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HOV Lane Evaluation and Monitoring-II

HOV EVALUATION AND MONITORING PHASE II

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16. ABSTRACT

This report presents and summarizes the baseline data collected in fulfillment of the requirements for the Washington State Department of Transportation grant "HOV Lane Evaluation and Monitoring." This report provides the information necessary to analyze HOV lane performance and development. Data collection results and analysis are presented, followed by conclusions and recommendations.

The data contained herein were collected during Phase I and Phase II of the high occupancy vehicle lane (HOV) monitoring project (July 1992-June 1995). The data collection methodology is described in the final report, "HOV Monitoring and Evaluation Tool." Included in this report are the following primary and secondary measures of HOV lane performance: (1) average vehicle occupancy data, (2) travel time data, (3) public opinion survey results, (4) transit ridership data, (5) enforcement, compliance, and adjudication data, and (7) accident data. Data collection issues and their implications for data availability are discussed.

It is important to note that this report does not evaluate the HOV lane system in the Puget Sound region. Rather, it is a compilation of the data necessary to conduct a meaningful evaluation. Although an analysis of public opinion, transit ridership, enforcement and accident data is provided, the report's primary purpose is to simply present the data and discuss issues associated with its use,-not to provide an extensive analysis.

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EXECUTIVE SUMMARY

This is the second in a series of biennial data reports for the High Occupancy Vehicle Lane (HOV) Monitoring and Evaluation project, sponsored by the Washington State Department of Transportation (WSDOT) and the Federal Highway Administration (FHWA). The purpose of this project is to collect data on the usage of the HOV lane system in the Puget Sound region and to make those data available to a wide audience of transportation planners and authorities. Completion of the HOV lane system is a high priority for WSDOT. However, it is useful to understand the strengths and weaknesses of the current HOV lane system before the significant costs of constructing new HOV lanes are incurred. The companion report, *HOV Monitoring and Evaluation Tool* (1), describes the data collection methodology in detail.

This report is not an evaluation of the HOV lane system in the Puget Sound region; rather, it is a compilation of the data necessary to conduct a meaningful evaluation. However, some of the data included in this report will need to be studied more closely before substantive recommendations on existing HOV lane policy can be made. Data are primarily presented in raw form; interpretation and relationships to other data are provided when appropriate. The key elements of this data collection effort are (1) that it gathers a wide range of information about the HOV lane system from throughout the Puget Sound region and (2) that the collection effort is sustained over time. These elements will allow WSDOT planners to assess the changes in travel behavior that an HOV lane system is designed to induce, particularly where HOV lanes do not currently exist.

Analysis of the types of data outlined below will enable WSDOT to evaluate the performance of the HOV lane system in terms of the objectives described in the 1992 Washington State Freeway HOV System Policy report. HOV systems serve the following objectives:

HOV LANE EVALUATION AND MONITORING

ABSTRACT

This report updates the previous report with the same title dated December 1994 (WA-RD 343.1), summarizing the data collected in fulfillment of the requirements for the Washington State Department of Transportation's contract HOV Lane Evaluation and Monitoring. This report provides the information necessary to analyze HOV lane performance and development. Data collection results and analysis are presented, followed by conclusions and recommendations.

The data contained herein were collected during Phase I and Phase II of the high occupancy vehicle lane (HOV) monitoring project (July 1992-June 1995). The data collection methodology is described in detail in the companion report, *HOV Monitoring and Evaluation Tool.* (1) Discussed in this report are the following primary and secondary measures of HOV lane performance: (1) vehicle occupancy data; (2) travel time data; (3) public opinion survey results; (4) transit ridership data; (5) enforcement; compliance; and adjudication data; and (6) accident data. Data collection issues and their implications for data availability are also covered.

It is important to note that this report does not evaluate the HOV lane system in the Puget Sound region. Rather, it is a compilation of the data necessary to conduct a meaningful evaluation. Although an analysis of public opinion, transit ridership, and enforcement and accident data is provided, the report's primary purpose is to simply present the data and discuss issues associated with their use, not to provide an extensive analysis.

- *Improve the capability of congested freeway corridors to move more people by increasing the number of people per vehicle.*
- *Provide travel time savings and a more reliable trip time to high occupancy vehicles that use the facilities.*
- *Provide safe travel options for high occupancy vehicles without unduly affecting the safety of freeway general-purpose mainlines.*

Measures of effectiveness used to determine the impact of the HOV system include the following:

- *person throughput*
- *vehicle occupancy*
- *comparative and absolute general-purpose (GP) and HOV lane travel times*
- *travel time reliability*
- *accident rates* (3).

Several trends in average car occupancy (ACO) data, public opinion, and accident rates have become apparent during this project. Multiple regression analysis of the ACO data (Chapter 3) revealed a statistically significant decrease in the ACO between the 1992-1993 period and 1993-1994 period. This trend was further supported by the public opinion data (Chapter 5), which showed a marked decline in the use and perceived importance of the HOV system, though the overall approval rate remains high. In general, a slight backlash appears to have occurred in the public's view of the HOV system as a viable solution to the current congestion problem. WSDOT management may want to consider expanding HOV public education efforts to prevent continuation of this trend.

Other trends of interest include safety concerns, both actual and perceived, about the orientation of the HOV lane relative to general purpose lanes. Accident data proved very erratic, making any solid conclusions difficult to deduce. Overall, outside HOV lanes appear to be the location of more incidents than inside HOV lanes. Perceived safety is down; more people agree that the HOV lanes are becoming increasingly dangerous because of erratic drivers. On the question of orientation vs. safety, changes in the opinions of motorists revealed an interesting tendency. Analysis of this question by commute corridor showed that commuters who travel in an outside HOV lane do not support this configuration as much as do those who travel on an inside HOV lanes (Figure 5.14.1). Finally, accident data analysis did not find any basis to suggest that HOV lanes are less safe than adjoining general purpose lanes.

The period covered by this report is July 1992 through June 1995. These data have been collected under the methodology developed for the HOV Monitoring and Evaluation Tool project. The collection of travel time data was suspended as of July 1993 and will be performed by special request only. Violation information is provided by the HERO program (see Chapter 6), the Washington State Patrol Violation Recap Agency, and the Office of the Administrator for the Courts. Data on vehicle occupancy and travel time are presented in Appendices B and E, respectively, at the end of the report. The ACO data are updated quarterly.

Recommendations

The following recommendations are guidelines for the continued success of the project. Although they are presented here as brief statements of ideals, a further explanation of their importance is provided in Chapter 7 of this report.

1. Continue to prioritize observations at locations that ensure the best use of resources.

2. Evaluate the appropriateness of collecting vehicle occupancy data on the I-5 express lanes.

3. Use short travel time study sections for data collection to decrease the likelihood of observed vehicles having changed lanes or exited the corridor.

4. Conduct more data collection sessions per travel time study section to increasing the volume of license plates collected.

5. As a special study, conduct travel time observations using the express lanes.

6. Conduct a special study of repeat offenders to shed some light on the extent to which violators change their behavior after receiving a ticket.

7. Conduct a special study on highway corridors characterized by chronic violation problems.

8. Investigate the accident rates for HOV lanes on the right side of the road in comparison to HOV lanes on the left side of the road to determine which configuration is safer.

9. Collect accident data on an annual or semi-annual basis, unless special studies are required.

CHAPTER ONE: INTRODUCTION AND RESEARCH APPROACH

PURPOSE AND PRODUCTS

The purpose of this project is to provide a comprehensive set of data for the HOV lane system in the Puget Sound area. These data will be primarily used by transportation planners and authorities to evaluate the performance of the HOV lane system and to aid planning of other HOV facilities. This report is the second in a series of biennial data reports that will allow parties to track changes in the performance of the HOV lane system over time. This report also contains recommendations for future HOV lane policy and evaluation efforts. Information concerning the data collection method is available in the companion report, *HOV Monitoring and Evaluation Tool* (1).

MEASURES OF EFFECTIVENESS

HOV lanes are intended to reduce average travel time and to increase travel time reliability for transit users, carpoolers, and other ridesharers. HOV lanes are expected to provide a relatively unobstructed lane for users. For these reasons, HOV lanes are expected to encourage transit use. These expected reductions in both travel time and congestion must be measured to determine whether HOV lanes are cost effective. Vehicle occupancy, travel time, and public opinion are the three types of primary data collected by this project. Secondary sources are used to assess accidents, enforcement and violations, and transit ridership along bus routes that use HOV lanes. Although traffic volumes and person throughput may be estimated from vehicle occupancy data,it is not the intent of this report to estimate these or any other catagories, such as accident rates, as related to traffic flows. Traffic volumes are better measured using volume data from inductance loop detectors; person throughput can then be estimated by multiplying the volume data by occupancy data percentages. Analysis of accident rates depends on traffic volume data available, as well. Inductance loop data are not currently collected as a part of this project. The data collection efforts have focused on the following measures:

- **Vehicle Occupancy/Mode Choice.** Vehicle occupancy is recorded by human observers in the field at 53 sites in the Puget Sound area. They collect data are collected from HOV lanes, general purpose lanes, and access/egress ramps to provide a profile of commute patterns, congestion, and the average number of passengers traveling along commute routes during peak commute hours. Rather than average vehicle occupancy (AVO), average car occupancy (ACO) is derived from the data.

  Transit ridership information is collected from the three local transit agencies that operate routes on HOV lanes: Metro (King County Department of Metropolitan Services), Community Transit (Snohomish County), and Pierce Transit (Pierce County). These data focus on changes in ridership over time for routes along freeway segments that contain HOV lanes. Mode choice data can be derived from vehicle occupancy. These data are supplemented by transit ridership data and survey results from this project and from other agencies. Subsequent sections of this report discuss data collection and their implications for the data available. A regression analysis of vehicle occupancy data was performed, and these results are discussed as well.

- **HOV Violations.** Violation rates may be calculated for peak-hour commute times by determining the number of single occupant vehicles (SOVs) that use the HOV lane. Data from ACO observations, the number of HOV violation tickets and warnings issued, adjudication results, and information from the HERO program indicate the frequency of HOV violations and the enforceability of current restrictions (see Chapter 6 for information on the HERO program). Taken together, these sources provide information about reports from citizens on HOV violations on area highways, tickets and warnings issued primarily by law enforcement officers, and the number of paid tickets and the outcomes of contested tickets in the courts. Survey results provide information about regional commuters' perceptions of violations.

- **Safety.** Accident information collected by the WSDOT Traffic Data Office is used to analyze the safety of the HOV lane system. Public opinion survey results provide information about commuter perceptions of HOV lane safety. Although this data report focuses on the frequency of accidents in HOV lanes, data on a variety of conditions for all reported accidents that occur on freeway segments containing HOV lanes are available. These data measure the level of concern about safety and its impact on mode choice.

- **Travel Time.** Travel time data measure the effectiveness of HOV lanes at reducing commute times and improving reliability. A license plate matching method has been developed and used to measure and compare travel times on HOV lanes and general purpose lanes. Multiple counts at specific sites and roadway segments measure the travel time reliability function of HOV lanes and estimate the speed and flow of the traffic. Over time, renewed observations may be used to measure the absolute and relative travel time savings for HOV lanes. Because of the demands on resources travel time measurement exacts and the level of labor required to produce significant samples, this measure of effectiveness was discontinued in the third quarter of 1993 and will be performed by special request only.

- **Public Opinion.** Public opinion data indicate the HOV program's perceived importance and effectiveness, as well as ways in which it may be modified to appeal to more of the region's drivers. Public opinion is measured by analyzing survey results from randomly selected commuters observed on freeways during peak commute periods along routes that contain HOV lanes. Mail-out surveys were sent to drivers of both HOV and SOV vehicles identified in the field by traffic observers. The mail-out surveys were designed to elicit area drivers' perceptions of the attractiveness, efficacy, safety, and violations of HOV lanes. This report presents public opinion data to show overall results and to determine differences in opinion between ridersharers and SOV commuters.

These categories of measures of effectiveness provide a valid basis for evaluating the performance of the current HOV lane system. They also help address WSDOT's information needs for determining where and when to construct new HOV facilities. WSDOT's *HOV Lane Minimum Threshold Policy* states four preconditions for HOV lane construction:

1. facility demand exceeds capacity for more than one hour each day
2. evidence exists that an HOV lane will move more people per hour during peak periods than the per-lane average of the adjacent general purpose lanes
3. there is local support for HOV lane construction
4. HOV lane segment improves continuity by linking other HOV lane corridors identified in the *Year 2000 HOV Core Lane System* (3).

The ACO and public perception data available from this study will provide WSDOT with some of the information necessary to evaluate minimum threshold requirements for new HOV lane construction. These data will also be useful in decisions concerning lane configuration, occupancy requirement policies, and general purpose lane conversion.

The data published in this report will be readily available to WSDOT officials and planners, as well as to other interested jurisdictions. Analysis of much of the data requires specialized computer programs designed for this project, in addition to the Statistical Package for Social Sciences (SPSS) statistical analysis program.

DATA COLLECTION

As stated before, extensive documentation of the data collection method used for this project is provided in the companion report *HOV Monitoring and Evaluation Tool* (1). However, a brief explanation of the data collection process is in order.

This study employs human observers to collect data pertaining to vehicle occupancy and travel time, as well as the information necessary to send out public opinion surveys. Traffic observers count the occupants in each vehicle in a given lane as the vehicle passes beneath a highway overpass or through an access ramp. Travel time data have been collected by matching license plate numbers with unique time indices at two points along a roadway. Observers also collect license plate numbers of both HOVs and SOVs to generate comparable samples for the public opinion survey. These observers enter data onto personal computers (observers originally used Toshiba T1000 laptops, but now use smaller, more reliable Hewlett-Packard HP-95 palmtop computers) and hard-copy forms when necessary. Data are collected on the major interstate and state highways in the region: I-5, I-90, I-405, SR520, SR16, SR167, SR410, and SR512 between the peak commute hours of 6:00 a.m. to 9:00 a.m., and 3:00 p.m. to 6:00 p.m. (three hours each). State highways 16, 167, 410, and 512 were added to this list in the third quarter of 1993. No data regarding express lane traffic on the I-5 north and I-5 downtown corridors have been collected, but a new site to observe the reversible lanes of I-90 was added in the third quarter of 1994. At the sametime, for ease of data management and to increase the number of data collection sites, the I-405 corridor was divided into three corridors: I-405 South, I-405 Central, and I-405 North (1). Observation sites were also added to I-5 in Everett and Tacoma. Table 1.1 indicates the data collection quarters and their corresponding dates for this study. (see Table A2 for the beginning dates of study for the data collection sites.)

Table 1.1: Data Collection Period, by Quarter

Quarter of Study	Dates
Q3/92	July 3, 1992 - October 2, 1992
Q4/92	October 5, 1992 - January 1, 1993
Q1/93	January 4, 1993 - April 2, 1993
Q2/93	April 5, 1993 - July 2, 1993
Q3/93	July 5, 1993 - October 1, 1993
Q4/93	October 4,1993 - December 31, 1993
Q1/94	January 3, 1994 - April 1, 1994
Q2/94	April 4, 1994 - July 1, 1994
Q3/94	July 5, 1994 - September 30, 1994
Q4/94	October 3, 1994 - December 30, 1994
Q1/95	January 2, 1995 - March 31, 1995
Q2/95	April 3, 1995 - June 30, 1995

The success of occupancy and travel time data collection is affected by the type of observation performed and the collection method used. The objective is to conduct as many observations for a wide distribution of sites, with a goal of ten counts per quarter per site. To make the best use of resources, data collection has focused on the direction in which peak period traffic is expected to flow. Scheduling is affected by the type of data being gathered, the number of observers, logistical considerations, weather, and the success of previous observations. Data collection is further affected by such factors as the site's geographic characteristics, weather and light conditions, observer performance, and data quality management.

The occupancy and travel time data presented in this report are from 59 sites studied during the first two phases of data collection (38 sites are for occupancy, 8 are for travel time data collection, and 13 are used for both). As recommended in the *HOV Monitoring and Evaluation Tool* final report, only vehicle occupancy data are now being collected. Travel time data collection was discontinued as of July, 1993 (1).

REPORT ORGANIZATION

Chapter 2 discusses the vehicle occupancy data. Chapter 3 analyzes these ACO data. Chapter 4 discusses the travel time data. Chapter 5 provides comprehensive information from the public opinion survey. Secondary data sources pertaining to enforcement, compliance, and adjudication; accidents; and transit ridership are presented in Chapter 6. Chapter 7 contains conclusions and recommendations. The appendices contain vehicle occupancy and travel time data, as well as relevant supplemental information.

CHAPTER TWO: BASELINE VEHICLE OCCUPANCY DATA

Vehicle occupancy data are an empirical measure of commuter mode choice. This measure can also be used to evaluate the effect of HOV lanes on the person-carrying capacity of commute corridors. Vehicle occupancy data indicate the proportion of vehicles of a certain occupancy or mode at a given freeway location during the weekday peak commute. For the projects ongoing collection, observers record the vehicle occupancy and mode at mainline and ramp locations by using a program that time-stamps each observation. Average car occupancy (ACO) is then calculated from these observations with the formula shown in Figure 2.1. Note that only passenger vehicles are considered in the calculation of this number. To calculate *average vehicle occupancy* (AVO), the formula in Figure 2.2 is recommended, but with reservations. The weighting factors of 10 and 40 occupants (for vanpools and public transit buses, respectively) vary by site, time of day, direction of travel, and quarter, and are likely to overestimate AVO. For this reason, ACO, rather than AVO, is used in the remainder of this report. In the future, AVO may be estimated after the average vanpool and bus loadings for each location have been acquired from the appropriate transit agencies.

Figure 2.1: Calculation of Average Car Occupancy

Average car occupancy (ACO) can be calculated using the following formula:

$$ACO = \frac{(1 \times SOV) + (2 \times DOV) + (3 \times TOV) + (4.1 \times FOV)}{SOV + DOV + TOV + FOV}$$

where

- SOV is the number of single-occupancy vehicles observed
- DOV is the number of double-occupancy vehicles observed
- TOV is the number of triple-occupancy vehicles observed
- FOV is the number of vehicles observed with four or more occupants.

Note: Vanpools, buses, other transit vehicles, motorcycles, and tractor semi-trailers are not considered.

Figure 2.2: Calculation of Average Vehicle Occupancy

Average vehicle occupancy (AVO) can be calculated using the following formula:

$$AVO = \frac{(1 \times SOV) + (2 \times DOV) + (3 \times TOV) + (4.1 \times FOV) + (\underline{10} \times VAN) + (\underline{40} \times PT)}{SOV + DOV + TOV + FOV + VAN + PT}$$

where

- ***SOV*** is the number of single-occupancy vehicles observed
- ***DOV*** is the number of double-occupancy vehicles observed
- ***TOV*** is the number of triple-occupancy vehicles observed
- ***FOV*** is the number of vehicles observed with four or more occupants
- ***VAN*** is the number of vanpools
- ***PT*** is the number of public transit buses.

Note: Other transit vehicles, motorcycles, and tractor semi-trailers are not considered.

Occupancy data in this report are presented in Appendix B according to the following characteristics:

- corridor of study
- observation site
- AM or PM peak period
- traffic flow direction
- mainline (GP or HOV) or access/egress ramp location.

Data indicate the number of vehicles that were observed by type of occupancy, the total number of vehicles, the ACO, and the number of counts successfully conducted for each quarter of the study. Data about mainline locations include the number of lanes so that the average counts per lane can be estimated for comparing general purpose (GP) lanes with HOV lane data. The figures in these tables are work-week and commute period aggregates (thereby assuming that the daily ACO does not vary significantly).

Although the data may be disaggregated by day of the week, by hour of commute, or by lane of traffic if desired, at some locations a sufficient number of observation sessions may not have been completed to make this possible. Occupancy data may also be aggregated to determine the overall ACO for multiple sites of a corridor, for both GP and HOV lanes, for all access/egress ramps, and for simultaneous directions of traffic flow (within the limits of the data and aggregation program). Because loop inductance data gathered from these sites are more representative of corridor traffic volumes, the data presented herein should only be used to generate estimates of the distribution of vehicle mode and occupancy (e.g., proportions of SOVs). Occupancy data presented in this report should *not* be used to compute traffic volumes.

During Phase I of this project, vehicle occupancy data were collected from 41 sites, each having either mainline or access ramp locations, or a combination thereof, amounting to 14 mainline and 26 access/egress ramp locations. During Phase II data collection was expanded to include sites in Tacoma, Everett, and Issaquah for a total of 53 sites with 10 new mainline and two access/egress ramp locations. (Data collection for Phase III will be severely limited due to budget constraints.) The data, shown in Appendix B, are available beginning with the third quarter of 1992 and ending with the second quarter of 1995 (see Table 1.1 for the quarters and their calendar equivalents). In Appendix B, the data for each site are precededby a diagram of all the sites in a given corridor, followed by a lane diagram of the site that indicates the traffic flow direction and type (mainline or ramp). Comments made by observers while they were collecting occupancy data can be found in Appendix C. These comments pertain to the weather and traffic conditions in which the data were collected.

OCCUPANCY DATA AVAILABILITY

To provide statistically significant data, a minimum of ten 30-minute counts per quarter per site for each peak commute period are necessary (2). Under optimum conditions, five to six counts are conducted per 3-hour session. Although collection was designed with this requirement in mind, the significance of results is affected by the availability of the data collected, as well as by the variation of each peak period at each site. The availability of data for these sites depends on the number of observation sessions scheduled and on the number of counts successfully performed for a given quarter. (For a description of factors likely to render data unusable, please refer to *HOV Monitoring and Evaluation Tool.*) These conditions are affected, in turn, by a number of factors, including the direction of traffic flow, the weather, geographic characteristics of the site location, and the success of scheduling efforts. Because of the large number of locations involved, counts were prioritized in favor of sites that were expected to capture more typical traffic patterns. Additional locations were scouted and scheduled as the project progressed. Scheduling is also affected by the availability of transportation for observers.

Because of these variables, data for some tables are incomplete. In the majority of cases in which data are insufficient, it is because no counts had been scheduled during that time. In other cases, only one or two counts were completed, and the available data files were not usable (see *HOV Monitoring and Evaluation Tool* for a discussion of causes (1)). In addition, data may be unavailable for specific lanes of traffic at certain mainline locations because of the number of lanes relative to the number of counts conducted at those sites. As for Phase III, data for several sites will not be available until additional resources can be located.

Scheduling

Determining which sites to use was a process that developed over time, partially as a result of learning which locations were better for observations, as well in response to WSDOT requests for new information. During the first two quarters of data collection, emphasis was placed on scheduling observations according to expected commute patterns: e.g., inbound Seattle central business district (CBD) traffic during the morning commute and outbound traffic during the evening commute. In areas where this pattern was less clear, such as the CBD traffic on the downtown I-5 corridor and the suburb-to-suburb traffic on the I-405 corridor, collection efforts were expanded to include less obvious reverse traffic flows as well. Although most sites had been identified by the summer of 1992, months of observation were needed to discern these counter-traffic patterns and to schedule observations accordingly. Scheduling success was also affected by whether student observers had transportation; because more than one observer typically relied on a single vehicle, if that vehicle was not available, the counts for the affected observers were canceled. Whenever possible, canceled observations were rescheduled.

Visibility

The ability to see into passing vehicles--and thus to observe the number of occupants accurately--is affected by the positions of the observer, the traffic, and the light source (1). Because visibility can be greatly affected by weather conditions, the usefulness of sites typically remains unknown until the weather and light conditions change. Overpasses are generally undesirable because the farther away an observer sits from traffic, the more difficult it is to see into passing vehicles. However, overpasses do provide the best combination of visibility and safety in comparison to street level sites, which do not allow observers to see all lanes of traffic. As weather and light availability changes, a site on an overpass that provides a good view into the interiors of vehicles in the summer may become useless in the winter because streetlights are absent or provide insufficient light to see into passing vehicles. Under such circumstances, data collection maybe limited to daylight hours. The result is that, for a number of locations, data during the fall and winter quarters (e.g., Q4/92 and Q1/93, respectively) are not available. Darkness during the winter months has forced morning counts to begin after 7:30 a.m. and evening counts to end before 5:00 p.m.--an hour to an hour-and-a-half later (or earlier) than scheduled. Therefore, instead of the expected five to six counts per session, only three to four counts per session may have been successfully performed during the fall and winter quarters, if at all. Another issue that affects observer performance is whether traffic is approaching or going away from observers. (4)

Mainline Observations

Mainline data include both HOV and GP observations; these are collected by observing a different lane for each 30-minute count. Ramp data are collected by observing the same ramp throughout the session. The number of lanes at each mainline location is shown in the site diagram and displayed under the location heading ("GP lanes" or "HOV lanes") (see Appendix B). Although the observers collect data separately for each individual lane, the analysis program distinguishes only between HOV and GP lanes (thereby combining the data for individual GP lanes). As a result, the number of counts performed for GP lanes effectively outnumber those for HOV lanes, which makes a direct comparison between the two types of lanes difficult.

To compare HOV lane with GP lane observations, the number of HOV and GP lanes must be taken into consideration. This can be done by dividing the number of quarterly counts by the number of each type of lane to obtain the average number of counts per lane. In an effort to make the samples of HOV and GP lanes more comparable, a type of rotation counting was adopted in the fourth quarter of 1994. Observers now begin their sessions with the HOV lane, proceed to a GP lane for their second count, then return to observing the HOV lane for their next count. By repeating this order, sample sizes of HOV and GP lanes will be fairly uniform for each quarter.

Data availability for mainline locations are affected by a number of factors. Although mainline data are preferable to data collected at access/egress ramps, they are more difficult to obtain. They require the use of overpasses, which are more difficult to locate because overpasses occur less frequently than access/egress ramps, and those with characteristics favorable for observing vehicles (such as adequate lighting and lower height (1)) are even rarer. During the winter months, observations were scheduled to obtain mainline data from at least one overpass per corridor; access ramp data were collected to supplement them. As a result, data tend to be more readily available from ramp locations during the winter months.

Data also may be unavailable for individual lanes of certain mainline locations because the number of lanes is greater than the number of possible counts per session. During a three-hour session, observers are able to conduct up to six half-hour counts. When observers are faced with more lanes of traffic than the conditions of the session allow, at least one lane may be missed for any given session; during the fall and winter quarters, this number rises to include at least two lanes. This limitation was counteracted by specifying the lane at which a session was to begin and then rotating the order of the lanes so that each lane would be observed at least once per quarter.

Ramp Observations

There are almost twice as many ramp sites as there are mainline sites. Because access/egress ramps are more numerous and typically have better lighting than overpasses, they are ideal locations for observing vehicle occupancy. An important feature of access/egress ramps (particularly on-ramps) is that data are likely to vary greatly. This is due to the lower volume of vehicles they carry, which means that there is a greater chance for random variation. Ramp locations were therefore studied to supplement mainline data, as well as to determine whether some of their data could be used as "proxies" for data gathered on the mainlines. A result is that some locations were only counted during the winter months. Both on- and off-ramps were used. In places where ramps had metered GP and HOV bypass lanes, vehicles were recorded regardless of the lane, thereby combining the data for these locations. Ramp observations were discontinued at the end of the second quarter of 1995 because of budget cuts.

AVERAGE CAR OCCUPANCY SITES

I-5 North Corridor (Fig. B1)

The I-5 North corridor is 9.4 kilometers long, beginning at NE Northgate Way (north of SR-520) and continuing to 236th Street SW. Four evenly spaced sites were used with well-lighted locations: 236th Avenue SW, N 175th Street, N 145th Street and NE Northgate Way. For all sites, morning southbound and evening northbound traffic was measured from on- and off- ramp locations, respectively Of these, only N 145th Street was used for mainline data collection. Data are unavailable only for 236th Avenue SW for the AM northbound flows during the second quarter of 1993 (Q2/93) and for the PM southbound flows during the third and fourth quarters of 1993 because observations were not scheduled.

I-5 Downtown Corridor (Fig. B6)

This corridor begins at Roanoke Street and ends at S 144th Street, a distance of 18.9 kilometers, including I-90 and ending before the I-405 and SR520 interchange. Conducting observations in this corridor was difficult because both directions of traffic had to be examined for each commute period (there was no obvious directional flow). Additionally, because of the irregular layout of the access/egress ramps, it was impossible to conduct observations in the same manner as was possible at suburban locations with traditional cloverleaf or diamond patterns. Because no single set of locations could satisfy collection requirements, a greater number of sites had to be used. Six ACO sites--Lakeview Boulevard E , Roanoke Street, S Holgate Street, Albro Place, Madison Street, and S 144th Street--were used for mainline observations. Eight sites--Lakeview Boulevard E, Corson Avenue S, Stewart Street, S Michigan Street, Olive Street, Madison Street, and Howell/Yale Sts.--were used for ramp data collection.

The majority of observations were conducted around three clusters of ramps: one set north of the downtown central business district (CBD), a second set at the CBD, and third set south of the CBD. *North of the CBD*, observations were conducted at Lakeview Boulevard E, but the site was then replaced by Roanoke Street (which was found to be better because it was closer to street level) during the first quarter of 1993 (Q1/93). However, data are unavailable for Roanoke until Q2/93 because the retrieval program cannot distinguish between the two sites for Q1/93.

At the CBD, locations at Olive Way (northbound, evening on-ramp) and Howell/Yale Sts. (southbound, evening on-ramp) provided for "outbound" traffic; Madison (northbound, morning off-ramp) and Stewart Street (southbound, morning off-ramp) provided for "inbound" traffic data. Morning counts at Olive Street and Howell/Yale Sts., northbound, did not begin until later in 1992. Mainline data collection at Madison Street was a special study begun at the request of WSDOT District 1 during the Q2/93. Ramp data collection began in the fourth quarter of 1992 (Q4/92) for AM counts and in the fourth quarter of 1993 (Q4/93) for PM counts. Stewart Street was not added until Q4/92 for AM counts and until Q4/93 for PM counts. Data are unavailable for Olive Way AM counts during Q3/93, Howell/Yale Sts. counts AM during Q3/93, and Madison AM counts during Q4/93 because observations were not scheduled.

South of the CBD, counting at S Holgate Street was changed to counting at Albro Place because of the unfavorable characteristics of the site (There was a sidewalk on only one side of the overpass, and at the time, the HOV lane ended about 200 yards before the overpass, making it difficult to determine vehicle occupancies in that lane.). Observations were suspended because of construction at the following sites: S Holgate Street and Corson Avenue S beginning Q1/93 and S Michigan Street beginning Q2/93. Mainline evening counts were discontinued at S 144th. Street.

<u>I-5 South Corridor</u> (Fig. B18)

The corridor begins south of the I-405 interchange, at S 188th Street, and continues south to S 272nd Street, for a distance of 8.9 kilometers. Data collected during the morning commutes were for northbound traffic (on-ramps only); afternoon data were collected from only southbound traffic (off-ramps only). Of the seven occupancy collection sites, one (S 216th Street) was used exclusively for mainline observations; the remainder (S 188th Street, S 200th Street, SR516--Kent/DesMoines Road, SR516--Kent ramp, SR516--DesMoines ramp, and S 272nd Street) were used to collect ramp data. The ramp locations at SR516 were treated as if they were three different sites.

An instance of observations missing where sessions had been conducted is the HOV lane of S 216th Street in the morning northbound lanes (Q4/92). The data from the two counts completed for that lane were found to be unusable. No observations were scheduled at the SR516--DesMoines on-ramp AM northbound for Q2/93, the S 188th St. off-ramp PM southbound for Q2/94, and the S 272nd St. on-ramp AM northbound for Q1/94 and off-ramp PM southbound for Q4/93.

<u>SR-520 Corridor</u> (Fig. B24)

This corridor is 7.9 kilometers long from the Hunt's Point pedestrian bridge to the 148th Avenue overpass. Of seven ACO sites, two were used exclusively for mainline observations (Yarrow Point and 148th Avenue); the rest were used for ramp data collection (Hunt's Point, SR908, 124th Avenue, and 148th Avenue--Bellevue and 148th Avenue--Redmond ramps). These sites are all located east of Lake Washington; to date, data have not been collected on the Seattle side of the lake. Like SR516 on the I-5 South corridor, 148th Avenue NE was treated as if it were three separate sites. Data were collected for morning westbound (on-ramps) and evening eastbound (off-ramps) traffic only.

Data collected for this corridor were not usable or available for the following locations: the Hunt's Point on-ramp AM westbound for Q4/92 and Q2/93; the 124th Avenue NE on-ramp AM westbound for Q1/93 and off-ramp PM eastbound for Q2/93;

148th Avenue NE mainline AM westbound for Q4/92 and eastbound for Q1/93; and the 148th Avenue -Redmond ramp, Q1/93.

I-90 Corridor (Fig. B30)

This corridor spans Lake Washington from 23rd Avenue S in Seattle to Front St. in Issaquah (between I-5 and SR18), for a total of 23 kilometers. This corridor consists of nine ACO sites. Island Crest Way and Newport Way were used for both mainline and ramp observations, whereas 60th Avenue SE, E Mercer Way, Bellevue Way SE, and Front St. were ramp sites only. The site along the I-90 reversible lanes was added in Q3/94 for mainline ACO data. Sites at 142nd Avenue and SR900 were only considered during the initial testing period and have not been used since that time.

Island Crest Way was reported to be a poor vantage point in the mornings because of water sprinklers, landscaping, and the elevation of the overpass (4). Morning counts at this location were temporarily postponed during Q4/92 and Q1/93 because of the freeway landscaping project that was under way (which turned the location into a "sea of mud" following rain storms (4)). Data collected at the Island Crest Way on-ramp were not usable for Q1/93.

Observations at the E Mercer Way on-ramp were not scheduled for Q2/93 and Q3/93; observations at the off-ramp were not begun until Q1/93 because of construction; and data for Q3/93 was not useable or absent. Again, observations were scheduled for morning westbound traffic and evening eastbound traffic only. Observations were suspended in Q4/94 to free-up resources for renewed observation at the Front St. site. Data for Bellevue Way are not available for the afternoon off-ramp eastbound site for Q3/93. Newport Way and Front Street in Issaquah were added during the third quarter of 1993 (Q3/93), and those data are included in this report with the exception of the following: Newport Way ACO data for Q4/93 and Front St. ramp ACO data between Q4/93 and Q3/94.

<u>I-405 Corridor</u> (Fig. B35 and Fig. B40)

This corridor is unique in a number of ways. Before it was broken up in the third quarter of 1993, it stretched from Tukwila Parkway (at Southcenter) to SR908 (north of SR520, by Kirkland) for a total of 27.9 kilometers, and had more sites than any other corridor (except I-5 Downtown corridor, which has nine sites). The corridor was in a number of "activity zones," which meant that morning and evening data on both northbound and southbound traffic had to be collected. Although a large amount of data were obtained, there were so many locations that observations were not performed as often as desired. As a result, bad data affected a larger proportion of the observation quarters. To improve collection efforts, and in anticipation of more sites along this corridor, I-405 was divided into three sections, as described below.

<u>I-405 South Corridor</u> (Fig. B35)

This section begins at Tukwila Parkway and ends at 112th Avenue SE (Lake Washington Boulevard), for a total of 13.7 kilometers. It is the most complex section because it runs through the suburban centers of Tukwila (where it merges with I-5) and Renton (to Bellevue). Traffic here flows in multiple directions, traveling to and from both I-5 and I-90 towards Seattle, Tukwila, Renton, and Bellevue in the morning and returning in the evening. Although there were only four sites in this corridor, observations were conducted to measure both morning northbound and southbound, and evening southbound and northbound traffic (similar to the I-5 Downtown corridor). During the period covered in this report, two sites (Tukwila Parkway and 112th Avenue SE) were used solely for mainline observations; three (SR167, S Park Dr. and 112th Avenue SE) were used for ramp data collection (as of Q2/93, ramp data collection from 112th Avenue SE was suspended).

Data collected at Tukwila Parkway are unavailable for the morning northbound commute of Q3/92, and for the evening northbound commute between Q3/92 and Q1/93 because of bad data and the low number of counts performed. Counter-flow traffic data (morning southbound and evening northbound) were not collected during the winter months because of generally poor visibility and because they were not a high priority.

Ramp data for SR167 were unusable for the evening northbound commute of Q4/92. For all other quarters in which data are missing, the reason is that counts were not scheduled. This ramp was not a healthy counting location because vehicle exhaust tended to accumulate here.

S Park Drive provides access to the Renton Boeing Plant, and so traffic patterns tend to be different here; peak periods run from 6:00-7:30 AM and from 2:00-4:00 PM; traffic is gone by 5:00 PM (4). Data for the northbound on-ramp traffic were not usable for the morning commute during Q4/92 and Q1/93; or for the evening commute during, Q3/92 and Q4/92. Nor were they usable for the evening southbound commute during Q3/92 and Q4/92. During the period covered by this study, ramp improvement construction occurred at S Park Drive, which may have restricted the number of counts. The reason that data are missing from any other quarters is that no sessions were scheduled.

At 112th Avenue SE, Q4/92 data were not usable for the GP lanes during the morning northbound commute; and data were not usable for either the GP or HOV lanes of the morning southbound commute during Q3/92 to Q4/92. Both the evening northbound and morning southbound locations were counter-flow commutes, and thus observations were not begun until 1993. At all other locations for which data are absent, observations were not scheduled.

<u>I-405 Central Corridor</u> (Fig. B40)

This 2.2-kilometer section of I-405 centers around downtown Bellevue from SE 8th Street to NE 12th Street, between I-90 and SR520. With the completion of a new outside HOV lane, observations at this site were relocated to NE 4th, which provides a better viewpoint. Of the two active ACO sites, NE 4th Street was used for mainline observations, and ramp observations were conducted at SE 8th Street.

Data for SE 8th Street were not usable for the northbound commute of Q3/92 or for the morning on-ramp commute during Q4/92 to Q2/93. Both sets of data were from counter-flow commutes. Traffic for the morning southbound commute was so light (as demonstrated by Q3/92 data) that on-ramp observations here were discontinued until Q3/93. At all other locations for which data are absent, observations were not scheduled.

Observations at NE 8th Street were abandoned after a few trial counts during the third quarter of 1992, although additional counts were performed during the first quarter of 1993. NE 8th Street was a poor site for observations because the northbound on-ramp was too far away, and the traffic there moved too fast for observers to determine occupancy reliably. Although the southbound off-ramp was well-lighted, two lanes of traffic exited at the same time and moved too fast to count (4).

During the winter months, it was generally too dark to see the number of occupants when mainline observations were conducted at NE 12th Street because the lighting was inadequate (4). Morning northbound and southbound commutes were not scheduled until Q2/93; data collected for the evening northbound commute during the two counts of Q1/93 were not usable.

I-405 North Corridor (Fig. B40)

At present, there is only one site in this corridor at SR908, 6.4 kilometers north of NE 12th Street. Mainline counts did not begin until Q3/93; consequently, they are not displayed. Both ramp and mainline counts were primarily conducted from the pedestrian bridge located here. Winter observations were difficult at the overpass because of poor lighting on the pedestrian bridge; better-lighted ramp locations at this site (such as the southbound on-ramp, which does not have a Jersey barrier) were not safe for observations (4). No observations were scheduled for the AM southbound on-ramp commute during Q2/93 and Q4/93 or for the PM northbound off-ramp commute during Q2/94. In Q2/95, a new outside HOV lane was added northbound, and the HOV lane southbound is scheduled to open by Q4/95.

Outlying Locations

Starting in the third quarter of 1993, several new observation sites outside the original corridors were added to the scheduling log. These sites were chosen to provide baseline data for the areas surrounding Tacoma, Everett, Kent/Auburn, and Issaquah. These sites are

- North I-5 at 112th SE in Everett (SB and NB, AM and PM) (Observations at this site were suspended in Q4/95 because of budget constraints.)
- South I-5 at 70th E in Fife (SB and NB, AM and PM)
- South I-5 at the Tacoma Mall (SB and NB, AM and PM) Data for Q3/93 are absent because of problems with the quality.
- SR16 at the Narrows Bridge in Tacoma (WB and EB, AM and PM)
- SR410 at East Valley Avenue in Sumner (WB and EB, AM and PM)
- SR512 at Ainsworth Ave./ Steele in Parkland (WB and EB, AM and PM)
- SR167 at 37th NW in Auburn (SB and NB, AM and PM) Observations were scheduled until Q4/93 for AM SB and NB, and PM NB.
- SR-167 at S 208th in Kent (SB and NB, AM and PM) Data sessions were not scheduled for the following: PM NB in Q3/93, AM SB in Q4/93, and PM SB between Q3/93 and Q4/93.

Only mainline ACO data are collected at these sites.

CONCLUSIONS AND RECOMMENDATIONS

Occupancy data were successfully collected from most of the study sites. Where data are unavailable, it is because an insufficient number of counts were scheduled or successfully completed. This happened for a number of reasons, including inclement weather, poor visibility, more sites than observers, and the discontinuation of data collection at some sites. The impact of having too few successful counts per quarter was that when bad data rendered the counts unusable, data for the entire quarter were possibly lost. During the first two years of the project, observation sessions were consistently more numerous for ramp than for mainline locations. This was because of the greater number of ramp locations and the better visibility they offered. There were also proportionally more successful observations for GP lanes as a whole than for HOV lanes as a whole. This situation was corrected during the fourth quarter of 1994 with the adoption of a new counting procedure that involved rotating the lane to be observed between HOV and GP lanes. This procedure will provide sample sizes that are more comparable and enhance the validity of any comparision between HOV and GP lanes. However, starting in the third quarter of 1995, the total number of observations was reduced to ten counts per week because of a reduction in the funds allocated to the project. At present, only mainline counts are being scheduled.

Factors not directly explored in this chapter include observer performance, and observer and data management: these are treated in greater detail elsewhere (1). Because observers are unsupervised in the field, they are trusted to begin and end observations on time and to observe and record vehicle occupancies accurately. Although data quality was verified by checking individual files for "gross errors" such as misnamed files and repeats, in the future, quality will be verified by statistically comparing current site data with site data collected from previous observations (see *HOV Monitoring and Evaluation Tool* (1)). As this project progresses, data will become increasingly accurate because of this method and the more stable average that will emerge as the volume of data increases. With this in mind, the following changes are recommended:

1. Continue to prioritize observations at locations that ensure the best use of resources. Safe locations that provide the best visibility over varying conditions, as well as ease of access and scheduling, are obviously preferred. Therefore, a directory of sites that includes site diagrams and a matrix of characteristics that affect data collection should be maintained. The question of whether counter-flow traffic patterns should be continued or eliminated at existing locations, or expanded at additional locations should be explored, as well as whether or not to maintain ramp data collection.

2. Evaluate the appropriateness of collecting vehicle occupancy data on the I-5 express lanes. Because express lanes contain both HOV and GP lanes, "before" data for this corridor may be useful in areas where express lane expansion is planned and would allow planners to monitor the express lanes' performance.

The occupancy data presented in this report provide valuable information in two areas: (1) the operation and performance of HOV lanes in comparision to GP lanes and (2) commuter mode choice in the greater Seattle area. Additionally, as the HOV lane system expands, areas where "before" data are now being collected will serve as baseline reference points in assessing the impact of HOV facilities on commuter mode choice. However, a caveat is in order: because loop data are more representative of traffic volumes in these corridors, the data included in this report should be used only to indicate the percentages of mode and vehicle occupancy in the corridors studied. The following chapter, "Average Vehicle Occupancy Data Analysis," provides a treatment of these raw data and potential sampling bias.

CHAPTER THREE: AVERAGE VEHICLE OCCUPANCY DATA ANALYSIS

The average vehicle occupancy (ACO) data presented in this report are raw numbers. They are based on actual observations conducted between July 1992 and June 1995; they are not corrected for sample bias. The process for sampling time of the year, day of the week, time of day, lanes (or ramps), and locations, was designed to provide overall ACO figures that can be compared from year to year. The sample size is large enough that statistical variation is small, which allows for fairly accurate determination of the ACO at one location for a particular peak period in a given quarter. However, because ACO varies by time of the year, day of the week, time of day, lane (or ramp), and location, comparisons involving small subsamples (such as one location for a particular time period in a given quarter) must take these variations into account.

An example will illustrate the variations that must be considered. For instance, if one were interested in determining changes in the evening peak ACO in the northbound general purpose lanes at 145th NE on I-5 from the last quarter of 1992 to the first quarter of 1993, one would have to take into account the number of observations in each of the following categories:

- day of the week
- time period during the evening peak
- the particular general purpose lane in which vehicles were observed.

If ACO turned out to be always higher on Fridays (because of families or other groups traveling out of town together for the weekend, for example), a larger sample of Friday observations in the second quarter could point to the misleading conclusion that ACO was increasing. Despite controls in the sampling methodology, it is not always possible to sample in a way that will prevent all potential misinterpretation of the raw data.

This section of the report deals with this issue. The data from Phase I and Phase II of the study were analyzed to determine differences by time of year, day of week, time of day, lane (or ramp), and location. Awareness of these differences may be helpful in adjusting for sampling bias (see Appendix D for an explanation and examples).

ANALYSIS METHODOLOGY

SPSS was used to convert ACO observation data for the entire year to a new format for analysis. ACO was calculated for each 15-minute period at each location for each lane (or ramp) during each quarter. Each ACO was then stored in a data file with its associated location, quarter, lane (or ramp), and time period identifiers. The SPSS data file contained 34,796 entries: 21,816 for observations in lanes and 12,980 for observations on ramps. Next, two separate files were created: one for freeway lanes and one for ramps. ACO figures based on fewer than 50 observations were deleted, and locations with fewer than 50 observations were also deleted. This reduction in the number of cases eliminated anomalous figures and reduced variability, but it maintained enough observations to conduct the analysis.

Following this reduction, 17,502 observations remained in the lane data file and 10,755 observations remained in the ramp data file. Multiple regression was the general method for determining the influence of various factors on ACO. ACO was treated as the dependent variable, and various combinations of other information were used to determine the influence of factors such as location, time of day, day of the week, lane (or ramp), and time of year. The regression coefficients indicated the strength and direction of the influence of the factors of interest.

For instance, if the lane in which an observation was made was indicated by a dummy variable taking the value of 0 or 1 (depending on whether the observation was or was not in the lane), the regression coefficient for that dummy variable could be used to assess that lane's influence on its ACO. For example, if the coefficient for a dummy variable indicating lane 2 was .07, and the coefficient for lane 3 was .12, we could conclude that the ACO was .05 higher in lane 3 than in lane 2 for the sample included in the regression. Furthermore, we could assess whether this difference was universal or was true only at some locations by comparing the regression coefficients for the total sample with the regression coefficients at each location. The differences in patterns of coefficients would indicate how locations varied. The regression coefficients for the overall analysis are shown in Table D1.

Differences in time of the year, day of the week, time of day, and lane (or ramp), were analyzed. Results are described in the following section.

TIME OF THE YEAR

Multiple regression was performed on all data using location, lane (or ramp), day of the week, and time of day, as well as dummy variables indicating the quarter in which an observation was made. By separating out the influences of all relevant variables, the independent influence of time of year could be assessed.

By using the summer quarter data as a baseline, the relative influence of the other quarters can be seen (see Table D1). These data revealed that the summer ACOs (third quarter) were higher than those from the rest of the year. The coefficients for the remaining quarters did not differ significantly with one exception. The ramp coefficient for the second quarter was significantly higher than that of the Q4 and Q1. The general pattern is that ACO is lowest in the fall and winter, rises somewhat in spring, and reaches its highest level during the summer. One explanation is the increasing number of non-commute trips that people take during the spring and summer.

LANE ANALYSIS

Lanes were classified by type: (1) HOV, (2) outer, (3) center, and (4) inner. The ACO in HOV lanes was obviously different from that in general purpose lanes; consequently, the analysis concentrated on detecting differences among the general purpose lanes. The coefficient for the HOV lane was about 1.00 standard units higher than that in other lanes. This means that on average there was one more person in vehicles in the HOV lanes than in the general purpose lanes.

The coefficients for inner and outer lanes did not differ significantly. However, the coefficient for the center lane was significantly lower than that for each of the two other lane types

TIME OF DAY

ACO is clearly higher during the evening peak than during the morning peak. ACO data were analyzed separately for each peak period; this analysis concentrates on the variations within each peak period.

An overall multiple regression was performed using dummy variables for each 15-minute period in separate analyses for each peak period. (Figures D1 through D4 show the adjustment factors (based on the regression) for each 15-minute interval for each peak period.) Ramps and lanes were analyzed separately. In addition, a regression was performed on the adjustment factors to determine the general patterns.

Data for the morning peak (for both ramps and lanes) indicated a tendency for ACO to rise during the entire peak period, with a slight tendency for ACO to be higher in the very early part of the morning peak. The rise was statistically significant for both ramps and lanes. The most likely explanations for this rise are as follow:

- Commuters who want to drive by themselves tend to leave earliest to avoid traffic.
- Commuting carpoolers can leave later and still take advantage of HOV facilities.
- Toward the end of the morning peak period, non-work trips begin to influence ACO.

There was a general tendency for ACO to fall during the evening peak. However, the evening peak pattern was clearly U-shaped, and this "U" was statistically significant.

During the entire evening peak, non-commuters (who tend to travel in higher occupancy vehicles) were prevalent (in comparision to the morning peak). However, during the peak of the peak, commuters (primarily in SOVs) reduced non-commuters' influence on ACO.

DAY OF THE WEEK

ACO was lowest on Monday and increased throughout the week. The coefficient for Friday was significantly higher than that of all other days of the week. The rising trend during the week was statistically significant. (Table D1 shows overall differences in ACO by day of the week.)

YEARLY CHANGES

When all factors are accounted for, there were yearly changes that could be detected. Between the 92-93 period and the 93-94 period, there was a significant, but small, increase (.014) in the ACO with respect to lane data. However, there was a significant decrease in ACO (.011) from the 93-94 year to the 94-95 year. Ramp data revealed a similar pattern (a .006 increase, followed by a .02 decrease).

CONCLUSIONS

Many factors affect ACO. Therefore, it is important to design a sampling frame that reduces the influence of these factors. However, because it is impossible to perfectly sample all time periods, days of the week, lanes, and ramps at each location for the whole year, it is important to consider these factors when changes in ACO are analyzed. After four years of data collection, we are confident in our understanding of these differences, but additional data will be important in confirming the analyses presented herein. Caution should be exercised in applying these correction factors. However, in conducting such detailed analysis, it is better to apply them than to use the raw data without adjustments.

CHAPTER FOUR: BASELINE TRAVEL TIME DATA

Travel time data measure the time savings that HOV lanes provide over GP lanes. One commonly accepted standard for HOV lanes is that they must offer a time savings of at least 1 minute per mile. Another policy in Washington state guides decisions about occupancy requirements. According to the *Washington State Freeway HOV System Policy*, "HOV lane vehicles should maintain or exceed an average speed of 45 mph or greater at least 90% of the times they use that lane during the peak hour (measured for a six-month period)" (3). Travel time data collected in this project provide average vehicle speeds, which will allow others to apply these time savings criteria when comparing HOV and GP lanes, and to apply lane performance criteria when evaluating HOV lanes.

Study sections were specifically chosen to bound the HOV lanes' beginning and end points along given corridors. For the average traffic speed of GP lanes, vehicles traveling in the fast (leftmost general purpose) lane were observed, and their license plates numbers were tracked. To determine HOV lanes' average traffic speed, the identification numbers of Metro buses traveling in the HOV lane were recorded. Average vehicle speeds were calculated from the time differences between matches of these identification numbers recorded at beginning and end points of given study sections. (See *HOV Monitoring and Evaluation Tool* for a complete explanation.)

While observations on all of the corridors were scheduled to capture regular commute traffic flows, observations on the downtown I-5 and I-405 corridors captured reverse commute traffic flows as well.

Travel time data were organized along the following parameters:

- corridor of study
- beginning and end site (study section)
- morning or evening peak period
- traffic flow direction

The data (see Appendix E) were arranged to indicate, in 15-minute intervals, the average vehicle speed observed in HOV and GP lanes during the morning and evening peak periods by quarter (in miles per hour). Because GP lane traffic speeds were drawn from fast lane observations, they sometimes exceeded the speed limit (because of the lane's use as a passing lane). Because their number varied over the length of each study section, the number of GP lanes was not included.

From July 1992 to July 1993, travel time data were collected from 21 sites (mainly overpasses), organized into 26 study sections. Of these, only two locations, S 260th on I-5 South and 35th Avenue S on I-90, were at street level. Data were available from Q3/92 through Q2/93. In Appendix E, corridor diagrams that indicate the study sections precede the data; these are followed by diagrams for each site. Comments made by observers as they collected travel time data refer to aspects of data collection, traffic, and weather conditions; they are contained in Appendix F.

TRAVEL TIME DATA AVAILABILITY

As indicated in the *HOV Monitoring and Evaluation Tool* final report, travel time data are difficult to obtain and expensive to produce for a number of reasons. Reliable data collection is hampered by a slow learning curve and the high amount of coordination required to schedule observations and ensure that collection periods match. In addition, factors associated with traffic patterns (such as vehicles changing lanes) can greatly reduce reliable data collection. For this study, a large number of travel time sessions were conducted in all of the corridors, it was difficult to obtain matches during all peak-period times for all quarters. Consequently, quarterly average vehicle speeds are not consistently available for all given peak-period intervals.

In addition to the same weather-related problems that affect ACO data collection (see above), travel time data are highly dependent on the number of successful license plate matches, which in turn is affected by several critical factors. First, gathering travel time data requires greater accuracy and faster reaction time than is required for gathering occupancy data. Therefore, this process is even more sensitive to conditions that reduce visibility. Second, gathering travel time data requires a "startup" period of at least 15 to 30 minutes, during which the vehicles observed at the beginning data point of a study section must travel to the specified end point before they can be observed and recorded. Third, the same license plates of passing vehicles must be recorded at each end of the study section, and for the same lane of traffic. Because vehicles rarely stay in the same lane, the likelihood that a vehicle has changed lanes or exited the freeway increases with the length of the study section. Fourth, observers cannot end and begin a session every half hour as they can when collecting ACO data; while observers take breaks, these add to the likelihood that a vehicle recorded by one observer will not be recorded by the other Finally, average vehicle speeds can vary greatly from quarter to quarter.

Visibility

Rather than viewing and recording the number of persons in a vehicle with a single digit, as is done in the case of occupancy data collection, observers must be able to discern and record strings of license plate characters. Each character is smaller than the size of a business card (7 cm high by 2.5 cm wide), and vehicles can be traveling anywhere from 24 to 105 kilometers per hour. Complicating this is the fact that the license plate numbers are usually read from overpasses, which place the observer from 6 to 11 meters above the traffic flow. Poor visibility because of weather and lighting only compounds the problem by restricting the length of the sessions. Additionally, some observers find that they perform the task best when traffic is approaching them, whereas others collect data best from vehicles moving away from them. Where these observers are limited by sites to record license plates from traffic that is moving the wrong direction, less than optimal observer performance occurs.

Observation Session Length

Data are typically unavailable for the beginning period of the count because of the fact that the vehicles observed at the point of origin are not recorded at the end point until at least 15 minutes later, assuming that the observers even begin at the same time. This assumption is often not the case. Because two or more observers normally rely on a single vehicle for transportation to and from the sites, one observer has to drop off the other(s) before continuing on to the end site. Depending on the length of the corridor, this can add approximately 15 to 45 minutes to the start time of the session before matches can be expected (this is also true for session end times). If, as in the cases of I-5 and I-405, multiple travel time sessions are performed over long distances, the start-up time is greater.

Study Section Length

Successful matches depend upon the plates of the same vehicles being recorded in the same lanes at both ends of a study section. The distance from the beginning to the end site of a study section, therefore, directly influences the number of successful matches because vehicles rarely remain in the same lane. As the distance between observation sites increases, the likelihood that the same vehicle will be recorded decreases because the driver is more likely to have changed lanes or to have exited the corridor altogether, depending on the availability of access/egress ramps. Furthermore, because GP vehicle speeds are derived from fast lane observations, the number of successful matches may be reduced because of the fast lane's use as a passing lane. (For a list of the study sections and their respective lengths, see Table E2).

TRAVEL TIME SITES

I-5 North Corridor (Fig. E1)

The I-5 North corridor is 8.2 kilometers long. It has three observation sites and consists of two study sections from which data were collected:

- 236th Street SW to NE 117th Street for morning inbound traffic
- NE 117th Street to NE 185th Street for evening outbound traffic

236th Street SW was selected because it was the northernmost site at which HOV lanes operate; for this reason it was kept despite the fact that N 185th was later determined to be a better location (4). Both 236th Street SW and 117th Ave NE have sidewalks on the north side only; consequently, observers had to count vehicles coming toward them in the morning and going away from them in the evening (Figures E2 and E4).

For 236th Street SW to 117th St. NE (Table E3), fewer data were available for the morning commute because the study section is longer (see Table E2). Observations for both the winter (Q4/92) and spring quarters (Q1/93) were affected by inclement weather and a shorter daylight cycle, as indicated by the lack of data for the early morning (Table E3) and late evening (Table E4). For Q1/93, data were unavailable because only one count was performed for each section, and no reliable matches were made.

I-5 Downtown Corridor (Fig. E5)

This is the second longest corridor at 18.8 kilometers long. It has four sites organized into six study sections:

- between Lakeview Boulevard E and S Holgate Street
- between Lakeview Boulevard E and Albro Place
- between Lakeview Boulevard E and S 144th Street
- between S Holgate Street and Albro Place

- between S Holgate Street and S 144th Street
- between Albro Place and S 144th Street

Regarding the individual sites, Lakeview Boulevard E was chosen to be the northernmost site of this corridor because it was also being used for vehicle occupancy collection (the HOV lane actually begins further south, at Mercer). Although Lakeview Boulevard E was discontinued for occupancy counts, it continued to be used for travel times through Q2/93 (Tables E5 through E9). S Holgate Street was a difficult site to collect data from because it was uncomfortable for observers to sit at and had poor visibility (Figure E7). Its one sidewalk was on the north side. The overpass, situated on a steep hill, placed the observer in an awkward sitting position. Southbound traffic was 6 meters lower than northbound traffic, and in the morning sun, license plates were difficult to see because of the shadow cast by the overpass (4). Visibility was good at Albro Place in both directions, but observers complained of the diesel fumes that collected there (Figure E8) (4). S 144th Street was the best location because it had wide sidewalks on both sides of the overpass (Figure E9).

Except for a few study sections where the distances between sites were short, travel time data for this corridor were sparse. Again, data were less available for the winter quarters, as well as for the longer study sections (such as Lakeview Boulevard E and Albro Place). Although HOV lane observations were successfully performed for each of the above study sections, no reliable matches were obtained from any of the data collected.

For the morning southbound commute from Lakeview Boulevard E to S Holgate Street, no data were successfully collected during Q1/93 (Table E5); for the evening southbound commute, no data were successfully collected during Q4/92 (Table E6). On Lakeview Boulevard E and Albro Place, one count each was successfully performed and matched during Q3/92 and Q4/92 of the morning southbound commute (Table E7); for the evening southbound commute, two successful counts were reliably matched for Q3/92, and one count for Q4/92 (Table E8) At the same study section for the morning northbound commute, data were successfully collected and reliable matches were obtained for only Q3/92 (Table E15 and E16). Of the one successful count performed at Lakeview Boulevard E and S 144th Street for the evening, southbound commute, one match was made (Table E9); no reliable matches were found from the single count performed for the morning northbound commute (Tables E20, E10, E11). For the morning northbound commute at S 144th Street to Lakeview Boulevard E, no reliable matches were obtained from the one successful count performed during Q3/92 (Table E20).

For the S Holgate Street to Albro Place study section, data were collected successfully for the morning southbound commute during Q3/92 and Q4/92 only (Table E12). For S Holgate Street and S 144th Street, data were only collected and matched for evening, southbound traffic during Q3/92 and Q4/92 (Table E14); no data were successfully collected for the morning, northbound commutes (Table E21). For the Albro to Holgate study section, no data were successfully collected for the morning northbound commute during Q2/93 (Table E17); data were successfully collected for the evening northbound commute only during Q2/93 (Table E18).

<u>I-5 South Corridor</u> **(Fig. E10)**

The I-5 South corridor was one of the project's more successful travel time data collection sites. This corridor is 8.9 kilometers long, has three sites, and consists of two study sections from which data were collected:

- S 178th Street to S 216th Street for evening outbound traffic
- S 260th Street to S 216th Street for morning inbound traffic

Although a great deal of data were collected for the morning commute at S 260th Street to S 216th Street (Table E24), S 260th Street was a difficult and unsafe location at which to collect data. The site is located on the median dividing the northbound and southbound lanes, rather than on an overpass (Figure E13). To reach this site, observers parked on the underpass and scrambled up a steep dirt hill and around a chain link fence while carrying a folding chair and a laptop computer (4). In rain, the hill became very muddy and slippery (4).

Summer data for S 178th Street to S 216th Street were available later in the day than for any of the other travel time study sections. Data were collected until 7:15 p.m. to take advantage of the longer period of available daylight during that period (Table E23). Visibility for this corridor was adequate at all of the sites.

SR-520 Corridor (Fig. E14)

The SR-520 corridor is 7.9 kilometers long, from Hunt's Point to 148th Avenue NE, and includes SR-908. This corridor was divided into three study sections, and data were collected for morning inbound and evening outbound traffic:

- Hunt's Point and SR908
- Hunt's Point and 148th Avenue NE
- 148th Avenue NE and SR908.

The location at Hunt's Point was a pedestrian overpass four blocks west of the vehicle overpass (Figure E15). It was particularly good for collecting data because observers could see well in both directions and traffic was always almost stopped, which made it easy to record license plates (4). The only distinguishing feature of 148th Avenue NE (Figure E17) was that it carried a great deal of traffic, and observers reported that the occupants of passing vehicles often stared at them (4).

Although the study sections on this corridor were generally better than those in other areas, HOV lane data were very limited because the only HOV lane was an outer lane running from SR908 to Hunt's Point for westbound traffic (sites 41 and 43 on Figure

E14). Data on "reverse flow" traffic were briefly collected; evening sessions were conducted on the westbound traffic from Hunt's Point to SR908 for Q3/92 and then were discontinued because of the insufficient number of matches for the HOV lane (Table E26). Data were not collected from the 148th Avenue NE to Hunt's Point section for morning westbound traffic until Q4/92 (Table E27). Data for evening eastbound traffic are missing for the winter quarters (Q4/92 and Q1/93), despite a relatively high number of sessions that were scheduled.

I-90 Corridor (Fig. E18)

The I-90 corridor is 7.7 kilometers long and consists of two study sections from which data were collected:

- E Mercer Way to 35th Avenue S for morning westbound traffic
- 23rd Avenue S to E Mercer Way for evening eastbound traffic

The neighborhood around 23rd Avenue S was not considered safe, especially in the dark for women, so male observers were preferred; this affected scheduling (4). Furthermore, observers had to stand to see the traffic because of the 1.2-meter high wall (Figure E19). Observers relied on either of two locations for observations at 35th Avenue S: they sat on the retaining wall on the overpass or on the bicycle path that is on the same level as the lanes, looking across traffic (Figure E20). Getting to this site was time-consuming because of the winding roads on Mercer Island; consequently, counts tended to begin later than usual--especially if a "drop-off" was involved (4). The retaining wall position, although less comfortable, offered better visibility. Visibility from E Mercer Way was adequate, although the location was heavily landscaped (observers were often sitting in bark mulch) (Figure E21).

Travel time data collection was successful for this corridor as well, except for two winter quarters for which data are unavailable. For 23rd Avenue S to E Mercer Way, data are unavailable because no matches were obtained from the four sessions for Q1/93 (Table E32); the same problem occurred for E Mercer Way to 35th Avenue S during Q4/92 (Table E33).

I-405 Corridor (Fig. E23)

This corridor is the longest of the six corridors--27.5 kilometers, with ten study sections (also the most of any corridor). Because of the complexity of traffic patterns (see Chapter 3, pp. 25-26), observations were conducted to capture both regular and reverse traffic flows at the following locations:

- Tukwila Parkway and Benson Road S
- Tukwila Parkway and 112th Ave SE
- Tukwila Parkway and NE 12th Street
- Tukwila Parkway and SR908
- Benson Road S and 112th Ave SE
- Benson Road S and NE 12th Street
- Benson Road S and SR908
- 112th Ave SE and NE 12th Street
- 112th Ave SE and SR908
- NE 12th Street and SR908

This was the least successful corridor for collecting travel time data for a number of reasons. The root problem was that, unlike the corridor for the occupancy data, I-405 was not segmented into south, central, and north corridors because the study sections spanned the corridor's entire length. First, observation sessions were spread too thin. An average of only one to two counts were successfully performed for each applicable parameter (site, commute period, traffic direction). Second, most study sections were too long to obtain matches reliably. All but one were longer than 5 kilometers (Table E2) and had numerous access/egress ramps in between (Figure E23), thereby increasing the likelihood that observed vehicles would have changed lanes or exited the corridor altogether.

HOV data for the longer study sections are unavailable for similar reasons, and because the HOV lanes are neither continuous nor remain on the same side of the corridor. Inside HOV lanes begin at Tukwila Parkway and end at Benson Road S; yet from NE Park Drive to 112th Avenue SE, HOV lanes are on the outside. There were no HOV lanes in the central and northern portions of the corridor during the time of this study. During Q2/93, data were only collected between the shorter study sections: Tukwila Parkway to Benson Road S (Tables E34, E35, E41 and E42); Benson Road S to 112th Ave SE (Tables E43, E44, E50 and E51); 112th Ave SE to NE 12th Street (Tables E52, E53, E60 and E61); and NE 12th Street to SR908 (Tables E62, E63, E68 and E69).

Tukwila Parkway, 112th Avenue SE/Lake Washington, and NE 12th Street were average sites for collecting data (Figures E24, E26 and E27, respectively). Benson Road had good visibility and a wide sidewalk on the west--the sidewalk on the east side was very narrow (Figure E25). Observers recording travel time data from the pedestrian bridge at SR908 during the winter had the same difficulties as they had experienced with occupancy data collection efforts (p.28) (Figure E28).

CONCLUSIONS AND RECOMMENDATIONS

Although the effort to collect reliable travel time data was very educational, the usefulness of the travel time data presented in this report is very limited. Although the data can generally be used to compare HOV lane performance to GP lane performance and to identify areas of congestion, a number of factors render data interpretation difficult. Vehicle speeds can only be compared by time of commute for the quarter in which they occurred. Because the data are presented as average speeds, only individual study sections may be used; the data cannot be aggregated to examine the differences between HOV and GP lanes corridor-wide. The speeds indicated for areas tend to vary widely from quarter to quarter; therefore, yearly averages are unreliable. The standard deviation for each time period must first be established to determine the number of observations required for statistically meaningful information. This means that additional data will be necessary before vehicle speeds (and times) can be reliably generalizated.

It was much more difficult and complex to collect travel time data than it was to collect vehicle occupancy data. Observers not only had to be more accurate and have better visibility, they also had to coordinate their efforts more carefully. Although observer absences and tardiness are not discussed in this report, they further confounded the matching process, as did errors in data quality. Even with good data, matches were difficult to obtain because of normal traffic behavior (e.g., lane changes), especially over long distances. Intervening access/egress ramps in study sections only compounded this problem. However, more data were available for study sections that had high numbers of successful counts. This suggests that the number of reliable matches can be increased by completing greater numbers of successful sessions. Despite the obstacles that made it difficult to collect the travel time data, the experience gained in this study indicates that travel time data may be collected successfully under some conditions. The greatest quantity of travel time data was gathered at study sections characterized by good visibility, short length, and high numbers of successful observations. If manual travel time observations are re-established, the following recommended actions should make the data collection effort more successful:

1. Use short travel time study sections. To decrease the likelihood of observed vehicles changning lanes or exiting the corridor, distances between sites should be short (for example, under 3 kilometers) and chosen to limit the number of intervening access/egress ramps.

2. Conduct more travel time data collection sessions per study section. Although a number of factors reduce the likelihood of obtaining reliable license plate matches, one way to compensate is to increase the number of data collection sessions, thereby increasing the volume of license plates collected.

3. Limit travel time data collection to special studies. Effective collection of travel time data requires a great deal of coordination between observers to ensure that they begin and end at the same time, as well as corridor sections that facilitate license plate matches. Even when travel time data are effectively collected, they can vary so much that routinely gathering data to establish an "overall" travel time statistic for a length of corridor may not be very useful. An example of a special study is suggested below.

4. As a special study, conduct travel time observations using the express lanes. Not only do the express lanes have GP and HOV designations, they also constitute a "captive audience" in that vehicles may not exit for longer distances. As a result, it may be easier to obtain the matches necessary for reliable travel time data.

The travel time data available in this report confirm that travel time data collection is most successful when it is limited to special studies of short lengths of corridor. Even in the future, as technological improvements make it possible to collect travel time data without the use of human observers (such as video imaging), the success of the data collection will be affected by the distance between sites, accuracy, and the number of observations.

CHAPTER FIVE: PUBLIC OPINION SURVEY

The research methodology used to collect the data described in this chapter is detailed in the companion report, *HOV Monitoring and Evaluation Tool* (1). Users of these data should be aware that the sample used in this survey was not intended to represent the actual driving population. Rather, this portion of the project attempted to generate comparable samples of single occupant drivers and carpoolers to measure differences in their attitudes about HOV lane use and effectiveness. However, the sample generated for this survey was comprised of 70 percent SOVs and only 30 percent HOVs. This may be because travelers identified as driving HOVs may have been carpooling under special circumstances when observers recorded their commute mode in the field. In addition, the survey was mailed to the each vehicle's registered owner and thus may not have been received by the driver observed in the field. Only 38 percent of the drivers identified in the field in HOVs reported that they actually rideshare on a regular basis. On the other hand, 21 percent of drivers identified in SOVs reported that they rideshare on a regular basis. This underscores the uncertainty of correctly linking commute mode on any given day to overall mode choice. It is also important to note that this survey was intended to measure only attitudes about HOV lane effectiveness, not the underlying reasons behind individuals' choices to drive alone or to rideshare.

Three supplemental pieces of information were recorded with each returned survey. First, the postage date was entered to measure changes in opinions over time. Second, data entry staff recorded the commute mode in which observed survey respondents were traveling when observed by the traffic counters. Third, data entry staff assigned each survey a document number, which made it easier to retrieve from storage the phone numbers and addresses of respondents who indicated their willingness to answer follow-up questions.

Between July 1993 and May 1995 surveys were mailed to 23,659 owners of vehicles identified by traffic observers in the field. Drivers of vehicles identified as HOVs received 11,357 surveys; 2634 returned them, for a response rate of 23 percent. Drivers of vehicles identified as SOVs received 12,302 of the surveys; 2,858 returned them, for a response rate of 24 percent. The response rate for the entire survey population was 23.5 percent. These values represent an 8.5 percent decline in the response rate from the survey period that ended June 1993. The current size of the survey dasebase is 5492 cases, compiled since November 1992.

In addition to providing results from all survey questions on the questionnaire, this section contains several examples of how to use the survey data in conjunction with other data gathered for this project. The purpose of this project is to develop a wide ranging source of data that will allow analysts to evaluate the performance of the HOV lane system. Therefore, illustrative examples that demonstrate how to combine the disparate sources of data are provided, rather than a comprehensive analysis. Subsequent quarterly reports will contain additional examples of noteworthy trends and changes from the baseline data.

The bulk of the survey data is presented in aggregate form, treating SOV drivers the same as carpoolers. However, opinion data are presented by splitting these two groups. In an effort to better illustrate the changes in demographics and opinion since the previous survey period, many of the figures are based on data collected from January 1994 until May 1995. Any changes in opinions or trends were examined and the results are presented in a graphical format. A copy of the public opinion survey is contained in Appendix G.

TRAVELER DEMOGRAPHICS

To better acquaint users of these data with the survey population, demographic data are presented before sections relating to driving patterns and opinions on HOV lane effectiveness. This presentation of the results does not correspond with the order of the questions as they appeared on the survey, but it will facilitate interpretation of following sections.

It is impossible to ensure that the actual driver of the auto observed in the field will respond to the survey if more than one person in the house commutes to work. Therefore, we asked that the survey be filled out by the person in the house who commutes most often.

Figure 5.1 depicts the gender of survey respondents. In Figure 5.2, the distribution of the respondents' age is shown. Figure 5.3 examines the level of education respondents have reported.

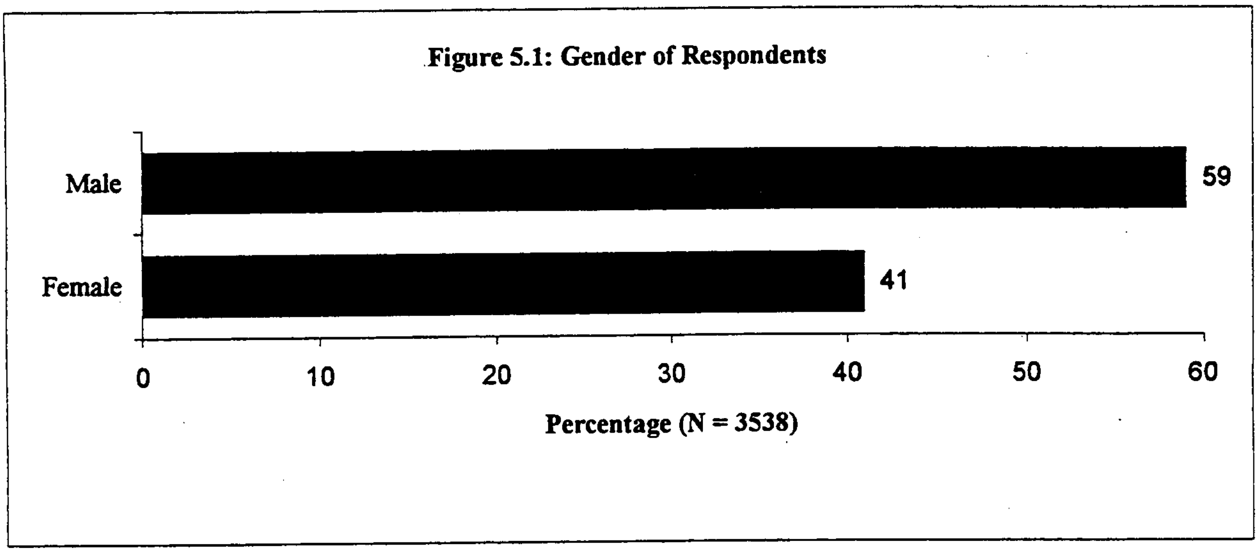


FIGURE 5.1 BOX TEXT: The percentage of female respondents increased slightly in comparison to previous results. This supports related data that women are participating in the work force at increasing rates.

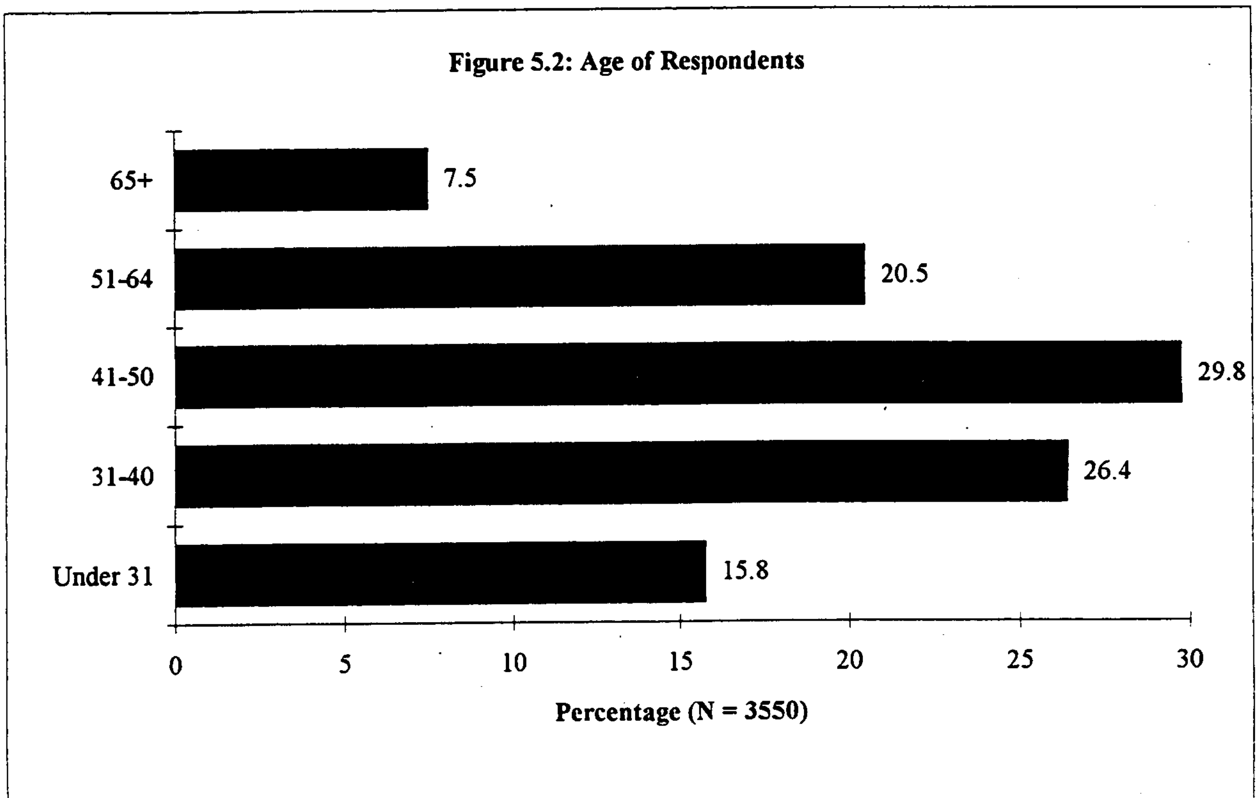


FIGURE 5.2 BOX TEXT: Over 250 respondents were age 65 or older, representing a sizable percentage of the sample size. This information confirms data that many users during peak hour are not necessarily commuters. It may also indicate that senior citizens are still very active in the urban work force.

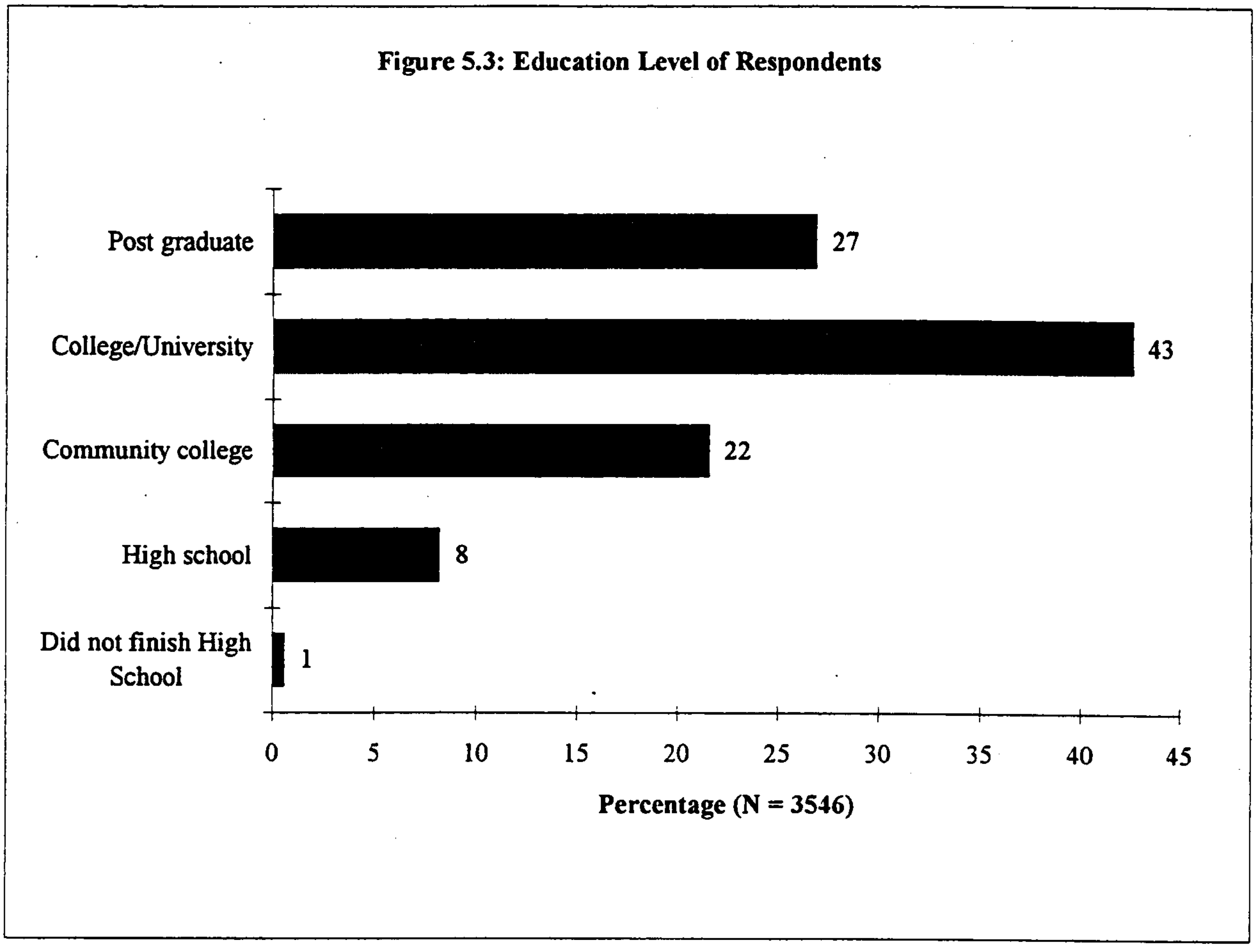


FIGURE 5.3 BOX TEXT: Seventy percent of survey respondents said they possess a college degree or post-graduate education. People with a relatively high level of education may be more inclined to respond to surveys than those with less education.

The public opinion survey asked respondents to provide information on their domestic conditions, including the number of people living in the household, the number of children age 15 or less to determine the number of eligible drivers, the number of people working outside the home, and the number of vehicles owned by residents. Table 5.1 shows the most common clusters of domestic conditions for survey respondents.

Table 5.1: Domestic Conditions of Respondents

Domestic Conditions	Number	Percentage
2 people living in house No people under 15 years of age 2 people working outside house 2 vehicles	**874**	**15.98**
2-3 people living in house No people under 15 years of age 2 people working outside house 2 vehicles	**372**	**6.80**
1 person living in house No people under 15 years of age 1 person working outside house 1 vehicle	**308**	**5.63**
3-4 people living in house 2 or less people under 15 years of age 2 people working outside house 3 vehicles	**297**	**5.43**
4 people living in house 2 people under 15 years of age 2 people working outside house 2 vehicles	**272**	**4.97**
3 people living in house 1 person under 15 years of age 2 people working outside house 2 vehicles	**264**	**4.83**
3-4 people living in house 1-2 people under 15 years of age 1 person working outside house 2 vehicles	**233**	**4.26**
2 people living in house No people under 15 years of age 1 person working outside house 2 vehicles	**222**	**4.06**
Other/No Response	**2627**	**48.04**
Total	**5469**	**100.00**

Figures 5.4 and 5.5 show the normal commute and trip routes for survey respondents. Originally, the commute route was determined by the highway corridor in which motorists were observed. This designation could then be used to measure sub-regional differences in opinion about HOV lanes. However, many respondents were observed in locations outside their normal commute routes or had commute routes that included more than one traffic observation corridor. To best analyze sub-regional differences in opinion, the commute route information is broken down into categories containing complete information on the commute route and other travel during peak hours. The major freeways located within the Puget Sound region were divided into ten corridors and six additional combined corridors.

1)	I-5 North	1a)	I-5 North\ I-5 Central
2)	I-5 Central		
3)	I-5 South	3a)	I-5 South\ I-5 Central
4)	I-90	4a)	I-90\ I-5 Central
		4b)	I-90\ I-405
5)	SR-520	5a)	SR-520\ I-405
		5b)	SR-520\ I-5 Central
6)	I-405		
7)	SR-16		
8)	SR-167		
9)	SR-410		
10)	SR-512		

Because a single corridor may be divided into one or more class divisions, the percentages shown on Figures 5.4 and 5.5 may be somewhat misleading. To determine to what extent a corridor is being utilized, the percentages from each class division with which a corridor is associated must be added. This sum represents the true percentage of the overall use on the various corridors as selected by the survey respondents.

Figure 5.4: Normal Commute Route

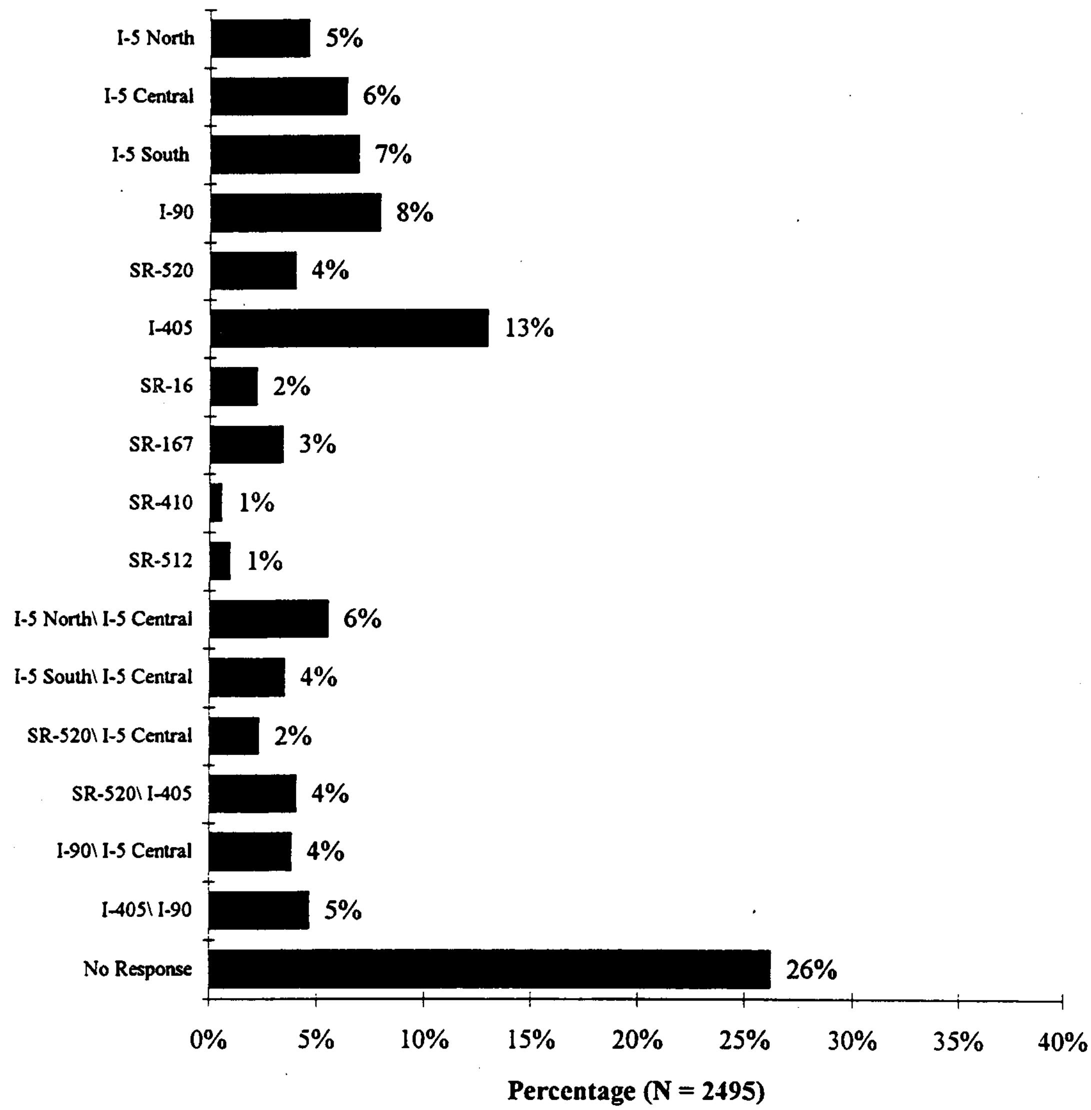


FIGURE 5.4 BOX TEXT: This chart may be misleading in that a single commute corridor is divided between more than one class division. To obtain the true percentage of use for a particular commute corridor, one must add the percentages.

Figure 5.5: Normal Trip Route

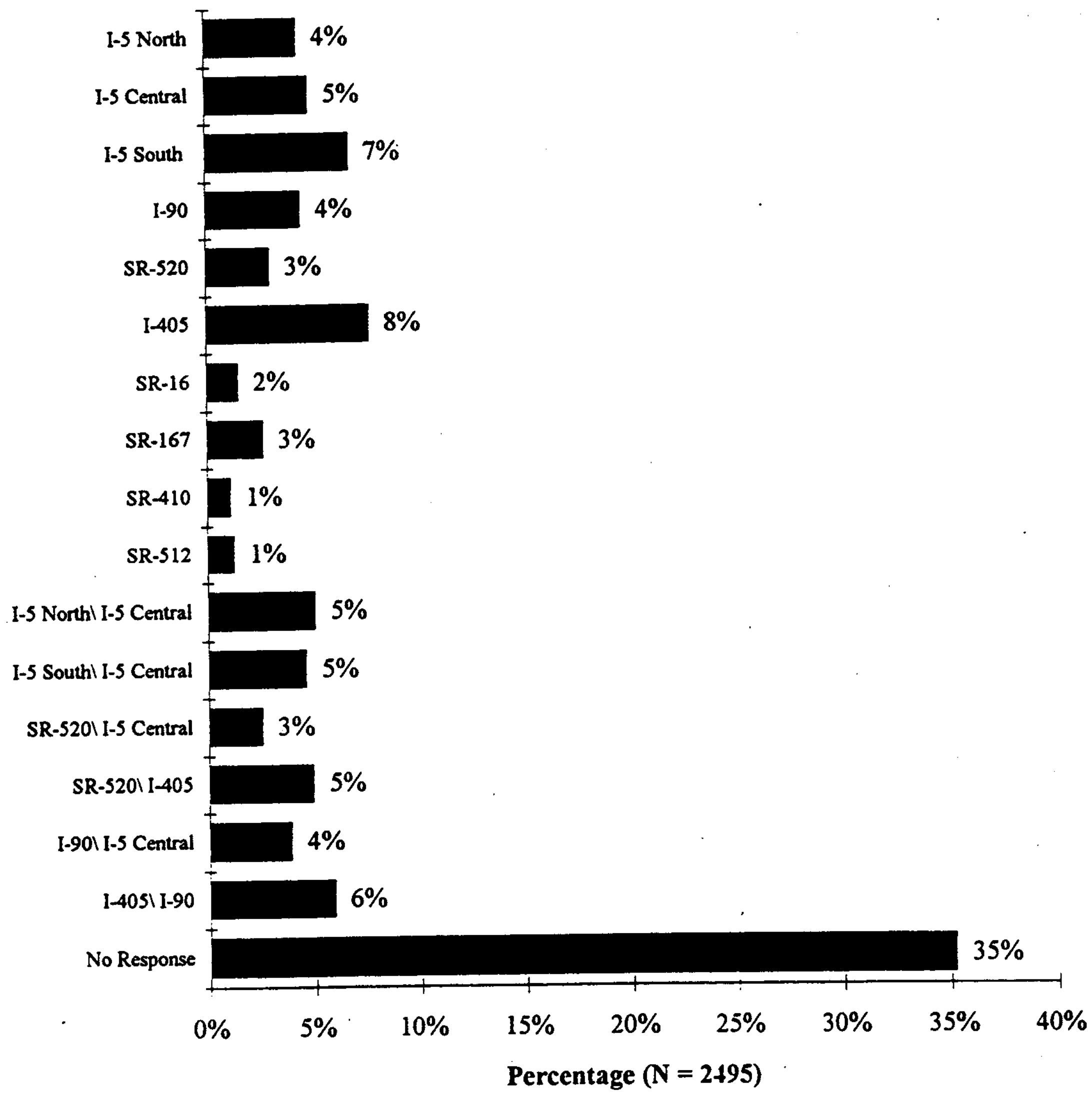
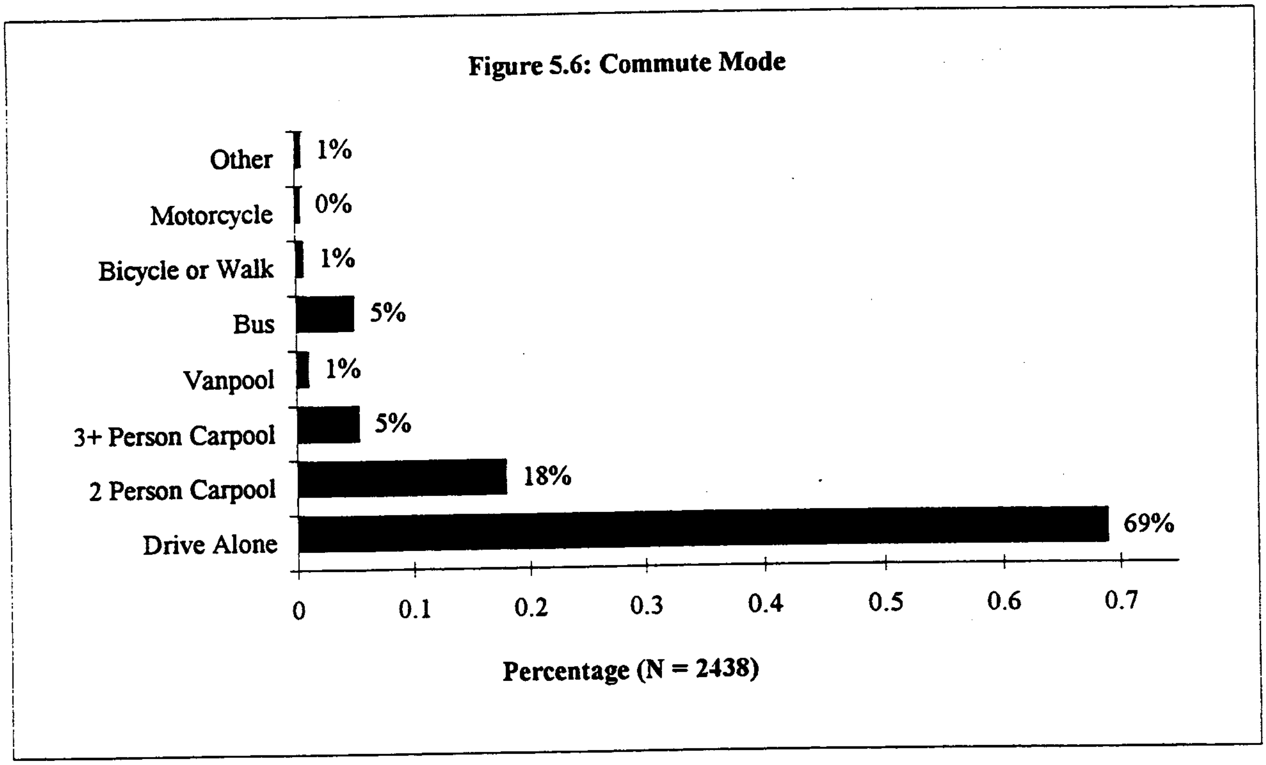


FIGURE 5.5 BOX TEXT: Again, this chart may be misleading in that a single commute corridor may be divided between more than one class division. To obtain the true percentage of use for a particular+A232 commute corridor, one must add the percentages.

TRAVELER COMMUTE TRIP

One of the controls for classifying survey responces is commute mode. Respondents' commute modes were determined visually by an observer during the peak hour counting sessions. Vehicles were selected from both the HOV lanes and general propose lanes at random. A vehicle's license plate was then recorded, sent to the Department of Motor Vehicles, and returned with the registered owner's name and address. Unfortunately, the observed driver was not always the registered owner, so asking the respondent to specify the commute mode of choice helped to avoid any confusion on this point.

Figure 5.6 shows the actual commute modes of survey respondents. For the purposes of later data analysis, the 2 Person Carpool, 3+ Person Carpool, Bus, Vanpool, and Motorcycle responses are combined into an HOV category. Motorcycles are added to the HOV category because these vehicles are allowed to use HOV lanes. Figure 5.6.1 provides insight on the change in percentage in the various commute modes since the previous survey period (January 1994). The trends suggest that despite the expansion of the current HOV system, commuters are traveling alone in even greater numbers.



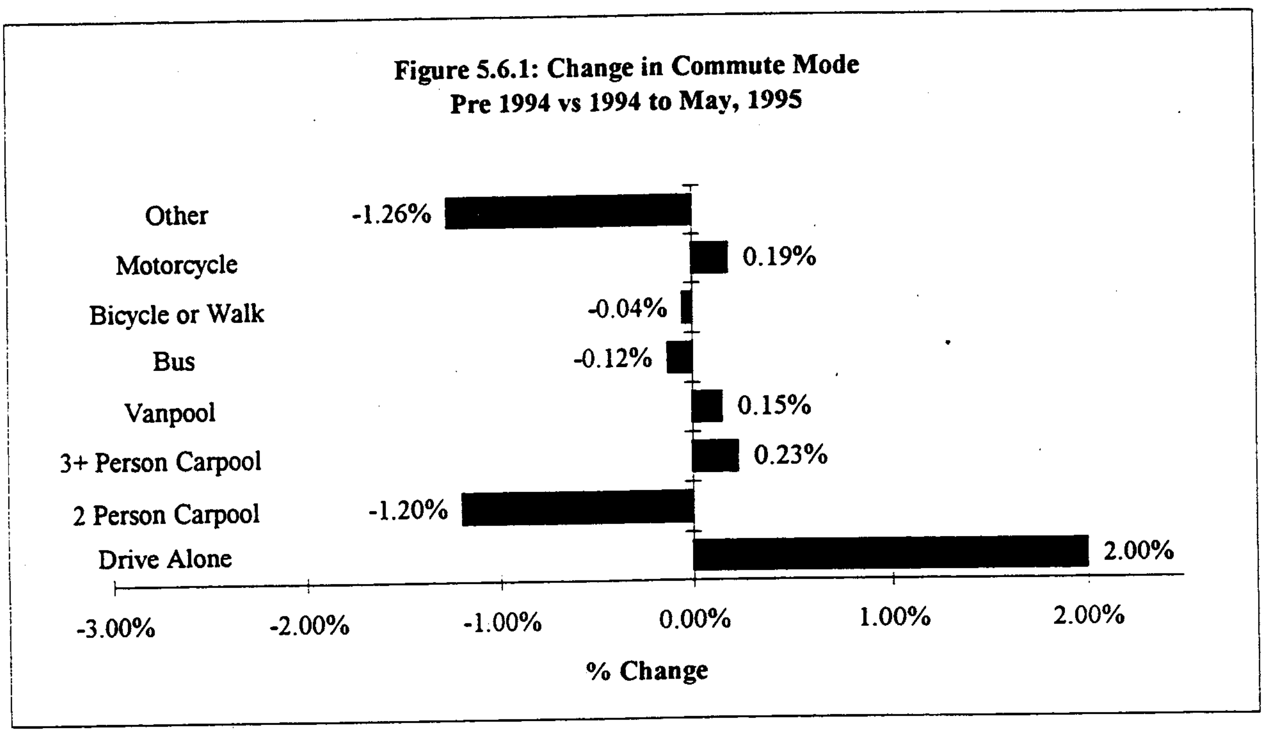


FIGURE 5.6-5.6.1: SOV commuters far outweigh those who rideshare, despite attempts to generate comparable samples of HOV and SOV drivers. Trends in commute mode suggest that drivers are still partial to traveling alone rather than ridesharing. This underscores the frequency with which special circumstances alter individuals' travel behavior.

