

APPENDIX C

Transportation Impact Analysis

Transportation Impacts Errata

The following are corrections to data in the Transportation Impacts report:

- Appendix C, Table 4 shows that the existing parking lot on Lake Washington Boulevard at Miller Street has 40 spaces. That lot actually has 25 spaces.
- The text of Appendix C, Section II.5 reports that the three parking areas located on Foster Island Drive contain a total of 35 spaces. These lots actually have a combined total of 70 spaces.
- The text of Appendix C, Section II.5 states that “the Graham Visitor Center has a total of 49 parking spaces at the north end of the park, which includes a lot located on the southeast corner of the Arboretum Drive/Foster Island Drive intersection.” Actually, the Graham Visitor Center has a total of 49 spaces itself. The ‘lot located on the southeast corner of the Arboretum Drive/Foster Island Drive intersection’ is one of the three parking areas located on Foster Island Drive (which contain a combined total of 70 spaces, as noted above).
- Appendix C, Table 4 and Table 8 list a total of 372 existing parking spaces. With the two corrections noted above – an additional 20 spaces along Foster Island Drive and 15 fewer spaces on Lake Washington Boulevard at Miller Street – the total number of existing parking spaces in the Arboretum becomes 377.
- Note: The Transportation Impacts Analysis was developed during the Draft EIS to address the proposal and alternatives under consideration at that time. Due to a number of factors, including potential traffic impacts, the proposed master plan has been changed for the Final EIS. The Transportation Impacts Analysis that comprises this Appendix was not substantially revised because the range of alternatives considered in the initial report was sufficient to characterize the impacts of the proposed master plan in the Final EIS.

I. Introduction

The Washington Park Arboretum encompasses about 200 acres of land in a ¼-mile-wide corridor that extends from Lake Washington (Union Bay) and the Foster Island marshes on the north to the Madison Valley on the south. The Arboretum Master Plan is proposing changes and improvements to the Arboretum, its physical facilities, and to the transportation system serving it. This Transportation Impact Analysis includes an inventory of existing transportation facilities and services, an analysis of existing conditions, an analysis of the impacts of the proposed master plan (and alternatives), and a set of recommended mitigation measures for the identified impacts.

I.1. Materials and Methods

Background information was obtained from published reports and data files from the City of Seattle Engineering Department (SeaTran) and the Washington State Department of Transportation (WSDOT). They include average weekday daily and p.m. peak hour traffic counts performed by SeaTran in late September, 1999.

In addition, Traffic Data Gathering, Inc. conducted peak period turning movement counts at five Lake Washington Boulevard intersections: SR 520 ramps (to/from the east), Foster Island Road, Boyer Avenue, Arboretum Drive, and Madison Street. (P.M. peak counts were made in late November, 1999, and a.m. peak counts were made by Traffic Count Consultants in early March, 2000.)

Estimates of Arboretum traffic generation and parking demand were developed by Consultant staff. Consultant staff also prepared the estimates of Year 2005 background traffic that were used in the traffic analysis; these 2005 background volumes were “projected” by estimating that current traffic would increase by 1% per year.

The effects of road network changes on Arboretum area traffic circulation patterns were determined using Year 2010 traffic forecasts prepared by the City of Seattle Strategic Planning Office using the City’s EMME/2 traffic forecasting model.

All intersection and arterial capacity and level-of-service (LOS) calculations were made using the methodologies prescribed by the *Highway Capacity Manual* (Transportation Research Board Special Report 209, Third Edition, 1994 Update).

II. Existing Conditions

The existing conditions analysis comprises seven sections: 1) an inventory and assessment of the roadway network serving the Arboretum, 2) a discussion of traffic volumes and patterns, 3) an analysis of existing traffic operations, 4) a discussion of the traffic accident history on the Arboretum-area road system, 5) an inventory of parking supply and demand, 6) a description of public transportation services, and 7) an inventory and assessment of the pedestrian and bicycle facilities providing access to/from and circulation within the Arboretum.

II.1. Roadway Network and Conditions

The roadway network within and surrounding the Arboretum is well established and consists of the SR 520 freeway and several arterials and local access streets.

Access to the Arboretum is provided by Lake Washington Boulevard, which runs through the park and in turn provides vehicular connections to regional freeway system and the Seattle arterial street system. The connections to the freeway system are provided at SR 520 (to/from the east via direct ramps and to/from the west via the Montlake Blvd Interchange at the north terminus of Lake Washington Blvd), and connections to the arterial street system are made via Montlake Blvd–24th Ave, Madison St, and Boyer Ave.

In addition to providing Arboretum access, Lake Washington Boulevard also provides the primary connection to SR 520, the Montlake Bridge, and the University Bridge (via Boyer Avenue) for Madison Park and other neighborhoods to the south along Lake Washington and the Martin Luther King Jr Boulevard corridor. These neighborhoods have limited or no access to 23rd Avenue¹, the Principal Arterial that provides the only alternative route for these trips (between Union Street – an east-west arterial street about a mile south of the Arboretum – and Boyer Avenue there are no convenient or appropriate connections to 23rd–24th Avenue).

Lake Washington Boulevard and Arboretum Drive are the main north-south streets that run through the Arboretum. Lake Washington Boulevard is a heavily traveled, two-lane arterial connecting Madison Street in the south with SR 520 and Montlake Boulevard–24th Avenue in the north. Arboretum Drive is a two-lane, narrow local access street or park drive which loops through the eastern portion of the Arboretum, connecting directly to Lake Washington Boulevard at the south end, and connecting to Lake Washington Boulevard via Foster Island Road at the north end.

Boyer Avenue and Interlaken Boulevard provide two additional vehicular access points into the Arboretum from the west. Boyer Avenue provides a connection to/from the residential neighborhood immediately west of the Arboretum, to/from 24th Ave (via a signalized intersection), to/from the Montlake and Roanoke Park neighborhoods west of 24th, and to/from the University Bridge. Interlaken Boulevard provides only a local street connection for a portion of the residential area between the Arboretum and 24th Avenue south of Boyer.

¹ 23rd Avenue “jogs” to the east and becomes 24th Avenue just north of Aloha Street.

II.1.1. Roadway Characteristics

Roadway characteristics are compiled in the following paragraphs. Facility type, number of lanes, posted speed limits, and shoulder types and widths are described..

Lake Washington Boulevard is classified as both a Class I Boulevard – Natural Landscaping, and a Collector Arterial by the City of Seattle. It is a two-lane roadway that provides circulation and direct access to the adjacent park land and provides access to and from neighborhoods along the western shore of Lake Washington and the Montlake and Madison Park neighborhoods, and the Arboretum itself. The roadway is a narrow (for two lanes) 24 feet in width, but the pavement is in good condition. There are curbs on both sides of the roadway, but no shoulders. The posted speed limit is 25 miles per hour (mph).

The Lake Washington Boulevard intersections at Madison Street and at Montlake Boulevard (where eastbound SR 520 on- and off-ramps also connect) are signalized. The Lake Washington Boulevard approach to the Montlake Boulevard intersection has adequate width, lane configuration and queue storage; however the Lake Washington Boulevard approach to the Madison Street intersection has an extremely short left turn pocket with inadequate queue storage capacity, and does not have a separate right turn lane.

The intersection of Lake Washington Boulevard and the SR 520 ramps to/from the east has all-way stop control for through movements on Lake Washington Boulevard and the SR 520 westbound off-ramp traffic. Traffic from northbound Lake Washington Boulevard enroute to the eastbound SR 520 on-ramp has a free right turn at the intersection, while access from southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp is prohibited.

Madison Street is classified as a Minor Arterial by the City of Seattle. Its primary function is to connect the Madison Park and Lake Washington areas with the city arterial system and the regional highway system to the west (e.g., 23rd Ave, 12th Ave, and the I-5 freeway), and to First Hill and downtown Seattle. Near the Arboretum south entrance at the signalized Lake Washington Boulevard intersection, the Madison Street consists of two lanes with parking on both sides of the street. The pavement is in good condition.

Montlake Boulevard–24th Avenue is a north-south Principal Arterial, which lies about 1/4-mile west of the Arboretum and provides access to the SR 520 freeway and, via the Montlake Bridge, to the University of Washington and northeast Seattle. The roadway has four travel lanes with sidewalks on both sides of the street. There is limited shoulder space and no on-street parking. Pavement conditions are good.

Boyer Avenue is classified as a two-lane Collector Arterial by the City of Seattle. Boyer Avenue provides a direct connection from Lake Washington Boulevard to 24th Ave, where there is a signalized intersection (Boyer is stop-controlled at its eastern terminus at Lake Washington Boulevard. West of 24th, Boyer runs northwestward through the Montlake neighborhood, terminating at Eastlake Avenue and the University Bridge.

East of 24th Avenue, on the segment of Boyer that connects Lake Washington Boulevard to the City arterial system, the roadway is quite narrow and has sharp curves at the oblique-angle local street intersections at 25th Avenue and 26th Avenue. Traffic circles have been installed at each of these two intersections to help control traffic flow. There are no shoulders and on-street parking is not permitted between 24th Avenue and 25th Avenue, and on-street parking is permitted only on the east side of the street between 25th and 26th. (The Boyer Avenue roadway between 25th and 26th is so narrow that although two-way traffic is permitted, many motorists are reluctant to approach an on-coming vehicle where there is a car parked on the street; on such occasions, Boyer functions like a one-lane roadway.) The pavement is in good condition, and the posted speed limit is 25 mph.

Arboretum Drive is classified by the City of Seattle as a Local Access Street. Arboretum Drive is a two-lane, north-south roadway which passes through the Arboretum. The roadway has a pavement width of 18 to 19 feet and is in good condition. Arboretum Drive primarily serves park-usage traffic, and there are many small parking lots for park users located along the roadway.

Foster Island Road is classified as a Local Access Street and provides access to the Broadmoor Golf Club (one of two access points to the Broadmoor subdivision) and to a parking lot for Foster Island. Total pavement width is 23 to 24 feet. The pavement is in fair-to-good condition, and the posted speed limit is 15 mph.

Interlaken Boulevard is classified as a Local Access Street. Interlaken Boulevard links Lake Washington Boulevard to 24th Avenue with no intermediate street connections. (Interlaken Boulevard's northwest-southeast alignment make it an out-of-direction connection for northbound travel from 24th to Lake Washington Boulevard and for southbound travel from Lake Washington Boulevard to 24th; however, it can be a convenient short-cut route from southbound 24th or from northbound Lake Washington Boulevard.) Interlaken Boulevard is stop-controlled at its intersection with 24th Avenue and at its eastern terminus at Lake Washington Boulevard. East of 24th Avenue, "chokers" – which reduce the street width and create a one-lane roadway – have been installed in two locations, and there is a one-lane bridge over 26th Avenue. Pavement east of 24th is in good condition, while the pavement west of Lake Washington Boulevard is in fair-to-poor condition.

