TIME BARRIERS TO ALTERNATIVE
COMMUTING NEAR
THE UNIVERSITY OF WASHINGTON

Summer 2001
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EXECUTIVE SUMMARY

Travel time and reliability are important factors when commuters choose their commute mode. This study focused on travel time; however, an analysis of the recorded data tells a lot about the reliability of various travel modes. In most of the study cases, automobile travel times and transit travel times varied greatly between trials. On the other hand, bicycling and pedestrian travel varied much less between trials. Appendix A details individual travel routes. Appendix B is a complete list of each trial’s travel time as well as the delays experienced at traffic lights during pedestrian trials.

Summary of Findings and Recommendations

- For distances of 1-1/2 miles or less, bicycling is often the fastest commute mode compared with automobile, transit, and pedestrian travel. Bicycle travel is comparable to automobile travel in both travel time (as fast or faster in all cases) and reliability (4 of 5 cases show bicycling travel times more consistent than automobile travel times).
- Walking is the most reliable commute mode.
- During afternoon peak travel, automobile and transit travel times can vary greatly depending on traffic volumes and passenger loads.
- Walking is in some cases faster than transit when travel time between bus stops and origin/destination is considered.
- Decrease of traffic signal cycles around the University District may reduce pedestrian travel times.
- The addition of bicycle lanes on NE 45th Street, Montlake, Pend Oreille, 20th Avenue, and Eastlake Avenue would give cyclists their own right-of-way therefore decreasing bicycle travel times in along these corridors.
- Marketing the MyBus website may reduce total transit travel times as it may decrease wait times.
- Extending inoperable hours of the Montlake Bridge (and for that matter the University Bridge) to better match University Area peak-hour travel times could reduce alternate mode travel times.
- A crosswalk added to Mary Gates Memorial Drive at Clark Road could reduce pedestrian travel times to destinations east of campus.

1 Internet users can access the MyBus website at http://www.mybus.org/
BACKGROUND AND PURPOSE

Since 1992, the University of Washington Transportation Office and King County Metro has commissioned a biennial telephone survey (U-Pass Telephone Survey) that asks a sample of faculty, staff and students about their travel behavior and attitudes.

Survey results provide inferences about the attitudes and behavior of the entire faculty, staff, and student population. In the autumn 2000 survey, about 18,000 of the faculty, staff, and students reported that they live two miles or less from campus, in whole mile increment. (Therefore, “two miles” is assumed to be less than 2-1/2 miles from campus.) About 1,400 who live within the distance indicated they usually drive alone to campus. When asked, 57 percent of those 1,400 said they did not walk because it takes too much time. The distribution of people living less than two miles from campus, who usually drive alone, is about 32 percent faculty, 29 percent staff and about 39 percent students.

In September of 2000, the University of Washington Transportation Office published its first Pedestrian Improvement Plan. Part of its Action Plan recommended that a travel time study be performed to better understand the pedestrian commute.

This study analyzes the differences in commute time among different modes – walking, bicycling, driving alone, and taking the bus – from campus to different locations in the study area. Purposes of this study are to: 1) identify routes where the relative commute time of walking, bicycling, and taking the bus present barriers to these of commute modes, 2) provide information to better market specific alternative commute, and 3) provide recommendations to improve alternative travel modes.

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2 Q6. Faculty = (2.3%+19.8%)*6,087=1,345. Staff = (4.1%+8.4%)*15,188=1,898. Students = (27.8%+13.4%)*35,582=14,659.
3 Question 75 asked “What are the main reasons you don’t commute to the UW by walking?” of the respondents living within 2 miles of campus.
4 The University of Washington Pedestrian Improvement Plan, published September 2000
SURVEY DESIGN AND METHODS

According to the Pedestrian Improvement Plan, fifty percent of urban pedestrians walk a mile to their destination, but two miles represent the maximum walking distance limit\(^5\). On this basis, this travel time study measured a 1-1/2 mile walking distance from Drumheller Fountain – a center point on the University of Washington campus – to set points around the campus. Destination locations were chosen in five directions from campus: west, north, east, southeast, and southwest.

