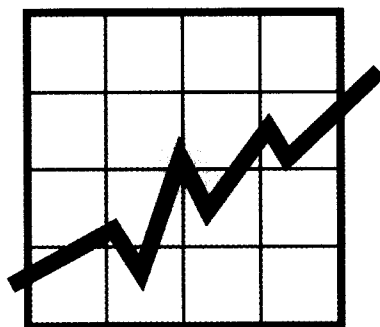


EAST-WEST GATEWAY COORDINATING COUNCIL

HOUSEHOLD TRAVEL SURVEY

Final Report of Survey Methodology

January 31, 2003



NuStats

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East-West Gateway Coordinating Council

The **East-West Gateway Coordinating Council** is the Metropolitan Planning Organization for the **St. Louis Metropolitan Area**. The Council is led by a Board of Directors comprised of locally elected officials and regional leaders, which meets at 10:00 a.m. on the last Wednesday of every month. The work of the Council is carried out by an Executive Director and a staff, which is organized into four departments: Administration, Transportation Planning, Planning & Information Services, and Policy & Programming. The work of the Council is also influenced by a number of Advisory Committees made up of community leaders from both the public and private sector.

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The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the local, state, and federal governmental agencies mentioned above. This report does not constitute a standard, specification, or regulation.

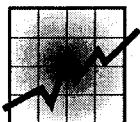
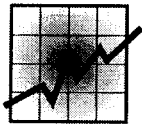


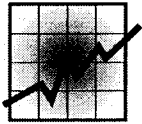
TABLE OF CONTENTS

Introduction	1
Survey Procedures	3
Survey Universe	3
Sample Design and Selection	3
The Survey Instruments	4
The Recruitment Questionnaire and Interview	4
Travel Log	5
Retrieval Questionnaire and Interview	6
Data Weighting	8
Geocoding	9
Data File Creation	10
Item Completion Rates	11
Sample Validation	12
Conclusion	15
GPS Augment	16
Background	16
Purpose/Objectives	16
Pilot Study	16
Geography and Sample Size	16
Equipment Description	17
Household Recruitment	18
Equipment Deployment	18
Data Collection Methods	19
NuStats Diary Collection	19
GeoStats Data Processing	20
Appendices	21
Appendix A – Recruitment Script	22
Appendix B – Diary Packet Materials	30
Appendix C – Retrieval Script	31
Appendix D – GPS Materials	37
Appendix D1: GPS Installation Instructions	37
Appendix D2: Thank You Postcard	39



LIST OF TABLES AND FIGURES

Figure 1: Geographic Distribution of Households	2
Table 1: Sampling Plan	3
Table 2: Recruited Households by County of Residence	4
Table 3: Recruitment Call Outcomes	5
Table 4: Retrieved Households by County of Residence	6
Table 5: Retrieval Call Outcomes	6
Table 6: Travel Day Distribution	7
Table 7: Month of Travel Day Distribution	7
Table 8: Geography Weight to Compensate for Disproportionate Sampling by County	8
Table 9: Household Size Weight	8
Table 10: Vehicle Ownership Weight	9
Table 11: Composite Weight and Expansion Factor by County	9
Table 12: Geocoding Match Rates	10
Table 13: Item Completion Rates	11
Table 14: Household Size	12
Table 15: Household Vehicles	12
Table 16: Household Income	13
Table 17: Residence Type	13
Table 18: Owner or Renter Status	14
Table 19: Age of Members of Households in the Sample	14
Table 20: Employment Status	14
Table 21: Student Status	15
Table 22: Original Sample Distribution	17
Figure 2: The GeoStats GeoLogger	17
Table 23: GPS Recruits and Deployments by Week	19



INTRODUCTION

This report documents the design and implementation of the Household Travel Survey conducted in the St. Louis Region, under contract to the East-West Gateway Coordinating Council (EWGCC). It provides a validation of the resulting survey sample through comparison of key variables with population parameters from the U.S. Census Bureau. The appendices contain samples of all survey materials.

The Household Travel Survey for the St. Louis Region entailed the collection of activity and travel information for all household members during a specific 24-hour period. In addition to providing basic information about each household and its members, the survey documented specific characteristics of activities and trips made, including number, purpose, time of day, mode and questions specific to mode usage.

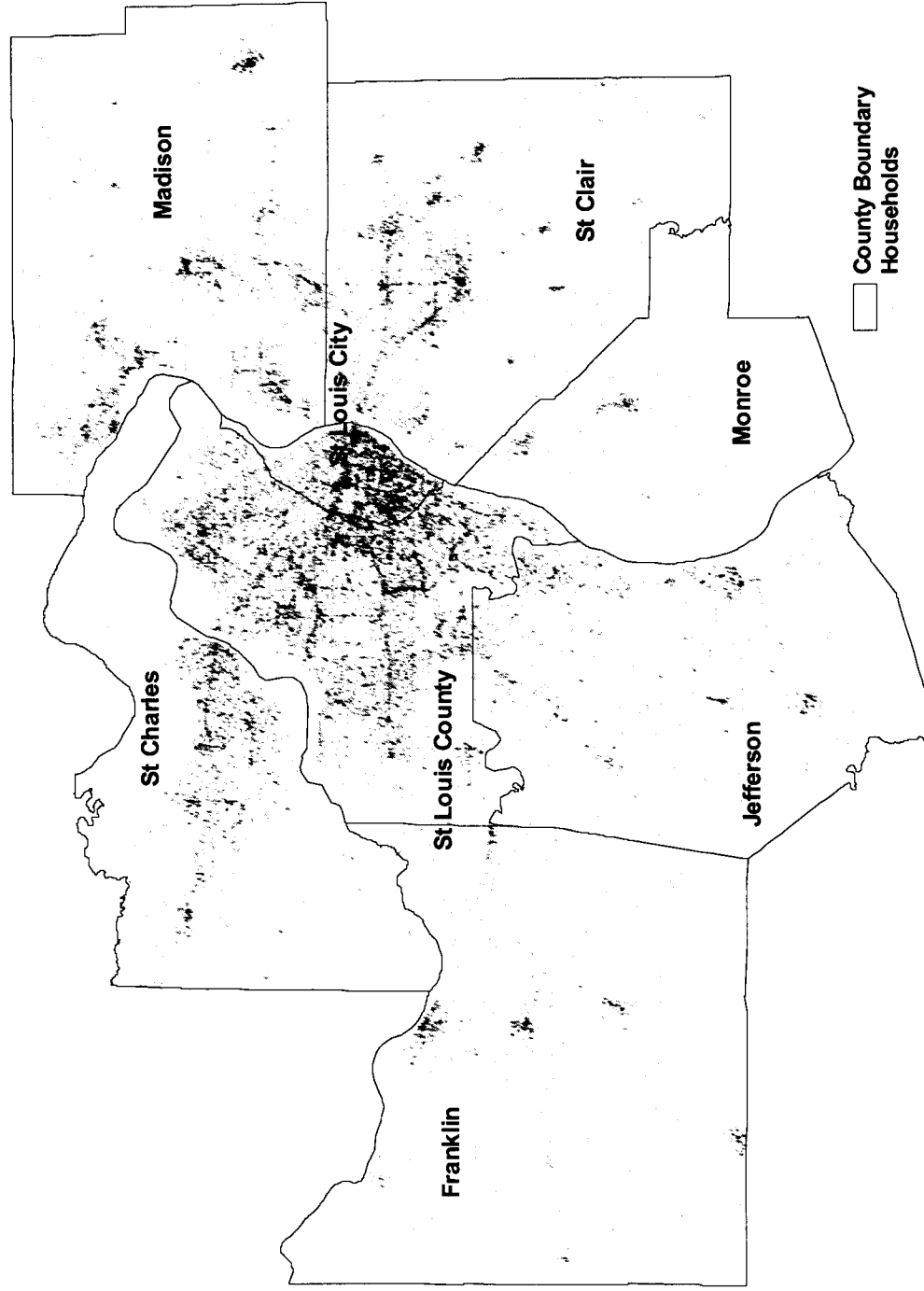
The study conformed to standard procedures for conducting a household travel behavior survey. These procedures included:

- Geocode Home Addresses,
- Advance Mailing,
- Recruitment Telephone Interview,
- Respondent Packet Mailing,
- Reminder Call,
- Data Retrieval Telephone Interview,
- Geocode Trips,
- Data Edit Checks and Cleaning, and
- Data Delivery.

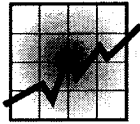
Travel days for the survey were spread across the pilot study (February 12-15, 2002) and the full study (April 22, 2002 - May 30, 2002 and September 2, 2002 – December 12, 2002). In total, 7,046 households were recruited to participate in the study. Of these 5,094 completed travel diaries, and the information was retrieved from all household members (see map on next page).

NuStats conducted the Household Travel Survey, in association with PBConsult, NuStats' DataSource, GeoStats, and Marketing Works, Inc. NuStats designed the survey, managed data collection, and analyzed the survey data. NuStats' DataSource conducted the telephone interviews and mailed the diary packets. PBConsult provided technical assistance to EWGCC for updating the travel forecasting model. GeoStats designed a global positioning system (GPS) data collection strategy for a subsample of the population, managed the data capture, and analyzed the resulting data. Marketing Works supported the public awareness component of the survey effort.

FIGURE 1: GEOGRAPHIC DISTRIBUTION OF HOUSEHOLDS



Data collected by NUSTATS
 Coverage data provided by East-West Gateway Council 2002
 Projection: State Plane NAD 1983 Missouri East



SURVEY PROCEDURES

SURVEY UNIVERSE

The survey universe for the Household Travel Survey was defined as all households with operational landline telephones located within the eight county area under the purview of the EWGCC. The counties comprising this area are the Missouri counties of St. Louis, St. Louis City, Franklin, Jefferson, and St. Charles, and the Illinois counties of Madison, Monroe, and St. Clair. According to the 2000 U.S. Census, there were 968,533 households located within this study area.

SAMPLE DESIGN AND SELECTION

This sampling description provides information on how households were selected for the survey. A sample is the subset of the universe that is used to gain information about the entire population. The population of inference for the Household Travel Survey was all households with landline telephones in the eight counties in the region. A probability design was used to select a sample that would truly represent all such households. The probability design ensured that each household with landline telephone service would have an equal chance of selection. The type of probability sample that was used was a random digit dial (RDD) sample, in which the primary sampling units were telephone numbers.

