

# Mail-Out/Mail-Back Travel Survey in Houston, Texas

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During the fall of 1984, a mail-out/mail-back travel survey was conducted on Houston area households. Designed to obtain household, tripmaker, and detailed trip characteristics, the survey was completed by 1,596 of 6,941 households contacted by telephone. The procedure used was to telephone selected households and request their participation. A survey form was mailed to each participating household on which each trip made by members of the household for a given day was recorded. The forms were then returned by mail and analyzed. The mail-out/mail-back survey procedure was chosen because it best met the constraints of project funding, time available for data collection, data needs, and staff availability and training. Based on statistical evaluation of the quantity and variability of travel by household type, it was determined that reliable estimates of tripmaking characteristics could be obtained with a stratified sample of 1,200 households. Although tending to under-represent household categories with small percentages of the total population, the sample was representative of the population in those household categories with the greatest proportions of Houston area travel.

In the 1970s and early 1980s the Houston urbanized area experienced explosive growth. To maintain and improve the mobility of residents, major transportation improvements are being planned and implemented which include: rail transit systems, tollways, busways, and beltways. To properly plan for these improvements, reliable forecasts of travel are essential.

The current models used to estimate travel within the urbanized portion of the Houston-Galveston Area Council (H-GAC) planning region were developed using travel survey data obtained in the 1960s and supplemented with more recent travel characteristics developed from other urban areas in Texas and the United States. Because of the rapid growth of the urbanized area, changes in household size and composition, increasing levels of congestion of the transportation system, and Houston's polycentric urban form, increasing concern has been raised about the need for up-to-date information for developing Houston's travel models.

As a result, H-GAC—in cooperation with the Texas State Department of Highways and Public Transportation, the Metropolitan Transit Authority of Harris County, FHWA, and UMTA—has undertaken a comprehensive review and update of the region's travel forecasting models.

As an important first step toward improved travel forecasts, the need for up-to-date travel characteristics specific to the H-GAC region was identified. In particular, data was needed to estimate

- How many trips were being made,
- What the trip purposes were,
- Where trips were made,
- What modes of travel were used,
- What distances were traveled, and
- When trips were made.

In early discussions, transportation staff of all participating agencies agreed about the need for some form of residence-based travel survey. With the availability of the 1980 U.S. Census Bureau's Urban Transportation Planning Package (UTPP) data on journeys to work for the Houston Consolidated Metropolitan Statistical Area (CMSA), it was felt that a small sample home-interview survey would be sufficient to provide additional information on travel (for other purposes than work), as well as to supplement and update the census travel-to-work data.

## SAMPLE DESIGN AND SELECTION

A stratified sampling method was chosen in order to obtain usable results while maintaining a manageable sample size. Using household size and vehicle availability, a stratified sample was estimated to require about 1,200 responses. This number was based on modified coefficients of household trip variation in each household size/vehicle ownership cell weighted by the proportion of households in each category. The categories used and the resulting sample requirements are shown in Table 1.

TABLE 1 SURVEYS REQUIRED BY HOUSEHOLD SIZE AND VEHICLE AVAILABILITY

Vehicle Availability	Household Size				Total
	1	1	3	4+	
0	6	4	3	5	18
1	109	74	47	82	312
2	21	185	106	194	506
3+	8	68	94	194	364
Total	144	331	250	475	1,200

To improve the probability of obtaining an adequate sample size in cells expected to have a low response rate and to allow for belated rejection of surveys, a goal of 1,500 usable surveys was set. To determine the total number of households required to be contacted in order to get 1,500 usable surveys, the results of a pilot study performed in the spring of 1984 were used.

	Percentage	Factor
Contact rate	65	1.54
Agreement rate	55	1.82
Response rate	40	2.50
Usable rate	95	1.05

Only 65 percent of the telephone numbers on the sample list could be contacted, largely because no one was home during the evening hours when calls were made. Of those contacted, only 55 percent agreed to participate and of those, 95 percent were usable. Therefore, the required number of households needed to be contacted is:  $1,500 \times 1.54 \times 1.82 \times 2.50 \times 1.05 = 11,036$ .

