THE GEORGE WASHINGTON UNIVERSITY
FOGGY BOTTOM CAMPUS PLAN
TRAFFIC AND PARKING STUDY

Prepared For

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APPENDIX M

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INTRODUCTION

This report presents the findings of a transportation and parking assessment to support The George Washington University (GW or the "University") Foggy Bottom Campus Plan for the years 2000 through 2010 (The "Campus Plan"). The analyses performed for this study were used to determine the overall impacts associated with the development and growth components of the Campus Plan. The objectives of this study have been to:

- Determine existing traffic and pedestrian conditions on-campus
- Identify the existing public transportation system and other transportation mode choice alternatives
- Determine the existing off-street parking demand
- Project future off-street parking requirements
- Project future traffic and pedestrian conditions associated with the Campus Plan development program and student enrollment projections
- Recommend transportation improvements
- Outline an effective Transportation Management Plan to minimize impacts of Campus Plan developments

The following tasks were completed as part of this study:

- Field observations were made to collect information regarding existing traffic volumes and flow, roadway characteristics, and pedestrian travel paths.
- Off-street parking surveys were conducted to obtain inventory and occupancy.
- Existing transportation operations at GW were reviewed.
- The proposed development plans included in the Campus Plan were reviewed.

Sources of data for this study include: The George Washington University Campus Plan (Year 1985 through Year 2000); The October 29, 1999 Draft George Washington University Campus Plan for the year 2000 through 2010; The 1985 George Washington University Parking Study prepared by Callow Associates, Inc.; District of Columbia Department of Public Works Bureau of Traffic Services 1996 Average Daily Traffic Volumes; Traffic Engineering by William R. McShande and Roger P. Roess; The George Washington University; KCF-SHG; and the files and library of Gorove/Slade Associates, Inc.

Scope of Study

A traffic and parking impact study was undertaken to determine the existing conditions on the roadway network within the Campus Plan boundaries, and to determine the impacts that the proposed Campus Plan development and growth components will have. The impacts of the Campus Plan were assessed under future conditions, for the year 2010, when the Campus Plan will expire.

This report presents the findings of a comprehensive assessment and analysis performed for the following conditions:

- ***Existing Conditions***
  Presents the results of an assessment of the existing roadway network, traffic conditions, public transportation opportunities, shuttle service, bicycle amenities, pedestrian activity, parking conditions, loading facilities, and the University's existing Transportation Management Plan (TMP). This Existing Conditions assessment also presents the results of an existing traffic capacity analysis and parking demand analysis.

- ***Campus Plan Development Conditions***
  Presents the results of conditions for the year 2010, including an assessment of the traffic conditions, public transportation opportunities, shuttle service, bicycle amenities, pedestrian activity, a proposed pedestrian mid-block crossing system, parking conditions, loading facilities, and the University's future Transportation Management Plan (TMP). This Campus Plan Development Conditions assessment also presents the results of a traffic capacity analysis and parking demand analysis for future conditions.

EXISTING CONDITIONS

Site Description

The George Washington University Foggy Bottom Campus (GW) is a forty-three acre campus located in the Foggy Bottom neighborhood of Northwest Washington, DC. The location of the campus with respect to the surrounding community is illustrated in Figure 1.

The campus is bounded by Pennsylvania Avenue to the north, 24th Street to the west, "F" Street to the south, and 19th Street to the east. The campus is served by 23rd Street, a major north-south commuter arterial, and Pennsylvania Avenue, a northwest-southeast arterial.

Existing Roadway Network

GW is an urban campus located within a grid roadway system. The roadways within the Campus Plan boundaries are described below. These roadways are shown schematically in Figure 2.

- Pennsylvania Avenue is a six lane, undivided major arterial traversing northwest to southeast. It extends from "M" Street in northwest Washington to Prince George's County, Maryland. Within the campus vicinity, parking is permitted on both sides of Pennsylvania Avenue during off-peak periods, reducing the number of travel lanes to four. Pennsylvania Avenue is closed from 17th Street to 15th Street near the White House. The Average Daily Traffic (ADT) on this portion of Pennsylvania Avenue is approximately 18,000* vehicle trips.

- Washington Circle is the traffic circle that connects "K" Street, New Hampshire Avenue, 23rd Street, and Pennsylvania Avenue. Washington Circle has three lanes of travel and a turn lane, except at Pennsylvania Avenue where there are two lanes of travel, and two turn lanes.

- 24th Street is a north-south, two-lane, local roadway with parking permitted on both sides of the street. This portion of 24th Street originates south at Virginia Avenue and extends to "N" Street Northwest. 24th Street is approximately thirty-two feet wide with no pavement markings to divide lanes. The Average Daily Traffic on 24th Street is approximately 4,000* vehicles per day.

- 23rd Street is a north-south, undivided, six lane arterial. This portion of 23rd Street extends south from Independence Avenue near the Lincoln Memorial, through Washington Circle, and terminates at Massachusetts Avenue in Northwest Washington D.C. 23rd Street is a one-way southbound roadway north of Washington Circle.

  During the AM peak period (7:00 AM - 9:30 AM), northbound 23rd Street dedicates all three lanes to through traffic, while southbound 23rd Street dedicates two of its three lanes to through traffic, and the outermost lane to metered parking. During the evening rush hour period (4:00 PM - 6::30 PM), 23rd Street dedicates three southbound lanes to through traffic, and two northbound lanes to through traffic and a northbound lane to metered parking.

