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AN ANALYSIS OF TOUR BUS OPERATIONS WITHIN THE NATIONAL MALL AND MEMORIAL PARKS

Phase II: Off-Bus Data Collection at Gateway Points

July 2013

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An Analysis of Tour Bus Operations within the National Mall and Memorial Parks

Project Phase II: Off-Bus Data Collection at Gateway Points

Technical Report Submitted to:

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EXECUTIVE SUMMARY

STUDY RATIONALE

The National Park Service (NPS), National Mall and Memorial Parks (National Mall), was awarded a grant through the Paul S. Sarbanes Transit in Parks Program to study and make recommendations for improving tour bus operations within the National Mall. The *National Mall Plan / Environmental Impact Statement* (NPS 2010) confirmed tour bus parking and traffic congestion problems and suggested that little has been done to address concerns that were previously identified in 2003. The 2010 plan reported that approximately 21-25 million visits occur in the 684-acre national icon each year. Approximately one-third of the visiting public arrives via tour bus; this can total as many as 1,200 buses a day operating in and around the National Mall during the spring-summer peak season.

The purpose of the current project is to quantitatively and qualitatively document existing conditions and set forth a plan of action for short-term and long-term improvements in operational efficiency. A seven-phase study is being completed that pertains to operational efficiency, congestion, visitor mobility, access, safety, education, recreation, health benefits and protection of sensitive natural, cultural and historical resources. The data collection phases are summarized in Table A. The current report is linked to Phase II, which is specific to off-bus data collection at gateway points. The data were collected and summarized by the Metropolitan Washington Council of Governments (COG). This report provides a spatial context of the data provided by COG, as evidenced through mapping and interpretation.

TABLE A: NATIONAL MALL AND MEMORIAL PARKS TOUR BUS STUDY PROJECT PHASES

Project Phase	Study	Details	Estimated / Completion Timeline (Chronological, Based on End Date)
I	Off-Bus Data Collection and Photographic Documentation at Loading and Unloading Zones, Part 1	Data collected and analyzed by GMU that is specific to congestion, operational efficiency, mobility, access, safety, and resource protection at loading and unloading zones.	All aspects of Phase I complete, January 2013
II	Off-bus Data Collection at Gateway Points	Data collected by COG for DDOT specific to tour bus volume and carrying capacity; summarized by COG and spatially mapped by GMU.	Data analysis and report writing completion estimate: July 2013
III	Off-Bus Data Collection and Photographic Documentation at Loading and Unloading Zones, Part 2	Data collected and analyzed by GMU that is specific to congestion, operational efficiency, mobility, access, safety, and resource protection at loading and unloading zones.	Data collection complete, June 2013 Data analysis and report writing completion estimate: September 2013
IV	Off-bus Data Collection at Parking Areas	Data collected and analyzed by GMU that is specific to turnover, stacking, user conflict, and carrying capacity at parking areas adjacent to major destinations as well as parking in peripheral locations.	Data collection complete, June 2013 Data analysis and report writing completion estimate: September 2013
V	On-Bus Data Collection and Photographic Documentation of Daily Bus Operations	Data collected and analyzed by GMU that is specific to congestion, operational efficiency, mobility, access, safety, education, recreation, health benefits and resource protection during the point-to-point experience	Estimate: Eight dates between March 2013 – January 2014 (4 dates complete as of June 2013) Data Analysis Estimate: Ongoing once data collection begins with completion by June 2014
VI	Operator Self-Reports	Data collected and analyzed by GMU that is specific to logs, itineraries, education, recreation, health, vehicle-miles-traveled, methods used to reduce pollution, safety, regulation, and suggestions for improving operational efficiency and energy conservation.	Estimate: Feedback from five tour bus companies between March 2013 to January 2014 Data Analysis Estimate: Ongoing once data collection begins with completion by June 2014

Project Phase	Study	Details	Estimated / Completion Timeline (Chronological, Based on End Date)
VII	Client Self-Reports	Data collected and analyzed by GMU that is specific to itineraries, group needs, intermodal capabilities of diverse tour group markets and ways to maximize the on-bus and pedestrian experience.	Estimate: Feedback from clients associated with four distinct tour bus markets to be collected between March 2013 to January 2014 Data Analysis Estimate: Ongoing once data collection begins with completion by June 2014

STUDY METHODS

COG researchers completed counts of buses heading inbound to Washington DC at 13 select locations. The dates selected (March 5, 2012; March 12, 2012; April 3, 2012; April 4, 2012; and April 5, 2012) coincided with the pre-peak, peak and post-peak periods of the cherry blossom blooms associated with the 2012 National Cherry Blossom Festival. On each date, bus counts were made between the hours of 6:00 a.m. and 12:00 noon. A total of 5,256 buses were documented during the data collection period.

