

**NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
METROPOLITAN PLANNING ORGANIZATION**

REQUEST FOR PROPOSAL
FOR AN EXTERNAL TRAVEL SURVEY
IN THE DALLAS-FORT WORTH METROPOLITAN AREA

October 1993

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The North Central Texas Council of Governments (NCTCOG) is requesting written proposals from consultants to accomplish an external travel survey during the spring of 1994. In conjunction with major workplace, household, and transit surveys programmed for calendar year 1994, the information collected from the external travel survey will be used to improve the transportation planning process in the Dallas-Fort Worth area. All surveys conducted by consultants for NCTCOG will be coordinated with the Texas Department of Transportation (TxDOT), the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and local agencies.

North Central Texas Council of Governments

The North Central Texas Council of Governments (NCTCOG) was established in 1966 as a voluntary association of cities, counties, and school districts within the 16-county North Central Texas Region. Since 1974, NCTCOG has served as the Metropolitan Planning Organization (MPO) for the North Central Texas area. It provides technical assistance and staff support to the Regional Transportation Council which is the MPO policy-making structure. In addition, NCTCOG assists local governments and transportation providers in planning coordinating, and implementing transportation decisions.

Background

Appendix A contains a description of the travel demand forecasting process currently used in the Dallas-Fort Worth Metropolitan Area. Although workplace, household, and transit surveys

were conducted in the area in 1984, the last comprehensive roadside survey at external station locations was conducted in 1964 by the Texas Department of Transportation. During that year, inbound and outbound motor vehicle drivers were interviewed as they crossed the hypothetical twenty-year urbanized area cordon line at one of 37 roadway locations. Low traffic volume stations were operated for an eight-hour period, those of intermediate volumes for sixteen hours, and those having volumes in excess of 1,000 motor vehicles per day were operated a full 24 hours. Data collected included trip origin, trip destination, vehicle type (automobiles or commercial vehicles), number of occupants, and trip purpose (work, business, medical-dental, school, social-recreation, change travel mode, eat meal, shopping, and serve passengers). It was found that approximately nine percent of all traffic passing these stations was through traffic, having neither an origin nor a destination within the study area. For all through trips, the interviewer determined if stops were made inside the study area, the purpose of those stops, and the highway route of entry or exit.

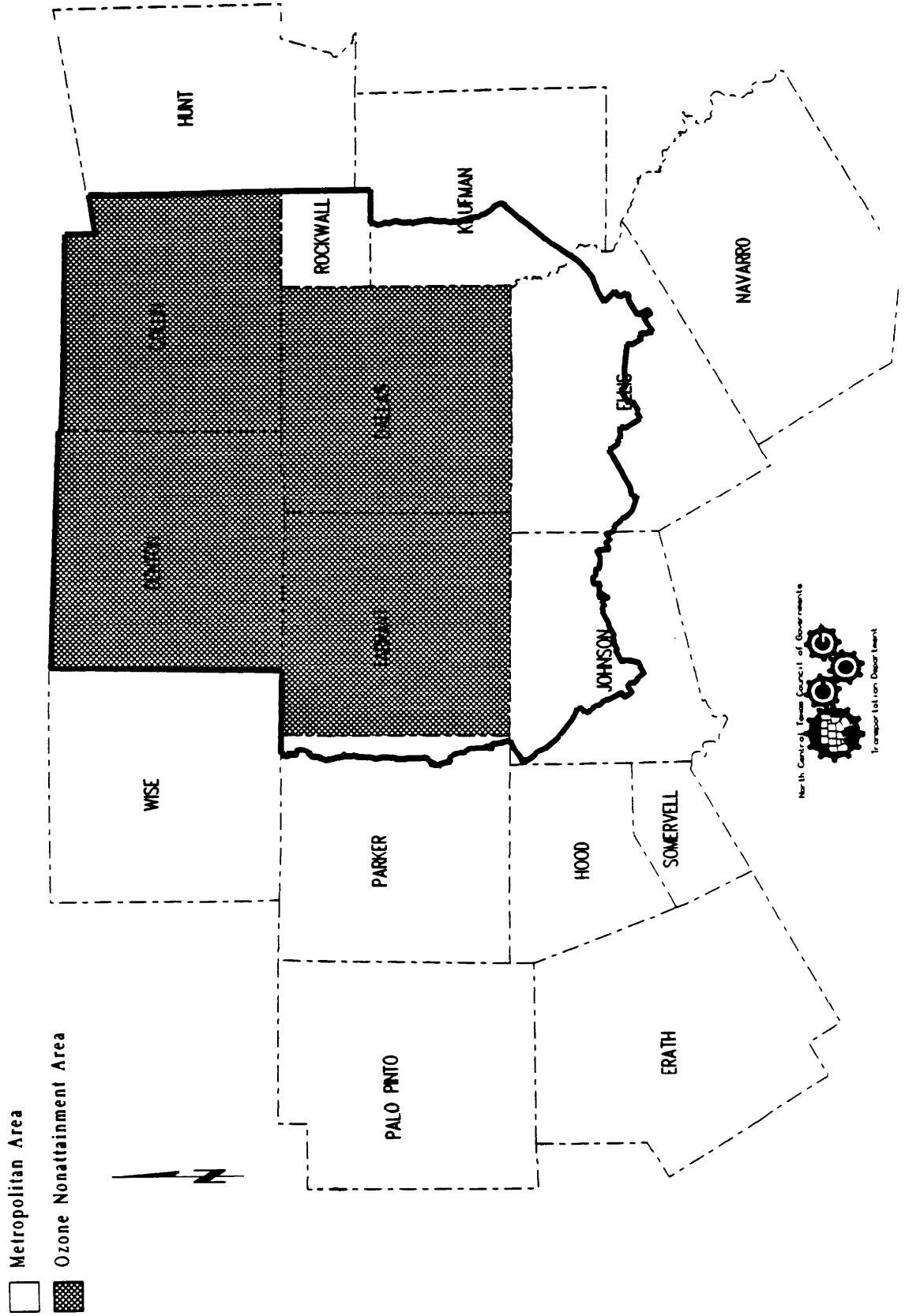
Since the 1964 external travel survey, the boundary for the Dallas-Fort Worth urbanized area has been expanded twice: once in 1984, and again in 1993. The recently-adopted Metropolitan Area boundary (see Figure 1) includes all of Collin, Dallas, Denton, Kaufman, and Tarrant Counties and portions of Ellis, Johnson, Parker, and Rockwall Counties. Prior to 1993, 59 external station locations were coded in the Dallas-Fort Worth regional travel model. The new boundary is expected to have 62 external station locations as identified in Table 1.

Purpose of Survey

The new external travel survey data will be useful for recalibrating the trip generation and distribution models, especially for the “other” trip purpose, and to determine if additional trip purposes will be necessary. Proposals are being requested from firms with both general and

FIGURE 1

TRANSPORTATION AND AIR QUALITY PLANNING AREAS



**TABLE 1
EXTERNAL STATION LOCATIONS FOR
NEW METROPOLITAN AREA BOUNDARY**

ID	ROAD NAME	COUNTY	LOCATION OF BOUNDARY CROSSING
1	US 377	Parker	1.9 miles southwest of Parker/Tarrant County line
2	FM 1187	Parker	0.1 miles east of FM 1187/FM 5 junction
3	IH 20	Parker	Just west of FM 3325
4	FM 1886	Parker	3.0 miles west of Parker/Tarrant County line
5	FM 730	Parker	3.1 miles southwest of FM 730/SH 199 junction
6	SH 199	Parker	3.0 miles northwest of SH 199/FM 730 junction
7	FM 2257	Parker	2.8 miles west of Parker/Tarrant County line
8	FM 730	Tarrant	At Tarrant/Wise County line
9	FM 718	Tarrant	At Tarrant/Wise County line
10	US 287	Tarrant	At Tarrant/Wise County line
11	SH 114	Denton	At Denton/Wise County line
12	FM 407	Denton	At Denton/Wise County line
13	FM 2449	Denton	At Denton/Wise County line
14	US 380	Denton	At Denton/Wise County line
15	FM 455	Denton	At Denton/Wise County line
16	IH 35	Denton	At Denton/Cooke County line
17	US 377	Denton	At Denton/Cooke County line
18	SH 289	Collin	At Collin/Grayson County line
19	FM 3356	Collin	At Collin/Grayson County line
20	US 75	Collin	At Collin/Grayson County line
21	SH 5	Collin	At Collin/Grayson County line
22	FM 3133	Collin	At Collin/Grayson County line
23	SH 160	Collin	At Collin/Grayson County line
24	SH 121	Collin	At Collin/Fannin County line
25	SH 78	Collin	At Collin/Fannin County line
26	FM 981	Collin	At Collin/Hunt County line
27	FM 1562	Collin	At Collin/Hunt County line
28	FM 2194	Collin	At Collin/Hunt County line
29	US 380	Collin	At Collin/Hunt County line
30	FM 6	Collin	At Collin/Hunt County line
31	SH 66	Collin	At Collin/Hunt County line