* *Average Daily Traffic volumes obtained from Department of Public Works*

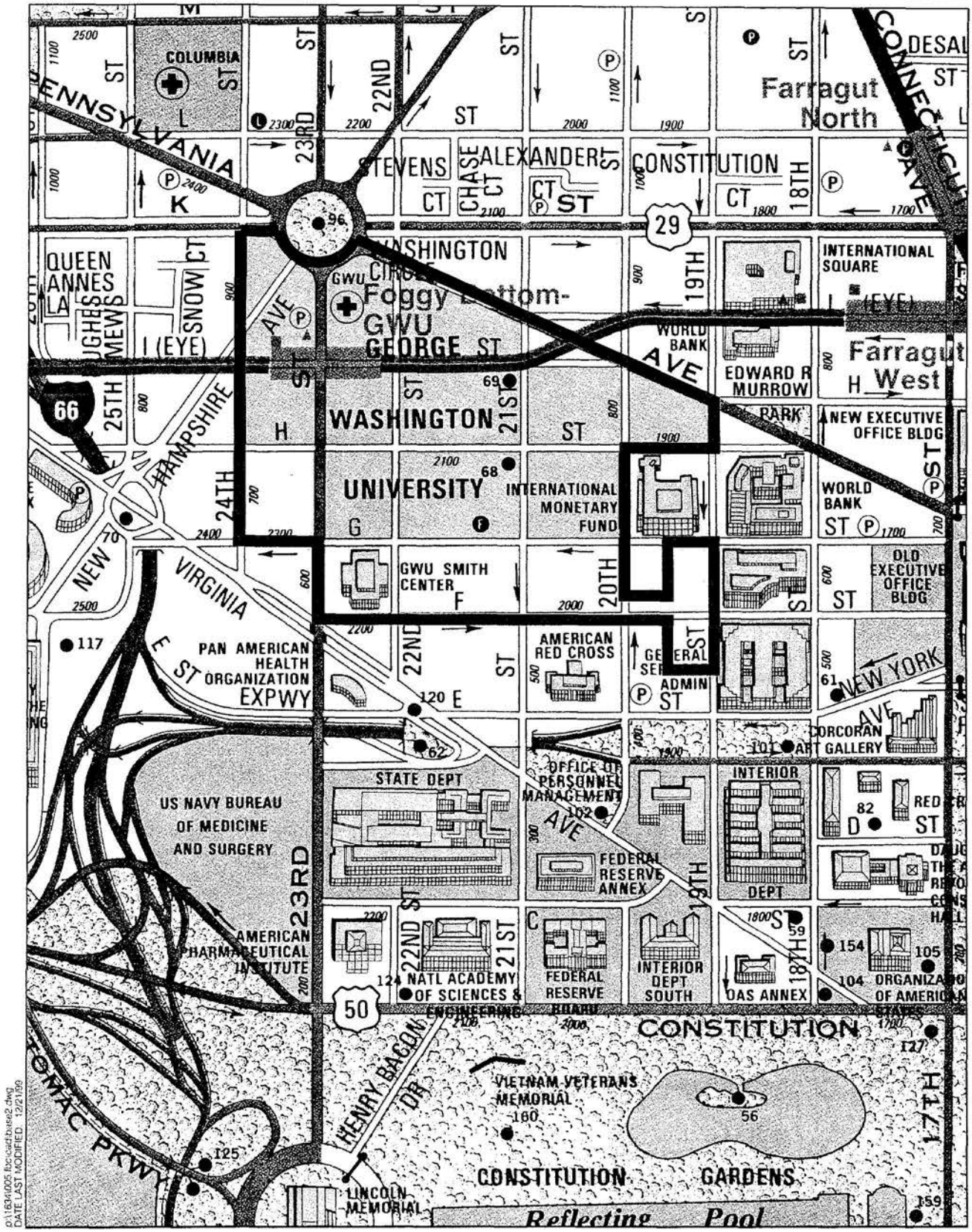

Figure 1
Area Site Location Map

SOURCE: ADC MAP

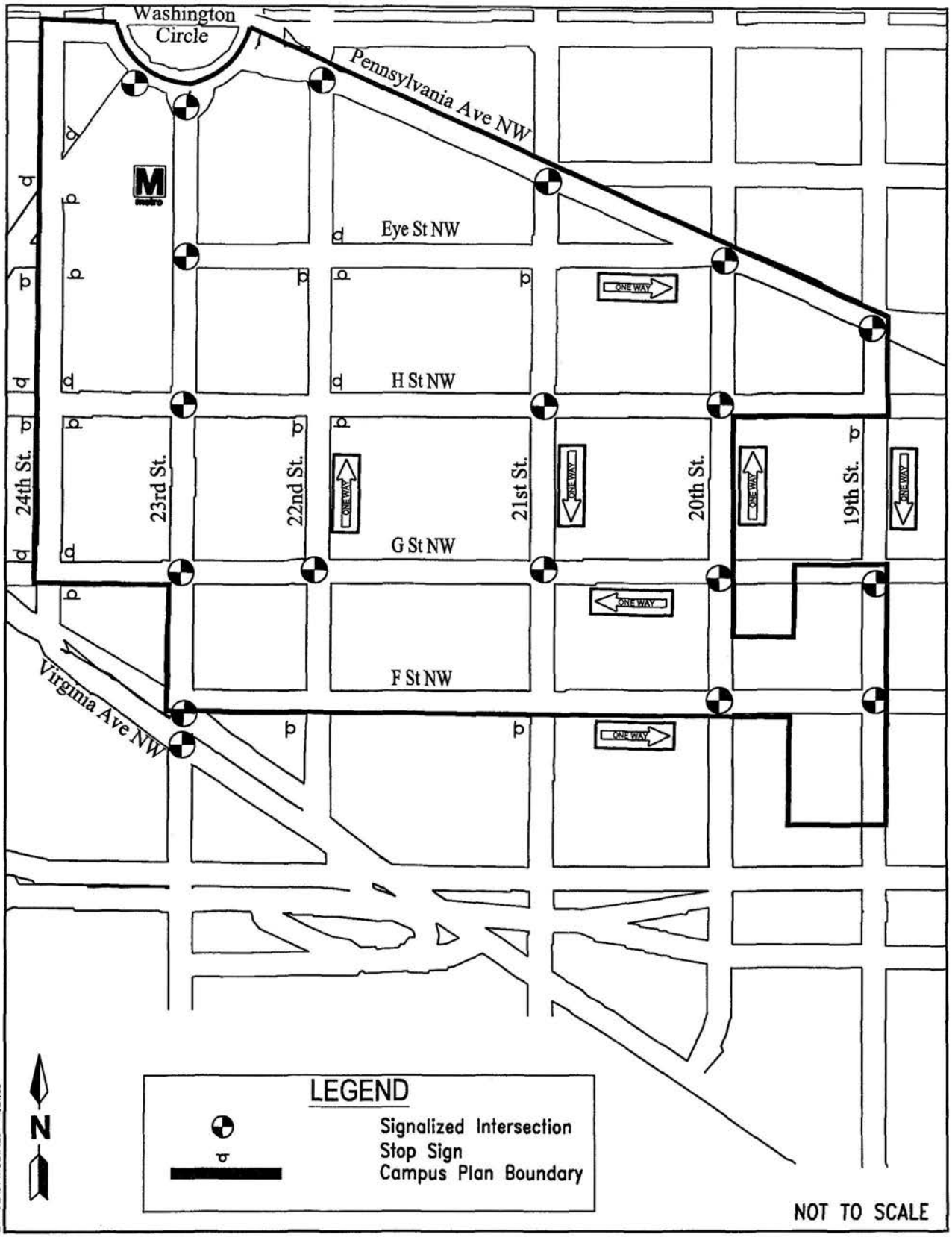

Figure 2
Existing Roadway Network

23rd Street carries a heavy volume of commuter traffic through The George Washington University campus to and from the business district north of Pennsylvania Avenue. The Average Daily Traffic (ADT) on 23rd Street within the Campus Plan boundaries is between 24,000 and 27,000 * vehicles per day.

- 22nd Street is a three-lane, one-way northbound roadway that extends from Constitution Avenue, across Pennsylvania Avenue, and terminates north of Massachusetts Avenue. Parking is permitted at certain locations on 22nd Street. The ADT on 22nd Street is approximately 6,000* vehicles per day.
- 21st Street is a one-way, southbound, three lane roadway. In the vicinity of the campus, 21st Street is a three-lane roadway that extends from Constitution Avenue to Florida Avenue. Metered parking is permitted in the left lane. The ADT on 21st Street is approximately 7,000* vehicles per day.
- 20th Street is a one-way, northbound, three lane roadway. Parking is permitted in the right lane during non-rush hour periods. This portion of 20th Street begins south at Virginia Avenue and extends north to Florida Avenue. The ADT on 20th Street is between 10,000 and 16,000* vehicles per day.
- 19th Street is a three-lane, one-way, southbound roadway. 19th Street extends from the Adams Morgan neighborhood to Constitution Avenue. The ADT on 19th Street is between 12,000 and 16,000* vehicles per day.
- Eye Street is primarily a westbound roadway that serves as a cross-town, one-way pair with "H" Street. Within the Campus Plan boundaries, Eye Street is a two-way local roadway west of 21st Street, and a one-way eastbound roadway east of 21st Street and west of Pennsylvania Avenue. Metered parking is permitted on both sides of Eye Street. Eye Street is closed between 23rd and 24th Street to allow for a pedestrian plaza at the Foggy Bottom Metro stop. The ADT on Eye Street, within the Campus Plan boundaries, is approximately 4,000* vehicles per day.
- "H" Street is primarily an eastbound roadway that serves as a cross-town, one-way pair with Eye Street. Within the GW Campus Plan boundaries, "H" Street is a two-lane, two-way, local street. Metered parking is permitted on both sides of "H" Street. The ADT on "H" Street is approximately 4,000* vehicles per day.
- "G" Street is a one-way, two-lane, westbound collector street. Metered and residential parking is permitted on both sides of the street. The ADT on "G" Street is approximately 3,000 - 4,000* vehicles per day.
- "F" Street is a one way, two-lane eastbound local roadway. In the vicinity of the campus, "F" Street extends from 23rd Street to 17th Street. Parking is permitted on both sides of "F" street. The ADT on "F" Street is approximately 2,000* vehicles per day.

* *Average Daily Traffic volumes obtained from Department of Public Works*

- New Hampshire Avenue is primarily a north-south roadway that extends from "F" Street to Florida Avenue. In the vicinity of the campus, New Hampshire Avenue is a two-lane residential roadway carrying approximately 4,000* vehicles per day.

Existing Traffic Conditions

Existing traffic volumes were obtained from manual traffic counts conducted between March 4, 1999 and March 25, 1999. Traffic counts were not conducted between March 15, 1999 and March 19, 1999, when classes were not in session for spring break. Traffic volumes were counted from 7:30 AM - 9:30 AM and 4:30 PM - 6:30 PM at intersections located throughout the perimeter of the Campus Plan boundary in order to determine the volume of motorists entering and exiting the campus during the peak periods of the day. Traffic volumes were counted at the following intersections:

- 24th Street/"K" Street
- New Hampshire Avenue/Washington Circle
- Pennsylvania Avenue/22nd Street
- Pennsylvania Avenue/21st Street
- 22nd Street/"F" Street
- 21st Street/"F" Street
- 20th Street/"F" Street
- 19th Street/"F" Street

Traffic volumes at other campus locations were obtained from traffic counts that were previously conducted for the Replacement Hospital (counts conducted April and May 1998), Media and Public Affairs building (counts conducted September 1998), Health and Wellness Center (counts conducted August 1997), and University Parking Garage expansion (counts conducted May and October 1998) traffic studies. Peak period traffic volumes are included in the Technical Appendix to this report.

Based on the March 1999 traffic counts, the campus wide AM and PM peak hours occurred from 8:15 AM - 9:15 AM and 5:15 PM - 6:15 PM respectively. Peak hour traffic volumes are shown in Figure 3 and are included in the Technical Appendix to this report.

As Figure 3 indicates, the volume of northbound/southbound traffic is significantly higher than eastbound/westbound traffic within the Campus Plan boundaries due to the high number of commuters that use 19th, 20th, 21st, 22nd, and 23rd Streets to approach and depart the business district north of Pennsylvania Avenue each day.

* *Average Daily Traffic volumes obtained from Department of Public Works*

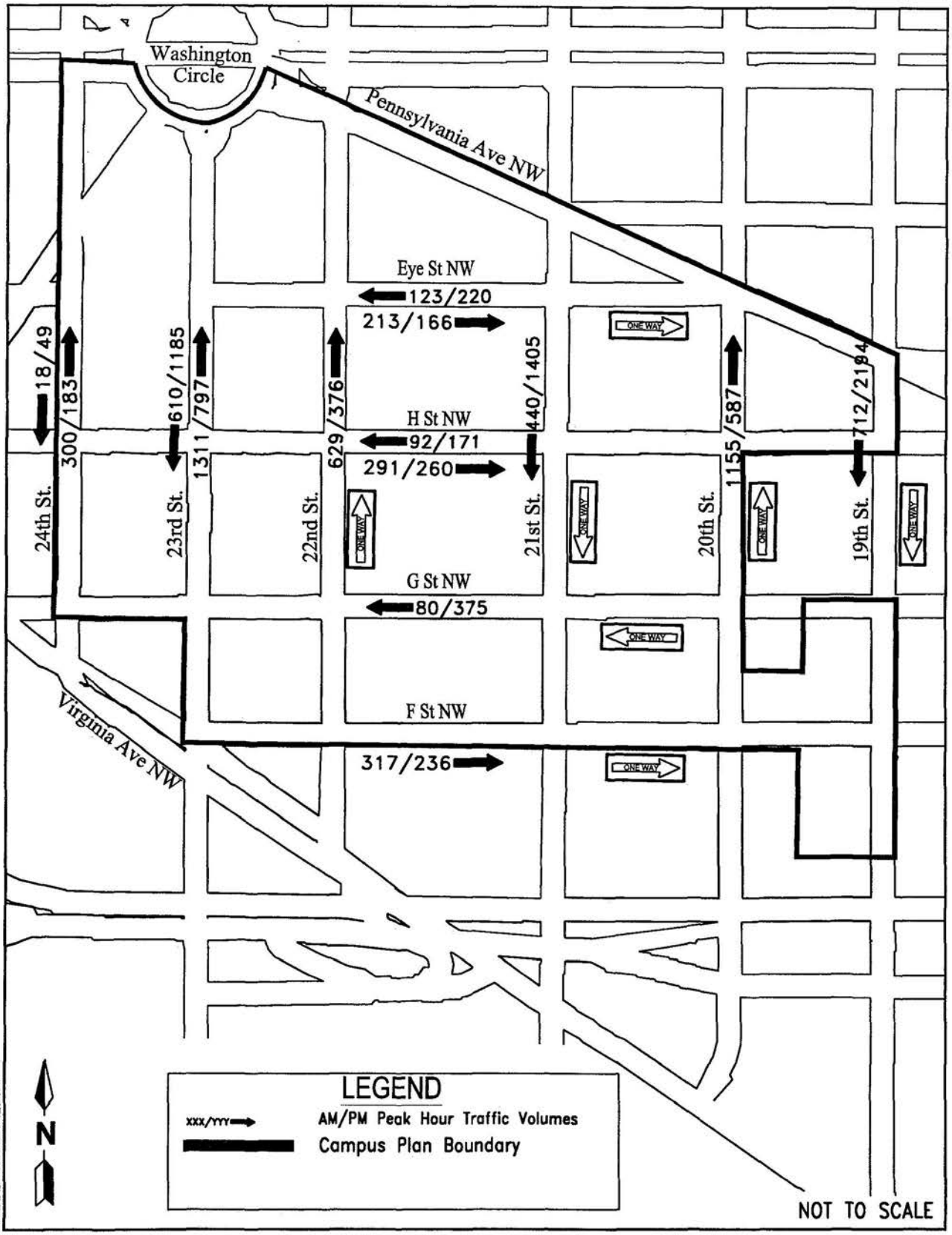

Figure 3
Existing Peak Hour Traffic Volumes

Existing Capacity Analysis

A capacity analysis was performed to determine the *calculated existing capacity* and the *resultant capacity* of roadways within the Campus Plan boundary. The *calculated existing capacity* of a roadway is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point under prevailing traffic, roadway, and control conditions. It is important to note that the observed or actual capacity of a roadway will vary from day to day and may vary from the calculated capacity due to the highly varying characteristics of drivers.