SUMMARY OF FINDINGS

To help understand the relationships present within the dataset, four tables and corresponding maps were used to illustrate the data. The first map (see Figure 2.1) provides an overview of the locations of the 13 entry points. These locations are distributed throughout Washington, D.C., to reflect the most heavily traveled points of entry into the district and, more specifically, to the National Mall. As the map reflects, not all entry points to the district were observed; however, general trends can be derived from the sample locations.

The second map (see Figure 2.2) indicates the average number of buses passing each observation location for all collection dates. It can be seen that I-295 southbound was the most heavily traveled route for buses entering Washington, D.C. While some of the southbound I-295 buses are presumably entering along US 50 (New York Avenue) a majority seemed to prefer entering from points farther south (i.e., I-695 /11th street Bridge, Pennsylvania Ave, East Capitol Street, etc.).

The third map (see Figure 2.3) displays the number of observation days and the composition of buses that were classified at each location. While the number of total buses entering the city along I-295 was the highest, more buses classified as motorcoaches were found to be entering using points west of Washington, D.C. The Theodore Roosevelt Bridge was the most popular entry point for motorcoaches, while I-295 southbound was the most popular entry location for DC yellow school buses.

The final map (see Figure 2.4) showcases the peak volume trends of the data observed at each location. Peak bus times were found to be an indicator of different bus types utilizing a route. For instance, peak bus times at entry points composed mainly of transit, commuter and school buses were found to be earlier than peak times for entry points used primarily by motorcoaches. Together, these illustrations indicate trends at each of the entry points, summarized in more detail as follows.

- 1. Key Bridge NW:** Located west of the National Mall, this entry point resides within the lower 50th percentile of all data locations showing an average of 125 total buses per collection date. The majority of buses entering the city through this location were classified as transit or motorcoaches. This location is consistent with other similar sites located west of the district.
- 2. Theodore Roosevelt Bridge NW:** Located west of the National Mall, this entry point ranks as showing the second highest number of total buses per collection date. While not showing the largest number of total buses per collection date (258) as opposed to 458 for site 9, this entry point had the highest number of motorcoaches, on average. These results reflect the high number of buses classified

as motorcoaches observed at this location, which on average were a full 63 percent of the total composition.

3. Arlington Memorial Bridge: Located southwest of the National Mall, ranks as a median site for average number of buses at 150 per collection date. While not the highest in number of buses, this site has the highest proportion of buses classified as motorcoaches, with 79 percent of buses passing this location classified as such.

4. 14th Street Bridge Express Lanes: As an entry points for multiple highways this collection site ranks as the third highest at an average 245. A majority of buses passing this location (56 percent) were classified as motorcoaches with 27 percent classified as commuter buses. The peak volume trends are indicating a peak volume earlier than other similar sites, indicating that the high total number of buses observed at this location is reflective of the large number of federal workers commuting into the district from points west.

5. 14th Street Bridge Local Lanes: As an entry point for multiple highways this collection site ranks as the fifth highest at an average of 174. A majority of buses passing this location (65 percent) were classified as motorcoaches with less than 5 percent classified as commuter buses. Local inbound lanes are being utilized by motorcoaches headed to tourist locations rather than express lanes which bypass popular tourist destinations.

6. Anacostia Freeway and Laboratory Road: As an entry point for locations south of the district this location is in the bottom 50th percentile of entry point locations at 100 buses per collection date. There is large variability within the composition of the buses which is prohibitive to discerning any single trend but is consistent with entry points south of the district.

7. Suitland Parkway SE and Alabama Ave SE: As an entry point for locations south of the district, this location resides in the bottom 25th percentile of entry point locations with an average of 51 buses per collection date. More specifically this site ranks as the second lowest in average total bus count. There is large variability within the composition of the buses which is prohibitive to discerning any single trend but is consistent with other entry points located south of the district

8. Pennsylvania Avenue SE and Southern Avenue: As an entry point for locations south of the district this location also resides in the bottom 25 percentile of entry point locations at 11 buses per collection date, which is the lowest average total bus count of all observed sites. There is large variability within the composition of the buses which is prohibitive to discerning any single trend but is consistent with other entry points located south of the district

9. Kenilworth Avenue (I-295) and Eastern Avenue: Located as an entry point for locations north and east of the district this site was observed to have the highest average total number of buses at 458. This was almost a full two times the amount observed at the next highest entry point location. The composition of buses at this site changes considerably from entry points located west. The majority or highest proportions of buses observed were classified as DC yellow school buses (30 percent). The temporal trends also indicate earlier peak times at this entry point, which can be reflective of commuters and school buses and less reflective of tourists.