For simplicity's sake, the sample size was set at 12,000 households. Because of the uncertainty of the actual overall return rate and the return rates for particular cells, the survey was divided into 10 subsamples or replicates of 1,200 samples each. Therefore, the survey results could be monitored while the survey was in progress, and adjustments made as necessary. The selection of samples for each replicate was designed so that each was chosen independently using the same procedures.

### PROJECT CONSTRAINTS

Several major factors influenced the selection of survey collection procedures:

1. Data needs—Complete travel data for all members of the household over the age of five for the selected day was needed, as well as household and trip-maker characteristics.
2. Time for data collection—The fall of 1984 was selected for the survey period. Therefore, the survey had to be collected

between the beginning of classes in early September and Thanksgiving in late October.

3. Staff availability and training—The level of experience with travel surveys varied widely among the H-GAC transportation staff. Moreover, relatively little nonadministrative manpower was available.

4. Project funding—A total of \$200,000 was budgeted for the entire process of survey design, collection and tabulation.

### DATA COLLECTION

Once the decision was made to perform a residence survey, three data collection strategies were examined:

1. Traditional home interview—A trained interviewer collects the travel survey data at the residence either through interviews with the household members or by collecting a survey form previously sent to the household.
2. Telephone interview—The travel data is retrieved through a telephone conversation with the household either through interviews with the household members or by having a survey previously sent to the household read over the telephone.
3. Mail-out/mail-back survey—The survey is sent to the participating household and is completed and returned through the mail.

The traditional home interview approach was rejected for several reasons. Early discussion with survey consultants indicated that the use of trained interviewers sent to the household would require approximately twice the funds allocated, as well as increased training, supervision, and data collection time.



## REGIONAL TRAVEL SURVEY

### INSTRUCTIONS

This survey has two parts. Part 1 (on the next page) contains information about you and your household. Some of the information has already been filled in based on our telephone conversation with a member of your household. Part 2 consists of a Trip Record for your travel. Please fill out one line for every place you went on the travel day.

#### FOR EXAMPLE:

YOU LEAVE HOME AND DRIVE TO WORK (1)  
 THEN DRIVE TO LUNCH (2)  
 NEXT DRIVE TO A STORE (3)  
 THEN DRIVE BACK TO WORK (4)  
 AND FINALLY RETURN HOME (5)  
 IF YOU MAKE NO ADDITIONAL TRIPS THAT DAY, YOU SHOULD FILL OUT FIVE LINES.

If you have any questions at all, call the Travel Survey Coordinator at (713) 627-3200.

Please give a separate Trip Record to every member of your household who is 5 years of age or older and who made trips on the Travel Day. All your answers are strictly **confidential**.

Please enclose all Trip Records in this questionnaire, and mail in the pre-paid envelope provided.

THANK YOU.

**FIGURE 1** Regional travel survey cover letter.

Because the earliest project start date was August 15, 1984, the time required to recruit and train surveyors may have been prohibitive. Moreover, concern was expressed about the difficulty of scheduling interviews and the willingness of households to permit an interviewer into their home.

The telephone interview was considered to have significant promise. In evaluating preliminary versions of the travel questionnaire during the pilot study, it was found that households with more than two trip makers required an excessive length of time to complete the questionnaire over the telephone. Unless the survey form was sent to the household and completed before the telephone call, problems arose with obtaining complete travel data for all trip makers in the household. However, this technique did provide the personal interaction between survey respondent and survey personnel important for ensuring an accurate understanding of the survey questions and complete information.

A modified version of a mail-out/mail-back survey process using telephone screening and follow-up was selected because it best met the critical constraints of funding and time, as well as providing for the important link between survey personnel

and the survey respondent necessary for an accurate comprehension and completion of the survey. The steps followed in this process are now discussed.

### MAIL-OUT/MAIL-BACK SURVEY PROCEDURES

The survey (Figures 1-3) was conducted during a 7-week period between September 10, 1984 and October 26, 1984. Staff and consultants working on the project felt that travel behavior after Thanksgiving may be affected by holiday trip making. Therefore, surveys should not be taken during the period between Thanksgiving and New Year's.