Figures 5.7 and 5.8 provide information on past use of HOV lanes. Respondents were asked to indicate which HOV lanes they have used and their usual driving mode while utilizing them. The total of the percentages exceeds 100 because respondents were asked to indicate all options that applied to their past use of HOV lanes; therefore an individual might have used HOV lanes in more than one mode and on more than one of the designated highway corridors.

Trends in HOV commute mode have remained fairly consistent, dominated by 2 and 3+ carpools, but Figure 5.8.1 shows some interesting changes in the levels of use of the various HOV lanes in the region. Along the I-5 Downtown and I-405 corridors, levels of use have risen dramatically, suggesting a change in commuter's mode of choice. These mode choices are influenced by a variety of factors, one being the pressure of congestion levels. It is possible that commuters along these corridors have responded to congestion pressures and subsequently have altered their commute mode for a more favorable option. One final point of interest is lack of increase in usage levels in the I-5 North corridor, where congestion continues to persist. One possible reason could be that because this HOV corridor has being open for nearly ten years, response to congestion pressures had reached a plateau before the previous survey period. Therefore, a change in levels of use would not be evident between the two survey periods.

It should be understood that these opinions are compiled from the responses of returned surveys. Because of the random nature of the mailing and those returning the surveys, conclusions drawn from this data should not be taken as fact; rather they should be considered and further investigated in a more analytical fashion.

Figure 5.7: Past Use of HOV Lanes

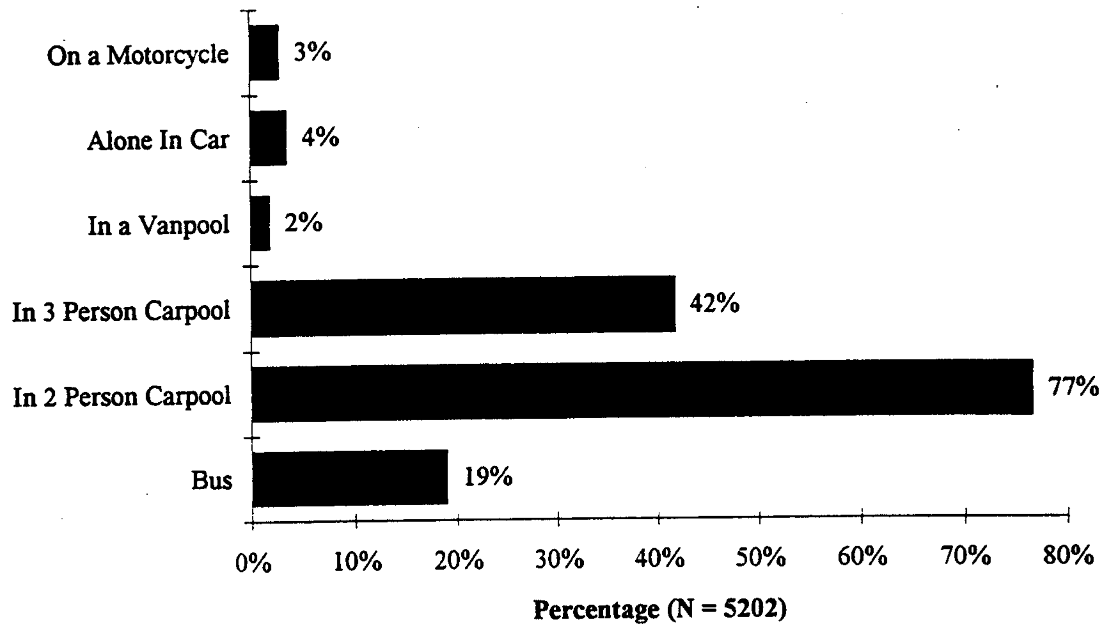


FIGURE 5.7 BOX TEXT: The high percentages in 2-Person and 3+ Person carpools could suggest that HOV lanes are popular during the work week when employees commute together. Families also contribute to higher percentages in this category as a result of occasional weekend traveling. Because of the wording of this question, (ever use vs. usually use), the percentages are higher than those of Figure 5.6.

Figure 5.8: Past Use of HOV Lanes as Recorded by Survey Respondents

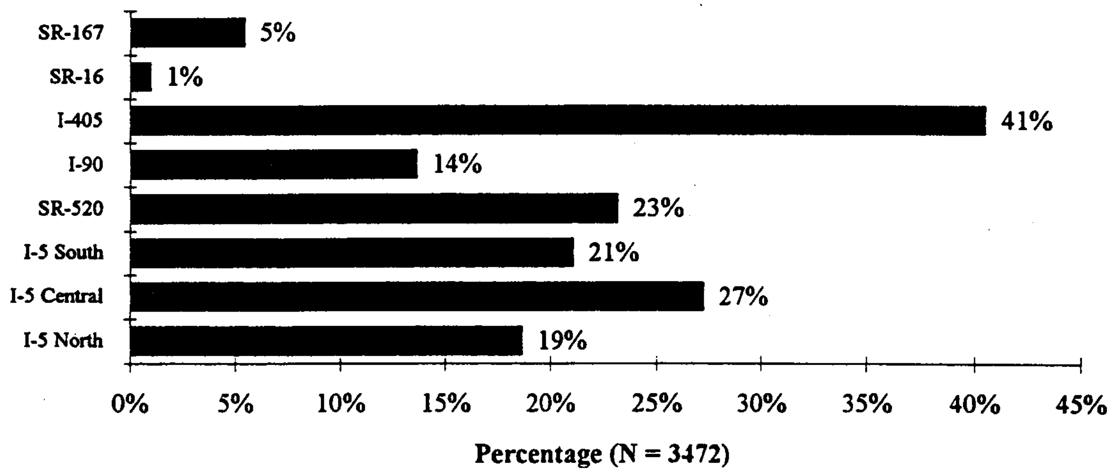


Figure 5.8.1: Change in Percentage in Past Use Pre 1994 vs 1994 to May, 1995

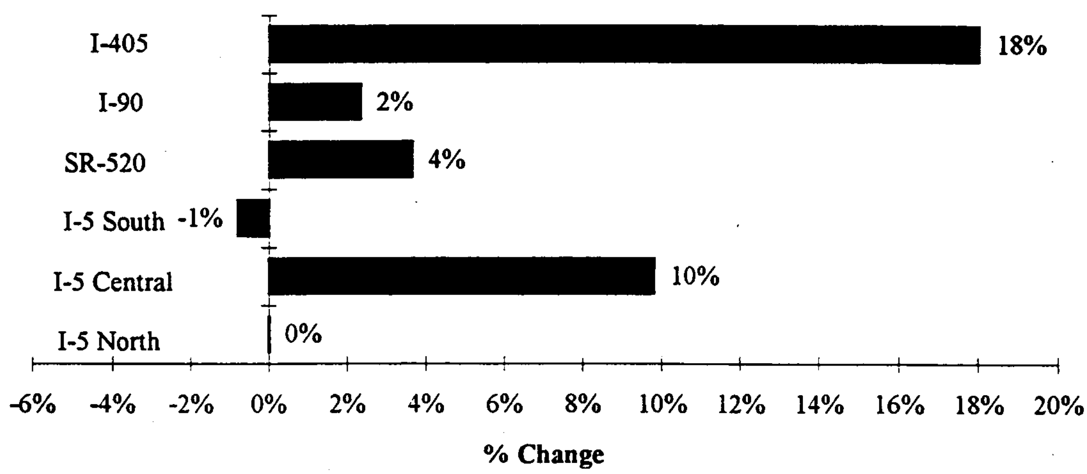


FIGURE 5.8-5.8.1 BOX TEXT: Again, the frequency of drivers who have utilized HOV lanes along the I-405 corridor surpasses that of all other study corridors. This could be a result of more surveys being distributed to eastside communities because of recent rises in population in the region. Both the I-405 and I-5 Central HOV lanes have shown an increase in use due possibly to increased congestion in these corridors over time.

Figures 5.9 and 5.10 show the percentages of respondents who qualified for HOV lane use but chose not to use the lanes and a list of reasons for this choice. Data for Figure 5.10 represent single instances in which respondents chose not to use HOV lanes. Respondents were asked to check all conditions that have kept them from using HOV lanes when they have been to eligible use them. Because of these multiple responses, the percentages have been normalized to provide a better representation of the data. These questions were modified in February 1994 to limit the time of consideration to the peak-hour periods only. As the HOV lane system is completed, it will be interesting to track opinion on these questions to see whether the travel time savings provided by longer HOV lanes attract more carpoolers.

Figure 5.9: Qualified for HOV Lane Use

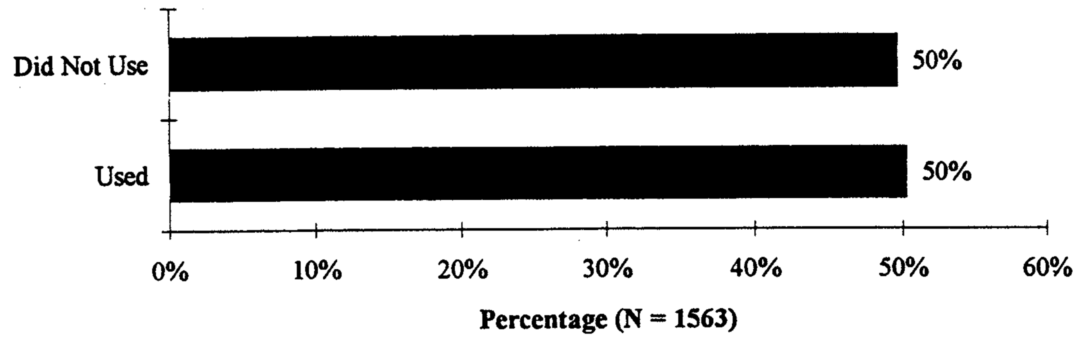


FIGURE 5.9 BOX TEXT: A significant number of respondents chose not to utilize HOV lanes even when vehicle occupancy requirements were met. This may be due to the wording of the question, which asked drivers whether they ever qualified to use the HOV lanes, as opposed to only inquiring whether they qualified during peak hours.

Figure 5.10: Reason HOV Not Used

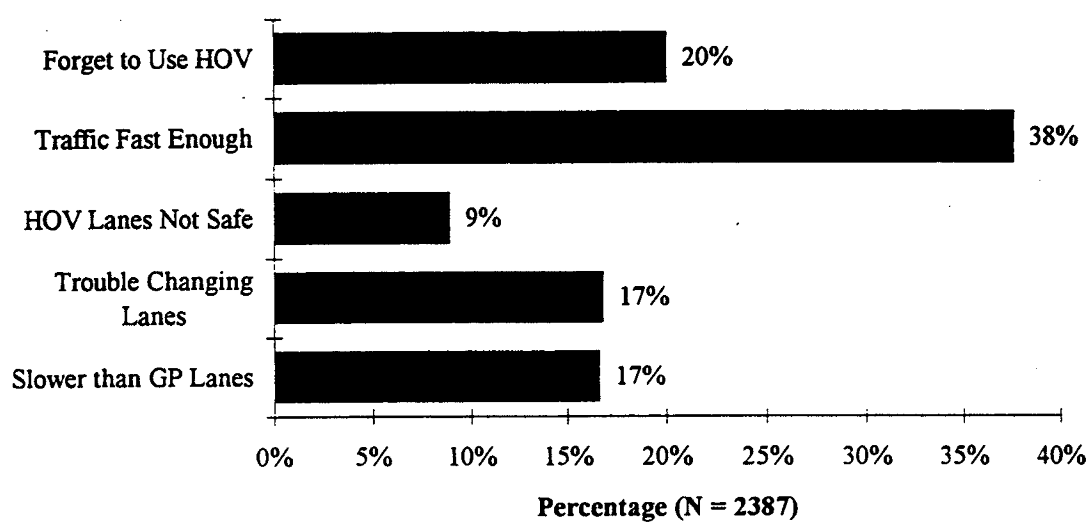


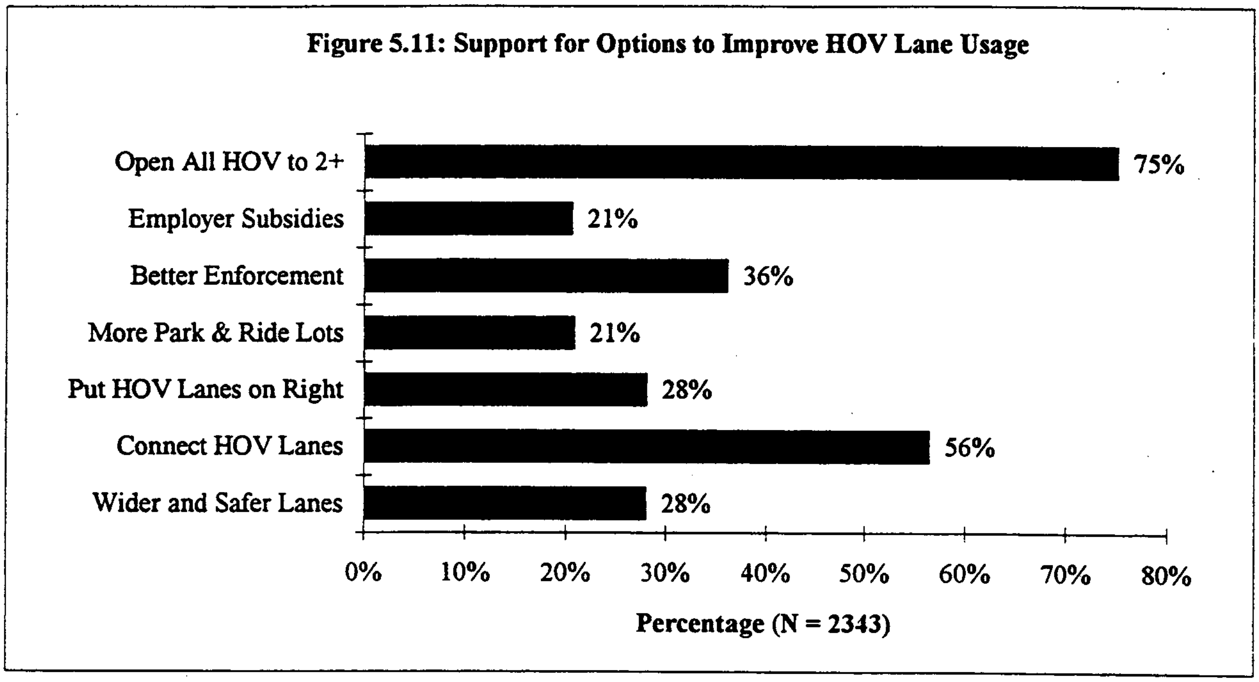
FIGURE 5.10 BOX TEXT: The selection "Traffic fast enough" predominates, since the question did not limit the commute period to the peak-hour. The function of some HOV lanes is to alleviate congestion bottlenecks during commute hours, and therefore, they A419are not required during off peak hours.

TRAVELER OPINIONS

Figure 5.11 shows the combined HOV and SOV responses for a set of options designed to enhance the attractiveness of the HOV lanes. Because respondents were asked to check three of seven options, the number of responses exceeds the number of overall survey responses. The distribution of responses remained consistent with that of the previous survey period, and the trends found earlier continue to exist. Figure 5.11.1 examines the change in percentage in opinion since the previous survey period.

The data presented in Figure 5.11 are broken down by commute mode in Figures 5.12 through 5.18. The number of responses for Figures 5.12 through 5.18 was 1,647 SOV and 647 HOV, for a total of 2,343. A p-value, representing statistical significance, is also provided for each question. A p-value of .05 or less represents statistically significant differences of opinion between HOV and SOV groups.

The issue of how the HOV lanes should be configured is explored in more depth in Figure 5.14.1 and Table 5.2, which break down support for HOV lanes on the right side of the freeway by commute route. Of interest here is whether commuters who drive on routes with outside HOV lanes support that configuration more than other drivers do. The mixed results are depicted in Table 5.2 and the change in percentage is illustrated in Figure 5.14.1. Drivers who regularly use SR520 and I-405 (which features HOV lanes on both the right and left sides of the highway) support HOV lanes on the right side much more than do drivers in other corridors, but trends in the change in percentage suggest that support for this option has weakened.



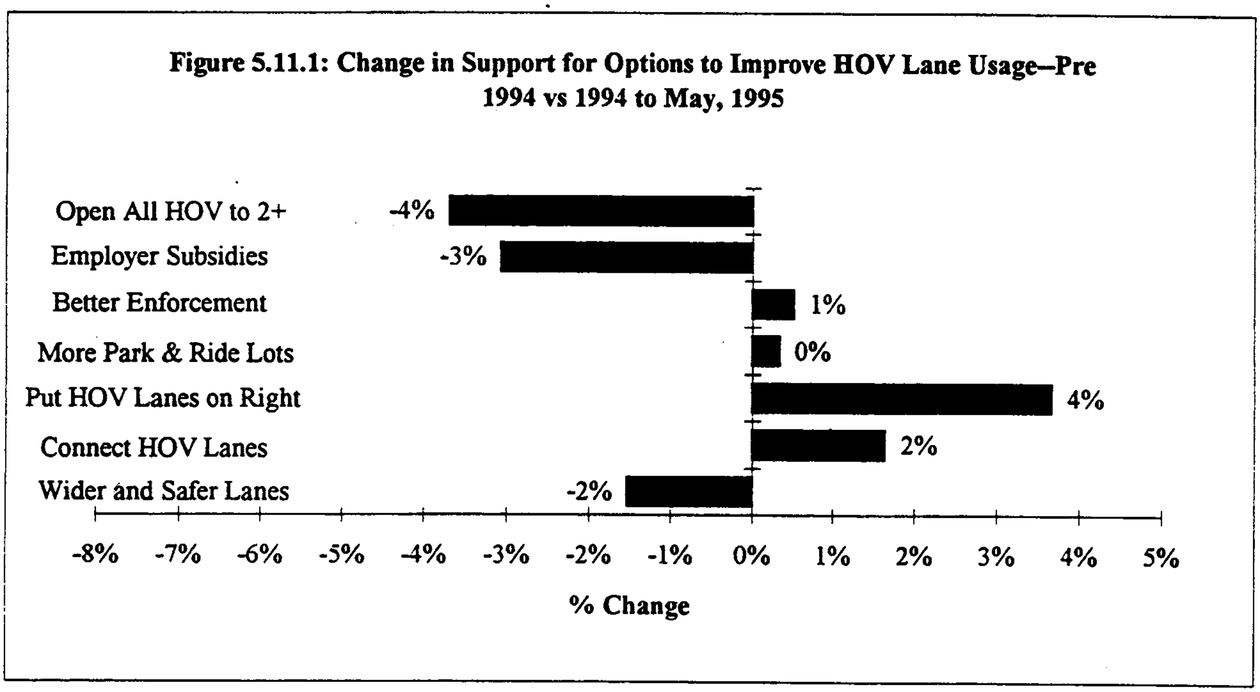


FIGURE 5.11-5.11.1: Except for the HOV lanes on SR-520, all freeway HOV lanes in the Puget Sound area are now designated as 2+. Completing the HOV lane system is an attractive option because substantial travel time savings will only be realized when drivers can use a continuous HOV lane throughout their trip. Enforcement and safety concerns appear to outweigh transportation demand management measures such as employer subsidies for ridesharing and additional Park & Ride lots. The issue of HOV lane configuration (right vs. left lane) is explored further in Figures 5.14 and Table 5.2.

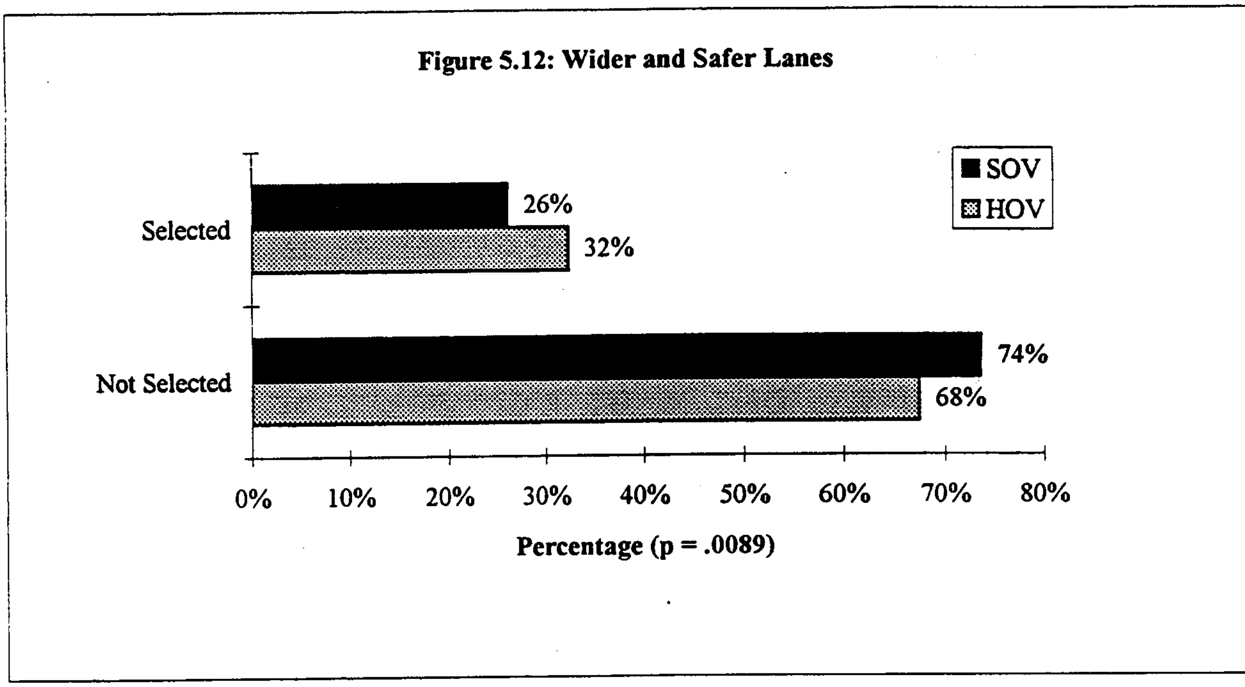


FIGURE 5.12 BOX TEXT: This option does not appear to be a high priority for either the HOV or the SOV groups. The marginal difference in option between groups may be due to carpoolers having more experience with HOV lanes than SOV drivers.

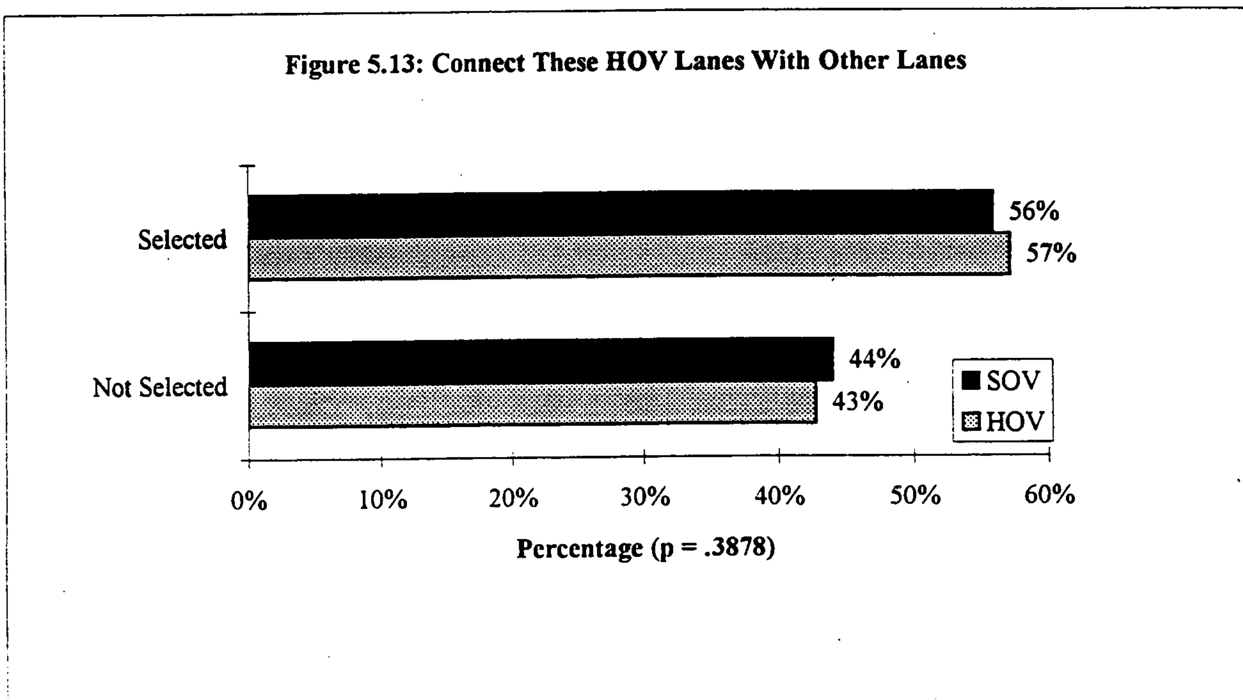


FIGURE 5.13 BOX TEXT: Drivers continue to show support for this option. Completing the HOV lane system would both benefit those already carpooling and provide a more compelling incentive for SOV commuters to switch over to ridesharing or transit.

Figure 5.14: HOV Lanes on Right Side of Freeway Instead of Left Side

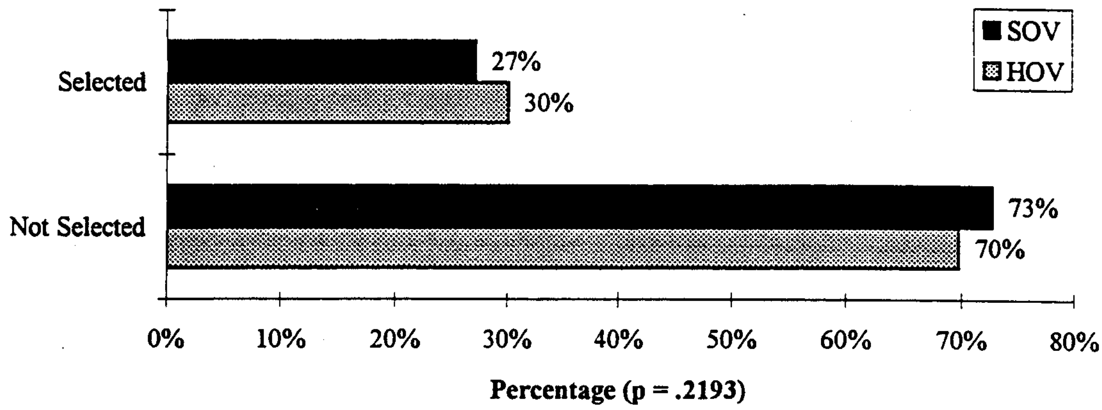
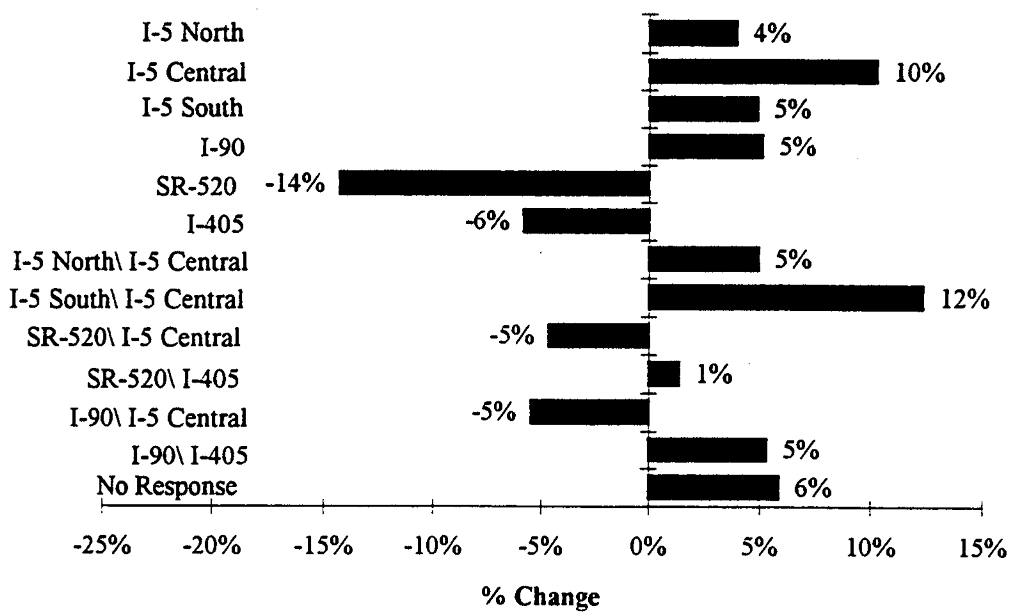


Figure 5.14.1: Change in Percentage in Support for HOV Lanes on Right Side of Freeway by Commute Route
Pre 1994 vs 1994 to May, 1995



FIGURES 5.14-5.14.1 BOX TEXT: Approval for this option is up slightly overall, but trends for individual corridors are much more evident if Figure 5.14.1 and Table 5.2 are examined. The change in percentage shows that drivers who have HOV lanes on the right side appear to favor them on the left, whereas those who commute on freeways with HOV lanes on the left seem inclined to try them on the right.

Table 5.2: Support for HOV Lanes on the Outside by Commute Route (HOV and SOV groups combined, p = .014)

Commute Route	% Selected	% Not Selected	Total
I-5 North	23	77	115
I-5 Downtown	23	77	159
I-5 South	27	73	172
I-90	25	75	197
SR-520	25	75	100
I-405	31	69	323
SR-16	25	75	55
SR-167	34	66	85
SR-410	43	57	14
SR-512	19	81	24
I-5 North\ I-5 Downtown	23	77	138
I-5 South\ I-5 Downtown	26	74	88
SR-520\ I-5 Downtown	18	82	58
SR-520\ I-405	28	72	101
I-90\ I-5 Downtown	21	79	96
I-405\ I-90	26	74	116
No Response	30	70	654
Total	**26**	**74**	**2495**

Figure 5.15: Park & Ride Lot Near Freeway Entrances and Exits

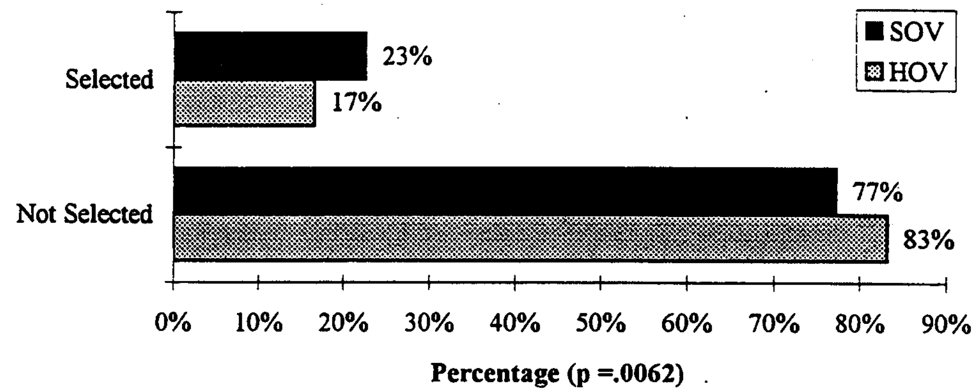


FIGURE 5.15 BOX TEXT: Support for this option has remained relatively unchanged, with SOV drivers showing slightly more support than their ridesharing counterparts. This may reflect the belief that Park & Ride lots are not so much places to assemble carpools as they are links to bus service.

Figure 5.16: Better Police Enforcement Against Violators

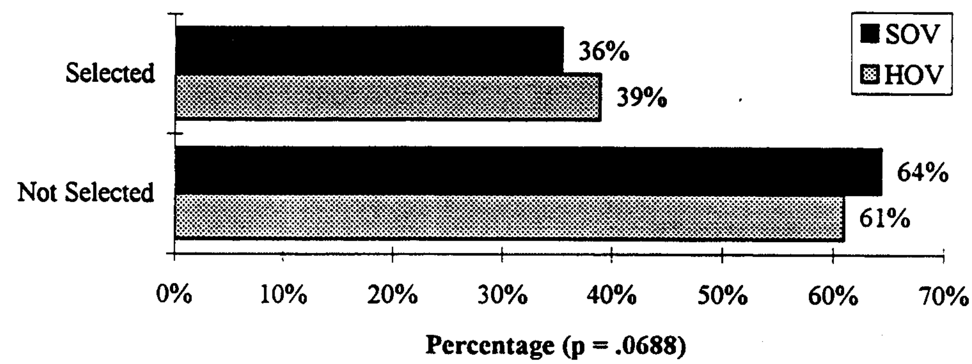


FIGURE 5.16 BOX TEXT: Both groups appear sensitive to violations of the HOV system when others are observed abusing this special privilege. The p-value of .0688 shows some difference in opinion between HOV and SOV drivers, but the variance is not a strong one.

Figure 5.17: Employer Subsidies for Ridesharing

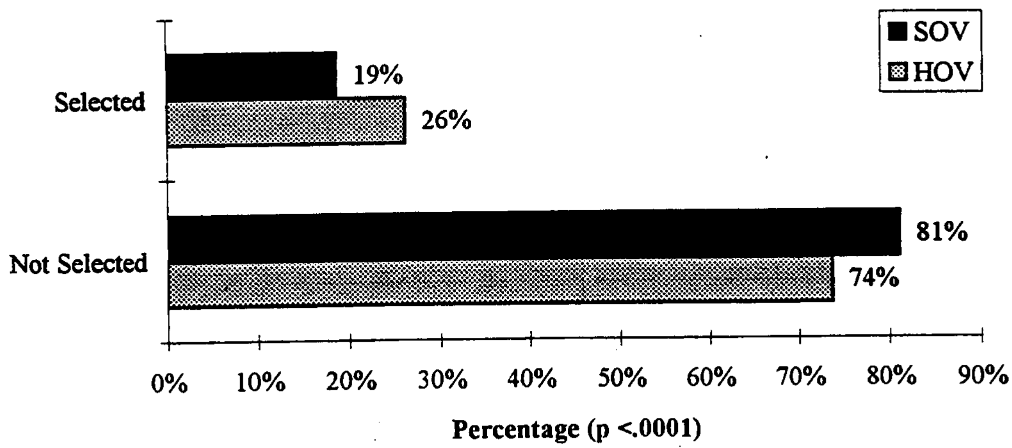


FIGURE 5.17 BOX TEXT: Carpools continue to support this option more than their SOV counterparts because they would benefit more readily from such subsidies. The low frequency of selection among both groups may indicate that drivers do not feel that rideshare inducements are very effective.

Figure 5.18: Open All HOV Lanes to 2 Person Carpools

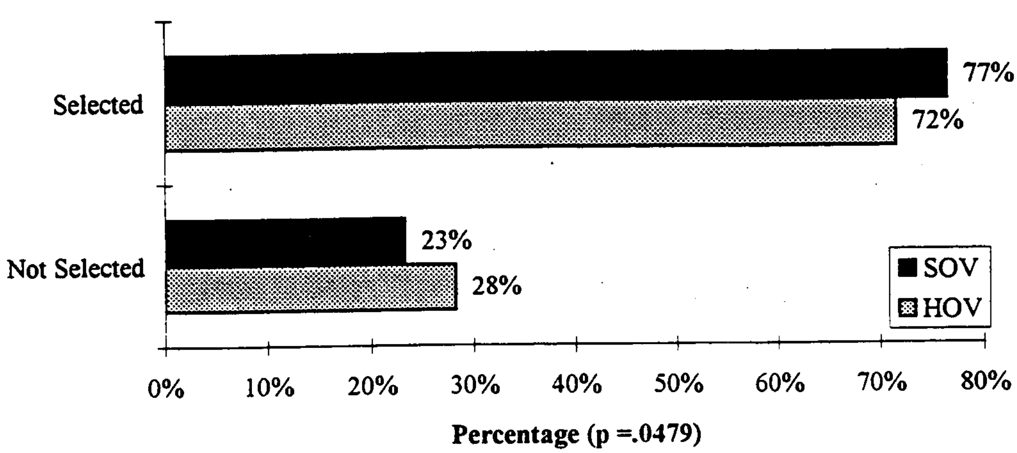


FIGURE 5.18 BOX TEXT: A clear majority of commuters still support this option, but 28 percent of carpoolers do not. A reason HOV drivers withhold support may be that they feel opening all HOV lanes to 2+ carpools has/would create congestion within the HOV lanes.

OPINIONS ON VARIOUS HOV LANE ISSUES

Figures 5.19 through 5.32 present data from questions about motorists' opinions on a variety of issues related to HOV lane use and effectiveness. The responses are broken down by normal commute mode and by the degree to which respondents agree with individual assertions. Sample sizes for both HOV and SOV groups are provided for each question. The exact wording of each question is provided in the figure titles.

It is important to note that in most cases, both HOV and SOV drivers tend to share the same basic opinions on issues related to HOV lane effectiveness. When both groups tend to agree in general, the differences in opinion among HOV and SOV drivers are frequently based on the degree of support for or opposition to a particular issue. The most notable exception to this trend is when an issue concerns mode choice and the impact of HOV lanes on congestion reduction.

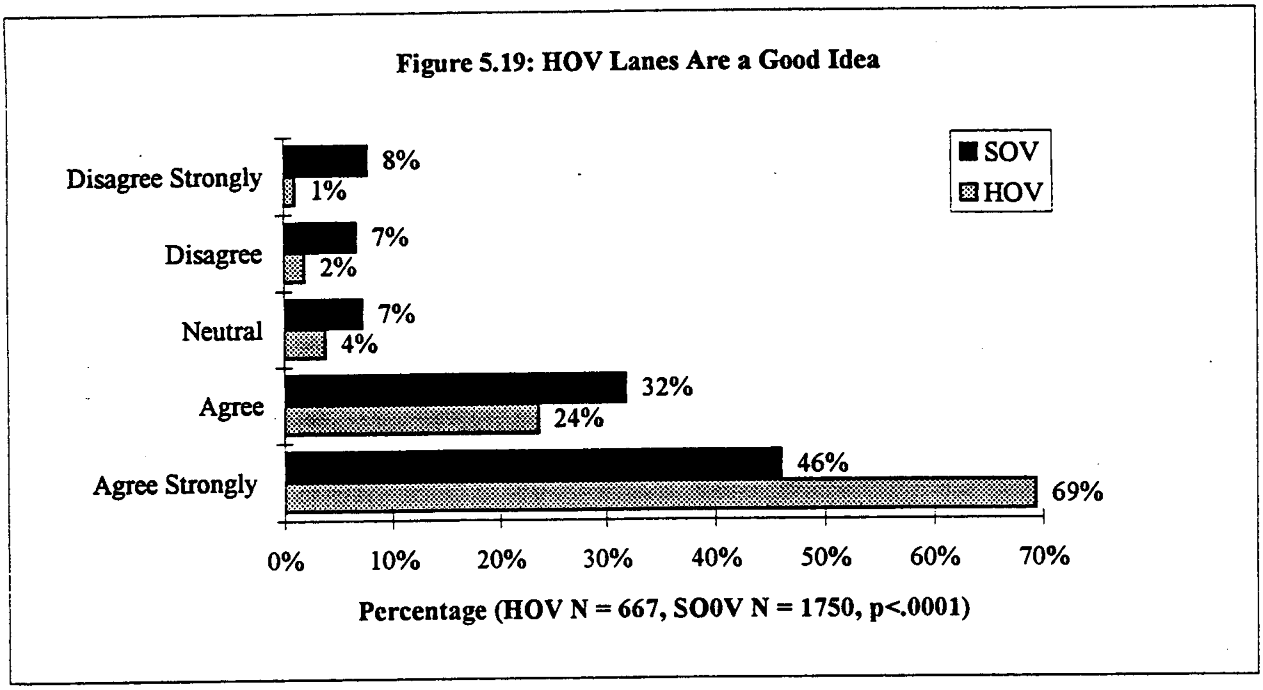


FIGURE 5.19 BOX TEXT: Currently, 82 percent of all drivers favor the idea of HOV lanes. This is a 5 percent decrease over the previous survey period, suggesting a possible change in the public's attitude toward the effectiveness of HOV lanes.

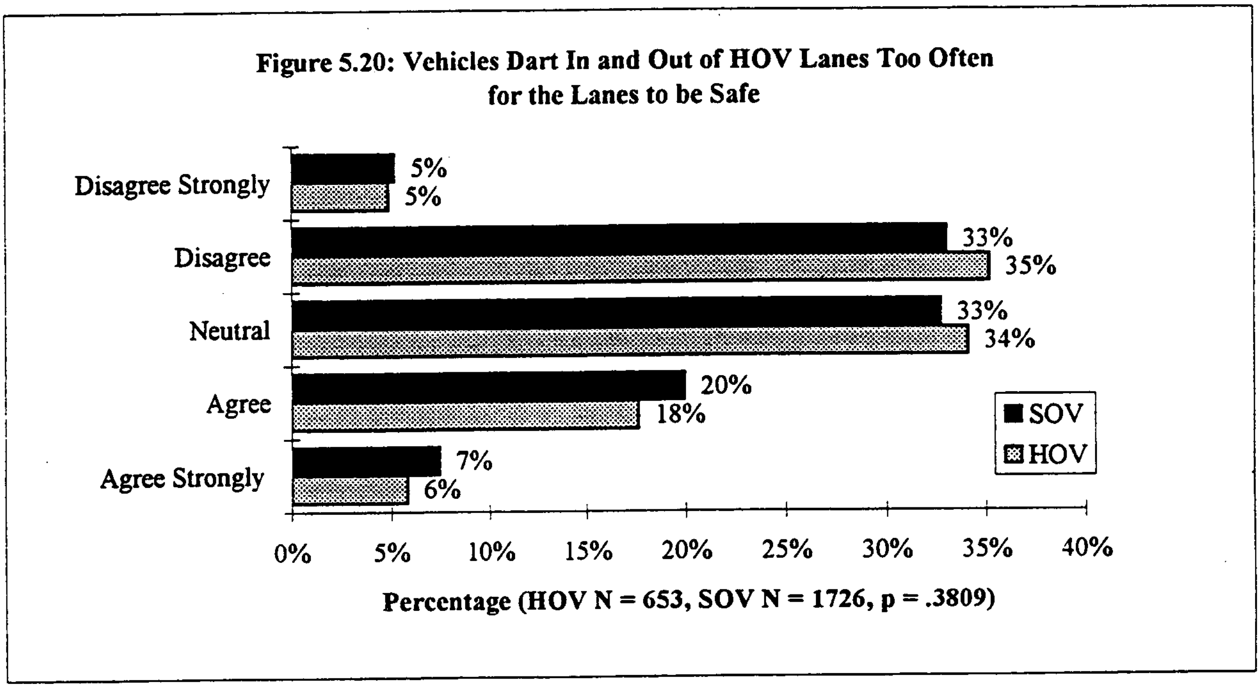


FIGURE 5.20 BOX TEXT: While the opinions of both HOV and SOV drivers are very similar on this issue, the high p-value shows that variance of opinion is too large to draw any certain conclusions. HOV drivers may feel safer on HOV lanes because of more experience or may just be unwilling to express something negative about the HOV system they utilize.

Figure 5.21: HOV Lanes Help Save All Commuters a Lot a Time

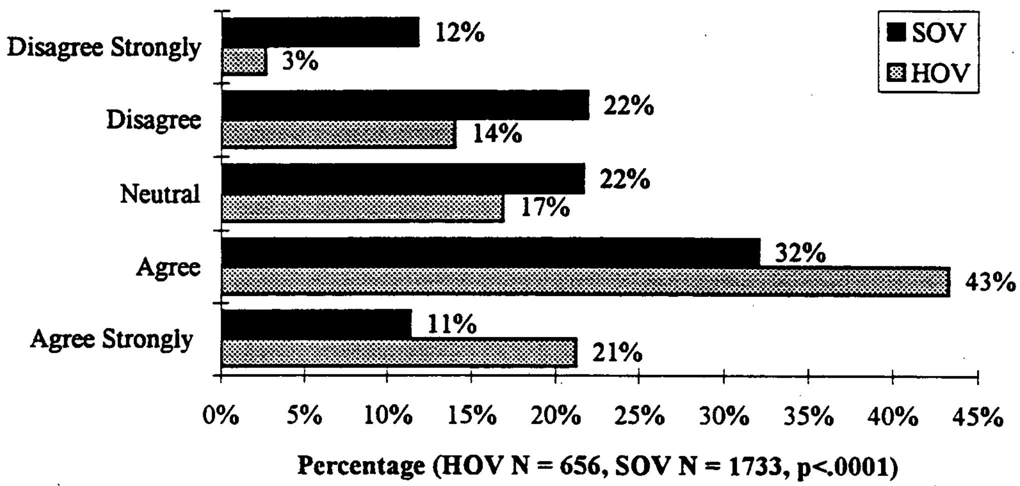
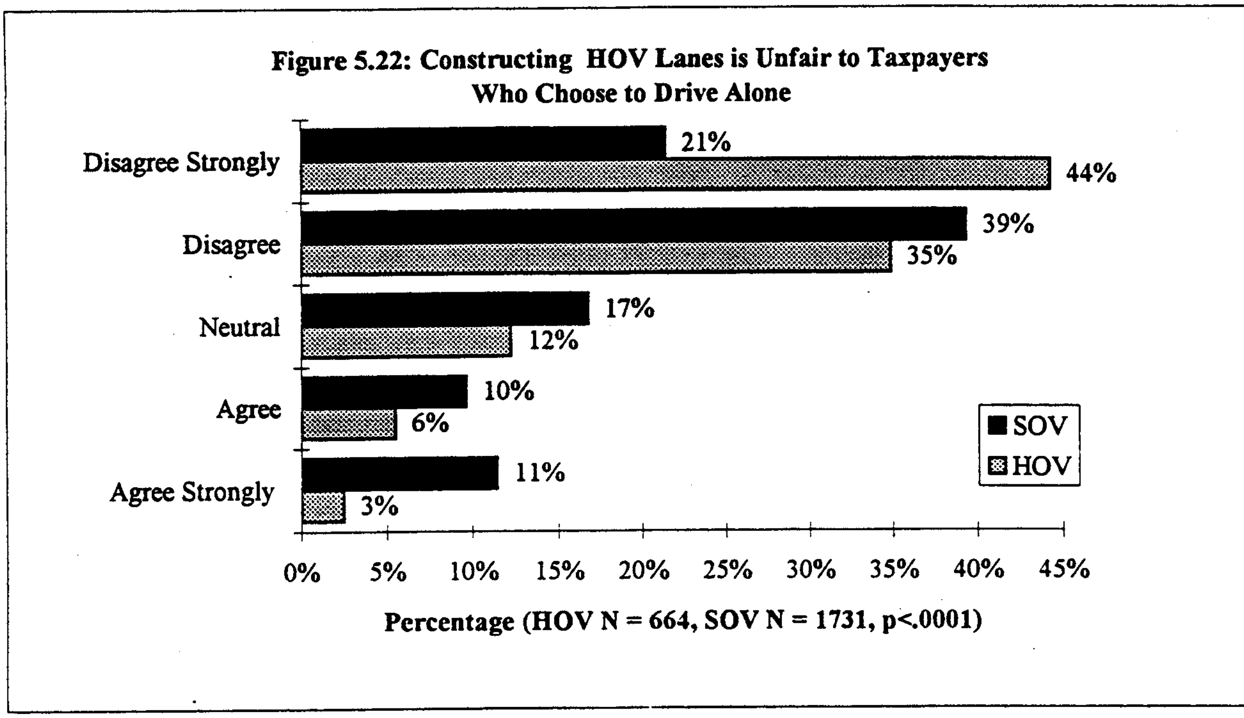


FIGURE 5.21 BOX TEXT: A significant difference of opinion on the travel time issue appears to exist between the two groups. SOV drivers tend to be more negative as they are forced to wait in congestion bottlenecks while an HOV lane stands relatively empty. Similarly, HOV users may feel an inflated sense of contribution to congestion reduction by virtue of their carpooling.



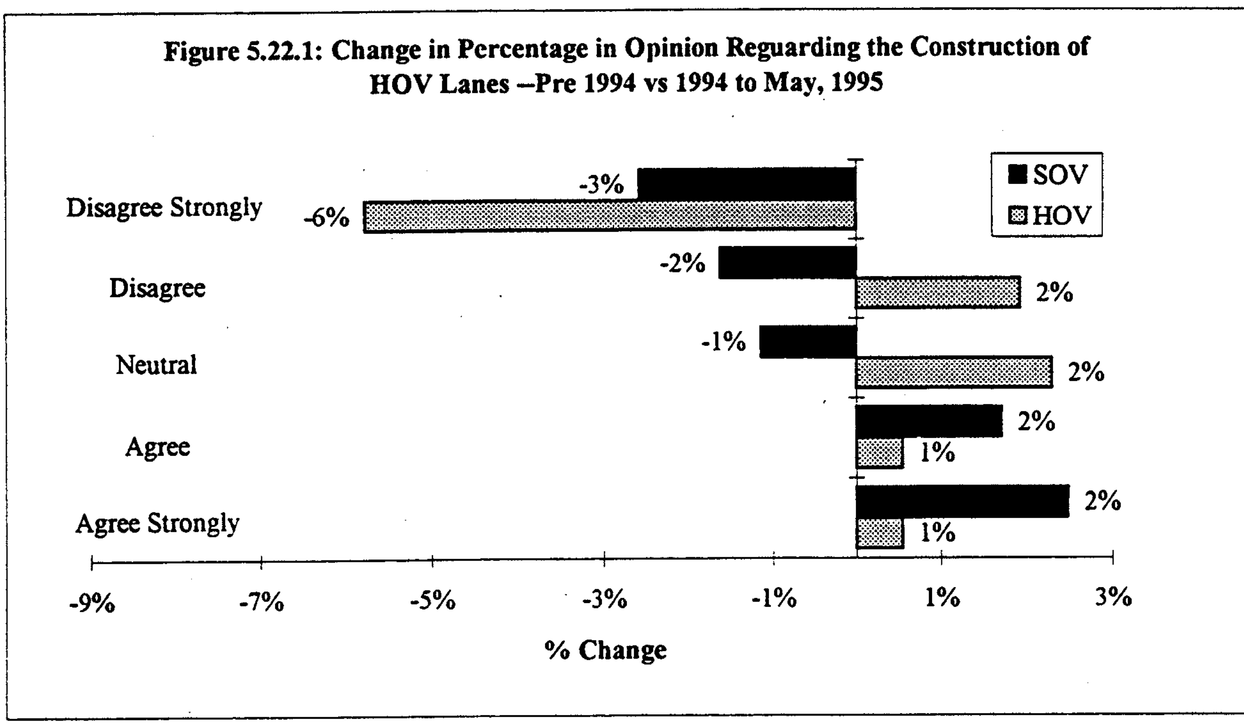


FIGURE 5.22-5.22.1 BOX TEXT: Although the majority of commuters believe that HOV lanes are a fair use of taxpayers' money, support appears to be waning. Trends in the change in percentage show that the opinions of both HOV and SOV groups are shifting towards agreeing strongly with this viewpoint. This may be due to a continued increase in congestion levels despite the availability of a partial HOV lane system is in place.

Figure 5.23: Existing HOV Lanes Are Being Adequately Used

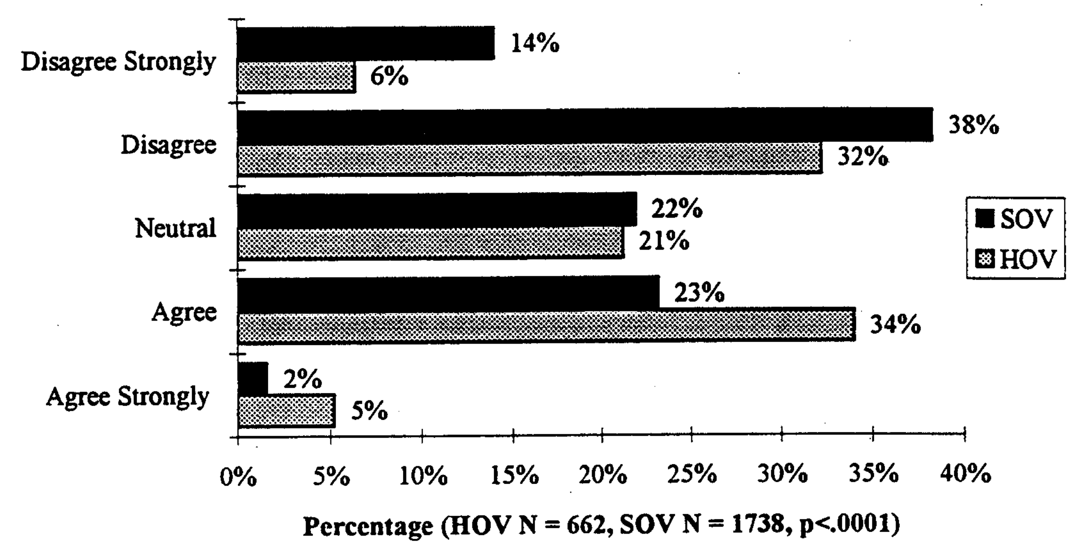


FIGURE 5.23 BOX TEXT: There is a definite split in opinion on this issue. Overall, 49 percent of respondents disagreed that the HOV lanes are being adequately used, 29 percent thought otherwise, and 22 percent remained neutral on this point.

Figure 5.24: HOV Violators Commit a Serious Traffic Violation

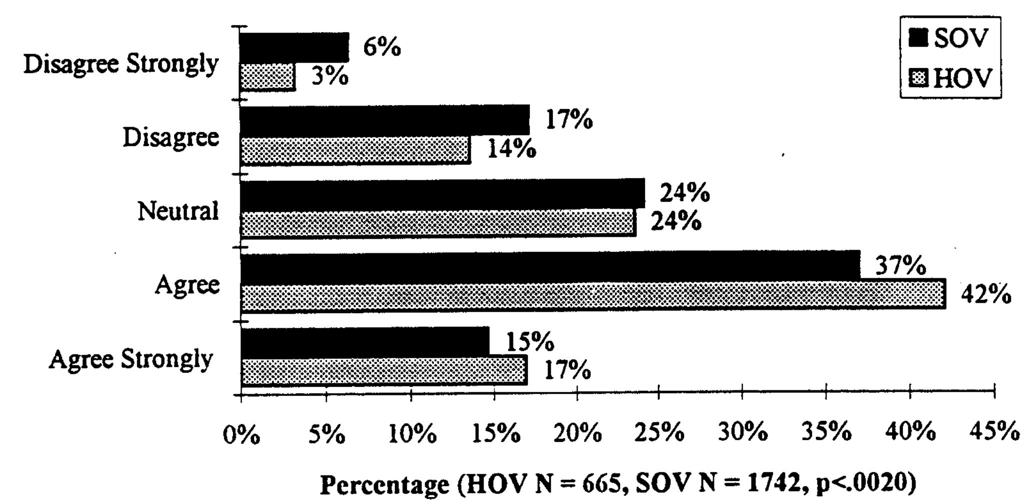
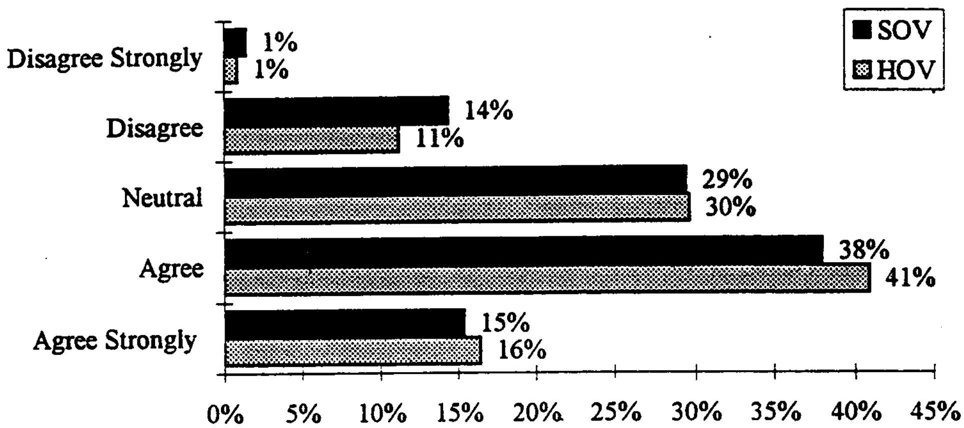


FIGURE 5.24 BOX TEXT: These results suggest that SOV drivers tend to place a lower priority on HOV lane enforcement than do HOV drivers. Even so, both groups appear to resent the fact that HOV lane violators are unwilling to sit in traffic like everyone else.

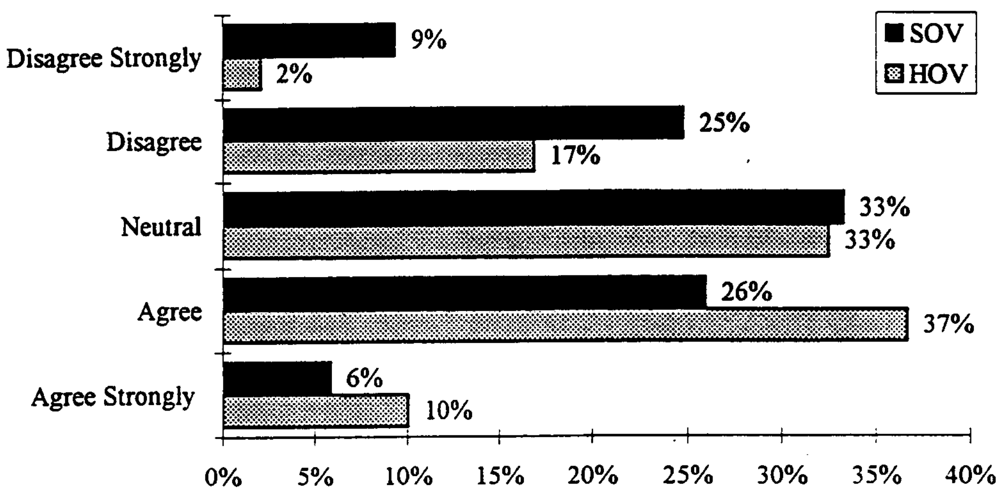
Figure 5.25: HOV Violations Are Common During the Commute Hours



Percentage (HOV N = 662, SOV N = 1729, p=.1842)

FIGURE 5.25 BOX TEXT: Overall, 54 percent of respondents agreed that violations are common during the commute hours. This may explain why better enforcement was selected as one of the top three options for increasing the attractiveness of HOV lanes. (Figure 5.11)

Figure 5.26: Many More People Would Carpool if HOV Lanes Were More Widespread



Percentage (HOV N = 656, SOV N = 1740, p<.0001)

FIGURE 5.26 BOX TEXT: Opinions have remained fairly consistent on this point, with some ambivalence among the population as a whole. There was a slight shift between the medians of each group, with SOV drivers converging on a neutral standpoint and HOV drivers tending to hold a more positive opinion, possibly a result of rising congestion rates.

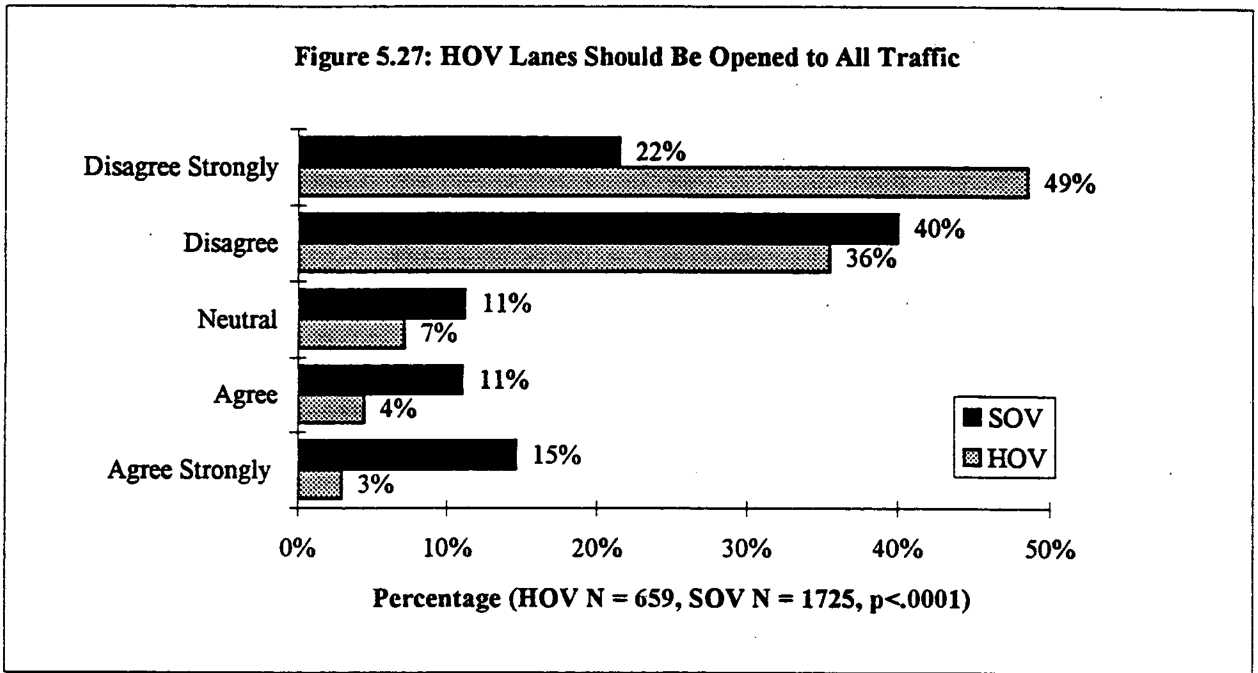


FIGURE 5.27 BOX TEXT: Currently, 68 percent of all respondents disagree with this proposition. This represents an 8 percent decrease over previous results. The associated trends in the change in percentage in opinion suggest+A898 that drivers may be changing their minds towards limiting access to HOV lanes at all times of the day.

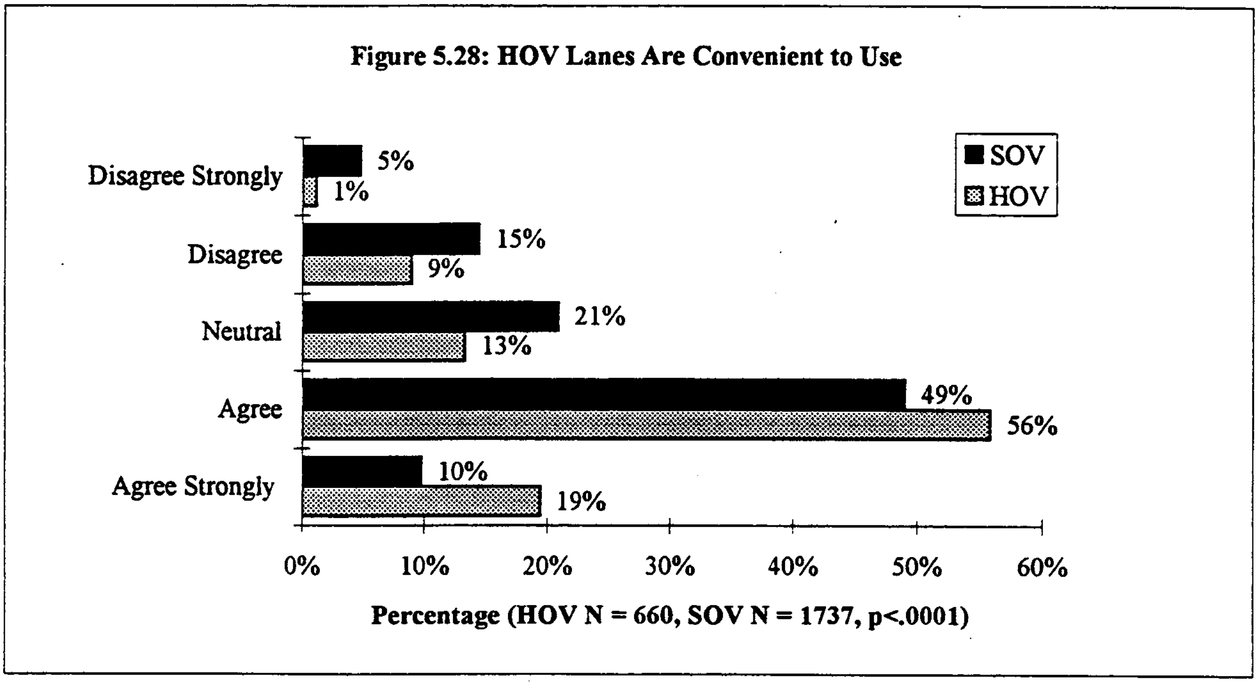


FIGURE 5.28 BOX TEXT: Both groups agree that HOV lanes are easy to use. As expected, HOV drivers are stronger supporters which may be due to the fact that they are more familiar with the HOV system's benefits and hazards.

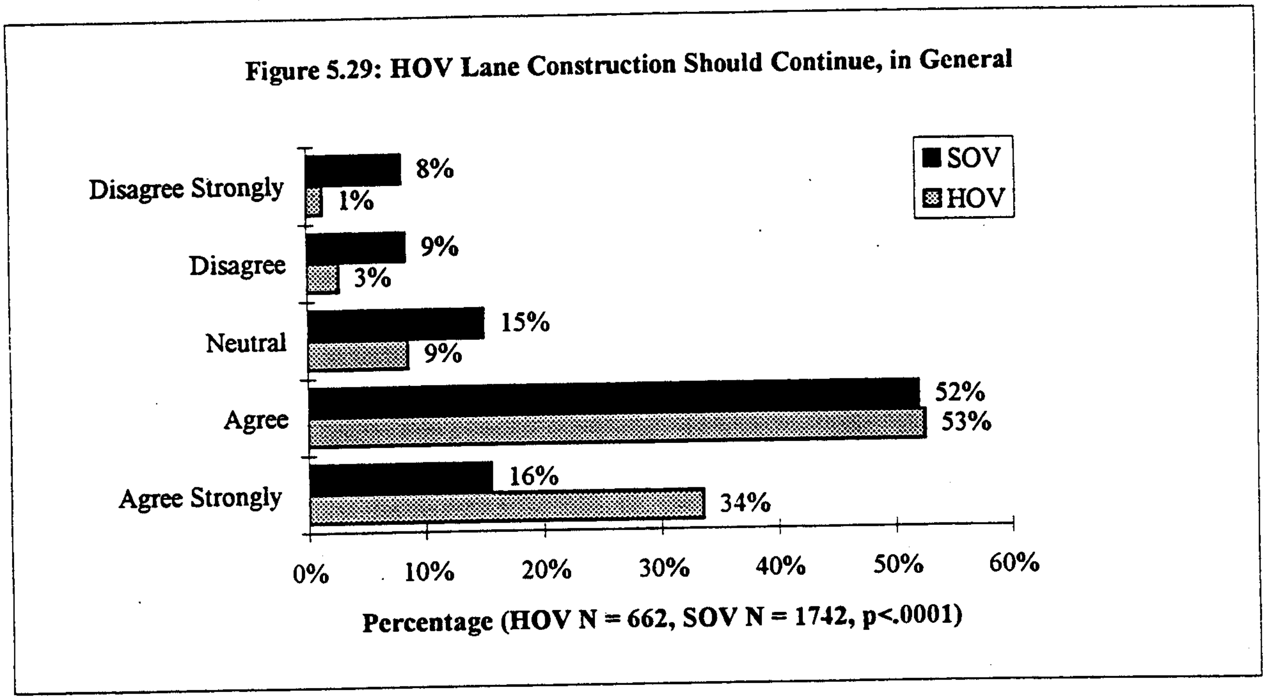


FIGURE 5.29 BOX TEXT: A majority of commuters continue to support the HOV lanes, with 73 percent in favor of this opinion. This high level of agreement is consistent with results from Figure 5.11; drivers favor the completion of the HOV system over other methods of improving the attractiveness of the HOV system.

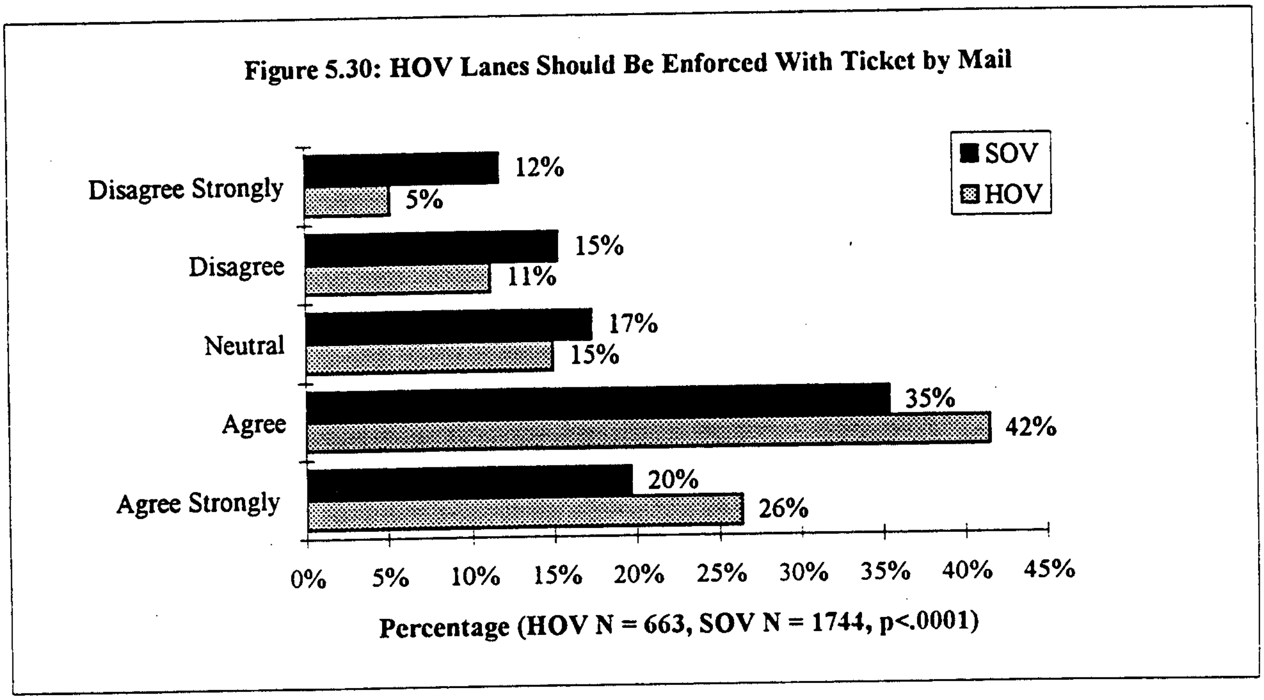


FIGURE 5.30 BOX TEXT: Fifty-five percent of SOV drivers, who would presumably be most affected by this method of enforcement, support the proposition. When compared to previous results, trends show+A971 a marginal decrease in overall support.

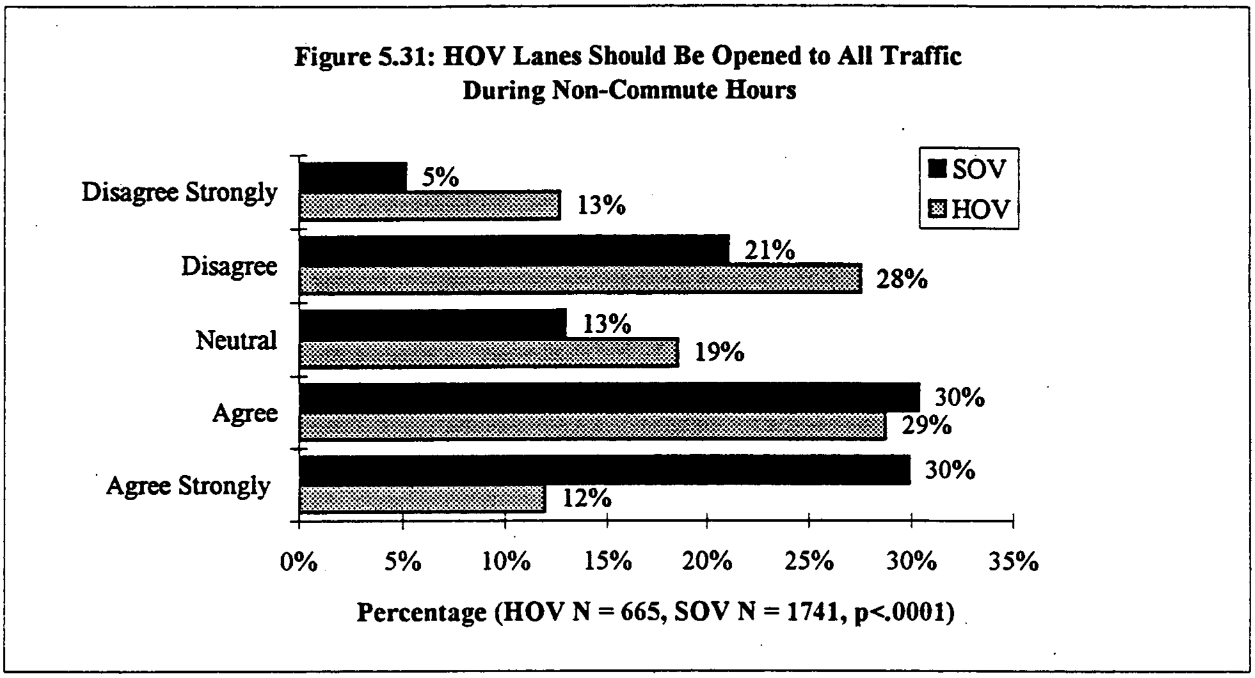


FIGURE 5.31 BOX TEXT: Opinions on this option are very wide spread. The p-value shows that variance between the groups is fairly uniform. SOV drivers favor opening HOV lanes (60 percent agreeing), but HOV commuters seem undecided, with 41 percent for and 41 percent against the opening of HOV lanes.

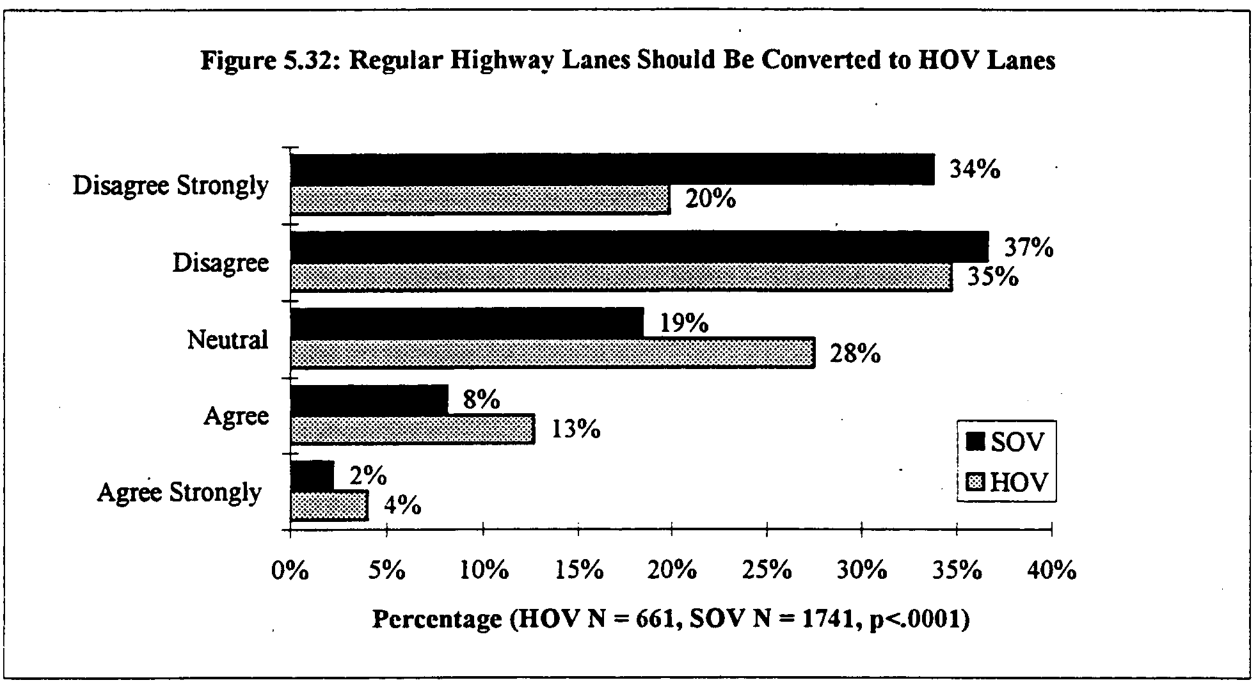


FIGURE 5.32 BOX TEXT: With 67 percent against this suggestion, clearly both groups disagree. Most drivers might believe that simply changing a lane's designation only creates more congestion but view new lanes as an increase in a freeway's overall capacity.

SUMMARY OF PUBLIC OPINION SURVEY RESULTS

There is strong public support for HOV lanes in general and for future HOV lane construction. Although there are differences of opinion on many issues between SOV drivers and those who rideshare, these differences do not undermine general support for HOV lanes among the entire survey population.

One sentiment evident throughout the survey was that while the public supports HOV lanes, many people feel that the lanes are not being fully utilized. The results from questions presented in Figure 5.12 through 5.18 should assist planners in selecting the HOV lane policies that will make the lanes more attractive to the public. Beginning in the third quarter of 1993 two new questions were added to the survey. One asked respondents about the level to which they felt HOV lanes should be opened to all traffic during non-commute hours. The other asked about the level to which they supported converting existing general purpose lanes to HOV lanes. Results from these survey questions should be valuable in assessing the desirability of these policy options. Future analyses will focus on changes in public opinion over time.

CHAPTER SIX: SECONDARY DATA SOURCES

BUS RIDERSHIP ON HOV LANES

One goal of adding HOV lanes is to increase the use of public transit by people who normally drive alone along routes that include HOV lanes. Currently, Metro, Community Transit, and Pierce Transit all have bus routes that use HOV lanes. It is assumed that public transit becomes more attractive to commuters as congestion increases travel times and erodes travel time reliability. Data from Metro, Community Transit, and Pierce Transit provide the basis for measuring HOV lane effectiveness in this area.

Results from the public opinion survey show that 5 percent of respondents regularly commute by bus and that 19 percent have ridden on a bus that used the HOV lane. Overall, survey respondents do not appear to support incentives to increase bus ridership on HOV lanes as much as they support options that make HOV lanes more attractive to auto users (Figure 5.8). One reason that public transit improvements are not favored as much as other methods of making HOV lane use more attractive may be that the sample generated for this study consisted primarily of auto users.

Metro Transit Ridership

Metro uses a statistical sampling method to measure ridership. Passenger counters are placed on a portion of the buses on each of Metro's runs. These passenger counters tally riders throughout the day. The passenger count samples generate a measure called the average daily maximum load. The average daily maximum load is then projected to the rest of the runs on the route. This measure is multiplied by the number of daily runs on that route and by the number of service days to generate a ridership estimate for a given period of time. Table 6.1 shows weekday Metro ridership figures for 1991 and 1992.

Metro measures average daily maximum load for three trimesters of the year: Spring (February 15 through June 5), Summer (June 6 through August 28), and Fall/Winter (August 29 through February 12). These divisions allow analysis of seasonal changes in transit ridership. However, dividing the year in this way complicates the analysis of monthly ridership estimates. First, the divisions of the year are unequal. Using the average daily maximum load to determine monthly totals would inflate some monthly totals and depress others. Second, the accuracy of this measure is based partly on aggregation of the numbers. Disaggregation would reduce the accuracy of the estimation method. However, as an overall estimate of total ridership, the Metro model appears to be accurate.

Two major problems complicate analysis of Metro's use of HOV lanes. First, safety considerations inhibit use of HOV lanes by Metro buses. A merge to the right into slower traffic is inherently dangerous for a bus driver. A safety guideline requires that Metro drivers begin to merge out of an HOV lane at least 2.5 kilometers before reaching a designated exit ramp. Because most HOV lanes in the Seattle area are so short, the difficulty of merging into an HOV lane and merging out of it soon thereafter reduce the benefit of using the lanes. The net result is that many Metro buses do not use the HOV lanes along their routes. Thus, the travel time savings associated with HOV lane use are precluded by safety concerns. The exception is when an HOV lane is located on the right side of the freeway, as along SR520 and the Sunset to Coal Creek section of I-405. As the HOV lane system is completed, Metro buses will use HOV lanes more frequently because the problem of merging into slower traffic will likely be reduced, and travel time savings will increase.

Another problem is that drivers on some routes are instructed to use an HOV lane for either the inbound or the outbound portion of their trips. These problems do not affect analysis of HOV lane use by Community Transit or Pierce Transit because the routes for both of these transit agencies are so long that HOV lanes provide significant travel time savings while posing fewer safety problems associated with merges into slower traffic.

The data in Table 6.1 show Metro ridership for all routes that use area highway segments containing HOV lanes.

Table 6.1: Average Daily Ridership for Metro Routes Along HOV Lanes

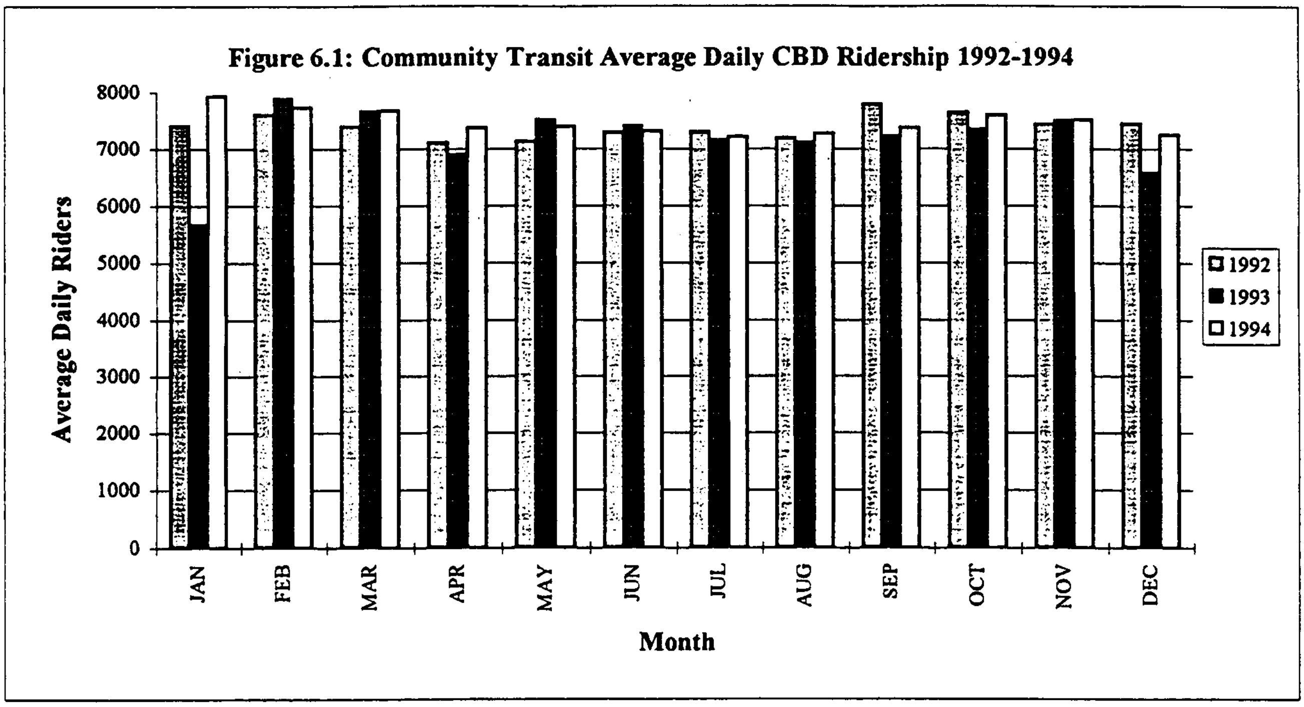
Route	Fall 91	Summer 91	Spring 91	Fall 92	Summer 92	Spring 92
I-5 SB						
236th SW to Express lanes	456	501	488	442	433	443
Tukwila to SR-516	1717	2018	2878	1774	1684	1869
I-5 NB						
Lake City Wy. to NE 195th	883	857	1047	734	810	799
SW 272nd to 200th	1699	2092	2207	1788	1735	1752
SR-520						
108th NE to 76th NE	5365	4814	5291	5323	4843	5295
I-90						
WB S Bellevue to Rainier Ave	1670	1634	1731	1636	1635	1682
I-405						
NB Sunset to Coal Creek	1573	1404	1474	1392	1394	1523
SB Coal Creek to Sunset	1432	1169	1293	1346	1378	1443
Total	14,795	14,489	16,409	14,435	13,912	14,806

TABLE 6.1 BOX TEXT: Metro ridership on routes that use HOV lanes or travel next to such lanes is highest in the spring, lower in fall, and lowest in summer. This trend generally holds true for Community Transit and Pierce Transit routes as well. Metro's 1991 ridership is higher, in general, than that for 1992. Data for 1993 and 1994 could not presented because Metro did not provide the information before the printing date.

Because not all Metro buses use HOV lanes, the figures overestimate true HOV lane ridership. Sifting out the routes that actually use HOV lanes from the ones that do not to generate a true ridership figure would not be worth the effort, because HOV lane use is such a small factor in Metro's route guidelines. One policy option for HOV lane planners is to build special exit ramps for HOV lanes on the inside of the freeway (commonly called "direct access/egress ramps"). This option would likely increase Metro's use of HOV lanes.

Community Transit Ridership

Community Transit supplied this project with ridership data for routes that use HOV lanes. This report includes data for the period between January 1992 and December 1994. Community Transit buses have two destinations in Seattle: the central business district (11 routes) and the University District (six routes). These routes use the northbound and southbound HOV lanes in the I-5 North corridor and on the express lanes. Figure 6.1 compares 1994 ridership with average ridership from 1992 through 1993 to the central business district (CBD). Figure 6.2 shows the same ridership comparison for Community Transit routes to the University District. Figures 6.1 and 6.2 show only the past three years of average total monthly ridership because the annual growth in Community Transit ridership along these routes would artificially inflate the difference between 1994 values and those of previous years. The increase in annual ridership to the CBD averaged about 4 percent, and the increase in annual ridership to the University District averaged about 2 percent over 1993 totals. Ridership to the CBD in 1994 increased by more than 70,000 riders from 1993 levels, while ridership to the University District grew by roughly 10,000 riders for the same period. Monthly ridership in both figures is adjusted to include only weekday, non-holiday service.



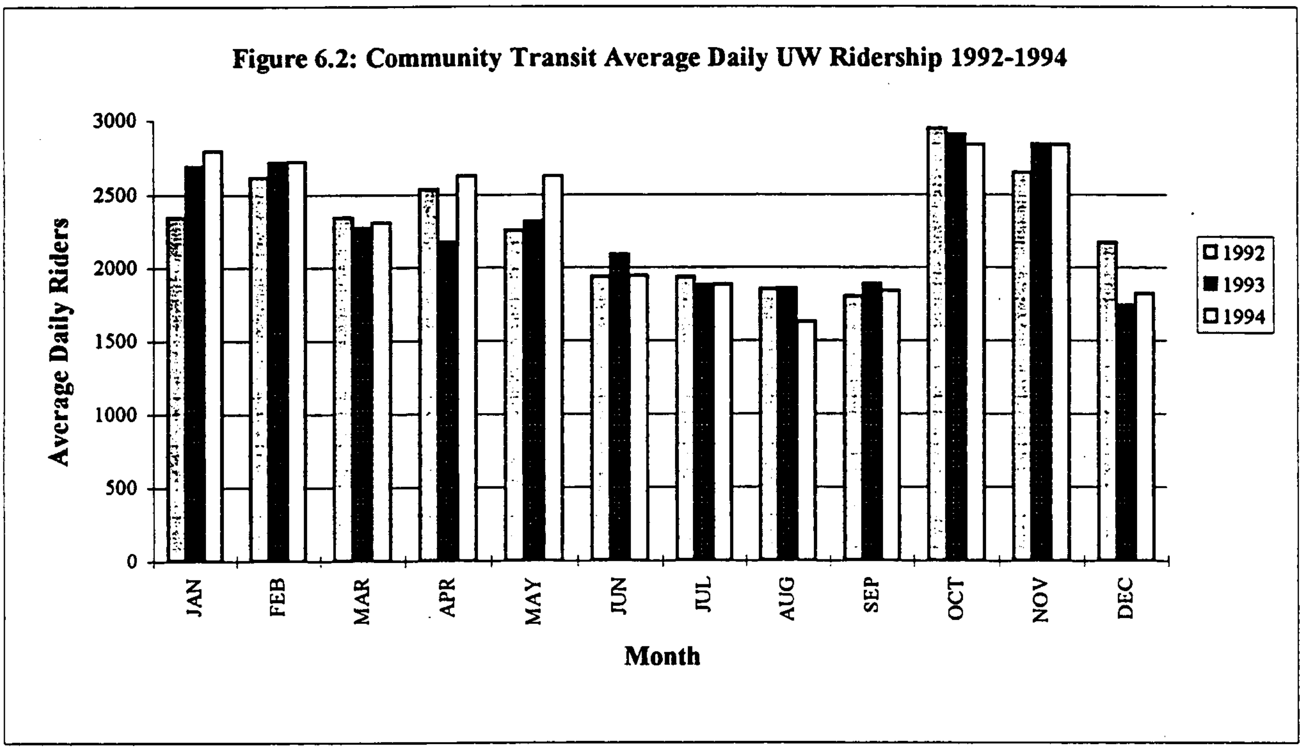


FIGURE 6.1 & FIGURE 6.2: Ridership to the CBD is more stable throughout the year than to the University District. Downtown employees probably have a more constant demand for transit over the year than do students.

Pierce Transit Ridership

Pierce Transit's Seattle Express program operates five transit routes to Seattle. This service started in September 1990. Figure 6.3 shows 1994 Seattle Express total monthly ridership in comparision to average monthly totals for 1992 and 1993. Ridership on Seattle Express buses has grown steadily. 1994 ridership was 12 percent higher than 1993 ridership. The monthly ridership levels shown in Figure 6.3 include only weekday, non-holiday service.

Figure 6.3: Pierce Transit Seattle Express Average Daily Ridership

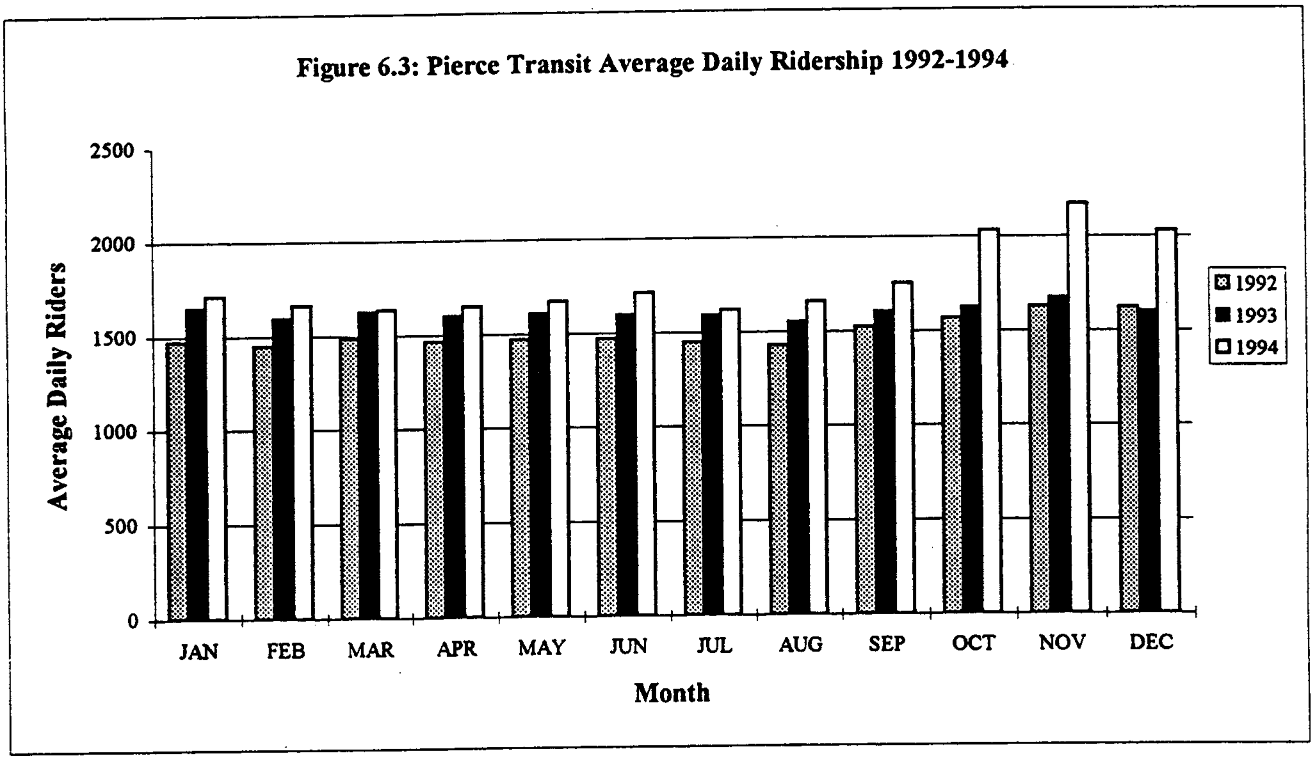


FIGURE 6.3 BOX TEXT: The relatively constant level of service suggests that the Seattle Express has a high proportion of daily riders. Ridership peaks in November.

ENFORCEMENT, COMPLIANCE, AND ADJUDICATION

Two measures of HOV lane effectiveness are (1) the violation rate of HOV lane restrictions, and (2) the outcomes of enforcement actions. We are interested in identifying trends in the number, locations, and outcomes of HOV violations. The average vehicle occupancy data collected by traffic observers provides some insight into violation rates, but we have collected data from other agencies to supplement this information, such as information from the Washington State Patrol and from the HERO program, which is run by Metro. To measure HOV violation outcomes, we gathered data from district courts in counties that have HOV lanes. The Washington State Office of the Administrator of the Courts supplied the data pertaining to the district courts.

In addition to these measures of HOV violations, the public opinion survey devoted three questions to motorists' perceptions of compliance and enforcement of HOV restrictions. Survey respondents ranked improving enforcement as their third highest priority for making HOV lanes more attractive, behind opening all lanes to 2+ carpools and connecting HOV lanes by finishing the HOV lane system (Figure 5.11). About 54 percent of both HOV and SOV drivers agree that HOV violations are common during peak commute hours. In addition, about 54 percent of both groups agree that HOV violators commit a serious traffic violation. To better enforce HOV lane restrictions, 68 percent of HOV drivers and 55 percent of SOV drivers support a ticket-by-mail program. Commute route information available from the public opinion survey allows comparison of localized public opinion with the number of citations given in a particular corridor.

The HERO Program

The HERO program is a service provided by Metro that encourages motorists to report HOV violators they observe on area highways. The HERO program encourages travelers to call in and report HOV lane violators at the telephone number 764-HERO. The HERO program office collects the license plates numbers of alleged HOV violators and sends that information to the Department of Licensing for the name and address of the vehicle's registered owner. HERO staff then send a brochure to the alleged violator, providing information on HOV lane policy and restrictions. Following a second report, the violator receives a letter from WSDOT, issued by the HERO office, that explains that the person's auto was observed violating HOV lane restrictions. If a third violation is observed, the vehicle owner receives a letter from the Washington State Patrol (WSP), also issued by the HERO office. The HERO program does not issue tickets because the State Patrol must actually observe the violation. HERO reports repeat violators to the WSP for possible enforcement action. Figure 6.4 shows annual violation report rates for the HERO program.

Figure 6.4: HERO Program Actions 1992-1994

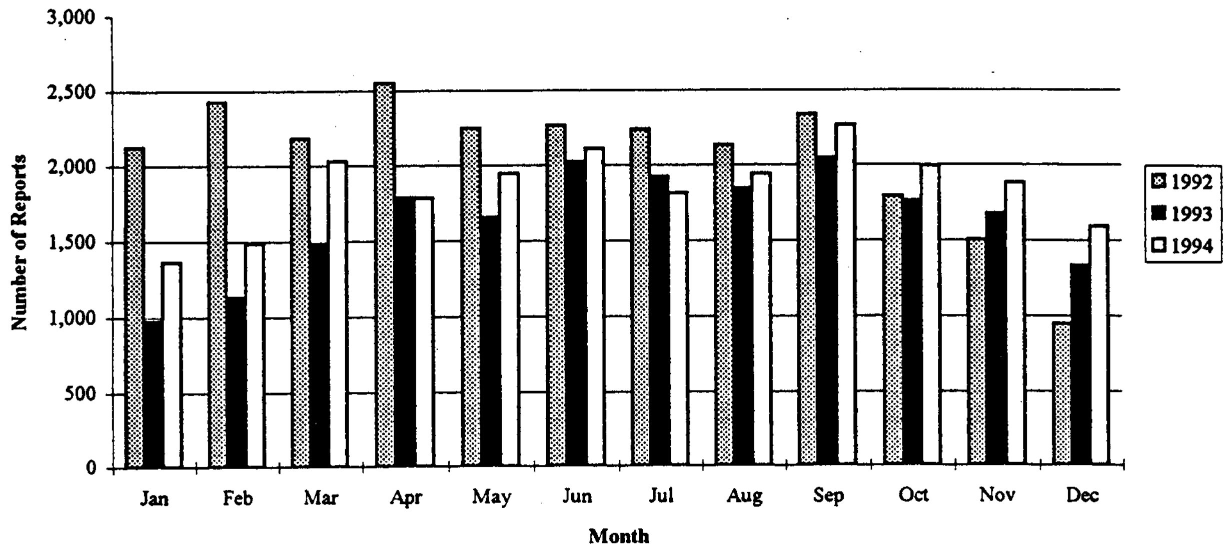


FIGURE 6.4 BOX TEXT: Violation reports were higher in 1994 than in to 1993 and appear to be surpassing figures for the later months of 1992. The decrease in the later months of 1992 and continuing into the early months of 1993 may be a lag due to the large number of reports given between August 1991 and September 1992. Reported violation rates appear to fall in the winter months, possibly because poorer light conditions during this time make it more difficult to see the number of occupants in nearby cars or to see a vehicle's license plate.

Washington State Patrol

The Washington State Patrol has primary responsibility for enforcing HOV lane restrictions on state highways. While the WSP catches only a fraction of HOV violators on any single day, repeat violators have a significant chance of eventually getting caught. For 1994 the WSP reported 6,284 contacts with HOV violators and issued 2,809 tickets. The numbers are lower than those for 1992 and 1993 (see Table 6.2). Figure 6.6 breaks down those enforcement actions by type.

Table 6.2: Washington State Patrol HOV Enforcement Actions, 1992-1993

Type of Action	Arrest Citations	Verbal Warnings	Written Warnings	Accident Citations	Other	**Total**
1992	3,790	3,717	248	7	21	7,783
1993	3,655	3,389	259	5	33	7,841
1994	2,809	3,159	225	N/A	11	6204

TABLE 6.2 BOX TEXT: WSP troopers issued only 2,809 tickets out of 6,204 contacts with HOV violators in 1994. The proportion of tickets issued was lower than in 1993. Troopers have the discretion to ticket offenders or to give verbal or written warnings as they see fit. WSP policy is to enforce HOV restrictions, and many other traffic violations, at the lowest possible level. This often results in verbal warnings for first-time violators and for those who have not been stopped for other violations, such as speeding.