II.1.2. Trans-Lake Washington Study

The Trans-Lake Washington Study was authorized by the State Transportation Commission and funded by the State Legislature in 1997. The purpose of the study was to identify a set of "reasonable and feasible solutions" to improve mobility across and/or around Lake Washington." The study considered improvements throughout the entire SR 520 Corridor from I-5 in Seattle to SR 202 in Redmond, as well as in the area from SR 522 to I-90. The study was charged with integrating a wide variety of transportation options (highway and transit capacity, travel demand management, bicycle and pedestrian facilities, and environmental enhancements) into the proposed solutions.

In July, 1999, the 47-member Trans-Lake Washington Study Committee recommended a wide array of solutions. These "solutions" all are conceptual in nature, and specific issues like interchange reconfiguration have not yet been addressed. The next step in the process is the preparation of an

environmental impact study that will support a decision on a preferred solution. It is within the regional context of the upcoming SR 520 environmental and design studies that examinations of and decisions about the disposition of the existing Lake Washington Boulevard and Montlake Boulevard SR 520 ramps will be made.

II.2. Traffic Volumes and Patterns

Traffic volumes and patterns in the Arboretum area were evaluated by collecting and reviewing average weekday daily traffic (AWDT) volume counts on selected key street segments and a.m. and p.m. peak hour volume counts at selected key intersections. The “AWDT” is the average number of vehicles that use a given street segment during a 24-hour period on a weekday. The peak hour intersection volumes are the numbers of turning and through movements – counted separately – that pass through a given intersection during the highest-volume 60-minute period during the a.m. and p.m. peak commute periods. AWDT volumes are shown in Figure 1, p.m. peak hour traffic volumes are shown in Figure 2, and a.m. peak hour traffic volumes are shown in Figure 3. Figures 4 and 5 show the travel paths of peak hour Lake Washington Boulevard traffic.

II.2.1. Daily Traffic

The daily traffic counts on Lake Washington Boulevard ranged from 11,300 vehicles per day (vpd) north of the SR 520 ramps to 19,900 vpd south of the SR 520 ramps. Volumes were 16,700 vpd north of Boyer Avenue and 19,300 vpd north of Madison Street. Although Lake Washington Boulevard is classified as a Collector Arterial, the volumes it is carrying are larger than the AWDT volumes on Madison Street (17,100 vpd), a Minor Arterial, and on 23rd Ave (15,900 vpd), a Principal Arterial. The Lake Washington Boulevard volumes also greatly exceed the 1,000 – 5,000 vpd range recommended for a Collector Arterials in *the Seattle Comprehensive Transportation Program – Street Classification.* , Lake Washington Boulevard

II.2.2. P.M. Peak Traffic

In the p.m. peak, Lake Washington Boulevard carries 650 – 800 vehicles per hour (vph) in each direction between the SR 520 ramps and Madison Street; north of the SR 520 ramps Lake Washington Boulevard carries direction volumes of 400 – 500 vph. Directional volumes are fairly well-balanced, with around 52% of total peak hour traffic traveling northbound, and 48% southbound.

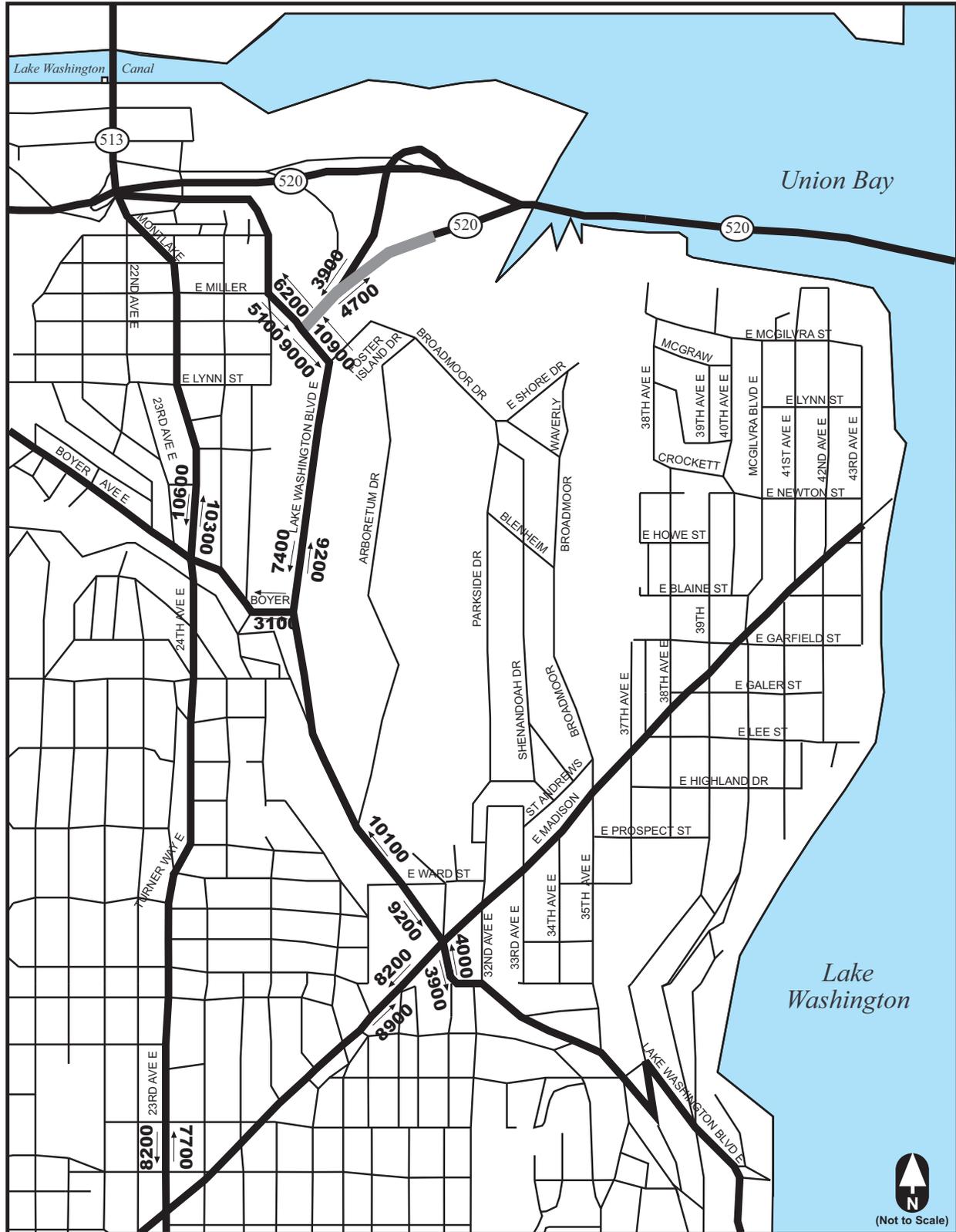


Figure 1- 1999 Average Weekday Traffic Volumes



Figure 2 - 1999 P.M. Peak Hour Traffic Volumes



Figure 3 - 2000 A.M. Peak Hour Traffic Volumes

Southbound Lake Washington Boulevard. In the p.m. peak, southbound Lake Washington Boulevard carries primarily homebound commuters coming from SR 520 and the Montlake Bridge. The southbound traffic has the following characteristics:

- Approaching Foster Island Drive, 53% of the southbound traffic (430 of 810) is coming from westbound SR 520 and 47% (380 of 810) is coming from Montlake Boulevard and eastbound SR 520.
- At Boyer Avenue 16% of the southbound traffic (100 of 635) turns right onto Boyer.
- South of Boyer 22% of the southbound traffic (150 of 685) has come from eastbound Boyer.
- At Madison Street, 37% of the southbound traffic (270 of 715) continues through on southbound Lake Washington Boulevard, 38% (265 of 715) turns left onto Madison toward Madison Park, and 25% (180 of 715) turns right onto southwestbound Madison.

In the p.m. peak hour, a large majority of southbound Lake Washington Boulevard traffic is traveling to Madison Park and other Seattle neighborhoods along Lake Washington and the Martin Luther King Jr Boulevard corridor. This traffic largely comes from SR 520 and the Montlake Bridge, and to a lesser extent from Eastlake and the University Bridge (via Boyer). A modest number of vehicles are using Lake Washington Boulevard and Boyer Avenue enroute from westbound SR 520 to Capitol Hill and the Central District (via 24th Avenue).

Northbound Lake Washington Boulevard. In the p.m. peak, northbound Lake Washington Boulevard carries primarily homebound commuters enroute to SR 520 and the Montlake Bridge. The northbound traffic has the following characteristics:

- North of Madison Street, 31% of northbound traffic (250 of 800) has continued across Madison on Lake Washington Boulevard, 41% (325 of 800) has turned right from southwestbound Madison (from Madison Park), and 28% (225 of 800) has turned left from northeastbound Madison.
- At Boyer Avenue 16% of northbound traffic (115 of 705) turns left onto Boyer
- North of Boyer 11% of northbound traffic (75 of 565) has come from eastbound Boyer.
- At the SR 520 ramps, 45% of northbound traffic (390 of 860) turns right onto the eastbound on-ramp and 55% (470 of 860) continues northbound to Montlake Boulevard.
- North of the SR 520 ramps, 20% of northbound traffic (115 of 585) has come from the westbound SR 520 off-ramp.

In the p.m. peak hour, a large majority of northbound Lake Washington Boulevard traffic is coming from Madison Park and other Seattle neighborhoods along Lake Washington and the Martin Luther King Jr Boulevard corridor. Much of this traffic is traveling to SR 520 and the Montlake Bridge, with a modest number traveling to Eastlake and the University Bridge (via Boyer). A small number is traveling to eastbound SR 520 from Capitol Hill, First Hill, and the Central District via 24th Avenue and Boyer Ave.

II.2.3. A.M. Peak Traffic

In the a.m. peak, Lake Washington Boulevard carries 1,000 – 1,200 vph northbound and 500 – 600 vph southbound between the SR 520 ramps and Madison Street; north of the SR 520 ramps Lake Washington Boulevard carries direction volumes of 400 – 450 vph. Directional volumes are strongly peaked, with around 65% of total peak hour traffic traveling northbound and 35% southbound.