The procedure used was to telephone selected households and request their participation. The pilot test showed that many people would agree to participate as a means of terminating the conversation. Therefore, another purpose of the initial call was to explain the nature and extent of the effort required to complete the survey and thereby obtain higher response rates after obtaining an agreement. If telephone contact was made with a household in the sample, the number of persons in the house-

## PART 1: HOUSEHOLD INFORMATION

1. Address \_\_\_\_\_  
Label \_\_\_\_\_

Remember, your travel day is \_\_\_\_\_ / \_\_\_\_\_  
MONTH DAY

The label above includes your home address, and the number of persons and the number of vehicles reported in our initial telephone conversation. If any of these are incorrect, please write the correct information directly on the label.

We would now like some information on each household member.

2. Please assign a "Person Number" to each person residing in your household who is five years or older, starting with yourself as "Person Number 1."  
(Fill in appropriate box for each question for each person.)

Person Number	Age	Sex	RELATIONSHIP TO PERSON NUMBER 1 (Check one)				Is he/she employed? If yes, full or part-time?			Did he/she travel on the "Travel Day"?		Form to be used for Trip Record
			M / F	Spouse	Child	Relative	Not Related	Full Time	Part Time only	No	Yes	
1	_____	_____	PERSON NUMBER 1				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Continue on Attached Page
2	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Blue
3	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Yellow
4	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Green
5	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tan
6	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pink
7	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gray
8	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Orange

3. If you add up the annual incomes of all household members, into what range does it fall? (Check one)

Under \$10,000 ☐ \$10,000 - \$20,000 ☐ \$20,000 - \$30,000 ☐ \$30,000 - \$40,000 ☐ Over \$40,000 ☐

This completes the household information needed. Please fill out the attached travel questionnaire for **yourself** and ask every other household member over 5 to complete the enclosed trip record of the color indicated in question 2 above. For example, person number 2 use blue form, person number 3 use yellow form, etc.

FIGURE 2 Regional travel survey Part 1.

hold and the number of vehicles available were determined before seeking survey participation.

Results of the screening calls are given in Table 2. The contact rate of 72 percent was higher than the expected 65 percent. This higher rate was due to a more vigorous follow-up program, as identified in the pilot test. The higher contact rate resulted in reducing the required sample from 12,000 to 9,585.

### MAIL-OUT SURVEY

On the day following the screening call, questionnaire packets were assembled and mailed to those households agreeing to participate in the survey. The packets had different cover letters and number of trip records, depending on household characteristics (e.g., zero vehicle availability, spanish-speaking, and

size). Daily mailings were made with an assigned travel survey date 8 days after the screening call. During the height of the survey, an average of 970 packets were mailed each week.

### FOLLOW-UP CONTACTS

It was determined during the pilot survey that a follow-up telephone call would increase the response rate and possibly enhance the quality of the information. As many as three follow-up contacts were made. The initial call would determine whether the questionnaire had been received and whether there were any questions. A common reaction was that the individual had agreed to participate but changed their mind after seeing the questionnaire. Frequently, people could be convinced that it really was quite simple, particularly when individuals recorded

(a)

## PART 2: TRIP RECORD

FOR PERSON NUMBER 1 (write number from question 2)

Please fill out this form for one person only.

Do NOT report walking or bicycle trips.

Please enter your travel day        /        /         
MONTH DAY

On this day, did you travel outside the home? (check one)

☐ NO — Return questionnaire

☐ YES — Continue below

MY FIRST TRIP TODAY BEGAN AT					
<input type="checkbox"/> Home <input type="checkbox"/> Other Location (fill in) _____					
BEGIN	THIS LOCATION	STARTING AT THIS TIME	FOR THIS PURPOSE (Check one)	BY MEANS OF: (Check all that apply)	NUMBER OF OTHER PERSONS IN VEHICLE
FIRST I WENT TO: 1	Address, Building or Nearest Intersection	_____ am _____ pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→ _____
	City _____				
THEN I WENT TO: 2	Address, Building or Nearest Intersection	_____ am _____ pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→ _____
	City _____				
THEN I WENT TO: 3	Address, Building or Nearest Intersection	_____ am _____ pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→ _____
	City _____				
THEN I WENT TO: 4	Address, Building or Nearest Intersection	_____ am _____ pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→ _____
	City _____				

CONTINUE TRIPS 5 THROUGH 10 ON REVERSE SIDE. THANK YOU.

