

Effects of Full-Facility Variable Tolling on Traveler Behavior:

*Evidence from a Panel Study of the SR-520
Corridor in Seattle*

*Report for Federal Highway Administration
March 2014*

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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|---|------------------------------------|-------------------------------------|-----------------------------------|--|--|
| 1. REPORT DATE (DD-MM-YYYY) 10-03-2014 | | 2. REPORT TYPE Final | | 3. DATES COVERED (From - To) 2010 - 2014 | |
| 4. TITLE AND SUBTITLE Effects of Full-Facility Variable Tolling on Traveler Behavior: Evidence from a Panel Study of the SR-520 Corridor in Seattle | | | | 5a. CONTRACT NUMBER | |
| | | | | 5b. GRANT NUMBER | |
| 6. AUTHOR(S) Peirce, Sean; Puckett, Sean; Petrella, Margaret; Minnice, Paul; Ray, Rosalie; Lappin, Jane 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AND ADDRESS(ES) Volpe National Transportation Systems Center Economic Analysis Division, RVT-21 55 Broadway, Cambridge, MA 02142 | | | | 5c. PROGRAM ELEMENT NUMBER | |
| | | | | 5d. PROJECT NUMBER | |
| | | | | 5e. TASK NUMBER | |
| | | | | 5f. WORK UNIT NUMBER | |
| 9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) Federal Highway Administration | | | | 8. PERFORMING ORGANIZATION REPORT | |
| | | | | 10. SPONSOR/MONITOR'S ACRONYM(S) | |
| | | | | 11. SPONSOR/MONITOR'S REPORT NUMBER(S) | |
| 12. DISTRIBUTION / AVAILABILITY STATEMENT | | | | | |
| 13. SUPPLEMENTARY NOTES | | | | | |
| 14. ABSTRACT This paper uses a two-stage panel survey approach, with roughly 2,000 respondent households, to analyze the impacts of a federally sponsored variable tolling program on SR-520 in the Seattle region. The focus is on corridor users' daily travel choices and opinions. Key survey findings include a marked decrease in respondents' travel in the corridor after tolling, particularly on SR-520, and significant diversion to nearby toll-free I-90. There were also increases in transit mode share in the corridor, while carpooling and telecommuting levels were relatively stable. In the post-tolling survey, respondents registered an overall increase in satisfaction with their commutes and less stress associated with driving. Reported satisfaction with the speed and reliability of individual trips on SR-520 also increased substantially, and personal attitudes shifted slightly in favor of tolling. | | | | | |
| 15. SUBJECT TERMS Congestion pricing, tolling, household travel behavior, survey research | | | | | |
| 16. SECURITY CLASSIFICATION OF: | | | | | |
| a. REPORT | | | | | |
| UNCLASSIFIED | | | 17. LIMITATION OF ABSTRACT | 18. NUMBER OF PAGES | 19a. NAME OF RESPONSIBLE PERSON |
| | b. ABSTRACT UNCLASSIFIED | c. THIS PAGE UNCLASSIFIED | Unclassified Unlimited | 115 | 19b. TELEPHONE NUMBER (include area code) |
| | | | | | Standard Form 298 (Rev. 8-98) Prescribed by ANSI Std. Z39.18 |

Executive Summary

Variable tolling was implemented in December 2011 on the SR-520 Bridge in the Seattle region as part of a federally funded initiative to reduce traffic congestion. SR-520 tolls vary by time of day up to a maximum (at the time of the study in 2012) of \$3.50 each way, or \$5 for non-account payments. A nearby parallel facility, Interstate 90, remains as a toll-free alternative across Lake Washington. Tolling was accompanied by investments in public transit and traffic management technologies and by efforts to promote telecommuting. Tolling revenues are being used to fund replacement of the aging SR-520 bridge.

This study used a two-stage panel survey approach to analyze the impacts that this tolling program has had on corridor users' daily travel choices. The Wave 1 "before" survey was conducted in autumn 2010 and the Wave 2 "after" survey was conducted in spring 2012. In each survey wave, over 3,600 respondents from roughly 2,000 households completed a two-day travel diary, with additional detail on trips in the Lake Washington corridor, plus a personal survey on general travel behavior and attitudes.

Key survey findings include a marked decrease in respondents' overall travel in the corridor after tolling. This decrease was particularly marked on SR-520 itself, which experienced a 43% reduction in recorded trips and 52% drop in vehicle-miles of travel (VMT). There was significant diversion to the toll-free alternative I-90, with about one-fourth of former SR-520 drivers switching to I-90 and overall cross-lake VMT on I-90 increasing about 3%. The shift from SR-520 to I-90 was most pronounced among males, those in lower-income households, and those with less workplace schedule flexibility. There were also modest increases in transit mode share in the corridor.

Vehicle occupancies increased slightly in the corridor, particularly on SR-520, but regular carpooling for commute purposes held roughly steady. Interestingly, there was also no recorded increase in telecommuting levels post-tolling.

Tolling impacts varied across trip purpose categories, with trips for school, shopping, dining, and pick-up/drop-off of another person falling significantly. Social/recreational, child care, and work trips were less affected.

Ownership of a toll transponder and actual tolls paid during the two-day diary periods were both correlated with higher household incomes. Toll payments were highest in the group of households earning between \$200,000 and \$250,000 per year. Lower-income households paid less in tolls, but cut back on their cross-lake travel more significantly than other groups. This may raise concerns about inequitable distribution of costs and benefits of the project, though equity impacts are somewhat difficult to interpret due to the high household income levels of SR-520 users even prior to tolling (averaging \$132,000). Impacts from tolling would need to be compared to other potential sources of comparable transportation revenues. In the post-tolling survey, respondents registered an overall increase in satisfaction with their commutes and less stress associated with driving. Reported satisfaction with the speed and reliability of individual trips on SR-520 also increased substantially, and personal attitudes shifted slightly in favor of

tolling. Nonetheless, respondents were strongly divided in their overall assessment of whether SR-520 tolling had improved their travel in the region, with SR-520 drivers generally giving a favorable assessment, I-90 drivers (including both existing I-90 drivers and those who switched from SR-520) an unfavorable assessment, and transit riders roughly neutral.

Introduction

The United States Department of Transportation (U.S. DOT) created the Urban Partnership Agreement (UPA) and Congestion Reduction Demonstration (CRD) programs to promote innovative approaches to reducing travel delays. The UPA/CRD programs provide Federal funding and technical assistance to metropolitan areas that commit to pursuing a coordinated “4 Ts” approach to congestion, comprising tolling, transit, telecommuting, and technology.

The Seattle region was one of six metropolitan areas selected for the UPA/CRD programs. In 2009, U.S. DOT signed an Urban Partnership Agreement with three local partners: the Washington State Department of Transportation (WSDOT), King County, and the Puget Sound Regional Council (PSRC). The centerpiece of this UPA project is variable, time-of-day pricing (tolling) of all lanes of the Evergreen Point Bridge, which carries State Route 520 (SR-520) across Lake Washington near downtown Seattle. At the time of the proposed Seattle UPA program, SR-520 experienced heavy congestion in both directions for long stretches of each day, and was nearing the end of its usable life.

Under the program, tolls were imposed on the SR-520 bridge, which had been toll-free for many years, with rates higher in peak periods in order to manage demand. Toll collection is fully automated; vehicles without an electronic toll transponder are identified using license plate recognition and billed by mail.

The Seattle local partners also committed to improving public transit service in this corridor, with the equivalent of 90 additional one-way bus trips during the weekday peak period and additional park-and-ride spaces. The project’s technology components include new highway signage showing current travel times, as well as an Active Traffic Management (ATM) or “Smarter Highways” system on SR-520 and Interstate 90. ATM uses overhead freeway signs to control lane usage and to implement variable speed limits during congested periods, reducing the follow-on effects of incidents. The local partners also included plans to expand their efforts to promote telecommuting, ridesharing, and flexible work schedules.

The UPA/CRD programs have placed a strong emphasis on evaluation, so that other metropolitan areas can learn from the experiences of the UPA/CRD sites. As one component of the evaluation, the Federal Highway Administration (FHWA) funded a before-and-after household travel survey at two of the six UPA/CRD sites, Seattle and Atlanta, to gain insight into how the UPA/CRD tolling programs affected the travel behavior choices of local households.

This report examines the findings from a two-stage panel study of Seattle-area households covering an interval from before the implementation of tolling on SR-520 to several months after tolling began. It begins with a discussion of previous work in the area of travel behavior response to congestion pricing. The report then presents details of the study and specific survey content, followed by key results and an overall summary.

Background

Seattle's UPA project is a particularly interesting subject for analysis because it is the first example in the United States of variable pricing for all lanes of a major existing toll-free highway. With variable tolling all lanes, it is distinct from other forms of congestion pricing that have typically been implemented in the US, such as high-occupancy toll (HOT) lanes and priced express lanes. Yet because toll-free alternative routes remain available, it is also distinct from cordon- and area-based charges of the kind used in London and other European cities, as well as from comprehensive road user charging, such as fees per vehicle-mile of travel (VMT).

Economic theory suggests that the imposition of a toll on a previously free route will reduce the demand for travel on that route, but this response can take many forms. Travelers facing a variable toll may, for example, simply choose to divert to other un-tolled routes or to lower-priced time periods. They may also consolidate or cancel certain trips, switch to public transportation or carpools, travel to different destinations, and/or make other adjustments to their travel.

Travelers' propensity to make these changes has been studied via modeling, surveys, and empirical observation. Responses to congestion pricing vary considerably according to the details of the pricing scheme and overall regional transportation conditions. For example, peak pricing on highway facilities in the US has generally been associated with shifts to the shoulder periods (1,2), whereas the cordon-type charges in London and Stockholm have also led to changes in routing as well as substantial shifts to public transit (3). Comprehensive VMT charging could also have broader influences on firm and household location choice and on employee compensation (4). Among tolled express lanes in the US, those that have used toll revenues to fund transit improvements have also seen bus ridership increases, while those that offer carpool discounts have observed increases in average vehicle occupancy (3). In addition to regional factors, individual and trip-specific characteristics are also strongly influential, such as the traveler's income and other demographics, value of time and reliability, and the purpose of the trip in question (5,6). Decisions to use or avoid the priced facility can also be influenced by personal attitudes about tolling and the ability to maintain an electronic toll account (7).

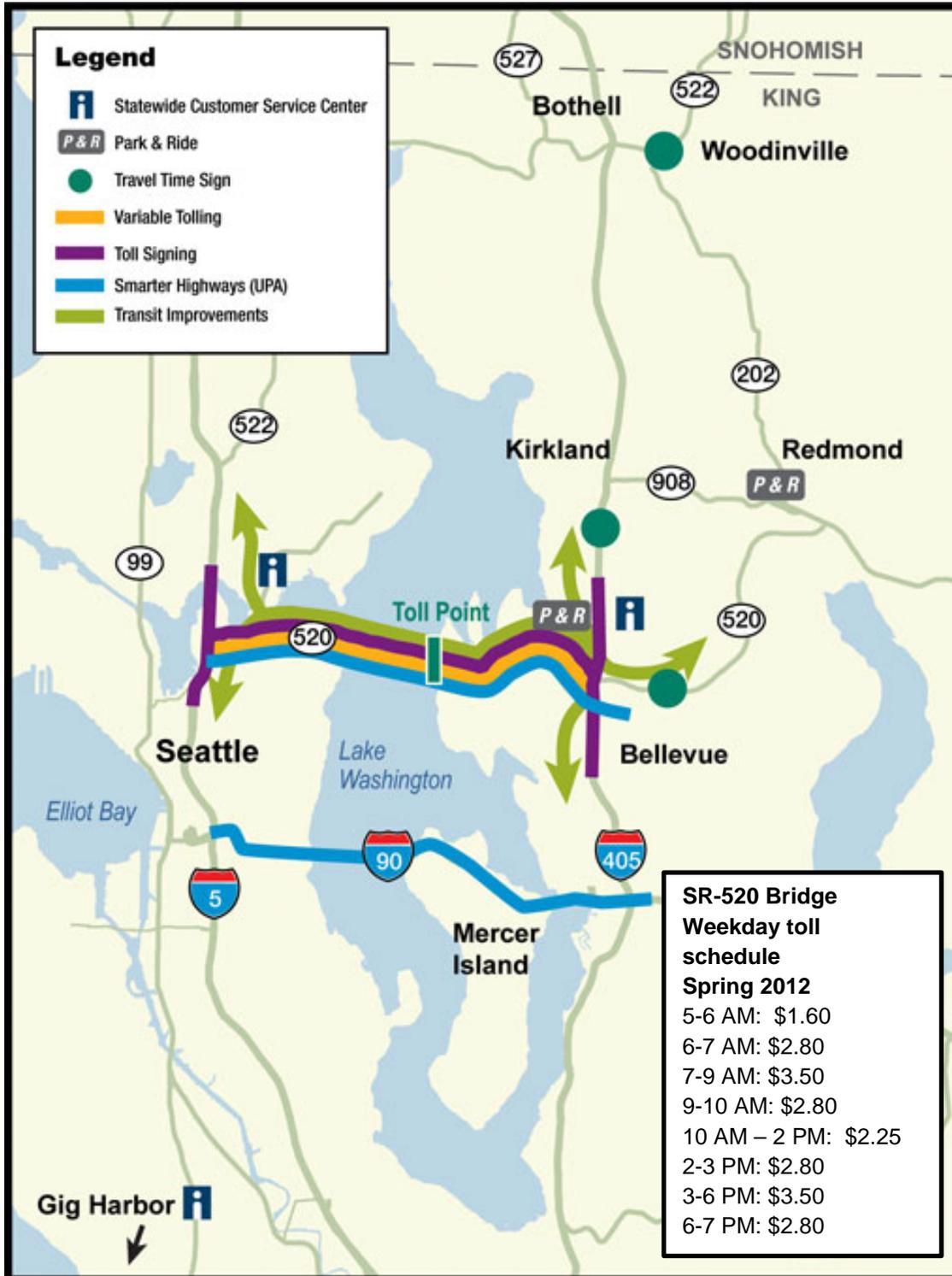
Orientation / Local Context

The SR-520 Bridge across Lake Washington links Seattle on the west with Bellevue and other communities on the east. Traditional commute flows on SR-520 were suburb-to-city, westbound in the morning and eastbound in the evening, but there is now an equally large "reverse" commuter flow to the many employment centers on the Eastside, such as downtown Bellevue and the Microsoft campus in Redmond. King County Metro and Sound Transit operate multiple bus routes across the bridge, with morning peak-period ridership in the range of 5,000 passengers.

The Interstate 90 Bridge is located approximately 4 miles south of SR-520 and is the only other direct route across the lake. Many commuters view the two bridges as potential substitutes for each other, depending on their particular origin and destination and current traffic conditions. I-90 also provides the only road access to Mercer Island. Around the northern half of Lake Washington, SR-522 is an arterial that is sometimes used as an alternative to the bridges.

I-90 and other routes in the region remain toll-free. During the course of this study, SR-520 went from toll-free to a variable pricing system. Tolling was designed in part as a demand-management strategy and in part to finance the construction of a new bridge to replace the aging structure. Then-current toll rates for 2-axle vehicles paying by transponder ranged from \$0 during the overnight hours to a maximum of \$3.50 during peak periods. The weekday toll schedule that prevailed during the study period is listed on the orientation map below. (Tolls have subsequently been raised.) The listed rates apply both eastbound and westbound, with a \$1.50 surcharge on non-zero tolls for vehicles paying by mail rather than by pre-paid account. There are separate toll schedules for heavy vehicles and for weekends, neither of which were part of this study.

Figure 1: Project Orientation Map and Toll Schedule



Source: ©Washington State DOT

Methodology

Overview

This study was structured as a household travel survey, with a panel design in which the same households are surveyed during the “before” and “after” period in order to assess changes in travel behavior. The core part of the survey was a 48-hour travel diary, in which respondents recorded the details of all trips taken on their assigned dates, including origin, destination, time, travel mode, and purpose. The survey also included a demographic questionnaire and questions about general travel patterns and attitudes, and specific follow-up questions for trips taking place in the Lake Washington corridor.

Wave 1 (“before”) data collection for Seattle took place in November 2010. Variable tolling had been expected to begin in spring 2011, with the Wave 2 (“after”) data collection planned for November 2011. Due to delays in the project, tolling instead started in December 2011 and so the Wave 2 survey was administered in April and May 2012. The timing of the survey was designed to limit seasonal effects and to give local residents several months to adjust to the start of tolling system. However, it is possible that respondents were still in the process of adjusting to the new tolling and traffic patterns at the time of the Wave 2 survey.

This section describes the overall study methodology, with information on the Wave 1 and Wave 2 surveys. More detailed information on sampling, survey materials, pilot testing, incentives, and survey administration can be found in the appendix.

Survey Roles and Responsibilities

Administration of the survey, including recruiting of participants, development of the survey interface, and collection of response data, was performed by Resource Systems Group, Inc. (RSG), under contract to the Volpe Center. The Volpe Center team maintained ongoing coordination with the national evaluation team from the Battelle Memorial Institute and with the local UPA partners: WSDOT, King County, and PSRC. In particular, WSDOT provided updates on the progress of the SR-520 tolling project, travel time signage, and ATM program. King County facilitated communication with vanpool riders. WSDOT and King County also granted permission for survey personnel to access their highway right-of-way and transit vehicles (respectively) to recruit survey participants.

Survey Population and Sampling

The population of interest was defined as: current peak- and shoulder-period users of the Lake Washington corridor, and all adult members of their household. This definition differs from a more typical regional travel survey, and a survey of the entire Seattle region would have the advantage of capturing a slightly wider range of users and impacts, for example if travelers who currently avoid the corridor start using SR-520 more frequently after the start of tolling due to reduced congestion. A fully regional survey, however, would expend scarce survey resources on large numbers of respondents who seldom use the Lake Washington corridor, for whom any impacts of pricing would be quite minor and indirect. Other household members were included

in the population in order to capture intra-household dynamics that may occur in response to tolling, such as changes in utilization of shared vehicles or division of household trips.

Corridor users were divided into three groups for recruiting purposes: drivers, transit riders, and vanpoolers:

- *Drivers* on the corridor were identified via license-plate capture photography on sections of SR-520 and I-90 near Lake Washington
- *Transit riders* were intercepted by survey staff onboard buses and at Park and Ride facilities in the corridor
- Members of King County *organized vanpools* received an e-mail solicitation to participate. Those who indicated interest provided their contact information on a survey website and were mailed a packet.

Sample Size: Definitions and Goals

The survey was structured so that all adult members of the contacted household were part of the sample, not just the primary contact. (Children under 18 were not asked to complete a survey due to potential concerns about privacy and informed consent, even though some teenagers are drivers and independent transit riders in the Lake Washington corridor. A limited exception was made in the few cases where a vehicle recorded during the license plate capture was registered to a 16- or 17-year old owner, or where a 16- or 17-year old transit rider was intercepted during transit recruitment. In these cases, the teenaged respondent was the primary contact for the household and was asked to complete the diary along with the adults in the household.)

The inclusion of all household members increases respondent burden and has the potential to include non-users of the corridor, but it ensures that the survey captures important intra-household dynamics regarding travel behavior. For example, congestion pricing on the SR-520 bridge could potentially encourage household members to carpool together, telecommute more frequently, or change the way shopping trips and errands are handled by different members of the household during the course of the day.

The overall goal for achieved sample in Wave 1 was 3,000 households: 2,600 “driver” households and 400 “transit/vanpool” households. These terms refer only to whether the primary contact for the household was recruited from the license plate sample or from the transit and vanpool contacts; other household members (or indeed even the initial contact himself) may use other modes of transportation some or all of the time. These sample sizes were chosen such that, with the expected 50% attrition between waves of the survey, approximately 1,500 households would complete both waves and comprise the panel dataset. A sample of this size is more typical of regional travel surveys in small- to medium-size metro areas, rather than a larger region such as Seattle, but appears appropriate given the more limited, corridor-specific focus of this study. The quota for transit recruits was designed to ensure that there are enough data to permit separate analysis of effects on this group.

Survey Questions

Questions and topic areas from the survey are summarized below. The full survey scripts for Wave 1 and Wave 2 are included in this document as an Appendix.

Each question from Wave 1 was also posed in Wave 2. In addition, Wave 2 had several tailored follow-up questions about reported changes in respondents' typical commutes.

Questions common to both survey periods captured information in the following areas:

- Household information and personal demographics
- Two-day travel diary, covering all trips made during assigned 48-hour diary period
- Follow-up questions for trips in the Lake Washington corridor, including trip satisfaction
- Typical commute patterns and general use of the Lake Washington corridor
- Personal attitudes

Household Information and Demographics

In this section, the primary contact provided information on behalf of the entire household, including the following items:

- Plans to move within one year¹
- Number of household vehicles
- Number of people in the household and their relationship to primary contact
- Age and gender for all household members
- For each adult in the household: driver licensure status, employment status, educational attainment, Hispanic/Latino origin, and race
- Annual household income
- Home address for future contact

Two-Day Travel Diary and Follow-Up Questions

In this section, each member of the household provided information on the trips made during the assigned 48-hour travel diary period. Respondents could enter trip locations using the exact address or nearest cross-streets, and/or by using a point-and-click map interface or business search tool. The survey software geocoded each location to latitude and longitude using a Google database, though this was not visible to respondents. Specific questions in this section of the survey were:

- Whether any trips were made on assigned days, and if not, reason(s) for staying home

¹ Respondents who indicated that they were likely to move within one year were excluded from the study, since panel data would not be available. These households skipped all remaining questions and were not considered part of the completed sample.

- Whether worked from home (telecommuted) on assigned days
- Trip roster for each day, i.e. order of location
- Origin, destination, departure time, arrival time, and purpose for each trip
- Mode(s) of transportation used for each trip
- For driving trips, whether driver or rider, parking cost, and number of other people in the vehicle (household members and others)
- Whether trip went over or around Lake Washington, and if so, by what driving route (SR-520, I-90, SR-522, or other) or mode (transit or other)

Respondents who used the Lake Washington corridor answered specific follow-up questions about the experiences. For each trip across/around Lake Washington, respondents were asked about:

- Satisfaction with overall driving time, travel speed, and predictability of travel time (for driving trips)
- Satisfaction with overall transit time, wait time at the stop, reliability of service, and availability of seating (for transit trips)
- Whether traveler information sources such as radio traffic reports, 511 telephone service, or websites were consulted before or during the trip.