Adjudication Data

While reports of violations and the number of warnings and tickets issued provides useful insight into HOV violation rates, it is also useful to know what happens once HOV violators are ticketed. State troopers refer HOV violators to district courts in the region in which they were ticketed. Those district courts send information on the outcomes of all court cases to the Office of the Administrator of the Courts, in Olympia, for central storage and analysis. That office supplied this project with data on outcomes for all infractions involving HOV lanes between 1991 and June 1993. Figure 6.5 shows the number of cases processed for that period, broken down by infraction type. The outcomes are as follow:

- Paid. Violator paid fine, no court action required.
- Committed. Violator contested ticket in court and lost, or the violator failed to appear. Failure to appear in court results in an additional fine.
- Not Committed. Court found violator not guilty.
- Dismissed. Court waived charges.
- Dismissed with Prejudice. Infraction dismissed, but court reserved right to enforce the infraction in the future.
- Dismissed Without Prejudice. Infraction dismissed, and court waived the right to enforce the infraction in the future.
- Amended. Violator found guilty of a different or lesser charge.
- Change of Venue. Charges against violator transferred to a different jurisdiction.
- Pending. Case not concluded as of December 1994.

Figure 6.5 shows the outcomes for HOV violations for 1991 through June 1993. Four categories (Dismissed with Prejudice, Dismissed Without Prejudice, Amended, and Change of Venue) were omitted because there were fewer than five in each.

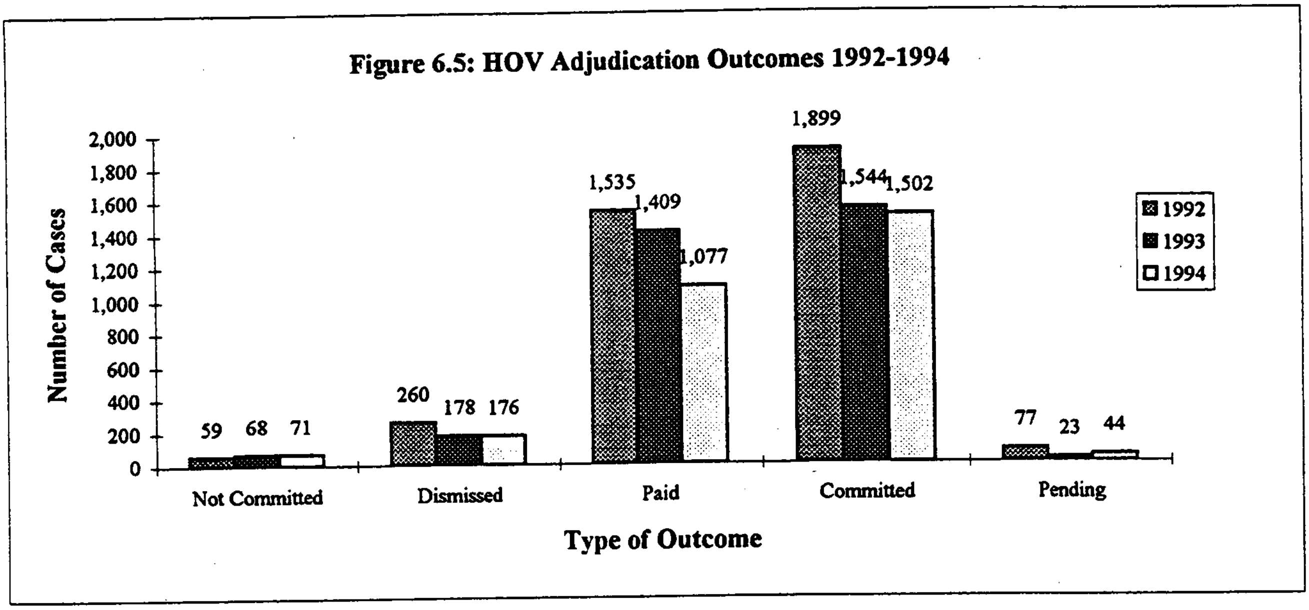


FIGURE 6.5 BOX TEXT: Violations committed in 1994 were slightly lower than in 1993. The number of cases that resulted in payment of the ticket decreased sharply.

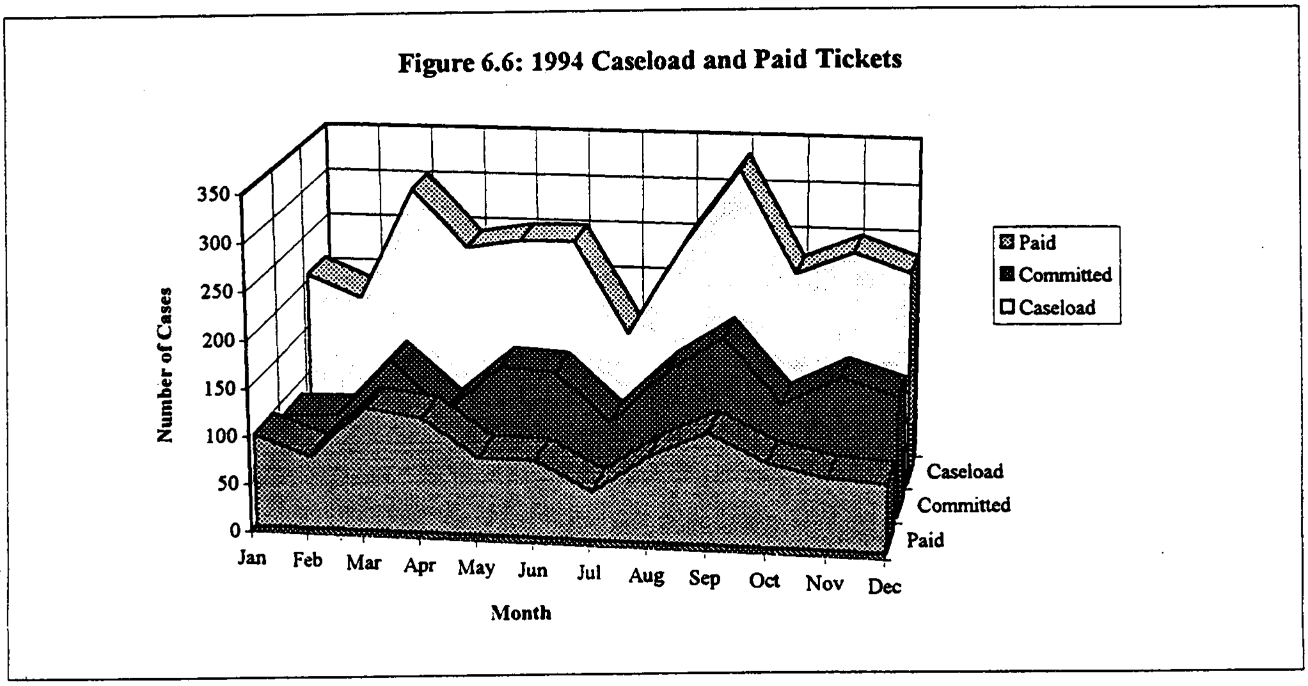


FIGURE 6.6 BOX TEXT: District courts try most cases within 90 days of the citation. This may explain the high number of cases tried in January and February and the low number of cases tried in November and December: the courts may schedule hearings for violation into the next year in an attempt to clear backlogs. This reduces the precision of evaluating changes in violations over time. These data fit with the HERO data provided in Figure 6.4. Caseload appears to peak between September and October and to be at a minimum in July, possibly because of vacation schedules.

The outcome data are also broken down by court district in Table 6.3. Figures shown represent the number of cases considered for each classification in each district.

Table 6.3: HOV Violation Outcomes by District (1994)

District Court	Paid	Committed	Not Committed	Dismissed	Pending	Total
King County: Aukeen	125	95	36	5	19	280
King County: Northeast	513	686	26	138	109	1472
King County: Shoreline	297	427	10	64	28	826
King County: Southwest	224	297	12	31	225	599
Bellevue	376	665	9	56	22	1128
Federal Way	187	634	14	6	5	846
Issaquah	114	102	15	13	8	252
Redmond	372	384	10	32	96	894
Seattle	196	89	7	28	11	331
Other*	18	10	2	4	3	37
Total Cases	2422	3389	141	377	336	6665

*Includes Everett, Pierce County, and Sea-Tac District Courts.

TABLE 6.3 BOX TEXT: Violations appear concentrated in areas with the most HOV lanes: Shoreline, Bellevue, Redmond, northeast King County, and Federal Way. Drivers ticketed in Federal Way contest their tickets more frequently than do drivers in any other area. Drivers ticketed in Seattle tend to pay the fines without contest most often. The convenience of appearing in court or underlying opinions about the legitimacy of HOV lane restrictions may guide those decisions.

ADJUDICATION DATA RECOMMENDATIONS

1. Conduct a special study of repeat offenders. Data on this subject may be available from district courts. Cross-referencing HERO data with violation outcome data may shed some light on the extent to which violators change their behavior after receiving a ticket.

2. Conduct a special study on highway corridors characterized by chronic violation problems. For instance, according to our ACO data, the HOV lanes on I-405 (just before the I-405/ SR 520 interchange) appear to have a very high violation rate northbound. We believe this is so because the traffic observation point is very close to where the highways merge, with an HOV lane merging with a two ramp access lanes from SE 8th. This configuration forces traffic from the general purpose lanes to cross the HOV lane. Even though this lane is designated for use by all traffic within the weave zone, as traffic begins to congest motorist tend to abuse the HOV lane by entering before this change to bypass the congestion. One way to assess the observed violation rate would be to observe traffic at that spot and at another spot 1/4 mile upstream simultaneously. Bellevue and Redmond appear to have high violation rates; these jurisdictions also have the highest number of outstanding violations among the court districts studied. Follow-up conversations with WSP officials and court clerks and judges may shed light on this trend.

ACCIDENT INFORMATION

WSDOT policy relating to the safety of HOV lanes stipulates that HOV lanes should provide safe travel options to HOVs without having a negative impact on the safety of general purpose lanes. HOV lane safety is therefore a key determinant of HOV lane effectiveness. If drivers do not feel safe on HOV lanes, it is likely that fewer drivers will use those lanes. While the public opinion survey measured *perceptions* of HOV lane safety, an effective evaluation also requires analysis of actual accident rates. Safety impacts of opening HOV lanes and accident trends over time are most relevant. In addition, a safety comparison among different HOV lane configurations and policies would be useful for planning purposes.

This section contains information on the HOV lanes under observation for this study (see Appendix A for a list of all sites where HOV lanes are present in the Puget Sound area). Each data set features information on all accidents that have occurred on each highway segment containing an HOV lane, plus the contiguous 2 miles of highway before and after the HOV lane. The additional highway sections were added to assess the safety impact of HOV lanes both up and downstream of the HOV lane itself. Accident data for the previous two years before an HOV lane was opened are also included to assess the safety impact of constructing and opening the HOV lane.

An HOV accident is defined as an accident that occurs following an HOV lane's opening date, between the milepost markers associated with that HOV lane, and in the lane designated as the HOV lane (inside/outside). Also included in this definition are accidents that occur on the shoulder next to the HOV lane. Shoulder accidents are included because a vehicle must be in or pass through the HOV lane to be involved in a shoulder accident. The accident data included in this report are current through December 31 1994, for each HOV lane segment.

Data Collection and Analysis

Accident data are supplied by the WSDOT Transportation Data Office. WSP and local law enforcement personnel enter data relevant to each highway accident on a standard form containing information about 90 different factors. These forms are forwarded to WSDOT. Information about 28 of the variables are of interest to this study, and are available to users of these data. The 28 variables selected are the following:

1. Year
2. Month
3. Day of month
4. Day of week
5. Hour of day
6. Minute of hour
7. State route number
8. Milepost (location of accident)
9. Type of area in which accident occurred (construction area, spur, new highway, etc.)
10. Precision of estimated accident location
11. Accident severity
12. Number of injuries
13. Number of fatalities
14. Number of vehicles involved
15. Roadway surface conditions
16. Weather conditions
17. Light conditions
18. Impact location (accident location on roadway)
19. Collision type
20. Proximity of first driver's residence
21. Proximity of second driver's residence
22. Proximity of third driver's residence
23. First driver's primary cause for accident
24. First driver's secondary cause for accident

25. Second driver's primary cause for accident

26. Second driver's secondary cause for accident

27. Third driver's primary cause for accident and

28. Third driver's secondary cause for accident

Beginning in 1988, the Transportation Data Office included a code on the accident data entry form to indicate whether an accident occurred in an HOV lane. This will be useful in studying HOV accidents for time periods after that date. However, because this study focuses on accidents occurring well before that date, the code was not much help.

Accident data for each HOV lane are organized to correspond to the traffic observation corridors described earlier. HOV accidents as a proportion of total accidents for each highway segment are presented in Figures 6.8 through 6.22. Vital statistics such as the opening date, location, lane miles, HOV lane location, occupancy requirements of each HOV lane, and HOV accidents as a percentage of all accidents are included with each figure. Lane location numbers indicate the position of the HOV lane relative to the right shoulder of the roadway. Higher lane numbers are on the inside, or left shoulder; lower numbers are on the outside, closer to the right shoulder. Any changes in the lane configuration or occupancy requirements are noted with the date of such changes. Where appropriate, data from the public opinion survey are provided to show how specific groups of drivers feel about safety on a particular HOV lane segment relative to the frequency of HOV accidents on that corridor.

Users of these data should be aware that each HOV lane opened at a different time of year. To ensure consistency across different HOV lane segments, accident data for the full first year included in each figure are provided. The accident data presented here are raw numbers. The data do not represent an accident rate because accident frequencies must be compared to traffic volumes to determine absolute rates. Therefore, while an HOV lane may represent 5 percent of all accidents in a given highway segment, only one-fifth as many vehicles may use that HOV lane as use general purpose lanes. Subsequent users of these data must compare relative lane volumes to derive a valid HOV lane safety evaluation. The accident data for all locations are current through December 31, 1994.

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I-5 North of Lake City Way

Figure 6.7: I-5 Southbound SR 524 to Express Lane Entrance
Opened: August 29, 1983
Extended (from 236th SW to SR 524): November, 1993
Milepost Location: 172.7 to 180.30
Lane Location: Lane 5 of 5 (172.7 to 174.1), lane 4 of 4 (174.1 to 180.3)
Lane Length: 12.23 kilometers
Occupancy Designation: 2+ (changed from 3+ August 8, 1991)
Proportion HOV Accidents: 307 of 3,970 (7.7%)

Table 6.4: HOV Accidents by Year: I-5 SB 212th SW to Express Lane Entrance

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Number	32	22	24	25	31	33	35	21	29	22	21

Figure 6.7: I-5 SB SR 524 to Express Lane Entrance

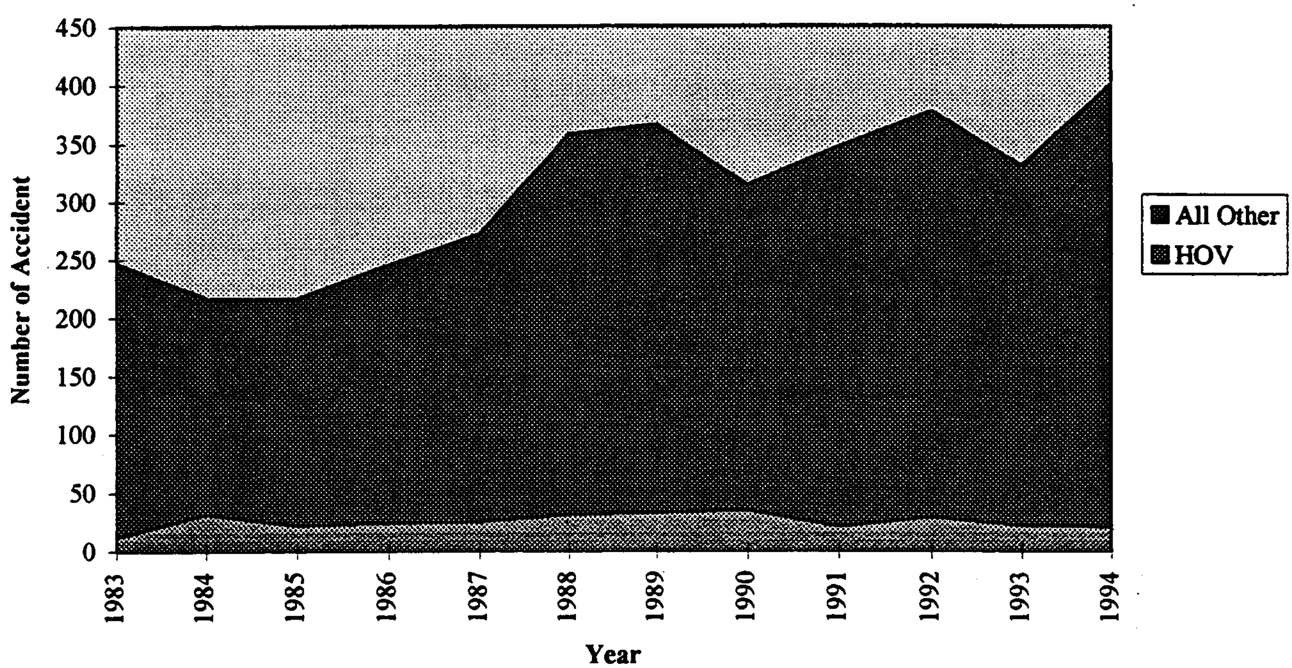

FIGURE 6.7 BOX TEXT: The reduction of the occupancy requirement from 3+ to 2+ in 1991 did not result in a large increase in HOV lane accidents (21 in 1991, 29 in 1992, and 22 in 1993). Likewise, the HOV lane did not appear to have had a negative safety impact north of its location. Accident rates were high immediately following (south) of the HOV lane, accounting for 25 percent of the total. This may be because the two left lanes merge into the express lanes, and when the express lanes are closed to southbound traffic, significant backups occur because of merging. This congestion may account for the high downstream accident rates, but these accidents are not necessarily related to the presence of the HOV lane. HOV lane construction was a significant factor in the increase of accidents at this junction: 111 of the 247 accidents in 1983 were construction-related.

Figure 6.8: I-5 Northbound Express Lane Entrance to 228th SW
Opened: August 29, 1983
Milepost Location: 172.4 to 178.7
Lane Location: Lane 5 of 5 (172.4 to 175.8), lane 4 of 4 (175.8 to 178.7)
Lane Length: 10.14 kilometers
Occupancy Designation: 2+ (changed from 3+ July 28, 1991)
Proportion HOV Accidents: 315 of 2,958 (10.6 %)

Table 6.5: HOV Accidents by Year: I-5 NB Express Lane Entrance to NE 185th

Year	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Number	23	24	27	27	29	34	31	31	33	27	22

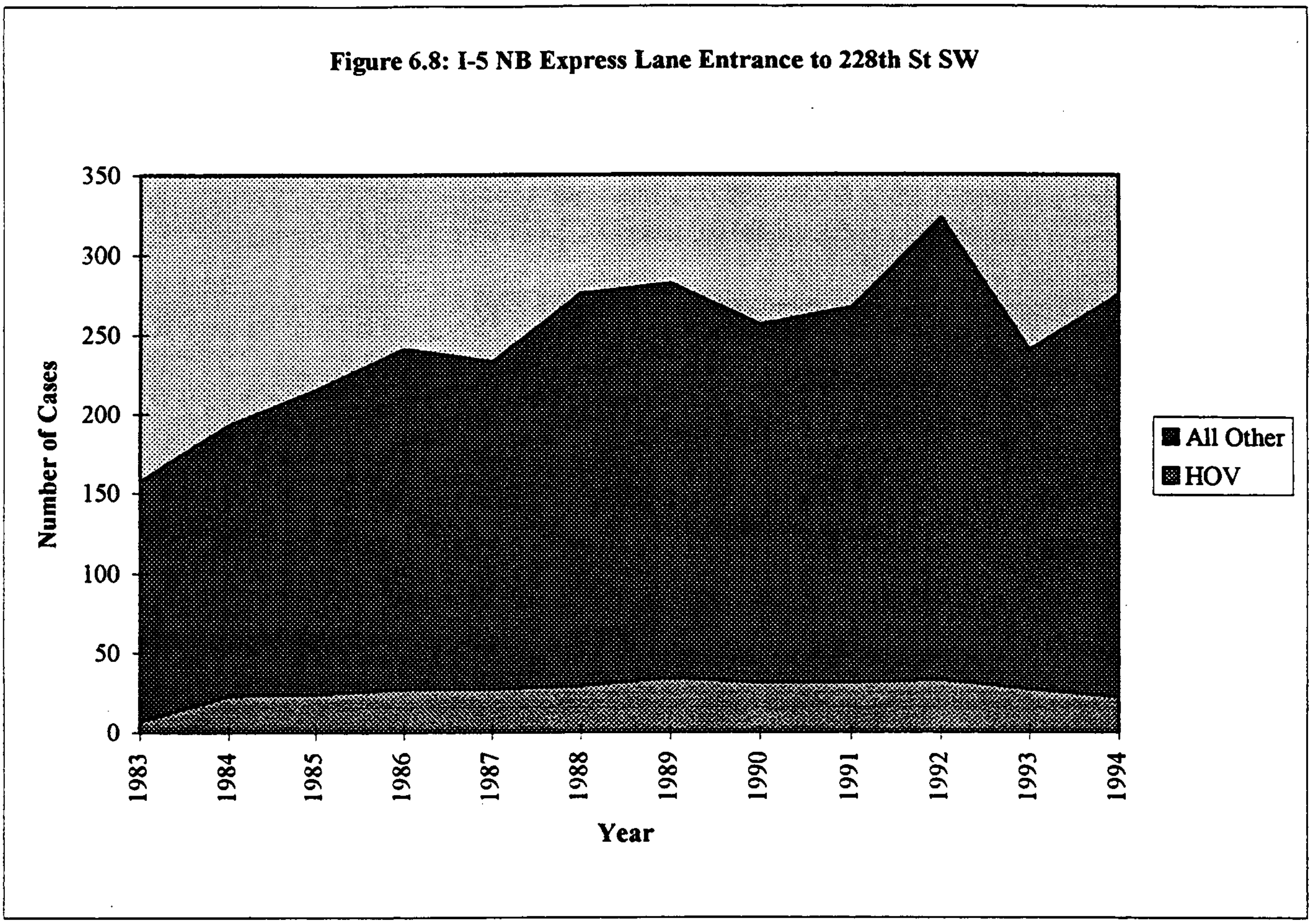

FIGURE 6.8 BOX TEXT: The change from a 3+ occupancy requirement to 2+ did not increase accidents significantly (31 in 1990, 31 in 1991, 33 in 1992, and 27 in 1993). However, general purpose lane and access ramp accidents grew immediately after the reduction of the occupancy requirement, then later fell below the original 1991 level (236 in 1991, 290 in 1992, and 213 in 1993). There is no clear trend of a high accident frequency at the merge point at the end of the HOV lane. The length of HOV lane being considered was expanded in the 1994 totals, from 185th NE endpoint used until 1993, to include 228th SW. Therefore, accident totals for 1994 may be elevated over previous years' data.

I-5 between Lake City Way and Southcenter

Figure 6.9: I-5 Southbound Mercer to S Spokane St.
Opened: April 1991
Milepost Location: 163.1 to 166.5
Lane Location: Lane 5 of 5 (166.5 - 165.7), lane 4 of 4 (165.7 - 165.4),
lane 3 of 3 (165.4 - 164.0), lane 5 of 5 (163.9 - 163.1)
Lane Length: 5.47 kilometers
Occupancy Designation: 2+ (changed from 3+ August 1993)
Proportion HOV Accidents: 146 of 1,806 (8.1%)

Table 6.6: HOV Accidents by Year: I-5 SB Mercer to Yesler

Year	1991	1992	1993	1994
Number	28	38	49	31

Figure 6.9: I-5 SB Mercer to S. Spokane St.

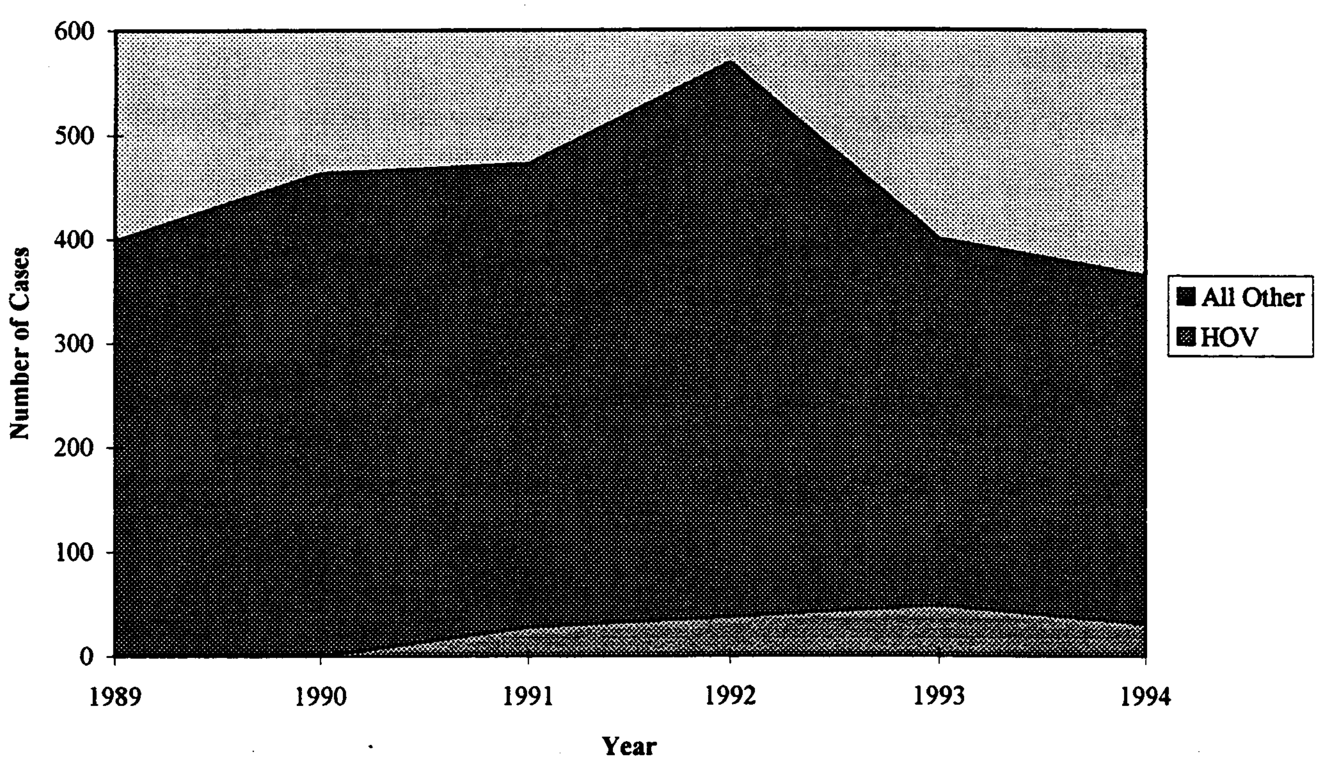

FIGURE 6.9 BOX TEXT: Effects of the change from a 3+ occupancy requirement to 2+ on the impact of HOV accidents on this HOV lane segment could not be determined. (38 in 1992, 49 in 1993, and 31 in 1994). However, general purpose lane accidents fell from 531 in 1992 to 351 in 1993. In 1994 the level of accidents dropped to 334, even though the lane length under consideration had been expand to 5.47 kilometers. Of note was the high frequency of accidents in the 0.16 kilometers immediately preceding the end of the HOV lane. This suggests that vehicles merging from the HOV lane and vehicles entering the mainline from the Express Lanes produce a negative safety impact.

Figure 6.10: I-5 Northbound Boeing Access Road to S Spokane St.
Opened: December, 1991
Milepost Location: 158.1 to 162.4
Lane Location: Lane 5 of 5
Lane Length: 6.9 kilometers
Occupancy Designation: 2+ (changed from 3+ December 14, 1992)
Proportion HOV Accidents: 58 of 584 (9.9%)

Table 6.7: HOV Accidents by Year: I-5 NB Boeing Access Road to S Spokane St.

Year	1992	1993	1994
Number	13	19	26

Figure 6.10:I-5 NB Boeing Access Rd. to Swift Ave.

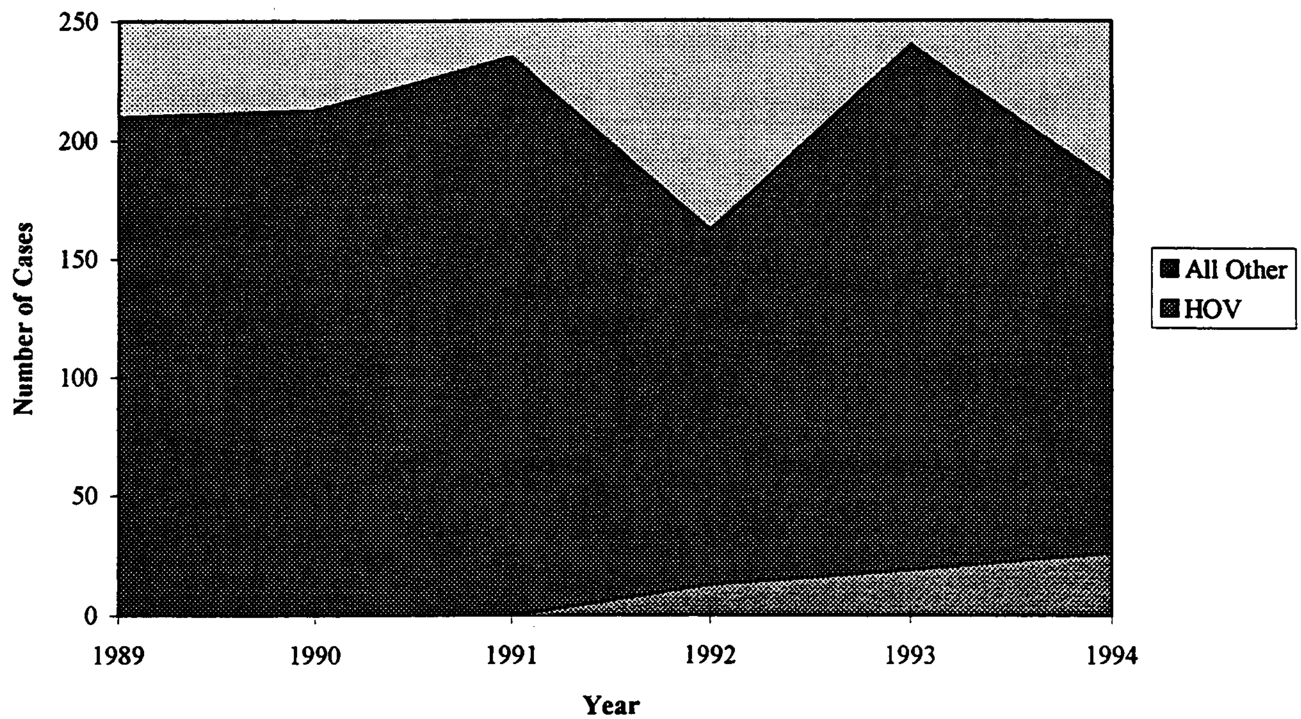

FIGURE 6.10 BOX TEXT: The occupancy requirement change from 3+ to 2+ appears to have had a slight impact on HOV accidents. Overall+A234, accident rates increased sharply in 1993 but decreased in 1994. There is no apparent increase in accidents because of the merge at the end of the HOV lane.

Figure 6.11: I-5 Southbound SR 599 to I-405 Entrance
Opened: 1990
Milepost Location: 154.6 to 155.3
Lane Location: Lane 7 of 7
Lane Length: 1.29 kilometers
Occupancy Designation: 2+
Proportion HOV Accidents: 6 of 90 (6.7%)

Table 6.8: HOV Accidents by Year: I-5 SB SR 599 to I-405 Entrance

Year	1992	1993	1994
Number	2	2	2

Figure 6.11: I-5 SB SR 599 to I-405

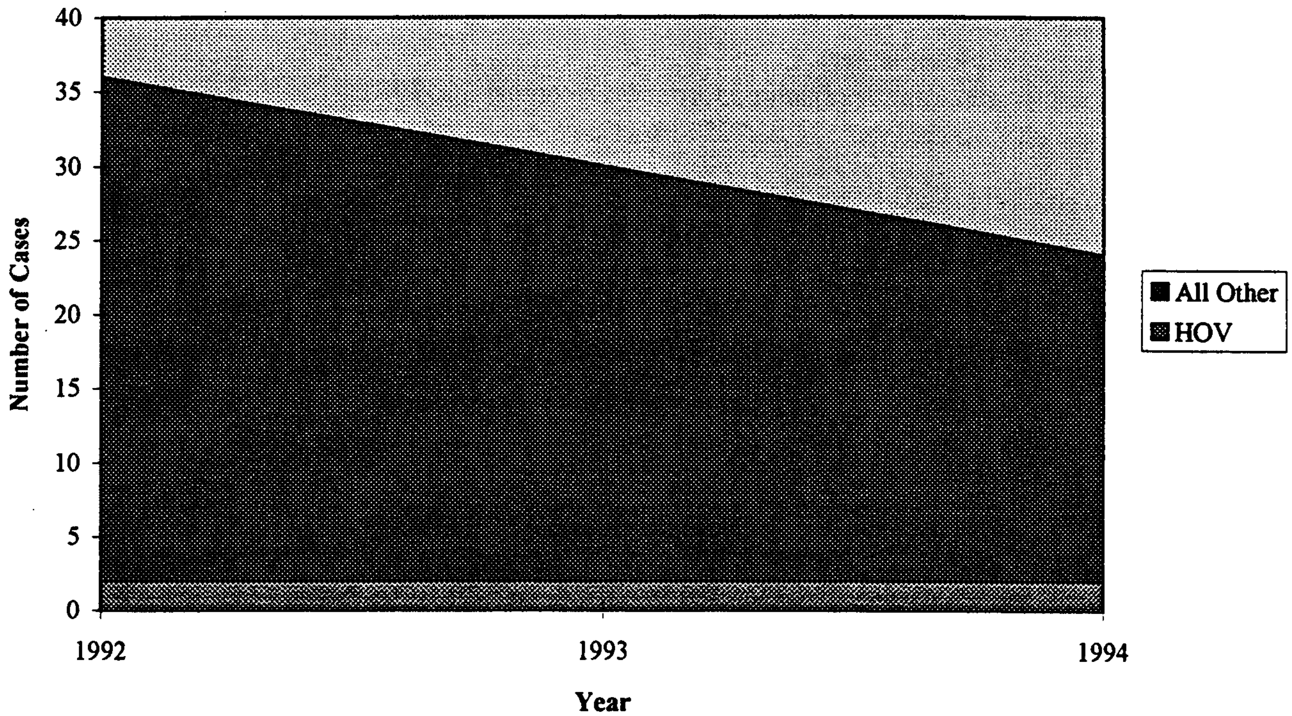

FIGURE 6.11 BOX TEXT: Because this HOV lane is so short and feeds directly into I-405, it is not suitable for use by drivers continuing south on I-5. The majority of all accidents for this highway section occur in the 3.22 kilometers preceding the HOV lane (58 percent) and following the HOV lane (31 percent). This HOV lane also falls between the traffic observation sites, so ACO data are unavailable.

I-5 South of Southcenter

Figure 6.12: I-5 Southbound Tukwila to SR-516
Opened: August 19, 1991
Milepost Location: 147.4 to 154.46
Lane Location: Lane 5 of 5
Lane Length: 11.4 kilometers
Occupancy Designation: 2+ (changed from 3+ December 7, 1992)
Proportion HOV Accidents: 141 of 958 (14.72%)

Table 6.9: HOV Accidents by Year: I-5 Southbound Tukwila to SR-516

Year	1991	1992	1993	1994
Number	13	41	56	31

Figure 6.12: I-5 SB Tukwila to SR-516

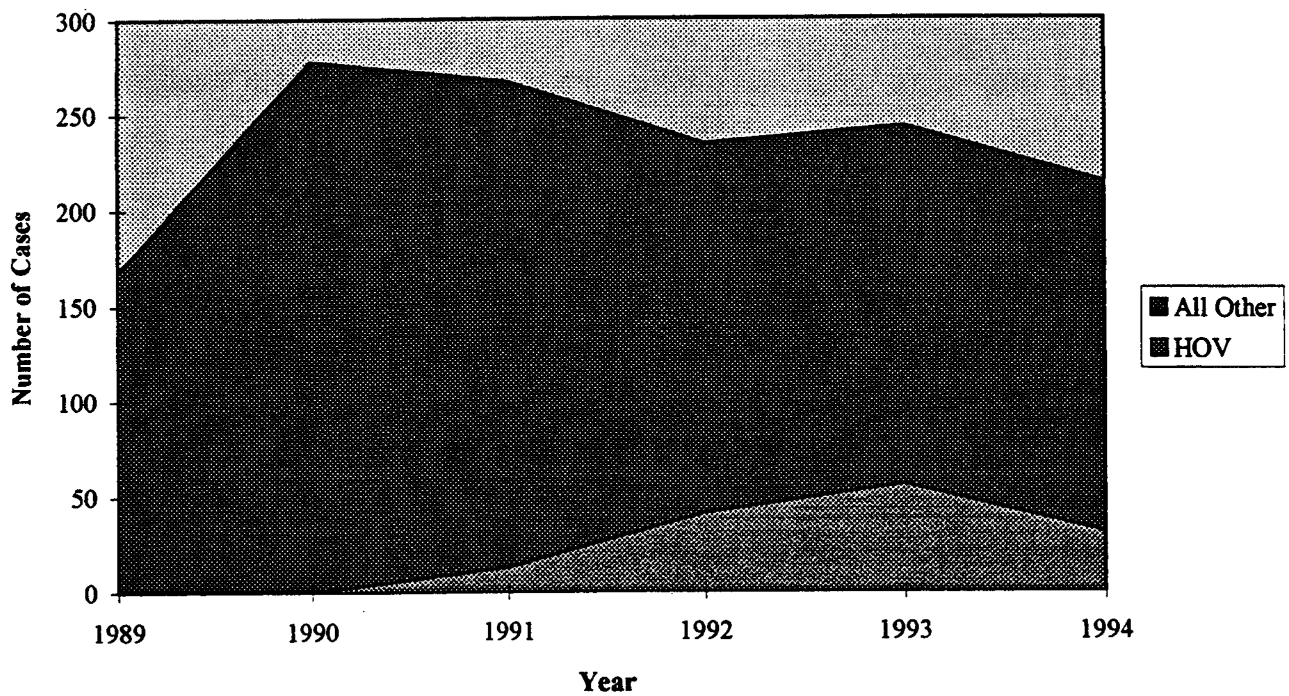

FIGURE 6.12 BOX TEXT: The change from 3+ to 2+ may have been the cause for an increase in HOV accidents (41 in 1992, 56 in 1993, but 31 in 1994). However, general purpose lane and access ramp accidents fell significantly after the change in the occupancy requirement (193 in 1992, 187 in 1993, 183 in 1994). There has been no increase in accidents at the end of the HOV lane because WSDOT added a right-side exit-only lane, negating the need for HOV lane users to merge back into the contiguous general purpose lane. HOV lane construction was not a significant factor in causing general purpose lane accidents. Construction accounted for only 39 of 545 accidents in 1990-91.

Figure 6.13: I-5 Northbound S 272nd to S 200th
Opened: August 19, 1991
Milepost Location: 147.6 to 152.9
Lane Location: Lane 5 of 5
Lane Miles: 8.5 kilometers
Occupancy Designation: 2+ (changed from 3+ December 21, 1992)
Proportion HOV Accidents: 71 of 565 (12.6%)

Table 6.10: HOV Accidents by Year: I-5 Northbound S 272nd to S 200th

Year	1991	1992	1993	1994
Number	14	17	11	29

The public opinion survey reveals a disparity between perceptions of HOV lane safety among drivers who regularly use this portion of I-5 during peak hours and actual accident frequencies. The survey asked respondents to indicate the extent to which they agreed or disagreed with the following statement: "Vehicles dart in and out of HOV lanes too often for the lanes to be safe." In general, only 24 percent of HOV drivers and 27 percent of SOV drivers agreed with the statement. Drivers who usually use the I-5 South corridor, however, perceived aggressive driving to be more of a problem than did other drivers: 30 percent of HOV drivers and 33 percent of SOV drivers felt the proposition to be true. These opinions are supported by the fact that HOV accidents for the southbound section of the corridor are above the average for the entire region.

Figure 6.13: I-5 NB S. 272nd to S. 200th

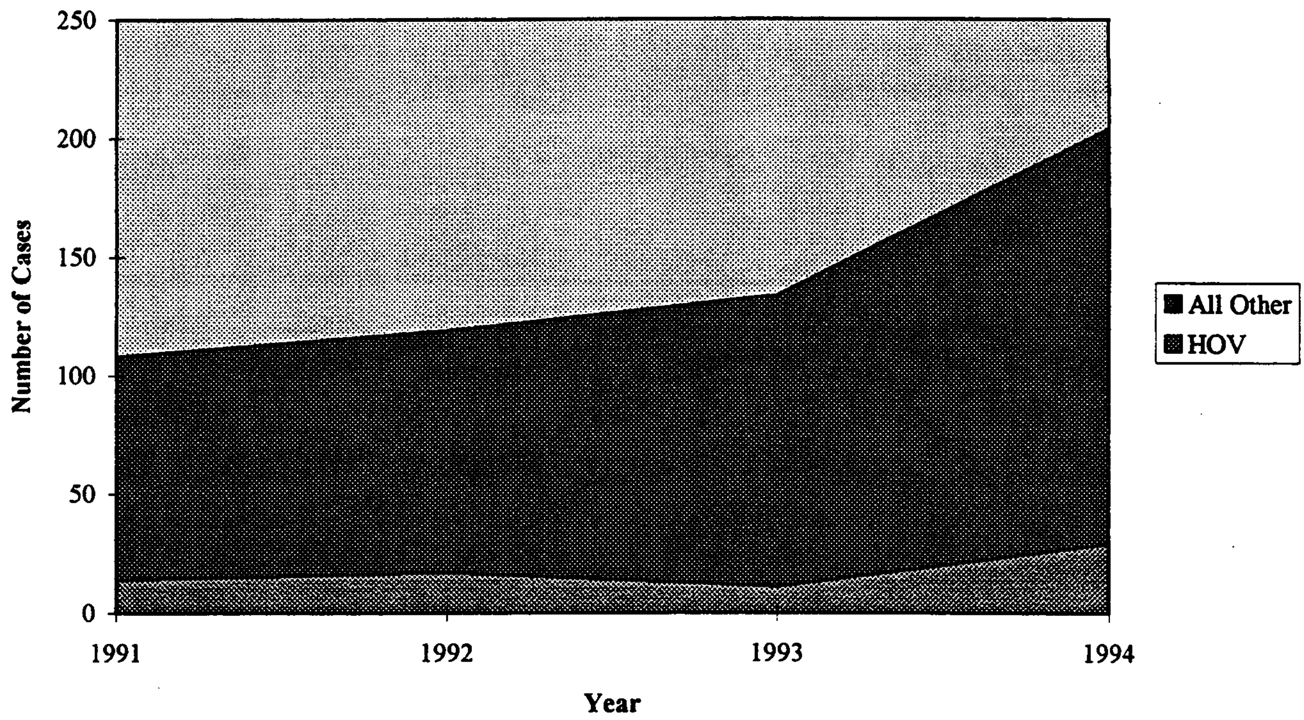

FIGURE 6.13 BOX TEXT: The change in occupancy restrictions from 3+ to 2+ did not result in an increase in either HOV or general purpose lane accidents. Data for 1994 consider a longer length of HOV lane, (a change from 2.09 kilometers to 8.5 kilometers), so the number of HOV accidents appears higher than previous years. Most of the accidents analyzed for this corridor occurred either before the HOV lane (43 percent) or after the HOV lane (37 percent). The merge to general purpose lanes at the end of the HOV lane does not appear to have resulted in a significant increase in accidents.

SR520

Figure 6.14: SR-520 Westbound 108th NE to 76th NE
Opened: 1973
Milepost Location: 4.23 to 6.38
Lane Location: Lane 1 of 3
Lane Length: 3.46 kilometers
Occupancy Designation: 3+
Proportion HOV accidents: 345 of 2,432 (14.2%)

Table 6.11: HOV Accidents by Year: SR-520 Westbound 108th NE to 76th NE

Year	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**
Number	22	25	17	31	31	37	36
Year	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**
Number	25	23	20	9	21	18	30

Figure 6.14: SR-520 WB 108th NE to 76th NE

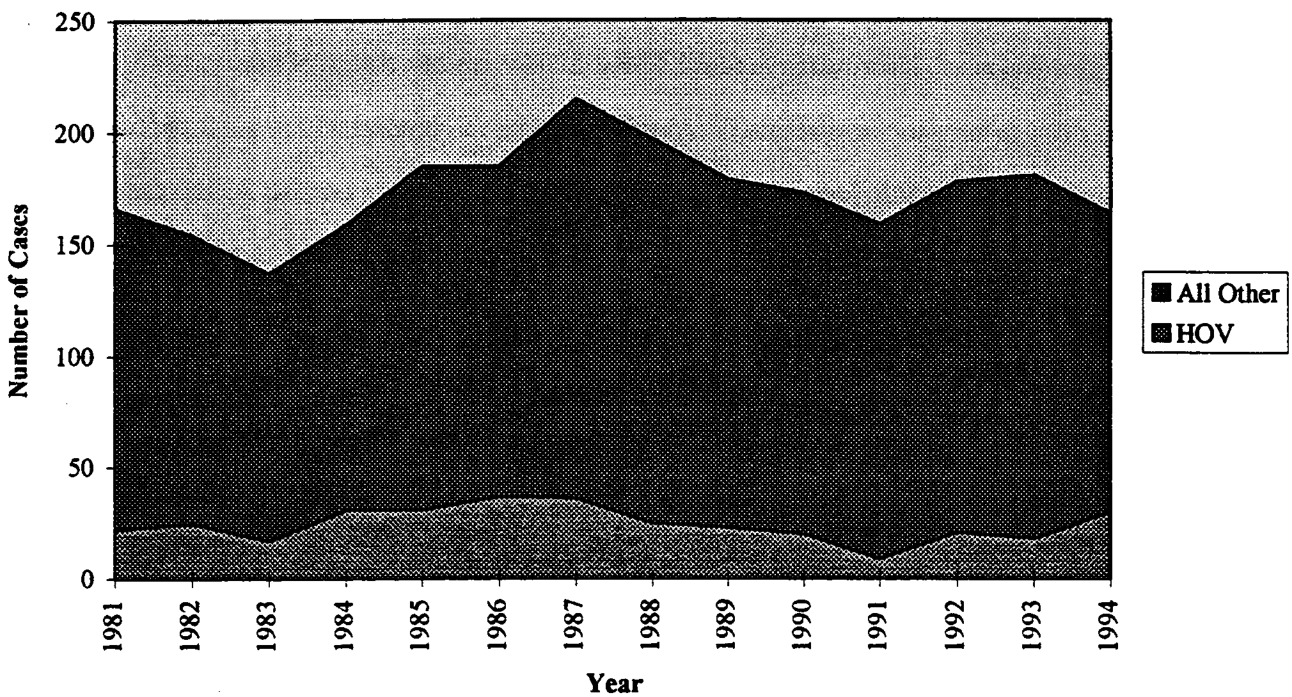

FIGURE 6.14 BOX TEXT: This HOV lane is located on the right-hand side of the highway, in part because Metro operates flyer bus stops just off the right shoulder. The high number of merges through the HOV lane by vehicles entering the highway and slowdown because of merging Metro buses may explain why the HOV accidents account for a high percentage of all accidents. There is no significant problem created by the merge at the end of the HOV lane. (Only 1.23 percent of all accidents occurred in the 0.16 kilometers before the end of the HOV lane).

Public opinion data show a disparity between perceived levels of HOV lane safety and actual accident rates on SR520. HOV and SOV drivers who usually use SR520 during peak hours generally reflect overall attitudes about HOV lane safety. HOV drivers on SR520 did not express more support for making HOV lanes wider and safer than did other HOV drivers . Thirty-four percent of SR-520 drivers selected this option for making HOV lanes a more attractive commuting option, in comparision to a 32 percent overall average for HOV drivers. On the other hand, HOV drivers on SR520 did feel more strongly that drivers dart in and out of HOV lanes too often for the lanes to be safe than did their counterparts traveling other highway corridors. Twenty-seven percent of HOV drivers on SR520 agreed with the proposition, whereas 24 percent of all HOV drivers agreed. SOV drivers who usually drive on SR520 during peak hours also reflected overall attitudes about HOV lane safety.

While drivers on SR520 appear to feel safe in their HOV lane, that particular lane has one of the highest accident frequencies of any corridor under observation (14 percent). One possible explanation for the mismatch between perceived safety and the relatively high frequency of HOV accidents on SR520 may be that because the HOV lane is on the right-hand side of the highway, drivers have become accustomed to traffic merging through that lane to get into the general purpose lanes. It is interesting to note that drivers who usually use SR520 did select moving HOV lanes from the right side of the freeway to the left side (where they appear to be safer) with greater frequency than did other drivers.

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I-90

Figure 6.15: I-90 Westbound Mercer Island to Rainier Avenue
Opened: June 4, 1989
Milepost Location: 3.49 to 8.54
Lane Location: Lane 4 of 4 (changed from lane 1 of 4 in February 1992),
Center roadway opened in late 1993.
Lane Length: 8.13 kilometers
Occupancy Designation: 2+ (changed from 3+ February 1992)
Proportion HOV Accidents: 84 of 635 (13.2%)

Table 6.12: HOV Accidents by Year: I-90 WB Mercer Island to Rainier Avenue

Year	1989	1990	1991	1992	1993	1994
Number	14	19	14	14	15	8

Figure 6.15: I-90 WB Mercer Island to Rainier Ave.

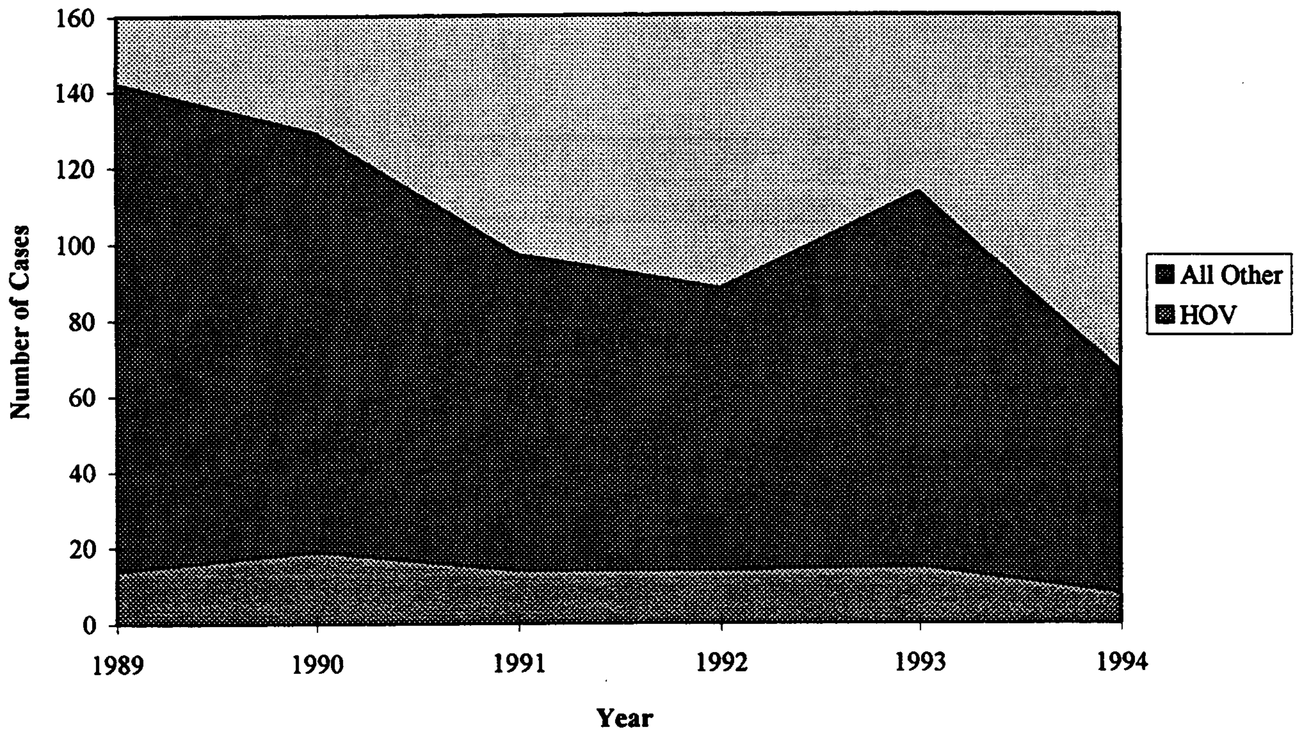

FIGURE 6.15 BOX TEXT: The change in occupancy requirements from 3+ to 2+ and the reconfiguration of the roadway does not appear to have had a negative impact on HOV lane safety. The opening of the center roadway to exclusively HOV and Island-only traffic appears to have reduced+A384 the number of HOV accidents from 15 in 1993 to 8 in 1994. The merge at the end of the HOV lane appears to reduce safety for all motorists (13 percent of all accidents occurred between the 0.16 kilometer preceding the end of the HOV lane and the 0.16 kilometer following the end of the lane).

Figure 6.16: I-90 Eastbound 5th Avenue to Rainier Avenue
Opened: February 17, 1992
Milepost Location: 1.98 to 3.49
Lane Location: Lane 4 of 4
Lane Length: 2.43 kilometers
Occupancy Designation: 2+
Proportion HOV Accidents: 43 of 259 (16.6%)

Table 6.13: HOV Accidents by Year: I-90 EB 5th Avenue to Rainier Avenue

Year	1992	1993	1994
Number	14	21	8

This data report does not include information on the center reversible HOV lanes opened on I-90 (from milepost 6.00 to 9.92). This is because data collected on accidents in these lanes have been inconsistent, and because data processors at the Transportation Data Office had not developed a consistent coding process for these accidents until recently. The figures supplied by the Transportation Data Office show that five HOV accidents have occurred in the westbound HOV lane configuration and that five have occurred in the eastbound configuration since the reversible HOV lanes opened in 1989 (the section open to both directions of traffic was restricted to the area from Rainier Avenue to 5th Avenue until January 1994). An update on the accident rates for these HOV lanes will be published in forthcoming reports.

Figure 6.16: I-90 EB 5th Ave. to Rainier Ave.

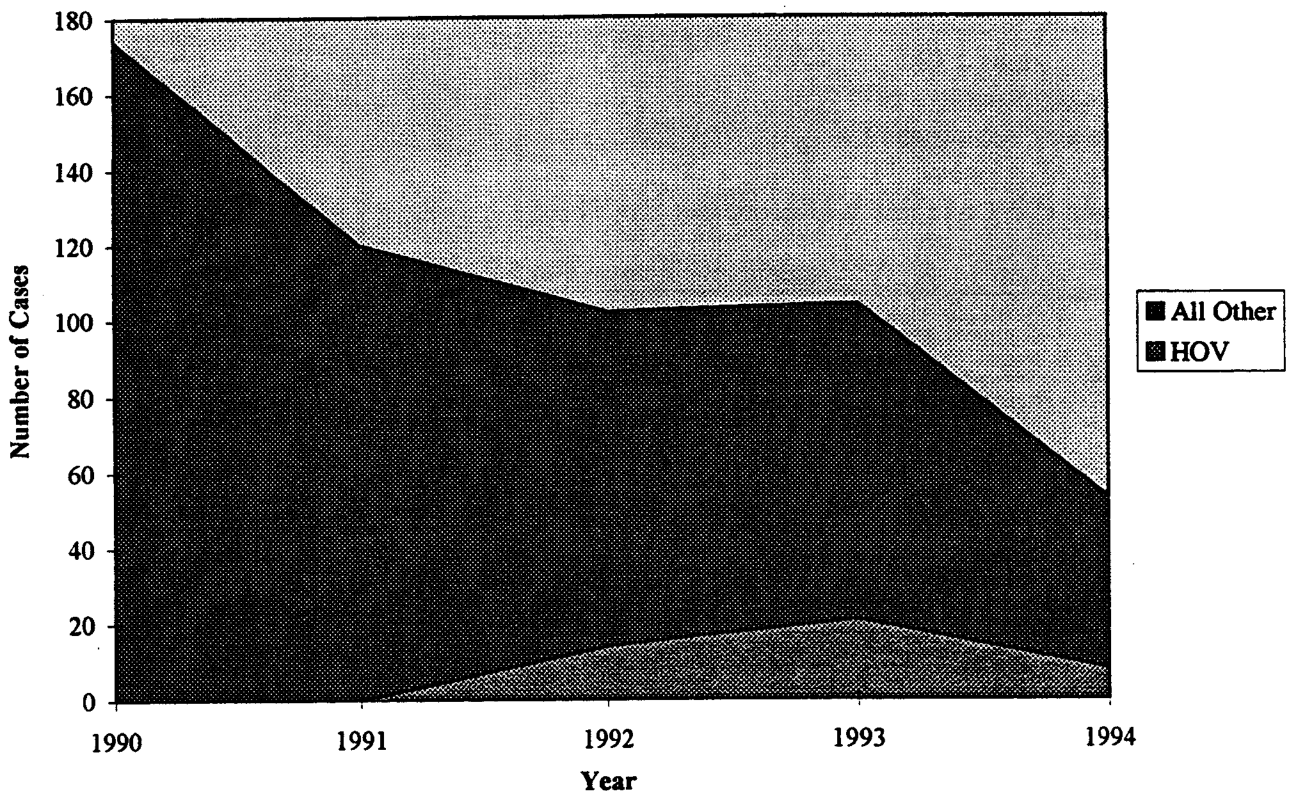

FIGURE 6.16 BOX TEXT: The number of accidents in the general purpose lanes and access/egress ramps has declined steadily, while HOV accidents fluctuated between 1992 and 1994. Because this HOV lane begins very near the origin of the highway, only 0.4 percent of all accidents occurred before the beginning of the HOV lane. Accidents in the 3.22-kilometer segment after the HOV lane ends, however, accounted for 72 percent of the total for the corridor.

I-405

Figure 6.17: I-405 Southbound Coal Creek to Sunset
Opened: 1986
Milepost Location: 4.82 to 10.47
Lane Location: Lane 1 of 3
Lane Length: 9.1 kilometers
Occupancy Designation: 2+
Proportion HOV Accidents: 171 of 1,506 (11.4%)

Table 6.14: HOV Accidents by Year: I-405 SB Coal Creek to Sunset

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
Number	13	18	27	15	24	14	16	10	34

Figure 6.17: I-405 SB Coal Creek to Sunset

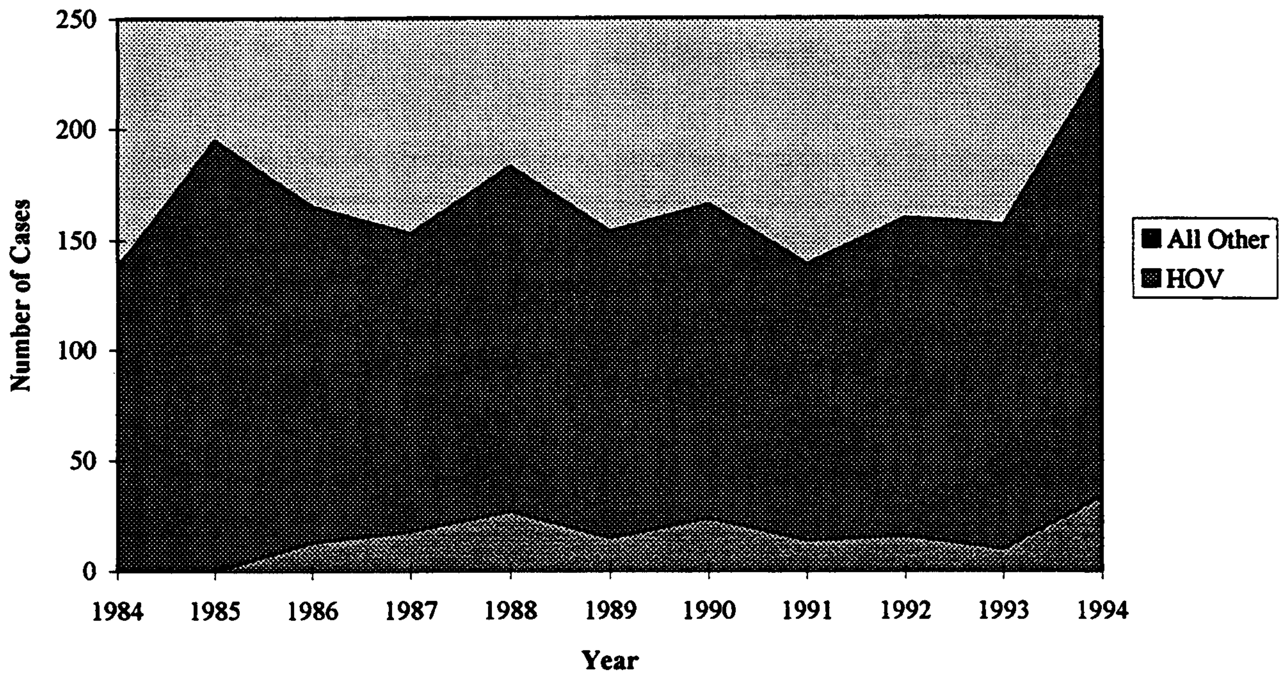

FIGURE 6.17 BOX TEXT: The rises in general purpose lane accidents in 1985 and 1994 appear to be related to construction and improvements of the HOV lane, which is located on the outside. Traffic entering the highway would have to merge through and drive next to the construction area. HOV accidents have fallen each year: from a peak of 27 in 1988, to 14 in 1991, to 16 in 1992, and 10 in 1993; but an increase in 1994 was possibly+A474 due to the S-Curve and Coal Creek projects. While this is one of the longer HOV lane segments in the area, the percentage of accidents occurring in the 3.22 kilometers before and after the HOV lane is very high (15 percent before and 55 percent after the HOV lane).

Figure 6.18: I-405 Southbound Tukwila to South Renton
Opened: December 1, 1990
Milepost Location: 0.32 to 2.98
Lane Location: Lane 3 of 3
Lane Length: 4.28 kilometers
Occupancy Designation: 2+
Proportion HOV Accidents: 40 of 704 (5.7%)

Table 6.15: HOV Accidents by Year: I-405 SB Tukwila to South Renton

Year	1990	1991	1992	1993	1994
Number	1	9	6	10	14

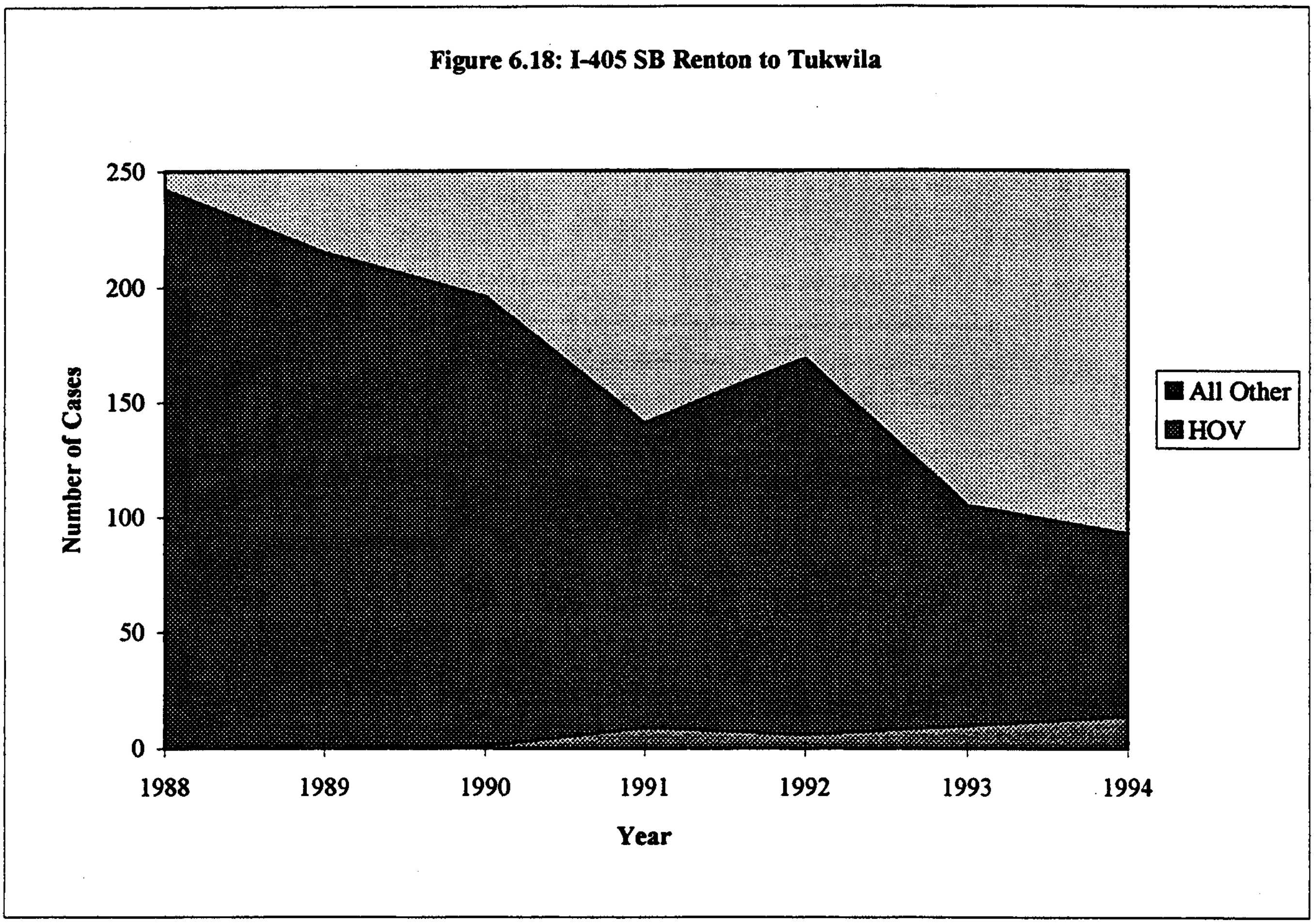

FIGURE 6.18 BOX TEXT: General purpose lane and access ramp accidents fell each year after the opening of the HOV lane, except for 1992. Because the HOV lane becomes an exit-only ramp to I-5 northbound, there is no merge problem with this lane.

Figure 6.19: I-405 Northbound Tukwila to South Renton
Opened: November 26, 1990
Milepost Location: 0.09 to 2.76
Lane Location: Lane 3 of 3
Lane Length: 4.3 kilometers
Occupancy Designation: 2+
Proportion HOV Accidents: 55 of 1,017 (5.4%)

Table 6.16: HOV Accidents by Year: I-405 NB Tukwila to South Renton

Year	1990	1991	1992	1993	1994
Number	2	14	18	13	8

Figure 6.19: I-405 NB Tukwila to South Renton

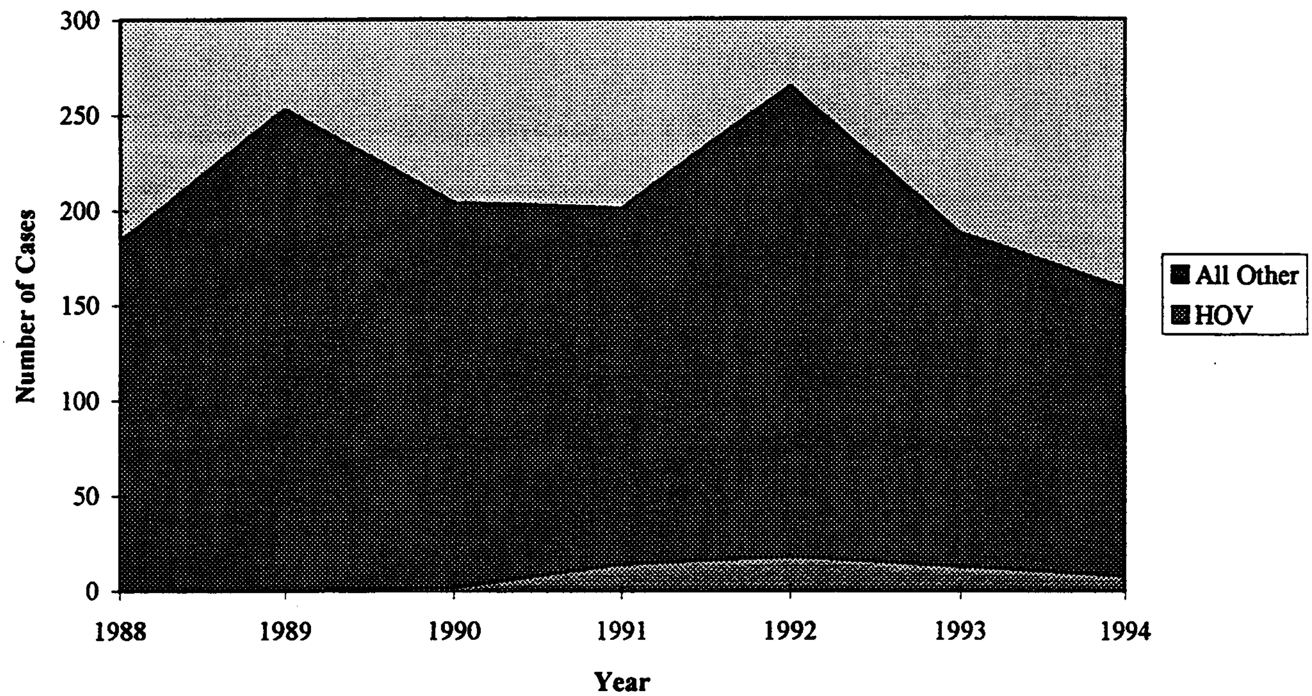

FIGURE 6.19 BOX TEXT: Accident patterns for this highway segment closely resemble those of the southbound segment. However, accident totals are higher for both general purpose lanes and HOV lanes. There does not appear to be any significant problem with the merge at the end of the HOV lane. HOV lane construction was a significant cause of accidents in 1989 and 1990. Accident records show that 135 of 253 accidents were construction-related in 1989, and construction was a factor in 93 of the 204 accidents in 1990.

Figure 6.20: I-405 Northbound Sunset to Coal Creek
Opened: 1986
Milepost Location: 4.62 to 10.56
Lane Location: Lane 1 of 3
Lane Length: 9.56 kilometers
Occupancy Designation: 2+
Proportion HOV: 197 of 1,527 (12.9%)

Table 6.16: HOV Accidents by Year: I-405 NB Tukwila to South Renton

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994
Number	32	28	17	20	27	18	20	16	19

Figure 6.20: I-405 NB Sunset to Coal Creek

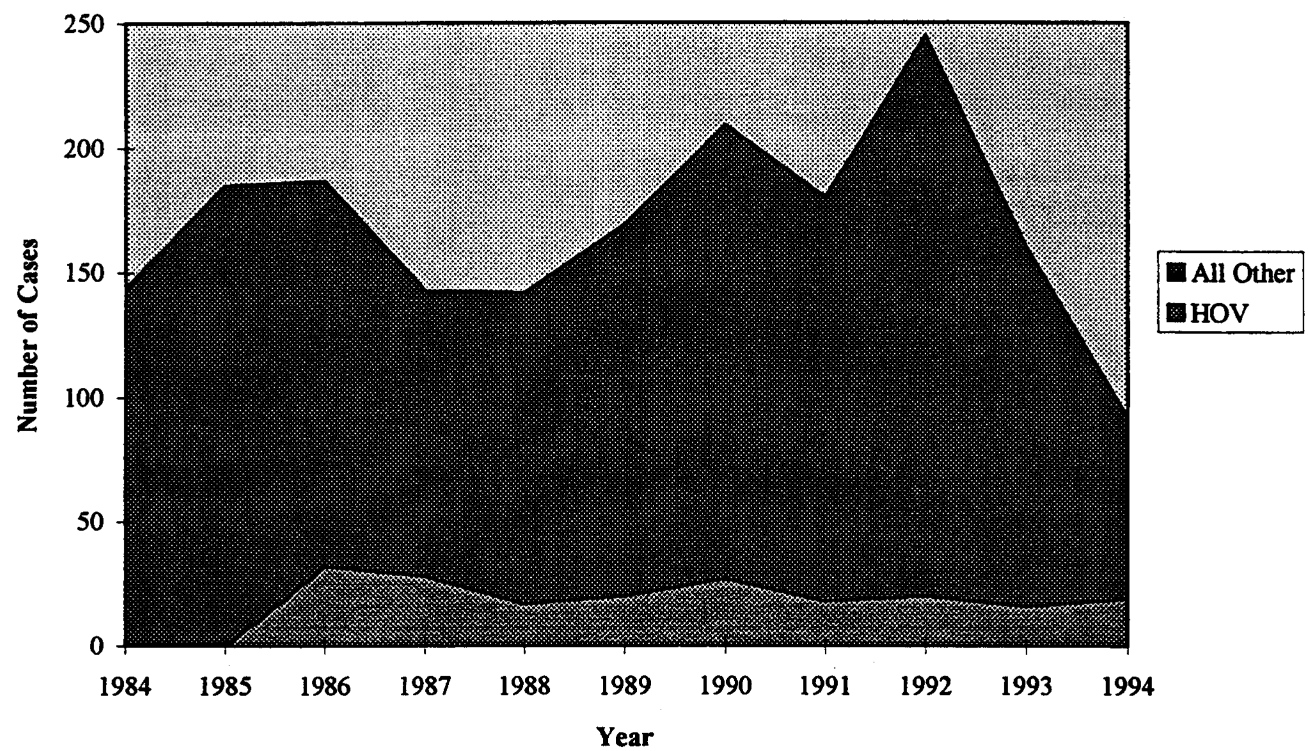

FIGURE 6.20 BOX TEXT: Accident trends for this corridor also resemble those of the southbound HOV lane. In 1985, HOV lane construction and location on the outside appear to have increased general purpose lane accidents during the time that the HOV lane was under construction. HOV lane accidents peaked in the lane's first year of operation, which suggests that drivers had difficulty adjusting to the new highway configuration. This HOV lane feeds onto I-90, so there is no forced merge from the HOV lane, and travelers wishing to continue north on I-405 can continue in the HOV lane, which now extents north through Bellevue.

Note on Future Graphs: Two new HOV lane locations opened in 1994, but since this is the first year of data, no graphs could be shown. Below are the first year data on HOV accidents at these sites.

I -405 Southbound SR 908 to SR 520
Opened: 1994
Milepost Location: 12.47 to 14.12
Lane Location: Lane 1 of 4
Lane Length: 2.65 kilometers
Occupancy Designation: 2+
Proportion HOV: 29 of 79 (36.7%)

1994
29

I -405 Northbound SR 520 to SR 908
Opened: 1994
Milepost Location: 12.47 to 14.12
Lane Location: Lane 1 of 4
Lane Length: 2.65 kilometers
Occupancy Designation: 2+
Proportion HOV: 23 of 76 (30.3%)

1994
23

ACCIDENT DATA CONCLUSIONS AND RECOMMENDATIONS

Accident patterns are erratic throughout the region, which makes it hard to generalize about accident trends. However, some summary observations appear valid.

First, HOV lanes located on the outside, or right hand side, of the highway experience more accidents than do HOV lanes located on the inside (see SR520 and I-405 north and southbound from Sunset to Coal Creek). The problem of merging traffic entering the highway through the HOV lane onto the general purpose lanes probably accounts for much of this phenomenon. One factor that may account for lower accident levels in HOV lanes on the inside of the highway may be that vehicles that experience accidents while merging across the general purpose lanes on their way to the HOV lane are not counted as HOV accidents. However, valid conclusions about the relative safety of inside or outside depend on traffic volumes. Because traffic volumes are probably greater for HOV lanes on the outside, it is difficult to say that those lanes are less safe than inside HOV lanes.

Second, reducing occupancy requirements does not appear to significantly worsen accident rates for either HOV or general purpose lanes. In only two cases was reducing occupancy requirements associated with an increased number of accidents: I-5 northbound from the Boeing Access Rd. to Swift Avenue, and I-5 southbound from Tukwila to SR516. However, in other areas, reducing occupancy requirements did not appear to result in significant safety problems.

The following are recommendations for the continued use of these data.

1. Investigate the accident rates for HOV lanes on the right side of the road in comparision to HOV lanes on the left side of the road to determine which configuration is safer. Safety analysis of each configuration should be factored into future HOV lane planning.

2. Collect accident data on an annual or semi-annual basis, unless special studies are required. Preparing and analyzing accident data are very time-intensive, and the value of quarterly data reports may not be commensurate with the costs of preparation. Accident data from the Transportation Data Office lag more than three months behind the current date, making up-to-date analysis difficult.

CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

This report represents a compilation of the data necessary to evaluate the Puget Sound area's HOV lane system. The data contained herein encompass vehicle occupancy, travel time, public opinion, transit ridership, violation and adjudication, and accident information. This report does not include volume information, which is available from inductance loop detectors. Inductance loop data are needed to evaluate person throughput and accident rate information; such calculations would complement the data in this report, and together they would allow for a valid evaluation of the HOV lane system.

AVERAGE VEHICLE OCCUPANCY CONCLUSIONS AND RECOMMENDATIONS

Occupancy data were successfully collected from all study sites. Data collection was improved during 1994 and the first half of 1995. Where data are missing, their absence is due to an insufficient number of counts or the fact that no counts were scheduled. This happened for a number of reasons, including inclement weather, poor visibility, having more sites than observers, and dropping some sites from the data collection menu. The impact of having too few successful counts per quarter was that when bad data rendered the counts unusable, data for the entire quarter were possibly lost. During the first two years of the project observations were consistently more numerous for ramp than for mainline locations, and there were more observations for GP lanes than for HOV lanes. This situation was corrected during the fourth quarter of 1994, when more HOV than GP counts were scheduled for mainlane locations and more mainlane counts were scheduled altogether. However, starting during the third quarter 1995, the total number of observations was reduced to ten counts per week because of budget cuts that reduced the funds assigned to the project. At present, only mainlane counts are being scheduled.

Factors not directly explored in this report include observer performance, and observer and data management. Because observers are unsupervised in the field, they are trusted to begin and end observations on time, and to observe and record vehicle occupancies accurately. Data quality was verified by checking individual files for "gross errors" such as misnamed files and repeats (see *HOV Monitoring and Evaluation Tool* (1)). Quality was also validated by comparing current site data with data collected from previous observations at the same location. As the project progressed, data became increasingly accurate. With this in mind, the following changes are in order.

Recommendations

1. Continue to prioritize observations at locations that ensure the best use of resources. Safe locations that provide the best visibility over varying conditions, as well as ease of access and scheduling, are obviously preferred. The question of whether counter-flow traffic patterns should be continued at existing locations or expanded at additional locations should be explored.

2. Evaluate the appropriateness of collecting vehicle occupancy data on the I-5 express lanes. Because the express lanes contain both HOV and GP lanes, "before" data for this corridor may be useful in areas where express lane expansion is planned, and they would allow planners to monitor the express lanes' performance.

The occupancy data presented in this report provide valuable information in two areas: (1) the operation and performance of HOV lanes in comparision to GP lanes, and (2) commuter mode choice in the greater Seattle area. Additionally, as the HOV lane system expands, areas where "before" data are now being collected will serve as baseline reference points in assessing the impact of HOV facilities on commuter mode choice.

However, a caveat is in order: because loop data are more representative of traffic volumes in these corridors, the data included in this report should be used only to indicate the percentages of mode and vehicle occupancy in the corridors studied.

ACO ANALYSIS CONCLUSIONS

Many factors affect ACO. Therefore, it is important to use a sampling frame that reduces the influence of these factors. However, because it is impossible to perfectly sample all time periods, days of the week, lanes, and ramps at each location for the whole year, it is important to take these factors into account when changes in ACO are analyzed.

After three years of data collection, we have some understanding of these differences. However, if one is conducting such detailed analysis, it is better to apply correction factors (see Chapter 3) than to use the raw data without adjustments.

TRAVEL TIME DATA CONCLUSIONS AND RECOMMENDATIONS

The usefulness of the travel time data presented in this report is very limited. Although the data can generally be used to compare HOV lane performance to GP lane performance and to identify areas of congestion, a number of factors render data interpretation difficult. Vehicle speeds can only be compared by time of commute for the quarter in which they occurred. Because the data are presented as average speeds, only individual study sections may be used; the data cannot be aggregated to examine the differences between HOV and GP lanes corridor-wide. Because the speeds indicated for areas tend to vary widely from quarter to quarter, yearly averages are unreliable. To determine the number of observations required for statistically meaningful information, the standard deviation for each time period must be established. Additional data will be necessary before reliable generalizations regarding vehicle speeds can be made.

It was much more difficult and complex to collect travel time data than it was to collect vehicle occupancy data. Observers not only had to be more accurate and have better visibility, they also had to coordinate their efforts more carefully. Although observer absences and tardiness are not discussed in this report, they further confounded the matching process, as did errors in data quality. Even with good data, matches were difficult to obtain because of normal traffic behavior (e.g., lane changes), especially over long distances. Despite the obstacles that made it difficult to collect the travel time data, the experience gained in this study indicates that travel time data may be collected successfully under some conditions. The greatest volume of travel time data was gathered at study sections characterized by good visibility, short length, and high numbers of observations.

Recommendations

1. Use short study sections. Distances between sites should be kept to under three kilometers and should be chosen to limit the number of intervening access/egress ramps.

2. Conduct observations using the express lanes. Not only do the express lanes have GP and HOV designations, they also constitute a "captive audience" in that vehicles may not exit for longer distances. As a result, it may be easier to obtain the necessary matches.

3. Data collection along the I-405 corridor should cover shorter distances and use fewer locations. For example, efforts might be more successful if observations were limited to two study sections (Tukwila Parkway and Benson Road S; 112th Avenue SE and NE 12th Street) for morning northbound and evening southbound commutes.

The travel time data in this report confirm that travel time data collection is most successful when it is limited to special studies. Even in the future, as technological improvements make it possible to collect travel time data without the use of human observers, the success of the data collection will be affected by the distance between sites, accuracy, and the number of observations.

PUBLIC OPINION SURVEY CONCLUSIONS

There is strong public support for HOV lanes in general and for future HOV lane construction. Although there are differences of opinion on many issues between SOV drivers and HOV travelers, these differences do not undermine general support for HOV lanes among the entire survey population.

One theme evident throughout the survey was that whereas the public supports HOV lanes, many people feel that the lanes are underutilized. The results from questions 5.12 through 5.18 (see Chapter 5) should assist planners in selecting the HOV lane policies that will make the lanes more attractive to the public. Beginning in the third quarter of 1993, two new questions were added to the survey. One asked respondents about the level to which they felt HOV lanes should be opened to all traffic during non-commute hours. The other asked about the level to which they supported converting existing general purpose lanes to HOV lanes. Results from these survey questions should be valuable in assessing the desirability of these policy options.

ENFORCEMENT DATA CONCLUSIONS AND RECOMMENDATIONS

The ACO data, violation data from WSP, HERO program data, and outcome data from the district courts provide a comprehensive picture of the extent of HOV violations in the Puget Sound area. Violation rates would be the most appropriate measure for evaluation purposes because they combine the number of cars using an HOV lane with the frequency of violations. Identification of the HOV lanes with the highest violation rates would provide valuable information to WSP troopers for their enforcement efforts. The ACO data presented in Appendix B provide an indication of violation rates (the number of SOVs observed in HOV lanes). Both WSP troopers and district court judges exercise a great deal of discretion in enforcing HOV lane violations. If WSDOT or other public officials desire to increase enforcement of HOV lane restrictions, consultation with these groups is in order.

Recommendations

1. Conduct a special study of repeat offenders. Data on this subject may be available from district courts. Cross-referencing HERO data with violation outcome data may shed some light on the extent to which violators change their behavior after receiving a ticket.

2. Conduct a special study on highway corridors characterized by chronic violation problems. For instance, according to our ACO data, the HOV lanes on I-405 (where SR167 merges with I-405) appear to have a very high violation rate. We believe that this is so because the traffic observation point is very close to where the highways merge, with a general purpose lane merging into an HOV lane on I-405. One way to assess the violation rate would be to observe traffic at that spot and at another spot one-quarter mile downstream simultaneously. Bellevue and Redmond appear to have high violation rates; these jurisdictions also have the highest number of outstanding violations among the court districts studied. Follow-up conversations with WSP officials and court clerks and judges may shed light on this trend.

ACCIDENT DATA CONCLUSIONS AND RECOMMENDATIONS

Accident patterns are erratic throughout the region, which makes it hard to generalize about accident trends. However, some summary observations appear valid.

First, HOV lanes located on the outside, or right hand side, of the highway experience more accidents than do HOV lanes located on the inside (see SR-520 and I-405 north and southbound from Sunset to Coal Creek). The problem of merging traffic entering the highway through the HOV lane onto the general purpose lanes probably accounts for much of this phenomenon. One factor that may account for lower accident levels in HOV lanes on the inside of the highway is that vehicles that experience accidents while merging across the general purpose lanes on their way to the HOV lane are not counted as HOV accidents. However, valid conclusions about the relative safety of inside or outside depend on traffic volumes. Because traffic volumes are probably greater for outside HOV lanes, it is difficult to say that those lanes are less safe than inside HOV lanes.

Second, reducing occupancy requirements does not appear to significantly worsen accident rates for either HOV or general purpose lanes. In two cases, reducing occupancy requirements was associated with an increased number of accidents: I-5 northbound from the Boeing Access Rd. to Swift Avenue, and I-5 southbound from Tukwila to SR516. However, in other areas, reducing occupancy requirements did not appear to cause significant safety problems.

Recommendations

1. Investigate the accident rates for HOV lanes on the right side of the road in comparision to HOV lanes on the left side of the road to determine which configuration is safer. Safety analysis of each configuration should be factored into HOV lane planning.

2. <u>Collect accident data on an annual or semi-annual basis, unless special studies are required</u>. Preparing and analyzing accident data are very time-intensive, and the value of quarterly data reports may not be commensurate with the costs of preparation. Accident data from the Transportation Data Office lag more than three months behind the current date, making up-to-date analysis difficult.

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- Pierce Transit, for transit ridership data
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- the Washington State Department of Transportation, Traffic Data Office for accident data
- the Washington State Patrol, for violation and accident data.

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2. Ulberg, Cy and McCormack, Edward. *Auto Occupancy Monitoring*. Seattle: Washington State Transportation Center (TRAC), WA-RD 157.1, 1988.

3. ______, *Washington State Freeway HOV System Policy, Executive Summary*. Olympia, WSDOT, 1992 (November).

4. Personal communication, Barbara Miller (HOV Monitoring and Evaluation Observations Manager, July, 1992 - June, 1993), November 24, 1993.

APPENDIX A

ACO AND TRAVEL TIME OBSERVATION SITES

Table A1 Observation Sites: Beginning Date & Characteristics

Corridor	Location	Date	Mainline	HOV	Ramp	Travel Time
I-5 North						
	236th St. SW	7/28/92			X	X
	NE 185th St.	7/1/92				X
	NE 175th St.	6/22/92			X	
	NE 145th St.	6/22/92	X	X	X	
	NE 117th St.	6/25/92				X
	NE Northgate Wy.	6/25/92			X	
I-5	Downtown					
	Lakeview Blvd. E	7/1/92	X			X
	Roanoke St.	4/7/93	X		X	
	S Holgate St.	6/23/92				X
	Michigan St.	6/26/92				
	Corson Ave. S	6/23/92				
	Albro Pl.	6/26/92	X	X		X
	S 144th St.	7/9/92				X
	Olive St.	9/22/92			X	
	Howell/Yale Sts.	9/29/92			X	
	Madison St.	12/18/92			X	
	Stewart St.	12/28/92			X	
I-5 South						
	S 178th St.	7/2/92				X
	S 188th St./ Orilla Rd.	6/23/92			X	
	S 200th St.	7/31/92			X	
	S 216th St.	6/23/92	X	X		X
	SR 516 -Kent/DesMoine Ramp	7/7/92			X	
	SR 516 -Kent Ramp	7/29/92			X	
	SR 516 -DesMoines Ramp	8/5/92			X	
	S 260th St.	7/14/92				X
	S 272nd St.	6/23/92			X	
SR-520						
	Hunt's Point	7/7/92			X	X
	Yarrow Point	6/24/92	X	X		
	SR-908 -Bellevue/ Kirkland	6/24/92			X	X
	124th Ave NE.	6/24/92			X	
	148th Ave NE.	7/27/92	X			X
	148th Ave NE/ Redmond Ramp	7/9/92			X	
	148th Ave NE/ Bellevue Ramp	7/13/92			X	

Table A1 Observation Sites: Beginning Date & Characteristics (continued)

Corridor	Location	Date	Mainline	HOV	Ramp	Travel Time
I-90						
	23rd Ave S	6/29/92				X
	35th Ave S	6/29/92				X
	Reversible Lanes I-90	8/10/94	X	X		
	60th Ave SE/ W Mercer Wy.	6/29/92			X	
	Island Crest Wy.	6/24/92	X		X	
	E Mercer Wy.	7/2/92			X	X
	Bellevue Wy.	7/28/92			X	
	Newport Wy.	8/2/93	X	X	X	
	Front St.	8/16/93			X	
	142nd	9/21/93	X			
	SR 900	9/21/93			X	
I-405	South					
	Tukwila Pkwy.	6/25/92	X	X		X
	SR-167	6/30/92			X	
	Benson Rd.	8/3/92				X
	S Park Dr.	7/10/92			X	
	112th Ave SE	6/22/92	X	X	X	X
I-405	Central					
	SE 8th St.	7/10/92			X	
	NE 4th St.	7/12/94	X	X		
	NE 8th St.	8/17/92	X	X		
	NE 12th St.	7/22/92	X	X		X
I-405	North					
	SR-908	7/8/92	X	X		X
Outlying	Sites					
	I-5N @ 112th SE-Everett	8/9/93	X			
	I-5S @ Fife	8/26/93	X			
	I-5S @ Tacoma Mall	9/20/93	X			
	SR-16 @ Tacoma Narrows Br.	8/12/93	X			
	SR-512 @ Ainsworth	9/22/93	X			
	SR-410 @ Valley Ave.	9/21/93	X			
	SR-167 @ 37th NW -Auburn	9/27/93	X			
	SR-167 @ S 208th -Kent	8/3/93	X	X		

APPENDIX B

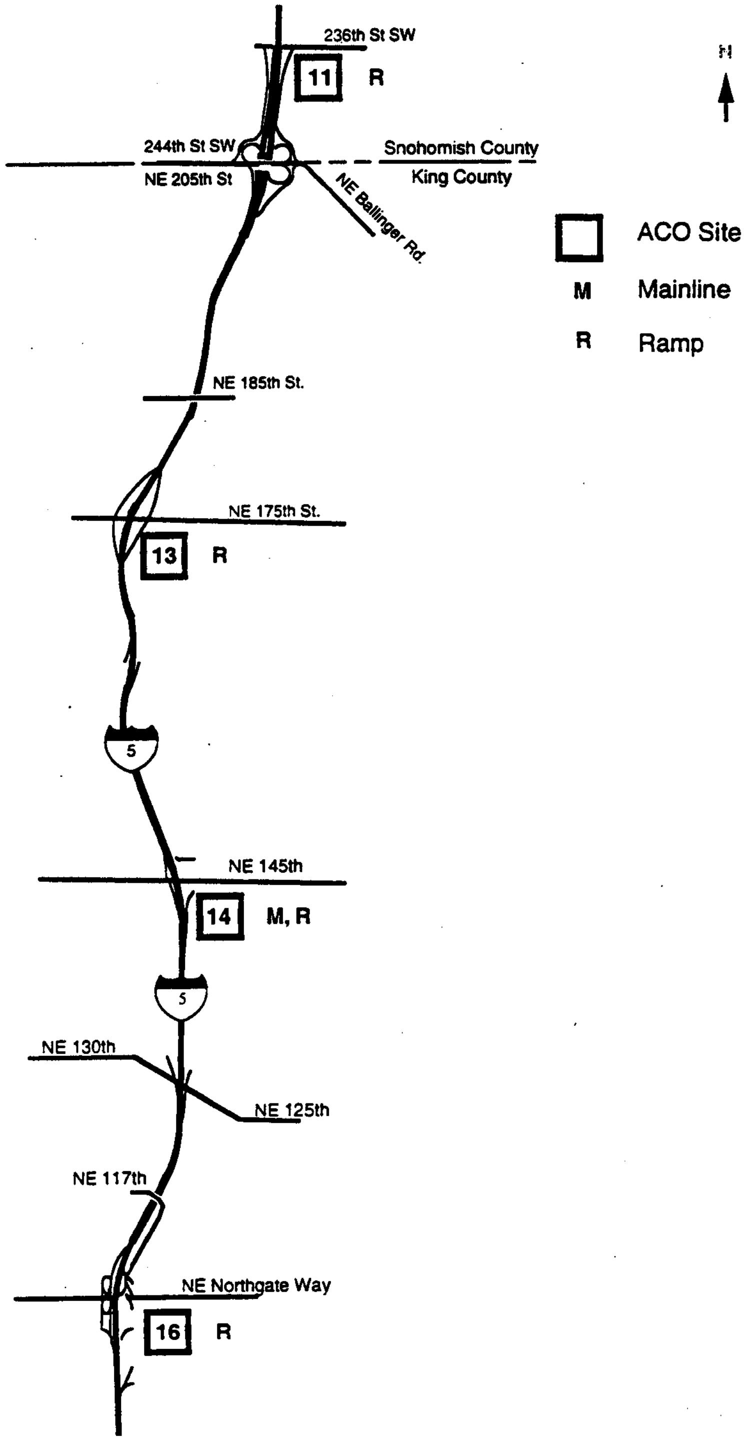
ACO DATA

Table B1: All Observation Sites, July 1992 - June 1995

I-5 North (corridor 1)	I-5 Downtown (corridor 2)	I-5 South (corridor 3)
11 = SW 236th St	21a = Lakeview Blvd. 21b = Roanoke	31
12	22 = S Holgate St	32 = S 188th/Orilla Rd
13 = N 175th St	23 = Michigan St.	33 = S 200th St
14 = N 145th St	24 = Corson Ave. S.	34 = S 216th St
15	25 = Albro Pl	35 = SR-516 -Kent/Des Moines Rd
16 = NE Northgate Wy	26	36 = SR-516 -Kent Ramp
	27 = Olive St	37 = SR-516 -Des Moines Ramp
	28 = Howell & Yale	38
	29 = Madison St	39 = S 272nd St
	20 = Stewart St	
SR 520 (corridor 4)	**I-90 (corridor 5)**	**I-405 South (corridor 6)**
41 = Hunt's Point	51	61 = Tukwila Pkwy — Southcenter
42 = Yarrow Point	52 = Reversible	62 = SR-167 -Renton
43 = Sr-908 -Bellevue/Kirkland	53 = 60th Ave SE/W Mercer Wy	63
44 = 124th Ave NE	54 = Island Crest Wy	64 = S Park Dr
45 = 148th Ave NE	55 = East Mercer Wy	65 = 112th Ave SE/Lake Wash. Bvd
46 = 148th -Redmond Ramp	56 = Bellevue Wy	
47 = 148th -Bellevue Ramp	57 = Newport Wy — Issaquah	
	58 = Front St — Issaquah	
	59 = 142nd Ave	
	50 = SR-900	
I-405 Central (corridor 7)	**I-405 North (corridor 8)**	**Outlying Locations**
71 = SE 8th St.	81 = SR 908 -Kirkland/Redmond	91 = I-5N @ 112th SE -Everett
72 = NE 8th St		92 = I-5S @ Fife
73a = NE 12th St		93 = I-5S @ Tacoma Mall
73b = NE 4th St		94 = SR-16 @ Tacoma Narrows Bridge
		95 = SR-512 @ Ainsworth
		96 = SR-410 @ Valley Ave -Sumner
		97 = SR-167 @ 137th NW -Auburn
		98 = SR-167 @ S 208th -Kent

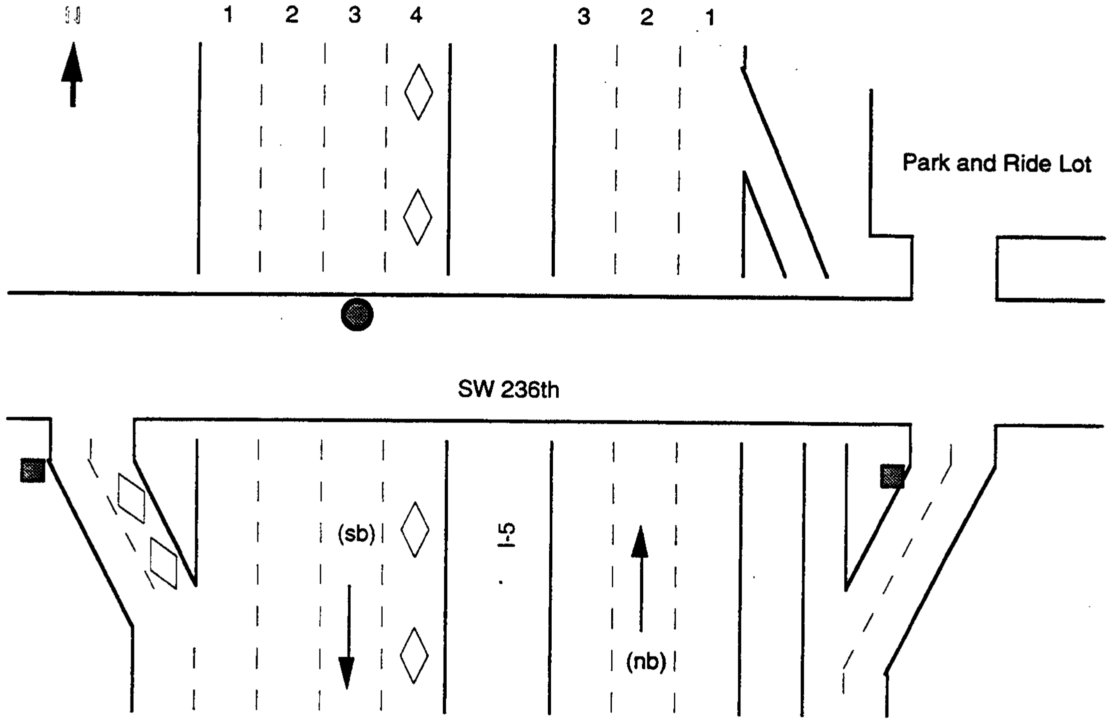
*Site numbers with no designation indicate discontinued sites.