\(^5\) Published by the University of Washington Transportation Office, September, 2000.
A map of trip origin and destinations

<table>
<thead>
<tr>
<th>Destination 1 (west):</th>
<th>2401 N 45th St</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination 2 (north):</td>
<td>2002 NE 63rd</td>
</tr>
<tr>
<td>Destination 3 (east):</td>
<td>4724 41st Ave NE</td>
</tr>
<tr>
<td>Destination 4 (southwest):</td>
<td>122 E Roanoke St</td>
</tr>
<tr>
<td>Destination 5 (southeast):</td>
<td>2252 E Roanoke St</td>
</tr>
</tbody>
</table>

\[^6\] Due to measurement error, destination 5 is 1 mile from the origination point instead of 1.5 miles.
Each destination was surveyed three times per mode. Bus schedules were consulted in order to time bus arrivals. Traffic regulations were strictly adhered to for all travel in this study. For description of individual travel paths, see Appendix A.

Travel by auto and bus occurred during peak travel times: 3p.m. – 6 p.m., during spring quarter 2001 and “doo-to-door” times were measured. Auto travel time measurements began at Drumheller Fountain and included walking to a car parked in the Central Plaza Garage (CPG - level C3), traveling from campus, parking on the street near the destination 7 and walking to the destination point. Transit measurements began at Drumheller Fountain and included walking to the bus, waiting for the bus, traveling on the route closest to the destination and walking to the destination.

Pedestrian and bicycling travel occurred during a variety of times during the day, including peak and off-peak times. These trips occurred during the interim between spring and summer quarters, 2001. Pedestrian and bicycling measurements include walking/bicycling time from Drumheller Fountain to the destination point and total delay time at traffic signals. A backpack burdened with books was carried while walking and bicycling. Signal wait times were measured separately during walking trips in order to determine whether signal wait time was a barrier to this commute mode.

7 Although auto trips were conducted during peak hours, time spent finding parking at the various destination points may not accurately reflect the true time a commuter may spend trying to find parking in his/her neighborhood.
TRAVEL TIME AND RELIABILITY

An average of the travel times for each mode is used to compare travel time between modes. Appendix B shows raw data collected in this study as well as the travel time average by mode and signal delays experienced during pedestrian trials. Consistency of the travel time results was the primary consideration in determining the reliability of the travel mode. If the travel times vary greatly, then the mode is displayed as a less reliable mode. Reliability is discussed here because mode reliability is noted to be the number one concern for commuters in determining their travel mode. Reliability relates to the consistency of travel times for the travel mode. Standard deviation (SD) is used to better understand the reliability of the travel mode surveyed and does not reflect the reliability of the values recorded during the survey.

Destination 1: 2401 N 45th Street

For travel to destination 1, walking (with travel time SD of 1.5) is the most reliable followed by auto travel (SD = 2.06), bicycling (SD = 2.16), and finally transit (SD = 6.8). While taking transit may be faster than bicycling and walking in some cases during peak times, in this case, bicycling is 11.54 minutes (42 percent) faster than transit on average. Taking the bus is just 4.79 minutes (15 percent) faster on average than walking.

According to the City of Seattle Transportation Strategic Plan.
Destination 2: 2002 NE 63rd Street

For travel to destination 2, bicycling\(^9\) (SD = 0), walking (SD = .42), and auto travel (SD = .48) are very reliable while transit (SD = 3.9) is less reliable. On average, auto travel is approximately half of a minute faster than bicycling but bicycling was more reliable. As in other cases in this study, walking travel time is comparable to transit travel time. For Destination 2, transit is only 1.45 minutes faster than walking on average.

\(^9\) The travel time measured 13 minutes and 55 seconds exactly for each of the three bicycle trials to Destination 3.
Destination 3: 4724 41st Ave NE

This chart shows that for travel to destination 3, walking (SD = .68) and bicycling (SD = .78) are most reliable, while auto travel (SD = 1.3) and transit (SD = 4.1) were least reliable travel modes. Bicycle travel time competed with automobile travel time; both had an average travel time of 14 minutes. On average, transit was 8.64 minutes faster than walking but again, walking was consistently more reliable than transit.
For travel to destination 4, bicycling was, on average, faster than automobile travel by approximately 2 minutes. Automobile travel was only 34 percent (7.13 minutes) faster than transit on average, which was 11 minutes faster than walking on average. As was seen in previous discussion, transit had the lowest reliability (SD = 6.5) as a travel mode to this destination. Bicycling was the most reliable (SD = .54), followed by auto travel (SD = 1.2), followed by walking (SD = 2.3). It was quite unusual to see high variation in pedestrian travel times for this study. However, during pedestrian trial three, traffic signal delayed the data collector almost two minutes longer than during the other two trials.