Northbound Lake Washington Boulevard. In the a.m. peak, northbound Lake Washington Boulevard carries primarily commuters enroute to work via SR 520 and the Montlake Bridge. The northbound traffic has the following characteristics:

- North of Madison Street, 42% of northbound traffic (450 of 1,065) has continued across Madison on Lake Washington Boulevard, 38% (400 of 1,065) has turned right from southwestbound Madison (from Madison Park), and 20% (215 of 1,065) has turned left from northeastbound Madison.
- At Boyer Avenue 12% of northbound traffic (120 of 1,010) turns left onto Boyer
- North of Boyer 20% of northbound traffic (230 of 1,120) has come from eastbound Boyer.
- At the SR 520 ramps, 74% of northbound traffic (1,035 of 1,390) turns right onto the eastbound on-ramp and 26% (355 of 1,390) continues northbound to Montlake Boulevard.
- North of the SR 520 ramps, 14% of northbound traffic (60 of 415) has come from the westbound SR 520 off-ramp

In the a.m. peak hour, a large majority of northbound Lake Washington Boulevard traffic is coming from Madison Park and other Seattle neighborhoods along Lake Washington and the Martin Luther King Jr Boulevard corridor. Much of this traffic is traveling to eastbound SR 520, with modest numbers traveling to westbound SR 520, the Montlake Bridge, and via Boyer, to Eastlake and the University Bridge. A significant number (over 200) is traveling to eastbound SR 520 from Capitol Hill, First Hill, and the Central District via 24th Avenue and Boyer Ave.

Southbound Lake Washington Boulevard. In the a.m. peak, southbound Lake Washington Boulevard carries primarily commuters enroute to work coming from SR 520 and the Montlake Bridge. The southbound traffic has the following characteristics:

- Approaching Foster Island Drive, 35% of the southbound traffic (250 of 700) is coming from westbound SR 520 and 65% (450 of 700) is coming from Montlake Boulevard and eastbound SR 520.
- At Boyer Avenue 5% of the southbound traffic (20 of 465) turns right onto Boyer
- South of Boyer 11% of the southbound traffic (55 of 500) has come from eastbound Boyer.
- At Madison Street, 40% of the southbound traffic (245 of 620) continues through on southbound Lake Washington Boulevard, 34% (210 of 620) turns left onto Madison toward Madison Park, and 26% (165 of 620) turns right onto southwestbound Madison.

In the a.m. peak hour, a large majority of southbound Lake Washington Boulevard traffic is traveling to Madison Park and other Seattle neighborhoods along Lake Washington and the Martin Luther King Jr Boulevard corridor. This traffic largely comes from SR 520 and the Montlake Bridge, and to a lesser extent from Eastlake and the University Bridge (via Boyer). A very small number of vehicles are using Lake Washington Boulevard and Boyer Avenue enroute from westbound SR 520 to Capitol Hill and the Central District (via 24th Avenue).

II.2.4. Trucks

Few heavy trucks use Lake Washington Boulevard through the Arboretum: the City has posted a truck prohibition, and the nine-foot height limit of the Wilcox Footbridge just south of Foster Island Road imposes a physical obstruction for large vehicles. Some medium-sized commercial (single-unit) trucks use Lake Washington Boulevard enroute to/from SR 520. The p.m. peak traffic count conducted by TDG Inc. in November 1999 found that trucks comprised 1 percent of the total vehicular traffic.

According to Arboretum staff, some over-height trucks traveling to/from the south use Arboretum Drive and Foster Island Road enroute to/from the SR 520 on- and off-ramps in order to by-pass the nine-foot-clearance pedestrian bridge over Lake Washington Boulevard. Also, some trucks use Foster Island Road for access to/from Broadmoor's north/west entrance gate.

II.3. Traffic Operations

Traffic operations on the Arboretum area roadway system were evaluated by determining the "Level of Service" (LOS) at key intersections and by reviewing observed traffic speeds on Lake Washington Boulevard.

II.3.1. Intersection Level of Service

The LOS is a qualitative measure of traffic operations, which ranges from LOS A, indicating free flow, to LOS E, indicating capacity, to LOS F, indicating forced flow or "jammed" conditions.

The methods used to calculate the levels of service are prescribed in the *1994 Highway Capacity Manual* (Special Report 209, Transportation Research Board). For unsignalized intersections, LOS is determined for each stop-controlled and yield-controlled traffic movement, and is based on estimated average delay (which is based on the availability of gaps in the on-coming traffic stream). For signalized intersections also, LOS is based on estimated average delay for traffic approaching the intersection; however, for signalized intersections LOS is determined for the intersection as a whole. LOS criteria are compiled in Table 1. The existing levels of service at key intersections in the site vicinity are compiled in Table 2.

Table 1: Intersection Level of Service

Level of Service	Average Delay (seconds per vehicle)	
	Unsignalized Intersections	Signalized Intersections
A	≤5	≤5
B	>5 and ≤10	>5 and ≤15
C	>10 and ≤ 20	>15 and ≤ 25
D	>20 and ≤30	>25 and ≤40
E	>30 and ≤45	>40 and ≤60
F	> 45	>60

Table 2: 1999 P.M. Peak Hour Intersection Levels of Service

Lake Washington Blvd Intersection	Intersection Control	LOS (Avg Delay)
<u>SR 520 ramps</u> westbound SR 520 off-ramp [left turn] [right turn] southbound Lk Washington Blvd thru northbound Lk Washington Blvd thru NB Lk WA Blvd RT to EB on-ramp	All-Way Stop Control free right turn	E (35 sec/veh) E (49 sec/veh) [F (59 sec/veh)] [B (10 sec/veh)] D (28 sec/veh) D (26 sec/veh)
<u>Foster Island Drive</u> left turn from Foster Island Dr right turn from Foster Island Dr	Two-Way Stop Control	C (15 sec/veh) A (9 sec/veh)
<u>Boyer Avenue</u> Boyer approach	Two-Way Stop Control	F (101 sec/veh)
<u>Arboretum Drive</u> left turn from Japanese Gdn/Ballfield lot left turn from Arboretum Dr	Two-Way Stop Control	F (57 sec/veh) F (54 sec/veh)
Madison Street	Actuated Signal SB LWB LT lane full	C (25 sec/veh); F (92 sec/veh)

Lake Washington Boulevard/SR 520 East ramps. The intersection of Lake Washington Boulevard and the SR 520 westbound off-ramp is all-way-stop-controlled. (Although the eastbound SR 520 on-ramp also is connected to the intersection, left turns from southbound Lake Washington Boulevard onto the ramp are prohibited, and there is an uncontrolled free right turn onto the ramp from northbound Lake Washington Boulevard.) The all-way-stop operated at LOS F under 1999 p.m. peak hour volumes; however, the congestion and delay at the intersection was experienced disproportionately by

the off-ramp traffic, which operated at LOS F while the Lake Washington Boulevard intersection approaches were operating at LOS D.

It also should be noted that the eastbound SR 520 ramp is metered, and during periods of severe congestion on SR 520, queues at the ramp meter can back up onto [northbound] Lake Washington Boulevard.

Lake Washington Boulevard/Foster Island Drive. The computed 1999 p.m. peak hour LOS for this intersection was C (for left turns onto southbound lake Washington Boulevard from the stop-controlled Foster Island Drive intersection approach). Despite the good computed LOS, however, there are periods when the difficulty and delay for left turns from Foster Island Drive onto southbound Lake Washington Boulevard is becoming excessive and is beginning to impact the general accessibility of the Arboretum.

Lake Washington Boulevard/Boyer Avenue. The stop-controlled Boyer Avenue approach to the intersection operates at LOS F under 1999 p.m. peak hour volumes. The delays for Boyer Avenue traffic at Lake Washington Boulevard often create queues on Boyer that can back up beyond (west of) 26th Avenue. These queues generate some neighborhood infiltration on surrounding streets by motorists too impatient to wait in the queue, but the delays and the queues also help discourage and limit the use of Boyer by through traffic.

Lake Washington Boulevard/Arboretum Drive. As at the Boyer Avenue intersection, left turns onto Lake Washington Boulevard from the stop-controlled Arboretum Drive approach to the intersection operate at LOS F under 1999 p.m. peak hour volumes. However, little traffic uses Arboretum Drive to get to Lake Washington Boulevard in the p.m. peak, as queues on southbound Lake Washington Boulevard backing up from Madison Street often extend through and beyond the Arboretum Drive intersection, turning Arboretum Drive into a right-turn-in/right-turn-out only connection.

The queues and heavy traffic flows also make turns into and out of the Japanese Garden/ballfields parking lot difficult. (Left turns out of the lot operate at LOS F under 1999 volumes.) This lot driveway congestion and delay is particularly problematic on spring weekday afternoons when the Montlake-Madrona Baseball League has multiple kids' ballgames scheduled at the ballfields.

Lake Washington Boulevard/Madison Street. The computed 1999 p.m. peak hour LOS for this intersection was C. However, the LOS methodology presumes that traffic can move through the intersection when it has a green signal, and this is not always the case. Southbound Lake Washington Boulevard coming out of the Arboretum is very narrow: it has a single lane with no shoulder or parking lane and it has no right turn lane at the Madison Street intersection. At Madison Street there is a short left turn pocket, with space to store three cars while they wait to make their turn. With the volume of traffic turning left from southbound Lake Washington Boulevard onto northeastbound Madison,

however, the limited left turn storage capacity is inadequate, and the queue of motorists waiting to make the left turn often backs up into the through lane, effectively blocking all movement on southbound Lake Washington Boulevard. When this happens, LOS drops to F, and queues form on southbound Lake Washington Boulevard, backing up beyond Arboretum Drive and the Japanese Garden, often as far as Interlaken Boulevard.

II.3.2. Lake Washington Boulevard Traffic Speeds

Informal observation of Lake Washington Boulevard traffic flow gives the clear impression that despite the narrow roadway and curving alignment, traffic is moving quite fast, with most vehicles exceeding the 25 mph speed limit by a significant margin. In order to determine actual traffic speeds, weekday 24-hour speed data were collected in March, 2000. (The speed “counts” were made north of Boyer Avenue, south of the Pinetum parking lot.)

The traffic data confirms the informal observations: over the 24-hour count period, less than 2% of the Lake Washington Boulevard traffic was traveling below 25 mph, nearly 60% was traveling at speeds between 30 and 35 mph, and over 20% was traveling above 35 mph. The 50th percentile speed – the speed below which half the motorists travel – was 33 mph, and the 85th percentile speed was 38 mph southbound and 35 mph northbound. (The 85th percentile speed, being the speed at or below which “most” motorists travel, is widely used as a criterion in technical studies, and is a principal factor used in the determination of proper speed limits.)

II.4. Traffic Accidents

II.4.1. Intersection Accidents

Table 3 summarizes the traffic accident history at site-vicinity intersections. The intersection accident data are for the three-year period from January 1, 1994 to December 31, 1996, and are compiled in terms of accidents per year and numbers of accidents related to intersection traffic volume (accidents per ‘million entering vehicles’, or MEV). Intersections with five or more accidents per year and 2.0 accidents per MEV are considered high-accident locations.

The highest number of accidents during the three-year analysis period occurred at the Lake Washington Boulevard/Madison Street intersection, where there were 19 accidents between 1994 and 1996. Most of these accidents involved vehicles making turning movements at the intersection (63 percent); turning movement accidents usually are attributable to driver inattention and/or drivers refusing to yield to other vehicles. Although this intersection experiences a relatively high number of accidents (6.33 per year), it is not considered a high accident location, because with its high volume of traffic, its accident rate is a relatively low 0.67/MEV.