The capacity for each roadway segment was calculated for the AM and PM peak hours based on characteristics such as the number of lanes, the width of lanes, the type of area (Central Business District), etc. The capacity calculations are included in greater detail in the Technical Appendix.

The *resultant capacity* of each roadway was calculated by subtracting the demand of each roadway segment from the *calculated capacity* of each roadway segment. Therefore, the *resultant capacity* of each roadway represents the additional number of vehicles per hour that can be accommodated on a particular roadway segment before that roadway reaches capacity.

The *demand* of each roadway segment was measured by counting the volume of vehicles that traversed a specific point. The traffic volumes shown in Figure 3 represent the demand that was determined for each roadway. The results of this analysis are summarized in Table 1. Numbers are presented in vehicles per hour (vph).

Table 1
Existing Capacity Analysis

	Roadway Capacity (vph)	AM Peak Demand (vph)	AM Resultant Capacity (vph)	PM Peak Demand (vph)	PM Resultant Capacity (vph)
19th Street SB	**2,020**	712	***1,308***	2,194	***-174***
20th Street NB	**1,920**	1,155	***765***	587	***1,333***
21st Street SB	**2,000**	440	***1,560***	1,405	***595***
22nd Street NB	**2,040**	629	***1,411***	376	***1,664***
23rd Street NB	**1,710**	1,311	***399***	797	***913***
23rd Street SB	**1,760**	610	***1,150***	1,185	***575***
24th Street NB	**600**	300	***300***	183	***417***
24th Street SB	**620**	18	***602***	49	***571***
Eye Street EB	**410**	213	***197***	166	***244***
Eye Street WB	**410**	123	***287***	220	***190***
H Street EB	**410**	291	***119***	260	***150***
H Street WB	**410**	92	***318***	171	***239***
G Street WB	**450**	80	***370***	375	***75***
F Street EB	**460**	317	***143***	236	***224***

As Table 1 shows, the analysis results indicate that all roadways, except 19th Street, have the capacity to accommodate additional vehicles. 19th Street has traffic volumes that are higher than the calculated capacity; however, it should be noted that the vast majority of the traffic on 19th Street is not University related. 19th Street is located on the eastern edge of the Campus Plan boundary and does not provide access to any University parking lot or garage or other University traffic generator. It should also be noted that the calculated capacity is not the absolute maximum rate of flow ever observed on a roadway. In some instances, measured rates of flow will exceed the textbook or defined capacity of the roadway.

Existing Public Transportation Options

The Foggy Bottom/GWU metrorail station is conveniently located on the GW campus at 23rd and Eye Streets. Several metrobus stops are also conveniently located throughout the campus for the 13M, 80, and L1 buses. These bus routes are shown in Figure 4.

A recent transportation mode choice survey was conducted on campus at the Marvin Center (800 21st Street) and the law library (716 20th Street). The survey was conducted during three time periods throughout the day for three days during the spring semester (April 27 - April 29, 1999). Over 1,000 individuals were surveyed. The results of the survey are summarized in Table 2.

Table 2
Transportation Mode Choice Survey Results

	Students	Faculty/Staff	Visitors
Drive/Ride	15%	45%	46%
Metrorail	13%	38%	23%
Metrobus	2%	12%	5%
Walk	68%	4%	24%
Other	2%	0%	1%

As Table 2 shows, the majority of the people surveyed arrived to campus via public transportation or by walking. Only 15% of the GW students surveyed drove or rode to the University that day, and less than half of faculty/staff and visitors drove or rode to campus. The majority of all subgroups arrived by means other than private automobile.

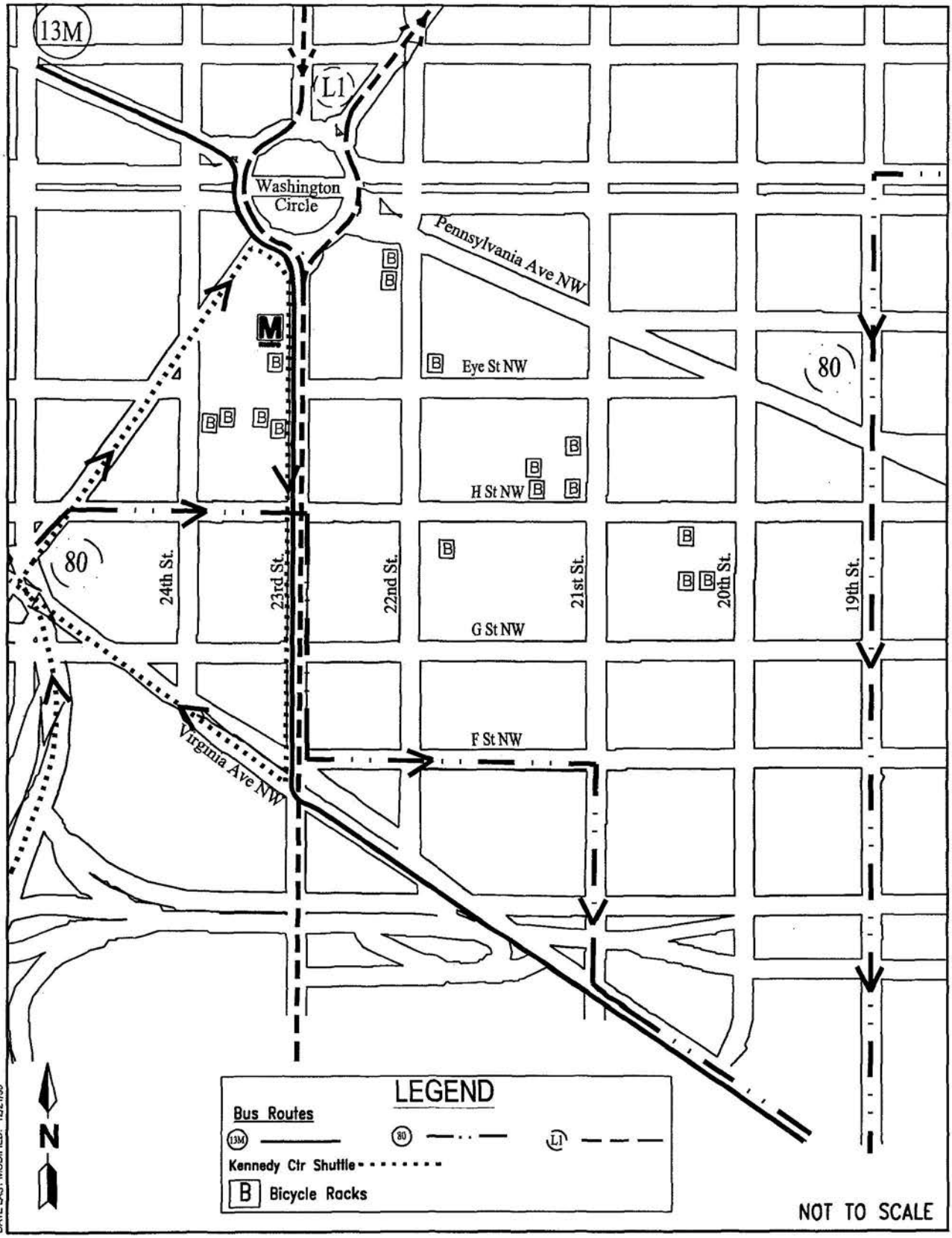

Figure 4
Bus Route Map and Bicycle Rack Locations

Existing Shuttle Bus Operation

The University operates a shuttle bus that provides direct nonstop service from GW's Mount Vernon campus to a designated stop at the Foggy Bottom Campus (22nd Street and Eye Street). The existing shuttle bus system operates two shuttle buses that are scheduled twenty minutes apart from 6:55 AM to 8:15 AM and from 5:55 PM to 2:00 AM, with the first bus leaving GW/MVC at 6:55 AM and the last bus leaving Foggy Bottom at 2:00 AM. Between 8:15 AM and 5:45 PM, the shuttle buses are scheduled every ten minutes apart. These buses normally travel from the Foggy Bottom Campus to the Whitehurst Freeway to Canal Road to Foxhall Road in order to reach the Mount Vernon Campus. The shuttle bus route is shown in Figure 5.

Other Existing Modes of Transportation

Bicycles are commonly used by students on the GW campus. Bicyclists use sidewalks and public streets throughout the campus to get from off campus destinations to campus and also to circulate around the campus. Bicycle racks are conveniently located at many locations throughout the campus (see Figure 4).