FIGURE 3 Regional travel survey Part 2: (a) trip record front and (b) trip record back.

(b)

	THIS LOCATION	STARTING AT THIS TIME	FOR THIS PURPOSE (Check one)	BY MEANS OF (Check all that apply)	NUMBER OF OTHER PERSONS IN VEHICLE
THEN I WENT TO: 5	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→
THEN I WENT TO: 6	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→
THEN I WENT TO: 7	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→
THEN I WENT TO: 8	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→
THEN I WENT TO: 9	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→
THEN I WENT TO: 10	Address, Building or Nearest Intersection _____ City _____	: am pm	<input type="checkbox"/> Return Home <input type="checkbox"/> Work <input type="checkbox"/> Work Related <input type="checkbox"/> School <input type="checkbox"/> Shop or Meal <input type="checkbox"/> Other (Social Recreation, Personal)	<input type="checkbox"/> Driver - Car or Truck <input type="checkbox"/> Passenger - Car or Truck <input type="checkbox"/> Bus <input type="checkbox"/> School Bus <input type="checkbox"/> Taxi <input type="checkbox"/> Other	→

IF YOU MADE MORE THAN 10 TRIPS, HOW MANY MORE? \_\_\_\_\_

FIGURE 3 continued

TABLE 2 RESULTS OF INITIAL SCREENING

	Number	Percentage
Completed calls	6,941	72.4
Agreed to participate	3,912	40.8
Refused	2,857	29.8
Dropped	172	1.8
Business/government	129	
Deaf/language	43	
Incompleted calls	2,644	27.6
Telephone disconnected	1,419	14.8
No answer after three calls	1,225	12.8
Total	9,585	100

their own trips. The second call was to determine whether people had completed the questionnaire, answer any remaining questions, and remind them to mail it back. The third call was a reminder to make sure the completed questionnaire had been mailed back. The first-call script is shown in Figure 4.

Follow-up calls were made to approximately 3,900 persons who had initially agreed to participate in the survey. Out of the original participants, about 2,100 (56 percent) reported that they had received the survey form and were willing to participate. A small percentage, generally running between 12 to 16 percent, claimed they had never received the questionnaire. Some of these may have been due to mailing problems with the post office. In other cases, the questionnaire had been received

Hello, may I please speak to **(NAME ON SCREEN)**? (If not in, ask for best time to reach tonight. If not available this evening,) **ASK:**

Did you **receive** the Travel Survey the Houston/Galveston Area Council of Governments mailed to you? (If NO, get correct address, Name, Zip Code and check against list, if same,) **SAY:**

You will probably receive the envelope tomorrow. We will call you back.

If They received packet, **SAY:**

Your travel survey is for tomorrow, **(DATE SHOWN)**. Have you had a chance to look over the survey?

If NO, ask that they look it over and you will call back later.

If YES, **ASK:**

Do you have any **questions** which I might be able to help you with now?

If NO, **SAY:**

Thank you. I will call you tomorrow to see if you have any questions.

If they say they can handle it, **SAY:**

Thank you very much.

If YES, **SAY:**

How can I help you?

**I/We do not have a car.**

We realize many people do not have cars, and we are interested in their travel as well. If you go with someone else, take public transportation or (walk or ride a bicycle), we would like to have the information. I will call you back tomorrow and we can go over your/your family's travel for **(DATE AND DAY INDICATED)**.

**I/We do not go anywhere tomorrow.**

That is alright, many people do not travel every day of the week. We still need the information in order to estimate the total travel for the County.

**I don't understand how to fill it out.**

Let's go over the forms. Once you see how it is done, we can either call you back tomorrow night and take the information over the phone, or you can fill it out and mail it in. We do need your help on this survey.

**My children only go to school on the bus, should I fill it out for them?**

Yes, we are interested in everyone in the household over the age of five, even (if they ride their bike) or are in a car pool.

**We don't want to participate.**

We need your participation. Your help will make it easier for the Houston/Galveston Area Council of Governments to plan for traffic improvements.