TABLE 1 (Continued)
EXTERNAL STATION LOCATIONS FOR
NEW METROPOLITAN AREA BOUNDARY

ID	ROAD NAME	COUNTY	LOCATION OF BOUNDARY CROSSING
32	IH 30	Rockwall	At Rockwall/Hunt County line
33	FM 35	Rockwall	At Rockwall/Hunt County line
34	SH 276	Rockwall	At Rockwall/Hunt County line
35	SH 205	Rockwall	At Rockwall/Kaufman County line
36	US 80	Kaufman	0.2 miles west of IH 20/US 80 junction
37	IH 20	Kaufman	0.5 miles east of FM 1641
38	FM 148	Kaufman	0.7 miles east of FM 148/FM 1641 junction
39	US 175	Kaufman	0.5 miles west of FM 2578
40	SH 34	Kaufman	2.0 miles southwest of US 175
41	FM 148	Kaufman	Just southeast of SH 34
42	FM 2451	Kaufman	Just east of SH 34
43	FM 1181	Ellis	0.1 miles southeast of SH 34
44	FM 1181	Ellis	4.0 miles east of IH 45
45	FM 85	Ellis	3.0 miles east of IH 45
46	IH 45	Ellis	1.0 miles south of FM 85
47	FM 1183	Ellis	3.0 miles south of Lake Bardwell Drive
48	SH 34	Ellis	2.3 miles west of FM 1183
49	FM 877	Ellis	2.0 miles south of Lake Waxahachie
50	IH 35E	Ellis	2.5 miles south of FM 876
51	FM 876	Ellis	2.5 miles south of IH 35E
52	FM 66	Ellis	0.1 miles north of FM 66/FM 916 junction
53	FM 2258	Ellis	At Ellis/Johnson County line
54	IH 35W	Johnson	2.3 miles south of US 67
55	FM 4	Johnson	0.1 miles southeast of FM 3136
56	FM 2135	Johnson	Just south of Cleburne city limits
57	SH 171	Johnson	0.2 miles southeast of SH 174
58	SH 174	Johnson	1.0 miles south of SH 171
59	US 67	Johnson	4.0 miles west of SH 171
60	FM 4	Johnson	5.0 miles west of SH 171
61	FM 2331	Johnson	Just south of SH 171
62	SH 171	Johnson	1.5 miles southeast of US 377

specific experience to perform the entire external travel survey. Each proposal should include detailed descriptions of how quality control will be maintained during data collection. This will be a specific requirement in the final contract and the successful firm will be held responsible for providing clean, usable, and accurate data for use in determining travel model inputs.

The tasks identified below in the Scope of Services are believed to be the minimum necessary to accomplish this project. Those firms responding should base their proposals on these tasks. Any expansion or alternative methodologies will be accepted provided they are clearly identified as variations so that a complete analysis can be made by the Consultant Selection Committee.

Scope of Services

The external travel survey will collect data on the number and purpose of trips (both vehicle and person) that are outbound from the Dallas-Fort Worth Metropolitan Area on a typical nonsummer weekday. The survey procedure will be an on-site interview of every Nth outbound vehicle at all external stations (the value for N will vary by location and will be based on the number of vehicles passing during the survey period divided by the desired sample size). Despite the fact that it is easier to administer a mailback survey at high-volume locations, the results from other external travel surveys conducted in Texas show that more reliable data is gathered through the personal interview process. Figure 2 contains a draft “External Travel Survey Interview Form” prepared by the Texas Transportation Institute that have been used by TxDOT for previous surveys in Texas.

The proposer is encouraged to comment on the proposed format and questions, and recommend changes that may be warranted. Suggestions raised by NCTCOG staff about the

EXTERNAL TRAVEL SURVEY INTERVIEW FORM

External Station #: _____ External Station Name/Location: _____

Survey Date: _____ Interviewer: _____

For each vehicle you collect:

	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5
Time	a.m. p.m.	a.m. p.m.	a.m. p.m.	a.m. p.m.	a.m. p.m.
Number people in vehicle					
Vehicle type (choose from options)					
Vehicle license number and state					
INSTRUCTIONS: Ask of driver Part A questions if traveling through (city) area; Ask Part B questions if local (city) origin.					
1. What year, make, and model is this vehicle? Gas or diesel?	Year	Year	Year	Year	Year
	Make	Make	Make	Make	Make
	Model	Model	Model	Model	Model
	Gas? <input type="checkbox"/> Diesel? <input type="checkbox"/>	Gas? <input type="checkbox"/> Diesel? <input type="checkbox"/>	Gas? <input type="checkbox"/> Diesel? <input type="checkbox"/>	Gas? <input type="checkbox"/> Diesel? <input type="checkbox"/>	Gas? <input type="checkbox"/> Diesel? <input type="checkbox"/>
2. What is the mileage on your odometer?					
3. Are you traveling through the greater (city) area on route to your final destination or did your trip begin in the (city) area?	1) Through (city) 2) (City) origin	1) Through (city) 2) (City) origin	1) Through (city) 2) (City) origin	1) Through (city) 2) (City) origin	1) Through (city) 2) (City) origin
4. What was your purpose for being at the location where you last got into your vehicle? (Choose from trip purposes below.)					
5. What approximate time did you leave the above location?	a.m. p.m.	a.m. p.m.	a.m. p.m.	a.m. p.m.	a.m. p.m.
6. What is your purpose for traveling to your next destination? (Choose from trip purposes below.)					
PART A If traveling through: What highway did you use to enter the greater (city) area?					
PART B If local: Where was the last place you got into your vehicle? place/address or nearest intersection/city					
Trip Purpose Options 1) Home/Return Home 6) Shop/Buy gas, etc. 2) Go to work 7) Pick up/Drop off passenger 3) Work related 8) Change travel mode 4) School 9) Delivery 5) Social/Recreational/Eat 0) Other (specify in block)			Arrival Options 1) Passenger (car/truck/van/motorcycle) 2) Bus 3) Taxi 4) School bus 5) Commercial vehicle (over 1 ton) 6) Other (specify in block)		

proposed survey form include the following:

- 0 The question on vehicle type options may need to be expanded to include other breakdowns
- Questions related to the year, make, and model of a vehicle, the gas versus diesel designation, and the odometer reading may be useful for air quality modeling but are not necessary for determination of travel behavior; it may be desirable to eliminate these questions from this survey.
- The text related to question 3 (Are you traveling through the area on route to your final destination or did your trip begin in the area?) may need some clarification to make it a simpler question to answer (e.g., how to define a trip).
- Changes to the Part B question about “the last place you got into your vehicle” may be necessary to improve the address geocoding process.

The proposer should also identify the information and assistance that will be requested from NCTCOG, TxDOT, and other agencies.

Task 1 - Site Selection

Each external site will require a traffic control plan which must be approved by TxDOT District 18 (Dallas) and/or TxDOT District 2 (Fort Worth) personnel and meet the requirements of the Texas Manual on Uniform Traffic Control Devices. The traffic control plan should detail a process for narrowing the traffic lanes down to one through lane in the outbound direction and address procedures to mitigate traffic congestion.

The selection of the actual survey sites will be done jointly with NCTCOG and TxDOT District staff, with assistance from the consultant. The consultant will assist TxDOT staff in setting up the traffic controls. It is recommended that a video tape of the traffic control devices for each site be made in the field before each survey in order to provide a record of the traffic control plan. Please note that costs for video taping, police personnel, etc. should be included in the proposal since these will be the responsibility of the consultant.

For development of the detailed work plan and cost estimates, the proposer should assume that the 62 external stations previously identified in Table 1 will represent the survey sites (the proposer should also assume that each location has more than 500 outbound vehicles in a 12-hour period). Additions or deletions to the number of survey sites may be considered by NCTCOG during the final work plan and budget negotiations.

Task 2 - Conducting the Survey

The survey will be a personal interview of every Nth vehicle which has been directed out of the travel lane, onto the shoulder, and stopped (some of the interviewers will need to speak both English and Spanish). If any drivers do not want to participate, they will be allowed to leave. The surveys will be conducted on Mondays through Thursdays during daylight hours for a duration of 12 hours. The survey may not be conducted during inclement weather or during school, state, or national holidays. The proposal should indicate whether the interviewer will write down the driver's information or use a hand-held computer for direct data entry.

Due to different volumes at each external station, the sample size at each station location may vary. A minimum of 300 completed and usable surveys should be taken at external stations having 12-hour volumes of 500 or more vehicles in the outbound direction. If any stations have

12-hour outbound volumes less than 500 vehicles (which has not yet been determined), 100 percent of the vehicles at those locations should be attempted to be surveyed.

In addition to the roadside interviews, a 24-hour traffic count (recorded at 15-minute intervals) will be taken at each external station for each direction on the day of the survey. Additional counts will be required at a particular location if it is later determined that the original count is invalid for any reason. Finally, all vehicles passing through the survey station during the 12-hour survey period will be manually classified by vehicle type, based on the “vehicle type options” to be utilized by the roadside interviewer.

In addition to the methodology and costs for the actual survey, the proposer should include a program for pilot testing, review of the preliminary results, and subsequent modifications to the consultant’s proposed survey design (if improvements to the procedures or interview questions are warranted).

Task 3 - Correcting Survey Data

The external station survey data obtained will be coded and entered by the consultant in a pre-specified microcomputer format. After clerical and other edit checks are made by the consultant, the file will be forwarded to NCTCOG every two weeks. NCTCOG, with TxDOT’s assistance, will process the files using computer programs designed to identify missing or inconsistent information. Those records identified as incomplete, illogical, etc., will be returned to the consultant for correction or further editing. The consultant will be responsible for correcting errors found in the data by NCTCOG and/or TxDOT during the survey and within three months following the completion of the survey.

