

**GW MOUNT VERNON CAMPUS
TRANSPORTATION IMPACT STUDY
WASHINGTON, D.C.**

Submitted on behalf of:
The George Washington University

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November 2009

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EXECUTIVE SUMMARY

The George Washington University is in the process of preparing its 2010 Mount Vernon Campus Plan. As part of the 2010 Plan, four new academic buildings and one new residential building are proposed. The University believes its space needs can be met over the next ten years by reallocating the gross floor area (GFA) already approved under the 2000 Plan. Thus, the 2010 Plan reallocates the remaining GFA to new sites in order to improve the campus' sense of community and provide a balance of uses to meet student, faculty and community needs.

Additionally, the 2010 Plan will eliminate the W Street entrance. A pedestrian entrance will be provided in its place. The pedestrian entrance will be designed to accommodate emergency vehicles. Under extreme conditions and during student move-in/move-out, the entrance could be opened to motorized traffic. During all other times, the W Street entrance will be closed to motorized vehicles.

A student cap increase of 10 percent in FTE students (total of 1,100 on a daily basis) and 15 percent in headcount students (total of 1,725 on a daily basis) also is proposed as part of the 2010 Plan. Additionally, the University anticipates that the number of faculty and staff will not exceed 150.

This study was conducted in order to assess the impacts of the 2010 Plan on the surrounding road network.

Based on this transportation impact study, the principal conclusions are as follows:

1. The increase in traffic associated with the projected increase in enrollment and associated increase in faculty and staff will account for approximately one percent or less of the traffic within the study area and will have no discernible impact,
2. The University's existing off-street parking supply adequately accommodates the current parking demand. With the projected enrollment increase and associated increase in faculty and staff, the proposed off-street parking supply will be adequate to meet the projected parking demand, provided that the University retains the ability to reclaim leased parking spaces from the Lab School at any time,
3. The proposed closure of the W Street entrance will redirect University traffic to Whitehaven Parkway and reduce the traffic volume on W Street,
4. The University will maintain and enhance its Transportation Management Plan, including the provision of a regular shuttle bus between the Mount Vernon and Foggy Bottom campuses,
5. The University will maintain and enhance its Parking Management Plan, including the provision of monitoring parking demand on an annual basis, and
6. The 2010 Plan will not generate objectionable impacts due to traffic or parking.

Section I INTRODUCTION

OVERVIEW

The George Washington University's (GW) Mount Vernon Campus is a fully integrated co-educational university that complements GW's Foggy Bottom campus. The Mount Vernon Campus is located on a 23-acre site on Foxhall Road in northwest Washington, DC, as shown on Figure I-1.

In December 1999, the District of Columbia Board of Zoning Adjustment issued Order Number 16505, which caps the student enrollment at the GW Mount Vernon Campus at 1,000 full time equivalent (FTE) students, which shall not exceed 1,500 students on a headcount basis. This approval will expire on December 31, 2010. Accordingly, GW intends to file the 2010 Mount Vernon Campus Plan with the District of Columbia Zoning Commission, which would propose an increase in the current student cap. A student cap increase of 10 percent in FTE students (1,100) and 15 percent in headcount students (1,725) is proposed.

Based on GW's census information for the Fall 2009 Semester, the Mount Vernon Campus currently has an average of 1,119 students on a headcount basis on any given day.

The Mount Vernon Campus also currently employs 81 full-time faculty and staff.

Access to the Campus currently is provided via full movement driveways on Whitehaven Parkway and W Street. The Whitehaven Parkway driveway is a 24-hour entrance for all GW students, faculty, staff, regular vendors, shuttles, and athletic department, pool and tennis club participants. The W Street driveway provides access to the visitors' parking lot. GWorld card holders are prohibited from using this entrance. However, as part of the 2010 Plan, this driveway will be eliminated and the visitors' parking lot will be removed. A pedestrian entrance will be provided in its place. The pedestrian entrance will be designed to accommodate emergency vehicles. Under extreme conditions and during student move-in/move-out, the entrance could be opened to motorized traffic. During all other times, the W Street entrance will be closed to motorized vehicles.

A secondary access road along Whitehaven Parkway has been constructed west of the main access. The secondary access currently is used by construction vehicles during the construction of the Pelham Hall redevelopment project.

After the Pelham Hall redevelopment project is complete, regular use of the secondary access will be limited to service and delivery vehicles. The 2010 Mount Vernon Campus Plan is shown on Figure I-2.

STUDY SCOPE

Overview

This report presents the results of a transportation impact study conducted in conjunction with the 2010 Mount Vernon Campus Plan. The scope of the study and proposed methodologies were discussed with the District Department of Transportation (DDOT).

Study Area

The study area was determined based on those intersections that potentially could be affected by the changes associated with the 2010 Plan. The following intersections were selected for analysis:

1. MacArthur Boulevard/W Street
2. W Street/GW Existing Driveway
3. Foxhall Road/
4. Foxhall Road/Whitehaven Parkway
5. Whitehaven Parkway/GW Existing Driveway
6. MacArthur Boulevard/Whitehaven Parkway
7. MacArthur Boulevard/Reservoir Road
8. Foxhall Road/Reservoir Road
9. Foxhall Road/Deerfield Road

Study Objectives

The objectives of this study were to:

1. Evaluate existing transportation and parking conditions on- and off-campus,
2. Evaluate future transportation and parking conditions on- and off-campus without any changes to the Campus,
3. Evaluate future transportation and parking conditions on- and off-campus with the proposed changes associated with the 2010 Plan,
4. Evaluate the effectiveness of the existing Parking Management Plan and Transportation Management Plan and recommend changes, as necessary, and
5. Recommend transportation improvements to promote the safe and efficient flow of vehicular and pedestrian traffic on campus.
8. Recommendation of improvements required to mitigate the impact of the proposed development.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

Tasks undertaken in this study included the following:

1. Review of plans provided by Ehrenkrantz Eckstut & Kuhn Architects.
 2. A meeting with DDOT staff regarding the traffic study scope.
 3. A field reconnaissance of existing roadway and intersection geometrics, traffic controls, and speed limits.
 4. A field reconnaissance of existing transportation operations on campus.
 5. Turning movement counts at the study intersections during the AM and PM peak periods.
 6. Analysis of existing and projected levels of service at the study intersections.
 7. Estimation of the number of AM and PM peak hour trips that would be generated by the proposed increase in enrollment and the other planned developments in the area.
 1. This report takes into account the impact of proposed increases in Mount Vernon student enrollment over the term of the 2010 Plan and the associated increase in faculty and staff.
 2. The Mount Vernon Campus currently generates an estimated 80 AM peak hour vehicle-trips and 52 PM peak hour vehicle-trips.
 3. University traffic currently accounts for less than one percent of all traffic on streets within the study area during both the AM and PM peak hours.
 4. The impact of projected increases to Mount Vernon student enrollment (606 headcount students) and faculty and staff levels (69 full-time faculty and staff) is expected to generate 57 additional AM peak hour vehicle-trips and 36 additional PM peak hour vehicle-trips.
- This volume of traffic is expected to have no discernible impact on traffic operations at the study intersections. At each intersection, the additional traffic will account for approximately one percent or less of the total future traffic.
5. The following intersections currently operate at acceptable levels of service (i.e. LOS "D" or better):
 - W Street/GW Driveway
 - Whitehaven Parkway/Foxhall Road
 - Whitehaven Parkway/GW Driveway
 - MacArthur Boulevard/Reservoir Road
 - Foxhall Road/Deerfield Road

The following intersections operate at or near capacity (i.e. LOS "E" or "F") under existing conditions during at least one of the peak hours:

- W Street/MacArthur Boulevard
- W Street/Foxhall Road
- MacArthur Boulevard/Whitehaven Parkway
- Foxhall Road/Reservoir Road

6. The GW Transportation Management Plan (TMP) currently consists of the following measures:

- Shuttle Bus Service Plan,
- Car Sharing,
- Carpool Incentive Program ,
- Significant bicycle parking, and
- Shopping cart loan program.

The following improvements to the existing TMP measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan:

- Continue existing TDM strategies,
- Maintain shuttle bus service with commitment to expand number of buses as necessary during peak periods,
- Provide preferential parking in garage for carpools, and
- Provide preferential parking for hybrid vehicles.

7. The following improvements to the existing parking measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan:

- Maintain ability to reclaim Lab School leased parking spaces at any time,
- Monitor Parking Annually – when parking occupancy in the garage reaches 85%, implement additional measures, such as increasing number of spaces by implementing attendant parking and restricting freshmen from bringing cars to campus,
- Provide preferential parking in garage for carpools, and
- Continue to encourage use of car sharing service by students and monitor potential demand for additional car sharing.

Section 2 EXISTING CONDITIONS

LAND USE

The GW Mount Vernon Campus is located in Ward 3, which is located in the northwest quadrant of the City. The Campus generally is bounded by Foxhall Road on the east, MacArthur Boulevard on the west, W Street on the north, and Whitehaven Parkway on the south.

The Campus currently houses academic and residential buildings, tennis courts, a lacrosse field, a softball field, a gymnasium, a chapel, and a parking garage.

Pelham Hall Redevelopment Project

The former Pelham Hall provided housing for 78 students and two staff apartments. The building currently is under redevelopment and upon completion of the project, will provide approximately 287 beds for students in addition to three staff apartments. The redevelopment also will include approximately 50,000 SF of below-grade residential/campus life and building support space, including a dining facility. The construction is expected to be completed and open for occupancy in fall 2010.

Surrounding Land Use

The area surrounding the Campus is comprised mainly of residential and institutional uses. St. Patrick's Episcopal Day School, the Lab School of Washington, and the Field School are located to the south, southwest, and north of the Campus, respectively.

The German Embassy also is located south of the Campus. Additionally, some retail uses are present to the west of the Campus, along MacArthur Boulevard.

ROADWAY NETWORK

The Mount Vernon Campus is served by a connected network of arterial, collector, and local streets. The existing lane use and traffic controls in the study area are shown on Figure 2-1. A description of each of the roadways in the study area is included below:

Foxhall Road is a minor arterial with a posted speed limit of 25 miles per hour (mph) in the vicinity of the campus. Foxhall Road is a two-lane roadway north of Whitehaven Parkway and a four-lane roadway south of Whitehaven Parkway, with no on-street parking. The Foxhall Road/Whitehaven Parkway intersection is controlled by a traffic signal. Foxhall Road carries an average daily traffic volume of 10,800 vehicles per day (vpd) south of Whitehaven Parkway and 18,000 vpd north of Whitehaven Parkway.¹

MacArthur Boulevard is a four-lane principal arterial with a posted speed limit of 25 mph. The intersection of MacArthur Boulevard with Reservoir Road is controlled by traffic signal. MacArthur Boulevard carries an average daily traffic volume of 15,800 vpd in the site vicinity.²

Reservoir Road is an east-west roadway that connects Canal Road and Wisconsin Avenue. Reservoir Road is a collector roadway west of MacArthur Boulevard and a minor arterial between MacArthur Boulevard and Wisconsin Avenue. Its intersection with MacArthur Boulevard and Foxhall Road is controlled by traffic signal.

Reservoir Road carries an average daily traffic volume of 2,000 vpd west of MacArthur Boulevard and 17,800 vpd east of MacArthur Boulevard.³

Whitehaven Parkway is a two-lane local street oriented in the east-west direction that provides access to the George Washington University Mount Vernon Campus, the St. Patrick's lower school campus (Whitehaven campus), the Lab School, Our Lady of Victory, and a small number of single-family detached homes. The Foxhall Road/Whitehaven Parkway intersection is controlled by a traffic signal.

W Street is a two-lane local street oriented in the east-west direction. W Street is stop-controlled at its intersections with Foxhall Road and MacArthur Boulevard. Sight distance looking left for motorists turning off of W Street onto Foxhall Road is restricted by heavy vegetation on the northwest corner of the intersection.

Planned/Programmed Roadway Improvements

In August 2002, the District Department of Transportation undertook a comprehensive traffic study in response to citizens' concerns. The study evaluated the traffic conditions in the Foxhall, Palisades, and Wesley Heights areas of the District. The main goal of the Palisades Traffic Impact Study⁴ was to make recommendations to improve traffic conditions in the area. The following improvements to Foxhall Road in the vicinity of the campus were recommended in the traffic study:

- Replace all pavement markings along Foxhall Road to improve visibility and safety (complete),
- Place temporary speed monitors on both directions of Foxhall Road north of W Street for a period of two weeks to be repeated every three months (incomplete),
- Construct sidewalk on east side of Foxhall Road between Whitehaven Parkway and Garfield Street (complete),
- Conduct a full signal warrant study at the Foxhall Road/W Street intersection after all proposed developments are in place and signalize the intersection if warranted (incomplete), and
- Ensure that signalization improvements emphasize exclusive left turn lane at the Foxhall Road/Whitehaven Parkway intersection and supplement existing signage related to the left turn lane (partially complete).

The following improvement to MacArthur Boulevard in the vicinity of the site was recommended in the traffic study:

- Prohibit right turn on red from left lane of Reservoir Road (incomplete).

The following improvements to Whitehaven Parkway in the vicinity of the site were recommended in the traffic study:

- Eliminate parking on the north side and operate two westbound lanes and one eastbound lane in this section (complete),
- Construct sidewalk on the north side of the street the length of the sidewalk on the south side of the street (incomplete),
- Install a raised crosswalk in front of St. Patrick's (incomplete),
- Install speed humps on Whitehaven Parkway: one between the St. Patrick's exit driveway and the GW driveway and one between the St. Patrick's entrance driveway and MacArthur Boulevard (incomplete), and
- Use westernmost driveway for St. Patrick's drop-off and easternmost driveway as exit (complete).

PUBLIC TRANSPORTATION FACILITIES AND SERVICES

The Mount Vernon Campus is located approximately 2½ miles from the Foggy Bottom-GWU Metro Station, approximately 2¾ miles from the Dupont Circle Metro Station, and approximately 3 miles from the Farragut North Metro Station.

Metrobus service in the area includes the Sibley Hospital-Stadium-Armory Line (Metrobus Routes D1, D3, and D6) and the MacArthur Boulevard-Georgetown Line (Metrobus Route D5), as described below.

The Sibley Hospital-Stadium-Armory Line (Metrobus Routes D1, D3, and D6) provides service to the Dupont Circle Metro Station, the Farragut North Metro Station, the Farragut West Metro Station, the Metro Center Metro Station, and the Union Station Metro Station.

The MacArthur Boulevard-Georgetown Line (Metrobus Route D5) provides service to the Farragut North Metro Station and the Farragut West Metro Station.

A total of 140 bus-trips are operated on these lines on a typical weekday, 80 bus-trips on a typical Saturday, and 60 bus-trips on a typical Sunday, as shown in Table 2-1.

