Arboretum.). At one point motorcoaches used the area around Hains Point and East Potomac Park for long term parking but that is no longer allowed by the National Park Service. Commuter operators used to also park midday in areas near Marlow Heights Maryland, but it is the study team's understanding that this option is being discontinued.

Table 2.1 Number of Bus Spaces by Type of Parking Location

Type of Parking Lot/Space	Number of Bus Spaces
Bus Parking Lot	611
Curbside	50
Off-Street Near Attraction	199
Off-Street	80
Total	**940**

Source: District of Columbia Motorcoach Volume Data, DDOT (2012), District of Columbia Motorcoach Action Plan, 2011

Figure 2.4 Existing Motorcoach Bus Parking Locations[8]



Source: DDOT.

[8] *Note: This Figure is missing the following locations: 9th St NW, Constitution Ave, D St SW, Independence Ave, and the Madison Drive NW 900 and 1200 blocks.*

Table 2.2 Existing Motorcoach Bus Parking Locations

Lot Name	Address	Restrictions	Cost	Bus Spaces	Facility Type
10th St NW: 1000 Block	10th St NW: 1000 Block	1 hour Tour Bus Parking 7:00 am – 6:30 pm	Free	1	Curbside
1500 Independence Avenue, SW	1500 Independence Avenue, SW	2 hour Tour Bus Parking 7:00 am – 6:30 pm	Free	8	Curbside
15th Street NW: 200-400 Block	15th Street NW: 200-400 Block	2 hour Tour Bus Parking 7:00 am – 6:30 pm	Free	5	Curbside
400 New Jersey Ave, NW	400 New Jersey Ave, NW	1 hour Tour Bus Parking	Free	1	Curbside
9th Street NW: 900 Block	9th Street NW	Parking Time Limits: 2 hours at bus stand		2	Curbside
Ballston	500 N. Randolph St	Parking Time Limits: 10 am-10 pm (3 hour limit), 10 pm-10 am (unlimited)	$3/hour	4	Curbside
Ballston	500 N. Quincy St	Parking Time Limits: 24 hours unlimited	$3/hour	2	Curbside
Basilica of the National Shrine of the Immaculate Conception	400 Michigan Ave NE	Generally restricted to site visitors	Free	100	Off-Street
Buzzard Point	2000 2nd St SW			80	Off-Street
Constitution Avenue		Up to 2 or 3 hours parking between the hours of 10am-3pm and 7pm-midnight		25	Rush Hour Bus Stops
Crystal City	1900 S. Clark St	Parking Time Limits: 24 hours unlimited	$3/hour	3	Curbside
Crystal City	300 18th St S	Parking Time Limits: 10 am-6 pm (2 hour limit), 6 pm-10 am (unlimited)	$3/hour	2	Curbside
Crystal City	200 18th St S	Parking Time Limits: 6 am-6 pm (2 hour limit), 6 pm-6 am (unlimited)	$3/hour	2	Curbside
DDOT MCAP Intercity Curbside Parking	U St/Vermont Ave			1	Curbside
DDOT MCAP Intercity Curbside Parking	19th St/Dupont Circle NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	20th St/Massachusetts Ave NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	1015 15th St NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	715 H St NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	617 H St NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	513 H St NW			1	Curbside
DDOT MCAP Intercity Curbside Parking	K St/North Capitol St			1	Curbside

Table 2.3 Existing Motorcoach Bus Parking Locations, continued

Lot Name	Address	Restrictions	Cost	Bus Spaces	Facility Type
Frederick Douglass Memorial Home	1411 W St SW	Restricted to site visitors	Free	3	Off-Street
Hains Point Bus Parking	East Capitol Street SE & 22nd St SE	7:00 am – 6:00 pm	Free	11	Curbside
Maine Ave, SW: 900-1200 Block	Maine Ave, SW: 900-1200 Block	Sightseeing and Tour Buses only	Free	4	Curbside
Maine Ave SW: 700-900 Block	Maine Ave SW: 700-900 Block	Tour Bus Parking 9:30 am-4:00 pm / 4 hour limit	Free	7	Curbside
National Arboretum	3500 New York Ave NE	Restricted to site visitors	Free	28	Off-Street
National Cathedral	3101 Wisconsin Ave NW	Restricted to site visitors	Free	18	Off-Street
National Zoo	3000 Connecticut Ave NW	Restricted to site visitors	Free	50	Off-Street
Pentagon City	1000 S. Hayes St	Parking Time Limits: 2 hour limit	$3/hour	10	Curbside
RFK Stadium (Lot 3)	2400 East Capitol St NE	5:30 am-10:00 pm in and out	$30/day	100	Bus Parking Lot
RFK Stadium (Lot 8)	2400 East Capitol St NE	Only open for excess demand and special events	$30/day	400	Bus Parking Lot
Rosslyn	1600 N Arlington Ridge Rd	Parking Time Limits: 10 am-6 pm (3 hour limit), 6 pm-10 am (unlimited)	$3/hour	18	Curbside
Rosslyn	1911 Fort Myer Drive	Parking Time Limits: 24 hours unlimited	$3/hour	4	Curbside
Shirlington	3500 S. Four Mile Run Drive	Parking Time Limits: 24 hours unlimited	$3/hour	10	Curbside
Union Station	30 Massachusetts Ave NE		Free	20	Curbside
Union Station Parking Garage	30 Massachusetts Ave NE	7:00 am – 7:00 pm	$20	100	Bus Parking Lot
Water St NW: 3500 Block	Water St NW: 3500 Block	Tour Bus Parking at all times	Free	4	Curbside

Source: DDOT Motorcoach Action Plan pp 27 & 34; http://transportation.arlingtonva.us/parking/public-parking/tour-buses/ .

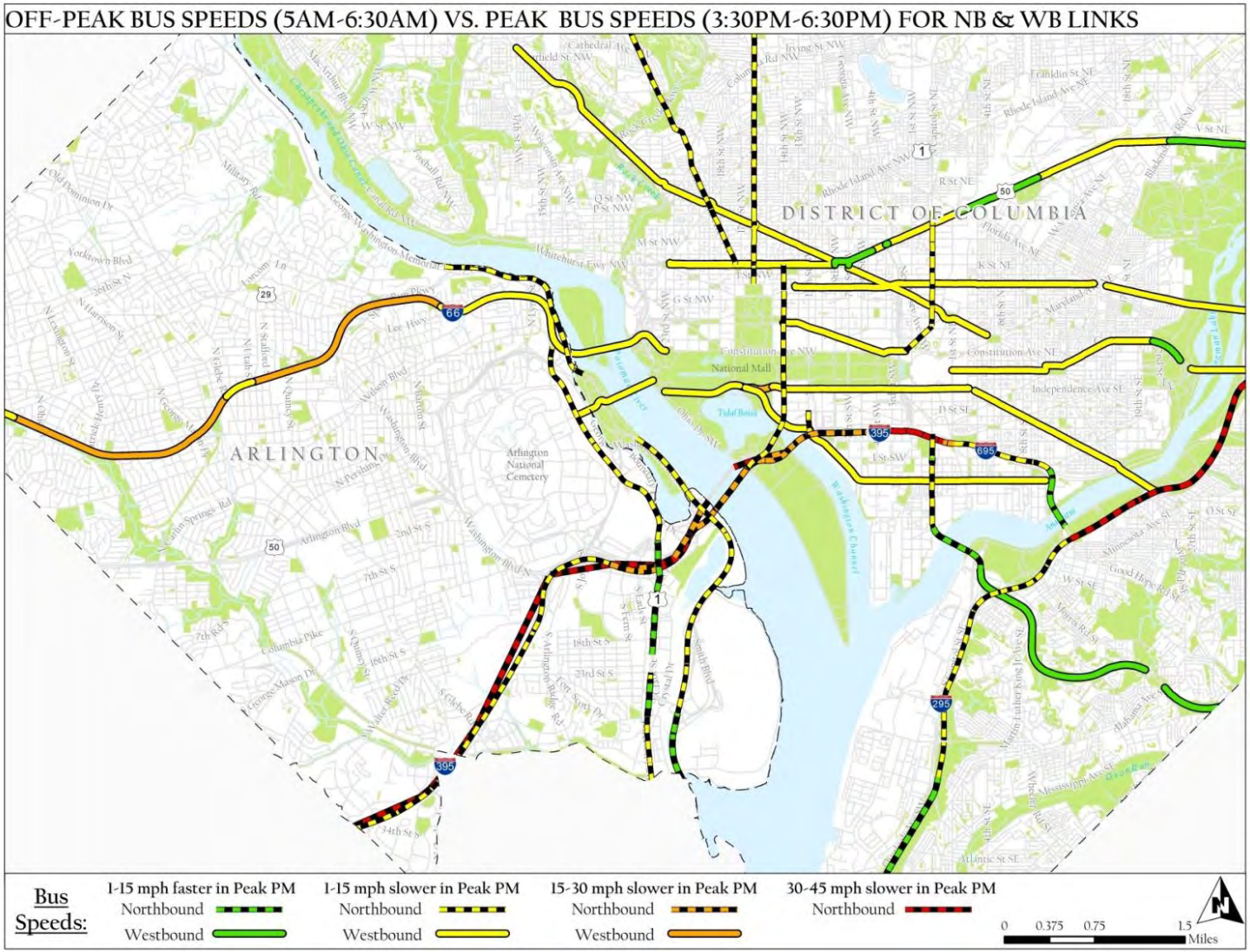
2.4 TRAFFIC CONDITIONS

An indicator of the traffic conditions and bottlenecks that motorcoaches face each day is the difference between the off-peak free flow speeds and the PM peak speeds that buses encounter when they leave the core areas. The difference in observed traffic speeds, between the peak and off-peak, are shown in Figure 2.5 and Figure 2.6. These vehicle speed maps show speeds for all vehicles and represent the speeds that buses would experience operating in mixed traffic. These maps compare vehicle speeds from 5:00 to 6:30 AM (off peak) to those from 3:30 to 6:30 PM (PM Peak) first in the northbound and westbound directions and then in the southbound and eastbound directions.

I-395 westbound and I -295 northbound are severely congested leaving the city in the PM. I-395 westbound through the core is also congested. Some links also show early morning congestion as people come into downtown, especially US 50 and East Capitol Street near RFK Stadium, and US 1 and the George Washington Memorial Parkway in Virginia.

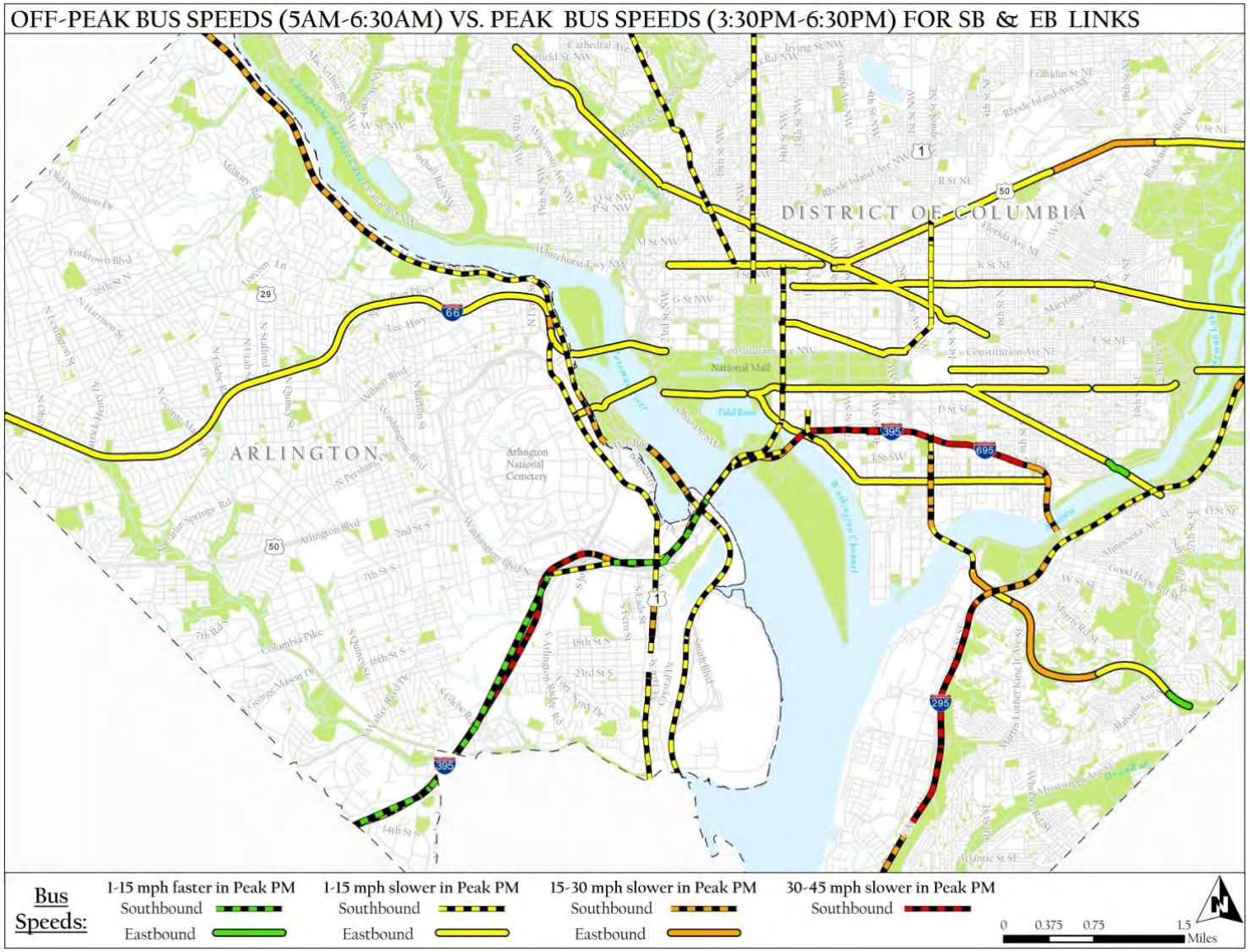
When examining the southbound and eastbound links similar patterns emerge. I-395 in Virginia is congested and I-295 moving south away from the core areas. I-395 and I-695 are congested through the core as well. George Washington Memorial Parkway from the Pentagon south to I-395 also is 15 to 30 miles per hour slower. The difference between the peak and off-peak speeds on main routes in the core seems to stay below 15 mph. Note that this may mean that due to signals and general overall friction that buses, even in closed door limited stop service, will not travel through the core areas rapidly without priority treatments such as bus lanes or transit signal priority.

Figure 2.5 Vehicle Speeds for Northbound and Westbound Links



Source: MWCOG Bus Speeds GIS Shapefile

Figure 2.6 Vehicle Speeds for Southbound and Eastbound Links

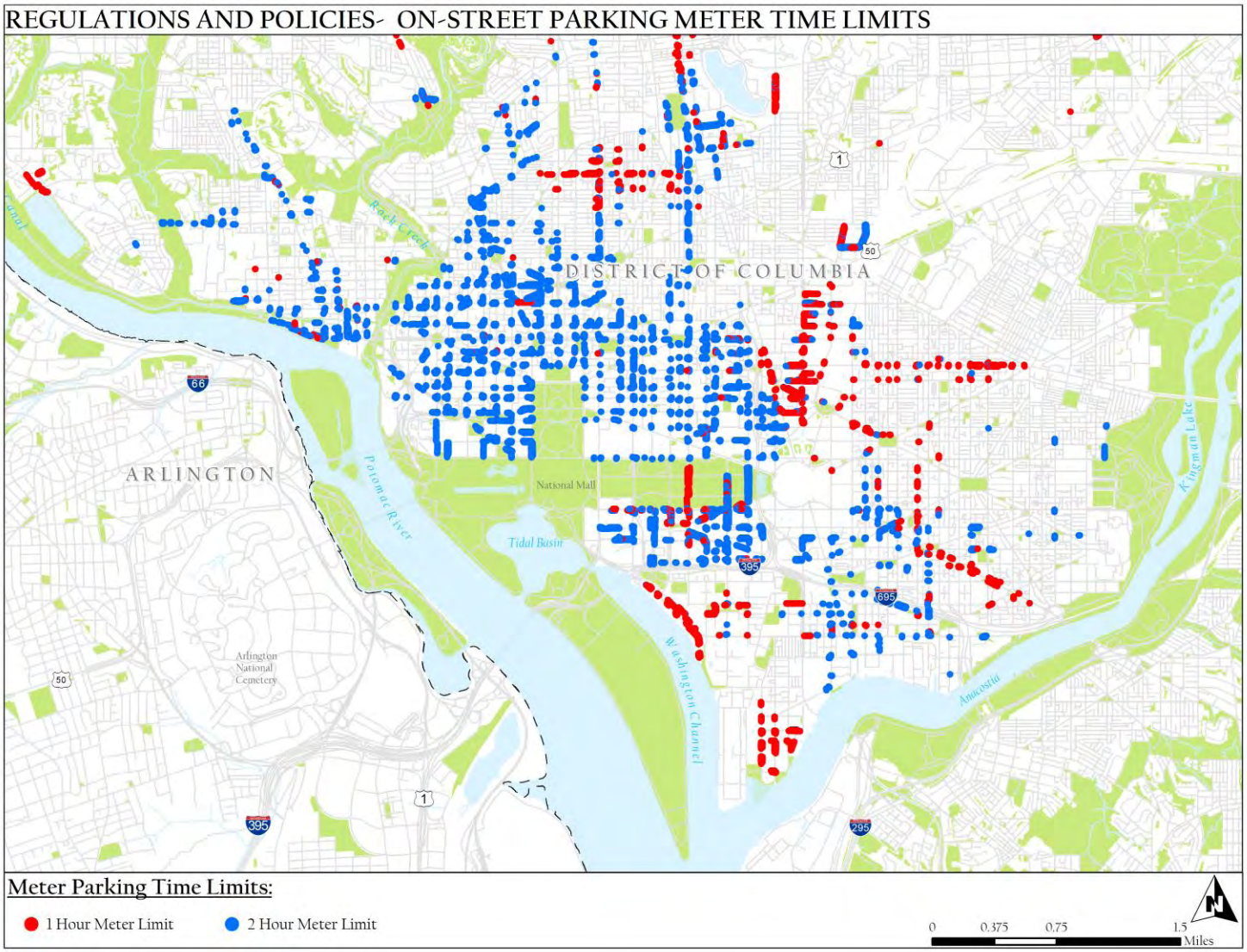


Source: MWCOG Bus Speeds GIS Shapefile

2.5 POLICIES AND RESTRICTIONS

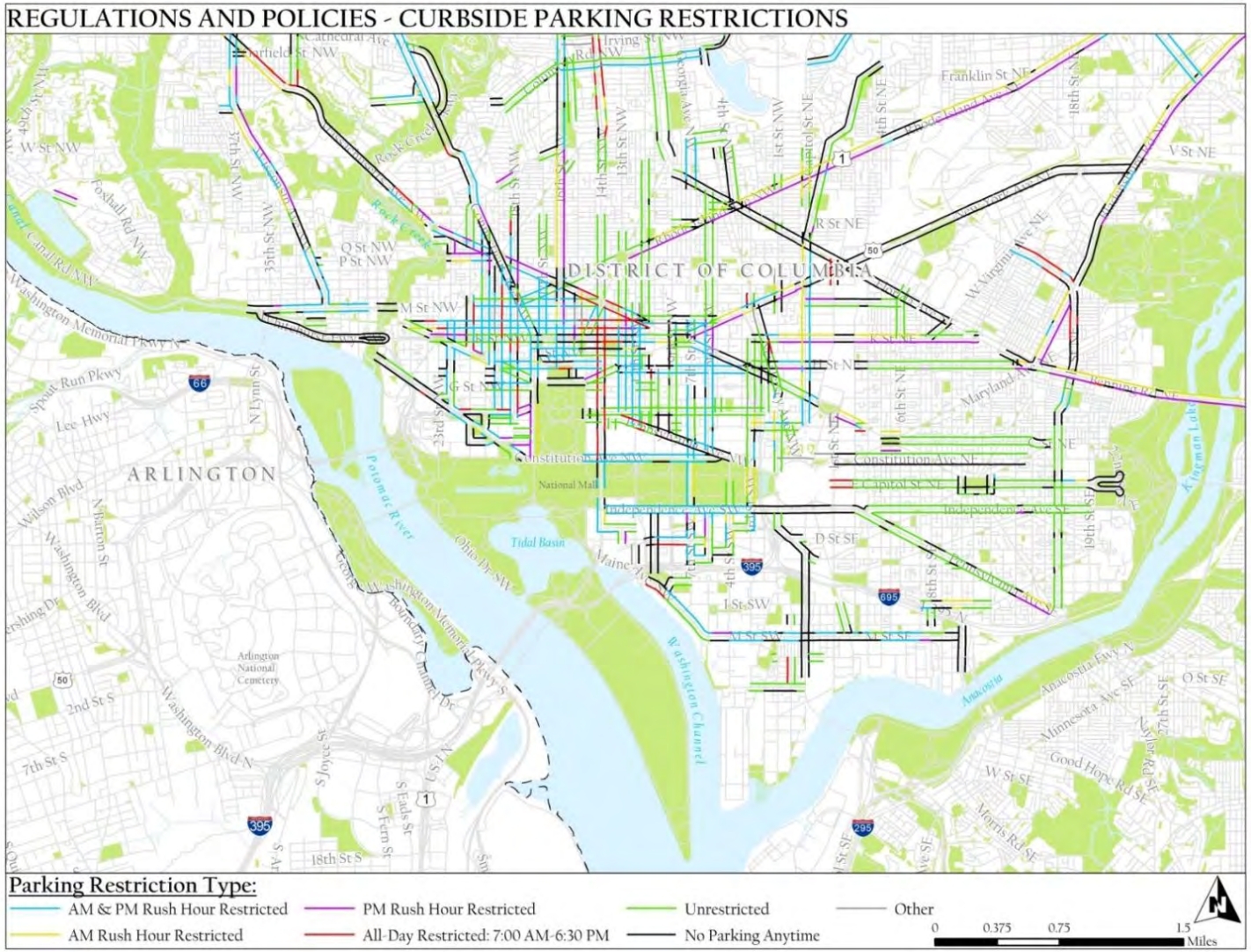
D.C. implements a number of parking policies and restrictions to alleviate traffic and to provide parking for federal agencies. Some of the restrictions include rush hour restrictions, anti-idling sign locations, parking for federal agencies and embassies, and American Disability Act (ADA) parking. Additionally, there are approximately 17,000 metered curbside parking spaces. These spaces are an important source of revenue for D.C. but they take up curbside space that could potentially be used for stops and/or parking. Figures 2.7, 2.8, and 2.9 represent the locations of parking meters, policies and restrictions in D.C..

Figure 2.7 Regulations and Policies: On-Street Parking Meter Time Limits



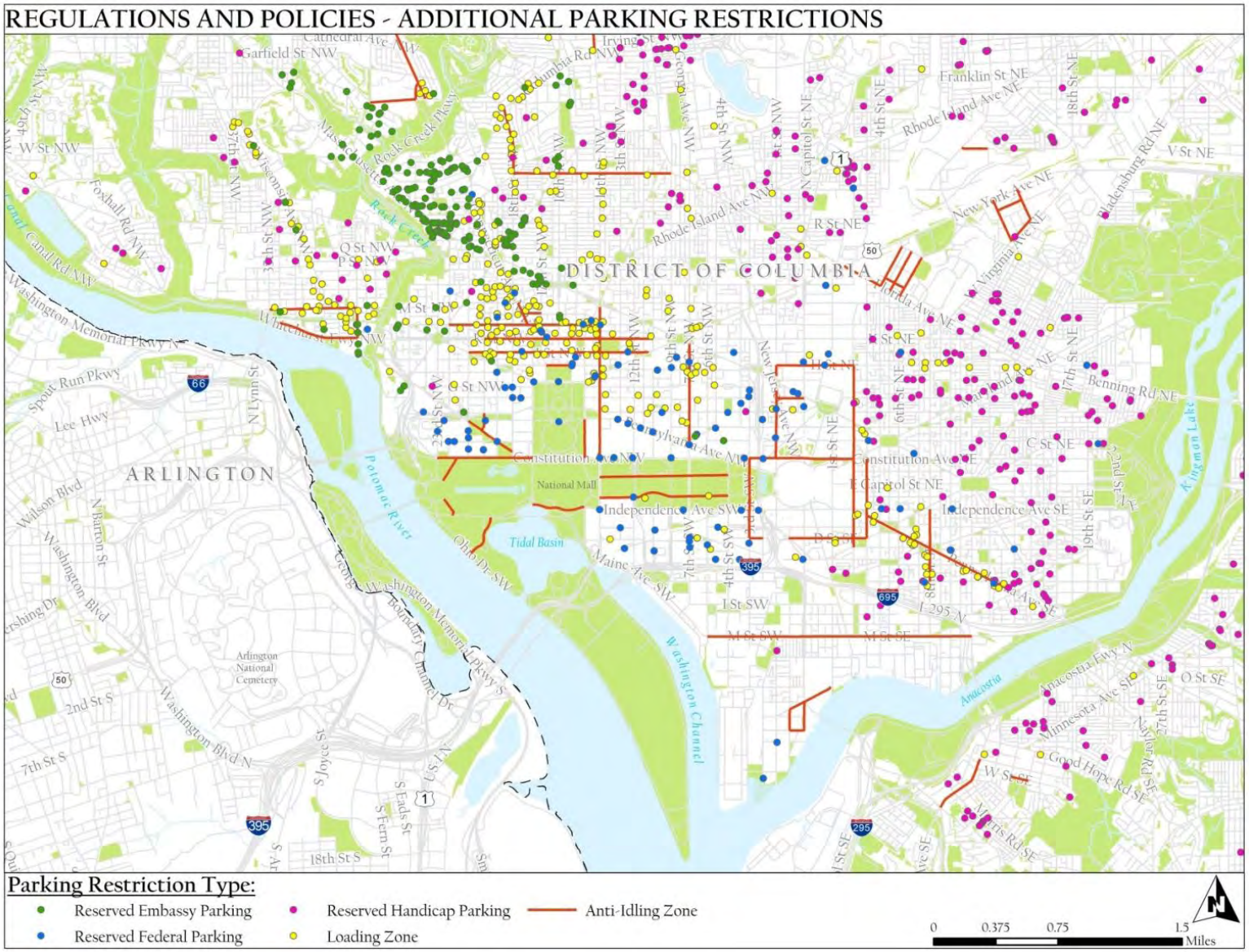
Source: DDOT – Long Term Network Framework Plan (2012)

Figure 2.8 Regulations and Policies: Curbside Parking Restrictions



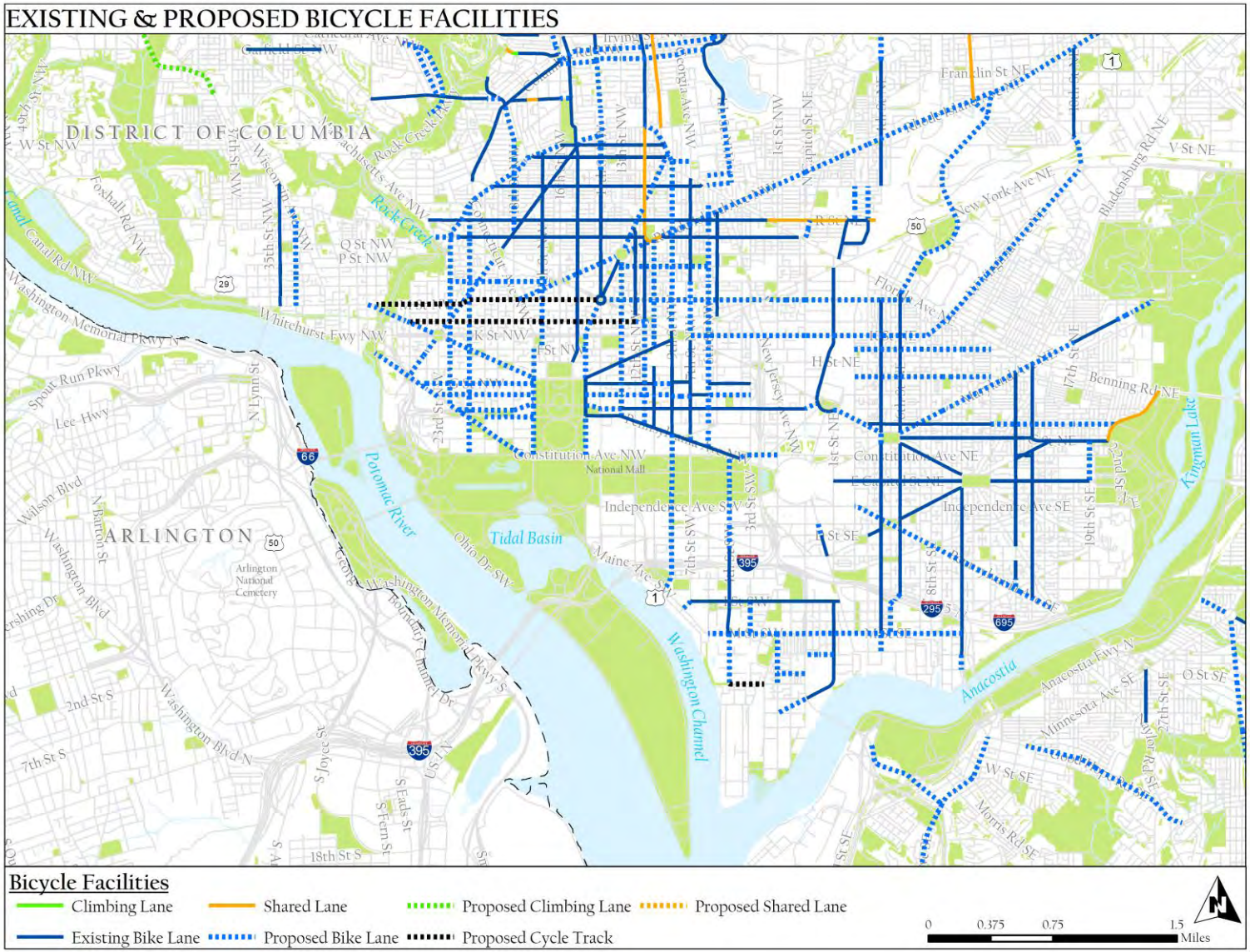
Source: DDOT – Long Term Network Framework Plan (2012)

Figure 2.9 Regulations and Policies: Additional Parking Restrictions



Source: DDOT – Long Term Network Framework Plan (2012)

Figure 2.10 Regulations and Policies: Existing & Proposed Bicycle Facilities



Source: DDOT – Long Term Network Framework Plan (2012)

3.0 Existing Conditions – Commuter Bus

3.1 SERVICE CHARACTERISTICS

Commuter buses provide service from Virginia and Maryland into the D.C./Arlington core, playing an important economic and environmental role in the Washington D.C. metropolitan region. As the population surrounding D.C. continues to grow, the demand for commuter bus services will also rise.

Several operators are responsible for commuter bus service in the Washington, D.C. metropolitan area: MTA, PRTC, Loudoun County, and Martz. Additional express services are provided by WMATA (Route 5A) and Fairfax Connector (Pentagon-Crystal City Express) that serve similar markets.

Table 3.1 lists the number of total commuter bus trips by operator for the 4 main commuter bus services. There are approximately 739 daily commuter trips entering and leaving the core, logging about 29,000 daily in-service miles. On an annual basis, commuter bus ridership rose from 1.9 million in 1999 to 6.6 million in 2009 – a 247% increase.[9] The MTA accounts for the most daily trips with 377 daily trips inbound and outbound to the core, followed by PRTC (215 daily trips) and Loudoun County (113 daily trips). The heaviest volume of commuter bus traffic occurs during the AM and PM peaks (7:00-9:30 am, 3:30-6:30 pm).

The extent of the existing commuter bus routes serving the D.C. core is illustrated in Figure 3.1, and the regional extent is illustrated in Figure 3.2. In both figures, routes are color-coded by operator.