Task 4 - Processing and Geocoding Survey Data

The geocoding of trip addresses from all of the usable responses to NCTCOG's traffic survey zone structure is an important element of this project. Due to NCTCOG's access to an existing address geocoding program (Arc/Info) on a Sun minicomputer system, NCTCOG staff will actively participate in the geocoding of survey data and the creation of external through and external local trip matrices.

Development of the final work plan and budget regarding the consultant's involvement in the geocoding of the surveyed trip records will be subject to negotiation prior to contract award. The proposer is asked to develop a preliminary work plan and budget for a procedure in which NCTCOG will be able to automatically geocode a high percentage of the surveyed trip records. The proposer is encouraged, for example, to consider modified on-site interview procedures (such as the use of maps) for improving the accuracy of a driver's response to "the last place you got into your vehicle" or "what highway did you use to enter the area."

Task 5 - Media Coverage

The external travel survey to be conducted in the Dallas-Fort Worth area in 1994, as well as other travel surveys, will involve large numbers of private citizens. It is important that a concentrated effort be undertaken to inform the public of the surveys, their general purposes, some of the procedures involved, the use of the information, and the benefits to be derived. The intent is to let people know, before the survey, what is happening in the community and try to alleviate fears and misapprehensions and create a level of confidence for individuals that may be asked to participate in the survey. The consultant, in cooperation with TxDOT and NCTCOG, will be responsible for designing and implementing a public awareness campaign.

The proposal should include specific details as to the efforts and methods that will be used to accomplish this campaign.

Task 6 - Survey Documentation and Reporting

The consultant is expected to meet periodically with a Project Review Committee that will be developed to monitor the work effort. During the time period over which the actual surveys are conducted, the consultant should hold progress report meetings every two weeks with this committee at NCTCOG offices.

Ten (10) draft copies of the external survey report must be provided to NCTCOG within one month of the last field survey (the last survey is expected to be completed in May of 1994) for review and comment. Following acceptance of the final report, fifty (50) reports must be prepared and delivered to NCTCOG with all corrections and comments incorporated in the final version. Final reports should be neatly bound with attractive covers. The report should contain tables, charts and/or graphs wherever applicable to improve clarity. The final document should address the following:

- Executive Summary
- Survey training and pilot survey results
- Final survey design and survey instruments
- Traffic control plans
- Survey implementation, timetable, and quality control
- Geocoding process
- Survey results and analysis, including refusal summaries

Federal financial assistance must **be** acknowledged in the front of the report in the following format:

Prepared in cooperation with the Texas Department of Transportation and the United States Department of Transportation, Federal Highway Administration and the Federal Transit Administration.

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the views or policies of the Federal Highway Administration, the Federal Transit Administration, or the Texas Department of Transportation.

In addition to the 50 copies, the final report will also be delivered as a reproducible copy and on a microcomputer floppy disk in WordPerfect or Microsoft Word format. Completed external survey forms, computer data files, and video tapes shall become the property of NCTCOG. The forms shall be sorted by ID Number before they are turned over to NCTCOG.

Schedule and Budget

The consultant will develop in the proposal, a schedule of tasks, with completion deadlines for each task. The consultant's schedule should be based on a Notice to Proceed in late December of 1993 and an overall time frame of eight months (January to August of 1994). Pilot surveys and final survey design should be completed in January and February of 1994, with the actual travel surveys performed in March, April, and May of 1994. The consultant will be responsible for correcting any errors found in the data for a period of up to three months following the completion of the survey.

The funds available for all travel survey-related consultant projects in the Dallas-Fort Worth area are approximately \$1.5 million in calendar year 1994. The funds to be allocated to the external travel survey will depend on the consultant's- approach proposed for this project. Proposers are encouraged to submit their proposal in the best terms possible as cost will be one of the basis of evaluation of the proposals. To assist the Consultant Selection Committee in their evaluations, the proposal should identify total costs for each project task.

Consultant Selection Criteria

The Consultant Selection Committee will review all proposals and select a firm it considers qualified to undertake the project. The following criteria will be used to evaluate all proposals:

- | | |
|--|------------|
| 1. Project Understanding | 25 percent |
| 2. Scope of Services | 25 percent |
| 3. Project Managers/Staff Qualifications | 20 percent |
| 4. Project Cost | 15 percent |
| 5. Firm Qualifications/Consultant References | 10 percent |
| 6. Study Schedule | 5 percent |

Other Requirements

- 0 Disadvantaged Business Enterprise participation meets 13 percent goal
- . Affirmative Action Plan included

Consultant interviews may be required in order to make a final consultant selection at NCTCOG's offices. Following final negotiations of the work plan and costs satisfactory to NCTCOG, the consultant will be asked to execute a contract with NCTCOG. A Notice to

Proceed will be issued immediately upon execution of the contract by the NCTCOG Executive Board and approval by TxDOT and the Federal Highway Administration. NCTCOG reserves the right to reject any and all proposals, to -contract for any or all portions of the project with the selected consultant(s), or to call in additional firms.

The successful responder(s) to this RFP must understand that they are expected to provide qualified personnel to accomplish each portion of the work in this study. NCTCOG will maintain the right to request the removal of any personnel found, in their opinion, during the course of work on this project, to be unqualified to perform the work.

APPENDIX A

Travel Demand Forecasting Process for the Dallas-Fort Worth Metropolitan Area

October 1993

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INTRODUCTION

The Dallas-Fort Worth Regional Travel Model is used to prepare long-range vehicle and transit ridership forecasts for a 3,200 square mile metropolitan area with a population of over three million people. The four-step model consists primarily of mainframe FORTRAN programs that are similar to the Urban Transportation Planning System (UTPS) software package. Recent updates have been based on the results of the 1984 home interview, workplace, and transit on-board surveys, as well as the 1980 U.S. Census Journey-to-Work data. Future updates will be guided by ISTEA (Intermodal Surface Transportation Efficiency Act) and EPA (Environmental Protection Agency) requirements and based on 1990 Census findings, new 1994 travel surveys, and ongoing highway and transit counts.

ACTIVITY ALLOCATION

Demographic and land-use forecasts are made for the 16-county North Central Texas region of 13,000 square miles and 4.1 million people (as of 1990). The forecasting methodology used in 1987 and 1993 had three stages:

1. Develop regional control totals of employment (five land-use types) and households (four income groups) that are based on estimates from national models.
2. Use EMPAL (Employment Allocation Model) and DRAM (Disaggregated Residential Allocation Model) to allocate control totals to districts in five-year increments, based on relative attraction factors such as district-to-district peak-period travel times and proximity to existing population and employment.
3. Within each district, allocate employment and households to traffic survey zones (**TSZs**) after accounting for local factors such as availability of developable land, policy and zoning constraints, and local government review.

TRIP GENERATION

The cross-classification trip generation model calculates weekday person trip productions and attractions for each of the 6,000 TSZs that make up the metropolitan area. Seven trip purposes are used:

- Home-Based Work -- Low Income (HBW1 = Income Quartile 1)
- Home-Based Work -- Low-Median Income (HBW2 = Income Quartile 2)
- Home-Based Work -- High-Median Income (HBW3 = Income Quartile 3)
- Home-Based Work -- High Income (HBW4 = Income Quartile 4)
- Home-Based Nonwork (HNW)
- Nonhome-Based (NHB)
- OTHER (truck, taxi, internal-external, external-internal, and external-external)

Four income categories for HBW trips are maintained so that the trip distribution model can balance the household incomes of residences with the household incomes of employees working at specific locations.

Input data for each TSZ includes total area, households, population, and employment, with employment grouped according to Standard Industrial Classification code: Basic (SIC 13-51) Retail (SIC 52-59), and Service (SIC 60-99). Each TSZ record also identifies average socioeconomic characteristics for the larger-sized Regional Analysis Area (RAA) that encloses the TSZ (each RAA generally contains nine to ten TSZs).

Trip Productions. The RAA averages for household income, household size, and area type are used to identify the trip production rates in Tables 1 and 2 to apply to a TSZ:

- Income -- Each zone's households are distributed among the four income quartiles according to a set of curves developed from the 1980 Census data; the ratio of RAA income divided by regional income is the independent variable that is used to predict the fraction of households that fall in each income quartile.
- Household Size -- In a manner similar to income distribution, the RAA's average household size is the independent variable that is used to predict the fraction of households in a zone that fall in each household size category.
- Area Type -- An activity density based on the combined population and employment density of an RAA is calculated, with employment factored by the regional population/employment ratio; five area types are used:
 - 1 = Central Business District (Density > 125 per acre)
 - 2 = Outer Business District (Density = 30-125 per acre)
 - 3 = Urban Residential (Density = 7.5-30 per acre)
 - 4 = Suburban Residential (Density = 1.8-7.5 per acre)
 - 5 = Rural (Density < 1.8 per acre)

Trip Attractions. The RAA averages for employment income and area type are used to identify the trip attraction rates in Table 3 to apply to a TSZ. The percent of each zone's employment that falls within a particular income quartile is calculated from regression equations that account for the proximity of the zone to households of each income quartile. The underlying assumption is that people live relatively close to the place they work, and low-income neighborhoods are more likely to have low-income jobs than high-income jobs.