Existing Pedestrian Activity

Pedestrian activity occurs throughout the campus in interior pedestrian circulation areas, along public sidewalks, at pedestrian street crossings, and at mid-block locations not designated for pedestrian crossing. The highest volume of University-related pedestrian activity occurs near major pedestrian generators, such as the Marvin Center, the University Parking Garage, the Smith Center, Lisner Auditorium, the hospital, and Gelman Library. Open space focus areas on campus such as the University Yard, and the Mid-campus quad also attract a relatively high number of pedestrians. The primary intersections and mid-block street crossing areas where pedestrian activity occurs are shown in Figure 6. Given the need to minimize pedestrian/vehicular conflicts at these locations, to maximize pedestrian safety, and to contribute to a consistent flow of traffic uninterrupted by pedestrians crossing at various mid-block street crossing areas, special treatment of these mid-block crossings are proposed as part of the Campus Plan.

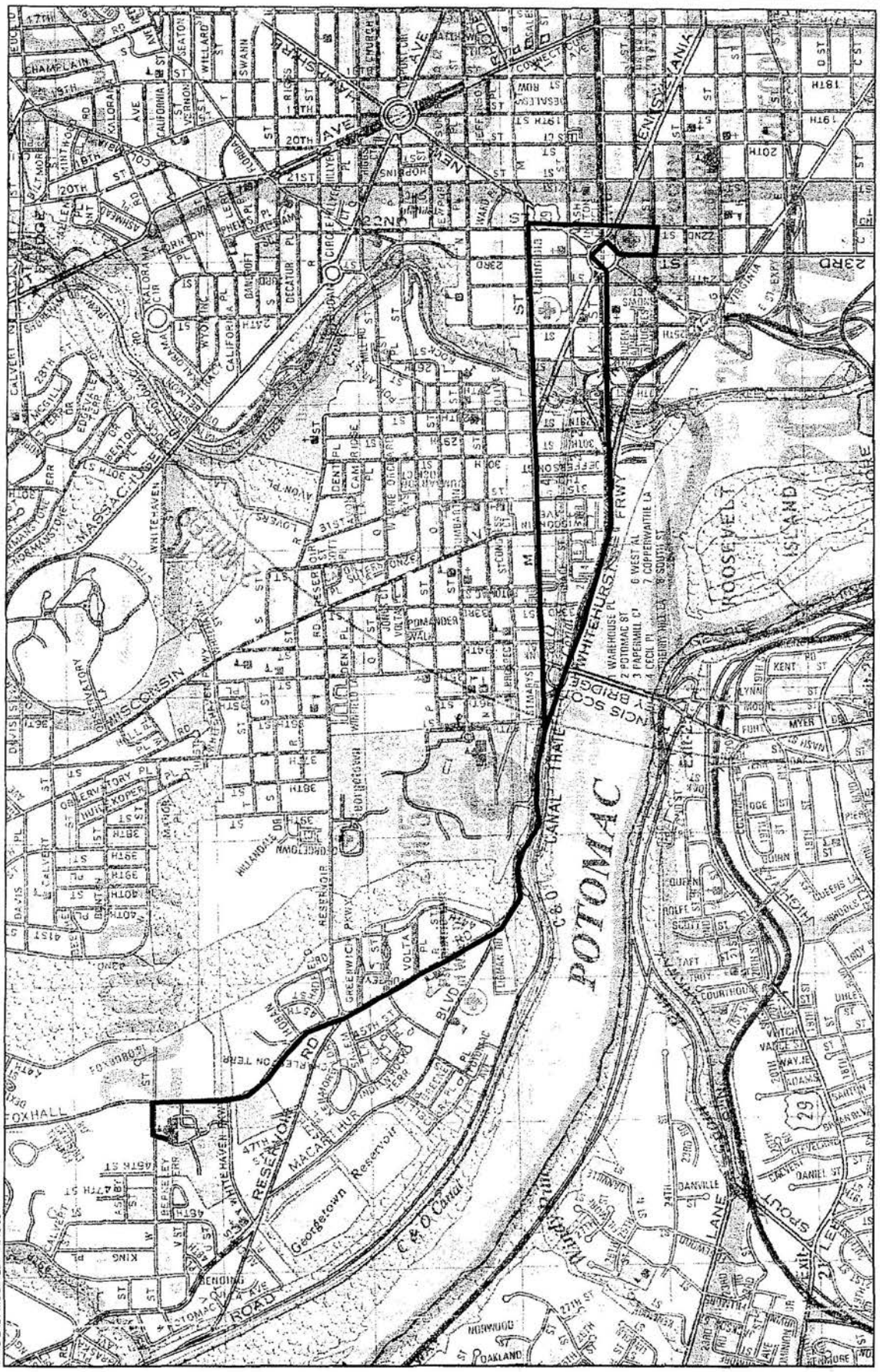

Figure 5
Foggy Bottom Campus/Mount Venon Campus Shuttle Route

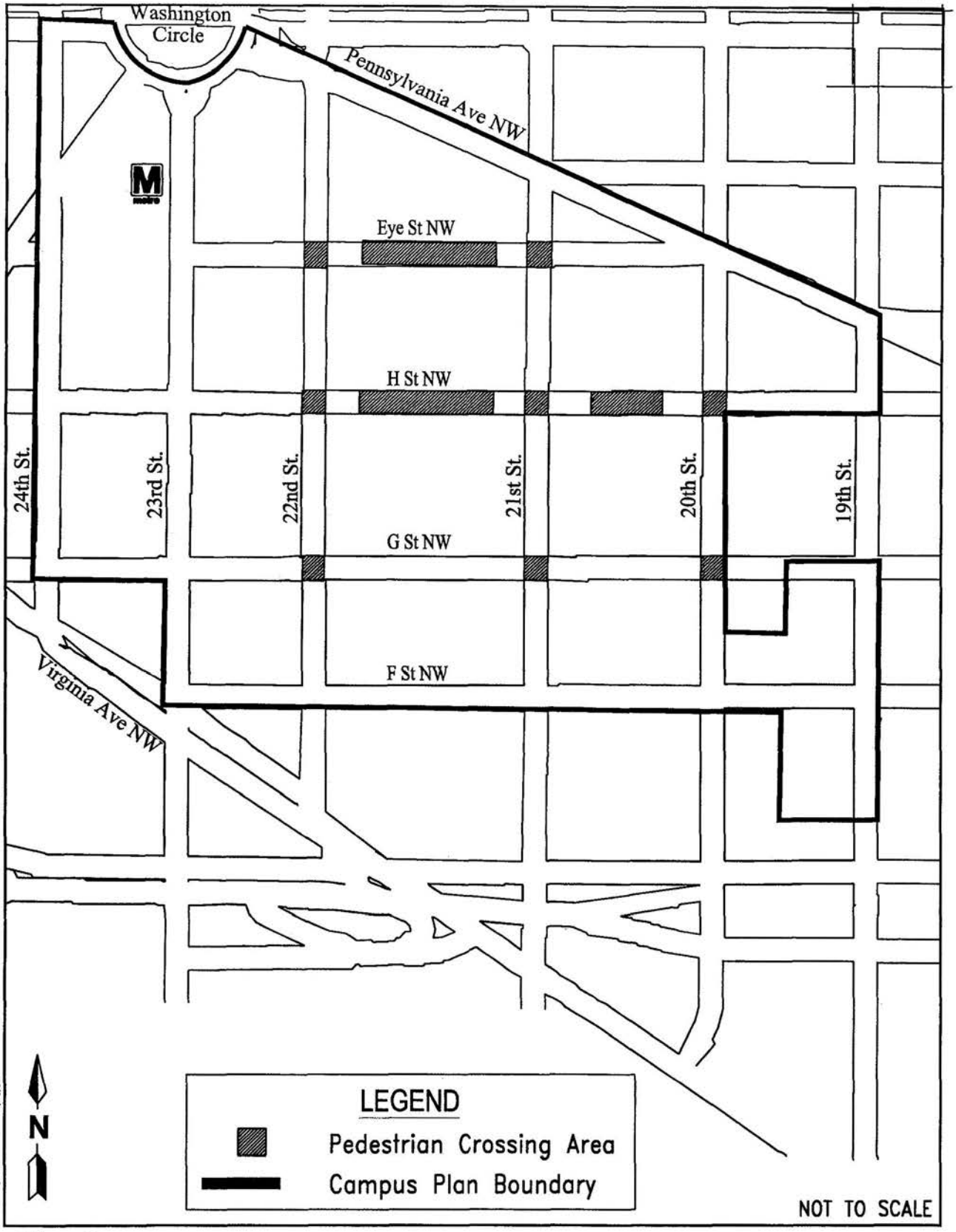

Figure 6
Major Pedestrian Crossing Areas

Existing Parking Conditions

Off-street Parking Inventory

In accordance with the 1985 Campus Plan, the University is required to maintain an off-street parking inventory of between 2,700 and 3,000 spaces. As of September 1999, GW had an inventory of 2,342 off-street parking spaces within the Campus Plan boundaries. In addition, the University has the capacity to stack park an additional 247 cars through the assistance of attendants. An additional 150 parking spaces are available for GW use at the Kennedy Center for a resultant off-street parking inventory of 2,739 spaces.

The use of Kennedy Center satellite parking spaces as part of the University's parking inventory is an acceptable parking management tool which has been approved by the BZA. Kennedy Center spaces are offered to students, faculty, and staff at reduced rates and provide an alternative to parking at University owned parking lots and garages. As a convenience, the Kennedy Center operates a shuttle bus from the satellite parking location to 23rd and Eye Street. The shuttle runs throughout the day, based on demand. Figure 4 shows the path of the Kennedy Center shuttle.

Figure 7 identifies the location and number of spaces in each of the off-street parking lots and facilities located within the Campus Plan boundaries (NOTE: Kennedy Center spaces are not included in this figure). Parking spaces located throughout the campus in various surface lots and parking facilities, and at the Kennedy Center, are designated as follows:

- 748 Student Spaces
- 1,580** Faculty and Staff Spaces
- 411 Visitor Spaces

2,739 Total Spaces

The allocation of these parking spaces as student, faculty/staff, and visitor spaces is summarized by specific lot and garage in the Technical Appendix.