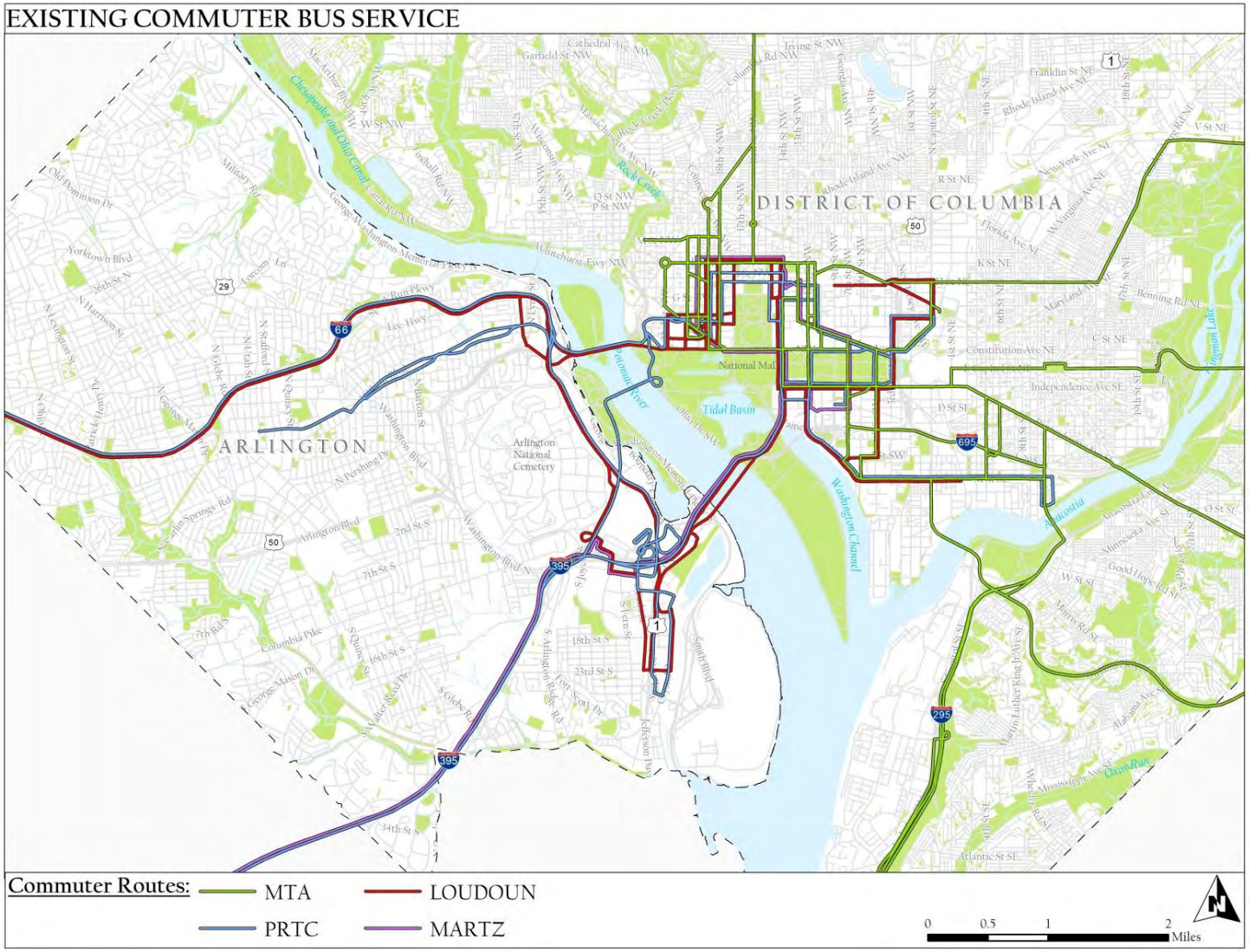
[9] *DDOT. (2011). Motorcoach Action Plan.*

Table 3.1 Total Commuter Bus Trips by Operator

Type	MTA	PRTC	Loudoun County	Martz (Fredericksburg, VA)	Service Characteristics Totals
AM Trips	183	95	55	17	351
PM Trips	194	120	57	17	388
AM Peak Trips (6-9 am)	158	77	46	17	298
PM Peak Trips (4-7 pm)	123	73	39	8	243
Total Daily Trips	377	215	113	34	739
AM Bus Miles (in service)	7,264	3,230	2,268	1,023	13,785
PM Bus Miles (in service)	7,772	4,080	2,503	1,002	15,357
Daily Bus Miles	15,036	7,310	4,771	2,025	29,142
AM Bus Service Hours	296	124	79	29.5	529
PM Bus Service Hours	335	172	86	30.5	624
Daily Bus Service Hours	630	296	165	60	1,151

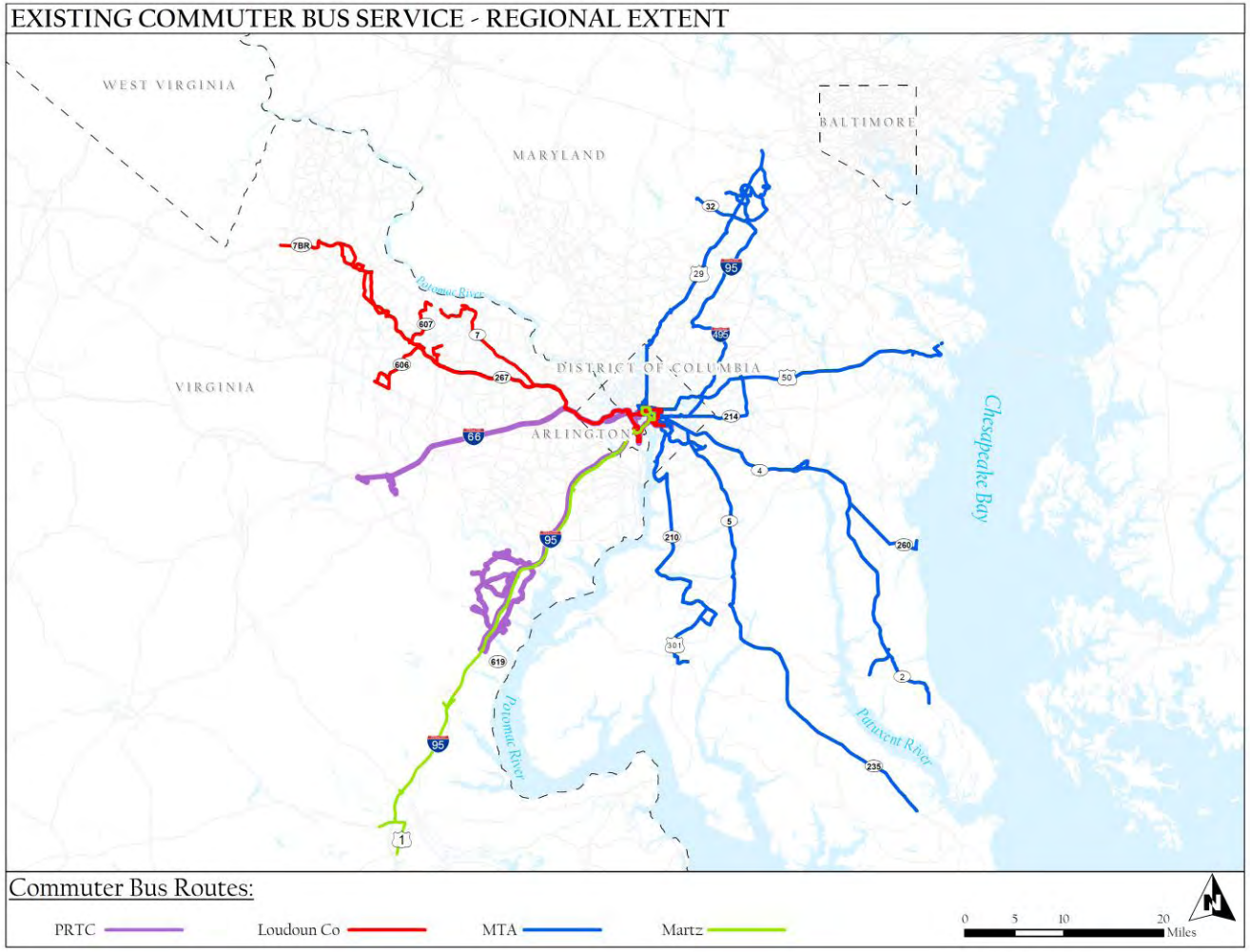
Source: Spring 2014 Bus Schedules & the General Transit Feed Specification (GTFS)

Figure 3.1 Existing Commuter Bus Service



Sources: GTFS, Published Bus Schedules, & DDOT

Figure 3.2 Existing Commuter Bus Service – Regional Extent[10]



Sources: GTFS, Published Commuter Bus Schedules, & DDOT.

[10] *This map does not inlucde the MTA 922/950 service from Kent Island to DC.*

Potomac and Rappahannock Transportation Commission (PRTC) - The PRTC Transit commuter bus program, OmniRide, provides service operating from:

- Eastern Prince William County and the Manassas area to D.C. metro area via the I-95 and I-66 corridors
- Dale City, Lake Ridge, Montclair, and US 1 corridor to D.C. metro area
- Eastern Prince William County to Franconia-Springfield Metro station
- Manassas to Vienna/West Falls Church Metro station (will be reassigned to the Metrorail Tysons Corner Station once Silver Line opens)
- Gainesville to West Falls Church Metro station (will be reassigned to the Metrorail Tysons Corner Station once Silver Line opens)
- Gainesville to D.C. metro area

As of July 2010, PRTC operated 135 buses, 108 of which were used for OmniRide and Metro direct service. OmniRide and Metro Direct currently require 79 buses for AM service and 91 for afternoon service. PRTC operates out of 21 park-and-ride lots, including the PRTC Transit Center. Ten of those lots are owned by VDOT, 4 are Proffers, and 4 are used under formal agreement. As of Spring 2011, the capacity of the lots totaled 8,484 spaces.[11]

Between FY 2005-2009, OmniRide saw an average of 1,746,974 annual passenger trips, 85,796 revenue hours, and 2,056,677 revenue miles.[12] Of the routes, the Dale City/D.C. route has the highest ridership, at around 700,000 annual riders in FY 2009.[13] Between FY 2005 and 2009, the number of unlinked passenger trips on OmniRide grew by 54.7%.[14] OmniRide routes are well utilized, with over 5,800 average daily passenger trips. Metro Direct, a service connecting with Metrorail stations, carries over 800 average daily passenger trips.[15]

PRTC has guidelines for the placement of shelters and benches on local bus routes, through not for the OmniRide stops outside of the local service area. Most of the OmniRide stops are co-located with Metrobus stops, with OmniRide signs sharing the same sign poles.[16]

Loudoun County - The Loudoun County commuter program provides service categorized as:

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[11] *PRTC. (2011). Transit Development Plan: FY 2012-2017. Page 1-26 and 1-27.*
[12] *PRTC. (2011). Transit Development Plan: FY 2012-2017. Page 2-4.*
[13] *PRTC. (2011). Transit Development Plan: FY 2012-2017. Page 3-2.*
[14] *PRTC. (2011). Transit Development Plan: FY 2012-2017. Page 3-3.*
[15] *I-95 Transit and TDM Plan Final Report. (2011). Page 12 and 13.*
[16] *WMATA. (2009). Page A-6. Guidelines for the Design and Placement of Transit Stops.* http://www.wmata.com/pdfs/planning/WMATA%20Guidelines-Design%20and%20Placement%20of%20Transit%20Stops.pdf

- Routes between park and ride lots in Loudoun County and the D.C. metro are central core
- Express service to West Falls Church Metro station
- Reverse commute serve from West Falls Church Metro station to Loudoun
- Tysons Express and shuttle
- LINK (Ashburn Farm /Dulles North shuttle)
- Ashburn North/D.C.

Currently, Loudoun County serves 14 park and ride lots within the County on weekdays. In FY 2010, Loudoun County served 966,824 riders on its commuter services, with over 83% of those on routes to/from D.C. For D.C./Dulles, Leesburg, and Purcellville routes, there was an average of 45 passengers/bus; and for the D.C./Ashburn routes, there was an average of 30 passengers/bus.[17]

Loudoun County Transit doesn't have formal bus stop guidelines, and most of the stops are located at Metrorail stations or Metrobus stops, though a few are at locations without signage.[18]

County and Private Buses - There are 48 existing bus trips daily from Stafford & Spotsylvania Counties into the region, 181 from Prince William County, and 73 from Fairfax County.[19] 277 of those trips are destined for the Central D.C. area, 11 trips to the Tysons Corner, and 14 to Fort Belvoir/Franconia-Springfield.[20] Two private bus companies, Martz and Academy, also provide commuter bus service from Fredericksburg and Stafford County. Martz makes between 800-900 passenger trips in each peak period, for a total of 1,600-1,800 daily one way passenger trips. Academy provides service between Culpeper or Warrenton to the D.C. core.

3.2 FREQUENCY AT BUS STOPS

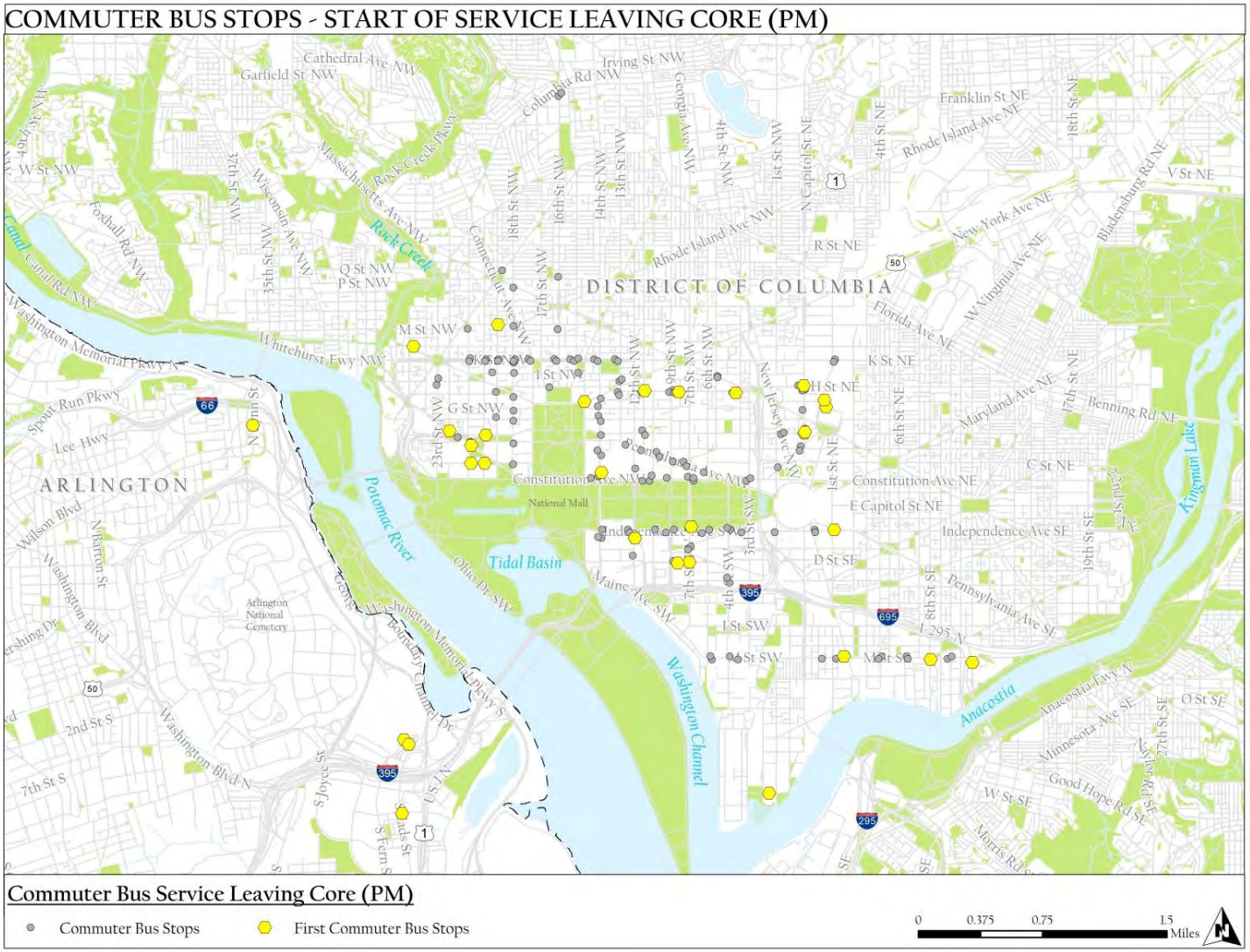
Commuter buses stop in D.C. and Arlington primarily in the peak commuting periods. Given this study's focus on afternoon staging locations, the frequency at the first stop made in the afternoon peak period is an indicator of the amount of staging space that is required. Figure 3.3 illustrates the locations of commuter bus stops in the core where service begins after noon and into the PM hours. Data for the 5 commuter services was gathered

[17] *Loudoun County. (2011). Transit Development Plan: FY 2012-2017. Page 3-1.*
[18] *WMATA. (2009). Page A-5. Guidelines for the Design and Placement of Transit Stops.* http://www.wmata.com/pdfs/planning/WMATA%20Guidelines-Design%20and%20Placement%20of%20Transit%20Stops.pdf
[19] *Virginia Department of Rail and Public Transportation. (2013). I-95 Transit and TDM Plan. Slide 10.*
[20] *Virginia Department of Rail and Public Transportation. (2013). I-95 Transit and TDM Plan Slide 11.*

from bus schedules & the General Transit Feed Specification (GTFS). Once all of the frequencies from the different commuter services were determined, the combined frequencies at first bus stops were compiled and totaled.

Commuter bus stops with frequent service are clustered in a few areas of the D.C. core including Foggy Bottom near the State Department, downtown locations particularly along K Street and H Street NW, L'Enfant Plaza, and the Navy Yard area. The commuter bus stops with the highest frequency in Arlington are clustered at the Pentagon, Pentagon City, Crystal City, Rosslyn, and Ballston areas. Table 3.2 lists the commuter bus frequencies at the "first stops" in the afternoon peak. This information will be useful in establishing the need for afternoon commuter bus staging in the core.

Figure 3.3 Commuter Bus Stops – Start of Service Stops (PM)



Sources: GTFS & Published Commuter Bus Schedules

Table 3.2 Commuter Bus PM Peak Trips at First Stop Locations

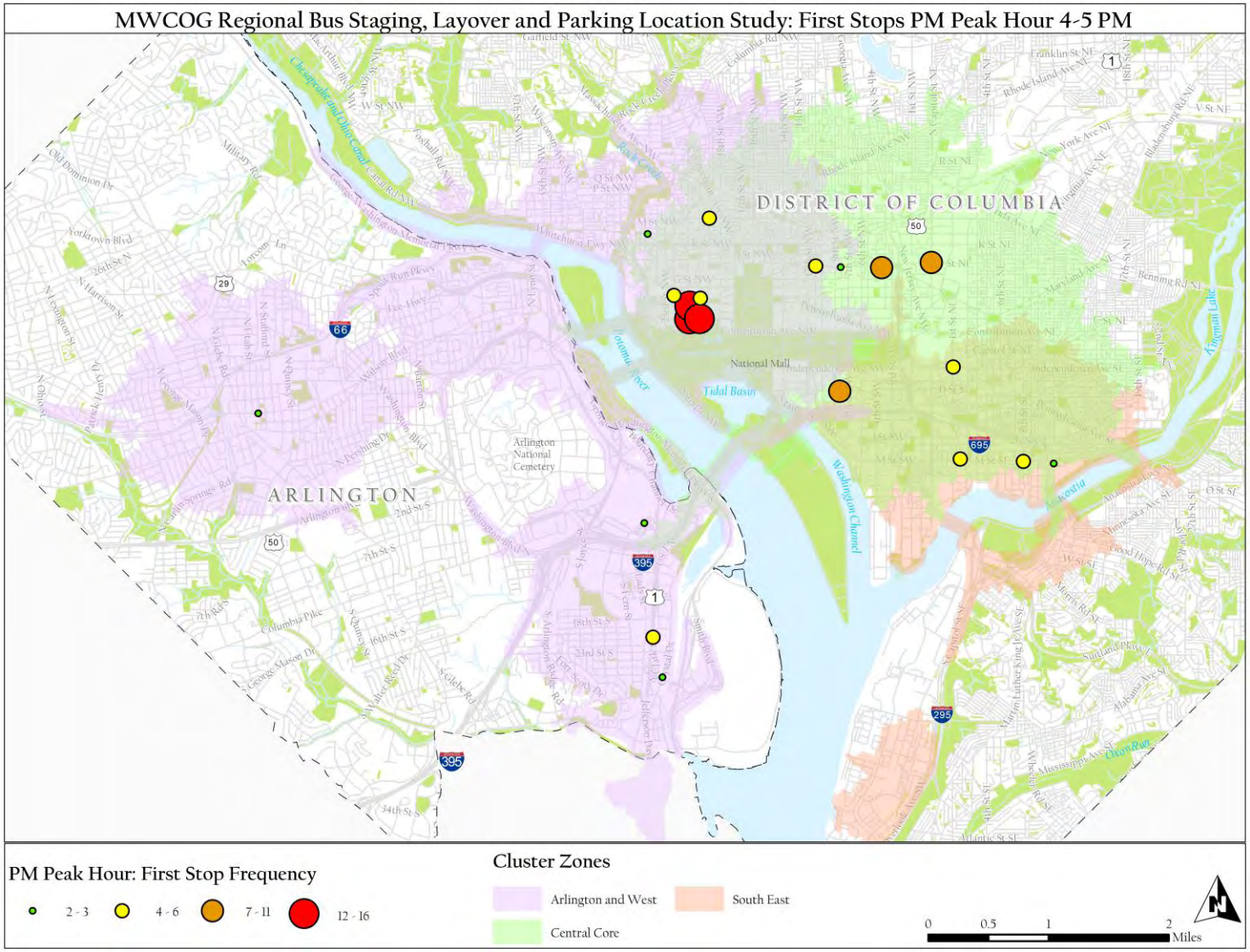
Stop Name	Location	Total PM Trips	PM Peak Period (3-5 pm) Trips	PM Peak Hour (4-5 pm) Trips
11th St & H St, NW	NW DC	15	9	5
12th & Independence, SW	SW DC	1	0	0
12th & M (Maritime Plaza), SE	SE DC	9	5	2
12th & Eads St	Arlington	2	2	2
14th & Pennsylvania (Commerce Dept), NW	NW DC	2	1	1
14th & Constitution Ave, NW	NW DC	6	3	1
1801 N. Lynn St	Arlington	2	1	1
19th St & M St, NW	NW DC	15	10	6
20th St & E St, NW	NW DC	22	11	6
2351 S. Clark St	Arlington	1	1	1
27th St & Crystal Dr.	Arlington	1	1	0
7th St & Independence Ave, SW	SW DC	2	2	0
C St & 20th St, NW (State Dept)	NW DC	38	26	15
C St & 21st St, NW	NW DC	52	30	16
Clark & 20th St	Arlington	15	7	4
Crystal Dr & 26th St	Arlington	6	4	3
7th & D St, SW	SW DC	27	18	9
E St & N. Capitol St	NW DC	1	1	0
Fairfax & North Taylor	Arlington	4	3	2
H St & 4th St, NW	NW DC	27	20	11
H St & 8th St, NW	NW DC	3	3	2
Independence Ave & 1st St, SE	SE DC	13	7	4
L St & 25th St, NW	NW DC	8	6	3

Table 3.2 Commuter Bus PM Peak Trips at First Stop Locations (-continued)

Stop Name	Location	Total PM Trips	PM Peak Period (3-5 pm) Trips	PM Peak Hour (4-5 pm) Trips
M St & 8th St, SE	SE DC	12	8	5
M St & New Jersey Ave, SE	SE DC	8	8	6
Massachusetts Ave, NE	NE DC	1	1	1
N. Capitol St & H St, NW	NW DC	21	16	8
Pentagon	Arlington	23	4	2
South Clark St.	Arlington	1	1	0
Virginia Ave & 21st St, NW	NW DC	50	26	16
Virginia Ave & E St, NW	NW DC	9	7	4

Source: Bus Schedules & GTFS

Figure 3.4 Commuter Bus Stops – PM Peak Hour Frequency at First Stop Locations



Sources: GTFS & Published Commuter Bus Schedules

3.3 MID-DAY PARKING & DEADHEADING ACTIVITY

Once a commuter bus reaches its last stop in the core during the AM, the bus goes out-of-service until the mid-day or PM run. Ideally, a bus that reaches its last stop would have a parking option to layover during the out-of-service time, however most buses often deadhead out to a parking facility in the suburban areas surrounding D.C. There exists some mid-day bus parking available in D.C., however the demand for bus layover parking far outweighs the bus parking spaces available. As a result of the lack of spaces and other economic reasons described, the vast majority of commuter bus operators return back to their parking facilities in Virginia or Maryland during the day.

Outlined below is the deadheading and bus parking activity for the core D.C. commuter bus operators, followed by a brief summary of mid-day parking needs in the region.

MTA

MTA contracts its commuter routes to Dillon's Bus Services, Keller Transportation, and The Martz Group. Dillon operates 7 routes in Washington D.C. servicing the I-95 corridor and southeast to St. Mary's County. Keller and Martz each operate 4 routes that service Southern Maryland. Below are the garage locations for MTA routes:

- Dillon – 7479 Ridge Rd Hanover, MD 21076 & 10725 DelMarr Rd White Plains, MD 20695
- Keller – 4472 Gallant Green Waldorf, MD 20601
- Martz - 5500 Tuxedo Rd Hyattsville, MD 20781

Dillon reported that approximately half of their buses return to the parking facility in White Plains after the AM trip into D.C.. The other half park at RFK Stadium. Keller also has about half of their buses returning to their Waldorf facility and the other half laying-over in Washington, D.C. Keller's buses used to layover at Marlow Heights but they will no longer be able to use this location and have other locations under consideration. Martz stages at the same location (5500 Tuxedo Rd Hyattsville, MD) as its MTA-contracted services.

PRTC

PRTC has recommended deadhead routes from all of their last stop locations in the core to the PRTC garage at 14700 Potomac Mills Road, Woodbridge, Virginia. PRTC also uses 3 different "staging" or layover locations near the D.C. Arlington core: East Potomac Park, West Potomac Park, and Route 1 Pentagon /Crystal City.

Loudoun County

Loudoun County's commuter services operate out of 2 garage locations:

- 42000 Loudoun Center Place Leesburg, VA 20175
- 109 North Bailey Lane Purcellville, VA 20132

The deadhead miles are between 30-40 miles depending upon the location, and between five and eight of the bus operators choose to park anywhere they can downtown. Another group of drivers returns to the bus yard. The remaining drivers have been granted permission to park near their homes. Although Loudoun County currently has 2 bus yards, they will be combined into one location (4200 Loudoun Center Place) beginning in November 2014.

Summary of Needs for Mid-Day Parking

There exists strong potential for mid-day parking in the D.C. core for commuter bus operators - for maintenance and parking facilities in or near the D.C. core to save operators in reduced fuel consumption and a reduction in fleet maintenance costs. However, there are several logistical and economic reasons why these facilities are not currently located within the D.C. core, though some were located there in the past but subsequently moved.

Commuter bus companies have found that it is critical for operators to begin and end their shifts in the same place, for logistical and hourly pay purposes. If a mid-day layover facility was used, a greater percentage of the company's operators would become part-time instead of full-time. In the experience of several commuter bus companies, a higher share of part-time employees has correlated with higher employee turnover and logistical complications in assigning spares and emergency service operations. From an economic standpoint, both facility costs and transportation costs play a role. The logistical costs in transporting part-time operators between the start and end of their shifts have been found to be roughly equal to the costs of bringing a bus back to a suburban maintenance facility. Using a second vehicle to transport the part-time operators adds greater cost. In addition, the cost of land and layover facilities built in suburban areas compared to the D.C. core is also strongly in favor of the suburban areas, since real-estate prices in the core are at an all-time high.

Though the construction of mid-day parking and maintenance facilities may not make logistical or economic sense under the region's current circumstances, this does not mean that conditions will not change in 5, 10, or 20 years. If the costs of deadheading buses to the suburbs increased because of traffic congestion, or if a site in the D.C. core allowed for cost-effective parking and maintenance functions, there may be a rationale for commuter bus operators to move facilities into the D.C. core.

4.0 Existing Conditions – Tour/Charter Bus

4.1 SERVICE CHARACTERISTICS

The Washington, D.C. region receives approximately 21-25 million visitors to the National Mall each year. The numbers of visitors has continued to increase in the past decade, from 16.4 million visitors in 2009. While the region does offer transit service into the downtown and National Mall area via Metrobus and Metrorail, approximately a third of visitors arrive via tour or charter bus. In 2013, around 1,200 tour buses traveled into the D.C. core and around the National Mall area.[21] The current top companies for sightseeing buses are Open Top, Double Decker, and Old Town Trolley.