**Table 1. Trip Production Rates by Household Size
and Income Quartile**

	Household Size					
	1	2	3	4	5	6+
Home-Based Work Trip Productions (Person Trips per Household)						
Income Quartile 1 (low)	1.000	1.700	1.800	1.846	2.500	2.875
Income Quartile 2	1.204	1.970	2.423	2.864	2.667	3.300
Income Quartile 3	1.552	2.267	2.812	2.824	3.696	3.846
Income Quartile 4 (high)	1.600	2.800	2.848	3.198	3.439	5.286
Home-Based Nonwork Trip Prod's (Person Trips per Household)						
Income Quartile 1 (low)	2.185	3.167	3.524	4.500	4.833	6.875
Income Quartile 2	1.620	2.791	4.028	5.682	8.000	7.700
Income Quartile 3	1.724	2.740	4.205	6.500	8.478	8.385
Income Quartile 4 (high)	2.455	3.145	4.527	6.840	8.927	14.143
Nonhome-Based Trip Productions (Person Trips per Household)						
Income Quartile 1 (low)	1.300	1.600	1.714	2.000	1.500	0.750
Income Quartile 2	1.611	1.657	2.014	2.500	2.208	1.800
Income Quartile 3	1.690	2.093	2.188	2.989	3.522	2.077
Income Quartile 4 (high)	3.364	3.275	2.866	2.821	3.463	3.357

Table 2. Trip Production Rates by Area Type

	Area Type				
	1	2	3	4	5
Other Person Trip Productions					
Per Basic Employee	0.264	0.298	0.395	0.488	1.007
Per Retail Employee	0.395	0.632	0.791	0.969	1.318
Per Service Employee	0.264	0.290	0.380	0.527	0.796
Per Household	0.375	0.375	0.375	0.375	0.375

Table 3. Trip Attraction Rates by Area Type

	Area Type				
	1	2	3	4	5
Home-Based Work Trip Attractions (Person Trips per Basic Employee)					
Income Quartile 1 (low)	1.677	1.384	1.413	1.312	1.389
Income Quartile 2	1.695	1.454	1.300	1.277	1.464
Income Quartile 3	1.545	1.421	1.300	1.260	1.530
Income Quartile 4 (high)	1.378	1.296	1.300	1.388	1.521
Home-Based Work Trip Attractions (Person Trips per Retail Employee)					
Income Quartile 1 (low)	1.500	1.486	1.643	1.400	1.455
Income Quartile 2	1.500	1.363	1.400	1.400	1.400
Income Quartile 3	1.467	1.435	1.736	1.634	1.400
Income Quartile 4 (high)	1.500	1.300	1.344	1.358	1.286
Home-Based Work Trip Attractions (Person Trips per Service Employee)					
Income Quartile 1 (low)	1.732	1.296	1.424	1.402	1.422
Income Quartile 2	1.700	1.322	1.430	1.295	1.338
Income Quartile 3	1.700	1.341	1.365	1.456	1.566
Income Quartile 4 (high)	1.704	1.258	1.265	1.323	1.244
Home-Based Nonwork Person Trip Attractions					
Per Basic Employee	0.453	0.442	0.300	0.200	0.139
Per Retail Employee	0.811	1.144	8.796	8.060	6.164
Per Service Employee	1.574	1.005	1.000	1.059	1.812
Per Household	0.442	0.500	0.511	0.627	0.682
Nonhome-Based Person Trip Attractions					
Per Basic Employee	0.500	0.655	0.858	0.589	0.500
Per Retail Employee	1.100	1.462	4.272	3.717	2.978
Per Service Employee	0.600	0.877	1.167	1.243	1.095
Per Household	0.100	0.104	0.216	0.261	0.235
Other Person Trip Attractions					
Per Basic Employee	0.208	0.235	0.312	0.385	0.795
Per Retail Employee	0.312	0.499	0.624	0.765	1.040
Per Service Employee	0.208	0.229	0.300	0.416	0.628
Per Household	0.299	0.299	0.299	0.299	0.299

Special Generators and External Stations. The 1984 workplace survey identified six special generator categories:

1. Regional shopping malls (15 locations)
2. Universities and colleges (ten locations)
3. Hospitals (six locations)
4. Commercial airports (three locations)
5. Regional recreation facilities (one location)
6. Military installations (two locations)

To handle special generators, the trip generation model first applies the trip attraction rates from Table 3 to the employment from these generators; the model user must then directly input any additional trips associated with special generators to each trip purpose.

External station data is added by the model user to the "OTHER" trip purpose category. The projected station volumes take into account trends both within and external to the metropolitan area.

Trip Balancing. The trip generation model goes through a final routine in which trip productions and attractions are balanced (i.e., normalized) by trip purpose:

- For HBW trips, total person trip productions within each income quartile are factored so that they equal total person trip attractions within each income quartile.
- For HNW and OTHER trips, total person trip attractions are factored so that they equal total person trip productions.
- For NHB trips, total person trip attractions are first factored so that they equal total person trip productions; the original person trip productions in each zone are then discarded and reset to equal the zone's NHB attractions.

ZONE AND NETWORK PREPARATION

The data sets known as the Transportation Information System (TIS) contain over **6,000** TSZs, 20,000 roadway link segments, and 14,000 network nodes. A focusing technique has been developed in which the activity of the entire Dallas-Fort Worth region can be handled in a manageable and computationally efficient problem size. Two modeling approaches have been developed:

1. The regional model consists of aggregating the 6,000 TSZs into 800 analysis zones, with the zones defined so that each one contains approximately the same level of trip activity in the forecast year. The region's Regional Transportation Plan, "Mobility 2010," is based on this approach.

2. A subarea model may also contain 800 zones, but with a zone structure that increases in size as one gets away from the area of interest. The recent Regional Arterial Needs Assessment (RANA) project consisted of 12 separate subarea models, with TSZs defined as analysis zones in each subarea's area of interest. For six of these subareas, the mainframe network and zonal data was downloaded to the microcomputer DOS environment so that the TRANPIAN software package could be used to perform trip distributions and traffic assignments.

To prevent unusual highway loading problems, the link level must be matched with the zone level whenever possible. Special FORTRAN programs have been written to automate the process of generating a balanced network and zone structure.

TRIP DISTRIBUTION

The trip distribution gravity model uses a "second order" Bessel function as the decay curve to estimate the number of person trips between each pair of zones for each of the seven trip purposes. The model uses cumulative minimum travel times between zones:

- For the four HBW trip purposes, link speeds are calculated by multiplying the link's free flow speed by a peak-period estimated loaded speed (ELS) factor. The ELS factor is obtained from a look-up table that varies by functional class, number of lanes on a roadway, location of the roadway in the region, and the forecast year.
- For the HNW, NHB, and OTHER trip purposes, link speeds are calculated by multiplying the link's estimated free flow speed by an off-peak ELS factor obtained from a look-up table that is similar to the peak-period table.
- All zone-to-zone travel times include the "terminal" time spent locating a parking space, paying for parking, and walking from the car to the office; these estimated times vary by area type and trip end (production versus attraction) and were derived from the 1984 workplace survey.

Each roadway link's estimated free flow speed is calculated as (link length) / (total travel time), in which total travel time is equal to travel time at the speed limit plus total traffic control delay. Traffic control delay is estimated as follows:

- Intervening controls represent stop delays experienced at an intersection with streets not coded in the network; each intervening control is assumed to equal 12 seconds of delay.
- End-node intersection control delays are assumed to be 22 seconds at a two-way stop and 14 seconds at a four-way stop; if a traffic signal is coded, the delay varies by functional class and area type and ranges from 7-15 seconds.

For each trip purpose, the distribution model is iterated 7-10 times to ensure that the estimated number of trips received by each zone equals the projected number of trip attractions.

MODE CHOICE

The mode choice model calibrated in 1988 (based on the 1984 home interview survey and 1984 on-board transit survey) is a simple multinomial logit model providing various choice sets for three trip purposes:

HBW -- Five modes: drive alone, 2 occupant shared ride, 3+ occupant shared ride, walk access to transit, and auto access to transit.

HNW - Four modes: drive alone, 2+ occupant shared ride, walk access to transit, and auto access to transit.

NHB -- Three modes: drive alone, 2+ occupant shared ride, and transit.

Model Coefficients. Tables 4, 5 and 6 present the model coefficients and constants used for each trip purpose. Impedances for HBW trips are based on peak periods, while impedances for HNW and NHB trips are based on off-peak periods. Four types of variables are represented:

1. Variables that describe the transportation system, such as times and costs
2. Location-specific variables that capture otherwise unmeasurable effects of travel to or from certain types of areas, such as the CBD
3. Socioeconomic characteristics of the traveler's household, such as autos per person
4. Mode-specific constants for travelers with no restrictions on their choice sets, for zero-car households (captive to transit-walk access and shared ride modes), and for managers/self-employed persons (captive to drive alone and shared ride modes)

HOV Assignment. To permit analysis of HOV lane impacts, the HBW mode choice model can read two sets of highway impedances. One set represents the highway travel times available to travelers in mixed-flow traffic, while the other represents the reduced travel times available to travelers with occupancies that qualify for the HOV lanes. The model assigns the appropriate travel time to each occupancy alternative and computes mode shares that recognize the impact of HOV time savings.