Off-Street Parking Occupancy

In April 1999, parking occupancy surveys were conducted at each of the off-street parking locations on campus. Parking occupancy surveys were performed to identify the existing utilization of on-campus parking spaces throughout the course of an average academic week. The survey was conducted for five weekdays while school was in session. The results of the survey are included in the Technical Appendix to this report. The results indicated a peak parking demand of 2,437 spaces on Wednesday April 21, 1999, at 2:00 PM when 91.4% of the off-street spaces were occupied (NOTE: The off-street parking inventory on-campus was 2,666 vehicles when this survey was conducted. The 150 Kennedy Center spaces were not included in this survey). The results of this survey indicate that the supply of off-street parking spaces located within the campus boundaries was adequate to accommodate the peak demand, with a surplus of 229 spaces on-campus at the time. The 150 spaces provided at the Kennedy Center were not surveyed during the time when on-campus lots and garages were surveyed; however, records indicate that approximately 40 GW related vehicles park at the Kennedy Center per day. This number varies depending on the day of the week and weather conditions.

** *150 of the Faculty/Staff spaces are located at the Kennedy Center*

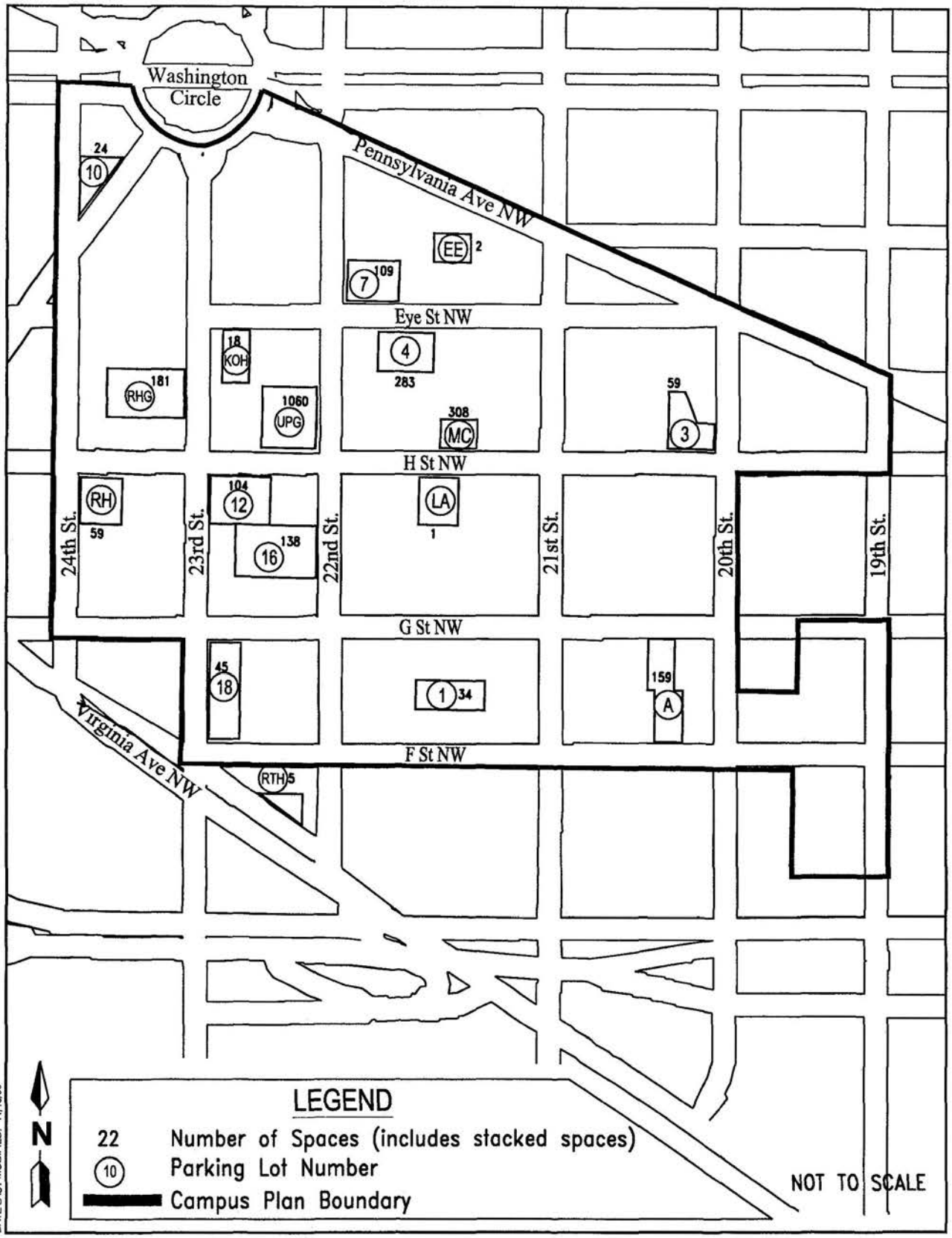

Figure 7
Existing Parking Lots & Garages

Note: 150 Kennedy Center Spaces not shown

View Number: 6

National Parking Averages

Twelve urban universities, such as NYU, Columbia, Loyola, and American University, were surveyed to determine the number of Full Time Equivalent (FTE) students, faculty and staff, as well as the number of off-street parking spaces on campus (NOTE: All universities included in the survey are supported by a convenient public transportation system.). The results of the survey were then used to calculate the number of parking spaces available per student, and the number of parking spaces available per faculty/staff. The calculations indicated an average of .02 spaces per student, an average of .10 spaces per faculty and staff, and an overall average of .15 spaces per person. NOTE: Some universities do not designate spaces as student or faculty/staff spaces. Therefore in order to measure an average that included all surveyed universities, and also to incorporate visitor spaces into the ratio calculation, the number of *spaces per person* was calculated.

The calculated average parking ratios were then compared to calculated GW parking ratios. GW parking ratios were calculated based on a student enrollment of 13,786 FTE students, and 8,155 FTE faculty and staff (including contract and hospital employees) at the GW Foggy Bottom Campus. Based on these population figures, and the previously stated parking designations (See Table 3), the parking ratios for GW were calculated to be .05 spaces per student, .19 spaces per faculty and staff, and .13 spaces per person. This indicates that GW's student and faculty/staff averages are equal to or higher than the calculated national averages. The slightly lower overall parking ratio is reasonable considering the high percentage of GW students, faculty/staff, and visitors that walk or take advantage of public transportation (see Table 2). The results of the National Parking Ratio survey are summarized in Table 3 and are included in the Technical Appendix to this report.

Table 3
Parking Ratios

	Spaces/Student	Spaces/Faculty & Staff	Spaces/Person
Minimum	0.00	0.00	0.00
Maximum	0.06	0.33	0.62
Average	0.02	0.10	0.15
GW	0.05	0.19	0.13

Based on the results of the off-street parking surveys and the comparison of GW ratios to national averages, the 2,700 - 3,000 parking inventory is appropriate for existing conditions.

Existing Loading Facilities

Except for specialized items and products, most materials delivered to the University are at various locations throughout campus through "just-in-time" direct delivery by vendors and bulk orders which are delivered to the Support Building, located at 2025 F Street. Exceptions include medical supplies, which are delivered directly to loading docks at Ross Hall and the hospital; computer center deliveries, which are made to the Academic Center; bookstore and food service items, which are received at the Marvin Center; library books, which are delivered directly to the Gelman Library. Each of these loading facilities is pictured in Figure 8.

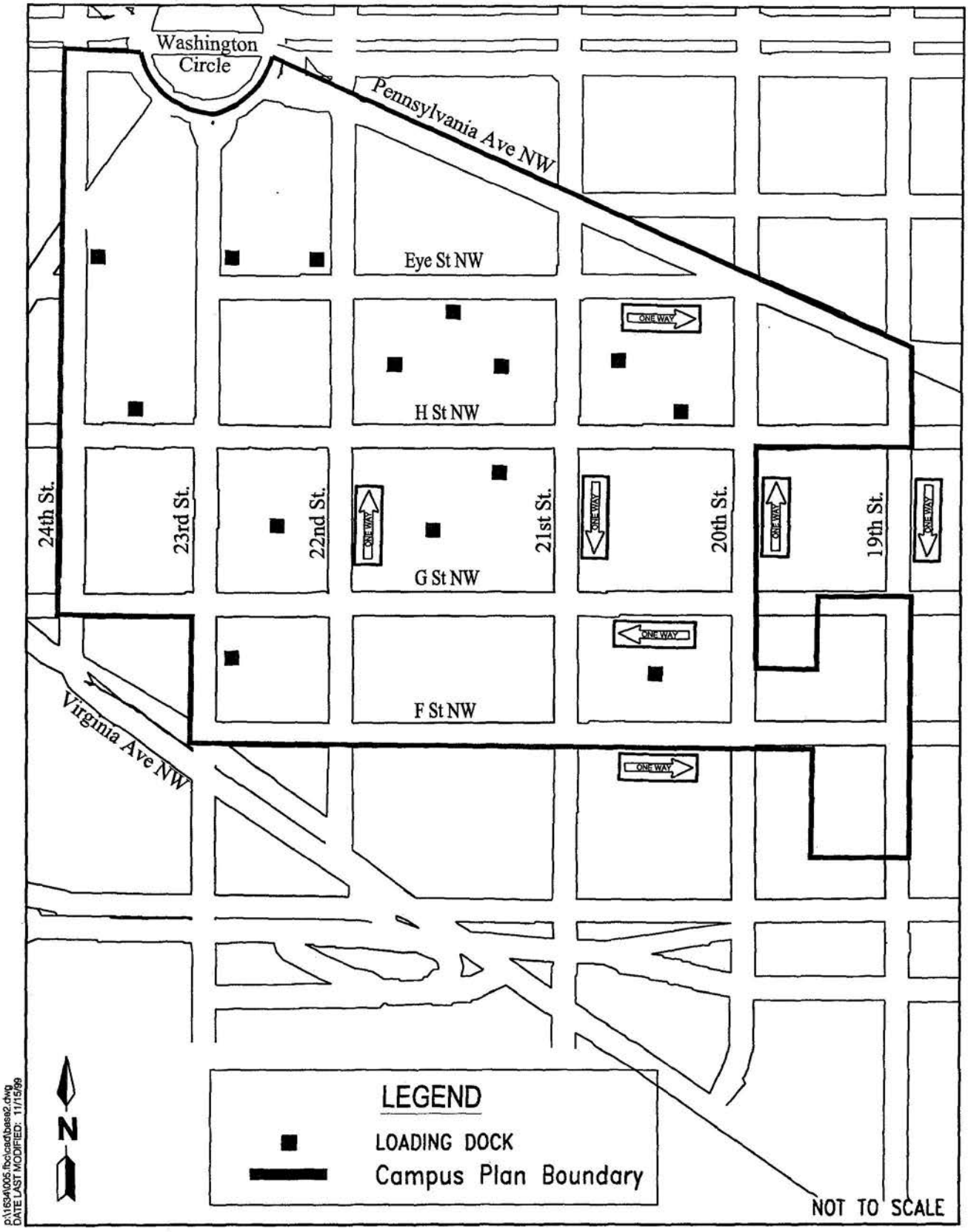

Figure 8
On-Campus Loading Facilities

CAMPUS PLAN DEVELOPMENT CONDITIONS

Campus Plan Growth Rates

Student enrollment numbers may increase from 13,786 Full Time Equivalents (FTE) to 16,553 FTE by the year 2010. This is an overall increase of approximately 20% over the next ten years. Faculty/staff numbers may increase from 8,155 to 10,550. This equates to a possible growth rate of 29% for faculty and staff and an overall population growth rate (including students) of approximately 24%. Traffic and parking facilities and programs have been planned to meet this growth.

