

Appendix IV

Travel Study Pre-Test Analysis and Report

Travel Study Pre-Test Analysis and Report

**Prepared for the King County Land Use, Transportation,
Air Quality, and Health Study**

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I. Purpose of the Travel Survey Pretest

A. Overview

The purpose of the travel study pretest analysis is to review the survey instrument, recruitment and data collection process, and data tabulation procedures in order to identify areas in which the travel survey components and process can be improved. Upon conclusion of the spring 2003 survey recruitment, 130 household travel surveys and corresponding individuals surveys and diaries were successfully completed in the White Center, Kent, and Redmond case study communities. During the subsequent months of June and July 2003, the survey and diary entries were coded into the survey database.

Prior to the second phase of the survey recruitment which will ramp up at the end of August 2003, and fully re-commence in September, it is necessary to review the survey procedures and database coding in order to pinpoint survey questions, recruitment issues, and tabulation methods that need to be changed. The critical issue with the travel survey process remains the recruitment rate and lack of sufficient household addresses in the Kent and Redmond communities. This matter must be addressed immediately to ensure a successful completion of the travel survey. In addition, through the pretest analysis, survey questions and tabulation procedures have been identified that upon changing will positively effect the collection process and quality of collected travel survey data.

This report reviews the survey recruitment process and protocol, the number of households which have both consented to and successfully completed the survey instruments in each of the three case study areas, the geographic distribution of the participant households in the three case study areas, the on-going recruitment problems in the Kent and Redmond communities, and changes that will be made to the survey instruments, recruitment process, and database tabulation before the recruitment begins in the fall.

II. Travel Survey Instruments and Recruitment Protocol

A. Travel Survey Instruments

Prior to commencing the travel survey recruitment, the survey instruments were designed and reviewed by the County, the NQLS team, and LFC. In total, five survey instruments were completed including two household level surveys for NQLS and non-NQLS participants, one individual level survey for all participants, and two-day travel diaries for adults and children. The NQLS household level survey was created for households which have previously been involved with the NQLS study. Since several of the demographic questions are repetitive between the NQLS and travel surveys, the NQLS version of the household survey references, but does not include, these questions.

B. Recruitment Protocol

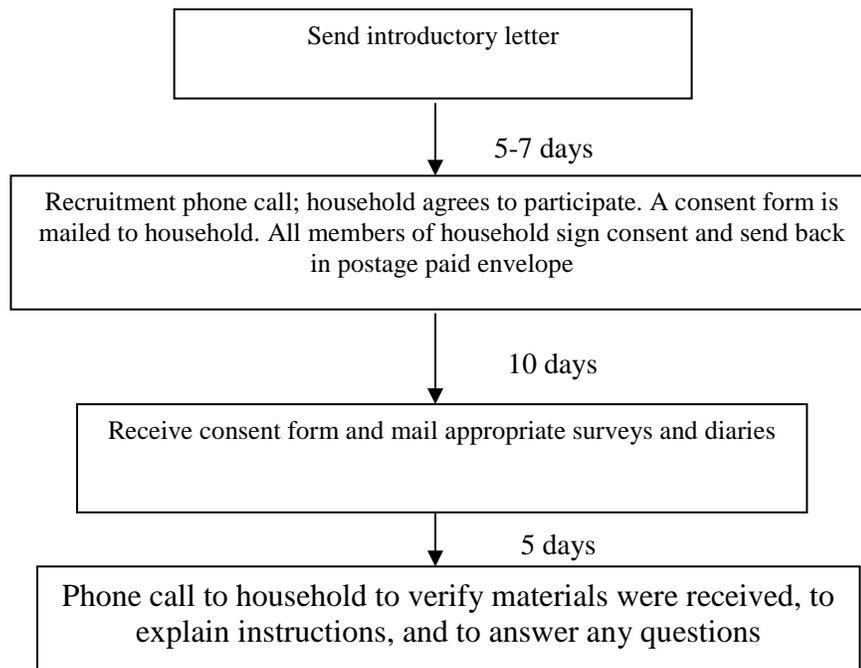
Before the survey recruitment commenced, recruitment protocol documents were created to delineate the procedures to be used for evaluating whether a potential participant meets selection criteria, the process by which to gain individual participants and a household's consent, and the methods to be used for assessing the level of survey instrument completeness required.