Within the eight counties, a pure random sample of households with telephones was selected. The sample goals by county were designed to be proportionate to household population (see Table 1).

Both listed and unlisted telephone numbers were generated using random digit dial (RDD) procedures. Listed numbers were generated from working exchanges and blocks for the telephone numbers in the study area. NuStats then generated all the possible combinations of telephone numbers within these working exchanges and blocks. Unlisted telephone numbers were randomly generated based on the telephone exchanges and blocks identified for the listed sample. All generated unlisted telephone numbers that were listed in the database were eliminated from the sampling frame. In all, 71,430 total telephone numbers were generated into 143 replicates. A replicate is a systematically selected subsample of the entire sample used to manage the sample effectively.

TABLE 1: SAMPLING PLAN

County	HH Population	HH Pop Percent	Recruited Sample Goal	Final Sample Goal	Total Sample Generated
St. Louis County, MO	404,312	41.7	2,982	2,087	29,818
St. Louis City, MO	147,076	15.2	1,085	759	10,847
Madison County, IL	101,953	10.5	752	526	7,519
St. Charles County, MO	101,663	10.5	750	525	7,498
St. Clair County, IL	96,810	10.0	714	500	7,140
Jefferson County, MO	71,499	7.4	527	369	5,273
Franklin County, MO	34,945	3.6	258	180	2,577
Monroe County, IL	10,275	1.1	76	54	758
EWGCC TOTAL	968,533	100.0	7,144	5,000	71,430

THE SURVEY INSTRUMENTS

The objectives of the Household Travel Survey required comprehensive survey instruments to collect demographic and socioeconomic details about households and persons, vehicle information, details of school and work travel, and detailed data of all trips made on an assigned travel day. The survey instruments contained three components: (1) the recruitment questionnaire, (2) the travel log, and (3) the retrieval questionnaire. An overview of each is provided in the following sections.

THE RECRUITMENT QUESTIONNAIRE AND INTERVIEW

The recruitment interview was administered using a computer-assisted telephone interviewing (CATI) program. At that time, each household was telephoned by an interviewer to determine if they qualified for the study. The respondent was then asked (on behalf of the entire household) to participate in the study. If the respondent agreed, demographic information was collected from the household including income, household size, vehicle ownership, and other household characteristics. In addition, demographic characteristics were obtained for each member of the household such as age, gender, employment and school status (see Appendix A for the recruitment questionnaire).

In total, 7,046 households were recruited to participate in the Household Travel Survey. Each recruited household was notified that it would receive a package in the mail that included a travel diary for each member in the household.

TABLE 2: RECRUITED HOUSEHOLDS BY COUNTY OF RESIDENCE

County	Frequency	Percent
St. Louis County	2,865	40.7
St. Louis City	1,080	15.3
St. Charles County	732	10.4
Madison County	732	10.4
St. Clair County	702	9.9
Jefferson County	535	7.6
Franklin County	309	4.4
Monroe County	91	1.3
Total	7,046	100.0

During the recruitment phase, 7,046 RDD households agreed to participate in the study for a recruitment response rate of 40 percent. About 39 percent refused to participate in the study. The response rate was calculated under standards of the Council of American Survey Research Organizations (CASRO). It was derived by dividing the number of households that agreed to participate by the sum of the total number of "eligible" households and a portion of the households for whom "eligibility" was unknown. This response rate formula is shown below. The final dispositions for the recruitment call attempts are indicated on the following page.

$$RR = \left(\frac{a}{A+(C * ER)} \right)$$

Where,

RR is the response rate,
a is the number of completed surveys,
A is the number of eligible telephone numbers,
C is the number of eligibility unknown, and
ER is the eligibility rate.

$$RR = \frac{7,046}{12,024+(30,091*.20)} = \frac{7,046}{12,024+6018} = \frac{7,046}{18,042} = 40\%$$

TABLE 3: RECRUITMENT CALL OUTCOMES

Call Outcome	Frequency
Recruited	7,046
Refused to participate	4,657
Partial completes	321
SUB-TOTAL ELIGIBLE	12,024
Ineligible Units	
Disconnected/non-working	11,283
Business/Government	2,842
Facsimile	2,115
Over Quota	2,067
Communications Barrier	444
SUB-TOTAL INELIGIBLE UNITS	18,751
Eligibility Unknown Units	
No answer	7,119
Call Back	15,203
Answering machine	7,174
Busy	595
SUB-TOTAL ELIGIBILITY UNKNOWN UNITS	30,091
Grand Total:	60,886

TRAVEL LOG

A total of 7,046 travel-log packages were mailed to recruited households. These packages consisted of a brochure, providing details about its objectives and methods, and one travel log for each member of the household. (See Appendix B for sample materials.) The travel log collected information about each trip made on the assigned travel day, including place name and address, time of travel, travel mode, and purpose. A reminder call was made to each recruited household prior to its assigned travel day. During that reminder call, the receipt of the package was confirmed, the assigned travel day acknowledged, and any questions were answered.

RETRIEVAL QUESTIONNAIRE AND INTERVIEW

The day following each household's assigned travel day, the household was contacted by telephone (or attempted to be contacted) to retrieve the travel information. (See Appendix C for the Retrieval questionnaire.) In total, 5,094 households provided complete activity and travel information. For most of these households, the information was collected within seven days of the assigned travel day.

TABLE 4: RETRIEVED HOUSEHOLDS BY COUNTY OF RESIDENCE

County	Frequency	Percent
St. Louis County	2,118	41.6
St. Louis City	745	14.6
Madison County	552	10.8
St. Charles County	512	10.1
St. Clair County	496	9.7
Jefferson County	386	7.6
Franklin County	214	4.2
Monroe County	71	1.4
Total	5,094	100.0

The retrieval response rate was 73 percent. This rate was calculated following CASRO standards.

$$RR = \left(\frac{a}{A} \right)$$

Where,

RR is the response rate,
a is the number of completed surveys,
A is the number of recruited households.

$$RR = \frac{5,094}{7,046} = 73\%$$

The final dispositions for the retrieval call attempts are indicated below.

TABLE 5: RETRIEVAL CALL OUTCOMES

Call Outcome	Frequency
Eligible Units	
Completed	5,094
Refused to participate	1,052
Partial completes	36
Non-contacts	700
SUB-TOTAL ELIGIBLE	6,882
Ineligible Units	
Disconnected/non-working	150
Facsimile	14
SUB-TOTAL INELIGIBLE UNITS	164
Grand Total:	7,046

The overall response rate for the main study was calculated as the product of the response and retrieval rates (40% * 73%) for an overall rate of 29 percent.

During recruitment, each household was assigned a travel day. The distribution of household by travel day indicates a fairly even distribution, with slightly more households traveling on Thursdays and slightly less households traveling on Fridays.

TABLE 6: TRAVEL DAY DISTRIBUTION

Travel Day	Percent
Monday	20.3
Tuesday	20.0
Wednesday	20.0
Thursday	22.7
Friday	17.0
Total	100.0

Base: 5,094 Households.

May not add to 100 percent due to rounding.

While data collection was spread between Spring 2002 and Fall 2002, less than one-fourth of households in the final sample traveled during Spring 2002. The majority of households in the final sample traveled during the months of September and October 2002.

TABLE 7: MONTH OF TRAVEL DAY DISTRIBUTION

Travel Day	Percent
April 2002	2.6
May 2002	18.3
September 2002	27.1
October 2002	25.7
November 2002	17.0
December 2002	9.4
Total	100.0

Base: 5,094 Households.

May not add to 100 percent due to rounding.

DATA WEIGHTING

The final data set includes several weight variables that were developed to account for over sampling or under sampling of particular population segments. There is also an expansion weight that factors the sample data to represent total households in the eight county region. The 2000 data for the eight county area from the U.S. Bureau of the Census were used to calculate these weights and expansion factors. A weight by geography was computed to proportionately distribute the samples by county.

TABLE 8: GEOGRAPHY WEIGHT TO COMPENSATE FOR DISPROPORTIONATE SAMPLING BY COUNTY

County	No. Households in Population	Percent of Total Population	Final Sample	Percent of Final Sample	GeoWgt
St. Louis County, MO	404,312	41.7	2,118	41.6	1.00
St. Louis City, MO	147,076	15.2	745	14.6	1.04
Madison County, IL	101,953	10.5	552	10.8	0.97
St. Charles County, MO	101,663	10.5	512	10.1	1.04
St. Clair County, IL	96,810	10.0	496	9.7	1.03
Jefferson County, MO	71,499	7.4	386	7.6	0.97
Franklin County, MO	34,945	3.6	214	4.2	0.86
Monroe County, IL	10,275	1.1	71	1.4	0.76
Total	968,533	100.0	5,094	100.0	—

The final sample under-represented larger (4+ persons) households relative to the census data population parameters. To compensate, NuStats developed a weight (hhswgt) to balance the sample relative to household size.

TABLE 9: HOUSEHOLD SIZE WEIGHT

Household Size	No. Households in Population	Percent of Total Population	Final Sample	Percent of Final Sample*	HHSWGT
One Person	267,580	27.6	1,379	27.1	1.02
Two Persons	308,770	31.9	2,101	41.2	0.77
Three Persons	161,154	16.6	865	17.0	0.98
Four Persons	138,682	14.3	517	10.1	1.41
Five Persons	62,284	6.4	167	3.3	1.96
Six Persons	20,238	2.1	50	1.0	2.13
Seven + Persons	9,825	1.0	15	0.0	3.45
Total	968,533	100.0	5,094	100.0	—

May not equal to 100 percent due to rounding.

The final sample also over represented high-vehicle ownership households relative to the census data population parameters. To compensate, NuStats developed a third weight (vehwgt) to balance the sample relative to household vehicle ownership.