Future Traffic Conditions

Since the total number of students, faculty, and staff may increase by 24% over the next ten years, a similar growth rate may be expected for University-related traffic volumes. In order to project potential future traffic volumes, University traffic was increased by 24% (Although 24% was used for these calculations, it should be noted that the traffic volumes and need for parking spaces is actually expected to increase by a rate less than 24% due to enhancements in the University's Transportation Management Plan.).

The 24% growth rate was applied to traffic volumes on east-west streets (F, G, H, Eye Streets) within the Campus Plan boundaries which primarily carry University related traffic A 24% growth rate applied to the north-south streets which carry primarily non-University commuter traffic would incorrectly inflate the high volume of commuter traffic as well as University traffic. Therefore, traffic volumes on 19th, 20th, 21st, 22nd, and 23rd Streets were increased by adding the projected increase in traffic volumes of east-west streets to the existing volumes on the north-south streets (see Technical Appendix for detailed calculation). Future Campus Plan Development traffic volumes are illustrated in Figure 9 (NOTE: The traffic volumes associated with a specific Campus Plan development project will be examined in greater detail during the further processing approval process and when the development plans for the project are more definitive.).

Future Capacity Analysis

The future traffic volumes that were projected based on the possible growth in Campus Plan population (see Figure 9) were compared to the *calculated capacity* of roadway segments that were calculated in the Existing Conditions Capacity Analysis section of this report (see Technical Appendix for detailed calculations). The results of the Future Capacity Analysis are shown in Table 4. As the results indicate, all of the roadway links within the Campus Plan boundaries, except 19th and "G" Streets, will have more than adequate capacity to accommodate future traffic volumes. "G" Street is projected to have slightly more vehicles (23) than the calculated capacity; however, in a grid roadway system such as this, motorists will likely relocate to an alternate east/west street where more capacity is available. Other nearby westbound streets ("H" and Eye Streets) provide an additional combined capacity of 328 vehicles.

19th Street has traffic volumes that are higher than the calculated capacity; however, it should be noted that the vast majority of the traffic on 19th Street is not University related. 19th Street is located on the eastern edge of the Campus Plan boundary and does not provide access to any University parking lot or garage or other University traffic generator. It should be noted that the

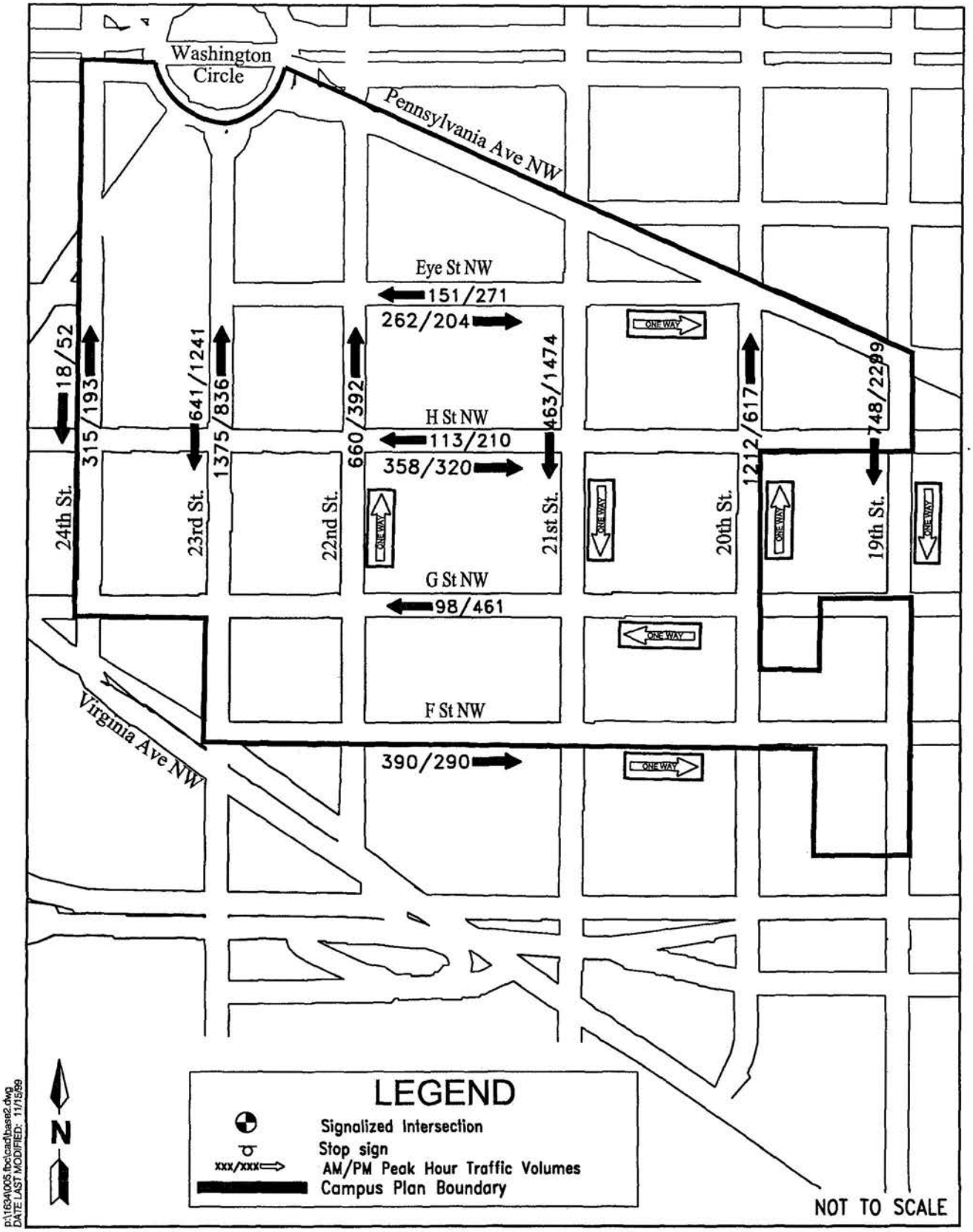

Figure 9
Future Peak Hour Traffic Volumes
Year 2010

calculated capacity is not the absolute maximum number of vehicles that can be accommodated on a roadway at a point in time. In fact, there are times when the calculated capacity is exceeded, and excess capacity is accommodated. Often, when calculated capacity is exceeded, excess vehicles reroute to alternate streets where more capacity is available.

Table 4
Future Capacity Analysis

	Roadway Capacity (vph)	AM Peak Demand (vph)	AM Resultant Capacity (vph)	PM Peak Demand (vph)	PM Resultant Capacity (vph)
19th Street SB	**2,020**	748	***1,272***	2,299	***-279***
20th Street NB	**1,920**	1,212	***708***	617	***1,303***
21st Street SB	**2,000**	463	***1,537***	1,474	***526***
22nd Street NB	**2,040**	660	***1,380***	392	***1,648***
23rd Street NB	**1,710**	1,375	***335***	836	***874***
23rd Street SB	**1,760**	641	***1,119***	1,241	***519***
24th Street NB	**600**	315	***285***	193	***407***
24th Street SB	**620**	18	***602***	52	***568***
Eye Street EB	**410**	262	***148***	204	***206***
Eye Street WB	**410**	151	***259***	271	***139***
H Street EB	**410**	358	***52***	320	***90***
H Street WB	**410**	113	***297***	210	***200***
G Street WB	**450**	98	***352***	461	***-11***
F Street EB	**460**	390	***70***	290	***170***

Future Public Transportation and Alternative Mode Choice Opportunities

In the future, the Washington Metropolitan Area Transit Authority (WMATA) public transportation system will continue to provide the University with convenient alternatives to single occupancy vehicles. In addition, the University will continue to encourage the use of other modes of transportation (See the Transportation Management Plan portion of this report for examples of GW's effort to encourage the use of other modes of transportation).

Future Pedestrian Activity

The future pedestrian activity associated with the GW Campus Plan developments is expected to increase similar to student, faculty and staff growth rates. Many of these pedestrians will be accommodated in the pedestrian open space areas such as the University Yard. Pedestrians will also continue to use sidewalks and cross intersections at crosswalks. In addition, pedestrians will continue to cross some streets at mid-block locations, which is why special treatment of these crossings is included in this Campus Plan.

Mid-Block Crossings

The University has many major pedestrian generators which attract high numbers of pedestrians. In some cases, one high pedestrian generator is located across from another high pedestrian generator in the middle of a block (i.e., the Marvin Center is located in the middle of the block on the north side of H Street and the Mid Campus Quad is located in the middle of the block on the south side of H Street). In this case, a large number of pedestrians cross H Street in the middle of the block instead of walking down the sidewalk to the intersection, crossing at the crosswalk, then walking up the sidewalk to their destination. In an effort to make these mid-block crossing areas safer for pedestrians and more consistent for traffic flow, the University is proposing the implementation of special "mid-block crossings" at strategic locations throughout the campus. The proposed mid-block crossing locations are illustrated in Figure 6.