Each year, 200,000 tour buses bring 8 million visitors to the National Mall. As many as 1,100 buses per day arrive at the Mall, making parking a large concern for tour buses. Tour buses are the third most used form of transportation by visitors. There are tour bus parking locations in close proximity to the Washington Monument, along the north curb of Independence Avenue between 15th and 17th St SW. Free parking for eleven tour buses is located at the Hains Point parking lot.[22] Parking is available away from the Mall, at Hains Point, the George Mason memorial, at numerous private parking garages downtown, and under the U.S. Agency for International Development.[23]

A 2014 report on the National Mall observed a peak of 74 buses between 11 am-noon on Fridays, and 82 buses on Saturday between 3-4 pm.[24] The peaks in bus activity closely correspond to buses dropping off groups in the late morning and picking them up later in the day. Buses were noted primarily along Madison Avenue and Jefferson Drive, and were noted using 15th Street north of Constitution Ave as layover parking while waiting between drop-offs and pick-ups. Additional bus activity was noted in the vicinity of L'Enfant Plaza Metro station.[25]

Many motorcoaches need to obtain a Trip Permit from the D.C. Department of Motor Vehicles (DMV). Union Station, RFK Stadium, and Buzzard Point are

[21] *NPS. (2013, January). NPS Tour Bus Operations Analysis.*
[22] *George Mason University School of Public Policy. (2008, May). A Review of Access and Circulation on the National Mall in Washington, D.C. Page 46.*
[23] *George Mason University School of Public Policy. (2008, May). A Review of Access and Circulation on the National Mall in Washington, D.C. Page 47.*
[24] *National Coalition to Save our Mall. (2014, March). National Mall Underground Parking Demand Study. Page 11.*
[25] *National Coalition to Save our Mall. (2014, March). National Mall Underground Parking Demand Study. Page 11.*

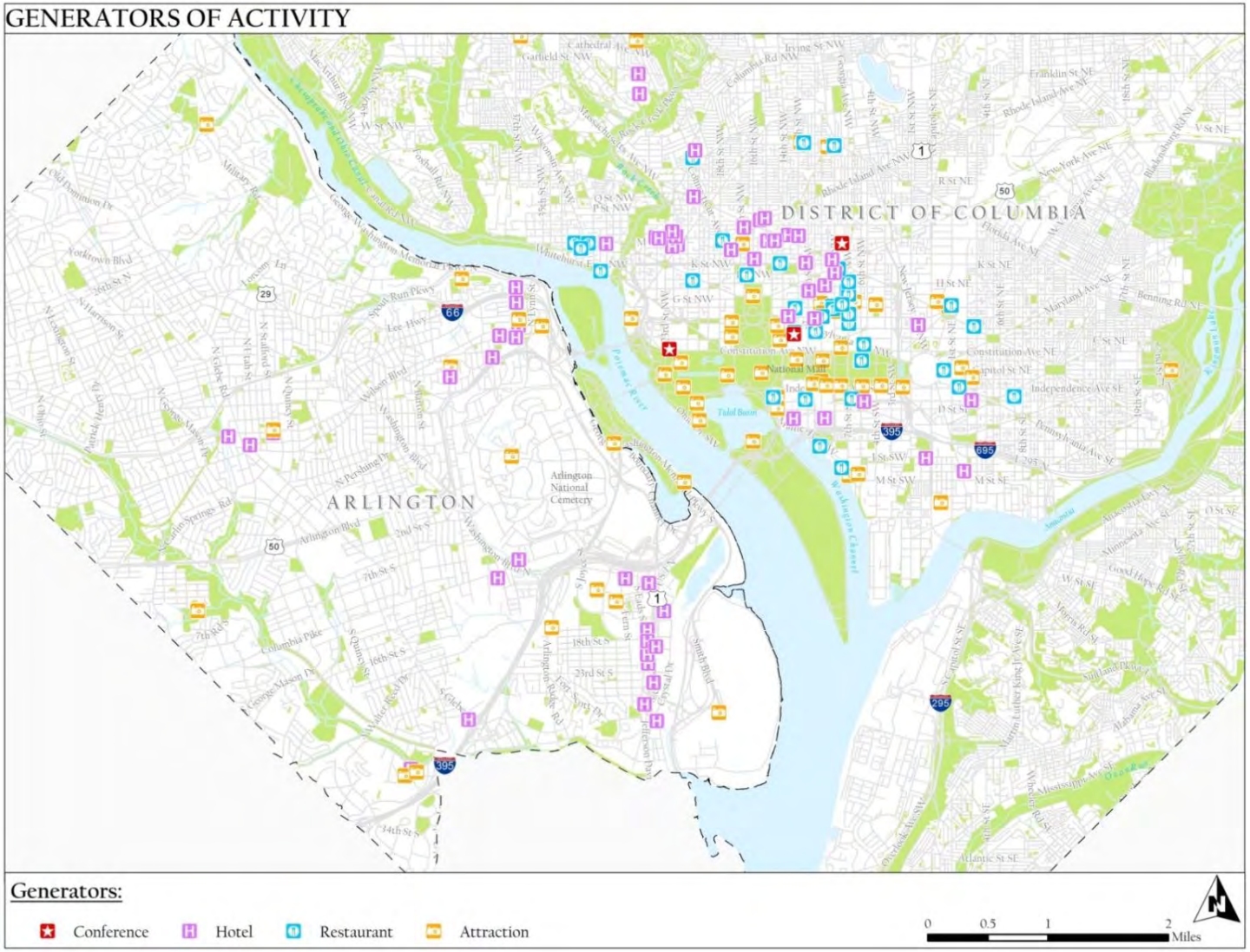
listed as the off-street parking locations. The map lists tour bus loading/unloading locations, tour bus parking locations, advance parking locations, and preferred bus routing in D.C.[26]

4.2 MAJOR ACTIVITY GENERATORS

The major activity generators and trip attractions for tour bus trips in the region include conference centers, major hotels, restaurants (food courts) with service contracts, and attractions such as museums, monuments, and government facilities. Locations are detailed for D.C. and Arlington in Figure 4.1. Note the concentration of attractions in and around the National Mall, and the concentration of restaurants and hotels some distance away. Tour buses must often therefore move their passengers between their hotels, to restaurants, to the attractions for the day and back again. A listing of major trip attractors in D.C. are also shown in Table 4.1, taken from the DDOT 2011 Motorcoach Action Plan.

[26] *DDOT. (2013). Motorcoach Operators Guide.*

Figure 4.1 Generators of Activity



Source: DDOT 2011 Motorcoach Action Plan

Table 4.1 Attraction Generators of Motorcoach Activity in D.C.

Attraction	Area	Annual Volume Category
Korean War Veterans War Memorial	Mall	Very High
Lincoln Memorial	Mall	Very High
National Air and Space Museum	Mall	Very High
National Gallery of Art	Mall	Very High
National Museum of American History	Mall	Very High
National Museum of Natural History	Mall	Very High
Vietnam Veterans Memorial	Mall	Very High
Washington Monument	Mall	Very High
National WWII Memorial	Mall	Very High
Capitol	Capitol Hill	Very High
Verizon Center	Penn Quarter	Very High
U.S. Botanic Garden	Capitol Hill	High
Library of Congress	Capitol Hill	High
Union Station	Capitol Hill	High
Corcoran Gallery of Art	Downtown	High
Ronald Reagan Building	Downtown	High
White House	Downtown	High
White House Visitors Center	Downtown	High
FDR Memorial	East Potomac Park	High
Jefferson Memorial/Tidal Basin	East Potomac Park	High
MLK Memorial	East Potomac Park	High
Holocaust Memorial Museum	Mall	High
National Archives	Mall	High
National Museum of the American Indian	Mall	High
Smithsonian Castle	Mall	High
National Zoo	Northwest	High

Table 4.2 Attraction Generators of Motorcoach Activity in D.C. (continued)

Attraction	Area	Annual Volume Category
National Portrait Gallery and Smithsonian American Art Museum	Penn Quarter	High
Nationals Park (Baseball)	Southeast	High
Arlington National Cemetery	Arlington	High
Ronald Reagan Washington National Airport	Arlington	High
Pentagon / Pentagon Centre	Arlington	High
Folger Shakespeare Library	Capitol Hill	Medium
Postal Museum	Capitol Hill	Medium
Supreme Court	Capitol Hill	Medium
Daughters of the American Revolution Museum	Downtown	Medium
National Geographic Museum	Downtown	Medium
Old Post Office Pavilion	Downtown	Medium
Washington Harbor, Georgetown	Georgetown	Medium
Bureau of Printing and Engraving	Mall	Medium
Freer Gallery of Art	Mall	Medium
Hirshorn Museum and Sculpture Garden	Mall	Medium
National Museum of African Art	Mall	Medium
Sackler Gallery	Mall	Medium
National Cathedral	Northwest	Medium
Lincoln Theatre	Northwest	Medium
Fords' Theatre	Penn Quarter	Medium
International Spy Museum	Penn Quarter	Medium
Madam Tussauds	Penn Quarter	Medium
National Building Museum	Penn Quarter	Medium
National Museum of Crime and Punishment	Penn Quarter	Medium
Newseum	Penn Quarter	Medium
Arena Stage	Southwest	Medium
Entertainment Cruises	Southwest	Medium

Source: DDOT 2011 Motorcoach Action Plan. Page 41-42.

4.3 PARKING ACTIVITY

The data and discussion for this section of the report are derived from the DDOT 2011 Motorcoach Action Plan Final Report. Regarding parking supply for motorcoaches in D.C., conditions have remained approximately the same or have worsened since the 2011 study was complete. As stated in the 2011 study there are only 30 designated curbside motorcoach parking spaces available in the City which is far short of the estimated 2,000 motorcoaches that enter the city during the peak season. The major facility for Tour/Charter long term bus parking is RFK Stadium with 100 spaces at a $40/day charge (It also had an additional 400 spaces during special events such as the inauguration). Union Station Parking Garage has approximately 20 spaces at a $20/day charge (Down from 100 in 2011), and Buzzard Point has 80 spaces at a cost of $20 for up to 3 hours or $50/day. All other sites with significant capacity (greater than 20 spaces) are restricted to site visitors. At one point motorcoaches used the area around Hains Point and East Potomac Park for long term parking but that is no longer allowed by the National Park Service.

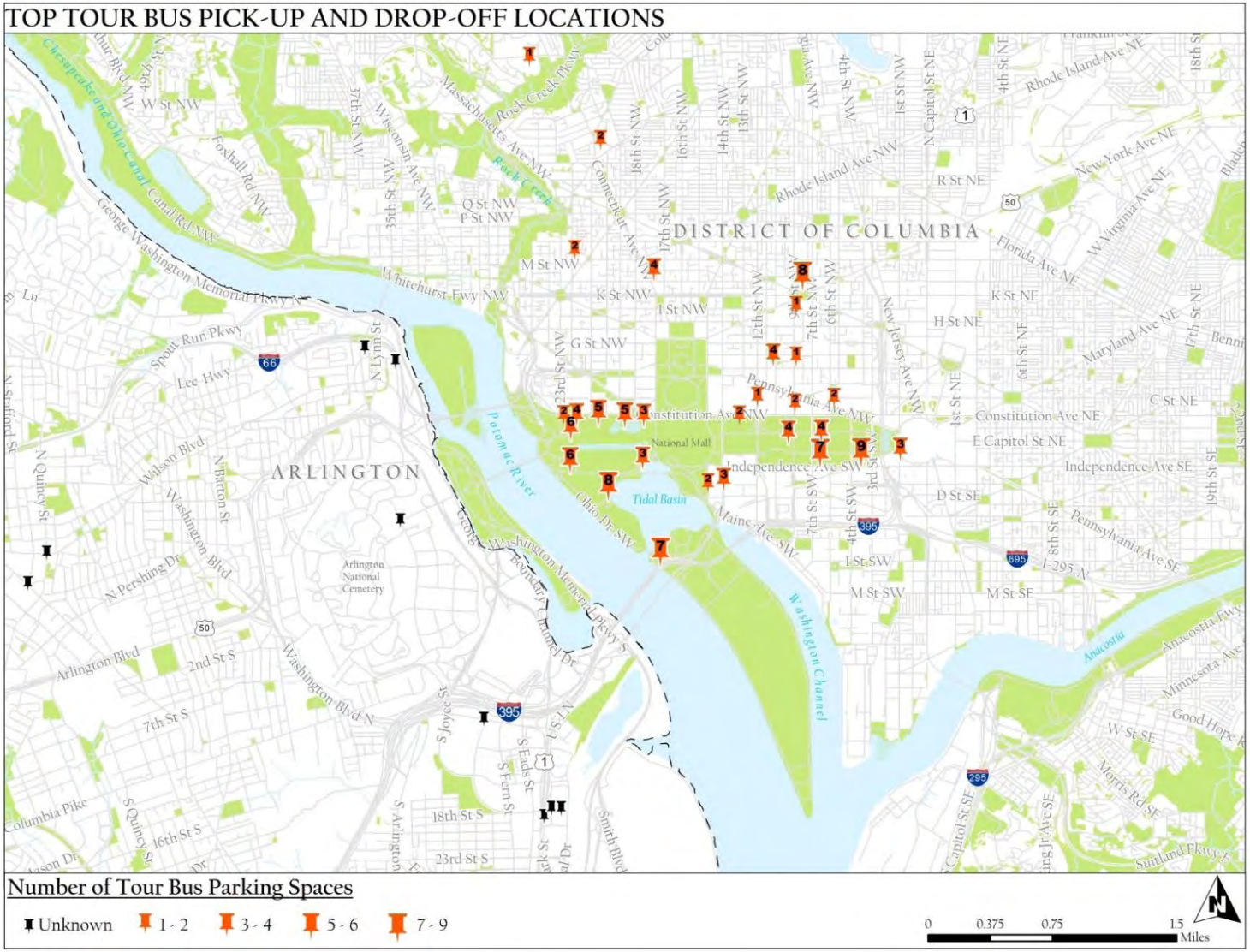
Arlington County, Virginia, has six tour bus zones with 44 parking spaces in areas convenient to local tourist attractions. These spaces are available on a first-come, first-served basis and cannot be reserved. These tour bus zones are listed below:[27]

- Pentagon City: South Hayes Street adjacent to Fashion Centre
- Shirlington: South Four Mile Run Drive
- Crystal City: 200 block of 18th Street South
- Crystal City: 300 block of 18th Street South
- Ballston: North Quincy Street
- Ballston: North Randolph Street

In addition to the long term parking opportunities (and deficit) there are also a number of short term pick-up and drop-off locations within D.C. and Arlington. These are shown in Figure 4.2. In the figure the locations for short-term pick-up and drop-off are shown along with the curbside number (number of buses). These locations are clustered near the National Mall. In Arlington, the locations are provided but the capacity is not known. The lack of long term parking can cause bus operators to remain at these locations longer than the brief period it takes them to load and unload. This combined with the increased demand in and around the major attractors often causes operators to load and unload in passenger car loading and unloading areas or illegally at corners or even local/commuter bus stops, potentially leading to unsafe conditions.

[27] *http://arlington.granicus.com/MetaViewer.php?view_id=&clip_id=1644&meta_id=74338*

Figure 4.2 Charter/Tour Bus Loading and Unloading



5.0 Existing Conditions – Other Buses

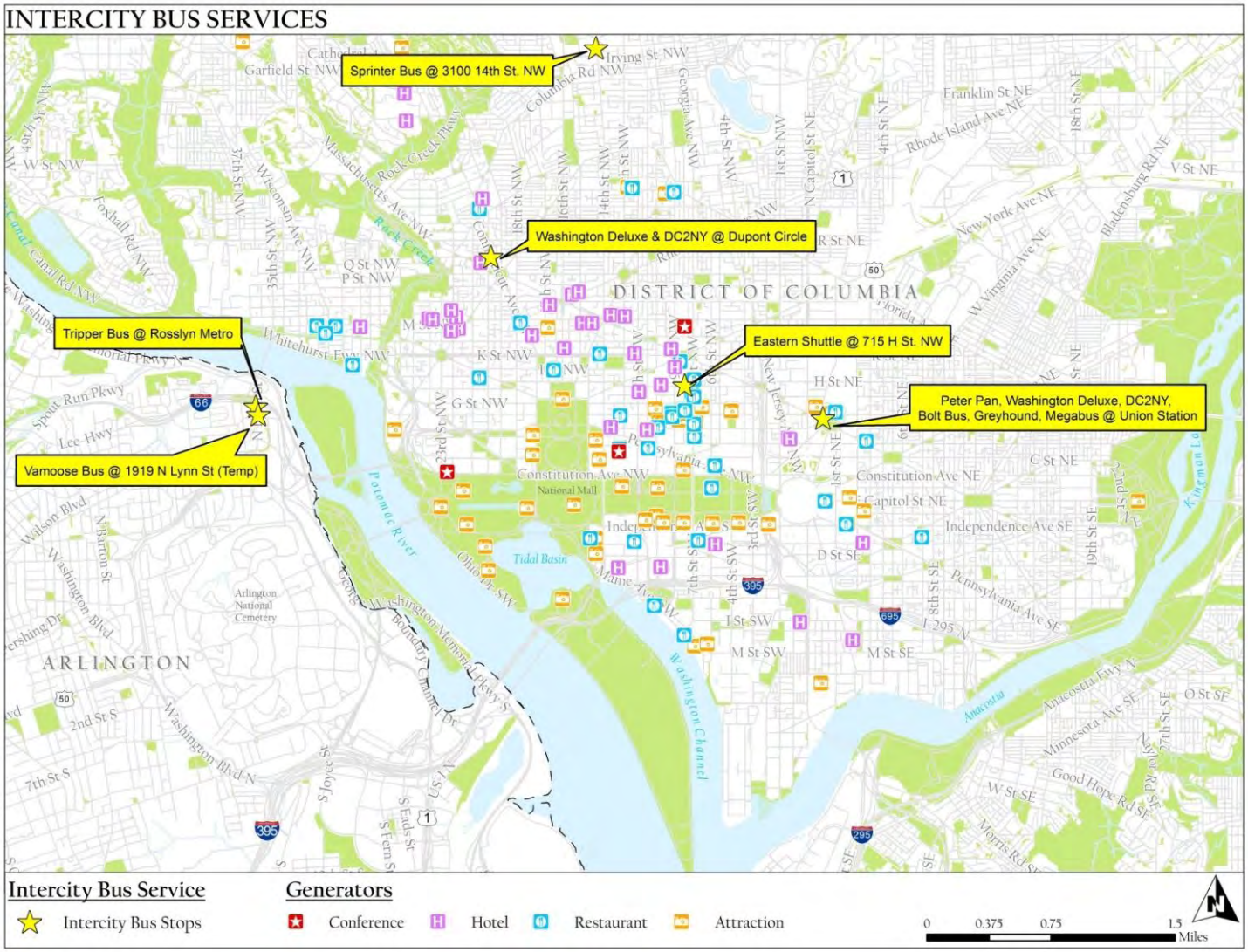
5.1 INTERCITY BUSES

Many intercity bus operators provide service from D.C. to many other cities along the East Coast such as New York, Philadelphia, Richmond, and beyond. In order of weekly volume, the largest intercity bus carriers that serve the region are Boltbus (160 buses/week), MegaBus (100 buses/week), Eastern (70 buses/week), DC2NY, Washington Deluxe, Sprinter, and Omnibus. On average, there are approximately 90+ intercity buses traveling daily in D.C. and Arlington.[28]

There are six existing locations in the D.C. area used for intercity bus service, of which many are close to Metrorail stations. Union Station services the largest share of intercity bus locations, due to its close proximity to Metrorail, Metrobus, and Amtrak rail services. Other locations that serve intercity bus service routes include: Chinatown, Dupont Circle, Columbia Heights, Rosslyn, and Arlington. Figure 5.1 highlights existing intercity pick-up and drop-off locations, along with the operators who use them. Typically, buses arrive at these locations, drop off passengers, load new passengers and depart, with very little layover and staging. Staging has occurred within the Union Station garage for Boltbus and MegaBus in particular.

[28] *DDOT. (2011). Motorcoach Action Plan.*

Figure 5.1 Primary Intercity Bus Drop Off, Pick Up, and Staging Locations



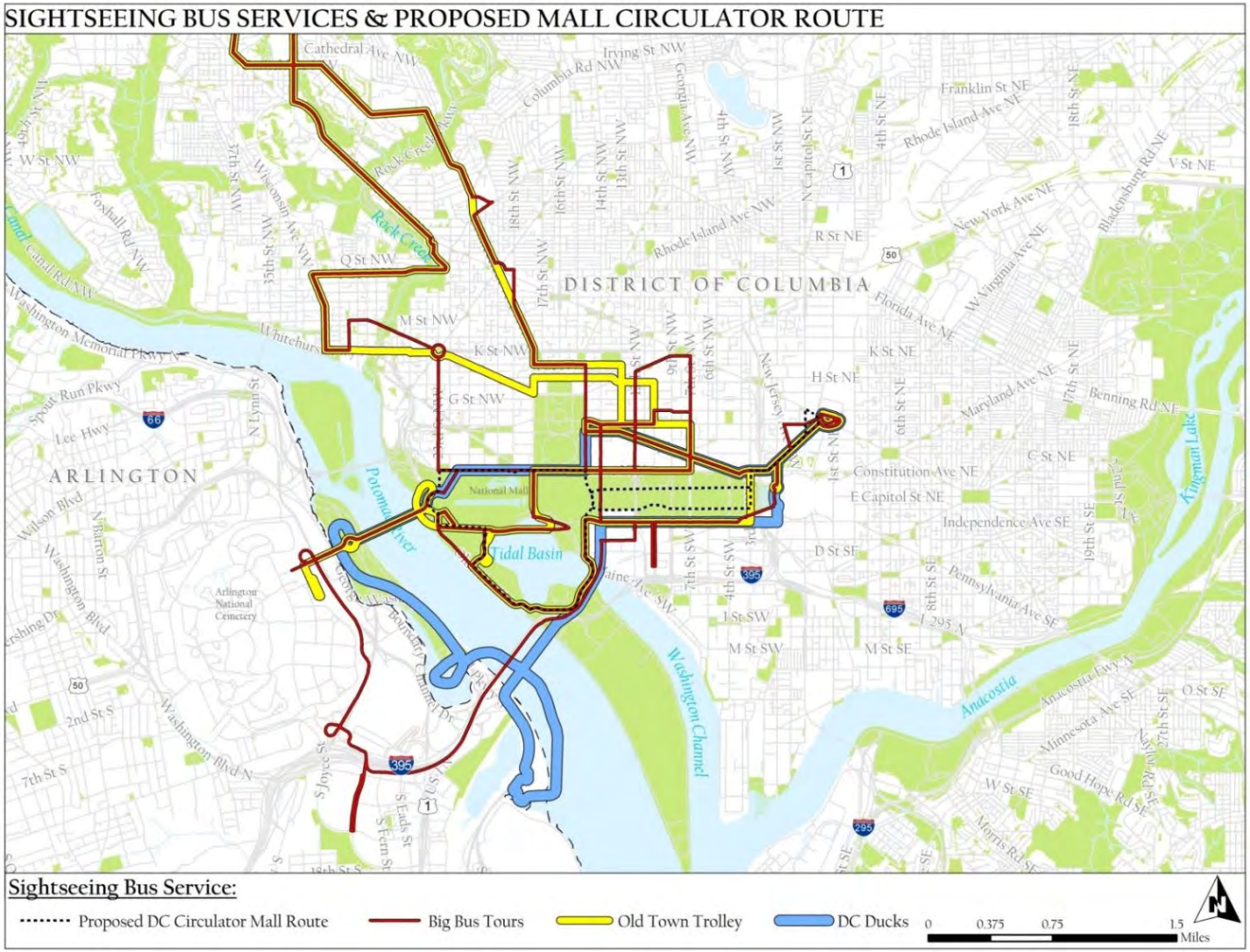
Source: Published intercity bus schedules

5.2 SIGHTSEEING BUSES

Sightseeing buses primarily run from Union Station to the National Mall, and into Arlington, Georgetown, and northeast up to Rock Creek Park, National Zoo, and surrounding areas. Arlington National Cemetery and Pentagon City are major destinations/origins in Arlington. Figure 5.2 illustrates the routes for sightseeing buses in D.C. and Arlington, color-coded by operator.

Included with the shuttle services is the proposed D.C. Circulator Mall Route which would provide service from Union Station around the National Mall and Tidal Basin, serving many of the same attractions as existing sightseeing buses.

Figure 5.2 Sightseeing Tour Bus Locations



Sources: Published bus schedules & DDOT

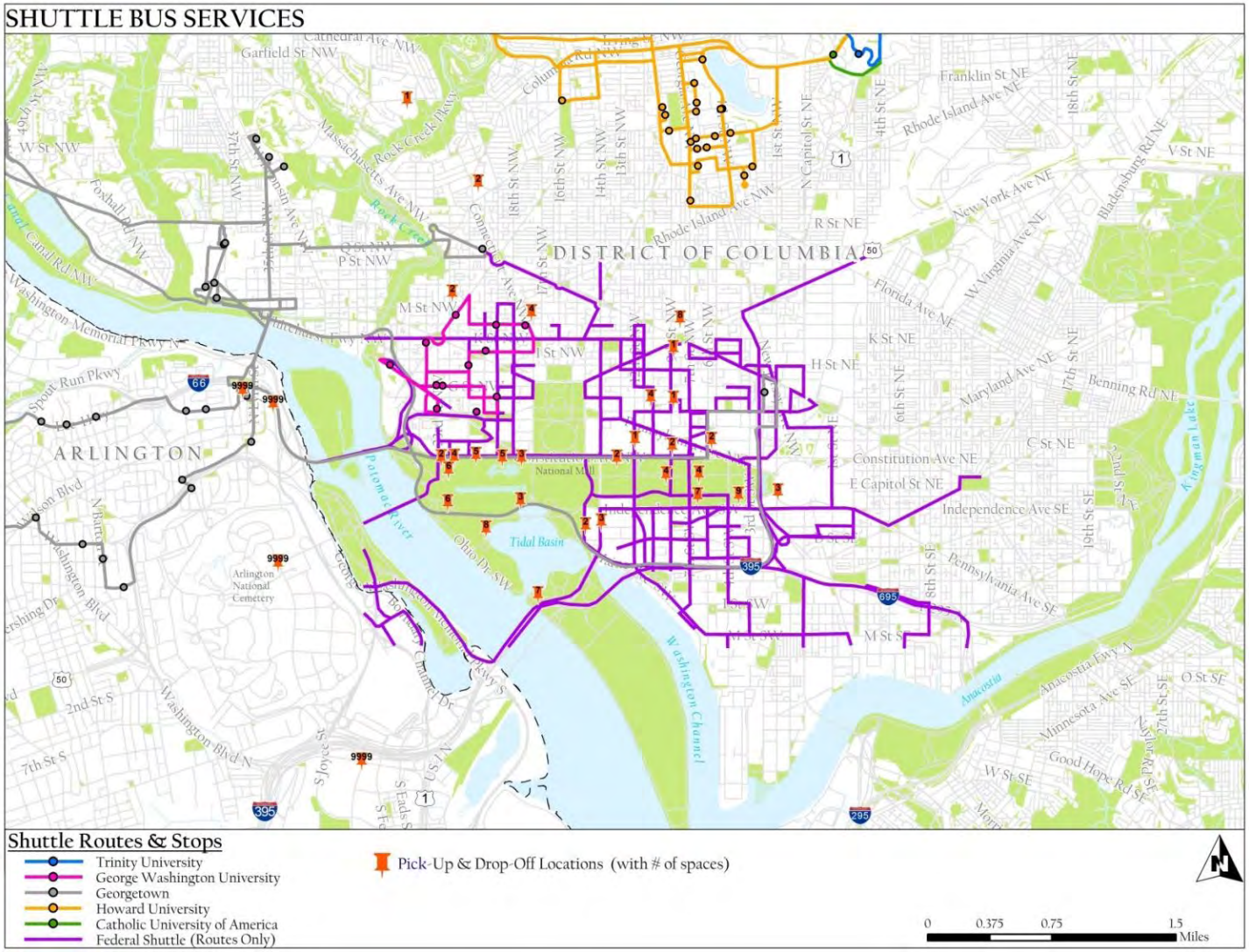
5.3 SHUTTLE BUSES

Several shuttle services are provided in the region for employees of the Federal government as well as other major employers. Figure 5.3 shows the wide range of employee shuttle bus services that provide transportation services both between major facilities of a single employer (such as the U.S. Department of Transportation (USDOT) and major universities to/from major Metrorail stations. Routes shown in Figure 5.3 are non-defense shuttle routes. There are over 20 shuttle services shown provided mostly as employee shuttles by the Federal government and universities to serve students, faculty, and staff.

Detailed information on the Federal employee shuttle program is no longer publicly available due to security concerns, however some routes are publicly known. For example, an employee shuttle runs between the USDOT headquarters (near the Navy Yard Metro station) and the FHWA Turner-Fairbank Highway Research Center in McLean, Virginia, and other known service routes travel between the Federal Aviation Administration (FAA) headquarters (near the L'Enfant Plaza Metro station), the Navy Yard, the Pentagon, and other facilities. It was noted in one of the study steering committee meetings that D.C. is planning to start requiring licenses for shuttles that are using curb space sometime in the near future.

In addition to the Federal government, several regional hospitals provide employee shuttles between their facilities and Metrorail stations such as the MedStar National Rehabilitation Hospital to the Brookland-CUA and Columbia Heights stations. Sibley Hospital also offers shuttle service to the Tenleytown-AU Metrorail station. However, these services fall outside the core areas of this study and were not focused on in detail.

Figure 5.3 Shuttle Bus Locations



Sources: Published bus schedules, DDOT 2011 Motorcoach Action Plan, and GSA *"Overview of the Recommendations for the Federal Local Transportation Logistics Report"*

6.0 Future Demand Projections

To estimate the future levels of bus service required to meet demand, cooperative land use forecasts, Transportation Planning Board (TPB) model output, and transit plans have been reviewed to develop planning-level estimates of future demand for the different types of bus services. Bus parking demand needs to be estimated for three types of needs:

- Off-street and mid-day parking (short and long term parking)
- Curbside stops (loading and unloading)
- Layover and staging

Due to the different types of bus service being considered, growth factors vary by type, due to the variability in demand markets like commuters compared to visitors, as well as the data available for analysis. For example, the key driver for commuter bus service will be the growth in the population of the outer jurisdictions and jobs in the regional core, and this translates into growth in transit trips between the outer jurisdictions and core in the TPB model results. Similarly, the trend in number of visitors to the National Capital Parks (Central),[29] which encompass the National Mall and attractions in its immediate vicinity is used as the basis for estimating the future demand for tour bus facilities.

6.1 Regional Growth Forecast

The TPB model is utilized to understand absolute growth in average weekday transit trips to the D.C. and Arlington core, as well as the distribution of these trips by origin and the mode share of bus versus commuter rail and Metrorail.[30]

The current and forecast distribution of all daily commuter and transit bus trips combined to the D.C. core and Arlington core are presented in Figure 6.1. The split of person trips from the Maryland outer suburbs[31] are 41 percent in 2010 and 48 percent in 2025. The split of person trips from the Virginia outer suburbs are 59 percent in 2010 and 52 percent in 2025. The decline in the Virginia share is attributable primarily to the opening of the

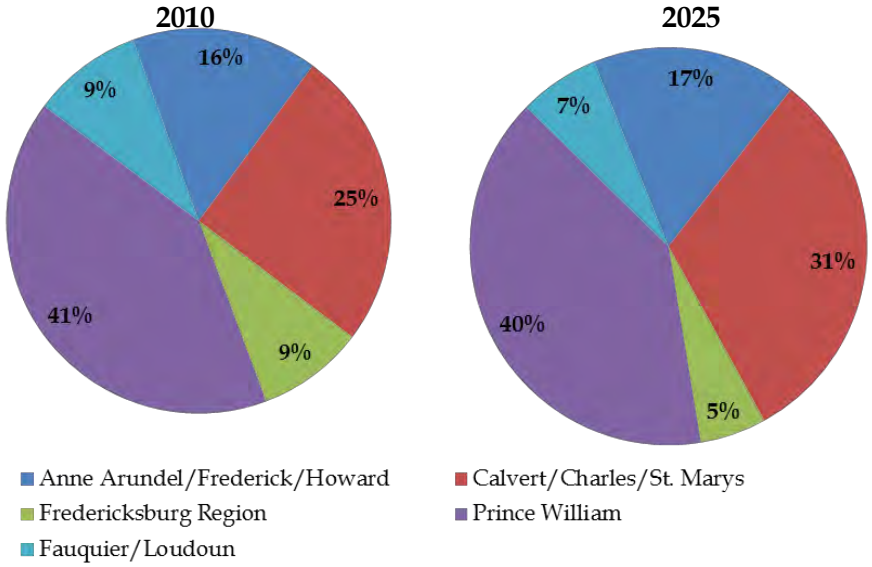
[29] *National Park Service Visitor Use Statistics, Annual Park Recreation Visitation Graph, Accessed at https://irma.nps.gov/Stats/Reports/Park*

[30] *TPB Model Version 2.3.52 and Cooperative Forecasts Round 8.2*

[31] *Outer suburbs include the top 10 counties plus Fredericksburg by number of transit trips to the D.C. core among the designated outer suburbs and jurisdictions beyond them. They are: Loudoun, Fauquier, Prince William, Frederick, Howard, Anne Arundel, Calvert, St. Mary's, Charles, Stafford, Spotsylvania, and Fredericksburg.*

Silver Line – leading to decreases in bus trips from Loudoun County through 2025. For purposes of presentation, the 10 counties and Fredericksburg are grouped into five sub-regions in the charts and tables within this section.