Personal Survey

After the two-day diary, the final section of the survey asked each respondent to provide more general information about their transportation patterns and personal attitudes. These questions allow the more detailed, trip-level information from the diary to be viewed in light of the respondents' broader patterns in using the SR-520 corridor. It also allows for analysis of how "typical" commute patterns (rather than specific trips) and attitudes toward tolling and traffic may change after the start of congestion pricing. Questions in this section included:

- When the respondent last used public transportation
- Average number of trips per week across/around Lake Washington
- Typical route/mode for trips across Lake Washington and alternatives considered
- Ownership of personal computers and telecommunications devices

Employees and students were also (as applicable) asked about:

- Number of days per week commuting and telecommuting
- Typical commute mode
- Flexibility in work/school schedule (and reason for those with no flexibility)
- Commuter benefits offered and used (e.g. discounted parking or transit pass)

For the Wave 2 survey only, targeted follow-up questions were posed on aspects of typical commuting behavior. For example, respondents who changed their typical route or mode of travel, or increased or decreased their use of telecommuting, between waves were asked about the motivation for the changes.

In both survey waves, respondents also rated their agreement or disagreement with a number of attitudinal statements about traffic and tolling, such as “At least twice a week, there’s an unexpected delay on my trip.” Some of these attitudinals have been used in previous Seattle-area studies, permitting some measure of insight into how attitudes may have evolved over a longer period of time. The Wave 2 survey included some opinion questions about the SR-520 tolling program.

Sample Size and Response Rates

In order to capture intra-household dynamics, the survey was structured so that all adult members of the contacted household – not just the traveler – were part of the sample. Households were defined as “complete” if all adult members of the household completed the two-day diary and all other questions in the survey. By this standard, the panel includes 2,063 households with a total of 3,698 adult respondents. The Wave 1 overall response rate was 10%, and 61% of Wave 1 households also completed wave 2, for an overall response rate of 6%, as measured by the number of completed households divided by the number of initial contacts.

Table 1: Response Rate Summary

| | |
|---|--------|
| Net Survey Invitations | 31,873 |
| Wave 1 Completed Households (Entire Survey Completed by All Adult Household Members) | 3,356 |
| Wave 1 Response Rate (As Share of Initial Contacts) | 10% |
| Households Retained in Wave 2 | 2,063 |
| Wave 1 to Wave 2 Panel Retention Rate | 61% |
| Overall Response Rate (as Share of Initial Contacts, by Mode) | 6% |

Weighting

The survey’s sampling plan was stratified by mode and route, resulting in some methods of commuting being over- or under-represented in the sample, as compared to their true proportions in the population of peak-hour travelers in the Lake Washington corridor. In particular, more drivers were recruited off of SR-520 than I-90. Approximately 72 percent of respondents’ trips captured in the recruitment process took place on SR-520, versus approximately 28 percent on I-90, even though the latter has higher peak-period traffic volumes (42 percent on SR-520 versus 58 percent on I-90). Transit riders were also slightly under-

represented in the sample compared to their actual share of peak-period travelers (approximately 12 percent sampled versus 13 percent of observed daily peak-period trips via transit).

In representing the shares of recruited trips by route, it was necessary to account for the potential to capture trips by a sampled vehicle on multiple routes. For example, a given vehicle owned by a sampled household could have been captured taking four different trips along the corridor during the recruitment process. Rather than ignoring additional trips (i.e., assuming that the first sampled trip is representative, as in the case of vehicles captured exactly once), the sampled route for the vehicle would be represented as the weighted average across the captured trips (e.g., three trips by SR-520 and one trip by I-90 would be classified as $\frac{3}{4}$ of a vehicle recruited on SR-520 and $\frac{1}{4}$ of a vehicle recruited on I-90).

To adjust for the effects of this stratified sampling approach, the raw data were weighted at the household and person level using data on peak-period, cross-lake travel volumes by route and mode. Household-level weights were identified using the ratios of observed peak-period, cross-lake travel share to the share of the sample recruited by route and mode, multiplied by a given mode's observed share. For example, the household weight for SR-520 was estimated as the ratio of the observed peak-period, cross-lake travel volume on SR-520 (42%/72%), multiplied by the observed share of cross-lake driving trips (86%) – yielding a weight of approximately 0.586.

Person-level weights were established to give each sampled household equal representation, and to yield summed weighted person-level data that was consistent with the recruitment method for the household (i.e., mapped to the household weights). To achieve this, the person-level weights were specified as the product of the ratio of respondents to sampled households (i.e., 3698/2063, or approximately 1.793) and the reciprocal of the number of respondents in a sampled household.

Throughout the paper, results presented are based on the weighted data, with the exception of analyses of particular subgroups such as transit riders or SR-520 drivers.

Non-Response Bias

Although response rates from this survey appear to be typical of other household travel surveys (8) and other surveys of this corridor, there is the possibility of non-response bias, i.e. that respondents differ from the broader population of interest on certain key attributes. In particular, low- and high-income households, low- and high-mileage drivers, non-drivers, young single people, households with children, and people in metropolitan areas all tend to be under-represented in household travel surveys (8).

In order to examine possible non-response bias, the demographics of the Wave 1 sample were compared to three other sources of information: responses from households that only *partially* completed their surveys; other recent transportation surveys in the corridor conducted on behalf of WSDOT; and data from the Census Bureau's American Community Survey for King County. In addition, the estimated income levels of participating and non-participating households were

compared using a commercial marketing database. All of these data indicate that the Wave 1 sample was largely similar in its demographics to other samples of Lake Washington corridor users. There were significant differences from the Census, but these were consistent with the fact that this sample, by virtue of its focus on peak-hour travelers, has a greater share of employed commuters, with correspondingly higher incomes and more representation from the middle age brackets. The sample had slightly fewer large households as compared to households that only partially completed the survey.

The demographics of the final panel were also compared against the larger set who completed Wave 1 to assess the possibility of differential panel attrition. There were no major differences on key demographic variables such as race, gender, and household size.

Overall, based on these comparisons, there do not appear to be any systematic issues with non-response. However, non-response bias can also result from less observable factors such as personal attitudes, particularly for a controversial issue such as tolling, for which a survey may disproportionately draw those with strong opinions. Table 2 below summarizes the demographics of the final, weighted panel compared to un-weighted data, Wave 1 responses, and other surveys in the corridor. Figure 2 shows the geographic distribution of respondents' home locations.

Table 2: Demographic Summary of the Final Respondent Panel

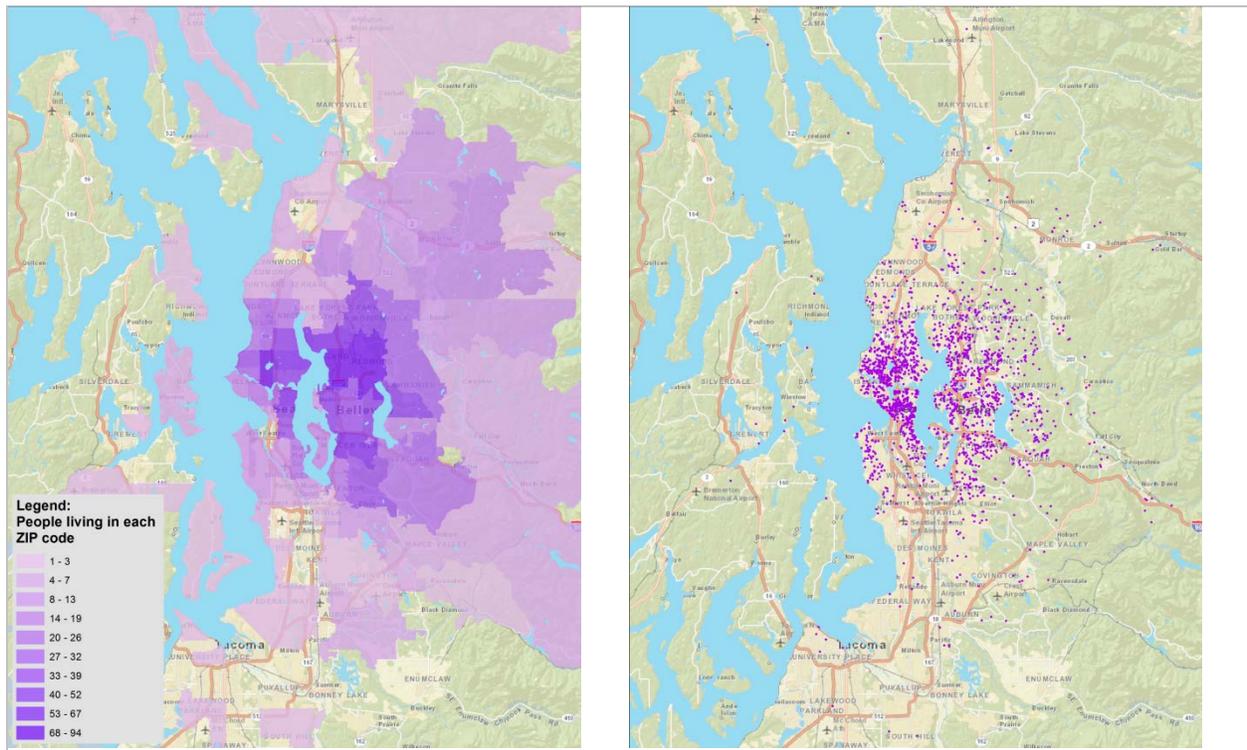
| Characteristic | Wave 1, Raw Data | Wave 1-2 Panel, Raw Data | Wave 1-2 Panel, Weighted | RSG / Wilbur Smith Survey (2009) | WSDOT Corridor Survey (2010) | ACS, King County (2008-2010) |
|----------------------------|------------------|--------------------------|--------------------------|----------------------------------|------------------------------|------------------------------|
| Gender: | | | | | | |
| Male | 48% | 48% | 45% | 50% | 51% | 50% |
| Female | 52% | 52% | 55% | 50% | 49% | 50% |
| Age: | | | | | | |
| 18-24 | 5% | 3% | 2% | 2% | 5% | 12% |
| 25-34 | 22% | 21% | 21% | 47% | 34% | 40% |
| 35-44 | 23% | 25% | 24% | | | |
| 45-54 | 24% | 24% | 24% | 24% | 22% | 19% |
| 55-64 | 19% | 20% | 20% | 19% | 21% | 15% |
| 65+ | 7% | 7% | 7% | 7% | 16% | 14% |
| Race: | | | | | | |
| White | 81% | 80% | 81% | | 80% | 70% |
| Black | 1% | 1% | 1% | | 2% | 6% |
| Asian | 15% | 16% | 15% | | 7% | 14% |
| Other / Two or More | 4% | 3% | 4% | | 4% | 10% |
| Ethnicity: | | | | | | |
| Hispanic / Latino | 3% | 3% | 3% | | | |

| Characteristic | Wave 1, Raw Data | Wave 1-2 Panel, Raw Data | Wave 1-2 Panel, Weighted | RSG / Wilbur Smith Survey (2009) | WSDOT Corridor Survey (2010) | ACS, King County (2008- 2010) |
|--|------------------------|--------------------------------|--------------------------------|--|---------------------------------------|---|
| Not Hispanic / Latino | 97% | 97% | 97% | | | |
| Education: | | | | | | |
| High school diploma or less | 6% | 5% | 4% | | | 25% |
| Vocational | 3% | 2% | 2% | | | |
| Some college / Associate's degree | 16% | 15% | 14% | | | 29% |
| Bachelor's degree | 43% | 43% | 43% | | | 29% |
| Post-graduate | 33% | 35% | 36% | | | 17% |
| Household income: | | | | | | |
| Under \$50,000 | 13% | 11% | 11% | 14% | | 37% |
| \$50,000 to \$99,999 | 31% | 29% | 30% | 29% | | 32% |
| \$100,000 to \$150,000 | 24% | 24% | 24% | 26% | | 17% |
| Over \$150,000 | 23% | 23% | 21% | 23% | | 15% |
| Decline to state | 9% | 13% | 14% | | | |
| Household composition: | | | | | | |
| 1 adult, no children | 21% | 24% | 24% | | | |
| 2 adults, no children | 41% | 39% | 40% | | | |
| 3+ adults, no children | 7% | 6% | 6% | | | |
| 1 adult & child(ren) | 3% | 2% | 2% | | | |
| 2 adults & child(ren) | 25% | 25% | 25% | | | |
| 3+ adults & child(ren) | 3% | 4% | 3% | | | |
| Number of household vehicles: | | | | | | |
| Zero | 1% | 1% | 1% | 0% | 0% | 9% |
| One | 30% | 31% | 31% | 19% | 24% | 35% |
| Two | 47% | 48% | 49% | 52% | 46% | 37% |
| Three | 16% | 14% | 14% | 29% | 28% | 19% |
| Four | 5% | 4% | 4% | | | |
| Five or more | 2% | 2% | 2% | | | |
| Employment status: | | | | | | |
| Employed full-time | 64% | 65% | 68% | | | |
| Employed part-time | 8% | 7% | 8% | | | |
| Self-employed | 7% | 7% | 6% | | | |
| Student (including students also working) | 5% | 3% | 4% | | | |
| Homemaker | 6% | 7% | 7% | | | |
| Retired | 6% | 7% | 7% | | | |

| Characteristic | Wave 1, Raw Data | Wave 1-2 Panel, Raw Data | Wave 1-2 Panel, Weighted | RSG / Wilbur Smith Survey (2009) | WSDOT Corridor Survey (2010) | ACS, King County (2008-2010) |
|-------------------|------------------|--------------------------|--------------------------|----------------------------------|------------------------------|------------------------------|
| Unemployed | 4% | 3% | 3% | | | |

Note: Blank cells are used for cases in which other surveys did not use the same question and/or comparable response categories

Figure 2: Home locations (Left: by ZIP code, Right: Individual locations)



Technology Ownership and Use

In addition to the demographic questions summarized above, respondents also provided details about the ownership and use of advanced technologies. These questions provide additional context about respondents' lifestyles and their propensity to consult traveler information services as part of their travel. The vast majority (97%) of respondents reported owning a personal computer, and approximately 40% own a navigation/GPS device. Smartphone ownership rose from 53% of respondents in Wave 1 to 70% of respondents in Wave 2, while ownership of conventional mobile phones fell from 49% to 34%.

External Factors

Even though the panel design of the study allows for examination of changes within the same households, many factors aside from the UPA tolling project could affect households' travel choices in the corridor. In particular, gasoline prices in the Seattle region rose from about \$3.10 per gallon in Wave 1 to \$4.10 in Wave 2, a roughly 35 percent increase (9). Using a midrange estimate from the literature (10) of the short-run elasticity of vehicle-miles traveled (VMT) with respect to fuel prices of roughly -0.15, a reduction in overall regional travel of around 5% would be expected if other conditions held constant. Transit fares also increased during this time period – base fares went up 25 cents, or roughly 10% – which would also tend to reduce travel demand. Altogether, these external factors point to a potential decrease in the overall volume of travel in Wave 2. Other external factors that could affect travel choices include weather, special events, and construction, but there were no major disruptions or anomalies on the assigned travel dates.

Key Findings

This section presents a summary of key findings from the survey data, focusing on changes to travel behavior that emerge when comparing pre- and post-tolling travel diaries and related questions from the panel. Results presented in this section are based on weighted data from the panel of respondent households. Unless noted, reported differences from Wave 1 (pre-tolling) to Wave 2 (post-tolling), or between groups of respondents, are significant at the 95% level using paired and unpaired t-tests and chi-squared as appropriate.

Overall Travel and Use of the Corridor

Overall travel as recorded in the diaries fell significantly from Wave 1 to Wave 2, from an average of 3.8 trip segments and 95 minutes per adult per day in Wave 1 to 3.2 trip segments and 84 minutes in Wave 2. This is a decrease of 14% by trip count and 12% by total duration.

An estimate of vehicle-miles of travel (VMT) was also calculated for all trips where the respondent drove a personal vehicle.² For the panel as a whole, VMT from recorded trips fell by 15% from Wave 1 to Wave 2.

Looking just at trips in the Lake Washington corridor, the total number of recorded trip segments (by any route or mode) fell from a total of 8,101 in Wave 1 to 6,681 in Wave 2. This is a drop of about 18% – somewhat more than the 14% overall decline – and is primarily due to a very large decrease (-43%) in trips on SR-520. Trips on I-90 declined about 13% and transit trips held roughly steady. Estimated VMT for all trips involving use of the SR-520 bridge was down 52%, while estimated VMT for all trips involving the I-90 bridge essentially held steady at +3%. Combining both of these routes, total estimated cross-lake VMT was down 29%.

It is possible that some of the decline in recorded trips – overall and in the corridor – is due simply to respondents' having been less conscientious about recording all of their trips in Wave 2 as compared to Wave 1. This is a form of “panel fatigue” that is a known issue with household travel surveys. However, in a separate follow-up question about the number of one-way trips they typically make across or around Lake Washington, respondents' estimates fell from a mean of 6.0 trips per week in Wave 1 to a mean of 4.9 per week in Wave 2, a drop of about 19%, which is quite consistent with decreases recorded in the diary entries. The decline in recorded travel was also much larger on SR-520 than on toll-free I-90, and appeared to be consistent with many respondents' open-ended comments about making efforts to avoid cross-lake travel where possible. The pattern also held up when looking at the data on the basis of “tours” rather than individual trip segments, with the total number of recorded tours falling 12% overall and

² Since respondents did not provide their exact route, mapping software was used to calculate the mileage on the typical path between the listed origin and destination. This may not correspond with the actual route taken; however, for cross-lake trips, this calculation did take into account whether SR-520, SR-522, or I-90 was used.

19% on the Lake Washington corridor.³ All of this suggests that much of the recorded drop in cross-lake travel is a real phenomenon rather than an artifact of the survey administration, though it may still represent the influence of non-tolling factors.

Route and Mode Choice

As shown in Table 33, 31% of recorded trips in the Lake Washington corridor in Wave 1 were driving trips on SR-520, compared to 46% driving on I-90, 2% driving on SR-522, 15% on public transportation, and 6% by another route or mode. In Wave 2, these proportions changed substantially. Driving trips on SR-520 fell to 21% of trips in the corridor, while other routes increased, with I-90 at 49% and SR-522 at 4%. Transit's share of trips also increased to 18%, and other routes and modes increased to 8%.

In addition to the diary data, respondents who reported making at least two one-way trips across or around Lake Washington in a typical week were asked what route or mode they used most often. Among these respondents, driving on SR-520 was indicated as the most frequently used means by 33% in Wave 1 and 23% in Wave 2. I-90 was indicated by 48% in Wave 1 and 53% in Wave 2, while public transit was indicated by 15% in Wave 1 and 16% in Wave 2. (A further 1% of the panel no longer cross Lake Washington regularly.) In response to a question about their typical use of SR-520 post-tolling versus pre-tolling, a plurality (40%) said that they were using SR-520 with roughly the same frequency. However, 29% reported using it “much less” often and 24% “less” often, compared to only 5% who reported using it “more” often and 1% who reported using it “much more” often.

In general, these two different sets of metrics – actual travel choices as recorded in the diary, and stated preference questions about preferred routes and modes – align fairly closely and indicate that variable tolling of SR-520 was associated with significant shifts away from that route in favor of public transit and the un-tolled I-90 and SR-522. Evidence of a modest shift toward transit also comes from a question on the modes typically used for commuting, for which there was a net increase of 41 respondents (1.5%) who reported using the bus for their daily commute.

³ For this analysis, a “tour” was defined as a set of linked trip segments comprising a full circuit from Home to Work, Work to Home, Work to Work, Home to Home, or other. For example, a trip from home to daycare to work would be categorized as a Home-to-Work tour. The same itinerary in reverse would be a Work-to-Home tour. A series of errands that begins and ends at home would be a Home-to-Home tour.

Table 3: Lake Washington Corridor Travel Summary, by Route and Mode, Before and After SR-520 Tolling

| | Corridor Trips Recorded in Diary (Share of Corridor Total) Pre-Tolling | Corridor Trips Recorded in Diary (Share of Corridor Total) Post-Tolling | Corridor Trips Recorded in Diary (Share of Corridor Total) Change in Trip Count | Reported as Most Commonly Used Means For Corridor Trips Pre-Tolling (N=2,531) | Reported as Most Commonly Used Means For Corridor Trips - Post-Tolling (N=2,082) |
|---------------------------|--|---|---|---|--|
| Drive on SR-520 | 2,515 (31%) | 1,428 (21%) | -43% | 33% | 23% |
| Drive on I-90 | 3,751 (46%) | 3,269 (49%) | -13% | 48% | 53% |
| Drive on SR-522 | 148 (2%) | 284 (4%) | +92% | 1% | 4% |
| Public transit | 1,236 (15%) | 1,209 (18%) | -2% | 15% | 16% |
| Other route / mode | 450 (6%) | 491 (7%) | +9% | 3% | 4% |
| TOTAL | 8,101 | 6,681 | -18% | | |

These recorded changes are also roughly consistent with preliminary data on actual changes in traffic volumes in the region. These figures show an overall drop of 6% in total daily corridor vehicle travel – reflecting an initial 50% drop in traffic volumes on SR-520 (later rebounding to only a 30% drop), an 11% increase in volume I-90, and a 7% increase on SR-522. These external data are not strictly comparable due to measurement issues (including differences in the before-and-after periods and the inclusion of trucks and other non-household vehicles). However, while they do not match the survey data precisely, they generally confirm the overall picture of a steep decline in SR-520 travel accompanied by somewhat smaller shifts toward I-90 and SR-522. For public transit, survey respondents recorded slightly fewer transit trips in Wave 2 (but with a higher mode *share* for transit), whereas external ridership data show outright increases in peak-period ridership in the range of 10%-20%. This difference appears to stem from the fact that transit enhancements were launched well in advance of the start of tolling, in many cases prior to the Wave 1 baseline, as well as the study’s focus on existing rather than new peak-period commuters.

Respondents who changed their usual means of cross-lake travel between Wave 1 and Wave 2 were asked follow-up questions about their motivations. Avoiding the toll on SR-520 was cited as a reason to change by 86% of those who had switched from driving on SR-520 to driving on I-90 or SR-522. Among those who switched from driving to transit, 58% cited a desire to avoid

the SR-520 tolls, 39% cited gasoline prices, 39% said that they switched because transit is less stressful, and 20% cited environmental reasons. Only 9% identified the improved bus service in the corridor as part of their motivation.