TABLE 10: VEHICLE OWNERSHIP WEIGHT

Household Vehicles	No. Households in Population	Percent of Total Population	Final Sample	Percent of Final Sample*	VEHWGT
Zero Vehicles	89,158	9.2	203	3.9	2.31
One Vehicle	336,217	34.7	1,385	27.2	1.28
Two Vehicles	384,151	39.6	2,211	43.4	0.91
Three Vehicles	118,150	12.2	935	18.4	0.66
Four Vehicles	30,782	3.2	245	4.8	0.66
Five + Vehicles	10,075	1.0	115	2.3	0.46
Total	968,533	100.0	5,094	100.0	—

May not equal to 100 percent due to rounding.

A composite weight (finwgt) was calculated that was the product of these three weights (geowgt * hhswgt * vehwgt). This composite weight was processed iteratively to ensure that all weighted proportions (geography, household size, and vehicle ownership) matched census proportions. The final step was to normalize the weight to ensure that the weighted household count matched the unweighted count. This weight was applied to the data when weighted sample statistics only were required.

The expansion factor (expfct) was calculated by dividing the total households based on Census 2000 data (968,533) by the number of households surveyed (5,094). When using the sample data to run population estimates, the final expansion factor was applied. This final expansion factor was the product of "finwgt" and "expfct". It is designated as "expwgt" in the data file.

TABLE 11: COMPOSITE WEIGHT AND EXPANSION FACTOR BY COUNTY

County	No. Households in Population	Percent of Total Population	Expanded No. of Households	Percent of Expanded Sample	Expansion Factor
St. Louis County, MO	404,312	41.7	404,312	41.7	190.13
St. Louis City, MO	147,076	15.2	147,076	15.2	
Madison County, IL	101,953	10.5	101,953	10.5	
St. Charles County, MO	101,663	10.5	101,663	10.5	
St. Clair County, IL	96,810	10.0	96,810	10.0	
Jefferson County, MO	71,499	7.4	71,499	7.4	
Franklin County, MO	34,945	3.6	34,945	3.6	
Monroe County, IL	10,275	1.1	10,275	1.1	
Total	968,533	100.0	968,533	100.0	

GEOCODING

Geocoding was conducted using coverage files obtained from East-West Gateway Coordinating Council. Home addresses and trip-end addresses were geocoded subsequent to the retrieval interview. The retrieval interview collected multiple location information such as address, nearest landmark, nearest cross street or street intersection to facilitate geocoding. City name and zip code were used to distinguish duplicated street names in different geographies. U.S. Postal Office Standard Address Format, which matched the address style of the street network reference database, was used to record address information.

Out of the 31,910 addresses that were recorded by households as "traveled to", and were within the study area, 94 percent were successfully matched to some level of geography. Ninety-nine percent were matched to an X/Y coordinate, less than one percent were matched to a zip code centroid, and zero percent were matched to a city centroid. Table 12 presents geocode match rates by location type. As shown, the school addresses had the lowest overall match rate at 96 percent.

TABLE 12: GEOCODING MATCH RATES

Address Type	Total
Home	100%
Work	97%
School	96%
Trip Ends	97%

DATA FILE CREATION

After completion of data collection and data editing tasks, the survey data were contained in six files:

1. **Household data file** – the household is the unit of analysis, with 5,094 records. Contains data elements relating to household demographics such as household size, vehicles available to household and household income.
2. **Person data file** – persons within households are the units of analysis, with 11,490 records. Contains data elements relating persons, such as age, gender, work and school status.
3. **Place data file** – represents a particular geographic location with 58,399 records.
4. **Trip data file** – trips made by persons within households are units of analysis, with 46,909 records. Contains information relating to travel, such as locations, purpose, mode, and time of travel.
5. **Vehicle data file** – vehicles owned by households are the units of analysis, with 10,219 records. Contains information relating to vehicles, such as make, model, and year.
6. **Location data file** – all locations pertinent to households and trips made by persons within households, with 31,910 records. Contains a location number that links to trip, person and household files.

All data files contain certain variables, such as sample number (unique number assigned to each household), and the weight variables "finwgt" and "expwgt".

ITEM COMPLETION RATES

Table 13 presents completion rates for the most important non-geographic variables. As shown, these rates are excellent.

TABLE 13: ITEM COMPLETION RATES

Variable	Completion Rate	Refused/ Valid Cases
Household Data		
Household Size	100.0%	0 / 5,094
Vehicles Available	100.0%	0 / 5,094
Bikes Available	99.9%	1 / 5,093
Residence Type	100.0%	0 / 5,094
Own/Rent Status	99.9%	14 / 5,080
Income	99.8%	704 / 4,390
Person Data		
Gender	99.9%	3 / 11,487
Age	99.9%	179 / 11,311
Driver License	100.0%	0 / 9,962
Employment Status	100.0%	0 / 9,962
Type of Non-Employment	99.9%	3 / 3,177
Number of Jobs	100.0%	0 / 6,512
Educational Attainment	99.9%	118 / 11,372
Student Status	100.0%	0 / 11,490
Trip Data		
Arrival Time	100.0%	0 / 46,909
Departure Time	100.0%	0 / 46,909
Trip Purpose	100.0%	0 / 46,909
Activity (*Both origins and destinations)	100.0%	0 / 46,909
Mode	99.9%	24 / 46,885
Vehicle Data		
Year	99.9%	248 / 9,971
Make	99.9%	112 / 10,107
Model	100.0%	0 / 10,219



SAMPLE VALIDATION

The sample was comprised of 5,094 completed households (including the records collected during the pretest), which is a reasonable representation of St Louis area households. The following tables compare the sample distributions on key demographic variables with census data. The unweighted proportions represent data that have been weighted by geography. The weighted proportions represent data that have been weighted by geography, household size, and vehicle ownership.

The unweighted household size sample distribution differed from that of the census population parameters. The sample had more two-person households and slightly fewer four- and five-person households than the study area as a whole.

TABLE 14: HOUSEHOLD SIZE

Household Size	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
One Person	27%	28%	28%
Two Persons	41%	32%	32%
Three Persons	17%	17%	17%
Four Persons	10%	14%	14%
Five Persons	3%	6%	6%
Six Persons	1%	2%	2%
Seven + Persons	.3%	1%	1%
Total	100%	100%	100%

Base: 5,094 Households. May not add to 100 percent due to rounding.

**Census 2000 Summary File 3*

The unweighted sample under represents one-vehicle and over represents three-vehicle households. It represented zero-vehicle and two vehicle households well.

TABLE 15: HOUSEHOLD VEHICLES

Household Vehicles	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Zero Vehicle	4%	9%	9%
One Vehicle	27%	35%	35%
Two Vehicle	43%	40%	40%
Three Vehicles	18%	12%	12%
Four Vehicles	5%	3%	3%
Five + Vehicles	2%	1%	1%
Total	100%	100%	100%

Base: 5,094 Households. May not add to 100 percent due to rounding.

**Census 2000 Summary File 3*

The unweighted survey sample represented the St Louis area income distribution fairly well, even though the proportion of households in the \$5,000 to \$14,999 range was lower than the study area as a whole, and the proportion of households with incomes more than \$75,000 was greater. About 15 percent of all households interviewed refused to report income, which is typical for household travel surveys.

TABLE 16: HOUSEHOLD INCOME

Income	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Up to \$4,999	2%	3%	3%
\$5,000 to \$14,999	5%	7%	11%
\$15,000 to \$24,999	9%	12%	12%
\$25,000 to \$44,999	24%	25%	24%
\$45,000 to \$74,999	30%	28%	26%
More than \$75,000	31%	26%	23%
Total	100%	100%	100%

Base: 4,390 households providing income. May not add to 100 percent due to rounding.

**Census 2000 Summary File 3*

The unweighted sample majority (83 percent) resided in single-family dwellings. This percent was significantly higher than for the study area as a whole. This outcome may be an artifact of the survey methodology because mail delivery to apartment buildings can be problematic so that travel log packages are not received and then completed. Persons who live in apartment buildings may also be under represented in the final sample because these households tend to be more mobile with less stable addresses.

TABLE 17: RESIDENCE TYPE

Residence Type	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Single Family, Unattached	83%	79%	69%
All Other	17%	21%	31%
Total	100%	100%	100%

Base: 5,094 households. May not add to 100 percent due to rounding.

**Census 2000 Summary File 3*

Most households in the unweighted sample resided in owner-occupied dwellings. In this statistic, the survey over represented homeowners, which is not unusual for these types of surveys. Homeowners are typically more connected to their communities and more likely to take the time to complete a travel log than are renters. The sample percent for homeowners (84 percent) was higher than that for households in single-family dwellings (83 percent), indicating a healthy percentage of owners of condos and duplexes in the sample.

TABLE 18: OWNER OR RENTER STATUS

Housing Tenure	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Owner	84%	79%	71%
Renter	16%	21%	29%
Total	100%	100%	100%

*Base: 4,279 households with valid responses. *Census 2000 Summary File 3*

The unweighted sample is a good representation of the study area residents by age group.

TABLE 19: AGE OF MEMBERS OF HOUSEHOLDS IN THE SAMPLE

Age	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Under 5 years	1%	2%	7%
5 years to 15 years	15%	23%	17%
16 years to 24 years	10%	10%	12%
25 years to 34 years	12%	11%	13%
35 years to 44 years	17%	18%	17%
45 years to 54 years	19%	15%	14%
55 years to 64 years	13%	9%	9%
65 years and older	14%	13%	13%
Total	100%	100%	100%

Base: 11,311 Persons reporting age. May not add to 100 percent due to rounding.

**Census 2000 Summary File 3*

The unweighted sample provided an excellent distribution of employed versus non-employed persons in the study area. It contained proportionately the same number of employed persons that are present in the population. The resulting data will provide unique information on the work trips of households in the St Louis Metropolitan Area.

TABLE 20: EMPLOYMENT STATUS

Employment Status	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Employed	67%	64%	64%
Not employed	33%	36%	36%
Total	100%	100%	100%

Base: persons over age 15 reporting employment status.

*May not add to 100 percent due to rounding. *Census 2000 Summary File 3*

The unweighted sample also represented students well relative to the Census proportions of students versus non-students. Information on trips to school should be adequately covered.

TABLE 21: STUDENT STATUS

Student Status	Sample Proportions (Unweighted)	Sample Proportions (Weighted)	Census 2000*
Enrolled	26%	34%	33%
Not enrolled	74%	66%	67%
Total	100%	100%	100%

Base: 11,490 persons.