10. New York Avenue NE and South Dakota Avenue NE: Located as an entry point for locations North and East of the district this site was observed to have the fourth highest average total number of buses at 229. The composition of buses was consistent with other entry points servicing locations north of the district with 31 percent classified as DC yellow school buses

11. New York Avenue NE and Montana Avenue NE: This location is in the 25th percentile and ranks as the third lowest for average number of buses at 55. The precipitous drop in average number of buses between entry point 11 and entry point 10 or from an average of 229 buses per date to 55 could be indicative of buses not utilizing US 50 (New York Avenue) as the primary route. On average the largest composition of buses at this entry point are motorcoaches (43 percent). While these

relationships are observed it must be noted that the geographic location of this site could cause double counting of buses from previous locations.

12. H Street NE and Florida Avenue NE: This entry point has a high number of average total buses per collection date (167) which ranks in the top 50th percentile. Yet this number may be skewed by the large composition of buses classified as transit. While these relationships are observed it must be noted that the geographic location of this site could cause double counting of buses from previous locations.

13. Maryland Avenue NE and 14th Street NE: This entry point ranks in the 25th percentile of average number of buses per collection day with 67. The compositions of buses at this location are classified as 50 percent motorcoaches and 42 percent transit. While these relationships are observed it must be noted that the geographic location of this site could cause double counting of buses from previous locations.

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1. INTRODUCTION AND BACKGROUND

The National Park Service/National Mall and Memorial Parks (NPS/National Mall) management team completed a plan and environmental impact statement (*National Mall Plan*, 2010) to provide a long-term management framework for the future of the National Mall and Pennsylvania Avenue National Historic Park. As part of the larger plan, conditions pertaining to access and circulation were highlighted. The *National Mall Plan* proposed numerous recommendations in light of tour bus operations, including but not limited to: loading and unloading locations; parking; the management of large groups arriving by tour bus; creating multilingual educational opportunities for culturally diverse groups that arrive by tour bus; ready access to refreshments for tour bus arrivals and departures at select locations; information provision; and sustainable practices.

The background for the 2010 recommendations included findings from a 2003 study entitled the *District of Columbia Tour Bus Management Initiative* that was conducted by the Volpe National Transportation Systems Center for the District of Columbia Department of Transportation and other key stakeholders. The 2003 study highlighted numerous problems associated with tour bus operations in the District of Columbia, including traffic congestion, residential neighborhood disruption, air pollution, excessive noise, obstruction of view corridors and major landmarks and negative impacts on local infrastructure. The 2003 study recommended specific changes as well as on-site data collection and counts for monitoring purposes. However, the concerns raised and recommendations set forth in the *National Mall Plan*, completed in 2010, suggested that little progress had been made in the interim period.

In 2011, NPS contracted with GMU to conduct scoping study to determine the perceptions of the current state of tour bus operations in Washington, D.C., from key stakeholders. The study was conducted to better understand tour bus operations, in general, and specifically to determine the constraints to making improvements to current tour bus operations on the National Mall.

The GMU research team worked collaboratively with NPS to identify agencies for participation in the scoping interviews. Feedback was also received through meetings, e-mail communication and webinar participation. The following stakeholders were represented in the 2011 study: Academy Bus / New World Tours, Destination DC, DDOT, Guild of Professional Tour Guides, National Tour Association, United Motorcoach Association, U.S. Capitol Police, U.S. Park Police and U.S. Travel Association. The primary goal of the scoping questions was to determine perceptions of the progress that has been made in terms of addressing the problems identified and the recommendations made in the 2003 study. Results from operators indicated perceptions of little progress, with an overall sense of increased enforcement being accompanied by a decrease in available parking, resulting in increased congestion and cruising. A disconnect between operator and enforcement personnel was evidenced, with operators indicating that parking and loading spaces near key visitor sites on the National Mall are inadequate for current demand while enforcement agencies indicated concerns regarding a lack of knowledge of and/or unwillingness to use available sites.