Table 2-1
 Metrobus Service

Line	No. of Trips			Total
	Weekday Service	Saturday Service	Sunday Service	
D1, D3, and D6: Sibley Hospital- Stadium-Armory	127	80	60	267
D5: MacArthur Boulevard- Georgetown	13	--	--	13
Total	140	80	60	280

GW SHUTTLE BUS

The *Vern Express* is a free bus service that provides transportation between the Foggy Bottom and Mount Vernon campuses for students, faculty/staff, and visitors. The three-mile trip between the two campuses takes between 10 and 13 minutes during non-rush hours. During the academic year, the *Vern Express* runs 24 hours a day, seven days a week, providing an easy and efficient link between the campuses. During the summer and semester breaks, the *Vern Express* provides more limited service.

On weekdays during the academic year, the *Vern Express* operates with headways of five to ten minutes from 7:00 AM to 9:00 PM, 15 minutes from 6:00 AM to 7:00 AM and from 9:00 PM to 12:00 AM, and 30 minutes from 12:00 AM to 6:00 AM. On weekends during the academic year, the *Vern Express* operates with 15 minute headways from 8:00 AM to 2:00 AM and 30 minute headways from 2:00 AM to 8:00 AM. On the Mount Vernon Campus, the *Vern Express* stops at the Clock Tower, the Webb Building, and the Quad (the primary stop).

Approximately 12 to 14 buses are utilized to meet the *Vern Express* schedule. Each shuttle bus has a capacity of at least 24 passengers. Approximately half of the fleet is equipped with handrails to allow standing passengers, thereby increasing the capacity of those buses to 34 passengers.

During the 2008-2009 academic year, ridership on the *Vern Express* was 650,137 passengers, which is a increase in ridership of approximately two percent when compared to the 2007-2008 academic year. Additionally, an eight percent increase in ridership was seen in September 2009 when compared to September 2008.

ZIPCAR

Zipcar is an automated car rental or car sharing system in the Washington, D.C. area. Zipcar users must fill out an application online and then receive a Zipcard, which enables them to reserve Zipcars at any of the locations. Users pay either an hourly or daily rental fee to utilize the car for their reserved time slot.

Cars must be returned to the same designated parking space at which it was picked up. One Zipcar is located on the Mount Vernon campus at the visitors' parking lot. With the removal of this lot, the Zipcar space will be moved to the parking garage.

BICYCLES

There currently are four bicycle racks on campus. The bicycle rack located at the UPD Gatehouse has a capacity to hold between six and nine bicycles. The bicycle rack located at Merriweather Hall has a capacity to hold between seven and ten bicycles. The bicycle racks located at Somers Hall and in the parking garage each have a capacity to hold between eight and twelve bicycles.

Currently, no designated bicycle lanes or routes exist within the campus vicinity. Bicyclists must share the roads with vehicular and pedestrian traffic. Topography in the area discourages bicycling.

The District of Columbia Bicycle Master Plan⁵ ("Bicycle Plan) seeks to create a more bicycle-friendly city by establishing high quality bicycle facilities and programs that are safe and convenient.

According to the Bicycle Plan, under the existing conditions (i.e. bicyclists sharing the road), MacArthur Boulevard operates at a bicycle level of service (BLOS) "C", Foxhall Road operates at a BLOS "E", and Reservoir Road operates at a BLOS "F", as shown on Figure 2-2.

Additionally, the Bicycle Plan reports the number of bicycle crashes that occurred between 2000 and 2002. No bicycle crashes occurred at any of the study intersections during the three-year period.

According to the Bicycle Master Plan, a signed bicycle route is proposed on MacArthur Boulevard within the campus vicinity. Bicycles will share the travel lane with motor vehicles.

PEDESTRIANS

Sidewalks are present along both sides of MacArthur Boulevard and along both sides of Reservoir Road within the site vicinity. Sidewalks are present along both sides of Foxhall Road south of Whitehaven Parkway and are present along the east side of Foxhall Road north of Whitehaven Parkway. Sidewalks are present along the south side of Whitehaven Parkway between Foxhall Road and the driveway for St. Patrick's and along the north side between the main GW driveway and the secondary driveway. Sidewalks are not present along the north side of Whitehaven Parkway between Foxhall Road and the main GW driveway or along W Street.

The signalized intersections on Foxhall Road at Whitehaven Parkway, and Reservoir Road and on MacArthur Boulevard at Reservoir Road include painted crosswalks and pedestrian signals that allow safe crossing maneuvers. The intersection of Foxhall Road and Deerfield Road includes a crosswalk and pedestrian signals for pedestrians crossing Deerfield Road.

The District of Columbia Pedestrian Master Plan⁶ ("Pedestrian Plan") strives to make Washington, D.C. safer and more walkable by improving sidewalks, roadway crossings, and the quality of the pedestrian environment as well as by ensuring that the District's policies and procedures support walking.

The Pedestrian Plan provides an overview of existing pedestrian conditions, recommends new pedestrian projects and programs, establishes performance measures, and provides a plan for implementation through 2018.

The Pedestrian Plan estimates areas of pedestrian activity and deficiency. Within the campus vicinity, MacArthur Boulevard contains areas of moderate pedestrian activity and moderate pedestrian deficiency and Foxhall Road and Reservoir Road contains areas of low pedestrian activity and low pedestrian deficiency as shown on Figure 2-3.

Additionally, sidewalk deficiencies exist within the campus vicinity. Foxhall Road, Whitehaven Parkway, and W Street contain stretches of roadway with a sidewalk gap on one or both sides of the road.

The Pedestrian Plan provides pedestrian crash data for the years 2000 through 2006. No pedestrian crashes occurred at any of the study intersections during the seven-year period.

As part of the Pedestrian Plan, eight priority corridors (one in each ward) were identified based on areas of heavy pedestrian traffic and deficient walking conditions. The priority corridor in Ward 3 is Wisconsin Avenue NW from Western Avenue NW to Woodley Road NW and, therefore, is outside of the Mount Vernon Campus study area. No specific improvements to roadways in the study area were outlined in the Pedestrian Plan.

PARKING

GW Policy

Because of the limited number of parking spaces on the streets surrounding the Campus, the availability of public transportation, and the need to limit the impact of parked vehicles on the surrounding neighborhoods, the University has established a parking policy in accordance with the 1999 Campus Plan Order. According to the On-Campus Parking Restrictions Policy, all students, faculty, staff, and visitors are required to park their vehicles on the campus. Additionally, all students who bring cars to campus are required to obtain a parking permit. Currently, only six students have parking permits.

This policy is available on-line and also is provided to new residents of the Mount Vernon campus. University Police monitor the parking on the streets adjacent to the campus.

In the event that a vehicle parked on an adjacent street is identified as being affiliated with GW, University staff places a flyer, which outlines the parking policy, on the vehicle. Students who violate the policy are subject to disciplinary action under the University's Code of Student Conduct. GW also maintains a Community Concern Hotline for neighbors to report parking enforcement issues.

Parking Supply

The campus currently has 196 parking spaces located on-campus that are used by students, faculty/staff, and visitors. There are 148 parking spaces in the parking garage (which is attended weekdays between 7 AM and 10 PM), 39 parking spaces located in the visitors' parking lot (which is metered on weekdays from 7 AM to 7 PM), and nine surface parking spaces throughout the campus. Of the 39 parking spaces located in the visitors' parking lot, eight of the parking spaces are reserved for permit holders and one of the parking spaces is reserved for a Zipcar. An additional 46 parking spaces are offline due to the construction of the Pelham redevelopment project.

As part of the 2010 Plan, the visitors' parking lot will be removed. In addition to the 46 parking spaces that will come online with the completion of the Pelham Hall redevelopment project, the University will construct approximately seven spaces along the secondary access roadway near Hand Chapel. In total, 201 parking spaces will be provided on campus.

Parking Demand

The parking garage on campus is used by GW faculty, staff, students, and visitors. Additionally, 30 spaces in the garage are allocated for use by the Lab School faculty and staff as a result of the University's agreement with the Lab School dated September 2006. The Lab School agreement expires in August 2011 and can be terminated anytime prior to that date. Based on data collected in conjunction with the Lab School, an average of 13 parking spaces is occupied by Lab School faculty and staff.

Parking occupancy counts were conducted on Tuesday, September 15, 2009 from 7:00 AM to 7:00 PM. The parking occupancy counts were conducted to assess the existing utilization of the off-street parking facilities, while school was in session. The results are shown on Table 2-2. The parking occupancy data are included in Appendix A.

Table 2-2
Parking Occupancy

Time of Day	Parking Garage	Visitor Parking Lot	Surface Parking Spaces	TOTAL
7:00 AM	38	8	2	48
8:00 AM	62	10	8	80
9:00 AM	85	10	6	101
10:00 AM	108	16	9	133
11:00 AM	107	17	9	133
12:00 PM	99	24	9	132
1:00 PM	100	22	9	131
2:00 PM	109	24	9	142
3:00 PM	88	26	9	123
4:00 PM	68	19	9	96
5:00 PM	54	26	9	89
6:00 PM	51	30	8	89
7:00 PM	44	31	7	82
Spaces Available	148	39	9	196
Peak Utilization	74%	79%	100%	72%

The peak parking demand was observed at 2:00 PM, when 142 spaces (72 percent) of all off-street parking spaces were occupied.

Currently, the construction contractor for the Pelham Hall redevelopment project is authorized to park up to 20 vehicles in the parking garage. On average, 15 workers park in the garage. They arrive before 7:00 AM and leave between 2:00 PM and 3:00 PM.

Therefore, 114 of the 142 spaces are occupied by GW faculty, staff, students, visitors, or contractors.

The University's existing off-street parking supply adequately accommodates current parking demands.

Off-Campus Parking

Students, faculty, staff, and visitors of the GW Mount Vernon Campus are not permitted to park off-campus. Parking along Whitehaven Parkway, including both parallel parking spaces and the angle parking spaces on the south side of Whitehaven Parkway, is signed "No Parking Students, Faculty, Staff, or Visitors of The George Washington University".

The angled parking spaces along the south side of Whitehaven Parkway were constructed by St. Patrick's Episcopal Day School for use by the school.

Additional signage that reads, "Permit Parking During School Hours, Back-in Parking Only" and "Parking for St. Patrick's Episcopal Church & Day School Only, M-F 7AM – 4 PM, Sun 7 AM – 1 PM, Towing Enforced" also is present for these angled spaces.

LOADING

The central loading dock on campus currently is located at Ames Hall. Additional deliveries made via Fed-Ex, UPS, or USPS are received at the individual buildings on campus. Trash pick-up is temporarily located to the rear of Eckles Memorial Library. Trash pick-up will be relocated to the Pelham site once the Pelham Hall redevelopment project is complete.

Currently, four to eight deliveries are made daily during the week. There are approximately 31 deliveries made per week. A breakdown of the delivery days by vendor is shown in Table 2-3.

Table 2-3
Delivery Schedule

Delivery	Days
Sysco	Monday, Wednesday, Friday
Coca Cola	Friday
Milk	Monday, Wednesday, Friday
Bread	Monday, Tuesday, Thursday, Friday
Produce	Seven day per week
Odwalla	Thursday
Century	Monday through Friday
Ice Cream	Friday
Bakery	Six days per week
Mail	Six days per week

TRANSPORTATION DEMAND MANAGEMENT

In order to encourage carpooling, thereby reducing single-occupant vehicle trips, GW initiated a carpool incentive program effective January 1, 2009. Under the program, employees who register as a carpool are eligible for a reduced parking fee at the Mount Vernon Campus. The University is enrolled in "NuRide," a ride sharing program that encourages and rewards carpooling. Registered riders earn reward points that can be redeemed for gift cards, discounts, and event tickets.

EXISTING TRAFFIC VOLUMES

Turning movement, bicycle, and pedestrian counts were conducted at the following intersections on Tuesday, September 15, 2009 from 6:30 AM to 9:30 AM and from 2:30 PM to 7:00 PM:

1. MacArthur Boulevard/W Street
2. Foxhall Road/W Street
3. Foxhall Road/Whitehaven Parkway
4. MacArthur Boulevard/Whitehaven Parkway
5. MacArthur Boulevard/Reservoir Road (west)

Additionally, turning movement, bicycle, and pedestrian counts were conducted at the following intersections on Tuesday, September 15, 2009 from 7:00 AM to 7:00 PM:

6. W Street/GW Driveway
7. Whitehaven Parkway/GW Secondary Driveway

At the request of the citizens at a September 10, 2009 community meeting and DDOT, two additional intersections subsequently were added as study intersections:

8. Foxhall Road/Reservoir Road, and
9. Foxhall Road/Deerfield Road

Vehicular turning movement, bicycle, and pedestrian counts were conducted at these intersections on Wednesday, September 30, 2009 from 6:30 AM to 9:30 AM and from 4:00 PM to 7:00 PM.

Based on the data collected, a common AM peak hour and a common PM peak hour were selected for the entire study area. The common AM peak hour occurred from 7:45 AM to 8:45 AM and the common PM peak hour occurred from 5:15 PM to 6:15 PM.

Existing traffic volumes at some intersections were adjusted to balance with adjacent intersections with some allowance for driveways located between the intersections.

Peak hour baseline traffic volumes are summarized on Figure 2-4. Peak hour pedestrian counts volumes are summarized on Figure 2-5. Traffic count data are included in Appendix B.

EXISTING CAMPUS TRIP GENERATION

During the Fall 2009 semester, 411 resident students and 708 non-resident students were registered at the Mount Vernon Campus for a total enrollment of 1,119 students. These enrollment numbers are based on the average enrollment Monday through Thursday since the enrollment numbers for Friday were significantly lower.

There currently are 81 full-time faculty and staff at the Mount Vernon Campus.

The number of peak hour vehicle-trips entering and exiting the campus was determined based on traffic counts at each of the driveways. A total of 80 vehicle-trips entered or exited the campus during the AM peak hour and 52 vehicle-trips entered or exited the campus during the PM peak hour, as shown in Table 2-4.

Table 2-4
 Existing Vehicle Trip Generation Summary^{1,2}

	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Shuttle Buses	8	8	16	8	7	15
Students	15	4	19	6	5	11
Faculty/ Staff	35	10	45	13	13	26
Total	58	22	80	27	25	52

¹ Based on traffic count data obtained on Tuesday, September 15, 2009 by Wells & Associates, Inc.

² The proportion of student trips versus faculty/staff trips was assumed to be 30 percent/70 percent based on the percentage allocation of parking spaces identified in the Traffic Impact Study for the Pelham Replacement Project.

EXISTING CAPACITY ANALYSIS

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic control shown on Figure 2-1, baseline traffic volumes shown on Figure 2-4, the existing pedestrian volumes shown on Figure 2-5, and actual traffic signal timings obtained from DDOT, included in Appendix C.