As specified in the protocol document, for households for which telephone numbers are known, an introduction letter is mailed to the household. Two or three days after expected letter delivery, trained telephone recruiters will contact the household to introduce and explain the study, and to determine the household's eligibility and interest in participating. All individuals in the household must agree to participate in order for the household to be eligible to participate. The household will be sent a consent form to review and sign, with a business reply envelope in which to mail back the signed consent form. After receiving the consent form, households will be mailed the appropriate number of travel surveys and diaries to complete, with a postage paid return envelope to mail back the materials.

For households for which telephone numbers are not known, an introduction letter and business reply return post-card will be mailed to the household. Households interested in participating will be encouraged to mail back the post-card with contact information provided (e.g., telephone number). After receiving the post-card, trained telephone recruiters will contact the household to introduce and explain the study. The household will be sent a consent form to review and sign, with a business reply envelope in which to mail back signed consent form. After receiving the consent form, households will be mailed the appropriate number of travel surveys and diaries to complete, with a postage paid return envelope to mail back the materials. A toll-free telephone number is provided on each survey instrument in order for survey respondent's to ask questions about the survey and their participation.

The expected timeline to recruit a new participant is shown in Figure 1, below.

Figure 1: Expected Timeline to Recruit A New Participant



The surveys and diaries are mailed based on a two day-pair, such as Monday and Tuesday, during which the travel diaries must be completed to ensure sampling variation and an even distribution of collected travel data. Diary two-day pairs are assigned to and discussed with the household members. The total time expected to recruit a new participant is between 27 and 32 days, when no delay in the process occurs. If a survey is returned incomplete, the recruitment time is likely to be extended by a minimum of two weeks. The typical household takes 45 days from the recruitment call to the day on which the surveys are received and deemed complete. An estimated one-third of participating households have no delays in the process. At least half of the respondents receive a telephone call to prompt the return of the survey instruments. Several households have required five or more telephone reminders before the survey materials are returned.

In addition to outlining the recruitment process, the protocol documents discuss the elements in each survey instrument required to perform analysis on respondent travel behavior and patterns with urban form patterns at their residence and employment locations. From the household level survey, the questions in each of the following survey sections are critical for the purpose of this study:

- Vehicle information;
- Household travel behavior to destinations located close by;
- Reasons why the neighborhood was selected;
- Desirability of public investments; and
- Neighborhood preferences.

From the individual level survey, the questions in each of the following sections were deemed necessary for the purpose of this study:

- Demographic information;
- Travel behavior to and from employment site and other destinations
- Participation in employer incentive programs (TDM);
- Time and cost tradeoffs for carpool, vanpool, and public transportation;
- Level and type of physical activity;
- Physical activity and social life in the neighborhood; and
- Health and life satisfaction.

From the adult and child version of the travel diary, the necessary information that must be captured over the two-day travel period is the following:

- Places visited;
- Travel mode;

- Travel time;
- Travel cost; and
- Activities engaged in.

A certain percentage of questions from each of these sections must be answered in order for the instrument to be considered complete. When a survey or diary is returned and does not meet these criteria, the respondent is notified and survey questions with missing answers are highlighted and the instruments are mailed back to the respondent. The most common missing element is the destination street address or cross street information on the travel diary. This information is critical to locating the origin and destination of trips and understanding an individual's and household's trip making behavior over the two-day period. Other survey and diary questions in which multiple respondents did not answer or had difficulty answering are discussed in detail in Section IV of this report. Incentives are not paid until all instruments are deemed complete.

III. Travel Survey Recruitment

A. Recruitment Process

After considerable efforts in instrument design and protocol establishment, the travel survey recruitment commenced at the end of March, 2003, in the White Center, Kent, and Redmond communities. As documented in the progress reports and shown in Figure 2, below, as of the beginning of June, 2003, Kent reported 11, Redmond showed 42, and White Center had a total of 80 households that have completed the survey and thus finished the travel survey process. This is a total of 133 households. At this time, an additional 169 households had consented and were in the process of documenting their travel behavior, demographic profile, and physical health using the survey instruments. 405 households had agreed to participate in the survey and were filling out consent forms. Recruitment stopped in White Center earlier than in Kent and Redmond due to the fact that 274 White Center households had agreed to participate in the travel survey. Not all of these households will return consent forms and complete the surveys, but it is expected that the target number of 200 households will complete the process successfully. This is a major success to have recruitment going so well in this community. Kent and Redmond, as discussed in the community recruitment section of this report, are not proceeding at the same rate.

Once a household agrees to participate in the survey, each individual in the household is sent a survey consent form and is added to the AGREED list in the table shown in Figure 2, below. When the signed and dated consent forms are received by the NQLS team, the household's status is changed to CONSENTED. And after the completed survey and diary instruments are returned and it is determined that these forms reach an appropriate level of "completion," the household's status becomes COMPLETED.