The current study builds upon the background knowledge provided in the 2003, 2010 and 2011 reports by beginning the process of systematically documenting existing conditions related to tour bus operations. This is the second phase of the seven-phase study that will ultimately be integrated into a comprehensive plan of action for short-term and long-term improvements in tour bus operational efficiency within the National Mall. For this phase, data specific to gateway points into Washington, D.C., provided by COG were spatially analyzed.

2. RESULTS

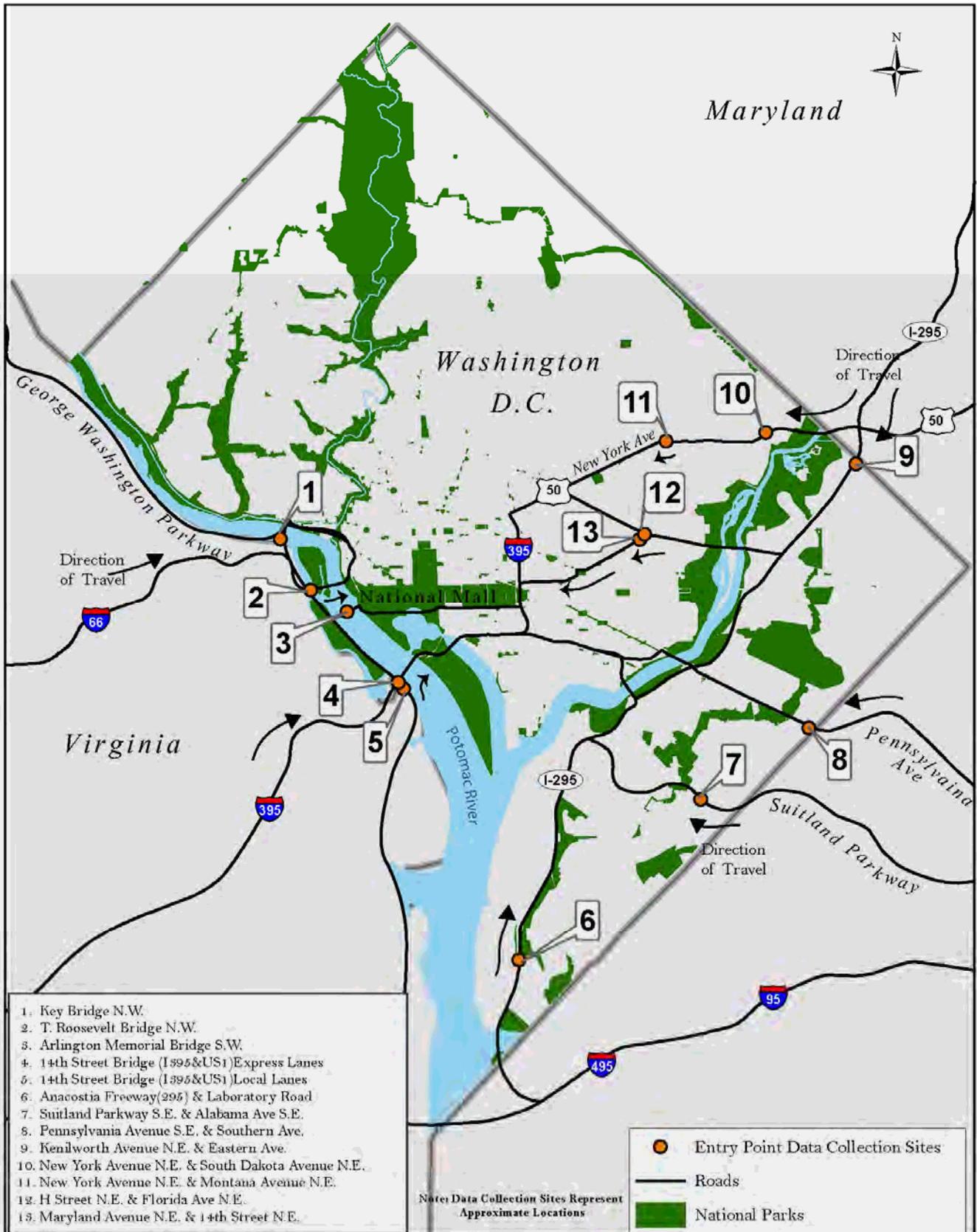
2.1 GEOGRAPHIC DISTRIBUTION OF ENTRY POINTS

Table 2.1 and the first map in the series (Figure 2.1) indicate the basic geographic distribution of all entry point data collection sites. The map is provided to give the reader a spatial context of the data collection site locations. There were 13 separate entry point locations where buses were observed and recorded while heading inbound toward the district. The locations of entry points can be read directly from the map and corresponding description of approximate intersection found in the table. Locations are represented as orange circles and arrows indicating direction of travel on the map. Only roads that are relevant to the location of the entry points are represented, many adjacent roads have been removed for clarity.