There was a relatively small group of travelers who switched from other routes and modes to driving on SR-520: 113 respondents, or about 9% of those who were previously using other routes or modes as their primary means for cross-lake travel. For this group, the most commonly cited reasons were time savings (56%) and convenience (44%).

Vehicle Occupancy and Ridesharing

Based on travel diaries, the mean occupancy for all private vehicle trips in the Lake Washington corridor rose slightly from 1.48 in Wave 1 to 1.56 in Wave 2. For trips on SR-520, mean occupancy rose from 1.42 to 1.61, and the share of car trips that were single-occupancy fell from 76% to 69%. For trips on I-90, mean occupancy rose from 1.28 to 1.35.

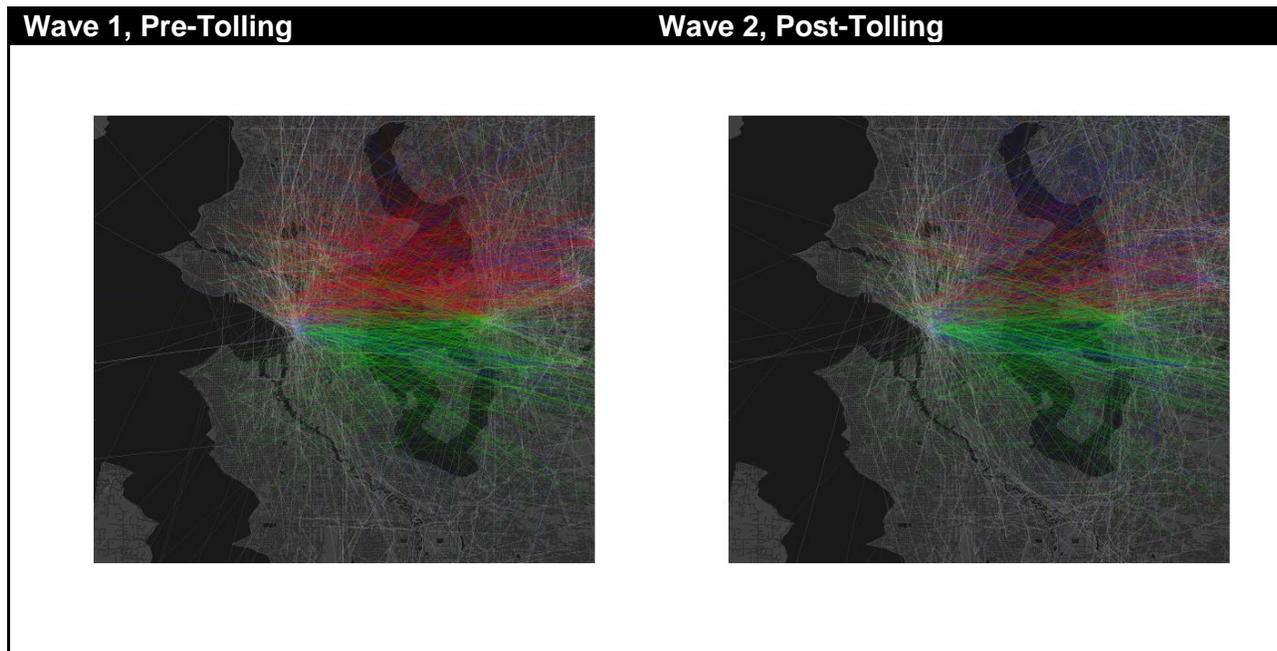
Despite these small increases in average occupancy, there was no reported increase in regular carpooling. Based on responses to a question about typical commute modes, carpooling to work had a net loss of 37 respondents (about 1% of regular commuters) between waves. In follow-up questions, the most commonly cited reasons for ending a carpool were changes in home or work locations (42% of those who stopped carpooling) and other carpool members having dropped out (33%). Respondents could select more than one reason for their changes. Among those who started carpooling after Wave 1, the most common stated motivations were sharing vehicle operational costs (33% of new carpoolers) and improved convenience or less stress (32%). Only 9% of new carpoolers specifically mentioned sharing toll costs as one of the reasons that they began carpooling, though it is possible that the salience of the tolls drew commuters' attention to the overall costs of driving.

Although regular carpooling did not increase, there is also no evidence that the newly free-flowing conditions on SR-520 led directly to any drop in carpooling. Only 3 respondents said that they stopped carpooling because it was now faster to drive alone on SR-520

Breakdown by Trip Purpose

Changes in trip-making behavior differed strongly by trip purpose. In general, the number of trips for child care and social/recreational purposes was relatively stable from Wave 1 to Wave 2, while trips for school, personal business, shopping, dining, and pickup/dropoff of another person declined more than average. The decline was particularly pronounced for SR-520. For example, driving trips to the primary workplace via SR-520 declined 49% by count and 52% by VMT from Wave 1 to Wave 2, while they increased 5% by count and 7% by VMT via I-90. This again highlights the shift from SR-520 to the toll-free I-90. It is shown visually in Figure 3 below, in which the recorded start and end points of all trips to the primary workplace are connected by lines and color-coded by the mode and route selected.

Figure 3: Trips to Primary Workplace, Wave 1 to Wave 2, by Route and Mode



Red = Crossed Lake Washington by car/truck on SR-520

Green = Crossed Lake Washington by car/truck on I-90

Blue = Went across Lake Washington via public transit or around via SR-522, or other route/mode

White = Trip did not cross Lake Washington

Breaking the occupancy data down by trip purpose, the small increases that appeared in the overall data are largely the result of slightly higher occupancies for trips for social, religious, community, shopping, and dining purposes. There was very little change in mean occupancy for trips to work.

In the open-ended comments, many respondents noted that they were attempting to limit their discretionary travel across Lake Washington wherever possible, for example by availing of shopping, dining, and recreation options that were closer to home. This pattern was borne out in the trip diaries to some extent. For example, trips in the social and recreational category held roughly steady from Wave 1 to Wave 2 overall (-1% by count and +1% by VMT), but VMT for these trips *on the Lake Washington corridor* fell substantially, by 18% on SR-520 and by 30% on I-90. This suggests that respondents continued to make social and recreational trips with the same frequency and average distance as before, yet had significant flexibility to find alternative destinations for these trips that did not involve driving across the lake. A different pattern prevailed for other discretionary trips, such as shopping, dining and exercise trips. For these categories, not only did VMT decline on the Lake Washington corridor (especially SR-520), but

overall VMT and the number of trips to any destination was also down, indicating that respondents cut back on the overall number of trips in these categories, rather than just shifting destinations. It is unclear to what extent these changes were related to tolling itself rather than other changes, such as gasoline prices and other regional transportation conditions.

Table 4: Summary of Trip-Making Changes by Trip Purpose, Wave 1 (Pre-Tolling) to Wave 2 (Post-Tolling)

| Trip Purpose | Change in total trips (all modes, all destinations), by count | Change in total VMT (all destinations) | Change in VMT, cross-lake trips via SR-520 | Change in VMT, cross-lake trips via I-90 |
|--|---|--|--|--|
| Go home | -9% | -12% | -52% | +7% |
| Go to primary workplace | -14% | -13% | -54% | +12% |
| Go to other work-related location | -28% | -22% | -53% | +12% |
| Child care | +15% | -7% | -55% | -6% |
| School | -23% | -29% | -51% | -46% |
| Personal business | -20% | -19% | -53% | -18% |
| Social / recreational | -1% | +1% | -18% | -30% |
| Exercise / gym | -19% | -18% | -55% | +12% |
| Religious / community activity | +6% | -30% | -58% | -21% |
| Shopping | -20% | -25% | -54% | -26% |
| Eat out or pick up takeout | -24% | -21% | -44% | -28% |
| Drop off or pick up someone else | -21% | -25% | -65% | -13% |
| Other | -16% | +25% | +30% | +14% |
| TOTAL | -14% | -15% | -52% | +3% |

Trip Departure Time

Although the overall level of cross-lake travel was down, the distribution across the day remained relatively stable, with 59% of such trips departing during a peak period (7-9 AM and 3-6 PM) in Wave 1 and 58% in Wave 2, a statistically insignificant change. Small changes in patterns of trip timing were, however, evident on the individual routes. For SR-520, the share of trips that took place during the peak periods rose from 53% to 57%, with most of the change stemming from changes in non-work trips. On I-90, the movements were in the opposite direction, with the proportion of peak trips falling from 61% to 56%, and the largest reduction among work-related trips. The sources of these shifts are not clear, though it is possible that the

diversion to I-90 prompted some drivers to do more to avoid the peak periods, whereas tolling on SR-520 allowed that route to remain free-flowing at most times, somewhat reducing the need to avoid the peak periods for those willing to pay.

Trip Satisfaction

As part of the travel diary, respondents were asked to rate their level of satisfaction with aspects of each cross-lake trip recorded. Drivers were asked about travel time, travel speed, and predictability, while transit riders were asked about travel time, wait time, reliability, and seating availability. Each attribute was rated on a seven-point scale, ranging from “very dissatisfied” to “very satisfied.”

On each of the three measures, satisfaction with SR-520 driving trips increased significantly, both for peak-period trips and for all time periods, while satisfaction with I-90 trips experienced a slight decrease (see Table 5). This pattern is consistent with preliminary data on regional traffic conditions, which indicate that average peak-period travel speeds on SR-520 have risen 10 to 26 mph [16 to 42 km/h] above pre-tolling levels, while I-90 average speeds have fallen by 2-7 mph [3 to 11 km/h]. Amongst transit riders, trip satisfaction levels were relatively stable, though there was a slight increase in satisfaction with travel time and a decrease in satisfaction with seating availability. Again, this is consistent with the fact that transit service was expanded but that ridership increased, creating more competition for seating. The small increases in satisfaction with SR-522 are harder to interpret, since there are no indications that traffic conditions improved on SR-522. However, drivers may be more satisfied with SR-522 relative to the alternative of paying a toll on SR-520.

Table 5: Summary of Mean Satisfaction Scores for Peak-Period Trips Around or Across Lake Washington, Before and After SR-520 Tolling

Scale: 1=Highly Dissatisfied, 4=Neutral, 7=Highly Satisfied

“Peak Period” = Trips departing 7-9 AM or 3-6 PM

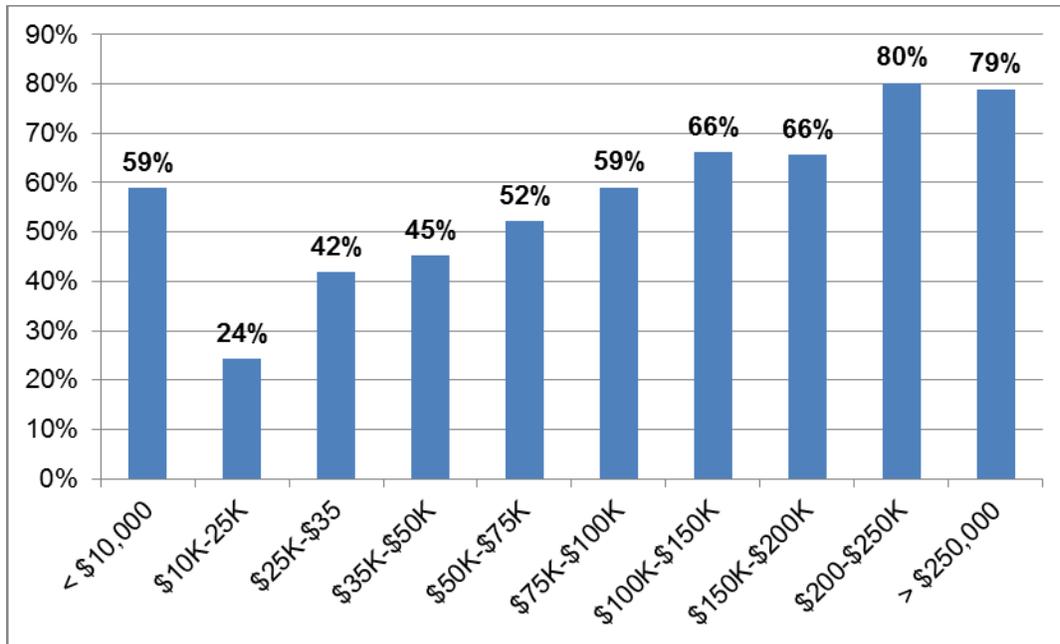
* denotes statistically significant change

| | Pre-Tolling | Post-Tolling | Change |
|--|-------------|--------------|---------|
| Driving Trips on SR-520: N=1,840 trips pre-tolling N=1,032 trips post-tolling | | | |
| Satisfaction with Travel Time | 3.41 | 5.17 | +1.76 * |
| Satisfaction with Travel Speed | 3.35 | 5.16 | +1.81 * |
| Satisfaction with Predictability | 3.47 | 5.13 | +1.66 * |
| Driving Trips on I-90: N=1,306 trips pre-tolling N=1,199 trips post-tolling | | | |
| Satisfaction with Travel Time | 3.98 | 3.87 | -0.11 * |
| Satisfaction with Travel Speed | 3.93 | 3.81 | -0.12 * |
| Satisfaction with Predictability | 4.03 | 3.68 | -0.35 * |
| Driving Trips on SR-522: N=104 trips pre-tolling N=169 trips post-tolling | | | |
| Satisfaction with Travel Time | 3.34 | 3.66 | +0.32 * |
| Satisfaction with Travel Speed | 3.39 | 3.64 | +0.25 * |
| Satisfaction with Predictability | 3.91 | 3.97 | +0.06 |
| Transit Trips: N=758 trips pre-tolling N= 714 trips post-tolling | | | |
| Satisfaction with Travel Time | 4.90 | 5.17 | +0.27 * |
| Satisfaction with Wait Time | 5.10 | 5.15 | +0.05 |
| Satisfaction with Reliability | 5.23 | 5.23 | 0.00 |
| Satisfaction with Seating Availability | 5.19 | 4.73 | -0.46 * |

Transportation Costs and Tolling Equity Issues

Roughly 61% of households reported owning at least one Good to Go! toll transponder, which provides a discounted toll rate. While lower-income households were less likely to have a transponder, the most frequent reason given was infrequent use rather than expense of the transponder itself or the difficulty of opening and maintaining an account.

Figure 4: Ownership rates for Good to Go! transponders, by household income group

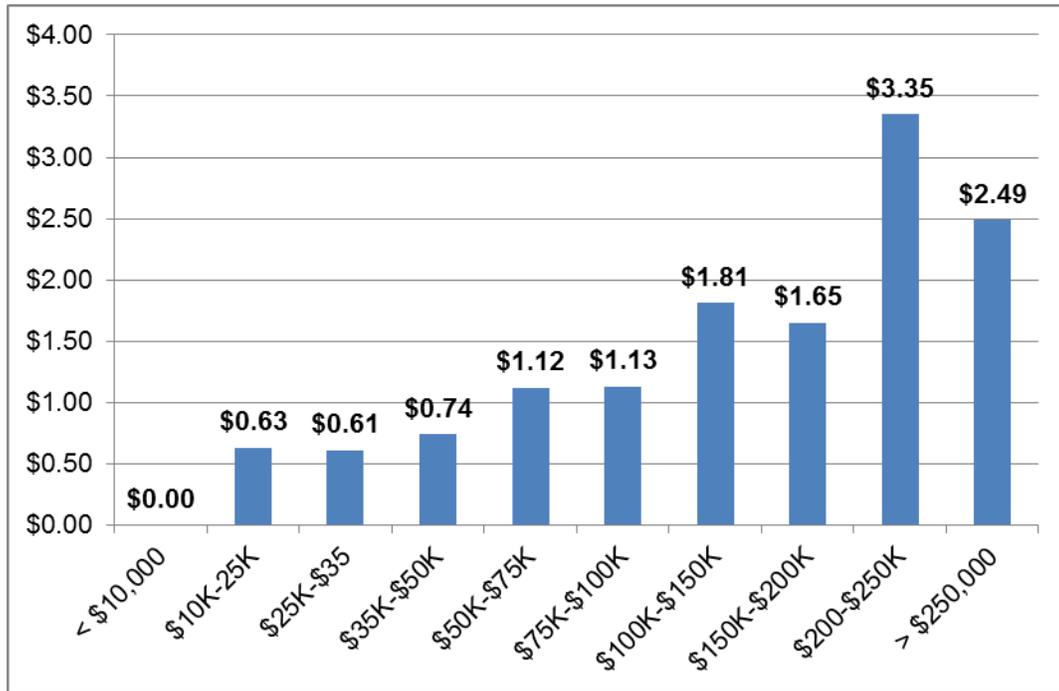


About 5% of commuters indicated that their employer or school provided partial or full reimbursement for SR-520 tolls; of these, about two-thirds said that they claimed the reimbursement. A small number of respondents, just under 2%, also indicated that their employer or school provided a one-time payment related to getting a Good to Go! pass.

Overall, 19% of households and 13% of individuals recorded any tolled trips in their diary records, with an overall average of \$1.58 in tolls paid per household over the two-day period. Looking just at households who did pay at least one toll during the two-day diary period, the median and mode for total paid was \$7 per household.

There were substantial differences in tolls paid across income groups, with tolls generally rising with income. Households earning less than \$50,000 per year paid an average of \$0.67 over the two-day period, versus \$3.35 among households earning between \$200,000 and \$250,000. (The highest-income group, \$250,000+, paid slightly less, at \$2.49.)

Figure 5: Total tolls paid by household members over 2-day travel diary period: Average by household income group



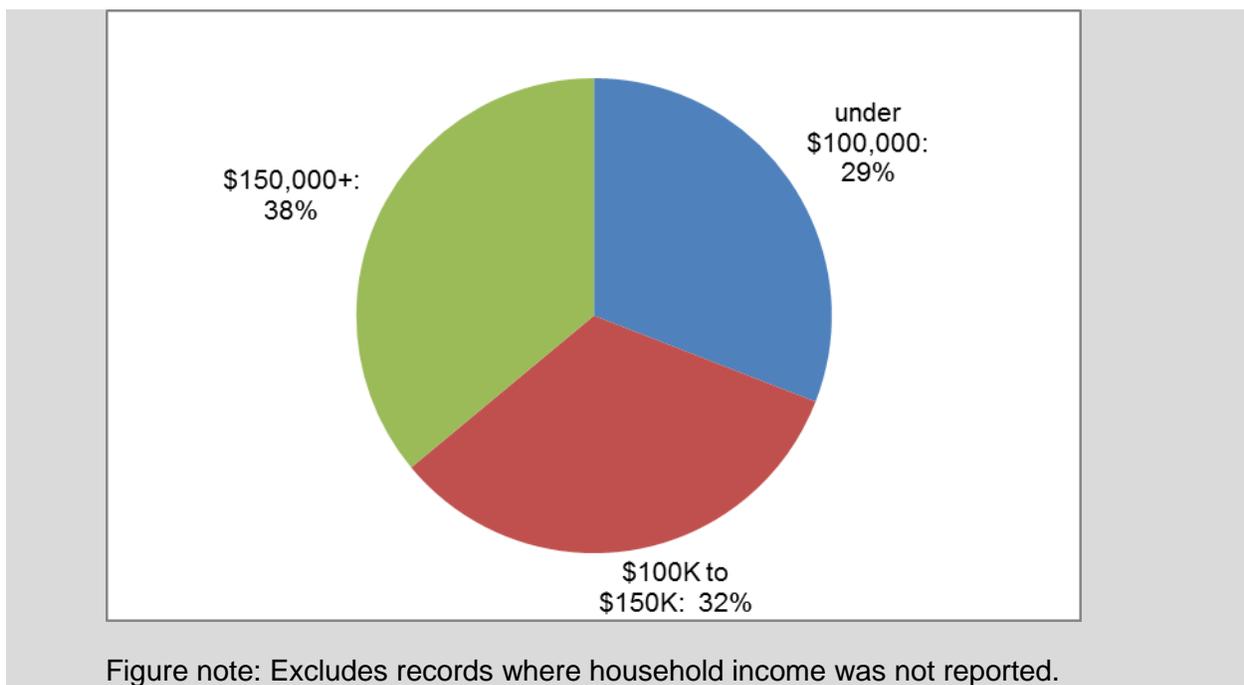
The average toll paid was roughly equal for all income levels at approximately \$3 per transaction; the difference in total tolls paid stemmed primarily from differences in the *number* of tolled trips made, rather than in major differences in the use of peak versus off-peak rates. Indeed, looking at changes in cross-lake trips by income group, members of the lowest income group cut back on their travel much more substantially than others. For this group, those earning less than or up to 3 times the poverty level for their household size (or about \$40,000 for a small family), total recorded trips on the corridor declined by 28%, versus 19% overall. For discretionary trip purposes such as shopping and dining, the difference was even more striking, with the lowest income group reducing trips by 51% compared to 25% overall.

Table 6: Change in trip count on Lake Washington corridor (SR-520, I-90, SR-522 and Transit), Wave 1 to Wave 2, by Household Income Group

| | To Home | To Work / School/ Child Care | Discretionary | Other | Total |
|-------------------------------|---------|------------------------------|---------------|-------|-------|
| Below 3x Poverty Level | -9% | -34% | -51% | -27% | -28% |
| 3-5x Poverty Level | -16% | -18% | -27% | -17% | -18% |
| 5-10x Poverty Level | -13% | -19% | -19% | -30% | -18% |
| Over 10x Poverty Level | -19% | -18% | -24% | -16% | -19% |
| Income Not Reported | -18% | -23% | -24% | -10% | -21% |
| Total | -15% | -20% | -25% | -22% | -19% |

The substantial drop in travel for the lowest-income group raises potential concerns about foregone mobility and inequitable distribution of costs and benefits of the tolling program. However, the overall equity impacts are difficult to ascertain because of the very small number of respondents in the lower-income groups; households earning less than \$50,000 per year comprised just over 10% of the sample. (As noted earlier, the peak period travelers in the sample were disproportionately employed commuters with above-average incomes. The average household income of SR-520 drivers was roughly \$132,000 prior to tolling and \$140,000 after tolling.) Moreover, the equity of the tolling program would need to be compared to alternative methods of raising transportation revenues to replace the SR-520 bridge, such as sales or excise taxes, some of which could pose greater hardship to lower-income households. Examining the share of recorded tolls paid by household income groups (see chart below) shows that a large majority of toll revenue came from households earning more than \$100,000 per year.

Figure 6: Share of total recorded tolls paid, by household income group, Wave 2 travel diaries.