10 Note: During these trials travel to Destination 4 was never interrupted by the operation of the Universit Bridge; however like destination 5, commuters may experience additional delays while bridge is in operation.
Bicycling was by far the fastest option for commuters to destination 5. Bicycling was 13.06 minutes faster than automobile travel, 14.15 minutes faster than transit, and 15.49 minutes faster than walking. For this case, walking contended with transit (which was only 1.34 minutes faster than walking) and automobile travel (which was only 2.43 minutes faster than walking) as well. One reason is that the pedestrian route to destination 5 is much more direct than either bus or automobile routes that encircle campus and compete with the Montlake Bridge. For destinations within one-mile from campus, walking seems to be the fastest commute choice.

Travel time and reliability findings

- During afternoon peak travel, automobile and transit travel times can vary greatly depending on traffic volumes and passenger loads.
- Walking is the most reliable commute mode.
- Walking is in some cases faster than transit and in all cases in this survey, more reliable than transit.
- Bicycle travel is comparable to automobile travel in both travel time (as fast or faster in all cases) and reliability (4 of 5 cases show bicycling travel times more consistent than automobile travel times).

11 Due to error in measurement, Destination 5 is 1 mile from the origin point instead of 1.5 miles.
BARRIERS TO AND RECOMMENDATIONS FOR IMPROVEMENT OF ALTERNATIVE MODE TRAVEL

Barriers to Transit Travel

According to the City of Seattle Transportation Strategic Plan, travel time is second in importance to reliability in determining whether people choose transit as their commuting alternative. Recommending ways to improve the speed and reliability of transit in the University District are beyond the scope of this study; however, some observations about current transit travel speed and reliability are highlighted in this section. During peak times, heavy traffic and passenger loads caused long wait times at bus stops as well as extended trip lengths. For all cases in this study, bus travel times varied greatly because of wait time at bus stops and bus travel times were unpredictable.

For example, while traveling to destination 1 along the 15th Avenue and NE 45th Street corridors, wait times of up to six minutes after scheduled bus arrival time at bus stops were noted.

Destination 2 is serviced by only one bus from the University District – the number 71. A significant portion of the travel time logged in the three bus trials was spent walking to the bus stop - seven to eight minutes average as compared to four to six minutes average for other routes surveyed in this study. The length of this walk to the bus stop is due in some part to the choice of origin point. However, there are bus routes servicing the University District whose routes do not pass many commuter’s trip (outbound) origins. Bus numbers 71, 72, and 73 are examples of routes that do not pass close to the majority of campus commuter’s trip origins. Walking trips to bus stops are part of the total bus trip time and must be considered when routes are derived. In some instances, pedestrian travel times were shorter than the transit travel times because of the combination of walking and waiting time.

Lengthy wait times occurred while waiting for the number 75 bus to destination 3. Scheduled arrival times did not coincide with actual arrival times and for the first two trials, the data collector arrived at the bus stop at the scheduled arrival time. For the third trial, however, the data collector arrived at the bus stop nearer the actual arrival time, thereby reducing the total travel time to this destination. The third trip was therefore more competitive to automobile travel times. Travel from the origin point to the retrieval bus stop is direct, the bus trip to this destination is short, and the walk from the arrival bus stop to the
destination point is less than thirty seconds. The only improvement this trip could have is a shorter wait time at the retrieval bus stop.

Bus travel to destination 4 varied greatly between the three trials. This is attributed to the lengthy wait at the retrieval bus stop and traffic delays caused by heavy traffic.

Bus travel to destination 5 varied because of the operation of the Montlake Bridge. When the bridge is raised, traffic delays can be dramatic. Currently, bus service to destination 5 is adequate. Two routes carry passengers to this destination and bus service occurs every 5 to 10 minutes. The only delay in bus service occurs when traffic and passenger loads are heavy and when the Montlake Bridge is opened. The Montlake Bridge does not operate during the peak hours of 3:30 p.m. – 6 p.m.; however, peak travel hours for the University Area are approximately 2 p.m. – 6 p.m.12

Recommendations for improvement of transit travel time

- Bus routes, such numbers 71, 72, and 73, should be re-evaluated in the University District.
- Market the use of the MyBus 13 website. This information would allow travelers to accurately predict the arrival of their bus.
- Inoperable hours of the Montlake Bridge (and possibly the University Bridge) should be extended to better match University Area peak-hour travel times.

Barriers to Bicycle Travel

The high variation in bicycle travel times for destination 1 is relative to the route chosen and the wait time at the Interstate 5 and NE 45th Street interchange, at which 5th Ave NE and 7th Ave NE cross NE 45th Street. Additionally, conflict with pedestrian and automobile traffic along NE

Figure 1: Bicyclists are forced to act as pedestrians on NE 45th Street.