**Census 2000 Supplementary Survey Summary Tables.*

CONCLUSION

By definition, household travel surveys seek information from a sample of households. Invariably, some members of the sample do not provide the desired information. There are many reasons why the relevant information may not be obtained. Given the wide range of potential outcomes of a data collection effort, it is important to document the outcomes and summarize the success of a survey in collecting data from members of the sample.

As the contents of this technical report indicate, the St Louis Metropolitan Area Household Travel Survey sample was a reasonable representation of the study area population. The sample design was executed effectively so that adequate samples were obtained for each county in the study area. The sample is a good reflection of population parameters, with exceptions per variable category noted in this report. The sample can be reliably used for robust statistical analyses on survey results to provide usable information to transportation decision makers and planners.

The addition of the GPS augment will provide useful information on actual trip-making among the subsampled households that both completed diaries and installed GPS units in their household vehicles. This information can be used for the development of trip correction factors to obtain a more accurate estimate of trips per household. The Report of Survey Results provides insight into this use of the GPS data results.



GPS AUGMENT

BACKGROUND

Trip underreporting has long been a problem in household travel surveys due to the self-reporting nature of traditional survey methods, which consist of either mail out / mail back diaries or mail out diaries with computer-assisted telephone interview (CATI) retrieval. Memory decay, failure to understand or to follow survey instructions, unwillingness to report full details of travel, and simple carelessness have all contributed to the incomplete collection of travel data in these self-reporting surveys. To fully understand the nature of these effects and their contribution to underreporting, it is necessary to collect independent data on observed trips.

In the late 1990's, several pilot studies were conducted to investigate the use of Global Positioning System (GPS) technology as a supplement in the collection of personal travel data. These pilot studies confirmed the feasibility of applying GPS technology to improve both the accuracy and completeness of travel data. In 1998, the first real deployment of GPS equipment in a household travel survey occurred in Austin; however, challenges with GPS data accuracy related to the U.S. government's intentional GPS signal degradation (known as Selective Availability) made it difficult to assess the benefit of collecting GPS data concurrently with travel diary data. On May 1, 2000, President Clinton announced the termination of Selective Availability – which improved, literally overnight, the positional accuracy of raw GPS data from a 50-100 meter range down to 5-10 meters. This dramatic improvement in GPS positional accuracy made the use of GPS in household travel surveys more desirable, while the continuously declining costs associated with GPS equipment made the application of this technology more feasible.

PURPOSE/OBJECTIVES

The objective of this study was to explore the use of passive GPS devices for determining the trip-making characteristics of a sub-sample of the St. Louis Regional Travel and Congestion Survey. In the larger study, participants were asked to fill out a paper diary of their daily travel. In the GPS portion of the study, a sub-sample of households were asked to carry a GPS device in their vehicle as well. Results of the study provide insight into the extent of mis-reported trips and provide foundations for using passive GPS devices in future travel surveys. The GPS data can also be explored for other contributions to transportation planning in the St. Louis area' such as developing space/time diagrams of household travel behavior or exploring network travel times.

PILOT STUDY

As part of the project tasks, a pilot study was conducted to run through deployment procedures, including equipment delivery, equipment pickup, data download, and data transfer. The pilot was conducted on August 20 – 23, 2002. Eight households participated and thirteen vehicles were instrumented. All traveling vehicles returned useable GPS data. Since CATI retrieval was not part of the pilot study scope, the GPS data collected for these households is not included in the overall study analysis.

GEOGRAPHY AND SAMPLE SIZE

Eight counties in the St. Louis area were included in the study area. They include five counties in Missouri (St. Charles, St. Louis, St. Louis City, Jefferson and Franklin) and three counties in Illinois (St. Clair, Madison, and Monroe). North to South the area measures 69 miles and East to West it measures 96 miles (4589 square miles overall).

Table 22 shows the initial sample distribution planned for the GPS portion of the study. The distribution mirrors the county population breakdown, as well as the expected full study sample distribution. Based on completion rates from other GPS studies, it was determined that a recruitment pool of 450 households would be sufficient to reach the deployment goal of 300 households. As it turned out, many households were willing to participate in the GPS portion of the study and we had more than 500 households agree to participate in the GPS portion of the study.

TABLE 22: ORIGINAL SAMPLE DISTRIBUTION

Region	Population	Percent of Total	Full Study Recruits	Expected Full Study Completes	Expected GPS Recruitment	GPS Deployment Goal
Franklin County, MO	34,945	3.6	258	180	16	11
Jefferson County, MO	71,499	7.4	527	369	33	22
St. Charles County, MO	101,663	10.5	750	525	47	31
St. Louis County, MO	404,312	41.7	2,982	2,087	188	125
St. Louis City, MO	147,076	15.2	1,085	759	68	46
Madison County, IL	101,953	10.5	752	526	47	32
Monroe County, IL	10,275	1.1	76	53	5	3
St. Clair County, IL	96,810	10.0	714	500	45	30
TOTAL	968,533	100.0	7,143	5,000	450	300

EQUIPMENT DESCRIPTION

For this GPS-enhanced travel study, the GeoStats GeoLogger was the GPS data collection device used. The GeoLogger is a rugged yet simple GPS data-logging device (see Figure 2) that has been deployed in household travel surveys and travel time studies within the US and in other countries. The GeoLogger is very easy to install – the respondent only needs to plug the power connector into the cigarette lighter socket within the vehicle and to place the combination GPS receiver/antenna on the roof of the vehicle that attaches via a magnetic mount.

FIGURE 2: THE GEOSTATS GEOLLOGGER



This device can log at either one-second or five-second frequencies, can log all valid GPS points or only those valid points for which the speed is greater than 1 MPH (to screen out non-movement events), and is available in 1 MB, 2 MB, and 4 MB versions. For the purpose of this study, the 4 MB units were used, the logging logic was set at one-second logging frequencies, and points were not be logged when speed measured was less than or equal to 1 MPH.

The standard GPS data stream elements recorded by the GeoLogger include date, time, latitude, longitude, speed, heading, altitude, number of satellites, and horizontal dilution of precision (HDOP, a measure of positional accuracy). These elements are stored in the logger in standard NMEA units and are converted into user-specified units and formats upon download.

Along with enough GeoLoggers to instrument up to three vehicles, each participating household received an installation instruction sheet. The instructions can be seen in Appendix A.

HOUSEHOLD RECRUITMENT

In order to maximize the number of GPS recruits, NuStats developed a CATI program tailored specifically for GPS recruitment. The sample frame in this recruitment program was set to households living within the eight GPS sample counties. Every household with working vehicles recruited by this program was asked to participate in the GPS study.

The program contained the same questions as the regular diary recruitment program, along with descriptive information and questions relevant to the GPS component. These questions ascertained which vehicles were most likely to be used by the household and whether they had working cigarette lighters or 12-volt outlets (needed to power the GeoLoggers). The program also collected information to assist in delivering the GPS units such as a designated contact person, specific delivery address, and suggested date for equipment delivery.

NuStats was provided a production plan designed to match the deployment schedule developed by GeoStats. The schedule allowed for at least five households to receive equipment per day.

The day following recruitment, NuStats created a GPS recruitment list with the pertinent deployment information from the recruitment interview. This data was transferred to a secure web site for the deployment team to download each day.

EQUIPMENT DEPLOYMENT

A deployment firm was contracted to deliver and pick up the GeoStats GeoLoggers (the passive in-vehicle GPS data loggers, see Figure 1) to and from each household recruited into the GPS study. A GeoLogger was provided for up to three vehicles in each household and was delivered to each household a few days prior to the assigned travel day.

Once the assigned travel day passed, the equipment was picked up within one or two days; the deployment field staff scheduled the date and time for pickup during equipment delivery. Each household was also asked to fill out the standard paper travel diary provided for the household travel survey and to report the household travel information via traditional CATI-retrieval methods.

The original travel dates for the GPS study were September 5, 2002 (Thursday) through December 12, 2002 (Thursday). There were to be no deployments on the week of Thanksgiving (November 25-29, 2002). Based on this schedule, there were 66 travel days available for the study. For 300 deployments, this averaged approximately 4.5 deployments a day. GeoStats initially provided 45 GeoLoggers for this study to support the deployment schedule and later sent an additional 15 units as the project continued. The extra units helped to maximize the deployment staff and served to accelerate the deployment schedule, allowing for completion of GPS deployments by November 7, 2002.

The actual number of household deployments per week can be seen in Table 23. Over the course of the deployment period, the deployment team averaged seven household deployments per day and 31 households per week.

TABLE 23: GPS RECRUITS AND DEPLOYMENTS BY WEEK

Project Time Line	Recruits	Deployed	Percent of Recruits
Week 1	23	13	56.5
Week 2	50	33	66.0
Week 3	42	33	78.6
Week 4	46	36	78.3
Week 5	51	37	72.5
Week 6	44	36	81.8
Week 7	55	39	70.9
Week 8	52	36	69.2
Week 9	44	25	56.8
Week 10	48	25	52.1
TOTAL	455	313	68.8

DATA COLLECTION METHODS

In order to perform a trip comparison between GPS-measured trips and CATI-reported trips, data were required from both sources. After being recruited into the GPS portion of the study, each participating household received a GeoLogger with instructions to install the devices in each household vehicle prior to the start of the first trip of the survey date. The installation instructions were very simple – the respondent only needed to plug the power connector into the cigarette lighter and to place the GPS receiver/antenna on the roof of the vehicle. A copy of the instructions can be seen in Appendix A.

Each GeoLogger was programmed to store date, time, position, and speed information for each second that the vehicle was in motion. Once the GeoLoggers were retrieved after the study dates, the deployment firm downloaded the GPS data from each device and transferred the GPS files to the GeoStats office in Atlanta. The GPS files were then logged according to the study region and unique household identification number.

Although the recruitment call did ask for confirmation of working cigarette lighters in each household vehicle, it became evident upon retrieval of the equipment and downloading of the data loggers that it was likely that some of the cigarette lighter sockets were not working. However, an 'empty' data logger could also indicate that the respondent chose not to install the GeoLogger into a particular vehicle or that no household members traveled in that vehicle on the travel day. The true reason for total GPS data loss for a particular vehicle would become clearer once the household reported travel data was examined later in the process.