Figure 6.1 Distribution of Bus Transit Trips by Origin to Core, 2010 - 2025



Source: TPB Model Version 2.3.52 and Cooperative Forecasts Round 8.2

Table 6.1 Total Bus Transit Trips and Mode Share by Origin to Core, 2010 - 2025

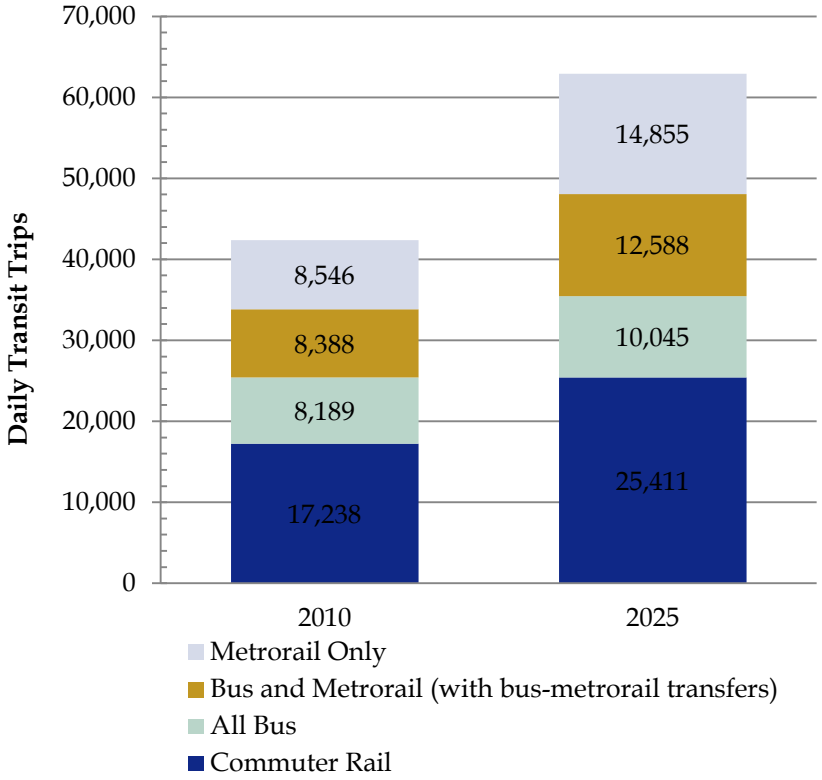
	2010		2025	
Outer Suburb	**Total Daily Bus Transit Trips**	**Bus Transit Mode Share**	**Total Daily Bus Transit Trips**	**Bus Transit Mode Share**
Anne Arundel/ Frederick/Howard	1,185	5%	1,546	5%
Calvert/Charles/St. Mary's	1,817	40%	2,773	37%
Maryland Subtotal	**3,002**	**10%**	**4,319**	**11%**
Loudoun/Fauquier	970	26%	1,006	9%
Prince William	3,442	44%	4,129	38%
Fredericksburg Region	775	53%	591	19%
Virginia Subtotal	**5,187**	**40%**	**5,726**	**23%**
TOTAL	**8,189**	**21%**	**10,045**	**18%**

Source: TPB Model Version 2.3.52 and Cooperative Forecasts Round 8.2

Growth in total transit trips (bus, commuter rail, and Metrorail) to the combined D.C./Arlington core shows a projected 48 percent increase

between the years 2010 and 2025. For trips made by bus, it is a 23 percent increase during the same period (in absolute numbers this equates to an additional over 1,800 daily person bus trips to the D.C. core). A slower rate of growth for bus is due primarily to new competing service including the Silver Line Metrorail to Fairfax and Loudoun Counties and the VRE extension to Spotsylvania. Though total transit trips increase over time, the proportion of transit trips made from Spotsylvania to the D.C. core using bus among the total transit trips declines from 19 percent in 2010 to 16 percent by 2025. Figure 6.2 presents the change in total transit trips by mode to the combined D.C./Arlington core from 2010 to 2025. In 2010, trips to the Arlington core represent 12 percent of the total. By 2025, the Arlington core share increases to 17 percent.

Figure 6.2 Change in Daily Transit Trips by Mode to Core, 2010 – 2025

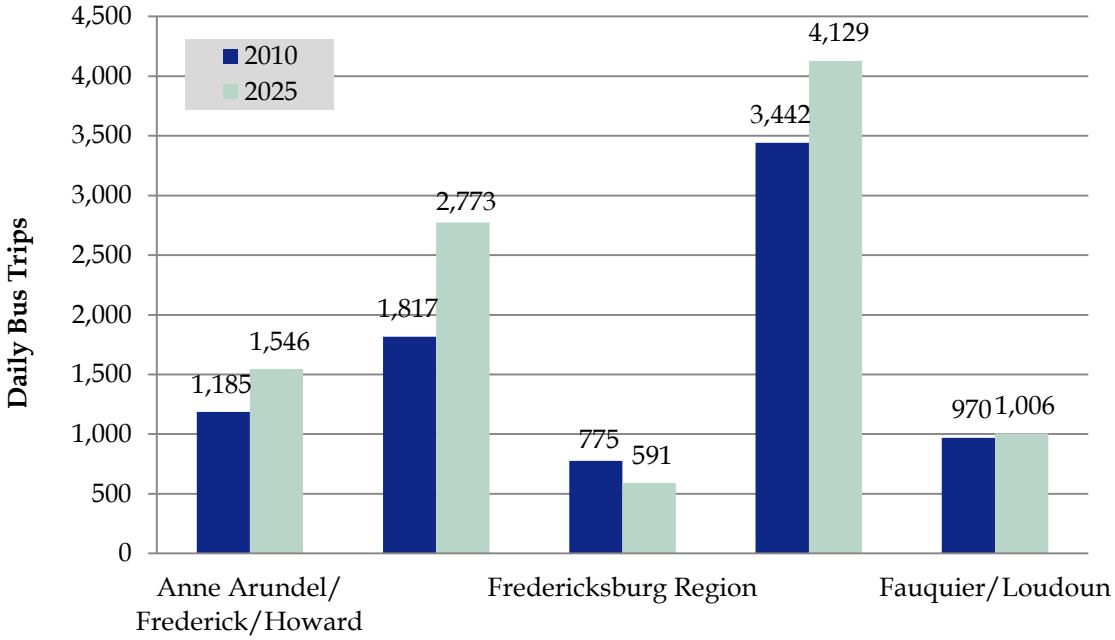


Source: Cambridge Systematics analysis of MWCOG TPB Model Summary Trip Tables

The jurisdictions in the outer suburbs that have the highest transit bus ridership traveling to combined D.C./Arlington core are Prince William, Charles, Howard, and Loudoun Counties. Figure 6.3 presents forecasted daily transit bus trips to the combined D.C./Arlington core in 2010 and 2025 across the five outer suburb sub-regions. As shown in Figure 6.3, the Southern Maryland sub-region (Calvert, Charles, St. Mary's) shows the largest growth from 2010 to 2025, with a forecasted 53 percent increase in daily transit trips to the combined D.C./Arlington core (additional 956 daily trips). Prince William County shows a 20 percent increase from 2010 to 2025

(additional 687 trips), and the remainder of Maryland (Anne Arundel, Frederick, Howard) shows a 30 percent increase (additional 361 trips). The Loudoun/Fauquier sub-region shows only 4 percent growth, while the Fredericksburg sub-region (Stafford, Spotsylvania, and Fredericksburg) show a 24 percent decrease.

Figure 6.3 Change in Bus Ridership from Outer Suburbs to Core, 2010 - 2025



Source: Cambridge Systematics analysis of MWCOG TPB Model Summary Trip Tables

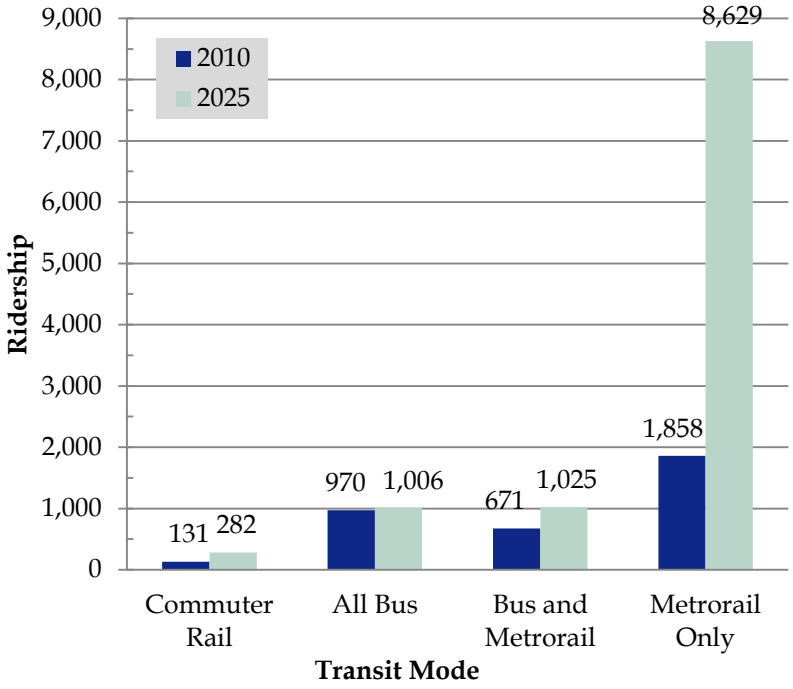
Effect of Silver Line Metro on Commuter Bus Trips to Core

The TPB model predicts over a 400 percent increase in daily Metrorail trips to the combined D.C./Arlington core from Loudoun County, while transit bus ridership only increases 40 percent from 2010 to 2025 as shown in Figure 6.4. As depicted in Figure 6.4, the result is effectively no net change (approximately a 4 percent increase) in total daily bus trips from Loudoun County between 2010 and 2025.

Effect of VRE Extension to Spotsylvania on Commuter Bus Trips to Core

Extension of VRE from Fredericksburg to Spotsylvania (a new VRE station proposed at U.S. 17 about five miles south of Fredericksburg) results in nearly a 4 percent increase in daily commuter rail trips to the combined D.C./Arlington core from Fredericksburg/Spotsylvania, while transit bus ridership decreases 72 percent over the same period. Figure 6.4 illustrates these changes.

Figure 6.4 Change in Transit Bus Ridership from Loudoun County to Core by Transit Mode, 2010 - 2025

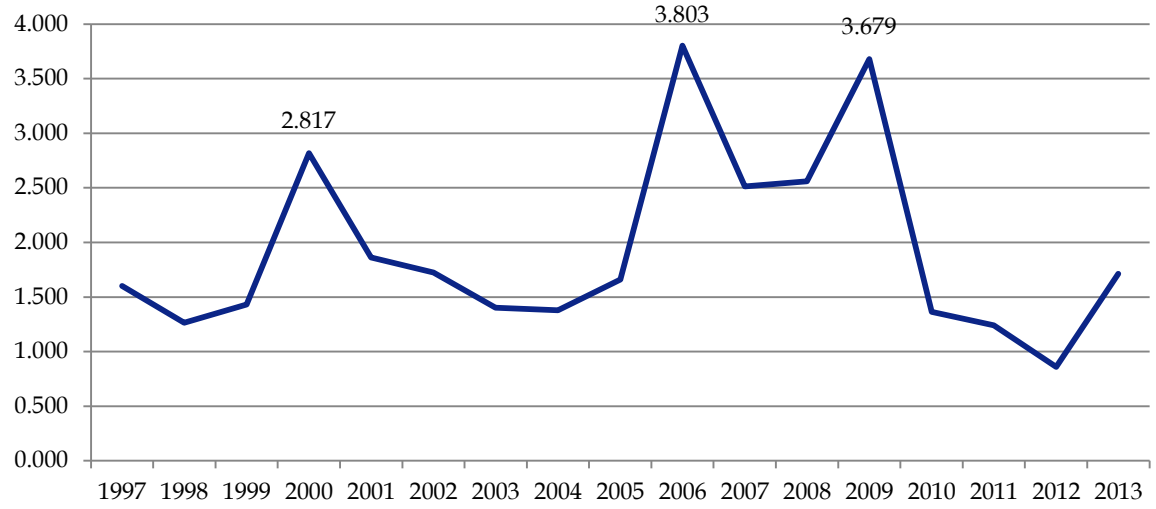


Source: Cambridge Systematics analysis of MWCOG TPB Model Summary Trip Tables

Changes in National Mall Visitors

One of the major components of regional growth is examining historical statistics on visitors to the National Mall area. Figure 6.5 shows annual recreation visitor statistics to the National Mall area from 1997-2013, encompassing the National Mall, memorials, and parks in close vicinity. Using a trend-line fitting, the number of visitors to the National Mall Park (Central) is estimated to be 2,132,536 by the year 2025, which is an increase of 56% over the year 2010.

Figure 6.5 Recreational Visitors to the National Capital Parks (millions)



Source: National Park Service, Visitor Statistics of Recreation Visitors to National Capital Parks (Central)

6.2 Off-Street and Mid-Day Parking

To estimate the future demand for mid-day parking, existing demand for the same purpose has been estimated for commuter, tour-bus and other buses (Non-DC School and Church Buses) from the District of Columbia Motorcoach Volume Data (2012). Among the data sources considered in the estimation of current and future demand of off-street parking are:

- Total number of buses requiring parking
- Available off-street parking

Projected increase in future demand is displayed in Table 6.2, showing steps in estimating current and future demand of off-street parking for commuter bus, tour-bus and other buses (Non-DC School and Church Buses). Some of the key assumptions made in this estimation are:

Share of Buses Requiring Mid-Day Parking

Two scenarios are considered in this analysis. The first is a "business as usual" (BAU) scenario that uses the existing share of buses which are currently parking at a location in the D.C. core. This information is based on other relevant studies and operator interviews. For example, among Loudoun County, PRTC, and MTA, only half of MTA's fleet currently parks in the study area. Hence the share of commuter buses requiring mid-day parking is determined to be 15% in a business-as-usual case. The second scenario assumes 50% participation by commuter bus operators assuming that a suitable mid-day off-street location is identified and operational. The 50% participation scenario may not be realistic for current conditions but is

helpful at setting an upper bound of the additional spaces that could be required if commuter buses used parking facilities in the core.

Commuter bus operators have indicated that a number of factors affect their decision to return buses to suburban garage locations during the mid-day period. In order to shift the participation rate from the BAU scenario to the 50% participation level (or higher), new locations in the core would need to provide sufficient cost savings and meet a number of conditions including having operator facilities and the potential for mid-day servicing and maintenance. If future traffic conditions increased the delays experienced when dead-heading buses back to the suburbs, that could make the mid-day parking options more attractive.

Fleet Increase to Meet Future Demand

Existing vehicle load factors were obtained from the National Transit Database (NTD) data and given their existing loads, and potential for increased capacity utilization, it was assumed that only half of projected demand would need to be addressed by adding new fleet, while the remaining half of the demand can be accommodated by increased occupancy. Table 6.2 displays the off-street and mid-day parking estimation for 2010 and 2025, for commuter buses, tour buses, and other bus services.

It can be noted that an additional 305 to 322 off-street parking spaces could be required by 2025. That is in addition to the existing parking need of 755 to 860 spaces making it a total of 1060 to 1182 total spaces desired by 2025. This exceeds the total off-street parking of 890 spaces available today.

A key observation is that the existing supply of off-street parking spaces in D.C. is 890 spaces, of which, 500 spaces are located at RFK Stadium. There exists a spatial mismatch between parking demand and supply with an excess of overall parking spaces but a scarcity of desirable parking locations near stops and attractions in the D.C. core.

Table 6.2 Off-Street and Mid-Day Parking Estimation

	Primary		Secondary
	Commuter Buses	Tour/Charter Buses	Non-DC School & Church Buses
Existing (2010)			
Total buses coming to DC core that could require parking	300	754	134
Share of buses requiring mid day off-street parking	15%	80%	80%
Available off-street parking		**890**	
Off-street parking required (BAU)	45	603	107
At 50% commuter bus operator participation	150		
Total off-street parking required (BAU)		**755**	
Total off-street parking required (50% commuter bus operator participation)		**860**	
Future (2025)			
Change in travel demand 2010-2025 (% change in person trips)	21%	56%	56%
Demand to be met by adding fleet		75%	
Fleet increase to meet demand	47	317	56
Required increase in fleet by 2025		**420**	
Additional parking needed to meet demand by 2025			
Off-street Parking required (BAU)	7	253	45
At 50% commuter bus operator participation	24		
Total additional parking required by 2025 (BAU)		**305**	
Total additional parking required by 2025 (50% commuter bus operator participation)		**322**	
Total motorcoach off-street parking required by 2025 (BAU)		**1060**	
Total motorcoach off-street parking required by 2025 (50% commuter bus operator participation)		**1182**	

Tour Bus

The following data was used for estimation of future curbside demand in the National Mall (Central) area:

- Visitors at major attractions (National Park Service Visitor Statistics)
- Existing demand

Following the DDOT 2011 Motorcoach Action Plan methodology, this analysis considers the demand for attractions located in vicinity of shared stops with other types of bus services. The demand for tour bus parking is 114 spaces in the areas that are in a close vicinity to commuter and other bus operations, thereby being areas of overlap including some shared stop locations. To account for the increase in visitor traffic by 2025, 64 additional stops are required, taking the total stops in the National Mall Park visitor area vicinity to 178 spaces. Table 6.5 illustrates existing tour bus spaces and demand at attractions in the D.C. core.

Table 6.3 Tour Bus Spaces at Attractions

Attraction	Spaces Available	Existing Demand
Lincoln Memorial	17	16
FDR Memorial	8	6
WWII Memorial	11	7
Jefferson Memorial	7	5
Washington Monument	13	11
American History Museum	6	14
Smithsonian Castle	0	5
National Gallery of Art	8	11
Air and Space Museum	16	16
US Capitol	3	7
Ford's Theater	4	7
Ronald Reagan Building	6	1
White House	0	4
Arena Stage	13	2
DAR Constitution Hall	0	2
Total	**112**	**114**

Source: DDOT 2011 Motorcoach Action Plan

6.3 LAYOVER PARKING/STAGING

An already scarce curbside parking space supply and reduced reliability in travel time due to congestion in the D.C. core means operators will have to consider layover facilities in close proximity to their first pick-up stop locations for PM trips. The requirement is acute for those locations along high frequency routes and in places where curbside parking is very limited. In considering locations for possible staging areas, the split between trips originating in the D.C. core versus the Arlington core should be considered, as well as the distribution within the DC Core.

Table 6.4 organizes the first stop locations (presented in Table 3.2) into four clusters of stops within the Core that could be used to locate potential staging locations. The four clusters include:

- Arlington County
- Central-East DC Core – stops generally located in NW and NE DC, east of 16th street NW
- SW-SE DC Core – all stops in SW and SE
- West DC Core – stops located in NW, west of 16th street NW

Table 6.4 Commuter Bus Trips at First Stops by Cluster

Cluster	Total PM Trips	PM Peak Period (3-5)	PM Peak Hour (4-5)	Staging Space Needs
Arlington	55	24	15	5
Central-East DC Core	103	72	38	13
SW-SE DC Core	45	30	17	5
West DC Core	194	116	66	22
Total	**397**	**242**	**136**	**45**

As shown in the table, there are 397 P.M. peak commuter bus trips leaving the first stop locations, of which 136 trips are in the peak hour between 4:00 P.M. and 5:00 P.M. It is assumed a staging window of roughly 20 minutes would be needed for operators to layover prior to the first trip. This results in a need for 5 staging spaces in Arlington and 40 staging spaces in DC currently. Based on the growth projections discussed in the previous section, an increase of at least 11% in bus trips could be needed (to handle a 21% increase in bus trips) and this would raise the staging requirements to 50 spaces.

7.0 Site Evaluation Methodology

7.1 SITE-SCREENING EVALUATION CRITERIA

To screen potential sites, two sets of initial evaluation criteria were developed. The first set of criteria evaluates potential sites (on-street) for commuter bus staging, and the second set evaluates potential sites for mid-day/long-term parking (off-street).

The objective of the evaluation is to identify the most promising sites that will proceed into an evaluation that considers feasibility, implementation costs, site layout, potential environmental impacts, traffic impacts, and public support. Some of the site options that are focused upon include:

- On-street locations where capacity may exist during hours when the property is underutilized or unutilized (i.e., shared uses, food truck zones, transitional areas)
- Co-location with existing transit facilities or layover locations
- Off-street locations where capacity may exist during hours when the property is underutilized or unutilized

To conduct an evaluation of potential staging locations as part of the site screening, both criteria and a ranking system was developed to apply to the short-term staging options. This screening system assigns a point value to each criteria, and then weights each criterion (totaling 100 points) to determine a total score. The definitions of the initial criteria for both the short-term and long-term staging options are presented below.

Bus Staging Evaluation Criteria

Locations that are adjacent or quickly accessible to PM peak first stop locations are preferred as sites for commuter bus short-term staging. For short-term staging options, existing underutilized or vacant surface parking lots or underutilized on-street parking near beginning route stops in the PM peak are preferred. Potential exists for parking management approaches that restrict metered on-street parking areas to bus parking only during staging hours.

For long-term staging options, the same options presented for tour bus mid-day parking are relevant for commuter bus staging (although for off-street, less capacity is required), plus parking management approaches that restrict on-street parking areas to bus parking only during peak hours. Table 7.1 summarizes the evaluation criteria and ranking for bus staging sites (the higher the weighting number, the more important the criterion).

Table 7.1 Bus Staging Evaluation Criteria

Criteria	Rating				
	5	4	3	2	1
1. Site Size[32]	> 10 buses > 600 ft	7-10 buses 420-600 ft	3-7 buses 180-420 ft	1-3 buses 60-180 ft	< 1 bus < 60 ft
2. Site Land Use	Surface parking	Public ROW		Developed/ vacant	Undeveloped/ park
3. Site Availability	Existing metered parking		Striped shoulders		Travel lanes
4. Travel Time to First Stop	< 5 minutes	5-7 minutes	7-10 minutes	10-15 minutes	> 15 minutes
5. Site Connectivity/ Ease of Access	Convenient (< 5 min from freeway, minimal intersections and turns)		Challenging (5-10 min. from fwy,some ints/ turns)		Difficult (>10 min from fwy, many ints/turns)

- **Site Size:**
  - Number of buses accommodated by on-street parking should balance commuter bus staging demand with reducing on-street parking capacity for private vehicles. For the purposes of this analysis, we assume the length of a bus space at 60 feet.
- **Site Land Use:**
  - Land-use directly adjacent to the on-street parking location. Good includes vacant or industrial land use, acceptable equals commercial/hotel/retail land use, not acceptable equals park or residential land use.
- **Site Availability:**
  - The portion of the street the on-street bus parking is replacing. The unmarked cells represent potential for mixed approaches. Travel lanes include both vehicle and/or bicycle lanes.
- **Travel Time to First Stop:**
  - The average PM peak period travel time from each potential site to the nearest grouping of first stop locations is evaluated using drive time data from the I-95 Corridor Coalition Vehicle Probe Project (VPP, Inrix) from the Metropolitan Washington Council of Governments (MWCOG). The first stop location groupings are as follows: Rosslyn/Ballston/I-66 corridor, Pentagon/Crystal City, D.C. K-Street/Mall West of I-395, D.C. K-Street/Mall/Capitol Hill East of I-395, D.C. South of I-395/Navy Yards.

[32] *For the purposes of this analysis, the study team assumed the length of a bus space at 60 feet.*

- Initial weekday travel times estimates were calculated using data acquired by MWCOG from INRIX . Congestion factors were calculated for road type and neighborhood for the DC Core, which includes roughly the areas surrounding downtown DC and the National Mall. This speed data is based on Traffic Management Center (TMC) data for weekday traffic in the months of April and May 2013. PM peak congestion factors were used to calibrate the actual travel speed during the afternoon pick-up period for commuter buses. Congestion factors are the ratio of the arithmetic mean of reference speed (85th percentile speed) to PM peak congested travel speed. Once initial times were compared to sample real-time data using Google Maps, the congestion factors listed in Table 7.2 below were applied according to neighborhood.

Table 7.2 Travel Time Congestion Factors

Neighborhood	PM Congestion Factor
Arlington	4.40
Central East Core	3.98
Southwest/Southeast Core	4.00
West Core	3.42

Source: INRIX, MWCOG.

- **Site Connectivity/Ease of Access to First Stop:**
  - This is a qualitative measure representing the directness of the path from the staging location to the first stop. The measure takes into account the location of the staging location relative to the regional freeway network, as well as the path from the staging location to the first stop (# of intersections, # of turns required, left turns required). Convenient is less than 5 minutes from a freeway, and minimal intersections or turns to access the first stop. Challenging is 5 to 10 minutes from a freeway, and multiple intersections or turns to access the first stop. Difficult is greater than 10 minutes from a freeway, and many intersections or turns to access the first stop.

Bus Mid-Day/Long-Term Evaluation Criteria

There are several criteria essential for evaluating potential sites for mid-day/ long-term parking. Because mid-day parking correlates with tour bus operations, site locations that are adjacent or quickly accessible to the National Mall are preferable. Site locations that could provide for multi-hour secured parking with some amenities for drivers, including access to transit, are also considered desirable.

For shorter-term mid-day parking options, existing underutilized or vacant surface parking lots easily accessible to the National Mall are preferred. Examples include sites such as Buzzard Point between 1st and 2nd Streets SW.

RFK Stadium, while an existing site with available capacity, is less preferred by operators due to routing restrictions and travel time to the National Mall.

For longer-term mid-day parking options, the proposed Underground National Mall parking garage concept is currently the most ideal site, however this site faces several financial and institutional challenges. Other potential sites include, among others, Banneker Overlook and a new Southeast Boulevard that would replace the Southeast Freeway between the 11th Street Bridge and Barney Circle. However, both of these sites also require extensive infrastructure investment to implement and may conflict with neighborhood goals.

To conduct an evaluation of potential mid-day/long-term parking locations, a evaluation criteria and a ranking system was developed. This site screening system assigns a point value to each criteria, and will later weight each of the criteria according to their relative importance. Table 7.3 summarizes the evaluation criteria and ranking for bus staging sites (the higher the weighting number, the more important the criteria).

Table 7.3 Bus Mid-Day/Long-Term Evaluation Criteria

Criteria	Rating				
	5	4	3	2	1
1. Site Size[33]	> 150 buses > 3 acres	100-150 buses 2 – 3 acres	50-100 buses 1 – 2 acres	25-50 buses 0.5 – 1 acre	< 25 buses < 0.5 acre
2. Site Land Use	Surface parking	Public right of way (ROW)		Developed/ vacant	Undeveloped/ park
3. Adjacent Land Use	Surface parking	Public ROW		Developed/ vacant	Undeveloped/ park
4. Site Availability	Public land – clear title, recent survey, definitely available	Public land – clear title, recent survey, possible available	Private land – clear title, recent survey, possibly available	Private land – uncertain title/ boundaries; multiple owners	Private land – clear or unclear title, private owner/seller not interested
5. Planned Development	No		Maybe		Yes
6. Travel Time to National Mall	< 5 minutes	5-7 minutes	7-10 minutes	10-15 minutes	> 15 minutes

- **Site Size**:
  - Acreage is indicative of the parking capacity of the site as well as the potential for a secure facility and on-site amenities. The analysis assumes 5

[33] *For the purposes of this analysis, the study team assumed 1 acre can hold 50 buses. (https://ag.tennessee.edu/cpa/Information%20Sheets/CPA%20222.pdf)*

buses per acre for a surface lot. For proposed structured lots, total bus parking capacity is the value considered for this criteria.

- **Site Land Use**:
  - Current land use of the site. Site land use status is a precursor to an evaluation of potential construction costs. Options include: surface parking, public right of way (ROW), developed/vacant, or undeveloped/park. If the location plans for structured parking (above or below grade), this criteria is included as a rating of one.
- **Adjacent Land Use**:
  - Predominant land use of adjacent blocks. Is the long-term parking of buses compatible with neighborhood land use. Good includes vacant or industrial land use, acceptable equals commercial/hotel/retail land use, not acceptable equals park or residential land use.
- **Site Availability**:
  - Private, public, or federal land. Preferably, the site should be public or federal land, with the title free of legal encumbrances, platted and surveyed with an accurate legal description and have a single owner. If the site is public and available, with a clear title and recent surveys, it is a stronger contender than a private site with the same characteristics. The availability of the site was determined using the "Vacant Parcels" GIS shapefile from the DC Government Open Catalog.
- **Planned Development**:
  - Any competing interests for site development.
- **Travel Time to National Mall Area**:
  - The average PM peak period travel time from each potential site to the National Mall is evaluated using drive time data from MWCOG. The travel time will be defined to the center of the National Mall (appx. the Air and Space Museum, Smithsonian Castle). Congestion factors were calculated for road type and neighborhood from INRIX data made available by MWCOG for the DC Core. PM peak congestion factors were used to calibrate the actual travel speed during the afternoon pick-up period for commuter buses. Congestion factors are the ratio of the mean of reference speed (85th percentile speed) to PM peak congested travel speed. Once initial times were compared to sample real-time data using Google Maps, the congestion factors listed in Table 7.3 were applied.

8.0 Evaluation of Bus Staging Sites

This section presents the process used to evaluate and narrow down the list of on-street staging sites for consideration as regional bus staging sites. Locations that are adjacent or quickly accessible to PM peak first stop locations are preferred as sites for commuter bus short-term staging. For short-term staging options, existing underutilized or vacant surface parking lots or underutilized on-street parking near beginning route stops in the PM peak are preferred. Potential exists for parking management approaches that restrict metered on-street parking areas to bus parking only during staging hours.

Routing

Motorcoach buses can have a significant impact on local, neighborhood streets. Since staging sites are primarily targeted at commuter buses, Figure 8.1 illustrates the location of existing commuter bus service routing in the Washington, D.C. region, along with the locations of PM first stops. The largest concentrations of first stops within the study area are located at the Foggy Bottom/State Department area and the L'Enfant/Bureau of Engraving areas. Both of these areas are serviced by all four motorcoach operators.

Evaluation

To evaluate commuter bus staging on-street locations, the initial stages of identifying sites involved analysis of existing parking blocks in the region. Using GIS, various factors such as parking restrictions or routing directions were applied, ultimately resulting in a list of 50 on-street sites for further detailed evaluation. Figure 8.2 illustrates a sample of the process used by the study team to narrow down the on-street sites to final consideration, by looking at existing land uses, special uses that do not show up on GIS (such as the National Mall or other government/federal open spaces), and local knowledge of various streets, routing, or construction projects.

Ultimately, the study team ended up with 34 on-street locations for final consideration for short-term staging, illustrated in Figures 8.3 – 8.8. These sites are named by quadrant, for instance, site NW-2 indicates that the site is located in the Northwest quadrant of DC. Once the list of sites were finalized, a site evaluation was conducted in Table 8.1. Each of the evaluation criteria explored in Section 2 was applied to each of the 34 sites in detail. In addition, listed below are brief summaries and discussions of the sites under consideration, listed by neighborhood.

Northwest/Northeast DC

- **Foggy Bottom**. Since the State Department is a focus of many commuter bus first-stops and stop locations, the Foggy Bottom area was preferred for many sites in this analysis. Several on-street sites that could serve as short-term or layover sites for commuter buses. Most of these center around the State Department first stop locations. Primarily, these locations are along C St NW, D St NW, and E St NW around the 17th St and 18th St areas. There are two additional locations, currently used as food truck staging areas, that could be potential shared use areas for commuter buses. These locations are along Virginia Ave NW between 21st Street and 22nd Street NW, and along H Street NW between 21st Street and 22nd Street NW on the campus of George Washington University (GWU).
- **Farragut/McPherson Square.** There are three different sites that could serve as short-term, layover sites for commuter buses in the Farragut/McPherson Square areas. This includes two food truck staging areas: the western side of Farragut Square, along 17th Street NW northbound, and the southern side of K Street NW between 13th St and 14th St NW, on the north of Franklin Park. In addition, the western side of Franklin Park along 14th Street NW is also being considered as a potential location.
- **Metro Center.** One site in the Metro Center area is being considered as an off-street location, along 12th St NW between F and G Street NW. This is a food truck staging area, and has potential to be converted into a shared use area.
- **Judiciary Square.** Because of reduced traffic around the Judiciary Square area, there are several sites that could be considered for short-term layover staging. These sites center around the National Building Museum, along F St NW and G St NW, and also include side streets such as 3rd St and 4th St NW. Currently, there is metered parking along most of these streets, which could be removed or modified to include a commuter-bus-only parking time.
- **NoMa (North of Massachusetts Avenue).** There are three sites that could serve as commuter-bus staging sites in the NoMa area, which is defined as the area north and east of Union Station along North Capitol Street. Two are located adjacent to New Jersey Avenue NW, along L St NW and Pierce St NW. Currently, there is street metered parking along these streets that would require conversion into commuter-bus layover sites. The other sites is located immediately to the east of the Amtrak tracks, along 2nd Street NE between K and L St NE. There is a wealth of under-utilized parking along the eastern side of the roadway that could be used for commuter buses.

Southwest/Southeast DC

- **Lincoln Memorial**. Around the National Mall area, Ohio Drive SW and West Basin Drive SW are two roads that could serve as commuter bus staging

areas. These areas are close to major thoroughfares, and are currently zoned for tour bus parking.