Table 3: Intersection Traffic Accidents (1994-96)

Lake Washington Blvd Intersection	Total Accidents	Average Annual Accidents (accidents/year)	Accident Rate (accidents per million entering vehicles)
SR 520 Ramps	5	1.67	0.23
Foster Island Dr	2	0.67	0.17
Boyer Ave	1	0.33	
Arboretum Dr	1	0.33	
Madison St	19	6.33	0.67

Source: Seatran

Other intersections in the site vicinity did not experience accident rates or exhibit obvious safety problems. However, at intersections where significant delay is imposed on sidestreet traffic – as it is on Boyer Avenue and Foster Island Drive at Lake Washington Boulevard – motorist impatience and frustration can lead to increasing instances of ill-advised maneuvers and the resulting accidents.

II.4.2. Arterial Accidents

The 1994-1996 traffic accident records also indicate that the 1⁺-mile segment of Lake Washington Boulevard between the SR 520 ramps and Madison Street experienced a total of 101 accidents, for an average of 33.7 accidents per year. This accident experience, in terms of a volume-related rate, translates to an accident rate of 4.0 accidents per million vehicles miles (MVM). This accident rate is significantly higher than the rate for state roads in King County: the *1996 Washington State Highway Accident Report* reported a 1996 accident rate of 2.3 per MVM for state roadways in King County, and the *1994 to 1996 Washington State Highway Accident Reports* indicated an average rate of 2.1 accidents per MVM for state roadways in King County.

A number of factors may contribute to the greater-than-average accident rate. The oblique angles at several intersections and driveways and the sharply curving alignment of Lake Washington Boulevard create limited sight distances along the roadway. In addition, the narrow roadway, excessive speeds, and peak hour queuing on the roadway contribute to the accident problems.

II.5. Parking

There are a total of 19 scattered parking lots located throughout the Washington Park Arboretum as shown in Table 4 and Figure 6. There are two main parking lots within the Park. The Graham Visitor Center has a total of 49 parking spaces at the north end of the park, which includes a lot located on the southeast corner of the Arboretum Drive and Foster Island Road intersection. The Japanese Garden/Washington Park Playfield located at the sound end of the Park has about 84 parking spaces.

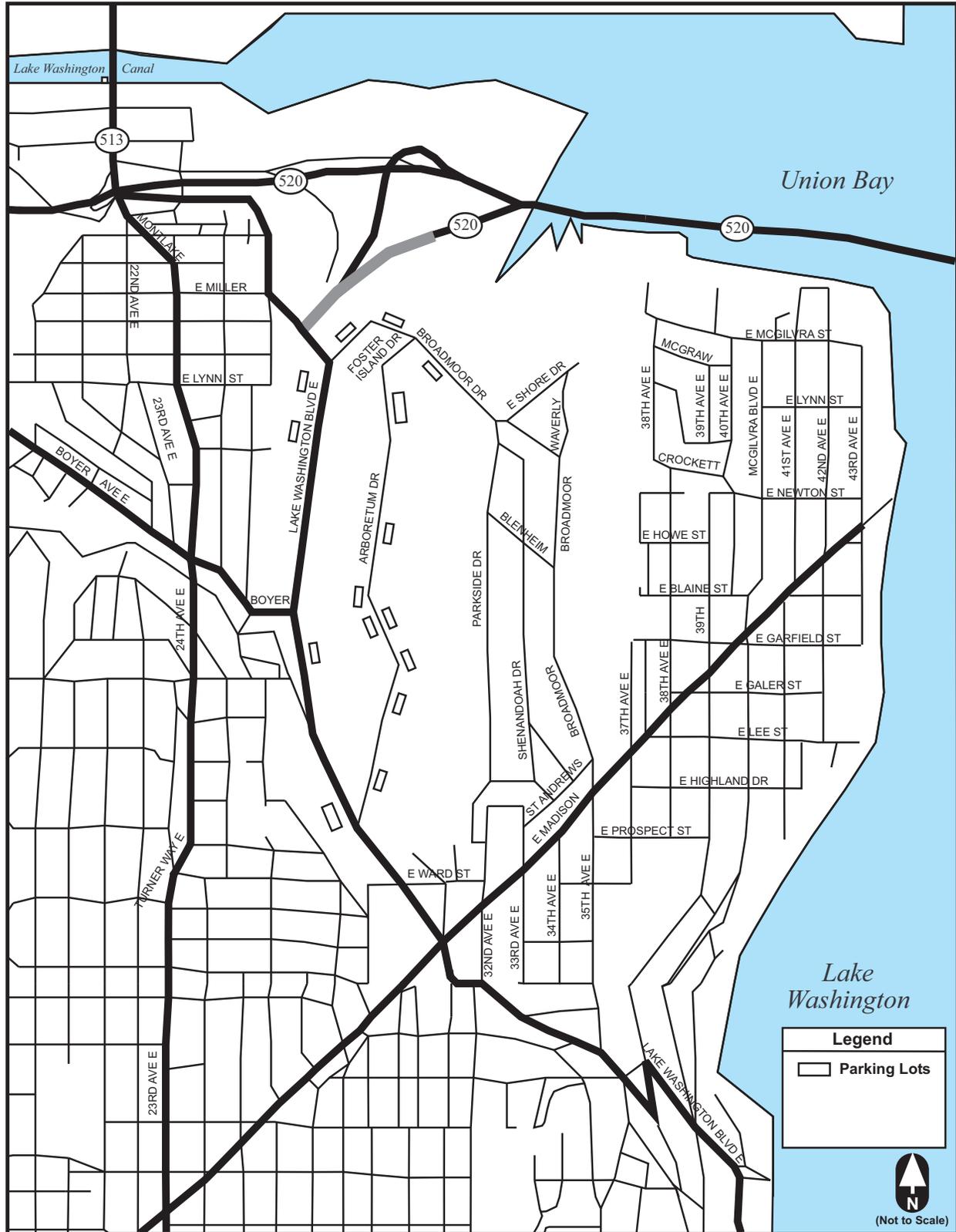


Figure 6 - Existing Parking Lot Locations

Table 4: Existing Parking Lots

Existing Lots	Total Spaces
LWB, Miller St.	40
Foster Island Dr (Lindens)	12
Foster Island Dr (Duck Bay)	38
Graham Visitors Center	49
Along Arboretum Drive	89
Japanese Garden/Playfield	84
LWB, South end of Azalea Way	22
LWB, South Side of Pinetum	12
LWB, North of Wilcox Footbridge	26
TOTAL	372

Near the Graham Visitor Center, there are three parking areas located on Foster Island Road, two on the north side of the roadway and another at the roadway terminus. These parking areas contain a total of about 35 spaces. Along Arboretum Drive, there are about ten parking areas with a total of 89 available parking spaces. Three other parking areas are located along Lake Washington Boulevard, with about 55 to 60 parking spaces.

Parking spaces are painted only at the Graham Visitor Center. Many of the smaller parking areas, other than the Graham Visitor Center and the Japanese Garden/ Washington Park Playfield, consist of gravel lots and are in poor condition with many potholes.

On many good weather weekdays and weekends during the spring and fall, parking supply is inadequate to meet the visitor demand.

II.6. Public Transportation Services

King County Metro Transit provides public transportation services in the Arboretum area.. No bus routes actually enter the Arboretum, but several routes operate at or near the Arboretum periphery:

- Route 11, which serves Madison Park, First Hill, and downtown Seattle has a stop at the south end of the Arboretum at the Lake Washington Boulevard/Madison St intersection.
- North Seattle, Bellevue, and downtown Seattle bus routes that travel on SR 520 provide Arboretum access at the Montlake “Flyer” stop/station on SR 520 at Montlake Boulevard, near the northwest corner of the Arboretum.
- Routes 44 and 48, which serve downtown Seattle, the Central District, Capitol Hill, Montlake, and the University District, operate on 24th Avenue and Montlake Boulevard, providing access to the

Arboretum's west-side pedestrian entrances via the east-west local streets (Boyer, Lynn McGraw, Calhoun, Miller and Roanoke).

All of these bus stops are located far from the center of Arboretum activities. As a result, transit access to the Arboretum is reasonably convenient for visitors who have come to hike and walk, but inconvenient for visitors coming to specific events, meetings, and classes.

II.7. Non-Motorized Transportation (Pedestrian and Bicycle)

II.7.1. Access into and out of the Arboretum

There are several pedestrian and bicycle access points into the Arboretum, all of which are arrayed along west side of the Arboretum and at its southern end. (It should be noted that pedestrians are likely to be traveling to/from a destination within the Arboretum, while many/most bicyclists, like motorists, are more likely to be passing through the Arboretum.) Pedestrians and bicyclists can enter and exit the Arboretum on/along Lake Washington Boulevard at the Arboretum's south end (at Madison Street) and northwest corner. The other access points are at the Arboretum west boundary at local streetends (Roanoke, Miller, Calhoun, McGraw, and Lynn Streets) and where local streets actually enter the Arboretum (Boyer Avenue and Interlaken Boulevard). Pedestrians and bicyclists also can enter the Arboretum from the north via the Foster Island Trail, but access to this trail is from the Museum of History and Industry and from Montlake Boulevard between SR 520 and the Montlake Bridge. The City of Seattle's Bicycling Guide Map identifies Lake Washington Boulevard and Boyer Avenue as "streets commonly used by bicyclists."

The Broadmoor Golf Course is located along the eastern boundary of the Arboretum, and the property line is defined by a continuous chain link fence along most of that boundary. There are no public pedestrian access points along the east boundary, aside from a small path near Stone Cottage at the south end of the Arboretum.

The local streetend access points (on the northerly portion of the west side of the Arboretum) connect directly to the Arboretum trail system, and the local streets leading to these access points all have sidewalks. Lake Washington Boulevard at the northwest corner of the Arboretum also has sidewalks. The sidewalks and the direct connections to trails provides reasonably safe and convenient access for pedestrians and bicyclists.

Conversely, the pedestrian/bicycle accesses that are "on-street" – on Lake Washington Boulevard at Madison, on Boyer Avenue, and on Interlaken Boulevard – are neither safe nor convenient. None of these accesses have sidewalks, and in each case bicyclists must share a narrow roadway with vehicular traffic.

II.7.2. Circulation within the Arboretum

The Arboretum has an extensive system of trails that provides convenient internal circulation throughout the Arboretum. However, Lake Washington Boulevard forms a formidable barrier against safe, convenient pedestrian circulation through virtually the entire length of the Arboretum. Although the Lake

Washington Boulevard roadway is fairly narrow, the heavy traffic volumes, high traffic speeds, limited sight distances, and lack of traffic controls (signals, stop signs) can make crossing the road difficult and inconvenient for pedestrians: the experience of crossing Lake Washington Boulevard on foot is certainly out-of-keeping with the intended and otherwise pervasive pleasant environment that exists throughout the rest of the Arboretum trail system.