For lower-income households who continued to drive on SR-520, affordability of the tolls is difficult to judge solely from the available data. As a rough indicator, a total of 73 households with incomes under \$100,000 per year (about 9% of such households) recorded paying \$4 or more in tolls during the two-day diary period. Using an assumed 250-workday year, this would be equivalent to \$500 or more per year, or 1% of gross income for a household earning \$50,000.

Telecommuting

The survey provides two different measures of the incidence of telecommuting. All respondents recorded actual telecommuting that occurred during the assigned dates of their two-day travel diary. In addition, employed respondents were asked about the frequency with which they “typically” telecommute, with answer choices ranging from “never” to “5 or more days per week.”

Recorded telecommuting held relatively constant between Wave 1 and Wave 2 with no significant change. In both survey waves, 15% of respondents telecommuted for at least part of one or both assigned diary days.

On the question about typical telecommuting, the overall reported frequency of telecommuting was very similar across both waves, although there were slight shifts in behavior. Twenty percent of employed respondents reported telecommuting more frequently in Wave 2, compared to 14% who reported telecommuting less frequently. In follow-up questions about the reasons for telecommuting more or less frequently now, 54% of those who increased their

telecommuting cited work-related reasons, 20% cited reduced commuting costs, 17% cited changes in their personal situation, 16% cited improvements in their home technology, and 9% cited reduced toll costs. (Respondents could select more than one reason.) Among those who reduced their telecommuting, 78% cited changes in their work situation. Only six respondents (less than 0.5% of those employed) said that they are telecommuting less frequently now because traffic conditions have improved. Overall, the project does not appear to have increased telecommuting in the region, especially when viewed in light of a general trend toward increasing telecommuting rates nationally (11).

Attitudes and Opinions

Respondents rated their level of agreement or disagreement to a number of opinion statements, using a seven-point scale from “strongly disagree” (1) to “strongly agree” (7), with 4 as “neutral.” (Respondents could also select “not applicable”; these responses were treated as missing values.) These statements covered a range of topics related to tolling, transportation, and personal attitudes.

Table 7: Traveling on Seattle / Lake Washington region highways is stressful for me

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 1 | 2% | 10% | 7% | 16% | 26% | 22% | 18% |
| Wave 2 | 5% | 14% | 8% | 19% | 26% | 16% | 12% |
| Change | +3% | +4% | +1% | +3% | 0% | -6% | -6% |

Table 8: At least twice a week, there is an unexpected delay on my trip

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 1 | 4% | 15% | 9% | 13% | 18% | 21% | 20% |
| Wave 2 | 6% | 16% | 11% | 18% | 22% | 15% | 12% |
| Change | +2% | +1% | +2% | +5% | +4% | -6% | -8% |

Table 9: I am satisfied with my commute

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 1 | 9% | 14% | 16% | 13% | 17% | 20% | 11% |
| Wave 2 | 8% | 12% | 15% | 15% | 18% | 21% | 11% |
| Change | -1% | -2% | -1% | +2% | +1% | +1% | 0% |

Table 10: I will use a toll route if the tolls are reasonable and I will save time

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 1 | 10% | 12% | 11% | 13% | 21% | 22% | 10% |
| Wave 2 | 6% | 6% | 6% | 13% | 26% | 30% | 14% |
| Change | -4% | -6% | -5% | 0% | +5% | +8% | +4% |

Table 11: Highway tolls are unfair to people with limited incomes

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 1 | 4% | 11% | 7% | 16% | 19% | 19% | 24% |
| Wave 2 | 4% | 9% | 8% | 19% | 23% | 17% | 20% |
| Change | 0% | -2% | +1% | +3% | +4% | -2% | -4% |

Table 12: Tolling on SR-520 has improved my travel in the region

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 2 | 23% | 18% | 10% | 23% | 9% | 10% | 7% |

Table 13: Overall, I am spending more time stuck in traffic since tolling started on SR-520

| | Strongly Disagree (1) | Disagree (2) | Somewhat Disagree (3) | Neutral (4) | Somewhat Agree (5) | Agree (6) | Strongly Agree (7) |
|---------------|-----------------------|--------------|-----------------------|-------------|--------------------|-----------|--------------------|
| Wave 2 | 12% | 19% | 10% | 20% | 15% | 11% | 13% |

While the responses to many attitudinal questions stayed roughly consistent from Wave 1 to Wave 2, there were also several interesting changes in overall agreement scores. For the statement, “Traveling on Seattle / Lake Washington region highways is stressful for me,” mean agreement fell from 4.9 in Wave 1 to 4.5 in Wave 2. For the statement, “At least twice a week, there is an unexpected delay on my route,” mean agreement fell from 4.7 to 4.3. In Wave 2, respondents were also slightly more likely to agree that “I am satisfied with my commute,” with the mean score rising from 4.2 to 4.3.

On attitudes regarding tolling, mean agreement rose from 4.3 in Wave 1 to 4.9 in Wave 2 for the statement, “I will use a toll route if the tolls are reasonable and I will save time.” The increase

was greatest among those who primarily use SR-520, but I-90 users also registered an increase in agreement with this statement, indicating a somewhat more broad-based change in attitudes.

Looking at the changes from Wave 1 to Wave 2 at the individual level, there were 560 individuals (15%) who switched from registering some form of *disagreement* with the statement to some form of *agreement*, compared to only 107 respondents (3%) whose opinions moved in the other direction. Overall, this suggests that actual experience with the SR-520 tolls was associated with changes in attitudes that were more open to the concept of tolling.

In Wave 2, respondents were also slightly less likely to describe highway tolls as unfair to people with limited incomes, though the change was much smaller, from a mean of 4.9 in Wave 1 to 4.8 in Wave 2. On this measure, most of the movement came from those who primarily use SR-520 to cross the lake; opinions of I-90 users were unchanged.

For Wave 2 only, respondents were asked to agree or disagree with a statement that the tolling project has “improved [their] travel in the region.” For this statement, 26% agreed, 51% disagreed, and 23% were neutral. Breaking the responses down by the typical route/mode used for Lake Washington trips, there were vast differences in perspectives. Among Wave 1 users of SR-520, those who remained with SR-520 were generally in agreement with this statement (mean score 5.1), while those who switched to I-90 were much more likely to disagree (mean score 2.8). This appears to reflect a self-selection effect, whereby those who were willing to pay the toll to continue using SR-520 had an improved experience, while those who switched to I-90 experienced longer travel times. Existing users of I-90 who remained with I-90 were even more negative (mean score 2.4), which makes sense given that these travelers obtain little benefit from the improved traffic conditions on SR-520, and indeed may experience additional congestion on I-90. While small numbers of transit riders switched to driving on SR-520 or I-90, the bulk of riders remained on transit and gave an essentially neutral rating (4.1) to this statement.

Respondents were also asked to respond to the statement: “Overall, I am spending more time stuck in traffic since tolling started on SR-520.” For this statement, 39% agreed, 42% disagreed, and 20% were neutral. The overall pattern of responses by typical route/mode was broadly similar to that for the statement about whether SR-520 tolling had improved the respondent’s overall travel in the region.

Table 14: “Tolling on SR-520 Has Improved My Travel in the Region,” Mean Agreement Score by Wave 1 and Wave 2 Typical Route/Mode for Lake Washington Trips

| Wave 1 Typical Route/Mode (read down): | Wave 2 Typical Route/Mode (SR-520) | Wave 2 Typical Route/Mode (I-90) | Wave 2 Typical Route/Mode (Transit) |
|--|------------------------------------|----------------------------------|-------------------------------------|
| SR-520 | 5.1 | 2.8 | 4.1 |
| I-90 | 4.6 | 2.4 | 2.5 |
| Transit | 5.3 | 2.7 | 4.1 |

Table 15: Summary of Attitudinal Questions

| Statement | Wave 1 Mean | Wave 2 Mean |
|--|-------------|-------------|
| Driving on Seattle/Lake Washington region highways is stressful for me | 4.9 | 4.5 |
| I am satisfied with my commute | 4.2 | 4.3 |
| At least twice a week there is an unexpected delay on my trip | 4.7 | 4.3 |
| I will use a toll route if the tolls are reasonable and I will save time: All respondents | | |
| All respondents | 4.3 | 4.9 |
| Primarily use SR-520 | 4.7 | 5.6 |
| Primarily use I-90 | 4.0 | 4.7 |
| Highway tolls are unfair to people with limited incomes | | |
| All respondents | 4.9 | 4.8 |
| Primarily use SR-520 | 5.1 | 4.7 |
| Primarily use I-90 | 4.9 | 4.9 |
| Overall, I am spending more time stuck in traffic since tolling started on SR-520 | | |
| All respondents | | 3.9 |
| Primarily use SR-520 | | 2.6 |
| Primarily use I-90 | | 4.6 |
| Primarily use transit | | 3.2 |
| Tolling on SR 520 has improved my travel in the region | | 3.3 |
| Primarily use SR-520 | | 4.9 |
| Primarily use I-90 | | 2.6 |
| Primarily use transit | | 3.9 |

1=strongly disagree, 4=neutral, 7=strongly agree

Overall, respondents' opinions of the tolling project appear to be mixed. On the more indirect measures of satisfaction with the regional transportation network, respondents reported *less* overall stress from driving in the region, *fewer* unexpected traffic delays, and slightly *more* satisfaction with their commute. They also expressed somewhat more willingness to use a tolled route. All of this would suggest that SR-520 tolling has been associated with improvements to overall conditions in the corridor, though it is unclear whether this is directly related to the tolling project itself or to other regional changes. However, on a direct question about whether SR-520 tolling had improved the respondent's own travel, negative opinions were more common than positive ones. Responses to this question were somewhat polarized, with I-90 drivers generally disagreeing and SR-520 drivers generally agreeing.

In addition to the influence of I-90 drivers' negative assessments on overall perceptions of the project, there is anecdotal evidence from respondents' open-ended comments that the demand-management aspect of tolling is not well understood. Many corridor travelers, even those who said that they approved of the project, described it in their comments as primarily a revenue source. Therefore, it is possible that respondents who experienced improved traffic conditions did not necessarily ascribe those improvements to SR-520 tolling.

Tracking the Choices of SR-520 Drivers

The panel design of the survey allowed for follow-up questioning of those who made changes to their usual travel patterns. Among those who identified driving on SR-520 as their primary means of crossing Lake Washington in Wave 1, 55% still described it as their primary means in Wave 2, while 24% switched to I-90, 7% switched to SR-522, 8% switched to public transit, and 4% switched to another route or mode. (This change in route/mode choice was statistically significant.) An additional 1% no longer crossed Lake Washington on a regular basis.

Breaking the figures out by demographic groups, those former SR-520 drivers who switched to I-90 were more likely to be male, to have lower incomes, and to have less workplace flexibility, compared to those who stayed with SR-520. Specifically, 27% of male SR-520 drivers switched to I-90, versus 21% of female SR-520 drivers. Among SR-520 drivers in Wave 1, 32% of those with incomes under \$100,000 per year switched to I-90, versus only 21% for those with incomes above \$100,000. Furthermore, among Wave 1 SR-520 drivers in the highest income category (over \$250,000 per year) 73% are still using SR-520, versus 55% overall. Roughly 26% of those with no reported schedule flexibility at their job, or arrival time flexibility of about 30 minutes, switched to I-90, compared to 21% of those with the ability to adjust their arrival time at will.

Responses to Wave 1 attitudinal questions about tolling appear to be correlated with respondents' subsequent travel choices in Wave 2. One example is the statement, "I will use a toll route if the tolls are reasonable and I will save time." Among SR-520 drivers in Wave 1 who disagreed with this statement (including "strongly disagree," "disagree," and "somewhat disagree"), only 35% were still primarily using SR-520 in Wave 2, versus 63% of SR-520 drivers

who had agreed with the statement in Wave 1 (including “strongly agree,” “agree,” and “somewhat agree”).

Use of Traveler Information Sources

For each trip in the Lake Washington corridor, respondents provided information about the traveler information sources, if any, that they consulted prior to or during their trip. These sources include radio and TV traffic reports as well as 511 phone lines, variable message signs on the highway, traffic and transit websites and smartphone applications. Overall, some form of information was consulted on 45% of Wave 1 trips and 40% of Wave 2 trips, with the highest rates of information consultation during the afternoon peak. Radio reports, smartphone apps, and websites were the most common sources, with smartphone apps being more commonly used among respondents in the younger age groups, and radio more commonly used among respondents over 45.

The basic daily patterns of traveler information usage were unchanged between Wave 1 and Wave 2. However, overall usage rates were somewhat lower. For example, for trips during the afternoon peak period, the overall consultation rate (i.e., share of trips for which at least one information source was checked) fell from 51% to 46%. The greatest difference in information usage from Wave 1 to Wave 2 occurred on SR-520; SR-520 consultation rates fell 9% and 11% in the AM and PM peaks, respectively, compared to (statistically insignificant) decreases of 2% and 3% for AM and PM peak trips on I-90, respectively. This result suggests that improved reliability on SR-520 reduced the demand for information to guide decisions in trips taken on SR-520.

Conclusions

Seattle’s Urban Partnership Agreement project involves variable tolling of all lanes on a key regional facility, the SR-520 Bridge over Lake Washington, and accompanying investments in public transportation. This panel study provides insight into the response of travelers in the Lake Washington corridor to this congestion pricing approach. While the Seattle project is unique in some ways, findings from this work may be of interest to other regions that are contemplating congestion pricing.

Based on analysis of the survey data, variable tolling of SR-520 has produced marked shifts in traveler behavior that are largely consistent with experience and with economic theory. Faced with a toll of up to \$3.50 each way on SR-520, travelers responded by making fewer overall trips in the corridor and by making substantial shifts to alternative routes and to public transportation.

Recorded trip segments in the travel diaries fell about 14% overall, 18% in the corridor, and 43% on the tolled SR-520. Estimated VMT declined by 15% overall, 29% in the corridor, and 52% on SR-520. These figures track fairly closely with respondents’ assessments of the changes they made to their typical weekly patterns, as well as to initial records of changes in actual roadway volumes.

The shift to toll-free I-90 stands out among the changes that respondents made. Nearly one-fourth of regular SR-520 users switched to using I-90 as their primary means of crossing the lake after tolling, and targeted follow-up questions showed that avoiding the toll was their primary motivation. Recorded trips on I-90 significantly increased as a share of corridor travel. This suggests that, consistent with previous work on congestion pricing, even modest tolls can yield large shifts in travel choices under certain circumstances (12). The size of these shifts varies across demographic groups to some extent; those who switched from SR-520 to I-90 were disproportionately male and lower-to-middle income, and had less workplace flexibility.

Shifts to public transit were smaller in absolute terms and the total number of transit trips was essentially unchanged. However, because overall corridor travel was down, transit mode share for cross-lake travel rose from 15% to 18%, and the share of regular commuters who reported using transit registered a net gain of 1.5 percentage points.

Although many individual travelers reported making changes to their trip timing in response to SR-520 tolling, the *net* effects on the distribution of trips across the peak and off-peak periods were relatively minor compared to what has been observed in other congestion pricing programs (3,12). Telecommuting levels also appear to have been unaffected by the tolling program.

Vehicle occupancies on SR-520 rose slightly, which stands in contrast to the larger increases that have been observed on other tolled routes that offer a carpool discount, such as the SR-91 Express Lanes in California (3). Breakouts by trip purpose and reported typical commute modes show that much of the small increase that did occur came from non-work trips.

Past work with tolling suggests that some travelers place a high valuation on travel time savings and will thus choose a tolled route over a congested alternative despite the cost (6). In the Seattle case, this phenomenon does appear in the data, but appears to be limited in scale. About 2% of respondents reported using SR-520 more often after tolling than before, and about 9% of prior users of other routes and modes switched to driving on SR-520 as their most typical means of crossing Lake Washington.

On trip-by-trip questions about personal satisfaction with conditions, drivers on SR-520 reported being much more satisfied with their travel time, speed, and reliability after tolling (despite having potentially higher expectations from having paid a toll). Meanwhile, satisfaction with trips on I-90 fell only slightly despite the increased pressure on this toll-free alternative. Transit riders were slightly more satisfied with travel times but slightly less satisfied with seating availability. Overall, these nearly contemporaneous records of personal satisfaction with specific trips in the corridor suggest that SR-520 tolling has substantially improved travelers' subjective experiences on that tolled route in terms of speed and reliability. In that sense, the project has met one of its key objectives.

Prior to the project, tolling in the Puget Sound region was relatively limited, with one HOT lane on a portion of SR-167 and a tolled bridge over the Tacoma Narrows. As has often (but not always) been the case with other tolling projects (13), more direct experience with pricing

appears to have led to more favorable perceptions of the idea of tolling. Respondents registered a slight overall increase in their expressed willingness to use a tolled route. Opinion was divided on the overall question of whether SR-520 tolling had improved the respondent's travel in the region; the general pattern was favorable views from SR-520 drivers, negative views from I-90 drivers, and neutral views from transit riders.

Tolling projects, perhaps especially those that involve all lanes of travel rather than a single HOT lane or express lane, can raise questions about equity impacts. The travel diaries show clear differences across income groups in ownership of toll transponders, use of SR-520, tolls paid, and changes in personal travel. While higher-income households are paying the largest share of the tolls, lower-income households have reduced their cross-lake travel substantially. On a direct opinion question, there was a small decrease post-tolling in the belief that tolls are unfair to low-income households, though a majority of respondents still hold this view. This is an area that may warrant follow-up study, given the limited number of lower-income households who were regular users of SR-520 even prior to tolling and the continued interest in equity impacts.

Acknowledgements

This work was funded by the Federal Highway Administration. The authors would also like to acknowledge the assistance of the Seattle UPA local partners: Washington State DOT, Puget Sound Regional Council, and King County.

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Appendix 1: Survey Methodology Details

Driver Sample: License Plate Capture

The license plate capture technique uses high-speed photography to record vehicles as they pass fixed points on the highway. The plate numbers recorded are then matched to the registered name and address of the vehicle owner using state motor vehicle databases, so that an invitation to participate in the survey can be sent by mail. This approach is well-suited to studies of particular routes and corridors because it provides a representative sample of actual highway users, regardless of their origin, destination, or trip purpose. Drivers who use the facility more frequently are proportionately more likely to be sampled.

Figure A-1: License Plate Capture Sites: Maps and Photographs

SR-520



I-90



The Wave 1 sampling plan called for 75 percent of the license plates to be captured on SR-520 and 25 percent on I-90. RSG worked with a subcontractor, All Traffic Data Systems, to conduct the license plate photography on each of the two routes. Based on a review of conditions, two camera locations were established: one on the 76th Avenue NE/Evergreen Point Road overpass across SR-520, just east of the SR-520 bridge, and the other on the 76th Avenue SE bridge over I-90 (near N. Mercer Way) on Mercer Island. Both locations afforded favorable sightlines of the travel lanes in both directions, and were as close to the bridges as possible so that bridge crossing traffic (rather than local entrances and exits) would be captured.

At the time the survey was planned, tolling on SR-520 was expected to begin in the spring of 2011, with some of the other UPA project components starting even earlier. Therefore, the Wave 1 survey was planned for the autumn of 2010 in order to obtain a relatively “clean” baseline, unaffected by the tolling project. Early autumn is also a preferred time for travel surveys in general because there are no major holidays or school vacations to disrupt typical patterns, and daylight and weather conditions tend to be favorable. Based on input from the local partners, sampling of the driver population in the corridor was delayed until after the start of the University of Washington academic year (September 29), so that the large number of SR-520 users in the university community would be represented.

License plate capture of vehicles in the corridor was conducted on October 5-7, 2010 (see detailed Table A- below). With the further time required to process the license plate image data and contact participants, the assigned travel dates for the diary survey were in early to mid-November. Specifically, each responding household was assigned one of the following 2-day diary periods: Nov. 8-9, Nov. 9-10, Nov. 16-17, or Nov. 17-18. This was later than ideal due to the potential for severe weather, but was still comfortably before the start of the Thanksgiving holidays. There were tentative plans to offer make-up travel dates in early December for respondents who could not complete their diaries on the November dates as assigned; however, given the relatively strong response rate, this option was viewed as unnecessary and was not pursued. Assigned travel dates for Wave 2 were between April 23 and May 3, 2012, after tolling had been in place for approximately 4 months.

License plate collection was focused on peak and shoulder periods (7-10 a.m. and 3-7 p.m.) since these periods are expected to be most affected by the tolling project and additional transit service. Photography was limited by available daylight hours at that time of year, and ended around 6:45 p.m. A mixture of east- and westbound travel was included across time periods so that the license plate capture included both the “traditional” commute (from Eastside suburbs westbound to Seattle in the morning, and then eastbound in the afternoon) as well as the “reverse” commute. WSDOT data indicate that traffic volumes are roughly equal in both directions.

Table A-1. License Plate Capture Plan

| Date | Road | Direction of Traffic | License Plates to Capture | Time Period |
|----------------|--------|----------------------|---------------------------|-------------|
| 5 October 2010 | SR-520 | Eastbound | 10,000 | 7-10AM |
| 5 October 2010 | SR-520 | Eastbound | 10,000 | 3-6:30PM |
| 5 October 2010 | I-90 | Eastbound | 7,500 | 7-10AM |
| 5 October 2010 | I-90 | Eastbound | 7,500 | 3-6:30PM |
| 6 October 2010 | SR-520 | Westbound | 10,000 | 7-10AM |
| 6 October 2010 | SR-520 | Westbound | 10,000 | 3-6:30PM |
| 6 October 2010 | I-90 | Westbound | 7,500 | 7-10AM |
| 6 October 2010 | I-90 | Westbound | 7,500 | 3-6:30PM |
| 7 October 2010 | SR-520 | Westbound | 5,000 | 7-10AM |
| TOTALS | SR-520 | Both | 45,000 | |
| TOTALS | I-90 | Both | 15,000 | |

RSG and All Traffic Data converted the video photography files into datasets of license plate numbers. The datasets necessarily excluded vehicles with missing or illegible plates. Furthermore, for the purposes of this study, out-of-state plates, commercial and rental vehicles, and taxi/livery vehicles were excluded, in keeping with the focus on Seattle-area households. The resulting file was sent to the Washington Department of Licensing for name and address matching. Approximately 94 percent of submitted plate numbers were successfully matched to an address. RSG further processed the address file to eliminate duplicates and handle special cases such as leased vehicles. This became the contact database used for initial communication with respondents, as described in more detail below.

Table A-, below, presents an overall summary of the license plate capture and address matching effort. Note that due to strong response to the pilot survey, the total number of planned license plate captures was reduced from a total of 60,000 to 50,000, with the same 75%/25% split between SR-520 and I-90.