12 According to the 2000 University of Washington Annual Traffic Count.
13 Internet users can access the MyBus website at http://www.mybus.org/
45th Street slows bicycle times. See figure 1. While the NE 40th Street/Sunnyside Avenue NE route is a significantly slower ride (due to the steep grade of these pathways) this route’s travel times were faster because there are no traffic signal delays.

Bicycling to destination 2 was the fastest alternative commute mode; it was not more than one minute slower than any automobile trip measured. Bicycle travel time was consistent and conflict with pedestrian and automobile traffic was low compared with other surveyed routes. The route utilized for bicycle travel is more direct than the route utilized by automobiles and transit. Nevertheless, this route has two time barriers. One is a traffic light at 20th Avenue and NE 45th Street where the wait time is as much as 1.5 minutes. The other time barrier is the lack of maneuver space for bicyclists traveling on 20th Avenue (see figure 2). Pedestrian traffic and other bicyclists provide potential conflicts for bicycle commuters. During all three trials, the ride was uninhibited; nevertheless, at peak hours, bicycle travel may conflict with larger pedestrian and automobile volumes. The addition of a bicycle lane along the 20th Avenue corridor may reduce any interaction with pedestrians or automobiles, allowing a much faster flow of bicycle traffic along this roadway.
The longest travel time barrier to destination 3 was at the NE 45th Street, 25th Avenue NE, Walla Walla Road, Montlake Boulevard and Pend Oreille Road intersection (see figure 3). The traffic signals at this point leave bicyclists at this intersection waiting up to two minutes. Bicyclists traveling on this route are forced to vacillate between sharing the roadway with automobile traffic and sharing poorly maintained sidewalks with pedestrians. The transitions between these two are increasingly difficult where sidewalks lack curb cuts, specifically at the NE 45th Street, 25th Avenue NE, Walla Walla Road, and Pend Oreille Road intersection and at the intersection of NE 45th Street and Sand Point Way.

Bicycle travel time barriers to destination 4 included traffic delays at the NE 40th Street and 15th Avenue NE intersection, automobile traffic on Campus Parkway, traffic light delays at Fuhrman Avenue, and pedestrian traffic on Eastlake Ave. A bicycle lane across the University Bridge made travel during this portion of the trip faster than other portions of the trip. The bicycle lane ends just after Fuhrman Avenue significantly slowing bicycle travel; once the bicycle lane ends, cyclists are forced to share the narrow roadway with cars and transit or compete with pedestrians on the sidewalk (see figure 4).

Travel by bicycle is by far the fastest and easiest commute to destination 5. The outbound trip is direct and downhill, on a very light grade. Time barriers included the crossing at Pacific Place where automobiles are unlikely to stop for crossing cyclists, the crossing of Montlake Boulevard NE, and various locations around the State Route 520/Montlake Boulevard NE interchange where overgrowth of public and private trees requires bicycle travel to slow and even stop because views of oncoming...
traffic were blocked (see figure 5). Currently, automobiles traveling east and west on Pacific Place are unaware of the crossing and rarely stop for cyclists or pedestrians. This leaves cyclists and pedestrians stranded at the crosswalk until they are noticed by automobiles (see figure 8). In addition, delays at Montlake Boulevard NE can extend bicycle travel times upwards to two minutes.

Recommendations for improvement of bicycle travel time

- While curb cuts exist on some high traffic corridors, curb cuts could be added on other as well as additional signage leading bicyclists to sidewalks or to other pathways where they could avoid the high traffic. This could decrease bicycle travel times.
- Decrease traffic signal cycle at the converging point of NE 45th Street, 25th Avenue NE, Walla Walla Road, Montlake Boulevard, and Pend Oreille Road.
- The addition of curb cuts along the NE 45th Street corridor. (This would aid wheelchair bound travelers as well as bicyclists. However, when traffic is heavy bicyclists may wish to use the sidewalk.)
- The addition of bike lanes along Pend Oreille Road may reduce bicycle travel times.
- Extend the bicycle lane from its current termination at Harvard Avenue through the Eastlake Avenue corridor to Fairview Avenue. If this extension is not possible, additional curb cuts and signage leading bicyclists to the sidewalks or alternative paths may decrease bicycle times.
- Increase visibility of the crossing at Rainier Vista and Pacific Place with improved signage and perhaps pavement lights.
- Decrease traffic signal cycle at Montlake Boulevard and Pacific Avenue.