Figure 2: Travel Survey Status – June 2, 2003

TARGET			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	100	100	200
Redmond	100	100	200
White Center	100	100	200
Total	300	300	600

CURRENT AGREED			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	11	9	20
Redmond	20	91	111
White Center Center	21	253	274
Total	52	353	405

CONSENTED			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	8	5	13
Redmond	16	54	70
White Center	15	71	86
Total	39	126	169

COMPLETED			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	7	4	11
Redmond	11	31	42
White Center	9	71	80
Total	27	106	133

In addition to the above stats, there are 466 households that have been contacted that have refused to participate in the travel survey. The breakdown of these households is shown in Figure 3, below.

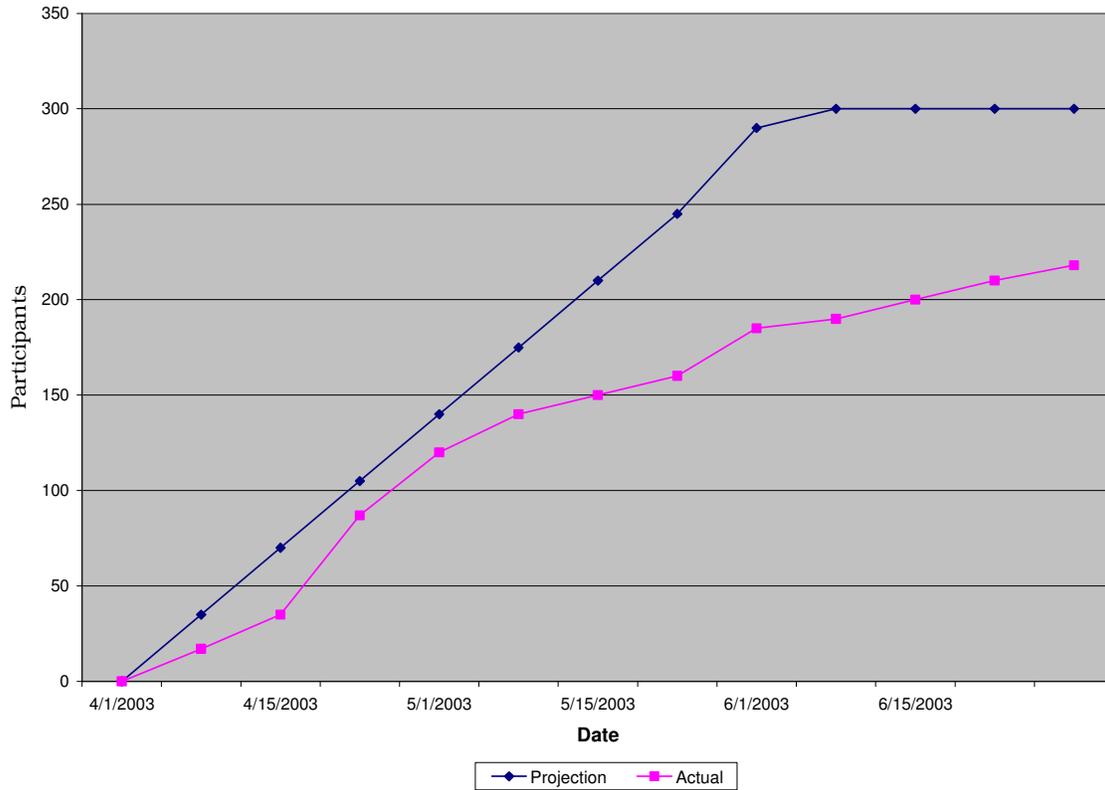
Figure 3: Number of Households That Have Refused To Participate By Community – June 2, 2003

REFUSED			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	1	11	12
Redmond	9	87	96
White Center	4	354	358
Total	14	452	466

Furthermore, 35 households contacted have not been eligible due to the size of their household, and similarly, 154 households have not been able to participate since English is not the primary language spoken in the home. There is 1 household in the Redmond and 11 households in the White Center communities that have asked to be placed on a waiting list and re-contacted as the survey progresses. Furthermore, 12 surveys have been returned incomplete to date. These survey instruments have been returned to the participants with questions that require responses highlighted.

And as of the end of July 2003, several additional survey instruments, returned in June 2003, have been coded into the survey database, resulting in 218 households that have completed the survey process. Figure 4 illustrates the actual recruitment as compared with the projected recruitment for April through June 2003.