Table A-2. Seattle Wave 1 Driver Households: License Plate Capture, Address Matching, Mailout and Response Rates

| | Planned | Actual |
|--|--------------|--------------|
| License Plates Captured SR-520 | 37,500 | 37,657 |
| License Plates Captured I-90 | 12,500 | 13,314 |
| Total License Plates Captured | 50,000 | 50,971 |
| Total Mailout: License Plates Matched to an Eligible, Valid Address | 32,500 (65%) | 32,470 (64%) |

| | Planned | Actual |
|--|---------|--------|
| Adjusted for Mail Returned as Undeliverable | 32,500 | 31,282 |
| Overall Response Rate | 8.0% | 9.3% |
| Completed Households in Sample | 2,600 | 2,908 |

One important limitation of this license plate capture approach is that survey materials can be sent only to the address of the registered owner of vehicles that are photographed. This has the effect of excluding from the sample those travelers in the corridor who are passengers in a vehicle owned by someone else (or in some cases, as the driver of someone else’s vehicle). This limitation may make it more challenging to identify changes in carpooling. However, this is mitigated by the fact that other household members are included in the survey population. Carpool passengers also have a chance of being sampled at times when they (or another household member) drove their own vehicle or rode transit in the corridor.

Transit Intercepts

RSG survey staff used two techniques, postcard handout and onboard intercept, to personally contact transit riders in the corridor and recruit them to participate. The postcard handout method was used at suburban transit centers and downtown bus stops serving buses on the corridor. Survey staff engaged with transit riders as they waited for their bus, described the survey effort and answered questions, and distributed invitation postcards with the survey’s internet address and other information. Interested respondents could go online and begin the first part of the survey as soon as they wished, though their assigned travel dates were kept consistent with the rest of the sample.

For the onboard intercept method, RSG staff boarded buses during their normal runs in the corridor and had one-on-one interactions with transit riders. Using portable computers, they administered a “quick poll” on transit service issues and recorded the e-mail addresses of riders willing to participate in the full survey. (The quick poll dealt with satisfaction with the transit trip in progress and was meant to engage potential survey respondents, rather than collect Wave 1 data per se.) Bus riders willing to participate in the study were handed a survey packet with further information. Riders unwilling to commit to the survey were given an invitation postcard. Survey staff also distributed invitation postcards to other riders on the bus as time allowed.

The transit recruiting was also focused on the peak and shoulder periods. Unlike the license plate capture for drivers, however, it was not constrained to daylight hours, and thus a slightly longer period was used.

Table A-3. Seattle Wave 1 Transit Recruiting Plan

| Time | Crew | Recruiting Details | October 18 | October 19 | October 20 | October 21 |
|----------------|------|--------------------|-------------------|-------------------|-------------------|-------------------|
| 6-10 AM | 1 | Approach | Postcard Handout | Postcard Handout | Postcard Handout | Onboard Intercept |
| 6-10 AM | 1 | Location | Bellevue | Eastgate | South Kirkland | SR-520 |
| 6-10 AM | 1 | Postcards | 250 | 200 | 200 | 150 |
| 6-10 AM | 1 | Intercepts | n/a | n/a | n/a | 150 |
| 6-10 AM | 2 | Approach | Postcard Handout | Onboard Intercept | Postcard Handout | Postcard Handout |
| 6-10 AM | 2 | Location | Redmond | SR-520 | Bellevue | Eastgate |
| 6-10 AM | 2 | Postcards | 150 | 150 | 250 | 200 |
| 6-10 AM | 2 | Intercepts | n/a | 150 | n/a | n/a |
| 3-7 PM | 1 | Approach | Onboard Intercept | Postcard Handout | Onboard Intercept | Postcard Handout |
| 3-7 PM | 1 | Location | SR-520 | Downtown | SR-520 | Bellevue |
| 3-7 PM | 1 | Postcards | 150 | 200 | 150 | 100 |
| 3-7 PM | 1 | Intercepts | 150 | n/a | 150 | n/a |
| 3-7 PM | 2 | Approach | Onboard Intercept | Postcard Handout | Onboard Intercept | Postcard Handout |
| 3-7 PM | 2 | Location | SR-520 | Downtown | I-90 | Downtown |
| 3-7 PM | 2 | Postcards | 150 | 200 | 150 | 200 |
| 3-7 PM | 2 | Intercepts | 150 | n/a | 150 | n/a |

Vanpool Participants

Seattle has the one of the country’s largest organized vanpool programs, making it important to analyze the effects of the Lake Washington UPA on vanpoolers. As noted, the license plate capture method would tend not to capture vanpool passengers (except to the extent that they or other household members also drove their own vehicles or took transit in the corridor at other times). A special recruitment effort was made in partnership with King County, whereby all registered members of King County vanpools in the Lake Washington corridor (approximately 70 vanpools with 520 members) were e-mailed an invitation to participate in the survey. Interested respondents went to an RSG-hosted survey website to register their interest and

enter their name and address. From that point forward, respondents received the same survey materials by mail as those recruited via license plate capture. Vanpool respondents' survey passwords were, however, encoded to reflect that they were recruited in this way, so that they could later be analyzed as a sub-group.

Survey Communications and Administration

Respondents recruited via license plate capture received a series of hard-copy mailings from the survey team. The first was a pre-notification postcard that briefly described the survey and advised that a full survey packet would be arriving in a few days. The postcard also noted that a \$15 gift card was being offered as an incentive for completing the survey. Mailing of the postcard was timed to have it arrive approximately 5 business days prior to the assigned travel dates for the survey.

Figure A-2: Survey Postcard



The survey packet itself, which arrived about 2 days prior to the assigned travel dates, comprised an invitation letter on USDOT stationery from the Volpe Center project manager; a set of “memory jogger” sheets for respondents to make notes about their daily trips, with explanatory notes about how to record the information; and a page of Frequently Asked Questions and answers. The invitation letter included the survey website address, the household’s unique password, assigned travel dates, and a dedicated e-mail address and telephone number to use for questions about the survey, or to complete the survey by phone.

All survey materials were in English, due to the costs involved with translation compared to the relatively small sizes of the non-English proficient communities in the Lake Washington corridor. This decision was made in consultation with PSRC, which also uses only English for the regional travel surveys that it administers.

Respondents completed the survey online, with the option to call or e-mail with any questions or concerns. A small number of participants (no more than about 5 percent)⁴ also elected to take all or part of the survey by telephone. For these respondents, RSG used trained telephone operators who led respondents through the survey questions by phone and entered their responses into the same online survey tool.

The final survey question was an open-ended comment field that allowed respondents to comment on any aspect of the survey or transportation in the Seattle region.

Pilot Study

The entire survey process, from recruiting of participants all the way through to collection and analysis of data, was pre-tested using a small-scale pilot survey. The pilot was designed to ensure that no unforeseen issues would compromise the Wave 1 survey effort, and more specifically with the following purposes:

- Respondent feedback on the pilot survey was used to refine the questionnaire and improve the user interface of the web-based survey tool.
- A variety of respondent incentives were tested in the pilot to gauge the cost-effectiveness of different incentive formats and levels.
- Responses from the pilot helped to calibrate the expected response rates for the Wave 1 survey and assess the representativeness of the sample.
- Conducting each stage of the survey in the pilot helped to identify any logistical issues with license plate capture, address matching, transit intercepts, local agency permissions, mailings and other respondent communications, and overall timeline.

Recruiting Pilot Participants

One portion of the study that was not pre-tested was the recruiting of organized vanpool participants. This decision was made to ensure that the limited number of vanpoolers in the corridor would be available for the Wave 1 study, rather than “used up” in the pilot. Otherwise, the pilot proceeded in the same way as described above for the Wave 1 survey, but with a reduced number of participants. License plate capture for the pilot was conducted on SR-520

⁴ RSG’s call center logged inbound calls, but these data do not allow a precise calculation of the number of households or individuals who actually completed the survey by phone. In total, 174 households (about 5 percent of the completed sample) made at least one telephone contact, but this includes a large number who simply asked a clarification question about the survey.

during morning and afternoon peak and shoulder periods on August 5, 2010. Onboard transit intercepts were conducted during morning and afternoon peak periods on August 18, with postcard handouts the following day during the morning peak at the Redmond and Bellevue transit centers. Assigned travel dates for both the driver and transit samples in the pilot study were September 1-2.

Results from the pilot’s recruiting efforts are summarized below.

Table A-4: Pilot Study: License Plate Capture

| | Estimated | Actual |
|--|------------|------------|
| Plates Recorded | 2200 | 2261 |
| Plate Numbers Matched to Valid and Eligible Addresses | 75% | 81% |
| Total Address List for Mail-Out | 1650 | 1827 |
| Survey Response Rate | 6.1% | 9.6% |
| Completed Households | 100 | 175 |

Table A-5: Pilot Study: Transit Onboard Intercept and Postcard Handout

| | Estimated | Actual |
|---|-----------|------------|
| Postcards Handed Out – Transit Centers | 400 | 405 |
| Response Rate | 4% | 19% |
| Completed Households from Postcards at Transit Centers | 16 | 78 |
| Postcards Handed Out – Onboard Buses | 150 | 144 |
| Response Rate | 4% | 12% |
| Completed Households from Postcards Onboard Buses | 6 | 17 |
| Onboard Intercept Contacts | 50 | 100 |
| Response Rate | 20% | 23% |
| Completed Households from Intercepts | 10 | 23 |
| Total Completed Households | 72 | 118 |

Testing of Incentives

The pilot survey offered an opportunity to test the effectiveness of different incentive levels and formats. Two main variations were considered: a \$10 or \$15 gift card offered for completion of the full survey, and the presence or absence of a single \$1 bill enclosed with the survey invitation letter as a thank-you in advance. The driver (license plate capture) sample was thus divided into four nearly equal groups, with each group offered a different incentive package. Coded information about the incentive was built into respondents' unique passwords so that response rates could be tracked for each group separately. Respondents in the transit sample were given the standard incentive (\$15 gift card only) and were not part of this test, due to their smaller numbers and the difficulty of comparing response rates across groups that were recruited via different methods.

Table A-6: Results from Incentive Test

| Incentive Format | Total Mailout | Completed Households | Response Rate |
|--|---------------|----------------------|---------------|
| \$10 gift card only | 457 | 32 | 7.0% |
| \$10 gift card & \$1 bill in envelope | 457 | 45 | 9.8% |
| \$15 gift card only | 457 | 43 | 9.4% |
| \$15 gift card & \$1 bill in envelope | 456 | 54 | 11.8% |

As Table shows, higher incentives were associated with higher response rates, with the higher gift card amount and the extra \$1 bill each adding 2-3 percentage points to the response rate compared to the corresponding alternative. Overall, based on professional judgment, the \$15 gift card with no additional dollar bill was selected as the best trade-off between response rate and cost. (The additional dollar bill, because it goes in all mailings rather than only to completed households, nearly doubles the total cost of incentives.) The gift cards are also administratively simpler and avoid concerns about sending cash through the mail.

Open-Ended Comments

In addition to the draft version of the Wave 1 survey questions, the pilot survey included several open-ended questions about respondents' perceptions of the survey, particularly whether the instructions and questions were clear, whether the answer choices were adequate, and whether they had any other recommendations for improving the survey. These comments were taken into consideration when revising the survey for Wave 1. Major comment areas included the following:

- Most of those who chose to comment stated that the instructions and questions were clear and that the answer choices were appropriate, or had only minor critiques.

However, a number of commenters suggested making the error messages more specific, and some respondents had difficulty (possibly related to browser settings) entering address and location data.

- Several respondents mentioned that bicycle transportation was not adequately covered in the survey.
- A few respondents were concerned that the two assigned travel dates were not typical of their usual travel patterns.
- A number of comments dealt with the length of the survey; many felt that it was too long or that the estimate of 10-15 minutes to complete was not realistic. Some provided no further detail, while others suggested specific questions to cut. Another suggestion was to improve the automation of the survey tool, for example by automatically carrying over address information from Day 1 to Day 2.

Telephone Debriefs

At the end of the pilot survey, respondents were asked whether they would be willing to be contacted by telephone for a more in-depth discussion of the survey. Of those who agreed, seven households were selected for telephone debriefs conducted by RSG survey staff. These interviews probed the respondents' response to the printed materials they received, their experiences with the online survey tool, their view of the incentive, and other general impressions. Despite the small number of interviews, RSG attempted to include a mix of respondents with respect to commute mode, household size, and other factors such as income, age, and English proficiency. Major themes of the debriefs were:

- There were no major problems cited with the survey questions or the online tool, but the overall length of the survey was a common concern, with some interviewees feeling very strongly about this.
- Most interviewees had favorable reactions to the printed materials. Respondents varied in their actual use of the Memory Jogger sheets, ranging from relatively conscientious use to simply relying on memory.
- On the online survey, questions using "drop-down" windows for answer choices were perceived to be onerous and less user-friendly.
- Several interviewees suggested ways to streamline data entry, for example by pre-filling Day 2 locations with the information from Day 1, and reducing the level of detail requested in the diary (e.g. by not requiring as much detail on trip departure and arrival times).
- There was some skepticism about the driver satisfaction questions and some of the attitudinal, namely about whether these would provide meaningful information. Some of the attitudinal (e.g. about budgeting expenses or the fairness of tolling) were also perceived as either non-transportation related or biased in their phrasing.

Survey Changes Based on the Pilot

The Volpe Center study team worked with RSG to analyze results of the pilot, including those from completed surveys as well as partially complete surveys and comments from telephone debriefs. While no major problems with the survey were detected, several questions and sets of instructions were rephrased for clarity, and some error messages in the online tool that respondents had found confusing were made more specific.

Although overall response rates exceeded expectations, there were also numerous comments from respondents that the survey was too long. Several questions were simplified or cut altogether to address this concern. Specific changes to the survey included:

- Questions on the details of household vehicles (make, model, year) were deleted; respondents were asked only to provide the number of household vehicles.
- Within individual diaries, the starting point for Day 2 was automatically pre-coded with the ending point from Day 1. User-defined locations such as “work” and “daycare” were also carried over from Day 1 to Day 2 to reduce data entry.
- A note was added to instruct respondents to use only the internal navigation within the online survey, and not the “forward” or “back” buttons on their web browser. The interface was also changed so that most information already entered would be saved if respondents did accidentally use the forward/back buttons or otherwise log themselves out.
- Question on the type of parking used (commercial lot/garage, on-street, driveway, etc.) was dropped.
- Two trip purpose categories were combined into one for clarity: “Go home to do paid work” and “Go home –for any other reason” were changed to “Go home.” This change limited the ability to analyze certain aspects of telecommuting behavior, but was viewed as worthwhile because of the confusion that respondents had with the two categories.
- Other trip purpose categories were also adjusted slightly to make them more inclusive, e.g. by adding “Exercise/Gym.”
- A question on the respondent’s satisfaction with the “driving behavior of other drivers” was deleted.
- An attitudinal question on budgeting expenses carefully (as an indicator of price-sensitivity for tolls) was deleted.
- A question on workplace commuter benefits was simplified by removing some of the less common options: bike racks/lockers, preferred parking spaces for carpools or vanpools, and “other” benefits.
- The question on telecommuting had additional response categories added to capture less frequent telecommuting, e.g. “A few times a month.” This addresses the situation

of a respondent who does not telecommute as frequently as once per week, but does so from time to time.

Respondent Incentives

Incentives have become common practice in the household travel survey community because a small incentive can be more cost-effective than refusal conversion in improving response rates, and more generally because they improve the representativeness of the sample. In the absence of an incentive, employed commuters and larger households – those who use the transportation system the most – are often under-represented, while retirees are over-represented because they have more free time to complete surveys. Incentives can also help to overcome the tendency of lower-income households to be under-represented in travel surveys, which is problematic for analysis of the equity issues surrounding congestion pricing.

Incentives were particularly important for this study because of its design as a panel survey, with the same set of respondents in both survey waves. An incentive in the form of a \$15 gift card to Amazon.com was offered to households that completed all parts of the Wave 1 survey. The survey materials also noted that completion of Wave 2 would earn the household an additional \$30 gift card, which was designed to reduce panel attrition and reflect the fact that the Wave 2 survey may have more questions.

For ease of administration and to make the reward more immediate, e-gift cards (i.e. electronic codes that are valid for purchases) were used and were e-mailed to respondents soon after completion of their survey. Amazon was believed to be a relatively neutral choice for the gift card because of the wide variety of products sold, reducing the potential for bias compared to cards from a more specialized retailer. Amazon is also recognized as a Seattle-based company, which may have engendered some goodwill among respondents.

Panel Maintenance and Focus Groups

Panel maintenance activities were used to keep respondents engaged with the study and improve retention of respondent households from Wave 1 to Wave 2. The first communication was an e-mail notification that the Wave 2 survey would be delayed to spring 2012 due to the delays in starting SR-520 tolling. Members of the panel received an e-mail update on the survey in March 2011, with information on the importance of the study and a summary sheet showing basic trip statistics from Wave 1. In February 2012, respondents were also offered a chance to take an optional mini-survey on their initial experiences with tolling on SR-520. Although primarily intended as a panel maintenance activity, this mini-survey provided some useful information on responses to tolling.

A series of focus groups was also held in February 2012 to gain further qualitative insight into responses to tolling and to help refine the Wave 2 questionnaire. Four groups were convened: two groups with frequent drivers of SR-520, one with lower and one with higher incomes, one group of transit riders, and one group of infrequent SR-520 drivers. Focus group participants described their general travel patterns in the region, their responses to SR-520 tolling and their attitudes toward the project. They also provided suggestions on the survey process. More detailed information from the focus groups is summarized in a separate report.

Appendix 2: Survey Instrument – Wave 1

U.S. DOT Transportation Study

Welcome. Please enter your password: _____

For more information, please email seattle@rsgsurveys.com or call toll-free 1.888.774.5985.

INTRODUCTION

1. Welcome.

Thank you for visiting our website. Resource Systems Group, Inc. is conducting this study on behalf of the U.S. Department of Transportation (U.S. DOT), in cooperation with the Puget Sound Regional Council, the Washington State Department of Transportation (WSDOT) and King County.

The purpose of the study is to understand travel patterns in the Seattle/Lake Washington region and how they are changing over time. You are part of a landmark national study that will analyze travel patterns in four U.S. cities (Seattle, Atlanta, Dallas, and San Diego) in order to help guide transportation improvements both in your area and around the country. **Yours is one of a small number of households who have been invited to take part, so your responses will have a significant effect on transportation decisions in the region.**

Your privacy will be protected throughout this study. Please click [here](#) to view our privacy policy. If you have any further questions about the study, please email RSG at seattle@rsgsurvey.com or call 1-888-774-5982.

2. This study has several parts. First, one person in your household should complete a short household information survey. Next, every person in your household is asked to complete a travel diary survey about your travel on November <day 1> and <day 2>. We will then send your household a \$15 gift card. Because we're studying changes over time, we will ask your household to complete a 2nd travel diary in one year. We will then send your household a \$30 gift card.

| Survey | When | Who | What |
|-----------------------|------|-----|--|
| Household Information | Now | You | Short survey about your household and vehicles used. |

| Survey | When | Who | What |
|--|------------------------------|---|--|
| Travel diary #1 | November <day 1> and <day 2> | All adult household members 18 or older | On November <day 1> and <day 2> each adult member of your household will write down all the trips they made on their Memory Jogger At the end of each of the two days (or at the end of the second day), each adult member of your household will return to this website to enter the information from their Memory Jogger. |
| \$15 gift card emailed to your household | | | |
| Household update | In 6 months | You | We email you with a few questions and to share the preliminary results of the study. |
| Travel Diary # 2 | In 1 year | All adult household members 18 or older | Each adult household member will once again write down all the trips made over a 2-day period and then enter those trips online. |
| \$30 gift card emailed to your household | | | |

DASHBOARD

Welcome

This page shows the status of all information we will ask you to provide over the course of this study. Any time you enter the website you will come to this page first. From here, you can begin or continue taking any available surveys.

Next Steps

Please click on the link below to begin the “Household Information” survey.

Remember, you can complete this survey on your own. You don’t need other household member. This survey should take about 10 minutes.

| Surveys | Status |
|-----------------------|-----------------------------------|
| Household Information | Let's get started |
| Travel Diary 1 | Let's get started |
| Household Update | Let's get started |
| Travel Diary 2 | Let's get started |

HOUSEHOLD BACKGROUND

1. **Welcome to the Household Information Survey.**

We'd like to ask some general questions about your household and your vehicles. You are answering this survey on behalf of everyone who lives with you in your home, including any relatives, boarders, and live-in employees.

Here are some tips for navigating the survey:

- After you have answered all questions on a page, use the "Next" button on the bottom of the screen to advance.
- Please do NOT use your internet browser's Back button; this will log you out of the survey. If this happens, you can log back in, and you will be able to continue where you left off.

Now, let's get started!

2. **Do you plan to move (from your current residence) in the next 12 months?**

- a. Yes [terminate – will be directed to a thank you page]
- b. Maybe
- c. No

3. Please tell us about the vehicles your household uses.

How many motor vehicles (in working order) are there in your household?

Please include all cars, pickup trucks, minivans, and motorcycles/scooters to which your household has regular access, whether owned, leased, or a company vehicle.

- 0 (no vehicles)
- 1 vehicle
- 2 vehicles
- 3 vehicles
- 4 vehicles
- 5 or more vehicles

4. **Please tell us about yourself.**

Name or Initials:

Your age:

Your gender:

Do you have a valid driver's license?

Your employment status:

Your education status:

Are you of Hispanic or Latino Origin?

Your race:

Note: The following age categories will be used.

- . 16-17
- . 18-24
- . 25-34
- . 35-44
- . 45-54

- . 55-64
- . 65-74
- . 75-84
- . 85 or older

Note: The following gender categories will be used.

- . Male
- . Female

Note: The following license categories will be used.

- . Yes
- . No

Note: The following employment categories will be used.

- . Employed full-time
- . Employed part-time
- . Self-employed (full or part-time)
- . Student, not employed or employed <25 hrs/week
- . Student, employed 25+ hrs/week
- . Homemaker
- . Retired
- . Not currently employed

Note: The following education categories will be used.

- . Less than high school
- . High school graduate
- . Some college
- . Vocational/technical training
- . Associates degree
- . Bachelors degree
- . Graduate/post-graduate degree

Note: The following Hispanic categories will be used.

- . Yes
- . No

Note: The following race categories will be used.