Attempts to retrieve the household travel survey information occurred concurrently via CATI methods. Once these data were collected, additional data verification and location geocoding procedures occurred prior to the delivery of the CATI trip files for the GPS households to the GeoStats office. At this point in time, both data streams were ready for processing.

NUSTATS DIARY COLLECTION

The GPS households were expected to participate in the regular diary portion of the survey exactly as any other St. Louis travel survey participant. The households recruited from the GPS recruitment program were called for diary data retrieval starting the day following their travel day in the regular diary CATI retrieval program.

Data collected during the retrieval telephone call included all trips made on the designated travel day for all persons in the household. Specific information about each trip was recorded. This information included the origin and destination addresses, travel duration, travel mode, including specified household vehicle if applicable, and the purpose of each trip.

GEOSTATS DATA PROCESSING

The GPS second-by-second data, once received at GeoStats, were first converted into GIS-compatible formats and then viewed for potentially bad or poor data points. Next, the files were processed to identify potential trip ends based on time intervals between consecutively logged points. For this study, 120 seconds was defined as the appropriate dwell time between GPS-recorded trips. The 120-second stops were marked as the initial trip ends. Next, each potential trip was evaluated within an interactive GIS-based application to allow the project analyst to identify both missing (those less than 120 seconds) and false trip ends (those typically between 2 minutes and 5 minutes in duration that were actually traffic delays). Once this step was completed, the updated GPS-based trip file for a given household vehicle was ready for comparison with the collected CATI data.

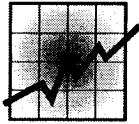
When the CATI-retrieved household trip files arrived electronically at the GeoStats office, the first processing step was to convert the files into a vehicle-based format to provide a standard unit against which GPS trips could be compared. Once this conversion was complete, both the GPS vehicle-based trip files and the CATI-retrieved vehicle-based trip files were ready for comparison. A program was run using the two files as input – comparing the individual trip records within each based on departure time. The comparison results were then examined in tabular form, with questionable items reviewed and modified if necessary.



APPENDICES

The Appendices section contains the following:

- Recruitment Script,
- Diary Packet Materials,
- Retrieval Script, and
- GPS Materials.



APPENDIX A – RECRUITMENT SCRIPT

Hello, my name is _____ and I am calling on behalf of the 2002 St. Louis Regional Travel & Congestion Survey. The information gathered in this study will be used by the East-West Gateway Coordinating Council, with support from the Missouri and Illinois Departments of Transportation, for transportation planning in<CTFIP>. May I speak with someone 18 years of age or older?

Your household has been selected to participate in a very important survey of travel patterns. The information will be used by transportation planners to identify where and when traffic is most congested, allowing them to come up with solutions to reduce traffic congestion. You should have received a postcard about the study, or heard about it in your local news.

This survey has three parts; first we will conduct a phone interview with you that I would like to start on right now. Second, we will mail you specially prepared travel logs so that everyone in your household can track their travel for one day. Finally, we will call you back to collect the information that you recorded in your logs. Unless you have questions I will begin the first part now.

<<SAMPN>>

IMPORTED SAMPLE NUMBER

<<PHONE>>

<<LISTD>>

LISTED OR UNLISTED NUMBER?

LISTED	1
UNLISTED	2

<<HCNTY>>

First I need to verify that you live in

Franklin County, MO 29071

Jefferson County, MO 29099

St. Charles County, MO 29183

St. Louis County, MO 29189

ST LOUIS CITY 29510

Madison County, IL 17119

Monroe County, IL 17133

St. Clair County, IL 17163

DK/RF 99999

<<HHSIZ>>

Now I need to get information about the persons in your household. How many people, including yourself, live in your household? Includes all persons who sleep there at least 3 nights per week.

<<HHVEH>>

Now, how many vehicles are presently available to members of your household? This includes all cars, vans, trucks, RVs, SUVs, motorcycles and mopeds, whether owned or leased or provided by an employer.

<<VEHNO>>

VEHICLE NUMBER

<<YEAR>>

Now think about your vehicles in order from being driven the most to being driven the least.

What is the year of

DK 8888

RF 9999

<<MAKE>>

What is the make of that vehicle?

<<MODEL>>

VEHICLE MODEL

<<VOWN>>

Is this vehicle owned or leased?

Owned by a household member

1

Owned by a person/company not in your household

2

Leased by a household member

3

Leased by a person/company not in your household

4

<<BIKES>>

Now, how many bicycles in working condition are available to members of your household for use in their daily travel?

<<RESTY>>

Do you live in a...

Unattached Single Family Home or mobile home/trailer

1

Duplex/Apartment/Condo/Townhome

2

Group quarters (dorms, barracks, etc.)

3

OTHER, SPECIFY

7

DK/RF

9

<<OWN>>

Do you own or rent this home?

Own/buying

1

Rent

2

OTHER, SPECIFY

7

DK

8

RF

<<PSAMP>>

PERSON SAMPLE NUMBER

<<PERNO>>

PERSON NUMBER

PERSON 1 01

PERSON 2 02

PERSON 3 03

PERSON 4 04

PERSON 5 05

PERSON 6 06

PERSON 7 07

PERSON 8 08

<<FNAME>>

<<RESP>>

IS THIS PERSON THE RESPONDENT? ONLY THE PERSON YOU ARE SPEAKING TO CAN BE THE RESPONDENT.

YES

1

NO

2

<<GEND>>

What is <FNAME> gender? DON'T ASK FOR RESPONDENT

MALE

1

FEMALE

2

DK/RF

9

<<AGE>>

What is<YOUR>age in years? IF LESS THAN 1, ENTER 0

98 years and older

98

DK/RF

99

<<RELAT>>

What is<YOUR>relationship to you? DON'T ASK FOR RESPONDENT

SELF

1

Spouse/partner

2

Son/Daughter

3

Mother/Father/Mother In-law/Father In-law

4

Other relative

5

Live-in Help

6

Not Related

7

DK/RF

9

<<LIC>>

Do/Does<YOU>have a valid driver's license?

Yes

1

No

2

DK

8

RF

9

<<DISAB>>

Do/Does<YOU>have a physical, mental, or other health disability that has lasted 6 or more months and which makes it difficult for<YOU2>to go outside the home alone, for example to shop or visit a doctor's office?

Yes

1

No

2

DK/RF

9

<<DISTY>>

What type of disability is that?

None

1

Difficulty standing, walking or climbing stairs

2

Visually impaired/blind

3

Hearing impaired/deaf

4

Wheelchair

5

Require cane/walker

6

OTHER, SPECIFY

7

DK/RF

9

<<EMPLY>>

Are/Is<YOU>employed?

Yes

1

No

2

DK/RF

9

<<PRIMA>>

Which of the following best describes<YOUR>current situation?

Retired

1

Disability status

2

Homemaker

3

Unemployed and looking for work

4

Unemployed and NOT looking for work

5

Other, SPECIFY

7

DK/RF

9

<<JOBS>>

How many paying jobs do/does<YOU>hold?

ONE	1
TWO	2
THREE OR MORE	3
DK/RF	9

<<JOBFI>>

On average, how many hours a week do/does<YOU>work at<YOUR><MAINW>job? IF LESS THAN 1, ENTER 0

97+ hours	97
DK	98
RF	99

<<FTPT>>

FULL-TIME, PART-TIME

FULL-TIME	1
PART-TIME	2

<<OCCUP>>

What is<YOUR >primary occupation?

Agriculture, forestry, and fishing	11
Mining	12
Construction	13
Manufacturing	14
Transportation, communications, electric, gas and sanitary services	15
Wholesale trade	16
Retail trade	17
Finance, insurance, and real estate	18
Services	19
Public administration	20
Education	21
Medical	22
Professional/Scientific	23
OTHER, SPECIFY	97
DK/RF	99

<<JLOC1>>

Which of the following best describes<YOUR>job location?

Home	1	=> HWOR2
Fixed Address	2	
No fixed address (e.g. traveling salesman, repairman, etc.) VERIFY THAT THERE IS NO OFFICE THAT THEY GO TO REGULARLY	3	=> MODE1
DK/RF	9	

<<WCNT1>>

Is<YOUR><MAINW>job in<HCNTY>? SELECT APPROPRIATE COUNTY

<<WNAM1>>

WORKPLACE NAME

<<WZIP1>>

WORK ZIP CODE

DK/RF	99999
-------	-------

<<FREE1>>

Is parking free at the workplace?

Yes	1	=> EMPT1
No	2	
DK/RF	9	=> EMPT1

<<EMPP1>>

Does the employer offer to pay any of the parking costs?

Yes	1	
No	2	=> EMPT1
DK/RF	9	=> EMPT1

<<EMPP2>>

Do/Does<YOU>use the employer's offer to pay?

YES	1
NO	2
DK/RF	9

<<EMPT1>>

Does<YOUR>employer offer to pay for any of the cost for public transit?

Yes	1	
No	2	=> MODE1
DK/RF	9	=> MODE1

<<EMPT2>>

Do/Does<YOU>use the employer's offer to pay?

YES	1
NO	2
DK/RF	9

<<MODE1>>

How do/does<YOU>usually get to<YOUR><MAINW>job?

Drive alone	1
Auto, Truck, Van shared ride - 2+ persons	2
Public transit	3
Walk	4
Bike	5
DK/RF	9

<<PRKP1>>

How much, if anything, do/does<YOU>personally pay to park? YOU CAN ENTER CHANGE AMOUNTS, LIKE "50 CENTS"=0.50

FREE	000000
DK/RF	999999

<<PARU1>>

What time period does that payment cover?

Per ride	0
Daily	1
Weekly	2
Monthly	3
Annually	4
OTHER, SPECIFY	7
DK/RF	9

<<BUSP1>>

How much do/does<YOU>personally pay for a transit pass or ride?

NOTHING	000000
DK/RF	999999

<<BUSU1>>

What time period does that payment cover?