Figure 4: Actual Recruitment As Compared With Projected Recruitment, April Through June, 2003



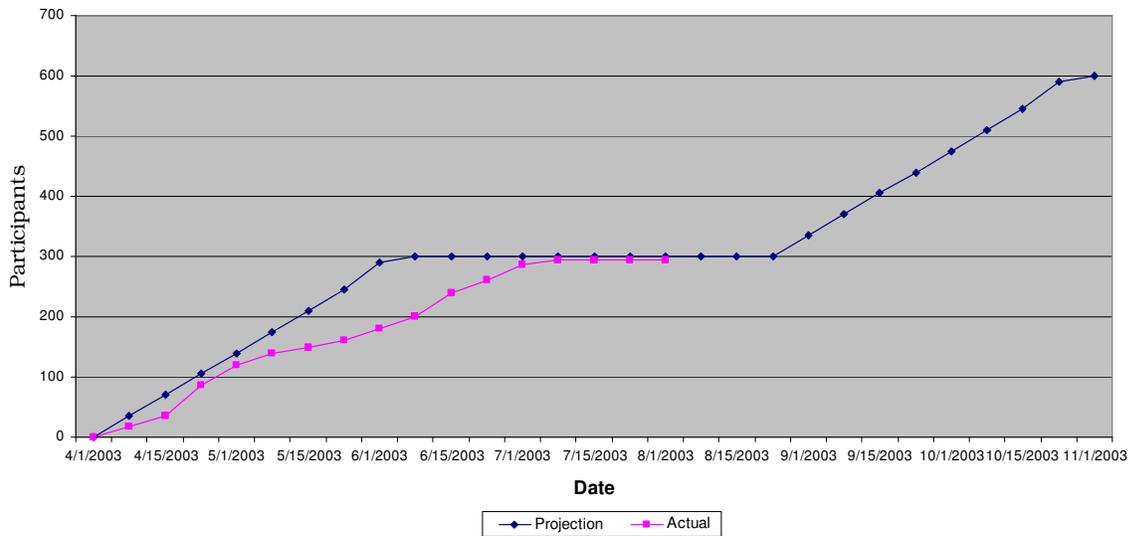
The breakdown of the 218 households per community is shown in Figure 5, below.

Figure 5: Recruitment Per Community as of June 30, 2003

SURVEYS			
	Current NQLS participants	Non-NQLS participants	
Kent East Hill	7	5	12
Redmond	17	55	72
White Center	22	112	134
Total	46	172	218

Households have continued to be recruited into the survey over the summer months, but due to budget constraints and the fact that full time recruitment will ramp up at the end of August 2003, a limited amount of staff time has been devoted to this task. This effort, however, has been instrumental in increasing the number of household CONSENTS from 169, as shown in Figure 6, to 294. Figure 6 illustrates the current number of consent forms as compared with the projected progress.

Figure 6: Number of Household Consents as Compared with Project Progress – July 30, 2003



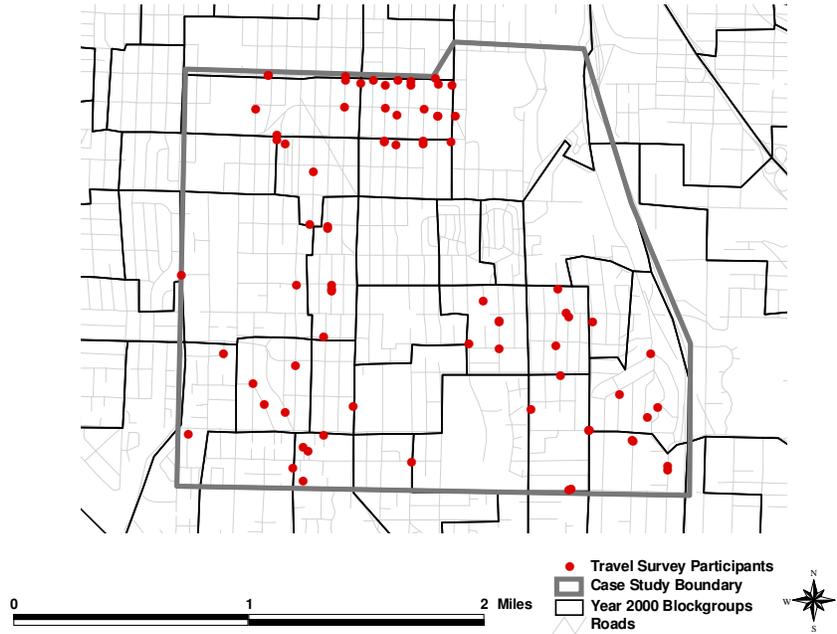
B. Community Recruitment Issues

White Center

As documented above, the recruitment in the White Center community has progressed smoothly. The community area consists of several census blockgroups. Early on in the recruitment process, 3,200 addresses were geocoded inside the White Center boundary. These addresses, along with the NQLS participants located in White Center, should provide enough households, and in particular, households with phone numbers, to successfully reach the recruitment target.