There are three signed and posted crosswalk locations on Lake Washington Boulevard between the SR 520 ramps and Madison Street. One crosswalk is located in between Interlaken Boulevard and the northernmost driveway for the Japanese Garden/Washington Park Playfield parking lot, and the other two crosswalks are located at the intersection of Boyer Avenue. There also is a marked crosswalk at Roanoke Street, north of the SR 520 ramps intersection. The marked crosswalks do little to help pedestrians cross the fast, heavy Lake Washington Boulevard traffic stream.

The only safe, convenient pedestrian crossings are the Wilcox Footbridge that crosses over Lake Washington Boulevard just south of Foster Island Drive, and to some extent the signalized intersection at Madison Street. These conditions effectively sever the east side of the Arboretum (with the Visitor Center and the bulk of the plant collections and trail mileage) from the west side of the Arboretum (with the playfields, Japanese Garden, and external pedestrian/bicycle connections).

Pedestrian and bicycle counts were made at specific intersections on Lake Washington Boulevard during the p.m. peak period in November, 1999. The results are shown in Table 5. The volume counts show that there is more nonmotorized activity in the southern area of the Arboretum near the Japanese Garden and Washington Playfields. It should be noted that bicyclists were observed using the pedestrian-only walkways.

Pedestrian facilities along Lake Washington Boulevard are limited. A sidewalk is located on Lake Washington Boulevard in between Interlaken Boulevard and the northernmost driveway for the Japanese Garden/Washington Park Playfield parking lot. There is a dirt pathway located from the northernmost driveway for the Japanese Garden/Washington Park Playfield parking lot to Madison Street.

Azalea Way is the main pedestrian spine of the Arboretum. It connects the Graham Visitor's Center on the north end of the Park to the Japanese Garden on the south end of the Park. The Hillside and Lookout trails also provide north-south routes, but are less identifiable because of the confusing assortment of trails.

Table 5: P.M. Peak Period Pedestrian and Bicycle Volumes

Intersection	Pedestrians	Bicycles
Lake Washington Blvd at SR 520 Ramps	2	10
Lake Washington Blvd at Foster Island Drive	2	3
Lake Washington Blvd at Boyer Avenue	10	3
Lake Washington Blvd at Arboretum Drive	25	27
Lake Washington Blvd at Madison Street	58	24

There are no designated bicycle paths or lanes through the Arboretum. The City of Seattle's Bicycling Guide Map identifies Lake Washington Boulevard, Boyer Avenue, and Arboretum Drive as "streets commonly used by bicyclists." However, bicyclists use all of the roadways in the area and often share the roadway with motorized vehicles to access and pass through the Arboretum. Bicycle use of Lake Washington Boulevard creates hazardous situations, resulting from the combination of a narrow and curving roadway, heavy traffic volumes, and a high proportion of impatient motorists.

III. Description of Alternatives

The alternatives under consideration in this EIS comprise a set of specific measures, which are divided into seven components of the visitor experience and built facility:

- Roadways
- Pedestrian and bicycle circulation
- Parking facilities
- Buildings
- Outdoor shelters
- Landscape features
- Safety features

This section will focus on those components that affect Arboretum transportation facilities and/or the traffic and parking demands generated by the Arboretum.

III.1. No-Action Alternative

Under the no-action alternative, the Arboretum would continue to operate much as it does today under the general guidance of the 1978 master plan. The general recommendations of the 1978 master plan update that have transportation implications are summarized below:

- Make no massive changes in the basic physical structure or landscape character of the Arboretum.
- Continue the Arboretum's role as a regional botanical resource, a special city park, and a facility fully available to the surrounding communities.
- Introduce no new recreational facilities, and accommodate existing uses with more grace and less impact. Carefully executed improvements and additions would be beneficial.
- Examine the interchange ramps for screening and eventual closure, and consider reacquisition of unoccupied portions of state highway rights-of-way.
- Manage the Arboretum primarily for the display of plants for public enjoyment, for horticulture, and for landscape gardening.

Based on these general recommendations, several specific measures were identified for future improvements, changes, or actions. Some of the specific measures of the 1978 master plan update that have not been implemented to date have been incorporated into the currently-proposed master plan, where they have been expanded and described in greater detail. Other measures have been eliminated as components of the no-action alternative because they are infeasible or no longer address conditions at the site. Other measures, which are feasible to implement, are described below as part of the no-action alternative.

III.1.1. Roadways

- Make no significant changes to roadways.

III.1.2. Pedestrian and Bicycle Circulation

- Make no significant changes to the existing trail system. Maintain the system and make minor improvements to provide Americans with Disabilities Act-accessibility at strategic places.
- Complete the Marsh Island trail around Duck Bay, connecting it to the Museum of History and Industry area.

III.1.3. Parking Facilities

- Remove the small five-car parking lot (now much larger) near the Wilcox Footbridge and the lot near the reflecting pool at Lake Washington Boulevard and Interlaken.
- Provide a 20-car parking lot off the Boyer Avenue intersection with Lake Washington Boulevard.
- Remove most shoreside parking along Foster Island Drive, but redesign and improve a 25-car parking area on the north side opposite the oak grove, and expand roadside parking on the south side between Arboretum Drive and the Broadmoor entrance.
- Retain parking on the east side of Arboretum Drive.
- Retain and reconfigure an approximately 60-car parking lot as part of the Arboretum service core.
- Revise the Japanese garden/playfield parking lot to create a turnaround at the south end, and eliminate the south-end access to Lake Washington Boulevard.

III.1.4. Buildings, Landscaping, Safety Features

No new facilities are proposed that would support new programs or generate increased Arboretum visitation beyond normal growth.

III.2. Proposed Master Plan

Elements of the proposed master plan are outlined below and shown in Figure 2 of the EIS.

III.2.1. Roadways

Roundabout at North Entry to Arboretum

- Add a traffic roundabout linking Lake Washington Boulevard and the on/off-ramps of SR 520 (and Foster Island Drive).
- Northwest of the roundabout, replace the currently abrupt connection of SR 520 ramps at Lake Washington Boulevard with a gracefully curving alignment leading to the roundabout.
- Modify the unused freeway ramp at the north end of the Arboretum to make a pedestrian/bicycle link to the Museum of History and Industry.

Lake Washington Boulevard Improvements with Overpasses

- Continue the existing configuration of a two-way arterial linking Lake Washington neighborhoods to the University of Washington, including access to and from the SR 520 ramps and Arboretum attractions.
- Add a dual-use pedestrian/bicycle trail along the east side of Lake Washington Boulevard and a pedestrian trail along the west side of the boulevard.
- Install pedestrian signalization; pedestrian refuge islands; marked, textured, and/or raised crosswalks; and/or other pedestrian safety improvements as appropriate on Lake Washington Boulevard at its intersections with Arboretum Drive and Boyer Avenue.
- Redesign a right-angle intersection connecting Arboretum Drive and the Japanese garden/playfield parking lot with Lake Washington Boulevard.
- Install a pedestrian/bicycle overpass on Lake Washington Boulevard south of the Japanese garden.

Arboretum Drive Realignment and Parking Lot Consolidation

- Relocate the northern third of Arboretum Drive eastward, from the Graham Visitors Center to just north of the Picea (spruce) display.
- Leave Arboretum Drive open to two-way through traffic; implement measures to eliminate trucks and other inappropriate vehicles.
- Designate a separate parallel pedestrian pathway along the full length of Arboretum Drive.
- Use the drive for low-speed electric or pedal-powered tour vehicles and other special-purpose access, such as tram tours.
- Reduce the number of small parking lots along Arboretum Drive from the existing ten lots (89 cars) to three lots (30 cars).

III.2.2. Pedestrian and Bicycle Circulation

Provide a dual-use trail system with a south-end overpass:

- Reorient pedestrian trails for improved viewing of displays; improve public access (including slope and surfacing to meet Americans with Disabilities Act [ADA] guidelines); develop three major loop trails, including a ramped switchback trail at the Rise (approximately midway along the north-south axis of the Arboretum); and retain many informal trails.
- Install a dual-use pedestrian and bicycle trail running the length of the east side of Lake Washington Boulevard, with two branches near the south end: one crossing Arboretum Drive and passing north of the stone cottage to East Madison Street, and the other crossing to the west side of Lake Washington Boulevard and passing under East Madison Street to the Harrison Valley.
- Add a complete pedestrian trail running the length of the Arboretum west of Lake Washington Boulevard, with eight pedestrian links to the adjoining neighborhood.
- Add a wheelchair-accessible overpass over Foster Island Road East, terminating at an earthen fill on the north side.

- Make an open-space trail hub west of Graham Visitors Center, without disturbing significant existing vegetation.
- Install an elevated canopy walk between the summits of Yew Hill and Honeysuckle Hill for access to the treetops.
- Add an overpass over Lake Washington Boulevard south of the Japanese garden and north of the Washington Park playfield, including bicycle accommodation.
- Install sidewalks along Lake Washington Boulevard from East Madison Street to Arboretum Drive.
- Complete the Foster Island loop trail.

III.2.3. Parking Facilities

Consolidate, expand, and add parking lots:

- Consolidate the existing scattered small parking lots at the north end of Washington Park (presently six lots, 108 cars).
- Retain the Department of Transportation lot, with 25-car capacity, off Lake Washington Boulevard just west of the SR 520 ramps.
- Expand the present Graham Visitors Center lot southward in order to increase capacity from 49 cars to 109 cars and four buses.
- Add an 18-car parking lot northeast of the woodland meadow.
- Reduce the number of Arboretum Drive parking lots, presently ten lots for 89 cars, to three lots for 30 cars.
- Relocate portions of Arboretum Drive East, and add a 60-car parking lot adjoining the educational and visitor facility proposed near the south end of the Arboretum.
- Reconfigure the Lake Washington Boulevard/Interlaken parking lot for better planting and efficiency, increasing capacity from 26 to 28 cars.
- Expand the 112-vehicle parking lot between the Japanese garden and Washington Park playfield to accommodate approximately 128 cars and four buses, and improve landscaping.

III.2.4. Buildings, Landscaping, Safety Features

The proposed facilities listed below are those that would support new programs or generate increased Arboretum visitation beyond normal growth.

- Construct a new facility near the Graham Visitors Center to support education (3,050 square foot footprint) and community meeting space (1,500 square foot footprint).
- Construct a combined educational and visitor services building at the proposed Madrona Terrace Educational Gateway site at the south end of the park, with approximately 6,250 square feet of floor area (5,000 square foot footprint) to accommodate education, restrooms, and interpretation regarding the south end ecogeographic exhibits.

- Add a Japanese garden pavilion, approximately 1,000 square foot floor area (same footprint), with a small enclosed space and a veranda, against the hillside north of the ponds.
- Spread programmatic activities and facilities more evenly throughout the Arboretum.
- Reduce or eliminate parking in isolated areas.

III.3. Alternatives to Proposed Plan

The alternative plan elements described below are independent elements. Together, they do not constitute an “alternative plan”; rather, they are individual alternatives to individual elements of the proposed master plan.