- . African American or Black
- . American Indian or Alaskan Native
- . Asian
- . White or Caucasian
- . Other

5. **How many OTHER PEOPLE live in your household?**

Please include everyone who normally resides with you in your home, including any relatives, boarders, and live-in household employees. Please do not include people away at the school or the military.

- 1 0 people (I live alone)
- 2 1 other person
- 3 2 other people
- 4 3 other people
- 5 4 other people
- 6 5 other people
- 7 6 other people
- 8 7 other people
- 9 8 other people
- 10 9 other people
- 11 10 or more other people

6. [If no other members in household, skip to income] **Please tell us about the other members of your household.**

| Name or Initials | Age | Gender | Relationship |
|---|-----|--------|--------------|
| Drop down menus for Age, Gender, Relationship | | | |

Note: The age and gender categories used will be the same as those listed above, with the age category additions of "5-15" and "Under age 5"

Note: The following relationship categories will be used.

- . Husband/Wife/Unmarried Partner
- . Son/Daughter/In-Law
- . Mother/Father/In-Law
- . Brother/Sister/In-Law
- . Other relative
- . Roommate/Friend
- . Household Help
- . Other

7. [Only show for members 18 and over] **Please enter the following information about the other members of your household.**

| Name | Has a valid driver's license | Employment Status | Education Status |
|-------------|--|-------------------|------------------|
| <populated> | Drop down menus for License, Employment, Education | | |

Note: The license, employment and education categories used will be the same as those listed above.

8. [Only show for members 18 and over] **Please enter the following information about the other members of your household.**

| Name | Hispanic or Latino Origin | Race |
|-------------|---|------|
| <populated> | Drop down menus for Hispanic Origin, Race | |

Note: The Hispanic origin and race categories used will be the same as those listed above.

9. **In 2009, what was <your personal/your household's> total annual income (from all sources) before taxes or other deductions from pay?**

Note: If your household doesn't share income, please report your personal income only.

- 1 Less than \$10,000
- 2 \$10,000–\$24,999
- 3 \$25,000–\$34,999
- 4 \$35,000–\$49,999
- 5 \$50,000–\$74,999
- 6 \$75,000–\$99,999
- 7 \$100,000–\$149,999
- 8 \$150,000–\$199,999
- 9 \$200,000–\$249,999
- 10 \$250,000 or more
- 11 Prefer not to answer

Note: This information is used to make sure a representative sample of the Seattle/Lake Washington region participates in this study.

10. **For future contact, including sending you your \$15 and \$30 gift cards, please enter your email address.**

You will only be contacted for this study and your email will NEVER be shared.

Primary email address for household: _____

Secondary email address for household (if available): _____

Note: Validate to require an email address that has an @ symbol and an "."

11. **What is your home address?**

Street: _____

City/Town: _____

State: Drop down, pre-populated with "Washington"

Zip Code: _____

Note: Error message if Zip Code doesn't match State selected. Terminate if state selected is not Washington.

12. Thank you, you have now completed the "Household Information" survey.
Please click "Finish" submit this information.

DASHBOARD

1. Welcome

This page shows the status of all information we will ask you over the course of this study. Any time you enter the website you will come to this page first. From here, you can begin any available surveys or continue from where you last left off in a survey.

Next Steps

When the “Travel Diary 1” survey becomes available, click on the link below to record your household’s trips.

| Surveys | Status |
|-----------------------|-----------------------------------|
| Household Information | Completed |
| Travel Diary 1 | Let's get started |
| Household Update | Let's get started |
| Travel Diary 2 | Let's get started |

DIARY DASHBOARD

1. Thank you for taking the time to complete the household trip diary.

Please have each member of your household listed below enter his or her trips for <day 1> and <day2>. We want to encourage each member of your household to complete his/her own travel diary because we hope to understand how each person feels about the trips they are making.

Please have your “Memory Jogger” ready, then click on a link to begin.

| Members | Day 1 | Day 2 |
|----------------|-----------------------------------|-----------------------------------|
| <self> | Let's get started | Let's get started |
| <populated> | Let's get started | Let's get started |
| <populated> | Let's get started | Let's get started |

Listed household members: any that are 18 and older, and 16-17 year old members if they were the one to fill out the household info survey.

HOUSEHOLD DIARY #1 – DAY 1

1.1 Travel Log

1. Hello <member>. We are now going to ask you to enter the information from your “Memory Jogger.”

To begin, did you make any trips* on November <day 1>?

- 1 Yes
- 2 No

***What is a trip?**

- A trip consists of any travel from one point to another by car, bus, train, ferry, bicycle, or other means, or walking for more than five minutes. For example, going from home to work is one trip and going from work to the grocery store is a second trip.
- Please include all legs of your trips (e.g. stop for coffee on the way to work)
- Please do NOT include any trips that you made as a paid commercial driver, such as a cabdriver or delivery driver.
- We are interested in learning about your trips even if you don’t consider it a “typical” travel day for you or your household.

2. [If respondent did not make any trips – i.e. answered ‘no’ to previous question] **Why did you decide not to travel or make any trips* on November <day1>?**

Please select all that apply.

- 1 I worked from home for pay (e.g., home-based business or telecommuting)
- 2 I worked around the home (not for pay)
- 3 I was sick or I cared for a sick/unwell member of my household
- 4 I was out of the Seattle/Lake Washington region for the entire 24-hour period
- 5 Other

For respondents who didn’t make any trips, register the survey as complete after they answer this question, then branch back to diary dashboard

3. [If respondent did make a trip] **Did you work from home or telecommute instead of traveling to work for any part of the day on November <day1>?**

- 1 Yes, all day
- 2 Yes, part of the day
- 3 No

4. **<member>, please list ALL the places you went on November <day 1>.**
 Please make sure to include your start and end location* for the day (e.g., Home).
[Click here for a 45 second help video for how to complete this page.](#)

I began my day at Add Location
 Then I went to Add Location

| | | | | |
|-------------------|------------|---|---|---|
| I began my day at | Home |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | Pizza shop |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | School |  |  |  |
| Then I went to | Home |  |  |  |

*The last place you enter should be where you ended your day, or the place you were at 3 AM. For example, if you started at “Home” and returned home at the end of the day, then your last location should be “Home.”

If first and last locations do not match, warning message that reads “Your start location differs from your end location, click “Next” if this is correct.”

5. **Please locate each place that you went on November <day 1>. You can do this 3 different ways:**
1. **Address:** Enter the full address (including street number and name OR nearest intersection) in the text box.
 2. **Business or Attraction:** Click on the Business Search button, then enter the business name, city, and state.
 3. **Map:** Click on the marker to the right of the textbox to activate it, then click on the map to place the marker.

[Click here for a 45 second help video for how to complete this page.](#)

| Location | Address or Intersection | | |
|-------------|-------------------------|--|-------------------|
| <populated> | |  | (Business Search) |
| <populated> | |  | (Business Search) |

6. **<member>, please tell us about the trips you made.**

| Trip # | Origin | Destination | Departed | | Arrived | | Primary Purpose of Trip |
|--------|------------|-------------|----------|-----|---------|-----|-------------------------|
| 1. | Home | Work | Hr | Min | Hr | Min | select... |
| 2. | Work | Pizza shop | Hr | Min | Hr | Min | select... |
| 3. | Pizza shop | Work | Hr | Min | Hr | Min | select... |
| 4. | Work | Home | Hr | Min | Hr | Min | select... |
| 5. | School | Home | Hr | Min | Hr | Min | select... |

Note: All hours (AM and PM) will be available, as will all minutes in 5 minute increments.

Note: The following purpose categories will be used.

- . *Go home*
- . *Go to primary workplace*
- . *Other work-related location (e.g., meeting, sales call)*
- . *Child care*
- . *School*
- . *Personal business (e.g. medical, banking, post office)*
- . *Social/recreational (e.g. movies, visit friends/family)*
- . *Exercise/gym*
- . *Religious/community activity*
- . *Shopping*
- . *Eat out/pick up takeout*
- . *Drop off or pick up someone else*
- . *Other*

7. <member>, please enter (in order) the types of transportation you used to make each trip.

Example 1: If you used your car for the entire trip, then click “Auto/Truck/Motorcycle” under Type 1 and leave Type 2, Type 3, and Type 4 blank.

Example 2: If you drove your car to a park and ride lot, took the bus, and then walked 10 minutes, click “Auto/Truck/Motorcycle” under Type 1, “Public Bus” under Type 2, and “Walked” under Type 3 (leave Type 4 blank).

| Trip # | Origin | Destination | Type 1 | Type 2 | Type 3 | Type 4 |
|---------------|---------------|--------------------|---------------|---------------|---------------|---------------|
| 1. | Home | Work | select.... | select.... | select.... | select.... |
| 2. | Work | Pizza shop | select.... | select.... | select.... | select.... |
| 3. | Pizza shop | Work | select.... | select.... | select.... | select.... |
| 4. | Work | School | select.... | select.... | select.... | select.... |
| 5. | School | Home | select.... | select.... | select.... | select.... |

Note: The following transportation modes will be used.

- . *Auto/Truck/Motorcycle*
- . *Bicycle*
- . *Walked/wheelchair*
- . *Taxi/limo/shuttle*
- . *Public bus*
- . *School bus*
- . *Organized vanpool*
- . *Train/Rail*
- . *Ferry*
- . *Dial-A-Ride/Access*
- . *Other*

8. [drop downs only for trips that include driving, rest filled in "N/A"] <member>, please tell us about your driving trips.

| Trip # | Origin | Destination | Were you the driver or a passenger? | Personal Parking Cost for Trip |
|--------|------------|-------------|-------------------------------------|--------------------------------|
| 1. | Home | Work | select... | select... |
| 2. | Work | Pizza shop | select... | select... |
| 3. | Pizza shop | Work | select... | select... |
| 4. | Work | School | select... | select... |
| 5. | School | Home | select... | select... |

Note: The following driver answers will be used.

- . Driver
- . Passenger

Note: The following parking cost options will be used.

- . Did not park
- . Free
- . \$1.00
- (Dollar increments)
- . \$24.00
- . \$25.00 or more

9. [first two columns filled in "N/A" for non-auto trips] <member>, please tell us about your trips.

| Trip # | Origin | Destination | Number of household members in vehicle (not including you) | Number of people outside of your household in vehicle | Did this trip go across/around Lake Washington? |
|--------|------------|-------------|--|---|---|
| 1. | Home | Work | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... |
| 4. | Work | School | select... | select... | select... |
| 5. | School | Home | select... | select... | select... |

Note: Number of household members available to select will be limited to number of household members described in Household Information survey.

Note: The following categories will be used for number of people outside of the household.

- . 0
- . 1
- . 2
- . 3
- . 4

- . 5
- . 6 or more

Note: The following categories will be used for the question asking whether trip crossed Lake Washington. Top three options only shown for trips that include auto use. The fourth option will only be shown for trips that include transit use.

- . *Yes, drove across via SR-520 bridge*
- . *Yes, drove across via I-90 bridge*
- . *Yes, drove around via SR-522*
- . *Yes, took public transit across/around*
- . *Yes, took other route/transportation type*
- . *No*

10. [drop downs only for trips that crossed Lake Washington by car/truck/motorcycle, rest filled in "N/A"] **We are interested in how you felt about each of your DRIVING trips across or around Lake Washington. Please tell us how satisfied you were with each of the following.**

| Trip # | Origin | Destination | Your overall driving time | Your travel speed | The predictability of your driving time |
|---------------|---------------|--------------------|----------------------------------|--------------------------|--|
| 1. | Home | Work | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... |
| 4. | Work | School | select... | select... | select... |
| 5. | School | Home | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . *Very Dissatisfied*
- . *Dissatisfied*
- . *Somewhat Dissatisfied*
- . *Neutral*
- . *Somewhat Satisfied*
- . *Satisfied*
- . *Very Satisfied*

11. [drop downs only for trips that crossed Lake Washington by transit, rest filled in "N/A"] **For your PUBLIC TRANSPORTATION trips across/around Lake Washington, how satisfied were you with the following?**

| Trip # | Origin | Destination | Your overall transit travel time | The wait time at your stop(s) | The reliability of the service (e.g., on-time performance) | The availability of seating onboard transit |
|--------|------------|-------------|----------------------------------|-------------------------------|--|---|
| 1. | Home | Work | select... | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... | select... |
| 4. | Work | School | select... | select... | select... | select... |
| 5. | School | Home | select... | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . Very Dissatisfied
- . Dissatisfied
- . Somewhat Dissatisfied
- . Neutral
- . Somewhat Satisfied
- . Satisfied
- . Very Satisfied

12. [check boxes only for trips that crossed Lake Washington, rest filled in "N/A"] **For your trips across/around Lake Washington, which of the following sources did you consult (either before or during your trip) for information about traffic or transit conditions? Select all that apply.**

| Trip # | Origin | Dest. | Radio | TV | 511/ Other Phone Service | Any Website | Electronic freeway signs | GPS/ Navigation system | Other | None of these |
|--------|------------|------------|-------|----|--------------------------|-------------|--------------------------|------------------------|-------|---------------|
| 1. | Home | Work | | | | | | | | |
| 2. | Work | Pizza shop | | | | | | | | |
| 3. | Pizza shop | Work | | | | | | | | |
| 4. | Work | School | | | | | | | | |
| 5. | School | Home | | | | | | | | |

13. <member>, thank you for telling us about your travel on November <day 1>. Please click "Finish" to submit this information.

DIARY DASHBOARD

1. Welcome

This page shows the status of all information we will ask you over the course of this study. Any time you enter the website you will come to this page first. From here, you can begin any available surveys or continue from where you last left off in a survey.

Next Steps

When the “Travel Diary 1” survey becomes available, click on the link below to record your households’ trips.

| Surveys | Status |
|-----------------------|-----------------------------|
| Household Information | Completed |
| Travel Diary 1 | In Progress |
| Household Update | Let’s get started |
| Travel Diary 2 | Let’s get started |

2. Thank you for taking the time to complete the household trip diary.

Please have each member of your household (listed below) enter his or her trips for November <day1> and <day2>. We want to encourage each member of your household to complete his/her own travel diary because we hope to understand how each person feels about the trips they are making. Please have your “Memory Jogger” ready, then click on a link to begin.

| Members | Day 1 | Day 2 |
|-------------|-----------------------------------|-----------------------------------|
| <self> | Completed | Let’s get started |
| <populated> | Let’s get started | Let’s get started |
| <populated> | Let’s get started | Let’s get started |

HOUSEHOLD DIARY #1 – DAY 2

1.2 Travel Log

1. Hello <member>. We are now going to ask you to enter the information from your “Memory Jogger.”
To begin, did you make any trips* on November <day 2>?

- 1 Yes
- 2 No

***What is a trip?**

A trip consists of any travel from one point to another by car, bus, train, ferry, bicycle, or other means, or walking for more than five minutes. For example, going from home to work is one trip and going from work to the grocery store is a second trip.

Please do NOT include any trips that you made as a paid commercial driver, such as a cabdriver or delivery driver.

2. [If res respondent did not make any trips – i.e. answered ‘no’ to previous question] **Why did you decide not to travel or make any trips* on November <day1>?**

Please select all that apply.

- 1 I worked from home for pay (e.g., home-based business or telecommuting)
- 2 I worked around the home (not for pay)
- 3 I was sick or I cared for a sick/unwell member of my household
- 4 I was out of the Seattle/Lake Washington region for the entire 24-hour period
- 5 Other

For respondents who didn't make any trips, register the survey as complete after they answer this question, then branch back to dashboard.

3. [If respondent did make a trip] **Did you work from home or telecommute instead of traveling to work for any part of the day on November <day1>?**

- 1 Yes, all day
- 2 Yes, part of the day
- 3 No

4. **<member>, please list ALL the places you went on November <day 2>.**
Please make sure to include your start and end location* for the day (e.g., Home).
[Click here for a 45 second help video on how to complete this page.](#)

I began my day at Add Location
Then I went to Add Location

| | | | | |
|-------------------|------------|---|---|---|
| I began my day at | Home |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | Pizza shop |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | School |  |  |  |
| Then I went to | Home |  |  |  |

*The last place you enter should be where you ended your day, or the place you were at 3 AM. For example, if you started at “Home” and returned home at the end of the day, then your last location should be “Home.”

If respondent is filling out Day 2 travel after Day 1 travel, last location listed for Day 1 will be prepopulated as first location listed for Day 2.

If first and last locations do not match, warning message that reads “Your start location differs from your end location, click “Next” if this is correct.”

5. **Please locate each place that you went on November <day 2>. You can do this 3 different ways:**
1. **Address:** Enter the full address (including street number and name OR nearest intersection) in the text box.
 2. **Business or Attraction:** Click on the Business Search button, then enter the business name, city, and state.
 3. **Map:** Click on the marker to the right of the textbox to activate it, then click on the map to replace the marker.

[Click here for help video.](#)

| Location | Address or Intersection | | |
|-------------|-------------------------|--|-------------------|
| <populated> | |  | (Business Search) |
| <populated> | |  | (Business Search) |

If respondent is filling out Day 2 travel after Day 1 travel, any locations identified in Day 1 travel will be pre-located.

6. **<member>, please tell us about the trips you made.**

| Trip # | Origin | Destination | Departed | | Arrived | | Primary Purpose of Trip |
|--------|------------|-------------|----------|-----|---------|-----|-------------------------|
| 1. | Home | Work | Hr | Min | Hr | Min | select... |
| 2. | Work | Pizza shop | Hr | Min | Hr | Min | select... |
| 3. | Pizza shop | Work | Hr | Min | Hr | Min | select... |
| 4. | Work | Home | Hr | Min | Hr | Min | select... |
| 5. | School | Home | Hr | Min | Hr | Min | select... |

Note: All hours (AM and PM) will be available, as will all minutes in 5 minute increments.

Note: The following purpose categories will be used.

- . Go home
- . Go to primary workplace
- . Other work-related location (e.g., meeting, sales call)
- . Child care
- . School
- . Personal business (e.g. medical, banking, post office)
- . Social/recreational (e.g. movies, visit friends/family)
- . Exercise/gym
- . Religious/community activity
- . Shopping
- . Eat out/pick up takeout
- . Drop off or pick up someone else
- . Other

7. <member>, please enter (in order) the types of transportation you used to make each trip.

Example 1: If you used your car for the entire trip, then click “Auto/Truck/Motorcycle” under Type 1 and leave Type 2, Type 3, and Type 4 blank.

Example 2: If you drove your car to a park and ride lot, took the bus, and then walked 10 minutes, click “Auto/Truck/Motorcycle” under Type 1, “Public Bus” under Type 2, and “Walked” under Type 3 (leave Type 4 blank).

| Trip # | Origin | Destination | Type 1 | Type 2 | Type 3 | Type 4 |
|--------|------------|-------------|------------|------------|------------|------------|
| 1. | Home | Work | select.... | select.... | select.... | select.... |
| 2. | Work | Pizza shop | select.... | select.... | select.... | select.... |
| 3. | Pizza shop | Work | select.... | select.... | select.... | select.... |
| 4. | Work | School | select.... | select.... | select.... | select.... |
| 5. | School | Home | select.... | select.... | select.... | select.... |

Note: The following transportation modes will be used.

- . Auto/Truck/Motorcycle
- . Bicycle
- . Walked/wheelchair
- . Taxi/limo/shuttle
- . Public bus

- . School bus
- . Organized vanpool
- . Train/Rail
- . Ferry
- . Dial-A-Ride/Access
- . Other

8. [drop downs only for trips that include driving, rest filled in “N/A”] <member>, please tell us about your driving trips.

| Trip # | Origin | Destination | Were you the driver or a passenger? | Personal Parking Cost for Trip |
|--------|------------|-------------|-------------------------------------|--------------------------------|
| 1. | Home | Work | select... | select... |
| 2. | Work | Pizza shop | select... | select... |
| 3. | Pizza shop | Work | select... | select... |
| 4. | Work | School | select... | select... |
| 5. | School | Home | select... | select... |

Note: The following driver answers will be used.

- . Driver
- . Passenger

Note: The following parking cost options will be used.

- . Did not park
- . Free
- . \$1.00
- (Dollar increments)
- . \$24.00
- . \$25.00 or more

9. [first two columns filled in “N/A” for non-auto trips] <member>, please tell us about your trips.

| Trip # | Origin | Destination | Number of household members in vehicle (not including you) | Number of people outside of your household in vehicle | Did this trip go across/around Lake Washington? |
|--------|------------|-------------|--|---|---|
| 1. | Home | Work | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... |
| 4. | Work | School | select... | select... | select... |
| 5. | School | Home | select... | select... | select... |

Note: Number of household members available to select will be limited to number of household members described in Household Information survey.

Note: The following categories will be used for number of people outside of the household.

- . 0
- . 1
- . 2
- . 3
- . 4
- . 5
- . 6 or more

Note: The following categories will be used for the question asking whether trip crossed Lake Washington. Top three options only shown for trips that include auto use. The fourth option will only be shown for trips that include transit use.

- . Yes, drove across via SR-520 bridge
- . Yes, drove across via I-90 bridge
- . Yes, drove around via SR-522
- . Yes, took public transit across/around
- . Yes, took other route/transportation type
- . No

10. [drop downs only for trips that crossed Lake Washington by car/truck/motorcycle, rest filled in "N/A"] **We are interested in how you feel about each of your DRIVING trips across or around Lake Washington. Please tell us how satisfied you were with the following.**

| Trip # | Origin | Destination | Your overall driving time | The overall level of traffic congestion | The driving behavior of other drivers | The predictability of your driving time |
|---------------|---------------|--------------------|----------------------------------|--|--|--|
| 1. | Home | Work | select... | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... | select... |
| 4. | Work | School | select... | select... | select... | select... |
| 5. | School | Home | select... | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . Very Dissatisfied
- . Dissatisfied
- . Somewhat Dissatisfied
- . Neutral
- . Somewhat Satisfied
- . Satisfied
- . Very Satisfied

11. [drop downs only for trips that crossed Lake Washington by transit, rest filled in “N/A”] **For your PUBLIC TRANSPORTATION trips across/around Lake Washington, how satisfied were you with the following?**

| Trip # | Origin | Destination | Your overall transit travel time | The wait time at your stop(s) | The reliability of the service (e.g., on-time performance) | The availability of seating onboard transit |
|--------|------------|-------------|----------------------------------|-------------------------------|--|---|
| 1. | Home | Work | select... | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... | select... |
| 4. | Work | School | select... | select... | select... | select... |
| 5. | School | Home | select... | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . *Very Dissatisfied*
- . *Dissatisfied*
- . *Somewhat Dissatisfied*
- . *Neutral*
- . *Somewhat Satisfied*
- . *Satisfied*
- . *Very Satisfied*

12. [shown only for trips that crossed Lake Washington, rest filled in “N/A”] **For your trips around/across Lake Washington, which of the following sources did you consult (either before or during your trip) for information about traffic or transit conditions? Select all that apply.**

| Trip # | Origin | Dest. | Radio | TV | 511/ Other Phone Service | Any Website | Electronic freeway signs | GPS/ Navigation system | Other | None of these |
|--------|------------|------------|-------|----|--------------------------|-------------|--------------------------|------------------------|-------|---------------|
| 1. | Home | Work | | | | | | | | |
| 2. | Work | Pizza shop | | | | | | | | |
| 3. | Pizza shop | Work | | | | | | | | |
| 4. | Work | School | | | | | | | | |
| 5. | School | Home | | | | | | | | |

1.3 General Transportation Patterns

- [For respondents who do not list using public transit at least once in their travel diary] Thank you for telling us about your travel on November <day 2>. We'd now like to ask you a few questions about your general travel around the Seattle/Lake Washington region.