It is anticipated that the mid-block crossing system will evolve over time. Therefore, it can be monitored to ensure that it is enhancing both the pedestrian and the vehicular traffic environment. The components of design for the mid-block crossings may include the following:

- ***Pavement characteristics.*** The existing pavement may have pavement markings indicating the pedestrian crossing zone. Alternatively, the pavement could be raised in elevation by a few inches in the form of a long " speed hump." In another design alternative, the sidewalk and street pavements could flow together with a unified paving surface similar to that used on Fourth Street between the East Wing and the West Wing of the National Gallery of Art.

- ***Traffic control devices.*** On low traffic volume streets, the pedestrian crossing may be marked with simple warning signs to alert motorists that pedestrians have the right of way. In higher volume streets, a pedestrian traffic signal may be warranted.

- ***Other design features.*** Other alternative features of the mid-block crossings could be a gateway which defines one of the entries on the campus. These gateways could be used at some of the heaviest pedestrian crossings to help define the entry to the campus (i.e. the gateway at China Town).

  At some sites, special lighting may be appropriate and warranted. This lighting would attract pedestrians to the crossing location after dark and would help ensure that motorists recognize that they are approaching a crossing location.

The mid-block crossings could go from curb face to curb face on each street. The longitudinal dimension along the street may be as short as 25 feet (one parking space) and as long as approximately 200 feet. This would depend on the characteristics of each location. The specific design features of each mid-block crossing will be developed in cooperation with, and is subject to the approval of, the Department of Public Works. An example of these mid-block crossings is included as Figure L of the Campus Plan.

Other Safety Considerations

In addition to mid-block crossings, other specific areas of possible improvements on-campus have been identified. The primary purpose of these improvements is to reduce impacts due to potential pedestrian/vehicular conflicts, thereby improving safety. Improvements may include signage, traffic signalization changes, or paint stripping. Each potential safety improvement location is identified in Figure 10.

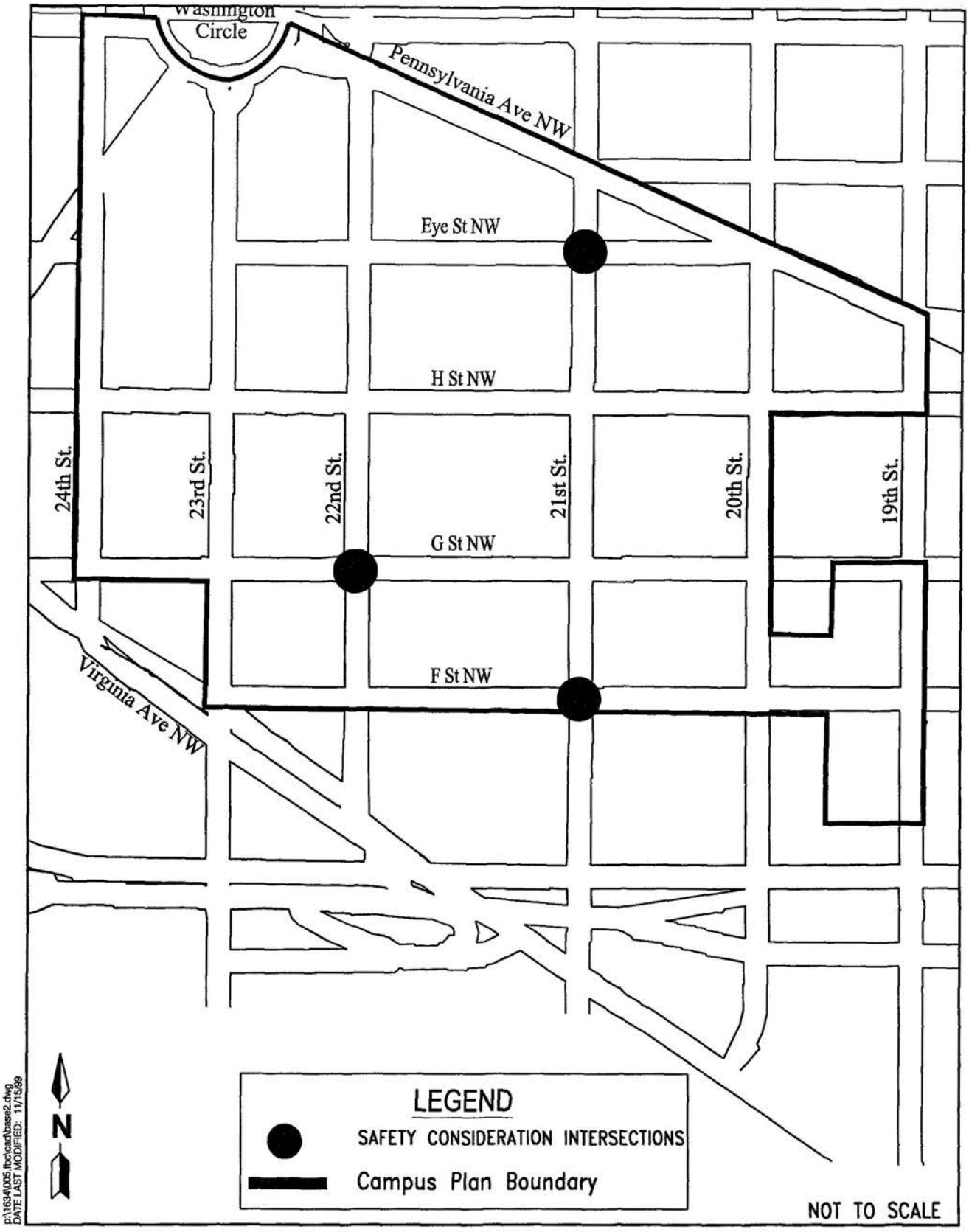

Figure 10
Safety Improvements

Future Parking Conditions

The off-street parking occupancy surveys conducted in April 1999 indicated that existing parking inventory is more than adequate to meet existing parking needs. Projected increases in students, faculty, and staff will create an additional demand for off-street parking spaces in the future. Table 5 summarizes the expected increase in parking that may be needed in the future if the student, and faculty/staff projections are realized. A detailed calculation of the projected parking inventory is included in the Technical Appendix.

Table 5
Campus Plan Development Parking Projections

Existing Peak Parking Demand (on-campus)	2,437
Kennedy Center Peak Parking Demand	40
Increase due to students	132
Increase due to faculty & staff	410
Increase due to visitors*	70
Subtotal	***3,089***
10% Increase to allow for turnover and easy location of spaces	309
5% Reduction for TMP programs	-154
Total	**3,244**

** 19% growth rate used*

As Table 5 indicates, approximately 3,240 parking spaces will be adequate to meet the University's parking needs in the future if student, faculty and staff members reach their maximum projections. The University will not reach the expected population numbers immediately, if at all; therefore a minimum parking inventory of 2,700 spaces is recommended.

GW will increase its current parking inventory when the Health & Wellness Center, Media & Public Affairs building, and the University Parking Garage expansion projects, all currently under construction, are complete. The development of these projects will provide the University with an additional 385 spaces for a total of 3,124 spaces (current inventory of 2,739 plus an additional 385). The allocation of these additional spaces is summarized in Table 6.

Table 6
Future Parking Space Allocation

	Student Spaces	Fac/Staff Spaces	Visitor Spaces	**Total Spaces**
Existing	748	1,580	411	**2,739**
Health & Wellness	55	85	0	**140**
Media & Pub Affairs	0	65	0	**65**
UPG Expansion	24	46	110	**180**
Total	827	1,776	521	**3,124**

TRANSPORTATION MANAGEMENT PLAN

The major objectives of the Transportation Management Plan (TMP) are to minimize the traffic demand on campus, maximize the effective use of available parking on campus to serve the anticipated parking demand, address the traffic operations associated with the Campus Plan development, and promote the utilization of the shuttle bus service for intercampus travel. The GW TMP consists of the following components to address these objectives:

- Traffic Demand Management consists of applying program measures in association with the Campus Plan to reduce the single occupancy vehicle traffic demand generated by the GW campus.
- Traffic Operations Management consists of managing University related traffic in order to minimize unnecessary circulation and reduce pedestrian/vehicular conflicts. This also includes the effective management of the GW shuttle system.
- Parking Demand Management consists of reducing the demand for parking spaces on campus by reducing the number of single occupancy vehicles that need to park. Parking demand management has a significant effect on the resulting traffic demand generated by GW.
- Parking Operations Management consists of managing the operation of the off-street parking supply through means such as designating the acceptable users of the supply, or by increasing parking rates.

Existing Transportation Management Plan

The University currently has the following Transportation Management Plan programs in place:

1. **Companion Access Card Program** Two GW "GWorld" identification cards are activated to a single parking contract account to facilitate ride sharing by accommodating parking access to persons who are married, or have shared, within the year, a mutual residence and maintain a committed relationship. The Companion Access Card is purchased through the Parking Services Office.
2. **On-site Transit Pass Distribution** Metrorail fare cards are sold as a convenience on-campus at the GW Bookstore. The GW Bookstore is located in the ground floor of the Marvin Center at 800 21st Street. Approximately two dozen metro cards are sold in the GW Bookstore each month.
3. **GW Parking Permit Distribution and Lot Designation** As part of the parking demand management program, resident students, commuting students and faculty/staff members are required to obtain a parking permit to park on-campus (occasional parkers who pay visitors' hourly rates may park on-campus without a parking permit). This includes the distribution of parking permits and the designation or parking permits as student or faculty/staff. Parking Management also includes designating a certain number of visitor spaces for University visitors. Students, faculty, and staff who purchase a monthly contract are assigned a specific lot or garage. The number of permit holders can be limited if necessary.

4. **Way-finding Signs** A way-finding signing system is an effective Traffic Operations Management measure. The University posts signs around campus to help University visitors locate major destinations on campus, thereby minimizing unnecessary traffic circulation. For example, signs are posted on hospital columns to inform hospital visitors that visitor parking is available in a University Parking Garage (UPG). Signs which clearly identify the location of major destinations such as the hospital, Smith Center, Lisner Auditorium, and the University Parking Garage should continue to be clearly posted to minimize unnecessary circulation.

5. **Kennedy Center Parking** Part of the GW Parking Operations Management Plan includes designating certain off-campus lots for GW use. The use of satellite parking facilities is a commonly used parking operation measure that creates additional supply within a reasonable distance. The use of a satellite facility is acceptable for everyday use, as well as occasional use when overflow parking may be needed. Off-site parking spaces are available at the Kennedy Center at reduced parking rates. Shuttle service is provided to and from the Kennedy Center at regular intervals.