Synchro software (Version 7, Build 763) was used to evaluate levels of service at each of the study intersections during the AM and PM peak hours. Synchro is a macroscopic model used to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings and to optimize traffic signal timings. The levels of service reported were taken from the Highway Capacity Manual 2000 (HCM) reports generated by Synchro. Levels of service descriptions are included in Appendix D.

The results of the analyses are summarized in Table 2-5. Capacity analysis worksheets are included in Appendix E.

As shown in Table 2-5, the following intersections currently operate at acceptable levels of service (i.e. LOS "D" or better):

- W Street/GW Driveway
- Whitehaven Parkway/Foxhall Road
- Whitehaven Parkway/GW Driveway
- MacArthur Boulevard/Reservoir Road
- Foxhall Road/Deerfield Road

Each lane group at these intersections operate at a LOS "D" or better during both the AM and PM peak hours.

As shown in Table 2-5, the following intersections operate at or near capacity (i.e. LOS "E" or "F") under existing conditions during at least one of the peak hours:

- W Street/MacArthur Boulevard
- W Street/Foxhall Road
- MacArthur Boulevard/Whitehaven Parkway
- Foxhall Road/Reservoir Road

Table 2-5
Existing Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard		
EBLTR	E [42.1]	A [0.0]
WBLTR	C [19.2]	B [14.9]
NBLTR	A [0.3]	A [0.2]
SBLTR	A [2.8]	A [1.0]
2: W Street/GW Driveway		
WBLT	A [0.2]	A [0.3]
NBLR	A [9.3]	A [9.2]
3: W Street/Foxhall Road		
EBLTR	F [776.0]	F [190.9]
WBTLR	F [223.6]	E [45.2]
NBLTR	A [0.9]	A [1.6]
SBLTR	A [0.5]	A [0.1]
4: Whitehaven Parkway/Foxhall Road		
EBLR	C (23.3)	D (43.2)
NBL	A (8.9)	A (1.7)
NBT	B (17.3)	A (3.8)
SBT	A (7.1)	A (2.8)
SBR	A (3.2)	A (1.2)
OVERALL	B (12.5)	A (5.4)
5: Whitehaven Parkway/GW Driveway		
EBLT	A [0.9]	A [0.4]
SBLR	B [12.4]	B [10.0]
6: MacArthur Boulevard/Whitehaven Parkway		
EBLT	A [4.6]	A [1.5]
SBLR	F [57.7]	F [79.0]
7: MacArthur Boulevard/Reservoir Road		
EBL	C (26.8)	D (35.7)
EBR	C (31.9)	C (34.8)
NBL	A (5.5)	A (6.6)
NBT	A (4.9)	A (1.8)
SBTR	A (6.5)	A (1.6)
OVERALL	A (8.3)	A (2.6)
[9.2] = unsignalized intersection control delay in sec/veh [9.2] = signalized intersection control delay in sec/veh		

Table 2-5 (Continued)
Existing Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
8: Foxhall Road/Reservoir Road		
EBL	C (34.5)	D (40.0)
EBT	E (77.1)	D (48.0)
EBR	C (34.5)	D (36.6)
WBL	F (782.7)	F (707.9)
WBT	C (33.0)	D (41.3)
WBR	C (28.9)	C (26.2)
NBLTR	F (85.2)	D (39.4)
SBL	F (2329.7)	F (665.3)
SBTR	F (116.5)	F (185.5)
OVERALL	F (418.0)	F (172.6)
9: Foxhall Road/Deerfield Road		
WBLR	C (26.9)	D (47.1)
NBTR	B (16.4)	A (3.3)
SBL	C (22.8)	D (41.2)
SBT	A (2.7)	A (1.1)
OVERALL	A (9.2)	A (2.4)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh		

In order to attain a LOS "D" or better under existing conditions, an incremental series of improvements was evaluated to determine the level of improvements necessary to accommodate existing traffic. The incremental series of improvements included evaluation of peak hour traffic signal warrants and adjustments to signal timings.

In accordance with the Manual on Uniform Traffic Control Devices (MUTCD)⁷ an evaluation of the peak hour traffic signal warrant was conducted for the W Street/MacArthur Boulevard, W Street/Foxhall Road, and MacArthur Boulevard/Whitehaven Road intersections. This analysis showed that the peak hour traffic signal warrant would be met at the W Street/Foxhall Road and the MacArthur Boulevard/Whitehaven Parkway intersections during the AM peak hour under existing traffic volumes. The traffic signal warrant analysis is included in Appendix F.

Furthermore, the Palisades Traffic Impact Study recommended that a full signal warrant study be conducted at the W Street/Foxhall Road intersection after all proposed developments are in place and, if warranted, a traffic signal should be installed.

Accordingly, the analysis for the W Street/Foxhall Road intersection was conducted as a two-phase signal operation and was coordinated with the adjacent signal at the Foxhall Road/Deerfield Road intersection.

The installation of traffic signals at these intersections was evaluated as a potential means of bringing existing conditions to acceptable levels of service. Signalization at these locations is not necessary to mitigate the impact associated with the 2010 Plan.

Table 2-6 summarizes the results of the analysis. Level of service reports for existing conditions with the recommended improvements are provided in Appendix G.

Table 2-6
Existing Levels of Service
With Improvements

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard		
EBLTR	E [42.1]	A [0.0]
WBLTR	C [19.2]	B [14.9]
NBLTR	A [0.3]	A [0.2]
SBLTR	A [2.8]	A [1.0]
2: W Street/GW Driveway		
WBLT	A [0.2]	A [0.3]
NBLR	A [9.3]	A [9.2]
3: W Street/Foxhall Road		
EBLTR	C (22.1)	D (43.5)
WBTLR	C (20.1)	D (39.1)
NBLTR	A (5.9)	A (1.5)
SBLTR	A (9.8)	A (4.9)
OVERALL	A (9.5)	A (5.9)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh		

Table 2-6 (Continued)
Existing Levels of Service
With Improvements

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
4: Whitehaven Parkway/Foxhall Road		
EBLR	C (23.3)	D (43.2)
NBL	A (8.9)	A (1.7)
NBT	B (17.3)	A (3.8)
SBT	A (4.6)	A (2.5)
SBR	A (1.6)	A (1.1)
OVERALL	B (11.4)	A (5.3)
5: Whitehaven Parkway/GW Driveway		
EBLT	A [0.9]	A [0.4]
SBLR	B [12.4]	B [10.0]
6: MacArthur Boulevard/Whitehaven Parkway		
EBLT	A [4.6]	A [1.5]
SBLR	F [57.7]	F [79.0]
7: MacArthur Boulevard/Reservoir Road		
EBL	C (26.8)	D (35.7)
EBR	C (31.9)	C (34.8)
NBL	A (5.5)	A (6.6)
NBT	A (4.9)	A (1.8)
SBTR	A (6.5)	A (1.6)
OVERALL	A (8.3)	A (2.6)
8: Foxhall Road/Reservoir Road		
EBL	C (34.5)	D (40.0)
EBT	E (77.1)	D (48.0)
EBR	C (34.5)	D (36.6)
WBL	F (782.7)	F (707.9)
WBT	C (33.0)	D (41.3)
WBR	C (28.9)	C (26.2)
NBLTR	F (85.2)	D (39.4)
SBL	F (2330.0)	F (662.5)
SBTR	F (116.7)	F (182.7)
OVERALL	F (418.1)	F (171.9)
9: Foxhall Road/Deerfield Road		
WBLR	C (26.9)	D (47.1)
NBTR	B (16.4)	A (3.3)
SBL	B (17.9)	D (35.3)
SBT	A (1.6)	A (0.5)
OVERALL	A (8.6)	A (2.1)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh		

Section 3 FUTURE BACKGROUND CONDITIONS

LAND USE

Three other developments are planned in and around the study area and were considered as part of the background traffic growth.

Friends of St. Patrick's Episcopal Day School is proposing to develop a 17.30-acre tract of land located on the east side of Foxhall Road, between Hoban Road and Whitehaven Parkway in northwest Washington, DC. As proposed, the development would consist of an independent school with approximately 440 students in grades 7 through 12 and approximately 100 faculty/staff members. Additionally, 28 single-family detached residential dwelling units are proposed on the south side of the site. The development is expected to be completed in 2012.

The redevelopment of **Philips Estate, "Philips Park"** currently is under construction east of Foxhall Road and south of W Street in northwest Washington, DC. The proposed development received approval from the District of Columbia Board of Zoning Adjustment in July 2005 and will consist of 47 single-family detached residential dwelling units. The redevelopment is expected to be completed in 2012.

The **Lab School of Washington** currently has 278 students enrolled at its Main Campus located at 4759 Reservoir Road, NW. Under a January 2007 Order of the District of Columbia Board of Zoning Adjustment Order (Order No. 17383A), a maximum enrollment of 330 students is allowed; therefore, an additional 52 students could be enrolled at the Lab School under this order. Since the increased enrollment is approved, the traffic that would be generated by the additional students was assumed in the background analyses.

The location of each pipeline development is shown in Appendix H.

FUTURE BACKGROUND TRAFFIC FORECASTS

In order to account for regional traffic growth outside the immediate site vicinity, a 1.0 percent growth rate, compounded annually, was applied to the baseline traffic volumes. The resulting volumes are shown on Figure 3-1.

Additionally, traffic volumes from the pipeline developments previously described were included in the future traffic forecasts. The number of trips that would be generated by the Friends of St. Patrick's development and the Philips Estate redevelopment was taken from the Friends of St. Patrick's Transportation Impact Study.⁸ However, the site trips were carried through the study intersections for this study as needed.

The number of trips that would be generated by the additional students approved for the Lab School of Washington was estimated based on the Institute of Transportation Engineers' (ITE) Trip Generation⁹ manual.

The peak hour site trips associated with each of the developments are included in Appendix H. The combined peak hour site trips associated with the pipelines are shown on Figure 3-2.

The factored traffic volumes shown on Figure 3-1 were combined with the pipeline developments traffic assignments shown on Figure 3-2 to yield the 2020 future background traffic forecasts shown on Figure 3-3.

BACKGROUND CAPACITY ANALYSIS

Capacity/level of service (LOS) analyses were conducted at the study intersections based on the existing lane use and traffic control shown on Figure 2-1, future background traffic forecasts shown on Figure 3-3, and existing DDOT traffic signal timings provided in Appendix C.

The Synchro level of service results for the 2020 background conditions without the 2010 Plan are presented in Appendix I and summarized in Table 3-1.

As shown in Table 3-1, the following intersections would operate at acceptable levels of service (i.e. LOS "D" or better) under background conditions and have additional capacity to accommodate increases in traffic:

- W Street/GW Driveway
- Whitehaven Parkway/Foxhall Road
- Whitehaven Parkway/GW Driveway
- MacArthur Boulevard/Reservoir Road
- Foxhall Road/Deerfield Road

Each lane group at these intersections would operate at a LOS "D" or better during both the AM and PM peak hours.

As shown in Table 3-1, the following intersections would have lane groups that would operate at or near capacity (i.e., LOS "E" or "F") under 2020 background conditions during at least one of the peak hours:

- W Street/MacArthur Boulevard
- W Street/Foxhall Road
- MacArthur Boulevard/Whitehaven Parkway
- Foxhall Road/Reservoir Road

QUEUE ANALYSIS

A queuing analysis was conducted for 2020 conditions without the 2010 Plan. Synchro was used to conduct the analyses, using the 95th percentile queue lengths. The results are summarized in Table 3-2. Queue reports are provided in Appendix J.

The results of the queuing analysis indicate that the northbound left and northbound through queues at the MacArthur Boulevard/Reservoir Road intersection are projected to extend beyond the available storage, the westbound left queue at the Foxhall Road/Reservoir Road intersection is projected to extend beyond the available storage, and the northbound and southbound through queues at the Foxhall Road/Deerfield Road intersection are projected to extend beyond the available storage under 2020 background conditions without the 2010 Plan.

Table 3-1
2020 Background Conditions Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard		
EBLTR	F [59.1]	A [0.0]
WBLTR	C [23.2]	C [16.7]
NBLTR	A [0.4]	A [0.2]
SBLTR	A [3.9]	A [1.5]
2: W Street/GW Driveway		
WBLT	A [0.2]	A [0.3]
NBLR	A [9.4]	A [9.4]
3: W Street/Foxhall Road		
EBLTR	F [*]	F [*]
WBTLR	F [*]	F [223.9]
NBLTR	A [1.6]	A [2.3]
SBLTR	A [1.2]	A [0.7]
4: Whitehaven Parkway/Foxhall Road		
EBLR	C (24.7)	D (41.4)
NBL	C (23.2)	A (3.2)
NBT	C (23.1)	A (6.7)
SBT	B (11.6)	A (3.9)
SBR	A (3.6)	A (1.6)
OVERALL	B (17.0)	A (7.1)
5: Whitehaven Parkway/GW Driveway		
EBLT	A [0.8]	A [0.3]
SBLR	B [13.3]	B [10.3]
6: MacArthur Boulevard/Whitehaven Parkway		
EBLT	A [6.8]	A [2.2]
SBLR	F [300.6]	F [238.5]
7: MacArthur Boulevard/Reservoir Road		
EBL	C (25.9)	C (34.3)
EBR	C (33.7)	C (33.5)
NBL	B (12.3)	B (15.8)
NBT	A (6.0)	A (2.3)
SBTR	A (8.8)	A (2.1)
OVERALL	B (10.2)	A (4.0)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh * denotes that the level of service could not be determined		

Table 3-1 (continued)
2020 Background Conditions Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
8: Foxhall Road/Reservoir Road		
EBL	C (34.7)	D (45.3)
EBT	F (111.1)	D (51.9)
EBR	C (34.9)	D (36.6)
WBL	F (925.3)	F (1108.6)
WBT	C (34.1)	D (48.7)
WBR	C (29.1)	C (26.5)
NBLTR	F (163.3)	E (64.9)
SBL	F (2643.3)	F (781.6)
SBTR	F (198.1)	F (293.7)
OVERALL	F (503.7)	F (247.5)
9: Foxhall Road/Deerfield Road		
WBLR	C (27.3)	D (47.8)
NBTR	B (19.0)	A (6.7)
SBL	C (22.9)	D (41.2)
SBT	A (5.1)	A (1.3)
OVERALL	B (11.7)	A (4.7)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh * denotes that the level of service could not be determined		

Table 3-2
2020 Background Queue Summary^{1,2}

INTERSECTION/ LANE GROUP	AVAILABLE STORAGE ³	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard			
EBLTR	270	13	0
WBLTR	400	23	15
NBLTR	375	1	1
SBLTR	240	12	4
2: W Street/GW Driveway			
WBLT	500	0	0
NBLR	N/A	0	0
3: W Street/Foxhall Road			
EBLTR	500	*	*
WBTLR	560	*	53
NBLTR	370	4	7
SBLTR	280	2	2
4: Whitehaven Parkway/Foxhall Road			
EBLR	315	123	95
NBL	1,200	77	31
NBT	1,200	588	504
SBT	945	540	80
SBR	75	21	5
5: Whitehaven Parkway/GW Driveway			
EBLT	1,260	2	0
SBLR	N/A	4	3
6: MacArthur Boulevard/Whitehaven Parkway			
EBLT	100	24	5
SBLR	1,260	253	210
7: MacArthur Boulevard/Reservoir Road			
EBL	75	44	28
EBR	1,900	173	15
NBL	100	27	243
NBT	100	143	101
SBTR	2,000	365	113
¹ Reported queues are 95 th percentile queues from Synchro.			
² All queues are in feet.			
³ Length of turn lane or distance to nearest major intersection.			
* Denotes queue could not be calculated.			