III.3.1. Roadways

Four-Way Stop at North Entry to Arboretum

- Develop a four-way traffic stop to connect the SR 520 on/off-ramps with Lake Washington Boulevard and Foster Island Drive, with some rerouting of the roadways to make them interconnect.
- Demolish the unused freeway ramp.

Lake Washington Boulevard Improvements with At-Grade Crossings

- Install pedestrian signalization; pedestrian refuge islands; marked, textured, and/or raised crosswalks; and/or other pedestrian safety improvements as appropriate on Lake Washington Boulevard at Foster Island Drive (in addition to the improvements at Arboretum Drive and Boyer Avenue).

Arboretum Drive Parking Lot Consolidation with Restricted Access

- Close Arboretum Drive to through vehicular traffic, but use it for service vehicles, low-speed or pedal-powered tour vehicles, and special-purpose access.
- Remove all small parking lots along Arboretum Drive, consolidating parking in the north and south parking areas only.

III.3.2. Pedestrian and Bicycle Circulation

Dual-Use Trail System with Overpass at Interlaken Blvd

- Instead of a Lake Washington Boulevard pedestrian/bicycle overpass south of the Japanese garden, locate a pedestrian/bicycle overpass at the north end of the Japanese garden near the Interlaken intersection.

Separated Bicycle and Pedestrian Trails

- Develop a high-speed/through bicycle trail rather than a dual-use pedestrian/bicycle trail along the east side of Lake Washington Boulevard, so that bicycles would have a safe route and vehicular traffic would be less constrained by slower-moving bicycles.

Dual-Use Trail System with South-End Traffic Signal and Crosswalk

- Instead of a Lake Washington Boulevard overpass near the south end of the Japanese garden, install a pedestrian-activated traffic signal and crosswalk in that vicinity

III.3.3. Parking Facilities

Parking Lot Expansion at Dispersed Locations

- Expand the Japanese garden/Washington Park playfield parking lot from its approximate existing capacity of 112 cars to accommodate 158 cars and four buses.
- Retain the scattered small parking lots along Arboretum Drive, to provide a small number of parking stalls in the Madrona Terrace area to support an outdoor educational center proposed nearby (see third alternative described below for buildings).

III.3.4. Buildings, Landscaping, Safety Features

Building Renovations without Expansion, and Downsized South-End Structure

- Instead of accommodating all or most of the additional educational, curatorial, administrative, and meeting space near the Graham Visitors Center, locate approximately half of it offsite (about 5,000 square feet).
- Reduce the size and functions of the Madrona Terrace educational structure in the proposed plan at the south end of the Arboretum to approximately 2,500 square feet, and dedicate the building to public educational use related only to plant exhibits in that part of the Arboretum. Reduce the associated parking proportionately with the reduced square footage.
- Use available space in the existing shelter house, especially if an overpass is provided for pedestrians crossing Lake Washington Boulevard near there.

Building Renovations without Expansion, and Downsized South-End Structure at Japanese Garden Entrance

These alternative elements represent a variation on the previous set of alternative elements:

- Locate the 2,500 square foot south end educational gateway facility in conjunction with the Japanese garden's proposed entrance, together providing a total of approximately 4,200 square feet of educational and visitor services for the south end of the Arboretum.
- Provide a new pedestrian overpass in this vicinity to facilitate safe visitor access across Lake Washington Boulevard.
- Supplement the two facilities by an outdoor educational shelter of approximately 900 square feet at the Madrona Terrace location east of Lake Washington Boulevard, to facilitate public enjoyment of the new south-end exhibits included in the proposed plan (see outdoor shelter Alternative described below).

Limited Educational Space Offerings

- Provide only enough new indoor education space on-site to accommodate two or three classrooms of children at any one time, bringing the necessary educational and other support staff into the park as needed for scheduled programs in those facilities.

No Building Expansion

- Reallocate space in the existing Graham Visitors Center to only the highest-priority administrative, educational, curatorial, and visitor service activities, and locate all new space for these activities offsite (with the exception of small outdoor stations).
- Emphasize outreach programs to schools rather than on-site programs.

IV. Transportation Impacts

The transportation impact analysis for the Arboretum Master Plan alternatives addressed impacts of and impacts on traffic volumes and patterns, traffic operations, traffic safety, parking, public transportation services, and pedestrian and bicycle access and circulation.

IV.1. Traffic Volumes

The traffic impact analysis for the Arboretum Master Plan alternatives focused on Year 2005 p.m. peak hour conditions. Current “background” traffic volumes (traffic unrelated to the Arboretum) were projected to 2005, and the traffic generated by the Arboretum was estimated for a maximum-use scenario for the proposed Master Plan.

IV.1.1. Background Traffic Volumes

Background traffic volumes were estimated by assuming that current p.m. peak hour traffic volumes would grow at a rate of 1% per year. This is a fairly conservative (high) estimate of traffic growth for p.m. peak hour traffic on a congested street/highway network like the one serving the Arboretum. Under such conditions, peak period traffic volume increases occur mainly during the hours before and after the peak hour, while the volumes during the peak hour do not tend to increase much. The background volumes plus existing Arboretum volumes are the volumes used for the analysis of the No Action Alternative.

IV.1.2. Traffic Generation

The traffic generated by the Arboretum under the proposed Master Plan was estimated for a “maximum-use” scenario. The maximum-use scenario traffic generation comprises several components: employees and typical day-to-day users, attendees of meetings/events at the expanded visitor center, attendees of meetings/events at the new educational center (the Madrona Terrace Center), attendees of meetings/events at the new Japanese Garden Pavilion, and ballfield participants and spectators.

- Typical day-to-day users (employees and general visitors). The traffic generation of this “group” was estimated by taking existing counts and increasing them by the same proportion that Arboretum general-purpose employment is expected to increase (+100%).

Traffic generation: 85 outbound trips and 75 inbound trips.

- Attendees of meetings/events at the expanded visitor center. The traffic generation of this group was estimated by assuming that each of the two meeting rooms – the existing and the new – would be fully occupied by a group that would depart during the p.m. peak hour and by another group that would arrive during the p.m. peak hour. This scenario comprises 200 attendees arriving and 200 attendees departing (at 2.5 persons per car) during the peak hour.

Traffic generation: 80 outbound trips and 80 inbound trips.

- Attendees of meetings/events at the new educational center (the Madrona Terrace Center). The traffic generation of this group was estimated by assuming that the Center would be fully occupied

by a group that would depart during the p.m. peak hour and by another group that would arrive during the p.m. peak hour. This scenario comprises 75 attendees arriving and 75 attendees departing (at 2.5 persons per car) during the peak hour.

Traffic generation: 30 outbound trips and 30 inbound trips.

- Attendees of meetings/events at the new Japanese Garden Pavilion. The traffic generation of this group was estimated by assuming that the Pavilion would be fully occupied by a group that would depart during the p.m. peak hour. This scenario comprises 25 attendees departing (at 2.5 persons per car) during the peak hour.

Traffic generation: 10 outbound trips.

- Ballfield spectators and participants. The traffic generation of this group was estimated by assuming that during the p.m. peak hour, the participants/spectators for two youth baseball games would depart and the participants/spectators for two other games would arrive. This scenario comprises 30 players and coaches and 20 spectators arriving and 30 players and coaches and 20 spectators departing during the peak hour. A further estimate is that 15 players are being dropped off and 15 are being picked up – each generating one inbound and one outbound vehicle-trip – with the remainder averaging 2.5 persons per car.

Traffic generation: 60 outbound trips and 60 inbound trips.

This method of determining Arboretum traffic generation yields a conservatively high estimate, as it is highly unlikely that all of these capacity events would ever occur simultaneously.

IV.2. Parking Demand

Parking demand for general Arboretum visitation is expected to increase over time with increasing visitation. (The improvements comprised by the Proposed Master Plan are not expected to have a significant impact on general visitation or on general visitation parking demand). However, new facilities and the new programs they support will generate increased parking demand:

Expanded visitor center. At full occupancy, the new meeting room will generate the need for an additional 40 parking spaces (100 people at 2.5 persons per car).

New educational center. At full occupancy, the new educational center will generate the need for an additional 30 parking spaces (75 people at 2.5 persons per car).

Japanese Garden Pavilion. At full occupancy, the new educational center will generate the need for an additional 10 parking spaces (25 people at 2.5 persons per car).

IV.3. Impacts of No Action Alternative

IV.3.1. Traffic Volumes and Patterns

The 2005 p.m. peak hour traffic volumes for the No Action Alternative are compiled in Figure 7. These volumes comprise background volumes (traffic not enroute to or from the Arboretum) plus existing Arboretum-generated volumes. Because background volumes were assumed to increase 1% per year

between 1999 and 2005, and Arboretum traffic was assumed to not increase, the No Action Alternative traffic volumes and patterns are similar to existing volumes and patterns.

IV.3.2. Traffic Operations

Traffic operations on the Arboretum area roadway system for the No Action Alternative were evaluated by determining the “Level of Service” (LOS) at key intersections. The 2005 p.m. peak hour levels of service at key intersections in the site vicinity are compiled in Table 6.

Table 6: No Action Alternative, 2005 P.M. Peak Hour Intersection Levels of Service

Lake Washington Blvd Intersection	Intersection Control	LOS (Avg Delay)
<u>SR 520 ramps</u> westbound SR 520 off-ramp southbound Lk Washington Blvd thru northbound Lk Washington Blvd thru NB Lk WA Blvd RT to EB on-ramp	All-Way Stop Control free right turn	<u>E (40 sec/veh)</u> F (59 sec/veh) D (30 sec/veh) D (26 sec/veh)
<u>Foster Island Drive</u> left turn from Foster Island Dr right turn from Foster Island Dr	Two-Way Stop Control	C (20 sec/veh) B (10 sec/veh)
<u>Boyer Avenue</u> Boyer approach	Two-Way Stop Control	F (539 sec/veh)
<u>Arboretum Drive</u> left turn from Japanese Gdn/Ballfld lot left turn from Arboretum Dr	Two-Way Stop Control	F (97 sec/veh) F (88 sec/veh)
Madison Street	Actuated Signal <i>SB LWB LT lane full</i>	D (45 sec/veh); F (118 sec/veh)

Lake Washington Boulevard/SR 520 East ramps. With increased background traffic, 2005 p.m. peak hour traffic operations will deteriorate to LOS E at the all-way-stop-controlled intersection. As is the case under existing conditions, the congestion and delay at the intersection will be experienced disproportionately by the off-ramp traffic, which will operate at LOS F while the Lake Washington Boulevard intersection approaches will operate at LOS D.

Also, with increasing background and regional traffic volumes the periods of severe congestion on SR 520, during which queues at the ramp meter can back up onto [northbound] Lake Washington Boulevard, will occur more frequently and last longer.