TABLE 2.1: ENTRY POINT LOCATIONS

Site Number	Entry Point Location
1	Key Bridge NW
2	Theodore Roosevelt Bridge NW
3	Arlington Memorial Bridge SW
4	14th Street Bridge (I-395 & US 1) Express Lanes
5	14th Street Bridge (I-395 & US 1) Local Lanes
6	Anacostia Freeway (I-295) & Laboratory Road
7	Suitland Parkway SE & Alabama Avenue SE
8	Pennsylvania Avenue SE & Southern Avenue
9	Kenilworth Avenue NE & Eastern Avenue
10	New York Avenue NE & South Dakota Avenue NE
11	New York Avenue NE & Montana Avenue NE
12	H Street NE & Florida Avenue NE
13	Maryland Avenue NE & 14th Street NE

FIGURE 2.1: GEOGRAPHIC DISTRIBUTION OF ENTRY POINTS



2.2 AVERAGE NUMBER OF BUSES AT ENTRY POINTS

Table 2.2 and Figure 2.2 indicate the average number of buses at each location aggregated for all collection dates. A spatial pattern of the bus count data is evidenced, with the largest average number of buses observed along I-295 approximately located at the intersection of Kenilworth Avenue NE and Eastern Avenue (shown as location 9). This entry point has an average count of 458 buses per day. The large number of buses recorded at this location is the result of high volumes of buses converging from the north on I-295 and from the east on US 50 and the large numbers of D.C. Yellow school buses that were recorded passing this location. Numbers recorded at locations 9 and 10 are also evidence of more buses utilizing I-295 southbound than westbound along New York Avenue regardless of which direction they originate.

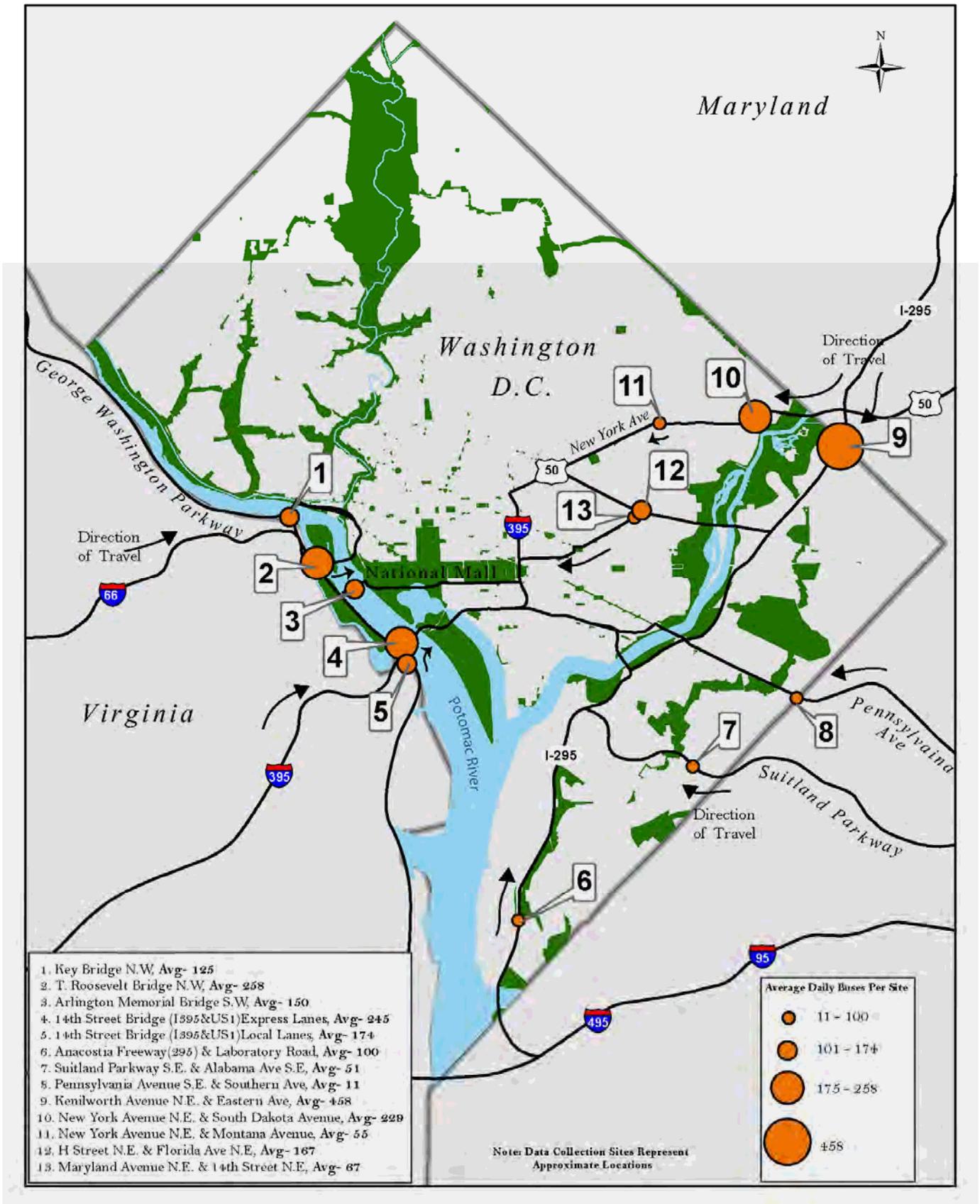
Entry point sites servicing locations south of the district are reflecting the lowest number of buses per collection date and the lowest averages overall. The data points show a sharp decrease in the number of buses entering from the south-southeast along Pennsylvania Avenue, Suitland Parkway and Anacostia Freeway (I-295). This can be observed from either the map or table in the small averages at locations 6, 7 and 8. The smallest average was observed at intersection of Pennsylvania Avenue and Southern Avenue with an average of 11 buses per day (location 8). While the entry point locations in the south are not showing a significant number of buses per day, this may not reflect the number of buses entering the city from the south, particularly across the 11th Street Bridge and along South or East Capitol Street. While the numbers are reflective of decreased entry from points south, the distributions of entry point locations are insufficient to determine the actual entry points of buses traveling I-295 southbound or northbound from all points south.