- **Bureau of Engraving**. Two sites around the Bureau of Engraving could be potential sites for commuter bus staging, along D St SW and C St SW between 12th and 14th St SW. Both sites are currently used as metered parking, which could be easily converted into commuter bus staging.
- **L'Enfant Plaza**. As one of the largest first stops in the area, the L'Enfant plaza area has tremendous draw for commuter bus operators as a staging region. Several sites could be considered for commuter bus staging in the area, including: D St SW between 6th & 9th St SW, Virginia Ave SW WB between 6th & 7th St SW, Virginia Ave SW WB between 4th & 6th St SW, 6th St SW between E & D St SW, E St between 6th & 7th St SW, and Maryland Ave SW between 6th and 7th St SW. Many of these streets currently have metered parking that could be easily converted into commuter bus staging, however there are some specific sides of roadways that have Metrobus stops which must be avoided.
- **Federal Center**. There are two sites near the Federal Center area, both along D Street SW, from 2nd St SW to 4th St SW. Both sections of D Street SW have metered parking.

Sites Outside of DC

- **Arlington**. One site in Arlington has potential to be a commuter bus staging area, along South Eads Street between 31st St and 26th Rd, approximately. Currently, the roadside is unmarked, and is commonly used by tour or charter buses as staging parking, on a first-come, first-serve basis.
- **Crystal City**. In Crystal City, there is metered parking spaces available on the western side of Long Bridge Drive that could serve as commuter bus staging areas. In fact, when researching and viewing maps for this stretch, several PRTC buses were identified already using the roadside for staging, as seen below in Figure 8.1 and Figure 8.2.

Figure 8.1 Existing Commuter Bus Service

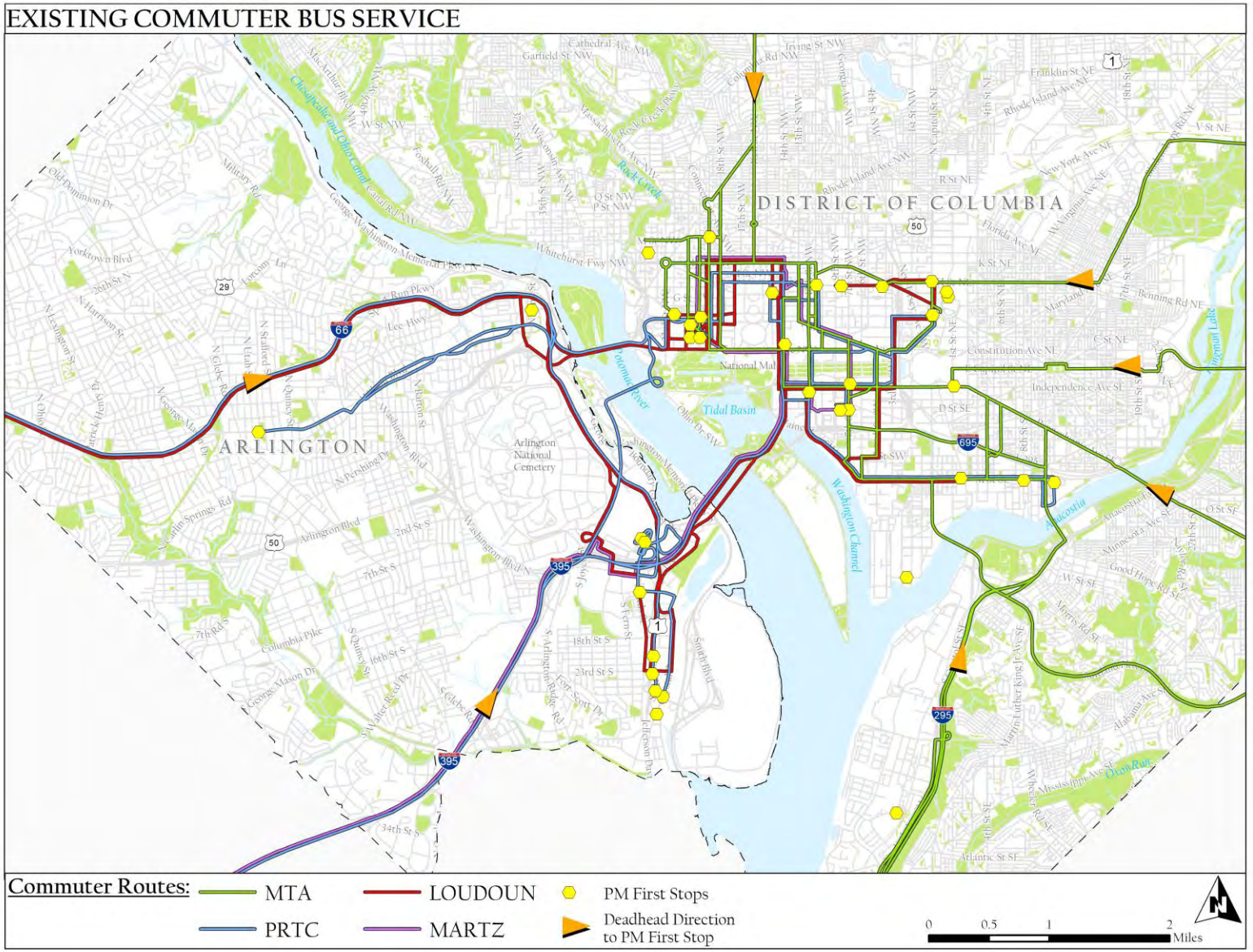
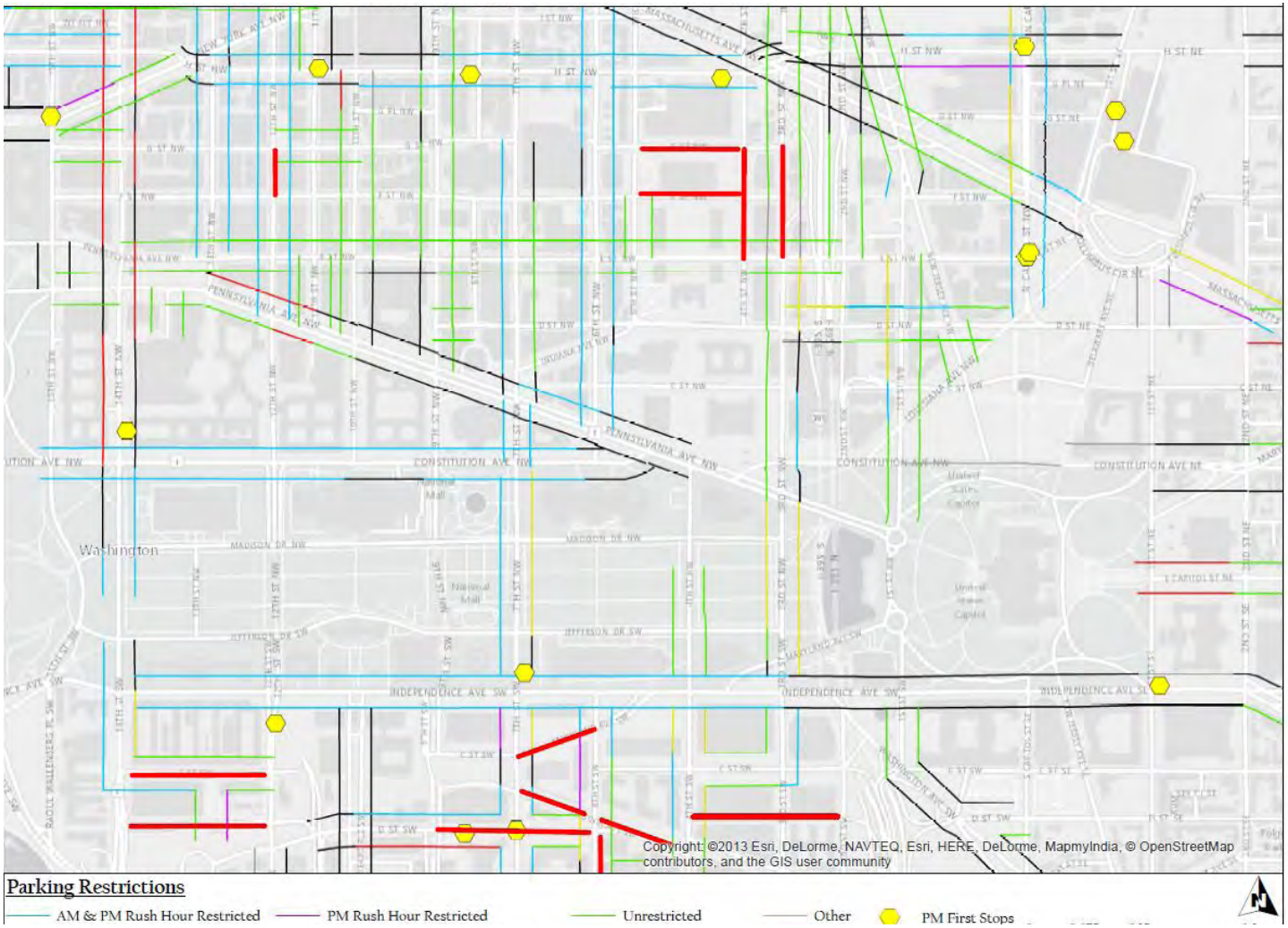


Figure 8.2 Example of Initial Consideration Process for Short-Term Staging Sites[34]



[34] *This graphic is meant to represent the site screening without showing all of the sites considered.*

Figure 8.3 On-Street Sites under Final Consideration for Short-Term Staging

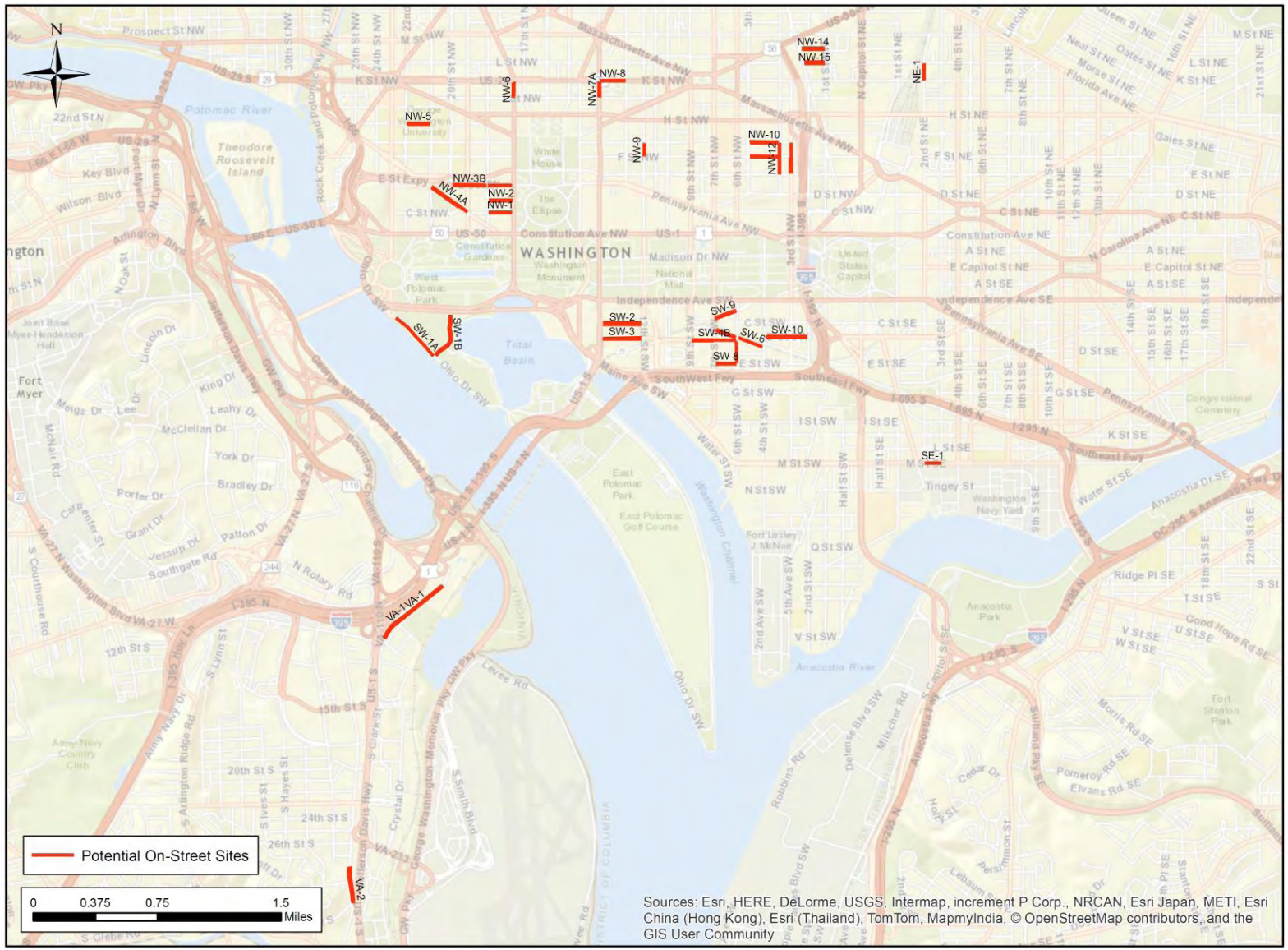


Figure 8.4 On-Street Sites under Final Consideration for Short-Term Staging: Foggy Bottom/Farragut

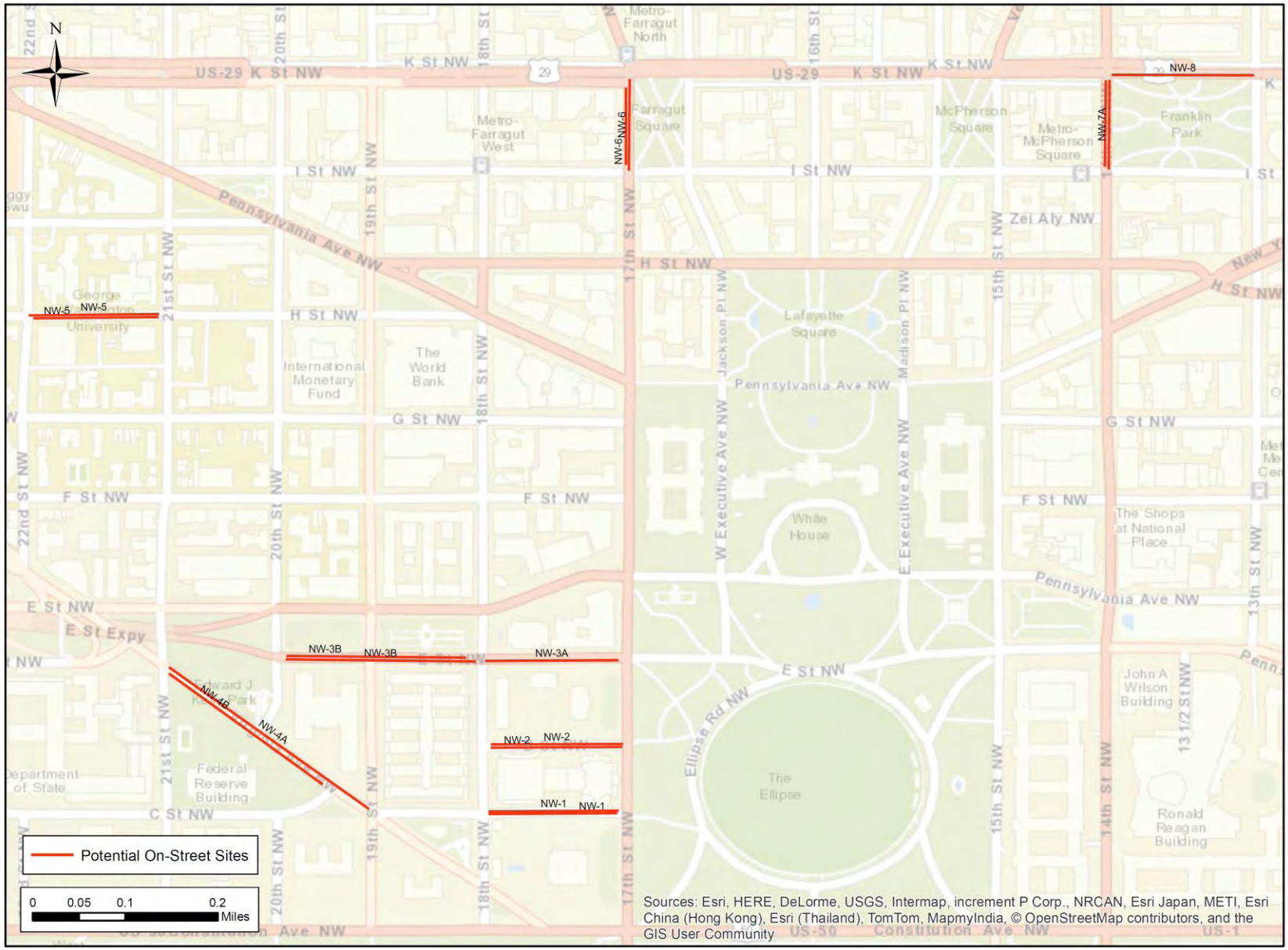


Figure 8.5 On-Street Sites under Final Consideration for Short-Term Staging: NoMa/Judiciary Square

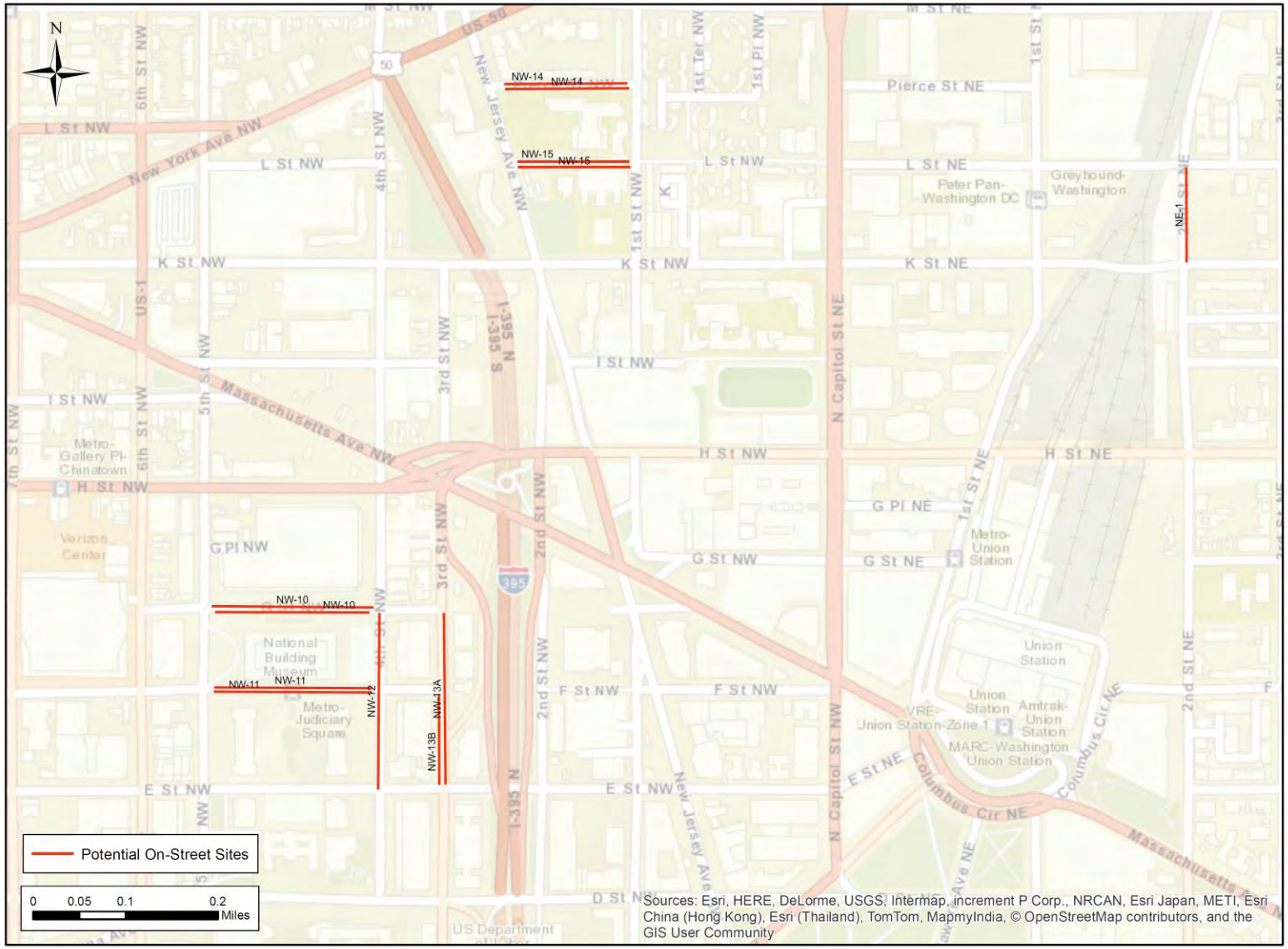


Figure 8.6 On-Street Sites under Final Consideration for Short-Term Staging: L'Enfant

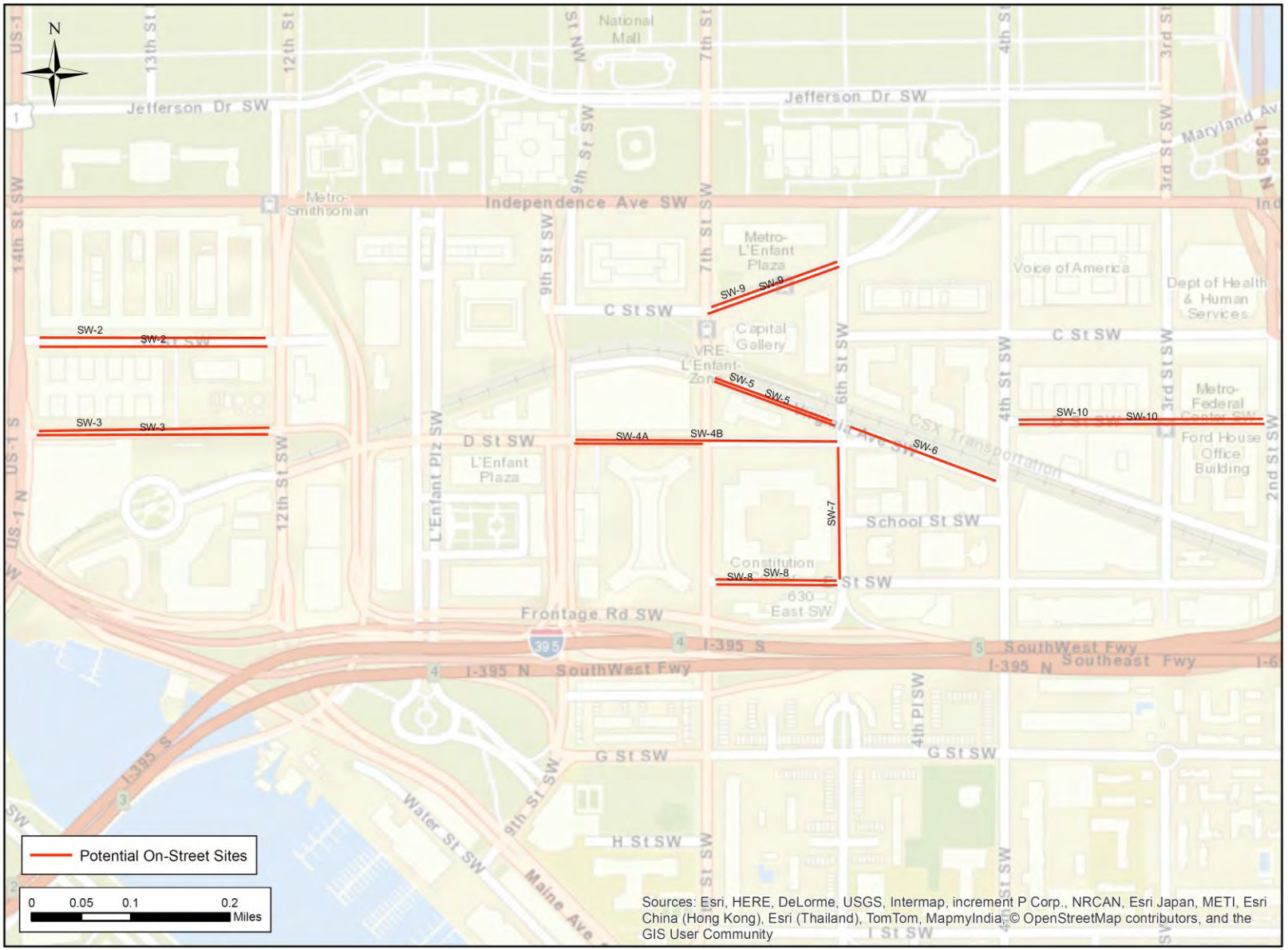


Figure 8.7 On-Street Sites under Final Consideration for Short-Term Staging: National Parks

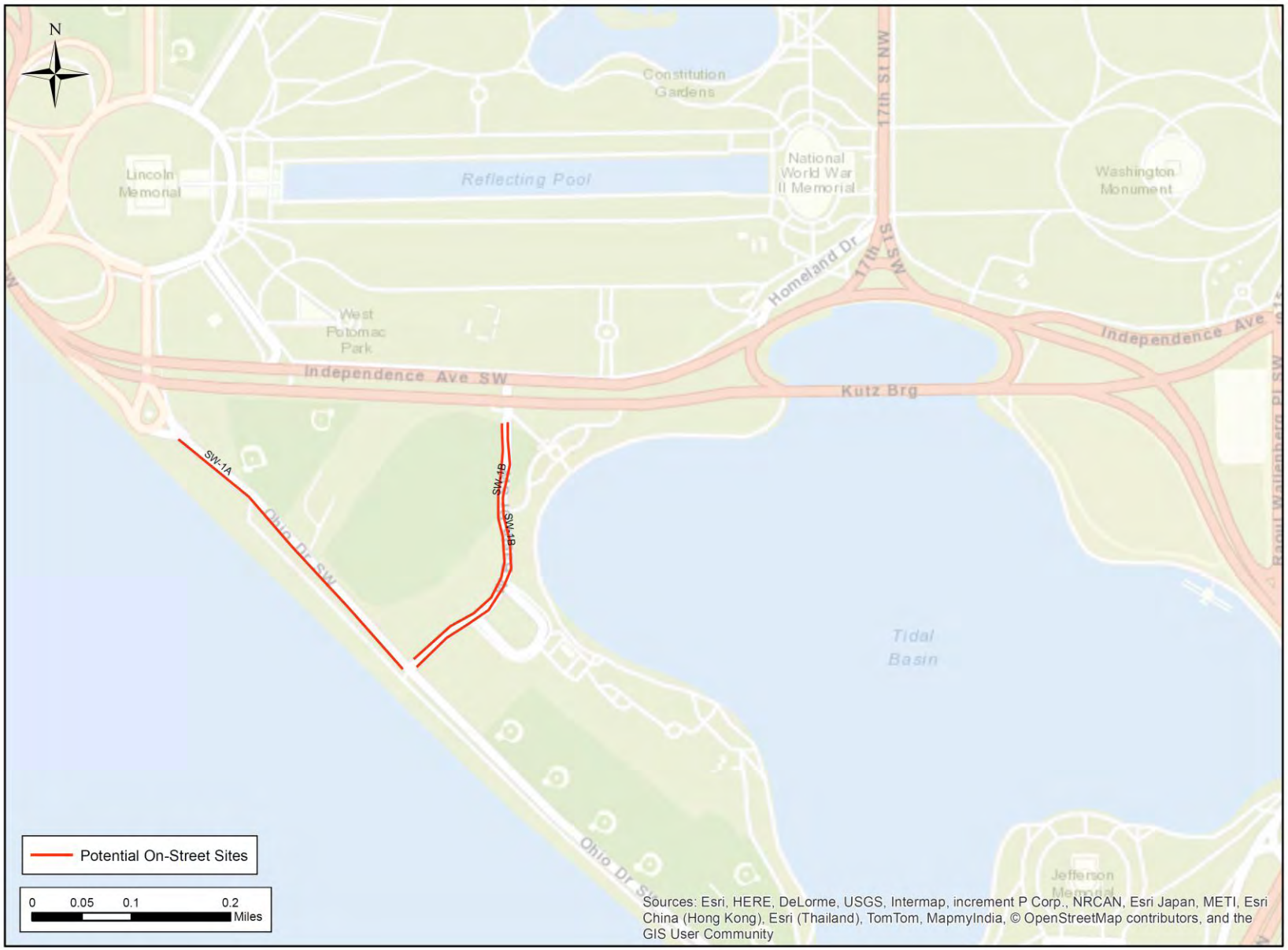


Figure 8.8 On-Street Sites under Final Consideration for Short-Term Staging: Virginia