Table 3-2 (continued)
2020 Background Queue Summary^{1,2}

INTERSECTION/ LANE GROUP	AVAILABLE STORAGE ³	AM PEAK	PM PEAK
8: Foxhall Road/Reservoir Road			
EBL	100	30	45
EBT	2,425	650	196
EBR	240	48	34
WBL	75	336	439
WBT	625	211	437
WBR	625	42	53
NBLTR	2,250	673	463
SBL	1,750	776	349
SBTR	1,750	828	734
9: Foxhall Road/Deerfield Road			
WBLR	N/A	20	22
NBTR	540	618	264
SBL	100	24	24
SBT	375	598	181
¹ Reported queues are 95 th percentile queues from Synchro.			
² All queues are in feet.			
³ Length of turn lane or distance to nearest major intersection.			
* Denotes queue could not be calculated.			

Section 4 2010 MOUNT VERNON CAMPUS PLAN

OVERVIEW

The 2010 Mount Vernon Campus Plan proposes an increase in student caps by the equivalent of a 15 percent increase to the student headcount cap and a 10 percent increase to the student FTE cap set forth under the 2000 Plan. The 2010 Plan also proposes four new academic buildings and one new residential building. The University believes its space needs can be met over the next ten years by reallocating the gross floor area (GFA) already approved under the 2000 Plan. Thus, the 2010 Plan reallocates the remaining GFA to new sites in order to improve the campus' sense of community and provide a balance of uses to meet student, faculty and community needs.

Additionally, the 2010 Plan will eliminate the W Street entrance. A pedestrian entrance will be provided in its place. The pedestrian entrance will be designed to accommodate emergency vehicles. Under extreme conditions and during student move-in/move-out, the entrance could be opened to motorized traffic. During all other times, the W Street entrance will be closed to motorized vehicles.

TRIP GENERATION ANALYSIS

To estimate the number of trips generated as a result of the proposed increase in student enrollment and the associated increase in full-time faculty and staff, site-specific trip generation rates were used. The site-specific vehicle generation rates, were derived based on the current, total number of vehicles entering and exiting the school by students, faculty, staff, contract employees, and visitors. Separate trip generation rates were developed for students and for faculty and staff.

Today, 1,119 students are enrolled at the Mount Vernon Campus (on a headcount basis on any given day). There also are 81 full-time faculty and staff at the Mount Vernon Campus. Accordingly, the Campus generates 0.0170 trips per student (79 percent inbound, 21 percent outbound) and 0.5556 trips per faculty/staff member (78 percent inbound, 22 percent outbound) during the AM peak hour and 0.0098 trips per student (55 percent inbound, 45 percent outbound) and 0.3210 trips per faculty/staff member 50 percent inbound, 50 percent outbound) during the PM peak hour.

Under the current BZA Order, the student headcount is capped at 1,500 students. Under the proposed increase of 15 percent, the student headcount cap would be 1,725 students. Therefore, an additional 606 students could be enrolled at the Mount Vernon Campus beyond the current enrollment on any given day.

The University also estimates that the full-time faculty and staff at the Mount Vernon Campus will not exceed 150 under the proposed enrollment cap. Therefore, an additional 69 full-time faculty and staff could be employed at the Mount Vernon Campus.

For purposes of estimating the potential increase in shuttle buses, the number of additional shuttles buses was assumed to be proportional to the increase in number of students.

Therefore, an additional 58 AM peak hour vehicle-trips and 37 PM peak hour vehicle-trips would be generated, as shown on Table 4-1.

Table 4-1
 Site Trip Generation Summary

	AM Peak			PM Peak		
	In	Out	Total	In	Out	Total
Shuttle Buses	4	5	9	4	4	8
Students	8	2	10	3	3	6
Faculty/ Staff	30	9	39	11	12	23
Total	42	16	58	18	19	37

SITE TRIP DISTRIBUTION

The distribution of peak hour trips generated by the 2010 Plan was based on existing traffic patterns in the study area, zip code information for the faculty and staff at the Mount Vernon Campus, and the location of the Campus with respect to the Foggy Bottom Campus.

SITE TRAFFIC ASSIGNMENTS

The site-generated traffic volumes were assigned to the public roadway network according to the directional distribution described above. The resulting site traffic assignments are shown on Figure 4-1.

Table 4-2
 Distribution of Site Trips

Roadway	Direction (to/from)	Distribution
Foxhall Road	North	21%
Foxhall Road	South	24%
MacArthur Boulevard	North	27%
Reservoir Road	East	25%
Reservoir Road	West	3%
TOTAL		100%

BICYCLE REQUIREMENTS

According to the DCMR,¹⁰ the number of bicycle parking spaces provided shall be at least equal to five percent of the number of automobile parking spaces provided. Therefore, a total of ten bicycle parking spaces would be required for the proposed 2010 Plan.

There currently are four bicycle racks on campus. The bicycle rack located at the UPD Gatehouse has a capacity to hold between six and nine bicycles. The bicycle rack located at Merriweather Hall has a capacity to hold between seven and ten bicycles. The bicycle racks located at Somers Hall and in the parking garage each have a capacity to hold between eight and twelve bicycles. Pelham Hall will have bicycle racks to accommodate 56 bicycles upon completion. In total, a minimum of 77 bicycle spaces will be provided throughout campus.

PROJECTED PARKING OCCUPANCY

Based on parking occupancy counts that were done on September 15, 2009, the peak parking demand was observed at 2:00 PM, when 142 spaces (72 percent) of all off-street parking spaces were occupied. Of the 142 spaces occupied, 13 were with Lab School employees, 15 were construction contractors, and 114 were GW faculty, staff, students, and visitors.

Consistent with the methodology used to estimate the number of trips generated under the 2010 Plan, the 114 spaces occupied by GW were allocated as faculty/staff or students based on the percentage parking allocation in the Traffic Impact Study for the Pelham Replacement Project.¹¹ Accordingly, 70 percent (or 80 spaces) were assumed to be occupied by faculty/staff and 30 percent (or 34 spaces) were assumed to be occupied by visitors.

It was assumed that the number of parking spaces needed under the 2010 Plan would increase proportionally with the increase faculty and staff and with the increase in students. As a result, a projected parking demand of 200 parking spaces would be needed (excluding the number of parking spaces currently occupied by the Lab School and excluding temporary construction contractors).

With a parking supply of 201 parking spaces provided in the 2010 Plan, including the 30 parking spaces that currently are leased to the Lab School, a deficit of 29 parking spaces potentially could be realized. Therefore, it is recommended that GW maintain the ability to reclaim the leased parking spaces from the Lab School at any time. Additionally, GW should conduct parking occupancy counts annually in order to ensure that sufficient parking exists on Campus and prevent spillover parking in the neighborhoods. At such time that the parking occupancy in the garage reaches 85 percent, the University should investigate other means of reducing parking demand or increasing parking supply. Such measures could include restricting freshmen from bringing vehicles to campus or implementing stacked, attendant parking in the garage.

Section 5 TOTAL FUTURE CONDITIONS

TOTAL FUTURE TRAFFIC FORECASTS

Because of the removal of the W Street driveway, the existing traffic utilizing this driveway was redistributed to the driveway on Whitehaven Parkway. The redistribution of trips was performed based on existing travel patterns in the study area. The rerouted existing traffic is shown on Figure 5-1.

Total future traffic forecasts with the proposed campus development were determined by combining the 2020 background traffic forecasts shown in Figure 3-3 with the site traffic volumes shown on Figure 4-1 and the rerouted existing volumes shown on Figure 5-1 to yield the 2020 total future traffic forecasts shown on Figure 5-2.

PROPORTIONAL IMPACT ANALYSIS

In order to determine the amount of traffic on the surrounding roadways that is attributable to the 2010 Mount Vernon Campus Plan, a proportional impact assessment was conducted. That is, the additional trips generated as a result of the 2010 Plan were compared to the total future traffic forecasts at each intersection. Table 5-1 displays the results of the proportional impact analysis.

Table 5-1
Proportional Impact Analysis

Intersection	AM Peak	PM Peak
MacArthur Boulevard/W Street	< 1.0%	< 1.0%
Foxhall Road/W Street	< 1.0%	< 1.0%
Foxhall Road/Whitehaven Parkway	1.0%	< 1.0%
MacArthur Boulevard/Whitehaven Parkway	1.1%	< 1.0%
MacArthur Boulevard/Reservoir Road (west)	< 1.0%	< 1.0%
Foxhall Road/Reservoir Road	< 1.0%	< 1.0%
Foxhall Road/Deerfield Road	< 1.0%	< 1.0%

As shown in Table 5-1, the proportional impact at the study intersections is expected to be insignificant.

OPERATIONAL ANALYSES

Capacity analyses were performed for the study intersections using the existing lane use and traffic control, the total future peak hour traffic forecasts shown on Figure 5-2, and existing signal timings.

The analysis is summarized in Table 5-2 and the results are included in Appendix K.

As shown in Table 5-2, under 2020 conditions with the 2010 Plan, the levels of service are expected to be consistent with the levels of service under 2020 conditions without the 2010 Plan, with the exception of the MacArthur Boulevard/Whitehaven Parkway intersection.

The feasibility of installing a traffic signal at the MacArthur Boulevard/Whitehaven Parkway intersection was evaluated. Due to the proximity of the intersection to the adjacent traffic signal at the MacArthur Boulevard/Reservoir Road intersection, it was determined that signalization was not appropriate. Additionally, traffic associated with the 2010 Plan will account for less than one percent of traffic at the MacArthur Boulevard/Whitehaven Parkway intersection.

Furthermore, based on previous experience at unsignalized intersections with a high volume, multiple lane major street, the Highway Capacity Manual (HCM) under estimates the available capacity for the stop-controlled approach. According to the Synchro User Guide, "the gap acceptance formula assumes that all vehicles arrival times are independent events which is not true with large volumes. Three phenomenons are missed by the formula:

1. Vehicles can not occupy the same space at the same time.
2. Slow vehicles create platoons behind and gaps ahead of them.

3. If the main street is multilane, two vehicles can occupy the same space in adjacent lanes.

Items 1 and 2 cancel each other out to some extent, item 3 in conjunction with items 1 and 2 cause there to be more gaps on multi-lane approaches than predicted by the gap acceptance formula. The net effect of items 1, 2, and 3 is that the gap acceptance formula is underestimating capacity for high volume main movements, especially if the main street has multiple lanes."¹²

Field studies performed by Wells + Associates at other locations have substantiated this conjecture.

In summary, although the theoretical delay for Whitehaven Parkway at its intersection with MacArthur Boulevard is projected to range from 307 to 559 seconds per vehicle during the peak hours, the actual delay experienced by motorists will be much shorter.

QUEUE ANALYSIS

A queuing analysis was conducted for 2020 conditions with the 2010 Plan. Synchro was used to conduct the analyses, using the 95th percentile queue lengths. The results are summarized in Table 5-3.

As shown in Table 5-3, where available storage is not exceeded under background conditions, available storage will not be exceeded under total future conditions. Additionally, the queues are expected to be consistent with the queues under 2020 conditions without the 2010 Plan.

Queue reports are provided in Appendix L.

Table 5-2
 2020 Total Future Conditions Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard		
EBLTR	F [60.1]	A [0.0]
WBLTR	C [23.3]	C [16.8]
NBLTR	A [0.4]	A [0.2]
SBLTR	A [3.9]	A [1.5]
3: W Street/Foxhall Road		
EBLTR	F [*]	F [*]
WBTLR	F [*]	F [232.3]
NBLTR	A [1.6]	A [2.2]
SBLTR	A [1.2]	A [0.7]
4: Whitehaven Parkway/Foxhall Road		
EBLR	C (25.0)	D (41.5)
NBL	C (23.4)	A (3.4)
NBT	C (22.8)	A (6.9)
SBT	B (11.8)	A (4.0)
SBR	A (3.8)	A (1.7)
OVERALL	B (17.0)	A (7.4)
5: Whitehaven Parkway/GW Driveway		
EBLT	A [1.6]	A [1.3]
SBLR	B [14.1]	B [10.6]
6: MacArthur Boulevard/Whitehaven Parkway		
EBLT	A [7.7]	A [2.5]
SBLR	F [558.7]	F [307.0]
7: MacArthur Boulevard/Reservoir Road		
EBL	C (25.5)	C (34.3)
EBR	C (34.0)	C (33.5)
NBL	B (13.5)	B (16.3)
NBT	A (6.0)	A (2.3)
SBTR	A (8.9)	A (2.1)
OVERALL	B (10.3)	A (4.1)
[9.2] = unsignalized intersection control delay in sec/veh (9.2) = signalized intersection control delay in sec/veh * denotes that the level of service could not be determined		

Table 5-2 (continued)
 2020 Total Future Conditions Levels of Service

INTERSECTION/ LANE GROUP	AM PEAK	PM PEAK
8: Foxhall Road/Reservoir Road		
EBL	C (34.7)	D (46.2)
EBT	F (114.8)	D (52.7)
EBR	C (34.9)	D (36.7)
WBL	F (925.3)	F (1162.6)
WBT	C (34.4)	D (49.6)
WBR	C (29.1)	C (26.5)
NBLTR	F (171.3)	E (67.7)
SBL	F (2643.1)	F (787.7)
SBTR	F (201.9)	F (297.2)
OVERALL	F (503.6)	F (253.9)
9: Foxhall Road/Deerfield Road		
WBLR	C (27.3)	D (47.8)
NBTR	B (19.0)	A (6.7)
SBL	C (22.9)	D (41.2)
SBT	A (5.3)	A (1.4)
OVERALL	B (11.8)	A (4.7)
(9.2) = signalized intersection control delay in sec/veh		

Table 5-3
 2020 Total Future Queue Summary^{1,2}

INTERSECTION/ LANE GROUP	AVAILABLE STORAGE ³	AM PEAK	PM PEAK
1: W Street/MacArthur Boulevard			
EBLTR	270	13	0
WBLTR	400	23	15
NBLTR	375	1	1
SBLTR	240	12	4
3: W Street/Foxhall Road			
EBLTR	500	*	*
WBTLR	560	*	54
NBLTR	370	4	6
SBLTR	280	2	2
4: Whitehaven Parkway/Foxhall Road			
EBLR	315	128	103
NBL	1,200	52	33
NBT	1,200	589	499
SBT	945	540	80
SBR	75	22	6
5: Whitehaven Parkway/GW Driveway			
EBLT	1,260	4	1
SBLR	N/A	8	6
6: MacArthur Boulevard/Whitehaven Parkway			
EBLT	100	28	6
SBLR	1,260	337	253
7: MacArthur Boulevard/Reservoir Road			
EBL	75	44	28
EBR	1,900	174	15
NBL	100	32	245
NBT	100	144	101
SBTR	2,000	372	114
¹ Reported queues are 95 th percentile queues from Synchro. ² All queues are in feet. ³ Length of turn lane or distance to nearest major intersection. * Denotes queue could not be calculated.			