Barriers to Pedestrian Travel

Similar to the bicycling travel route, the NE 40th Street/ Sunnyside Ave NE route is a considerably more difficult pedestrian path than is the 15th Avenue NE and NE 45th Street path. However, for travel to destination 1, the significant traffic signal delays created by the Interstate 5 ramps at 5th Ave NE and 7th Ave NE make the NE 40th Street/ Sunnyside Ave NE route the fastest alternative. Push buttons are installed at the 5th Ave NE/ 7th Ave NE and NE 45th Street intersections but are currently operating only on a cyclical basis, not by sensor. Both 5th Ave NE and 7th Ave NE have short crossing distances fo
pedestrians (figure 5); therefore, reprogramming of the signals at these intersections should minimize pedestrian travel time while continuing to move automobile traffic at these intersections.

Time delays noted during destination 2 trials were only at the 20th Avenue NE and NE 45th Street intersection. As noted in the chart on Appendix B, during two of the three trials, this traffic light presented no delay at all. Portions of this route’s sidewalks are exhibiting signs of wear. Improving these sidewalks could improve pedestrian travel times as well as improve conditions for wheelchair travel that may pass through this corridor.

Pedestrians en route to destination 3 intersect with two traffic light – one at NE 45th Street and Mary Gates Memorial Drive and the other at NE 45th Street and Sand Point Way. These lights delay trips up to 1 minute, 9 seconds. The longest pedestrian time delay for this route is created by the lack of a crosswalk where Clark Road meets Mary Gates Memorial Drive. A crosswalk at this intersection (perhaps with a pedestrian curb bulb) would provide a safe, more direct path to and from the Laurelhurst neighborhood and would allow the pedestrian traveler to avoid the delays caused by walking to NE 45th Street and waiting for traffic signals at the 45th Street/Mary Gates Memorial Drive intersection.

Pedestrian travel time barriers to destination 4 included signal delays at the NE 40th Street/15th Avenue NE intersection and the Eastlake Avenue/Fuhrman Avenue intersection. These delays can lengthen pedestrian trips by almost three minutes.

Pedestrian travel time barriers for destination 5 included the crossing of Montlake Boulevard NE where traffic delays can be upwards of 1 minute, thirty seconds, the crossing of the Montlake Bridge where raising of the bridge can delay travel for up to six minutes, and various places around the SR 520/Montlake
Boulevard interchange where crosswalks exist but automobile traffic does not stop. Similar to bicycle delays on this route, automobiles traveling east and west on Pacific Place are unaware of the crosswalk and rarely stop for pedestrians. Delays at Montlake Boulevard NE can extend pedestrian travel times up to two minutes.

Long waits at this traffic signal also create a significant safety hazard. Pedestrians forced to endure lengthy waits at intersections are more likely to take the risk of crossing against the light.\footnote{The data collector witnessed this phenomena during one of the bicycle trials.}

**Recommendations for improvement of pedestrian travel time**

- Traffic signals at the 5th Ave NE/7th Ave NE and NE 45th Street intersections should be programmed to allow pedestrian traffic through these intersections more quickly.
- Decrease the traffic signal cycle on intersections at NE 45th Street.
- Improve sidewalk conditions along the 6th Avenue and NE 45th Street corridors.
- Add a crosswalk and pedestrian curb bulb to Mary Gates Memorial Drive at Clark Road.
- Traffic signal delays at the Fuhrman Avenue/Eastlake Avenue intersection should be reduced.
- Visibility of the crosswalk at Rainier Vista and Pacific Place should be improved to increase safety at this node as well as decrease pedestrian travel times.
- Decrease traffic signal cycle at Montlake Boulevard and Pacific Avenue intersection.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{PacificPlaceCrosswalk}
\caption{Looking east on Pacific Place, drivers cannot see a second crosswalk.}
\end{figure}
CONCLUSION

The chart below compares average mode times by destination point. This chart shows that overall, pedestrian travel time is consistent; therefore we conclude that walking is the most reliable commute mode.

Although it has a shorter travel distance (one mile) than other observed destinations, automobile travel to destination 5 is on average between three and four minutes longer than for any other destination. Transit travel to destination 5 is at least as long or longer than transit travel to other routes although the relative distance to destination 5 is shorter. For all destination points, average bicycle travel times are faster than or just as fast as automobile travel time making bicycling the fastest travel mode.

In most of the study cases, automobile travel times and transit travel times varied greatly between trials. There may be several ways to account for this high variance. The two most significant were heavy passenger loads and peak-hour traffic. Heavy passenger loads caused high variance in bus stop wait times and travel times. Peak-hour traffic varied throughout the trials causing travel times to vary (see Appendix B).