6. **Stacked Parking/Attendant-aided Parking** Attendants are available to stack cars in order to provide additional parking supply when needed.

7. **Shuttle Service to Mount Vernon College Campus** GW operates a shuttle bus between the Foggy Bottom campus and the Mount Vernon campus that provides direct nonstop service from the Mt. Vernon campus to a designated stop at 22nd Street and Eye Street. The existing shuttle bus system operates two shuttle buses that are scheduled twenty minutes apart from 6:55 AM to 8:15 AM and from 5:55 PM to 2:00 AM, with the first bus leaving GW/MVC at 6:55 AM and the last bus leaving Foggy Bottom at 2:00 AM. Between 8:15 AM and 5:45 PM, the shuttle buses are scheduled every ten minutes apart. These buses normally travel from the Foggy Bottom Campus to the Whitehurst Freeway to Canal Road to Foxhall Road in order to reach the Mount Vernon Campus. The shuttle bus route is shown in Figure 5.

Future Transportation Management Plan

GW plans to continue using and enhancing the existing TMP programs that are currently in place. In addition, GW plans to expand the TMP which may include the following additional programs:

1. **Alternate Work Schedules (AWS)** Although no formal program exists at GW to allow flexible work schedules, supervisors are increasingly entering into such arrangements with their staffs. These arrangements are largely in response to employees who need to address child care issues, who want to avoid traveling during times of peak traffic congestion, or who wish to take advantage of GW's tuition benefits and attend classes held during scheduled work hours. Improvements in GW's information technology systems now allow GW employees to access certain GW computer resources from their home computers. Increasing this access is a current topic of discussion. As a result of changes such as these, employees can

"telecommute" more easily than ever before. This, coupled with the freedom given the GW supervisors to enter into creative work schedule arrangements, should result in an on-going reduction of GW traffic during peak travel times.

2. **MetroCheck Program** In August of 1998, a working group was formed to evaluate how the University could take advantage of the MetroCheck program, which allows employees to purchase fare cards with pre-tax earnings. Since that time, Dick Siskind, a Senior Account Representative of the Metro Area Transit Authority, was invited to participate in this working group. In the spring of 1999, representatives from the EPA and the US Department of Transportation, both of whom have instituted the MetroCheck program, spoke to the working group about their experiences with the program. The presentation was extremely useful in highlighting the kinds of resources which GW will need to commit to administering a MetroCheck program. The group is in the process of exploring whether the administration of the program can be outsourced or whether this function is better addressed within the University. Additional meetings of the group will be scheduled over the coming months as a formal implementation plan is developed.

3. **Shuttle Bus Service** As the Mount Vernon College campus begins to grow, the demand for shuttle service between GW campuses will likely increase. It is essential that the shuttle bus service is adequate to serve the projected demand and that the service operates on a timely schedule. This projected demand can be accommodated by increasing the shuttle bus service during the peak commuting hours of the day as warranted by demand. The peak periods during the week can be monitored to determine travel patterns that become established after the beginning of each semester, and shuttle bus service can be altered as the semester progresses or when the demand warrants it.

   The Kennedy Center bus will continue to provide convenient, on-demand service from the Kennedy Center satellite parking garage to the 23rd Street/Eye Street intersection.

4. **Off Hour Metro Passes** GW's Institute for the Environment, under the leadership of Professor Laurent Hourcle, a member of the faculty of The George Washington University Law School, has had discussions with the Metro Area Transit Authority about the possibility of Metro creating an "off hour" Metro fare card which could be sold to students, the elderly and others who might be interested in traveling during non-peak metro hours. Metro authorities see this as a way to increase the utilization of metrorail during off-hours. The District's Environmental Health Administration is excited about this idea as a means to expand the use of public transportation in the D.C. metropolitan area. With the introduction of Metro's new Smart Card, the feeling is that this kind of card should be fairly simple to introduce. GW's Institute for the Environment will continue to push for this program.

5. **Ride Matching Program** Two ride share programs are in development at the University. GW's parking office is exploring the creation of a web site which would allow those commuting locally to and from GW to find carpool matches. In addition, the Institute for the Environment has proposed the creation of a web site

that would allow similar matches for students traveling to and from their homes in various states for holidays and breaks.

6. **Preferential Parking for Carpools** GW's parking office is evaluating plans to designate conveniently located parking spaces for carpool participants.

7. **Freshman Orientation Program** Both the Dean of Student's Office and Student and Academic Support Services have agreed to add segments on alternative modes of transportation to their respective freshman orientation programs. In addition, Parent Services has agreed to include in the parent newsletter, which goes to all GW parents, information about the easy availability of public transportation on and near the Foggy Bottom Campus.

8. **Bicycle Friendly GW** GW currently supports the GW Cycling Club, a registered student organization. As membership in this club is quite competitive, the creation of another cycling club for students who are looking for a less structured experience is being explored. In addition to clubs promoting the use of bicycles, the University's dorms are increasingly "bike friendly." Many dorms provide bike storage in secure locations. Students bringing bikes to dorms without formal bike storage areas can usually make arrangements to store their bikes in their rooms. Discussions are underway with Parking Services about increasing the number of bike lockers on campus, which it is hoped will encourage the increased use of bikes by students.

CONCLUSIONS

The purpose of this report is to provide traffic and parking information to support the Campus Plan for The George Washington University Foggy Bottom Campus (GW) for the years 2000 through 2010. This document presents the results of an assessment of the existing roadway network, traffic conditions, public transportation opportunities, shuttle service, bicycle amenities, pedestrian activity, parking conditions, loading facilities, and the University's existing Transportation Management Plan (TMP). This report also presents the results of an existing traffic capacity analysis and parking demand analysis. In addition to presenting existing conditions, this document outlines the proposed Campus Plan improvements to the campus, the traffic and parking implications associated with future population projections, and the various elements of the Transportation Management Plan (TMP) to address the traffic and parking impacts of the Campus Plan recommendations. The following are the findings of this report:

Existing Conditions

- All roadways within the Campus Plan boundaries, except 19th Street during the PM peak hour, have the capacity to accommodate additional vehicles. 19th Street has traffic volumes that are higher than the calculated capacity; however, the vast majority of the traffic on 19th Street is not University related.
- A recent transportation mode choice survey revealed that only 15% of students, 45% of faculty/staff, and 46% of visitors drive or ride automobiles to campus. The remaining population arrives by metrorail, metrobus, walking, or other means.
- The existing shuttle bus system currently operates two shuttle buses between Mount Vernon to Foggy Bottom that are scheduled twenty minutes apart throughout the day from 6:55 AM to 8:15 AM and from 5:55 PM to 2:00 AM, with the first bus leaving GW/MVC at 6:55 AM and the last bus leaving Foggy Bottom at 2:00 AM. Between 8:15 AM and 5:45 PM, the shuttle buses are scheduled every ten minutes apart.
- Bicycle racks are conveniently located at many locations throughout the campus.
- Pedestrian activity occurs throughout the campus in interior pedestrian circulation areas, along public sidewalks, at pedestrian street crossings, and at mid-block locations not designated for pedestrian crossing.
- In accordance with the 1985 Campus Plan, the University is required to maintain an off-street parking inventory of between 2,700 and 3,000 spaces. As of September 1999, GW had an inventory of 2,739 parking spaces, including 150 spaces which it is permitted to provide at the Kennedy Center.
- The results of a one week off-street parking occupancy survey indicated the University experienced a peak parking demand of 2,437 spaces. This peak occurred at 2:00 PM on a Wednesday.

Campus Plan Development Conditions

- University population numbers may increase as follows: student enrollment may increase by 20%, and faculty/staff members may increase by 29% by the year 2010.

- All roadway links within the Campus Plan boundaries, except "G" and 19th Streets, will have enough capacity to accommodate future traffic volumes. "G" Street westbound is projected to have slightly more vehicles (23) than the calculated capacity; however, in a grid roadway system such as this, motorists will likely relocate to an alternate east/west street. 19th Street has traffic volumes that are higher than the calculated capacity; however, it should be noted that the vast majority of the traffic on 19th Street is not University related.
- Pedestrians currently cross some streets at mid-block locations. In an effort to make these mid-block crossing areas safer for pedestrians and to promote more consistent traffic flow, the University is developing special "mid-block crossings" at strategic locations throughout the campus. The components of design for the mid-block crossings may include pavement characteristics, traffic control devices and/or other design features such as special lighting.
- An off-street parking inventory range between 2,700 and 3,240 spaces is recommended to accommodate future population growth.

Transportation Management Plan

The GW TMP consists of the following components:

- Traffic Demand Management consists of applying program measures in association with the Campus Plan to reduce the traffic demand associated with the GW campus. These measures would be geared to emphasize alternative commuting means to reduce single occupancy vehicles.
- Traffic Operations Management consists of managing University related traffic in order to minimize unnecessary circulation and reduce pedestrian/vehicular conflicts. This also includes the effective management of the GW shuttle system.
- Parking Demand Management consists of reducing the demand for parking spaces on campus by reducing the number of single occupancy vehicles that need to park. Parking demand management has a significant effect on the resulting traffic demand associated with GW.
- Parking Operations Management consists of managing the operation of the off-street parking supply through means such as designating the acceptable users of the supply, or by increasing parking rates.

The University currently has the following TMP programs in place:

1. Companion Access Card Program
2. On-site Transit Pass Distribution
3. GW Parking Permit Distribution and Lot Designation
4. Way-finding Signs
5. Kennedy Center Parking
6. Stacked Parking/Attendant-aided Parking
7. Shuttle Service to Mount Vernon College Campus & Kennedy Center

GW Plans to continue using and enhancing the existing TMP programs that are currently in place. In addition, GW plans to expand the TMP, which may include the following additional programs:

1. Alternate Work Schedules
2. MetroCheck Program
3. Off Hour Metro Passes
4. Ride Matching Program
5. Preferential Parking for Carpools
6. Freshman Orientation Program
7. Bicycle Friendly GW

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THE GEORGE WASHINGTON UNIVERSITY
FOGGY BOTTOM CAMPUS PLAN
TRAFFIC AND PARKING STUDY

Technical Appendix

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The George Washington University Foggy Bottom Campus Plan
Traffic And Parking Study Technical Appendix
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