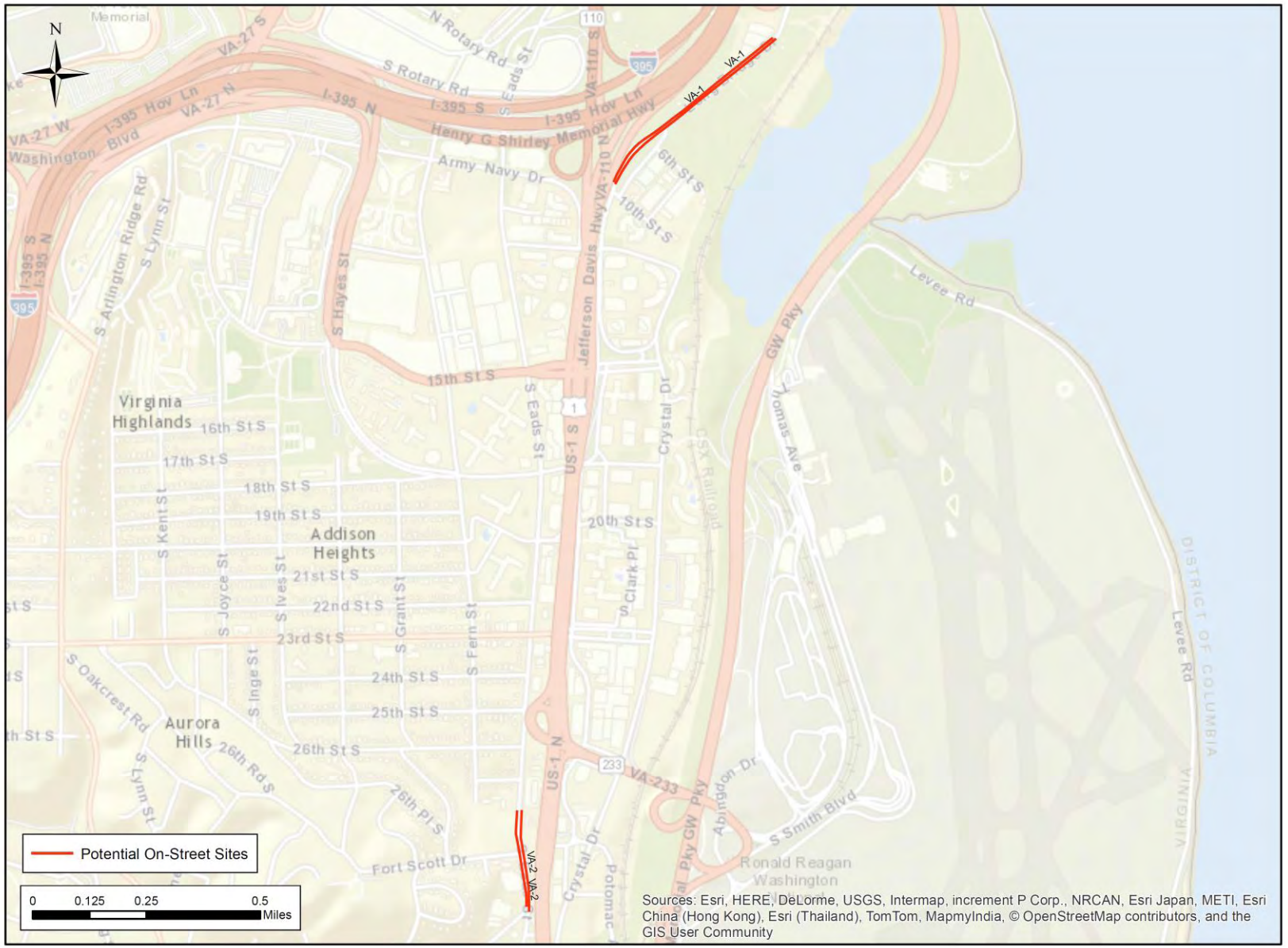


Table 8.1 Evaluation of On-Street Sites for Short-Term Staging

Site Number	Neighborhood	Site Description	Site Size[35]	Land Use	Site Availability[36]	Travel Time to First Stop	Connectivity	Road Characteristics
Northwest DC								
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	575 ft (9 buses)	Institutional	2-hour metered parking; PM Rush Hour Restricted, 4-6:30	3.3 mins	Convenient	One-Way St Both block faces
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	575 ft (9 buses)	Institutional	2-hour metered parking	4.4 mins	Convenient	Two-Way St Both block faces
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	575 ft (9 buses)	Federal / Public /Parks & Open Spaces	2-hour metered parking	3.3 mins	Convenient	One-Way South block face
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	800 ft (13 buses)	Federal / Public /Parks & Open Spaces	2-hour metered parking	3.3 mins	Convenient	One-Way Both block faces
NW-4A	Foggy Bottom	Along Virginia Avenue NW between 19th & 21st St NW	800 ft (13 buses)	Federal / Public /Parks & Open Spaces	Standard Rush Hour Restricted, 7am – 9:30, 4pm-6:30	2.0 mins	Convenient	Two-Way St North block face
NW-4B	Foggy Bottom	Along Virginia Avenue NW between 20th & 21st St NW	450 ft (7 buses)	Federal / Public /Parks & Open Spaces	Food truck parking; Standard Rush Hour Restricted, 7am – 9:30, 4pm-6:30;	2.0 mins	Convenient	Two-Way St South block face
NW-5	Foggy Bottom	Along H St NW between 21st & 22nd St NW	250 ft (4 buses)	Institutional	Food truck parking; 2-hour metered parking	4.2 mins	Challenging	Two-Way St Both block faces
NW-6	Farragut	Along 17th St NW between H & I St NW	150 ft (2 buses)	Parks & Open Spaces	Food truck parking; West block face 2 hour metered parking, Standard Rush Hour Restricted, 7am – 9:30, 4pm-6:30	7.6 mins	Challenging	Two-Way St Both block faces
NW-7A	McPherson Sq.	14th St NW between I & K St NW, Northbound	250 ft (4 buses)	Commercial / Parks & Open Spaces	Food truck parking; All Day restricted, 7am-6:30pm	7.6 mins	Challenging	Two-Way St East block face
NW-7B	McPherson Sq.	14th St NW between I & K St NW, Southbound	250 ft (4 buses)	Commercial / Parks & Open Spaces	All Day restricted, 7am-6:30pm	7.6 mins	Challenging	Two-Way St West block face
NW-8	McPherson Sq.	K St NW north of Franklin Park, Eastbound	450 ft (7 buses)	Commercial / Parks & Open Spaces	Food truck parking; All day restricted 7am-6:30 pm	11.0 mins	Challenging	Two-Way St South block face
NW-9	Metro Center	12th St NW between F & G St NW	200 ft (3 buses)	Commercial	Food truck parking; 2-hour metered parking, Standard Rush Hour Restricted, 7am – 9:30, 4pm-6:30	9.0 mins	Challenging	Two-Way St East block face
NW-10	Judiciary Sq.	G St NW between 4th & 5th St NW	625 ft (10 buses)	Federal / Parks & Open Spaces/ Public	2-hour metered parking	6.5 mins	Challenging	Two-Way St Both block faces
NW-11	Judiciary Sq.	F St NW between 4th & 5th St NW	625 ft (10 buses)	Federal / Public	2-hour metered parking	6.7 mins	Challenging	Two-Way St Both block faces
NW-12	Judiciary Sq.	4th St NW between E and G St NW, Southbound	625 ft (10 buses)	Federal / Parks & Open Spaces/ Public	2-hour metered parking	6.5 mins	Challenging	One-Way St Both block faces

[35] *The estimated number of buses on one side of the street was calculated by dividing the length by the average length of a bus, 60 feet. The value was rounded down.*

[36] *Sites with PM Rush Hour Restrictions, if selected, will require further analysis and partnership with DDOT to remove the PM restrictions.*

Table 8.1 Evaluation of On-Street Sites for Short-Term Staging (Continued)

Site Number	Neighborhood	Site Description	Site Size	Land Use	Site Availability	Travel Time to First Stop	Connectivity	Road Characteristics
NW-13A	Judiciary Sq.	3rd St NW between E and G St, NW, Northbound	625 ft (10 buses)	Federal / Parks & Open Spaces/ Public	2-hour metered parking	6.6 mins	Challenging	Two-Way St East block face
NW-13B	Judiciary Sq.	3rd St NW between E and F St, NW, Southbound	300 ft (5 buses)	Federal / Parks & Open Spaces/ Public	2-hour metered parking	6.6 mins	Challenging	Two-Way St West block face
NW-14	NoMa	Pierce St NW between New Jersey Ave and 1st St NW	500 ft (8 buses)	Commercial /Institutional / Low-medium Residential	Unrestricted	9.5 mins	Challenging	Two-Way St Both block faces
NW-15	NoMa	L St NW EB between NJ Ave to 1st St NW	500 ft (8 buses)	Commercial / Public	Unrestricted	10.4 mins	Difficult	Two-Way St Both block faces
Northeast DC								
NE-1	NoMa	2nd St NE NB from K St to L St NE, Northbound	350 ft (5 buses)	Commercial / Transport, Communication & Utilities	Unrestricted	13.0 mins	Challenging	Two-Way St East block face
Southeast DC								
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	350 ft (5 buses)	Commercial / Transport, Communication & Utilities	Food truck parking; All Day restricted, 7am-6:30pm	5.6 mins	Convenient	Two-Way St North block face
Southwest DC								
SW-1A	National Parks	Ohio Dr SW between Independence Ave SW and West Basin Drive SW	1,200 ft (20 buses)	Parks & Open Spaces	Unrestricted	8.6 mins	Challenging	Two-Way St Southwest block face
SW-1B	National Parks	West Basin Drive SW between Ohio Dr SW and Independence Ave SW	1,200 ft (20 buses)	Parks & Open Spaces	Unrestricted	8.6 mins	Challenging	Two-Way St Both block faces
SW-2	Bureau of Engraving	C St SW between 12th & 14th St SW	950 ft (15 buses)	Federal / Transport, Communication & Utilities	2-hour metered parking	8.7 mins	Convenient	Two-Way St Both block faces
SW-3	Bureau of Engraving	D St SW between 12th & 14th St SW	950 ft (15 buses)	Federal / Parking / Transport, Communication & Utilities	2-hour metered parking	8.4 mins	Convenient	Two-Way St Both block faces
SW-4A	L'Enfant	D St SW between 7th & 9th St SW, Eastbound	750 ft (12 buses)	Federal / Commercial	2-hour metered parking	5.8 mins	Challenging	Two-Way St South block face
SW-4B	L'Enfant	D St SW between 6th & 9th St SW, Westbound	1,000 ft (16 buses)	Federal / Commercial	2-hour metered parking	5.8 mins	Challenging	Two-Way St North block face
SW-5	L'Enfant	Virginia Ave SW WB between 6th & 7th St SW	475 ft (7 buses)	Federal / Commercial	2-hour metered parking	5.9 mins	Challenging	Two-Way St Both block faces
SW-6	Buzzard Point	Virginia Ave SW WB between 4th & 6th St SW, Westbound	500 ft (8 buses)	Commercial	2-hour metered parking	7.0 mins	Challenging	Two-Way St North block face
SW-7	Southwest	6th St SW between E & D St SW, Southbound	475 ft (7 buses)	Federal / Commercial / Local Public	2-hour metered parking	6.8 mins	Challenging	Two-Way St West block face

Table 8.1 Evaluation of On-Street Sites for Short-Term Staging (Continued)

Site Number	Neighborhood	Site Description	Site Size	Land Use	Site Availability	Travel Time to First Stop	Connectivity	Road Characteristics
SW-8	L'Enfant	E St between 6th & 7th St SW	1,150 ft (19 buses)	Federal	2-hour metered parking	6.9 mins	Challenging	Two-Way St Both block faces
SW-9	L'Enfant	Maryland Ave SW between 6th and 7th St SW	575 ft (9 buses)	Federal	Food truck parking	5.9 mins	Challenging	Two-Way St Both block faces
SW-10	Federal Center	D St SW between 2nd and 4th St SW, Eastbound	1,000 ft (16 buses)	Commercial	Unrestricted parking	10.1 mins	Challenging	One-Way St Both block faces
SW-11	National Parks	Ohio Dr SW between and the Francis Case Memorial Bridge	550 ft (9 buses)	Parks & Open Spaces	Unrestricted	8.6 mins	Challenging	Two-Way St Both block faces
Outside of DC								
VA-1	Arlington	Long Bridge Drive, Arlington	2,000 ft (33 buses)	Commercial	Unrestricted	8.7 mins	Challlenging	Two-Way St Both block faces
VA-2	Crystal City	S Eads St NB, Arlington	900 ft (15 buses)	Commercial / Residential	Metered	16.9 mins	Difficult	Two-Way St Both block faces

Table 8.2 Evaluation of On-Street Sites for Short-Term Staging[37]

Site Number	Neighborhood	Site Description	Site Size	Land Use	Site Availability	Travel Time to First Stop	Connectivity
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	4	4	5	5	5
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	4	4	5	5	5
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	5	5	5	5	5
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	5	5	5	5	5
NW-4A	Foggy Bottom	Along Virginia Avenue NW between 19th & 21st St NW	5	5	5	3	5
NW-4B	Foggy Bottom	Along Virginia Avenue NW between 20th & 21st St NW	5	5	5	3	5
NW-5	Foggy Bottom	Along H St NW between 21st & 22nd St NW	3	4	5	4	3
NW-6	Farragut	Along 17th St NW between H & I St NW	3	3	5	3	3
NW-7A	McPherson Sq.	14th St NW between I & K St NW, Northbound	3	4	4	3	3
NW-7B	McPherson Sq.	14th St NW between I & K St NW, Southbound	3	4	4	3	3
NW-8	McPherson Sq.	K St NW north of Franklin Park, Eastbound	5	4	4	2	3
NW-9	Metro Center	12th St NW between F & G St NW	3	4	4	3	3
NW-10	Judiciary Sq.	G St NW between 4th & 5th St NW	5	4	5	2	3
NW-11	Judiciary Sq.	F St NW between 4th & 5th St NW	5	5	5	2	3
NW-12	Judiciary Sq.	4th St NW between E and G St NW, Southbound	5	4	5	2	3
NW-13A	Judiciary Sq.	3rd St NW between E and G St, NW, Northbound	5	4	5	2	3
NW-13B	Judiciary Sq.	3rd St NW between E and F St, NW, Southbound	3	4	5	2	3
NW-14	NoMa	Pierce St NW between New Jersey Ave and 1st St NW	3	4	4	3	3
NW-15	NoMa	L St NW EB between NJ Ave to 1st St NW	4	4	4	2	1
NE-1	NoMa	2nd St NE NB from K St to L St NE, Northbound	4	4	4	2	3
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	4	4	5	4	3
SW-1A	National Parks	Ohio Dr SW between Independence Ave SW & West Basin Drive SW	5	3	3	3	3
SW-1B	National Parks	West Basin Drive SW between Ohio Dr SW & Independence Ave SW	5	3	3	3	3
SW-2	Engraving	C St SW between 12th & 14th St SW	5	4	5	3	5
SW-3	Engraving	D St SW between 12th & 14th St SW	5	4	5	3	5
SW-4A	Engraving	D St SW between 7th & 9th St SW, Eastbound	5	3	5	4	3
SW-4B	Engraving	D St SW between 6th & 9th St SW, Westbound	5	3	5	4	3
SW-5	Engraving	Virginia Ave SW WB between 6th & 7th St SW	4	3	5	4	3
SW-6	Engraving	Virginia Ave SW WB between 4th & 6th St SW, Westbound	4	3	5	4	3
SW-7	L'Enfant	6th St SW between E & D St SW, Southbound	4	4	5	4	3
SW-8	L'Enfant	E St between 6th & 7th St SW	5	3	5	4	3
SW-9	L'Enfant	Maryland Ave SW between 6th and 7th St SW	4	3	5	4	3
SW-10	Federal Center	D St SW between 2nd and 4th St SW, Eastbound	5	3	4	2	3
SW-11	National Parks	Ohio Dr SW between and the Francis Case Memorial Bridge	4	3	3	3	3
VA-1	Arlington	Long Bridge Drive, Arlington	5	3	3	3	3
VA-2	Crystal City	S Eads St NB, Arlington	5	2	5	1	3

[37] *Total weighted score is calculated in Section 11.*

9.0 Evaluation of Bus Mid-Day/Long-Term Sites

This section presents the process used to evaluate and narrow down the list of off-street staging sites for consideration as regional bus mid-day and long-term parking sites. There are several criteria essential for evaluating potential sites for mid-day/ long-term parking. Because mid-day parking correlates with tour bus operations, site locations that are adjacent or quickly accessible to the National Mall are preferable. Site locations that could provide for multi-hour secured parking with some amenities for drivers, including access to transit, are also considered desirable.

For shorter-term mid-day parking options, existing underutilized or vacant surface parking lots easily accessible to the National Mall are preferred. For longer-term mid-day parking options, the proposed Underground National Mall parking garage concept is currently the most ideal site, however this site faces several financial and institutional challenges. Other potential sites include, among others, Banneker Overlook and a new Southeast Boulevard that would replace the SE Freeway between the 11th Street Bridge and Barney Circle. However, both of these sites also require extensive infrastructure investment to implement and may conflict with neighborhood goals.

Evaluation

To evaluate commuter bus mid-day/long-term off-street locations, the initial stages of identifying sites involved analysis of existing land parcels in the region. Using GIS, various factors were applied, ultimately resulting in a list of 25 off-street sites for further detailed evaluation. Figure 9.1 illustrates a sample of the process used by the study team to narrow down the off-street sites to final consideration, by looking at existing land uses, special uses that do not show up on GIS (such as the National Mall or other government/federal open spaces), and local knowledge.

Ultimately, the study team ended up with 25 off-street locations for final consideration for mid-day/long-term parking, illustrated in Figures 9.2 – 9.7. These sites are named by quadrant, for instance, Site NW-2 indicates that the site is located in the northwest quadrant of DC and is the second in the table. Once the list of sites were finalized, a site evaluation was conducted in Table 9.1. Each of the evaluation criteria explored in Section 2 was applied to each of the 25 sites in detail. In addition, listed below are brief summaries and discussions of the sites under consideration, listed by neighborhood.

Northwest/Northeast DC

- **Foggy Bottom**. In the Foggy Bottom neighborhood, there is one site that can be examined as potential layover sites, centering around the State Department and along Virginia Avenue NW. The site is located along Virginia Avenue NW immediately off of Constitution Avenue NW, around 0.2 acres in size, that could also serve as a staging area.
- **NoMa**. There is one recommended site in the western side of NoMa that could serve as a potential layover area for the National Mall. This site is located to the north of H Street NW between New Jersey Avenue and 2nd St NW, near the new Walmart. Currently, the site is a vacant parking lot that could easily be converted into a commuter bus layover area. In the NoMa neighborhood, there are two sites identified that can be examined as potential sites for off-street sites, including a 3.8 acre site on North Capitol Street to the immediate northwest of the New York Avenue NE intersection, and Union Station. Currently, Union Station does not allow for commuter bus parking since it was converted into a Intercity Bus hub a few years ago.
- **Arboretum & RFK**. There are two additional sites identified in Northeast DC that could serve as potential off-street sites: at the National Arboretum along the north side of New York Ave NE, and at RFK Stadium in the parking lot along Constitution Avenue NE. Currently, along the north side of New York Avenue NE are vacant parking lots that could be converted into commuter bus layover areas. At RFK, the parking lot closest to the intersection of Constitution Ave NE and 19th St NE is typically vacant and could serve as a layover area.

Southwest/Southeast DC

- **Lincoln Memorial**. Near the Lincoln Memorial, there are five sites that could be commuter bus layover areas. Three parking lots along Ohio Drive SW just adjacent to the southern stretch of the Southwest Freeway are close to the National Mall, in addition to the two sites along the northern stretch of Ohio Drive SW to the east of East Basin Drive SW. Currently, these sites are owned by the NPS, and it is unknown how likely these could be used for commuter buses.
- **South Capitol**. In the South Capitol/Federal Center neighborhood, several sites that can be examined as potential sites for off-street sites, primarily around the Southeast Freeway. Two of the potential sites are parking lots located beneath the Southeast Freeway: one is along 2nd Street SE and H Street SE, and the second between 7th and 8th Street SE under the Freeway. Along 2nd Street SE, there is available parking on the north side of the street, primarily serving the skate and sports park under the highway. Between 7th and 8th Street SE below the Freeway is a public metered parking lot that has potential to be converted into commuter bus parking if needed, even if just half the lot is converted. The other two sites are located along New Jersey

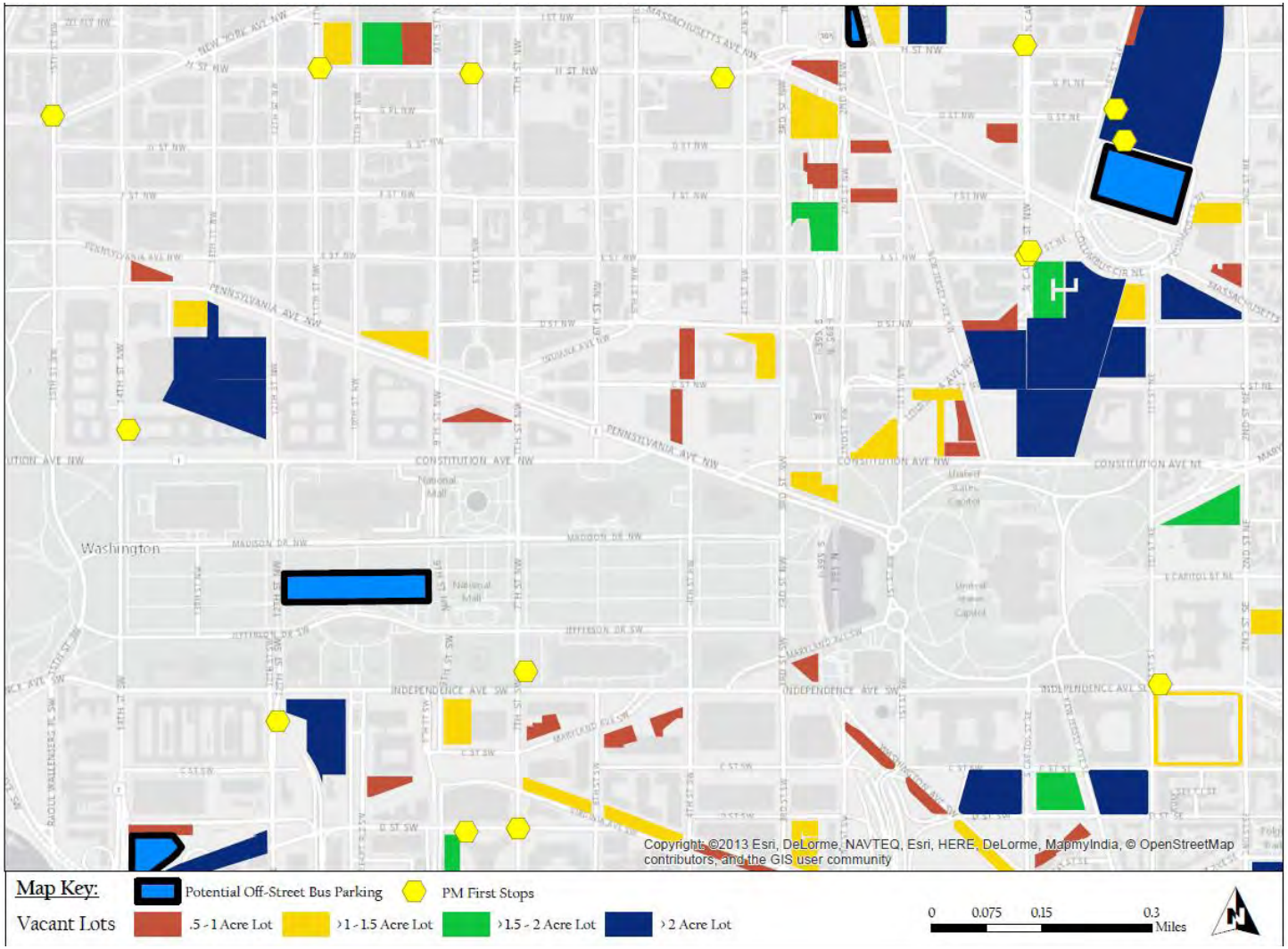
Avenue SE, and are both large, 5 and 6 acre sized city-block parcels. These large parcels, close to the Freeway and to the National Mall, could provide opportunities for a commuter bus layover and maintenance facility.

- **Federal Center**. There are two sites within the Federal Center area that could serve as commuter bus staging areas: a small vacant, parking lot to the east of the 2nd and E Street SW intersection, and underneath the Southeast Freeway between 3rd Street SW and South Capitol Street SW. In the Bureau of Engraving neighborhood, there is one site: just southeast of the 14th Street SW and D Street SW intersection. This site is currently a privately owned parking lot, which could be converted into a commuter bus lot. This site boasts close proximity to the National Mall, I-395, and other key roadways such as Independence Avenue.
- **Southeast Waterfront**. Along the Anacostia River, there are two sites for consideration. The first is the vacant parcel below the Southeast Freeway just easy of the M Street SE/11th Street SE intersection, estimated at around 7 acres in size. The second site is not currently available, but could potentially be incorporated into plans for the Southeast Boulevard, along the Anacostia Riverwalk Trail Area. Uncertain timetable on the Southeast Boulevard. The DC Office of Planning recommends Banneker Overlook as a potential off-street site. Along Potomac Avenue SW between R and Q Streets SW, there are 2 sites, totaling 9.9 acres, that could be purchased and converted into lots for off-street parking. These sites have convenient access to South Capitol Street, the Frederick Douglass Memorial Bridge, and the Southeast Freeway.

Sites Outside of DC

- **Arlington**. In Arlington, there are two recommended off-street sites, a vacant parking lot, located along Crystal Drive between 29th St and 33rd Street.
- **Cheverly**. In Cheverly, there is one area just north of New York Avenue NE and Kenilworth Avenue that has several vacant parking lots that could be used.

Figure 9.1 Example of Initial Consideration Process for Mid-Day/Long-Term Off-Street Sites[38]



[38] *The Union Station air rights site was deemed conflicting with development plans and removed from consideration.*

Figure 9.2 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking

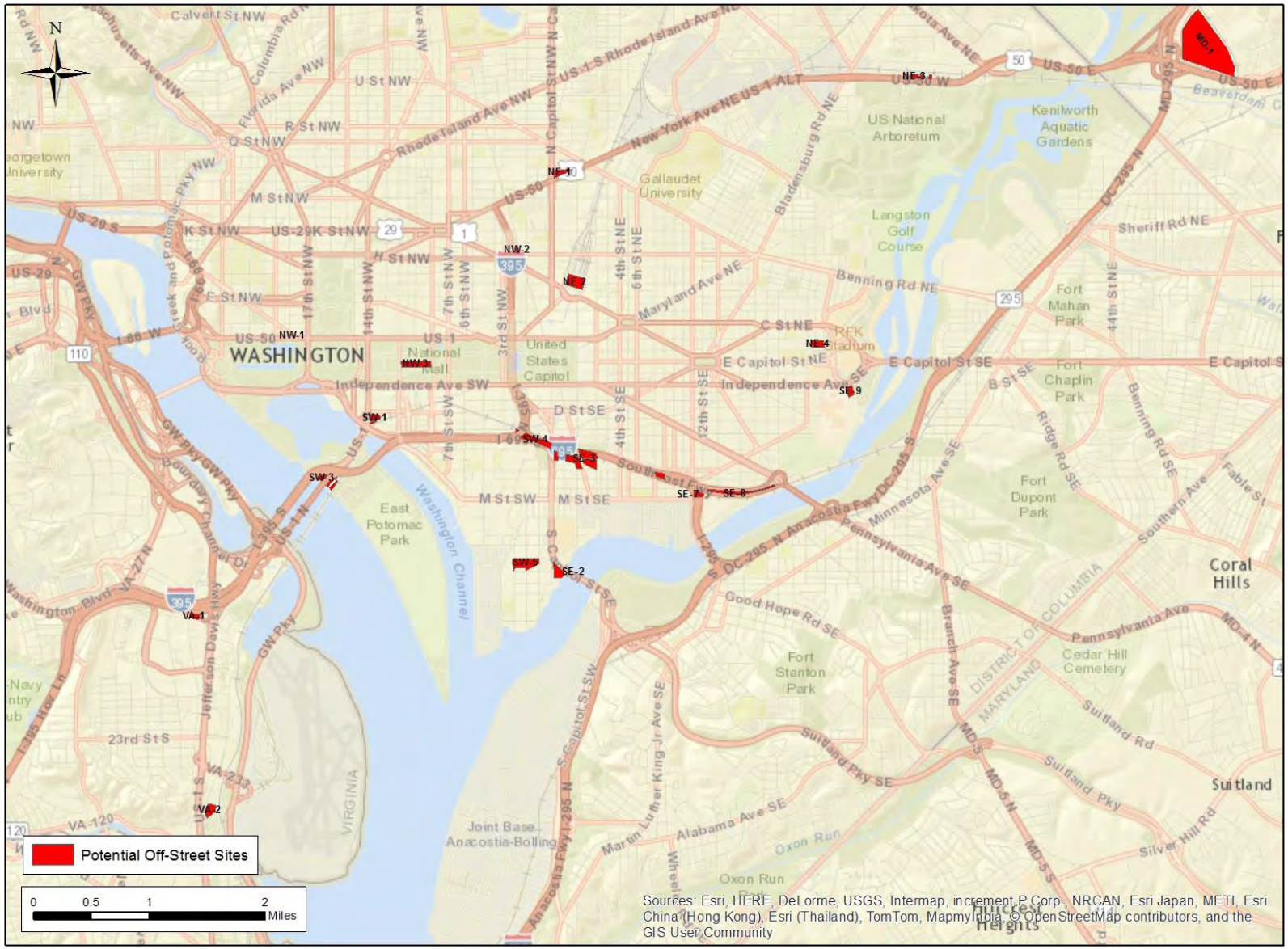


Figure 9.3 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking: Foggy Bottom

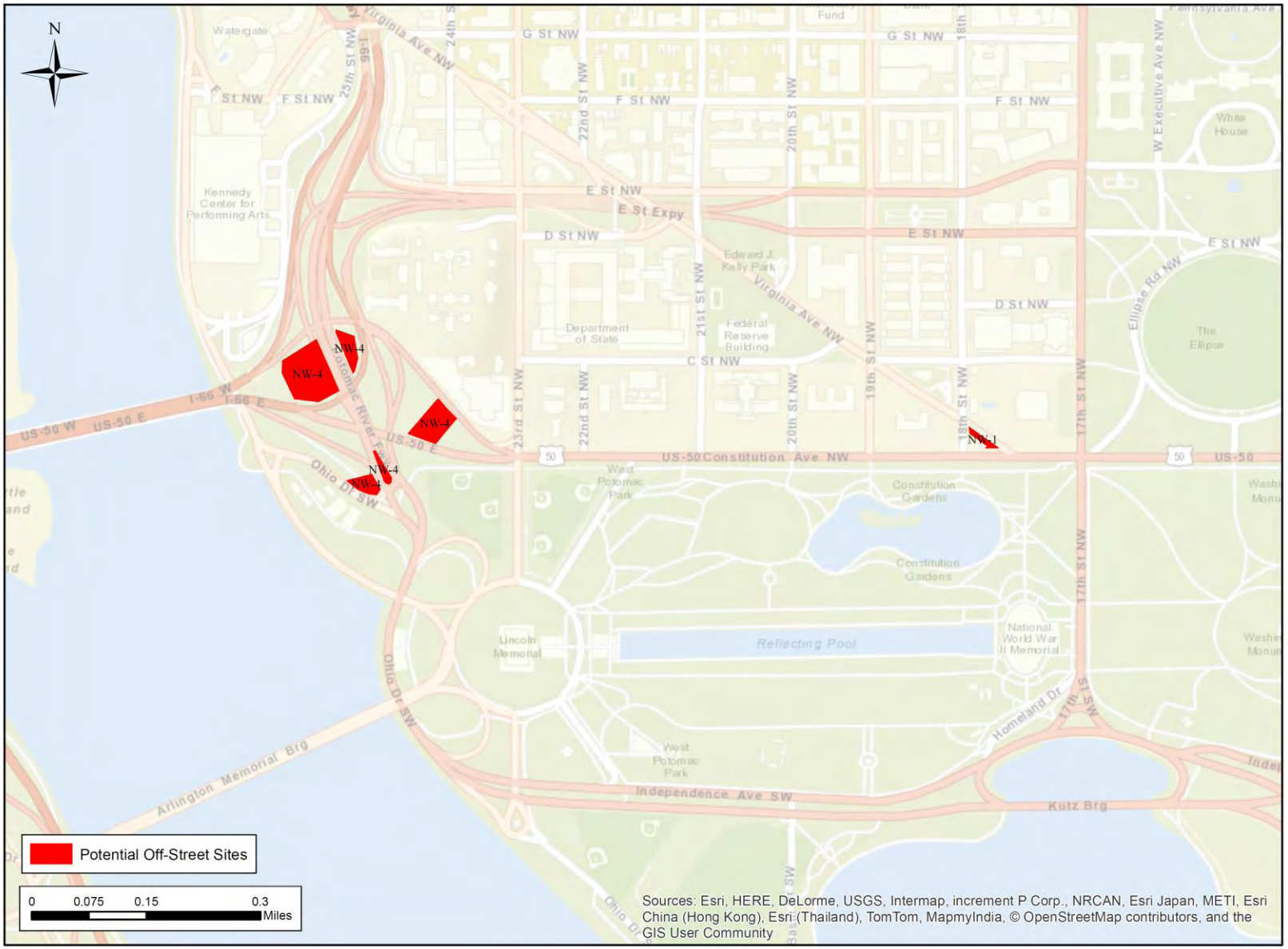


Figure 9.4 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking: Northeast

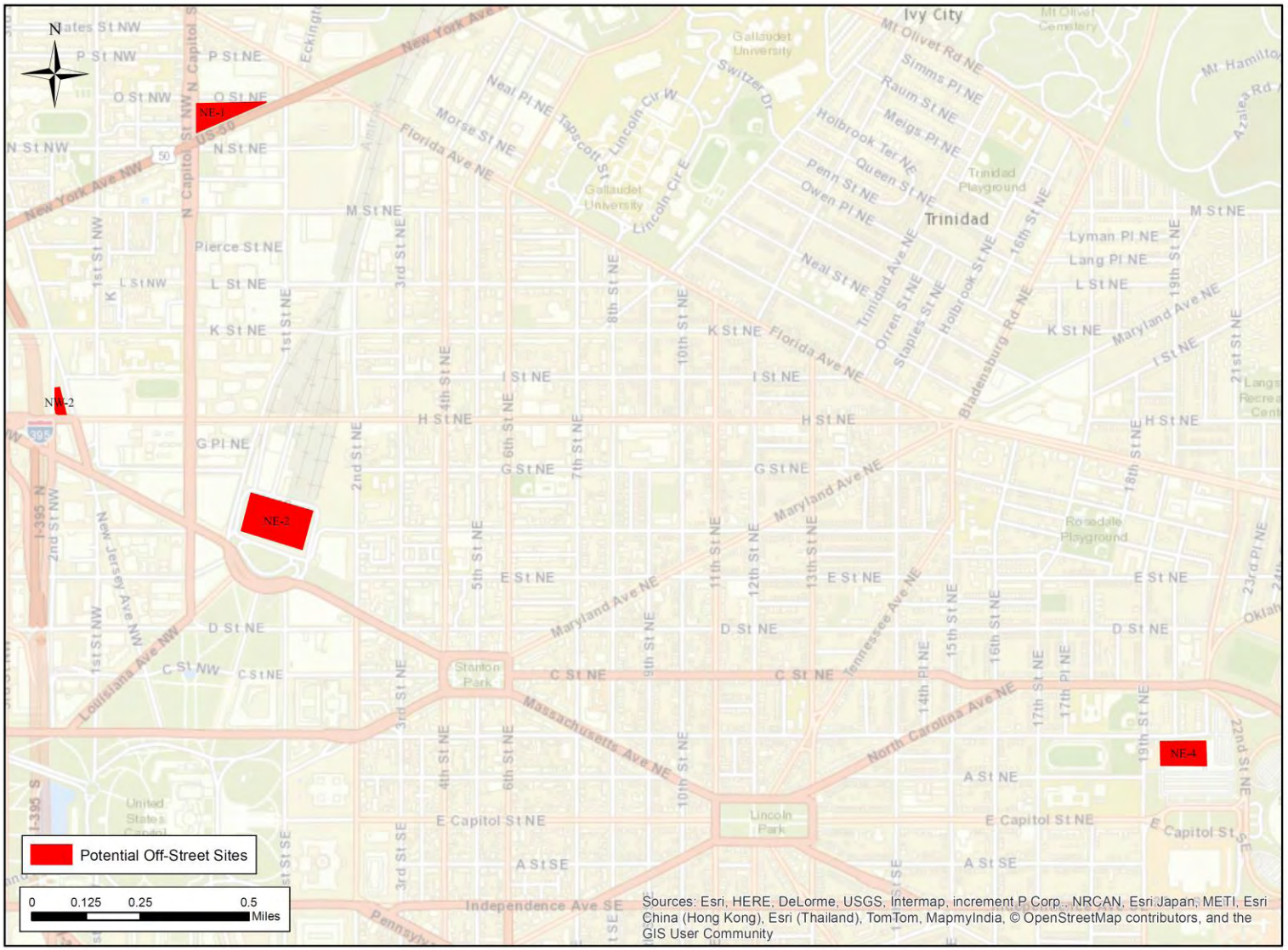


Figure 9.5 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking: Far Northeast