The 80 households included in the pretest analysis have an acceptable geographic spread throughout the White Center community, as illustrated below in Figure 7. Yet, there are blockgroups that do not include travel study participants. Households in these areas will be the emphasis in the next phase of the survey.

Figure 7: Households in White Center That Have Completed the Travel Survey

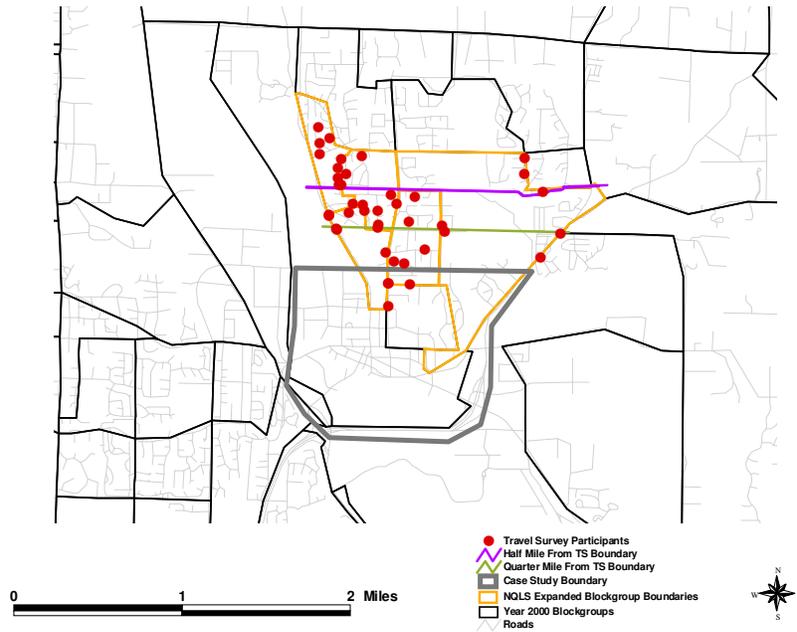


Redmond

The Redmond case study area has a unique characteristic that has affected the way in which households are recruited. The community boundary is different than that defined by the NQLS study, and the overlap between these two boundaries is fairly small. Furthermore, the northern portion of the NQLS boundary is quite a distance from the commercial area in the travel survey community, and it is not likely that residents would walk from this area to the commercial streets. However, due to the number of single and multi-family homes in the travel study community, it was deemed necessary to recruit households from the NQLS community. Thus, “new” boundaries based on ¼ mile and ½ mile distances from the northern edge of the travel survey boundary were created in order to screen the NQLS households.

The recruitment of NQLS participants in the Redmond community has been focused on households that are located within the overlapping areas as well as the area between the northern edge of the travel survey boundary and ¼ mile to the north, as shown by the green line in the map below in Figure 8. Since additional addresses have been required, recruitment has occurred within the area between the ¼ and ½ mile markers, as illustrated by the green and purple lines below. The green and purple lines follow parcel boundaries and are thus not straight lines. Households above the purple line were recruited before May 1, 2003, when this issue was worked through.

Figure 8: Households in Redmond That Have Completed the Travel Survey



In June 2003, an order was placed with Contact Solutions, a marketing company, for addresses in the blockgroups which comprise the travel survey. Out of 1,400 addresses, close to 900 were located within the desired boundary. An additional 45 addresses were matched in the area between the northern end of the travel survey boundary and the ¼ mile marker. Seventy-seven more addresses were located in the area between the ¼ and ½ mile markers. Of the addresses that matched within the travel survey boundary, only about 60 households can be expected to participate in the study due to the fact that 60% of households in this list do not have telephone numbers. The recruitment rate for households with telephones in the Redmond area has been 20% and for non-telephone households, 2%. Overall, the recruitment rate is 8%. An additional 250 addresses are needed in the Redmond community to ensure that the target recruitment is met.