Figure B1. Vehicle Occupancy (ACO) Sites
I-5 North (Corridor #1)



SITE #11. I-5 NORTH - 236th Street SW

ACO on/ramp SB-am
ACO off/ramp NB-pm



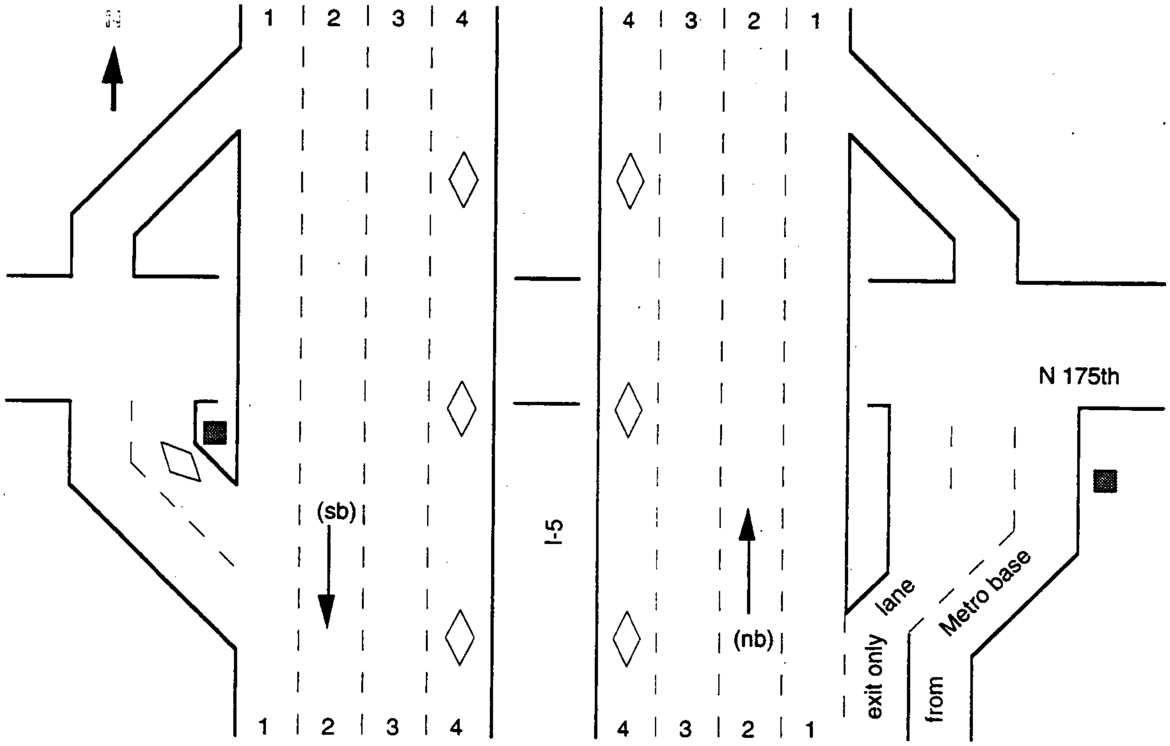
a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2929	554	103	32	6	16	20	27	8	28	**3723**	**1.24**	**12**
	Q4/92	3200	962	69	11	15	39	7	27	2	15	**4347**	**1.27**	**14**
	Q1/93	1447	440	78	17	9	18	7	17	1	13	**2047**	**1.33**	**6**
	Q2/93	2146	500	75	29	11	24	6	32	2	16	**2841**	**1.27**	**9**
	Q3/93	No observations										--		
	Q4/93	No observations										--		
	Q1/94	1196	301	31	12	2	14	6	15	4	6	**1587**	**1.26**	**6**
	Q2/94	1523	344	50	20	5	22	4	47	7	10	**2032**	**1.26**	**9**
	Q3/94	1748	335	43	11	16	21	0	15	4	15	**2208**	**1.21**	**9**
	Q4/94	516	75	4	8	0	7	3	14	3	0	**630**	**1.18**	**4**
	Q1/95	1292	138	13	12	7	17	6	20	3	6	**1514**	**1.14**	**7**
	Q2/95	1653	306	31	8	15	15	5	11	8	10	**2061**	**1.20**	**6**
														82

p.m.	northbound Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	5485	1456	256	107	45	28	2	74	2	71	**7526**	**1.32**	**14**
	Q4/92	1867	311	39	15	20	6	2	26	1	10	**2297**	**1.20**	**4**
	Q1/93	7875	1603	227	49	60	37	9	126	6	32	**10024**	**1.23**	**20**
	Q2/93	No observations										--		
	Q3/93	2764	605	89	26	17	10	1	44	2	18	**3576**	**1.25**	**7**
	Q4/93	5659	1152	140	67	38	20	7	95	13	16	**7207**	**1.23**	**14**
	Q1/94	1778	315	39	14	10	6	3	20	2	9	**2196**	**1.20**	**4**
	Q2/94	1307	285	43	26	10	7	2	33	0	24	**1737**	**1.27**	**5**
	Q3/94	3427	790	147	58	35	18	3	45	5	33	**4561**	**1.29**	**11**
	Q4/94	2588	682	90	52	31	14	5	60	6	9	**3537**	**1.30**	**9**
	Q1/95	2969	720	73	40	34	19	7	42	3	6	**3913**	**1.26**	**10**
	Q2/95	1584	406	53	25	10	12	0	17	3	10	**2120**	**1.29**	**5**
														103

SITE #13. I-5 NORTH - North 175th Street

■ **ACO on/ramp SB-am**
■ **ACO off/ramp NB-pm**



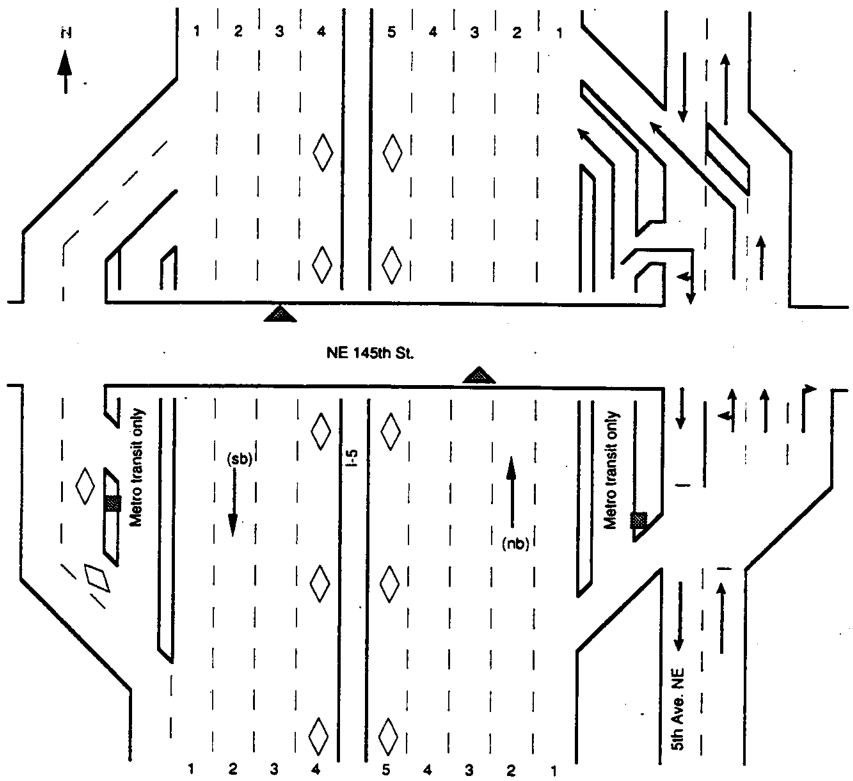
a.m.	southbound													
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	8033	1572	223	49	9	81	1	120	69	59	**10216**	**1.22**	**26**
	Q4/92	6170	1167	72	19	6	63	2	74	48	34	**7655**	**1.18**	**17**
	Q1/93	1724	221	23	2	2	15	2	22	10	6	**2027**	**1.14**	**4**
	Q2/93	1224	292	54	15	4	15	0	21	10	4	**1657**	**1.28**	**5**
	Q3/93	1055	280	16	7	1	15	0	16	11	4	**1405**	**1.25**	**9**
	Q4/93	760	161	19	9	1	12	2	4	9	6	**983**	**1.24**	**3**
	Q1/94	2073	527	51	12	4	23	3	35	10	11	**2749**	**1.25**	**8**
	Q2/94	1954	464	46	14	2	29	3	30	11	2	**2555**	**1.24**	**9**
	Q3/94	2953	650	97	45	4	36	2	30	38	·26	**3881**	**1.26.**	**11**
	Q4/94	1172	249	21	8	7	20	0	33	9	2	**1521**	**1.22**	**7**
	Q1/95	1586	374	32	4	3	22	0	16	10	1	**2048**	**1.23**	**6**
	Q2/95	2115	371	35	13	6	27	2	27	14	23	**2633**	**1.19**	**11**
														116

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	9367	1662	308	136	13	62	9	101	33	64	**11755**	**1.24**	**18**
	Q4/92	5466	714	62	19	14	35	5	75	24	12	**6426**	**1.14**	**13**
	Q1/93	14713	1865	183	63	19	89	13	126	40	36	**17147**	**1.14**	**30**
	Q2/93	4928	758	90	41	8	33	2	73	10	23	**5966**	**1.18**	**9**
	Q3/93	4773	677	108	55	4	30	5	47	17	23	**5739**	**1.19**	**9**
	Q4/93	7786	1212	139	37	18	63	7	105	13	22	**9402**	**1.18**	**17**
	Q1/94	5040	567	32	25	7	41	4	70	12	15	**5803**	**1.13**	**10**
	Q2/94	2712	504	64	37	4	18	2	26	9	6	**3382**	**1.23**	**6**
	Q3/94	8157	1197	138	55	17	59	3	71	13	74	**9784**	**1.17**	**16**
	Q4/94	1916	320	36	18	4	16	2	29	3	2	**2346**	**1.20**	**5**
	Q1/95	7865	1256	121	38	29	54	12	60	5	24	**9464**	**1.17**	**15**
	Q2/95	2665	460	43	30	6	18	3	45	4	17	**3291**	**1.20**	**5**
														153

SITE #14. I-5 NORTH - Northeast 145th Street

▲ ACO mainline SB-am & NB-pm
■ ACO on/ramp SB-am
■ ACO off/ramp NB-pm



Note: To count on the southbound entrance ramp in the morning, walk across the overpass from the substation. On the west end and south side of the overpass, there is a sidewalk leading half a block down the ramp to a bus shelter. You can sit by the concrete wall to count traffic to your left. You will also need to count the buses using the transit-only lane to your right.

To count on the northbound exit ramp in the afternoon, walk across the street from the substation so you are on the west side of 5th NE and the south side of N 145th. You have to walk down the grassy strip about a block, so that you count only the traffic exiting from the freeway, and the traffic from 5th NE which merges at this point.

I-5 North - NE 145th Street a.m. southbound

Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q3/92	12	654	105	33	4	18	18	2	0	28	**874**	**2.21**	**2**
lanes	Q4/92	72	842	94	7	9	43	2	15	0	27	**1111**	**2.04**	**3**
1	Q1/93	14	1180	71	11	10	55	6	3	0	28	**1378**	**2.06**	**2**
	Q2/93	44	1865	173	54	6	97	3	18	1	53	**2314**	**2.12**	**4**
	Q3/93	35	2097	304	97	32	109	15	23	5	108	**2825**	**2.19**	**6**
	Q4/93	59	948	69	24	0	32	11	5	0	19	**1167**	**2.06**	**4**
	Q1/94	9	485	49	17	0	22	6	6	4	3	**601**	**2.14**	**2**
	Q2/94	23	1034	103	36	8	42	8	11	0	16	**1281**	**2.13**	**3**
	Q3/94	22	910	82	34	4	44	1	16	2	35	**1150**	**2.13**	**3**
	Q4/94	74	2020	99	23	22	110	2	15	1	19	**2385**	**2.03**	**5**
	Q1/95	29	1995	109	19	7	119	13	23	0	13	**2327**	**2.06**	**6**
	Q2/95	94	3173	197	34	57	175	12	24	1	113	**3880**	**2.05**	**11**
														46

Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	5354	379	36	8	0	16	4	67	105	12	**5981**	**1.08**	**7**
lanes	Q4/92	4042	255	31	5	2	6	0	61	58	2	**4462**	**1.08**	**5**
3	Q1/93	6229	356	12	1	1	4	1	89	130	6	**6829**	**1.06**	**7**
	Q2/93	11174	680	41	14	6	15	8	228	234	20	**12420**	**1.07**	**15**
	Q3/93	12211	917	94	23	5	14	4	220	294	24	**13806**	**1.09**	**16**
	Q4/93	10526	657	90	27	3	16	2	162	200	17	**11700**	**1.08**	**14**
	Q1/94	7428	275	13	6	3	8	5	98	157	3	**7996**	**1.04**	**12**
	Q2/94	7844	403	43	18	4	11	4	112	190	10	**8639**	**1.07**	**11**
	Q3/94	7249	457	22	9	3	19	2	191	226	16	**8194**	**1.07**	**11**
	Q4/94	2473	122	2	2	1	3	0	32	68	0	**2703**	**1.05**	**5**
	Q1/95	1733	101	5	7	1	2	1	25	58	1	**1934**	**1.07**	**3**
	Q2/95	5113	167	6	32	5	13	1	77	192	5	**5611**	**1.05**	**9**
														115

p.m. northbound

Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q3/92	18	652	121	32	10	33	3	1	1	37	**908**	**2.21**	**2**
lanes	Q4/92	7	841	37	6	6	34	5	5	2	13	**956**	**2.05**	**2**
1	Q1/93	2	624	61	17	3	30	0	3	0	10	**750**	**2.14**	**1**
	Q2/93	25	1109	141	51	17	37	4	18	0	45	**1447**	**2.17**	**2**
	Q3/93	17	686	122	56	8	44	4	9	0	20	**966**	**2.26**	**2**
	Q4/93	No observations												
	Q1/94	40	1450	208	55	34	68	3	11	0	23	**1892**	**2.16**	**3**
	Q2/94	84	1268	73	30	14	46	9	15	0	17	**1556**	**2.04**	**2**
	Q3/94	46	2237	237	91	42	80	19	18	0	112	**2882**	**2.15**	**5**
	Q4/94	35	2821	202	71	77	111	10	27	0	54	**3408**	**2.10**	**7**
	Q1/95	40	3467	198	68	64	137	10	20	0	41	**4045**	**2.08**	**8**
	Q2/95	70	3399	259	79	88	137	9	30	0	97	**4168**	**2.10**	**11**
														45

Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	4187	649	80	40	1	7	2	83	76	12	**5137**	**1.19**	**11**
lanes	Q4/92	4036	396	33	15	1	6	2	78	61	5	**4633**	**1.11**	**7**
4	Q1/93	4968	648	32	3	3	11	2	70	96	5	**5838**	**1.13**	**10**
	Q2/93	8752	939	51	17	7	11	3	1165	152	8	**11105**	**1.11**	**16**
	Q3/93	14864	2089	345	149	13	32	18	329	230	43	**18112**	**1.19**	**26**
	Q4/93	3011	253	21	5	2	3	2	6	41	3	**3347**	**1.09**	**4**
	Q1/94	7157	669	83	21	6	4	3	99	122	1	**8165**	**1.11**	**13**
	Q2/94	7244	766	81	40	6	7	3	179	143	9	**8478**	**1.13**	**12**
	Q3/94	5171	709	52	29	4	10	11	145	89	18	**6238**	**1.15**	**13**
	Q494	3028	950	84	22	15	27	5	54	44	5	**4234**	**1.29**	**8**
	Q1/95	5152	369	31	11	4	7	0	68	110	0	**5752**	**1.08**	**9**
	Q2/95	6516	612	59	24	8	10	0	84	133	15	**7461**	**1.11**	**12**
														141

I-5 North - NE 145th Street

a.m. southbound

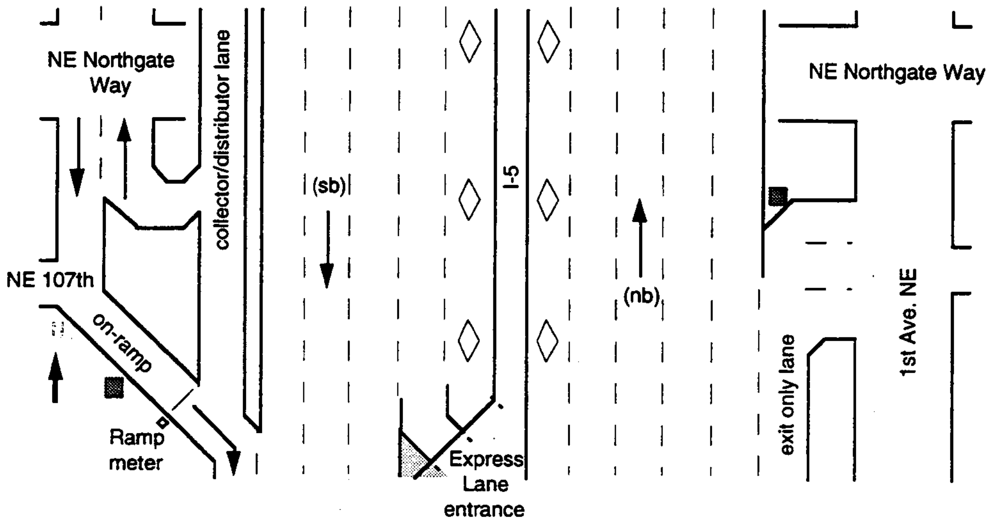
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	10190	1307	185	66	17	52	13	120	43	56	**12049**	**1.16**	**17**
	Q4/92	7178	885	98	36	6	57	10	59	39	12	**8379**	**1.15**	**14**
	Q1/93	5050	571	56	26	9	30	12	54	14	6	**6328**	**1.12**	**8**
	Q2/93	8761	1049	73	22	3	45	5	123	37	29	**10147**	**1.13**	**12**
	Q3/93	5894	511	58	19	2	32	7	54	23	40	**6650**	**1.11**	**13**
	Q4/93	5656	473	35	26	2	36	17	55	27	16	**6343**	**1.10**	**10**
	Q1/94	4315	303	25	18	0	22	14	42	11	5	**4755**	**1.09**	**8**
	Q2/94	6757	760	108	31	9	34	22	69	22	12	**7824**	**1.14**	**10**
	Q3/94	3687	345	27	13	2	20	8	41	16	22	**4181**	**1.11**	**7**
	Q4/94	4406	432	46	17	6	23	9	42	13	10	**5004**	**1.12**	**7**
	Q1/95	4686	548	39	5	3	20	10	36	24	8	**5379**	**1.12**	**7**
	Q2/95	5385	660	31	6	5	34	8	44	26	27	**6226**	**1.12**	**9**
														127

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	4779	896	170	79	14	2	2	56	14	43	**6055**	**1.25**	**12**
	Q4/92	6332	1048	108	27	11	17	7	73	18	16	**7657**	**1.18**	**14**
	Q1/93	9256	1586	193	70	11	34	13	1948	19	23	**13153**	**1.20**	**23**
	Q2/93	2059	465	47	16	0	18	1	17	4	8	**2635**	**1.24**	**5**
	Q3/93	5039	977	178	79	9	39	1	72	38	19	**6451**	**1.25**	**13**
	Q4/93	1781	336	55	13	9	0	5	18	8	1	**2226**	**1.22**	**4**
	Q1/94	1823	346	33	16	3	3	3	13	2	5	**2247**	**1.21**	**4**
	Q2/94	4872	940	151	74	10	36	4	53	10	21	**6171**	**1.24**	**11**
	Q3/94	6931	1240	180	96	24	21	14	87	14	51	**8658**	**1.23**	**16**
	Q4/94	5797	832	87	34	15	21	5	60	8	18	**6877**	**1.17**	**14**
	Q1/95	1633	283	36	5	7	1	2	10	2	3	**1982**	**1.19**	**5**
	Q2/95	3214	626	91	31	7	22	7	69	12	14	**4094**	**1.23**	**11**
														132

SITE #16. I-5 NORTH - NE Northgate Way

■ ACO on/ramp SB-am
■ ACO off/ramp NB-pm



Note: Counting the southbound on/ramp traffic means you have to count all the cars on the collector/distributor lane. To do this, walk down the ramp until the c/d lane merges into one, and sit behind the jersey barrier for safety.

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2807	393	47	17	7	3	8	62	15	19	**3378**	**1.17**	**13**
	Q4/92	2386	362	44	18	1	3	9	46	4	6	**2879**	**1.18**	**13**
	Q1/93	2040	294	25	5	5	5	9	41	7	9	**2440**	**1.15**	**8**
	Q2/93	1339	182	25	10	0	1	6	408	10	5	**1986**	**1.17**	**11**
	Q3/93	1644	192	24	12	2	0	22	30	8	20	**1954**	**1.15**	**11**
	Q4/93	843	104	16	4	2	0	5	18	3	0	**995**	**1.15**	**3**
	Q1/94	1734	199	23	3	0	1	13	45	2	0	**2020**	**1.13**	**8**
	Q2/94	2172	347	41	24	10	1	6	40	7	6	**2654**	**1.20**	**9**
	Q3/94	1902	281	27	4	6	0	6	47	14	7	**2294**	**1.16**	**15**
	Q4/94	1168	182	18	4	3	0	10	23	10	2	**1420**	**1.17**	**7**
	Q1/95	3082	424	44	5	7	3	15	40	13	4	**3637**	**1.15**	**11**
	Q2/95	2214	305	35	18	4	2	7	62	18	13	**2678**	**1.17**	**10**
														119

I-5 North - NE Northgate Way

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	3998	1161	240	112	5	9	4	36	19	32	**5616**	**1.36**	**14**
	Q4/92	5038	1124	179	58	1	22	5	117	17	9	**6570**	**1.26**	**14**
	Q1/93	4475	931	88	43	6	17	2	42	10	9	**5623**	**1.22**	**14**
	Q2/93	3329	775	71	24	1	9	6	24	20	16	**4244**	**1.24**	**10**
	Q3/93	3567	810	133	58	2	3	2	37	11	17	**4640**	**1.28**	**10**
	Q4/93	5773	1395	182	77	10	4	5	53	14	12	**7525**	**1.27**	**17**
	Q1/94	1857	326	37	18	0	2	4	12	6	2	**2264**	**1.20**	**5**
	Q2/94	4118	1034	149	57	9	3	3	44	12	26	**5455**	**1.28**	**13**
	Q3/94	3621	820	124	59	10	3	6	40	7	16	**4706**	**1.27**	**12**
	Q4/94	3318	714	90	35	3	2	6	27	8	7	**4210**	**1.24**	**10**
	Q1/95	1700	416	45	24	0	2	4	14	3	2	**2210**	**1.27**	**5**
	Q2/95	3699	900	126	35	4	5	7	29	6	30	**4841**	**1.27**	**12**
														136

Figure B6. Vehicle Occupancy (ACO) Sites
I-5 Downtown (Corridor #2N)

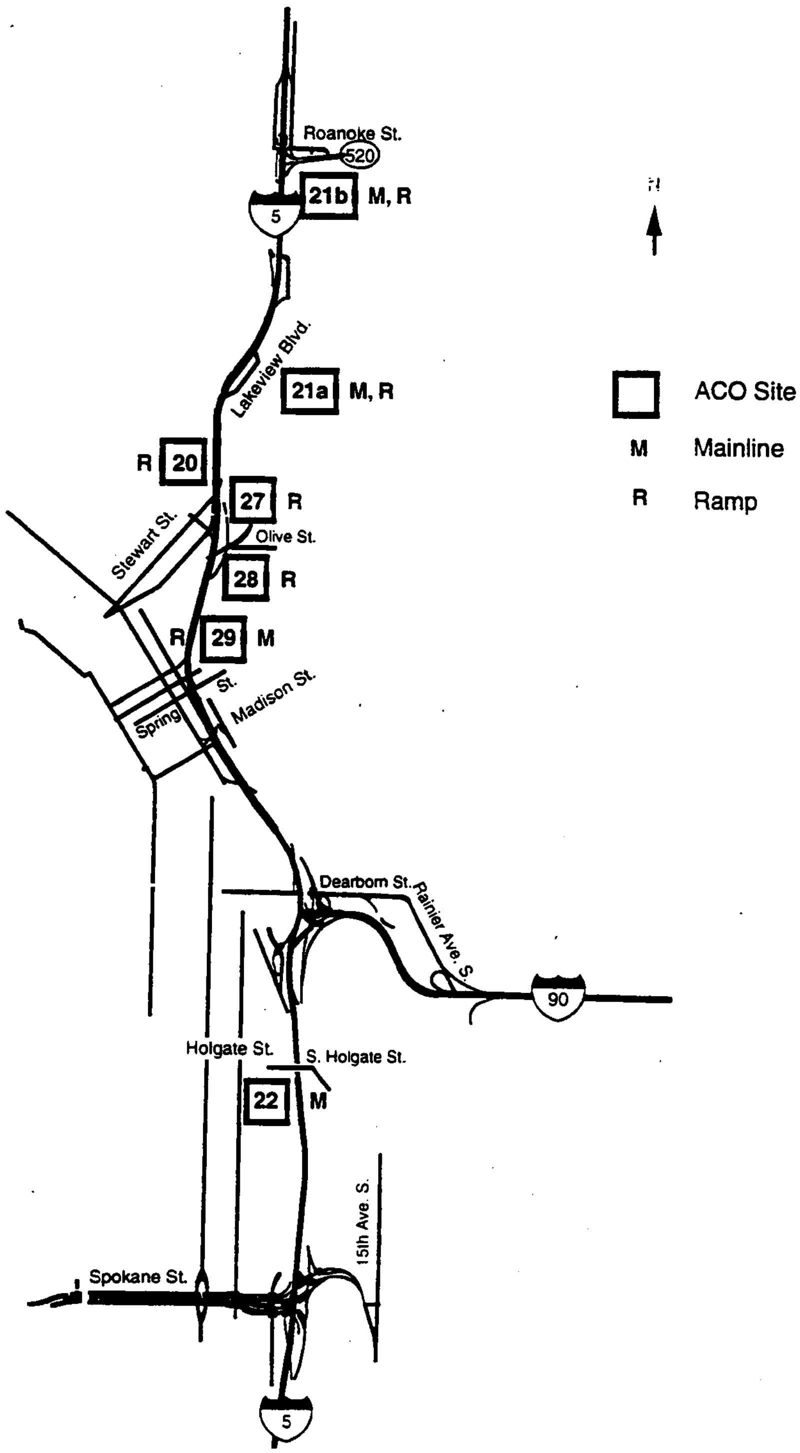
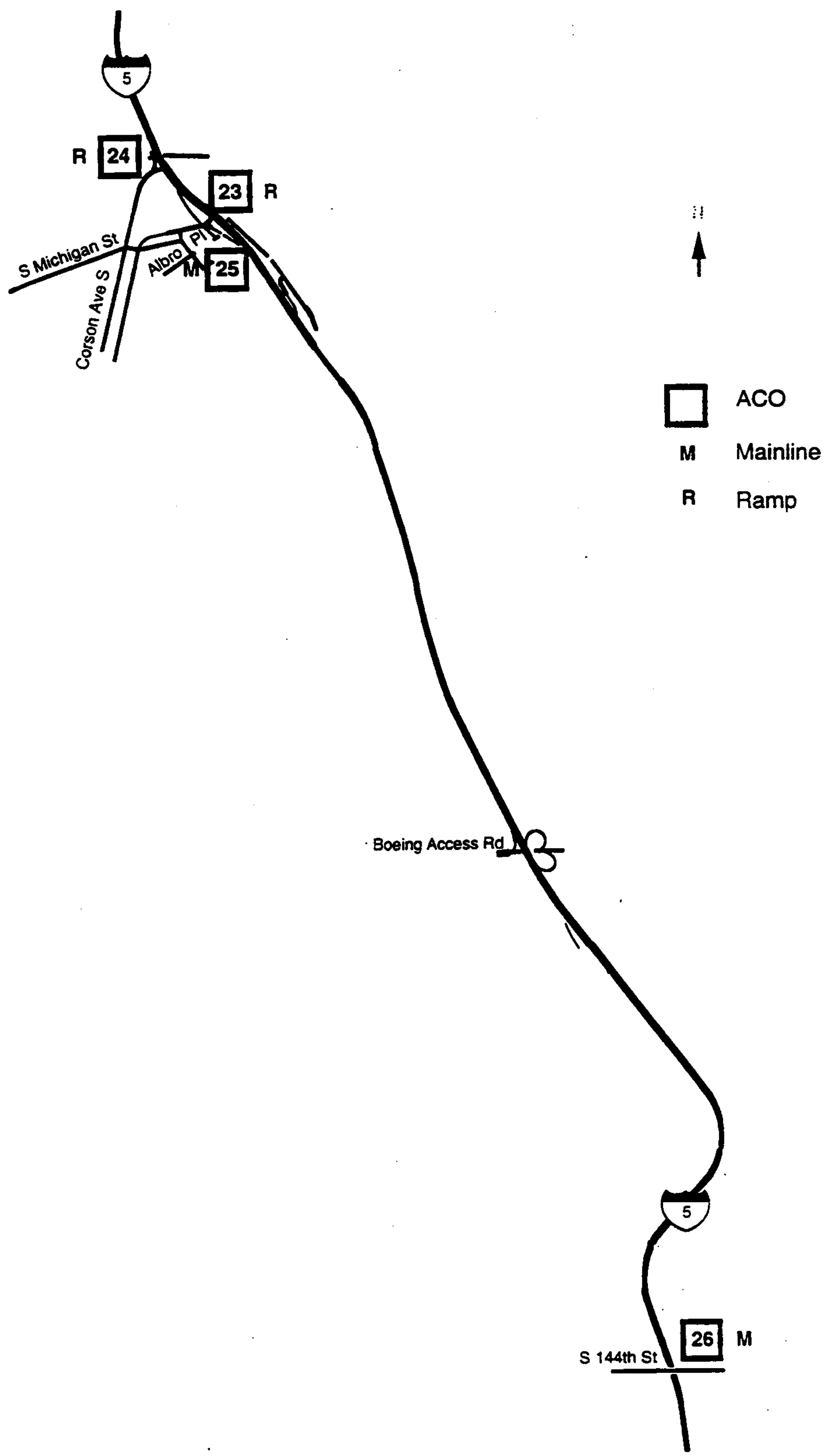
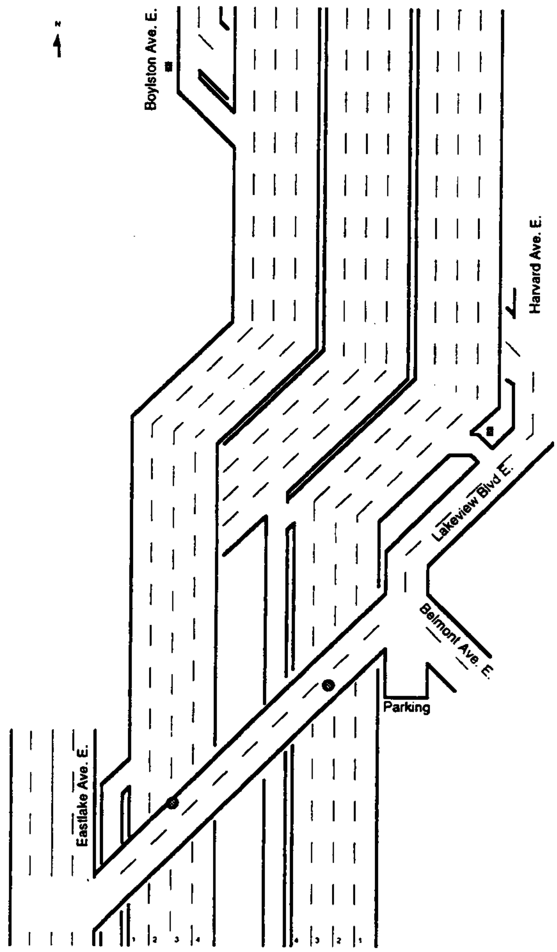


Figure B6. Vehicle Occupancy (ACO) Sites (cont.)
I-5 Downtown (Corridor #2S)



SITE #21a. I-5 DOWNTOWN - Lakeview Boulevard

ACO mainline SB pm
ACO mainline NB am
ACO off/ramp SB-am
ACO off/ramp NB-pm



Note: This site was suspended at end of Q2/93.

Downtown I-5 - Lakeview Blvd.

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q3/92	576	209	11	4	0	0	0	10	41	8	859	1.30	1
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	No observations										--		
														1

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q3/92	1004	202	19	3	2	20	2	46	53	4	1355	1.20	4
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	No observations										--		
														4

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q3/92	3428	609	49	19	4	33	13	43	41	30	4269	1.19	6
	Q4/92	2427	228	1	0	4	8	3	11	35	1	2718	1.09	4
	Q1/93	No observations										--		
	Q2/93	No observations										--		
														10

a.m. southbound

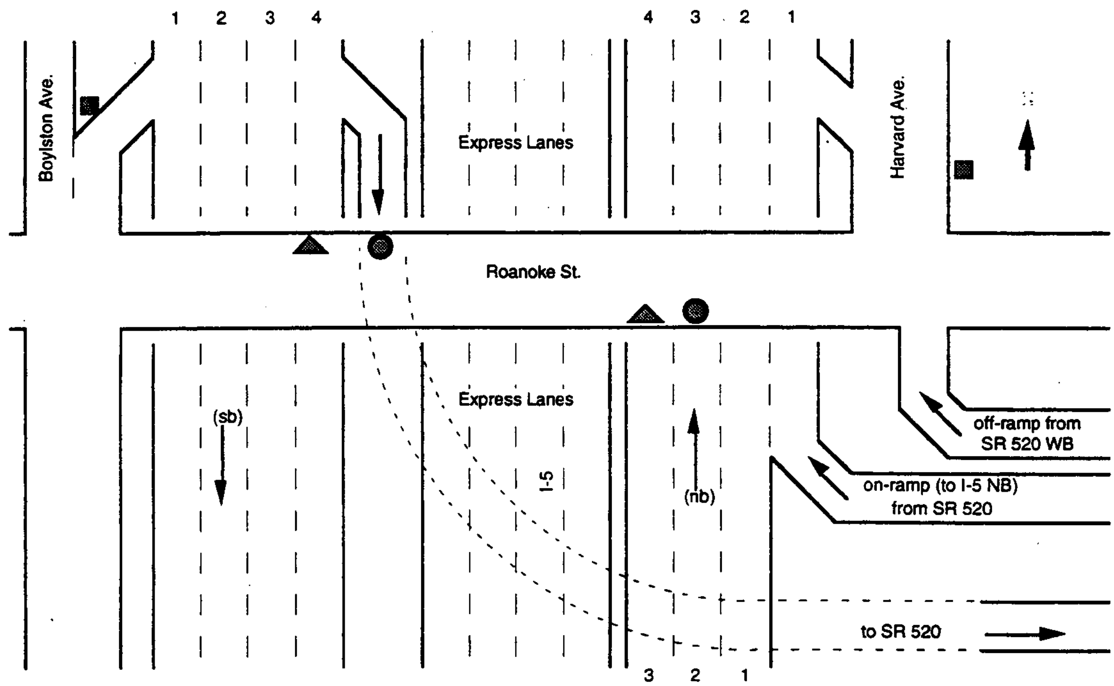
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	6922	614	46	9	1	0	5	106	48	30	7781	1.10	17
	Q4/92	1708	377	43	8	1	0	1	28	12	5	2183	1.23	3
	Q1/93	No observations										--		
	Q2/93	No observations										--		
														20

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	7244	1440	188	29	2	0	5	54	20	29	9011	1.21	14
	Q4/92	3510	403	23	7	0	0	0	56	8	13	4020	1.12	7
	Q1/93	No observations										--		50
	Q2/93	No observations										--		
														21

SITE #21b. I-5 DOWNTOWN - Roanoke Boulevard

- ACO mainline SB & NB-am & pm
- ACO off/ramp SB-am & pm
- ACO on/ramp NB-am & pm



Directions: Take I-5 south from 45th Avenue NE, and take the first exit south of the ship canal. To count either mainline or southbound off/ramp traffic, find a place to park along the side of the street (you may need to turn right on Roanoke and go around the block).

To count northbound on/ramp traffic, turn left on Roanoke, cross over the mainline, and turn left again on Harvard Ave. The on/ramp is about a block down on your left. You can park across the street in the residential area, and sit on the sidewalk just to the south of the ramp.

Note: Do not count the express lanes at all in this location. The off/ramp southbound merges with traffic on Boylston Avenue East. You have to sit someplace where you can see clearly only the ramp traffic.

I-5 Downtown - Roanoke Blvd.

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	9057	864	58	9	7	23	14	177	201	10	**10420**	**1.10**	**17**
	Q2/93	1987	195	17	2	0	5	3	41	32	6	**2288**	**1.11**	**4**
	Q3/93	8806	799	105	52	12	23	12	169	231	37	**10246**	**1.12**	**19**
	Q4/93	8921	801	68	15	5	21	18	146	153	16	**10164**	**1.10**	**19**
	Q1/94	7866	881	96	23	5	74	46	185	196	8	**9380**	**1.13**	**16**
	Q2/94	8282	693	71	36	6	27	31	148	220	22	**9536**	**1.10**	**22**
	Q3/94	6323	675	70	28	8	17	5	99	121	29	**7375**	**1.13**	**15**
	Q4/94	6108	535	39	7	2	15	21	102	159	6	**6994**	**1.09**	**13**
	Q1/95	3944	338	23	9	3	16	12	84	114	6	**4549**	**1.10**	**10**
	Q2/95	5576	394	36	25	13	13	10	104	116	21	**6308**	**1.09**	**13**
														148
Off ramp	Q3/92	6812	599	44	9	1	0	5	106	48	30	**7654**	**1.10**	**15**
	Q4/92	1689	123	21	4	0	0	1	28	9	4	**1879**	**1.10**	**4**
	Q1/93	No observations												
	Q2/93	No observations												
	Q3/93	919	154	19	7	0	0	0	19	4	5	**1127**	**1.20**	**4**
	Q4/93	1647	280	47	26	0	2	13	13	1	5	**2034**	**1.23**	**6**
	Q1/94	3172	435	68	26	12	2	24	25	0	3	**3767**	**1.18**	**12**
	Q2/94	1325	226	47	25	1	1	17	8	1	3	**1654**	**1.25**	**5**
	Q3/94	2248	262	26	15	4	3	11	31	8	12	**2620**	**1.14**	**12**
	Q4/94	1681	248	32	15	2	3	14	26	2	5	**2028**	**1.18**	**9**
	Q1/95	1111	142	12	7	2	2	19	19	3	4	**1321**	**1.15**	**7**
	Q2/95	1121	165	28	41	10	3	11	11	2	4	**1396**	**1.26**	**6**
														80

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	2562	871	61	3	4	47	21	1530	74	19	**5192**	**1.29**	**9**
	Q3/93	9304	3838	610	216	14	119	42	385	302	75	**14905**	**1.41**	**25**
	Q4/93	8776	2693	344	117	35	118	36	255	278	56	**12708**	**1.31**	**20**
	Q1/94	5851	1579	246	93	7	76	33	198	192	18	**8293**	**1.30**	**14**
	Q2/94	9267	3006	484	286	41	142	40	365	316	48	**13995**	**1.37**	**22**
	Q3/94	8000	2756	365	230	24	115	33	373	276	71	**12243**	**1.37**	**20**
	Q4/94	4751	1194	69	19	15	60	17	205	145	22	**6497**	**1.23**	**12**
	Q1/95	9306	1608	188	97	15	18	14	194	214	44	**11698**	**1.20**	**13**
	Q2/95	6274	1859	276	58	26	94	22	261	247	44	**9160**	**1.31**	**14**
														149
Off ramp	Q3/93	1210	342	62	19	1	15	0	23	1	12	**1685**	**1.32**	**5**
	Q4/93	1139	266	43	16	5	20	5	5	0	9	**1508**	**1.28**	**7**
	Q1/94	1004	229	22	10	0	18	5	4	0	2	**1294**	**1.24**	**5**
	Q2/94	2737	664	107	32	5	32	7	23	2	23	**3632**	**1.28**	**12**
	Q3/94	3448	773	78	48	8	41	1	27	0	54	**4478**	**1.25**	**16**
	Q4/94	1030	145	14	6	2	13	1	12	0	4	**1227**	**1.16**	**5**
	Q1/95	2400	564	75	29	5	47	10	21	0	5	**3156**	**1.26**	**11**
	Q2/95	1081	235	38	14	1	13	4	24	0	3	**1413**	**1.26**	**5**
														66

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
4	Q1/93	664	61	7	2	0	4	0	19	19	4	**780**	**1.11**	**2**
	Q2/93	1814	344	12	6	0	34	15	113	169	11	**2518**	**1.18**	**5**
	Q3/93	8464	1197	128	95	17	156	53	399	394	52	**10955**	**1.18**	**24**
	Q4/93	8400	1073	109	66	12	253	109	399	439	33	**10893**	**1.16**	**14**
	Q1/94	8411	1039	110	42	10	132	94	414	203	17	**10472**	**1.15**	**18**
	Q2/94	12443	1796	221	79	37	329	101	566	548	69	**16189**	**1.17**	**25**
	Q3/94	5632	1042	129	55	25	119	26	346	258	41	**7673**	**1.22**	**12**
	Q4/94	6911	1037	66	16	23	164	62	334	326	22	**8961**	**1.15**	**15**
	Q1/95	4855	761	48	10	15	95	28	200	224	11	**6247**	**1.16**	**9**
	Q2/95	5497	693	73	20	9	174	53	236	228	15	**6998**	**1.14**	**14**
														138

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q3/93	696	86	9	5	1	0	1	5	3	3	**809**	**1.15**	**5**
ramp	Q4/93	606	97	6	7	0	0	9	6	1	0	**732**	**1.18**	**4**
	Q1/94	732	110	11	4	4	1	7	2	1	0	**872**	**1.17**	**4**
	Q2/94	1083	132	23	10	0	1	13	9	4	4	**1279**	**1.17**	**10**
	Q3/94	1113	190	28	11	0	1	12	11	2	12	**1380**	**1.21**	**12**
	Q4/94	1080	182	18	6	3	2	10	12	2	3	**1318**	**1.18**	**9**
	Q1/95	1237	204	28	10	5	2	15	6	0	2	**1509**	**1.20**	**8**
	Q2/95	785	130	15	3	4	0	14	7	1	2	**961**	**1.18**	**6**
														58

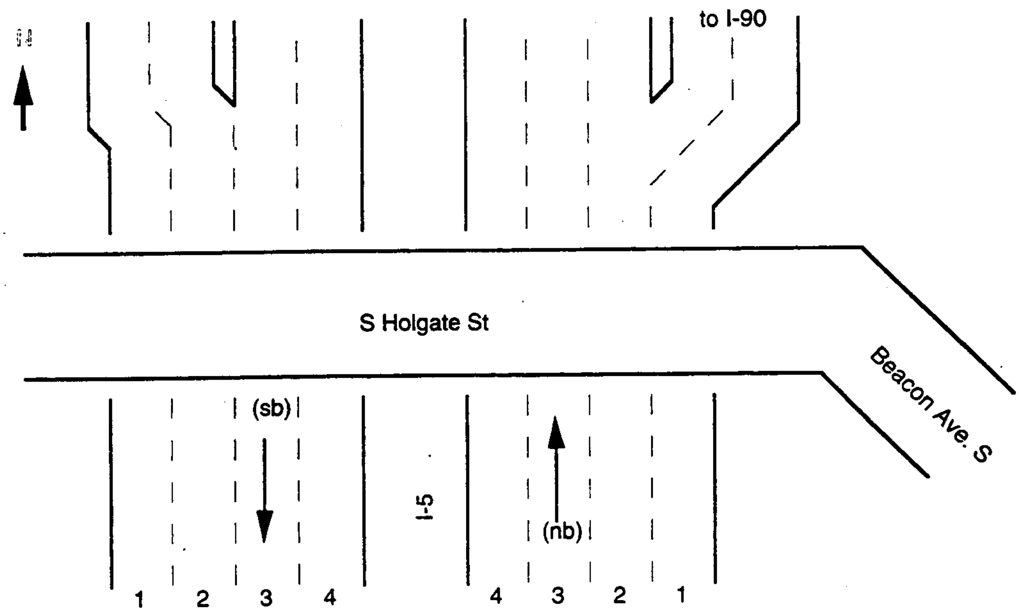
p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
4	Q1/93	7645	1951	104	20	5	19	13	2061	152	39	**12009**	**1.23**	**16**
	Q2/93	8018	1749	126	18	7	19	17	152	152	33	**10291**	**1.21**	**14**
	Q3/93	19593	4561	625	281	23	30	36	433	358	93	**26033**	**1.27**	**35**
	Q4/93	8945	1807	269	89	9	16	18	139	151	33	**11476**	**1.24**	**17**
	Q1/94	11823	2283	296	95	38	24	35	186	166	31	**14977**	**1.22**	**18**
	Q2/94	10724	1970	247	92	53	13	19	189	186	50	**13543**	**1.21**	**17**
	Q3/94	13866	2962	458	218	40	38	20	243	246	72	**18163**	**1.26**	**22**
	Q4/94	11473	1757	216	92	19	16	22	214	212	34	**14055**	**1.18**	**18**
	Q1/95	9306	1608	188	97	15	18	14	194	214	44	**11698**	**1.20**	**15**
	Q2/95	8976	2082	164	39	21	15	20	126	188	40	**11671**	**1.23**	**16**
														188

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q3/92	7164	1251	158	28	0	0	5	54	20	28	**8708**	**1.19**	**15**
ramp	Q4/92	3422	402	23	7	0	0	0	55	8	13	**3930**	**1.12**	**7**
	Q1/93	No observations												
	Q2/93	No observations												
	Q3/93	3064	740	107	58	2	0	2	35	3	30	**4041**	**1.29**	**10**
	Q4/93	1576	324	41	18	0	0	6	28	3	6	**2002**	**1.24**	**7**
	Q1/94	1797	408	66	25	3	0	8	13	3	7	**2330**	**1.27**	**6**
	Q2/94	1624	377	77	35	2	0	5	23	2	10	**2155**	**1.30**	**5**
	Q3/94	3426	794	153	55	16	0	0	22	3	37	**4506**	**1.29**	**12**
	Q4/94	3322	551	65	20	2	1	14	32	2	7	**4018**	**1.19**	**11**
	Q1/95	3485	718	93	27	7	0	17	38	3	5	**4393**	**1.23**	**11**
	Q2/95	1565	334	65	20	2	0	6	12	3	11	**2018**	**1.27**	**6**
														90

SITE #22. I-5 DOWNTOWN - S. Holgate Street

ACO Mainline SB & NB-am & pm



Note: There is a sidewalk only on the north side of Holgate over the freeway, so counting northbound travel times must be done with traffic moving away from you. The southbound lanes are on a considerably lower level than the northbound lanes, and are consequently somewhat harder to see.

Observations at site discontinued Q4/92.

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	4751	625	23	5	14	41	8	90	126	11	**5694**	**1.13**	**8**
lanes 4	Q4/92	3292	312	19	7	2	58	10	95	111	7	**3913**	**1.10**	**6**
														14

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	12011	3874	529	87	16	30	43	252	371	103	**17316**	**1.32**	**24**
lanes 4	Q4/92	7108	1689	144	61	17	12	21	182	194	30	**9458**	**1.24**	**16**
														40

a.m. northbound

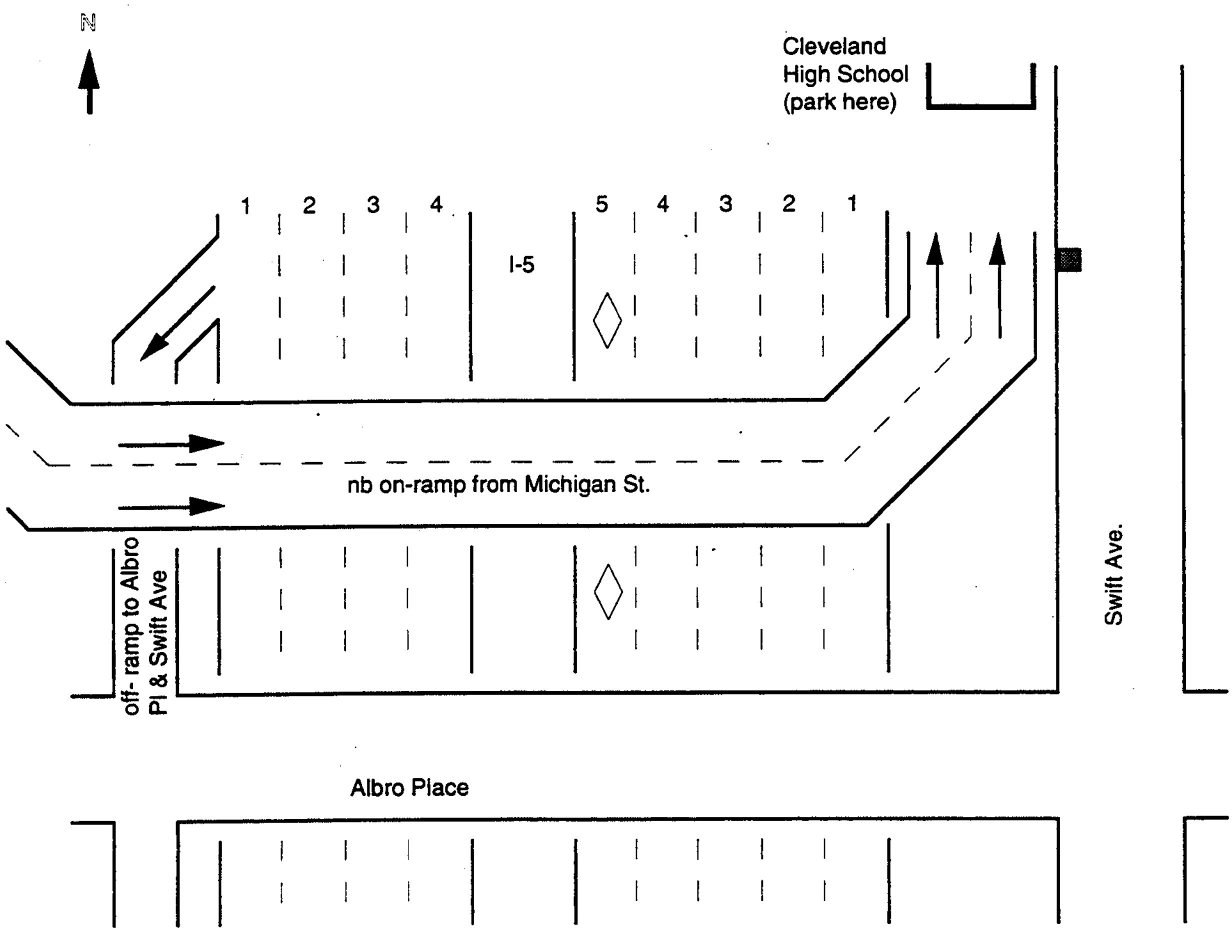
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	2436	436	33	21	8	4	7	73	103	13	**3134**	**1.19**	**6**
lanes 4	Q4/92	1246	310	28	4	13	10	34	78	70	11	**1804**	**1.24**	**4**
														10

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	2762	602	64	25	7	7	6	55	81	37	**3646**	**1.24**	**5**
lanes 4	Q4/92	No observations										--		
														5

SITE #23. I-5 DOWNTOWN - Michigan St.

■ ACO onramp NB-am
■ ACO onramp NB-pm



Note: Observations at site discontinued Q1/93.

a.m. **northbound**

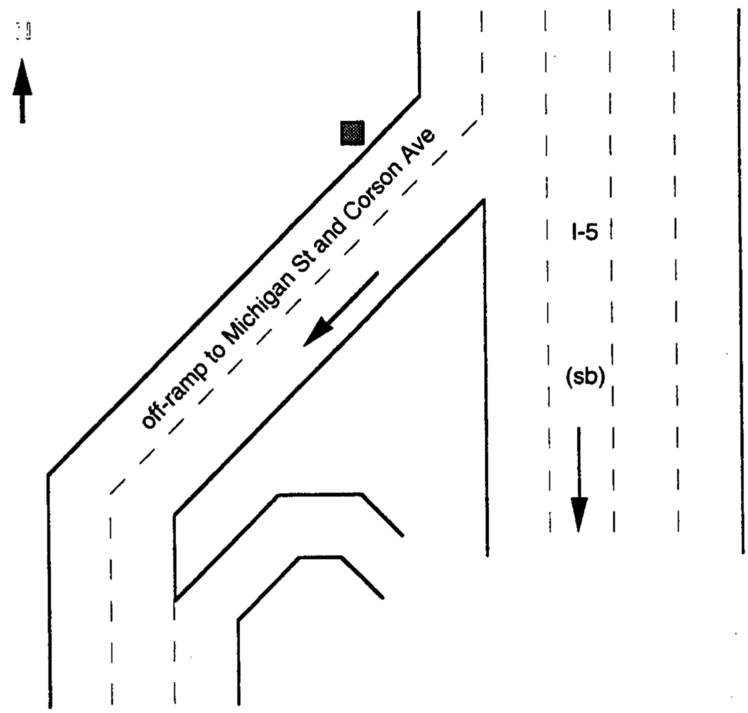
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2037	414	62	14	3	5	23	152	152	18	**2880**	**1.23**	**8**
	Q4/92	2096	299	41	17	18	12	8	48	56	7	**2602**	**1.18**	**10**
	Q1/93	1264	336	41	13	5	4	0	17	14	2	**1696**	**1.28**	**4**
														22

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	5550	654	100	37	20	22	9	67	116	41	**6616**	**1.15**	**15**
	Q4/92	2096	299	41	17	18	12	8	48	56	7	**2602**	**1.18**	**7**
	Q1/93	1264	336	41	13	5	4	0	17	14	2	**1696**	**1.28**	**4**
														26

SITE #24. I-5 DOWNTOWN - Corson Avenue S.

■ **ACO offramp SB-am**
■ **ACO offramp SB-pm**



Note: Observations at site discontinued Q1/93.

a.m. **southbound**

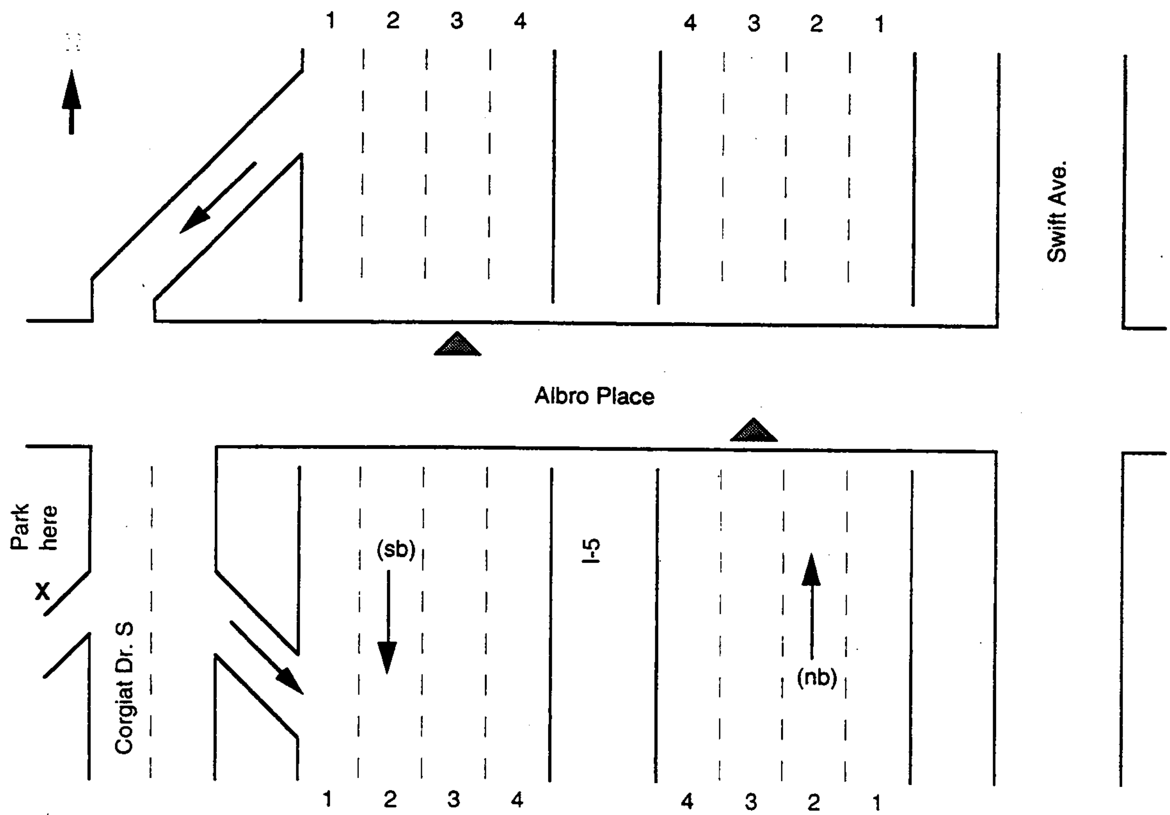
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	2332	198	22	5	1	9	4	43	112	12	2738	1.10	8
	Q4/92	1060	44	1	0	0	3	2	31	29	3	1173	1.04	2
	Q1/93	No observations										--		
														10

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	1610	359	35	28	6	5	29	41	119	19	2251	1.25	9
	Q4/92	808	185	27	17	2	2	17	68	41	4	1171	1.28	4
	Q1/93	No observations										--		
														13

SITE #25. I-5 DOWNTOWN - Albro Place

▲ ACO mainline SB & NB-am & pm



Note: Prior to 11-9-93, the HOV lanes northbound ended about a hundred yards south of this overpass. The newly-opened southbound HOV lanes end about a hundred yards to the north of this overpass.

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
4	Q1/93	2475	505	3	1	1	40	5	100	114	1	**3245**	**1.17**	**6**
	Q2/93	2436	369	30	11	2	16	8	69	108	5	**3054**	**1.16**	**4**
	Q3/93	9093	1580	152	54	21	110	24	328	413	43	**11818**	**1.19**	**18**
														28

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
4	Q1/93	No observations										--		
	Q2/93	7014	1863	256	101	12	55	24	216	287	13	**9841**	**1.29**	**21**
	Q3/93	10331	3194	629	317	19	81	33	419	360	46	**15429**	**1.38**	**24**
														45

I-5 Downtown - Albro Place

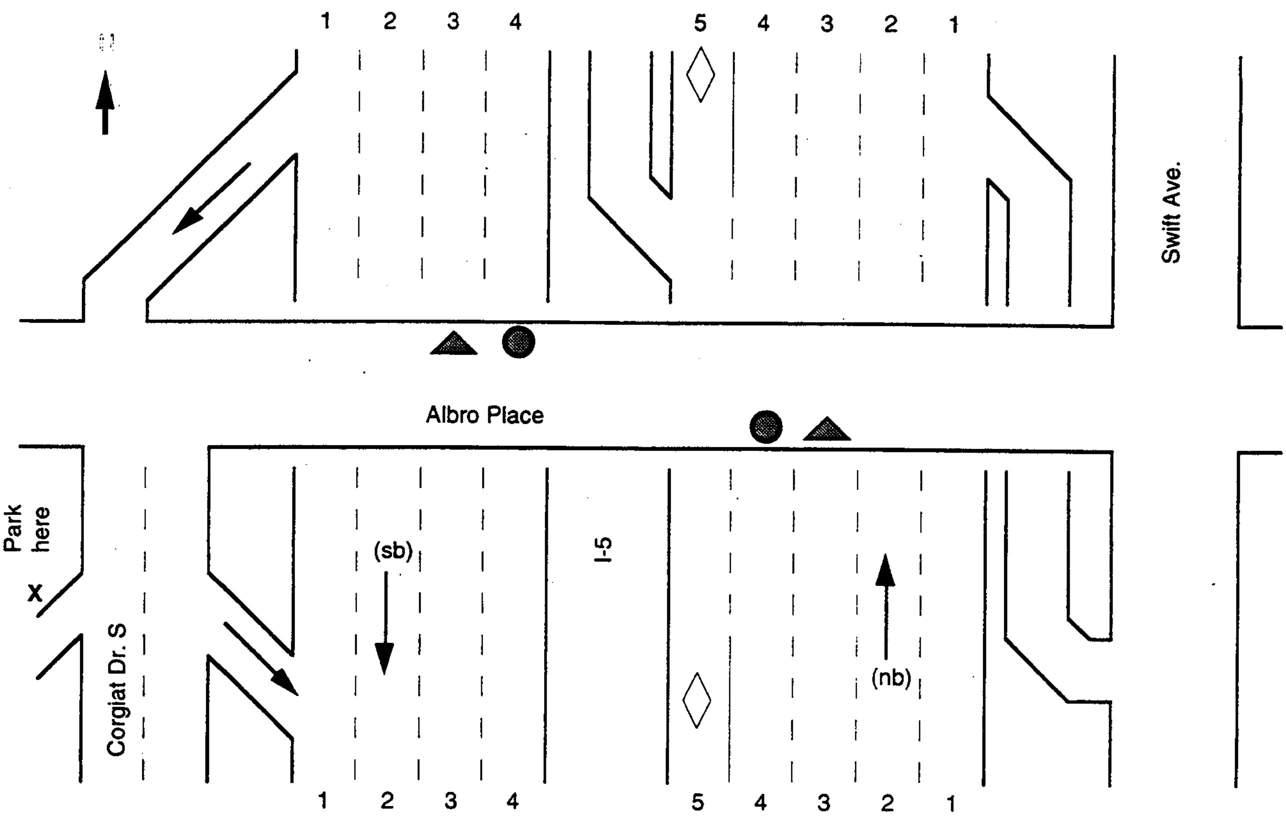
a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
4	Q1/93	No observations										--		
	Q2/93	1939	333	66	9	1	28	1	62	65	15	**2519**	**1.21**	**4**
	Q3/93	8473	1468	207	58	20	164	36	288	355	43	**11112**	**1.20**	**19**
														23

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	1853	448	65	47	8	13	11	49	49	9	**2552**	**1.30**	**3**
lanes	Q4/92	No observations										--		
4	Q1/93	2380	606	11	2	0	42	4	80	113	3	**3241**	**1.21**	**5**
	Q2/93	7126	2479	151	62	14	98	11	171	224	22	**10358**	**1.30**	**14**
	Q3/93	9487	3071	353	161	17	121	29	312	346	52	**13949**	**1.33**	**19**
														41

I-5 Downtown - Albro Place



Note: For data prior to Q4/93 see the preceeding pages.

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q4/93	5016	605	40	28	5	73	7	234	217	6	**6231**	**1.14**	**11**
lanes	Q1/94	6939	741	66	16	8	63	5	284	159	9	**8290**	**1.12**	**13**
4	Q2/94	7018	1182	173	40	15	60	8	262	236	26	**9020**	**1.20**	**12**
	Q3/94	7501	1094	136	20	21	75	4	314	303	33	**9501**	**1.16**	**13**
	Q4/94	3170	762	53	9	6	58	9	179	253	2	**4501**	**1.22**	**7**
	Q1/95	4027	395	33	3	0	27	7	169	267	4	**4932**	**1.11**	**10**
	Q2/95	2729	244	14	8	5	29	10	132	183	9	**3363**	**1.10**	**13**
														79

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q4/93	5101	1309	193	85	19	56	11	160	184	9	**7127**	**1.29**	**17**
lanes	Q1/94	7102	1863	324	90	27	79	10	197	261	15	**9968**	**1.30**	**15**
4	Q2/94	7412	2149	276	114	33	84	41	194	275	21	**10599**	**1.31**	**18**
	Q3/94	6120	2175	282	117	50	129	13	151	223	67	**9327**	**1.36**	**17**
	Q4/94	5201	939	104	58	25	87	19	165	168	13	**6799**	**1.21**	**11**
	Q1/95	6459	803	28	15	1	48	8	129	220	4	**7715**	**1.12**	**16**
	Q2/95	5849	1197	88	32	2	37	8	137	176	16	**7542**	**1.21**	**13**
														107

a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q4/93	4468	448	48	30	4	97	16	132	179	5	**5427**	**1.13**	**12**
	Q1/94	5959	739	82	16	9	112	19	190	274	8	**7408**	**1.14**	**14**
	Q2/94	6063	780	49	29	4	118	17	171	314	14	**7559**	**1.14**	**18**
	Q3/94	6043	812	84	39	23	118	16	152	252	33	**7572**	**1.16**	**17**
	Q4/94	3752	405	30	8	12	71	14	120	183	8	**4603**	**1.12**	**10**
	Q1/95	3785	405	21	5	13	55	15	89	210	6	**4604**	**1.11**	**10**
	Q2/95	6696	850	77	14	16	141	14	200	303	47	**8358**	**1.14**	**16**
														120

I-5 Downtown - Albro Place

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 4	Q4/93	7551	1988	264	62	27	98	18	253	251	17	**10511**	**1.27**	**14**
	Q1/94	6970	2002	301	176	25	77	13	255	260	21	**10100**	**1.34**	**14**
	Q2/94	10871	2992	305	184	33	140	18	336	374	27	**15280**	**1.29**	**21**
	Q3/94	10113	2920	498	321	49	132	21	383	463	40	**14945**	**1.36**	**21**
	Q4/94	7243	1588	156	50	39	93	10	231	326	14	**9750**	**1.23**	**14**
	Q1/95	7925	1059	83	41	39	81	20	250	267	5	**9770**	**1.15**	**14**
	Q2/95	8701	3615	275	124	69	129	23	286	376	76	**13674**	**1.36**	**21**
														160

a.m. **northbound**

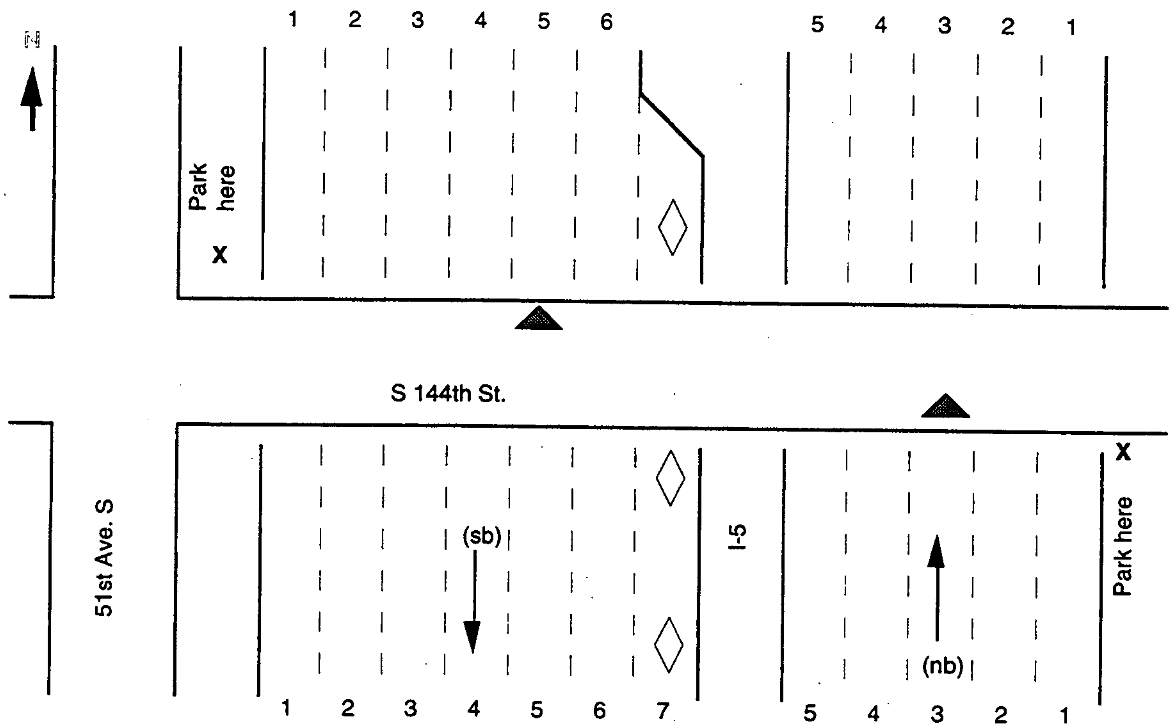
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV/ exit lane 1	Q4/93	No observations												
	Q1/94	176	121	18	4	1	2	2	6	7	5	**342**	**1.53**	**2**
	Q2/94	432	457	94	23	8	7	5	25	21	22	**1094**	**1.71**	**3**
	Q3/94	364	428	67	10	5	4	2	17	17	14	**928**	**1.68**	**3**
	Q4/94	509	519	35	5	3	20	6	19	15	2	**1133**	**1.57**	**2**
	Q1/05	575	1571	133	17	10	28	5	37	42	23	**2441**	**1.82**	**6**
	Q2/95	3017	2877	142	33	52	83	31	66	101	125	**6527**	**1.54**	**13**
														29

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV/ exit lane 1	Q3/93	98	16	1	4	0	0	0	4	3	0	**126**	**1.26**	**2**
	Q4/93	61	91	28	9	4	2	1	6	3	1	**206**	**1.93**	**1**
	Q1/94	322	561	98	31	14	32	6	16	15	9	**1104**	**1.85**	**3**
	Q2/94	270	761	111	34	24	16	18	16	25	14	**1289**	**1.93**	**4**
	Q3/94	382	971	157	67	39	85	4	37	28	39	**1809**	**1.95**	**5**
	Q4/94	102	420	44	16	11	36	9	8	8	8	**662**	**1.96**	**3**
	Q1/95	857	2265	269	86	58	196	31	64	72	25	**3923**	**1.89**	**9**
	Q2/95	906	1863	176	44	54	210	25	79	61	68	**3486**	**1.79**	**11**
														38

SITE #26. I-5 DOWNTOWN - South 144th St.

ACO Mainline NB am & SB pm



Note: Observations at site discontinued Q1/93.

a.m. northbound

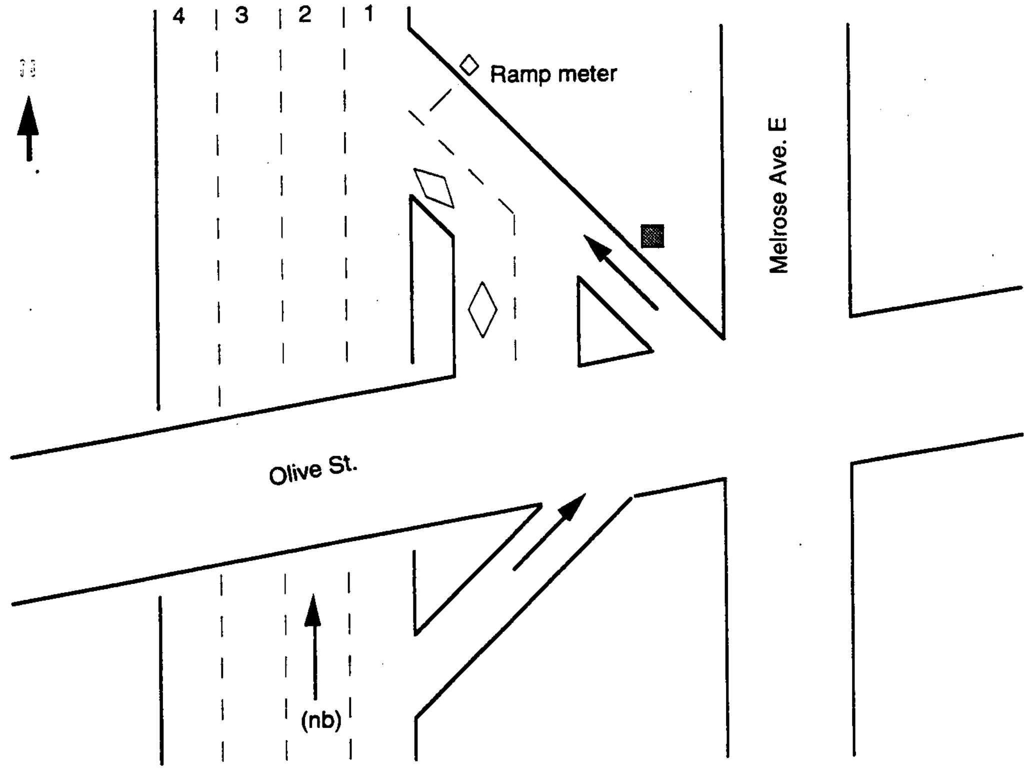
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	6015	1039	127	36	10	38	13	263	361	54	7956	**1.20**	**16**
lanes	Q4/92	270	14	1	0	1	1	0	5	14	2	308	**1.06**	**1**
5	Q1/93	1987	168	14	2	3	8	6	74	109	2	2373	**1.09**	**3**
														20

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	5246	1212	246	99	16	47	12	158	253	44	7333	**1.30**	**14**
lanes	Q4/92	No observations										--		
6	Q1/93	No observations										--		
														14

SITE #27 I-5 DOWNTOWN - Olive Street

ACO on/ramp NB-am & pm



a.m. **northbound**

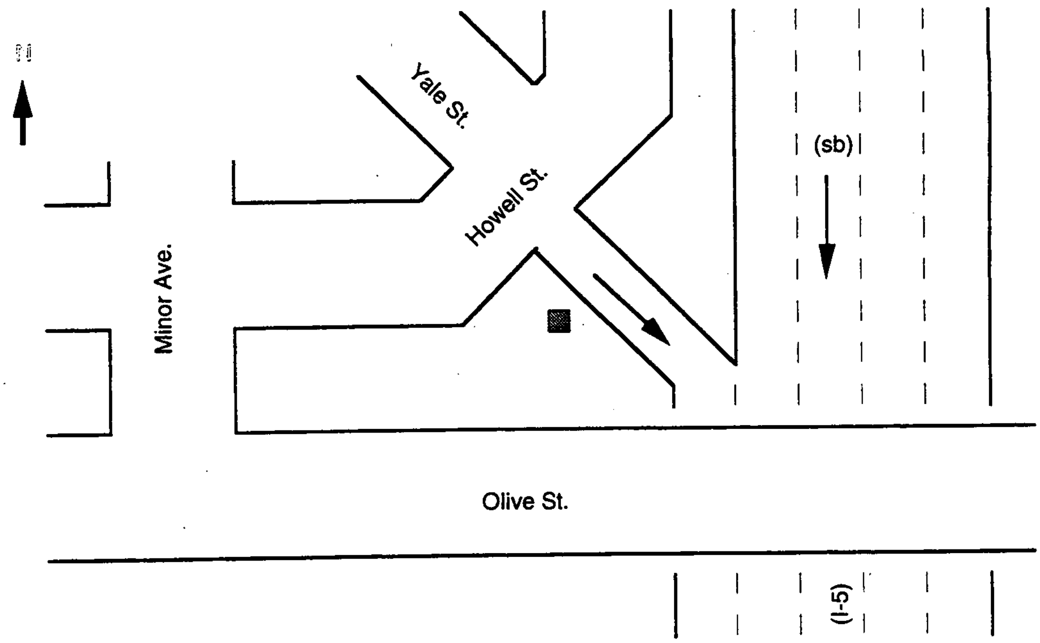
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	No observations										--		
	Q4/92	2258	500	32	4	1	3	5	24	6	0	**2833**	**1.21**	**4**
	Q1/93	4006	522	45	15	9	520	33	36	12	12	**5210**	**1.14**	**19**
	Q2/93	1051	111	14	8	0	122	11	11	5	8	**1341**	**1.14**	**5**
	Q3/93	No observations										--		
	Q4/93	938	130	18	6	4	125	4	14	4	0	**1243**	**1.17**	**4**
	Q1/94	1757	190	19	5	2	201	16	19	4	7	**2220**	**1.12**	**7**
	Q2/94	1818	170	24	6	2	234	17	25	5	10	**2311**	**1.12**	**4**
	Q3/94	1119	143	19	5	0	139	13	11	2	10	**1461**	**1.15**	**10**
	Q4/94	734	68	7	4	1	130	5	14	3	0	**966**	**1.12**	**5**
	Q1/95	1375	120	13	0	1	176	6	21	5	6	**1723**	**1.10**	**7**
	Q2/95	1353	91	15	3	3	237	18	25	4	8	**1757**	**1.09**	**11**
														76

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2041	441	72	21	1	51	4	14	3	12	**2660**	**1.25**	**4**
	Q4/92	1522	299	21	5	1	44	4	14	2	3	**1915**	**1.19**	**3**
	Q1/93	8443	1649	195	76	2	335	15	626	11	31	**11383**	**1.22**	**21**
	Q2/93	3407	766	138	54	0	123	4	668	2	21	**5183**	**1.28**	**10**
	Q3/93	1223	292	53	32	0	21	1	16	0	8	**1646**	**1.31**	**5**
	Q4/93	4579	931	123	41	0	138	2	34	7	15	**5870**	**1.23**	**10**
	Q1/94	2144	440	73	21	3	57	3	15	1	3	**2760**	**1.24**	**5**
	Q2/94	2149	519	97	36	0	75	7	23	1	17	**2924**	**1.30**	**5**
	Q3/94	3469	823	116	90	1	134	7	32	0	24	**4696**	**1.30**	**8**
	Q4/94	4811	438	39	13	4	141	3	38	3	9	**5499**	**1.11**	**10**
	Q1/95	5106	770	79	19	7	138	3	41	4	16	**6183**	**1.17**	**10**
	Q2/95	4100	957	98	50	13	115	9	46	5	15	**5408**	**1.25**	**10**
														101

SITE #28. I-5 DOWNTOWN - Howell/Yale Streets

■ ACO on/ramp SB-am & pm



Note: It is okay to park in the loading zone, as long as you try to stay away from the docks and out of the way as much as possible. It is a good idea to leave a big note on your dashboard that you are counting at the ramp, in case your car needs to be moved.

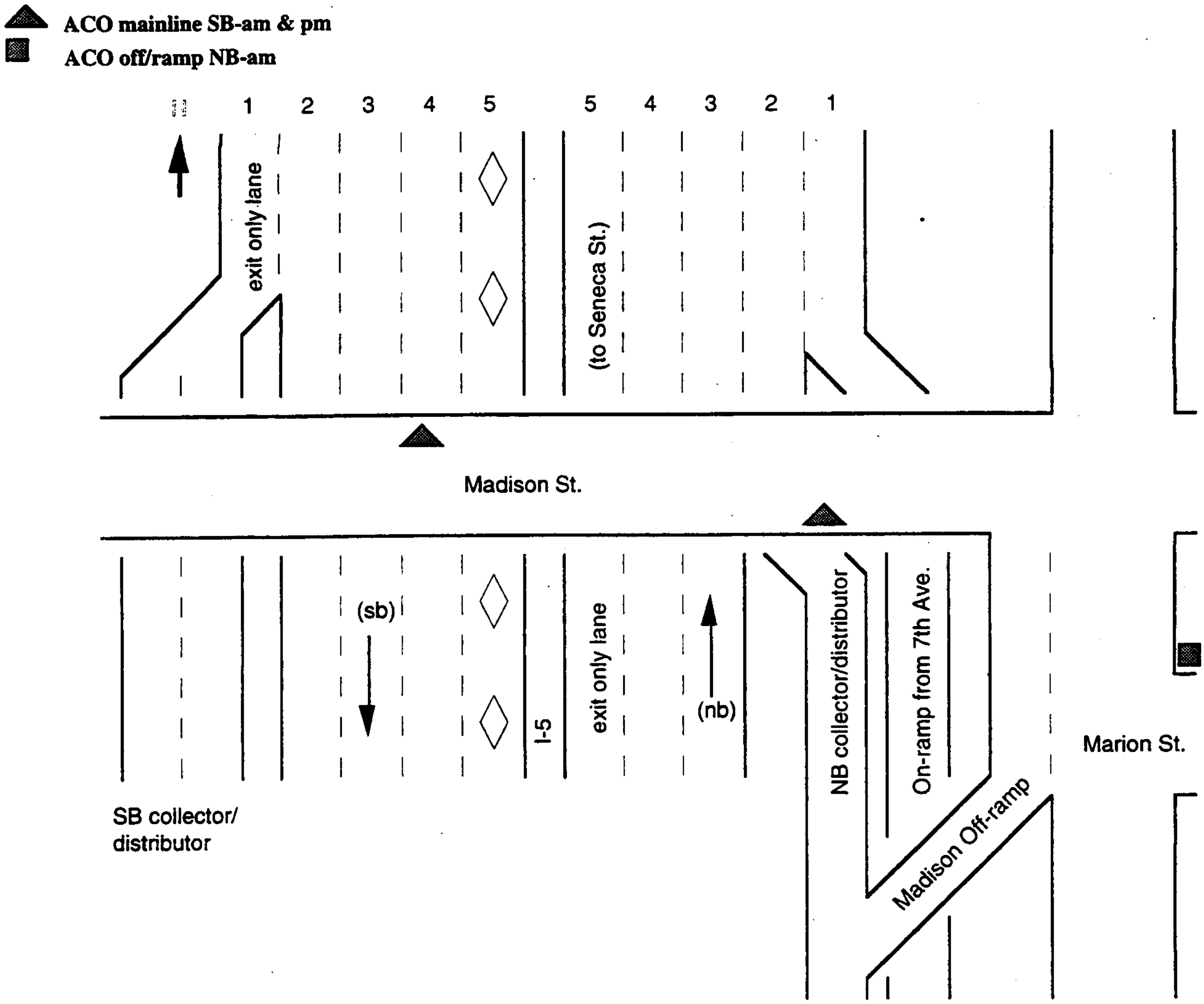
a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	1099	123	8	0	1	147	4	36	15	0	**1433**	**1.11**	**4**
	Q2/93	1510	211	34	17	0	173	7	42	19	8	**2021**	**1.19**	**5**
	Q3/93	No observations										--		
	Q4/93	801	37	5	3	0	92	4	18	6	1	**967**	**1.07**	**3**
	Q1/94	2466	235	21	23	2	231	17	64	11	9	**3079**	**1.13**	**7**
	Q2/94	1269	135	19	8	0	135	10	34	5	5	**1620**	**1.14**	**4**
	Q3/94	975	114	6	13	1	148	5	21	11	5	**1299**	**1.15**	**5**
	Q4/94	2211	236	26	11	5	230	5	27	9	2	**2762**	**1.13**	**6**
	Q1/95	2371	239	25	4	6	243	5	33	10	7	**2943**	**1.11**	**7**
	Q2/95	2417	269	35	18	1	235	10	54	25	24	**3088**	**1.14**	**11**
														50

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	1967	409	54	21	2	3	7	16	2	9	**2490**	**1.24**	**3**
	Q4/92	4757	1158	162	69	4	6	22	48	9	15	**6250**	**1.28**	**11**
	Q1/93	12106	2555	290	124	16	7	64	824	19	30	**16034**	**1.23**	**25**
	Q2/93	5017	1229	152	87	8	17	15	78	8	33	**6644**	**1.28**	**10**
	Q3/93	5806	1363	248	178	10	4	21	93	17	34	**7774**	**1.32**	**12**
	Q4/93	2245	589	90	29	7	3	8	5	4	9	**2989**	**1.29**	**3**
	Q1/94	2712	556	61	19	5	4	15	58	7	6	**3443**	**1.22**	**5**
	Q2/94	2425	683	125	43	27	10	8	34	0	18	**3373**	**1.33**	**4**
	Q3/94	5812	1498	328	145	54	17	3	95	12	48	**8012**	**1.34**	**12**
	Q4/94	5409	917	104	66	10	2	24	92	14	9	**6647**	**1.21**	**11**
	Q1/95	5706	986	106	23	25	1	19	79	14	21	**6980**	**1.19**	**11**
	Q2/95	5516	1361	179	61	10	3	15	85	7	46	**7283**	**1.27**	**11**
														118

SITE #29. I-5 DOWNTOWN - Madison Street



Note: The southbound mainline site was observed by special request to evaluate HOV lane effectiveness. SB HOV lane went from 3+ persons to 2+ persons 8/18/93.

Count the collector/distributor lanes at this location as lanes #1 and #2 in each direction (this is different than most other sites with collector/distributor lanes). When counting the off/ramp northbound, be sure to include only the traffic coming off the freeway, and not traffic merging from 7th Avenue.

I-5 Downtown - Madison Street

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	No observations										--		
	Q4/92	1658	404	35	4	1	5	2	24	5	0	**2138**	**1.23**	**4**
	Q1/93	11762	2251	207	36	8	19	31	114	22	12	**14461**	**1.20**	**19**
	Q2/93	4855	983	93	17	6	7	15	72	19	8	**6075**	**1.21**	**8**
	Q3/93	7044	1581	161	24	5	12	18	97	33	14	**8989**	**1.22**	**12**
	Q4/93	No observations												
	Q1/94	4179	757	52	9	3	8	10	52	4	3	**5077**	**1.18**	**7**
	Q2/94	1521	197	14	2	1	3	11	8	3	3	**1763**	**1.13**	**4**
	Q3/94	4279	553	40	23	3	8	19	48	19	8	**5000**	**1.14**	**10**
	Q4/94	1988	153	15	4	0	3	1	25	8	3	**2200**	**1.09**	**7**
	Q1/95	2038	392	14	4	1	3	2	11	9	1	**2475**	**1.18**	**3**
	Q2/95	4197	630	34	20	7	6	12	33	19	6	**4964**	**1.18**	**10**
														84

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q4/93	3462	740	124	44	22	6	14	22	4	9	**4447**	**1.26**	**12**
	Q1/94	1390	257	30	22	1	3	10	10	2	4	**1731**	**1.23**	**5**
	Q2/94	1192	339	50	14	0	4	3	10	1	4	**1617**	**1.30**	**5**
	Q3/94	3008	676	76	51	7	3	24	32	6	30	**3913**	**1.26**	**10**
	Q4/94	3245	642	61	44	8	8	12	34	1	1	**4056**	**1.23**	**11**
	Q1/95	1228	207	42	7	2	5	5	8	5	5	**1514**	**1.21**	**4**
	Q2/95	2357	554	75	39	15	4	14	22	4	4	**3088**	**1.27**	**10**
														57

a.m. southbound

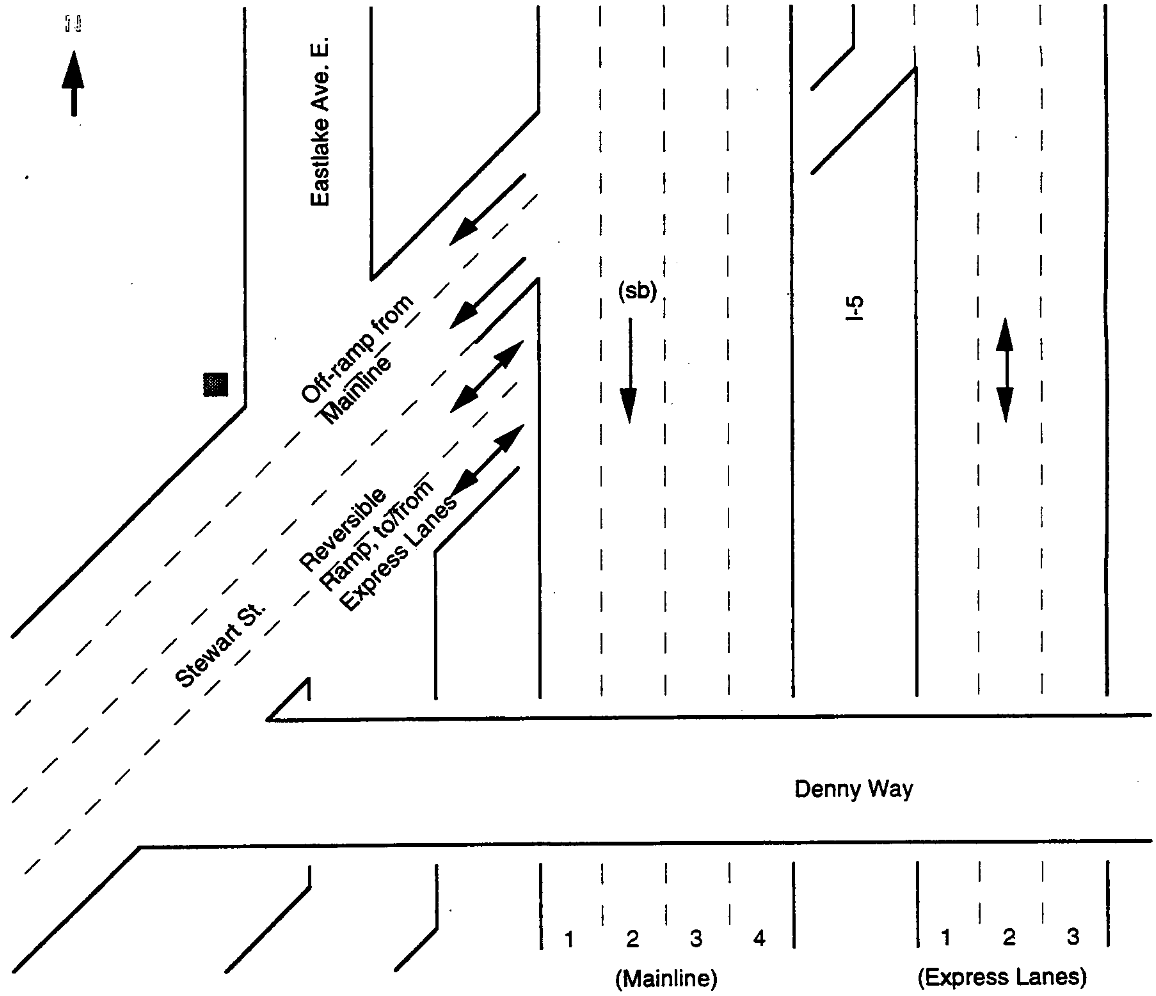
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q2/93	6	16	42	31	2	14	8	1	0	7	**127**	**3.10**	**6**
														6
GP lanes 4	Q2/93	12624	1053	92	36	13	206	40	300	336	19	**14719**	**1.10**	**21**
														21

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q2/93	245	858	192	30	52	13	22	76	2	64	**1154**	**2.01**	**6**
														6
GP lanes 4	Q2/93	12456	2932	77	4	14	61	22	1107	358	28	**17059**	**1.20**	**24**
														24

SITE #20. I-5 DOWNTOWN - Stewart Street

ACO off/ramp SB-am & pm



Note: The best place to sit is on the triangular island directly across the street from the ramp traffic as it goes through the stoplight at Eastlake Avenue. The two lanes to the north at the stoplight are traffic from the mainline, and the two lanes to the south at the stoplight are traffic from the express lanes. **Do not count the express lane off/ramp traffic.** Count both mainline off/ramp lanes at the same time.

a.m. **southbound**

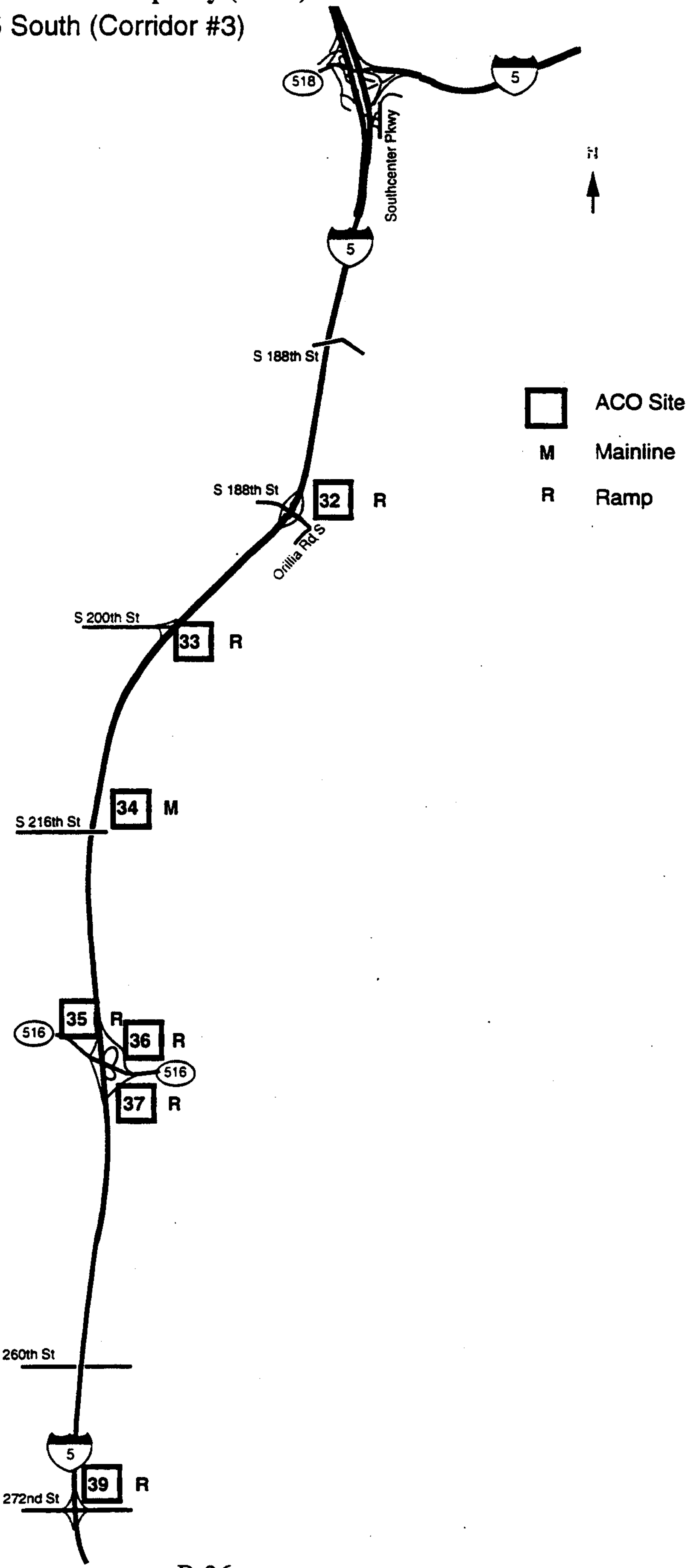
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	No observations										--		
	Q4/92	491	73	10	4	2	25	2	5	2	0	**614**	**1.18**	**3**
	Q1/93	9399	1146	66	11	4	429	4	127	28	13	**11227**	**1.12**	**29**
	Q2/93	5571	502	44	20	2	264	6	515	10	12	**6946**	**1.11**	**17**
	Q3/93	3691	290	43	18	1	127	0	24	8	14	**4216**	**1.11**	**13**
	Q4/93	No observations										--		
	Q1/94	3154	394	16	6	0	150	2	28	0	6	**3756**	**1.12**	**4**
	Q2/94	4507	536	40	8	2	167	6	14	5	7	**5292**	**1.13**	**5**
	Q3/94	1715	230	33	5	0	66	1	29	1	5	**2085**	**1.16**	**5**
	Q4/94	3613	386	19	1	2	179	3	22	7	3	**4235**	**1.11**	**7**
	Q1/95	2743	279	14	0	0	115	1	26	6	5	**3189**	**1.10**	**8**
	Q2/95	3960	319	13	6	7	167	3	27	19	27	**4548**	**1.08**	**11**
														102

I-5 Downtown - Stewart Street

p.m. southbound

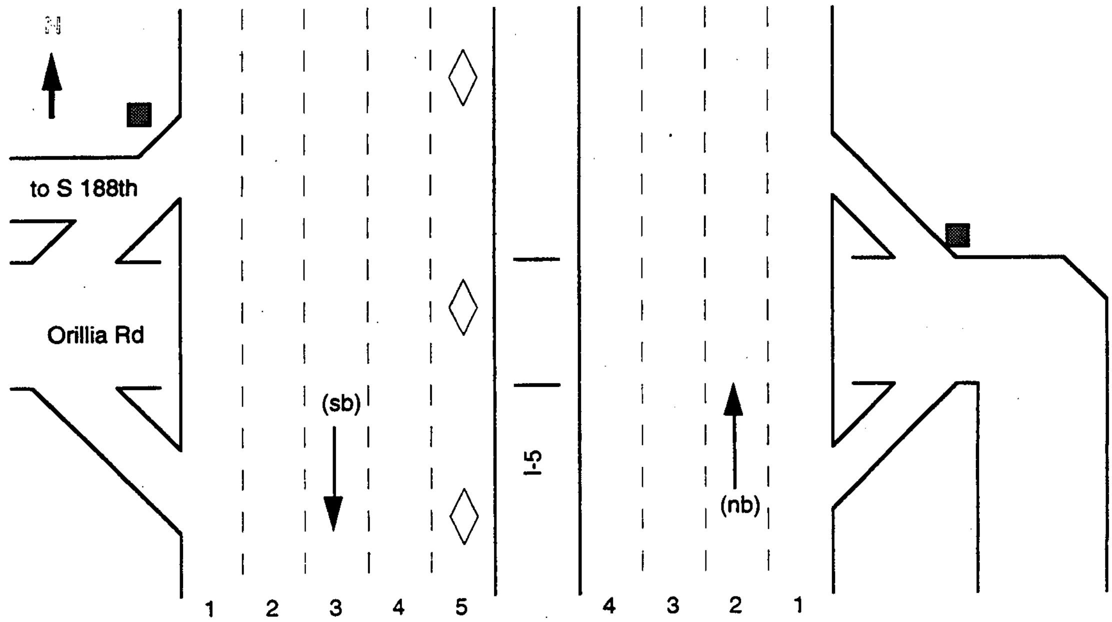
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	1431	358	42	20	1	69	5	18	3	8	**1955**	**1.27**	**6**
	Q1/94	1227	308	25	11	1	66	2	19	0	4	**1663**	**1.25**	**5**
	Q2/94	1462	427	61	29	7	88	0	12	1	11	**2098**	**1.32**	**6**
	Q3/94	2758	840	163	85	10	152	11	45	1	30	**4095**	**1.37**	**11**
	Q4/94	2351	413	38	14	6	116	13	26	0	2	**2979**	**1.19**	**9**
	Q1/95	2171	571	61	29	7	109	8	25	0	9	**2990**	**1.28**	**8**
	Q2/95	2562	792	112	72	11	158	13	27	7	25	**3779**	**1.35**	**11**
														56

Figure B18. Vehicle Occupancy (ACO) Sites
I-5 South (Corridor #3)



SITE #32. I-5 SOUTH - South 188th St./Orillia Road

ACO on/ramp NB-am
ACO off/ramp SB-pm



Note: Since both these ramps are very busy, and there is not a lot of clearance at the edges of the ramps, it is important that you have a vest and hard hat with you and make sure that you sit where drivers may be able to see you when sitting at the edge of the ramp.

a.m. northbound

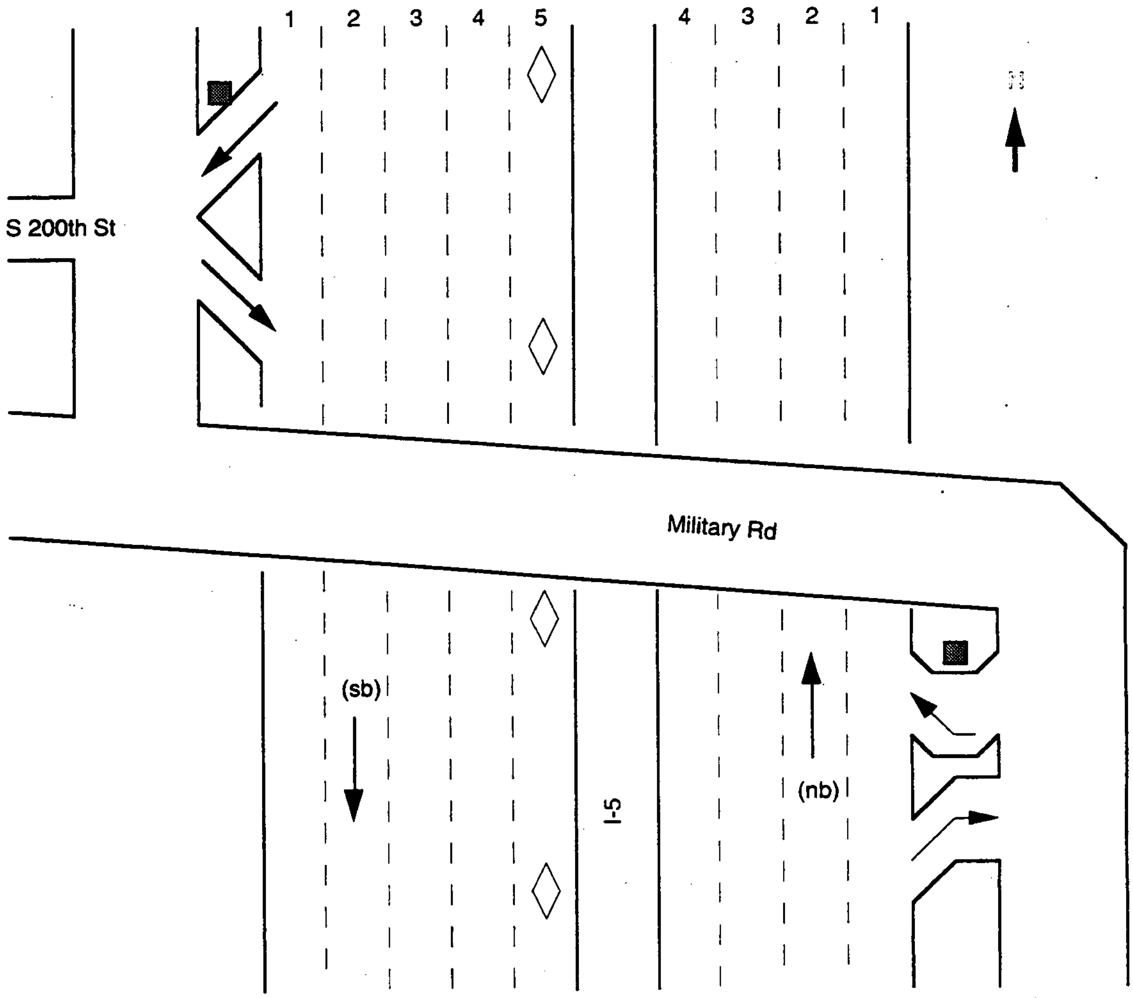
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	4582	656	86	30	4	1	7	303	422	13	**6104**	**1.17**	**14**
	Q4/92	1274	190	9	11	0	1	5	106	128	3	**1727**	**1.16**	**6**
	Q1/93	2905	357	24	8	2	2	11	238	200	2	**3749**	**1.13**	**9**
	Q2/93	971	125	9	2	0	1	4	75	76	1	**1264**	**1.13**	**3**
	Q3/93	4581	581	92	64	3	11	15	451	403	31	**6232**	**1.18**	**10**
	Q4/93	760	100	9	1	1	3	4	32	18	0	**928**	**1.14**	**7**
	Q1/94	2469	264	28	9	4	15	16	267	136	1	**3209**	**1.13**	**9**
	Q2/94	1054	149	14	12	1	4	1	90	101	4	**1430**	**1.18**	**5**
	Q3/94	1747	166	21	12	0	7	6	136	215	9	**2319**	**1.13**	**15**
	Q4/94	1038	120	6	5	2	2	2	106	142	0	**1423**	**1.13**	**6**
	Q1/95	1660	93	6	5	1	5	8	139	173	0	**2090**	**1.07**	**7**
	Q2/95	1921	184	10	9	1	11	8	141	210	16	**2504**	**1.11**	**12**
														103

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	1390	351	50	36	4	8	1	79	122	6	**2047**	**1.31**	**9**
	Q4/92	901	201	11	4	1	6	2	73	86	5	**1290**	**1.21**	**4**
	Q1/93	1871	362	30	21	0	8	2	115	154	4	**2567**	**1.21**	**9**
	Q2/93	1593	378	53	49	4	4	0	30	32	7	**2150**	**1.31**	**5**
	Q3/93	1183	240	61	28	0	0	1	50	61	4	**1628**	**1.30**	**5**
	Q4/93	1550	363	50	21	12	7	2	60	70	3	**2138**	**1.27**	**10**
	Q1/94	1984	382	42	27	6	12	2	150	120	5	**2730**	**1.23**	**8**
	Q2/94	No observations										**--**		
	Q3/94	993	166	34	10	2	5	1	82	106	2	**1401**	**1.22**	**5**
	Q4/94	1859	310	36	10	10	10	1	186	110	3	**2535**	**1.19**	**8**
	Q1/95	2567	442	49	22	11	8	4	113	95	3	**3314**	**1.20**	**11**
	Q2/95	1131	182	22	8	4	7	0	161	58	0	**1513**	**1.19**	**5**
														79

SITE #33. I-5 SOUTH - South 200th Street

ACO on/ramp NB-am
ACO off/ramp SB-pm



a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	3620	435	56	27	5	0	2	35	18	9	**4207**	**1.15**	**18**
	Q4/92	1508	163	10	3	0	0	0	24	5	0	**1713**	**1.11**	**6**
	Q1/93	1149	130	5	10	1	0	0	15	12	9	**1318**	**1.12**	**7**
	Q2/93	562	15	1	0	0	0	0	9	6	3	**596**	**1.03**	**4**
	Q3/93	563	58	8	9	0	1	0	8	13	12	**672**	**1.16**	**4**
	Q4/93	243	35	4	1	0	0	2	13	3	0	**301**	**1.16**	**1**
	Q1/94	1161	140	17	6	0	0	1	16	5	3	**1349**	**1.15**	**8**
	Q2/94	784	99	10	1	0	0	3	22	11	2	**932**	**1.14**	**5**
	Q3/94	1396	158	15	10	0	0	2	35	13	9	**1638**	**1.14**	**10**
	Q4/94	645	95	11	4	1	0	0	16	11	2	**785**	**1.17**	**6**
	Q1/95	836	85	6	8	0	0	1	8	18	0	**962**	**1.13**	**7**
	Q2/95	954	123	14	2	4	0	1	18	14	5	**1135**	**1.14**	**6**
														82

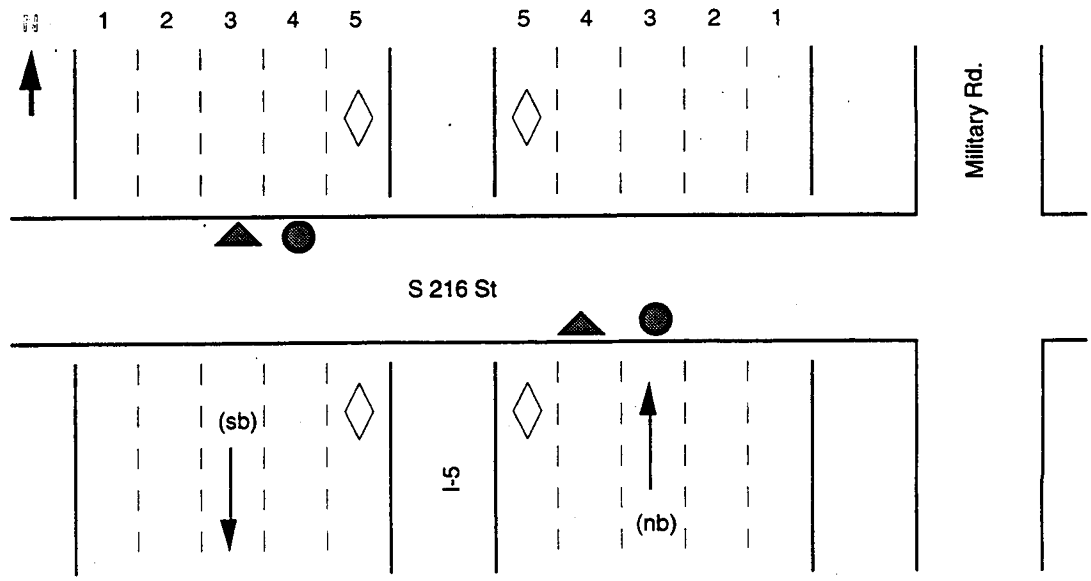
I-5 South - South 200th Street

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	2122	408	73	29	1	1	5	25	18	22	**2704**	**1.25**	**15**
	Q4/92	1389	288	43	16	0	0	0	30	12	11	**1789**	**1.24**	**13**
	Q1/93	1386	294	36	15	3	7	0	265	19	3	**2028**	**1.24**	**10**
	Q2/93	480	82	24	4	0	0	0	254	8	3	**855**	**1.24**	**6**
	Q3/93	337	106	15	1	0	0	0	6	1	0	**466**	**1.30**	**4**
	Q4/93	1374	244	50	20	2	0	0	39	15	4	**1748**	**1.24**	**10**
	Q1/94	559	126	17	5	0	0	1	10	3	0	**721**	**1.25**	**4**
	Q2/94	1249	153	15	5	2	0	4	25	13	3	**1469**	**1.14**	**9**
	Q3/94	1121	258	49	25	5	0	2	21	9	5	**1495**	**1.30**	**11**
	Q4/94	1071	193	17	11	2	0	2	20	4	1	**1321**	**1.20**	**9**
	Q1/95	1398	177	10	13	3	2	0	23	14	2	**1642**	**1.15**	**11**
	Q2/95	1699	234	34	46	5	2	1	26	14	5	**2066**	**1.22**	**9**
														111

SITE #34. I-5 SOUTH - S 216th St.