Per ride	0
----------	---

Daily	1
Weekly	2
Monthly	3
Annually	4
DK/RF	9

<<HWOR2>>

How many hours a week on average, do/does<YOU>work at this second job? IF LESS THAN 1, ENTER 0

97+ hours	97
DK	98
RF	99

<<JLOC2>>

Is the location of this second job

Home	1
Fixed address	2
No fixed address (e.g. traveling salesman, repairman, etc.)	3
DK/RF	9

<<STUDE>>

Are/is<YOU>enrolled in any type of school, including day-care, technical institutes, adult classes, or senior care?

Yes	1
No	2
DK	8
RF	9

<<SCHOL>>

What type of school is that?

Daycare/Pre-School	1
K - 6	2
7 - 12	3
Trade/Technical	4
College Undergraduate Studies	5
College Graduate Studies	6
OTHER, SPECIFY	7
DK/RF	9

<<SLOC1>>

Do/Does<YOU>attend school at home or at another location?

HOME	1
ANOTHER SCHOOL LOCATION	2
DK/RF	9

<<SCNT1>>

Is the school in <HCNTY>?

<<SNAM1>>

SCHOOL NAME

<<SZIP1>>

SCHOOL ZIP CODE

<<EDUCA>>

What is the highest level of education<YOU>have/has attained?

11th grade or less	1
High school graduate	2
2 years of college/Associates Degree	3
4 years of college/Bachlors degree	4
Post-Graduate	5

OTHER, SPECIFY	7
DK/RF	9

<<EQUIP>>

I just have a few more questions about your household. First, which of the following pieces of equipment or services are used in your home, including a home office?

NONE OF THESE	0
A portable cellular telephone	1
A fax machine	2
A desktop or laptop computer	3
Web TV	4
Answering Machine/Voice Mail	5
Caller ID	6
Call Blocking	7
Internet Service	8
RF	9

<<INCOM>>

I'm going to read a series of broad income ranges. Stop me when I read the range in which your household income falls. Your household income is the total income made by all household members last year before taxes.

from \$0 to \$4,999	1
from \$5,000 to \$14,999	2
from \$15,000 to \$24,999	3
from \$25,000 to \$44,999	4
from \$45,000 to \$74,999	5
\$75,000 or more	6
DK/RF	9

<<PHLNS>>

How many telephone lines do you have?

<<DEDIC>>

How many of those telephone lines are only used for a fax or modem?

<<SHRE2>>

How many other households share a phone line with your household?

<<NOPHN>>

Have there been times within the past 12 months when the home you were living in did not have telephone service?

<<LENGT>>

How long were you without phone service? Was it . . .

Less than 1 month	1
1 month to less than 1 year	2
1 year or longer	3
DK	8
RF	9

<<ASSN>>

Thank you for completing Part One of the survey. In Part Two, remember people in your household are asked to record their travel for one day in logs that we'll mail to you. The logs package will contain instructions and more information about the survey. Are there any questions about the logs that I can answer now? Okay. Your household should keep track of their travel on READ DATE. Is this okay?

<<DOGPS>>

In addition to having households record their travel information in travel logs, we are selecting a handful of households to help test the use of the Global Positioning System, or GPS technology in conducting travel surveys. We will deliver GPS devices, as well as pick them up. All you need to do is simply plug the device into your car's cigarette lighter or power outlet. This will not harm your car or affect its performance in any way. Once you plug it in, there is nothing else to do. The process is very simple and the results of this test can lead to improving transportation studies in the future. If selected, will you help us with this exciting project?

YES

1

NO

2

<<CLITE>>

Does the cigarette lighter/power outlet operate?

YES

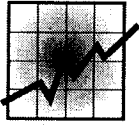
1

NO

2

<<ASSN>>

Thank you for completing Part One of the survey. In Part Two, remember people in your household are asked to record their travel for one day in logs that we'll mail to you. The logs package will contain instructions and more information about the survey. Are there any questions about the logs that I can answer now? Okay. Your household should keep track of their travel on READ DATE. Is this okay?



APPENDIX B – DIARY PACKET MATERIALS



January 15, 2003

1000008-1

John Doe
133 W. San Antonio St.
San Marcos, TX 78666

Dear John Doe:

Thank you for agreeing to participate in the 2002 St. Louis Regional Travel & Congestion Survey.

YOUR TRAVEL DAY IS:

Wednesday, January 15

We appreciate your time and help with this very important project. For more information about this survey and a list of frequently asked questions, visit the survey web site at www.nustats.com/stlouis.

If you have any questions or comments, please call NuStats at 1-877-261-4621.

Sincerely,

A handwritten signature in cursive script, appearing to read "Johanna Zmud".

Johanna Zmud
Project Manager, NuStats

Enclosure

Travel logs for each household member age 5 years and older
Information Brochure

ST. LOUIS POST- DISPATCH

Good morning, St. Louis. Today is Monday, March 4, 2002.

Motorists here will be asked to keep diaries of daily travels

By Ken Leiser
Of The Post-Dispatch

St. Louis will soon have its behind-the-wheel version of Television's Nielsen families.

Regional transportation planners are paying a research firm \$1.3 million to conduct one of the most comprehensive travel surveys the St. Louis metropolitan area has seen in years.

Part of the eight-county sampling will require NuStats of Austin, Texas, and its subcontractors to recruit up to 7,000 local families to keep daily travel diaries tracking their trips to work, school and the market.

"The last major regional travel survey done in this area was in 1965," said Les Sterman, executive director of the East-West Gateway Coordinating Council. "Travel habits have changed dramatically over the last 35 years."

People own more cars, they're traveling to places that weren't even on the maps back in the 1960s and they are making multiple stops back-to-back – a phenomenon known as "trip chaining."

A small number of participants will be tracked throughout the day by global positioning satellite units in their vehicles to ensure the accuracy of the data, said Johanna Zmud, president of NuStats.

The household travel survey is designed now, and data will be collected from the end of this month through June. No data will be gathered during the summer, and the survey will resume in the fall.

Knowing where people are going and how they're getting there is key to spending decisions, Sterman said.

"We make investments of hundreds of millions of dollars of public funds," he said. "You want to know which investment gives you the biggest return on your money. Unless you have some good information, it is hard to be very sure."

A second survey will focus on 11,000 riders who use Bi-State, Madison County and St. Clair County transit systems. Part of the sampling will involve polling people who use transit at special events.

The transit portion of the survey will be conducted this month and in April. A final report on both surveys is expected next year. The money comes from state and federal sources.

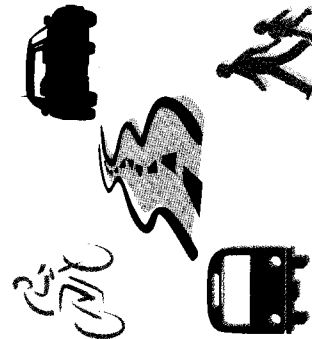
WHY PARTICIPATE?

Everyone needs to travel . . . and wants to travel on uncongested roads. In the St. Louis area alone, our communities invest millions of dollars each year in improving our transportation system. The survey information is needed to spend that money wisely in the future for:

- Improving highways.
- Reducing congestion.
- Improving and providing convenient transit service.
- Building walkways and bike paths.
- Reducing air pollution from cars and trucks.

THANK YOU!

You are helping your community plan for the transportation needs of the 21st century.



WHO ARE THE SPONSORS?

East-West Gateway
Coordinating Council (EWGCC)
with support from
Missouri Department of Transportation
(MoDOT)
Illinois Department of Transportation
(IDOT)

DO YOU HAVE QUESTIONS?

For more information please contact:

Michael Skipper of NuStats
800-447-8287, ext. 2241
mskipper@nustats.com

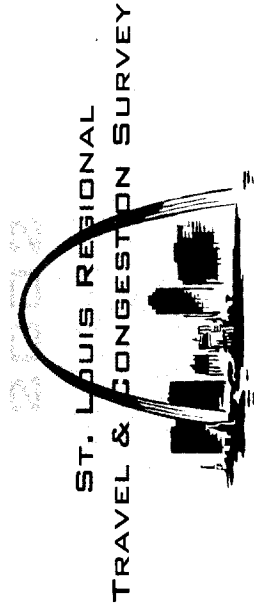
EWGCC Contact:

Marty Altman
314-421-4220
marty.altman@ewgateway.org

or

visit the project webpage at

www.nustats.com/stlouis




YOUR PARTICIPATION IS IMPORTANT!

See inside for details on how you can help your community plan for the transportation needs of the 21st Century.

Survey conducted by NuStats on behalf of the
East-West Gateway Coordinating Council (EWGCC)
with support from
Missouri Department of Transportation (MoDOT)
Illinois Department of Transportation (IDOT)

 East-West Gateway
Coordinating Council



 Illinois Department of Transportation

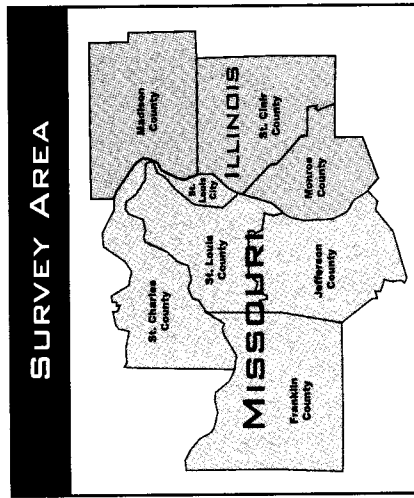


NuStats

WHAT IS THE SURVEY ABOUT?

The 2002 ST. LOUIS REGIONAL TRAVEL & CONGESTION SURVEY is a major study of travel patterns and transportation needs throughout the St. Louis area. The study will collect and analyze information on:

- where people travel,
- why they travel, and
- how they travel.



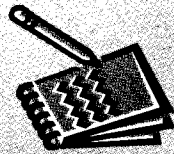
This information is needed to properly plan for transportation improvements that will reduce congestion and meet everyone's travel needs.



The information will be used by transportation planners to determine the needs of today's travelers and to anticipate future travel needs so that effective highway and transit improvements can be devised.

WHAT DOES YOUR PARTICIPATION INVOLVE?

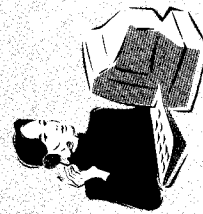
PHASE 2: TRAVEL LOGS



The survey requires that travel information from all types of people is collected - no matter how much they travel or what age they are - for an assigned travel day. So NuStats will provide personal travel logs to all members of your household. These logs should be carried on the assigned travel day and used to record travel details. Parents can complete the logs for any children age 12 or younger.