Table 5-3 (continued)
 2020 Total Future Queue Summary^{1,2}

INTERSECTION/ LANE GROUP	AVAILABLE STORAGE ³	AM PEAK	PM PEAK
8: Foxhall Road/Reservoir Road			
EBL	100	30	45
EBT	2,425	659	204
EBR	240	49	34
WBL	75	336	443
WBT	625	219	446
WBR	625	42	54
NBLTR	2,250	686	470
SBL	1,750	774	351
SBTR	1,750	835	740
9: Foxhall Road/Deerfield Road			
WBLR	N/A	20	22
NBTR	540	628	262
SBL	100	24	24
SBT	375	608	184
¹ Reported queues are 95 th percentile queues from Synchro. ² All queues are in feet. ³ Length of turn lane or distance to nearest major intersection. * Denotes queue could not be calculated.			

Section 6 TRANSPORTATION AND PARKING MANAGEMENT

TRANSPORTATION MANAGEMENT

Existing Transportation Management Plan (TMP) Measures

The GW Transportation Management Plan (TMP) promotes efficient traffic operations within the campus and implements effective shuttle bus service on- and off-campus. The TMP currently consists of the following measures:

1. Shuttle Bus Service Plan
2. Car Sharing
3. Carpool Incentive Program
4. Significant bicycle parking
5. Shopping cart loan program

Shuttle Bus Service Plan – GW provides shuttle bus service, the Vern Express, between the Mount Vernon and Foggy Bottom Campuses.

Car Sharing – The University currently provides one car sharing space on the Mount Vernon Campus.

Carpool Incentive Program – Carpooling is encouraged at GW through the Carpool Incentive Program, which allows employees to park any car registered in their carpool group in the parking garage at a reduced parking rate. Additionally, employees can enroll in “NuRide”, a flexible ride sharing program that encourages and rewards carpooling.

Significant bicycle parking – Bike racks are located at the UPD Gatehouse, Merriweather Hall, Somers Hall, and in the parking garage. The Pelham Hall redevelopment project also will have bicycle racks.

Shopping cart loan program – This program allows students to borrow a shopping cart from the UPD for use at Safeway and CVS upon presenting a GWorld card. This program enables students on foot to conveniently bring packages to Campus eliminating the need to use cars for this purpose.

Proposed Transportation Management Plan (TMP) Measures

Improvements to the existing TMP measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan. The following elements should comprise the TMP program:

- Continue existing TDM strategies,
- Maintain shuttle bus service with commitment to expand number of buses as necessary during peak periods to ensure sufficient capacity is available,
- Provide preferential parking in garage for carpools, and
- Provide preferential parking for hybrid vehicles.

PARKING MANAGEMENT

Existing Parking Management Plan

All GW faculty, staff, students, and visitors must park on campus. The policy is available on-line and is given to new residents of the Mount Vernon Campus. The Campus actively enforces parking restrictions on neighborhood streets. Additionally, flyers are placed on vehicles affiliated with GW that are parked on neighborhood streets to remind them of the campus parking policy.

Proposed Parking Management Plan

Improvements to the existing parking measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan. The following elements should comprise the program:

- Maintain ability to reclaim Lab School leased parking spaces at any time,
- Monitor Parking Annually – when parking occupancy in the garage reaches 85%, implement additional measures, such as increasing number of spaces by implementing attendant parking and restricting freshmen from bringing cars to campus,
- Provide preferential parking in garage for carpools, and
- Continue to encourage use of car sharing service by students and monitor potential demand of car sharing.

Section 7 CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations of this study are as follows:

1. This report takes into account the impact of proposed increases in Mount Vernon student enrollment over the term of the 2010 Plan and the associated increase in faculty and staff.
2. The Mount Vernon Campus currently generates an estimated 80 AM peak hour vehicle-trips and 52 PM peak hour vehicle-trips.
3. University traffic currently accounts for less than one percent of all traffic on streets within the study area during both the AM and PM peak hours
4. The impact of projected increases to Mount Vernon student enrollment (606 headcount students) and faculty and staff levels (69 full-time faculty and staff) is expected to generate 57 additional AM peak hour vehicle-trips and 36 additional PM peak hour vehicle-trips.

This level of traffic is expected to have no discernible impact on traffic operations at the study intersections. At each intersection, the additional traffic will account for approximately one percent or less the total future traffic.

5. The following intersections currently operate at acceptable levels of service (i.e. LOS "D" or better):
 - W Street/GW Driveway
 - Whitehaven Parkway/Foxhall Road
 - Whitehaven Parkway/GW Driveway
 - MacArthur Boulevard/Reservoir Road
 - Foxhall Road/Deerfield Road

The following intersections operate at or near capacity (i.e. LOS "E" or "F") under existing conditions during at least one of the peak hours:

- W Street/MacArthur Boulevard
 - W Street/Foxhall Road
 - MacArthur Boulevard/Whitehaven Parkway
 - Foxhall Road/Reservoir Road
6. The GW Transportation Management Plan (TMP) currently consists of the following measures:
 - Shuttle Bus Service Plan,
 - Car Sharing,
 - Carpool Incentive Program ,
 - Significant bicycle parking, and
 - Shopping cart loan program.

The following improvements to the existing TMP measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan:

- Continue existing TDM strategies,
- Maintain shuttle bus service with commitment to expand number of buses as necessary during peak periods,
- Provide preferential parking in garage for carpools, and
- Provide preferential parking for hybrid vehicles.

7. The following improvements to the existing parking measures are recommended in conjunction with the 2010 Mount Vernon Campus Plan:
- Maintain ability to reclaim Lab School leased parking spaces at any time,
 - Monitor Parking Annually – when parking occupancy in the garage reaches 85%, implement additional measures, such as increasing number of spaces by implementing attendant parking and restricting freshmen from bringing cars to campus,
 - Provide preferential parking in garage for carpools, and
 - Continue to encourage use of car sharing service by students and monitor potential demand for additional car sharing.

REFERENCES

- ¹ 2007 Traffic Volumes, District Department of Transportation, Traffic Services Administration, Washington, D.C., [http://ddot.dc.gov/ddot/frames.asp?doc=/ddot/lib/ddot/information/maps/trafficvolume/2007_citywide.pdf].
- ² Ibid.
- ³ Ibid.
- ⁴ Palisades Traffic Impact Study, Traffic Services Administration, District Department of Transportation, District of Columbia, August 2002.
- ⁵ District of Columbia Bicycle Master Plan, District Department of Transportation, April 2005, [http://ddot.dc.gov/ddot/frames.asp?doc=/ddot/lib/ddot/information/bicycle/pdf/master_plan/cover.pdf&open=|32399|].
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- ⁷ Manual on Uniform Traffic Control Devices, U.S. Department of Transportation, Federal Highway Administration, 2003 Edition with Revision No. 1 Incorporated, effective July 21, 2004.
- ⁸ Friends of St. Patricks' Transportation Impact Study, Wells & Associates, Inc., September 7, 2005.
- ⁹ Trip Generation, 7th Edition, Volume 2, Institute of Transportation Engineers, Washington, D.C., 2003.
- ¹⁰ District of Columbia Municipal Regulations, Title 11-Zoning, Section 2119.2, 2001 Edition.
- ¹¹ The George Washington University Mount Vernon Campus Pelham Replacement Project Traffic Impact Study, Symmetra Design, May 23, 2007.
- ¹² Synchro Traffic Signal Software – User Guide, Trafficware Corporation, Albany, CA, 2003.

Figures

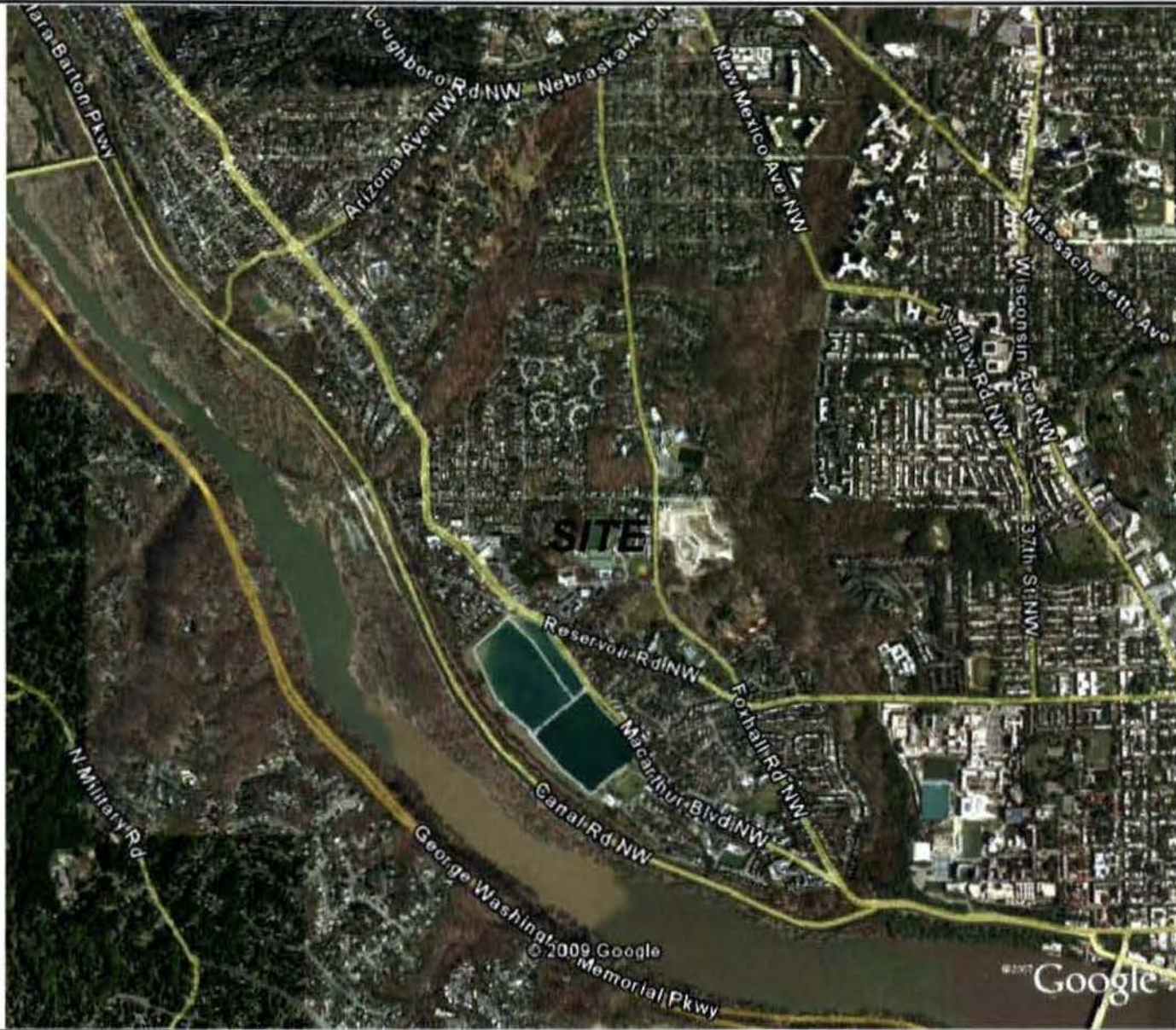
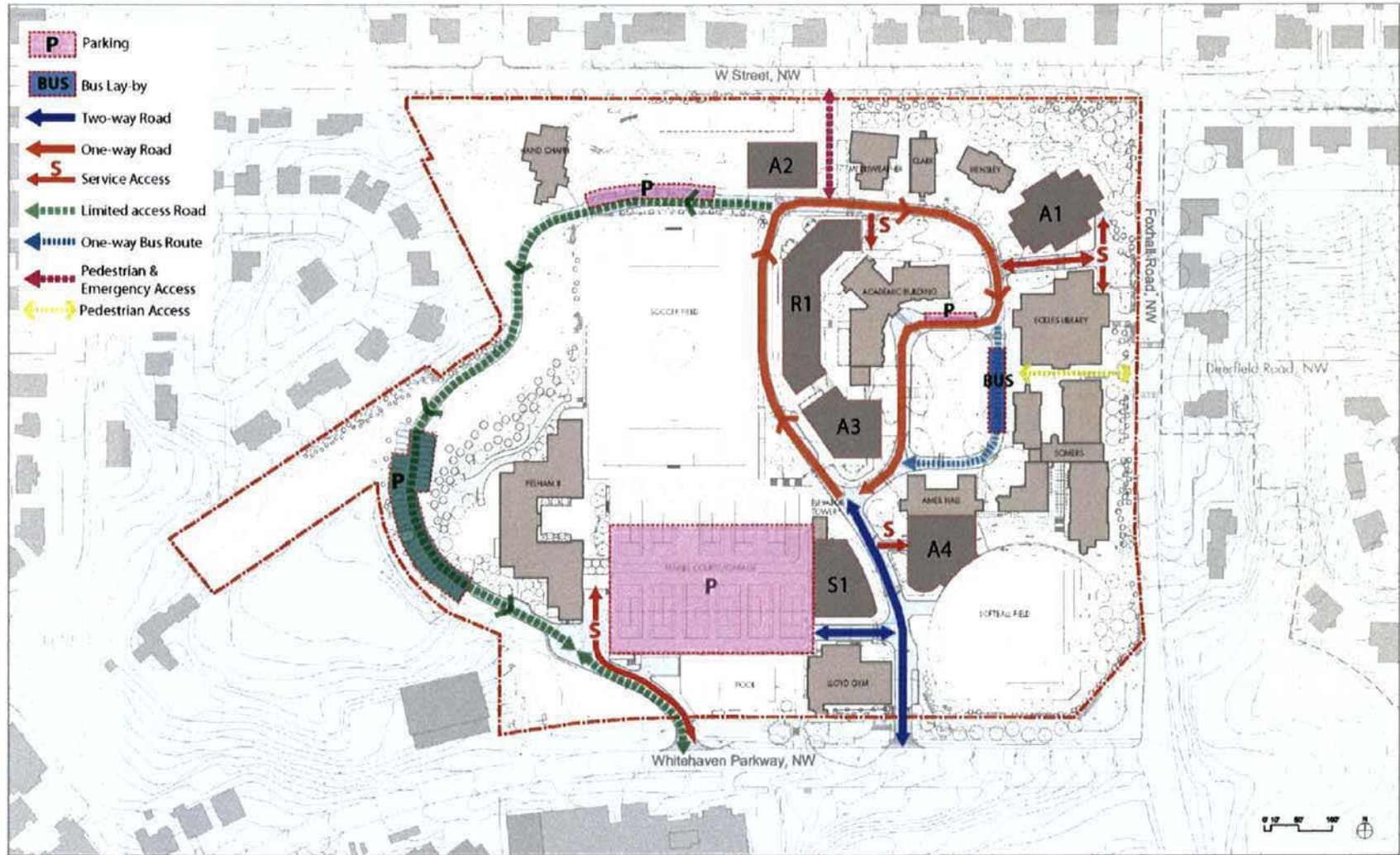