When did you last use public transit (bus, train, ferry) within the Seattle/Lake Washington region?

- Within the past month
- More than a month ago but within the past year
- More than a year ago
- I have never used transit in the Seattle/Lake Washington region

- In a typical week, how many trips do you make across or around Lake Washington? Please count a round-trip as 2 trips.**

Note: Drop down with options from 0 to 15 or more.

- [If 2 or more trips in previous question] **How do you use MOST OFTEN travel across or around Lake Washington?**

- I drive on SR-520
- I drive on I-90
- I drive on SR 522
- I take public transportation
- I use some other route or type of transportation

- When making trips across/around Lake Washington, how often do you use each of the following as an alternative to <mode selected in previous question>?**

| | Never | Rarely | Sometimes | Often |
|---|-------|--------|-----------|-------|
| Drive on SR-520 | | | | |
| Drive on I-90 | | | | |
| Drive on SR 522 | | | | |
| Take public transportation | | | | |
| Take some other route or type of transportation | | | | |

Note: The options selected as the most frequently used mode will be omitted from this matrix.

1.4 Work/School Commuter Information

- [If student or employed – student employed 25+ hours counts as employed] **How many days per week do you typically commute to your <work/school>?**
 - 7 days a week
 - 6 days a week

- 3 5 days a week
- 4 4 days a week
- 5 3 days a week
- 6 2 days a week
- 7 1 day a week
- 8 0 days a week
- 9 No fixed site or regular commute

6. [If >= 1 day/week] **How do you typically get to your <workplace/school>? Please select all that apply.**

- 1 Drive alone (car/truck)
- 2 Carpool (2 or more people in vehicle)
- 3 Organized vanpool
- 4 Bus
- 5 Ferry
- 6 Train (commuter rail, light rail, or monorail)
- 7 Motorcycle / moped
- 8 Walk (for at least 5 minutes, or the whole way)
- 9 Other

7. [If employed] **How many days per week do you typically work from home or telecommute instead of traveling to work?**

- 1 5-7 days a week
- 2 4 days a week
- 3 3 days a week
- 4 2 days a week
- 5 1 day a week
- 6 A few times per month
- 7 Less than monthly
- 8 Never
- 9 Not applicable

8. [If employed or a student] **Which of the following statements best describes your <work/school> schedule?**

- 1 I have no flexibility in my schedule
- 2 I have some flexibility to adjust my schedule, within about 30 minutes
- 3 I'm pretty much free to adjust my work schedule as I like

9. [If no flexibility] **Why don't you have flexibility in your <work/school> schedule?**

- 1 My schedule requires me to be present for specific hours each day
- 2 My personal situation requires me to arrive and leave at specific times each day
- 3 Other

10. [If employed or a student] **Which of the following commuter benefits does your <employer/school> offer? Which do you personally use?**

| | Not offered | Offered, but I don't use | Offered, and I use | Don't know |
|---|-------------|--------------------------|--------------------|------------|
| Free or discounted parking | | | | |
| Free or discounted transit pass | | | | |
| Free or discounted vanpool transportation | | | | |

1.5 Opinions/Perceptions and General Questions

1. **Which of the following items do you own?**

| | I own | I do not own |
|--|-------|--------------|
| A home computer (desktop or laptop) with access to the internet | | |
| A Smartphone, iPhone, Blackberry, or other web-enabled mobile device | | |
| A cell phone that is not web-enabled | | |
| Mobile navigation or GPS device (such as Tom-Tom or Garmin) | | |

2. **How strongly do you agree or disagree with each of the following statements?**

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| Driving on Seattle/Lake Washington region highways is stressful for me | | | | | | | | |
| At least twice a week there is an unexpected delay on my trip | | | | | | | | |
| I adjust my routes and/or my departure times to avoid traffic congestion | | | | | | | | |
| I will use a toll route if the tolls are reasonable and I will save time | | | | | | | | |
| Highway tolls are unfair to people | | | | | | | | |

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| with limited incomes | | | | | | | | |
| I don't have enough time in the day to do all I need to do | | | | | | | | |

Note: Statements will be shown in randomized order.

3. [If employed] **How strongly do you agree or disagree with each of the following statements?**

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| I am satisfied with my commute | | | | | | | | |
| Within the past year, I've seriously considered changing where I live or work to reduce the time I spend traveling | | | | | | | | |

Note: Statements will be shown in randomized order.

4. [if employed and use a transit mode for typical commute] **How strongly do you agree or disagree with the following statement?**

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|---|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| As soon as I can, I'd like to switch to driving to work | | | | | | | | |

5. **If you would like to share any final opinions about transportation in the Seattle/Lake Washington region, please type your comments in the box below.**

6. The U.S. Department of Transportation, in cooperation with Puget Sound Regional Council, Washington State Department of Transportation, and King County, is considering holding focus groups in your area over the next year and would love to hear more feedback from residents like you.

Would you be willing to participate in a focus group to further share your experiences traveling in the Lake Washington region?

- 1 Yes
- 2 No

- [If respondent would participate in a focus group] **Please provide your phone number so that we may contact you to participate in a focus group.**

If you are selected, you will receive an invitation for your participation.

Telephone number:

- Thank you! You have completed your Travel Diary.
Please click “Finish” to submit your information.

DIARY DASHBOARD

- Welcome**

This page shows the status of all information we will ask you over the course of this study. Any time you enter the website you will come to this page first. From here, you can begin any available surveys or continue from where you last left off in a survey.

Next Steps

When the “Travel Diary 1” survey becomes available, click on the link below to record your households’ trips.

| Surveys | Status |
|-----------------------|-----------------------------|
| Household Information | Completed |
| Travel Diary 1 | In Progress |
| Household Update | Let’s get started |
| Travel Diary 2 | Let’s get started |

- Thank you for taking the time to complete the household trip diary.

Please have each member of your household (listed below) enter his or her trips for November <day1> and <day2>. We want to encourage each member of your household to complete his/her own travel diary because we hope to understand how each person feels about the trips they are making. Please have your “Memory Jogger” ready, then click on a link to begin.

| Members | Day 1 | Day 2 |
|-------------|-----------------------------------|-----------------------------------|
| <self> | Completed | Completed |
| <populated> | Let’s get started | Let’s get started |
| <populated> | Let’s get started | Let’s get started |

Appendix 3: Survey Instrument – Wave 2

1. U.S. DOT Transportation Study

Welcome. Please enter your password: _____

For more information, please email seattle@rsgsurveys.com or call toll-free 1-877-258-6501.
[password]

DASHBOARD

Welcome

Thank you again for your household's participation in this study.

Next Steps

Please click on the link below to tell us how your household has changed since November 2010. This should take about 4 minutes.

| Surveys | Status |
|-----------------------|-----------------------------------|
| Household Information | Completed |
| Travel Diary 2010 | Completed |
| Household Update | Let's get started |
| Travel Diary 2012 | Available <day 1>, 2012 |

HOUSEHOLD BACKGROUND

1. **Welcome to the Household Update Survey.**

We'd like to ask some general questions about how your household has changed since November 2010, when you last completed this survey. You are answering on behalf of everyone who lives with you in your home, including any relatives, boarders, and live-in employees. The survey should only take about 4 minutes of your time.

Here are some tips for navigating the survey:

- After you have answered all questions on a page, use the "Next" button on the bottom of the screen to advance.
- Please do NOT use your internet browser's Back button; this will log you out of the survey. If this happens, you can log back in, and you will be able to continue where you left off.

Now, let's get started!

2. **Have you moved since November 2010?**

- 1 No
- 2 Yes

3. [If moved in last 12 months only]

What is your current home address?

Street:

City/Town:

State: Drop down, pre-populated with "Washington"

Zip Code:

[terminate if state is not WA]

4. **How many motor vehicles (in working order) are there in your household?**

Last year, you reported <X> vehicles.

Please include all cars, pickup trucks, minivans, and motorcycles/scooters to which your household has regular access, whether owned, leased, or a company vehicle.

- 1 0 (no vehicles)
- 2 1 vehicle
- 3 2 vehicles
- 4 3 vehicles
- 5 4 vehicles
- 6 5 or more vehicles

5. [if 1+ vehicles]

Please tell us about the vehicles in your household.

Viewing <x> of <n> total vehicle(s).

Year: <dropdown>

Make: <dropdown>

Model: <dropdown>

6. [If 1+ vehicles]

How many *Good to Go!* passes do you have in your household?

Please include all [*Good to Go!*](#) passes in your household regardless of the type of pass or tag.

- 1 0 *Good to Go!* passes
- 2 1 *Good to Go!* pass
- 3 2 *Good to Go!* passes
- 4 3 *Good to Go!* passes
- 5 4 *Good to Go!* passes
- 6 5 or more *Good to Go!* passes

Good to Go! is the electronic toll system in Washington and can be used to pay tolls on SR 520, the SR-167 HOT lanes, and the SR-16 Tacoma Narrows Bridge.

7. [If 0 *Good to Go!* passes]

Does anyone in your household have a *Good to Go!* Pay-By-Plate account?

- 1 Yes, my household has a *Good to Go!* Pay-By-Plate account
- 2 No, my household does not have a *Good to Go!* Pay-By-Plate account
- 3 I don't know

Washington DOT offers the option of a *Good to Go!* Pay-By-Plate account where you can create an account to register your license plate(s) and then pay the posted *Good to Go!* toll rates plus a \$0.25 fee per transaction.

8. [If has 1 *Good to Go!* pass] **When did you purchase your *Good to Go!* pass?**

[If has 2+ *Good to Go!* passes] **When did you purchase your first *Good to Go!* pass?**

[If has a *Good to Go!* Pay-By-Plate account] **When did you set up your *Good to Go!* Pay-By-Plate account?**

- 1 Before tolling started on SR 520 (before December 29, 2011)
- 2 After tolling started on SR 520 (on or after December 29, 2011)

9. [If 0 passes and no pay by plate account]

What are the reasons why you do not have a *Good to Go!* Pass and/or Pay-By-Plate account?

Please select all that apply.

- 1 I don't use Washington's toll roads/bridges often enough
- 2 Tolls are too expensive
- 3 I'm against tolling in general
- 4 I'm concerned about privacy
- 5 I don't want to have to manage another account
- 6 I don't want my account to be charged automatically
- 7 I prefer not to have to pay a deposit in advance
- 8 I have not yet had a chance to set up an account
- 9 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

10. [For year 1 primary respondent]

Please update the information below for the following household member.

Name: <name>
Age: 18-24
Driver's license? Yes
Employment: Employed full-time
Education: Bachelor's degree

<if full time, part time, self employed, student 25+ in year 1 and full time, part time, self employed, student 25+ in year 2>

Has this person's primary job location changed since November 2010?

select...

<if full time, part time, self employed, student 25+ in year 1 and full time, part time, self employed, student 25+ in year 2>

Has this person's work schedule (number of hours and/or when they work) changed significantly since November 2010?

select...

(checkbox) This person is no longer in the household

Note: Information for first 4 dropdowns is prepopulated using year 1 data but is editable

Note: The following age categories will be used.

- . 18-24
- . 25-34

- . 35-44
- . 45-54
- . 55-64
- . 65-74
- . 75-84
- . 85 or older

Note: The following license categories will be used.

- . Yes
- . No

Note: The following employment categories will be used.

- . Employed full-time
- . Employed part-time
- . Self-employed (full or part-time)
- . Student, not employed or employed <25 hrs/week
- . Student, employed 25+ hrs/week
- . Homemaker
- . Retired
- . Not currently employed

Note: The following education categories will be used.

- . Less than high school
- . High school graduate
- . Some college
- . Vocational/technical training
- . Associates degree
- . Bachelors degree
- . Graduate/post-graduate degree

Note: The following age categories will be used.

- . Under age 5
- . 5-15
- . 16-17
- . 18-24
- . 25-34
- . 35-44
- . 45-54
- . 55-64
- . 65-74
- . 75-84
- . 85 or older

11. [Cycle through all Year 1 adults]

Please update the information below for the following household member.

Name: <name>
Age: 18-24
Driver's license? Yes
Employment: Employed full-time
Education: Bachelor's degree

<if full time, part time, self employed, student 25+ in year 1 and full time, part time, self employed, student 25+ in year 2>

Has this person's primary job location changed since November 2010?

select...

<if full time, part time, self employed, student 25+ in year 1 and full time, part time, self employed, student 25+ in year 2>

Has this person's work schedule (number of hours and/or when they work) changed significantly since November 2010?

select...

(checkbox) This person is no longer in the household

12. [Cycle through all Year 1 children]

Please update the information below for the following household member.

Name: <name>

Age: 16-17

[if 18-24] **Driver's license?** Yes

[if 18-24] **Employment:** Employed full-time

[if 18-24] **Education:** Bachelor's degree

Has this child's school or daycare location changed since November 2010?

select...

Has this child's school or daycare schedule changed significantly since November 2010?

select...

(checkbox) This child is no longer in the household

13. How many NEW ADULTS (18 OR OLDER) live in your household?

Please answer for any adults who have become a part of your household since November 2010. This includes adults who normally reside with you in your home, including relations, boarders, and live-in household employees. Please do not include people away at school or the military.

- 1 0 (no adults need to be added)
- 2 1 new adult
- 3 2 new adults
- 4 3 new adults
- 5 4 new adults
- 6 5 new adults
- 7 6 new adults
- 8 7 new adults
- 9 8 new adults
- 10 9 new adults
- 11 10 or more new adults

14. Please tell us about the NEW ADULTS (18 OR OLDER) in your household.

Viewing <x> of <n> new adults (18 OR OLDER).

Name: <name>
Age: 18-24
Gender:
Relationship:
Driver's license? Yes
Employment: Employed full-time
Education: Bachelor's degree
Hispanic?
Race:

15. How many NEW CHILDREN (UNDER AGE 18) live in your household?

Please include all new children who normally reside with you in your home. Please do not include any minors away at school or the military.

- 1 0 (no minors need to be added)
- 2 1 new minor
- 3 2 new minors
- 4 3 new minors
- 5 4 new minors
- 6 5 new minors
- 7 6 new minors
- 8 7 new minors
- 9 8 new minors
- 10 9 new minors
- 11 10 or more new minors

16. Please tell us about the NEW CHILDREN (UNDER AGE 18) in your household.

Viewing <x> of <n> new children (UNDER AGE 18).

Name: <name>
Age: 18-24
Gender:
Relationship:

17. Have there been any other major changes in the life of your household since November 2010 that have affected your regular daily travel?

18. In 2011, what was your household's total annual income (from all sources) before taxes or other deductions from pay?

Note: If your household doesn't share income, please report your personal income only.

- 1 Less than \$10,000
- 2 \$10,000-\$24,999
- 3 \$25,000-\$34,999
- 4 \$35,000-\$49,999
- 5 \$50,000-\$74,999
- 6 \$75,000-\$99,999
- 7 \$100,000-\$149,999
- 8 \$150,000-\$199,999
- 9 \$200,000-\$249,999
- 10 \$250,000 or more
- 11 Prefer not to answer

Note: This information is used to make sure a representative sample of the Seattle/Lake Washington region participates in this study.

19. For future contact, including sending you your \$30 gift card, please confirm your email address.

You will only be contacted for this study and your email will NEVER be shared.

Primary email address for household: <pre-populated, but changeable>

Secondary email address for household (if available): <pre-populated, but changeable>

Note: Validate to require an email address that has an @ symbol and a "."

20. Thank you, you have now completed the "Household Update" survey.

Please click "Finish" submit this information.

DASHBOARD

1. **Welcome**

This page shows the status of all information we will ask you over the course of this study. Any time you enter the website you will come to this page first. From here, you can begin any available surveys or continue from where you last left off in a survey.

Next Steps

2. Please have each adult member of your household record all the trips they make on **<Day 1>** and **<Day 2>**. To help keep track of these trips, click here to view and print the Memory Jogger. When the “Travel Diary 2012” survey becomes available, click on the link below to record your household’s trips.

| Surveys | Status |
|-----------------------|-----------------------------------|
| Household Information | Completed |
| Travel Diary 2010 | Completed |
| Household Update | Completed |
| Travel Diary 2012 | Let's get started |

DIARY DASHBOARD

1. Thank you for taking the time to complete the household trip diary.
Please have each household member listed below (including any new adult members) enter his or her own trips. We want to encourage each member of your household to complete his/her own travel diary because we hope to understand how each person feels about the trips they are making. Please have your “Memory Jogger” ready, then click on a link to begin.

| Members | <Day 1> | <Day 2> |
|----------------|-----------------------------------|-----------------------------------|
| <self> | Let's get started | Let's get started |
| <populated> | Let's get started | Let's get started |
| <populated> | Let's get started | Let's get started |

Listed household members: any that are 18 and older, and 16-17 year old members if they were the one to fill out the household info survey.

HOUSEHOLD DIARY #1

1.1 Travel Log

1. Hello <member>. We are now going to ask you to enter the information from your “Memory Jogger.”

To begin, did you make any trips* on <day #>?

- 3 Yes
- 4 No

***What is a trip?**

- A trip consists of any travel from one point to another by car, bus, train, ferry, bicycle, or other means, or walking for more than five minutes. For example, going from home to work and stopping for coffee along the way will be 2 trips. A trip from home to the coffee shop and a trip from the coffee shop to work.
- Please include all legs of your trips (e.g. stop for coffee on the way to work)
- Please do NOT include any trips that you made as a paid commercial driver, such as a cabdriver or delivery driver.
- We are interested in learning about your trips even if you don’t consider it a “typical” travel day for you or your household.

2. [If no trips]

Why did you decide not to travel or make any trips* on <day #>?

Please select all that apply.

- 6 I worked from home for pay (e.g., home-based business or telecommuting)
- 7 I worked around the home (not for pay)
- 8 I was sick or I cared for a sick/unwell member of my household
- 9 I was out of the Seattle/Lake Washington region for the entire 24-hour period
- 10 Other

3. [If respondent did make a trip and full/part/student +25]

Did you work from home or telecommute instead of traveling to work for any part of the day on <day #>?

- 4 Yes, all day
- 5 Yes, part of the day
- 6 No

4. **<Member>, please list ALL the places you went on <day #>.**
 Please make sure to include your start and end location* for the day (e.g., Home).
[Click here for a 45 second help video for how to complete this page.](#)

I began my day at Add Location
 Then I went to Add Location

| | | | | |
|-------------------|------------|---|---|---|
| I began my day at | Home |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | Pizza shop |  |  |  |
| Then I went to | Work |  |  |  |
| Then I went to | School |  |  |  |
| Then I went to | Home |  |  |  |

*The last place you enter should be where you ended your day, or the place you were at 3 AM. For example, if you started at "Home" and returned home at the end of the day, then your last location should be "Home."

If first and last locations do not match, warning message that reads "Your start location differs from your end location, click "Next" if this is correct."

5. **Please locate each place that you went on <day #>. You can do this 3 different ways:**
- 1 First, select the place that you want to locate.
 - 2 Then, you can either:
 - . Search for an address or business in the box below.
 - . Click on the map to zoom in on your location. Keep zooming until a marker appears.
- [Click here for a 45 second help video for how to complete this page.](#)

| Location | Address or Intersection | | |
|-------------|-------------------------|--|-------------------|
| <populated> | |  | (Business Search) |
| <populated> | |  | (Business Search) |

1. **The list below should include all the trips you made on <day #>.**
 If you need to add or remove any trips, please click "Previous" to go back and edit your locations. If all of your trips from <day #> are shown below, please click "Next" to continue.

| Trip | Origin | Destination | Approx. Distance |
|------|------------|-------------|--------------------|
| 1. | Home | Work | <calculated> miles |
| 2. | Work | Pizza shop | <calculated> miles |
| 3. | Pizza shop | Work | <calculated> miles |
| 4. | Work | School | <calculated> miles |
| 5. | School | Home | <calculated> miles |

[on the right side of the screen, there should be a Google map of the area, showing all of the listed trip markers in context]

2. **<Member>, please tell us about the trips you made.**

| Trip # | Origin | Destination | Departed | | Arrived | | Primary Purpose of Trip |
|--------|------------|-------------|----------|-----|---------|-----|-------------------------|
| 1. | Home | Work | Hr | Min | Hr | Min | select... |
| 2. | Work | Pizza shop | Hr | Min | Hr | Min | select... |
| 3. | Pizza shop | Work | Hr | Min | Hr | Min | select... |
| 4. | Work | Home | Hr | Min | Hr | Min | select... |
| 5. | School | Home | Hr | Min | Hr | Min | select... |

Note: All hours (AM and PM) will be available, as will all minutes in 5 minute increments.

Note: The following purpose categories will be used.

- . *Go home*
- . *Go to primary workplace*
- . *Other work-related location (e.g., meeting, sales call)*
- . *Child care*
- . *School*
- . *Personal business (e.g. medical, banking, post office)*
- . *Social/recreational (e.g. movies, visit friends/family)*
- . *Exercise/gym*
- . *Religious/community activity*
- . *Shopping*
- . *Eat out/pick up takeout*
- . *Drop off or pick up someone else*
- . *Other*

3. **<member>, please enter (in order) the types of transportation you used to make each trip.**

Example 1: If you used your car for the entire trip, then click “Auto/Truck/Motorcycle” under Type 1 and leave Type 2, Type 3, and Type 4 blank.