ACO mainline NB-am & SB-pm



Note: The NB HOV lane was changed from 3+ to 2+ effective December 21, 1992. The SB HOV lane was similarly changed effective December 7, 1992.

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	7	24	25	14	2	2	1	0	0	7	**82**	**2.70**	2
	Q4/92	No observations											--	
	Q1/93	2	24	6	5	0	0	0	0	0	1	**38**	**2.41**	1
	Q2/93	5	159	33	19	3	7	0	2	0	10	**238**	**2.32**	2
	Q3/93	20	523	80	38	3	27	3	2	0	29	**725**	**2.22**	3
	Q4/93	17	264	54	27	5	10	1	1	0	1	**380**	**2.27**	3
	Q1/94	15	33	6	4	1	0	1	0	0	0	**60**	**2.00**	1
	Q2/94	5	85	6	8	2	3	2	0	0	0	**113**	**2.18**	1
	Q3/94	7	90	24	11	2	3	1	0	0	5	**143**	**2.13**	2
	Q4/94	33	700	47	12	2	26	1	16	0	4	**841**	**2.05**	4
	Q1/95	19	744	56	15	11	36	2	5	1	2	**891**	**2.08**	7
	Q2/95	28	2162	91	23	50	137	6	12	0	46	**2555**	**2.05**	17
														43
GP lanes 4	Q3/92	6040	883	72	29	3	11	4	80	200	8	**7330**	**1.16**	11
	Q4/92	5521	547	48	9	0	8	2	104	244	7	**6190**	**1.12**	8
	Q1/93	4929	360	21	14	3	7	4	103	171	1	**5613**	**1.08**	7
	Q2/93	6981	562	60	20	0	10	2	132	235	1	**8003**	**1.10**	12
	Q3/93	8411	936	168	57	3	21	10	238	353	27	**10224**	**1.15**	14
	Q4/93	5890	262	28	27	2	9	6	109	294	4	**6631**	**1.07**	14
	Q1/94	6525	378	37	12	1	14	4	148	329	3	**7451**	**1.07**	13
	Q2/94	5778	533	40	19	2	16	6	139	376	9	**6918**	**1.11**	10
	Q3/94	5060	618	52	44	2	25	6	124	245	25	**6201**	**1.15**	13
	Q4/94	1563	97	6	4	3	1	0	35	113	0	**1822**	**1.07**	3
	Q1/95	3776	215	11	6	7	4	5	59	240	2	**4325**	**1.06**	8
	Q2/95	5575	386	34	14	8	6	4	83	245	5	**6360**	**1.08**	10
														123

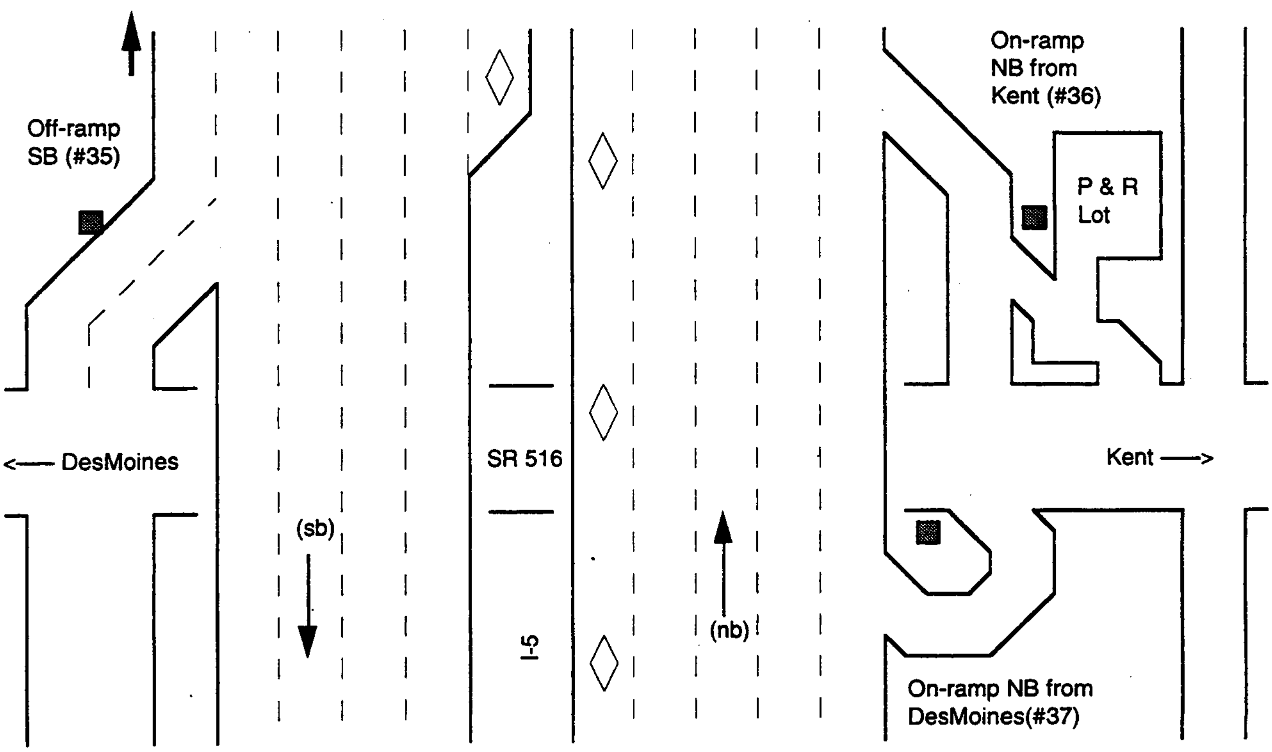
I-5 South - 521th St

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q3/92	4	11	112	63	3	11	4	0	0	26	**271**	**2.92**	**1**
lanes	Q4/92	7	46	43	8	9	4	0	2	0	3	**122**	**2.52**	**1**
1	Q1/93	36	642	68	28	12	35	4	2	0	5	**832**	**2.12**	**3**
	Q2/93	16	802	168	61	14	31	5	15	0	8	**1120**	**2.27**	**2**
	Q3/93	57	982	212	92	11	33	6	18	1	20	**1432**	**2.27**	**3**
	Q4/93	36	898	83	43	7	31	3	9	0	22	**1132**	**2.13**	**3**
	Q1/94	49	1152	210	59	19	36	8	6	0	9	**1548**	**2.20**	**1**
	Q2/94	18	911	85	56	15	28	2	5	0	12	**1132**	**2.18**	**3**
	Q3/94	37	1972	229	90	42	63	2	15	0	51	**2501**	**2.17**	**4**
	Q4/94	86	3212	209	43	134	38	2	18	0	16	**3758**	**2.06**	**6**
	Q1/95	100	3409	158	21	156	106	11	8	1	16	**3986**	**2.03**	**9**
	Q2/95	86	4422	465	109	139	95	10	34	3	116	**5479**	**2.12**	**10**
														46
GP	Q3/92	6558	1215	188	68	8	17	7	102	197	27	**8387**	**1.23**	**13**
lanes	Q4/92	3420	451	21	7	0	8	8	67	168	0	**4150**	**1.13**	**7**
4	Q1/93	10469	1294	95	30	4	15	9	368	344	12	**12640**	**1.13**	**14**
	Q2/93	14311	2047	83	4	6	26	6	225	442	14	**17164**	**1.14**	**20**
	Q3/93	10551	1162	162	57	6	21	7	220	325	27	**12538**	**1.14**	**16**
	Q4/93	8806	1078	106	110	12	12	6	217	355	5	**10707**	**1.16**	**12**
	Q1/94	7767	974	148	47	14	16	7	172	246	6	**9397**	**1.16**	**7**
	Q2/94	6027	702	97	42	15	12	4	127	190	7	**7223**	**1.15**	**13**
	Q3/94	10627	1172	155	85	15	25	3	190	408	27	**12707**	**1.15**	**18**
	Q4/94	2623	336	31	13	11	10	0	72	128	0	**3224**	**1.15**	**4**
	Q1/95	6967	457	49	35	6	15	8	100	250	5	**7892**	**1.09**	**10**
	Q2/95	6512	527	71	58	5	14	4	103	177	9	**7480**	**1.12**	**11**
														144

SITES #35,36,37. I-5 SOUTH - SR 516: Kent/Des Moines Road

ACO on/ramp NB from Kent-am & from DesMoines-am
ACO off/ramp SB-pm



p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	7681	1429	273	62	17	101	11	161	73	72	**9880**	**1.23**	**20**
	Q4/92	3400	476	70	28	14	34	14	93	50	6	**4185**	**1.16**	**7**
	Q1/93	5364	838	91	46	16	58	3	67	50	8	**6541**	**1.18**	**11**
	Q2/93	2414	419	57	15	7	22	5	49	26	13	**3027**	**1.20**	**5**
	Q3/93	2308	444	111	46	5	25	1	67	33	45	**3085**	**1.28**	**5**
	Q4/93	3906	517	30	47	13	44	3	64	15	3	**4642**	**1.16**	**9**
	Q1/94	4546	870	170	52	22	53	6	59	56	9	**5843**	**1.24**	**11**
	Q2/94	5072	885	107	51	26	66	5	97	71	19	**6399**	**1.21**	**12**
	Q3/94	2689	555	108	49	16	27	1	56	32	32	**3565**	**1.27**	**5**
	Q4/94	5670	874	92	20	29	61	4	86	67	10	**6913**	**1.17**	**13**
	Q1/95	6346	786	101	29	29	67	12	79	68	25	**7542**	**1.15**	**12**
	Q2/95	4279	405	29	61	15	40	1	60	28	15	**4933**	**1.14**	**10**
														120

I-5 South - SR516: Kent/Des Moines Road

a.m. northbound, Kent

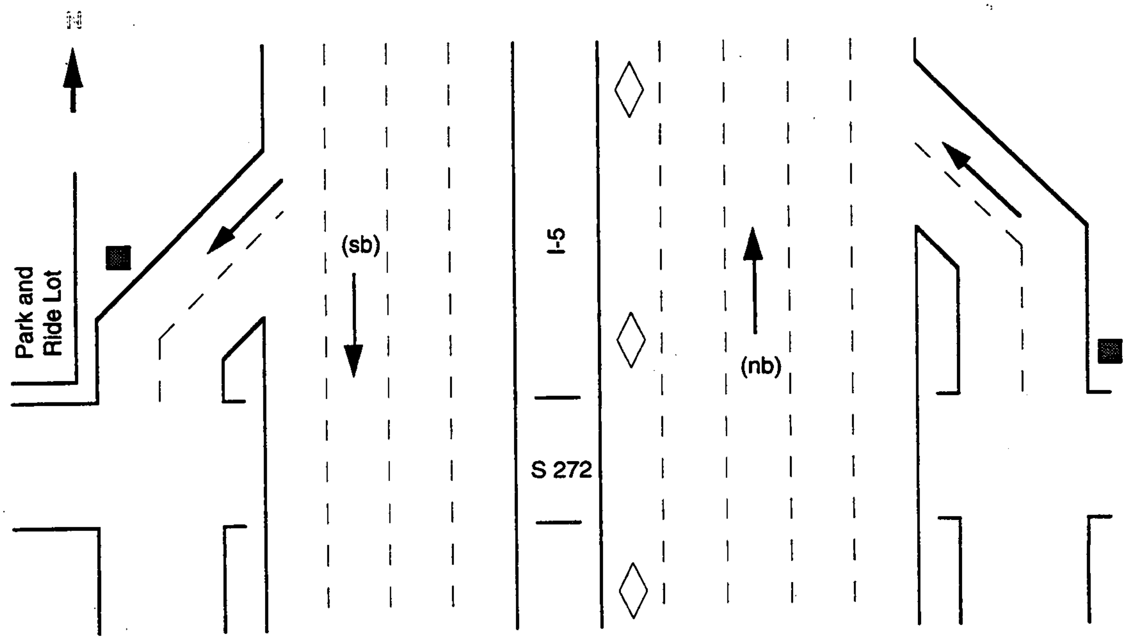
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	4739	580	80	28	9	77	5	122	90	26	**5756**	**1.15**	**15**
	Q4/92	1099	106	8	2	5	18	0	23	18	1	**1280**	**1.11**	**3**
	Q1/93	6917	666	64	19	17	118	8	111	133	7	**8060**	**1.11**	**19**
	Q2/93	934	117	11	6	3	20	0	32	22	4	**1149**	**1.15**	**3**
	Q3/93	1190	187	21	3	2	20	0	35	24	8	**1490**	**1.17**	**4**
	Q4/93	435	52	6	4	0	9	2	23	15	0	**546**	**1.15**	**2**
	Q1/94	814	104	10	2	0	16	3	33	8	1	**991**	**1.14**	**4**
	Q2/94	2160	254	28	10	5	52	3	68	61	8	**2649**	**1.14**	**9**
	Q3/94	840	122	16	7	4	30	2	18	28	7	**1074**	**1.18**	**5**
	Q4/94	807	69	5	5	1	22	3	36	37	3	**988**	**1.11**	**4**
	Q1/95	1674	125	20	4	2	31	4	48	62	0	**1970**	**1.10**	**9**
	Q2/95	2859	244	32	6	7	61	1	51	57	9	**3327**	**1.10**	**10**
														87

a.m. northbound, Des Moines

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2778	332	36	17	2	18	3	59	50	10	**3305**	**1.14**	**16**
	Q4/92	800	88	12	1	0	5	1	18	10	2	**937**	**1.13**	**3**
	Q1/93	1770	162	12	1	0	12	1	18	26	2	**2011**	**1.10**	**10**
	Q2/93	No observations										**--**		
	Q3/93	604	51	1	7	0	8	0	12	7	3	**693**	**1.11**	**4**
	Q4/93	385	53	2	1	0	2	1	8	6	0	**458**	**1.14**	**3**
	Q1/94	815	41	5	1	0	6	0	6	6	0	**880**	**1.06**	**5**
	Q2/94	1470	197	33	8	0	12	1	15	14	14	**1764**	**1.17**	**9**
	Q3/94	279	40	5	3	0	6	0	7	5	4	**349**	**1.18**	**5**
	Q4/94	1092	134	11	6	0	7	1	18	24	1	**1294**	**1.14**	**10**
	Q1/95	1000	52	9	2	1	5	1	18	9	2	**1099**	**1.07**	**8**
	Q2/95	1218	129	6	6	0	7	2	20	14	2	**1404**	**1.07**	**9**
														82

SITE #39. I-5 SOUTH - South 272nd Street

ACO on/ramp NB-am
ACO off/ramp SB-pm



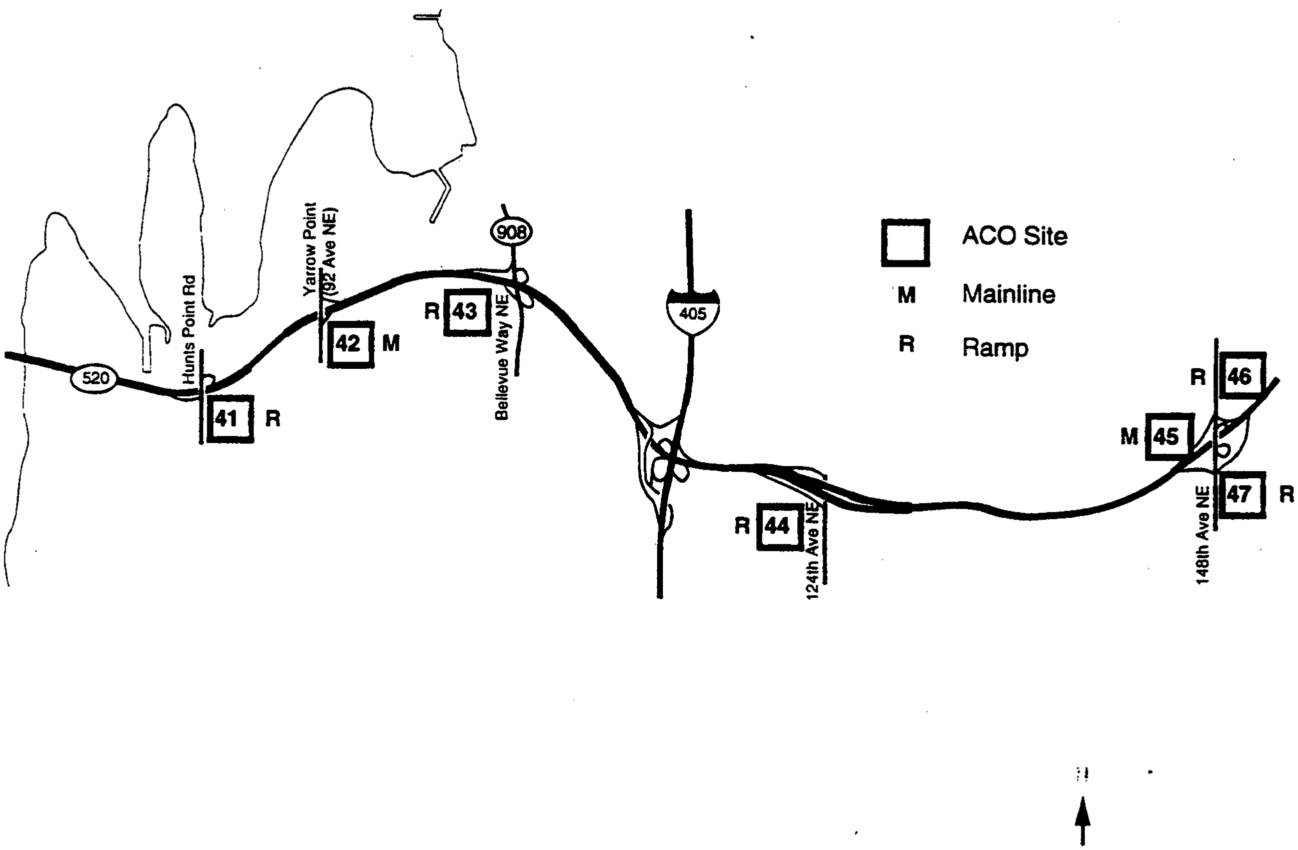
a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	11866	1324	189	87	30	124	5	187	69	99	**13980**	**1.15**	**27**
	Q4/92	4902	452	46	21	8	61	5	69	37	8	**5609**	**1.11**	**13**
	Q1/93	6177	689	57	16	15	80	7	74	27	3	**7145**	**1.12**	**13**
	Q2/93	2071	141	22	9	5	18	1	32	11	6	**2316**	**1.10**	**4**
	Q3/93	5689	462	49	41	5	60	5	108	48	41	**6508**	**1.11**	**14**
	Q4/93	1251	39	10	3	1	22	0	27	11	3	**1367**	**1.05**	**4**
	Q1/94	No observations										**- -**		
	Q2/94	3658	533	63	19	6	39	5	71	30	27	**4451**	**1.17**	**8**
	Q3/94	1270	140	12	7	3	26	0	26	21	3	**1508**	**1.13**	**5**
	Q4/94	2740	272	20	14	0	26	4	59	40	6	**3181**	**1.12**	**8**
	Q1/95	920	40	5	0	0	9	3	17	13	0	**1007**	**1.05**	**2**
	Q2/95	5303	244	18	23	13	39	1	52	25	20	**5738**	**1.06**	**9**
														107

p.m. **southbound**

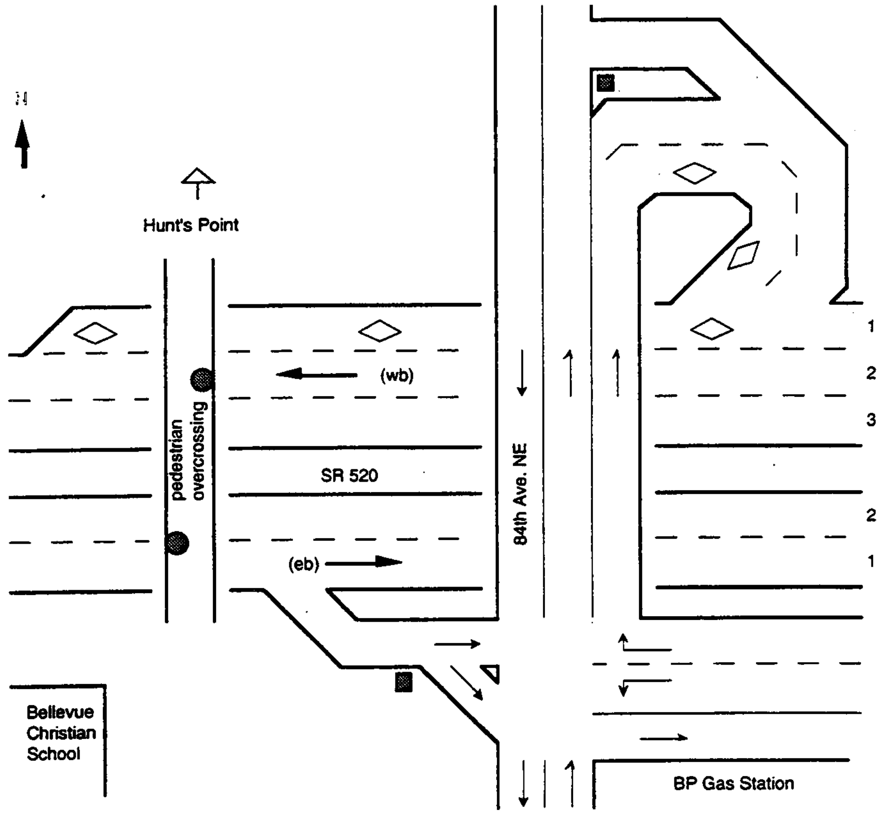
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	6903	1226	279	115	45	66	3	115	28	51	**8831**	**1.25**	**15**
	Q4/92	3133	397	59	25	14	21	1	50	18	7	**3725**	**1.16**	**7**
	Q1/93	1541	214	32	9	4	16	0	25	8	1	**1850**	**1.17**	**3**
	Q2/93	2196	437	72	43	13	21	0	29	21	7	**2839**	**1.26**	**5**
	Q3/93	3548	684	87	66	21	28	1	78	20	38	**4571**	**1.24**	**11**
	Q4/93	No observations										**- -**		
	Q1/94	1875	301	43	17	15	17	0	39	17	3	**2327**	**1.20**	**4**
	Q2/94	4360	853	83	44	28	37	3	125	32	25	**5590**	**1.22**	**9**
	Q3/94	4800	805	130	87	38	39	2	103	47	35	**6086**	**1.23**	**10**
	Q4/94	2562	308	41	7	21	25	1	20	21	7	**3013**	**1.14**	**6**
	Q1/95	3678	455	38	28	39	27	3	42	18	2	**4330**	**1.15**	**10**
	Q2/95	4512	406	27	69	26	29	0	79	24	11	**5183**	**1.14**	**10**
														90

Figure B24. Vehicle Occupancy (ACO) Sites
SR 520 (Corridor #4)



SITE #41. SR 520 - Hunt's Point

ACO on/ramp WB-am



Note: There is an HOV lane on the outside, but only going westbound. There is currently no HOV lane going eastbound at this location.

a.m. **westbound**

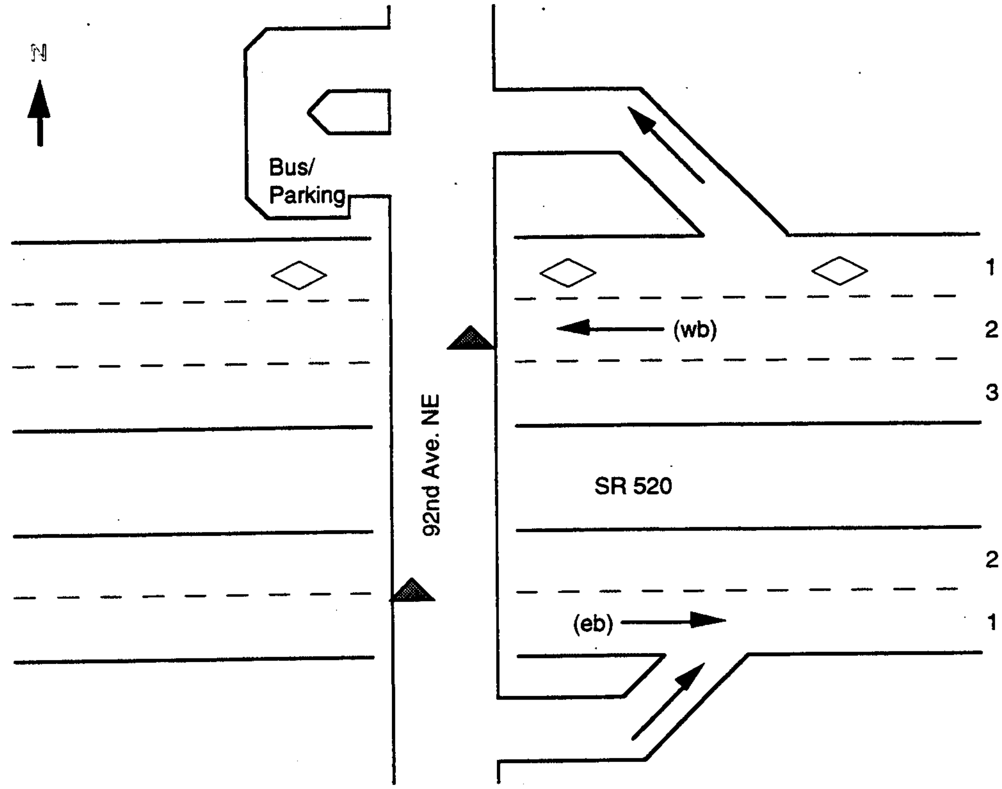
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2917	355	33	23	1	32	3	25	2	5	**3396**	**1.15**	**15**
	Q4/92	No observations										**- -**		
	Q1/93	922	69	3	1	0	8	0	7	1	0	**1011**	**1.08**	**4**
	Q2/93	No observations										**- -**		
	Q3/93	1720	176	35	19	0	21	2	25	2	1	**2001**	**1.16**	**10**
	Q4/93	917	127	13	7	0	7	0	1	0	0	**1072**	**1.16**	**3**
	Q1/94	957	116	17	5	0	7	1	8	1	0	**1112**	**1.15**	**4**
	Q2/94	874	99	9	1	0	10	1	5	0	1	**1000**	**1.12**	**5**
	Q3/94	650	96	10	2	0	9	0	5	1	0	**773**	**1.16**	**5**
	Q4/94	1575	127	9	3	0	17	0	9	0	0	**1740**	**1.09**	**8**
	Q1/95	1948	192	17	11	3	20	0	16	1	0	**2208**	**1.12**	**11**
	Q2/95	888	71	7	2	0	12	0	9	2	3	**994**	**1.09**	**9**
														74

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q1/94	900	211	31	12	0	13	0	10	0	2	**1179**	**1.27**	**6**
	Q2/94	809	165	28	13	0	12	1	8	0	3	**1039**	**1.26**	**5**
	Q3/94	1595	331	60	37	5	25	0	7	1	7	**2068**	**1.28**	**13**
	Q4/94	1365	188	17	14	0	16	0	9	0	2	**1611**	**1.17**	**10**
	Q1/95	910	140	19	4	2	13	0	3	0	0	**1091**	**1.18**	**6**
	Q2/95	731	122	20	9	0	10	4	5	0	3	**904**	**1.22**	**5**
														45

SITE #42. SR 520 - Yarrow Point

ACO mainline WB-am & EB-pm



Note: There is an HOV lane on the outside of the westbound mainline lanes in this location. Be sure to count it as lane #1.

a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
HOV lanes 1	Q3/92	5	6	26	3	1	20	1	0	0	10	**72**	**2.69**	**2**
	Q4/92	23	9	1	0	0	24	0	0	0	4	**61**	**1.33**	**1**
	Q1/93	3	12	34	8	2	36	1	0	0	6	**102**	**2.85**	**2**
	Q2/93	5	14	79	29	5	94	2	0	0	20	**248**	**3.09**	**4**
	Q3/93	18	52	62	25	6	116	2	0	0	32	**313**	**2.63**	**7**
	Q4/93	9	18	38	5	0	30	4	1	0	4	**109**	**2.57**	**5**
	Q1/94	6	25	43	5	1	31	1	0	0	0	**112**	**2.61**	**3**
	Q2/94	2	2	15	4	2	44	1	0	0	7	**77**	**2.95**	**2**
	Q3/94	14	29	106	23	4	128	2	2	1	34	**343**	**2.83**	**8**
	Q4/94	12	159	51	4	8	101	2	1	0	9	**347**	**2.21**	**5**
	Q1/95	30	127	187	33	7	199	3	1	0	24	**611**	**2.61**	**12**
	Q2/95	40	141	151	5	11	210	7	1	0	59	**625**	**2.36**	**10**
														61

a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP lanes **2**	Q3/92	3170	394	10	3	0	8	1	57	26	2	**3671**	**1.12**	**6**
	Q4/92	1082	86	0	0	0	0	0	22	6	0	**1196**	**1.07**	**2**
	Q1/93	2964	340	6	0	0	0	0	42	18	0	**3370**	**1.11**	**4**
	Q2/93	7004	823	29	5	3	13	3	145	78	3	**8106**	**1.11**	**12**
	Q3/93	10737	1260	68	24	1	18	7	240	161	13	**12529**	**1.12**	**17**
	Q4/93	3507	276	11	3	0	2	0	60	34	3	**3896**	**1.08**	**9**
	Q1/94	5260	531	9	2	0	10	4	105	55	0	**5976**	**1.10**	**11**
	Q2/94	4849	466	20	13	0	4	0	104	47	3	**5506**	**1.10**	**7**
	Q3/94	6277	653	22	4	2	11	3	137	61	26	**7196**	**1.10**	**12**
	Q4/94	3548	395	7	0	0	0	0	120	23	0	**4093**	**1.10**	**7**
	Q1/95	4297	536	4	2	1	2	0	106	70	0	**5018**	**1.11**	**8**
	Q2/95	4835	510	16	4	0	8	2	117	45	4	**5541**	**1.10**	**9**
														104

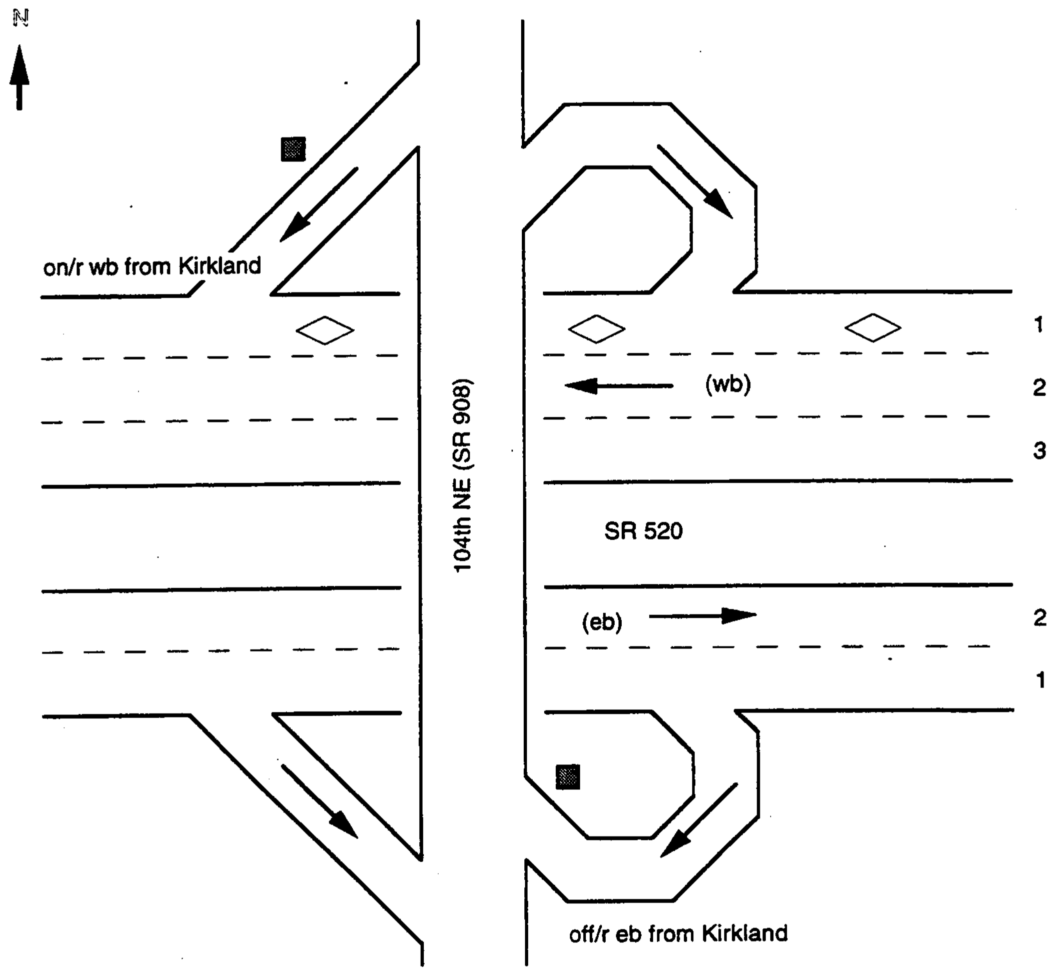
SR 520 - Yarrow Point

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP lanes **2**	Q3/92	4480	879	99	32	2	49	0	46	16	28	**5630**	**1.21**	**15**
	Q4/92	4157	626	36	8	1	49	3	61	24	11	**4976**	**1.15**	**6**
	Q1/93	1897	310	38	8	8	20	5	51	1	3	**2341**	**1.18**	**6**
	Q2/93	10760	1997	151	28	4	138	5	2245	53	63	**15444**	**1.18**	**21**
	Q3/93	15060	2778	282	115	3	200	1	284	67	86	**18876**	**1.20**	**25**
	Q4/93	14684	2745	299	115	20	207	6	290	88	55	**18509**	**1.21**	**24**
	Q1/94	8351	1751	216	67	5	100	4	121	37	24	**10676**	**1.23**	**16**
	Q2/94	12651	2448	275	142	13	175	2	186	61	42	**15995**	**1.22**	**24**
	Q3/94	11063	1611	176	122	1	195	7	158	56	74	**13463**	**1.18**	**21**
	Q4/94	9698	1318	152	78	8	117	0	148	40	25	**11584**	**1.17**	**17**
	Q1/95	7896	1344	121	43	3	82	3	108	37	12	**9649**	**1.18**	**13**
	Q2/95	9003	1516	140	52	19	124	2	123	60	47	**11086**	**1.18**	**15**
														203

SITE #43. SR 520 - SR 908: Bellevue/Kirkland

ACO on/ramp WB from Kirkland-am
ACO off/ramp EB to Kirkland-pm



a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1776	212	20	9	3	7	0	11	3	7	**2048**	**1.14**	**11**
	Q4/92	1914	178	19	2	3	9	0	14	5	3	**2147**	**1.11**	**8**
	Q1/93	954	64	12	4	1	4	0	4	0	1	**1044**	**1.10**	**4**
	Q2/93	1784	140	12	5	0	6	0	16	4	6	**1973**	**1.09**	**7**
	Q3/93	2791	188	22	8	2	9	0	34	4	12	**3070**	**1.09**	**10**
	Q4/93	318	32	6	0	0	0	0	11	15	0	**382**	**1.12**	**3**
	Q1/94	744	66	7	4	0	4	0	7	1	1	**834**	**1.11**	**3**
	Q2/94	1004	106	15	8	1	5	0	7	1	10	**1157**	**1.14**	**5**
	Q3/94	2766	217	27	4	3	15	4	25	10	2	**3073**	**1.09**	**5**
	Q4/94	1096	63	7	7	2	4	0	10	2	4	**1195**	**1.08**	**7**
	Q1/95	1191	91	20	3	1	7	0	10	1	1	**1325**	**1.11**	**7**
	Q2/95	1108	87	14	8	2	7	3	8	2	5	**1244**	**1.12**	**11**
														81

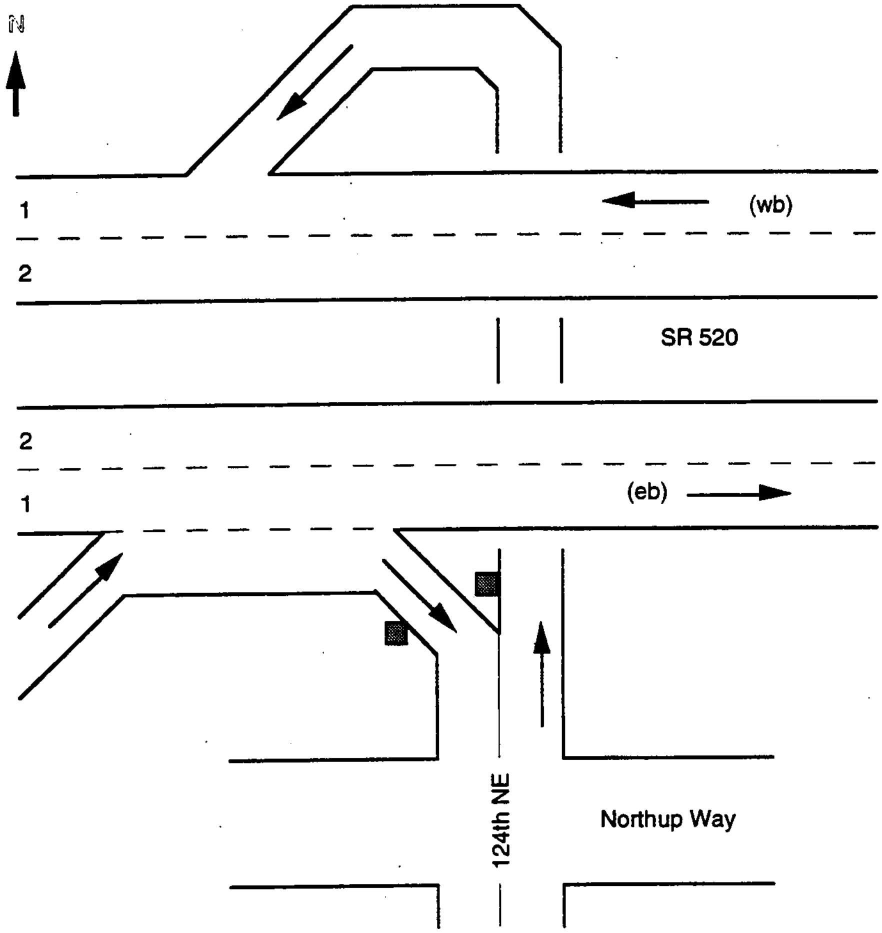
SR 520 - SR 908: Bellevue/Kirkland

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	940	228	33	16	2	14	1	5	2	7	**1248**	**1.28**	**4**
	Q4/92	2892	433	41	26	2	38	2	22	4	7	**3467**	**1.18**	**15**
	Q1/93	3481	612	76	54	4	70	0	458	6	12	**4773**	**1.22**	**14**
	Q2/93	1326	263	36	22	0	17	0	10	2	13	**1689**	**1.25**	**6**
	Q3/93	2345	499	101	40	5	42	0	18	2	22	**3074**	**1.28**	**10**
	Q4/93	1337	231	24	10	4	24	0	13	3	2	**1648**	**1.19**	**5**
	Q1/94	2455	514	69	24	2	45	0	24	2	11	**3146**	**1.24**	**10**
	Q2/94	1823	366	59	19	4	24	2	10	2	12	**2323**	**1.24**	**10**
	Q3/94	2341	458	93	49	10	46	1	19	4	16	**3037**	**1.27**	**10**
	Q4/94	1617	248	22	9	6	28	0	12	1	0	**1943**	**1.17**	**6**
	Q1/95	747	114	12	5	0	14	0	2	1	0	**895**	**1.18**	**4**
	Q2/95	901	136	15	8	2	22	0	1	0	7	**1092**	**1.18**	**5**
														99

SITE #44. SR 520 - 124th Avenue NE

ACO on/ramp WB-am
ACO off/ramp EB-pm



a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2604	314	50	24	4	25	2	134	149	9	**3315**	**1.16**	**15**
	Q4/92	3225	265	29	13	3	30	4	271	242	2	**4077**	**1.10**	**19**
	Q1/93	No observations										--		
	Q2/93	1802	199	19	9	0	23	2	140	121	2	**2317**	**1.13**	**9**
	Q3/93	1881	164	15	7	0	27	2	110	162	5	**2373**	**1.10**	**9**
	Q4/93	654	72	7	2	0	1	2	49	28	0	**815**	**1.13**	**3**
	Q1/94	1539	109	15	4	1	3	1	94	120	2	**1888**	**1.09**	**8**
	Q2/94	927	77	8	3	0	3	0	57	74	1	**1150**	**1.10**	**4**
	Q3/94	940	58	5	2	0	22	2	61	81	5	**1176**	**1.07**	**5**
	Q4/94	1344	126	10	2	3	13	3	105	94	2	**1702**	**1.10**	**8**
	Q1/95	870	65	3	3	0	3	1	73	62	0	**1080**	**1.09**	**5**
	Q2/95	1095	98	9	1	2	11	0	58	68	0	**1342**	**1.10**	**5**
														90

SR 520 - 124th Avenue NE

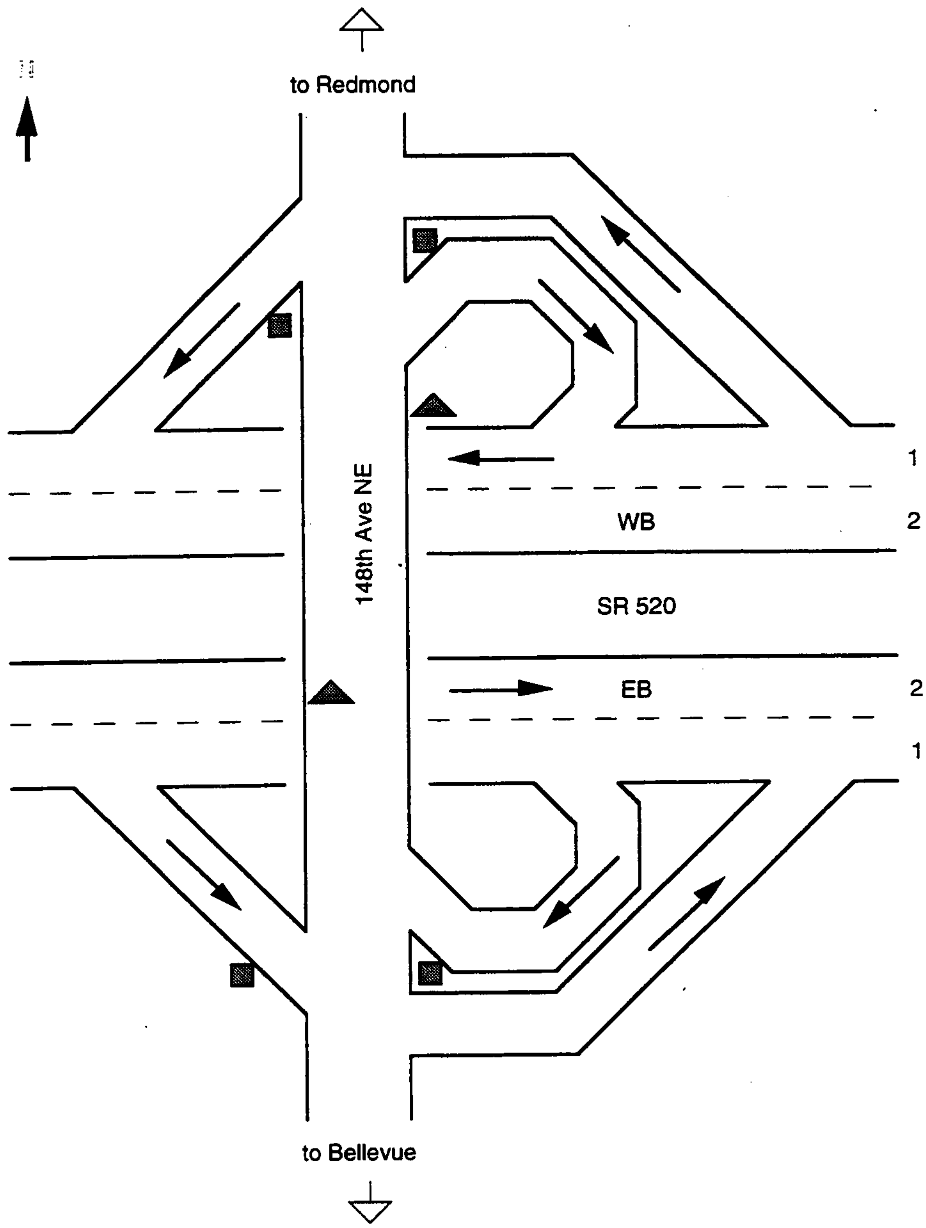
p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	4565	844	153	71	1	35	6	160	187	39	**6061**	**1.24**	**17**
	Q4/92	2748	435	45	13	2	7	1	116	77	5	**3449**	**1.17**	**7**
	Q1/93	1873	262	44	8	2	9	3	55	69	8	**2333**	**1.17**	**7**
	Q2/93	No observations										**--**		
	Q3/93	3568	746	85	59	0	23	2	151	135	19	**4788**	**1.25**	**14**
	Q4/93	1784	355	43	17	0	2	0	77	61	4	**2343**	**1.25**	**8**
	Q1/94	3322	547	74	26	1	26	4	122	86	2	**4210**	**1.20**	**10**
	Q2/94	1939	345	14	8	74	10	2	81	54	24	**2484**	**1.17**	**5**
	Q3/94	4005	757	76	35	18	25	4	187	136	21	**5264**	**1.21**	**13**
	Q4/94	3452	566	72	51	0	10	1	152	148	4	**4456**	**1.21**	**10**
	Q1/95	1650	214	10	6	0	3	3	75	64	**2**	**2027**	**1.13**	**5**
	Q2/95	1871	414	28	18	3	15	0	72	96	**2**	**2519**	**1.23**	**5**
														101

Note: This is a very busy ramp, so it is a good idea to have a vest with you for visibility and safety.

SITES #45, 46, & 47. SR 520 - 148th Avenue NE

▲ ACO mainline WB-am & EB-pm
■ ACO on/ramp WB from Bellevue-am & from Redmond-am
■ ACO off/ramp EB to Bellevue-pm & to Redmond-pm



Note: To count ACO mainline westbound in the morning, you must walk down the east side of 148th NE and go behind the concrete overpass barrier to find a place to sit in the grassy embankment. You will be looking down and to the side to see the mainline traffic.

To count ACO mainline eastbound in the afternoon, you can sit on the sidewalk on the west side of the 148th NE overpass. The entrance and exit ramps in this location are split, so you have to look carefully to be sure you are counting the correct ramp.

SR 520 - 148th Avenue NE

a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	5289	533	51	15	3	13	0	172	77	16	**6169**	**1.12**	**12**
lanes	Q4/92	No observations										**--**		
3	Q1/93	1971	191	13	6	1	5	2	46	18	4	**2257**	**1.11**	**4**
	Q2/93	3472	238	14	5	0	17	3	89	68	6	**3912**	**1.08**	**10**
	Q3/93	8786	640	49	45	4	29	10	230	145	67	**10005**	**1.09**	**27**
	Q4/93	2128	214	32	13	1	14	0	100	59	5	**2566**	**1.13**	**6**
	Q1/94	6326	609	74	13	5	14	6	249	58	9	**7363**	**1.11**	**14**
	Q2/94	5872	402	44	33	0	15	5	225	124	22	**6742**	**1.09**	**23**
	Q3/94	8852	379	25	11	2	35	5	328	158	46	**9841**	**1.05**	**21**
	Q4/94	5008	351	23	10	1	17	6	193	90	7	**5706**	**1.08**	**12**
	Q1/95	3748	220	9	4	1	9	8	108	67	1	**4175**	**1.06**	**5**
	Q2/95	6978	462	40	11	5	21	8	197	118	11	**7851**	**1.08**	**15**
														149

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	2446	465	46	9	1	8	2	50	30	18	**3075**	**1.20**	**7**
lanes	Q4/92	2435	389	31	5	1	9	2	61	27	13	**2973**	**1.16**	**7**
2	Q1/93	No observations										**--**		
	Q2/93	3633	584	28	4	1	14	1	101	21	14	**4401**	**1.15**	**9**
	Q3/93	9387	1296	153	36	4	32	6	272	98	55	**11339**	**1.16**	**24**
	Q4/93	7176	845	37	8	5	27	3	215	81	25	**8422**	**1.12**	**22**
	Q1/94	4619	694	65	32	2	13	3	119	67	11	**5625**	**1.17**	**12**
	Q2/94	7942	996	150	74	1	22	6	200	80	22	**9493**	**1.17**	**20**
	Q3/94	7850	706	41	13	17	34	4	183	84	50	**8982**	**1.10**	**16**
	Q4/94	3515	421	38	21	1	11	2	85	41	7	**4142**	**1.14**	**9**
	Q1/95	5640	681	71	28	2	21	6	148	95	12	**6704**	**1.14**	**5**
	Q2/95	6099	1183	102	57	11	28	9	160	105	23	**8377**	**1.20**	**16**
														147

a.m. westbound - Redmond Ramp

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q3/92	2068	242	44	16	2	23	2	24	11	4	**2436**	**1.16**	**13**
ramp	Q4/92	782	106	9	5	0	10	0	4	3	0	**919**	**1.16**	**6**
	Q1/93	1792	230	20	14	1	24	2	170	3	2	**2258**	**1.15**	**11**
	Q2/93	1096	105	18	4	0	14	0	171	1	3	**1413**	**1.13**	**8**
	Q3/93	804	91	16	5	0	5	0	17	5	2	**945**	**1.15**	**9**
	Q4/93	1021	109	7	8	0	12	1	22	2	0	**1182**	**1.13**	**9**
	Q1/94	543	67	2	2	0	7	2	13	3	1	**640**	**1.13**	**4**
	Q2/94	547	89	5	0	2	6	1	7	5	0	**662**	**1.15**	**4**
	Q3/94	1502	180	11	9	3	16	2	24	11	5	**1763**	**1.14**	**10**
	Q4/94	1132	75	8	7	1	12	0	13	9	2	**1259**	**1.09**	**8**
	Q1/95	1167	85	10	3	1	13	3	13	9	4	**1308**	**1.09**	**8**
	Q2/95	2379	171	22	4	2	20	1	27	15	8	**2378**	**1.10**	**11**
														101

p.m. **eastbound - Redmond Ramp**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	1038	171	35	30	1	12	0	11	6	8	**1312**	**1.26**	**9**
	Q4/92	1583	225	24	6	0	21	0	21	12	2	**1894**	**1.16**	**15**
	Q1/93	No observations										--		
	Q2/93	488	85	6	1	0	2	0	9	3	3	**597**	**1.17**	**4**
	Q3/93	1807	355	75	36	1	14	3	16	7	6	**2320**	**1.27**	**9**
	Q4/93	470	31	2	16	2	6	0	2	0	0	**529**	**1.17**	**4**
	Q1/94	2190	294	39	12	3	17	0	20	3	3	**2581**	**1.16**	**10**
	Q2/94	570	110	16	3	0	5	1	8	1	3	**717**	**1.22**	**5**
	Q3/94	1417	242	44	32	3	12	1	20	4	7	**1782**	**1.25**	**11**
	Q4/94	830	85	14	3	1	6	0	7	7	4	**957**	**1.13**	**6**
	Q1/95	1010	191	17	10	0	6	0	21	11	1	**1267**	**1.21**	**9**
	Q2/95	565	103	17	6	5	6	0	4	3	0	**709**	**1.23**	**10**
														92

SR 520 - 148th Avenue NE - Bellevue Ramp

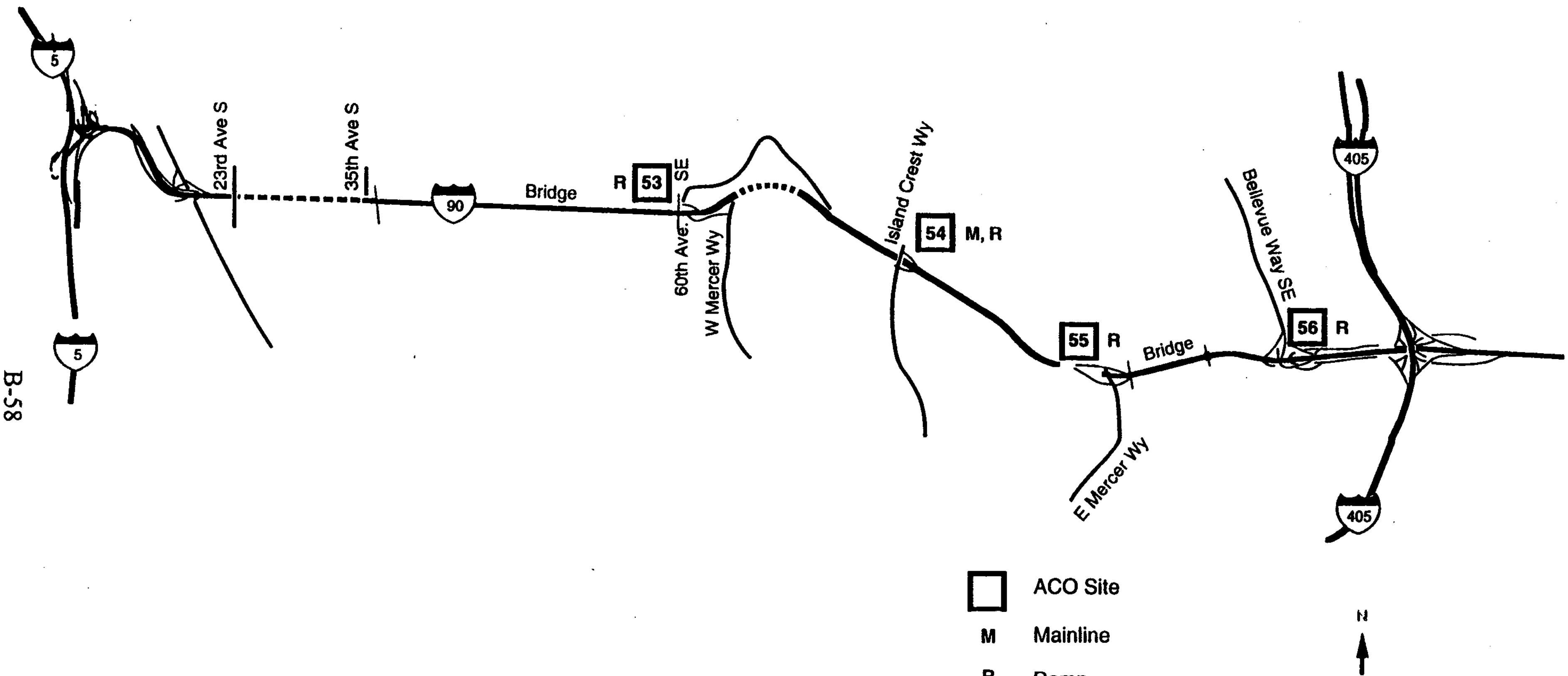
a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2657	274	47	28	0	26	1	36	10	6	**3085**	**1.15**	**12**
	Q4/92	1383	128	10	1	2	13	2	8	6	1	**1554**	**1.10**	**7**
	Q1/93	2987	289	29	2	2	25	2	45	13	2	**3396**	**1.11**	**14**
	Q2/93	2035	240	28	14	2	27	8	17	17	10	**2398**	**1.15**	**9**
	Q3/93	1770	170	21	16	0	13	4	24	10	9	**2037**	**1.13**	**10**
	Q4/93	676	73	10	6	7	11	1	10	12	3	**807**	**1.15**	**3**
	Q1/94	750	88	9	5	4	7	0	9	4	0	**876**	**1.14**	**4**
	Q2/94	988	107	6	4	5	9	1	15	8	2	**1145**	**1.12**	**5**
	Q3/94	2279	225	26	18	8	23	0	50	10	8	**2647**	**1.13**	**10**
	Q4/94	961	51	10	6	1	8	3	15	12	1	**1068**	**1.09**	**7**
	Q1/95	1522	136	18	4	2	13	3	24	17	1	**1740**	**1.11**	**8**
	Q2/95	1895	174	26	5	11	17	2	28	20	4	**2182**	**1.12**	**10**
														98

p.m. **eastbound**

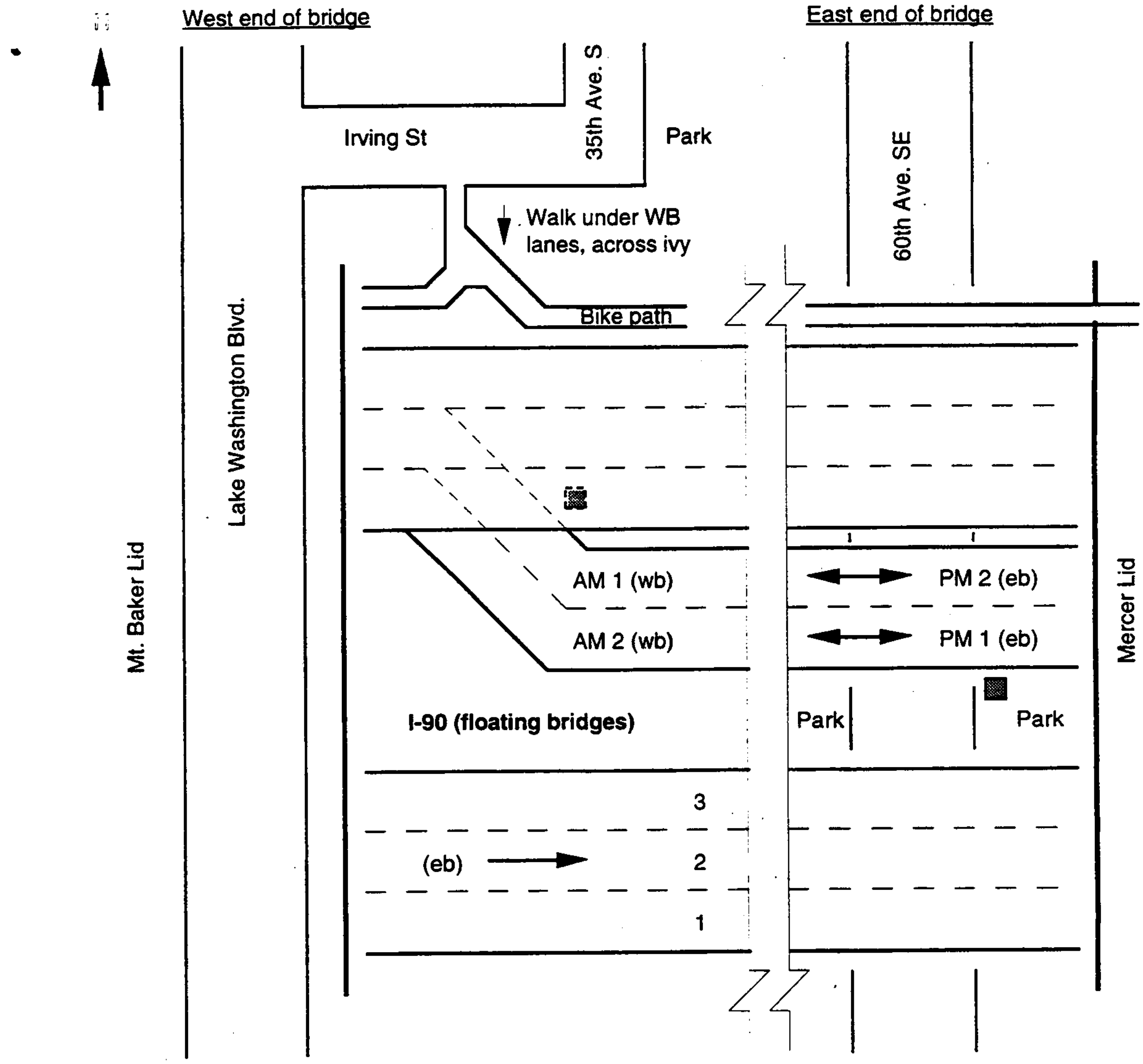
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	2397	503	103	55	4	15	6	15	11	14	**3123**	**1.29**	**11**
	Q4/92	4177	621	79	24	3	25	7	59	10	5	**5010**	**1.17**	**14**
	Q1/93	1038	141	17	1	1	4	2	2	0	3	**1209**	**1.15**	**3**
	Q2/93	1507	271	47	19	1	7	4	22	1	11	**1890**	**1.23**	**5**
	Q3/93	3658	703	136	85	3	23	4	42	16	12	**4682**	**1.17**	**16**
	Q4/93	1908	435	88	52	6	10	1	19	9	7	**2535**	**1.31**	**9**
	Q1/94	1960	348	51	8	3	14	1	15	1	6	**2407**	**1.20**	**6**
	Q2/94	1648	301	43	5	1	9	0	8	2	10	**2027**	**1.20**	**5**
	Q3/94	1859	403	77	42	10	12	1	10	3	9	**2416**	**1.29**	**9**
	Q4/94	3084	543	66	21	7	24	1	33	7	12	**3798**	**1.20**	**9**
	Q1/95	3687	752	65	30	4	23	1	41	7	11	**4621**	**1.22**	**10**
	Q2/95	3821	690	83	12	7	26	1	35	6	18	**4699**	**1.19**	**11**
														108

Figure B30. Vehicle Occupancy (ACO) Sites
I-90 (Corridor #5)



SITE #52. I-90 Reversible Lanes

ACO reversible lanes WB-am
ACO reversible lanes EB-pm



Note: The two lanes in the center roadway are for use by HOVs and Mercer Island SOVs.

a.m. **westbound**

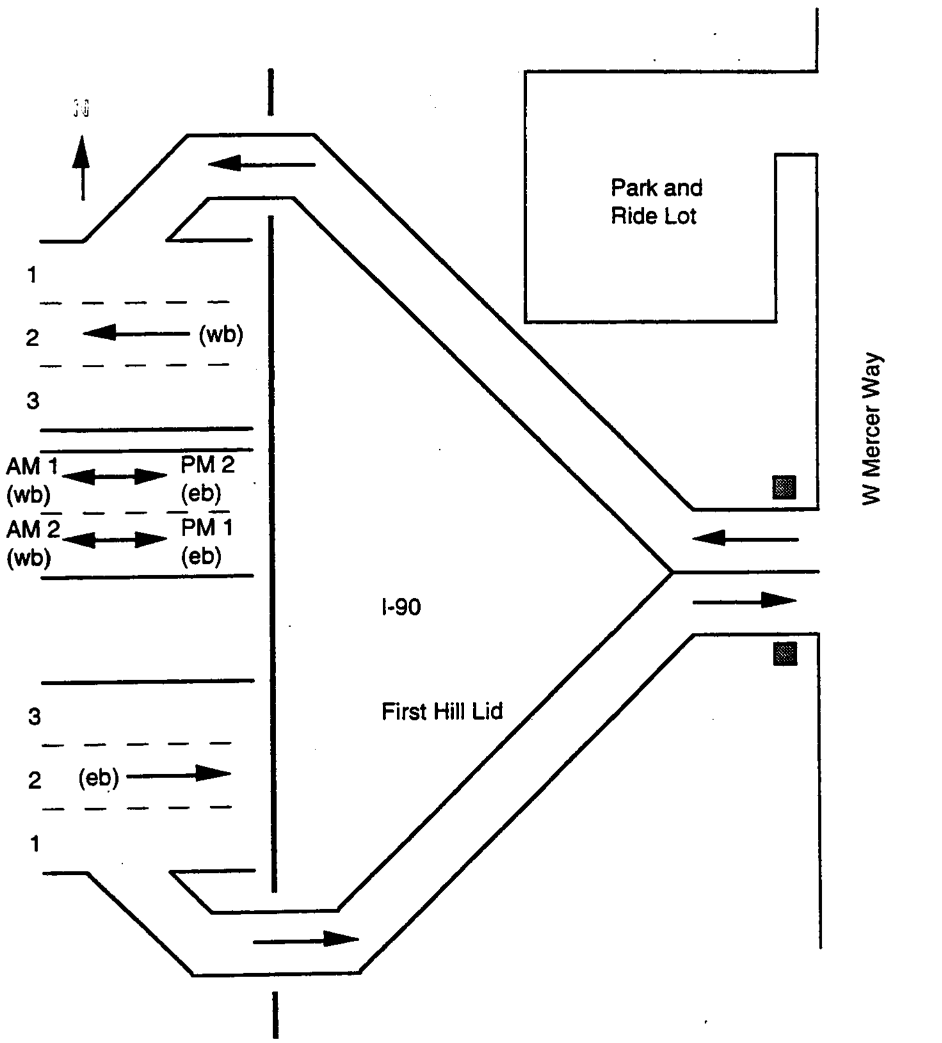
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Reversible Lanes	Q3/94	1004	811	56	22	6	37	0	7	0	41	**1984**	**1.52**	**9**
	Q4/94	752	1837	46	22	4	54	5	8	0	17	**2745**	**1.75**	**11**
	Q1/95	8	2612	39	28	7	67	9	9	0	14	**2793**	**2.03**	**13**
	Q2/95	1712	1683	141	34	23	77	5	12	2	73	**3762**	**1.58**	**15**
														48

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Reversible Lanes	Q3/94	1141	1486	163	82	21	60	2	14	0	68	**3307**	**1.66**	**12**
	Q4/94	1256	1983	144	56	15	78	5	15	1	39	**3592**	**1.71**	**16**
	Q1/95	1685	2048	210	60	18	85	9	25	0	33	**4173**	**1.66**	**22**
	Q2/95	1444	1661	134	64	25	46	6	8	0	26	**3414**	**1.65**	**17**
														57

SITE #53. I-90 - 60th Avenue SE

■ ACO on/ramp WB-am
■ ACO off/ramp EB-pm



a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	1570	185	21	10	0	18	1	6	2	1	**1814**	**1.15**	**13**
	Q4/92	1201	154	13	6	0	15	2	7	1	2	**1401**	**1.14**	**8**
	Q1/93	1697	166	12	3	0	18	1	5	1	0	**1903**	**1.11**	**10**
	Q2/93	538	59	17	1	0	7	1	9	0	0	**632**	**1.16**	**4**
	Q3/93	1211	120	13	5	1	14	1	8	11	1	**1385**	**1.12**	**9**
	Q4/93	550	53	3	1	0	7	3	2	4	0	**623**	**1.10**	**3**
	Q1/94	767	77	7	4	0	7	3	19	2	2	**878**	**1.12**	**8**
	Q2/94	397	33	5	2	0	6	1	4	2	0	**450**	**1.11**	**3**
	Q3/94	544	65	6	1	1	8	0	1	6	1	**633**	**1.13**	**6**
	Q4/94	517	48	8	5	0	8	1	1	2	1	**591**	**1.14**	**5**
	Q1/95	945	74	5	1	0	17	3	6	3	0	**1054**	**1.09**	**13**
	Q2/95	544	51	9	3	1	11	1	1	3	0	**624**	**1.13**	**6**
														88

I-90 - 60th Avenue SE

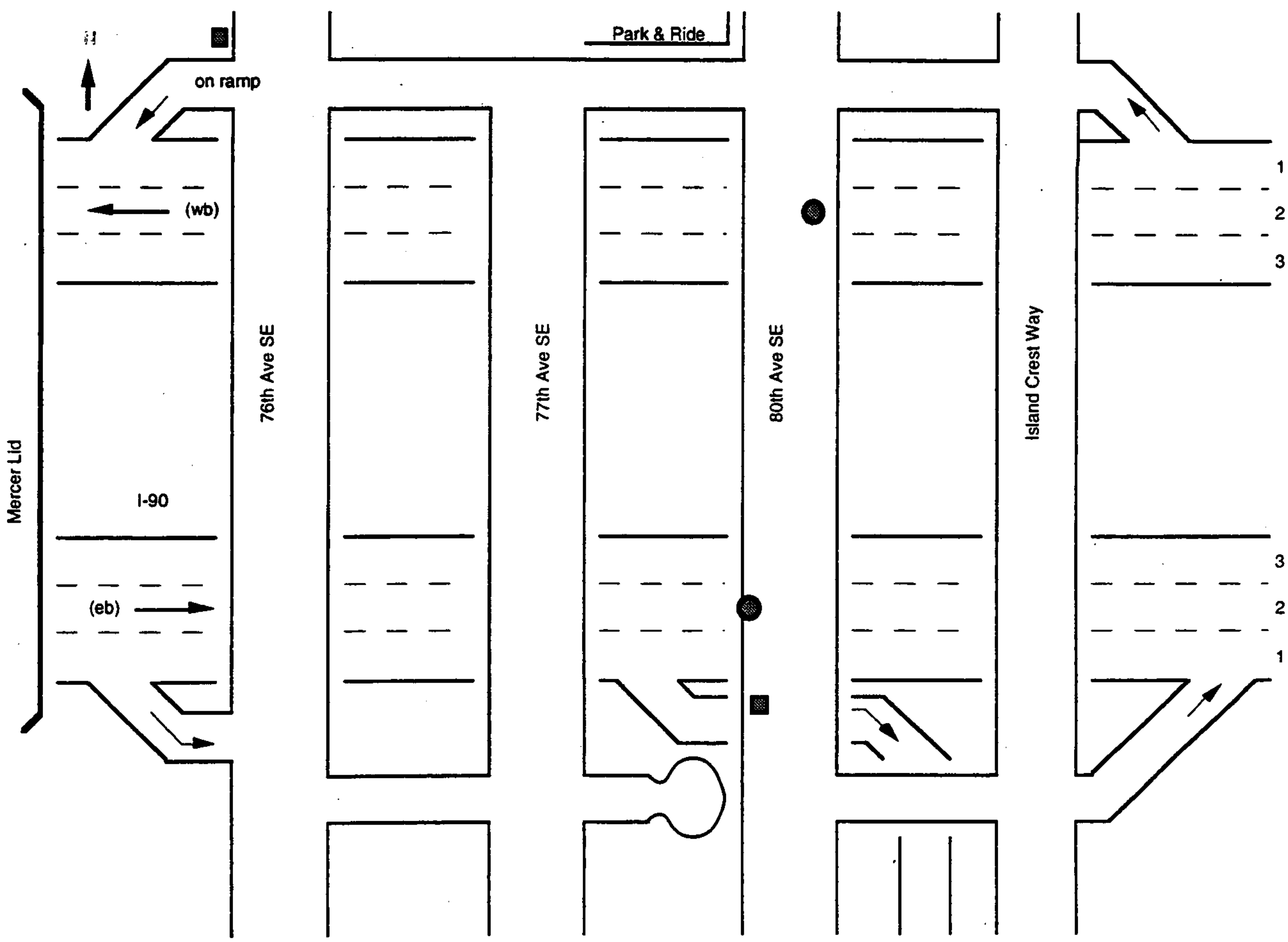
p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	1256	278	52	28	0	13	0	8	2	6	**1643**	**1.29**	**10**
	Q4/92	2269	301	37	17	0	22	8	34	1	4	**2693**	**1.16**	**14**
	Q1/93	1110	220	40	11	0	16	1	465	0	4	**1867**	**1.24**	**12**
	Q2/93	956	189	30	18	0	12	1	156	1	1	**1364**	**1.26**	**9**
	Q3/93	No observations										**- -**		
	Q4/93	1148	198	25	13	0	16	3	18	0	1	**1422**	**1.21**	**13**
	Q1/94	480	76	15	7	0	9	1	1	1	1	**591**	**1.22**	**6**
	Q2/94	1057	226	47	17	5	15	0	5	0	3	**1375**	**1.28**	**16**
	Q3/94	1597	258	56	33	4	23	2	17	5	9	**2004**	**1.24**	**17**
	Q4/94	939	96	9	6	2	12	3	5	0	1	**1073**	**1.13**	**9**
	Q1/95	557	70	9	2	1	12	1	3	1	0	**656**	**1.15**	**6**
	Q2/95	743	145	13	9	4	14	0	1	3	1	**933**	**1.22**	**8**
														120

SITE #54. I-90 - Island Crest Way

- ACO on/ramp WB-am
- ACO off/ramp EB-pm
- ACO mainline WB-am
- ACO mainline EB-pm

Ending Q1/94



I-90 - Island Crest Way

a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q3/92	26	919	84	15	4	46	2	0	1	49	**1146**	**2.09**	7
lanes	Q4/92	No observations										**--**		
1	Q1/93	No observations										**--**		
	Q2/93	5	311	15	6	0	8	3	2	0	4	**354**	**2.07**	**2**
	Q3/93	22	735	131	47	0	30	1	6	1	22	**995**	**2.23**	**4**
	Q4/93	29	409	34	13	0	18	1	3	0	5	**512**	**2.07**	**3**
	Q1/94	10	149	16	4	1	5	1	1	0	1	**188**	**2.08**	**1**
														17
GP	Q3/92	4777	294	18	6	0	1	0	56	93	4	**5249**	**1.07**	**13**
lanes	Q4/92	No observations										**--**		
3	Q1/93	No observations										**--**		
	Q2/93	4863	156	18	7	3	17	1	82	114	2	**5263**	**1.04**	**10**
	Q3/93	8561	421	54	23	3	3	5	128	158	8	**9364**	**1.07**	**15**
	Q4/93	4869	84	5	4	1	0	1	39	76	2	**5081**	**1.02**	**9**
	Q1/94	5845	321	48	13	0	0	0	81	118	0	**6426**	**1.07**	**7**
														54

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	14886	2890	319	112	9	60	5	156	204	83	**18724**	**1.21**	**28**
lanes	Q4/92	2139	278	23	7	2	8	6	19	30	5	**2517**	**1.14**	**4**
3	Q1/93	5904	708	26	4	2	0	5	85	72	4	**6810**	**1.12**	**9**
	Q2/93	9828	1165	45	18	1	1	7	1024	144	21	**12254**	**1.12**	**21**
	Q3/93	12609	2045	276	44	3	5	16	161	230	39	**15428**	**1.18**	**19**
	Q4/93	12012	2156	197	65	10	11	5	227	176	29	**14888**	**1.19**	**21**
	Q1/94	6426	745	60	8	0	1	2	61	83	11	**7397**	**1.12**	**11**
														113

a.m. westbound

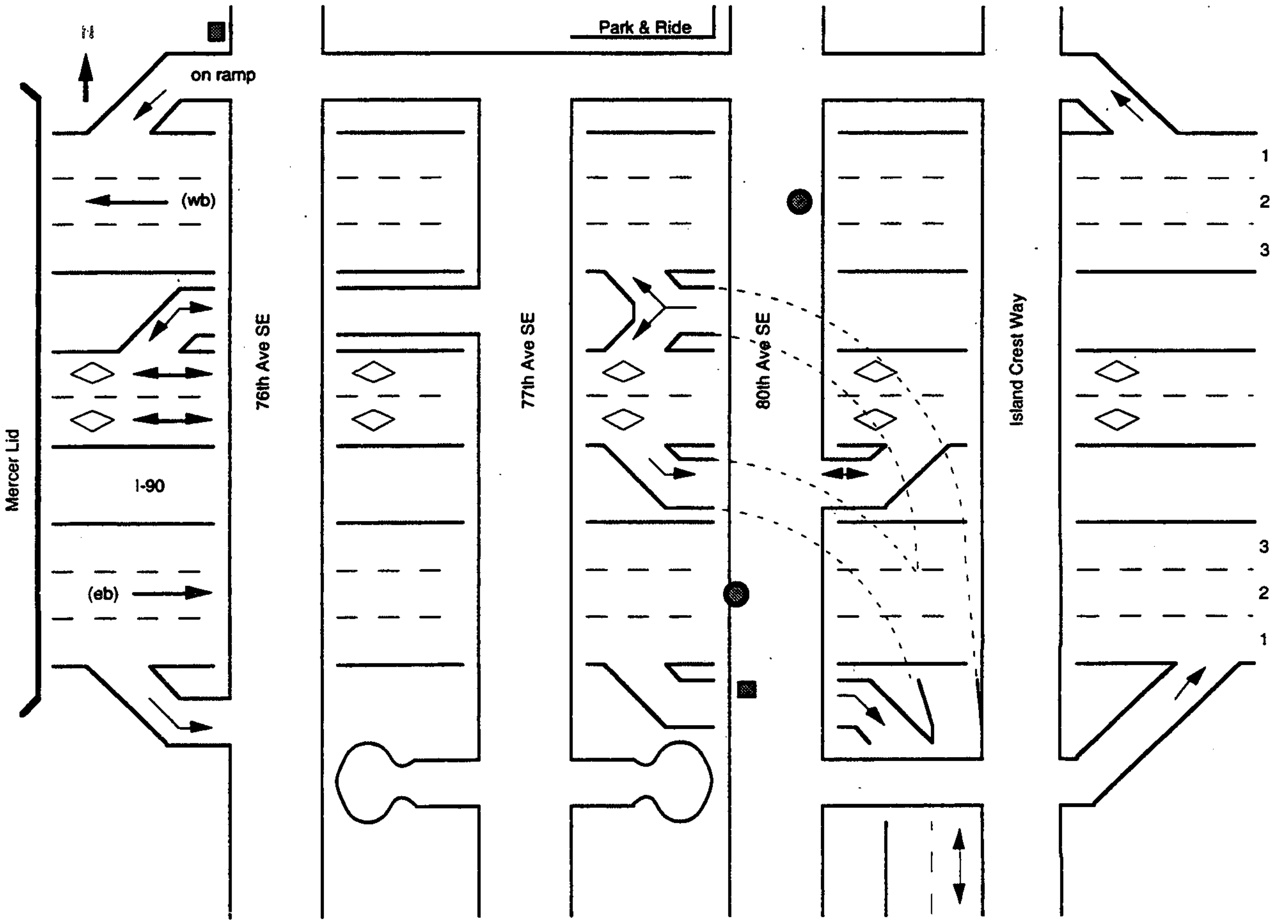
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q3/92	2351	351	41	10	3	38	2	22	9	3	**2830**	**1.17**	**15**
ramp	Q4/92	989	111	8	1	0	0	3	2	1	0	**1115**	**1.12**	**5**
	Q1/93	No observations										**--**		
	Q2/93	480	73	7	2	0	19	0	197	2	1	**781**	**1.17**	**5**
	Q3/93	1148	157	16	5	2	37	0	19	3	1	**1388**	**1.15**	**14**
	Q4/93	906	120	21	5	1	22	1	8	3	3	**1090**	**1.17**	**6**
	Q1/94	967	91	8	4	0	28	1	8	4	1	**1112**	**1.11**	**7**
														52

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off	Q3/92	2725	476	101	25	0	1	2	14	3	12	**3359**	**1.23**	**24**
ramp	Q4/92	2253	272	40	16	2	0	0	7	1	0	**2591**	**1.16**	**19**
	Q1/93	1422	207	18	10	0	0	6	9	0	0	**1672**	**1.17**	**15**
	Q2/93	1888	391	39	7	0	0	0	8	3	2	**2338**	**1.21**	**22**
	Q3/93	1338	317	27	2	0	22	2	9	1	2	**1720**	**1.22**	**19**
	Q4/93	2741	499	86	31	0	0	6	17	1	1	**3382**	**1.23**	**22**
	Q1/94	723	167	34	9	0	0	2	6	3	1	**945**	**1.28**	**11**
														132

Site # 54. I-90 - Island Crest Way

Beginning Q2/94



Note: The on/ramp westbound at this location is actually located at 76th Avenue SE. Occasionally the sprinklers in the landscaping will turn on unexpectedly, so it is a good idea to always have plastic bags and ponchos with you when you count at this location! HOV lanes are counted at Site #52.