Figure 1-1
Site Location





The George Washington University Office of Real Estate | THE UNIVERSITY OF THE DISTRICT OF COLUMBIA | FDWV | AFCEM | WVA | **Mount Vernon Campus Master Plan Update** | Washington, DC | PROPOSED CIRCULATION & PARKING | October, 2009

Figure 1-2
Site Plan Reduction



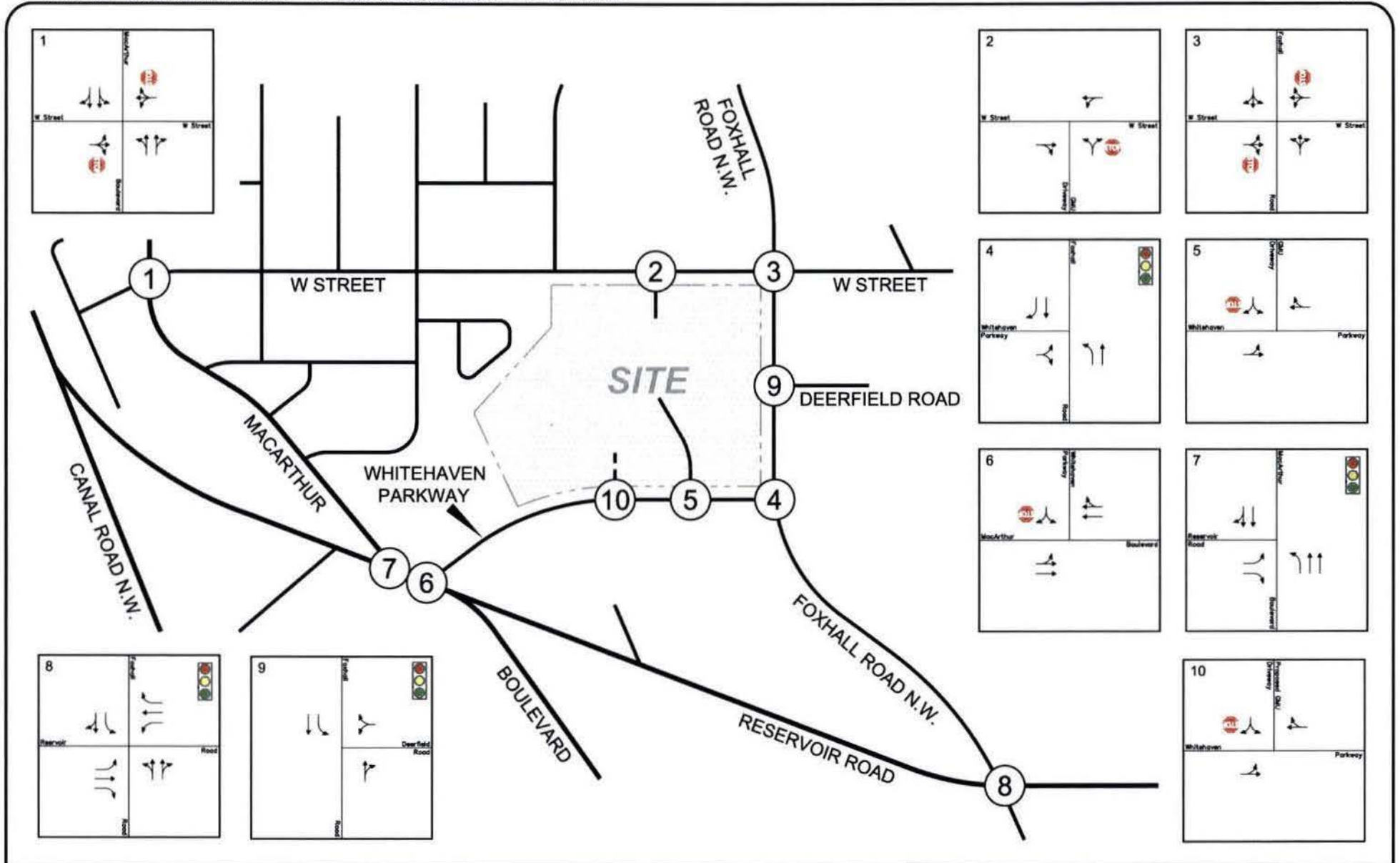


Figure 2-1
Existing Lane Use and Traffic Control

- ← Represents One Travel Lane
- 🚦 Signalized Intersection
- 🛑 Stop Sign
- 🏠 North