**Table 4. Hourly Service Volume Per Lane
(Level of Service E)**

Functional Class	Area Type				
	1	2	3	4	5
Freeway	1,800	1,850	1,875	1,950	2,000
Freeway Ramp	1,100	1,200	1,250	1,400	1,500
Frontage Road					
Divided	550	600	625	700	750
Undivided	500	550	575	625	675
Principal Arterial					
Divided	550	600	650	725	800
Undivided	500	550	600	675	725
Minor Arterial					
Divided	550	600	625	700	750
Undivided	500	550	575	625	675
Collector Street					
Divided	450	475	500	550	575
Undivided	400	425	450	500	525
Local Street					
Divided	450	475	500	550	575
Undivided	400	425	450	500	525

**Table 5. Home-Based Work Mode Choice Model
Coefficients and Constants**

VARIABLE DESCRIPTION	Drive Alone	Shared Ride (2 pers.)	Shared Ride (3+ pers.)	Transit/Walk	Transit/Drive
IVT = In-Vehicle Travel Time, Excluding Drive Time to Transit, minutes	-0.029670	-0.029670	-0.029670	-0.029670	-0.029670
TERMINAL = Time at Both Ends of a Trip, minutes	-0.055240	-0.055240	-0.055240	0.000000	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	0.000000	-0.055240	-0.055240
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.004649	-0.004649	-0.004649	-0.004649	-0.004649
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.000000	3.100000	0.000000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.011623	-0.011623	-0.011623	0.000000	0.000000
AUTOS/PERSON = Number of Autos per Person in the Household	0.000000	-1.256000	-1.256000	-0.721800	0.000000
AUTOS/HOUSEHOLD = Numbers of Autos in the Household	0.000000	0.000000	0.000000	-0.866000	-0.529700
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-0.258900	-0.362680	3.516120	3.234250
FT. WORTH CBD FLAG (1 = Attraction in CBD)	0.000000	0.491750	0.354340	2.669160	1.870840
FWAITLT7 = First Wait Time for Transit, Seven Minutes or Less	0.000000	0.000000	0.000000	-0.054920	-0.054920
FWAITGT7 = First Wait Time for Transit, Excluding the First Seven Minutes	0.000000	0.000000	0.000000	-0.028730	-0.028730
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	0.000000	-0.059090	-0.059090
HOV = Time Savings per Mile for Vehicles Using HOV, minutes	0.000000	0.130000	0.130000	0.000000	0.000000
INCOME QUARTILE for the Household (1 = Low, 4 = High)	0.000000	0.000000	0.000000	-0.493400	-0.100000
DETERRENT = Auto Access Time - Transit IVT for NonCBD Zones, Minutes	0.000000	0.000000	0.000000	0.000000	-0.660400
CHOOSERS (1 = Yes)	0.000000	-0.693560	-1.705190	0.358150	-3.361420
ZERO-CAR HHOLDS (1 = Yes)	0.000000	-2.073120	-2.261870	3.117990	0.000000
SELF EMPLOYED (1 = Yes)	0.000000	-1.024280	-1.491550	0.000000	0.000000

**Table 6. Home-Based NonWork Mode Choice Model
Coefficients and Constants**

VARIABLE DESCRIPTION	Drive Alone	Shared Ride (2+ pers.)	Transit/Walk	Transit/Drive
IVT = In-Vehicle Travel Time, Excluding Drive Time To Transit, minutes	-0.003680	-0.003680	-0.003680	-0.003680
TERMINAL = Time at Both Ends of a Trip, minutes	-0.007360	-0.007360	0.000000	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	-0.007360	-0.007360
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.002300	-0.002300	-0.002300	-0.002300
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.200000	0.000000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.005750	-0.005750	0.000000	0.000000
AUTOS/PERSON = Number of Autos per Person in the Household	0.000000	-0.953600	-0.678000	0.000000
AUTOS/HOUSEHOLD = Numbers of Autos in the Household	0.000000	0.000000	-0.269400	-0.269400
HOUSEHOLD SIZE = Persons per Household	0.000000	0.254200	0.418900	0.482500
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-1.838400	1.667260	0.958500
FT. WORTH CBD FLAG (1 = Attraction in CBD)	0.000000	-1.020430	1.354110	0.422540
RURAL AREA FLAG (1 for Area Type 5)	0.000000	0.659200	0.000000	0.000000
WAIT TIME = Wait Time for Transit, minutes	0.000000	0.000000	-0.014720	-0.014720
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	-0.014720	-0.014720
INCOME QUARTILE for the Household (1 = Low, 4 = High)	0.000000	0.000000	-0.884500	-0.884500
CHOOSERS (1 = Yes)	0.000000	0.375450	-2.234640	-4.881230
ZERO-CAR HHOLDS (1 = Yes)	0.000000	2.756830	3.496340	0.000000
SELF EMPLOYED (1 = Yes)	0.000000	0.459230	0.000000	0.000000

Transit Network Coding. The transit network is coded over the roadway links for those modes and lines which share the right-of-way with automobiles. Special links are added for nodes operating on an exclusive right-of-way. -A supply-side simulation program processes each transit line to approximate actual operating characteristics.

Maximum transit access distances are assumed to be 2.5 miles for walk links and 15.0 miles for auto-access links. A FORTRAN program has been written to automatically generate up to four walk-to-local links, four walk-to-express links, and four drive-access links for each origin zone.

TRANSIT ASSIGNMENT

Four separate all-or-nothing assignments of weekday transit production-attraction person trips are performed:

- HBW walk-access transit trips loaded onto peak-period walk paths
- HBW drive-access transit trips loaded onto peak-period drive paths
- HNW and NHB walk-access transit trips loaded onto off-peak period walk paths
- HNW and NHB drive-access transit trips loaded onto off-peak period drive paths

After trip assignment, a time-of-day post-processing technique computes total peak and off-peak volumes on each transit link by reallocating the loadings according to the observed regionwide distribution of transit trips by purpose and access mode.

TRAFFIC ASSIGNMENT

The roadway assignment model uses a capacity-restrained incremental procedure to assign origin-destination vehicle trips to the roadway network. The minimum path-building routine uses a generalized cost equation (based on travel time, distance, and cost parameters) for the calculation of link impedance. The initial impedance for assignment purposes is based on free flow (uncongested) speeds. As traffic is loaded onto the links, the speed is reduced according to a volume-delay relationship and link impedances updated accordingly.

Weekday Assignment. Traffic assignments are generally performed for a weekday period, since most model validations by NCTCOG are made with weekday counts rather than peak-hour counts. Although an off-peak roadway network is used, the travel time estimates for the path-building routine are based on delays associated with peak periods. Separate volume-delay equations are used for high- and low-capacity facilities, in which high-capacity facilities (usually freeways) are normally defined as those exceeding 3,400 one-way vehicles per hour.

The volume-delay equation for high-capacity facilities is:

$$\begin{aligned} &\text{Delay (in minutes/mile)} \\ &= \text{Minimum of [} 0.015 \times \text{EXP}(5.30 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

The volume-delay equation for low-capacity facilities is:

$$\begin{aligned} &\text{Delay (in minutes/mile)} \\ &= \text{Minimum of [} 0.05 \times \text{EXP}(3.00 \times (\text{hourly volume/hourly capacity})), 10] \end{aligned}$$

For the volume-delay equations, weekday link volumes are converted to hourly volumes using factors of 0.10 for freeway facilities and 0.12 for nonfreeway facilities (factors ranging from 0.08 to 0.14 have been used in some subarea studies). Hourly capacities are assumed to represent Level of Service "E" volumes. The capacities vary by functional class, area type, number of lanes, and divided/undivided designation and are obtained from the look-up table shown in Table 7.

Peak-Hour Assignment. In addition to using different volume-delay equations and a peak-period roadway network, the peak-hour assignment process requires the use of a peak-hour trip table. Peak-hour distribution factors by time-of-day (morning or afternoon), trip purpose (HBW, HNW, NHB, and OTHER), and trip orientation (production versus attraction) are applied to the daily production-attraction person trip tables before the tables are converted to origin-destination vehicle trip tables. The distribution factors were obtained from the 1984 home interview survey.

The volume-delay equation for high-capacity facilities is:

$$\begin{aligned} &\text{Delay (in minutes/mile)} \\ &= \text{Minimum of [} 0.015 \times \text{EXP}(7.00 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

The volume-delay equation for low-capacity facilities is:

$$\begin{aligned} &\text{Delay (in minutes/mile)} \\ &= \text{Minimum of [} 0.05 \times \text{EXP}(4.50 \times (\text{hourly volume/hourly capacity})), 10] \end{aligned}$$

PERFORMANCE REPORTS

The travel model process includes various post-processing programs that are used to summarize traffic and transit assignment results. The PERF report, for example, prints highway performance summaries by various geographic aggregations of highway links and zones. Two model applications can be quickly compared in terms of:

- Total trips sent and received;
- Average trip length sent and received;
- Centerline roadway miles by functional class;
- Lane miles by functional class;
- Lane miles at levels of service A, B, C, D, E, or F by functional class;

**Table 7. Nonhome-Based Mode Choice Model
Coefficients and Parameters**

VARIABLE	Drive Alone	Shared Ride (2+ pers.)	Transit/ Walk-Auto
IVT = In-Vehicle Travel Time, Excluding Drive Time To Transit, minutes	-0.012160	-0.012160	-0.012160
TERMINAL = Time at Both Ends of a Trip, minutes	-0.024320	-0.024320	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	-0.024320
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.004350	-0.004350	-0.004350
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.200000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.007020	-0.007020	0.000000
DALLAS CBD FLAG (1 = Production in CBD)	0.000000	-0.971410	1.301880
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-1.835180	0.349430
FORT WORTH FLAG (1 = Production in CBD)	0.000000	-0.549750	0.491930
FORT WORTH FLAG (1 = Attraction in CBD)	0.000000	-0.591560	0.920620
WAIT TIME = Wait Time for Transit, minutes	0.000000	0.000000	-0.085120
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	-0.085120
DENSITY = Employment Density, employees/acre	0.000000	0.000042	0.000000
ALL GROUPS—CONSTANT	0.000000	-0.285670	-2.242330

- Hourly capacity by functional class;
- Vehicle miles of travel by functional class;
- Vehicle hours of travel by functional class;
- Average free speed and average loaded speed by functional class;
- Vehicle hours of traffic control delay and congestion delay by functional class; and
- Fuel consumption, accidents, and emissions by functional class.

**NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
METROPOLITAN PLANNING ORGANIZATION**

REQUEST FOR PROPOSAL
FOR A WORKPLACE TRAVEL SURVEY
IN THE DALLAS-FORT WORTH METROPOLITAN AREA

October 1993

**REQUEST FOR PROPOSAL
FOR A WORKPLACE TRAVEL SURVEY
IN THE DALLAS-FORT WORTH METROPOLITAN AREA**

The North Central Texas Council of Governments (NCTCOG) is requesting written proposals from consultants to accomplish a workplace travel survey during the spring of 1994. In conjunction with major external station, household, and transit surveys programmed for calendar year 1994, the information collected from the workplace travel survey will be used to improve the transportation planning process in the Dallas-Fort Worth area. All surveys conducted by consultants for NCTCOG will be coordinated with the Texas Department of Transportation (TxDOT), the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and local agencies.

North Central Texas Council of Governments

The North Central Texas Council of Governments (NCTCOG) was established in 1966 as a voluntary association of cities, counties, and school districts within the 16-county North Central Texas Region. Since 1974, NCTCOG has served as the Metropolitan Planning Organization (MPO) for the North Central Texas area. It provides technical assistance and staff support to the Regional Transportation Council which is the MPO policy-making structure. In addition, NCTCOG assists local governments and transportation providers in planning, coordinating, and implementing transportation decisions.

Background

Comprehensive regional travel surveys in the Dallas-Fort Worth area were last conducted in 1984. The home interview survey gathered data on household travel patterns, the workplace

survey collected both employee and nonemployee trip data at the workplace, and the on-board transit survey provided information on trips using transit. The results of these surveys were used extensively in the late 1980s to update the Dallas-Fort Worth Regional Travel Model. Appendix A contains a description of the region's existing travel demand forecasting process.

The workplace survey conducted in the summer and fall of 1984 was the first such survey ever undertaken in the Dallas-Fort Worth area. The main objective of the survey was to improve the estimation of trips attracted to various land uses for NCTCOG's travel forecasting process, as well as to obtain additional information on travel patterns in the region. A total of 474 non-residential establishments and seven special generators were surveyed. The seven special generators were designated by NCTCOG to ensure that certain land uses and facilities received special attention in the development of trip attraction rates. They included a hospital, a high school, an amusement park (Six Flags Over Texas), a truck terminal, a regional shopping mall, a college/university, and a commercial airport (DFW International Airport). With the exception of DFW Airport, the same basic procedures and the same questionnaires and forms used in surveying other workplaces were used for the special generators.

The following contains additional information about the 1984 workplace survey:

- The initial sample was based on systematically selecting 33 to 50 workplaces from an retail, and service). The establishment file consisted of NCTCOG's 1977 socio-Bradstreet file of establishments. A weighting methodology was established to ensure that the probability of an establishment being included in the sample was proportional to its number of employees.

- An endorsement letter approved by the local Chamber of Commerce was sent to each business being sampled in a particular week. Phone contact was made three or four days later to solicit support for the survey.

- The interviewer visited the business prior to the survey day and obtained the information shown in Figure 1. Employee questionnaires (see Figure 2) were delivered and the employer was asked to distribute the questionnaires to and collect them from the employees. Pickup was done following the survey day. In the case of businesses with more than 100 employees, questionnaires were distributed by the employer to a random subset of all employees:
 - If 100-500 employees: 100 questionnaires + one for every two employees over 100
 - If 500 or more employees: 300 questionnaires

- The nonemployee questionnaire (see Figure 3) was distributed by a field surveyor who handed out these questionnaires at the entrances to a sampled establishment. An arrival count (see Figure 4) of all persons entering each establishment was also taken by a field surveyor on the survey day.

- Truck counts (see Figure 5) were obtained for a subsample of the sampled establishments and included the type of truck by the time of day of arrival at the establishment.

- Expansion factors were used for each establishment to account for employees who were not surveyed and employees and nonemployees who received a questionnaire but failed to return it. The sampled establishments were then expanded to represent the total employment of the study areas.

North Central Texas Council of Governments
1984 Workplace Survey

EMPLOYER INTERVIEW

Interview: Date _____ Day _____ Time _____

1. Name, address, and telephone number of establishment

Name _____ Telephone _____
Address _____
City _____ Zip Code _____

2. Name, title, department, and telephone number of contact person

Name _____ Department _____
Title _____ Telephone _____

3. Number of employees by shift

_____ : _____ A.M./P.M. to _____ : _____ A.M./P.M. Employees _____
_____ : _____ A.M./P.M. to _____ : _____ A.M./P.M. Employees _____
_____ : _____ A.M./P.M. to _____ : _____ A.M./P.M. Employees _____

4. Attendance on survey day: _____ (to be filled in following survey day)

5. Survey day _____ Date _____

6. Employee questionnaires delivered _____ to _____

7. Non-employee questionnaires delivered _____ to _____

8. Location of site entrances:

- Draw diagram of site or building; show entrances and surrounding streets and landmarks. If truck counts are being conducted here, note loading docks and delivery areas on diagram.
- Estimate number of surveyors needed: _____

FIGURE 2



North Central Texas Council of Governments
1984 EMPLOYEE TRAVEL SURVEY

The North Central Texas Council of Governments is sponsoring a survey of travel in the Dallas-Fort Worth area. We ask your cooperation by answering each of the questions below. If possible, please return this questionnaire to the person who gave it to you.

YOUR ANSWERS WILL BE KEPT CONFIDENTIAL AND WILL ONLY BE USED TO PRODUCE STATISTICAL DATA NEEDED TO IMPROVE TRANSPORTATION SERVICES IN THE AREA.

A. At what TIME do you usually arrive at work? _____ A.M. P.M. (write time and circle A.M. or P.M.)

B. HOW did you travel to work this morning? (Circle number)

1. I drove by myself.
2. I drove a car with others as passengers.
3. I was a passenger in a car driven by someone else.
4. I walked or bicycled.
5. I rode a motorcycle.
6. I rode in a vanpool.
7. I rode in a taxi.
8. I rode a bus.

C. If you traveled to work by auto, truck, or van, HOW MANY PERSONS were in the vehicle, including yourself? _____ (enter number of persons)

D. If you were the DRIVER today, how much did you PAY TO PARK? Free I paid \$ _____

E. If you were the DRIVER today, how many BLOCKS away from work did you park? (Circle number)

- 1 or less
- 2
- 3
- 4
- more than 4

F. If you traveled BY BUS to get to work today, how did you get to your first bus stop? (Circle number)

1. I drove by myself.
2. I drove a car with others as passengers.
3. I was a passenger in a car driven by someone else.
4. I walked or bicycled.
5. I rode a motorcycle.
6. I rode in a vanpool.
7. I rode in a taxi.

G. Did you make any STOPS on your way TO work today? (Check yes or no)

No, I traveled directly to work.

Yes, I made the following stops:

IF YES, please check the purpose for EACH stop

PURPOSE OF STOP	STOP MADE			
	1st Stop	2nd Stop	3rd Stop	4th Stop
Work Related	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shopping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
School	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social/Recreational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eat a Meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pick Up or Drop Off a Passenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

H. Did you make any STOPS on your way home FROM work yesterday for your last weekday at work?

No, I traveled directly home.

Yes, I made the following stops:

IF YES, please check the purpose for EACH stop

PURPOSE OF STOP	STOP MADE			
	1st Stop	2nd Stop	3rd Stop	4th Stop
Work Related	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shopping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
School	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social/Recreational	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Eat a Meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pick-Up or Drop Off a Passenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I. Did you make a trip(s) during working hours yesterday for your last weekday at work?

No Yes If yes, please check purpose for each trip.