The variation in travel times in this study may be justification for further trials. Three measurements may not show an accurate picture of the true variation of travel times commuters experience over time. It may also be helpful to measure a number of additional points to better generalize commute patterns. Surveying a number of additional points within the study area may reveal additional barriers to
alternative mode travel as well as give better understanding of commute patterns over time. Additionally, surveying these routes outside of peak-hour times may reveal how much travel times could be reduced if no delays were present. While traffic regulations were adhered to in this study, further study may be indicated to better understand how travel times may be reduced if traffic laws were not adhered to.

There are ways to improve alternative mode travel time in the University Area. First, extended/additional bicycle lanes along arterials such as NE 45th Street, Eastlake Avenue, and Montlake Boulevard are recommended; however, if these additions should become too costly, additional curb cuts and signage leading bicyclists onto sidewalks or to alternative pathways could decrease travel times. Second, an additional crosswalk at Clark Road and Mary Gates Memorial Drive is recommended. Finally increased cycling of traffic signals at 5th Avenue NE and NE 45th Street, 7th Avenue NE and NE 45th Street, Montlake Boulevard and NE Pacific Street, 25th Avenue and Pend Oreille Road, and Eastlake Avenue and Fuhrman Avenue are also recommended 16.

16 See additional recommendations from the University Area Transportation Study Bicycle and Pedestrian Working Group.
Travel to Destination 1: 2401 N 45th Street

AUTOMOBILE ROUTE

Auto travel occurred along two routes, which reflected the options a commuter may select. **Alternative 1:** From the CPG exit on 15th Avenue, travel occurred north along the 15th Avenue corridor, west along the NE 45th Street corridor, then south along Sunnyside Avenue to a parking space approximately ¾ of a block from the destination. **Alternative 2:** From the CPG exit on 15th Avenue, travel occurred west along the Lincoln Way corridor, west along NE 40th Street, then north along Sunnyside Avenue to a parking space approximately ¾ of a block from the destination. Average time for three trials: 17 minutes.


**BUS ROUTE**

Bus number 44 was met at the 15th Avenue and NE 40th Street bus stop. The bus traveled north along 15th Avenue to NE 45th Street, then west on NE 45th Street to ½ block west of Sunnyside Avenue. Data collected traveled east to Sunnyside Avenue and crossed NE 45th Street to reach the destination. Average time for three trials: 27 minutes.

**PEDESTRIAN/BICYCLING ROUTE**

Pedestrian and bicycle travel occurred along two routes, which reflected the options a commuter may select. **Alternative 1:** From Drumheller Fountain west along Stevens Way, north along 15th Avenue to NE 45th Street, west along NE 45th Street to Sunnyside Avenue. **Alternative 2:** From Drumheller Fountain west along Stevens Way, west along Lincoln Way, west along NE 40th Street, then north along Sunnyside Avenue to the destination. Average bicycling time for three trials: 16 minutes. Average walking time for three trials: 32 minutes.
Travel to Destination 2: 2002 NE 63rd Street

**AUTOMOBILE ROUTE**

From the CPG exit on 15th Avenue, travel occurred north along 15th Avenue to NE 65th Street, east on NE 65th Street to 20th Avenue, then south along 20th Avenue to a parking space approximately a ½ block from the destination. Average time for three trials: 13 minutes.

**BUS ROUTE**

Bus number 71 was met at the University Way NE/NE 41st Street intersection. This bus traveled north along University Way NE to 15th Avenue, north along 15th Avenue to NE 63rd Street, then east along NE
63rd Street to a stop at approximately 19th Avenue and NE 63rd Street. Average time for three trials: 31 minutes.

**PEDESTRIAN/BICYCLING ROUTE**

Pedestrian and bicycle travel occurred east along Grant Lane, north along Yakima Lane to Stevens Way, northwest along Stevens Way to Klickitat Lane, north along Klickitat Lane to 20th Avenue, and north along 20th Avenue to the destination. Average bicycling time for three trials: 13.92 minutes. Average walking time for three trials: 32 minutes.
Travel to Destination 3: 4724 41st Ave NE

AUTOMOBILE ROUTE

From the CPG exit on 15th Avenue, travel occurred north along the 15th Avenue corridor to NE 45th Street, east along NE 45th Street to Sand Point Way, north along Sand Point Way to a parking space approximately twenty meters from the destination. Average time for three trials: 14 minutes.