Example 2: If you drove your car to a park and ride lot, took the bus, and then walked 10 minutes, click “Auto/Truck/Motorcycle” under Type 1, “Public Bus” under Type 2, and “Walked” under Type 3 (leave Type 4 blank).

| Trip # | Origin | Destination | Type 1 | Type 2 | Type 3 | Type 4 |
|--------|------------|-------------|------------|------------|------------|------------|
| 1. | Home | Work | select.... | select.... | select.... | select.... |
| 2. | Work | Pizza shop | select.... | select.... | select.... | select.... |
| 3. | Pizza shop | Work | select.... | select.... | select.... | select.... |
| 4. | Work | School | select.... | select.... | select.... | select.... |
| 5. | School | Home | select.... | select.... | select.... | select.... |

Note: The following transportation modes will be used.

- . *Auto/Truck/Motorcycle*

- . Bicycle
- . Walked/wheelchair
- . Taxi/limo/shuttle
- . Public bus
- . School bus
- . Organized vanpool
- . Train/Rail
- . Ferry
- . Dial-A-Ride/Access
- . Other

4. [drop downs only for auto or vanpool, rest filled in "N/A"]
<member>, please tell us about your driving trips.

| Trip # | Origin | Destination | Were you the driver or a passenger? | Personal Parking Cost for Trip |
|--------|------------|-------------|-------------------------------------|--------------------------------|
| 1. | Home | Work | select... | select... |
| 2. | Work | Pizza shop | select... | select... |
| 3. | Pizza shop | Work | select... | select... |
| 4. | Work | School | select... | select... |
| 5. | School | Home | select... | select... |

Note: The following driver answers will be used.

- . Driver
- . Passenger

Note: The following parking cost options will be used.

- . Did not park
- . Free
- . \$1.00
- (Dollar increments)
- . \$24.00
- . \$25.00 or more

5. [first two columns only shown for auto or vanpool] **<member>, please tell us about your trips.**

| Trip # | Origin | Destination | Number of household members in vehicle (not including you) | Number of people outside of your household in vehicle | Did this trip go across/around Lake Washington? |
|--------|------------|-------------|--|---|---|
| 1. | Home | Work | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... |
| 4. | Work | School | select... | select... | select... |

| Trip # | Origin | Destination | Number of household members in vehicle (not including you) | Number of people outside of your household in vehicle | Did this trip go across/around Lake Washington? |
|--------|--------|-------------|--|---|---|
| 5. | School | Home | select... | select... | select... |

Note: Number of household members available to select will be limited to number of household members described in Household Information survey.

Note: The following categories will be used for number of people outside of the household.

- . 0
- . 1
- . 2
- . 3
- . 4
- . 5
- . 6 or more

Note: The following categories will be used for the question asking whether trip crossed Lake Washington. Top three options only shown for trips that include auto use. The fourth option will only be shown for trips that include transit use.

- . Yes, drove across via SR 520 bridge
- . Yes, drove across via I-90 bridge
- . Yes, drove around via SR-522
- . Yes, took public transit across/around
- . Yes, took other route/transportation type
- . No

6. [drop downs only for trips that crossed Lake Washington by “drove across via SR 520 bridge” rest filled in “N/A”] **<member>, please tell us about the toll you paid to drive across SR 520.** Click [here](#) to learn more about the 4 different ways to pay the SR 520 toll.

| Trip # | Origin | Destination | What method did you use to pay the toll? | Approximately how much was the toll (on SR 520)? |
|--------|------------|-------------|--|--|
| 1. | Home | Work | select... | select... |
| 2. | Work | Pizza shop | select... | select... |
| 3. | Pizza shop | Work | select... | select... |
| 4. | Work | School | select... | select... |
| 5. | School | Home | select... | select... |

Note: Travel Value answer choices:

- . Good to Go! pass

Note: Toll Rate schedule drop down list is shown according to payment method

- . Good to Go! pass

- . *Pay by mail*
- . *Pay by license plate*
- . *Short Term Account*
- . *Other*
- . *I don't know*

Note: Toll Rate schedule drop down list is shown according to payment method

Good to Go!

- . *Free*
- . *\$1.60*
- . *\$2.25*
- . *\$2.80*
- . *\$3.50*
- . *More than \$3.50*
- . *I don't know*

Pay by Mail

- . *Free*
- . *\$3.10*
- . *\$3.75*
- . *\$4.30*
- . *\$5.00*
- . *More than \$5.00*
- . *I don't know*

Pay by Plate

- . *Free*
- . *\$1.85*
- . *\$2.50*
- . *\$3.05*
- . *\$3.75*
- . *More than \$3.75*
- . *I don't know*
- . *Short Term Account*
- . *Free*
- . *\$2.60*
- . *\$3.25*
- . *\$3.80*
- . *\$4.50*
- . *More than \$4.50*
- . *I don't know*
- . *Other/I don't know*
- . *Free*
- . *\$0.01-\$1.00*
- . *\$1.01-\$2.00*
- . *\$2.01-\$3.00*
- . *\$3.01-\$4.00*
- . *More than \$4.00*
- . *I don't know*

7. [drop downs only for trips that crossed Lake Washington by car/truck/motorcycle, rest filled in "N/A"] **We are interested in how you felt about each of your DRIVING trips across or around Lake Washington. Please tell us how satisfied you were with each of the following.**

| Trip # | Origin | Destination | Your overall driving time | Your travel speed | The predictability of your driving time |
|--------|------------|-------------|---------------------------|-------------------|---|
| 1. | Home | Work | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... |
| 4. | Work | School | select... | select... | select... |
| 5. | School | Home | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . Very Dissatisfied
- . Dissatisfied
- . Somewhat Dissatisfied
- . Neutral
- . Somewhat Satisfied
- . Satisfied
- . Very Satisfied

8. [drop downs only for trips that crossed Lake Washington by transit, rest filled in "N/A"] **For your PUBLIC TRANSPORTATION trips across/around Lake Washington, how satisfied were you with the following?**

| Trip # | Origin | Destination | Your overall transit travel time | The wait time at your stop(s) | The reliability of the service (e.g., on-time performance) | The availability of seating onboard transit |
|--------|------------|-------------|----------------------------------|-------------------------------|--|---|
| 1. | Home | Work | select... | select... | select... | select... |
| 2. | Work | Pizza shop | select... | select... | select... | select... |
| 3. | Pizza shop | Work | select... | select... | select... | select... |
| 4. | Work | School | select... | select... | select... | select... |
| 5. | School | Home | select... | select... | select... | select... |

Note: For all satisfaction questions, the following options will be used.

- . Very Dissatisfied
- . Dissatisfied
- . Somewhat Dissatisfied

- . Neutral
- . Somewhat Satisfied
- . Satisfied
- . Very Satisfied

9. [check boxes only for trips that crossed/around Lake Washington, rest filled in "N/A"] **For your trips across/around Lake Washington, which of the following sources did you consult (either before or during your trip) for information about traffic or transit conditions? Select all that apply.**

| Trip # | Origin | Dest. | Radi o | T V | 511/ Other Phone Servic e | Any Websit e | Electro nic freeway signs | Smartp hone or table app (Toll Troll, etc) | GPS / Nav syst em | Othe r | N o ne of th es e |
|--------|---------------|---------------|-----------|--------|---------------------------------------|--------------------|------------------------------------|--|-------------------------------|-----------|-------------------------------------|
| 1. | Home | Work | | | | | | | | | |
| 2. | Work | Pizza shop | | | | | | | | | |
| 3. | Pizza shop | Work | | | | | | | | | |
| 4. | Work | Scho ol | | | | | | | | | |
| 5. | School | Hom e | | | | | | | | | |

10. <member>, thank you for telling us about your travel on <day #>. Please click "Finish" to submit this information.

1.2 General Transportation Patterns

1. Thank you for telling us about your travel on <day 2>. We'd now like to ask you a few questions about your general travel around the Seattle/Lake Washington region.

When did you last use public transit (bus, train, ferry) within the Seattle/Lake Washington region?

- 1 Within the past month
- 2 More than a month ago but within the past year
- 3 More than a year ago
- 4 I have never used transit in the Seattle/Lake Washington region

2. **In a typical week, how many trips do you make across or around Lake Washington?**

Please count a round-trip as 2 trips.

Note: Drop down with options from 0 to 20 or more.

3. **For any trips that you make across or around Lake Washington, how do you MOST OFTEN travel?**

- 1 I drive on SR 520
- 2 I drive on I-90
- 3 I drive on SR 522
- 4 I take public transportation
- 5 I use some other route or type of transportation
- 6 I never travel across or around Lake Washington

4. [If Year 1 >1 trip/week are MORE than Year 2 trip/week]

Compared to November 2010, you report making fewer trips across or around Lake Washington. Why are you making fewer trips now?

- 1 Work-related reason (e.g., new job location or schedule change)
- 2 Personal or family-related reason (includes moving to a new home)
- 3 Increased traffic congestion on my route(s) across or around Lake Washington
- 4 Transit service is less reliable
- 5 To avoid paying tolls
- 6 Other, please specify:
- 7 I don't know/Not applicable

[If Year 1 >1 trip/week are LESS than Year 2 trip/week]

Compared to November 2010, you report making more trips across or around Lake Washington. Why are you making more trips now?

- 1 Work-related reason (e.g., new job location or schedule change)
- 2 Personal or family-related reason (includes moving to a new home)
- 3 Decreased traffic congestion on my route(s) across or around Lake Washington
- 4 Improved transit service
- 5 Other, please specify:
- 6 I don't know/Not applicable

5. [if travel around/across in year 2]

Which of the following best describes your use of the SR 520 tolled bridge for your driving trips across or around Lake Washington?

- 1 I use SR 520 for all or nearly all my driving trips across Lake Washington I use SR 520
- 2 I sometimes use SR 520 for my driving trips across Lake Washington
- 3 I rarely use SR 520 for my driving trips across Lake Washington
- 4 I never use SR 520 to drive across Lake Washington
- 5 Not applicable (I never make any driving trips across or around Lake Washington)

6. [if all or nearly all crossings use SR 520]

What factors most influence your decision to use SR 520 for all or nearly all of your trips across Lake Washington?

Please select all that apply.

- 1 I use SR 520 to save time
- 2 I use SR 520 to be sure of arriving at my destination on time
- 3 I use SR 520 because it is the most direct route for my trip
- 4 I use SR 520 because my other routes are too congested
- 5 I use SR 520 because my employer or someone else pays some or all of the toll
- 6 Other, please specify:

7. [if sometimes or rarely cross using SR 520]

Under what circumstances will you tend to choose to drive across the SR 520 bridge instead of taking another route?

Please select all that apply.

- 1 I use SR 520 when I need to save time
- 2 I use SR 520 when I need to be sure of arriving at my destination on time
- 3 I use SR 520 when it is the most direct route for my trip
- 4 I use SR 520 when my other routes are too congested
- 5 I use SR 520 when my employer or someone else will defray the cost of the toll
- 6 Other, please specify:

Note: Compare Year 1 to Year 2

If Year 1 = 520 & Year 2 = 90 or 522 goto Q5

If Year 1 = 90 or 522 & Year 2 = 520 goto Q6

If Year 1 = drive & Year 2 = transit goto Q7

If Year 1 = transit & Year 2 = drive goto Q8

Else goto Q9

Else consists of:

Didn't complete year 1 diary

Made <= 1 trip/week in year 1

Year 1 main crossing = Year 2 main crossing

Year 1 or Year 2 main crossing = 'other'

Year 1 = 90 or 522 and Year 2 = 90 or 522

8. [Year 1 = 520 and Year 2 = 90 or 522]

In November 2010, you indicated that you used SR 520 most often when traveling across or around Lake Washington.

Why do you now use <I-90/SR 522> MOST OFTEN?

Please select all that apply.

- 1 To avoid paying tolls on SR 520
- 2 It is faster/less congested on <X>
- 3 Travel times are more predictable on <X>
- 4 Road conditions are safer on <X>
- 5 My home or work location has changed
- 6 <X> is more convenient for the trips I make
- 7 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

9. [Year 1 = 90 or 522 and Year 2 = 520]

In November 2010, you indicated that you used <I-90/SR 522> most often when traveling across or around Lake Washington.

Why do you now use SR 520 MOST OFTEN?

Please select all that apply.

- 1 It is faster/less congested on SR 520
- 2 Travel times are more predictable on SR 520
- 3 Road conditions are safer on SR 520
- 4 My home or work location has changed
- 5 SR 520 is more convenient for the trips I make
- 6 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

10. [Year 1 = driving on 520/90/522 and Year2 = transit]

In November 2010, you indicated that you usually drove when traveling across or around Lake Washington.

Why do you now use public transportation MOST OFTEN? Please select all that apply.

- 1 To avoid paying the toll on SR 520
- 2 Price of gasoline
- 3 Environmental reasons
- 4 Bus service has improved
- 5 Travel times are better than driving
- 6 I can be more productive while traveling
- 7 It is less stressful than driving
- 8 It is safer to take the bus than drive
- 9 It is more convenient for the trips I make
- 10 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

11. [Year1 = transit and Year2 = drive on 520/90/522]

In November 2010, you indicated that you usually rode public transportation when traveling across or around Lake Washington.

Why do you now drive MOST OFTEN?

Please select all that apply.

- 1 It is faster/less congested to drive
- 2 Travel times are more predictable
- 3 I am part of a carpool/vanpool now
- 4 There's better information about travel conditions
- 5 Bus service has gotten worse
- 6 Driving is safer than taking the bus
- 7 My home or work location has changed
- 8 Driving is more convenient for the trips I make
- 9 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

12. In summary, compared to November 2010, how often do you use each of the following to travel across or around Lake Washington?

Note: If you didn't use a route/mode in 2010 and you still don't use it, please select "No change."

| | Much less often | Less often | No change | More often | Much more often |
|----------------------------|------------------------|-------------------|------------------|-------------------|------------------------|
| Drive on SR 520 | | | | | |
| Drive on I-90 | | | | | |
| Drive on SR 522 | | | | | |
| Take public transportation | | | | | |

13. [HHs with 1+ trips in a typical week across/around Lake Washing in Year 2] For your trips across or around Lake Washington, how often have you done each of the following in the last month as a result of tolling on SR 520?

| | Never | Rarely | Sometimes | Often | Not Applicable |
|---|--------------|---------------|------------------|--------------|-----------------------|
| Carpooled/vanpooled instead of driving alone | | | | | |
| Rode a public bus instead of driving | | | | | |
| Decided not to make a trip at all | | | | | |
| Made a planned trip less frequently | | | | | |
| Took a different route/road to avoid using SR 520 | | | | | |
| Changed my trip departure time to | | | | | |

| | Never | Rarely | Sometimes | Often | Not Applicable |
|--|-------|--------|-----------|-------|----------------|
| avoid traffic congestion | | | | | |
| Changed my trip departure time for my SR 520 trip to avoid higher tolls | | | | | |
| [if employed] Telecommuted instead of traveling to work using SR 520 | | | | | |
| Changed my destination to avoid traveling across or around Lake Washington | | | | | |
| Switched to SR 520 instead of using I-90 or SR 522 | | | | | |

Note: The answer choices will be randomized.

1.3 Work/School Commuter Information

1. [If full-time employed, part-time employed, student working +25 hours/week, student working <25 hours/week]

How many days per week do you typically commute to your <work/school>?

- 1 7 days a week
- 2 6 days a week
- 3 5 days a week
- 4 4 days a week
- 5 3 days a week
- 6 2 days a week
- 7 1 day a week
- 8 0 days a week
- 9 No fixed site or regular commute

2. [If >= 1 day/week]

How do you typically get to your <workplace/school>?

Please select all that apply.

- 1 Drive alone (car/truck)
- 2 Carpool (2 or more people in vehicle)

- 3 Organized vanpool
- 4 Bus
- 5 Ferry
- 6 Train (commuter rail, light rail, or monorail)
- 7 Motorcycle / moped
- 8 Walk (for at least 5 minutes, or the whole way)
- 9 Other

3. [If carpool selected as typical commute mode in Year 1, but NOT in Year 2]
In November 2010, you indicated you carpooled for at least some of your <work/school> trips.

Why do you no longer carpool?

Please select all that apply.

- 1 My job location or schedule changed
- 2 Other carpool members dropped out
- 3 I switched to transit or vanpool
- 4 It is faster and more reliable to drive alone on SR 520
- 5 I prefer to drive alone now
- 6 HOV lanes have become less useful in saving time
- 7 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

4. [If carpool selected as typical commute mode in Year 2, but NOT in Year 1]
In November 2010, you indicated that you were not carpooling as part of your typical commute.

Why did you start carpooling?

Please select all that apply.

- 1 Using the HOV lanes saves time
- 2 To share the cost of the gasoline/commuting
- 3 To share the cost of the SR 520 toll
- 4 My job location or schedule changed
- 5 Carpooling is less stressful/more convenient
- 6 Carpooling is more environmentally-friendly
- 7 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

5. [If organized vanpool selected as typical commute mode in Year 1, but NOT in Year 2]
In November 2010, you indicated that you vanpooled for at least some of your <work/school> trips.

Why do you no longer vanpool?

Please select all that apply.

- 1 My job location or schedule changed
- 2 Other vanpool members dropped out
- 3 SR 520 has become less useful in saving time
- 4 I switched to transit or a carpool
- 5 It is faster and more reliable to drive alone on SR 520
- 6 I prefer to drive alone now
- 7 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

6. [If organized vanpool selected as typical commute mode in Year 2, but NOT in Year 1]
In November 2010, you indicated you were not vanpooling as part of your typical commute.

Why did you start vanpooling?

Please select all that apply.

- 1 Using SR 520 saves time
- 2 To reduce my commuting costs
- 3 My job location or schedule changed
- 4 Vanpooling is less stressful/more convenient
- 5 Vanpooling is more environmentally-friendly
- 6 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

7. [If employed]

How many days per week do you typically work from home or telecommute instead of traveling to work?

- 1 5-7 days a week
- 2 4 days a week
- 3 3 days a week
- 4 2 days a week
- 5 1 day a week
- 6 A few times per month
- 7 Less than monthly
- 8 Never
- 9 Not applicable

8. [If telecommute more]

Why do you telecommute MORE OFTEN than you did in November 2010?

- 1 Please select all that apply.
- 2 Traffic conditions are worse now
- 3 My personal situation has changed
- 4 My job situation has changed
- 5 The computer/telecommunications capabilities in my home are improved
- 6 Environmental reasons
- 7 To save money on gas/commuting
- 8 To reduce how often I pay a toll on SR 520
- 9 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

9. [If telecommute less]

Why do you telecommute LESS OFTEN than you did last year?

Please select all that apply.

- 1 Traffic conditions are better now
- 2 My personal situation has changed
- 3 My job responsibilities or tasks have changed

4 Other, please specify:

Note: Answer choices will be randomized with "other" anchored at the bottom of the list.

10. [If employed or a student]

Which of the following statements best describes your <work/school> schedule?

- 1 I have no flexibility in my schedule
- 2 I have some flexibility to adjust my schedule, within about 30 minutes
- 3 I'm pretty much free to adjust my work schedule as I like

11. [If no flexibility]

Why don't you have flexibility in your <work/school> schedule?

- 1 My work schedule requires me to be present for specific hours each day
- 2 My personal situation requires me to arrive and leave at specific times each day
- 3 Other

12. [If employed or a student]

Which of the following commuter benefits does your <employer/school> offer? Which do you personally use?

| | Not offered | Offered, but I don't use | Offered, and I use | Don't know |
|--|-------------|--------------------------|--------------------|------------|
| Free or discounted parking | | | | |
| Free or discounted transit pass | | | | |
| Free or discounted vanpool transportation | | | | |
| Partial or full reimbursement of SR 520 toll | | | | |

13. [If employed or a student]

Did your employer or school offer you a one-time payment to help offset the cost of setting up a *Good to Go!* account and paying the tolls on SR 520?

- 1 Yes
- 2 No

1.4 Opinions/Perceptions and General Questions

1. Which of the following items do you own?

| | I own | I do not own |
|--|-------|--------------|
| A home computer (desktop or laptop) with access to the internet | | |
| A Smartphone, iPhone, Blackberry, or other web-enabled mobile device | | |
| A cell phone that is not web-enabled | | |
| Mobile navigation or GPS device (such as Tom-Tom or Garmin) | | |

2. How strongly do you agree or disagree with each of the following statements?

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|---|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| Driving on Seattle/Lake Washington region highways is stressful for me | | | | | | | | |
| At least twice a week there is an unexpected delay on my trip | | | | | | | | |
| I adjust my routes and/or my departure times to avoid traffic congestion | | | | | | | | |
| I will use a toll route if the tolls are reasonable and I will save time | | | | | | | | |
| Highway tolls are unfair to people with limited incomes | | | | | | | | |
| I don't have enough time in the day to do all I need to do | | | | | | | | |
| Tolling on SR 520 has improved <u>my</u> travel in the region | | | | | | | | |
| The red X's on the electronic overhead lane signs on SR 520 and I-90 are helpful for knowing when to change lanes | | | | | | | | |
| I adjust my speed according to the speed posted on the electronic overhead lane signs on SR 520 and I-90 | | | | | | | | |

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| I can't afford to pay the SR 520 toll for any of my trips | | | | | | | | |
| I am spending more time stuck in traffic since tolling started on SR 520 | | | | | | | | |

Note: Statements will be shown in randomized order.

3. [If employed] **How strongly do you agree or disagree with each of the following statements?**

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|--|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| I am satisfied with my commute | | | | | | | | |
| Within the past year, I've seriously considered changing where I live or work to reduce the time I spend traveling | | | | | | | | |

Note: Statements will be shown in randomized order.

4. [if employed and use a transit mode for typical commute] **How strongly do you agree or disagree with the following statement?**

| | Strongly Disagree | Disagree | Somewhat Disagree | Neutral | Somewhat Agree | Agree | Strongly Agree | NA / Don't Know |
|---|-------------------|----------|-------------------|---------|----------------|-------|----------------|-----------------|
| As soon as I can, I'd like to switch to driving to work | | | | | | | | |

5. **Now that SR 520 is being tolled, was there anything else we should have asked you about how your household's travel has been impacted?**

6. **Would you be willing to continue to participate in future travel surveys like this one?**

In the future, the U.S. Department of Transportation, in cooperation with Puget Sound Regional Council, Washington State Department of Transportation, and King County, may occasionally conduct surveys just like this one to obtain feedback from residents like you about transportation topics and would love your feedback.

- 1 Yes
- 2 No

7. Thank you! You have completed your Travel Diary.
Please click "Finish" to submit your information.

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