It is important that you record exact locations in your logs. This information helps planners calculate how long it takes to get from one place to another and to figure out solutions for making travel easier for everyone. Therefore, all of the places you went to (such as work, school, gas stations, ATM, a friend's house, etc.) and how you got there (drive, walk, bike, etc.) should be recorded in detail.

PHASE 3: INFORMATION RETRIEVAL



After your travel day, NuStats will call to collect the log information for each household member. If your information is

already recorded in the logs, the interview is quick. NuStats needs to talk directly to each person age 13 and older, so a specific appointment (day and time) is made.

The 2002 ST. LOUIS REGIONAL TRAVEL & CONGESTION SURVEY will begin with a survey of over 5,000 households in 2002. We have contracted with NuStats, a nationally recognized survey research firm. They understand that your time is valuable and have trained its surveyors to be efficient and polite. NuStats uses a well-tested 3-phase survey method.



PHASE 1: RECRUITMENT

NuStats will conduct telephone interviews with a random sample of households throughout the survey area.

On a confidential basis, you will be asked to provide information about your household, such as the number of people in the household, how many vehicles you own or lease, and household location.

The telephone surveyor also collects information about each member of your household, such as age, employment status, and work and school information.

The analysis of this information ensures that all types of households with a wide range of travel patterns are selected to participate.

*We guarantee that the
information you provide will
remain confidential.*

Survey conducted by NuStats on behalf of the
East-West Gateway Coordinating Council (EWGCC)
with support from

Missouri Department of Transportation (MoDOT)
and
Illinois Department of Transportation (IDOT)

East-West Gateway Coordinating Council



Illinois Department of Transportation



NuStats

ST. LOUIS REGIONAL TRAVEL & CONGESTION SURVEY



PERSONAL ONE-DAY TRAVEL LOG FOR:

TRAVEL LOG INSTRUCTIONS

Record each PLACE you go to and what you did there beginning at 3am (or when you wake up) and ending at 2:59am the following day (or when you go to sleep on your travel day). Please remember:

- ✓ A PLACE is a location that has a new or different address.
- ✓ Write down all PLACES visited, even **short walks, trips, or stops** (e.g. getting coffee on the way to work or going through the drive-through at a fast food restaurant).
- ✓ If you park your car and walk to a new PLACE, record your activity as Code 17 (change mode of transportation).
- ✓ At the end of the travel day, please collect and keep all travel logs near the telephone. We will call to collect the information after your travel day.

THANK YOU
FOR YOUR
PARTICIPATION!

You are helping your community plan
for the transportation needs of
the 21st century.

If you need help filling out your
Travel Log, please call:

1-877-221-7828

For more information about the survey,
please call:

Michael Skipper, NuStats
800-447-8287, ext. 2241
mskipper@nustats.com

EGWCC Contact:

Marty Altman
314-421-4220

marty.altman@ewgateway.org

OR

visit the project webpage at
www.nustats.com/stlouis

LIST 1 & 2 are inside flap

Place name: Address: City/State/Zip: Cross street/Landmark:	What TIME did you ARRIVE? (record exact times)	HOW did you get there? (use LIST 1 codes)	WHERE did you go next?
WHERE were you at 3am on your travel day?	3:00 am/pm	-----	
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		
WHERE did you go next?	: am/pm		

Continue on the next page

LIST 1

HOW did you get there?

- Non-Motorized
- 1 Walk
 - 2 Bicycle
 - Auto/Van/Truck
 - 3 Driver
 - 4 Passenger
 - Other Modes
 - 5 Public Bus
 - 6 Metrolink
 - 7 School Bus
 - 8 Taxi/Shuttle/Limousine
 - 9 Motorcycle
 - 97 Other: (write code and specify)

LIST 2

WHY did you go there?

- Home
- 1 At home activities: (eating, TV, sleeping, homemaker, etc.)
 - 2 Working at home (job related)
- Work
- 3 Work (including regular volunteer work)
 - 4 Work-related (meeting, errand, etc.)
- School/Childcare
- 5 Attending School
 - 6 School-related (sports, extra-curricular)
 - 7 Childcare
- Personal
- 8 Quick stop for: gas, ATM, coffee, etc.
 - 9 Shopping
 - 10 Visit friends/Relatives
 - 11 Personal Business (medical/dental, drycleaning, errands, etc.)
- Social/Entertainment
- 12 Eat meal outside of home (restaurant, drive-through, take-out)
 - 13 Entertainment/Recreation/Fitness
 - 14 Civic/Religious activities
- Other
- 15 Pick-up or drop-off passenger
 - 16 Other (write code and specify)
 - 17 Change mode of transportation (board/deboard bus, park-n-ride, etc.)



PLACE 1

My Home



PLACE 2

ATM



PLACE 3

Drop off son at school



PLACE 4

My Work



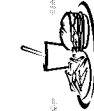
PLACE 5

Kinkos



PLACE 6

My Work



PLACE 7

South City Diner



PLACE 8

My Work



PLACE 9

Pick up son at school



PLACE 10

My Home

Record every PLACE you go to, including short walks and quick stops

Begin your Log at 3am on your travel day

Record code from LIST 1 (on flap in Log)

Record code from LIST 2 (on flap in Log)

Record exact times

RECORD the following information about each place:		WHAT time did you ARRIVE? (record exact times)	HOW did you get there? (use LIST 1 codes)	WHY did you go there? (use LIST 2 codes)	What TIME did you LEAVE? (record exact times)
Place name:	Address City/State/Zip Cross street/Landmark:				
WHERE were you at 3am on your travel day? My Home	Home address was provided in telephone interview.	3:00 am/pm			8:34 am/pm
WHERE did you go next? ATM	710 N. Kingshighway Blvd. St. Louis/Missouri/63108 Bank of America	8:31 am/pm	3	8	8:22 am/pm
WHERE did you go next? Son's school	5415 Page Blvd. St. Louis/Missouri/63112 Emerson Elementary	8:45 am/pm	3	15	8:51 am/pm
WHERE did you go next? My Work	10 Stadium Dr. St. Louis/Missouri/63102 N 7th /Busch Stadium	9:08 am/pm	3	3	11:47 am/pm
WHERE did you go next? Kinkos	1 South Broadway St. Louis/Missouri/63102 Market St./Riener Plaza	11:48 am/pm	1	4	12:03 am/pm
WHERE did you go next? My Work	Work address provided in Place 4 above.	12:04 am/pm	1	3	2:34 am/pm
WHERE did you go next? South City Diner	3141 S. Grand Blvd. St. Louis/Missouri/63118 Hartford St./Tower Grove Park	2:49 am/pm	5	12	3:31 am/pm

Person would continue to record Place 8 - My Work, Place 9 - Son's School and Place 10 - My Home

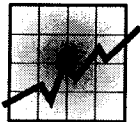
Record exact place name & complete address information

Record PLACES 11-19 on back

Continue recording PLACES 11-19

RECORD the following information about each place: Place name: Address: City/State/Zip: Cross street/Landmark:	WHAT time did you ARRIVE? <i>(record exact times)</i>	HOW did you get there? <i>(use LIST 1 codes)</i>	WHY did you go there? <i>(use LIST 2 codes)</i>	WHAT time did you LEAVE? <i>(record exact times)</i>
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm
WHERE did you go next?	: am/pm			: am/pm

Keep your completed Travel Logs by the phone and we'll call you to collect the information!



APPENDIX C – RETRIEVAL SCRIPT

Hi - my name is _____ and I'm calling on behalf of the St. Louis Regional Travel and Congestion Study about the travel survey your household recently completed. May I please speak with someone over the age of 18?

I'm calling to collect your travel information.

<<PACKT>>

Did your household receive the travel log packet that we sent to you?

YES	1	=> GPSR1
NO	2	
DK/RF	9	

<<DIARY>>

Did<YOU >use<YOUR >diary to record<YOUR >travel?

Yes	1
No	2
DK/RF	9

<<TOTPL>>

How many total places did<YOU >visit over the course of the travel day?

<<GETUP>>

What time did<YOU >wake up on<YOUR >travel day?

<<PTYPE>>

IF PLACE 1: Okay - Where were/was<YOU >at 3 am on...

HOME	01
SCHOOL	02
SCHOOL ADDRESS	12
WORK	03
WORK ADDRESS	13

PREVIOUSLY ENTERED PLACE/SOMEONE ELSE'S HABITUAL ADDRESS (NOT THE PERSON WHOSE INFO YOU ARE GETTING NOW. IE MOM DROPS KIDS OFF AT SCHOOL. 77

NEW PLACE (ASK IF THAT IS IN MISSOURI/ILLINOIS. IF NOT, IT'S OUT OF THE STUDY AREA SO, SELECT #9) 88

OUT OF THE TRAVEL STUDY AREA 99

<<LOCAT>>

Does the place have a name?

<<ADDR>>

What is the street address there?

<<XSTRT>>

Can you tell me the name of a street that crosses near <ADDR>?

<<LAND>>

Can you tell me a nearby landmark that can be found easily on a map? THIS CAN BE ANYTHING THAT WE CAN USE TO TRY TO FIND THIS PLACE. EXAMPLE: 7-11

ON THE CORNER OF XYZ STREET, HEB STORE, ETC.

<<MODE>>

What was<YOUR >main means of travel to this place?

Walk	01
Bicycle	02
Auto/Truck/Van Driver	03
Auto/Truck/Van Passenger	04
Public bus	05
MetroLink Rail	06
School Bus	07
Taxi/Shuttle/Limousine	08
Motorcycle/Moped	09
OTHER, SPECIFY	97
DK/RF	99

<<ARRTM>>

IF PLACE 1, ENTER 0300

OTHERWISE: What time did<YOU >get there? ENTER IN MILITARY TIME, HHMM
0000-MIDNIGHT, 1200-NOON, 2359-11:59PM, 0030-12:30AM

<<TPUR1>>

And what was<YOUR >main activity there? DO NOT READ LIST. SELECT BEST MATCH
AND CONFIRM.