The volume of buses coming from the west is the highest for buses traveling northbound along I-395 and eastbound on route 66 with the 14th Street Bridge express lanes (location 4) and Theodore Roosevelt Bridge (location 2) showing the largest averages in the west at 245 and 258 respectively. For clarification, the table indicates the site number and description with average bus counts arranged from highest to lowest values.

TABLE 2.2: AVERAGE NUMBER OF BUSES AT ENTRY POINTS, HIGHEST TO LOWEST

Site Number	Entry Point Location	Average Number of Daily Buses
9	Kenilworth Avenue NE & Eastern Avenue	458
2	Theodore Roosevelt Bridge NW	258
4	14th Street Bridge (I-395 & US 1) Express Lanes	245
10	New York Avenue NE & South Dakota Avenue NE	229
5	14th Street Bridge (I-395 & US 1) Local Lanes	174
12	H Street NE & Florida Avenue NE	167
3	Arlington Memorial Bridge SW	150
1	Key Bridge NW	125
6	Anacostia Freeway (I-295) & Laboratory Road	100
13	Maryland Avenue NE & 14th Street NE	67
11	New York Avenue NE & Montana Avenue NE	55
7	Suitland Parkway SE & Alabama Avenue SE	51
8	Pennsylvania Avenue SE & Southern Avenue	11

FIGURE 2.2: AVERAGE NUMBER OF BUSES AT ENTRY POINTS



2.3 COMPOSITION OF BUSES AT ENTRY POINTS

Table 2.3 and Figure 2.3 display the observation days and the composition of buses that were classified at each location. A rather obvious trend within the data is the variability of composition between collection sites. For example, consider entry point locations from the west (locations 1, 2, 3, 4, 5 and 13). These points show relative consistency from day to day observations. However, entry points generally concentrated in the east and south (locations 6, 7, 8, 9, 10, 11 and 12) are showing more variability in the composition of buses from day to day. While more total buses are entering the city from points north, more tourists are entering the city via motorcoaches from points located west of the district. This conclusion can be evidenced by considering entry point number 2 (Theodore Roosevelt Bridge) which has an average proportion of 63 percent classified as motorcoaches. Using this proportion and multiplying it by average buses per site it can be shown that on average 162 motorcoaches passed through this location as opposed to 69 at location 9 which saw a much higher total bus count. This result is most likely reflective of the large numbers of tourists who chose to stay in Virginia during their visit and the subsequent motorcoach tours they utilize. Additionally, it can be seen that the buses categorized as “All Other Buses and Motorcoaches” were the most prevalent type of bus to pass through all locations. In fact, out of 31 collection instances (measured as each day a count was taken per location) a full 22 instances or approximately 71 percent had “All Other Buses and Motorcoaches” as the largest category. Some general trends can also be seen in the daily bus composition at each entry point. For instance, notice how there seems to be a general increasing trend in the percentage of “All Other Buses and Motor Coaches” from early March collection days to April, in line with increasing tourist activity. Table 2.3 shows the average counts of buses observed at each site categorized by type while the map in Figure 2.3 depicts the average number of bus type as a percentage of all buses observed for each collection day.