Lake Washington Boulevard/Foster Island Drive. Under 2005 p.m. peak hour No Action Alternative traffic volumes, left turns onto southbound Lake Washington Boulevard from the stop-controlled Foster Island Drive intersection approach operate at LOS C. As with existing conditions, however, there will be periods when the difficulty and delay for left turns from Foster Island Drive onto southbound Lake Washington Boulevard will be excessive (these periods will be longer and come more frequently with increasing background traffic volumes).

Lake Washington Boulevard/Boyer Avenue. The stop-controlled Boyer Avenue approach to the intersection will operate at LOS F under 2005 No Action Alternative p.m. peak hour volumes, with delays significantly greater than 1999 delays. Under 2005 No Action Alternative p.m. peak hour volumes, with delays significantly greater than 1999 delays. The increased delays for Boyer Avenue traffic at Lake Washington Boulevard will exacerbate the existing queuing and neighborhood infiltration problems.

Lake Washington Boulevard/Arboretum Drive. Left turns onto Lake Washington Boulevard from the stop-controlled Arboretum Drive and Japanese Garden/Ballfield parking lot driveway approaches to the intersection will operate at LOS F under 2005 No Action Alternative p.m. peak hour volumes, with delays significantly greater than 1999 delays. With increasing background traffic, the queuing on southbound Lake Washington Boulevard (backing up from Madison Street) that blocks the intersection will occur more frequently and for longer periods.

Lake Washington Boulevard/Madison Street. Under 2005 p.m. peak hour No Action Alternative traffic volumes, the intersection operates at LOS D when the southbound Lake Washington Boulevard left turn lane is not full. When this short left turn lane is full – which will happen frequently during peak periods – the left turn queue blocks the southbound Lake Washington Boulevard through lane, and intersection conditions will drop to LOS F. Under such conditions, southbound Lake Washington Boulevard queues rapidly back up to and beyond Arboretum Drive and the Japanese Garden/Ballfield parking lot driveway.

IV.3.3. Traffic Safety

The number of traffic accidents on Lake Washington Boulevard can be expected to increase with increasing background traffic volumes, while the closure of the small parking lots at the Wilcox Footbridge and at Interlaken Boulevard will reduce traffic conflicts on Lake Washington Boulevard. Other than these minor impacts, the No Action Alternative will have little or no impact – positive or negative – on traffic safety.

IV.3.4. Parking

The parking lot closures, relocations, and reconfigurations comprised by the No Action Alternative will modestly improve parking access and convenience, but will have no significant impacts on parking supply or demand.

IV.3.5. Public Transportation Services

The No Action Alternative will have no impact on public transportation services or the convenience and availability thereof.

IV.3.6. Pedestrian Access and Circulation

The No Action Alternative will have no impact on pedestrian access and circulation, though pedestrian safety and convenience where affected by Lake Washington Boulevard traffic will continue to deteriorate with increasing background traffic volumes.

IV.3.7. Bicycle Access and Circulation

The No Action Alternative will have no impact on bicycle access and circulation, though bicycle safety and convenience where affected by Lake Washington Boulevard traffic will continue to deteriorate with increasing background traffic volumes.

IV.4. Impacts of Proposed Master Plan

IV.4.1. Traffic Volumes and Patterns

The 2005 p.m. peak hour traffic volumes generated by the Arboretum under the proposed Master Plan are compiled in Figure 8, and the total traffic volumes (background traffic and Arboretum traffic) for the Proposed Master Plan Alternative are compiled in Figure 9. Under the maximum-use scenario used for this analysis, the Arboretum generates only a modest amount of traffic during the weekday p.m. peak period; this traffic uses the same routes to/from the Arboretum – Lake Washington Boulevard to/from Montlake Boulevard, SR 520, Boyer Avenue, and Madison Street – as does existing traffic. Background volumes were assumed to increase 1% per year between 1999 and 2005, as they were for the No Action Alternative, and this traffic has little impact on Arboretum access routes.

The primary traffic circulation impact of the Proposed Master Plan Alternative is the provision of access from southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp. Currently left turns from southbound Lake Washington Boulevard to the on-ramp are prohibited (and physically prevented by channelization); however, construction of the roundabout specified by the Proposed Master Plan Alternative will make this movement possible, and in so doing provide a direct linkage from Montlake Boulevard (at its SR 520 Interchange) to the Lake Washington Boulevard eastbound SR 520 on-ramp. This new direct linkage will be particularly attractive for traffic traveling on southbound Montlake Boulevard enroute to eastbound SR 520, because it will allow some of this traffic to avoid the long Montlake Boulevard on-ramp queues (which can back up on southbound Montlake Boulevard as far as the Montlake Bridge), as well as the delays on congested eastbound SR 520 from the Montlake Boulevard on-ramp and the Lake Washington Boulevard on-ramp.

Traffic assignments prepared using the City of Seattle’s EMME/2 traffic forecasting model indicate that introduction of the new linkage (southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp) will result in a 30% increase in on-ramp traffic, all of which is coming from Montlake Boulevard and has shifted from other freeway access routes. In addition, the traffic assignments show that an equal volume of traffic enroute to the eastbound SR 520 on-ramp will shift from northbound Lake Washington Boulevard (coming from Madison Street) to a 24th Avenue–Montlake Boulevard–southbound Lake Washington Boulevard ramp access route.

IV.4.2. Traffic Operations

Traffic operations on the Arboretum area roadway system for the proposed Master Plan Alternative were evaluated by determining the “Level of Service” (LOS) at key intersections. The 2005 p.m. peak hour levels of service at key intersections in the site vicinity are compiled in Table 7.

Table 7: Proposed Master Plan, 2005 P.M. Peak Hour Intersection Levels of Service

Lake Washington Blvd Intersection	Intersection Control	LOS (Avg Delay)
<u>SR 520 ramps/Foster Island Dr</u> SR 520 off-ramp southbound Lk Washington Blvd northbound Lk Washington Blvd thru Foster Island Dr	Roundabout	(a) v/c: 0.85–1.07 v/c: 0.84–1.05 v/c: 0.85–1.06 v/c: 0.43–0.56
<u>Boyer Avenue</u> Boyer approach	Two-Way Stop Control	F (476 sec/veh)
<u>Boyer Avenue</u> Boyer Ave southbound Lk Washington Blvd northbound Lk Washington Blvd	All-Way Stop Control	<u>F (179 sec/veh)</u> C (16 sec/veh) F (185 sec/veh) F (222 sec/veh)
<u>Arboretum Drive</u> left turn from Japanese Gdn/Ballfld lot left turn from Arboretum Dr	Two-Way Stop Control	F (191 sec/veh) F (200 sec/veh)
<u>Arboretum Drive</u> Arboretum Dr Japanese Gdn/Ballfield lot southbound Lk Washington Blvd northbound Lk Washington Blvd	All-Way Stop Control	<u>F (180 sec/veh)</u> B (11 sec/veh) B (11 sec/veh) F (170 sec/veh) F (207 sec/veh)
Madison Street	Actuated Signal <i>SB LWB LT lane full</i>	D (42 sec/veh); F (122 sec/veh)

(a) for roundabouts, the Highway Capacity Manual specifies computation of the volume:capacity ratio (v/c); LOS and delay are not determined for roundabouts

Montlake Boulevard/SR 520 Interchange. As implied by the discussion of Proposed Master Plan Alternative traffic volumes and patterns in the previous section, the introduction of access to the SR 520 eastbound on-ramp from southbound Lake Washington Boulevard will have a significant impact on the

intersections at the Montlake Boulevard/SR 520 Interchange. These impacts were not analyzed or addressed by this study.

Lake Washington Boulevard/SR 520 East ramps/Foster Island Drive (Roundabout). A roundabout will have adequate capacity to accommodate the 2005 p.m. peak hour traffic volumes, including the traffic generated by the Arboretum with full buildout of the Proposed Master Plan and the additional traffic attracted by the new connection (provided by the roundabout) from southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp.

Lake Washington Boulevard/Boyer Avenue. The stop-controlled Boyer Avenue approach to the intersection will operate at LOS F under 2005 Proposed Master Plan p.m. peak hour volumes, with delays significantly greater than 1999 delays.

If all-way stop control is installed (as a means of providing a safer, more convenient pedestrian crossing of Lake Washington Boulevard), the intersection will operate at LOS F. Furthermore, instead of the delays being focused exclusively on the traffic approaching the intersection on Boyer Avenue, as they are with the existing two-way stop control, the all-way stop will shift the congestion and delay to Lake Washington Boulevard. With all-way stop control at Boyer Avenue, Lake Washington Boulevard traffic will operate at LOS F (average delays 185 seconds southbound and 222 seconds northbound), and Boyer Avenue traffic operations will be improved from LOS F to LOS C. Not only will this have congestion, delay, and air quality impacts on Lake Washington Boulevard, but it will also attract more through traffic to Boyer Avenue.

Lake Washington Boulevard/Arboretum Drive. Left turns onto Lake Washington Boulevard from the stop-controlled Arboretum Drive and Japanese Garden/Ballfield parking lot driveway approaches to the intersection will operate at LOS F under 2005 Proposed Master Plan p.m. peak hour volumes, with delays significantly greater than 1999 delays. With increasing background traffic, the queuing on southbound Lake Washington Boulevard (backing up from Madison Street) that blocks the intersection will occur more frequently and for longer periods.

If all-way stop control is installed (as a means of providing a safer, more convenient pedestrian crossing of Lake Washington Boulevard), the intersection will operate at LOS F. Furthermore, with all-way stop control, intersection delays will be shifted from Arboretum Drive and Japanese Garden/Ballfield parking lot driveway traffic, where the delays are focused with the existing two-way stop control, to Lake Washington Boulevard. With all-way stop control, Lake Washington Boulevard traffic will operate at LOS F (average delays 170 seconds southbound and 207 seconds northbound), and Arboretum Drive and parking lot driveway traffic operations will be improved from LOS F to LOS B.

Lake Washington Boulevard/Madison Street. Under 2005 p.m. peak hour Proposed Master Plan Alternative traffic volumes, the intersection will operate at LOS D when the southbound Lake Washington Boulevard left turn lane is not full. When this short left turn lane is full – which will happen

frequently during peak periods – the left turn queue blocks the southbound Lake Washington Boulevard through lane, and intersection conditions will drop to LOS F. Under such conditions, southbound Lake Washington Boulevard queues rapidly back up to and beyond Arboretum Drive and the Japanese Garden/Ballfield parking lot driveway.

IV.4.3. Traffic Safety

The number of traffic accidents on Lake Washington Boulevard can be expected to increase with increasing background and Arboretum-generated traffic volumes, while the closure of small parking lots and driveway consolidation along Lake Washington Boulevard will reduce traffic conflicts and improve safety. If the Boyer Avenue and Arboretum Drive intersections are converted to all-way stop control, the resulting congestion and delay on Lake Washington Boulevard can be expected to spawn a series of rear-end accidents. Other than these relatively minor impacts, the Proposed Master Plan Alternative will have little or no impact – positive or negative – on traffic safety.