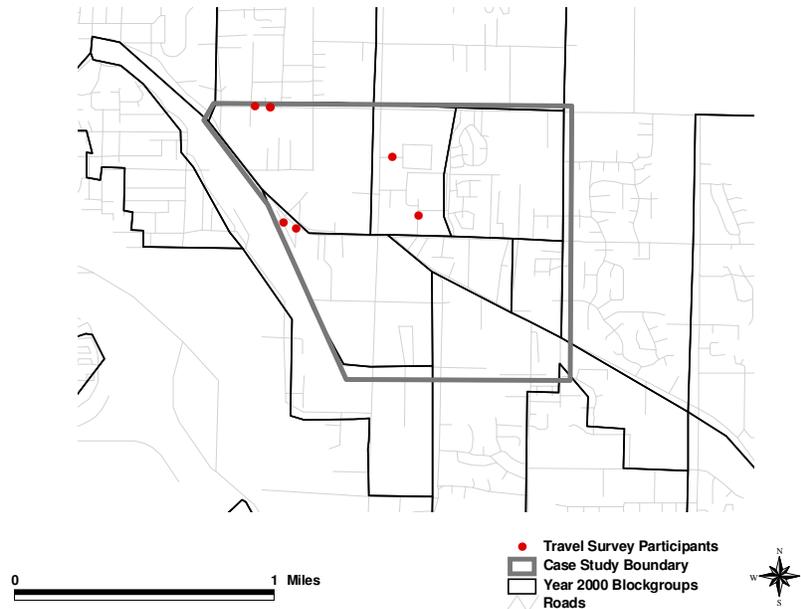
This order exhausted Contact Solution's database for the two blockgroups in the travel survey area, so in order to meet the target 200 households, additional new household addresses are needed or the Redmond community needs to be expanded. There are opportunities to expand, especially to the west of the community which has numerous single family homes; however, the team would prefer to not change the community form at this juncture in the project as this would result in an overall reduction in the quality of the final project.

Kent

The Kent community continues to pose a serious recruitment problem. As shown in Figure 9, below only two-dozen households have been recruited into the travel study to date. Kent's housing stock is comprised of single family homes and numerous multi-family developments. Several attempts have been made to increase recruitment at the apartment complexes throughout the Kent community, including previous measures performed for the NQLS project. It is important to note that only 65 households have been recruited into the NQLS study even though

recruitment has been intense and has been ongoing for 15 months, significantly longer than the travel survey recruitment. Due to the large number of households that are needed in Kent, it is estimated that close to 1,500 addresses, assuming ½ of these households have telephones, are required. This amount of addresses is daunting considering the actions that have already taken place in an attempt to increase the recruitment in Kent.

Figure 9: Households in Kent That Have Completed the Travel Survey



Some of the measures that have taken place to try to obtain additional addresses in Kent include Dr. Brian Saelens, co-investigator for the NQLS project, going door to door in Kent to talk with apartment managers in an effort to generate interest in the survey and obtain household telephone numbers. Additionally a postcard / flyer was created specifically for Kent and has been mailed to households that do not have telephones. It has been proposed that a staff member distribute these postcards in every mailbox and at every multi-family complex.

Furthermore, Mr. William Osborne, senior planner with the City of Kent, provided several contact names and numbers of individuals and companies who he believed would have access to names and phone numbers. What seemed like the most promising lead – the private company that supplies the Kent Fire Department with locations of residents does not have phone numbers and uses the same techniques to update their address database that has been employed in the NQLS study. Mr. Osborne also suggested that the head of the Kent elementary school PTA group could announce the study to parents at a back to school meeting. This individual has been contacted and is willing to assist, but she cannot solely be responsible for providing the team with the amount of addresses that are needed. Furthermore, there is some concern that the sample set from a PTA list would be of a similar demographic.

The logical next step in the Kent recruitment process was to evaluate the possibilities for expanding the community. The difficulty with expanding the Kent community in such a way

that maintains the same walk / income composition as the current community is that the 1990 and 2000 census blockgroups are significantly different. The addresses provided by Contact Solutions are based upon the 1990 geography; however, year 2000 census data has been used for socio-economic factors such as median household income, median age, ethnic composition, and educational attainment. The median annual income is quite varied among the blockgroups, with several blockgroups reporting a mean household income in the \$30,000's and other blockgroups reporting a figure much higher, in the \$50,000 - \$60,000's. Furthermore, the larger the community, the more varied the travel behavior will be due to changes in urban form and distance from the commercial core. Residents in the outlying blockgroups may be less likely to walk to the retail areas due to distances greater than a mile.