TABLE 2.3: COMPOSITION OF BUSES AT ENTRY POINTS

Site Number	Entry Point Location	Average Number of Observed Bus Types per Collection Site							
		Transit	Commuter	Inner-City Coaches	D.C. Yellow School	All Other Yellow School Buses	College University	Church Buses	All Other Buses/ Motorcoaches
1	Key Bridge NW	53	1	0	0	2	28	0	42
2	Theodore Roosevelt Bridge NW	28	44	1	1	21	1	0	162
3	Arlington Memorial Bridge SW	17	18	19	21	23	25	29	32
4	14th Street Bridge (I-395 & US 1) Express Lanes	16	68	4	1	15	0	2	138
5	14th Street Bridge (I-395 & US 1) Local Lanes	28	7	2	7	15	1	1	113
6	Anacostia Freeway (I-295) & Laboratory Road	1	40	1	10	11	0	0	37
7	Suitland Parkway SE & Alabama Avenue SE	15	10	1	2	5	0	1	18
8	Pennsylvania Avenue SE & Southern Avenue	1	0	0	1	7	0	0	3
9	Kenilworth Avenue NE & Eastern Avenue	56	37	9	105	28	0	1	69
10	New York Avenue NE & South Dakota Avenue NE	33	5	26	72	20	2	1	70
11	New York Avenue NE & Montana Avenue NE	7	3	8	10	2	1	0	26
12	H Street NE & Florida Avenue NE	97	11	30	18	3	1	0	10
13	Maryland Avenue NE & 14th Street NE	28	0.5	0	3.5	0	0	1.5	33.5