BUS ROUTE

Bus number 75 was met at the Stevens Way/Garfield Lane stop on campus. Travel occurred north on Stevens Way, northeast along Pend Oreille Road, east along NE 45th Street to Sand Point Way, north along
Sand Point Way to the stop at the intersection of NE 47th Street and Sand Point Way NE, across the street from the destination. Average time for three trials: 22 minutes.

**BICYCLING ROUTE**

Bicycle travel occurred east along Grant Lane, north along Yakima Lane to Stevens Way, north along Stevens Way to Pend Oreille Road, northeast along Pend Oreille Road to NE 45th Street, east along NE 45th Street to Sand Point Way NE, then north along Sand Point Way NE to the destination point. Average time for three trials: 14 minutes.

**PEDESTRIAN ROUTE**

Travel occurred east along Grant Lane, north along Yakima Lane, east along Wahkiakum Lane, north along the Burke-Gilman Trail, east across parking lot E1, northeast along Clark Road to NE 45th Street (via a small stretch of Mary Gates Memorial Drive), east along NE 45th Street to Sand Point Way NE, then north along Sand Point Way NE to the destination point. Average time for three trials: 31 minutes.
Travel to Destination 4: 122 E Roanoke Street

**AUTOMOBILE ROUTE**

From the CPG exit on 15th Avenue, travel occurred north along 15th Avenue to NE Campus Parkway, west along NE Campus Parkway to the University Bridge, south along the University Bridge and Eastlake Avenue to E Roanoke Street, then west along E Roanoke Street to a parking space approximately a ½ block from the destination. Average time for three trials: 14 minutes.
**BUS ROUTE**

Bus number 70 bus was met at the 15th Avenue/NE Campus Parkway stop (Schmitz Hall). The bus traveled west along NE Campus Parkway to the University Bridge, south along the University Bridge and Eastlake Avenue to a stop at the intersection of Eastlake Avenue and E Roanoke Street. The data collector crossed East Roanoke Street to reach the destination. Average time for three trials: 21 minutes.

**PEDESTRIAN/BICYCLING ROUTE**

Travel occurred along west along Stevens Way, west along Lincoln Way to the University Bridge, south along the University Bridge and Eastlake Avenue to the destination point. Average bicycling time: 11 minutes. Average walking time: 32 minutes.
Travel to Destination 5: 2252 E Roanoke Stree

AUTO ROUTE

From the CPG exit on 15th Avenue, travel occurred south along 15th Avenue to NE Pacific Street, east along NE Pacific Street to Montlake Boulevard, south along Montlake Boulevard, across the Montlake Bridge, south along 24th Avenue to a parking space approximately 15 meters from the destination. Average time for three trials: 20 minutes.
BUS ROUTE

For trial one, bus number 43 was met once at the UW Medical Center stop on NE Pacific Street. For trials two and three, bus number 43 was met at the 15th Avenue/NE 40th Street stop (Gould Hall). Travel occurred south along 15th Avenue to NE Pacific Street, east along NE Pacific Street to Montlake Boulevard, south along Montlake Boulevard, across the Montlake Bridge, south along 24th Avenue to a bus stop approximately one block from the destination. Average time for three trials: 21 minutes.

PEDESTRIAN/BICYCLING ROUTE

Travel occurred south along Rainier Vista to the NE Pacific Street/Montlake Boulevard intersection, south along Montlake Boulevard, across the Montlake Bridge, south along 24th Avenue to the destination point. Average bicycling time: 7 minutes. Average walking time: 23 minutes.
APPENDIX B: RAW DATA
### Destination 1: 2401 N 45th Street

<table>
<thead>
<tr>
<th>Trial</th>
<th>Auto</th>
<th>Transit</th>
<th>Bicycle</th>
<th>Pedestrian</th>
<th>Signal Delays During Pedestrian Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15 min 10 sec</td>
<td>27 min 50 sec</td>
<td>18 min 35 sec</td>
<td>30 min 15 sec</td>
<td>59 sec</td>
</tr>
<tr>
<td>2</td>
<td>19 min 7 sec</td>
<td>20 min 3 sec</td>
<td>14 min 45 sec</td>
<td>32 min 35 sec</td>
<td>3 min 5 sec</td>
</tr>
<tr>
<td>3</td>
<td>16 min 5 sec</td>
<td>33 min 40 sec</td>
<td>13 min 35 sec</td>
<td>33 min 5 sec</td>
<td>4 min 50 sec</td>
</tr>
<tr>
<td>Avg</td>
<td>16.79 mi</td>
<td>27.18 mi</td>
<td>15.64 mi</td>
<td>31.97 mi</td>
<td>2.97 mi</td>
</tr>
</tbody>
</table>