I-90 - Island Crest Way

a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q2/94	9220	484	47	18	2	3	0	112	185	8	**10079**	**1.07**	**14**
lanes	Q3/94	7988	442	56	15	1	1	3	123	185	9	**8823**	**1.07**	**15**
3	Q4/94	5467	143	13	3	0	1	3	63	115	2	**5807**	**1.03**	**11**
	Q1/95	6318	191	7	29	0	6	4	107	125	0	**6787**	**1.05**	**11**
	Q2/95	5822	185	8	4	1	0	1	73	142	17	**6253**	**1.04**	**12**
														63

p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q2/94	13065	1114	173	121	1	2	8	199	227	24	**14934**	**1.13**	**20**
lanes	Q3/94	12417	1155	194	136	11	0	4	166	239	19	**14341**	**1.14**	**27**
3	Q4/94	7279	625	59	35	2	0	1	137	129	7	**8274**	**1.11**	**14**
	Q1/95	11356	983	54	33	9	0	4	124	184	12	**12759**	**1.10**	**18**
	Q2/95	8286	685	40	16	2	0	2	104	144	20	**9299**	**1.09**	**14**
														93

a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q2/94	1727	171	17	7	0	25	0	43	9	1	**2000**	**1.12**	**15**
ramp	Q3/94	1109	109	16	2	0	16	0	20	8	3	**1283**	**1.12**	**10**
	Q4/94	696	50	8	1	1	7	1	13	5	0	**782**	**1.09**	**8**
	Q1/95	565	41	4	1	0	5	0	12	2	0	**630**	**1.09**	**7**
	Q2/95	979	89	7	2	0	6	0	15	9	1	**1108**	**1.10**	**10**
														50

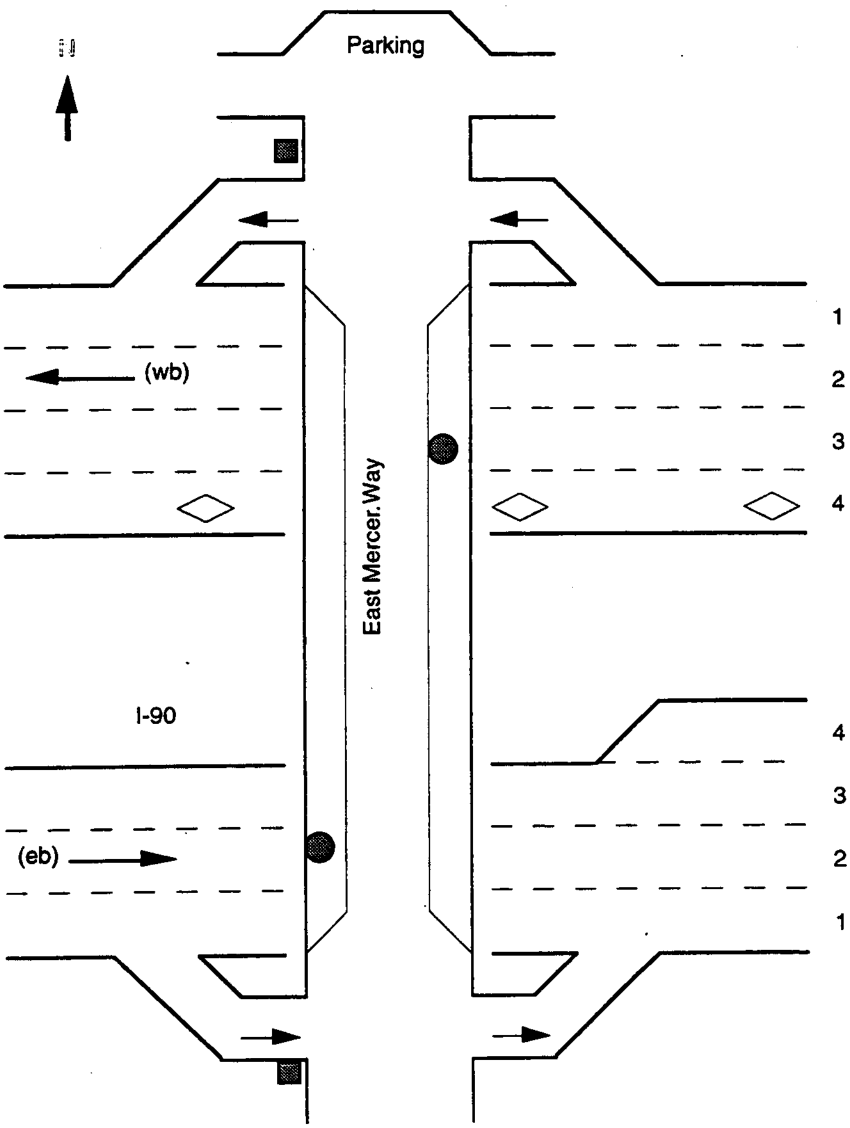
p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off	Q2/94	328	73	13	4	2	0	2	5	1	2	**930**	**1.27**	**7**
ramp	Q3/94	912	219	46	20	2	0	0	10	4	0	**1213**	**1.31**	**17**
	Q4/94	641	92	15	9	0	0	2	8	4	0	**771**	**1.20**	**10**
	Q1/95	532	87	22	10	0	0	0	4	0	0	**655**	**1.25**	**9**
	Q2/95	369	89	12	5	0	0	0	5	1	0	**481**	**1.27**	**10**
														53

SITE #55. I-90 - East Mercer Way

■ ACO on/ramp WB-am
■ ACO off/ramp EB-pm

Ending Q1/94



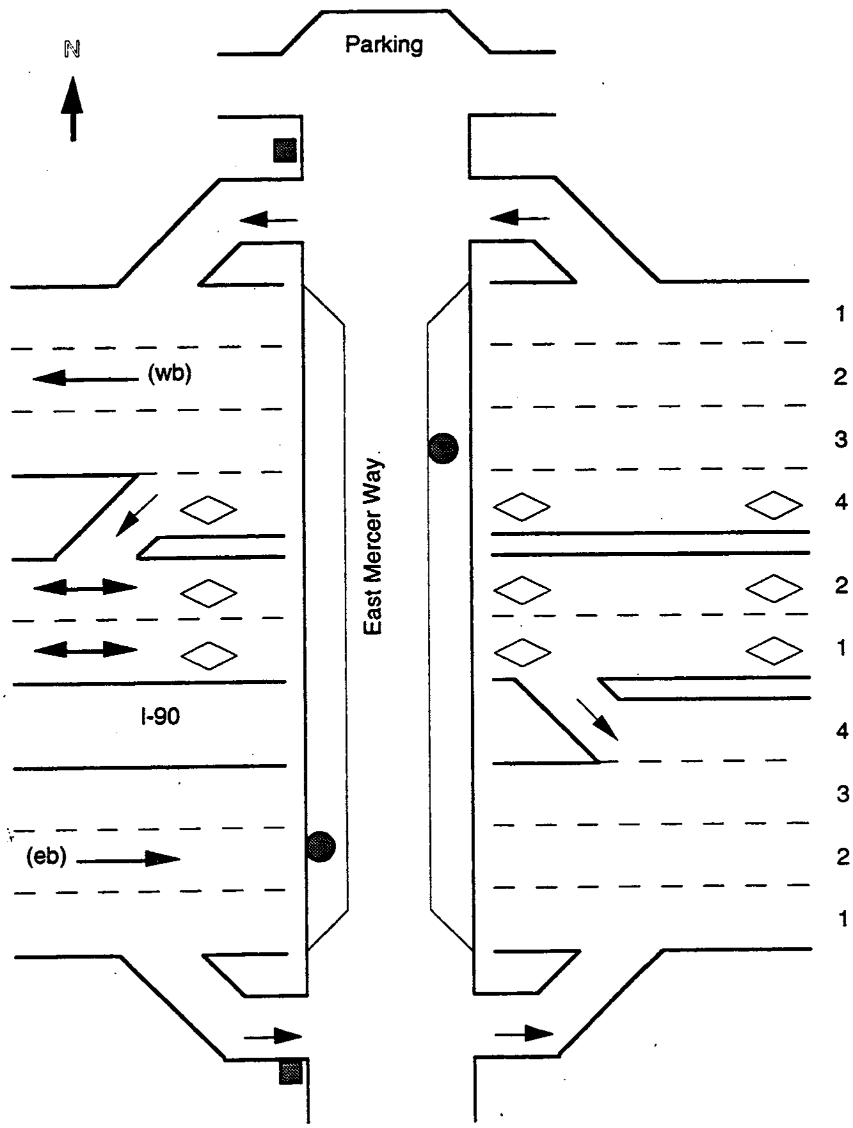
I-90 - East Mercer Way a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	213	23	6	0	0	4	0	3	0	1	**250**	**1.14**	**5**
	Q4/92	406	36	7	2	0	4	1	3	2	0	**461**	**1.13**	**3**
	Q1/93	36	6	1	0	0	0	0	0	0	0	**43**	**1.19**	**1**
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	217	10	0	0	0	4	0	1	0	0	**232**	**1.04**	**3**
	Q1/94	301	35	2	2	0	6	0	3	0	0	**349**	**1.13**	**8**
														20

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	199	47	2	2	0	6	0	1	0	0	**257**	**1.23**	**6**
	Q2/93	241	51	10	6	0	6	0	4	0	1	**319**	**1.29**	**5**
	Q3/93	No observations										--		
	Q4/93	608	138	30	16	0	16	1	3	0	1	**813**	**1.31**	**15**
	Q1/94	223	44	13	3	0	6	0	6	0	1	**296**	**1.28**	**5**
														31

I-90 - East Mercer Way
Beginning Q2/94



a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q2/94	150	16	0	0	0	4	0	0	1	0	**171**	**1.10**	4
	Q3/94	174	14	2	0	0	4	1	0	0	0	**195**	**1.09**	5
	Q4/94	No observations										- -		
														9

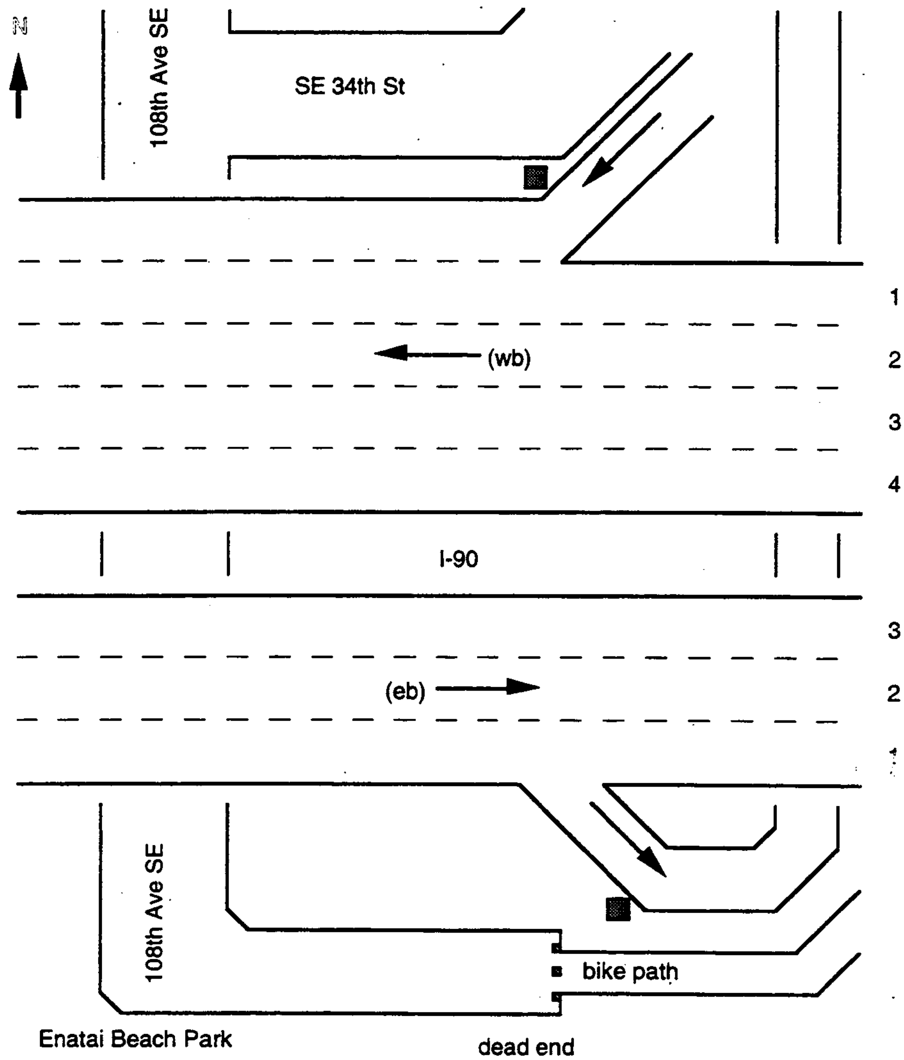
Note: Observations suspended as of Q4/94 and may resume at a later date.

p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q2/94	240	37	7	2	0	6	0	4	0	1	**297**	**1.20**	5
	Q3/94	196	38	10	9	0	6	1	12	0	1	**273**	**1.34**	5
	Q4/94	No observations										- -		
														10

SITE #56. I-90 - Bellevue Way

ACO on/ramp WB-am
ACO off/ramp EB-pm



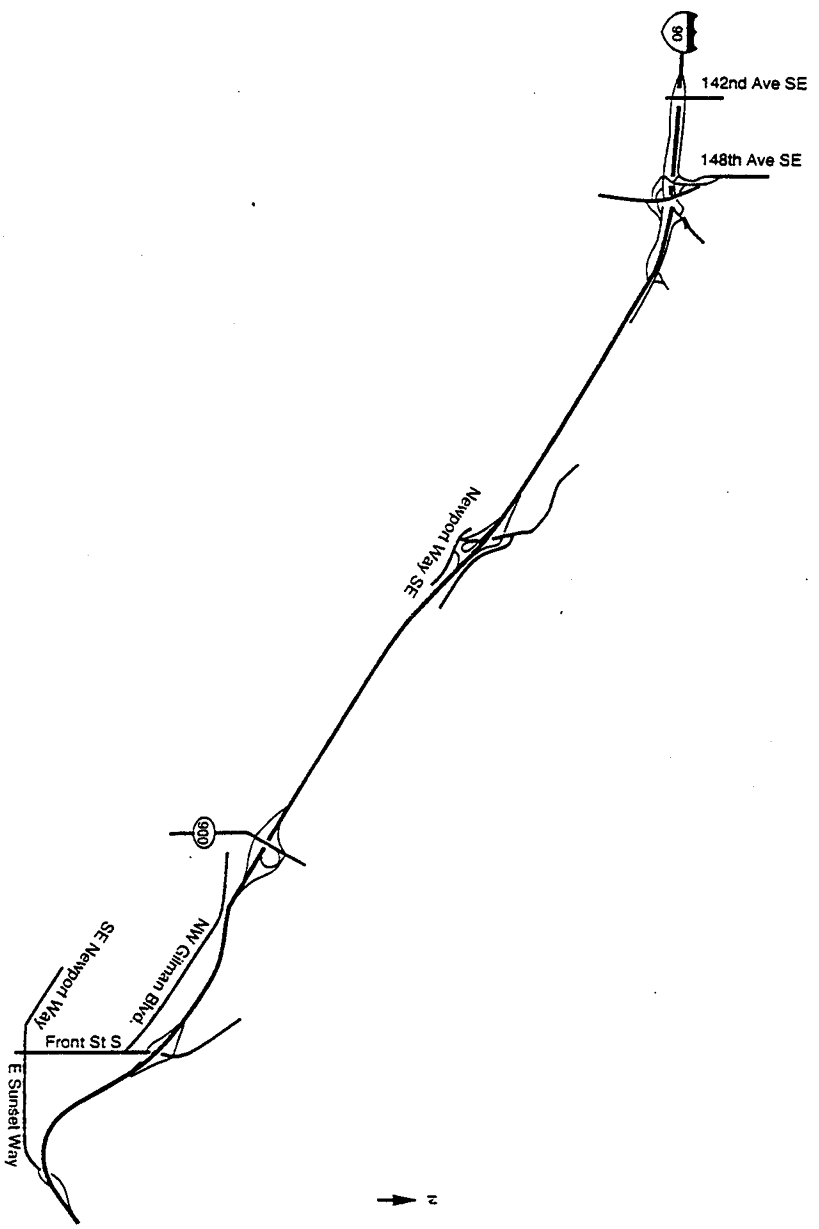
a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	2388	285	39	9	3	64	1	43	18	5	**2855**	**1.14**	**13**
	Q4/92	1114	106	12	4	0	28	0	22	4	4	**1294**	**1.12**	**5**
	Q1/93	2689	266	27	7	3	76	2	32	15	1	**3118**	**1.11**	**14**
	Q2/93	1464	202	24	4	0	46	0	20	9	5	**1774**	**1.16**	**8**
	Q3/93	1504	198	13	6	0	49	0	25	13	6	**1814**	**1.14**	**9**
	Q4/93	338	30	4	0	0	10	1	7	0	0	**390**	**1.10**	**2**
	Q1/94	2072	146	6	2	0	20	2	36	2	0	**2286**	**1.07**	**10**
	Q2/94	761	103	6	5	0	23	1	16	4	1	**920**	**1.15**	**4**
	Q3/94	1023	98	10	2	3	6	0	13	11	1	**1167**	**1.11**	**6**
	Q4/94	761	84	1	0	0	7	1	13	9	0	**876**	**1.10**	**5**
	Q1/95	807	53	3	2	0	7	1	14	7	0	**894**	**1.08**	**4**
	Q2/95	1087	60	9	1	0	8	2	4	14	2	**1187**	**1.07**	**6**
														86

I-90 - Bellevue Way

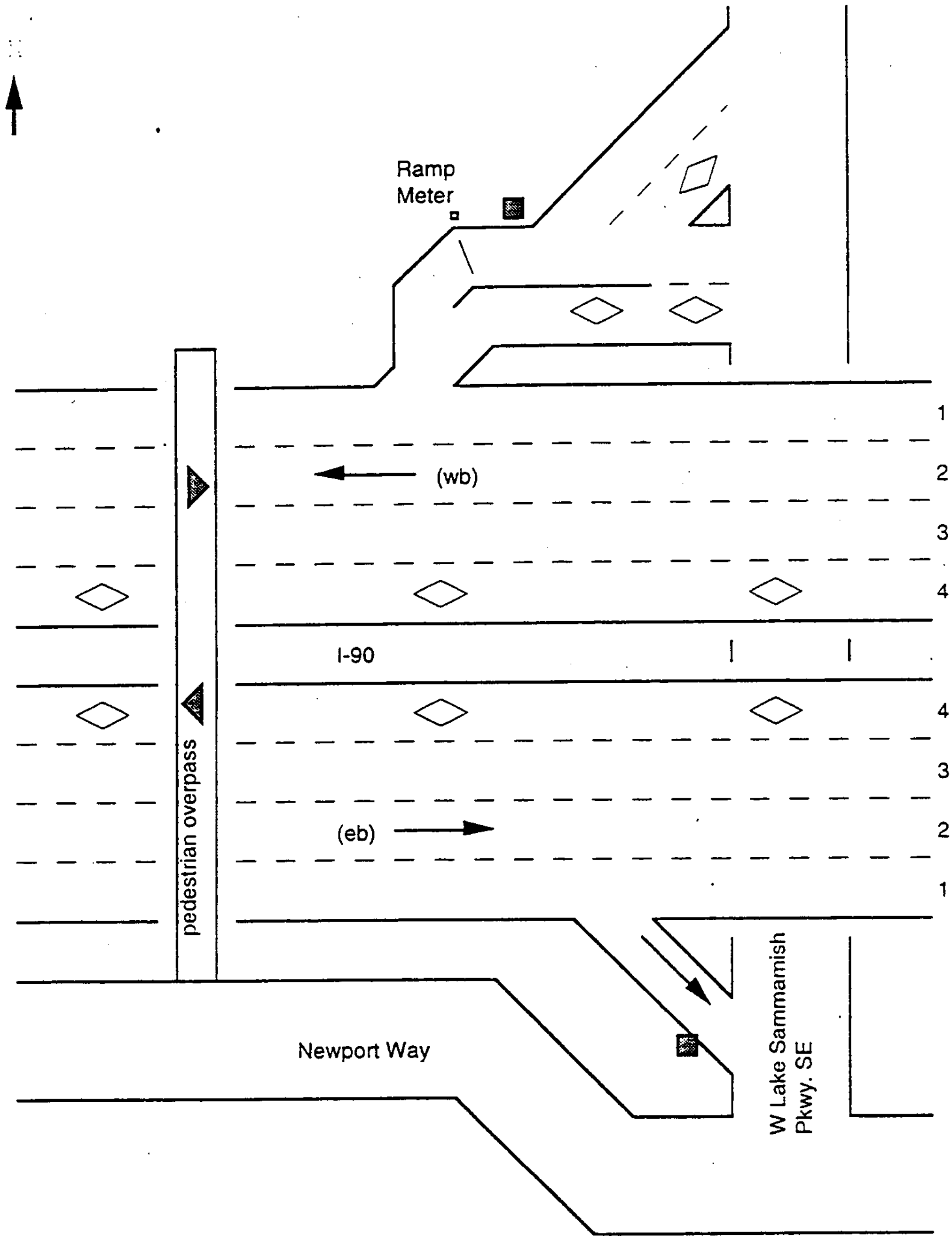
p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	4617	1117	227	95	5	76	2	37	18	19	**6213**	**1.31**	**16**
	Q4/92	1577	286	40	9	2	27	1	12	4	3	**1961**	**1.21**	**6**
	Q1/93	4838	839	90	41	2	41	3	27	12	5	**5898**	**1.20**	**17**
	Q2/93	1232	204	29	12	1	3	1	14	0	2	**1499**	**1.20**	**4**
	Q3/93	No observations										**--**		
	Q4/93	3162	396	43	22	3	10	1	26	9	0	**3672**	**1.15**	**10**
	Q1/94	2946	454	73	36	1	12	2	25	7	2	**3558**	**1.20**	**11**
	Q2/94	1540	322	49	10	1	25	5	17	9	6	**1984**	**1.24**	**6**
	Q3/94	3124	746	71	37	12	35	0	36	1	6	**4068**	**1.25**	**11**
	Q4/94	2115	292	33	18	1	9	2	18	8	1	**2497**	**1.17**	**7**
	Q1/95	1351	186	26	12	1	6	3	11	5	2	**1603**	**1.18**	**5**
	Q2/95	1383	168	20	15	1	6	2	14	3	0	**1612**	**1.16**	**5**
														98



SITE #57. I-90 - Newport Way

▲ ACO GP WB-am
▲ ACO GP EB-pm
▲ ACO HOV WB-am
▲ ACO HOV EB-pm
■ ACO on/ramp WB-am
■ ACO off/ramp EB-pm



WSDOT Copy

Note: Observations* for this site started in the third quarter of 1993. In the westbound direction lane 4 was opened as an HOV lane in November 1993.

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I-90 Newport Way a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q4/93	No observations										--		
1	Q1/94	2	31	11	0	0	0	0	0	0	0	**44**	**2.20**	**1**
	Q2/94	11	163	31	19	0	2	1	3	0	6	**236**	**2.28**	**5**
	Q3/94	26	448	44	10	8	5	1	2	0	27	**571**	**2.08**	**5**
	Q4/94	20	742	44	9	6	3	0	3	1	3	**831**	**2.05**	**6**
	Q1/95	25	870	71	13	14	5	2	2	2	15	**1019**	**2.08**	**9**
	Q2/95	12	502	31	9	14	5	2	0	0	20	**595**	**2.07**	**9**
														35
GP	Q3/93	14865	1529	128	65	15	22	17	282	592	88	**17603**	**1.12**	**36**
4*	Q4/93	No observations										--		
3	Q1/94	8050	664	45	9	0	10	9	159	214	7	**9167**	**1.09**	**11**
	Q2/94	5106	301	34	10	3	8	4	79	195	12	**5752**	**1.07**	**16**
	Q3/94	11938	961	65	30	7	15	6	234	431	56	**13743**	**1.09**	**26**
	Q4/94	2567	227	19	7	1	3	4	67	98	0	**2993**	**1.10**	**6**
	Q1/95	3074	164	11	2	3	2	2	32	103	7	**3400**	**1.06**	**6**
	Q2/95	2765	130	6	7	4	3	0	46	128	3	**3092**	**1.06**	**7**
														108

* 4 lanes until Q1/94

p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV	Q4/94	19	651	62	40	16	0	1	1	0	6	**796**	**2.17**	**9**
1	Q1/95	9	917	125	41	16	4	3	6	0	30	**1151**	**2.19**	**10**
	Q2/95	38	1073	93	38	18	4	2	3	1	22	**1292**	**2.11**	**9**
														28
	Q3/93	14667	3165	410	219	10	38	10	289	402	109	**19317**	**1.25**	**34**
GP	Q4/93	No observations										--		
4*	Q1/94	3779	714	133	46	4	7	6	63	148	6	**4906**	**1.24**	**9**
3	Q2/94	3665	919	149	83	9	4	3	80	77	12	**5001**	**1.31**	**8**
	Q3/94	5985	1380	266	145	21	11	3	116	240	38	**8205**	**1.31**	**16**
	Q4/94	4037	639	61	25	4	10	6	59	121	4	**4966**	**1.18**	**7**
	Q1/95	4378	620	77	43	3	8	1	79	126	13	**5348**	**1.18**	**7**
	Q2/95	3501	413	35	13	7	2	4	43	80	2	**4100**	**1.13**	**7**
														88

a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On	Q3/93	3099	351	57	28	0	1	1	22	17	18	**3594**	**1.16**	**14**
ramp	Q4/93	No observations										--		
	Q1/94	534	79	8	6	0	0	0	2	2	1	**632**	**1.18**	**3**
	Q2/94	1586	178	8	3	1	0	0	7	14	16	**1813**	**1.11**	**9**
	Q3/94	1208	161	17	9	2	0	0	7	3	4	**1411**	**1.16**	**5**
	Q4/94	1425	205	19	12	1	0	2	7	8	2	**1681**	**1.17**	**8**
	Q1/95	1567	239	17	7	0	0	0	7	6	0	**1843**	**1.16**	**6**
	Q2/95	2292	236	15	20	4	1	11	8	11	3	**2601**	**1.13**	**10**
														55

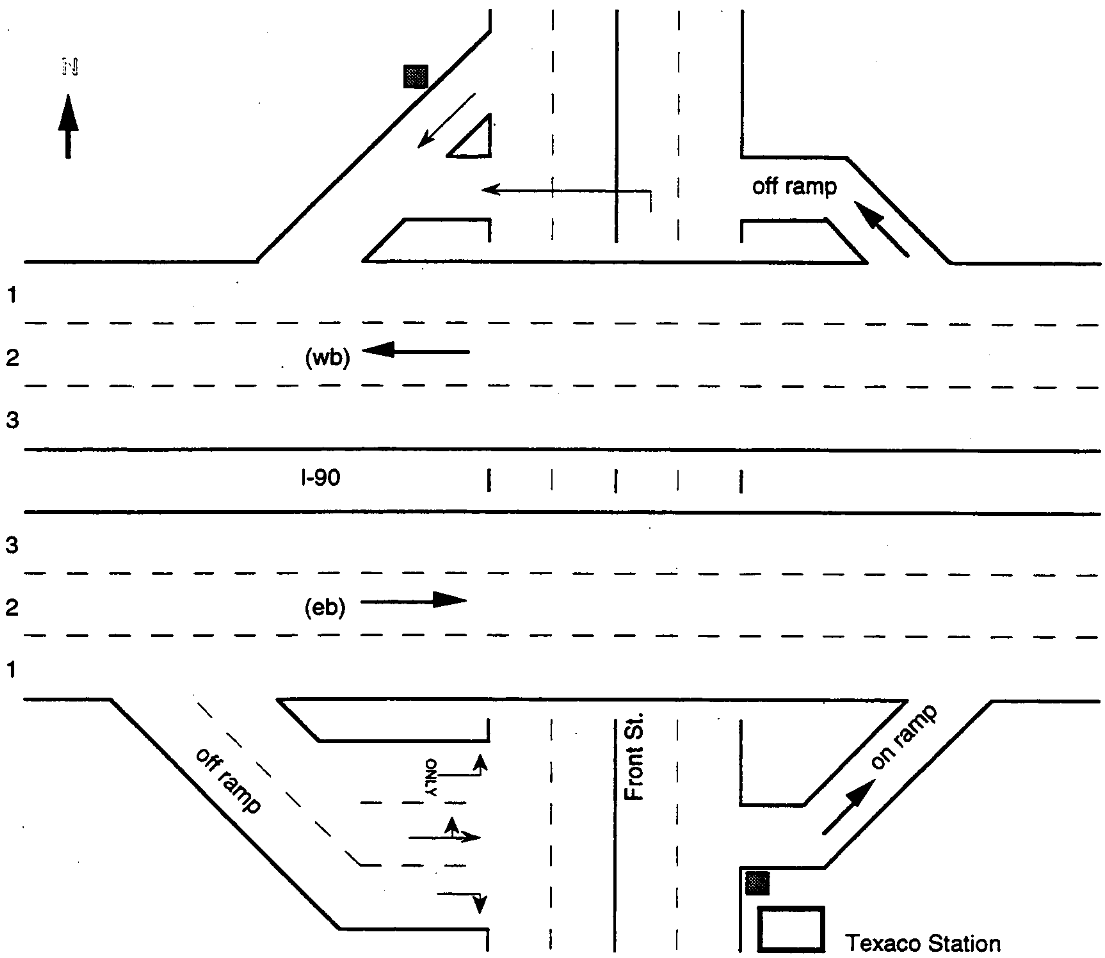
p.m. eastbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/93	2039	329	49	18	0	0	1	39	7	19	**2501**	**1.20**	**22**
	Q4/93	No observations										**--**		
	Q1/94	495	82	8	2	0	0	0	1	3	1	**592**	**1.18**	**5**
	Q2/94	1466	243	27	12	1	0	1	11	4	12	**1777**	**1.19**	**10**
	Q3/94	2904	452	75	34	8	1	2	27	11	10	**3524**	**1.21**	**14**
	Q4/94	1444	129	9	3	3	0	0	6	3	2	**1599**	**1.10**	**9**
	Q1/95	1239	161	20	8	2	0	0	8	2	3	**1443**	**1.16**	**5**
	Q2/95	1894	326	24	13	4	3	1	14	8	2	**2289**	**1.18**	**11**
														76

SITE #58. I-90 - Front St

- ACO on/ramp WB-am
- ACO off/ramp EB-pm

Ending Q3/94



Note: This site was observed by special request for baseline data before WB HOV ramp conversion.

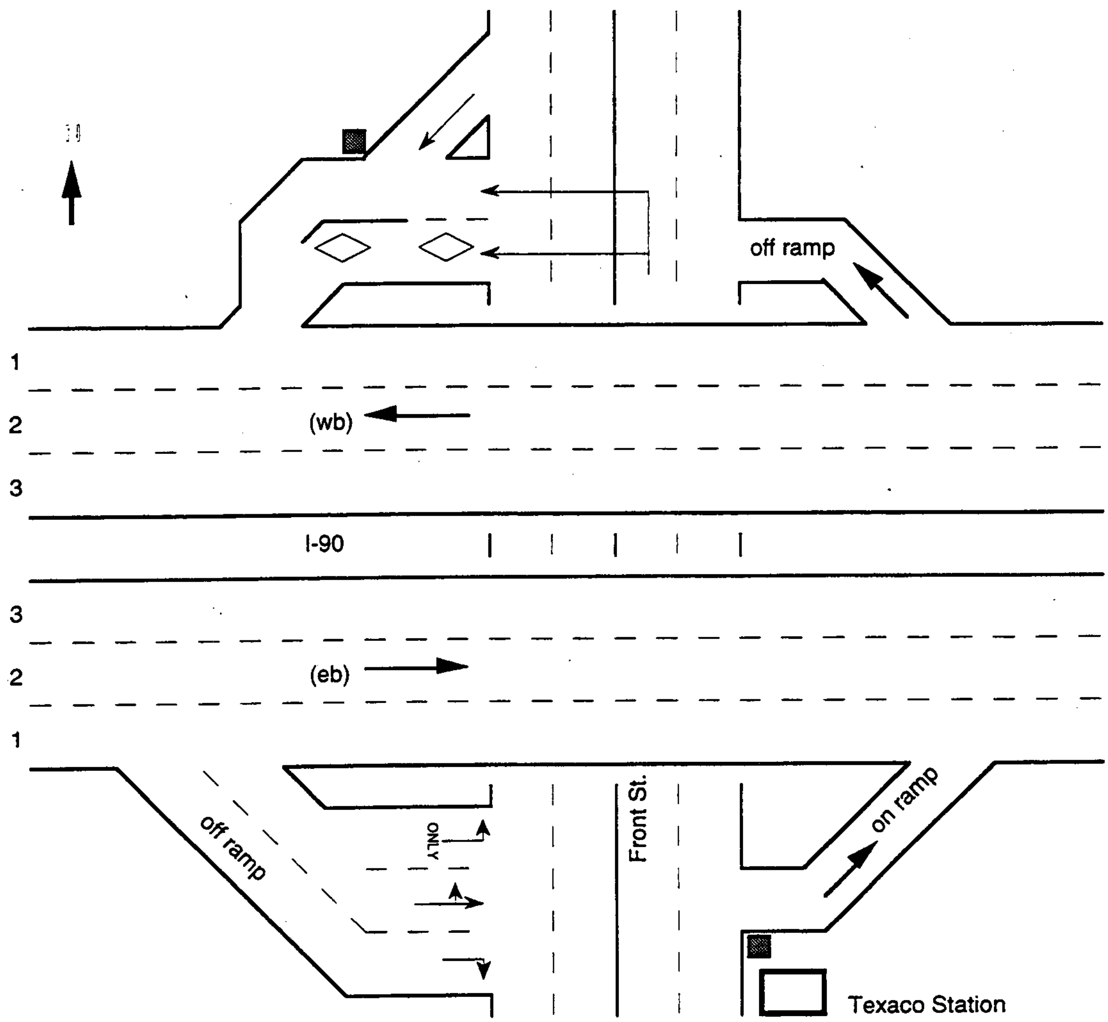
a.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/93	10965	930	90	45	7	1	13	122	204	35	**12412**	**1.10**	**15**
	Q4/93	No observations										--		
	Q1/94	No observations										--		
	Q2/94	No observations										--		
	Q3/94	No observations										--		
														15

p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/93	10558	1813	282	178	7	1	6	191	170	89	**13295**	**1.23**	**20**
	Q4/93	No observations										--		
	Q1/94	No observations										--		
	Q2/94	No observations										--		
	Q3/94	No observations										--		
														20

Beginning Q4/94



Note: This site was observed by special request for baseline data before WB HOV ramp conversion.

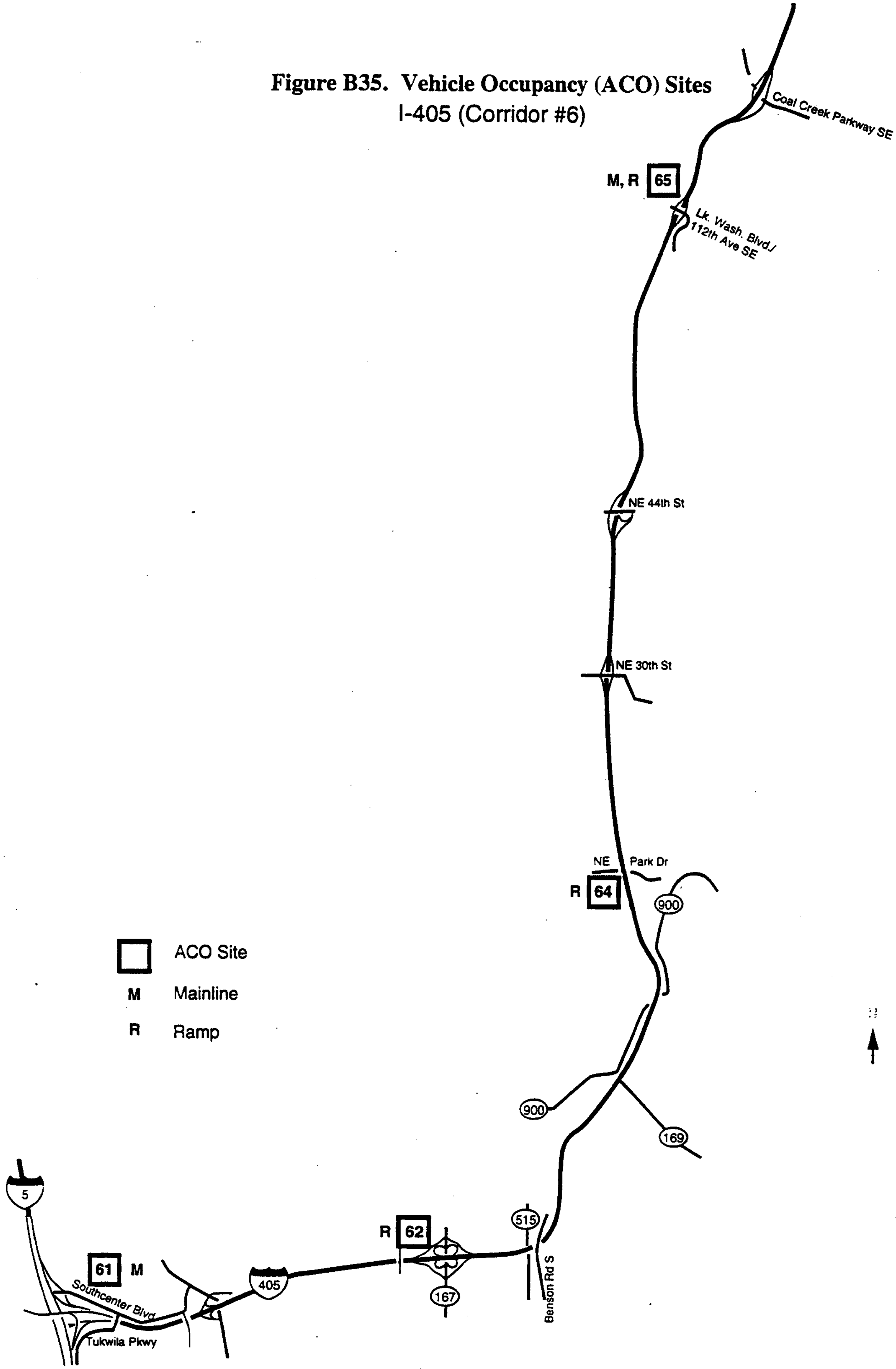
a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q4/94	2032	117	5	1	2	2	2	29	57	1	**2248**	**1.06**	**4**
	Q1/95	2222	180	8	1	2	0	4	15	50	3	**2493**	**1.09**	**3**
	Q2/95	3564	222	16	5	2	0	11	56	103	11	**3990**	**1.07**	**10**
														17

p.m. eastbound

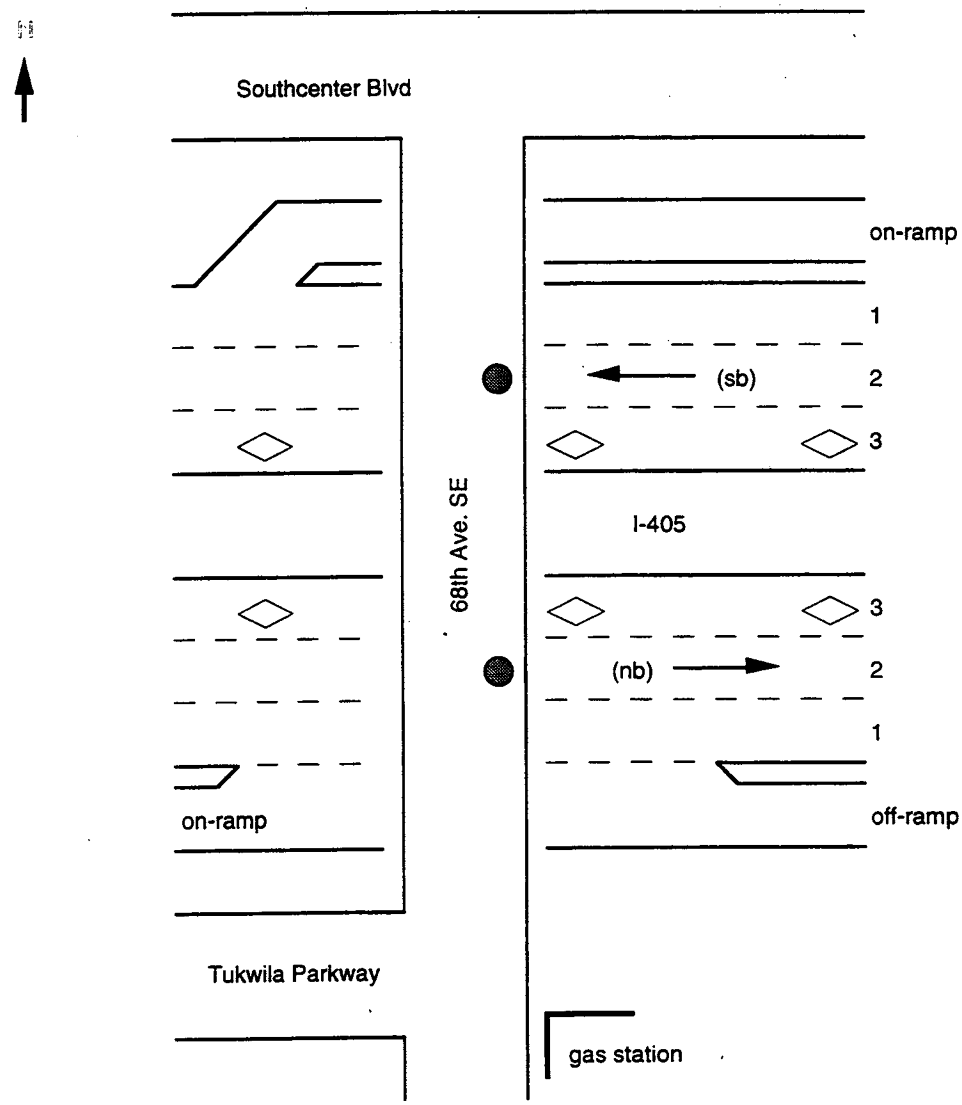
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q4/94	4808	835	109	61	6	3	2	73	63	4	**5964**	**1.21**	**10**
	Q1/95	3173	505	69	20	9	1	3	22	26	1	**3829**	**1.19**	**6**
	Q2/95	2334	369	45	14	4	3	1	44	40	6	**2860**	**1.18**	**5**
														21

Figure B35. Vehicle Occupancy (ACO) Sites
I-405 (Corridor #6)



SITE #61. I-405 SOUTH - Tukwila Parkway

ACO mainline NB & SB-am & pm



Note: The freeway here is called I-405 North and South, but you will actually be looking east or west when you observe traffic. Northbound I-405 goes east toward Bellevue, and southbound I-405 goes west toward the airport. Be sure to indicate north or south in the program.

There is a sidewalk on only the east side of Tukwila Parkway. In order to count northbound I-405 traffic on the mainline at this location, you have to cross the street, step over the jersey barrier, and sit on the very narrow strip of dirt at the very edge of the overpass. You will be looking down and to the side at the mainline traffic. Be sure to wear a vest in this location.

I-405 South - Tukwila Parkway

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	No observations										--		
	Q4/92	2	19	1	0	0	0	0	0	0	0	**22**	**1.95**	**1**
	Q1/93	17	73	11	6	0	0	0	2	0	16	**115**	**2.07**	**2**
	Q2/93	12	134	23	7	0	1	1	1	0	4	**183**	**2.15**	**2**
	Q3/93	507	223	22	14	2	5	2	14	16	28	**833**	**1.41***	**7**
	Q4/93	18	129	23	12	1	0	5	4	0	8	**200**	**2.17**	**3**
	Q1/94	13	180	21	6	2	1	3	2	0	6	**234**	**2.10**	**3**
	Q2/94	19	147	24	12	1	0	3	3	0	4	**213**	**2.16**	**4**
	Q3/94	34	325	39	16	4	6	5	1	0	35	**465**	**2.10**	**6**
	Q4/94	46	378	38	0	6	9	0	2	0	12	**491**	**1.98***	**6**
	Q1/95	7	347	44	8	2	3	4	10	0	13	**438**	**2.13**	**9**
	Q2/95	43	649	47	5	19	14	3	2	0	17	**799**	**2.02**	**13**
														56
GP lanes 2	Q3/92	No observations										--		
	Q4/92	593	25	1	1	0	0	4	14	31	0	**669**	**1.05**	**1**
	Q1/93	2844	176	6	0	2	2	1	78	94	4	**3207**	**1.06**	**5**
	Q2/93	2419	172	20	2	1	8	1	76	103	1	**2803**	**1.08**	**4**
	Q3/93	5243	370	27	10	2	7	17	219	291	10	**6196**	**1.08**	**9**
	Q4/93	3211	287	28	7	0	1	14	184	113	12	**3857**	**1.10**	**7**
	Q1/94	5922	441	32	6	3	5	10	219	214	2	**6854**	**1.08**	**10**
	Q2/94	4312	301	41	12	7	7	14	181	359	11	**5245**	**1.09**	**10**
	Q3/94	4922	408	50	16	8	13	18	180	364	11	**599**	**1.10**	**12**
	Q4/94	2150	101	9	4	6	0	7	99	153	4	**2533**	**1.06**	**4**
	Q1/95	1991	131	9	1	6	3	10	93	181	1	**2426**	**1.07**	**6**
	Q2/95	4469	231	13	17	12	8	4	115	288	3	**5160**	**1.07**	**13**
														81

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	10	428	43	33	2	1	0	9	0	12	**538**	**2.21**	**2**
	Q3/93	124	205	31	12	2	1	2	2	0	4	**383**	**1.82***	**2**
	Q4/93	6	505	13	12	0	1	5	4	1	7	**554**	**2.06**	**2**
	Q1/94	28	549	59	27	0	1	7	6	0	10	**687**	**2.14**	**3**
	Q2/94	49	649	103	25	9	0	0	0	0	7	**842**	**2.13**	**3**
	Q3/94	89	1478	140	84	15	3	6	15	0	70	**1900**	**2.13**	**8**
	Q4/94	69	1243	92	41	24	3	2	7	0	24	**1505**	**2.08**	**6**
	Q1/95	18	1199	101	39	28	16	5	7	1	8	**1422**	**2.12**	**7**
	Q2/95	61	2038	266	87	20	5	7	17	1	33	**2535**	**2.16**	**9**
														42

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP lanes **2**	Q3/92	1722	219	31	9	0	0	1	30	59	3	**2074**	**1.16**	**3**
	Q4/92	No observations										**--**		
	Q1/93	No observations										**--**		
	Q2/93	5982	305	48	17	1	0	5	120	180	8	**6666**	**1.07**	**10**
	Q3/93	1975	255	20	8	0	0	3	49	65	4	**2379**	**1.14**	**6**
	Q4/93	4717	452	3	65	0	0	6	125	88	3	**5492**	**1.14**	**7**
	Q1/94	6213	562	33	24	0	1	5	163	134	2	**7137**	**1.10**	**11**
	Q2/94	4205	448	66	29	6	2	1	73	109	0	**439**	**1.14**	**7**
	Q3/94	8604	785	115	91	16	1	1	199	261	15	**10088**	**1.14**	**15**
	Q4/94	4155	1210	161	38	18	1	5	80	84	41	**5756**	**1.30**	**11**
	Q1/95	4275	487	47	14	8	5	5	96	113	0	**5050**	**1.13**	**6**
	Q2/95	3498	287	33	15	1	1	1	46	96	2	**3980**	**1.10**	**6**
														82

*** Observers consistently note important number of violators on this HOV lane.**

I-405 South - Tukwila Parkway

a.m. southbound

Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	39	347	74	16	3	0	12	2	1	23	**517**	**2.15**	**5**
	Q4/92	No observations										**--**		
	Q1/93	No observations										**--**		
	Q2/93	4	50	23	3	0	0	0	0	0	1	**81**	**2.32**	**1**
	Q3/93	662	733	150	69	3	0	11	15	9	43	**1695**	**1.78***	**7**
	Q4/93	3	82	15	6	0	0	3	4	3	1	**114**	**2.24**	**1**
	Q1/94	21	309	63	9	2	0	2	3	0	1	**410**	**2.15**	**3**
	Q2/94	22	671	107	18	9	1	5	1	0	15	**849**	**2.15**	**6**
	Q3/94	17	578	114	37	13	0	1	5	0	20	**785**	**2.24**	**6**
	Q4/94	20	685	56	9	6	0	3	4	0	10	**793**	**2.07**	**6**
	Q1/95	24	820	68	7	12	0	3	1	0	23	**958**	**2.06**	**7**
	Q2/95	47	997	67	17	22	4	2	8	0	9	**1173**	**2.05**	**11**
														47
GP lanes 2	Q3/92	4935	428	52	13	2	1	1	112	212	6	**5762**	**1.11**	**8**
	Q4/92	No observations										**--**		
	Q1/93	No observations										**--**		
	Q2/93	1444	148	16	10	1	0	0	29	46	3	**1697**	**1.13**	**2**
	Q3/93	11005	1408	227	134	4	0	7	434	530	25	**13774**	**1.18**	**16**
	Q4/93	3133	260	26	10	1	0	6	86	123	1	**3646**	**1.10**	**6**
	Q1/94	6255	588	69	12	5	1	9	219	175	6	**7339**	**1.11**	**11**
	Q2/94	9349	853	118	24	8	0	13	195	426	6	**10992**	**1.11**	**15**
	Q3/94	7237	891	127	25	11	0	6	212	311	5	**8825**	**1.15**	**16**
	Q4/94	2579	255	16	13	2	0	4	89	125	2	**3085**	**1.11**	**4**
	Q1/95	3637	331	12	3	5	0	2	59	140	1	**4190**	**1.09**	**6**
	Q2/95	4753	289	12	2	6	1	6	120	220	9	**5418**	**1.06**	**9**
														93

p.m. southbound

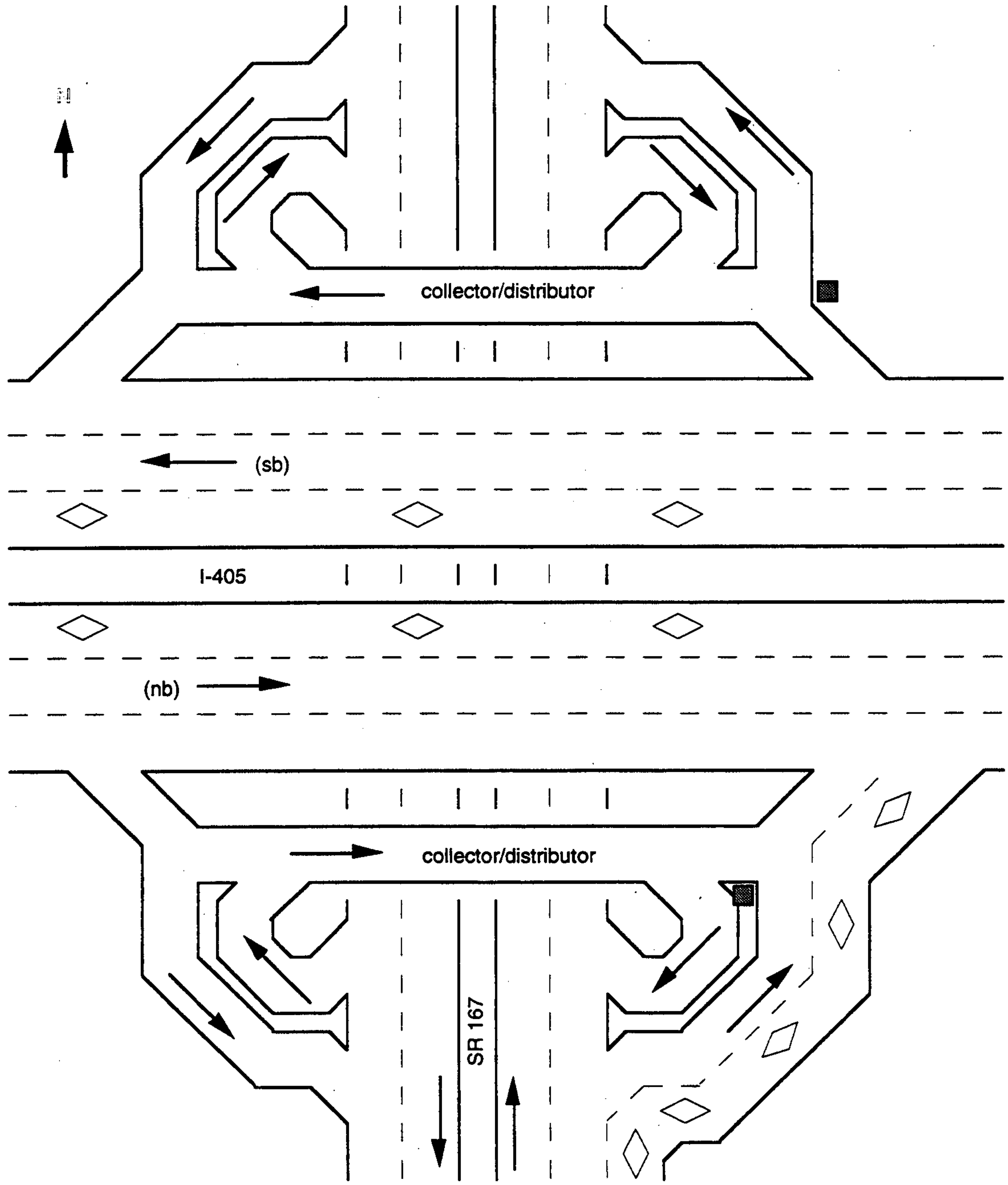
Lanes	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	3	53	15	2	0	0	1	1	0	5	**80**	**2.22**	**1**
	Q4/92	5	1	67	0	0	0	0	0	0	0	**73**	**2.85**	**1**
	Q1/93	8	54	14	3	0	1	0	0	0	1	**81**	**2.16**	**1**
	Q2/93	9	234	55	22	2	2	3	4	0	9	**341**	**2.30**	**4**
	Q3/93	665	214	11	1	0	2	2	2	1	3	**901**	**1.27***	**2**
	Q4/93	21	188	17	4	2	1	0	5	0	4	**242**	**2.02**	**3**
	Q1/94	23	280	69	22	8	0	0	2	0	8	**412**	**2.24**	**4**
	Q2/94	17	367	58	19	9	4	3	1	0	8	**486**	**2.18**	**5**
	Q3/94	105	867	94	30	20	9	2	12	0	5	**1189**	**2.05**	**7**
	Q4/94	73	725	72	31	21	5	2	15	1	15	**960**	**2.07**	**7**
	Q1/95	18	1199	101	39	28	16	5	7	1	8	**1422**	**2.12**	**8**
	Q2/95	75	1144	114	47	10	10	4	9	1	44	**1458**	**2.10**	**9**
														52

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP lanes 2	Mar-92	1434	382	32	14	0	1	4	27	55	3	**1952**	**1.26**	**4**
	Apr-92	1385	245	6	0	0	3	0	18	35	5	**1697**	**1.16**	**3**
	Jan-93	1396	336	23	6	1	1	3	25	45	0	**1836**	**1.23**	**3**
	Feb-93	6338	1477	194	48	10	6	7	181	157	17	**8435**	**1.25**	**11**
	Q3/93	4594	1319	83	12	3	2	3	103	126	26	**6271**	**1.25**	**9**
	Q4/93	3095	572	46	10	4	3	2	97	67	6	**3902**	**1.19**	**6**
	Q1/94	4820	1096	168	40	19	.3	9	110	112	7	**6384**	**1.25**	**9**
	Q2/94	6858	1302	139	63	28	9	8	161	164	7	**8739**	**1.21**	**14**
	Q3/94	7125	1504	125	32	10	4	7	234	213	23	**9277**	**1.21**	**14**
	Q4/94	2372	441	16	11	3	1	3	88	96	3	**3034**	**1.18**	**4**
	Q1/95	4275	487	47	14	8	5	5	96	113	0	**5050**	**1.13**	**9**
	Q2/95	3139	600	16	17	1	1	4	68	83	8	**3937**	**1.18**	**5**
														91

*** Observers consistently note important number of violators on this HOV lane.**

SITE #62. I-405 SOUTH - SR 167/Rainier Avenue South

ACO on/ramp NB-am & pm
ACO off/ramp SB-am & pm



Note: The on/ramp northbound from SR 167 to I-405 is very busy, and traffic travels at near-freeway speeds most of the time. The off/ramp southbound is just as busy, but traffic may not be traveling quite as fast. It is very important that you wear a vest in each of these locations, and stay protected as much as possible from oncoming traffic.

Since these are split ramps in all directions, you will need to determine in advance and be quite clear about exactly which ramp in which direction you are to observe.

I-405 South - SR 167/Rainier Avenue South

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1155	125	10	1	3	2	0	58	149	8	**1511**	**1.11**	**3**
	Q4/92	6449	740	69	15	11	14	5	524	705	6	**8538**	**1.13**	**15**
	Q1/93	229	35	2	1	3	1	0	32	43	0	**346**	**1.16**	**5**
	Q2/93	No observations										**--**		
	Q3/93	1419	114	10	3	4	2	1	78	140	9	**1780**	**1.09**	**6**
	Q4/93	1262	148	20	12	0	0	1	106	166	2	**1717**	**1.16**	**3**
	Q1/94	2922	332	33	6	1	0	3	306	243	3	**3849**	**1.13**	**6**
	Q2/94	4212	575	79	21	15	0	5	268	456	27	**5658**	**1.16**	**9**
	Q3/94	1763	135	9	1	5	0	8	137	236	10	**2304**	**1.08**	**5**
	Q4/94	695	62	4	4	3	0	1	82	122	0	**973**	**1.11**	**5**
	Q1/95	476	39	12	0	0	0	0	49	67	1	**644**	**1.12**	**3**
	Q2/95	2882	139	11	10	5	0	5	204	356	5	**3617**	**1.06**	**6**
														66

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1861	494	72	51	2	0	1	57	76	15	**2629**	**1.32**	**5**
	Q4/92	No observations										**--**		
	Q1/93	3648	346	32	12	2	0	6	68	113	3	**4230**	**1.11**	**8**
	Q2/93	No observations										**--**		
	Q3/93	No observations												
	Q4/93	1393	231	35	11	3	2	0	29	59	8	**1771**	**1.20**	**4**
	Q1/94	2714	369	35	20	1	2	0	56	75	6	**3278**	**1.16**	**5**
	Q2/94	2040	284	37	18	1	0	0	66	73	9	**2528**	**1.17**	**4**
	Q3/94	4646	838	148	89	8	4	12	123	206	45	**6119**	**1.25**	**10**
	Q4/94	3865	251	28	9	3	1	0	115	139	6	**4417**	**1.08**	**9**
	Q1/95	3340	381	49	6	8	0	5	70	88	3	**3950**	**1.13**	**5**
	Q2/95	2963	433	32	8	0	1	2	37	76	10	**3562**	**1.15**	**4**
														54

a.m. southbound

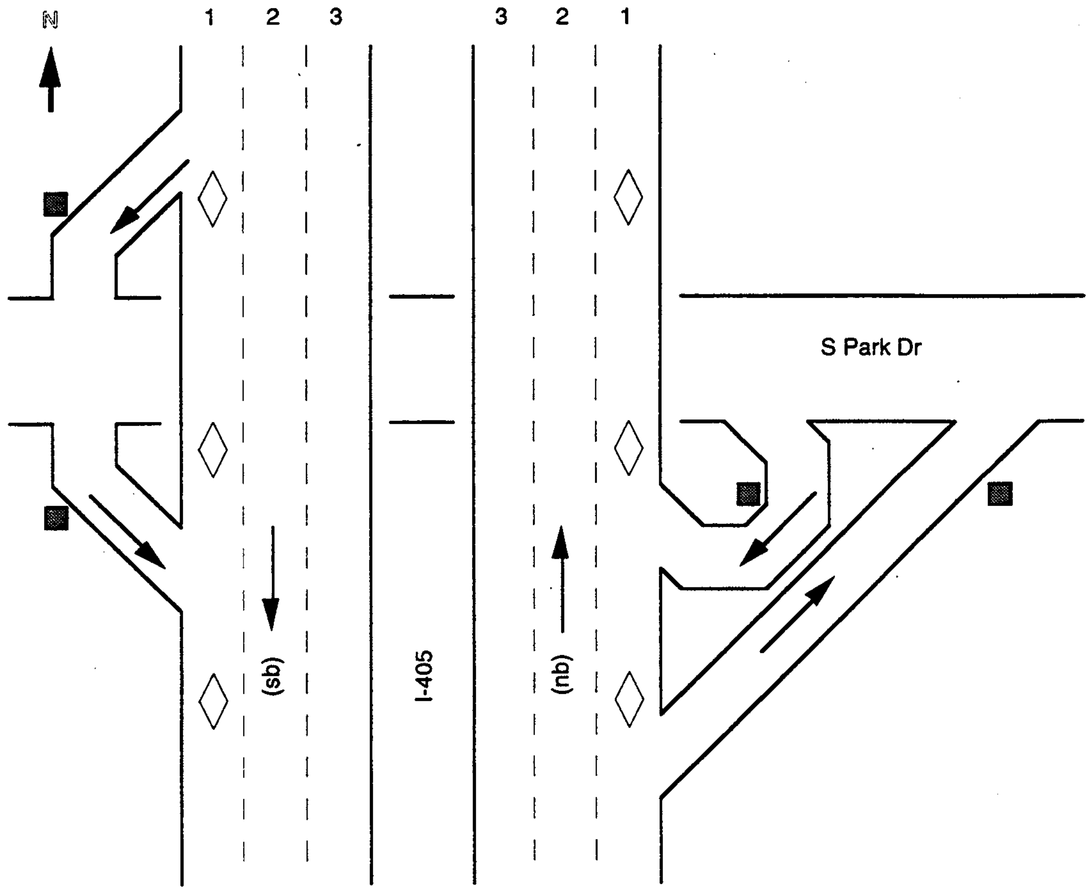
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	4576	493	72	29	2	0	3	164	196	16	**5551**	**1.14**	**7**
	Q4/92	1204	75	6	1	0	0	4	42	65	1	**1398**	**1.07**	**2**
	Q1/93	No observations										**--**		
	Q2/93	No observations										**--**		
	Q3/93	2190	116	13	6	1	0	3	64	120	3	**2516**	**1.07**	**8**
	Q4/93	341	14	2	2	0	1	5	9	7	0	**381**	**1.07**	**2**
	Q1/94	1797	145	14	2	2	1	0	93	79	1	**2134**	**1.09**	**3**
	Q2/94	5301	364	42	10	4	0	5	184	367	42	**6319**	**1.08**	**10**
	Q3/94	1502	155	9	11	2	4	0	128	136	8	**1955**	**1.12**	**5**
	Q4/94	2890	233	10	3	0	1	4	112	182	0	**3435**	**1.08**	**7**
	Q1/95	1256	80	10	1	1	1	1	64	136	3	**1553**	**1.08**	**3**
	Q2/95	896	60	4	3	0	5	0	29	92	8	**1097**	**1.08**	**5**
														52

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	No observations										--		
	Q4/92	1389	157	20	5	5	1	1	40	84	5	**1707**	**1.14**	**6**
	Q1/93	1486	224	30	3	5	1	0	63	47	5	**1864**	**1.17**	**3**
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	No observations										--		
	Q1/94	2715	52	70	14	21	4	1	120	146	5	**3619**	**1.21**	**6**
	Q2/94	1133	174	10	3	5	1	0	77	85	3	**1491**	**1.15**	**2**
	Q3/94	6763	1360	166	71	38	11	0	295	404	55	**9163**	**1.23**	**13**
	Q4/94	1564	220	19	7	16	3	1	55	91	5	**1981**	**1.15**	**9**
	Q1/95	1981	308	44	13	14	3	1	90	135	1	**2590**	**1.19**	**4**
	Q2/95	2812	685	63	26	20	2	1	158	144	12	**3923**	**1.25**	**5**
														39

SITE #64. I-405 SOUTH - S Park Drive

■ ACO on/ramp NB & SB-am & pm
■ ACO off/ramp NB & SB- am & pm



Note: There are a lot of Boeing plants and offices in this part of Renton, so traffic conforms to Boeing work schedules. If possible, it is a good idea to count these ramps from 5:30-8:30 in the morning, and from 2:00-5:00 or 5:30 in the afternoon. You will notice a significant drop in traffic after the shift change commute ends.

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
On ramp	Q3/92	425	63	8	4	2	10	0	8	1	2	**523**	**1.18**	**4**
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	401	67	9	5	1	12	0	17	6	2	**520**	**1.21**	**5**
	Q3/93	No observations										--		
	Q4/93	495	76	12	6	1	9	2	10	9	0	**620**	**1.20**	**4**
	Q1/94	430	57	8	1	2	13	5	19	7	0	**542**	**1.15**	**7**
	Q2/94	745	124	9	5	7	25	5	25	19	3	**967**	**1.18**	**9**
	Q3/94	380	77	8	2	2	15	2	13	5	1	**505**	**1.21**	**4**
	Q4/94	702	112	8	6	5	19	1	15	28	0	**896**	**1.18**	**7**
	Q1/95	209	30	7	2	1	7	1	9	13	3	**282**	**1.20**	**3**
	Q2/95	307	48	3	2	2	10	2	4	8	1	**387**	**1.17**	**3**
														46

I-405 South - S Park Drive

p.m. northbound

On ramp

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Q3/92	No observations										--		
Q4/92	No observations										--		
Q1/93	5084	482	38	21	39	82	5	463	13	8	**6235**	**1.11**	**16**
Q2/93	No observations										--		
Q3/93	1342	131	16	10	7	21	0	12	6	15	**1560**	**1.13**	**5**
Q4/93	2669	266	29	13	12	40	2	10	3	5	**3049**	**1.12**	**10**
Q1/94	1615	174	20	7	8	24	0	7	3	3	**1861**	**1.13**	**5**
Q2/94	2778	330	34	24	10	39	0	29	6	4	**3254**	**1.15**	**5**
Q3/94	3099	320	40	13	16	45	0	10	3	15	**3561**	**1.13**	**20**
Q4/94	1808	188	26	5	9	40	1	23	4	1	**2105**	**1.13**	**10**
Q1/95	1826	115	5	0	9	22	2	12	4	0	**1995**	**1.06**	**6**
Q2/95	1180	105	12	11	3	17	1	19	8	1	**1357**	**1.13**	**5**
													82

a.m. southbound

On ramp

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Q3/92	No observations										--		
Q4/92	910	89	8	3	0	10	5	15	24	1	**1065**	**1.11**	**6**
Q1/93	680	48	4	1	1	0	4	20	14	0	**771**	**1.08**	**4**
Q2/93	609	52	10	2	0	0	0	15	31	0	**719**	**1.12**	**4**
Q3/93	No observations										--		
Q4/93	1555	122	6	3	0	0	0	65	95	2	**1848**	**1.09**	**5**
Q1/94	990	85	12	4	0	0	4	38	23	2	**1158**	**1.11**	**7**
Q2/94	518	33	1	4	0	0	1	8	17	1	**583**	**1.09**	**5**
Q3/94	1450	119	5	8	0	0	2	34	65	8	**1691**	**1.10**	**9**
Q4/94	1360	119	6	3	0	0	3	42	63	3	**1599**	**1.09**	**9**
Q1/95	641	35	3	1	1	0	2	15	21	2	**721**	**1.07**	**3**
Q2/95	568	37	0	4	1	4	1	11	28	2	**656**	**1.08**	**5**
													57

p.m. southbound

On ramp

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Q3/92	No observations										--		
Q4/92	No observations										--		
Q1/93	1781	326	65	18	9	7	0	304	28	4	**2542**	**1.23**	**12**
Q2/93	No observations										--		
Q3/93	No observations										--		
Q4/93	1513	239	29	6	23	6	0	45	21	2	**1884**	**1.18**	**9**
Q1/94	924	189	30	17	10	2	1	19	13	3	**1208**	**1.26**	**5**
Q2/94	663	128	24	9	4	2	0	21	17	4	**872**	**1.25**	**4**
Q3/94	1692	386	65	35	19	5	2	59	27	13	**2303**	**1.29**	**10**
Q4/94	1854	204	22	19	12	7	0	44	42	9	**2213**	**1.15**	**10**
Q1/95	473	66	8	8	3	3	0	13	9	2	**585**	**1.19**	**3**
Q2/95	818	139	13	0	4	4	0	10	14	2	**1004**	**1.17**	**5**
													58

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	310	41	3	2	1	0	1	11	19	3	**391**	**1.15**	**4**
	Q4/92	362	29	3	0	1	0	0	18	24	0	**437**	**1.09**	**3**
	Q1/93	504	35	8	1	1	0	3	26	26	0	**604**	**1.10**	**4**
	Q2/93	534	48	7	6	0	0	1	26	28	2	**652**	**1.14**	**3**
	Q3/93	No observations										**--**		
	Q4/93	372	28	4	2	0	0	4	21	16	0	**447**	**1.10**	**3**
	Q1/94	961	127	11	2	2	0	6	52	41	1	**1203**	**1.14**	**7**
	Q2/94	1465	113	14	11	4	0	4	75	69	8	**1763**	**1.11**	**10**
	Q3/94	No observations										**--**		
	Q4/94	702	66	9	1	2	0	2	32	47	0	**861**	**1.11**	**7**
	Q1/95	371	29	5	1	0	0	1	20	21	1	**449**	**1.10**	**3**
	Q2/95	617	41	2	2	2	1	4	26	40	14	**749**	**1.08**	**6**
														50

I-405 South - S Park Drive

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	No observations										**--**		
	Q4/92	513	13	3	0	0	0	1	11	2	1	**544**	**1.04**	**3**
	Q1/93	2183	274	26	3	0	3	0	37	20	8	**2554**	**1.13**	**13**
	Q2/93	No observations										**--**		
	Q3/93	975	176	20	13	1	0	0	22	9	7	**1223**	**1.22**	**6**
	Q4/93	1402	2301	34	11	1	0	0	3	28	8	**1717**	**1.20**	**6**
	Q1/94	708	127	22	3	1	0	0	9	10	1	**881**	**1.21**	**4**
	Q2/94	1678	287	43	14	6	0	1	24	36	6	**2095**	**1.21**	**6**
	Q3/94	1486	325	49	30	0	1	0	67	30	15	**2003**	**1.27**	**14**
	Q4/94	1049	249	34	36	0	0	2	33	19	6	**1428**	**1.32**	**8**
	Q1/95	850	102	6	4	0	0	1	23	23	2	**1011**	**1.13**	**5**
	Q2/95	980	154	9	6	0	5	1	20	17	3	**1195**	**1.17**	**5**
														70

a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	1305	142	17	9	8	12	0	18	8	40	**1559**	**1.14**	**5**
	Q4/92	799	74	4	0	6	9	0	5	8	1	**905**	**1.09**	**3**
	Q1/93	2183	164	9	2	6	19	5	12	5	2	**2407**	**1.08**	**6**
	Q2/93	1029	58	8	3	3	9	1	16	5	1	**1133**	**1.08**	**4**
	Q3/93	No observations										**--**		
	Q4/93	211	10	1	2	0	1	2	5	2	0	**234**	**1.08**	**1**
	Q1/94	1647	107	11	0	1	10	10	39	3	2	**1830**	**1.07**	**7**
	Q2/94	1488	81	11	1	9	15	4	19	11	1	**1641**	**1.07**	**5**
	Q3/94	3149	211	21	6	16	31	2	42	23	13	**3514**	**1.08**	**10**
	Q4/94	1766	114	3	16	2	23	4	24	13	0	**1965**	**1.09**	**8**
	Q1/95	710	54	6	3	1	5	2	16	11	0	**808**	**1.10**	**3**
	Q2/95	1467	71	3	1	7	14	2	19	4	10	**1598**	**1.05**	**6**
														58

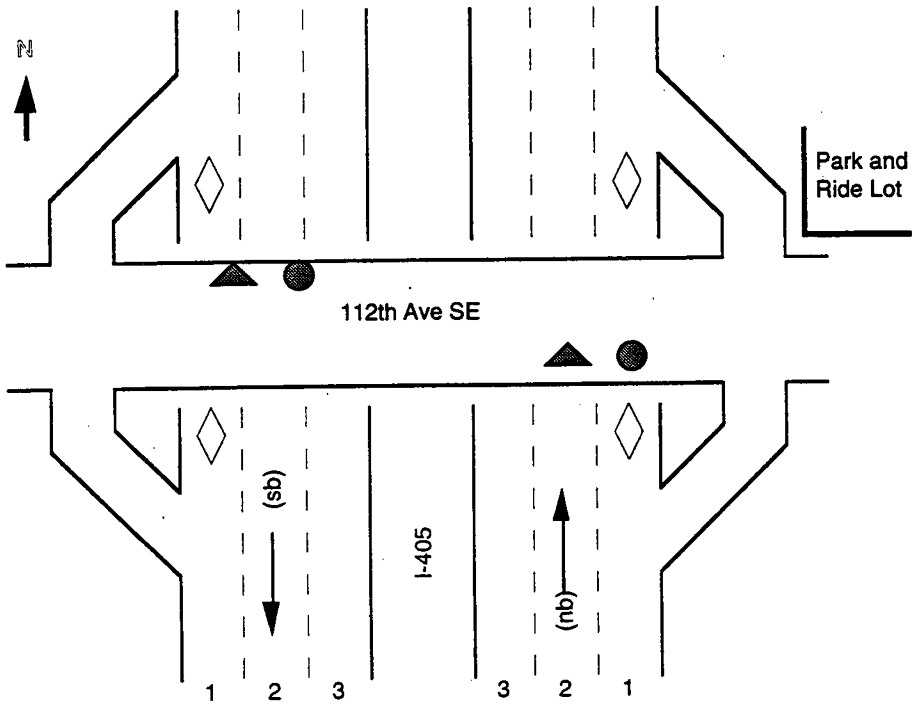
p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	No observations										--		
	Q4/92	478	72	9	3	8	11	1	12	5	0	**599**	**1.18**	**3**
	Q1/93	2056	380	60	22	15	53	3	46	9	1	**2645**	**1.23**	**13**
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	1642	224	41	16	43	41	3	37	14	0	**2061**	**1.19**	**10**
	Q1/94	790	182	41	6	29	22	2	15	1	2	**1090**	**1.28**	**5**
	Q2/94	875	187	23	13	20	21	0	17	7	3	**1166**	**1.25**	**5**
	Q3/94	1674	350	75	33	38	39	0	42	13	21	**2285**	**1.28**	**10**
	Q4/94	1105	206	22	4	48	29	6	33	10	3	**1466**	**1.20**	**8**
	Q1/95	672	53	2	2	21	18	5	18	8	0	**799**	**1.09**	**5**
	*Q2/95	168	107	9	18	9	11	2	0	0	1	**325**	**1.60**	**2**
														61

* Only 2 count, variation in ACO may be due to special week-end trip.

SITE #65. I-405 SOUTH - 112 Avenue SE/Lk Washington Blvd

▲Mainline ACO NB & SB-am & pm



Note: There is a sidewalk only on the south side of this street. If you are counting ACO mainline traffic southbound, you will be sitting on the shoulder on the north side of the street, and you must wear a vest.
The HOV lane is on the outside of the freeway in both directions at this location. Be sure to count it as lane #1.

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	15	317	55	23	5	1	0	2	0	13	**431**	**2.22**	**2**
	Q4/92	No observations										--		
	Q1/93	99	1168	99	9	24	8	9	18	0	14	**1448**	**2.01**	**5**
	Q2/93	45	716	103	21	16	5	1	17	0	17	**941**	**2.12**	**4**
	Q3/93	168	1681	226	57	21	15	11	56	1	65	**2301**	**2.09**	**8**
	Q4/93	48	538	141	63	8	4	4	16	1	4	**827**	**2.29**	**4**
	Q1/94	153	976	89	20	20	7	10	14	0	16	**1305**	**1.98***	**6**
	Q2/94	46	899	109	25	20	5	7	18	0	26	**1155**	**2.11**	**5**
	Q3/94	57	1014	113	44	6	15	10	23	2	49	**1333**	**2.12**	**7**
	Q4/94	76	1228	92	24	23	6	11	25	1	18	**1504**	**2.05**	**6**
	Q1/95	67	1962	94	15	27	9	14	36	4	11	**2239**	**2.03**	**10**
	Q2/95	152	2366	155	30	51	16	11	52	3	47	**2883**	**2.03**	**11**
														68

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 2	Q3/92	938	56	6	4	0	0	1	39	116	2	**1162**	**1.08**	**2**
	Q4/92	No observations										--		
	Q1/93	7791	155	10	2	3	1	1	255	247	0	**8465**	**1.02**	**10**
	Q2/93	4662	137	26	9	1	1	1	184	261	4	**5286**	**1.05**	**6**
	Q3/93	8857	249	26	31	3	2	4	364	505	12	**10053**	**1.04**	**15**
	Q4/93	5786	294	35	14	7	0	3	189	298	0	**6626**	**1.07**	**9**
	Q1/94	5888	151	14	10	0	0	3	232	345	4	**6647**	**1.03**	**11**
	Q2/94	5346	132	13	4	3	0	3	237	355	2	**6095**	**1.03**	**8**
	Q3/94	4802	78	10	6	3	1	5	155	261	2	**5323**	**1.02**	**8**
	Q4/94	2197	69	3	2	0	1	2	147	250	0	**2671**	**1.04**	**4**
	Q1/95	4107	262	16	5	2	2	3	139	262	1	**4799**	**1.07**	**7**
	Q2/95	4447	98	4	1	2	0	3	161	295	12	**5023**	**1.02**	**8**
														89

* Several violators detected in one count.

I-405 South - 112th Avenue SE/ Lake Washington Blvd.

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	67	829	95	27	8	6	0	318	3	6	**1359**	**2.09**	**8**
	Q2/93	101	984	150	16	13	6	1	12	1	6	**1290**	**2.07**	**5**
	Q3/93	48	1047	217	100	17	10	10	28	1	23	**1501**	**2.28**	**7**
	Q4/93	17	709	83	37	3	5	9	17	1	2	**884**	**2.17**	**3**
	Q1/94	34	1029	159	68	11	11	9	22	1	17	**1361**	**2.21**	**5**
	Q2/94	42	1105	173	68	11	9	2	8	1	28	**1447**	**2.20**	**5**
	Q4/94	856	1787	185	83	30	16	8	68	30	17	**3080**	**1.83**	**9**
	Q1/95	31	2344	235	114	30	22	12	26	1	23	**2838**	**2.17**	**10**
	Q2/95	238	3866	345	61	71	24	12	23	1	87	**4728**	**2.05**	**12**
														72
GP lanes 2	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	8091	610	21	11	4	1	1	1194	132	2	**10067**	**1.08**	**19**
	Q2/93	6664	526	48	3	3	0	1	135	143	2	**7525**	**1.09**	**8**
	Q3/93	6377	528	67	29	0	3	2	141	194	8	**7349**	**1.11**	**11**
	Q4/93	3412	277	54	17	0	0	2	91	80	1	**3934**	**1.12**	**5**
	Q1/94	6637	360	29	19	1	0	2	110	129	3	**7290**	**1.07**	**8**
	Q2/94	4762	314	36	20	2	2	1	83	95	6	**5321**	**1.09**	**7**
	Q3/94	8188	611	110	60	2	0	1	239	234	18	**9463**	**1.11**	**12**
	Q4/94	3676	177	15	10	0	0	2	89	100	0	**4069**	**1.06**	**5**
	Q1/95	4682	228	23	15	2	0	0	124	133	4	**5211**	**1.07**	**6**
	Q2/95	8147	466	42	12	10	0	1	183	289	6	**9156**	**1.07**	**11**
														92

I-405 South - 112th Avenue SE/ Lake Washington Blvd.

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	46	691	53	11	55	8	6	4	0	4	**848**	**2.04**	**5**
	Q2/93	10	230	31	14	6	2	4	12	0	4	**313**	**2.18**	**2**
	Q3/93	30	600	114	36	6	4	8	18	1	20	**837**	**2.21**	**7**
	Q4/93	12	99	85	44	1	1	4	8	0	1	**255**	**2.71**	**2**
	Q1/94	119	853	65	26	12	5	4	17	0	4	**1105**	**2.00**	**7**
	Q2/94	32	602	79	18	19	4	4	7	1	13	**779**	**2.12**	**5**
	Q3/94	36	518	66	31	7	15	7	12	0	18	**710**	**2.15**	**4**
	Q4/94	42	680	54	12	12	10	8	16	7	18	**853**	**2.05**	**6**
	Q1/95	40	1188	64	18	24	14	19	22	0	8	**1397**	**2.05**	**11**
	Q2/95	40	1184	82	22	33	17	13	17	0	38	**1446**	**2.07**	**11**
														60
GP lanes 2	Q3/92	No observations										--		
	Q4/92	No observations										--		
	Q1/93	5202	296	10	8	1	2	2	132	180	4	**5837**	**1.06**	**16**
	Q2/93	3594	204	14	5	2	0	0	97	201	0	**4117**	**1.06**	**6**
	Q3/93	6980	400	36	11	0	1	1	185	279	5	**7898**	**1.07**	**11**
	Q4/93	3097	116	27	10	0	0	2	99	94	0	**3445**	**1.08**	**6**
	Q1/94	6509	124	11	3	1	0	3	239	219	1	**7110**	**1.02**	**10**
	Q2/94	5887	216	20	3	1	0	0	165	304	2	**6598**	**1.04**	**9**
	Q3/94	5670	346	64	30	2	3	5	210	257	5	**6592**	**1.09**	**10**
	Q4/94	2393	108	5	0	1	1	0	96	131	1	**2736**	**1.05**	**5**
	Q1/95	3043	81	6	0	3	1	1	109	191	0	**3435**	**1.03**	**7**
	Q2/95	4746	122	7	8	3	0	0	144	215	3	**5248**	**1.03**	**9**
														89

a.m. northbound

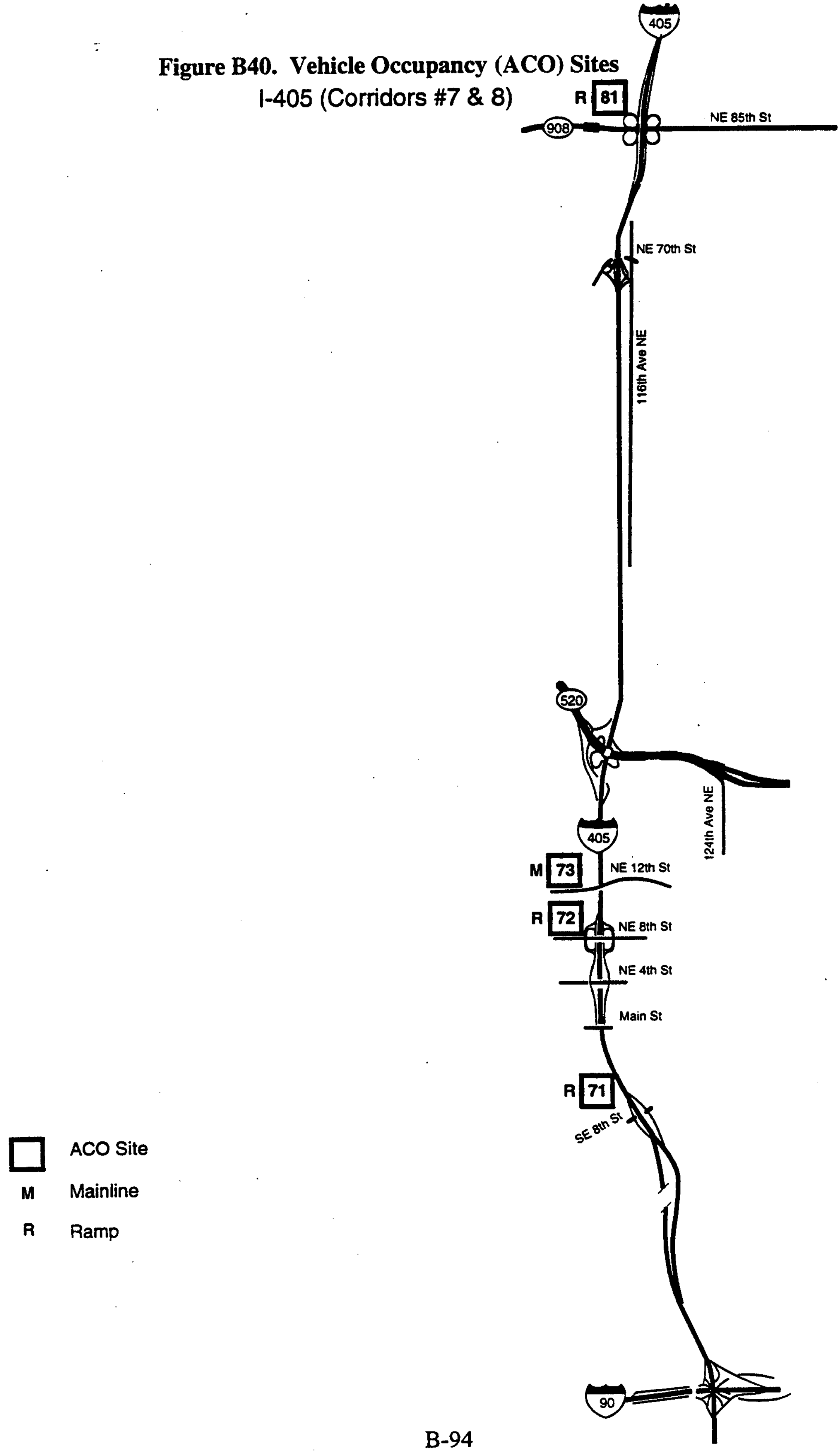
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	No observations										--		
	Q4/92	742	72	8	2	0	11	0	4	1	2	**842**	**1.11**	**6**
	Q1/93	913	160	9	3	10	37	0	0	1	5	**1138**	**1.17**	**8**
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	No observations										--		
														14

I-405 South - 112th Avenue SE/ Lake Washington Blvd.

p.m. **southbound**

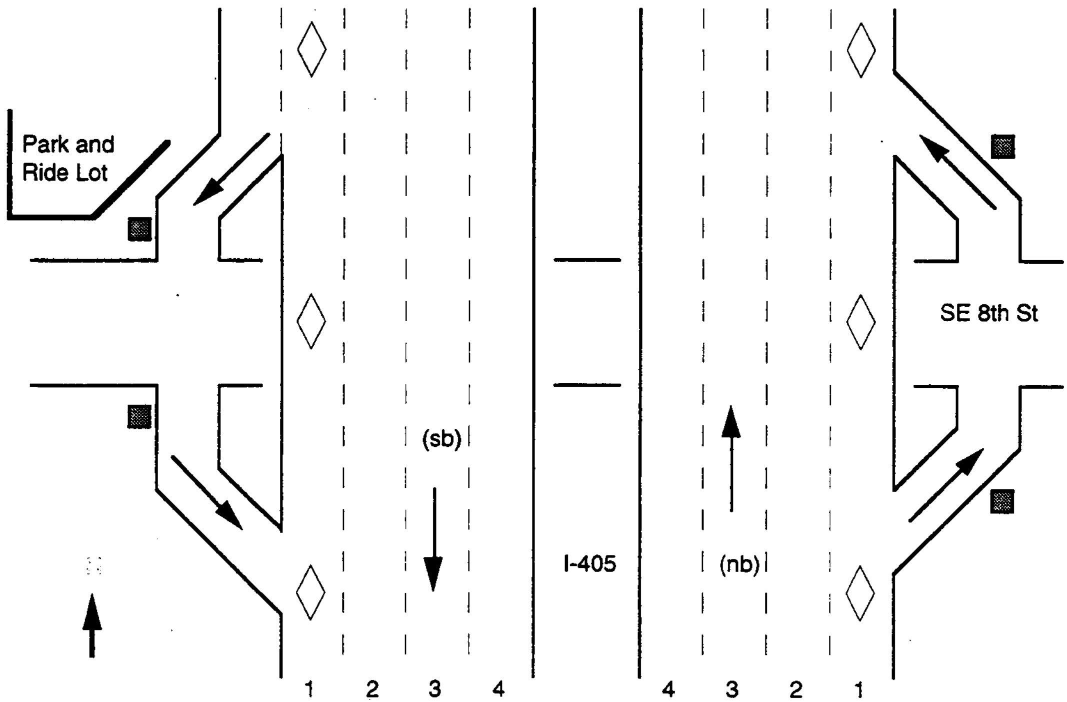
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
HOV	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
1	Q1/93	136	736	27	1	0	1	2	3	1	15	**922**	**1.88**	**6**
	Q2/93	28	708	120	33	23	2	6	181	1	10	**1112**	**2.19**	**4**
	Q3/93	47	1171	200	75	23	5	10	23	1	30	**1585**	**2.21**	**5**
	Q4/93	157	718	86	73	21	1	4	12	0	12	**1084**	**2.09**	**3**
	Q1/94	58	1293	253	67	62	1	4	8	0	22	**1768**	**2.20**	**5**
	Q2/94	35	1279	215	74	56	1	9	18	0	32	**1719**	**2.21**	**5**
	Q3/94	160	2553	299	136	106	19	7	17	1	74	**3372**	**2.14**	**8**
	Q4/94	74	1941	135	52	64	5	7	26	2	14	**2320**	**2.08**	**7**
	Q1/95	115	3312	233	63	140	5	13	36	0	24	**3941**	**2.07**	**10**
	Q2/95	170	3994	436	168	133	8	15	44	4	58	**5030**	**2.13**	**10**
														63
GP	Q3/92	No observations										--		
lanes	Q4/92	No observations										--		
2	Q1/93	13690	1034	27	1	3	0	1	269	250	4	**15219**	**1.07**	**13**
	Q2/93	4690	419	45	3	5	1	2	1231	171	6	**6573**	**1.10**	**8**
	Q3/93	6136	603	75	36	4	1	2	221	204	9	**7291**	**1.13**	**8**
	Q4/93	7919	618	15	4	1	2	1	143	188	6	**8897**	**1.08**	**11**
	Q1/94	6345	534	63	8	10	0	1	181	183	0	**7325**	**1.10**	**8**
	Q2/94	4899	384	53	13	4	0	0	131	129	5	**5618**	**1.10**	**7**
	Q3/94	8906	548	68	28	5	6	2	267	299	17	**10146**	**1.08**	**14**
	Q4/94	5062	178	15	4	4	0	0	143	160	1	**5567**	**1.04**	**7**
	Q1/95	7412	260	21	1	2	0	0	161	214	1	**8072**	**1.04**	**9**
	Q2/95	6169	426	32	17	8	0	2	168	322	3	**7147**	**1.08**	**10**
														95

Figure B40. Vehicle Occupancy (ACO) Sites
I-405 (Corridors #7 & 8)



SITE #71. I-405 CENTRAL - SE 8th Street

■ ACO on/ramp NB & SB-am & pm
■ ACO off/ramp NB & SB-am & pm



a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1589	136	12	6	5	16	3	39	21	3	**1830**	**1.10**	**8**
	Q4/92	1035	74	16	6	3	9	4	38	12	0	**1197**	**1.11**	**6**
	Q1/93	No observations										--		
	Q2/93	No observations										--		
	Q3/93	756	85	11	4	4	7	2	47	10	2	**928**	**1.14**	**5**
	Q4/93	943	96	22	4	0	10	3	17	6	1	**1102**	**1.14**	**5**
	Q1/94	1356	145	22	5	0	11	5	60	27	1	**1632**	**1.13**	**7**
	Q2/94	1608	149	40	5	4	20	3	57	24	9	**1919**	**1.14**	**9**
	Q3/94	786	103	8	9	8	10	0	35	32	1	**992**	**1.16**	**6**
	Q4/94	618	50	8	5	1	8	3	42	13	0	**748**	**1.12**	**4**
	Q1/95	1118	117	8	1	2	10	6	37	9	0	**1308**	**1.11**	**7**
	Q2/95	580	61	2	0	3	8	3	28	14	0	**699**	**1.10**	**5**
														62

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1227	154	29	21	3	0	1	30	8	6	**1479**	**1.20**	**7**
	Q4/92	991	112	19	4	1	0	1	19	5	3	**1155**	**1.14**	**4**
	Q1/93	1629	198	23	11	1	5	2	28	5	0	**1902**	**1.15**	**7**
	Q2/93	1170	180	21	6	2	1	5	26	7	5	**1423**	**1.18**	**5**
	Q3/93	No observations										--		
	Q4/93	3421	541	83	33	3	11	3	48	8	5	**4156**	**1.20**	**18**
	Q1/94	2062	307	60	23	1	9	9	27	6	2	**2506**	**1.20**	**8**
	Q2/94	2341	370	41	21	5	6	0	34	8	13	**2839**	**1.19**	**11**
	Q3/94	2507	340	49	22	12	7	2	52	7	11	**3009**	**1.17**	**12**
	Q4/94	1148	171	15	8	2	1	2	20	4	0	**1371**	**1.17**	**5**
	Q1/95	1047	98	9	1	2	1	2	20	5	1	**1186**	**1.10**	**5**
	Q2/95	1346	184	5	10	6	2	0	15	6	5	**1579**	**1.15**	**6**
														88

I-405 Central - SE 8th Street

a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	288	54	9	2	3	1	0	7	5	1	**370**	**1.22**	**4**
	Q4/92	No observations										--		
	Q1/93	No observations										--		
	Q2/93	No observations										--		
	Q3/93	342	65	10	9	0	1	5	14	8	0	**454**	**1.27**	**9**
	Q4/93	478	43	6	7	0	0	5	19	11	2	**571**	**1.14**	**4**
	Q1/94	271	29	2	2	2	1	4	6	6	0	**323**	**1.13**	**4**
	Q2/94	405	70	6	0	0	0	8	8	8	0	**505**	**1.17**	**5**
	Q3/94	222	24	1	2	0	1	3	4	9	0	**266**	**1.13**	**6**
	Q4/94	294	38	10	5	0	0	10	15	8	0	**380**	**1.21**	**4**
	Q1/95	176	26	2	1	0	0	4	8	4	0	**221**	**1.16**	**3**
	Q2/95	507	70	10	3	9	1	6	16	2	0	**624**	**1.17**	**6**
														45

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	1018	130	27	13	1	5	0	8	6	6	**1214**	**1.19**	**3**
	Q4/92	1070	92	6	0	3	8	2	11	8	3	**1203**	**1.09**	**4**
	Q1/93	2987	269	28	11	6	30	10	16	5	0	**3362**	**1.11**	**12**
	Q2/93	1389	185	54	18	12	14	0	7	6	4	**1689**	**1.21**	**5**
	Q3/93	No observations										--		
	Q4/93	3600	476	85	13	28	39	4	13	4	4	**4266**	**1.16**	**10**
	Q1/94	1680	278	61	10	20	13	3	16	5	4	**2090**	**1.21**	**6**
	Q2/94	1382	177	23	26	16	9	3	24	5	4	**1669**	**1.19**	**4**
	Q3/94	3133	477	97	33	30	22	3	20	8	21	**3844**	**1.21**	**11**
	Q4/94	3113	420	35	14	30	19	3	33	4	6	**3677**	**1.15**	**11**
	Q1/95	1096	98	7	2	11	8	5	11	2	1	**1241**	**1.10**	**5**
	Q2/95	1437	277	43	11	12	11	4	10	6	2	**1813**	**1.23**	**6**
														57

a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off	Q3/92	No observations										--		
ramp	Q4/92	990	103	8	2	3	5	1	7	12	2	**1133**	**1.11**	**6**
	Q1/93	2213	210	13	7	4	13	4	386	10	2	**2862**	**1.11**	**10**
	Q2/93	No observations										--		
	Q3/93	983	96	16	2	3	7	0	18	8	2	**1135**	**1.12**	**4**
	Q4/93	514	42	8	2	0	3	1	8	3	0	**581**	**1.11**	**3**
	Q1/94	1511	131	11	2	1	9	0	24	9	2	**1700**	**1.10**	**7**
	Q2/94	1132	126	14	3	5	9	0	16	4	4	**1313**	**1.13**	**5**
	Q3/94	1214	135	27	5	6	9	2	23	9	5	**1435**	**1.15**	**6**
	Q4/94	909	57	5	4	1	8	7	18	13	2	**1024**	**1.08**	**4**
	Q1/95	1273	84	10	1	1	10	12	20	6	5	**1422**	**1.08**	**7**
	Q2/95	1178	141	13	1	5	7	0	10	4	2	**1361**	**1.13**	**5**
														57

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off	Q3/92	No observations										--		
ramp	Q4/92	540	84	21	10	0	0	4	24	2	1	**686**	**1.24**	**4**
	Q1/93	1230	219	42	14	6	0	10	39	1	2	**1563**	**1.23**	**9**
	Q2/93	No observations										--		
	Q3/93	No observations										--		
	Q4/93	1461	322	49	15	9	1	5	12	9	2	**1885**	**1.25**	**9**
	Q1/94	619	130	17	9	1	2	7	13	2	0	**800**	**1.25**	**5**
	Q2/94	1088	256	51	29	5	5	6	26	9	3	**1478**	**1.32**	**7**
	Q3/94	1483	334	54	29	8	7	2	27	13	10	**1967**	**1.28**	**12**
	Q4/94	1377	153	16	7	3	7	6	18	4	3	**1594**	**1.13**	**13**
	Q1/95	616	185	8	3	1	8	6	10	2	1	**840**	**1.26**	**5**
	Q2/95	657	207	43	15	15	4	0	13	4	2	**960**	**1.37**	**6**
														70

I-405 Central - SE 8th Street

a.m. **southbound**

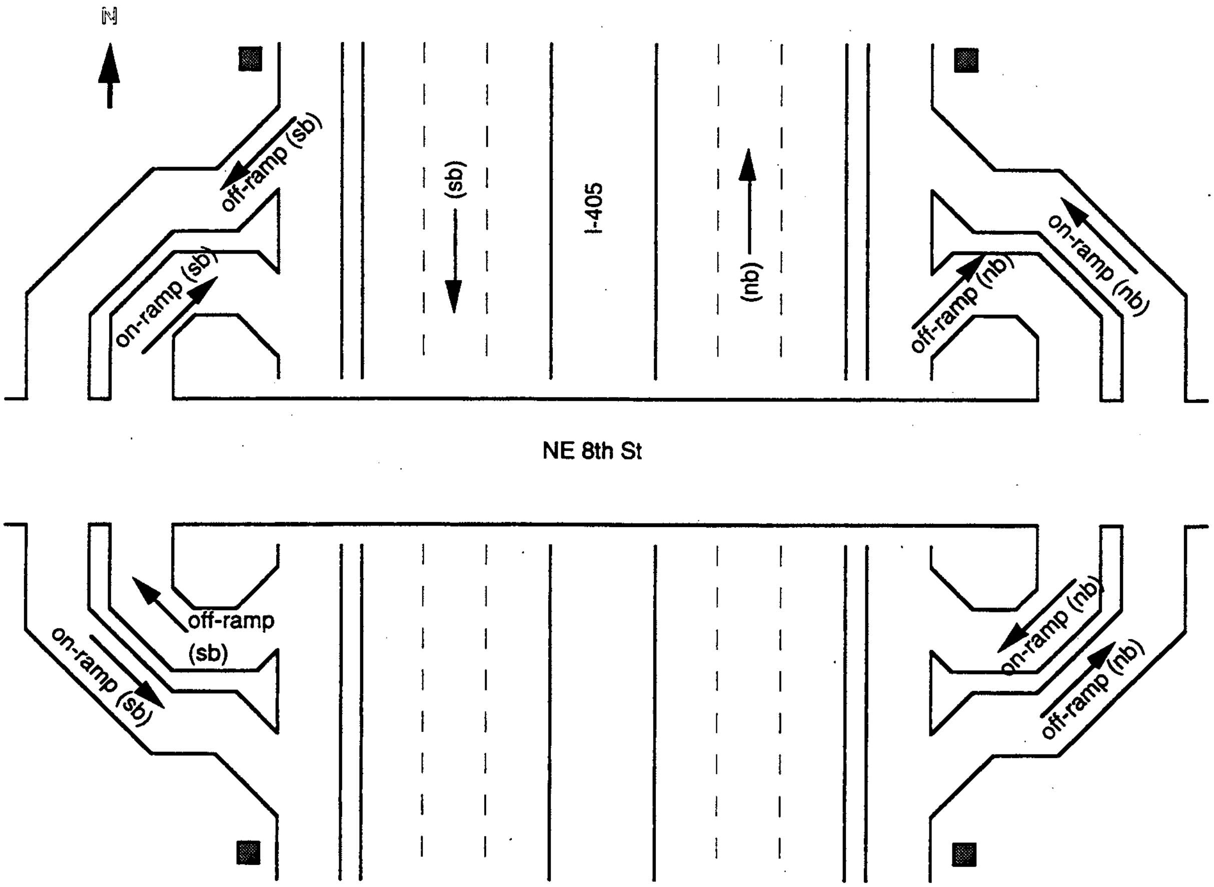
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off	Q3/92	2547	168	22	1	2	2	4	44	13	11	**2814**	**1.08**	**8**
ramp	Q4/92	2695	328	12	3	1	3	3	39	12	0	**3096**	**1.12**	**10**
	Q1/93	4028	304	18	2	4	4	10	38	13	3	**4424**	**1.08**	**12**
	Q2/93	No observations										--		
	Q3/93	1250	131	19	8	9	5	9	25	8	3	**1449**	**1.14**	**4**
	Q4/93	2184	201	18	2	1	5	2	40	4	2	**2459**	**1.10**	**7**
	Q1/94	2264	168	14	4	0	9	6	38	16	6	**2525**	**1.09**	**7**
	Q2/94	2731	188	10	1	1	12	2	36	12	8	**3001**	**1.07**	**10**
	Q3/94	1607	163	16	5	2	6	1	21	17	5	**1843**	**1.12**	**5**
	Q4/94	1259	95	9	0	0	4	3	13	8	2	**1393**	**1.08**	**4**
	Q1/95	971	90	6	1	0	3	3	8	3	1	**1086**	**1.10**	**3**
	Q2/95	532	41	2	3	1	1	1	15	4	1	**601**	**1.09**	**5**
														75

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
Off ramp	Q3/92	1737	344	55	37	4	15	1	23	13	6	**2235**	**1.26**	**5**
	Q4/92	5398	757	60	29	18	40	4	71	38	14	**6429**	**1.16**	**15**
	Q1/93	3449	671	96	23	15	34	2	67	14	3	**4374**	**1.22**	**9**
	Q2/93	No observations										**--**		
	Q3/93	No observations										**--**		
	Q4/93	6242	1335	198	67	59	105	3	103	43	6	**8161**	**1.25**	**19**
	Q1/94	1446	345	47	18	12	26	0	27	7	1	**1929**	**1.27**	**5**
	Q2/94	3804	786	73	42	39	50	3	78	29	19	**4923**	**1.23**	**11**
	Q3/94	2023	385	87	40	23	26	2	70	15	5	**2676**	**1.27**	**11**
	Q4/94	2230	404	66	25	24	29	1	62	14	0	**2855**	**1.23**	**10**
	Q1/95	1583	239	26	2	17	19	0	21	8	0	**1915**	**1.16**	**6**
	Q2/95	1081	263	44	14	13	24	2	26	15	4	**1486**	**1.28**	**6**
														97

SITE #72. I-405 CENTRAL - NE 8th Street

■ ACO on/ramp NB & SB-am & pm
■ ACO off/ramp NB & SB-am & pm



Note: Observations* at this site were discontinued at the end of Q1/93.

a.m. **southbound**

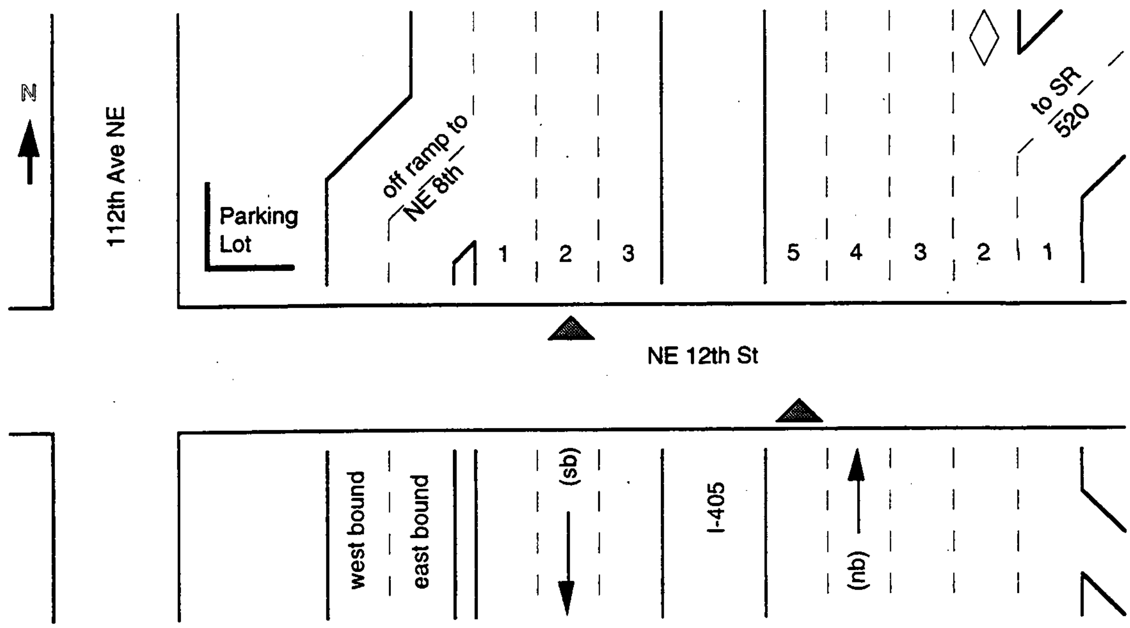
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q3/92	3527	270	17	3	2	2	1	56	26	8	**3912**	**1.08**	**5**
	Q4/92	No observations										--		
	Q1/93	5626	374	18	0	1	2	2	78	21	9	**6131**	**1.07**	**8**
														13

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q3/92	225	14	1	2	0	0	0	3	1	1	**247**	**1.09**	**1**
	Q4/92	No observations										--		
	Q1/93	No observations										--		
														1

SITE #73a. I-405 CENTRAL - NE 12th Street

▲ACO mainline NB & SB-am & pm



Note: The observation site was moved to I-405 Central - NE 4th Street in July 1994, due to weaving across outside HOV lanes. Lane 1 was opened as HOV SB & NB on July 9, 1994.

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	6606	727	48	8	2	16	3	164	274	21	**7869**	**1.11**	**16**
lanes	Q4/92	No observations										--		
4	Q1/93	No observations										--		
5*	Q2/93	945	115	12	3	2	3	0	4	65	4	**1190**	**1.14**	**3**
	Q3/93	8172	936	126	68	7	33	8	308	451	24	**10133**	**1.15**	**20**
	Q4/93	5393	619	87	23	8	21	5	212	238	31	**6637**	**1.14**	**17**
	Q1/94	5301	549	72	16	19	32	4	181	276	12	**6462**	**1.13**	**20**
	Q2/94	2900	278	23	15	5	10	5	116	152	13	**3526**	**1.12**	**9**
														85

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/92	4235	945	90	40	26	6	3	48	53	33	**5479**	**1.24**	**10**
lanes	Q4/92	825	153	15	1	1	2	0	17	11	1	**1026**	**1.19**	**2**
4	Q1/93	No observations										--		
5*	Q2/93	7363	1465	204	31	7	19	5	177	106	17	**9394**	**1.22**	**12**
	Q3/93	15106	2961	320	134	14	38	8	403	289	91	**19364**	**1.22**	**24**
	Q4/93	6907	1382	143	60	23	14	5	186	89	5	**8814**	**1.22**	**16**
	Q1/94	6085	1131	134	53	1	15	3	148	100	12	**7682**	**1.21**	**13**
	Q2/94	7559	1220	173	83	10	15	4	195	127	51	**9437**	**1.20**	**17**
														94

* Collector/distributor added to outside lane Q1/94.