NO OTHER ACTIVITIES	00
AT HOME ACTIVITIES	01
WORKING AT HOME (JOB RELATED)	02
WORK (INCLUDING REGULAR VOLUNTEER WORK)	03
WORK-RELATED (MEETING, ERRAND)	04
ATTENDING SCHOOL	05
SCHOOL-RELATED (EXTRA-CURRICULAR)	06
CHILDCARE	07
QUICK-STOP (GAS, COFFEE, POST OFFICE)	08
SHOPPING	09
VISIT FRIENDS/RELATIVES	10
PERSON BUSINESS (MEDICAL, ERRANDS)	11
EAT MEAL (RESTAURANT)	12
ENTERTAINMENT/RECREATION/FITENSS	13
CIVIC/RELIGIOUS	14
PICKUP/DROPOFF PASSENGER	15
CHANGE MODE OF TRANSPORTATION	16
OTHER, SPECIFY	17
DK/RF	99

<<TPUR2>>

And what other activities did<YOU >do there?

NO OTHER ACTIVITIES	00
AT HOME ACTIVITIES	01
WORKING AT HOME (JOB RELATED)	02
WORK (INCLUDING REGULAR VOLUNTEER WORK)	03
WORK-RELATED (MEETING, ERRAND)	04
ATTENDING SCHOOL	05
SCHOOL-RELATED (EXTRA-CURRICULAR)	06
CHILDCARE	07
QUICK-STOP (GAS, COFFEE, POST OFFICE)	08

SHOPPING	09
VISIT FRIENDS/RELATIVES	10
PERSON BUSINESS (MEDICAL, ERRANDS)	11
EAT MEAL (RESTAURANT)	12
ENTERTAINMENT/RECREATION/FITENSS	13
CIVIC/RELIGIOUS	14
PICKUP/DROPOFF PASSENGER	15
CHANGE MODE OF TRANSPORTATION	16
OTHER, SPECIFY	17
DK/RF	99

<<OTHTR>>

What was the total number of people traveling with<YOU >? NOT INCLUDING THE PERSON YOU'RE ON

<<HHMEM>>

Of those, how many were household members?

<<PERTP>>

Who was/were the person(s)?

<<NONHH>>

NON-HHMEMBERS

<<VEHA>>

Was a household vehicle used to make this trip?

YES	1
NO	2
DK	8
RF	9

<<VEHNO>>

Which vehicle did<YOU >use?

ONE	01
TWO	02
THREE	03
FOUR	04
FIVE	05
SIX	06
SEVEN	07
EIGHT	08
NON-HOUSEHOLD VEHICLE	97
DK/RF	99

<<PRKCO>>

Did<YOU >pay to park? How much?

FREE 000000 => PRKMO

DK/RF999999

<<PRKUN>>

And was that... READ LIST

Hourly	1
Daily	2
Weekly	3
Monthly	4
Quarterly	5
Annually	6
None	7
Other	8
DK/RF	9

<<PRKMO >>

Which method did<YOU >use to pay for<YOUR >parking?

DID NOT USE ANY METHOD TO PAY	0
Cash	1
Credit Card	2
Payroll Deduction/Employee Pass	3
Validated Parking Ticket	4
OTHER, SPECIFY	7
DK/RF	9

<<BOARD>>

At which bus/rail stop did<YOU >board? ENTER CROSS STREETS OF INTERSECTION

ENTER RESPONSE	1
DK/RF	9

<<ARRBS>>

What time did<YOU >arrive at the bus/rail stop? ENTER IN MILITARY TIME, HHMM
0000-MIDNIGHT, 1200-NOON, 2359-11:59PM, 0030-12:30AM

DK/RF	9999
-------	------

<<GETTO>>

How did<YOU >get to the bus/rail stop?

Walk	01
Bicycle	02
Auto/Truck/Van Driver	03
Auto/Truck/Van Passenger	04
Public bus	05
MetroLink Rail	06
School Bus	07
Taxi/Shuttle/Limousine	08
Motorcycle/Moped	09
OTHER, SPECIFY	97
DK/RF	99

<<RBLOC>>

What was the distance of this trip in blocks?

DK/RF	999
-------	-----

<<GETON>>

What time did<YOU >board (get on) the bus/train?

ENTER IN MILITARY TIME, HHMM

0000-MIDNIGHT, 1200-

NOON, 2359-11:59PM, 0030-12:30AM
DK/RF9999

<<SYSTEM>>

Which bus system/transit system did<YOU >use?

BI STATE/METROLINK	1
ST. CLAIR COUNTY TRANSIT	2
MADISON COUNTY TRANSIT	3
OTHER, SPECIFY	7
DK/RF	9

<<ROUTE>>

What route did<YOU >take?

RECORD RESPONSE	1
DK/RF	9

<<FARE>>

How much did it cost to ride the bus or train?

FREE RIDE	000000	=> +2
DK/RF	999999	=> +2

<<FTYPE>>

How did<YOU >pay for the trip?

Cash	1
Credit Card	2
Bus/Train Pass	3
Transfer Ticket	4
OTHER, SPECIFY	7
DK/RF	9

<<ALGHT>>

At which bus/rail stop did<YOU >get off?

ENTER CROSS STREETS OF INTERSECTION

ENTER RESPONSE	1
DK/RF	9

<<LEVBS>>

What time did<YOU >get off at the next stop? ENTER IN MILITARY TIME, HHMM
0000-MIDNIGHT, 1200-NOON, 2359-11:59PM, 0030-12:30AM

DK/RF	9999
-------	------

<<GETFR>>

How did<YOU >get from the bus/rail stop to<YOUR >next place?

Walk	1
Picked up car and drove	2
Was picked up	3
Rode bike	4
Transferred to another bus or train	5
OTHER, SPECIFY	7
DK/RF	9

<<WLKBL>>

What was the distance of this trip in blocks?

IF THEY DON'T KNOW, TRY TO GET THEM TO GUESS.

=> +1

si NOT(MODE=01,02)
DK/RF

999

<<DEPTM>>

IF LAST PLACE OF THE DAY, ENTER 0259 OTHERWISE: What time did<YOU >leave for the
next place? ENTER IN MILITARY

TIME, HHMM

0000-MIDNIGHT, 1200-NOON, 2359-11:59PM,

0030-12:30A

<<GOBED>>

What time did<YOU >go to sleep on<YOUR >travel day? ENTER IN MILITARY TIME HHMM
0000-MIDNIGHT, 1200-NOON, 2359-11:59PM, 0030-12:30AM

=> NOGO

DK/RF

9999

<<NOGO>>

So,<YOU >made no trips, including for work or school?

=> ADDEL

TRUE: Why not?

1

FALSE

2

=> CHECK

<<THANK>>

Okay, great. Those are all the questions I have for you today. We appreciate you for taking the time
to help us with this important study. Thank you and good day/evening.



APPENDIX D – GPS MATERIALS

APPENDIX D1: GPS INSTALLATION INSTRUCTIONS

Thank you for participating in GPS portion of the St. Louis Regional Travel and Congestion Survey! The data you are providing will be used to improve and evaluate the current transportation infrastructure in your area.

Below are instructions and guidelines for using the GPS equipment that has been provided to your household. If you need additional assistance or if you have questions after reading this document, please call GeoStats at 404-588-1004 between the hours of 8AM and 6PM EST.

We ask that you install the equipment in your vehicle before the start of your first trip of your assigned travel day and then remove it after the last trip of that day.

The equipment package itself has a GeoStats data logger, a combined GPS receiver / antenna, and a power connector. The guidelines for installation and usage are as follows.

- 1) Remove the equipment from the carry bag.
 - You can leave the bag in your vehicle or in your house. It is for carrying purposes only.
- 2) Attach the GPS antenna (black plastic unit with a magnet on one side) to the roof of the assigned vehicle.
 - **Select the door on your vehicle that is used least often.** Open the window for that door, place the antenna on the roof of your vehicle directly above the window, and then place the rest of the equipment through the open window into the interior of your vehicle. Note: If you have a sunroof on your vehicle, you may also use that instead of the window.
 - **Be careful not to slide the antenna** across your roof - place it directly where you want it.
 - **Close the window as much as possible** without crimping the antenna wire. It is best to leave a small gap for the wire.
 - **If you need to open the door at any time** during the day, remember to remove the antenna first, then open the door, then close the door, and finally place the antenna back on the vehicle.
 - **If it rains while you are driving** and you are concerned that water may enter your vehicle, you can remove the antenna from the roof and place it securely on your dashboard or rear package-shelf.
- 3) Plug the power cable connector into your cigarette lighter socket.
 - After inserting the power cable into the cigarette lighter socket, turn on your vehicle and verify that the GPS receiver is powered. To do this, examine the display on the back of the GPS data logger. It should be flashing. If it is not, twist the cigarette lighter or try plugging the unit in again. Note: If it never starts flashing, it is possible that the cigarette lighter is not working. At that point, remove the equipment and report the malfunction when the equipment is picked-up.
- 4) Leave the equipment plugged into your vehicle until you have finished traveling for the day.
 - If you need to remove the antenna from the roof of the vehicle during the day, do not remove the power supply and remember to return the antenna to the roof before starting your next trip.

- 5) After your last trip of the day, remove the equipment package.
- Unplug the power cable from the cigarette lighter.
 - Gently remove the antenna from the roof. Again, do not slide the antenna; tilt it until you are able to lift it easily.
 - Take the equipment into your home. Wrap up the cables and put everything back in the carry bag. Please, do not place the antenna directly against the data logger.
 - Someone from the project team will stop by, based on a previously agreed upon pickup time, to retrieve the equipment.

APPENDIX D2: THANK YOU POSTCARD

Recently you agreed to participate in the *2002 St. Louis Regional Travel and Congestion Survey*. Thank you for your participation!

At the same time, you agreed to participate in the GPS (Global Positioning System) survey. We have reached our allotment for your assigned travel day, and therefore **your participation on this specific portion is not necessary.**

Please note that you, and all other members in your household, **will still receive materials for the 2002 St. Louis Regional Travel and Congestion Survey.** However, you will not receive any additional materials related to the GPS survey.

If you have any questions or comments, please call the Travel Survey Hotline at 1 (800) 447-8287 x. 2241.