However, if expansion is the only means to obtain additional addresses in Kent, twelve blockgroups have been chosen as possible candidates for expansion, although they do not all meet the current walk and income characteristics. Walk and income scores can be averaged with other blockgroups to produce a community average that meets the "low-low" classification. Also, it is possible to break blockgroups to exclude certain urban form configurations, such as cul-de-sacs. Expansion in Kent will significantly reduce the quality of the travel survey results in the Kent community due to the factors delineated above. Additional, new address lists would be the ideal solution, but without the County's assistance, there remains no other option but to expand as all other avenues have been explored and exhausted.

IV. Analysis of Travel Survey Data

A. Overview of Analysis Plan

The quality of the collected travel survey data has been reviewed using two approaches. First, the recruitment team has compiled comments and observations of coding issues and common questions and comments received from survey participants. Since these suggestions come from the trained recruiters, they are vitally important to improving the survey instruments. Secondly, statistical analysis was performed on the survey databases to pinpoint and identify additional flaws in the survey instruments, the coding process, and the data tabulation. In order to perform this analysis, a number of key variables were selected from the household survey, individual survey, and travel diary. These variables were selected from the sections of the instrument deemed necessary to complete the project as listed in Section I of this report. Since these attributes have a large impact on the findings of this project, it is critical to identify areas requiring improvement. The following is the list of significant variables evaluated in the pretest statistical analysis for item non-response and other response / coding issues:

- Gender
- Age
- Race/Ethnicity
- Educational Attainment
- Income
- Primary mode to work
- Participation in employer incentive programs
- Commute time AM

- Commute time PM
- Monthly driving expenses
- Medical condition
- Height
- Weight
- Number of vehicles
- Type of residence
- Rent/own
- NQLS or non-NQLS
- Household Structure
- Number of household members

B. Data Quality and Outline of Issues

Household Survey

There was only one significant and a couple minor problems with the NQLS and non-NQLS versions of the household survey that warrants description. First, as shown in Table and Figure 16 in Appendix I, Questions A5 and A6 on the non-NQLS version of the instrument ask for type of residence and whether the residence is owned or rented. The type of residence question has a check option for “other” with a line for the respondent to write in an alternate type of dwelling unit. No responses were coded as “other;” however, twenty-seven individual surveys, or 12% of the instruments, have “N/A” coded for the residential ownership question. The wording of these questions is simple and clear and this anomaly is believed to be a coding error.

Another issue identified by the recruiters is that several individuals listed more the three vehicles in the answer box to Question B2. Vehicle year, make, model, and miles driven are not needed for more than three vehicles for each individual, so this question will remain the same and the additional vehicle information will not be coded into the database.

Lastly, Question A10 on the non-NQLS version of the instrument needs a skip pattern if the respondent answers “no” which indicates that a move out of Seattle is not being considered in the next three years.

Individual Survey

Due to the fact that the individual survey is much longer and more complex in its design, it is no surprise that a larger number of issues were identified as compared with the household survey. First, the recruitment team expressed difficulty in recording the individual survey responses into the database due to the number of answer choices for several questions. For instance, question A11 asks for total personal income in the last year and has 11 answer choices. It is easy for the chosen answer to be coded into the database in the wrong field. Another example is Question A4 which asks for a participant’s race and ethnicity. As shown in Table and Figure 2 in Appendix I, the percentage of Caucasian responses is quite large, at 89.2%, despite the fact that the study areas were selected in part for their racial diversity. The database shows that there are 6 American Indian / Alaskan Native individuals and only 4 Hispanic individuals. Due to the high number of Hispanics in the White Center community, it is likely that the database was coded improperly as the check boxes for these two choices are next to each other. To help mitigate this problem, the checkboxes in the individual and household survey instruments will be numbered. Other issues identified with the individual survey require substantive changes. First, several fields in the survey database were found to have illogical or inconsistent responses when asked

more than once. As shown in Table and Figure 1 in Appendix I, one record is coded as “0” in response to Question A1, “what is your gender?”. The answer choices are “male” or “female.” This is a coding error that needs to be rechecked before further analysis could commence. It is important to note that there were not any questions in the individual survey that had an item non-response rate greater than 5% of the total responses. Numerous questions had one or two item non-responses but this is not significant enough to warrant revising survey questions or process. There are several questions that are either specific to individuals who are employed outside the home. There are varying numbers of responses to these questions which seems to indicate that retired, unemployed, or individuals who work from home are providing answers. These questions have varying number of responses in which the answer selected reflects that the respondent is either not employed or works from home. For instance, as shown in Table and Figures 11 and 12 in Appendix I, Questions B18 and B19, respectively, prompt the respondent to write their commute time in the morning and evening. Seventy-two of these answers are coded as “N/A.” This number should be directly correlated with the number of respondents in Question B16, Table and Figure 8 in Appendix I, who checked the box that they were not employed or worked from home. The response to this question indicates that 68 individuals were not employed outside their home. Furthermore, in Question B1, the respondent is asked what primary mode of transportation is used to travel to work. As shown in Table and Figure 7 in Appendix I, 62 total respondents checked that they do not work outside of the home. Thus, as illustrated, the responses to these three questions are not compatible. The proposed solution for this inconsistency is to have individuals who are not employed or work from home skip Section B in its entirety and continue with Section C “Transportation To and From Other Locations.” In addition to the changes that will be made to the individual survey as discussed above, there are a few other important changes to the survey instrument that warrant discussion. These issues along with proposed solutions are provided below.