IV.4.4. Parking

The parking lot closures, relocations, and reconfigurations comprised by the Proposed Master Plan Alternative (see Table 8) will improve parking access and convenience, but will have no significant impact on parking supply or demand.

IV.4.5. Public Transportation Services

The Proposed Master Plan Alternative will have minimal impact on public transportation services or the convenience and availability thereof. The only impact will be that the improvement of Lake Washington Boulevard pedestrian crossings will improve Arboretum accessibility to 24th Avenue bus stops.

IV.4.6. Pedestrian Access and Circulation

The new and improved pedestrian/bicycle trails, the overpasses, and the at-grade street crossing improvements specified by the Proposed Master Plan all will reduce conflicts with automobile traffic and significantly improve the safety and convenience of pedestrian circulation in the Arboretum.

Table 8: Parking Lots

Parking Lots	Existing Spaces	Proposed Spaces
LWB, Miller St.	40	X
Foster Island Dr (Lindens)	12	X
Foster Island Road Dr (Duck Bay)	38	X
Graham Visitors Center	49	109 (+4 bus)
Along Arboretum Drive	89	30
Woodland Amphitheater	–	18
Madrona Terrace	–	60
Japanese Garden/Playfield	84	128 (+4 bus)
LWB, South end of Azalea Way	22	28
LWB, South Side of Pinetum	12	X
LWB, North of Wilcox Footbridge	26	X
TOTAL	372	373 (+8 bus)

IV.4.7. Bicycle Access and Circulation

The new and improved pedestrian/bicycle trails, the overpasses, and the at-grade street crossing improvements specified by the Proposed Master Plan all will reduce conflicts with automobile traffic and significantly improve the safety and convenience of bicycle circulation within and through the Arboretum.

IV.5. Impacts of Alternatives to Proposed Plan

IV.5.1. All-Way Stop at Arboretum North Entry

An all-way stop at the Lake Washington Boulevard/SR 520 East ramps/Foster Island Drive intersection would have the same impact on Lake Washington Boulevard and the Montlake Boulevard/SR 520 Interchange as would the roundabout concept that is incorporated in the Proposed Master Plan: the all-way stop will create an attractive new connection to the Lake Washington Boulevard eastbound SR 520 on-ramp from Montlake Boulevard – via southbound Lake Washington Boulevard – which in turn will increase traffic volumes at the already-congested Montlake Boulevard/SR 520 Interchange and on Lake Washington Boulevard north of the intersection.

In addition, the all-way stop itself would operate at LOS F, turning the Arboretum North Entry into a clogged congestion point (average delay for the intersection would be 200 seconds, with the SR 520 off-ramp and northbound Lake Washington Boulevard approaches experiencing average delays of 190 seconds and 437 seconds, respectively).

IV.5.2. Lake Washington Boulevard Pedestrian Crossing Improvements at Foster Island Drive

The installation of pedestrian crossing improvements on Lake Washington Boulevard at Foster Island Drive will improve the safety and convenience of pedestrian circulation within the Arboretum, especially for pedestrians enroute to/from Montlake Boulevard, Montlake Boulevard and SR 520 transit stops/stations, and the Montlake neighborhood. The crossing improvements – which may be marked crosswalks, a pedestrian signal, pedestrian refuge islands, and/or some other device – can be designed and located to provide a safe, convenient pedestrian crossing with minimal impact on Lake Washington Boulevard traffic flow.

IV.5.3. Close Arboretum Drive to Through Traffic

Closure of Arboretum Drive to through traffic would improve pedestrian and bicycle circulation within the Arboretum by eliminating pedestrian-auto and bicycle-auto conflicts. Any traffic that would have used Arboretum Drive to travel through the Arboretum will instead need to use Lake Washington Boulevard. Shifting this limited volume of traffic onto Lake Washington Boulevard will have no noticeable effect on Lake Washington Boulevard traffic operations.

IV.5.4. Lake Washington Boulevard Pedestrian/Bicycle Overpass at Interlaken

A pedestrian/bicycle overpass at Interlaken Boulevard would provide improved access between the Arboretum and the Interlaken trail. (Although 24th Avenue is difficult to cross on Interlaken Boulevard, west of 24th Interlaken Boulevard is a heavily-used pedestrian/bicycle route through Interlaken Park, which includes a segment between 22nd Avenue and 19th Avenue that is closed to motorized traffic.) However, this overpass is proposed not in addition to, but in lieu of an overpass south of the Japanese Garden. Because Interlaken Boulevard has limited use as an Arboretum access route, and because a crossing of Lake Washington Boulevard south of the Japanese Garden would serve greater use for Arboretum access and internal circulation, it can be concluded that the pedestrian/bicycle overpass at Interlaken Boulevard would provide less of a pedestrian/bicycle safety and convenience benefit than would an overpass south of the Japanese Garden.

IV.5.5. Lake Washington Boulevard Commuter Bicycle Path

A separated bicycle-only path (“commuter bicycle path”) along the east side of Lake Washington Boulevard may provide some improvement of traffic flow and bicycle safety by reducing on-street bicycle-auto conflicts. However, safety will be improved only to the extent that bicyclists actually use

the commuter path instead of riding on-street. Because there will be some inconvenience for bicyclists getting on and off the path at its termini, because pedestrians will be inclined to use the path as a sidewalk, and because many commuter cyclists prefer to ride in the street (and many travel at or near the vehicular speed limit on Lake Washington Boulevard), it is unlikely that the commuter bike path will be effective in getting bicycles off Lake Washington Boulevard and eliminating bicycle-auto conflicts.

IV.5.6. Lake Washington Boulevard Pedestrian Signal at Arboretum Drive

A pedestrian signal on Lake Washington Boulevard at Arboretum Drive would significantly improve pedestrian circulation within the Arboretum by providing a safe, convenience connection between the Japanese Garden and ballfields (and the their parking lot) and the main body of the Arboretum north/east of Lake Washington Boulevard.

Because the Madison Street intersection effectively controls the capacity and operation of the Lake Washington Boulevard “corridor,” a pedestrian signal at – or near – Arboretum Drive would have minimal impact on overall traffic flow through the corridor. In order to minimize traffic disruption, such a signal should be coordinated with the Madison Street traffic signal; however, if it is to be effective at its primary “mission” – getting pedestrians safely across Lake Washington Boulevard – the signal must be convenient to use. If pedestrians are to use the signal, it must be responsive; the walk sign should come on almost immediately after activation, as do the walk signs on the I-90 Lid Trail at its 23rd Avenue and Martin Luther King Jr Way crossings.

IV.5.7. Reduce Size and Function of Educational Center

Traffic on Arboretum Drive and its intersection with Lake Washington Boulevard would be reduced by a small amount, and the impact on traffic operations would not be significant.

IV.5.8. Locate Educational Center at Japanese Garden

A small volume of traffic would be shifted from Arboretum Drive to the Japanese Garden/ Ballfields parking lot. This traffic would continue to use the Lake Washington Boulevard/ Arboretum Drive/parking lot driveway intersection, there would be no impact on traffic operations. The only impact would be for pedestrians walking between the educational center and other parts of the Arboretum east of Lake Washington Boulevard who would need to cross Lake Washington Boulevard, and these impacts would be addressed by crossing improvements (i.e., an overpass or a pedestrian signal).

IV.5.9. Reduce Size and Function of Visitors' Center

Traffic on Foster Island Drive and its intersection with Lake Washington Boulevard would be reduced by a small amount, and the impact on traffic operations would not be significant.

V. Mitigation Measures

A set of several mitigation measures that address the identified impacts of the Master Plan Alternatives is described in this section.

V.1. Lake Washington Blvd/SR 520 East Ramps/Foster Island Dr Intersection (Arboretum North Entry)

Potential mitigation measure: Signalize the Lake Washington Blvd/SR 520 East Ramps/Foster Island Dr Intersection and prohibit left turns from southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp.

Signalization of this “Arboretum North Entry” intersection will allow for the creation of an Arboretum “gateway” – and all of the other roadway alignment and aesthetic elements of the Proposed Master Plan – without the traffic impacts on the Montlake Boulevard/SR 520 Interchange and Lake Washington Boulevard north of the gateway that would be caused by creating access from southbound Lake Washington Boulevard to the eastbound SR 520 on-ramp.

V.2. Lake Washington Boulevard Traffic Speeds

Potential mitigation measure: Install speed humps (or speed “lumps”²) and/or traffic circles.

Lake Washington Boulevard traffic speeds greatly exceed the 25-mph speed limit, despite roadway characteristics – narrow width and curving alignment – which tend to reduce speeds. Although the installation of stop signs at Lake Washington Boulevard intersections (Arboretum Drive, Interlaken Boulevard, Boyer Avenue) may reduce speeds in the immediate vicinity of the stop signs, they will have little or no effect on speeds between the stop-controlled intersections, and the congestion created by the stop signs can create air quality and noise problems. Furthermore, the improved access to Lake Washington Boulevard from the sidestreets at all-way stops can encourage/increase neighborhood infiltration by through traffic.

(It should be noted that the design of speed humps and other traffic calming devices must safely accommodate bicycle traffic.)

V.3. Lake Washington Boulevard Pedestrian Crossings

Potential mitigation measure: Install midblock crossings with median refuge islands (raised, with flashing inset lights, and/or with pedestrian signals if appropriate) in lieu of crossings at intersections.

Improved pedestrian crossings are needed on Lake Washington Boulevard to support safe and convenient pedestrian access and circulation in the Arboretum. However, placing such crossings at intersections exposes pedestrians to conflicts with turning traffic and motorists whose concentration and

² “Speed lumps” are speed humps that do not extend all the way across a lane. Wide-wheelbase trucks and buses can straddle the lumps, while at least one wheel of an automobile must roll over it.

attention is focused on other vehicles and their maneuvers. Placing crossings away from intersections eliminates these conflicts, and the refuge islands allow pedestrians to cross one lane/one direction of traffic at a time. Realigning the Lake Washington Boulevard travel lanes around a refuge island also can help reduce traffic speeds.

V.4. Lake Washington Boulevard Commuter Bicycle Lane

Potential mitigation measure: Widen Lake Washington Boulevard to provide a striped bicycle lane on both sides of the road.

Such a “Class II” bicycle lane will allow commuter bicycle traffic to continue to use Lake Washington Boulevard while reducing conflict between bicyclists and vehicular traffic and avoiding the creation of new pedestrian-bicycle conflicts.

V.5. Lake Washington Blvd/Madison Street Intersection

Potential mitigation measure: Lengthen the southbound Lake Washington Boulevard left turn lane at Madison Street.

Provision of adequate left turn queue storage on southbound Lake Washington Boulevard at Madison Street will allow the intersection to operate at LOS C and eliminate the southbound peak period queues that can strangle access to/from the Japanese Garden/ballfields parking lot and Arboretum Drive.