### Destination 2: 2002 NE 63rd Street

<table>
<thead>
<tr>
<th>Trial</th>
<th>Auto</th>
<th>Transit</th>
<th>Bicycle</th>
<th>Pedestrian</th>
<th>Signal Delays During Pedestrian Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13 min 45 sec</td>
<td>34 min</td>
<td>13 min 55 sec</td>
<td>32 min 50 sec</td>
<td>1 min 23 sec</td>
</tr>
<tr>
<td>2</td>
<td>13 min 30 sec</td>
<td>32 min 20 sec</td>
<td>13 min 55 sec</td>
<td>32 min</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>12 min 50 sec</td>
<td>26 min 30 sec</td>
<td>13 min 55 sec</td>
<td>32 min 20 sec</td>
<td>0</td>
</tr>
<tr>
<td>Avg</td>
<td>13.36 mi</td>
<td>30.94 mi</td>
<td>13.92 mi</td>
<td>32.39 mi</td>
<td>.46 mi</td>
</tr>
</tbody>
</table>

### Destination 3: 4724 41st Avenue NE

<table>
<thead>
<tr>
<th>Trial</th>
<th>Auto</th>
<th>Transit</th>
<th>Bicycle</th>
<th>Pedestrian</th>
<th>Signal Delays During Pedestrian Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14 min 35 sec</td>
<td>26 min</td>
<td>13 min</td>
<td>31 min</td>
<td>1 min 9 sec</td>
</tr>
<tr>
<td>2</td>
<td>12 min 40 sec</td>
<td>22 min 20 sec</td>
<td>13 min 10 sec</td>
<td>31 min 10 sec</td>
<td>58 sec</td>
</tr>
<tr>
<td>3</td>
<td>15 min 05 sec</td>
<td>17 min 50 sec</td>
<td>14 min 25 sec</td>
<td>29 min 55 sec</td>
<td>29 sec</td>
</tr>
<tr>
<td>Avg</td>
<td>14.11 mi</td>
<td>22.05 mi</td>
<td>13.52 mi</td>
<td>30.69 mi</td>
<td>.87 mi</td>
</tr>
</tbody>
</table>

### Destination 4: 122 E Roanoke Street

<table>
<thead>
<tr>
<th>Trial</th>
<th>Auto</th>
<th>Transit</th>
<th>Bicycle</th>
<th>Pedestrian</th>
<th>Signal Delays During Pedestrian Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>14 min 20 sec</td>
<td>18 min 55 sec</td>
<td>11 min 30 sec</td>
<td>30 min 30 sec</td>
<td>34 sec</td>
</tr>
<tr>
<td>2</td>
<td>14 min 10 sec</td>
<td>27 min 55 sec</td>
<td>11 min 40 sec</td>
<td>29 min 55 sec</td>
<td>1 min 5 sec</td>
</tr>
<tr>
<td>3</td>
<td>12 min 10 sec</td>
<td>15 min 13 sec</td>
<td>10 min 40 sec</td>
<td>34 min 5 sec</td>
<td>2 min 51 sec</td>
</tr>
<tr>
<td>Avg</td>
<td>13.55 mi</td>
<td>20.68 mi</td>
<td>11.28 mi</td>
<td>31.5 mi</td>
<td>1.5 mi</td>
</tr>
</tbody>
</table>

### Destination 5: 2252 E Roanoke Street

<table>
<thead>
<tr>
<th>Trial</th>
<th>Auto</th>
<th>Transit</th>
<th>Bicycle</th>
<th>Pedestrian</th>
<th>Signal Delays During Pedestrian Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15 min 30 sec</td>
<td>17 min 30 sec</td>
<td>8 min 40 sec</td>
<td>27 min 40 sec</td>
<td>8 min 41 sec</td>
</tr>
<tr>
<td>2</td>
<td>28 min 55 sec</td>
<td>22 min 55 sec</td>
<td>5 min 55 sec</td>
<td>19 min 47 sec</td>
<td>2 min 45 sec</td>
</tr>
<tr>
<td>3</td>
<td>15 min 50 sec</td>
<td>23 min 5 sec</td>
<td>6 min 30 sec</td>
<td>20 min 5 sec</td>
<td>1 min 59 sec</td>
</tr>
<tr>
<td>Avg</td>
<td>20.08 mi</td>
<td>21.17 mi</td>
<td>7.02 mi</td>
<td>22.51 mi</td>
<td>4.47 mi</td>
</tr>
</tbody>
</table>