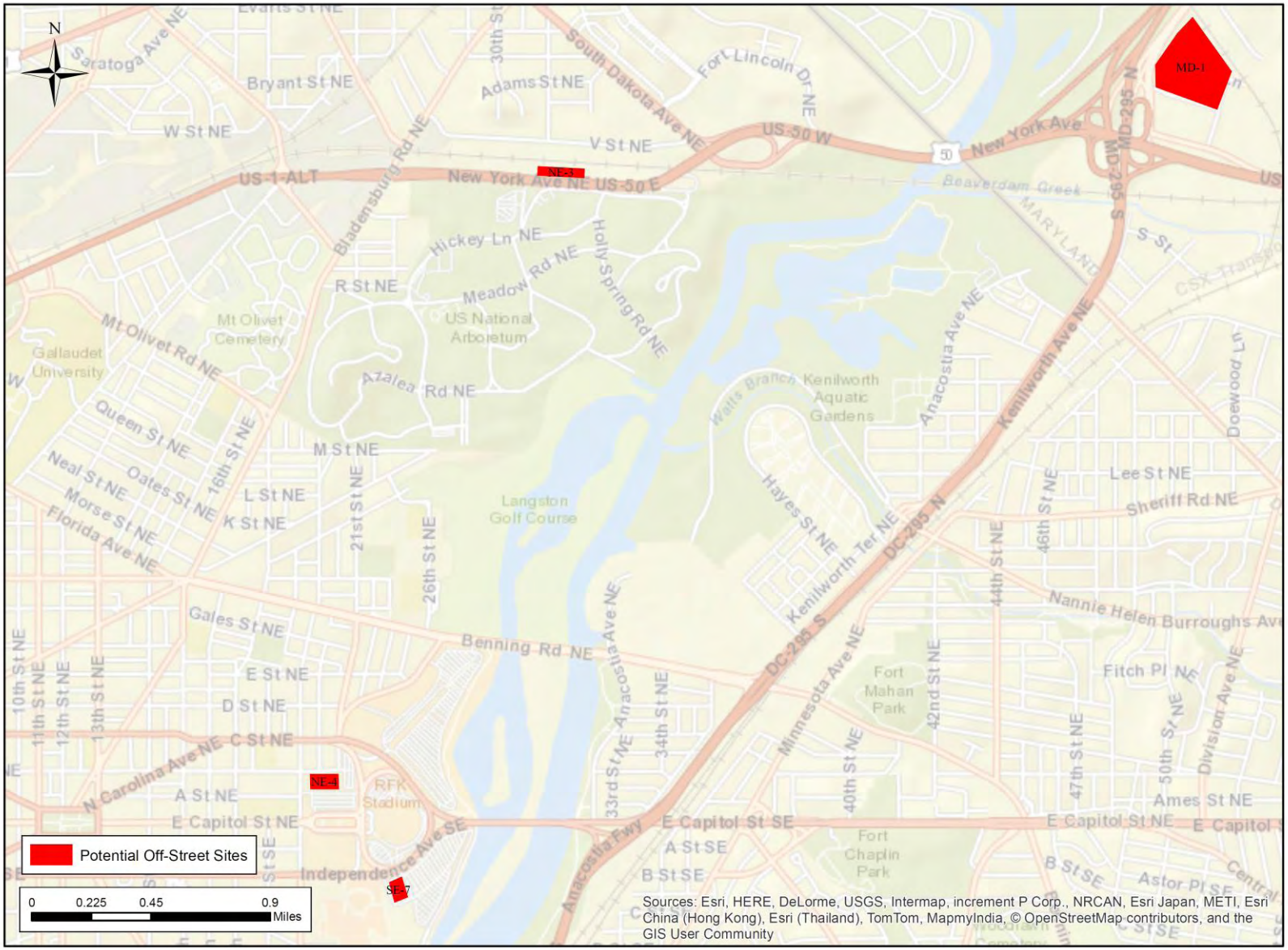


Figure 9.6 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking: National Mall

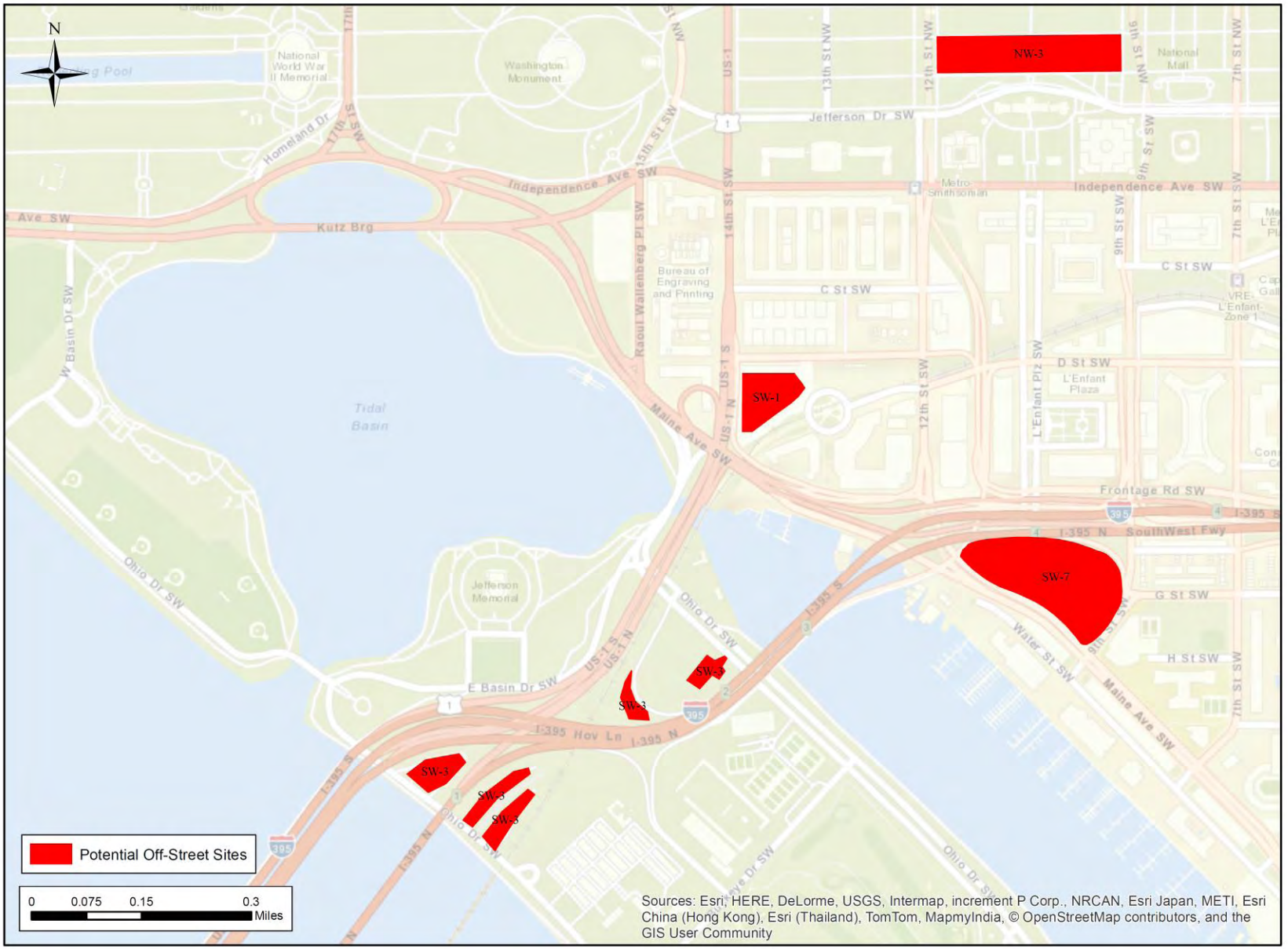
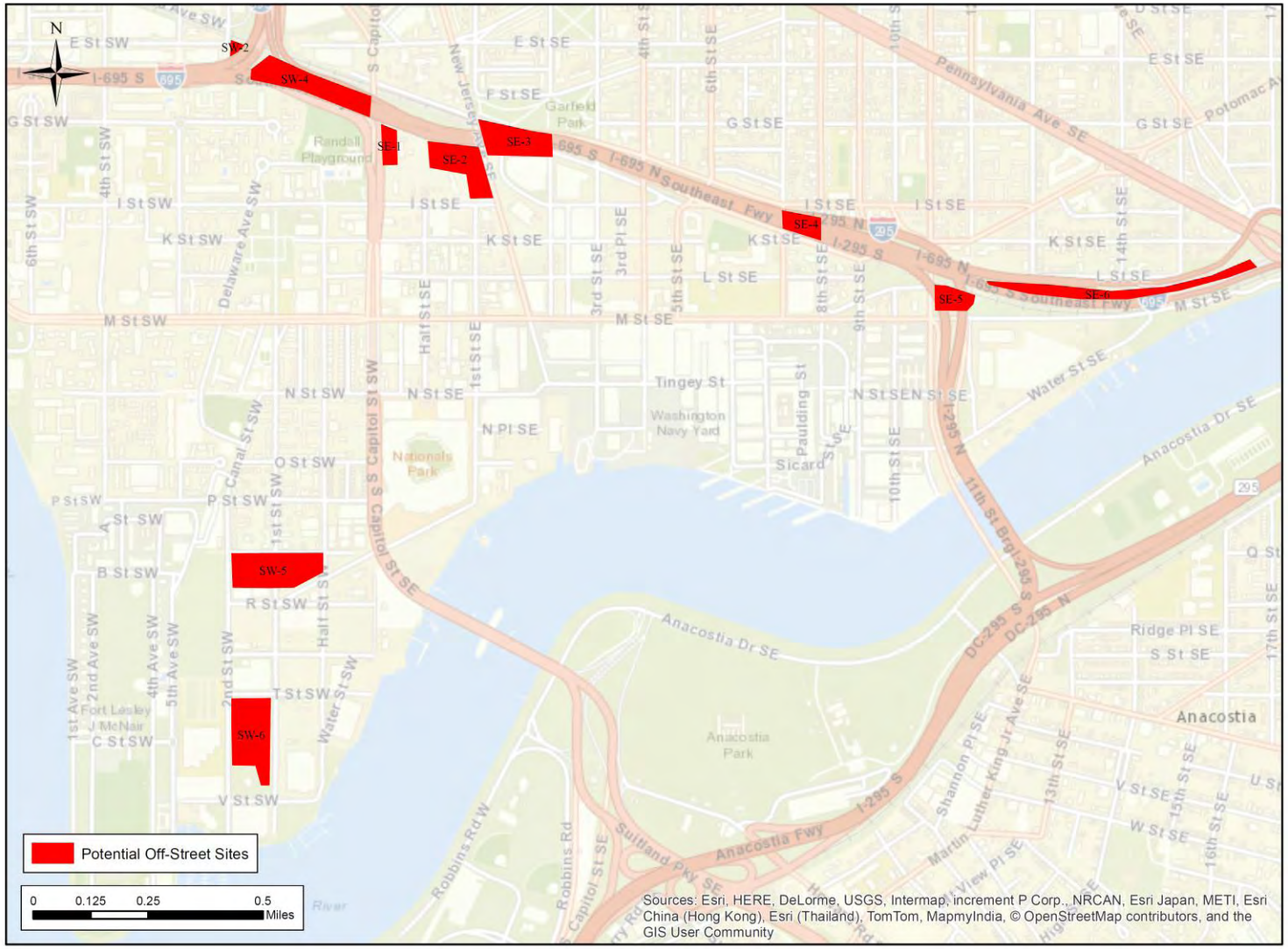


Figure 9.7 Off-Street Sites under Final Consideration for Mid-Day/Long-Term Parking: Southeast/Southwest[39]



[39] *Site SE-6 is the location of the proposed Southeast Boulevard, and any plans for development would need to work with DDOT.* http://www.anacostiawaterfront.org/tag/barney-circle-southeast-boulevard/

Table 9.1 Evaluation of Off-Street Sites for Mid-Day/Long-Term Parking

Site Number	Neighborhood	Site Description	Site Size (Acres)	Site Land Use	Adjacent Land Use	Site Availability	Planned Dev.	Travel Time to National Mall	Notes
Northwest DC									
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	0.2 acres (10 buses)	Transportation Right-of-way	Institutional / Parks & Open Spaces	Public Land, Available	No	8.0 mins	Very small off-street site. Could also function as an on-street staging area
NW-2	NoMa	H St NW between New Jersey Ave and 2nd Ave NW	0.8 acres (40 buses)	Commercial	Medium Density Residential / Parking	Public Land, Available	Maybe	11.0 mins	Potentially slated for development
NW-3	National Mall	National Mall Underground Garage	8.2 acres (410 buses)	Parks / Federal	Parks & Open Spaces	Private Land, Tentatively Available	Maybe	0.0 mins	Unsure of timeline
NW-4	Kennedy Center	Along Potomac River Fwy and I-66 Intersection	5.2 acres (260 buses)	Transportation Right-of-way	Parks & Open Spaces	Public Land, Tentatively Available	No	15.0 mins	Owned by the National Park Service
Northeast DC									
NE-1	NoMa	North Capitol St. between New York Ave NE and O St NE	3.8 acres (190 buses)	Commercial	Commercial / Parks & Open Spaces / Industrial / Federal	Private Land, Uncertain	Maybe	16.0 mins	Owned by Jemal. Development status unknown.
NE-2	NoMa	Union Station Parking Garage	9.0 acres (450 buses)	Mixed Use	Transport, Communication &Utilities / Federal / Parks & Open Spaces /Commercial	Private Land, Uncertain	No	13.0 mins	
NE-3	Arboretum	Parking Lot along New York Ave NE near National Arboretum	4.2 acres (210 buses)	Industrial	Industrial / Parks & Open Spaces / Transport, Communication &Utilities	Private Land, Tentatively Available	Maybe	25.0 mins	Along South Side of New York Avenue
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	4.1 acres (205 buses)	Parks / Local Public	Parking / Federal Public / Medium Den. Residential	Public Land, Available	No	15.0 mins	
Southwest DC									
SW-1	Bureau of Engraving	D St & 14th St SW	3.0 acres (150 buses)	Parking	Federal / Parks & Open Spaces / Commercial	Private Land, Uncertain	Maybe	7.0 mins	Currently leased by parking vendor. Future site of Portals IV and V. Development unknown.

Table 9.1 Evaluation of Off-Street Sites for Mid-Day/Long-Term Parking (Continued)

Site Number	Neighborhood	Site Description	Site Size (Acres)	Site Land Use	Adjacent Land Use	Site Availability	Planned Dev	Travel Time to National Mall	Notes
SW-3	Lincoln Memorial	Public Parking Lot along Ohio Dr SW at 14th St Bridge	5.0 acres (250 buses)	Parks & Open Space	Parks & Open Space	Private Land, Uncertain	Maybe	8 mins	5 various lots. Owned by National Park Service
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	8.0 acres (400 buses)	Roads	Public / Parks & Open Spaces	Private Land, Tentatively Available	Yes	12 mins	Currently leased by parking vendor
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	9.0 acres (450 buses)	Commercial / Industrial Low Medium Residential	Commercial / Industrial / Low Medium Residential	Public Land, Tentatively Available	Maybe	11 mins	Western half of site being developed by Pepco. Eastern half of site could function as a possible short-term site
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St SW	8.6 acres (430 buses)	Commercial / Industrial Low Medium Residential	Commercial / Industrial / Low Medium Residential	Public Land, Tentatively Available	No	11 mins	Access to this site may be challenging, but access could occur via Delaware or Canal Streets.
SW-7	Southwest	Banneker Overlook	1.2 acres (60 buses)	Parks & Open Space	Residential/Commercial	Public Land, Tentatively Available	Maybe	10 mins	Long-term optional. Would likely move forward with redevelopment of site as new memorial or cultural resource.
Southeast DC									
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	1.8 acres	Industrial	Industrial / Parks & Open Spaces	Public Land, Tentatively Available	Maybe	7.5 mins	
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	6.1 acres	Industrial	Industrial / Commercial / Public / Parks & Open Spaces	Public Land, Tentatively Available	No	8.5 mins	
SE-3	South Capitol	Parking under Southeast Freeway between 2nd St to NJ Ave SE	6.0 acres	Roads	Public / Parking / Parks & Open Spaces	Public Land, Tentatively Available	No	7.8 mins	
SE-4	South Capitol	Parking under Southeast Freeway between 8th St SE to 7th St SE	2.4 acres	Roads	Transportation right-of-way	Public Land, Tentatively Available	No	12.0 mins	
SE-5	Southeast Waterfront	Lot between Railroad and L St SE, West of Barney Circle	7.2 acres	Roads /Median	Transportation, Communication & Utilities	Private Land, Uncertain	Maybe	12.0 mins	Will require physical improvements to site

Table 9.1 Evaluation of Off-Street Sites for Mid-Day/Long-Term Parking (Continued)

Site Number	Neighborhood	Site Description	Site Size (Acres)	Site Land Use	Adjacent Land Use	Site Availability	Planned Development	Travel Time to National Mall	Notes
SE-6[40]	Southeast Waterfront	Proposed Southeast Blvd	2.6 acres	Median	Transportation right-of-way / Transport, Communication & Utilities	Private Land, Uncertain	Maybe	12.0 mins	
SE-7	RFK	RFK Stadium	2.8 acres	Parks & Open Spaces	Parks & Open Spaces / Federal	Public Land, Available	No	13.0 mins	
Outside of DC									
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street, to the north	2.0 acres	Parking	Parking / Commercial	Private Land, Not Available because of Future Development	Maybe	7.4 mins	
VA-2	Arlington	Crystal Drive between 29th and 33rd St	4.5 acres	Parking	Parking / Commercial	Private Land, Not Available because of Future Development	Yes	15.0 mins	
MD-1	Cheverly	Industrial lots near US 50 & Kenilworth	3.9 acres	Parking / Commercial / Industrial	Parking / Commercial / Industrial	Private Land, Tentatively Available	Maybe	25.0 mins	Various lots

[40] *Site SE-6 is the location of the proposed Southeast Boulevard, and any plans for development would require collaboration and partnership with DDOT.* http://www.anacostiawaterfront.org/tag/barney-circle-southeast-boulevard/

Table 9.2 Evaluation of Off-Street Sites for Mid-Day/Long-Term Parking[41]

Site Number	Neighborhood	Site Description	Site Size	Site Land Use	Adjacent Land Use	Site Availability	Planned Development	Travel Time to National Mall
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	1	4	1	5	5	3
NW-2	NoMa	H St NW between New Jersey Ave and 2nd Ave NW	2	3	2	5	3	2
NW-3	National Mall	National Mall Underground Garage	5	1	1	3	3	5
NW-4	Kennedy Center	Along Potomac River Fwy and I-66 Intersection	3	4	2	4	5	1
NE-1	NoMa	North Capitol St. between New York Ave NE and O St NE	4	3	3	2	3	1
NE-2	NoMa	Union Station Parking Garage	5	3	2	2	5	2
NE-3	Arboretum	Parking Lot along New York Ave NE near National Arboretum	3	4	2	3	3	1
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	4	1	2	5	5	1
SW-1	Holocaust Museum	D St & 14th St SW	2	5	4	2	3	3
SW-2	Federal Center	Vacant Parking at 2nd and E St SW	1	3	3	2	3	3
SW-3	Federal Center	Ohio Dr SW at 14th St Bridge and East Potomac Park	4	1	2	2	3	3
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	5	3	2	3	1	2
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	5	3	2	4	3	2
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St	5	3	2	4	5	2
SW-7	Southwest	Banneker Overlook	2	1	3	4	3	2
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	2	4	3	4	3	3
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	5	4	4	4	5	3
SE-3	South Capitol	Parking under Southeast Freeway between 2nd St to NJ Ave SE	5	2	4	4	5	3
SE-4	South Capitol	Parking under Southeast Freeway between 8th St SE to 7th St SE	3	2	4	4	5	2
SE-5	Southeast Waterfront	Lot between Railroad and L St SE, West of Barney Circle	5	4	1	2	3	2
SE-6	Southeast Waterfront	Southeast Blvd	3	4	2	2	3	2
SE-7	RFK	RFK Stadium Parking Lot	3	1	1	5	5	2
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street	4	4	3	3	3	3
VA-2	Arlington	Crystal Drive between 29th and 33rd St	5	4	3	1	1	1
MD-1	Cheverly	Industrial lots near US 50 & Kenilworth	5	4	4	3	3	1

[41] *Total weighted score is calculated in Section 11.*

10.0 Implementation

This section explores the various implementation options and funding implications for creating bus parking and layover facilities on selected sites resulting from the analysis described in the previous section. In the following, short-term and long-term options for creating bus layover and parking facilities are explored, including: capital and operating funding requirements, operating structure agreements between facility operators, and land ownership agreements.

Both short-term and long-term options for commuter bus layover and staging in the D.C. area will require different cost and operating structures, ranging from the equivalent price of a parking space in downtown or the cost of land and a parking structure in Southeast or Southwest. To develop rough estimates for these costs, this section researched existing literature and calculations on parking costs for both on-street and off-street scenarios across the nation.

10.1 BASE COSTS

Several studies were examined to develop an estimation of costs associated with implementation of bus staging and parking, for both on- and off-street sites. These studies applied to different regions, types of buses, and facilities, however the study team attempted to summarize the most applicable parts of them to this study of commuter buses in the Washington, D.C. region.

Table 10.1 Typical Parking Facility Financial Costs

Type of Facility	Land Cost, Per Acre	Annualized Land Cost, Per Space	Annualized Construction Cost	Annual O&M Costs	Total Annual Cost	Total Annual Cost
		Automobile				**Bus Space**
Urban, On-Street	$1.2 mil	$453	$543	$345	$1,341	$4,023
Urban, Surface	$1.2 mil	$944	$543	$345	$2,062	$6,186
CBD, 4-Level Structure	$6.0 mil	$1,089	$2,171	$575	$3,835	$11,505
CBD, Underground	$6.0 mil	$0	$3,776	$575	$4,007	$12,021

Source: Victoria Transport Policy Institute (VTPI), (2013). Page 5.4-10. Not DC specific.

Typical costs for bus staging/parking are listed in Table 10.1, which presents the Victoria Transport Policy Institute (VTPI) estimates of capital and O&M costs for on-street, surface, multi-level, and underground parking. As expected, the highest costs are associated with underground parking structures or multi-level

parking structures. Because surface parking in existing on-street spaces would allow for little capital costs, such as the renovation of a space, repaving, or signage, the capital costs for those types of facilities is very low. Even if an off-street site is purchased which requires paving or surface improvement, the capital costs are significantly less than that of constructing a multilevel structure or an underground structure.

In general, on-street facilities present the lowest estimated O&M costs, followed by surface facilities, multi-level parking structures, and underground structures. The specific cost of a facility would depend on the specific site selected, but also taking into account the length of time that a commuter bus operator would plan to use it or lease/own the land. For on-street sites where commuter bus spaces might be converted from metered parking spaces for tour buses or private automobiles, an additional segment of the O&M costs for operators would include the equivalent of the parking fees from the meter.

10.2 Costs & Operating Structures for Staging Sites

Bus Staging Site Costs

Since all of the sites under consideration for commuter bus staging are located on existing streets within the region and within existing right-of-way, there are no projected capital costs associated with a staging site. However, since the vast majority of the sites under consideration are located in 2-hour parking metered zones, there are costs associated with O&M of the parking spaces, if converted into commuter bus parking. Current parking space revenue along these sites will need to be matched by the commuter bus operators, with prices varying across neighborhoods and for different sites and specific time durations.

Parking Revenue Cost Estimation. According to DDOT, who manages approximately 17,000 metered parking spaces in the District, there are two types of street parking zones in the District: Premium Demand Zones (PDZ) - the busiest commercial districts - at a rate of $2.00/hour, and Normal Demand Zones (NDZ), at a rate of $0.75/hour.[42] Hours of enforcement for parking meters in Normal Demand Zones are from 7:00 am to 6:30 pm (11.5 revenue hours/day), and within Premium Demand Zones, enforcement is extended to 10:00 pm (15 revenue hours/day). Parking meters are enforced Monday through Saturday (six revenue days/week), excluding District holidays. However, since commuter bus operation is during the five weekdays, the study team assumed a five revenue days/week model to calculate the estimated space cost.

[42] http://ddot.dc.gov/page/parking-meters

Using this information, estimated parking space revenue per automobile and commuter bus space is calculated below in Table 10.2.

Table 10.2 Estimated Loss of Parking Space Revenue by Zone

Zone	Hourly Parking Fee per Automobile Space	Revenue Hours in Day	All Day Parking Fee per Space	Revenue Days in Year[43]	Estimated Annual Revenue Reimbursement Cost for Bus
Premium Demand Zone – Auto	$2.00	15	$30.00	260	$7,800
Premium Demand Zone – Bus	$2.00	15	$90.00	260	$23,400
Normal Demand Zone - Auto	$0.75	11.5	$8.63	260	$2,245
Normal Demand Zone - Bus	$0.75	11.5	$25.89	260	$6,728

The annual cost for a street parking space ranges from $2,245 (for an automobile) to $6,748 (for a bus) in the Normal Demand Zones. Within the Premium Demand Zones, however, the annual cost for a street parking space ranges from $7,800 (for an automobile) to $23,400 (for a bus). These estimations assume 5 revenue days per week and 52 revenue weeks per year.

With the significant differences in costs, there is incentive for commuter bus operators to locate their on-street staging sites within Normal Demand Zones, to reduce their annual revenue reimbursement costs. However, if they are willing to pay the higher fees to locate their commuter bus staging sites along sites within Premium Demand Zones, that is a feasible option as well. According to DDOT's website, Premium Demand Zones include:

- Adams Morgan
- Georgetown
- Penn Quarter/Chinatown
- U Street NW
- Downtown CBD
- Maine Avenue and Water Streets SW
- The National Mall
- Wisconsin Avenue NW

Bus Staging Site Implementation Arrangements

Besides costs for revenue reimbursement, there are other considerations to be made when thinking about implementation of staging sites for commuter buses in the Washington, D.C. region. The majority of the locations recommended for

[43] *Assuming 5 revenue days/week x 52 revenue weeks/year = 260 revenue days/year.*

consideration are located on public roadways owned by the District, thereby allowing for partnerships with DDOT and the ability to use existing parking spaces. However, there are locations recommended that are between public roadways owned by the District, on public roadways that are currently zoned for other uses (tour bus zones or food truck zones), or are privately-owned.

Different options to addressing these implementation and ownership challenges are explored below, but would each require unique and specific solution if actual implementation were pursued.

- **Traditional Street Parking**. The vast majority of recommended sites are traditional metered street parking in the District, owned by DDOT. To implement these sites as commuter bus staging areas would require permission from DDOT, a change of existing signage, and if required, a removal of the existing meters (removal of meters assumes the annual payment from the commuter bus operators to DDOT for the spaces). The cost of parking enforcement would remain the same for DDOT if no new street parking spaces are used.
- **Parking in Tour Bus Zones**. Several of the on-street adjacent or close to the National Mall are currently owned by DDOT, but currently zoned as "Tour Bus Parking Only." These include sites along Ohio Avenue SW and Tidal Basin Drive SW. One implementation strategy for these sites could be to pursue a shared zone permit in partnership with DDOT and the tour buses, allowing for both commuter and tour buses to park within the zone indicated. This shared zone permit could allow only commuter bus parking within a select few hours of the day, preferably during the early afternoon staging times, and allow for tour bus parking all other hours of the day.
- **Parking in Food Truck Zones**. A handful of the recommended sites within the DC CBD are zoned as "Mobile Roadway-Vending" (MRV) spaces, for different hours on weekdays. Under DC law, food trucks are randomly assigned spots at eight vending locations around the city – Farragut Square, Franklin Square, Union Station, State Department, L'Enfant Plaza, Navy Yard, Metro Center, and George Washington University. Approximately 200 food trucks are licensed in DC, of which 107 are given spots in the monthly lottery. There are a total of 95 parking spaces available each day.[44] Because the food trucks are allowed to use the sites between roughly the hours of 11:00 am and 3:00 pm, there is potential for commuter buses to use the same zones for the AM and PM staging, before and after.
- **Parking along National Park Service Roadways**. A few of the recommended sites within the Foggy Bottom area and surrounding the Kennedy Center are located on roadways not owned by DDOT, but by the National Park Service

[44] http://www.washingtonian.com/blogs/bestbites/food-restaurant-news/how-will-dcs-new- food-truck-regulations-impact-the-street-food-scene.php

(NPS). One of the potential partnerships that would greatly benefit both DDOT and the National Park Service (NPS) is a partnerships involving several of the key sites located near the National Mall or along Rock Creek Park. In the District, NPS operates 23 national parks, bringing in close to 34 million visitors in 2013 alone. The use of these sites for commuter bus staging would require permission and partnership with the NPS, which has not yet been clarified.

- As noted in the *Review of Access and Circulation on the National Mall in Washington, D.C.*, and originally proposed by DDOT in the *Tour Bus Management Initiative,* one idea is to convert the free street parking on Madison and Jefferson Drives into permit parking for up to 25 buses.[45]

In summary, there are several different options for commuter bus operators who wish to use an on-street site for staging in the region. Depending on the location of the specific site and hours of use during the day, the cost for annual parking space revenue reimbursement for an average-sized commuter bus could range from $6,500 to $23,400. If only a few hours out of each day are required for staging, those values could decrease by 50% or 75%, allowing other uses to occupy those Premium Demand Zones.