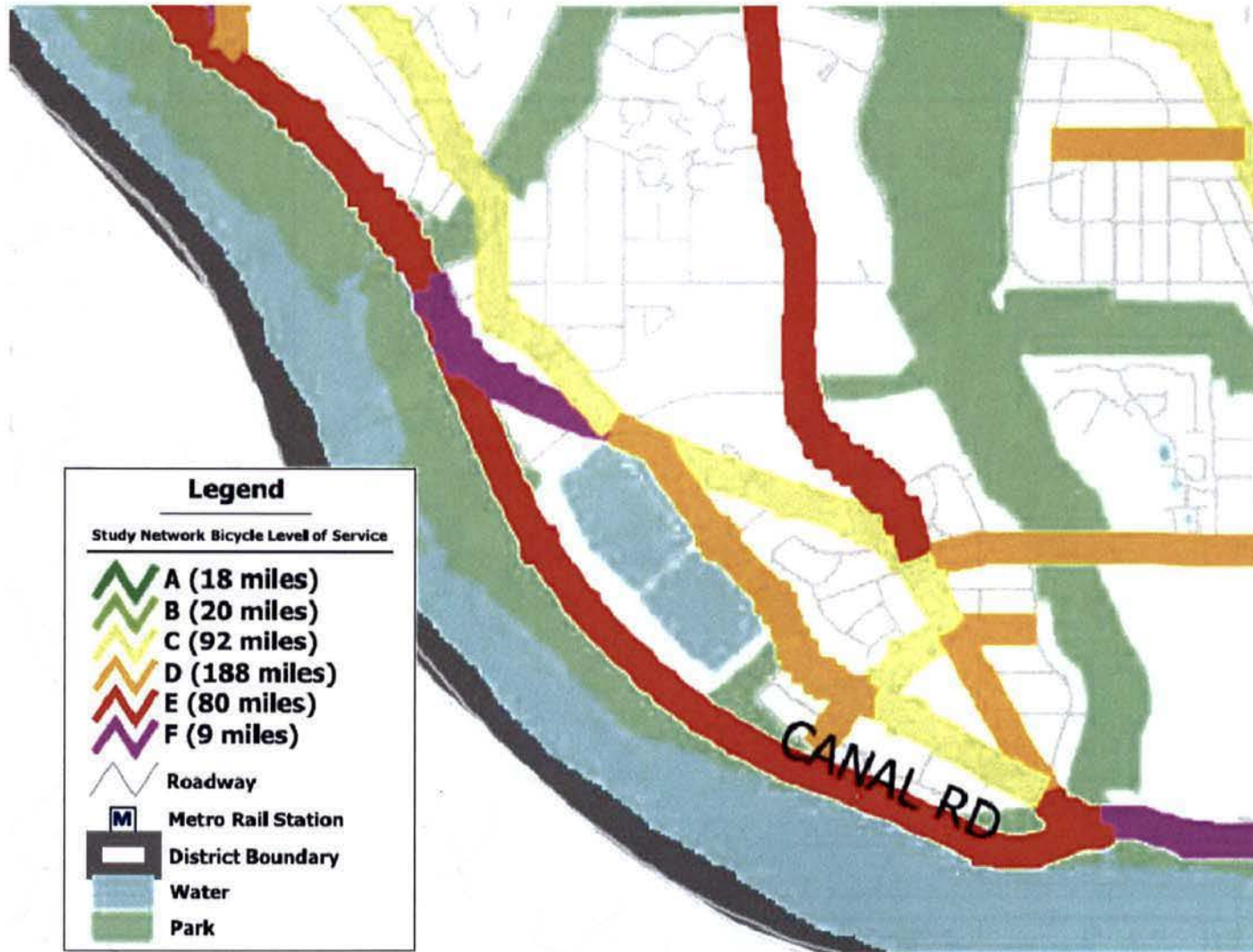


Figure 2-2
Bicycle Levels of Service



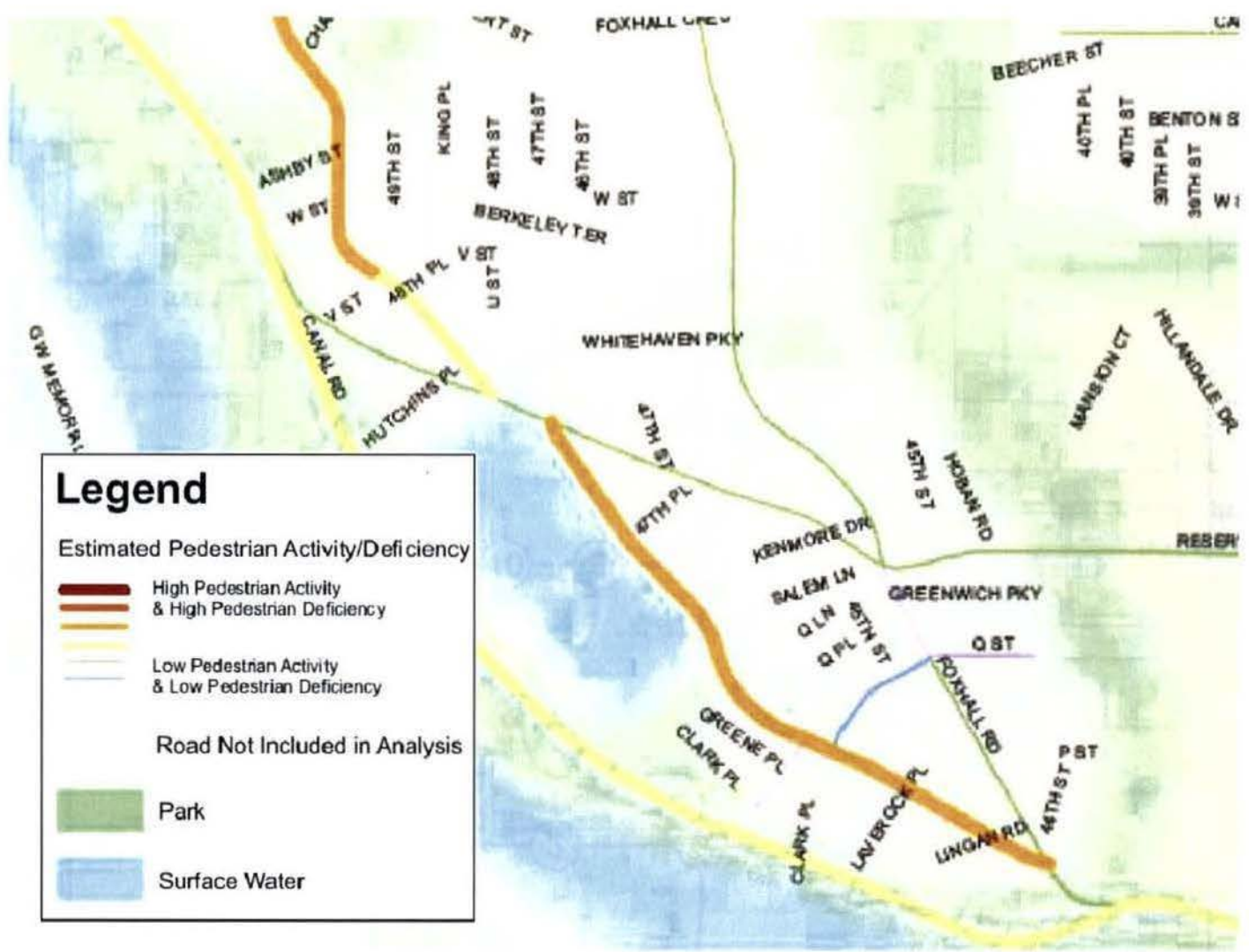


Figure 2-3
Pedestrian Master Plan



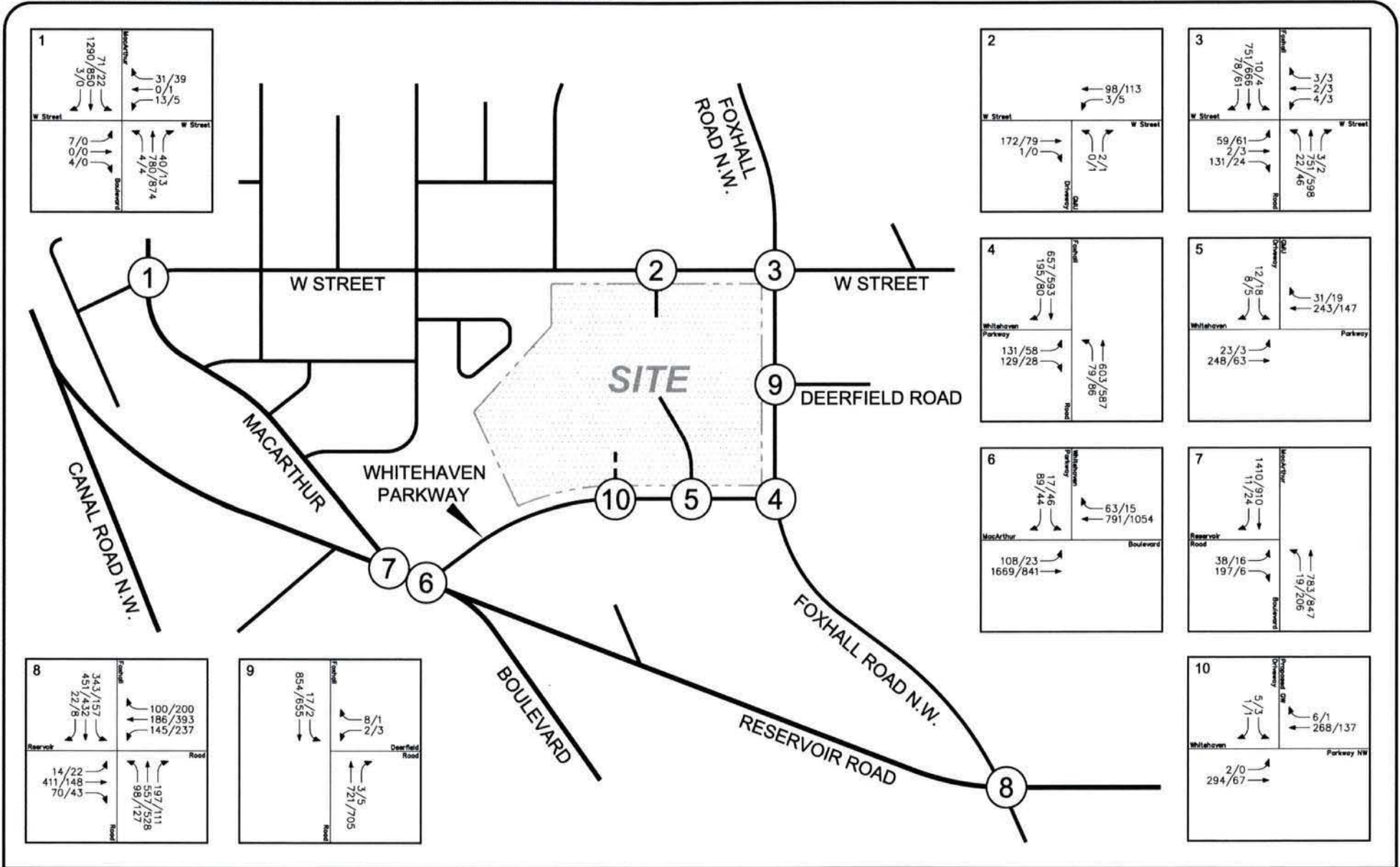


Figure 2-4
Baseline Peak Hour Traffic Volumes

AM PEAK HOUR
PM PEAK HOUR
000/000
North

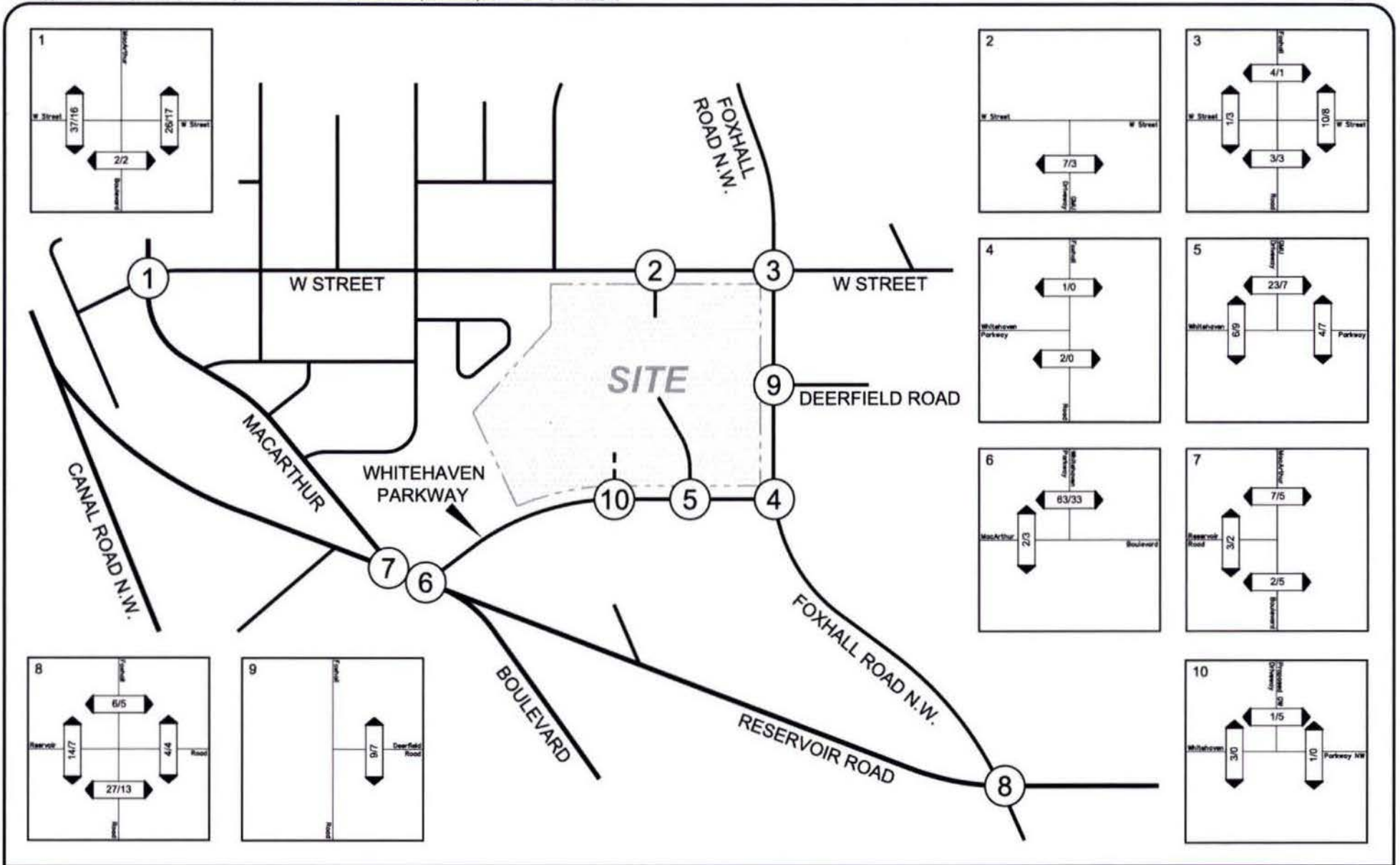


Figure 2-5
Peak Hour Pedestrian Volumes

All Peak Hour
PM Peak Hour
000/000



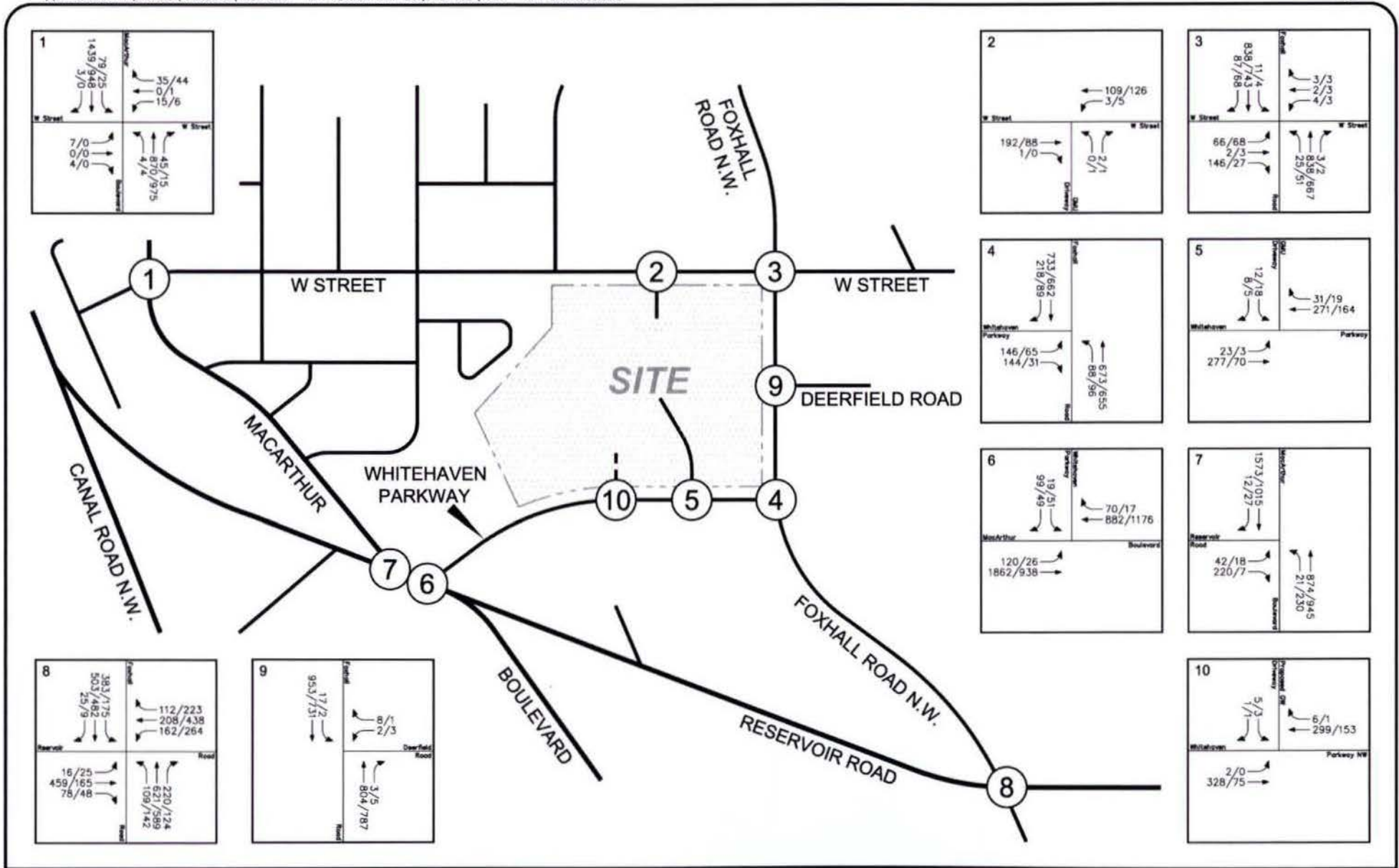


Figure 3-1
Existing Peak Hour Traffic Volumes with Regional Growth (2020)