I-405 Central - NE 12th Street

a.m. southbound

GP lanes 3

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	6837	906	85	12	5	18	4	131	220	21	**8238**	**1.14**	**10**
Q4/92	3615	256	9	1	0	8	0	99	65	3	**4056**	**1.07**	**5**
Q1/93	No observations										**--**		
Q2/93	3054	279	16	3	5	21	0	85	108	7	**3578**	**1.10**	**6**
Q3/93	7668	839	67	36	6	21	8	239	237	27	**9148**	**1.13**	**13**
Q4/93	5113	732	77	146	9	10	3	164	158	3	**6415**	**1.22**	**11**
Q1/94	11719	1224	83	15	15	30	3	431	287	9	**13816**	**1.11**	**20**
Q2/94	4358	531	25	11	1	13	4	160	143	13	**5259**	**1.13**	**8**
													73

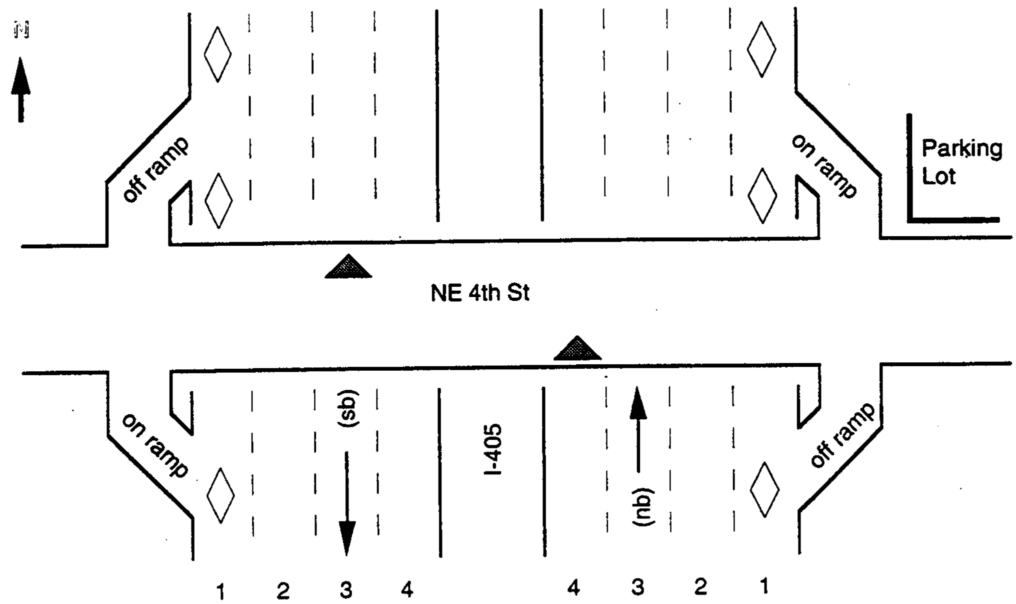
p.m. southbound

GP lanes 3

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	5961	1285	167	48	14	27	11	179	180	41	**7913**	**1.24**	**12**
Q4/92	1280	243	17	3	3	1	3	54	37	2	**1643**	**1.19**	**2**
Q1/93	2522	597	7	0	1	16	4	64	106	4	**3321**	**1.20**	**5**
Q2/93	1973	462	79	54	4	12	5	110	82	22	**2803**	**1.31**	**4**
Q3/93	12096	2829	233	39	11	74	6	460	401	109	**16258**	**1.23**	**24**
Q4/93	7391	1654	220	78	56	32	2	256	203	38	**9930**	**1.25**	**16**
Q1/94	6829	1527	238	60	45	42	5	242	222	17	**9227**	**1.25**	**14**
Q2/94	7754	1717	207	69	47	36	3	204	254	55	**10346**	**1.24**	**17**
													94

SITE #73b. I-405 CENTRAL - NE 4th Street

ACO mainline NB & SB-am & pm



a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/94	131	446	40	16	6	24	2	9	3	30	**707**	**1.91***	**5**
	Q4/94	55	776	53	11	10	53	10	21	1	18	**1008**	**2.02**	**7**
	Q1/95	148	756	57	14	29	65	9	13	9	12	**1112**	**1.94***	**8**
	Q2/95	427	1151	77	12	31	70	4	29	6	47	**1854**	**1.81***	**11**
														31
GP lanes 3	Q3/94	4273	357	41	22	7	6	1	151	301	29	**5188**	**1.11**	**11**
	Q4/94	2040	119	7	0	1	1	2	71	138	0	**2379**	**1.06**	**4**
	Q1/95	2791	126	9	1	0	6	2	116	204	4	**3259**	**1.05**	**7**
	Q2/95	4901	131	9	6	2	1	1	121	259	8	**5439**	**1.03**	**9**
														31

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV lanes 1	Q3/94	38	464	89	22	11	4	1	3	3	24	**659**	**2.16**	**3**
	Q4/94	101	1159	89	49	11	8	6	32	5	17	**1477**	**2.07**	**8**
	Q1/95	237	1971	118	36	22	10	13	36	7	5	**2455**	**1.98***	**12**
	Q2/95	279	1952	181	17	14	6	4	28	2	24	**2507**	**1.98***	**9**
														32
GP lanes 3	Q3/94	5202	831	120	76	4	4	4	146	149	25	**6561**	**1.21**	**12**
	Q4/94	2827	236	12	15	1	0	3	81	78	7	**3260**	**1.10**	**6**
	Q1/95	4716	206	14	8	5	0	1	98	116	3	**5167**	**1.05**	**9**
	Q2/95	3881	497	33	6	3	0	2	151	127	3	**4703**	**1.13**	**7**
														34

* Several observations with high percentage of violators

I-405 Central - NE 4th Street

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
HOV	Q3/94	51	323	34	20	6	21	2	5	2	19	**483**	**2.06**	**7**
lanes	Q4/94	25	366	32	9	3	4	5	7	3	7	**461**	**2.06**	**7**
1	Q1/95	51	441	31	4	4	7	5	5	1	8	**557**	**1.98***	**8**
	Q2/95	51	532	40	9	13	18	7	12	0	27	**709**	**2.01**	**11**
														33
GP	Q3/94	6154	738	105	31	4	1	1	252	296	20	**7602**	**1.15**	**22**
lanes	Q4/94	2001	165	6	1	0	0	0	107	145	1	**2426**	**1.08**	**5**
3	Q1/95	2660	208	17	4	0	0	0	89	96	4	**3078**	**1.09**	**7**
	Q2/95	3555	240	25	8	3	1	3	143	156	4	**4138**	**1.08**	**10**
														44

p.m. southbound

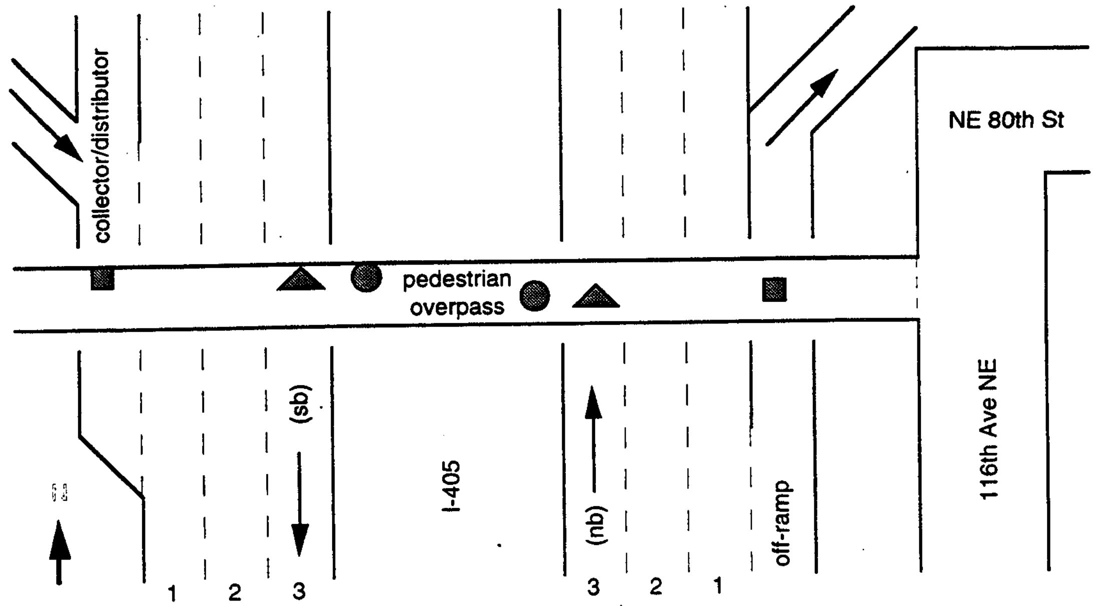
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
HOV	Q3/94	68	545	83	29	14	22	3	10	1	30	**805**	**2.11**	**5**
lanes	Q4/94	88	718	91	28	52	87	2	8	0	22	**1096**	**2.07**	**8**
1	Q1/95	57	1438	129	44	59	121	15	19	3	16	**1901**	**2.10**	**12**
	Q2/95	118	1028	95	22	18	67	14	18	3	10	**1393**	**2.02**	**6**
														31
GP	Q3/94	5761	1152	214	107	28	18	6	182	231	42	**7741**	**1.27**	**13**
lanes	Q4/94	2847	353	33	7	13	0	0	106	98	1	**3458**	**1.14**	**6**
3	Q1/95	4496	616	67	20	19	4	4	147	164	8	**5545**	**1.16**	**9**
	Q2/95	1961	373	15	7	1	3	3	95	118	3	**2579**	**1.18**	**5**
														33

* Some observations with high percentage of violators.

SITE #81. I-405 NORTH - SR 908: Central Way/NE 85th

ACO on/ramp SB-am
ACO off/ramp NB-pm

Ending Q3/94



a.m. **southbound**

On ramp

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	4322	495	71	22	3	7	5	135	63	18	5141	1.14	12
Q4/92	2356	211	32	5	0	2	8	25	25	1	2665	1.11	6
Q1/93	4164	389	33	3	0	4	5	81	46	8	4733	1.10	12
Q2/93	No observations										--		
Q3/93	1590	181	19	1	2	5	2	49	37	4	1890	1.12	4
Q4/93	No observations										--		
Q1/94	3130	273	32	6	4	1	1	86	23	4	3560	1.10	11
Q2/94	1954	253	34	5	3	6	3	40	44	7	2349	1.15	5
Q3/94	1751	202	25	12	4	3	0	63	34	7	2101	1.15	5
													55

p.m. **northbound**

Off ramp

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	7581	1351	254	124	16	71	3	114	47	44	9605	1.24	21
Q4/92	3047	342	60	12	10	27	5	41	20	8	3572	1.14	8
Q1/93	1539	262	24	19	4	13	2	33	5	8	1909	1.20	4
Q2/93	1544	286	44	19	3	4	0	36	6	6	1948	1.23	5
Q3/93	1347	270	47	13	1	5	0	20	8	10	1721	1.24	5
Q4/93	2566	445	77	35	9	23	3	47	54	8	3267	1.23	6
Q1/94	1768	319	49	12	10	19	1	33	11	0	2222	1.21	5
Q2/94	No observations										--		
Q3/94	2733	567	98	73	8	26	1	43	22	23	3594	1.29	10
													64

I-405 North - SR 908: Central Way/NE 85th

a.m. southbound

GP lanes 3

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	No observations										--		
Q4/92	No observations										--		
Q1/93	No observations										--		
Q2/93	No observations										--		
Q3/93	6533	691	66	21	1	31	1	181	153	21	**7699**	**1.12**	**9**
Q4/93	4995	371	32	36	5	30	8	151	165	2	**5795**	**1.10**	**9**
Q1/94	9742	917	56	17	9	42	4	248	233	9	**11277**	**1.10**	**15**
Q2/94	5538	496	35	20	2	34	3	167	203	11	**6509**	**1.10**	**10**
Q3/94	7939	795	68	26	8	35	6	254	219	23	**9373**	**1.11**	**14**
													57

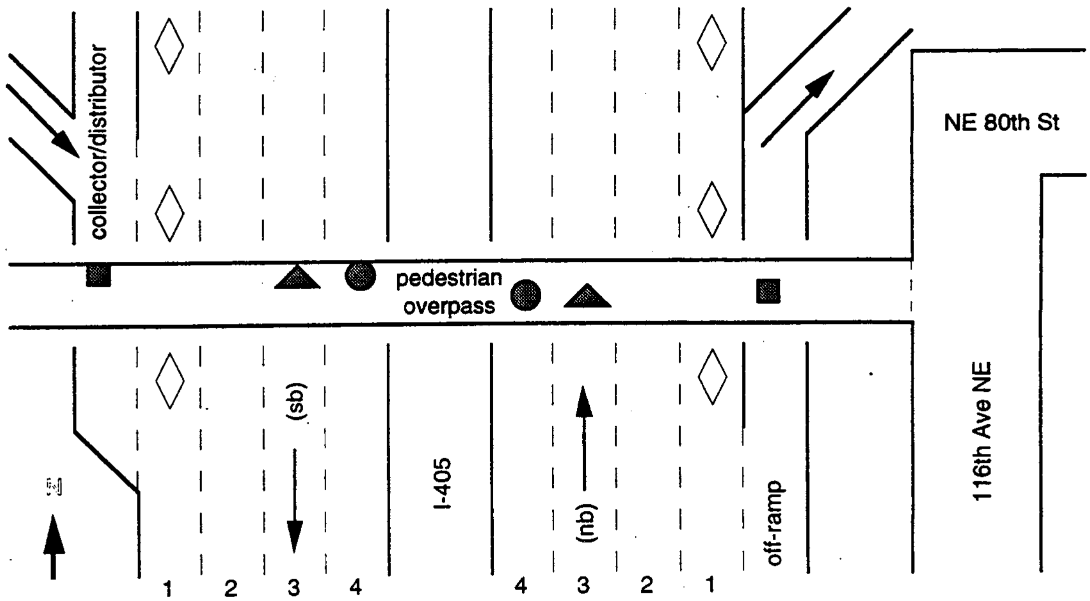
p.m. northbound

GP lanes 3

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/92	No observations										--		
Q4/92	No observations										--		
Q1/93	No observations										--		
Q2/93	No observations										--		
Q3/93	9950	1690	286	156	17	35	3	305	173	94	**12709**	**1.23**	**16**
Q4/93	6348	848	61	17	0	12	9	186	71	13	**7565**	**1.14**	**10**
Q1/94	5184	741	112	49	10	14	6	147	114	2	**6379**	**1.18**	**9**
Q2/94	10593	1522	179	121	17	33	8	227	209	39	**12948**	**1.18**	**18**
Q3/94	9259	1957	330	123	45	26	0	158	142	53	**12093**	**1.26**	**15**
													68

I-405 North - SR 908: Central Way/NE 85th

Beginning Q4/94



Note: In the winter, you can also park on the shoulder of each ramp in order to gain better visibility for ACO ramp counts.
The northbound HOV lane opened to traffic on December 18, 1994.
The southbound HOV lane is scheduled to open late summer/early fall, 1995.

a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
On ramp	Q4/94	3163	295	33	11	3	28	5	88	39	11	**3676**	**1.11**	7
	Q1/95	1219	78	1	5	2	1	5	38	27	3	**1379**	**1.07**	6
	Q2/95	3821	257	9	5	5	16	6	66	47	7	**4239**	**1.07**	11
														24

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Off ramp	Q4/94	3379	327	33	23	18	39	2	72	29	9	**3931**	**1.12**	9
	Q1/95	1726	246	23	4	7	2	0	23	17	0	**2048**	**1.15**	5
	Q2/95	2619	411	47	15	2	1	0	39	15	7	**3156**	**1.18**	9
														23

a.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP lanes 3	Q4/94	6957	688	71	9	9	25	5	171	209	13	**8157**	**1.11**	13
	Q1/95	6290	942	72	8	3	18	5	164	203	11	**7716**	**1.15**	12
	Q2/95	10103	731	41	11	17	48	4	301	408	37	**11701**	**1.08**	20
														45

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
HOV lanes 1	Q1/95	314	2555	269	117	32	89	12	67	10	31	**3496**	**2.07**	**12**
	Q2/95	382	1493	129	30	13	34	11	56	1	15	**2164**	**1.91**	**6**
														18
GP lanes 3	Q4/94	8490	990	108	26	5	15	4	184	162	9	**9993**	**1.13**	**14**
	Q1/95	4443	276	15	10	3	0	0	158	102	2	**5009**	**1.07**	**7**
	Q2/95	3863	467	34	8	0	0	2	106	87	10	**4577**	**1.13**	**6**
														27

* High number of violators in ALL counts in one section.

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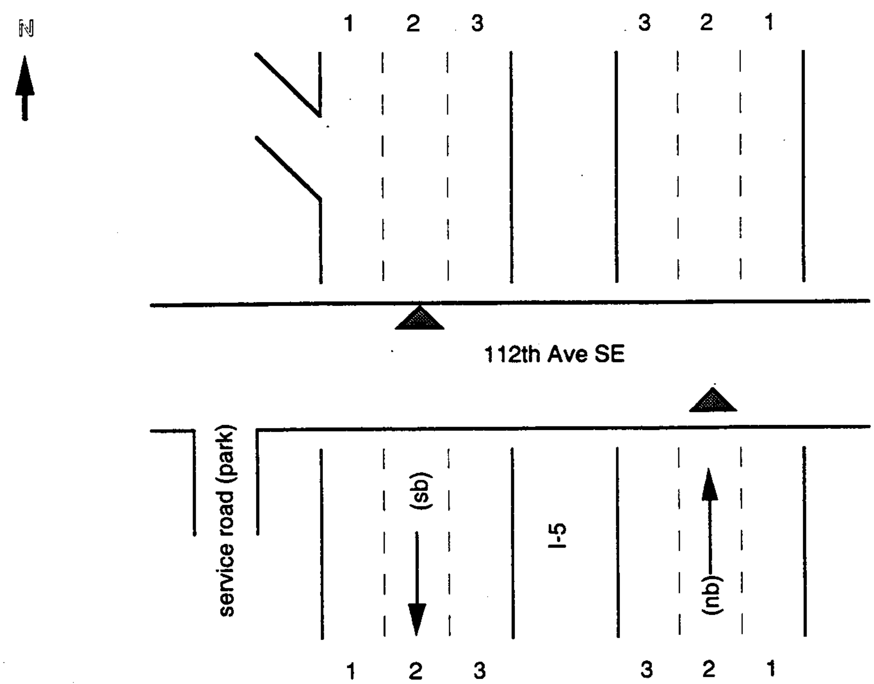
Vehicle Occupancy (ACO) Sites
(Outlying Locations)

SITE #91. I-5 NORTH @ 112th SE- Everett

ACO mainline SB-am
ACO mainline SB-pm
ACO mainline NB-am
ACO mainline NB-pm



a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP 3	Q3/93	2418	407	72	51	6	1	3	97	112	15	**3182**	**1.24**	**4**
	Q4/93	2021	121	23	11	1	0	4	51	64	3	**2299**	**1.09**	**6**
	Q1/94	4746	449	53	45	15	5	17	153	212	9	**5704**	**1.13**	**12**
	Q2/94	5738	540	67	35	15	4	16	154	301	29	**6899**	**1.12**	**18**
	Q3/94	6035	821	92	56	35	4	11	172	316	31	**7573**	**1.17**	**13**
	Q4/94	4938	386	29	2	15	5	10	118	197	0	**5700**	**1.08**	**10**
	Q1/95	4413	396	31	18	9	1	17	128	206	3	**5222**	**1.11**	**10**
	Q2/95	8713	662	65	15	55	14	23	172	408	19	**10146**	**1.09**	**18**
														91

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP 3	Q3/93	4318	1278	296	203	12	7	9	159	182	50	**6514**	**1.41**	**8**
	Q4/93	2086	653	90	34	9	0	5	52	72	1	**3002**	**1.33**	**5**
	Q1/94	6399	1949	141	100	9	4	38	133	182	22	**8977**	**1.30**	**5**
	Q2/94	4930	1249	166	81	18	5	18	168	192	26	**6853**	**1.29**	**14**
	Q3/94	7290	2006	277	199	13	4	18	243	269	54	**10373**	**1.33**	**16**
	Q4/94	7428	1208	105	75	23	8	24	173	235	27	**9306**	**1.19**	**14**
	Q1/95	6021	1296	108	85	13	9	17	150	211	11	**7921**	**1.24**	**10**
	Q2/95	6436	1774	155	48	14	12	50	195	341	30	**9055**	**1.27**	**13**
														85

I-5 North@ 112th SE - Everett

a.m. **southbound**

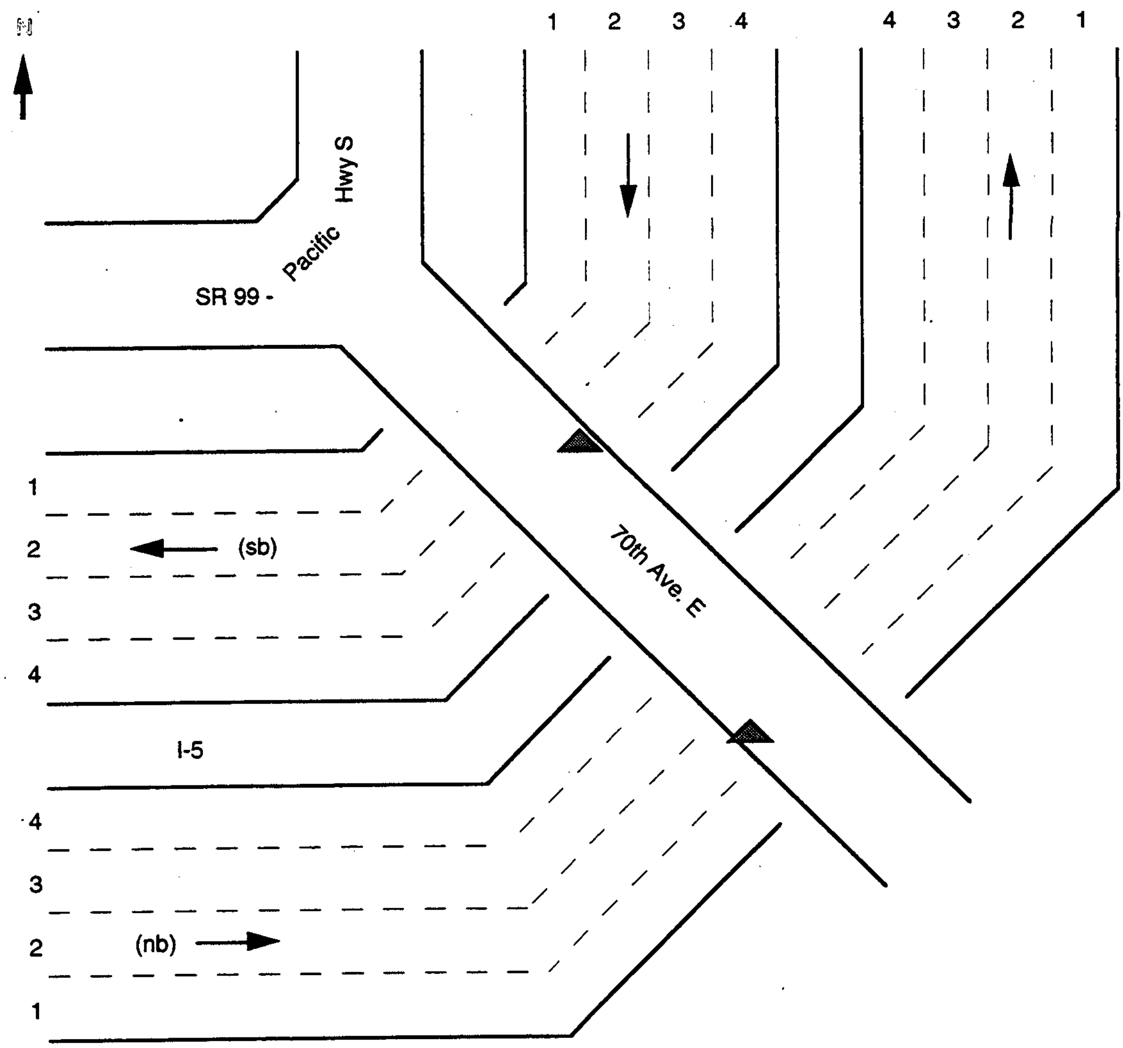
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	4341	752	102	27	0	14	11	204	254	22	**5727**	**1.20**	**12**
3	Q4/93	2279	275	16	8	0	1	2	43	47	5	**2676**	**1.13**	**4**
	Q1/94	6504	787	46	6	4	8	9	252	264	14	**7894**	**1.12**	**14**
	Q2/94	8642	1160	132	53	12	35	64	274	465	27	**10864**	**1.16**	**20**
	Q3/94	6878	960	133	116	12	16	7	160	265	35	**8582**	**1.20**	**15**
	Q4/94	3197	388	37	17	4	5	17	115	205	4	**3989**	**1.14**	**10**
	Q1/95	3749	571	39	9	6	5	17	110	235	5	**4745**	**1.16**	**10**
	Q2/95	4995	251	15	11	12	16	11	108	291	21	**5731**	**1.06**	**14**
														99

p.m. **southbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	6208	1464	246	137	22	12	15	185	209	40	**8538**	**1.30**	**13**
3	Q4/93	4499	1080	158	59	21	11	10	104	193	3	**6138**	**1.27**	**10**
	Q1/94	8248	2492	400	135	60	12	19	158	209	19	**11752**	**1.33**	**8**
	Q2/94	11899	2794	359	136	74	25	38	294	355	43	**16017**	**1.26**	**26**
	Q3/94	9935	2548	385	286	38	15	25	359	392	64	**14047**	**1.32**	**19**
	Q4/94	9898	1417	118	78	54	14	16	235	359	23	**12212**	**1.17**	**15**
	Q1/95	11319	2324	284	129	81	17	23	255	347	25	**14804**	**1.24**	**20**
	Q2/95	6820	1737	185	125	35	15	11	230	286	26	**9470**	**1.28**	**15**
														126

SITE #92. I-5 SOUTH @ 70th E - Fife

ACO mainline SB-am
ACO mainline SB-pm
ACO mainline NB-am
ACO mainline NB-pm



a.m.	**southbound** Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q3/93	1541	167	25	16	1	5	4	63	107	3	**1932**	**1.15**	5
Lanes	Q4/93	4747	564	41	17	14	6	7	176	345	1	**5918**	**1.13**	13
4	Q1/94	3929	435	45	23	5	2	12	170	314	6	**4941**	**1.14**	14
	Q2/94	4619	407	20	63	6	6	14	160	299	7	**5601**	**1.13**	13
	Q3/94	7765	490	13	43	14	15	3	319	594	38	**9295**	**1.08**	21
	Q4/94	2629	245	13	9	2	10	8	128	250	1	**3295**	**1.10**	9
	Q1/95	3589	225	26	54	4	18	1	130	147	2	**4195**	**1.12**	11
	Q2/95	5067	365	25	23	8	12	6	155	351	5	**6017**	**1.09**	14
														100

I-5 South @ 70th E - Fife

p.m. southbound

GP Lanes 4

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/93	2708	615	33	2	2	5	0	71	119	22	**3577**	**1.20**	**5**
Q4/93	7463	1877	166	57	54	11	12	208	405	14	**10267**	**1.25**	**16**
Q1/94	6561	1496	130	65	16	17	8	220	362	4	**8979**	**1.24**	**14**
Q2/94	6792	1324	154	144	27	12	7	192	576	22	**9250**	**1.25**	**17**
Q3/94	7817	1448	70	113	20	9	3	155	436	35	**10106**	**1.21**	**15**
Q4/94	9579	1126	88	78	25	18	7	198	419	8	**11546**	**1.14**	**17**
Q1/95	9826	1076	41	111	18	6	4	187	364	15	**11648**	**1.14**	**17**
Q2/95	9199	1023	39	124	15	8	6	189	282	41	**10926**	**1.14**	**20**
													121

a.m. northbound

GP Lanes 4

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/93	3938	501	59	49	8	10	11	143	387	19	**5125**	**1.17**	**11**
Q4/93	4533	688	73	23	16	8	9	151	314	10	**5825**	**1.17**	**11**
Q1/94	3911	451	52	16	3	12	13	145	438	2	**5043**	**1.14**	**18**
Q2/94	6468	493	71	50	12	16	9	164	455	14	**7752**	**1.11**	**14**
Q3/94	6793	783	37	45	2	19	15	195	502	22	**8413**	**1.13**	**17**
Q4/94	5200	814	49	34	6	11	8	147	411	2	**6682**	**1.17**	**13**
Q1/95	3990	260	14	22	7	4	10	115	228	4	**4654**	**1.08**	**11**
Q2/95	4639	291	22	35	5	8	15	142	508	17	**5682**	**1.09**	**13**
													108

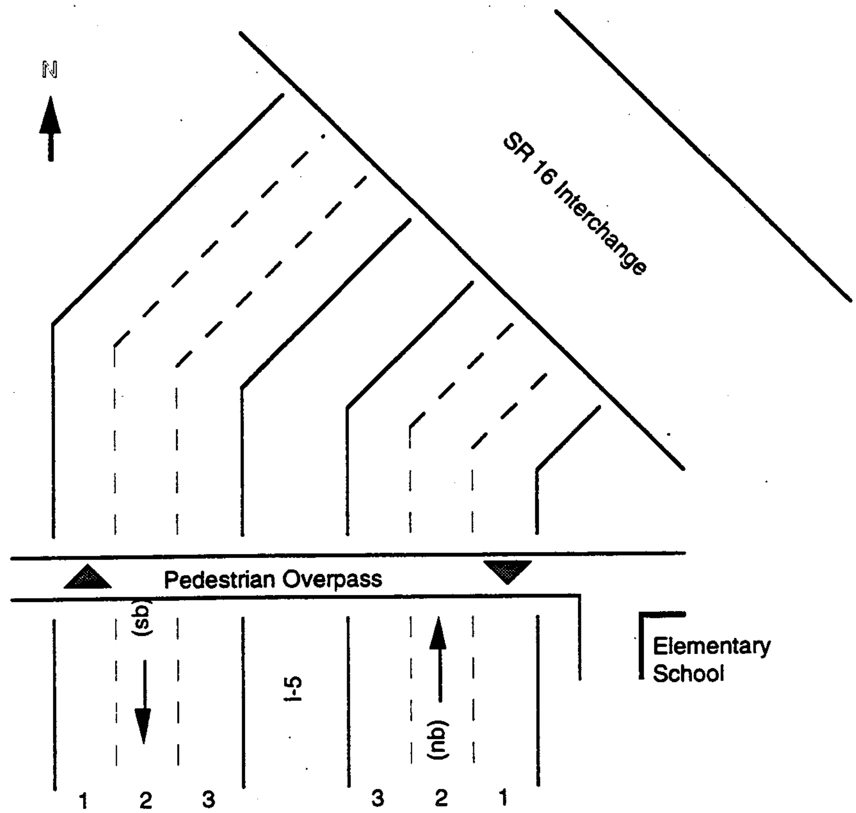
p.m. northbound

GP Lanes 4

Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
Q3/93	1901	704	50	4	4	0	4	80	111	21	**2879**	**1.31**	**5**
Q4/93	5893	1714	209	126	25	17	17	215	415	18	**8649**	**1.32**	**17**
Q1/94	6135	1605	179	22	13	12	10	196	329	8	**8509**	**1.26**	**14**
Q2/94	3714	767	123	90	4	10	7	171	404	19	**5309**	**1.28**	**12**
Q3/94	10180	1519	75	116	3	12	16	325	572	40	**12858**	**1.17**	**25**
Q4/94	8100	824	56	71	2	22	12	217	403	8	**9715**	**1.13**	**17**
Q1/95	5975	621	28	85	1	17	9	166	303	4	**7209**	**1.14**	**13**
Q2/95	7962	629	44	141	2	18	6	267	336	11	**9416**	**1.13**	**19**
													122

SITE #93. I-5 @ Tacoma Mall - Tacoma

ACO mainline SB-am
ACO mainline SB-pm
ACO mainline NB-am
ACO mainline NB-pm



a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	No observations										--		
3	Q4/93	6844	1330	90	28	37	31	16	322	596	8	**9302**	**1.19**	**28**
	Q1/94	2633	262	51	21	0	3	9	119	249	2	**3349**	**1.15**	**10**
	Q2/94	5028	409	18	27	8	27	14	268	558	10	**6367**	**1.10**	**15**
	Q3/94	6275	700	25	54	9	37	15	295	541	30	**7981**	**1.13**	**20**
	Q4/94	6887	400	13	31	0	39	10	230	402	4	**8016**	**1.07**	**16**
	Q1/95	6533	294	16	44	12	45	12	218	347	1	**7522**	**1.07**	**16**
	Q2/95	4794	122	6	11	8	38	12	207	316	5	**5519**	**1.03**	**15**
														120

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	1848	628	59	31	5	7	5	76	151	7	**2817**	**1.33**	**4**
3	Q4/93	4967	1349	117	56	20	15	14	128	283	12	**6961**	**1.27**	**12**
	Q1/94	6243	1697	196	24	22	17	13	156	359	4	**8731**	**1.27**	**15**
	Q2/94	3793	1249	259	159	3	9	8	152	195	21	**5848**	**1.42**	**9**
	Q3/94	7628	1806	51	87	4	12	5	154	407	30	**10184**	**1.23**	**15**
	Q4/94	8671	1215	45	42	2	22	7	158	398	7	**10567**	**1.14**	**17**
	Q1/95	8973	505	35	67	4	10	19	157	298	6	**10074**	**1.08**	**19**
	Q2/95	7707	320	16	89	4	10	9	133	250	14	**8552**	**1.08**	**15**
														106

I-5 @ Tacoma Mall - Tacoma

a.m. northbound

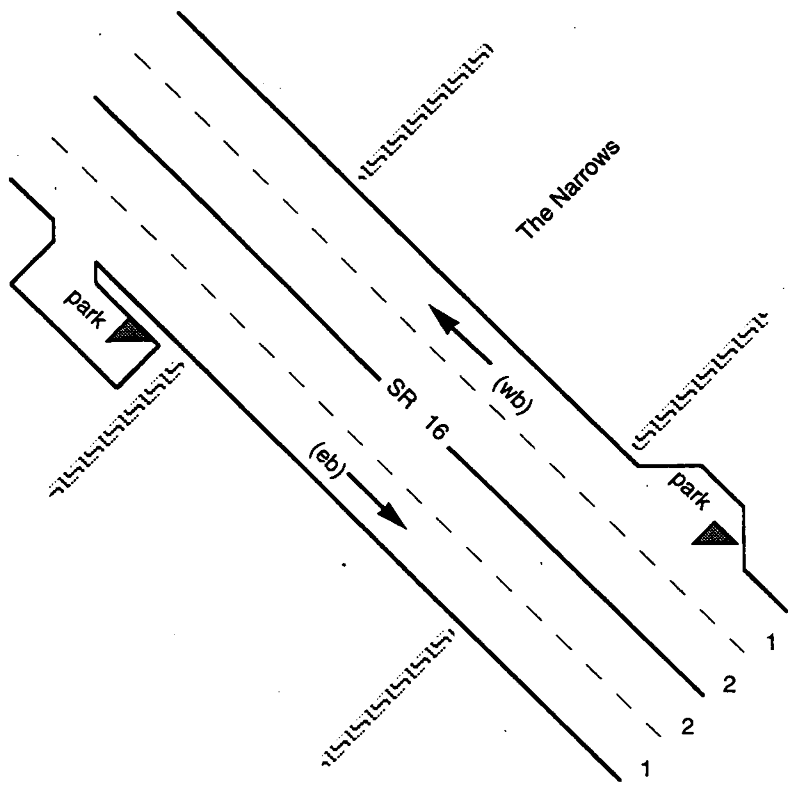
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	2097	361	29	9	6	7	4	51	144	13	**2721**	**1.18**	**5**
3	Q4/93	5857	1018	85	23	38	33	5	165	447	9	**7680**	**1.18**	**17**
	Q1/94	4439	691	85	30	8	8	18	145	429	10	**5863**	**1.18**	**17**
	Q2/94	5686	525	21	49	9	55	19	188	714	13	**7279**	**1.12**	**15**
	Q3/94	9617	1094	23	67	2	31	10	264	804	28	**11940**	**1.13**	**24**
	Q4/94	8596	665	15	45	4	19	6	163	506	5	**10024**	**1.09**	**18**
	Q1/95	3953	227	6	38	0	5	3	77	188	1	**4498**	**1.09**	**8**
	Q2/95	7900	381	16	51	2	31	14	142	507	17	**9061**	**1.07**	**18**
														122

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	1912	599	105	51	3	3	2	74	164	0	**2913**	**1.36**	**7**
3	Q4/93	3648	1186	167	33	16	6	77	151	253	5	**5476**	**1.32**	**12**
	Q1/94	4357	1354	109	53	5	10	16	193	299	4	**6400**	**1.30**	**14**
	Q2/94	5121	1396	102	131	11	16	15	179	420	40	**7431**	**1.30**	**15**
	Q3/94	3496	934	59	93	3	7	8	125	282	33	**5040**	**1.29**	**11**
	Q4/94	9118	1493	61	146	3	47	15	258	456	18	**11615**	**1.31**	**22**
	Q1/95	7980	673	19	70	3	25	6	188	306	6	**9276**	**1.11**	**18**
	Q2/95	3467	214	6	37	0	3	7	83	109	1	**3927**	**1.09**	**10**
														109

SITE #94. SR 16 @ Tacoma Narrows Bridge - Tacoma

ACO mainline EB-am
ACO mainline EB-pm
ACO mainline WB-pm



a.m. **eastbound**

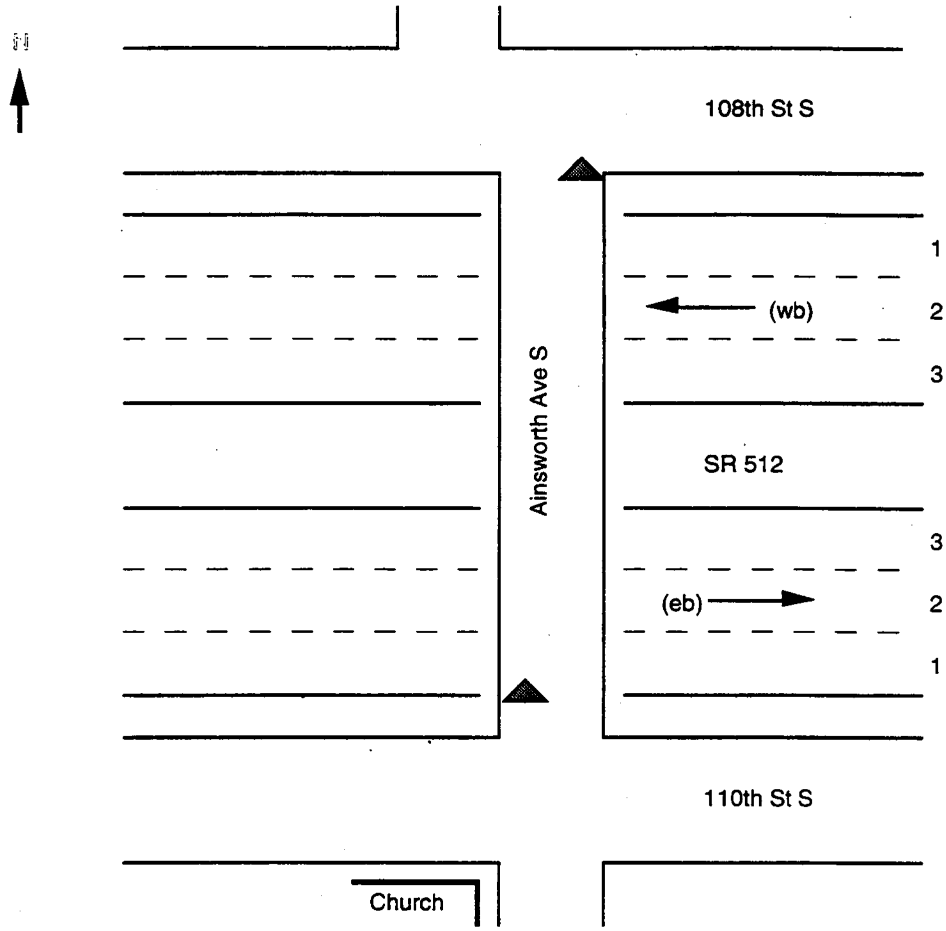
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	2694	386	56	24	4	2	2	57	39	16	**3280**	**1.18**	**4**
2	Q4/93	24211	3048	231	104	41	7	29	315	428	26	**28440**	**1.14**	**38**
	Q1/94	7474	769	94	30	4	1	13	109	152	7	**8653**	**1.13**	**11**
	Q2/94	10073	785	29	48	4	14	7	148	167	27	**11302**	**1.09**	**19**
	Q3/94	15117	907	24	85	4	9	5	151	206	52	**16560**	**1.08**	**20**
	Q4/94	10626	769	33	21	3	8	8	86	109	14	**11677**	**1.08**	**13**
	Q1/95	11289	780	26	66	0	10	6	93	124	5	**12399**	**1.09**	**17**
	Q2/95	10049	610	20	66	3	8	3	74	77	18	**10928**	**1.08**	**15**
														137

p.m. **westbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	4185	854	146	56	19	3	3	65	40	30	**5401**	**1.25**	**6**
2	Q4/93	4064	824	126	70	6	4	9	60	38	12	**5213**	**1.26**	**6**
	Q1/94	6999	1450	168	96	5	2	10	116	64	5	**8915**	**1.24**	**11**
	Q2/94	8506	1729	93	149	5	13	6	91	97	53	**10742**	**1.23**	**14**
	Q3/94	10790	913	32	57	4	7	5	96	104	139	**12147**	**1.10**	**14**
	Q4/94	12000	1282	62	109	4	9	4	104	95	7	**13676**	**1.13**	**16**
	Q1/95	14267	1043	31	120	9	9	7	137	118	3	**15744**	**1.10**	**23**
	Q2/95	10275	665	27	103	4	3	5	65	42	4	**11193**	**1.09**	**15**
														105

SITE #95. SR 512 @ Ainsworth Ave. - Parkland

ACO mainline WB-am
ACO mainline EB-pm



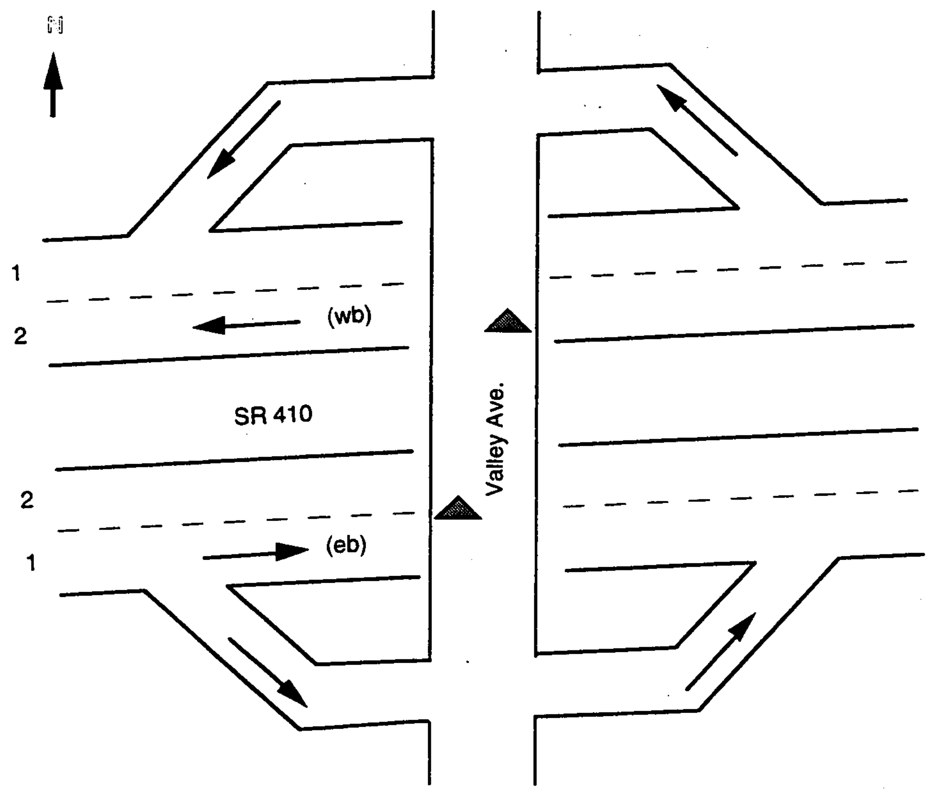
a.m. westbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	2267	275	22	2	1	3	0	112	119	6	**2807**	**1.13**	**6**
3	Q4/93	5179	558	40	7	2	8	4	161	224	7	**6190**	**1.11**	**16**
	Q1/94	2268	313	40	7	0	0	2	126	172	3	**2931**	**1.16**	**10**
	Q2/94	3748	290	21	14	0	4	3	146	226	11	**4463**	**1.09**	**9**
	Q3/94	7779	432	23	22	0	7	8	221	335	37	**8864**	**1.07**	**19**
	Q4/94	9067	768	39	64	5	7	4	258	304	7	**10523**	**1.11**	**16**
	Q1/95	6345	393	20	52	0	5	0	188	183	2	**7188**	**1.09**	**12**
	Q2/95	6150	257	6	52	0	0	3	178	185	9	**6840**	**1.07**	**15**
														103

p.m.	eastbound													
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q3/93	2830	822	148	54	2	2	4	125	96	23	**4106**	**1.33**	**9**
3	Q4/93	5944	1200	98	18	5	7	6	185	211	10	**7684**	**1.20**	**17**
	Q1/94	3164	687	79	22	1	5	6	125	117	8	**4214**	**1.23**	**9**
	Q2/94	2519	468	60	40	0	2	4	100	123	10	**3326**	**1.23**	**7**
	Q3/94	7591	843	37	73	1	6	3	166	207	22	**8949**	**1.13**	**20**
	Q4/94	8277	592	36	61	1	9	5	149	176	9	**9315**	**1.10**	**18**
	Q1/95	7942	499	24	50	0	9	2	211	214	9	**8960**	**1.08**	**18**
	Q2/95	5775	323	20	47	1	8	0	112	132	11	**6429**	**1.08**	**16**
														114

SITE #96. SR 410 @ East Valley Avenue - Sumner

ACO mainline WB-am
ACO mainline EB-pm
ACO mainline WB-pm



a.m. **westbound**

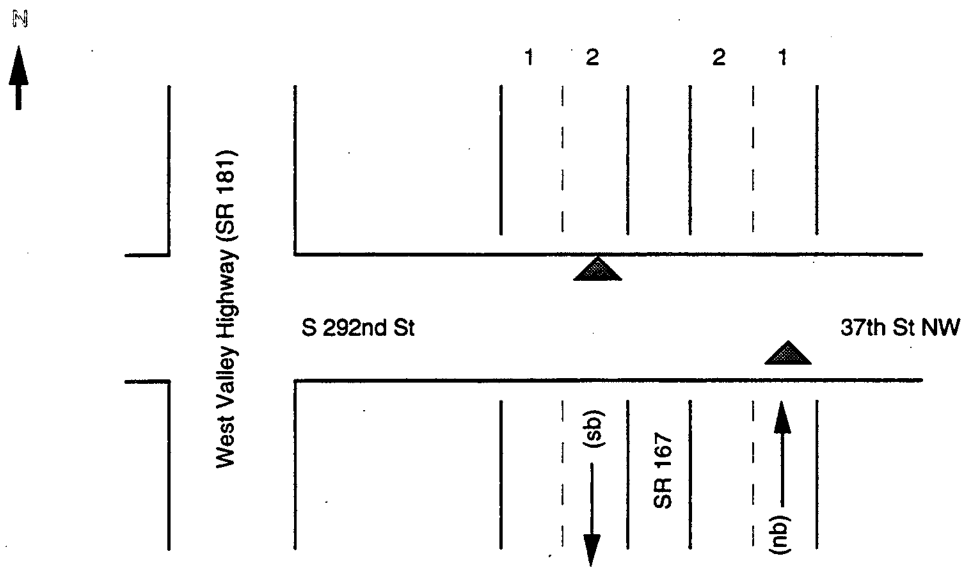
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	3494	478	54	14	1	2	4	103	79	14	**4243**	**1.16**	**12**
2	Q4/93	3200	460	37	10	6	3	6	62	73	5	**3862**	**1.15**	**12**
	Q1/94	2335	309	29	9	1	0	3	51	70	3	**2810**	**1.15**	**12**
	Q2/94	6705	830	52	34	1	0	6	147	139	29	**7943**	**1.14**	**19**
	Q3/94	9781	955	14	22	2	0	7	201	235	42	**11259**	**1.10**	**21**
	Q4/94	8379	642	19	20	0	6	7	153	235	4	**9465**	**1.08**	**17**
	Q1/95	5008	342	27	52	0	4	8	95	142	1	**5679**	**1.10**	**11**
	Q2/95	5699	165	1	16	31	8	4	85	109	9	**6127**	**1.04**	**14**
														118

p.m. **eastbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	3166	802	151	50	4	1	3	82	67	11	**4337**	**1.30**	**12**
2	Q4/93	3426	897	111	19	8	5	4	83	74	4	**4631**	**1.26**	**12**
	Q1/94	2811	571	70	16	1	1	3	62	57	10	**3602**	**1.22**	**5**
	Q2/94	1367	177	13	3	3	0	0	29	26	9	**1627**	**1.14**	**4**
	Q3/94	8974	1213	67	89	16	2	7	142	167	121	**10798**	**1.16**	**22**
	Q4/94	8377	708	29	42	10	3	14	109	146	10	**9448**	**1.10**	**16**
	Q1/95	9336	880	54	94	17	2	11	164	163	5	**10726**	**1.12**	**17**
	Q2/95	7131	524	21	41	10	2	6	105	97	2	**7959**	**1.09**	**15**
														103

SITE #97. SR 167 @ 37th NW - Auburn

ACO mainline NB-am
ACO mainline NB-pm
ACO mainline SB-am
ACO mainline SB-pm



a.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	No observations												
2	Q4/93	13513	1603	90	21	68	1	11	539	870	23	**16739**	**1.12**	**28**
	Q1/94	7720	923	65	14	15	1	3	323	523	32	**9619**	**1.13**	**18**
	Q2/94	8549	596	59	25	1	1	1	345	514	29	**10120**	**1.09**	**11**
	Q3/94	11014	361	13	13	15	8	4	412	649	41	**12530**	**1.04**	**15**
	Q4/94	8025	547	30	25	3	4	2	235	511	15	**9397**	**1.08**	**13**
	Q1/95	6507	362	20	30	0	2	5	243	404	15	**7588**	**1.07**	**12**
	Q2/95	6721	286	10	46	4	6	0	143	231	34	**7481**	**1.06**	**9**
														106

p.m. **northbound**

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	No observations										--		
2	Q4/93	7797	1953	147	32	24	5	3	356	509	13	**10839**	**1.24**	**25**
	Q1/94	3846	929	79	8	9	4	7	117	207	3	**5209**	**1.23**	**10**
	Q2/94	6616	1182	182	132	5	7	10	349	387	36	**8906**	**1.24**	**13**
	Q3/94	9927	1342	215	140	5	13	4	396	688	131	**12861**	**1.19**	**20**
	Q4/94	10886	945	53	63	3	5	6	401	458	19	**12839**	**1.10**	**19**
	Q1/95	6978	472	32	66	3	7	2	225	213	8	**8006**	**1.10**	**13**
	Q2/95	10212	434	20	67	1	11	1	365	433	24	**11568**	**1.06**	**20**
														120

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q3/93	No observations										--		
2	Q4/93	1584	310	8	2	6	2	2	109	180	2	**2205**	**1.17**	**6**
	Q1/94	3258	287	48	14	0	2	12	342	394	9	**4366**	**1.12**	**12**
	Q2/94	4711	393	65	28	4	7	8	269	546	30	**6061**	**1.12**	**12**
	Q3/94	10101	575	22	37	3	16	6	499	776	52	**12087**	**1.07**	**20**
	Q4/94	4742	366	19	34	2	13	2	277	452	1	**5908**	**1.10**	**14**
	Q1/95	4417	310	21	38	0	5	8	313	451	8	**5571**	**1.10**	**12**
	Q2/95	4528	354	31	63	20	0	1	136	252	7	**5392**	**1.12**	**15**
														91

SR167 @ 37th NW - Auburn

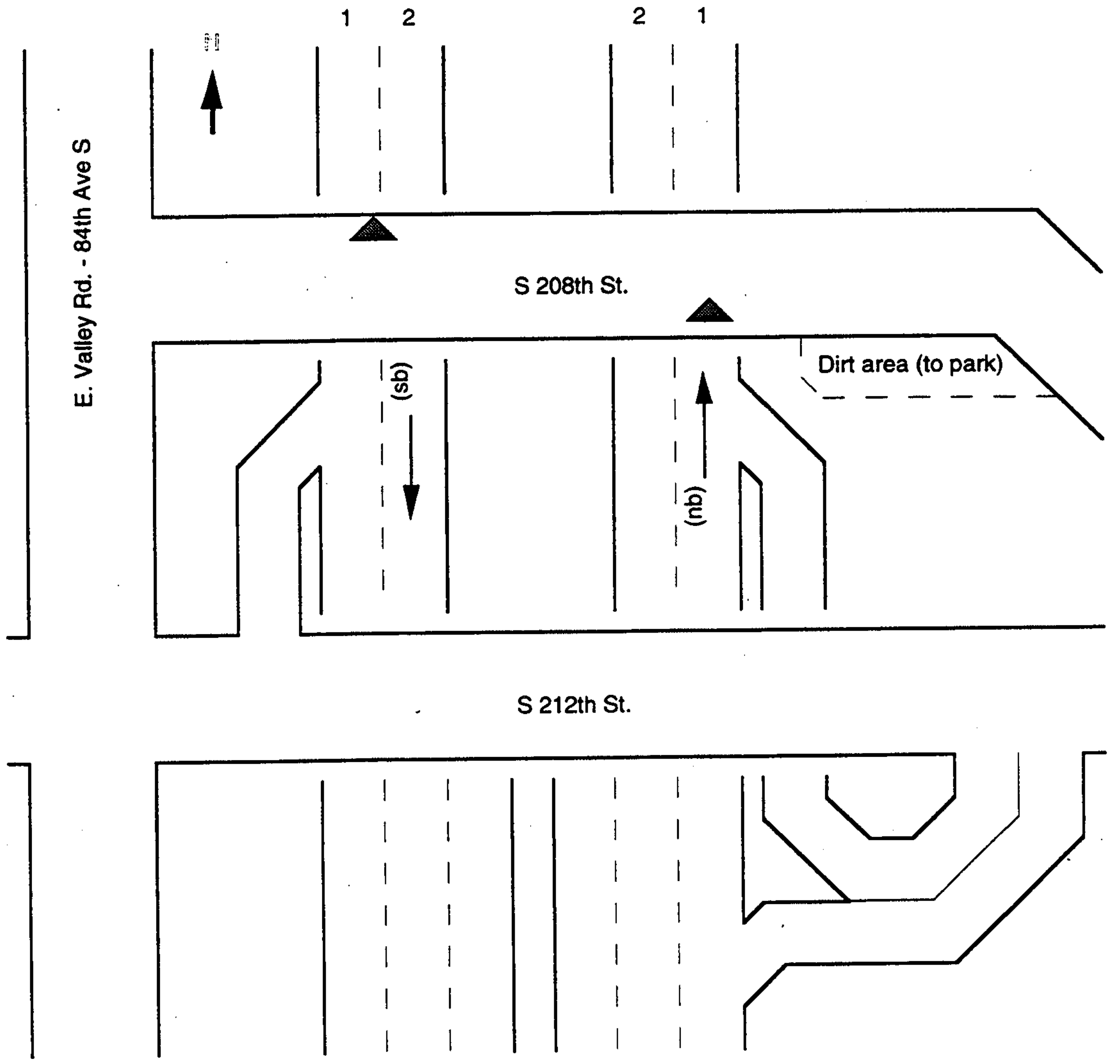
p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	**TOTAL OBS.**	**ACO**	**Counts**
GP	Q3/93	4188	585	92	12	25	6	2	134	175	31	**5250**	**1.17**	**6**
2	Q4/93	9417	2097	218	55	44	9	3	327	433	25	**12628**	**1.23**	**17**
	Q1/94	2754	364	22	3	8	4	1	62	93	4	**3315**	**1.13**	**4**
	Q2/94	10806	1470	210	57	29	11	1	246	420	49	**13299**	**1.17**	**15**
	Q3/94	13625	1633	164	109	21	17	3	345	577	66	**16560**	**1.15**	**26**
	Q4/94	14592	1379	74	112	30	15	6	260	532	8	**17008**	**1.12**	**20**
	Q1/95	9521	1034	40	136	21	10	3	218	334	23	**11340**	**1.14**	**13**
	Q2/95	8139	580	25	94	8	11	1	159	186	30	**9233**	**1.11**	**15**
														116

SITE #98. SR 167 @ S 208th - Kent

ACO mainline NB-am
ACO mainline NB-pm
ACO mainline SB-am
ACO mainline SB-pm

Ending Q4/94



SR167 @ S 208th - Kent

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	9419	959	118	62	18	14	9	448	692	65	**11804**	**1.13**	**16**
2	Q4/93	2462	153	20	10	0	1	2	97	187	5	**2937**	**1.09**	**5**
	Q1/94	5660	696	64	14	6	2	3	233	344	6	**7028**	**1.14**	**9**
	Q2/94	4774	537	51	16	11	4	3	233	214	23	**5866**	**1.13**	**10**
	Q3/94	5095	535	61	34	7	6	1	294	393	21	**6447**	**1.13**	**14**
	Q4/94	3857	431	51	7	2	5	3	216	326	4	**4902**	**1.13**	**14**
														68

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	No observations										--		
2	Q4/93	1241	225	19	5	1	0	1	54	18	7	**1571**	**1.19**	**3**
	Q1/94	3717	779	77	29	2	3	3	115	120	3	**4848**	**1.22**	**9**
	Q2/94	2620	525	63	17	6	1	1	81	104	11	**3429**	**1.22**	**5**
	Q3/94	6892	1644	322	206	7	4	6	273	324	31	**9709**	**1.33**	**18**
	Q4/94	3932	521	65	37	3	0	2	113	139	9	**4821**	**1.17**	**9**
														44

a.m. southbound

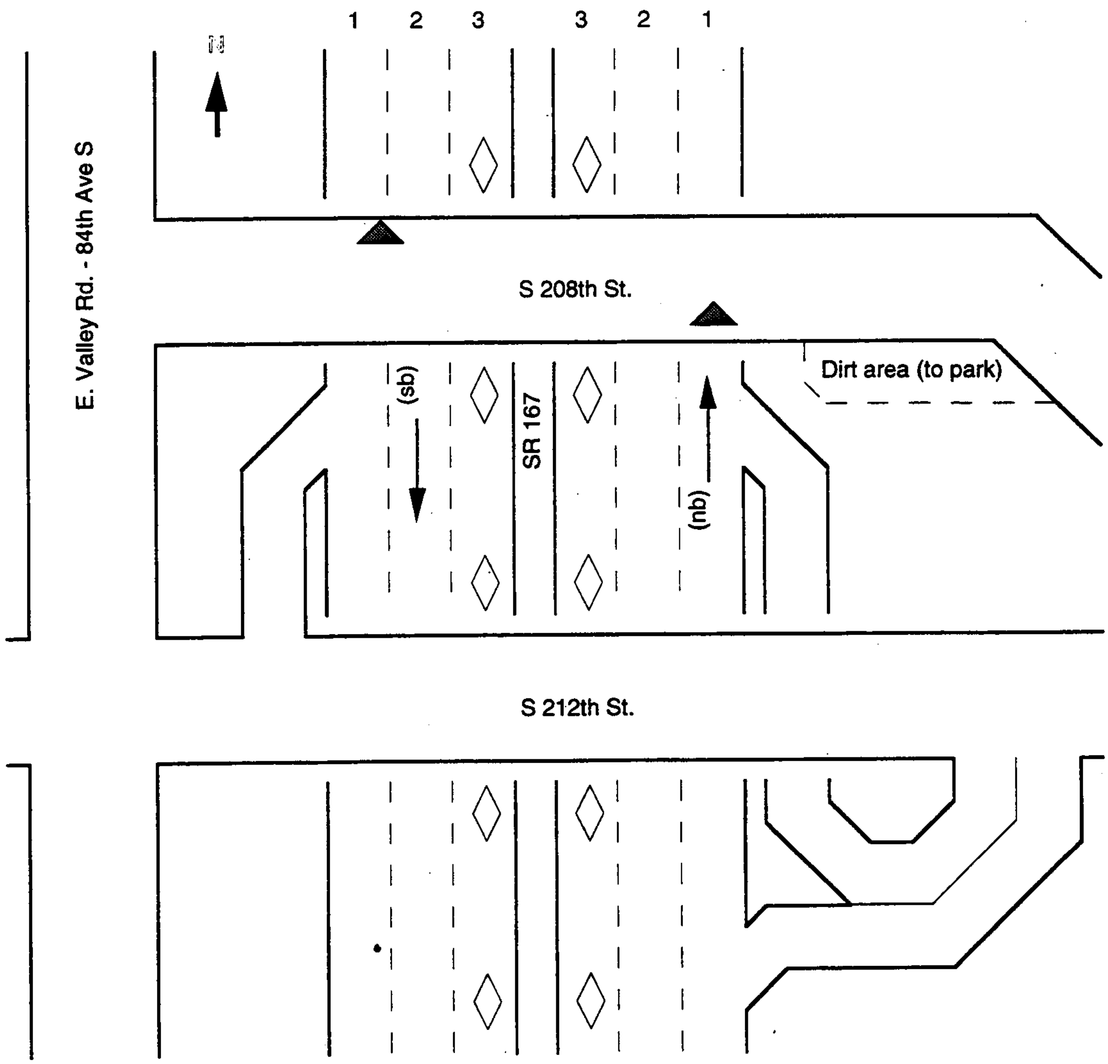
	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	704	90	11	1	0	0	1	68	84	5	**964**	**1.14**	**2**
2	Q4/93	No observations										--		
	Q1/94	6243	616	36	11	3	2	5	262	370	12	**7560**	**1.10**	**14**
	Q2/94	5104	472	31	16	1	5	6	183	349	18	**6185**	**1.10**	**15**
	Q3/94	5633	616	90	26	4	10	2	232	425	30	**7068**	**1.14**	**14**
	Q4/94	3120	303	38	12	1	1	6	172	262	1	**3916**	**1.12**	**13**
														58

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
GP	Q3/93	No observations										--		
2	Q4/93	No observations										--		
	Q1/94	5112	825	134	35	20	2	0	139	125	4	**6396**	**1.20**	**7**
	Q2/94	5653	906	142	40	29	5	0	157	157	26	**7115**	**1.20**	**9**
	Q3/94	10215	1834	305	132	39	14	4	406	424	52	**13425**	**1.23**	**18**
	Q4/94	4145	676	26	12	21	7	2	143	154	9	**5195**	**1.16**	**13**
														47

SR167 @ S 208th - Kent

Beginning Q1/95



Note: The HOV lanes opened to traffic on November 19, 1994. Prior to that time the HOV lanes did not exist.

a.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV 1	Q1/95	23	551	24	7	6	9	0	14	0	6	**640**	**2.03**	**8**
	Q2/95	49	895	63	17	23	7	3	14	1	23	**1095**	**2.05**	**13**
														21
GP 2	Q1/95	1942	179	5	13	0	2	4	137	198	2	**2482**	**1.11**	**5**
	Q2/95	5804	290	20	12	4	0	0	176	378	11	**6695**	**1.06**	**11**
														16

p.m. northbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV 1	Q1/95	109	425	24	17	13	0	2	3	2	9	**604**	**1.92**	**8**
	Q2/95	4	821	87	45	8	2	1	3	1	32	**1004**	**2.19**	**9**
														17
GP 2	Q1/95	2365	251	15	14	1	0	1	77	86	12	**2828**	**1.13**	**7**
	Q2/95	3245	641	42	43	1	0	1	89	121	13	**4196**	**1.22**	**8**
														15

a.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV 1	Q1/95	35	499	23	17	17	26	4	6	0	10	**637**	**2.04**	**7**
	Q2/95	34	334	24	4	8	10	1	1	1	8	**425**	**2.00**	**11**
														18
GP 2	Q1/95	1463	158	13	5	1	3	5	111	193	0	**1952**	**1.12**	**7**
	Q2/95	4206	224	21	6	0	8	0	146	287	7	**4905**	**1.06**	**9**
														16

p.m. southbound

	Qtr.	1	2	3	4+	Van	Public Transit	Other Bus	2 Axle	3+ Axle	Motor-cycle	TOTAL OBS.	ACO	Counts
HOV 1	Q1/95	342	809	79	18	40	1	0	16	4	19	**1328**	**1.82***	**7**
	Q2/95	214	1100	104	13	18	3	0	21	19	18	**1510**	**1.94***	**7**
														14
GP 2	Q1/95	4102	374	39	14	7	2	1	120	139	2	**4800**	**1.11**	**9**
	Q2/95	3014	518	36	11	5	1	0	84	103	5	**3777**	**1.17**	**6**
														15

* High Percentage of violators in most counts.

APPENDIX C

OBSERVER COMMENTS MADE DURING VEHICLE OCCUPANCY SESSIONS

Below is a sample of comments made by observers while collecting occupancy data throughout this period. Generally, these comments can be categorized into three types: comments regarding data collection, comments about traffic conditions, and comments about weather conditions. Ellipses represent time gaps between comments made by the observer. Because the length of comments is limited by the program used, words are sometimes cut off.

DATA COLLECTION

1. actually counting i-5nb off/r at madison st. mainline's moving well.

2. hard to see people in the back seat due to the angle

3. cars in this lane enter a patch of shade just before i can see them clearly, and don't emerge until just before they go under the overpass. on such a bright, sunny day, it makes it hard to see into back seats, esp in dark colored cars.

4. rolling slowdown, site is ok, sidewalk on s side is too narrow, so I'm watching them going away from me

6. just lost a file I started at half capacity battery I couldn't believe it

7. just lose a count, battery dead backup battery is also not full?! I will count as much as it can do

8. hve to go to meet other observers

9. no light for the inside lanes.......end counting

10. trying to get bus numbers

11. taking a break

TRAFFIC CONDITIONS

1. traffic in fast lane came to an abrupt stop one car skidded- almost a crash.......traffic is flowing smoothly again, but traffic speed is less than 55.......another quick stop in the fast lane along with some more burnt rubber.

2. CARS ENTERING FROM TOWN CROSS OVER LANES HER

3. MAINLINE OFF-RAMP AT STEWART ST. ST.........EXPRESS LANE OFF-RAMP CLD BE COUNTED HERE BY A SECOND PERSON.......THERE ARE POSSIBLY, AGAIN AS MANY CARS EXITTING FROM THE EXPRESS LANES AS THIS

4. TRAFFIC HAS MOVED WELL ALL MORNING, ONLY ONE SLOW-DOWN

5. JUST AS THIS LANE COUNT CLOSES, THE SPEED OF FLOW DROPS TO A CRAWL

6. THE BUSES HAD NO PASSENGERS

7. congestion because of traffic lights occured during the last 20 minute

8. mainline is moving very slowly. The motorcycle that exited here had 2 occupants

9. foggy-49 degrees, wet road.......traffic is heavy but is moving.....traffic slows down.......stop and go traffic.......my battery is running out.......accident below the overpass........I think the driver saw me and did not look at the traffic

WEATHER CONDITIONS

1. mountains are absolutely beautiful. Clear as a bell.

2. FREEZING/HARD RAIN

3. hot, hot, hot, hot,

4. sunny, hot, windy

5. clear,beautiful

6. rain rain rain

7. sunny and clear

8. cold, overcast, dark, finger-numbin' fun

9. cold drizzle--and i forgot my damn glove

10. Some sunshine bvut not enuf

APPENDIX D

ACO DATA ANALYSIS

Table D1: Adjustment Factors

Days	Lane	Ramps
Mon.	.000	.000
Tue.	-.001	.004
Wed.	-.001	.002
Thur.	-.002	.009
Fri.	.021	.025
Quarter		
Q3	.000	.000
Q4	-.021	-.044
Q1	-.020	-.046
Q2	-.019	-.021
Lanes		
HOV	0	na
In	-.984	na
Mid	-1.046	na
Out	-.982	na

USING TABLE D1 ADJUSTMENT FACTORS

To use the adjustment factors presented in table D1, merely add (subtract) the appropriate number to the ACO figures presented in Appendix B, based on the aplicable parameters. Continuing the example of the northbound general purpose lanes of I-5 at NE 145th Street during the evening peak in Chapter Three, one would perform the following steps to correct the observed ACO for sample bias.

1. Lookup the ACO value for each quarter of I-5 North, NE 145th Street (Site 14), p.m., northbound general purpose lanes (Table B7). This yields the following values:
   Q4/92 = 1.12
   Q1/93 = 1.13

2. Adjust the ACO for each quarter according to Table D1 as follows:
   Q4/92 = 1.12 - 0.060 = 1.060
   Q1/93 = 1.13 - 0.068 = 1.062

One can now conclude that ACO slightly increased during Q4/92 through Q1/93.

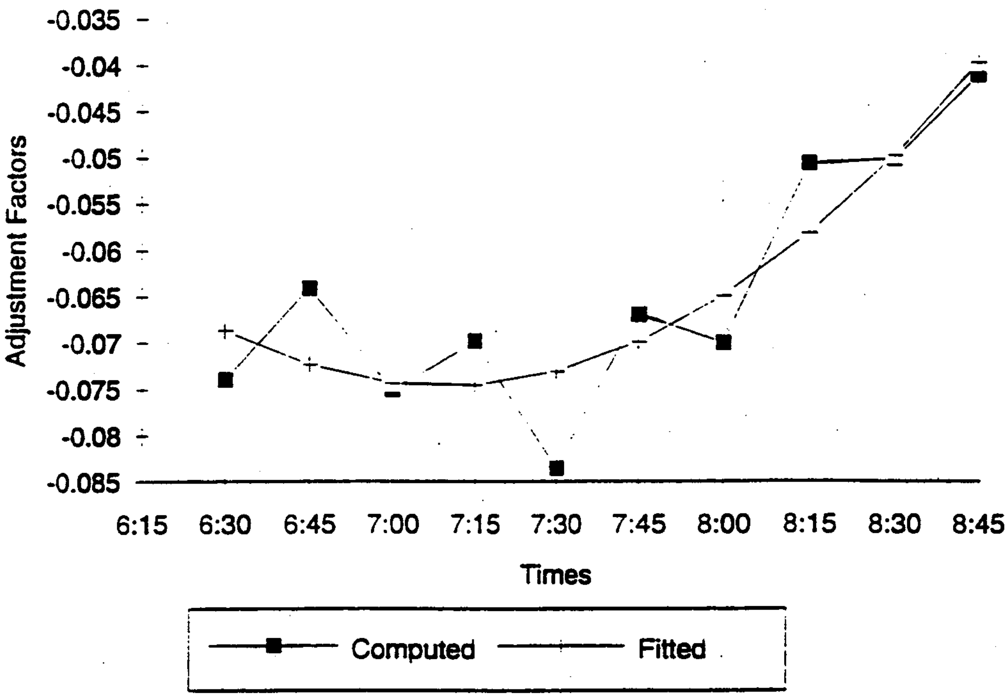


Figure D1. AVO Adjustment Factors – AM Lanes

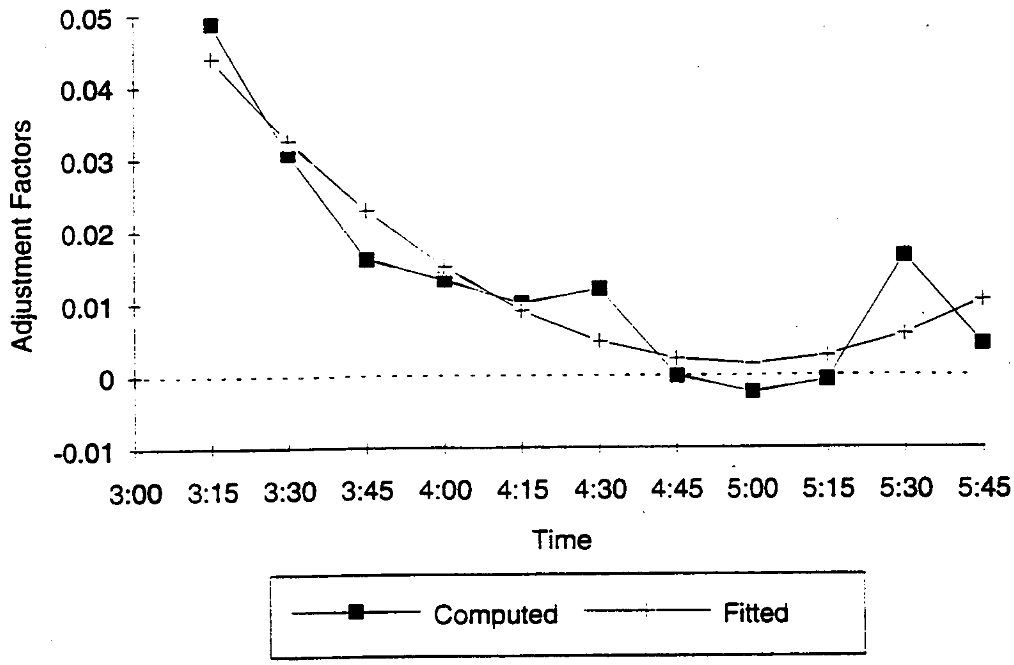


Figure D2. AVO Ajustment Factors – PM Lanes

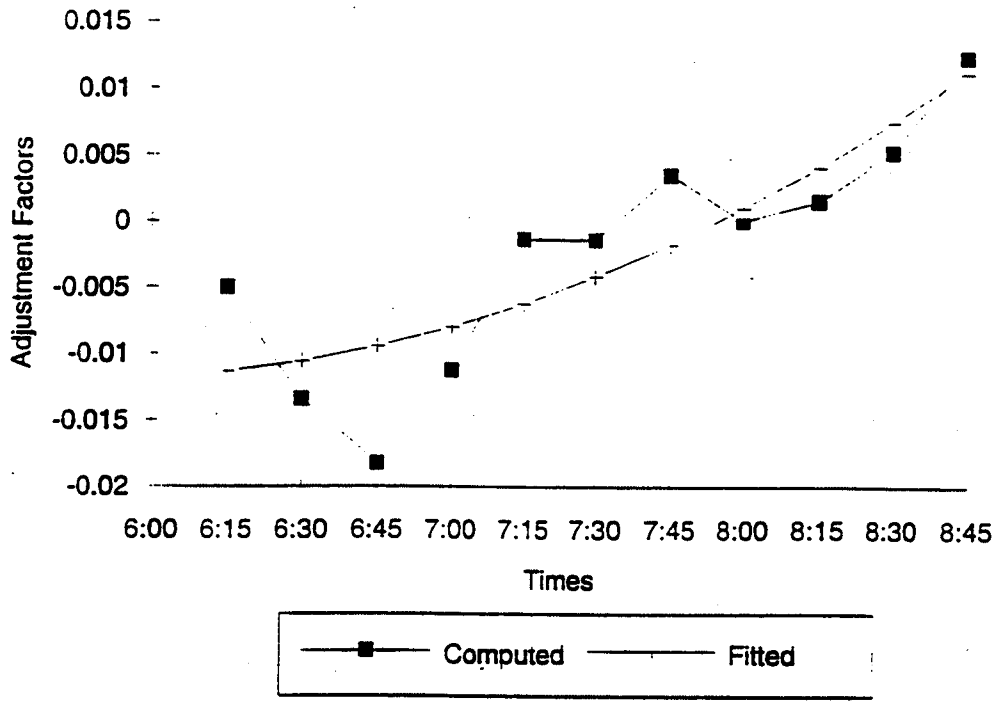


Figure D3. AVO Adjustment Factors - AM Ramps

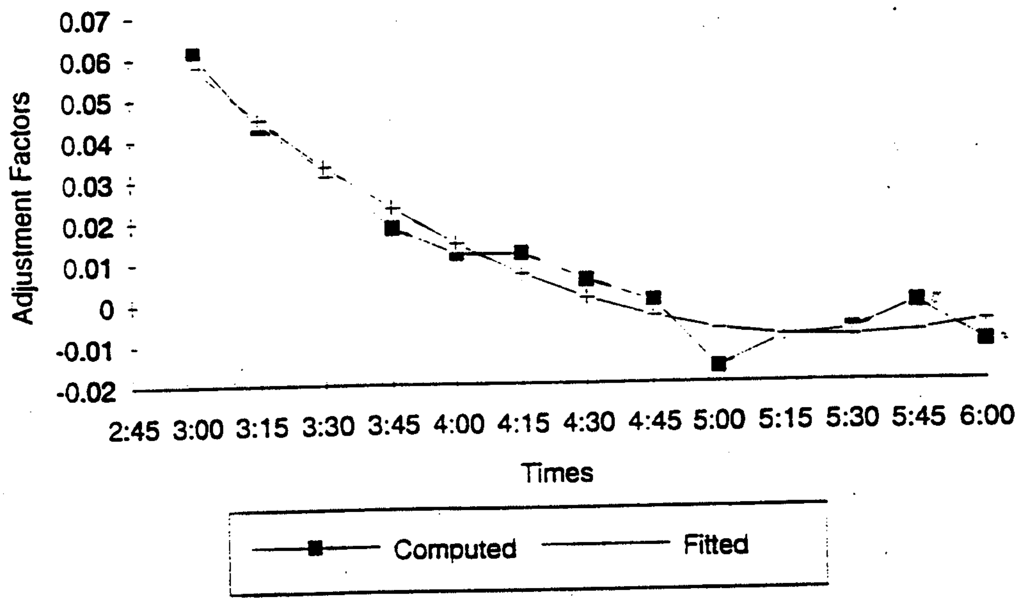


Figure D4. AVO Adjustment Factors – PM Ramps

APPENDIX E

TRAVEL TIME DATA

Table E1. Travel Time Observation Sites, July 1992 - July 1993

I-5 North (corridor 1)	I-5 Downtown (corridor 2)	I-5 South (corridor 3)
11 = SW 236th St	21a = Lakeview Blvd.	31 = S 178th St
12 = N 185th St	22 = Holgate St	32
13	23	33
14	24	34 = S 216th St
15 = N 117th St	25 = Albro Pl	35
16	26 = S 144th St	36
	27	37
	28	38 = S 260th St
	29	
	20	

SR 520 (corridor 4)	I-90 (corridor 5)	I-405 South (corridor 6)
41 = Hunt's Point	51 = 23rd Ave S	61 = Tukwila Pkwy
42	52 = 35th Ave S	62
43 = SR-908 - Bellevue/Kirkland	53	63 = Benson Rd S
44	54	64
45 = 148th Ave NE	55 = East Mercer Wy	65 = 112th Ave SE/Lake Wash. Blvd.
46	56	
47		

I-405 Central (corridor 7)	I-405 South (corridor 8)	Outlying Locations
71	81= SR 908 -Kirkland/Redmond	
72		
73 = NE 12th St		

Table E2. Travel Time Study Section Length

Study Section	Length (kilometers)
North I-5	
236th St. SW to NE 117th St.	8.2
NE 117th St. to NE 185th St.	5.8
Downtown I-5	
Lakeview Blvd. E to S Holgate St.	5.0
Lakeview Blvd. E to Albro Pl.	9.4
Lakeview Blvd. E to S 144th St.	18.9
S Holgate St. to Albro Pl.	4.4
S Holgate St. to S 144th St.	14.0
Albro Pl. to S 144th St.	9.5
South I-5	
S 178th St. to S 216th St.	4.5
S 260th St. to S 216th St.	4.3
SR-520	
SR-908 to Hunt's Pt.	2.7
148th Ave. NE to Hunt's Pt.	7.9
Hunt's Pt. to SR-908	2.7
148th Ave. NE to SR-908	5.2
I-90	
23rd Ave. S to E Mercer Way	7.7
E Mercer Way to 35th Ave. S	6.6
I-405	
Tukwila Pkwy. to Benson Rd. S	3.4
Tukwila Pkwy. to 112th Ave SE	14.0
Tukwila Pkwy. to NE 12th St.	21.5
Tukwila Pkwy. to SR-908	27.5
Benson Rd. S to 112th Ave SE	10.3
Benson Rd. S to NE 12th St.	18.1
Benson Rd. S to SR-908	24.1
112th Ave SE to NE 12th St.	7.8
112th Ave SE to SR-908	13.8
NE 12th St. to SR-908	6.0

Figure E1. Travel Time Sites
I-5 North (Corridor #1)

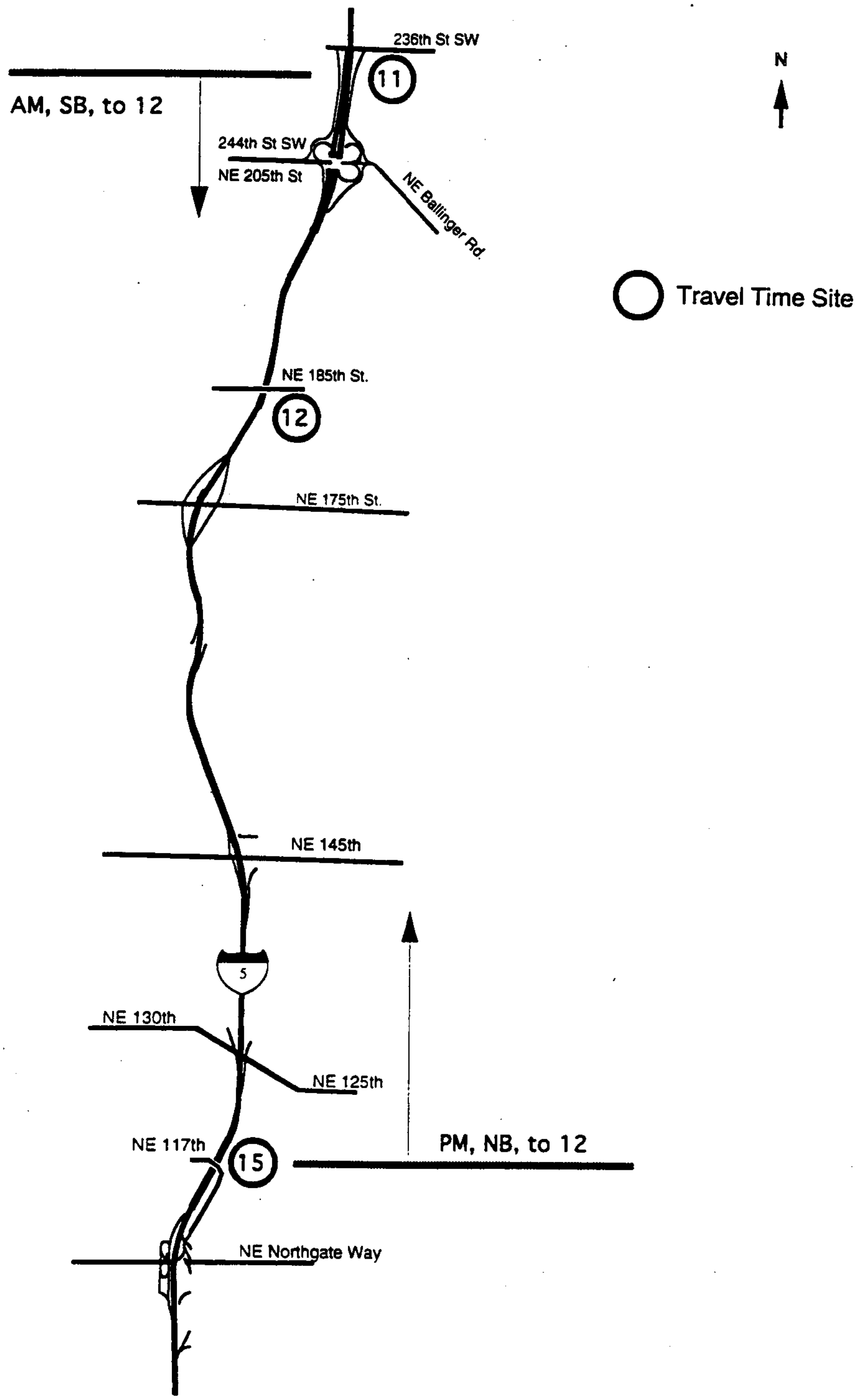


Figure E2. I-5 NORTH - SW 236th Street **SITE #11**

Travel times SB-am

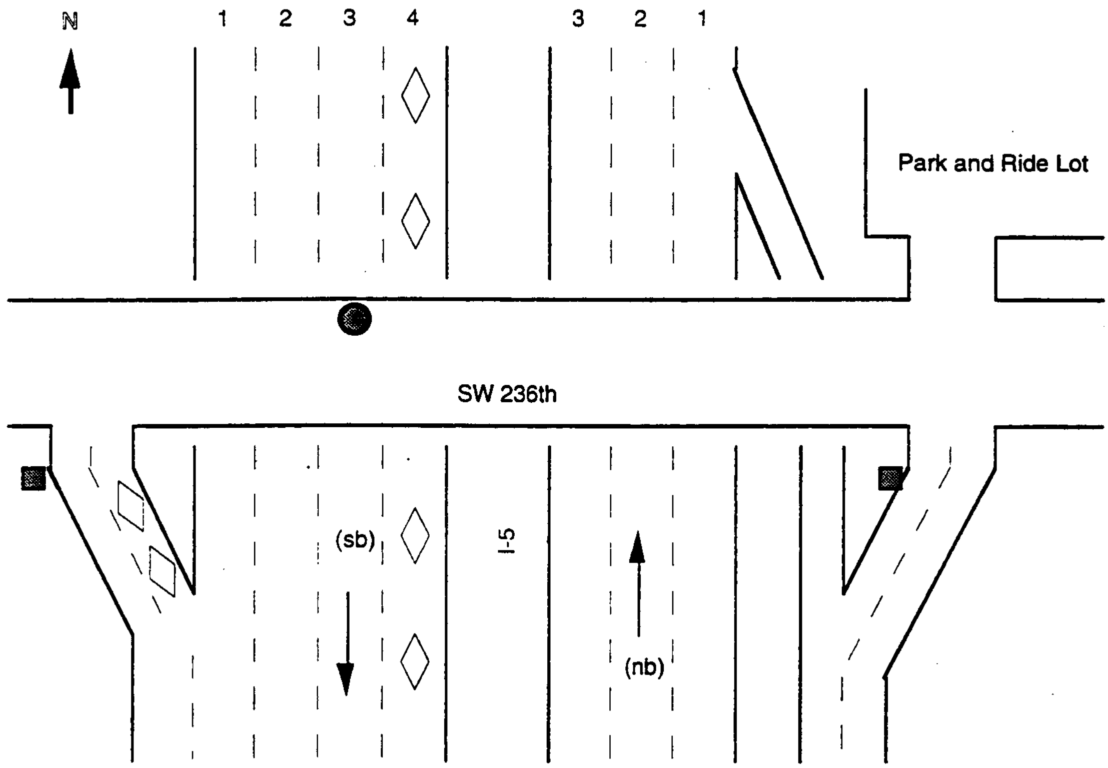


Figure E3. I-5 NORTH - North 185th Street **SITE #12**

Travel times NB-pm

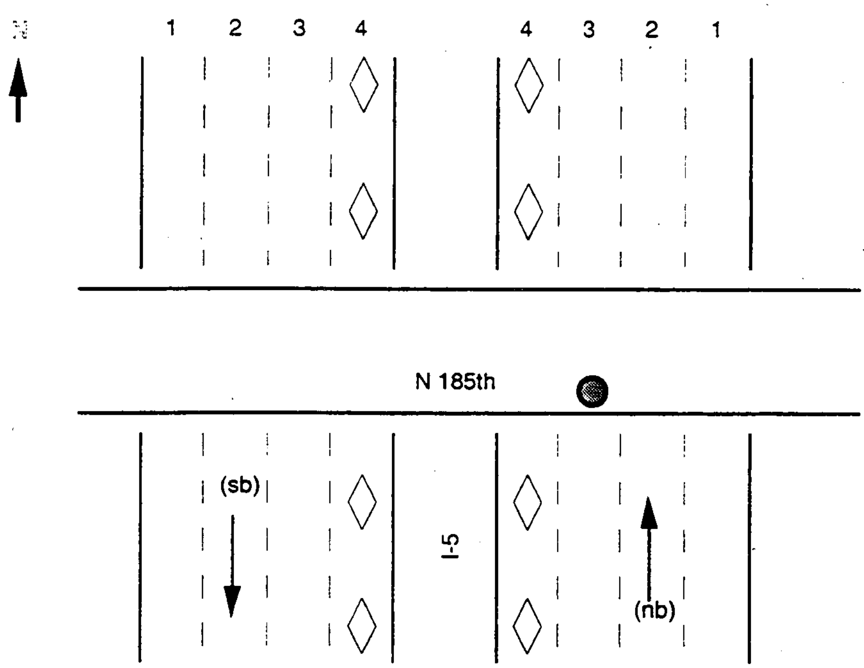
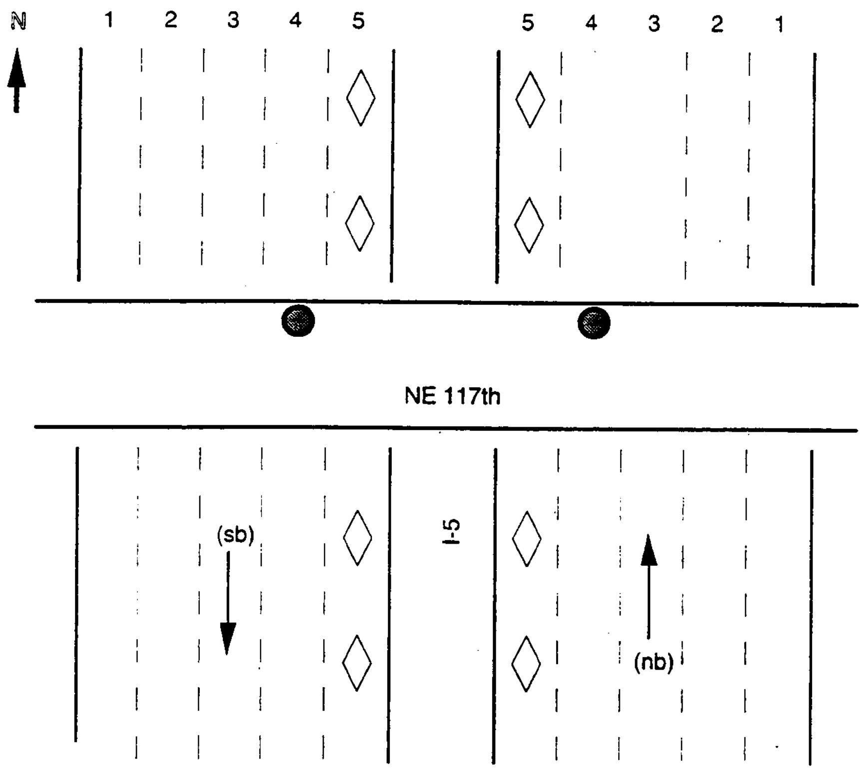


Figure E4. I-5 NORTH - 117th Avenue NE SITE #15

Travel times SB-am
Travel times NB-pm



Note: There is a sidewalk only on the north side of this overcrossing. You may count southbound traffic as it comes toward you, but you must count northbound traffic as it comes under the overcrossing and goes away from you.