**Who do we call to verify this call and survey.**

You may call \_\_\_\_\_.

FIGURE 4 Script for follow-up calls.

but had been discarded by another household member. This may also have been a convenient excuse for refusing to participate in the survey. A second mailing to persons interviewed in the first replicate who agreed to participate if they received a questionnaire elicited a very low response. Therefore, it was decided that the expense of a second mailing was not justified by the results. The follow-up calls also produced additional refusals by people who decided too much work was required or who had agreed earlier as an excuse to hang up the telephone.

## UNDER-REPORTED HOUSEHOLDS

Following the completion of eight replicates, it was determined that the projected total response appeared to be in line with the survey goals but that four individual categories would be substantially below the quota. These were

- Zero-car households with four or more persons,
- One-car households with three persons,

- One-car households with four or more persons, and
- Three- (or more) car households with four or more persons.

Because the number of such households, which would occur on the average in further replicates, was low, and the overall response rate was low, it was decided to do more intensive follow-up among households in these categories that had already received the questionnaire and promised to return it. This was combined with an offer of a \$10 cash incentive for target households in the zero- and one-car category. All willing households in this pool that had not yet returned questionnaires were contacted and, if necessary, mailed a duplicate questionnaire.

The result was a significant increase in responses within each category for a total of 52 additional completed questionnaires. The effect of this intensive follow-up was particularly marked for the one-car household. The three-person category increased from 21 to 38, and the four- (or more) person household response increased from 23 to 39. In these two categories alone, the response rate was increased by 75 percent. Incentive payments were sent to the 33 respondents in one-car household categories. There were no respondents in the zero-car households although they were offered the incentive payment. There were 19 additional respondents in the three- (or more) car households. This was a 15 percent increase and resulted in a total of 143 responses in that category.

## RESPONSE RATE

If telephone contact was made with the household in the sample, certain information about the household was requested before seeking survey participation. Therefore, the household size/vehicle availability category was identified for 4,548 households contacted. The response rate for households in each of these categories is given in Table 3. According to these figures, the rate of participation tends to decrease as household size increases, and the rate for households with no vehicles is much less than for households with at least one vehicle.

## SUMMARY

The number and percentage of sample households in each household size/vehicle availability category and the corresponding percentage of the population households belonging to each category are given in Table 4 for comparison.

Usually, the more significant the category (the larger per-

**TABLE 3 RESPONSE RATES BY HOUSEHOLD SIZE AND VEHICLE AVAILABILITY**

Vehicle Availability	Household Size				
	1 <sup>a</sup>	1 <sup>a</sup>	3 <sup>a</sup>	4+ <sup>a</sup>	Average <sup>a</sup>
0	13	12	8	11	12
1	40	29	29	21	34
2	34	41	31	28	34
3+	41	38	37	28	33
Average	37	37	32	27	33

Note: Includes only those sample households for which household size/vehicle availability category information was obtained (n = 4,548).

<sup>a</sup>Figures in percentages.

**TABLE 4 HOUSEHOLD SIZE AND VEHICLE AVAILABILITY DISTRIBUTION OF SAMPLE AND POPULATION HOUSEHOLDS**

Vehicle Availability	Household Size				Total
	1	1	3	4+	
0					
Responses	10	6	1	2	19
Sample (%)	1	1	1	1	1
Population (%)	4	1	1	1	7
1					
Responses	248	100	38	38	424
Sample (%)	17	7	3	3	28
Population (%)	17	9	5	6	37
2					
Responses	22	342	148	211	723
Sample (%)	1	23	10	14	48
Population (%)	3	15	7	12	37
3+					
Responses	7	72	109	142	330
Sample (%)	1	5	7	9	22
Population (%)	1	4	5	10	19
Totals					
Responses	287	520	296	393	1,496
Sample (%)	19	35	20	26	100
Population (%)	24	29	18	29	100

centage of the total) the better the sample matched the total population. The sample tends to under-represent the categories with small percentages of the total. For those categories, part of the difference may be due to errors in estimating the population from the 1980 U.S. Census Bureau's journey-to-work data. It is clear, however, that the sample does represent the population in those categories generating the most travel in Houston.