1ST TRIP PURPOSE	2ND TRIP PURPOSE	3RD TRIP PURPOSE	4TH TRIP PURPOSE	MEANS OF TRAVEL		AND THEN:	
				1	2	1	2
<input type="checkbox"/> Work Related	<input type="checkbox"/> Work Related	<input type="checkbox"/> Work Related	<input type="checkbox"/> Work Related	<input type="checkbox"/> Auto	<input type="checkbox"/> Auto	<input type="checkbox"/> Back to Work	<input type="checkbox"/> Back to Work
<input type="checkbox"/> Shopping	<input type="checkbox"/> Shopping	<input type="checkbox"/> Shopping	<input type="checkbox"/> Shopping	<input type="checkbox"/> Bus	<input type="checkbox"/> Bus	<input type="checkbox"/> In 2nd Trip	<input type="checkbox"/> In 4th Trip
<input type="checkbox"/> School	<input type="checkbox"/> School	<input type="checkbox"/> School	<input type="checkbox"/> School	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> In 3rd Trip	<input type="checkbox"/> In 4th Trip
<input type="checkbox"/> Social/Recreational	<input type="checkbox"/> Social/Recreational	<input type="checkbox"/> Social/Recreational	<input type="checkbox"/> Social/Recreational	<input type="checkbox"/> Personal Business	<input type="checkbox"/> Personal Business	<input type="checkbox"/> Get a Meal	<input type="checkbox"/> Get a Meal
<input type="checkbox"/> Personal Business	<input type="checkbox"/> Personal Business	<input type="checkbox"/> Personal Business	<input type="checkbox"/> Personal Business	<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Home	<input type="checkbox"/> Home
<input type="checkbox"/> Eat a Meal	<input type="checkbox"/> Eat a Meal	<input type="checkbox"/> Eat a Meal	<input type="checkbox"/> Eat a Meal	<input type="checkbox"/> Means of Travel	<input type="checkbox"/> Means of Travel	<input type="checkbox"/> AND THEN:	<input type="checkbox"/> AND THEN:
<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Pick Up/Drop Off a Passenger	<input type="checkbox"/> Auto	<input type="checkbox"/> Auto	<input type="checkbox"/> Back to Work	<input type="checkbox"/> Back to Work
<input type="checkbox"/> Home	<input type="checkbox"/> Home	<input type="checkbox"/> Home	<input type="checkbox"/> Home	<input type="checkbox"/> Bus	<input type="checkbox"/> Bus	<input type="checkbox"/> In 2nd Trip	<input type="checkbox"/> In 4th Trip
<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> Other	<input type="checkbox"/> In 3rd Trip	<input type="checkbox"/> In 4th Trip

J. How many AUTOS, PICKUPS, and VANS are available for use by members of your household? _____ (enter number)

K. What is your OCCUPATION? _____

L. What is your home ADDRESS? _____

 Number and Street City Zip Code

M. What is your annual HOUSEHOLD INCOME? (Circle number)

1. Less than \$5,000
2. \$ 5,000-\$ 9,999
3. \$10,000-\$14,999
4. \$15,000-\$19,999
5. \$20,000-\$24,999
6. \$25,000-\$29,999
7. \$30,000-\$34,999
8. \$35,000-\$39,999
9. \$40,000-\$50,000
10. More than \$50,000

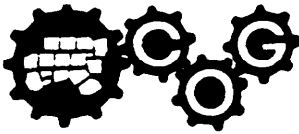


FIGURE 3

**North Central Texas Council of Governments
1984 NON-EMPLOYEE TRAVEL SURVEY**

The North Central Texas Council of Governments is sponsoring a survey of travel in the Dallas-Fort Worth area. We ask your cooperation by answering each of the questions below. If possible, please return this questionnaire to the person who gave it to you. If not, just place it in any mailbox.

YOUR ANSWERS WILL BE KEPT CONFIDENTIAL AND WILL ONLY BE USED TO PRODUCE STATISTICAL DATA TO IMPROVE TRANSPORTATION SERVICES IN THE AREA.

A. Is your regular place of employment at this address? (Circle number)

- 1. Yes
- 2. No

IF YOU ANSWERED "YES" TO QUESTION A, DO NOT ANSWER THE REMAINING QUESTIONS AND PLEASE RETURN THIS FORM TO THE PERSON WHO GAVE IT TO YOU.

IF YOU ANSWERED "NO," PLEASE CONTINUE.

B. At what TIME did you arrive here today? (Circle number)

- 1. Before 7:00 A.M.
- 2. 7:00 A.M. to 9:00 A.M.
- 3. 9:00 A.M. to 3:00 P.M.
- 4. 3:00 P.M. to 6:00 P.M.
- 5. After 6:00 P.M.

C. Where did you START the trip that brought you to this address?

_____ Street Address (or nearest intersection or place name) _____ City _____ Zip Code

Is this your home? Yes No

D. HOW did you get here? (Circle number)

- 1. I drove by myself.
- 2. I drove a car with others as passengers.
- 3. I was a passenger in a car driven by someone else.
- 4. I walked or bicycled.
- 5. I rode a motorcycle.
- 6. I rode in a vanpool.
- 7. I rode in a taxi.
- 8. I rode a bus.

E. If you traveled to this place by auto, truck, or van, HOW MANY PERSONS were in the vehicle, including yourself? _____ (enter number of persons)

F. If you were the driver today, how many BLOCKS away from here did you park?

- 1 or less
- 2
- 3
- 4
- more than 4

G. If you traveled BY BUS to get to this place, how did you get to your first bus stop? (Circle number)

- 1. I drove by myself.
- 2. I drove a car with others as passengers.
- 3. I was a passenger in a car driven by someone else.
- 4. I walked or bicycled.
- 5. I rode a motorcycle.
- 6. I rode in a vanpool.
- 7. I rode in a taxi.

H. What is the REASON for your trip here? (Circle number)

- 1. I work here
- 2. Work related
- 3. Shopping
- 4. School
- 5. Social/recreational
- 6. Personal business
- 7. Eat a meal
- 8. Pick up or drop off a passenger

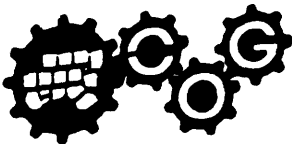


FIGURE 4

North Central Texas Council of Governments
1984 Workplace Survey
ARRIVAL COUNT

Sample Number Day Date

Number of Entrances _____

Name of Establishment

Location

Type of Establishment (Retail, Basic, or Service)

Contact Person

Non-employee Questionnaire Serial Numbers From _____ To _____
From _____ To _____



Location of Entrances
(Draw Diagram)
Indicate this Entrance with
an X

Time	Total Number of Entering Persons	Comments (Please note number of truck deliveries at this entrance)
12 M - 7 AM		
7 AM - 9 AM		
9 AM - 12 Noon		
12 Noon - 3 PM		
3 PM - 6 PM		
6 PM - 9 PM		
9 PM - 12 M		

TOTAL

Surveyor on Site _____ : _____ AM

_____ : _____ PM

Establishment From _____ : _____ AM
Operation To _____ : _____ AM
PM

Surveyor

Supervisor

FIGURE 5



**North Central Texas Council of Governments
Workplace Survey
TRUCK COUNT**

 Sample Number Day Date

Number of Entrances _____

Name of Establishment

Location of Establishment

Location of Entrances (Draw Diagram) Indicate this Entrance with an X

Type of Establishment

Time	Light Trucks (Pickups, Vans, etc.)	Heavy Trucks (Single Unit)	Heavy Trucks (Multi-Units)	Other Delivery Vehicles	Total Number of Truck Arrivals	Comments
12 M - 6 AM						
7 AM - 9 AM						
9 AM - 12 Noon						
12 Noon - 3 PM						
3 PM - 6 PM						
6 PM - 9 PM						
9 PM - 12 M						

TOTAL

Surveyor on Site _____ : _____ AM

_____ : _____ PM

Hours of Establishment Operation

From _____ : _____ AM
To _____ : _____ PM

Surveyor

Supervisor

- Trip attraction rates for an establishment were determined using the ratio of employee and nonemployee trips to the total employment for each trip purpose. Arrival count information was not available for 120 of the surveyed establishments, 19 of which were airline offices located at DFW Airport. Because arrival count data was vital in processing the workplace survey, establishments lacking this information were not included in the estimation of trip attraction rates.
- The workplace survey did not account for the employee's trip home following a nonhome-based trip, resulting in a potential underestimate of the home-based nonwork trip rate per employee. This data had to be obtained from the home interview survey.

Cross-classified person trip attraction rates were developed from the findings of the 1984 survey. There were, as in most model specifications, significant variations in observed weekday person trip attraction rates per employee for a particular employment type, area type, and trip purpose. Some of the other explanatory factors that may account for variations in both trip rates and trip lengths include:

- The types of businesses within each basic, retail, and service employment categories
- Levels of individual business marketing
- Economic conditions of the business market area
- Proximity to residences and other developments
- Extent and composition of land uses in multi-use developments
- Availability of alternative travel modes (e.g., transit)
- Availability of pedestrian facilities, parking, and other amenities
- Number, occupation, age, sex, race, and income of employees at the workplace

- Availability of employer-sponsored trip reduction programs
- Location (and severity) of local traffic congestion

Since the 1984 survey, the boundary for the Dallas-Fort Worth urbanized area has been expanded. The new Metropolitan Area boundary (see Figure 6) includes all of Collin, Dallas, Denton, Kaufman, and Tarrant counties and portions of Ellis, Johnson, Parker, and Rockwall Counties.