10.3 COSTS & OPERATING STRUCTURES FOR MID-DAY/LONG-TERM SITES

Bus Mid-Day/Long-Term Site Costs

While the calculation of estimated costs for staging sites was relatively similar, the calculation of costs for mid-day/long-term parking sites is more variable and dependent on specific characteristics of actual sites. As a result, this section leans more heavily on research and literature from existing studies or reports that calculate estimated costs for off-street parking, whether surface, structured, or underground.

This section provides estimated values for capital and construction costs of various types of bus mid-day/long-term site facilities. This section does not address operating or annualized costs due to the wide range of costs that could result from specific characteristics of each off-street site or structure arrangements.

- **Off-Street Surface Parking** are parking facilities on their own land, not on road rights-of-way
- **Off-Street Structured Parking** are parking facilities in or under multi-story buildings

[45] *Page 77.* http://www.savethemall.org/pdf/gmu-report.pdf

- **Underground Parking** are parking facilities underground

Off-Street Surface Parking. Using an off-street site for mid-day/long-term commuter bus parking would prove the most inexpensive option in terms of both capital and long-term costs for a commuter bus operator. If the site is already paved, and all that is needed are fences and a gate, then capital costs for using the lot would be very minimal. However, if the site is unpaved and requires paving, the capital costs would increase to cover the surfacing in addition to other services needed at that location. As a result, the estimated capital/construction costs for a off-street surface parking site in the region would include the cost of the land and the cost of paving/preparation for bus usage (if required).

> *Off-Street Surface Space: Land Cost +Paving Cost ($1,000 per bus space if pavement required)*

Off-Street Structured Parking. In many metropolitan regions, off-street structured parking are the only options for commuter or tour bus parking within CBDs or other urban areas. Compared to a surface lot, both capital costs and operating costs will be significantly higher since the design, construction, and maintenance of a parking structure would be required. Costs for parking structures can vary depending on size per space, shape of site, number of levels, topography, design, and geographic location. Structured parking involves a trade-off between construction and land costs, and typically becomes cost effective when land prices range between $1 million and $5 million per acre.[46]

According to VTPI, the average construction cost per automobile space for a parking structure in large American cities is between $15,000 and $20,000.[47] An April 2014 study by Carl Walker evaluates the median cost per automobile space in parking structures. For Washington, D.C., the study estimated that the construction cost of a passenger car space in a parking structure hovers around $17,500 per automobile space, and around $52,500 per bus space. Therefore, the estimated capital/construction costs for a off-street structured parking site in the region would include the cost of the land and the cost of the structure.

> *Off-Street Structured Space: Land Cost +Parking Structure Cost (around $50,000 per bus space)*

Off-Street Underground Parking. In many places where surface sites and air rights are hard or expensive to come by, underground structures become the last resort for parking. According to a study by Wilbur Smith Associates, constructing underground parking structures can be justified when land costs

[46] http://www.mtc.ca.gov/planning/smart_growth/parking/2-2-12/10-Rick_Willson_Cal_Poly_Pomona_Economic_View_of_Structures.pdf
[47] http://www.vtpi.org/tca/tca0504.pdf

exceed $10 million per acre, which applies to several places in the D.C. region.[48] The ITE Planning Handbook developed an estimated capital/construction cost for a bus space in an underground structure at around $95,900 per bus space.

> *Off-Street Underground Space: Land Cost + Parking Structure Cost (around $95,000 per bus space)*

Bus Mid-Day/Long-Term Site Implementation Arrangements

Besides costs for parking structures, there are other considerations to be made when thinking about implementation of mid-day/long-term sites for commuter and tour buses in the Washington, D.C. region. The majority of the locations recommended for consideration are located on private or City-owned land, thereby allowing for partnerships with DDOT. However, many of the locations have unclear ownership, or would require partnerships with local or private entities.

Different options to addressing these implementation and ownership challenges are explored below, each requiring a specific plan if actual implementation were pursued.

- **National Park Service Lots**. A few of the recommended sites within the Foggy Bottom area are located alongside roadways owned by the National Park Service (NPS), specifically along Rock Creek and Potomac Parkway and also along Ohio Drive SW near the Jefferson Memorial. The use of these sites for bus mid-day parking would require permission and partnership with the NPS, which has not yet been clarified.
- **Lots Owned by Private Individuals/Companies.** Several of the recommended sites are owned by private individuals/companies, and would requite specific partnerships and negotiations as to land purchase, land lease, or other such arrangements.

In summary, there are several different options for commuter bus operators who wish to use an off-street site for mid-day or long-term bus parking in the region. Depending on the location of the specific site, capital and construction costs per off-street bus space could range from $1,000 to $95,000.

[48] http://www.mtc.ca.gov/planning/smart_growth/parking/2-2-12/10-Rick_Willson_Cal_Poly_Pomona_Economic_View_of_Structures.pdf

11.0 Site Rankings and Recommendations

In the final section, the site evaluation process will be completed by summarizing site rankings and recommendations for both short-term staging and long-term/mid-day bus parking in the study area. Building on the evaluation criteria used earlier in this report, a framework of weighting criteria is applied to both sets of sites under consideration, further narrowing down a list of final recommended site. The weighting criteria, both quantitative and qualitative in nature, are used to rank order the matrix of options for bus staging, layover, and parking locations.

11.1 SITE ANALYSIS: BUS STAGING SITES

This study evaluated 34 on-street sites for bus staging and layover, examining their different characteristics, size, travel time, and location. To further analyze and rank the sites, a weighting framework was developed to determine a final list of recommended sites. This weighting framework is illustrated in Table 11.1 below, assigning percentage values to each of the five bus staging criteria used to weight different characteristics of higher or lesser importance to this study.

Table 11.1 Bus Staging Weighting Framework

Criteria	Share
1. Site Size	5%
2. Site Land Use	20%
3. Site Availability	20%
4. Travel Time to First Stop	40%
5. Site Connectivity/Ease of Access	15%
Total	**100%**

As evidenced by the weighting values, the factors of the highest importance to commuter bus staging in the region are travel time to first stop, site land use, and site availability. Larger sites that are closer to first stops are preferable to smaller sites that may be further away from their first stop locations. This weighting framework is applied to the on-street staging site locations in Table 11.2 and Table 11.3.

Table 11.2 Weighted Rankings: Staging Sites

Site Number	Neighborhood	Site Description	Site Size (5%)	Site Land Use (20%)	Site Avail. (20%)	Travel Time to First Stop (40%)	Connectivity (15%)	Weighted Ranking
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	4	4	5	5	5	4.8
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	4	4	5	5	5	4.8
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	4	5	5	5	5	5.0
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	5	5	5	5	5	5.0
NW-4A	Foggy Bottom	Along Virginia Avenue NW between 19th & 21st St NW	5	5	5	5	5	5.0
NW-4B	Foggy Bottom	Along Virginia Avenue NW between 20th & 21st St NW	5	5	5	5	5	5.0
NW-5	Foggy Bottom	Along H St NW between 21st & 22nd St NW	3	4	5	3	3	3.6
NW-6	Farragut	Along 17th St NW between H & I St NW	2	3	5	3	3	3.4
NW-7A	McPherson Sq.	14th St NW between I & K St NW, Northbound	3	4	4	3	3	3.4
NW-7B	McPherson Sq.	14th St NW between I & K St NW, Southbound	3	4	4	3	3	3.4
NW-8	McPherson Sq.	K St NW north of Franklin Park, Eastbound	4	4	4	2	3	3.1
NW-9	Metro Center	12th St NW between F & G St NW	3	4	4	3	3	3.4
NW-10	Judiciary Sq.	G St NW between 4th & 5th St NW	5	4	5	2	3	3.3
NW-11	Judiciary Sq.	F St NW between 4th & 5th St NW	5	5	5	2	3	3.5
NW-12	Judiciary Sq.	4th St NW between E and G St NW, Southbound	5	4	5	2	3	3.3
NW-13A	Judiciary Sq.	3rd St NW between E and G St, NW, Northbound	5	4	5	2	3	3.3
NW-13B	Judiciary Sq.	3rd St NW between E and F St, NW, Southbound	3	4	5	2	3	3.2
NW-14	NoMa	Pierce St NW between New Jersey Ave and 1st St NW	4	4	4	3	3	3.5
NW-15	NoMa	L St NW EB between NJ Ave to 1st St NW	4	4	4	2	1	2.8
NE-1	NoMa	2nd St NE NB from K St to L St NE, Northbound	3	4	4	2	3	3.0
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	4	4	5	4	3	4.1
SW-1A	National Parks	Ohio Dr SW between Independence Ave SW & West Basin Drive SW	5	3	4	3	3	3.3
SW-1B	National Parks	West Basin Drive SW between Ohio Dr SW & Independence Ave SW	5	3	4	3	3	3.3
SW-2	Engraving	C St SW between 12th & 14th St SW	5	4	5	3	5	4.0
SW-3	Engraving	D St SW between 12th & 14th St SW	5	4	5	3	5	4.0
SW-4A	Engraving	D St SW between 7th & 9th St SW, Eastbound	5	3	5	4	3	3.9
SW-4B	Engraving	D St SW between 6th & 9th St SW, Westbound	5	3	5	4	3	3.9
SW-5	Engraving	Virginia Ave SW WB between 6th & 7th St SW	4	3	5	4	3	3.9
SW-6	Engraving	Virginia Ave SW WB between 4th & 6th St SW, Westbound	4	3	5	4	3	3.9
SW-7	L'Enfant	6th St SW between E & D St SW, Southbound	4	4	5	4	3	4.1
SW-8	L'Enfant	E St between 6th & 7th St SW	5	3	5	4	3	3.9
SW-9	L'Enfant	Maryland Ave SW between 6th and 7th St SW	4	3	5	4	3	3.9
SW-10	Federal Center	D St SW between 2nd and 4th St SW, Eastbound	5	3	4	2	3	2.9
SW-11	National Parks	Ohio Dr SW between and the Francis Case Memorial Bridge	4	3	3	3	3	3.1
VA-1	Arlington	Long Bridge Drive, Arlington	5	3	4	3	3	3.3
VA-2	Crystal City	S Eads St NB, Arlington	5	2	5	1	3	2.5

Table 11.3 Weighted Rankings: Staging Sites (Sorted by Weighted Ranking)

Site Number	Neighborhood	Site Description	Site Size (5%)	Site Land Use (20%)	Site Avail. (20%)	Travel Time to First Stop (40%)	Connectivity (15%)	Weighted Ranking
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	5	5	5	5	5	5.0
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	4	5	5	5	5	5.0
NW-4A	Foggy Bottom	Along Virginia Avenue NW between 19th & 21st St NW	5	5	5	5	5	5.0
NW-4B	Foggy Bottom	Along Virginia Avenue NW between 20th & 21st St NW	5	5	5	5	5	5.0
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	4	4	5	5	5	4.8
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	4	4	5	5	5	4.8
SW-7	L'Enfant	6th St SW between E & D St SW, Southbound	4	4	5	4	3	4.1
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	4	4	5	4	3	4.1
SW-2	Engraving	C St SW between 12th & 14th St SW	5	4	5	3	5	4.0
SW-3	Engraving	D St SW between 12th & 14th St SW	5	4	5	3	5	4.0
SW-4A	Engraving	D St SW between 7th & 9th St SW, Eastbound	5	3	5	4	3	3.9
SW-4B	Engraving	D St SW between 6th & 9th St SW, Westbound	5	3	5	4	3	3.9
SW-8	L'Enfant	E St between 6th & 7th St SW	5	3	5	4	3	3.9
SW-5	Engraving	Virginia Ave SW WB between 6th & 7th St SW	4	3	5	4	3	3.9
SW-6	Engraving	Virginia Ave SW WB between 4th & 6th St SW, Westbound	4	3	5	4	3	3.9
SW-9	L'Enfant	Maryland Ave SW between 6th and 7th St SW	4	3	5	4	3	3.9
NW-5	Foggy Bottom	Along H St NW between 21st & 22nd St NW	3	4	5	3	3	3.6
NW-11	Judiciary Sq.	F St NW between 4th & 5th St NW	5	5	5	2	3	3.5
NW-14	NoMa	Pierce St NW between New Jersey Ave and 1st St NW	4	4	4	3	3	3.5
NW-7A	McPherson Sq.	14th St NW between I & K St NW, Northbound	3	4	4	3	3	3.4
NW-7B	McPherson Sq.	14th St NW between I & K St NW, Southbound	3	4	4	3	3	3.4
NW-9	Metro Center	12th St NW between F & G St NW	3	4	4	3	3	3.4
NW-6	Farragut	Along 17th St NW between H & I St NW	2	3	5	3	3	3.4
NW-10	Judiciary Sq.	G St NW between 4th & 5th St NW	5	4	5	2	3	3.3
NW-12	Judiciary Sq.	4th St NW between E and G St NW, Southbound	5	4	5	2	3	3.3
VA-1	Arlington	Long Bridge Drive, Arlington	5	3	4	3	1	3.3
SW-1A	National Parks	Ohio Dr SW between Independence Ave SW & West Basin Drive SW	5	3	4	3	3	3.3
SW-1B	National Parks	West Basin Drive SW between Ohio Dr SW & Independence Ave SW	5	3	4	3	3	3.3
NW-13A	Judiciary Sq.	3rd St NW between E and G St, NW, Northbound	5	4	5	2	3	3.3
NW-13B	Judiciary Sq.	3rd St NW between E and F St, NW, Southbound	3	4	5	2	3	3.2
SW-11	National Parks	Ohio Dr SW between and the Francis Case Memorial Bridge	4	3	3	3	3	3.1
NW-8	McPherson Sq.	K St NW north of Franklin Park, Eastbound	4	4	4	2	3	3.1
NE-1	NoMa	2nd St NE NB from K St to L St NE, Northbound	3	4	4	2	3	3.0
SW-10	Federal Center	D St SW between 2nd and 4th St SW, Eastbound	5	3	4	2	3	2.9
NW-15	NoMa	L St NW EB between NJ Ave to 1st St NW	4	4	4	2	1	2.8
VA-2	Crystal City	S Eads St NB, Arlington	5	2	5	1	3	2.5

11.2 SITE ANALYSIS: BUS MID-DAY/LONG-TERM SITES

This study evaluated 25 off-street sites for bus mid-day and long-term parking, examining their different characteristics, size, travel time, and location. To further analyze and rank the sites, a weighting framework was developed to determine a final list of recommended sites. This weighting framework is illustrated in Table 11.4 below, assigning percentage values to each of the six bus mid-day/long-term parking criteria used to weight different characteristics of higher or lesser importance to this study.

Table 11.4 Bus Mid-Day/Long-Term Weighting Framework

Criteria	Share
1. Site Size	25%
2. Site Land Use	10%
3. Adjacent Land Use	10%
4. Site Availability	25%
5. Planned Development	10%
6. Travel Time to National Mall	20%
Total	**100%**

As evidenced by the weighting values, the two factors of the highest importance to bus mid-day and long-term parking in the region are site size and site availability. Since a majority of the off-street sites are privately owned or would require additional work to purchase or lease than an on-street arrangement, it is very important that a recommended site be large enough, and available/easily accessible. This weighting framework is applied to the off-street mid-day/long-term site locations in Table 11.5 and Table 11.6.

Table 11.5 Weighted Rankings: Mid-Day/Long-Term Parking Sites

Site Number	Neighborhood	Site Description	Site Size (25%)	Site Land Use (10%)	Adjacent Land Use (10%)	Site Availability (25%)	Planned Development (10%)	Travel Time to National Mall (20%)	Weighted Ranking
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	1	4	1	5	5	3	3.1
NW-2	NoMa	H St NW between New Jersey Ave and 2nd Ave NW	2	3	2	5	3	2	3.0
NW-3	National Mall	National Mall Underground Garage	5	1	1	3	3	5	3.5
NW-4	Kennedy Center	Along Potomac River Fwy and I-66 Intersection	3	4	2	4	5	1	3.1
NE-1	NoMa	North Capitol St. between New York Ave NE and O St NE	4	3	3	2	3	1	2.6
NE-2	NoMa	Union Station Parking Garage	5	3	2	2	5	2	3.2
NE-3	Arboretum	Parking Lot along New York Ave NE near National Arboretum	3	4	2	3	3	1	2.6
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	4	1	2	5	5	1	3.3
SW-1	Holocaust Museum	D St & 14th St SW	2	5	4	2	3	3	2.8
SW-2	Federal Center	Vacant Parking at 2nd and E St SW	1	3	3	2	3	3	2.3
SW-3	Federal Center	Ohio Dr SW at 14th St Bridge and East Potomac Park	4	1	2	2	3	3	2.7
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	5	3	2	3	1	2	3.0
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	5	3	2	4	3	2	3.5
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St	5	3	2	4	5	2	3.7
SW-7	Southwest	Banneker Overlook	2	1	3	4	3	2	2.6
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	2	4	3	4	3	3	3.1
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	5	4	4	4	5	3	4.2
SE-3	South Capitol	Parking under Southeast Freeway between 2nd St to NJ Ave SE	5	2	4	4	5	3	4.0
SE-4	South Capitol	Parking under Southeast Freeway between 8th St SE to 7th St SE	3	2	4	4	5	2	3.3
SE-5	Southeast Waterfront	Lot between Railroad and L St SE, West of Barney Circle	5	4	1	2	3	2	3.0
SE-6	Southeast Waterfront	Southeast Blvd	3	4	2	2	3	2	2.6
SE-7	RFK	RFK Stadium Parking Lot	3	1	1	5	5	2	3.1
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street	4	4	3	3	3	3	3.4
VA-2	Arlington	Crystal Drive between 29th and 33rd St	5	4	3	1	1	1	2.5
MD-1	Cheverly	Industrial lots near US 50 & Kenilworth	5	4	4	3	3	1	3.3

Table 11.6 Weighted Rankings: Mid-Day/Long-Term Parking Sites (Sorted by Weighted Ranking)

Site Number	Neighborhood	Site Description	Site Size (25%)	Site Land Use (10%)	Adjacent Land Use (10%)	Site Availability (25%)	Planned Development (10%)	Travel Time to National Mall (20%)	Weighted Ranking
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	5	4	4	4	5	3	4.2
SE-3	South Capitol	Parking under SE Freeway, 2nd St to NJ Ave SE	5	2	4	4	5	3	4.0
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St	5	3	2	4	5	2	3.7
NW-3	National Mall	National Mall Underground Garage	5	1	1	3	3	5	3.5
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	5	3	2	4	3	2	3.5
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street	4	4	3	3	3	3	3.4
MD-1	Cheverly	Industrial Lots near US 50 & Kenilworth	5	4	4	3	3	1	3.3
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	4	1	2	5	5	1	3.3
SE-4	South Capitol	Parking under SE Freeway, 8th St SE to 7th St SE	3	2	4	4	5	2	3.3
NE-2	NoMa	Union Station Parking Garage	5	3	2	2	5	2	3.2
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	1	4	1	5	5	3	3.1
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	2	4	3	4	3	3	3.1
SE-7	RFK	RFK Stadium Parking Lot	3	1	1	5	5	2	3.1
NW-4	Kennedy Center	Along Potomac River Fwy and I-66 Intersection	3	4	2	4	5	1	3.1
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	5	3	2	3	1	2	3.0
NW-2	NoMa	H St NW between New Jersey Ave and 2nd Ave NW	2	3	2	5	3	2	3.0
SW-1	Holocaust Museum	D St & 14th St SW	2	5	4	2	3	3	2.8
SE-5	Southeast Waterfront	Southeast Blvd	3	4	2	3	3	2	2.8
SW-3	Federal Center	Ohio Dr SW at 14th St Bridge and East Potomac Park	4	1	2	2	3	3	2.7
SE-6	Southeast Waterfront	Southeast Blvd	3	4	2	2	3	2	2.6
NE-1	NoMa	North Capitol St. between New York Ave NE and O St NE	4	3	3	2	3	1	2.6
SW-7	Southwest	Banneker Overlook	2	1	3	4	3	2	2.6
NE-3	Arboretum	Parking Lot along New York Ave NE near National Arboretum	3	4	2	3	3	1	2.6
VA-2	Arlington	Crystal Drive between 29th and 33rd St	5	4	3	1	1	1	2.5
SW-2	Federal Center	Vacant Parking at 2nd and E St SW	1	3	3	2	3	3	2.3

Table 11.7 Estimates of Planning-Level Annual Costs: Recommended On-Street Sites

							Estimated Annual Costs		
Site Number	Neighborhood	Site	Weighted Ranking	Length of Space	Parking Zone	Bus Spaces[49]	11.5 hours/day	6 hours/day	3 hours/day
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	5.0	800 ft	Premium	13	$304,200	$158,713	$79,357
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	5.0	575 ft	Premium	9	$210,600	$109,878	$54,939
NW-4A	Foggy Bottom	Virginia Avenue NW between 19th & 21st St NW	5.0	800 ft	Premium	13	$304,200	$158,713	$79,357
NW-4B	Foggy Bottom	Virginia Avenue NW between 20th & 21st St NW	5.0	400 ft	Premium	6	$140,400	$73,252	$36,626
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	4.8	575 ft	Premium	9	$210,600	$109,878	$54,939
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	4.8	575 ft	Premium	9	$210,600	$109,878	$54,939
SW-7	L'Enfant	6th St SW between E & D St SW, Southbound	4.1	475 ft	Premium	7	$163,800	$85,461	$42,730
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	4.1	350 ft	Premium	5	$117,000	$61,044	$30,522
SW-2	Engraving	C St SW between 12th & 14th St SW	4.0	950 ft	Premium	15	$351,000	$183,130	$91,565
SW-3	Engraving	D St SW between 12th & 14th St SW	4.0	950 ft	Premium	15	$351,000	$183,130	$91,565
SW-4A	Engraving	D St SW between 7th & 9th St SW, Eastbound	3.9	750 ft	Premium	12	$280,800	$146,504	$73,252
SW-4B	Engraving	D St SW between 6th & 9th St SW, Westbound	3.9	1,000 ft	Premium	16	$374,400	$195,339	$97,670
SW-8	L'Enfant	E St between 6th & 7th St SW	3.9	1,150 ft	Premium	9	$210,600	$109,878	$54,939
SW-5	Engraving	Virginia Ave SW WB between 6th & 7th St SW	3.9	500 ft	Premium	7	$163,800	$85,461	$42,730

[49] *The study team assumed a length of 60 feet required for a bus space.*

Table 11.8 Estimates of Planning-Level Capital/Construction Costs: Recommended Off-Street Sites

Site Number	Neighborhood	Site	Weighted Ranking	Acreage	Land Cost (at $3 mil/acre)[50]	Potential Bus Spaces: Surface[51]	Potential Bus Spaces: Structure[52]	Construction Cost: Surface[53]	Construction Cost: Structure[54]
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	4.2	6.1 acres	$18.3 million	122	488	$122,000	$24,400,000
SE-3	South Capitol	Parking under Southeast Freeway between 2nd St to NJ Ave SE	4.0	6.0 acres	$18 million	120	480	$120,000	$24,000,000
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St	3.7	8.6 acres	$25.8 million	172	688	$172,000	$34,400,000
NW-3	National Mall	National Mall Underground Garage	3.5	8.2 acres	$24.6 million	n/a	200	n/a	$200,000,000+[55]
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	3.5	9.0 acres	$27 million	180	720	$180,000	$36,000,000
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street	3.4	2.0 acres	$6 million	40	160	$40,000	$8,000,000
MD-1	Cheverly	Industrial lots near US 50 & Kenilworth	3.3	3.9 acres	$11.7 million	78	312	$78,000	$15,600,000
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	3.3	4.1 acres	$12.3 million	82	328	$82,000	$16,400,000
SE-4	South Capitol	Parking under Southeast Freeway between 8th St SE to 7th St SE	3.3	2.4 acres	$7.2 million	48	192	$48,000	$9,600,000
NE-2	NoMa	Union Station Parking Garage	3.2	9.0 acres	$27 million	180	720	$180,000	$36,000,000
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	3.1	0.2 acres	$0.6 million	4	16	$4,000	$800,000
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	3.1	1.8 acres	$5.4 million	36	144	$36,000	$7,200,000
SE-7	RFK	RFK Stadium Parking Lot	3.1	2.8 acres	$8.4 million	56	224	$56,000	$11,200,000
NW-4	Kennedy Center	Along Potomac River Fwy and I-66	3.1	5.2 acres	$15.6 million	104	416	$104,000	$20,800,000
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	3.0	8.0 acres	$24 million	160	640	$160,000	$32,000,000

[50] Based on searches for commercial property in Washington, D.C. CBD in November 2014.
[51] The study team assumed 1 acre could hold 20 buses on a surface lot.
[52] The study team assumed a four-level parking structure, both above and underground.
[53] The study team estimated $1,000 construction cost per bus space, described in Section 11.3.
[54] The study team estimated $5,000 construction cost per bus space, described in Section 11.3.
[55] The National Mall Underground Garage is estimated to hold 600 automobiles, 200 buses, and have a capital/construction cost of $168-$248 million.

11.3 RECOMMENDED SITES

Beginning with hundreds of sites, this study used an evaluation process to perform site screening, selection, and weighting process for two types of regional bus needs in Washington, D.C.: on-street locations for staging commuter buses prior to the beginning of afternoon service, and off-street locations for parking or layover of buses. Lists of recommended sites have been identified for further investigation and advancement by motorcoach operators and agency stakeholders, including a variety of options within similar neighborhoods. A set of scoring and weighting criteria have been applied to the highest-ranked sites, building on the evaluation criteria identified in the beginning of the report. A ranked list of the most promising sites for both on-street staging and off-street parking are presented.

Recommended Sites. Using both the initial evaluation and weighting framework listed previously, a list of final recommended sites were determined, and are listed below in Table 11.9 for on street staging sites and in Table 11.10 for off-street mid-day/long-term parking.

For on-street staging sites, the majority of the sites are located in the Foggy Bottom or L'Enfant/Department of Engraving neighborhoods. As expected, most of the highest-ranked and weighted sites are very close to commuter bus first stops at the State Department and L'Enfant Plaza areas. The top sites in the Judiciary Square and NoMa neighborhoods rated lower overall.

Table 11.9 Recommended Sites: On-Street Staging

Site Number	Neighborhood	Site	Weighted Ranking
NW-3B	Foggy Bottom	E St NW between 18th & 20th St NW, Eastbound	5.0
NW-3A	Foggy Bottom	E St NW between 17th & 18th St NW, Eastbound	5.0
NW-4A	Foggy Bottom	Along Virginia Avenue NW between 19th & 21st St NW	5.0
NW-4B	Foggy Bottom	Along Virginia Avenue NW between 20th & 21st St NW	5.0
NW-1	Foggy Bottom	C St NW between 17th & 18th St NW, Westbound	4.8
NW-2	Foggy Bottom	D St NW between 17th & 18th St NW	4.8
SW-7	L'Enfant	6th St SW between E & D St SW, Southbound	4.1
SE-1	Southeast	M St SE between 2nd St SE and 3rd St SE	4.1
SW-2	Engraving	C St SW between 12th & 14th St SW	4.0
SW-3	Engraving	D St SW between 12th & 14th St SW	4.0
SW-4A	Engraving	D St SW between 7th & 9th St SW, Eastbound	3.9
SW-4B	Engraving	D St SW between 6th & 9th St SW, Westbound	3.9
SW-8	L'Enfant	E St between 6th & 7th St SW	3.9
SW-5	Engraving	Virginia Ave SW WB between 6th & 7th St SW	3.9
NW-11	Judiciary Sq.	F St NW between 4th & 5th St NW	3.5
NW-14	NoMa	Pierce St NW between New Jersey Ave and 1st St NW	3.5

For mid-day/long-term parking sites, a more diverse set of site options resulted, as compared to the rather clustered staging sites. Since the National Mall was

used as the destination from all of these commuter buses, the location of these sites vary in terms of size. They are all a relatively similar distance from the National Mall, though in different directions.

Table 11.10 Recommended Sites: Off-Street Mid-Day/Long-Term Parking

Site Number	Neighborhood	Site	Weighted Ranking
SE-2	South Capitol	Lot W of New Jersey Ave SE at Southeast Freeway	4.3
SE-3	South Capitol	Parking under Southeast Freeway between 2nd St to NJ Ave SE	4.0
SW-6	Buzzard Point	Buzzard Point, bounded by T, V, 1st and 2nd St	3.7
NW-3	National Mall	National Mall Underground Garage	3.5
SW-5	Navy Yard	Buzzard Point, along Potomac Ave SW	3.5
VA-1	Pentagon	Army Navy Drive between Joyce and Hayes Street	3.4
MD-1	Cheverly	Industrial lots near US 50 & Kenilworth	3.3
NE-4	RFK	RFK Stadium Parking Lot along Constitution Ave NE	3.3
SE-4	South Capitol	Parking under Southeast Freeway between 8th St SE to 7th St SE	3.3
NE-2	NoMa	Union Station Parking Garage	3.2
NW-1	Foggy Bottom	Virginia Ave at 18th Street NW	3.1
SE-1	South Capitol	Vacant Parking Lot under Southeast Freeway East of South Capitol St SW	3.1
SE-7	RFK	RFK Stadium Parking Lot	3.1
NW-4	Kennedy Center	Along Potomac River Fwy and I-66 Intersection	3.1
SW-4	Federal Center	Under Southeast Freeway from South Capitol St SW to 3rd St SW	3.0
NW-2	NoMa	H St NW between New Jersey Ave and 2nd Ave NW	3.0

Estimated Costs for Recommended Sites. Depending on the location of specific sites, estimated costs for commuter bus sites vary heavily. The cost for annual parking space revenue reimbursement for a commuter bus space could range from $6,500 to $23,400 if used for the entire weekday, and even less if used for only two or three hours a day. Cost estimates for annual costs by site are presented in Table 11.7 for recommended staging sites.

For mid-day/long-term parking needs, capital and construction costs for a commuter bus lot or structured facility could range as high as $95,000 per bus space (for an underground garage), or as low as $1,000 per bus space (for a surface lot). Cost estimates for capital/construction costs by site are presented in Table 11.8 for recommended long-term/mid-day sites.

Recommended Implementation Approaches. In addition, this study explored the various implementation options for creating bus layover and parking facilities on preferred sites resulting from the site analysis. Based on the analysis and on the location of the recommended sites, the following implementation options are recommended:

- Traditional Street Parking
- Parking in Food Truck Zones
- Lots Owned by Private Individuals/Companies

11.4 NEXT STEPS

This study investigated two basic needs for commuter and tour buses in the core of the region: (1) on-street locations for staging commuter buses prior to the beginning of afternoon service, and (2) off-street locations for parking or layover of both commuter and tour buses. The previous section included a list of recommended sites for further investigation and advancement by the motorcoach operators and agency stakeholders. The next steps moving forward also varies by the type of bus facility – on-street staging versus off-street parking.

For on-street staging sites, this study identified a number of potential candidate sites in D.C. and Arlington. The sites in D.C. rated higher overall due to their proximity to first stop locations. Some next steps for moving forward include:

- Further investigation on permitting of shared use locations, in particular, the shared use of curb space for both food trucks and commuter bus staging. The sites that are shared-use provide a good opportunity because of the limited impact on parking revenues and the relatively complementary time period needs (food trucks in the mid-day and commuter buses in the afternoon).
- Review and discussion with District Department of Transportation staff on the permit process and parking revenue impacts of some of the most promising sites that would impact on-street parking.
- Review and discussion with the National Park Service on locations adjacent to the National Mall and in East Potomac Park.
- Site approvals and potential agreement (such a Memorandum of Understanding) on the revenue subsidy.

For off-street locations reviewed for parking, the study revealed a low-level of interest by commuter bus operators for parking buses in the core during the mid-day between peak periods. However, there continues to be a strong need for mid-day and longer-term parking of motorcoach/tour buses near the National Mall. The proposed National Mall Underground would be the most dramatic improvement in bus parking capacity if constructed, but the high-cost and scale of the project likely mean that this is a longer-term option. For the other high-ranking off-street sites, some next steps for moving forward include:

- Detailed real estate scan of the most promising sites to review site ownership and development status.
- Further investigation of the financing and management options for advancing a central bus parking facility.