AM PEAK HOUR
PM PEAK HOUR
000/000

North

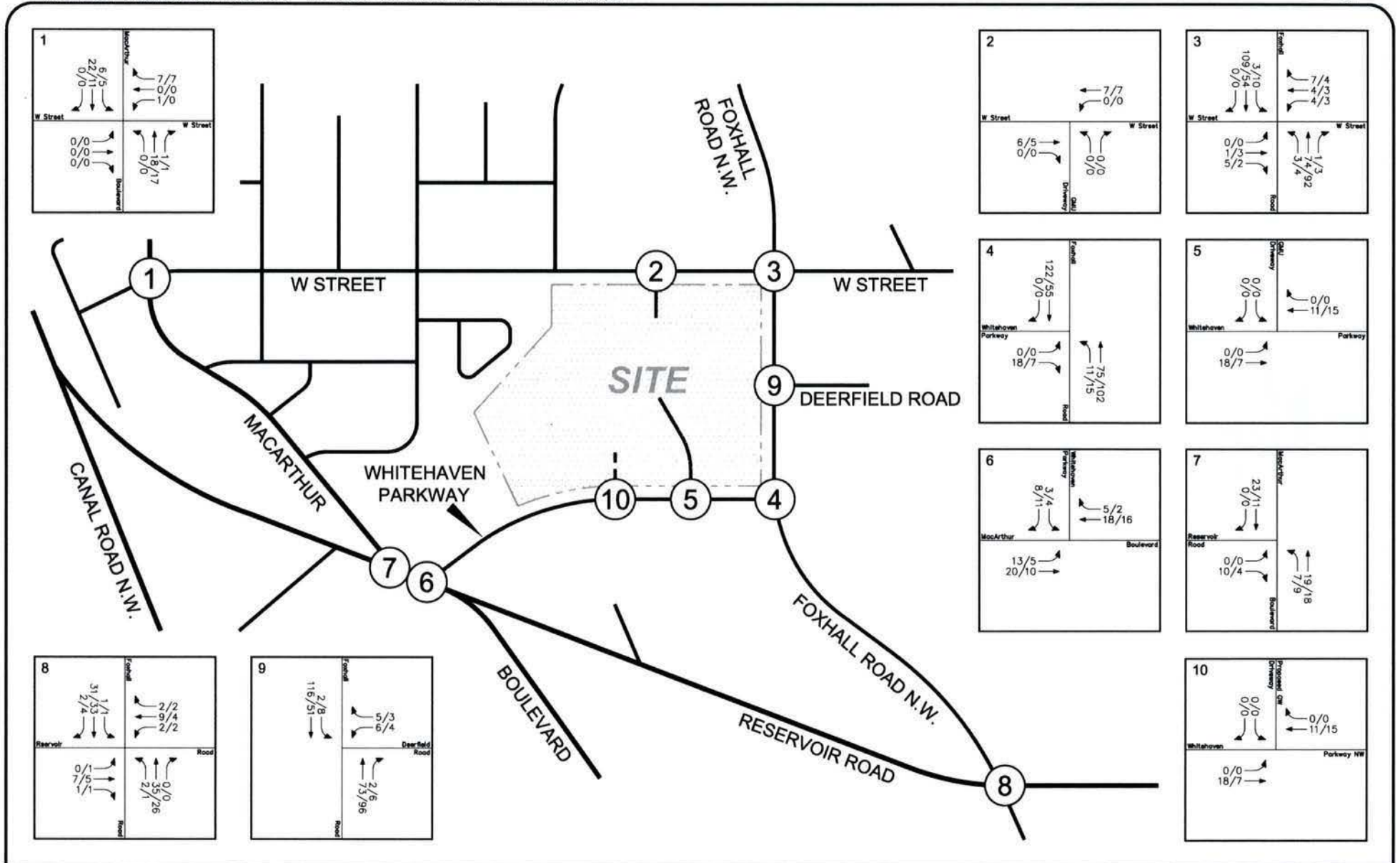


Figure 3-2
Pipeline Development Traffic Assignments

AM PEAK HOUR
PM PEAK HOUR
000/000



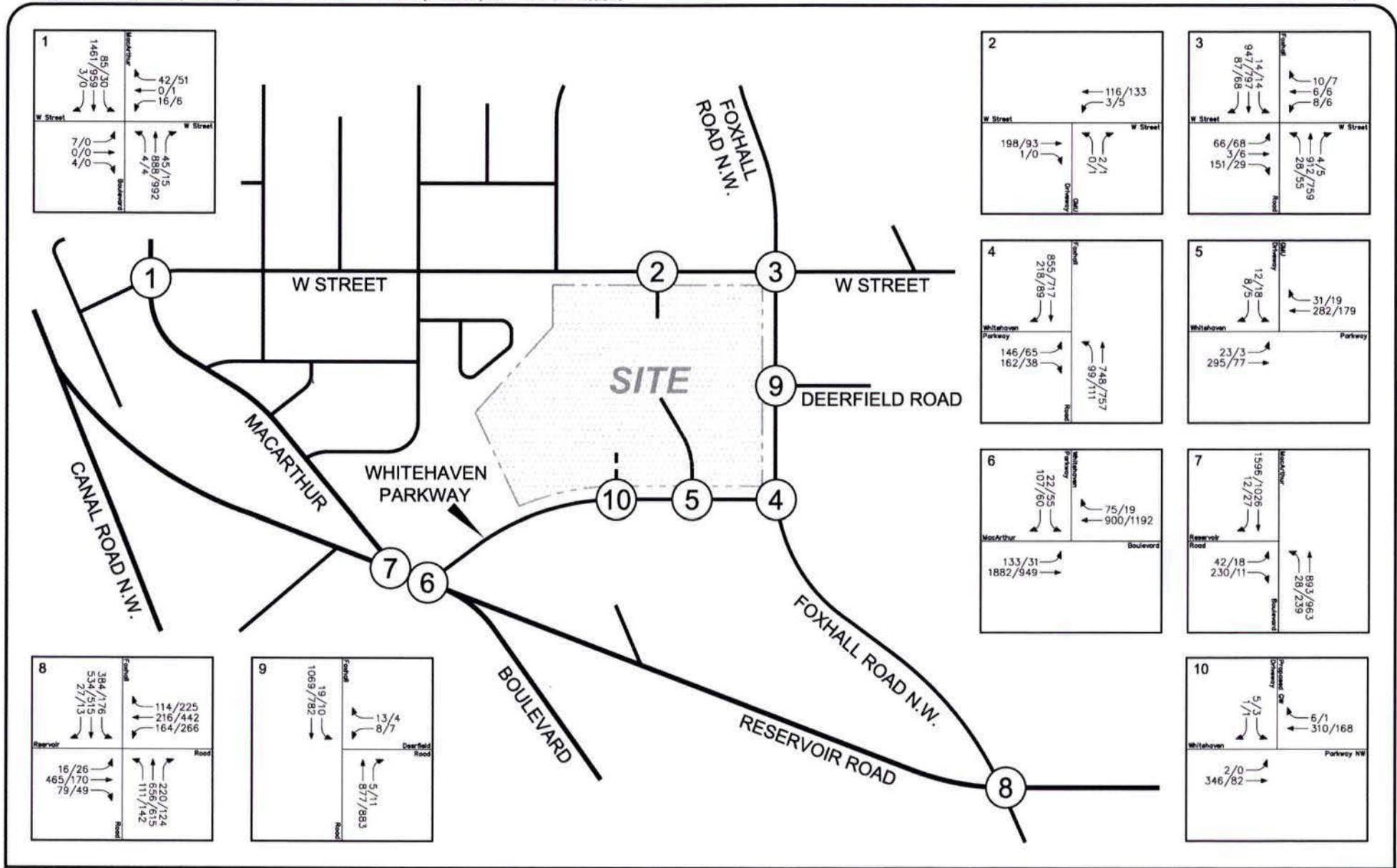


Figure 3-3
2020 Background Peak Hour Traffic Forecasts



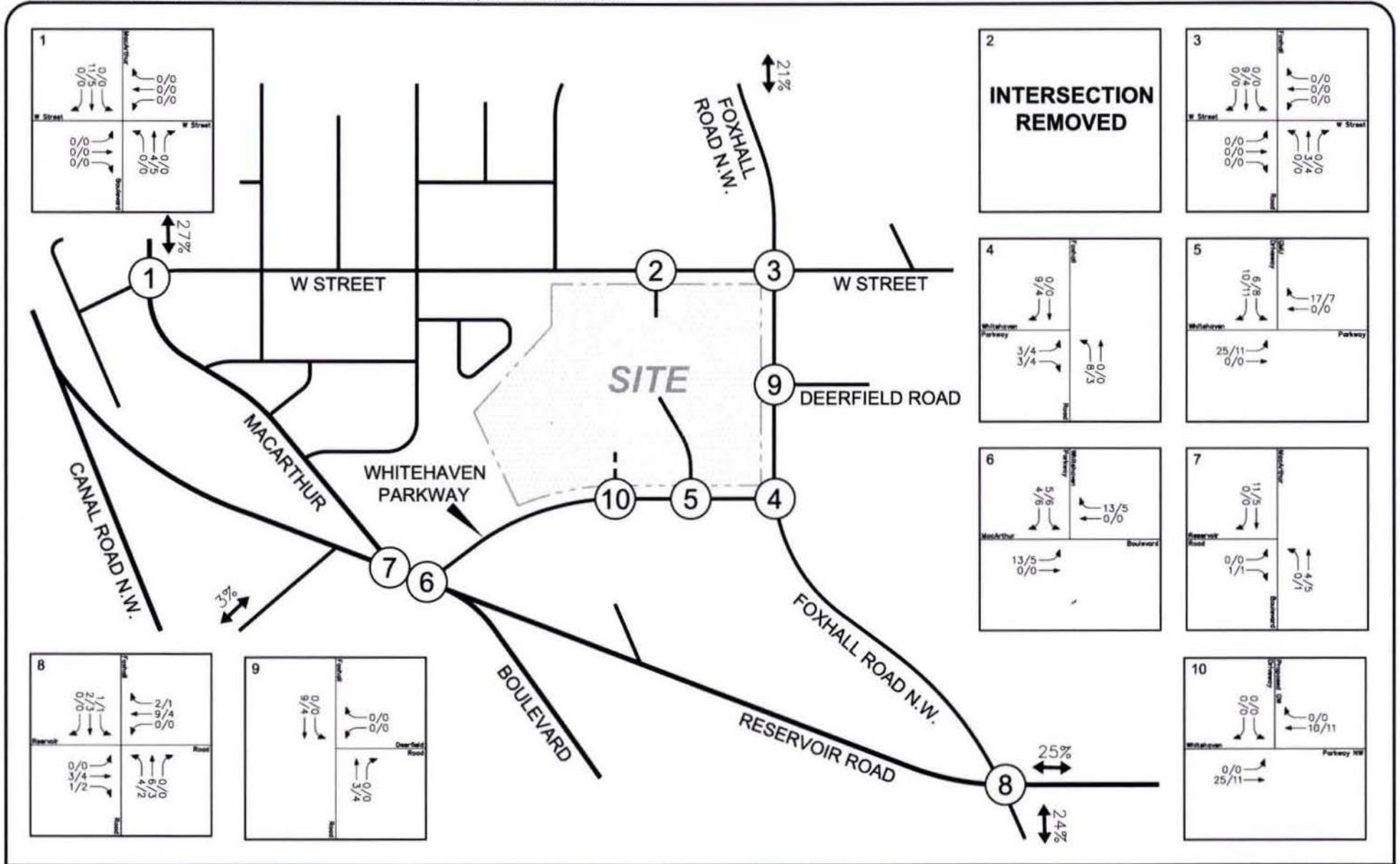


Figure 4-1
Site Trip Distribution and Assignments

XX%
Distributions

All Peak Hour
PM Peak Hour
000/000



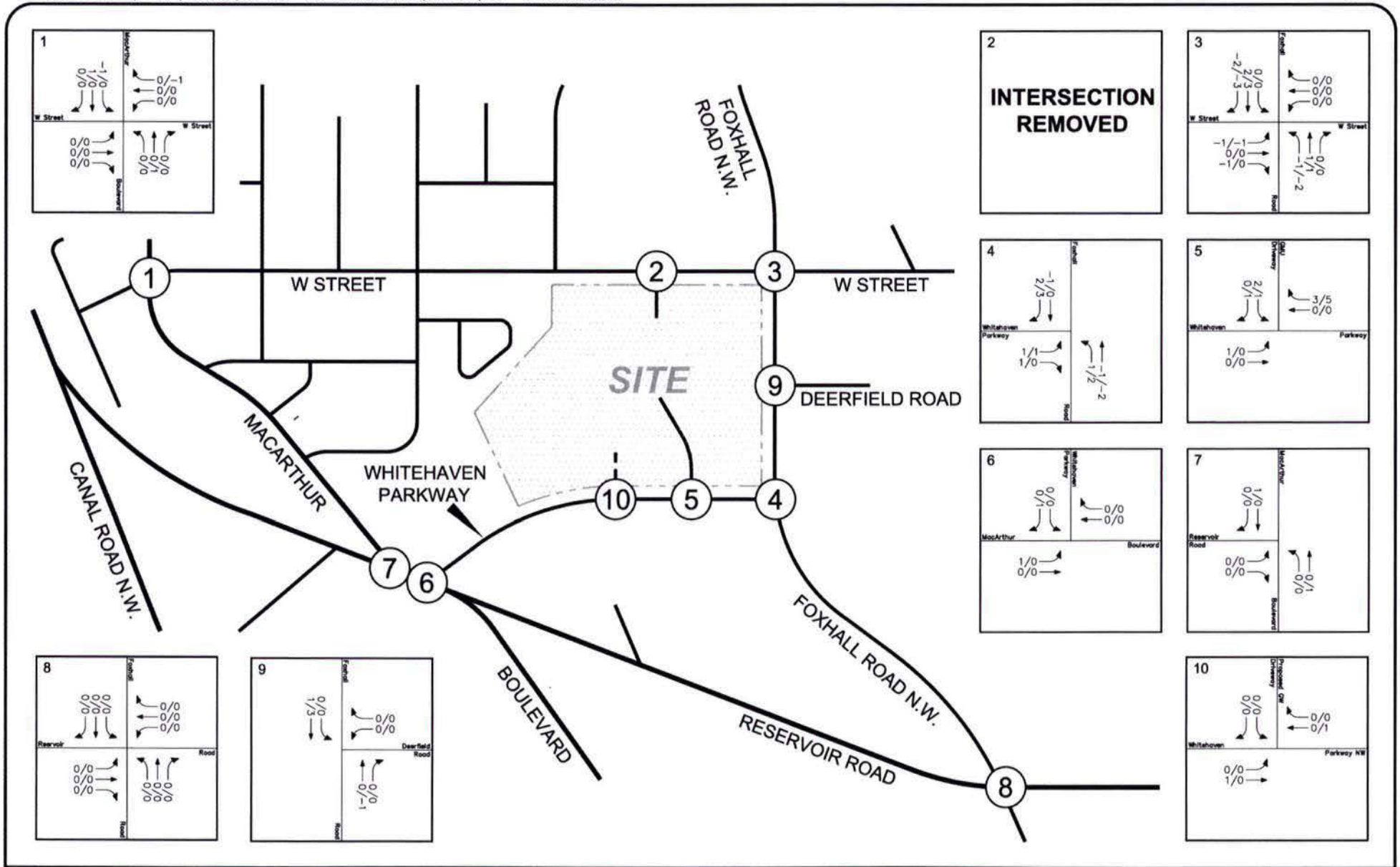


Figure 5-1
Rerouted Existing Volumes for Removal of W Street Driveway

AM PEAK HOUR
PM PEAK HOUR
000,000

North

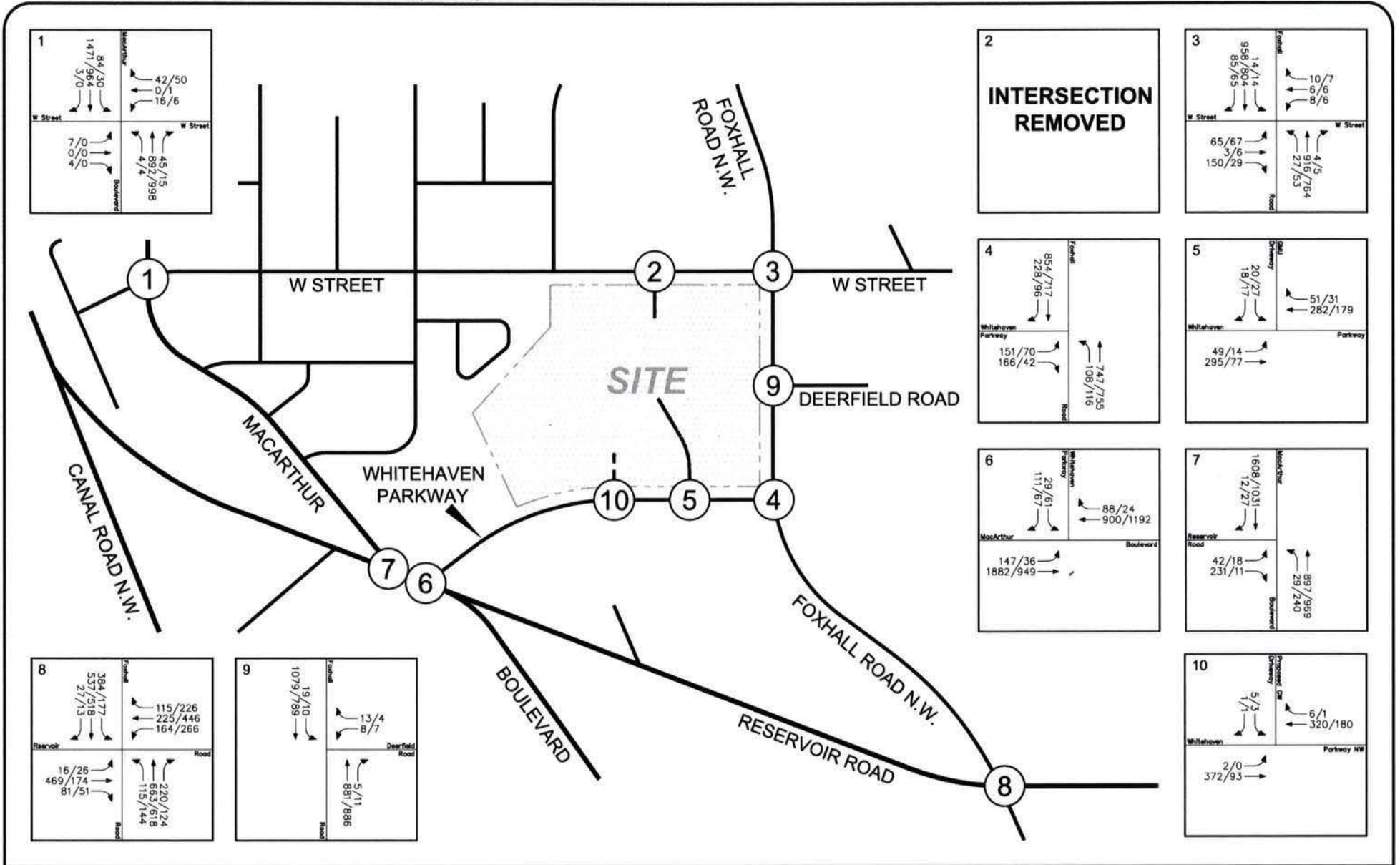


Figure 5-2
2020 Total Future Peak Hour Traffic Forecasts

AM PEAK HOUR
PM PEAK HOUR
000/000
North