Table E3. North I-5 236th St. SW to 117th St. NE , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	59.5	59	58	56.8	55	52.6	53.6	57.6	58.6	59	59.4
	Q4/92	–	–	–	–	–	–	–	–	–	–	32.6	32	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	57.6	–	–	–	53	–	–	–	–	–
HOV Lanes	Q3/92	–	–	–	–	55.7	57.1	53.6	55.8	55.5	53.7	56.3	57.4	58.8	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	50	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	54.7	–	–	–	–	–

Table E4. North I-5 117th St. NE to N 185th St. , northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	52.6	57.4	53.6	42.5	36.8	29.7	31.2	31.7	27.1	28.7	35.4	46.7
	Q4/92	–	–	5.3	9.8	31.3	34.9	22.9	37.3	–	–	–	–	–	–
	Q1/93	–	1.2	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	2.1	60.2	61.3	43.3	52.2	43.2	59.9	57	59.8	58.4
HOV Lanes	Q3/92	–	–	51.6	61.9	65.1	45	37.3	33.8	42.9	37.6	46.5	39.9	44.6	54.3
	Q4/92	–	–	–	–	37.7	28.1	–	43.4	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	59.2	60.4	59.3	58.6	55.3	58	57.3	57.5	56.5

Figure E5. Travel Time Sites
I-5 Downtown (Corridor #2N)

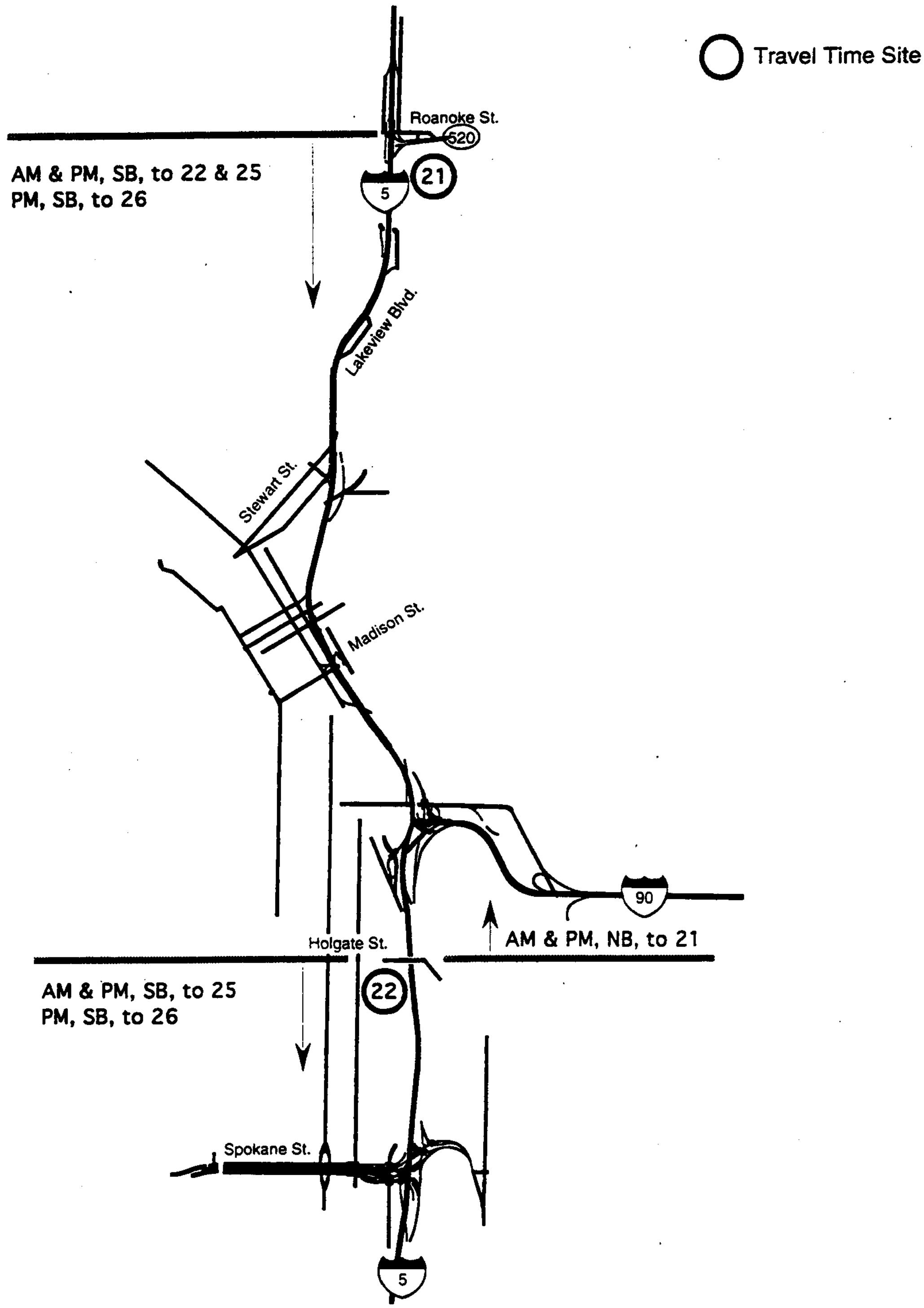


Figure E5. Travel Time Sites (cont.)
I-5 Downtown (Corridor #2S)

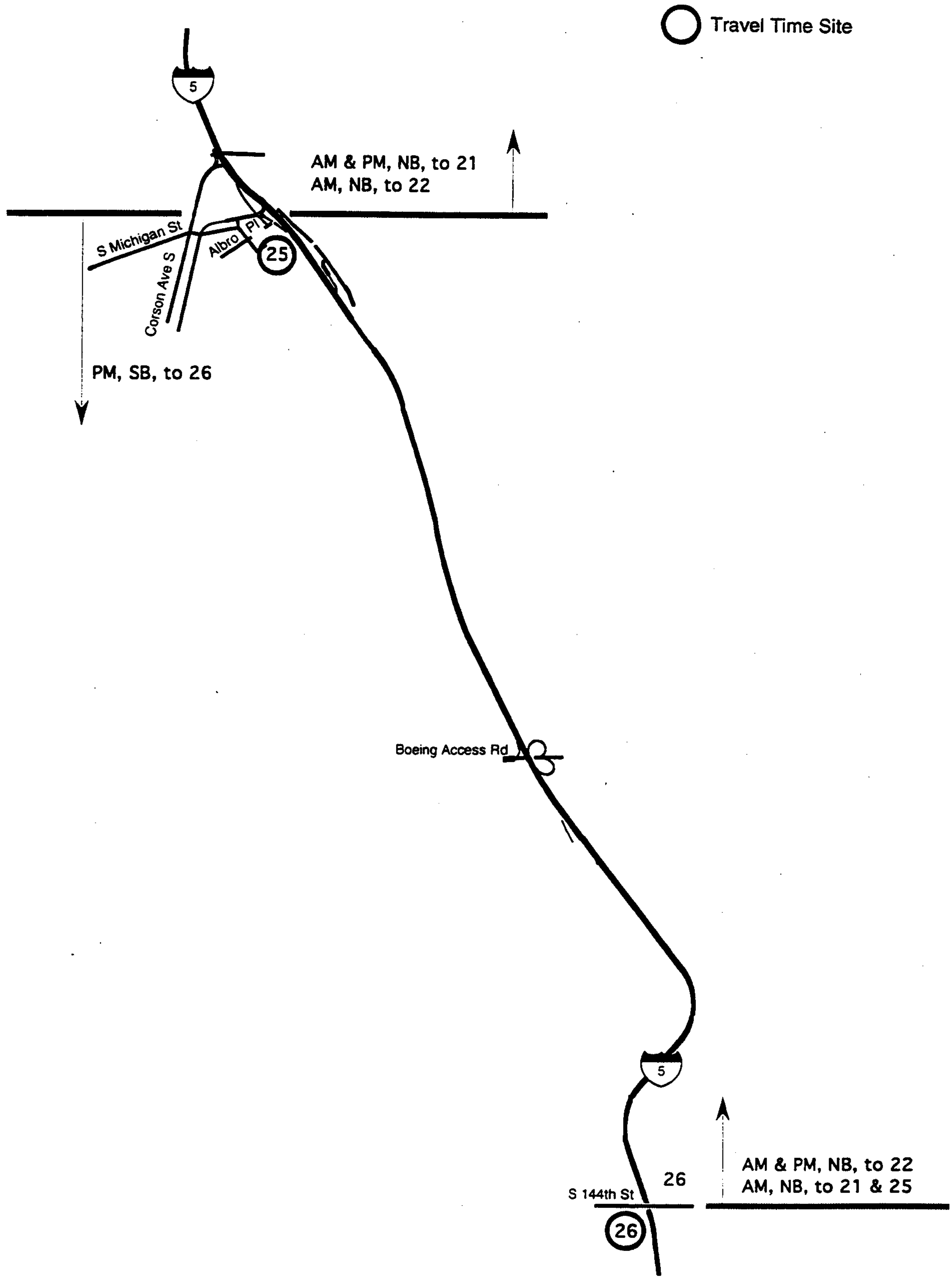


Figure E6. I-5 DOWNTOWN - Roanoke St. SITE #21b

Travel times SB&NB-am&pm

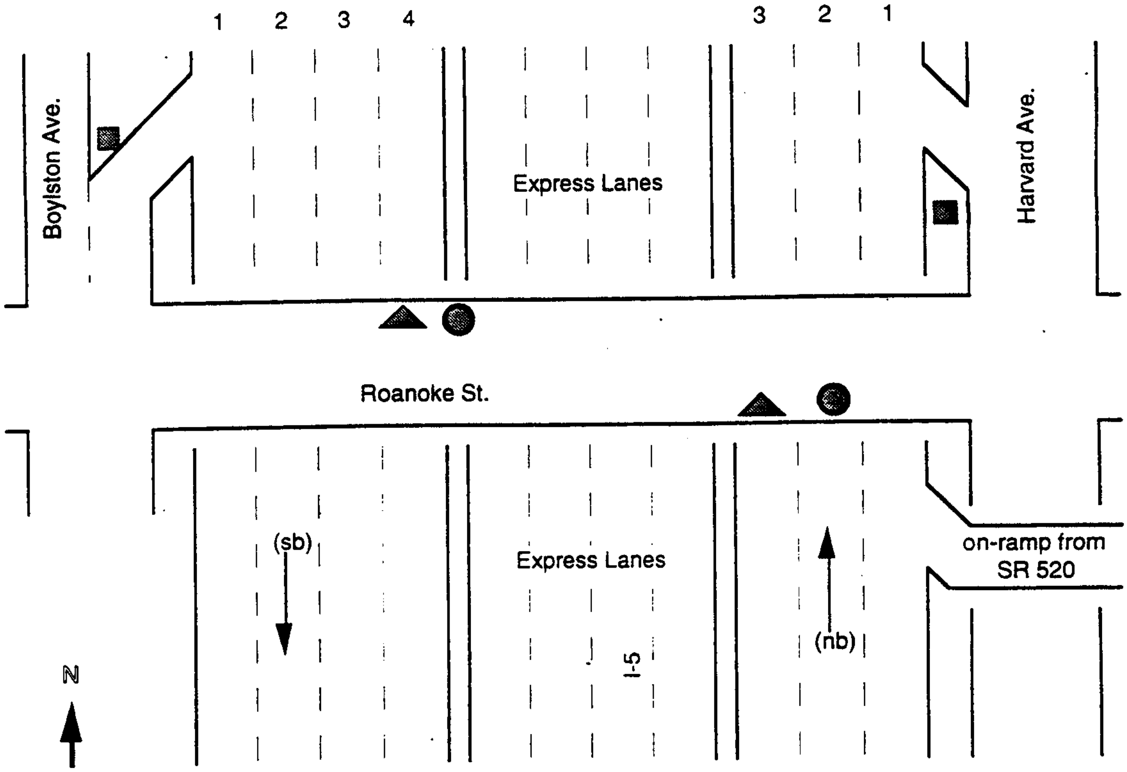


Figure E7. I-5 DOWNTOWN - S Holgate St. SITE #22

Travel times SB&NB-am&pm

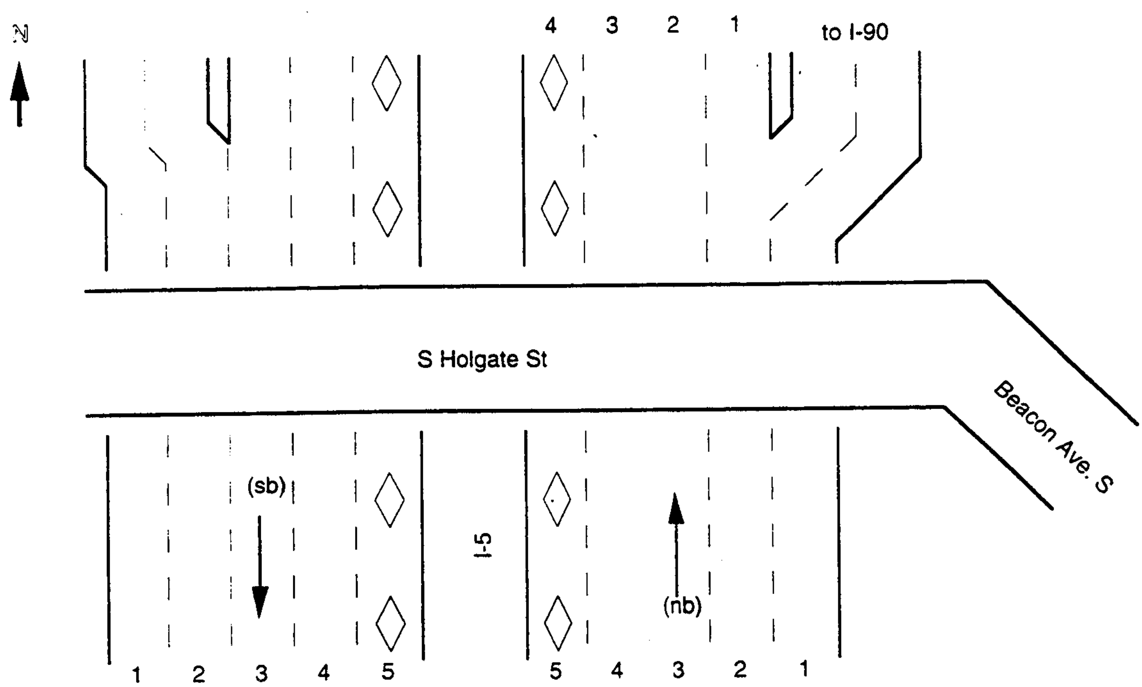


Figure E8. I-5 DOWNTOWN - Albro Place	SITE #25

Travel times SB & NB-am & pm

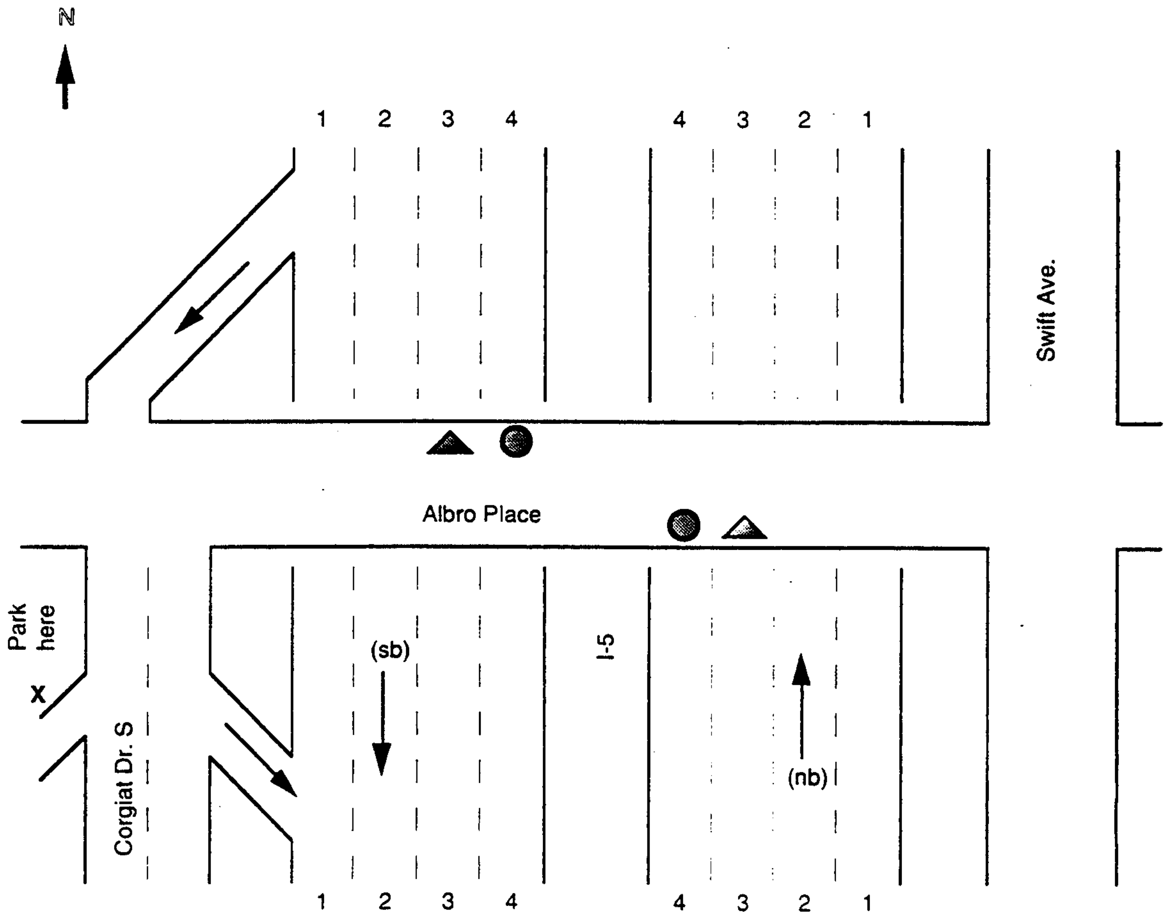


Figure E9. I-5 DOWNTOWN - South 144th St.	SITE #26

Travel times NB-am & SB-pm

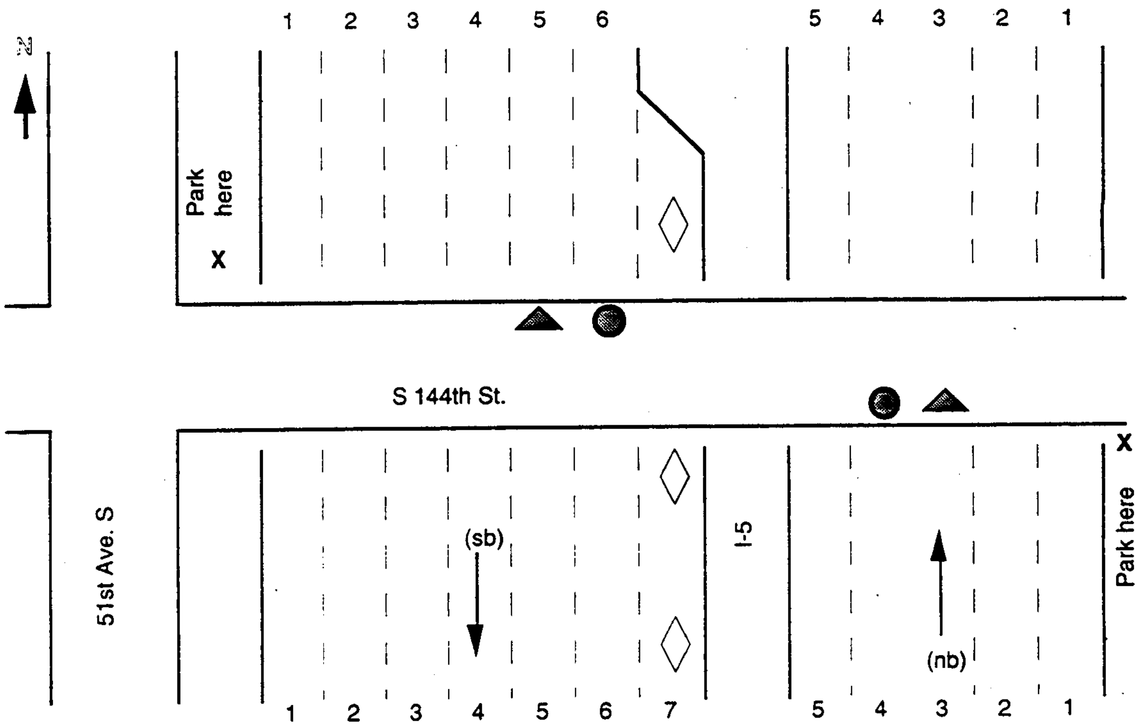


Table E5. I-5 Downtown Lakeview Blvd E to S Holgate St. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	60.8	57.4	50.5	44.3	48.3	52.1	53.8	49.5	52.3	57
	Q4/92	–	–	–	–	–	–	–	53.3	57.1	–	58	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	58.9	56	59.6	–	–	–	–

Table E6. I-5 Downtown Lakeview Blvd E to S Holgate St. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	26.1	27.5	24.7	25.4	24.9	25.3	25.7	26	27.9	22.5	18.4	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	35.5	33.1	42.8	28.2	40.1	39.1	22.1	12.4	2	1.8
	Q2/93	–	–	–	–	31.4	25.2	27.4	24.2	29.3	29.8	38.6	43.1	46.2	–

Table E7. I-5 Downtown Lakeview Blvd E to Albro Pl. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	47.5	44.5	34.5	31	46.7	54.6	53.7	55.7	–
	Q4/92	–	–	–	–	–	–	–	55.5	52.3	57.2	56.7	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E8. I-5 Downtown Lakeview Blvd E to Albro Pl. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	31.3	31.9	32.4	32	33.9	34.7	34.4	33.9	31	26.9	31.5
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	7.8	–	14.2	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E9. I-5 Downtown Lakeview Blvd E to S 144th St. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	53.4	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E10. I-5 Downtown S Holgate St. to Lakeview Blvd E , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	60.3	56.1	41.5	54.4	55.2	55.3	49.8	52.1	50	55.1	50.7
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	31.9	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	56.6	53.4	51	53.7	47.3	49.3	–	–	–	–

Table E11. I-5 Downtown S Holgate St. to Lakeview Blvd E , northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	27.9	–	–	–	–	–	32.9	–	32	–	–
	Q4/92	–	–	–	–	–	36.4	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	44.9	6.1	5.5	3	–	2.2	1.8	1.6	–
	Q2/93	–	–	1.9	10.7	35.8	28.6	28.2	32.1	31.3	33.9	26.9	32.3	27.9	–

Table E12. I-5 Downtown S Holgate St. to Albro Pl. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	50.4	60.4	67.3	54.8	67.1	67.2	69	–
	Q4/92	–	–	–	–	–	–	54.1	53.3	54.9	56.4	56.4	56.7	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E13. I-5 Downtown — S Holgate St. to Albro Pl., southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	58.1	58	56.6	57	59.3	60.8	60.2	57.2	61.1	54.8	59.3
	Q4/92	–	–	–	40	49.7	50.6	56.8	54.5	52.7	–	–	–	–	–
	Q1/93	–	–	–	58.4	61.7	58.3	61.8	51.6	62.4	63.4	64.4	64.8	63.3	64.5
	Q2/93	–	–	–	–	58.4	53.9	53.9	52.4	63.3	–	63.4	63.2	63.5	–

Table E14. I-5 Downtown — S Holgate St. to S 144th St., southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	47	–	19.3	15.2	20.6	24	22.6	32.5	34.8	53.6	52.9	–
	Q4/92	–	–	–	–	15.2	20.5	17.2	11.4	11.9	16.1	17.2	31.5	23.4	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E15. I-5 Downtown — Albro Pl. to Lakeview Blvd E, northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	24.2	55.9	56	48.8	29.2	39.8	53.6	44.3	46.6	50.7
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E16. I-5 Downtown — Albro Pl. to Lakeview Blvd E, northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	43	42.7	31.8	29.6	31	28.5	31.1	37	31.5	28	32.4
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	21.4	19.4	18.1	11.2	10.6	9.5	7.2	5.3	4.3	3.5	3.8

Table E17. I-5 Downtown — Albro Pl. to S Holgate St., northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	54.3	49.1	49.5	46.1	47.2	48.2	34.5	48.6	55.3	68.9
	Q4/92	–	–	–	–	–	–	–	–	–	27.6	28.3	26.2	27.8	29.1
	Q1/93	–	–	–	–	–	–	–	39.6	41.6	38.1	40.9	41.9	52.8	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E18. I-5 Downtown — Albro Pl. to S Holgate St., northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	42.9	39.2	30.6	34.3	30.3	17.9	19.4	19.3	33.9	30.2	26.1

Table E19. I-5 Downtown — Albro Pl. to S 144th St., southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	53.4	55.3	57.9	55.6	53.1	59.4	58.4	57.4	59.5	61.3
	Q4/92	–	–	–	–	39.1	53.8	61.6	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	60.3	60.6	60.3	59.6	8.6	–	–	3.8	3.1	–
	Q2/93	–	–	–	76.3	75.2	73.1	71.6	73.4	73.9	74.2	73.2	71.9	70.3	–

Table E20. I-5 Downtown — S 144th St. to Lakeview Blvd E, northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E21. I-5 Downtown — S 144th St. to S Holgate St. , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E22. I-5 Downtown — S 144th St. to Albro Pl. , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	63.7	61.1	61.9	59.8	43.6	32	31.7	45.2	61.8	63.2	64.3
	Q4/92	–	–	–	–	–	–	–	–	52.8	57.6	37.1	54.4	5.7	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Figure E10. Travel Time Sites
I-5 South (Corridor #3)

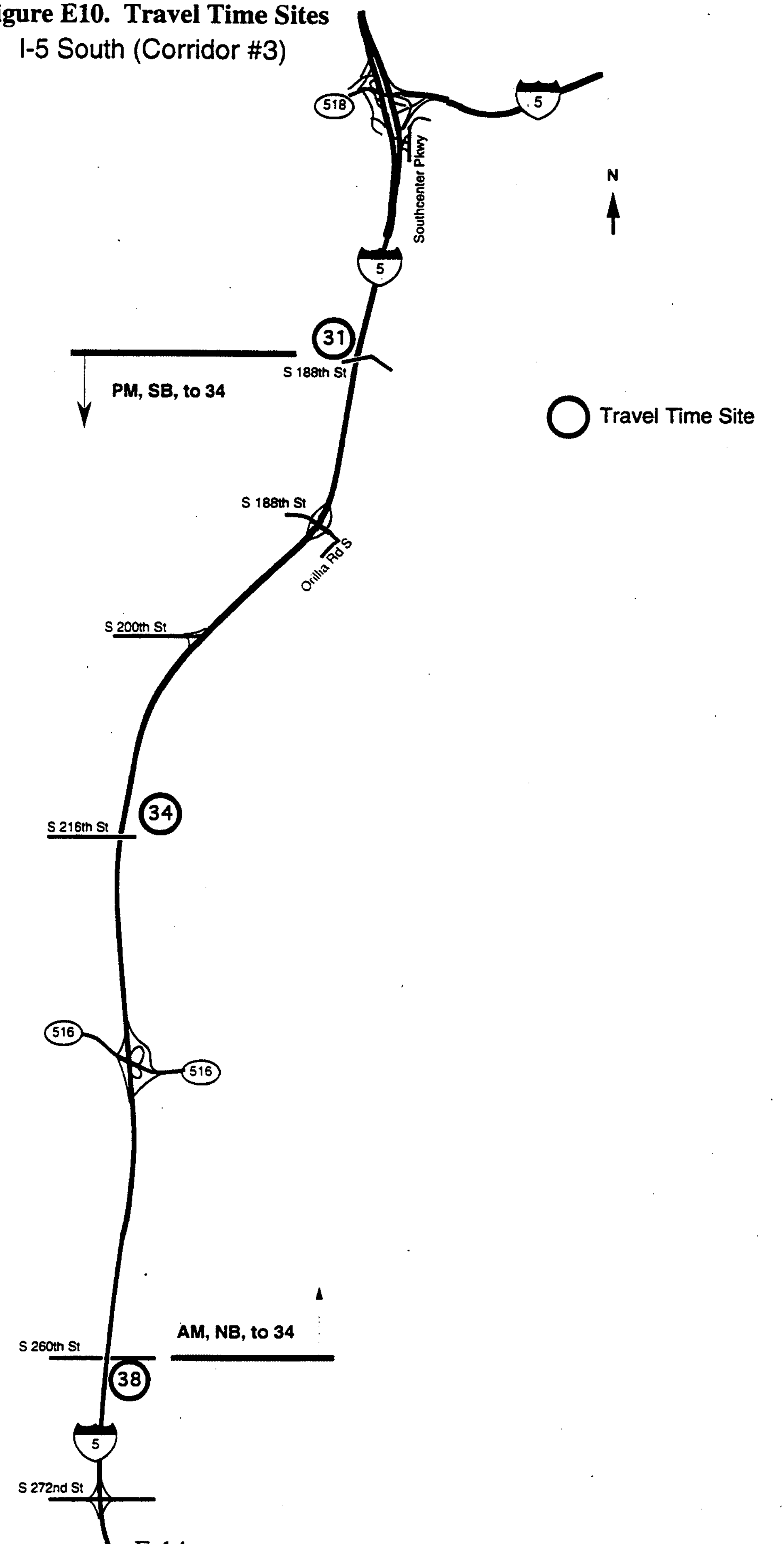


Figure E11. I-5 SOUTH - S. 178th Street **SITE #31**

Travel times SB-pm

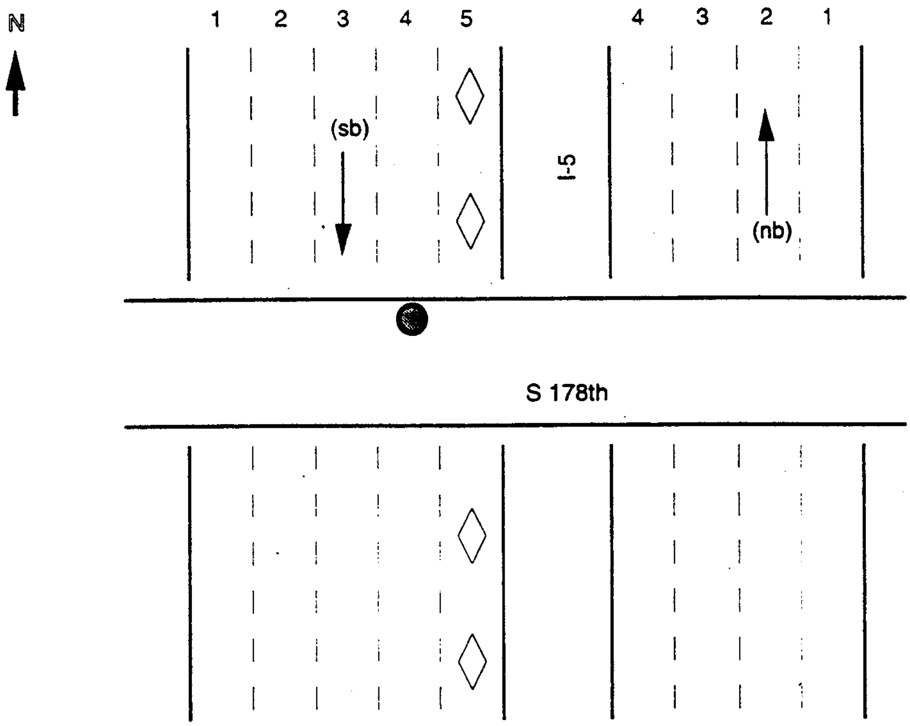


Figure E12. I-5 SOUTH - S 216th St. **SITE #34**

Travel times NB-am & SB-pm

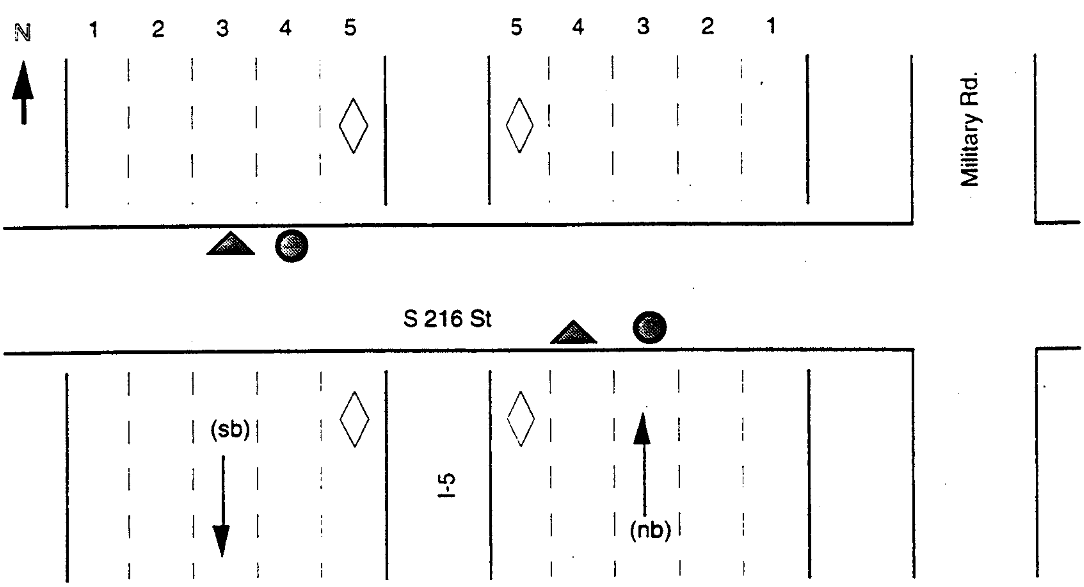
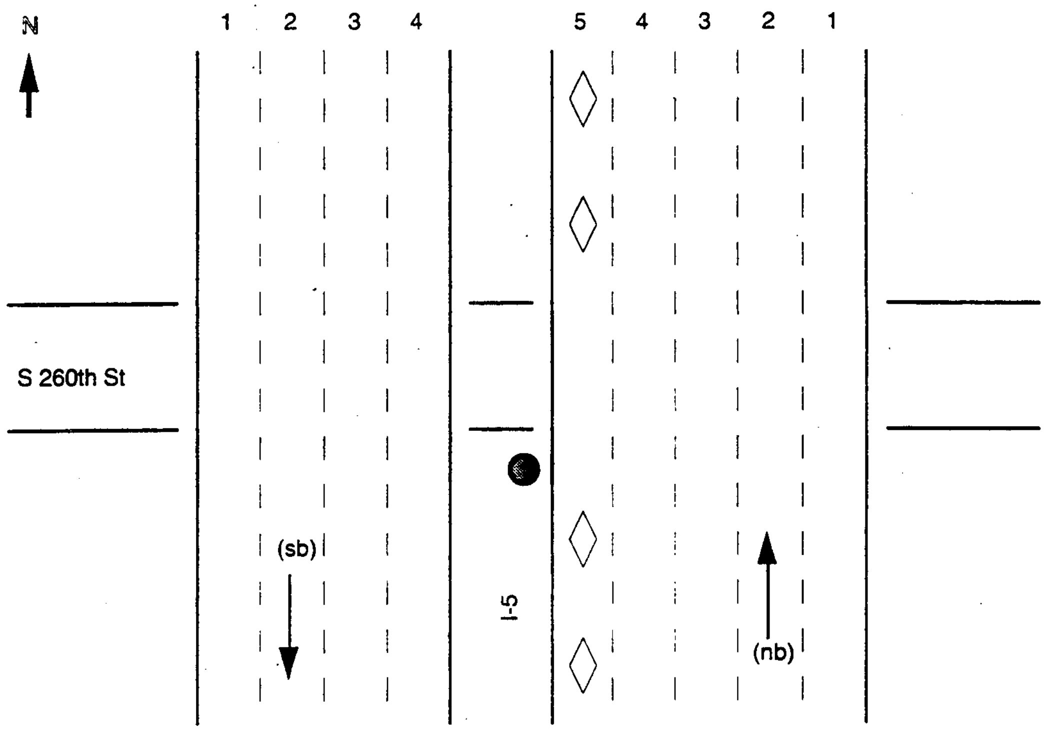


Figure E13. I-5 SOUTH - S 260th St.	SITE #38

Travel times NB-am



Note: You have to scramble up the hill on the south side of S. 260th and between the northbound and southbound freeway lanes. Climb over the fence at the top of the hill, and sit behind the jersey barrier at the edge of the freeway (the HOV and fast lanes northbound will be closest to you). Since you are in the freeway right-of-way at this location, you <u>must</u> wear a vest.

Table E23. I-5 South S 178th St. to S 216th St. , southbound p.m.

	Qtr.	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30	6:45	7:00	7:15
GP Lanes	Q3/92	35.6	39.7	37.4	37.2	42.7	42	43.2	47.8	41.8	52.3	66.1	–	–	–	–
	Q4/92	–	18.2	17.7	20	19.2	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	46.8	40.5	32.8	38.1	40.1	54	40.7	42	39.2	46.4	46.4	55.2	66.4	–
	Q2/93	8	40.4	35.2	40.6	40.3	39.3	38.1	39.1	36.2	30.6	20.7	22.2	37.5	60	62.4
HOV Lanes	Q3/92	41.2	33.2	38.4	43.1	36.9	38	35	45.2	45.7	49.7	55.7	73	–	–	–
	Q4/92	–	51.1	52.4	45.5	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	47.6	30.7	31.3	46.2	40.4	42.3	37.5	39	36.7	37.8	–	57.8	–
	Q2/93	–	–	45.6	46.5	42.7	40.3	43.9	45.7	42.1	36.8	29.6	29.5	–	–	–

Table E24. I-5 South S 260th St. to S 216th St. , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	38.8	36	37.7	38.1	38.9	41.2	53.2	61.3	61.9	62.2
	Q4/92	–	–	–	–	–	–	–	21.8	26.9	33.8	55.8	61.1	–	–
	Q1/93	–	–	–	–	–	28.6	23.9	12.8	15.4	18.2	29.4	37.8	46.1	51.8
	Q2/93	–	–	–	–	61.3	56.4	47.3	41.4	40.1	51.5	47.8	36.5	–	–
HOV Lanes	Q3/92	–	–	–	–	–	53.5	50.4	51.4	50.5	50.4	58.6	57.7	–	–
	Q4/92	–	–	–	–	–	–	–	45	44.6	48.1	–	–	–	–
	Q1/93	–	–	–	–	–	–	40.1	44.6	42.4	46	45.4	49.4	39.4	–
	Q2/93	–	–	–	–	–	52.1	52.8	52.9	52.5	51.9	–	45.1	–	–

Figure E14. Travel Time Sites
SR 520 (Corridor #4)

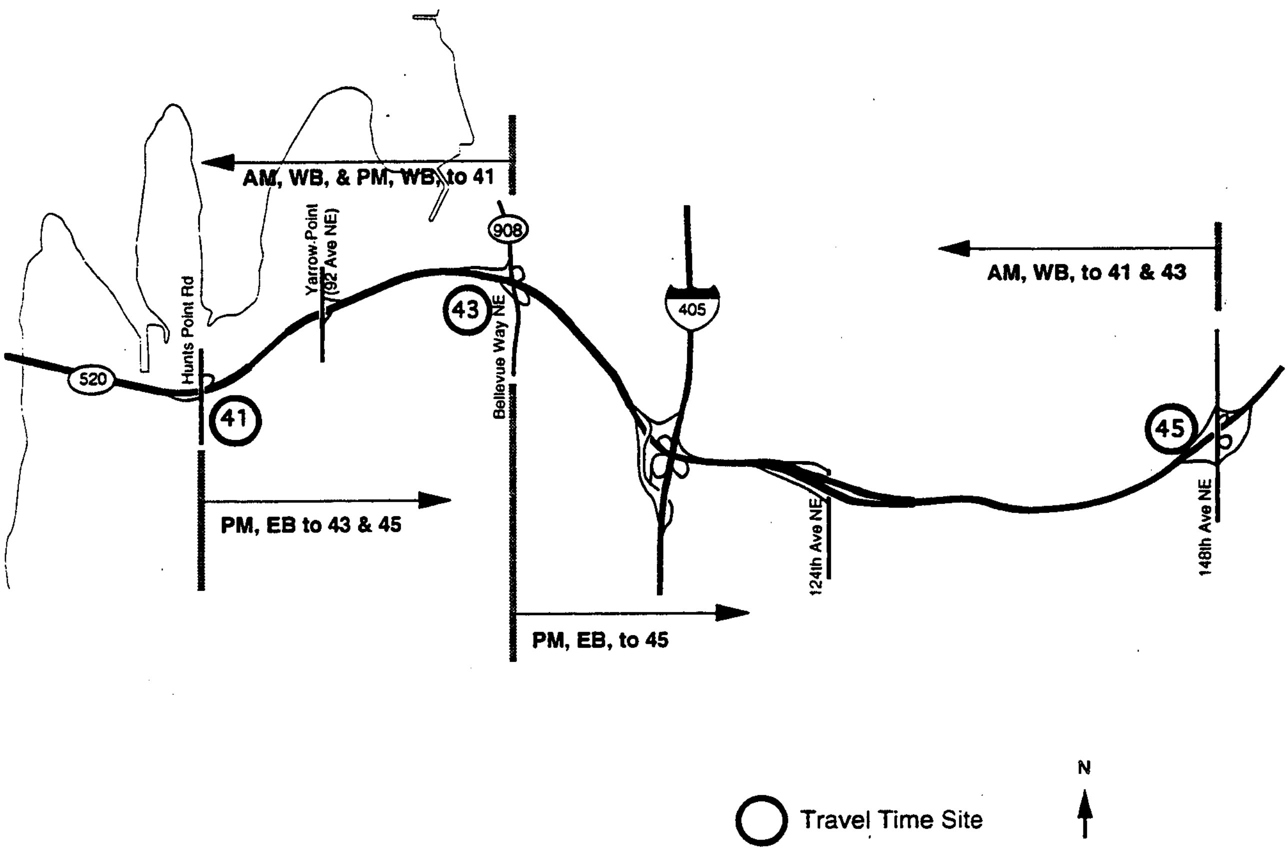


Figure E15. SR 520 - Hunt's Point SITE #41

Travel times WB-am & EB-pm

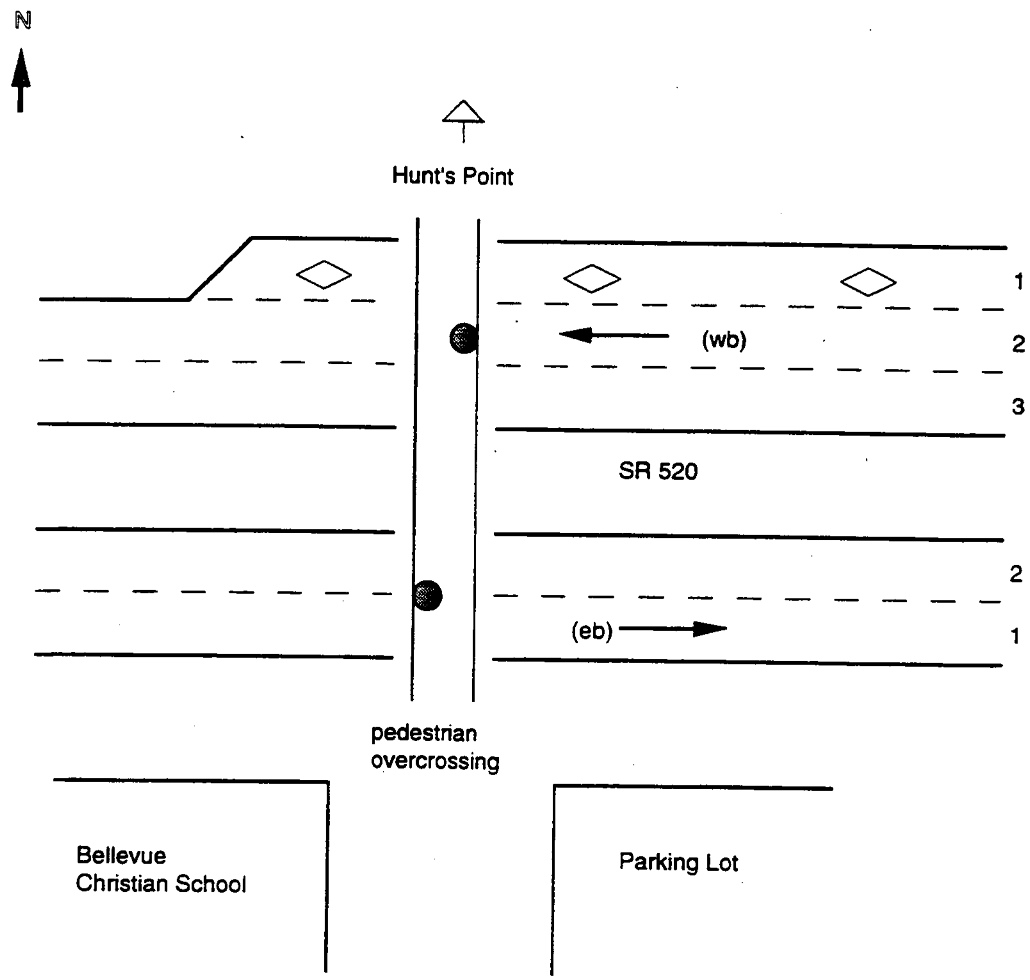


Figure E16. SR 908 - Hunt's Point - Bellevue/Kirkland	SITE #43

Travel times EB-am & WB-pm

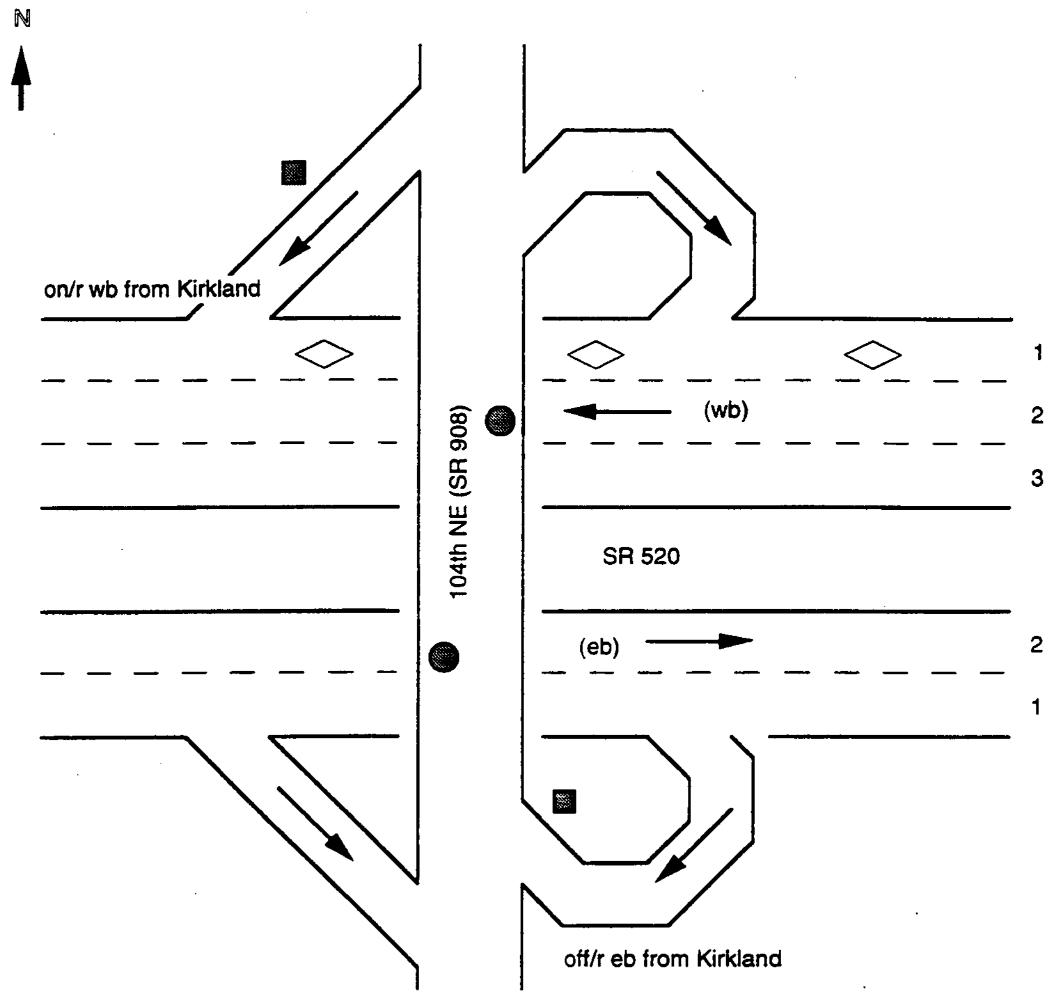


Figure E17. 148th Ave. NE **SITE #45**

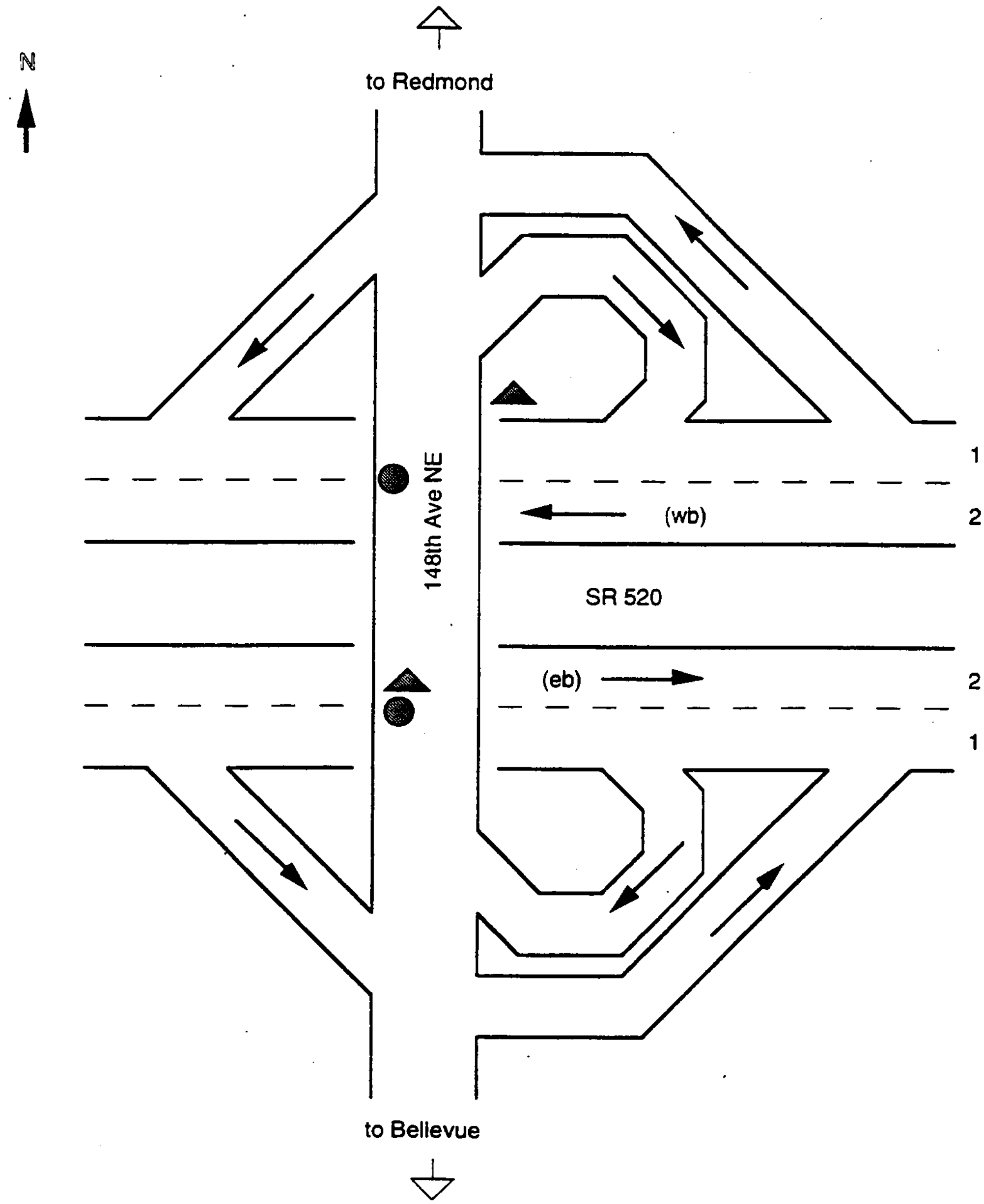


Table E25. SR 520 Hunt's Pt. to SR 908 , westbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	56.7	51.1	51.1	26.9	18	16.7	22.6	27.5	41	
	Q4/92	–	–	–	–	–	–	–	–	14.7	13.3	13.7	13.6	–	
	Q1/93	–	–	–	–	3.3	2.6	2.5	2.7	2.3	11.8	13.6	14.7	13.6	
	Q2/93	–	–	–	11.7	2.8	27.9	28.8	–	–	–	–	–	–	
HOV Lanes	Q3/92	–	–	–	–	–	52.5	54.8	–	–	1	9.3	17.2	1.4	
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	
	Q1/93	–	–	–	–	–	40	34.9	36.6	–	30.8	35.5	35.6	–	
	Q2/93	–	–	–	–	48.3	45.6	40.6	–	–	–	–	–	–	

Table E26. SR 520 Hunt's Pt. to SR 908 , westbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	55.9	55.8	56	56.8	51.3	38.8	38.9	24.4	22.4	12.3	11.2	11.4
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
HOV Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	16.2	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E27. SR 520 Hunt's Pt. to 148th Ave. NE , westbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	25.3	18.1	25.8	24.2	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E28. SR 520 SR 908 to Hunt's Pt. , eastbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	56.2	53.6	49	50.2	51.4	53.5	48	48.6	49.7	50.2	49.9	46.2	57.2
	Q4/92	–	–	–	–	–	–	60.1	59.4	58.5	59.9	60.1	–	–	–	–
	Q1/93	–	–	–	–	–	52.6	54.1	53.1	52.4	54.2	51.2	52.6	52.3	48.6	–
	Q2/93	–	58.9	57.6	56.2	54.5	48	56.3	38	39.3	40.7	54.1	56.1	51.5	40.7	–

Table E29. SR 520 SR 908 to 148th Ave. NE , westbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	61.7	62.2	58.7	55.6	41.9	27.1	30.6	32.3	27	23.5
	Q4/92	–	–	–	–	–	–	–	30.8	30.7	30.4	37.4	33	12.2	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	14.2	42.2	9.1	5.9	3.3	2.5	2.2	1.8	1.6	1.5

Table E30. SR 520 148th Ave. NE to Hunt's Pt. , eastbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	55	54.3	54.8	56.1	54.8	54.2	49.8	52.2	53.2	54.8	56.7
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	57.6	56.6	56.2	47.2	38.7	40.4	43.4	44.8	50.8	51.5	52.3	–

Table E31. SR 520 148th Ave. NE to SR 908 , eastbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	48.5	52.5	54.9	54	55.2	47.2	43.8	46.4	49.7	53.7	56.1	56.4
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	58	57	57.8	58.3	59.4	57.4	56.5	57.2	56.5	49.5	50.5	–	–

Figure E18. Travel Time Sites
I-90 (Corridor #5)

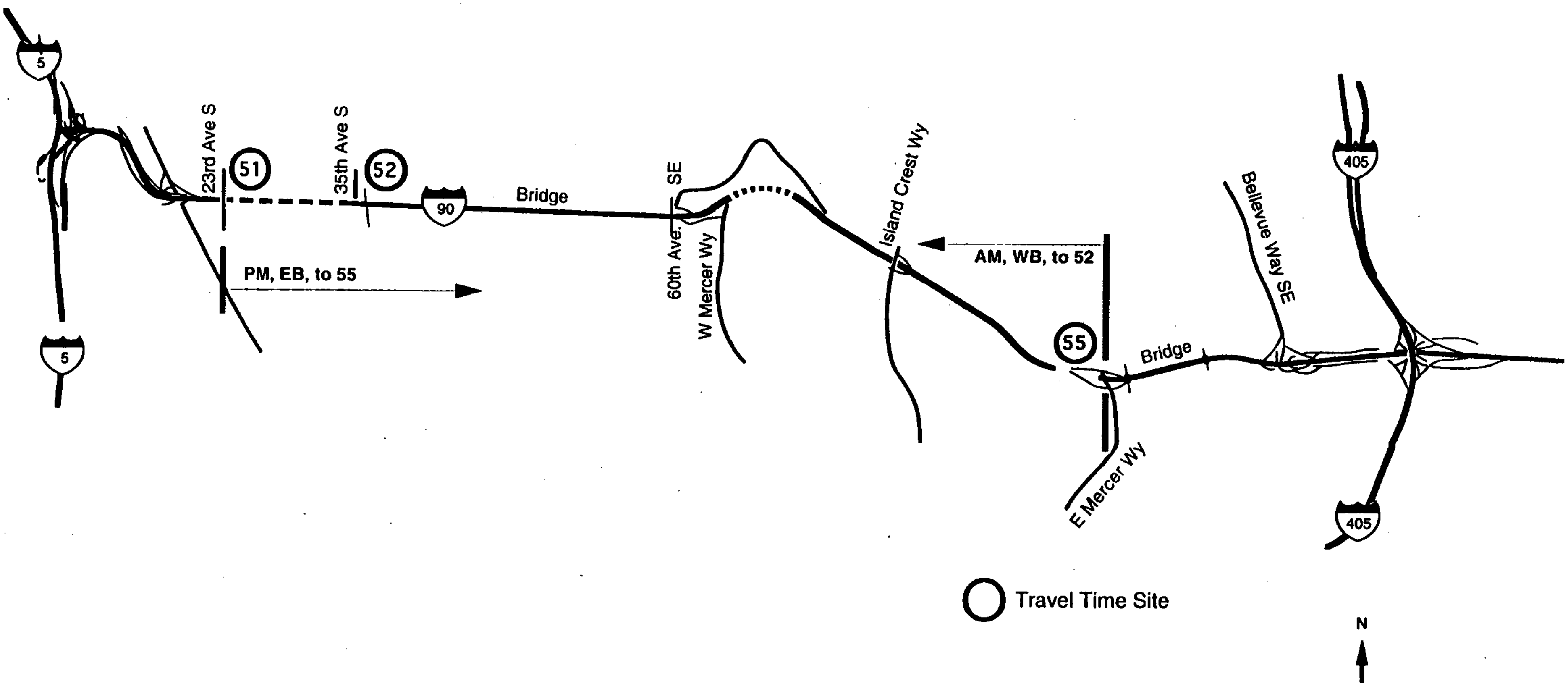
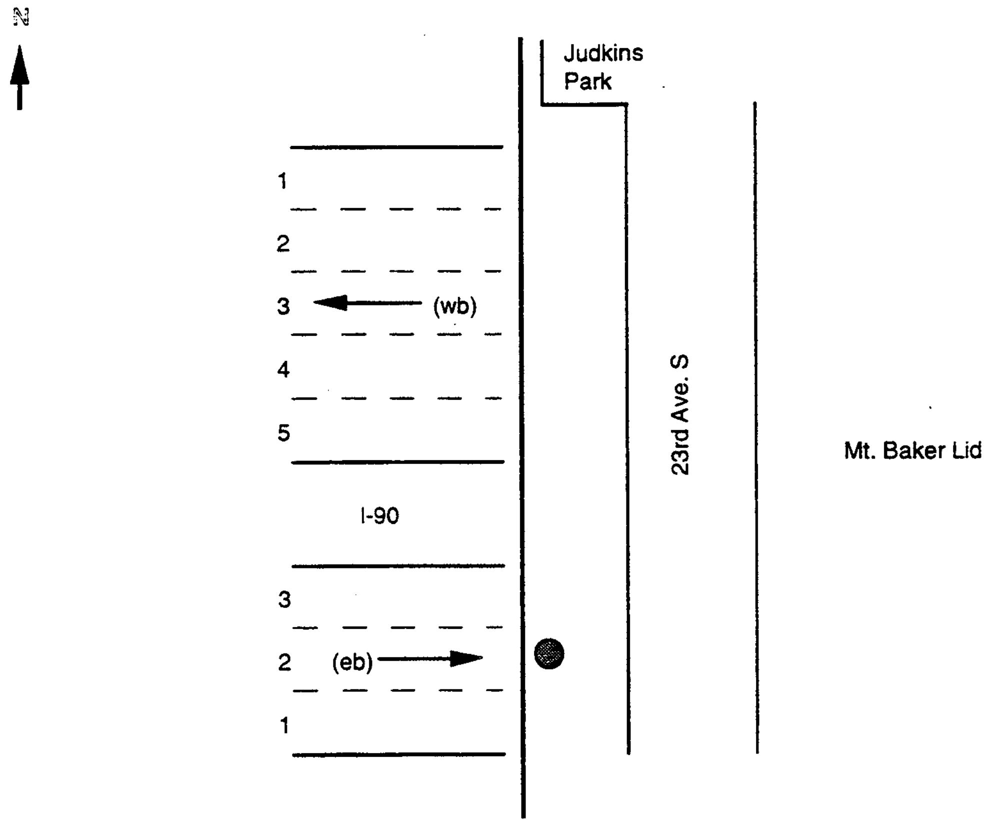


Figure E19. I-90 - 23rd Avenue South (west end of Mount Baker tunnel) **SITE #51**

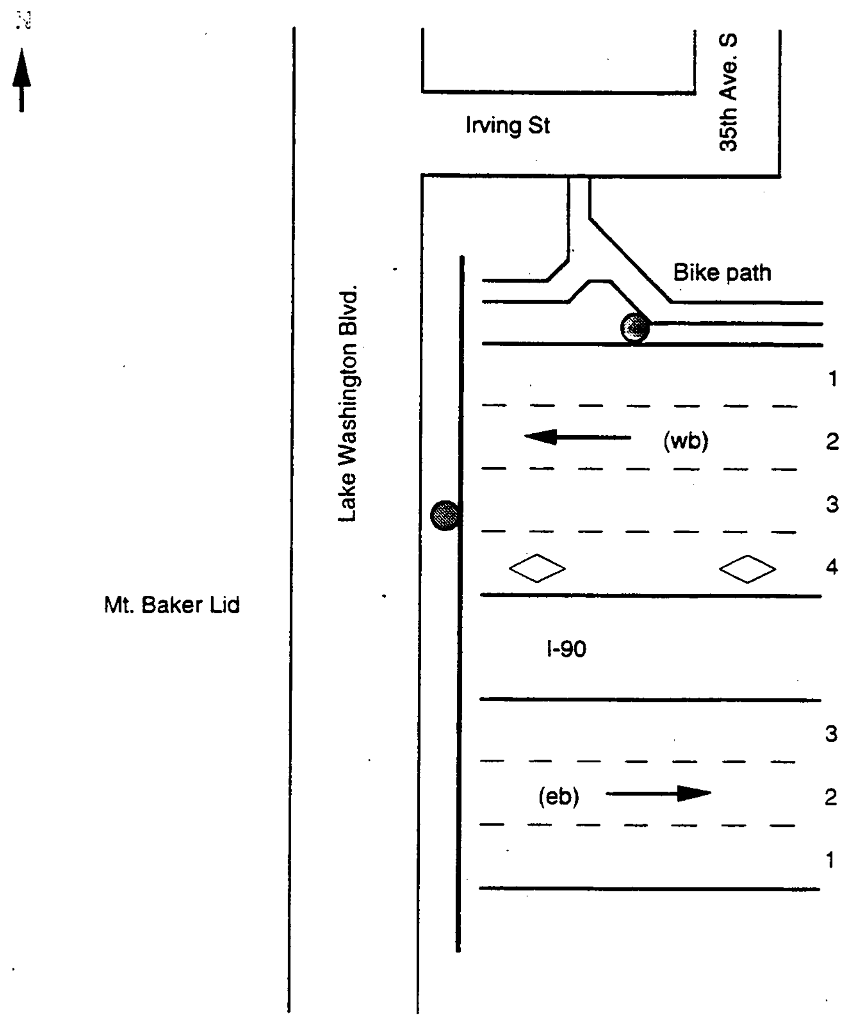
Travel times EB-pm



Note: The wall at the edge of the tunnel lid is about four feet high at this location, so you will have to stand to count.

Figure E-20. I-90 - 35th Avenue South (east end of Mount Baker tunnel) SITE #52

Travel times WB-am



Note: You will have to look across several lanes of traffic in order to see license plates in the fast and HOV lanes at this location.

Figure E21. I-90 - East Mercer Way	SITE #55

Travel times WB-am & EB-pm

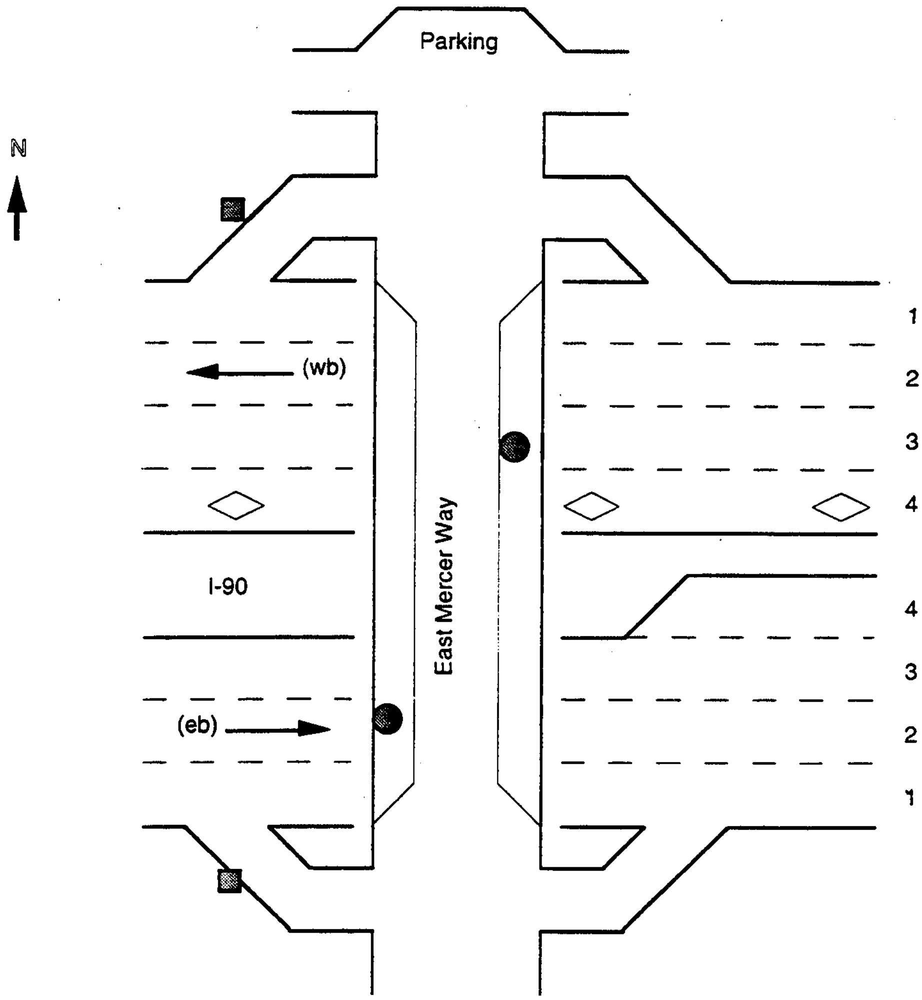


Figure E-22. I-90 - 142nd Place SE **SITE #59**

Travel times WB-am

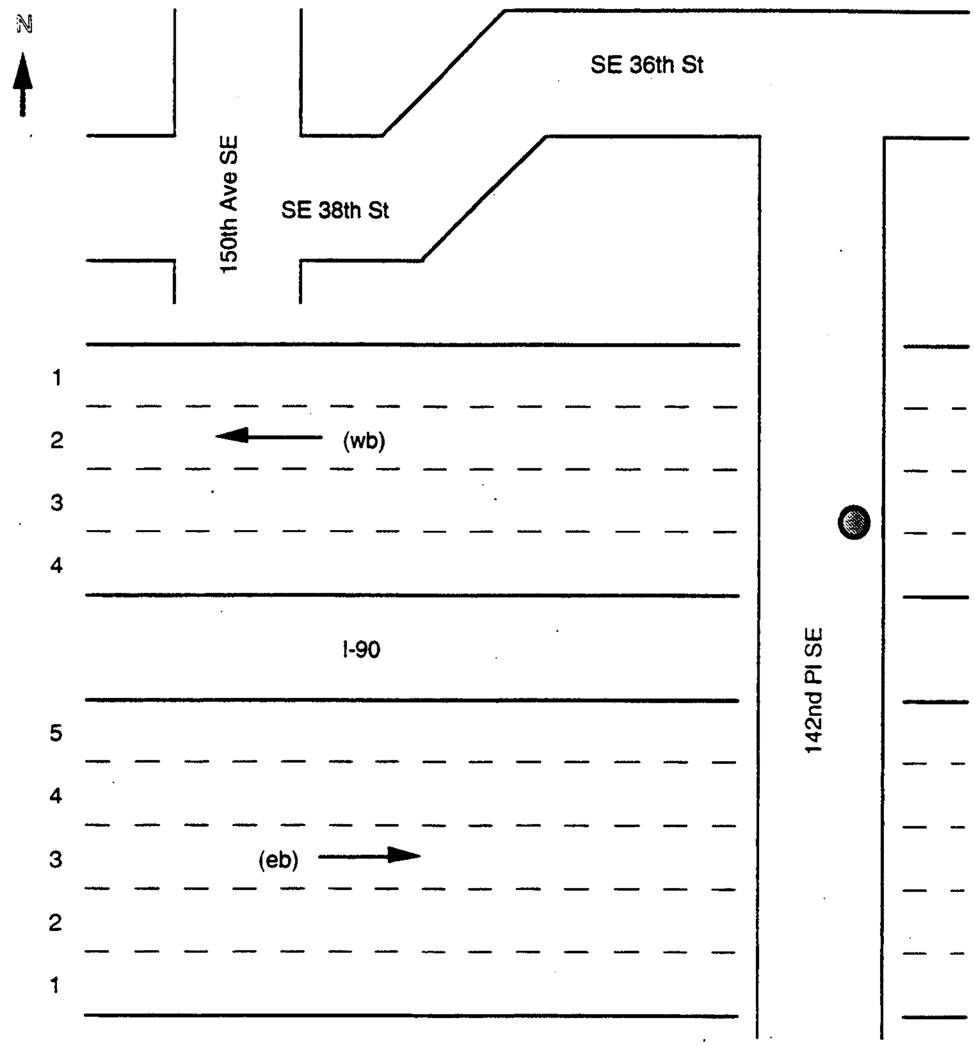


Table E32. I-90 23rd Ave. S to East Mercer Way , eastbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	12.9	21.2	33.5	43.5	49.2	45.7	49.5	54.9	53.2	42	44.5	27.6
	Q4/92	–	–	–	–	36	55.9	50.9	52.2	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	58.4	56.9	55.6	55.1	54.1	51.8	43.7	44.5	45	47.6	43.4

Table E33. I-90 East Mercer Way to 35th Ave. S . westbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	57.1	57.1	54.6	51.6	45.2	42.2	50.8	50	55.7	59.2
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	2.5	1.6	20.7	38.7	9.7	27.4	35	–	–
	Q2/93	–	–	–	–	57.9	58.2	56.4	54.7	51.4	52.6	57.4	57.8	–	–
HOV Lanes	Q3/92	–	–	–	–	48.5	53.6	52	50.9	52.1	54.7	53.2	54.9	54.1	59.6
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	42.1	43	43.4	46.7	44.7	51.1	54.4	–	–
	Q2/93	–	–	–	–	52.1	55.8	54.6	53	52.3	52.9	54	55.2	–	–

Figure E23. Travel Time Sites
I-405 (Corridors #6)

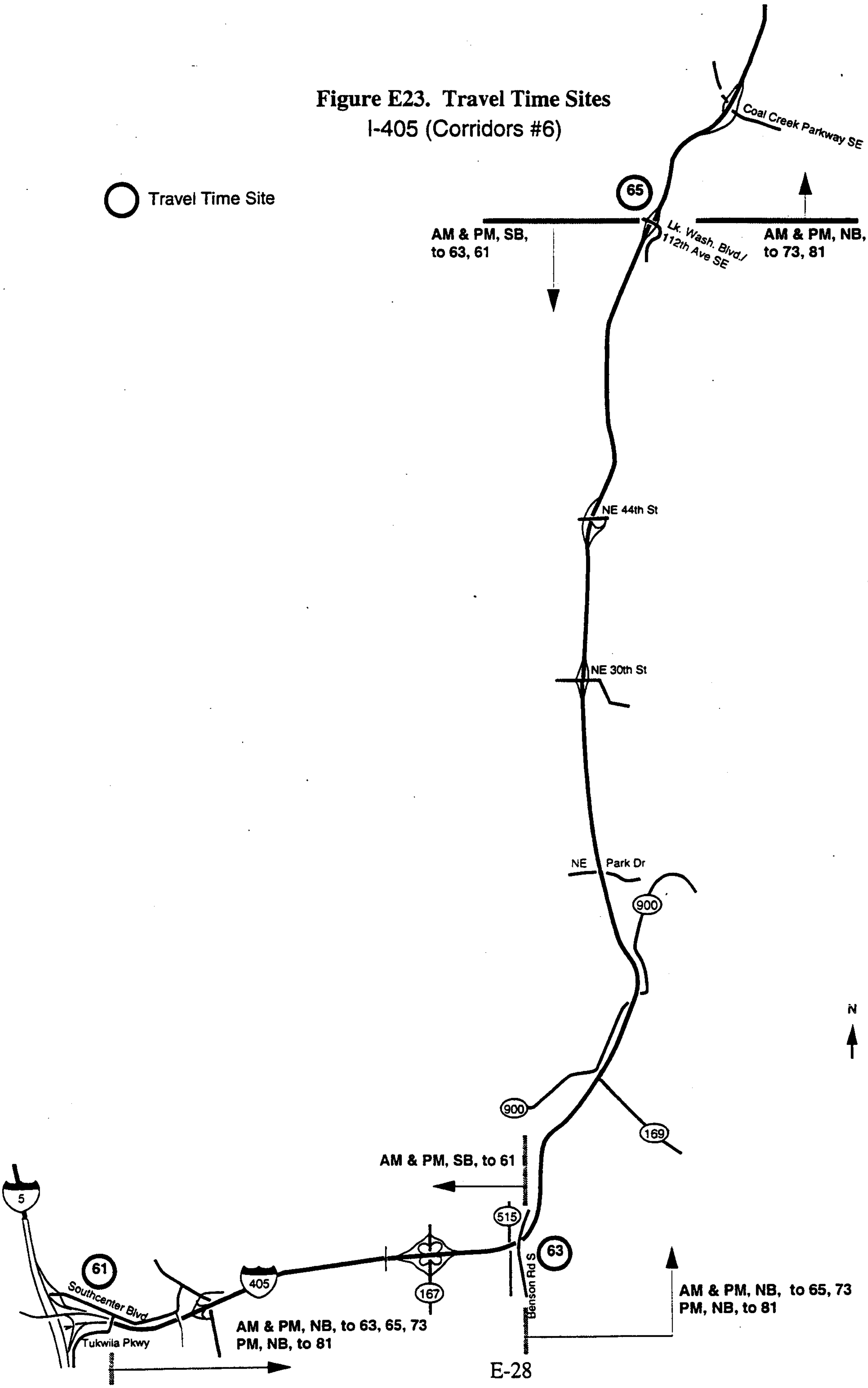


Figure E23. Travel Time Sites (cont.)
I-405 (Corridors #7 & 8)

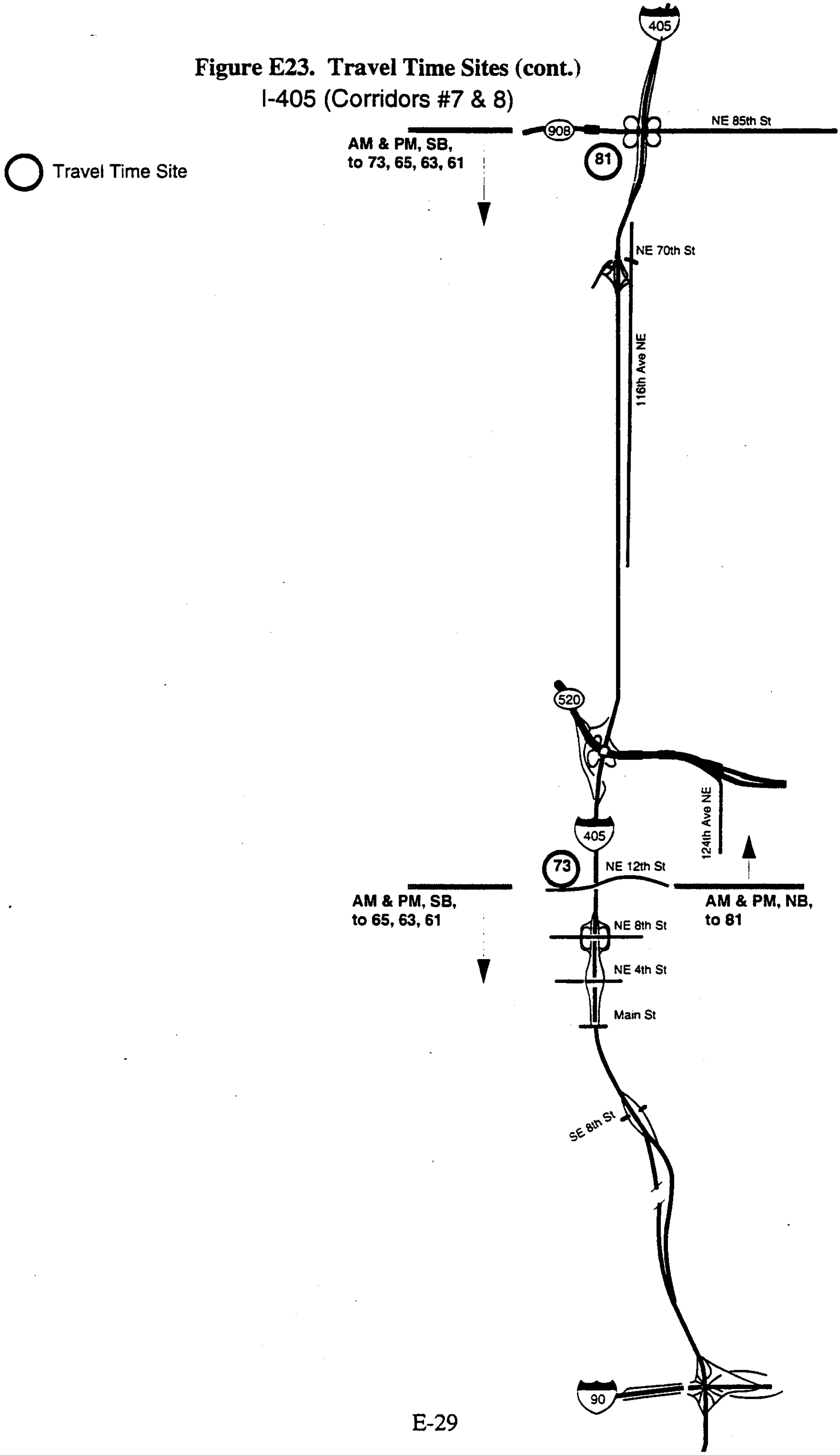


Figure E24. I-405 SOUTH - Tukwila Parkway **SITE #61**

Travel times NB & SB-am & pm

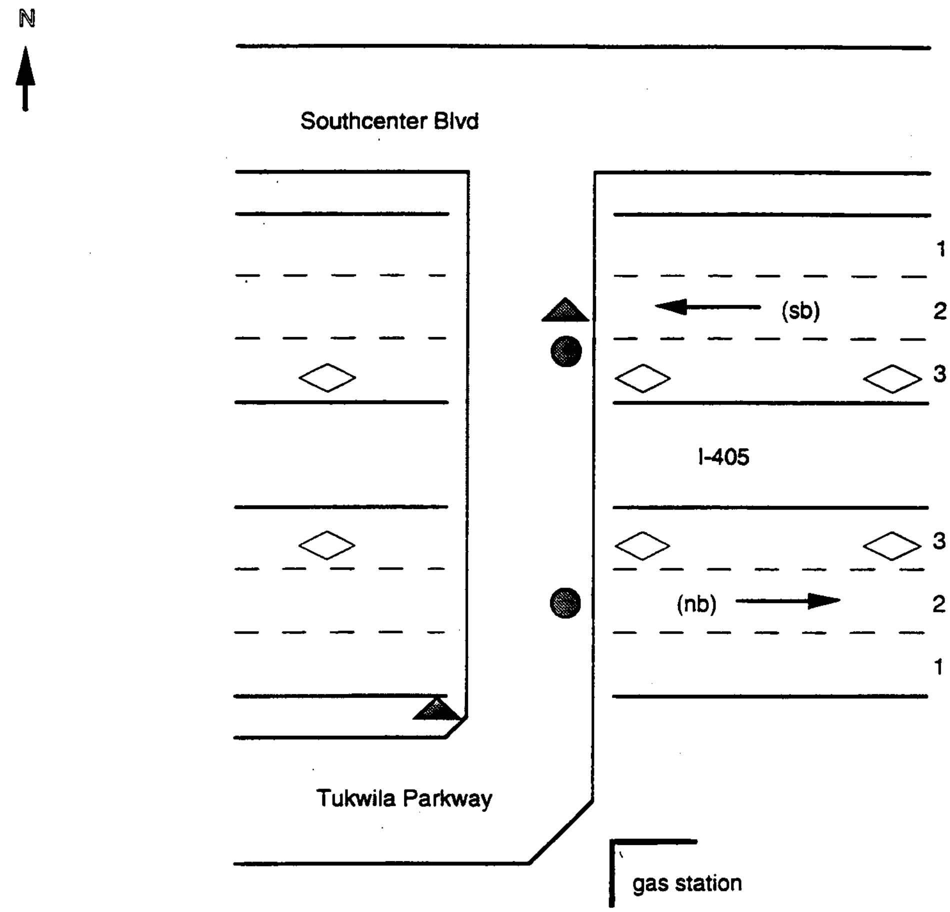
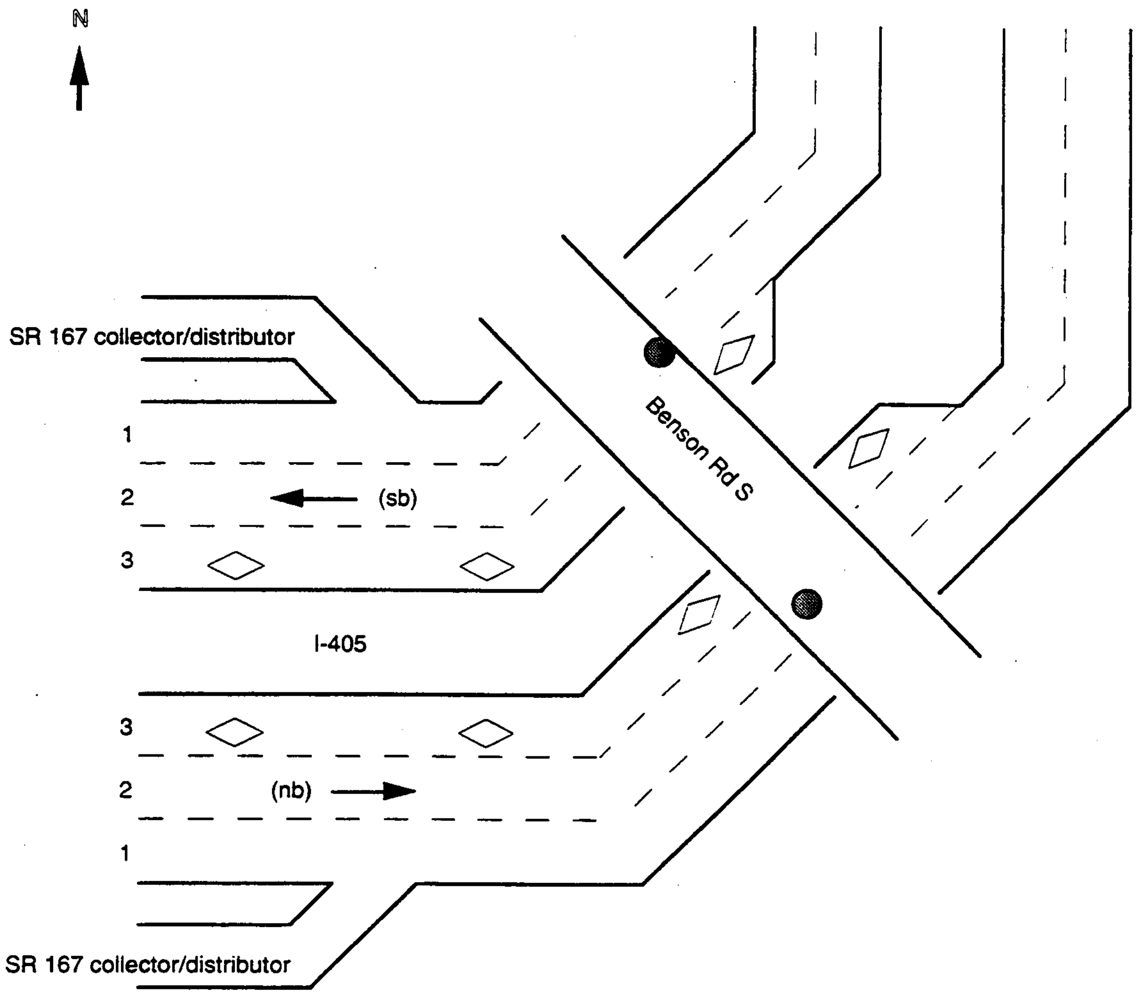


Figure E25. I-405 SOUTH - Benson Road South	SITE #63

Travel times NB & SB-am & pm



Note: There is a wide sidewalk on the west side of this overpass. and a very narrow one on the east side. If you are counting southbound traffic on the narrow sidewalk. it is a good idea to wear a vest in this location.

Figure E26. I-405 SOUTH - 112 Avenue SE/Lk Washington Blvd SITE #65

Travel times NB & SB-am & pm

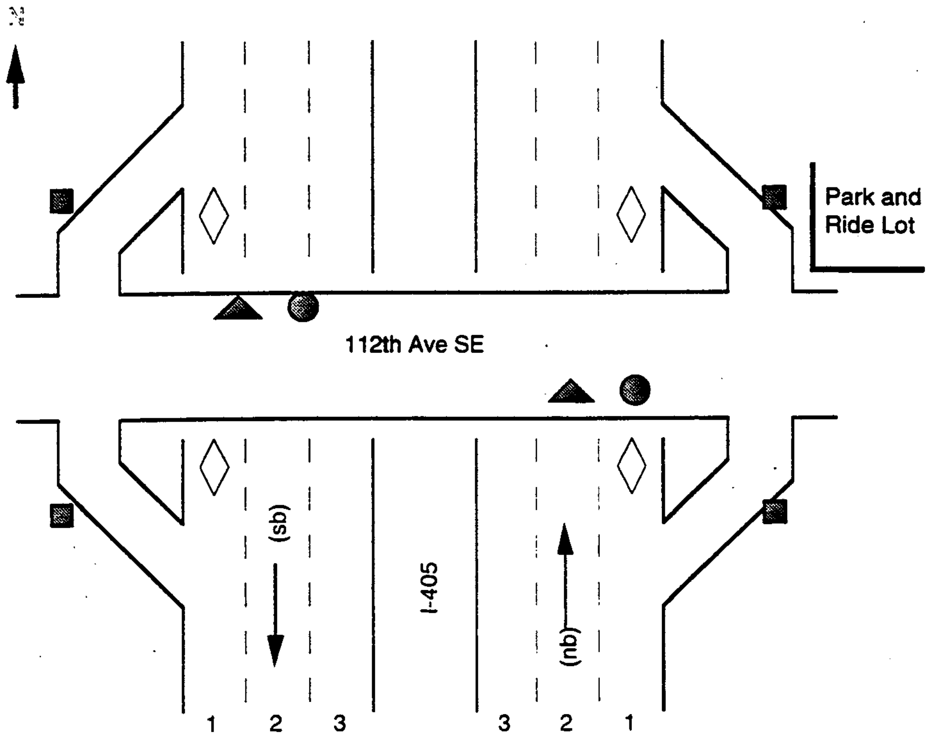


Figure E27. I-405 CENTRAL - NE 12th Street SITE #73

Travel times NB & SB-am & pm

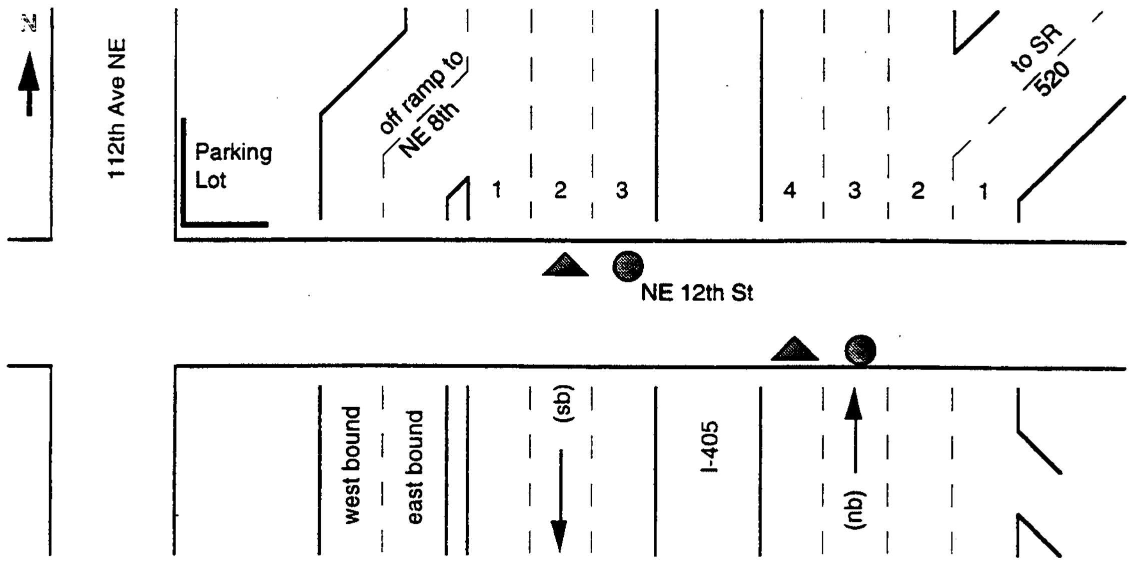


Figure E28. I-405 NORTH - SR 908: Central Way/NE 85th St. SITE #81

Travel times SB-am & NB-pm

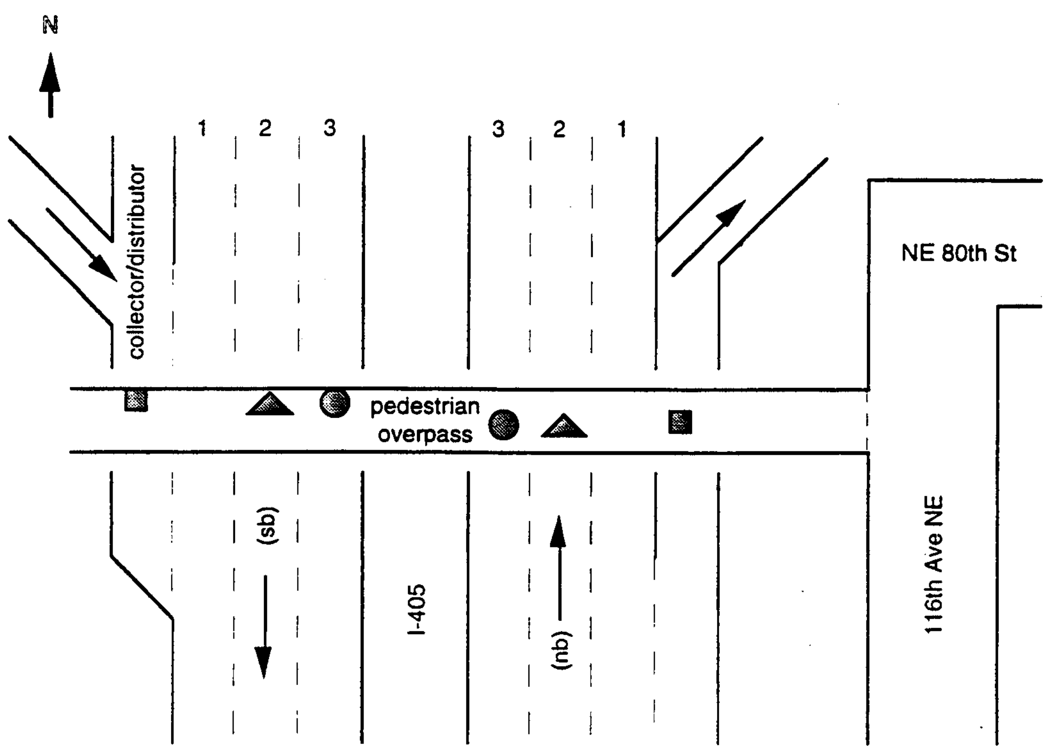


Table E34. I-405 Tukwila Pkwy. to Benson Rd. S . northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	62.8	53.6	42.3	48.4	61.4	62.8	62.1	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HOV Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	52.1	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E35. I-405 Tukwila Pkwy. to Benson Rd. S . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	-	-	-	-	28.2	33.6	36.4	26.4	23.6	22.6	24.9	16.4	17.1	8.6	2
	Q4/92	-	-	-	-	3.9	31.5	33.7	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	1.7	-	-	-	1	-	-
HOV Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	2.2	-	-	2.2	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E36. I-405 Tukwila Pkwy. to 112th Ave SE . northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	51.9	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E37. I-405 Tukwila Pkwy. to 112th Ave SE . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E38. I-405 Tukwila Pkwy. to NE 12th St. . northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	14.8	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E39. I-405 Tukwila Pkwy. to NE 12th St. . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E40. I-405 Tukwila Pkwy. to SR 908 . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q4/92	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q1/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Q2/93	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E41. I-405 Benson Rd. S to Tukwila Pkwy. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	33.2	33.6	31.4	32.9	30.6	31.4	34.3	33.8	33.3
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	52.5	55.7	48.6	51.1	44.6	49.7	56.7	–	–
HOV Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	3.7	–	–	–	–	–

Table E42. I-405 Benson Rd. S to Tukwila Pkwy. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	12.2	15.6	3	11.1	1.7	–	–	–
	Q1/93	–	–	–	–	1.4	17.5	27.2	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	58.2	59.2	56.5	59.2	58	58.8	59	58.3	60.1	–
HOV Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	1	–	1.2	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	64.3	–	–

Table E43. I-405 Benson Rd. S to 112th Ave SE , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	41.5	36.2	46.2	56.3	55.9	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E44. I-405 Benson Rd. S to 112th Ave SE , northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	32.9	26.9	31.4	28.2	33.9
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	48.6	46.7	48.9	43.8	49.9	50	51.9	51.6	52.7	52.9	–

Table E45. I-405 Benson Rd. S to NE 12th St. . northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15
GP Lanes	Q3/92	–	–	–	–	–	–	61.7	–	58.4	–	57	56.1	57.4	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	30.8	36.3	53.9	72.3	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E46. I-405 Benson Rd. S to NE 12th St. . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	15.9	17.5	19.6	18	15.6
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E47. I-405 Benson Rd. S to SR 908 . northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E48. I-405 112th Ave SE to Tukwila Pkwy., southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	21.1	26.4	25.1	26.6	28.9	41.5	50	57.3	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E49. I-405 112th Ave SE to Tukwila Pkwy., southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	20.8	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E50. I-405 112th Ave SE to Benson Rd. S, southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	41	39.4	37.5	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E51. I-405 112th Ave SE to Benson Rd. S, southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	12.5	13.9	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	15.1	16.4	–	–	–	–	–	–	–	–	–	–

Table E52. I-405 112th Ave SE to NE 12th St., northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	43.5	–	34.7	–	–	23.9	23.7	22.4	23.1	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	55.5	45.8	56.5	63	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E53. I-405 112th Ave SE to NE 12th St., northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	42.9	40.6	37.6	34.2	35.9	36.2	37.3	40.1	44.2	–	–
	Q4/92	–	–	–	–	–	56.3	58.6	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E54. I-405 112th Ave SE to SR 908, northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E55. I-405 112th Ave SE to SR 908, northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E56. I-405 NE 12th St. to Tukwila Pkwy. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	9	21.2	33.3	26.6	31.8	22.1	44.6	61.9	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E57. I-405 NE 12th St. to Tukwila Pkwy. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E58. I-405 NE 12th St. to Benson Rd. S , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	37	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E59. I-405 NE 12th St. to Benson Rd. S , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	11.3	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E60. I-405 NE 12th St. to 112th Ave SE , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	18.5	21.7	–	18.1	21.2	24.6	24.6	23.1	23.9	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	15.5	–	21.4	10.8	9.5	–	–	–	–
	Q2/93	–	–	–	–	–	61.1	59.1	58.2	59.5	60.4	58.5	59.4	58.9	–	–

Table E61. I-405 NE 12th St. to 112th Ave SE , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	47.5	45	46.1	–	40.4	42.5	38.7	–	–	–	–	–
	Q4/92	–	–	–	53.2	53.7	37.1	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	44.6	–	–	–	–	–	–	50	55.3	–	–
	Q2/93	–	–	–	–	46.5	44.4	46.1	46.2	54.8	44.3	31.5	21.1	21.9	–	–

Table E62. I-405 NE 12th St. to SR 908 , northbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
HOV Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E63. I-405 NE 12th St. to SR 908 , northbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	25.9	23.8	23.5	27.6	25.6	21.9	19	–	–	–
	Q4/92	–	–	–	–	–	25.9	23.8	23.5	27.6	25.6	21.9	19	–	–	–
	Q1/93	–	–	–	38.4	14.2	16.7	8.3	5	3.5	3.3	2.4	2.3	1.9	–	–
	Q2/93	–	–	–	–	–	18.5	16.1	16.5	16.7	15.3	14	14.9	16.6	–	–

Table E64. I-405 SR 908 to Tukwila Pkwy. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E65. I-405 SR 908 to Benson Rd. S , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E66. I-405 SR 908 to 112th Ave SE , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	36	33.8	34.4	38.2	37.5	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E67. I-405 SR 908 to 112th Ave SE , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table E68. I-405 SR 908 to NE 12th St. , southbound a.m.

	Qtr.	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30
GP Lanes	Q3/92	–	–	–	27.4	58.3	57.8	56.6	52.2	50.9	48.6	53.4	56.1	49.5	54.4	–
	Q4/92	–	–	–	–	–	–	–	26.9	30	30.4	30.3	–	–	–	–
	Q1/93	–	–	–	–	46.4	15.8	19.7	51.1	51	45.5	–	56.8	58.5	–	–
	Q2/93	–	–	–	–	46.4	–	–	–	–	–	–	–	–	–	–

Table E69. I-405 SR 908 to NE 12th St. , southbound p.m.

	Qtr.	3:00	3:15	3:30	3:45	4:00	4:15	4:30	4:45	5:00	5:15	5:30	5:45	6:00	6:15	6:30
GP Lanes	Q3/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q4/92	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q1/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Q2/93	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

APPENDIX F

OBSERVER COMMENTS DURING TRAVEL TIME DATA SESSIONS

Below is a sample of observer comments made during travel time data collection throughout this period. Like vehicle occupancy comments, they fall into three categories of data collection, traffic, and weather conditions. Ellipses represent time gaps between comments made by the observer. Because the length of comments is limited by the program used, words are sometimes cut off.

DATA COLLECTION

1. computer #52 I just found out is 18 minutes faster than #53 which was the other

2. cold, cloudy............ the previous count was lost due to computer malfunction

3. it's not quite daylight yety hard to read plates........CT COULDNT READ #

4. it's too dark to see anything but busues at this pt........traffic is very backed up.........the radio said ther is a big wreck up at 405 + 520 - not much traffic here

5. I am too far up and it is too dark to see yet-headlights are impediment also

6. it is very hard to see on this overpass.

7. Hard to see with the big traffic sign in the way...

8. some of thee number keys are wet and not working

9. time to change batteries bacik ijn a moment

10. Head aches too many counts today of TT! Bye!

TRAFFIC CONDITIONS

1. I'm wet ... traffic is slowed slightly ... no real stoppages

2. there is a stsalled car & a stste patrol car off to the right

3. RAINY AND MISERABLE..........TRAFFIC WAS TERRIBLE GETTING HERE SO WE STARTED WAY LATE...IT STAYED PRETTY TER- ...RI.........SEE AT ABOUT 6:30 OR SO. ACCIDENTS..

4. cloudy, warm-60 degrees, dry road........traffic is moving well........light traffic.......police stopped somebody in the express lane.......traffic is still moving well, below capacity.......another police pulling over somebody in the express lane.......traffic moving well during counting

5. THERE WAS A MAJOR BACKUP ALL DAY AT THIS SITE. IT POURED FOR ABOUT 20 MINUTES.

6. traffic is sluggish. gonna collect some license plates for MH!

7. final tally: two rear-enders, two near misses, 1 frazzled counter

WEATHER CONDITIONS

1. COLD/DARK/RAINY

2. FREEZING COLD/WINDY/GETTING DARK

3. sunny but hell cold!

4. SUNNY AND 80F. MINIMUM WAGE WEATHER.

5. I am late and it is wet. This is a bad day for me.......Traffic is stop and go

6. still dark due to daylight saving time last weekend......heavy traffic heavy traffic, but it is still moving well..........the rain has stopped for some time

7. cloudy, threatening; summer is grand

8. sunny, tantalizing, frenetic, abusive, c.........no problem : YOW! sunshine ... on my shoulder ... makes me happy

APPENDIX G

SAMPLE SURVEY

Washington State Department of Transportation

University of Washington

Washington State Transportation Center

HIGH OCCUPANCY VEHICLE LANE ANALYSIS
PUBLIC OPINION SURVEY

The Washington State Department of Transportation and the Washington State Transportation Center at the University of Washington are working together to study high occupancy vehicle (HOV) lanes, also known as carpool lanes. We would like to understand your driving preferences and your perception of HOV lane use and effectiveness.

Please give this survey to the person in your household who most often uses freeways between the hours of 6:00-9:00 am and 3:00-6:00 pm in the Puget Sound area. Ask him or her to fill out the survey and return it by mail within one week. We would appreciate your response. No postage is necessary.

This survey is anonymous. Your answers will not be associated with your name. If you are willing to be contacted by telephone, you may so indicate in Section C of this survey. You may also contact Cy Ulberg at 543-0365 between 8:00 A.M. and 5:00 P.M. if you wish to discuss the survey.

Section A: Your Commute Trip

1. Indicate your ***usual*** mode of driving when using area highways between 6:00-9:00 am and 3:00-6:00 pm.

___ Drive alone
___ Carpool--you and 1 other person
___ Carpool--you and 2 or more other people
___ Vanpool
___ Bus
___ Bicycle, Walk
___ Motorcycle
___ Other

2. Have you ever used HOV lanes while traveling in the Seattle area between 6:00-9:00 am and 3:00-6:00 pm?

YES___ NO___ *(If NO, please proceed to Question 3)*

→ How do you use HOV lanes? Please indicate all that apply.

___ on a bus
___ in a 2 person carpool
___ in a 3 person carpool
___ in a vanpool
___ alone in a car
___ on a motorcycle

On which freeway do you usually use HOV lanes?

___ I-5 north of Northgate
___ I-5 between Northgate and Southcenter
___ I-5 south of Southcenter
___ I-90
___ SR-520
___ I-405
___ SR-16
___ SR-167

3. Do you ever have enough people in your vehicle to qualify for HOV lanes but don't use them between 6:00-9:00 am and 3:00-6:00 pm?

Yes___ No___ If yes, why? (check all applicable)

___ slower than regular lanes
___ too much trouble to change lanes
___ the HOV lanes are not safe
___ all traffic moves fast enough
___ forget to use HOV lanes
___ other ________________

Section B: Your Opinions

4. Place an "X" by the *three options* that you think would most likely make HOV lanes more attractive for carpooling or bus riding.

    ____ Wider and safer lanes.
    ____ Connection of these lanes with other HOV lanes.
    ____ HOV lanes on the right side of the freeway rather than on the left side of the freeway.
    ____ Park & ride lots near freeway entrances/exits.
    ____ Better police enforcement against violators.
    ____ Employers' help with paying for part or all of bus passes or parking for carpoolers.
    ____ Opening all HOV lanes to 2 person carpools.

5. Please indicate the extent to which you agree or disagree with the following statements.

	Agree Strongly	Agree	Neutral	Disagree	Disagree Strongly
HOV lanes are a good idea.	___	___	___	___	___
Vehicles dart in and out of HOV lanes too often for the lanes to be safe.	___	___	___	___	___
HOV lanes help save all commuters a lot of time.	___	___	___	___	___
Constructing HOV lanes is unfair to taxpayers who choose to drive alone.	___	___	___	___	___
Existing HOV lanes are being adequately used.	___	___	___	___	___
HOV lane violators commit a serious traffic violation.	___	___	___	___	___
HOV lane violations are common during the commute hours.	___	___	___	___	___
Many more people would carpool if the HOV lanes were more widespread.	___	___	___	___	___
HOV lanes should be opened to all traffic.	___	___	___	___	___
HOV lanes are convenient to use.	___	___	___	___	___
HOV lane construction should continue, in general.	___	___	___	___	___
HOV lanes should be enforced with police who observe violators and mail tickets to the owner of the auto.	___	___	___	___	___
HOV lanes should be opened to all traffic during non-commute hours.	___	___	___	___	___
Instead of building new HOV lanes, regular highway lanes should be converted to HOV lanes.	___	___	___	___	___

Section C: About Yourself

6. Are you? ___ Male ___ Female

7. What is your age? ___under 31 ___31-40 ___41-50 ___51-64 ___65+

8. What is your highest level of education?

___ did not finish high school
___ high school
___ community college or trade school
___ college/university
___ post graduate

9. Including yourself, how many people live in your household? ______

10. How many people living in your household are over age 15? ______

11. How many people living in your household work outside the home? ______

12. How many vehicles (in working order) do you have? ______

13. What is the Zip Code of your work place?______________ your home? ____________

14. Which freeways do you frequently use while traveling in the Seattle area between the hours of 6:00-9:00 am and 3:00-6:00 pm? Please indicate whether you use each freeway for commute trips and/or for other trips.

Commute	Other		Commute	Other	
___	___	I-5 North of Northgate	___	___	I-405
___	___	I-5 between Northgate and Southcenter	___	___	SR-16
___	___	I-5 South of Southcenter	___	___	SR-167
___	___	I-90	___	___	SR-410
___	___	SR-520	___	___	SR-512

15. Would you be willing to answer more questions by a telephone call? If so, please provide your name, phone number, and best time to call.

____
____
____
____

PLEASE USE THIS SPACE FOR ANY COMMENTS:

____
____
____
____
____
____

APPENDIX H

COMMENTS OF SURVEY RESPONDENTS

The following are examples of respondent's written comments. The comments generally fall into four categories; support for HOV lanes, opposition to HOV lanes, solutions to traffic problems, and miscellaneous. Respondents' comments are overwhelmingly in opposition to HOV lane restrictions and further HOV lane construction. Ten representative comments illustrate respondents' input.

1. We strongly support recent efforts to extend HOV lanes and would encourage further efforts in this regard! Should keep open to 2-person [carpools].

2. I think HOV lanes are great and should be added on all major highways. It may take higher gas prices to entice more people to carpool.

3. When I am stuck in traffic and am in a hurry and cars with one person whiz past in the HOV lane it is VERY frustrating. The HOV lanes should be enforced strictly or eliminated. The way it is now scoff-laws use HOV lanes and get places quickly.

4. I carpool via I-5 from Kent to Seattle daily. We use the carpool lane, which starts around Tukwila and ends above Boeing, which saves time . . . until we get to the end! Then merging traffic backs up so that we don't save much time at all, if any. We'd rather that you either extend the carpool lane all the way into Seattle or just get rid of it. The way it is now, it doesn't help carpoolers save a lot of time. Thanks.

5. Vehicles typically run more efficiently and generate less pollution at higher speeds. HOV lanes are typically underutilized. Eliminating HOV lanes would help minimize congestion, increase freeway commute speed and reduce pollution. Adding HOV lanes to I-90 east of I-405 will change this route from a reasonable

commute to a slow commute. The three non-HOV lanes will have a vehicle load increase of 20-25% resulting in traffic moving 25-40% slower.

6. Traffic problems will not be solved until we have some other mass transit besides buses. Having sat on buses stuck in traffic, I know that buses are not the answer.

7. HOV lanes are shortsighted! Light rail or uni-rail would be more cost-effective in the long run!

8. I think a lot of commuters think the HOV lanes are for speeding. I like the lanes for convenience but it really scares me with the traffic darting back and forth.

9. I often use the HOV lane when I have my small son in the car with me. I am sure to some driving by that it looks like I'm alone. That is why I don't think observation and mailing a ticket is not [sic] a good idea.

10. I am a real estate appraiser and use these freeways to travel to and from appointments. Due to my profession I am not able to use the HOV lanes on a regular basis. It amazes me the number of multiple occupant vehicles that do not use HOV lanes. I would be interested in knowing why they don't.