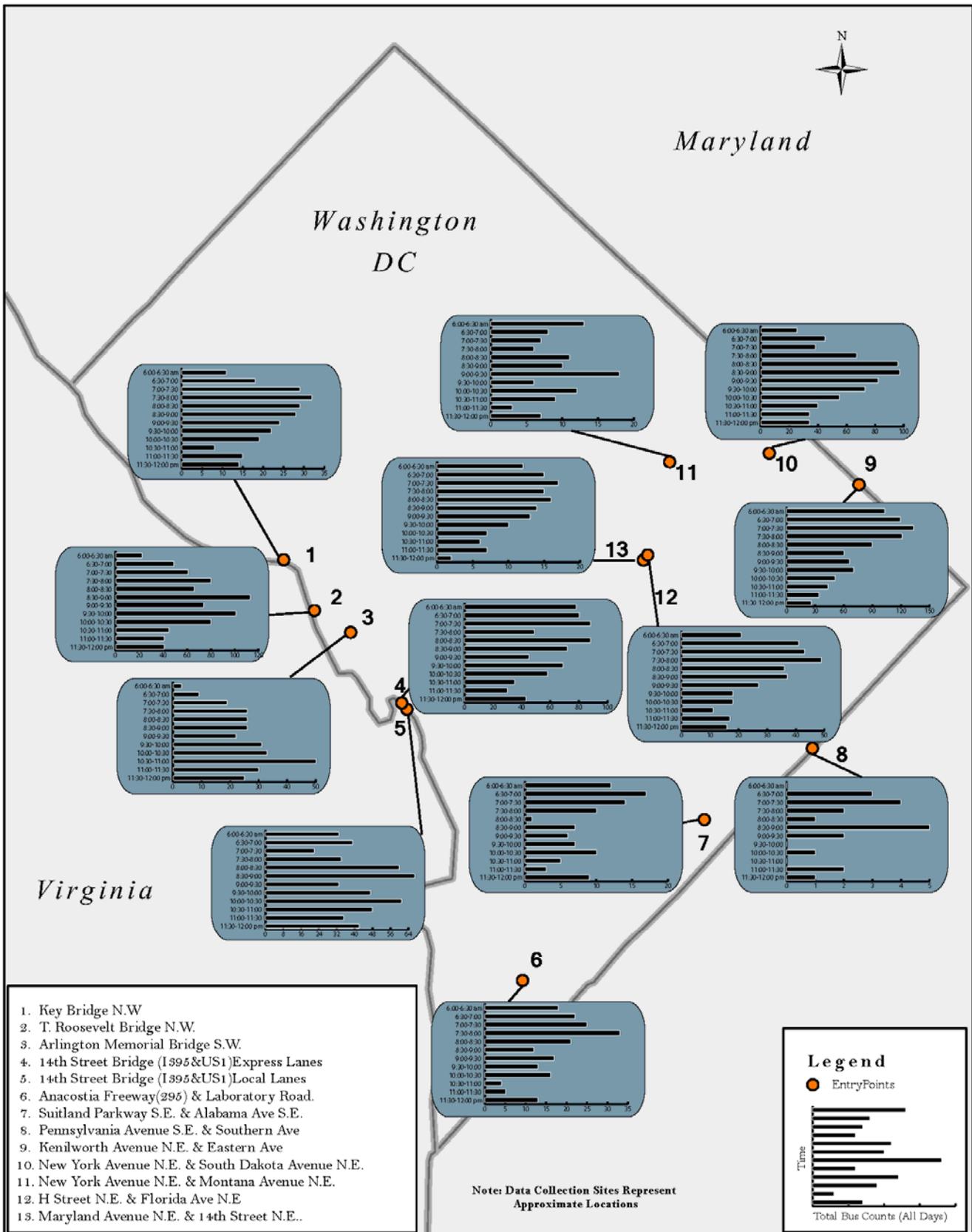
2.4 PEAK VOLUME BY TIME

Table 2.4 and Figure 2.4 further break down the data to examine the volume by time trends at each location. The dataset was aggregated to include all collection days for each site and the table indicates the numbers of buses passing each location per half hour interval. A total bus count for each half hour interval was graphed (Figure 2.4) to further highlight spatial trends in the volume of buses passing each location per unit time. The collection period was between 6:00 a.m. and 12:00 noon on all collection days. Trends within the data indicate that certain locations are showing earlier peak bus volumes (i.e., locations 6, 7, 9, 12 and 13) while others are showing later peak volumes (i.e., locations 2, 3, 5 and 10). Comparing this trend with bus composition data, it can be concluded that peak bus times vary with the composition type. To clarify, entry point locations primarily comprised of transit, commuter, and school buses have peak volumes that occur earlier than those with a significant motorcoach composition.

TABLE 2.4: PEAK VOLUME BY TIME

Site Number	Entry Point Location	Average Volume by Time											
		6:00-6:30 a.m.	6:30-7:00	7:00-7:30	7:30-8:00	8:00-8:30	8:30-9:00	9:00-9:30	9:30-10:00	10:00-10:30	10:30-11:00	11:00-11:30	11:30-12:00 p.m.
1	Key Bridge NW	11	18	29	32	29	28	24	22	19	8	15	14
2	Theodore Roosevelt Bridge NW	22	49	61	80	66	113	74	101	80	45	41	41
3	Arlington Memorial Bridge SW	3	9	19	26	26	26	22	31	33	50	30	25
4	14th Street Bridge (I-395 & US 1) Express Lanes	78	80	88	49	88	72	45	69	58	35	30	43
5	14th Street Bridge (I-395 & US 1) Local Lanes	33	39	22	34	60	67	33	47	61	48	35	42
6	Anacostia Freeway (I-295) & Laboratory Road	18	22	25	33	21	12	17	13	16	4	5	13
7	Suitland Parkway SE & Alabama Avenue SE	12	17	14	10	1	7	6	7	10	5	3	9
8	Pennsylvania Avenue SE & Southern Avenue	0	3	4	2	1	5	2	0	1	0	2	1
9	Kenilworth Avenue NE & Eastern Avenue	103	119	133	121	90	60	66	70	51	43	34	26
10	New York Avenue NE & South Dakota Avenue NE	25	45	38	67	96	97	82	73	55	40	34	34
11	New York Avenue NE & Montana Avenue NE	13	8	7	6	11	10	18	6	12	9	3	7
12	H Street NE & Florida Avenue NE	21	41	43	49	36	37	27	18	18	11	17	16
13	Maryland Avenue NE & 14th Street NE	12	15	17	15	16	14	13	10	7	6	7	2

FIGURE 2.4: TEMPORAL TRENDS AT ENTRY POINTS



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