- Similar to the above problem, in Questions A5-A13, individuals who are retired, homemakers, or students are having difficulty answering questions that pertain to the work environment. Due to the way in which the questions are worded, individuals who are not employed outside of the home are being asked Question A9, “How many people work for your employer,” Question A10, “Do you work from home,” and Question A11, “What is the address of your primary workplace.” These questions will be rearranged so that Question A9, which asks about paid employment follows Question 6, which asks “How many paying jobs do you have?” A skip pattern will be added to Question 6. Additionally, Questions A10-A12 may be relocated at the beginning of Section B. Instead of asking whether the respondent works from home, a check box will be added to the “What is the address of your primary workplace?” question with an “I work from home” check box option.
- Questions B1 and B2 will be combined to ask “What modes of transportation do you primarily use to get to work? Put a “1” by your primary mode(s), and a “2” by your secondary mode(s).” An example will be provided to illustrate that if the commute trip is dependent upon taking two modes, such as walking to the bus, that a “1” will be placed in both the “walk” and “bus” options. Additionally, the definition of car sharing will be repeated for this question as the correct use of this mode may be interpreted as using another household member’s vehicle.

- Question B17 will be slightly revised to make it clearer. It is guessed that the “check if you would use if offered” questions are often skipped. The question will be reformatted to force respondents to answer the questions depending on whether the employer based incentive is offered.
- Question C11 will have another destination named “Other” with a line for individuals to write in a destination in their neighborhood, such as a library.
- The option scales on Question G1 will be revised from “Never Walk” to “Almost Always Walk” with a “Not Applicable” at the end due to the fact that respondents have filled in percentages under the “Never Walk” column and must be re-contacted to clarify their answer.
- Question H1 will be relocated to the same page as Question H2. Presently, respondents are choosing “No” to the “Do you have a medical condition that makes it difficult to travel outside the home?” question and then checking medical conditions in Question H2. It is believed that individuals are not reading the skip pattern on Question H1, are turning the page, and then answering Question H2 without carefully reading the instructions. This issue will likely be resolved by placing these questions on the same page.

Travel Diary

The major problem with the travel diary revolves around the inability to properly map and indicate the location of participants’ trips due to lack of an address or cross street information. This data is critical to locate trip ends in a Geographic Information System and obtain trip distance, road facility type, and other needed information critical to studying trip making behavior and choices. The recruitment team has spent considerable time calling participants to obtain this information when it is missing. To help mitigate this situation, text will be added to the instructions indicating the importance of address information. On a related note, respondents are rewriting their home, employment, or school address multiple times when they simply need to place a check in the box for these locations. The only time the participant must indicate an address is if it is “Another Place.” Clearer directions as well as a redesign of the section will be carried out to prevent further confusion.

Additionally, if resources allow, the children’s diary needs to be more compatible with the adult diary. This will be accomplished by slightly rewording the “Total number traveling in your party” question. The children’s diary will remain simple and easy to fill out.

V. Conclusion and Next Steps

Based on the information provided by both the recruiters experience with the travel survey and also the results of the pretest analysis, modifications will be made to the travel survey instruments prior to their use in the fall recruitment. One of the most important changes is to number the answer choices in the household and individual travel survey instruments. This seemingly minor change is expected to significantly improve the database coding and tabulation process.

The results of the pretest and resource time to implement survey changes will not be well spent unless additional addresses are provided for the Kent and Redmond communities. The collective effect of a high number of addresses without telephone numbers, a low recruitment rate, and an overall insufficient number of addresses within these two communities has become a dire issue for this project. The LFC team looks forward to working with the County to solve this problem, but is requesting the County's assistance to obtain addresses no later than the end of August as all other avenues have been pursued and exhausted. If additional addresses cannot be provided, there will be no other choice but to expand the study areas in order to meet the 200 households per community requirement within the contract.