Purpose of Survey

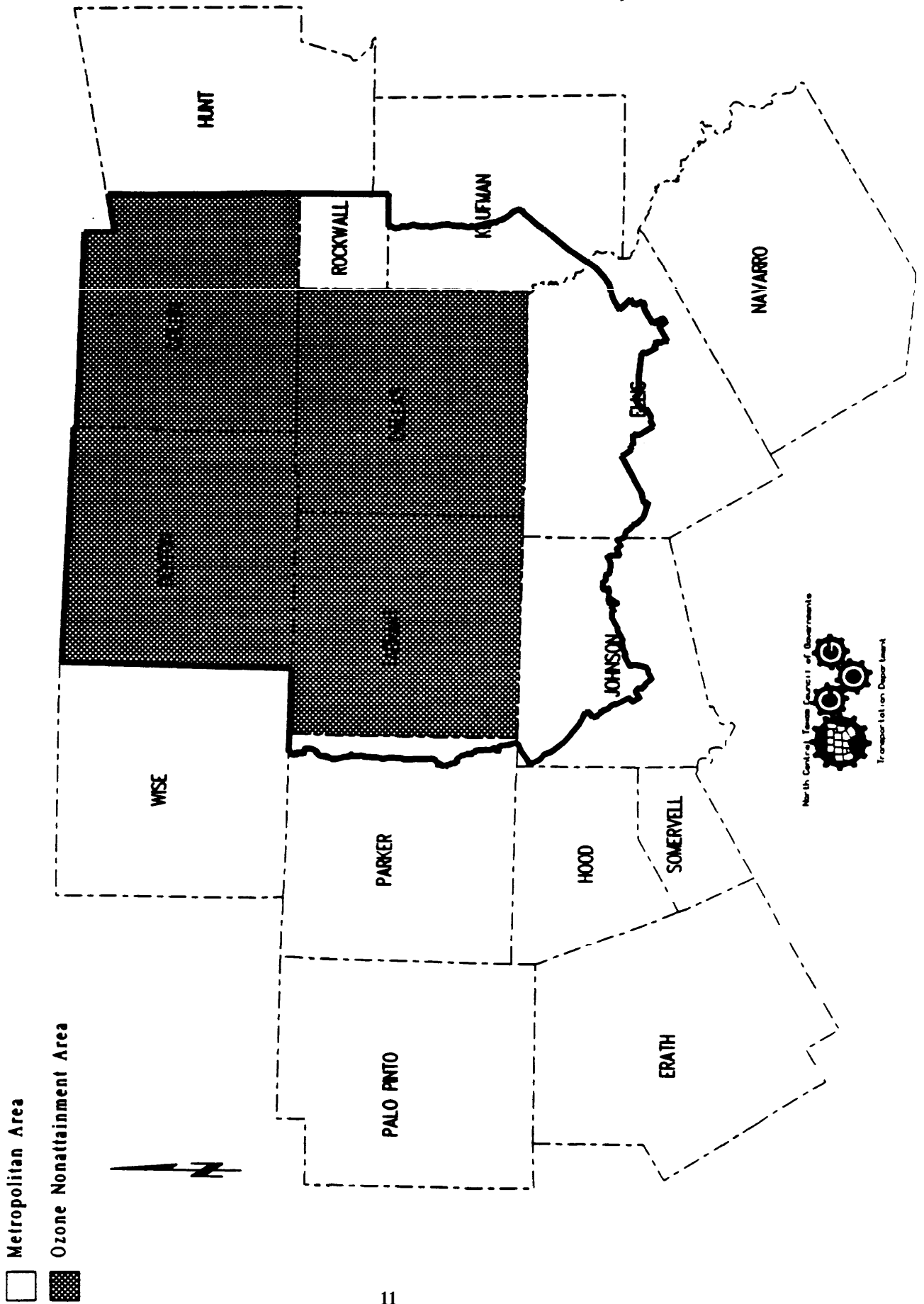
The new workplace travel survey data will be useful for re-calibrating the trip generation and distribution models currently utilized by NCTCOG, and may also provide useful information for updating the mode choice and post-processor models. In addition to obtaining a better understanding of travel behavior, related objectives include the following:

1. To document changes in workplace travel characteristics that have occurred since the 1984 survey and to compare these characteristics with other regions in Texas.
2. **To provide a source of local data on trip generation characteristics and to compare this data with trip generation statistics available from ITE's fifth edition of the Trip Generation manual.**

Proposals are being requested from firms with both general and specific experience to perform the entire workplace survey. Each proposal should include detailed descriptions of how quality control will be maintained during data collection. This will be a specific requirement in the final contract, and the successful firm will be held responsible for providing clean, usable, and accurate data for use in determining travel model inputs.

FIGURE 6

DALLAS-FORT WORTH METROPOLITAN AREA BOUNDARY



The tasks identified below in the Scope of Services are believed to be the minimum necessary to accomplish this project. Those firms responding should base their proposals on these tasks. Any expansion or alternative methodologies will be accepted provided they are clearly identified as variations so that a complete analysis can be made by the Consultant Selection Committee.

Scope of Services

The workplace survey will obtain information on trip generation characteristics of employees and the number of trip ends due to nonemployees at both freestanding and nonfree-standing workplaces. Three data collection efforts will be used to develop attraction rates for the travel demand modeling process: one deals with employees, another deals with nonemployees, and a third identifies the total number of vehicles and/or persons arriving and departing the workplace during its hours of operation.

Based on previous workplace and special generator surveys in Texas, a number of forms have been developed by the Texas Department of Transportation (TxDOT) and the Texas Transportation Institute (TTI):

- The “Workplace General Information Survey” and “Workplace Survey Data File Format, General Information Survey” forms are shown in Figures 7 and 8.

- The “Activity Center General Information Survey” and “Workplace Survey Data File Format, Activity Center Data” forms are shown in Figures 9 and 10.

- The “Special Generator General Information Survey” and “Special Generator Survey General Information File” forms are shown in Figures 11 and 12.

Survey Date: _____
 Record Type 9

Site # _____
 SIC Code: _____
 Serial Zone: _____
 Area Type: _____
 Employment Type: _____
 Free Standing
 Non-Free Standing

WORKPLACE GENERAL INFORMATION SURVEY FORM

Workplace Information

 Name

 Street Address

 City State Zip Code Telephone

Management Information

CEO/Administrator: _____
 Name Telephone

 Title

Personnel Manager
 or _____
 Name Telephone

Other Contact: _____
 Title

Security Director: _____
 Name Telephone

 Title

Weekday Hours of Operation: _____

Commercial Truck Count² _____ Vehicle Count¹ _____ Person Count² _____

Employment Information

Total Employees: _____
 (Full- and Part-time) No. of Employees at Work on Survey Day _____

If Multiple Shifts: _____
 Times If Multiple Shifts: _____
 No. of Employees per Shift

Parking Information (Optional)

Parking spaces: _____
 Number & Location Parking fee(s): _____

Delivery Information

Loading Docks: _____
 Number & Location(s)

Delivery Hours (If restricted): _____
 No. of Deliveries on Day of Survey _____

Transit Information

Bus Stop(s): _____
 Number & Location(s)

Bus Route(s): _____
 Name(s)/Number(s)

Layout / Site Plan

Requested: _____
 Date Location

Received: _____
 Date Location

¹ 24-Hour Count
² Total Count During Hours of Operation

FIGURE 8

**Workplace Survey Data File Format
General Information Survey**

This file will contain the general data collected from each workplace surveyed. The following format will be used in storing the data in an ASCII data file.

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be 9.
2. Month	3	4	Numeric RJ	I2	Month workplace was surveyed.
3. Day	5	6	Numeric RJ	I2	Day that workplace was surveyed.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace being surveyed.
5. SIC ¹ Code	11	14	Numeric RJ	I4	Standard Industrial Classification code of the workplace being surveyed.
6. Area Type	15	15	Numeric RJ	I1	Code indicating area type of zone the workplace is located within.
7. Employment Type	16	16	Numeric RJ	I1	Code indicating type of employment at the workplace being surveyed; 1 - Basic, 2 - Retail, 3 - Service.
8. <u>Zone</u>	17	21	Numeric RJ	I5	Zone where workplace is located.
9. Type of Worksite	22	22	Numeric RJ	I1	Code indicating type of worksite; 1 - Free Standing, 2 - Non-Free Standing.
10. Hours of Operation	23	24	Numeric RJ	I2	Normal hours of operation during weekdays.
11. Total Employment	25	29	Numeric RJ	I5	Total employment at workplace being surveyed. This includes employees not at work on day of survey.
12. Employees at Work	30	34	Numeric RJ	I5	Total number of employees at work at workplace on the day the survey was conducted. Only those employees physically at work.
13. Multiple Shifts	35	35	Numeric RJ	I1	Code indicating whether workplace being surveyed has multiple work shifts; 1 - Yes, 2 - No.
14. Parking Spaces	36	40	Numeric RJ	I5	Amount of parking provided at the workplace being surveyed for employees and customers.
15. Parking Cost	41	46	Numeric RJ	F6.2	Cost for parking.
16. Deliveries	47	49	Numeric RJ	I3	Number of deliveries made on day of survey.
17. Truck Count	50	52	Numeric RJ	I3	Number of commercial trucks counted entering and exiting the workplace site during the 24 hour period the survey was conducted.
18. Vehicle Count	53	57	Numeric RJ	I5	Total number of vehicles (non-commercial trucks) counted entering and exiting the workplace during the 24 hour period the survey was conducted.
19. Person Count	58	62	Numeric RJ	I5	Total number of persons counted entering and exiting workplace during its hours of operation.
20. Bus Stops	63	65	Numeric RJ	I3	Number of bus stops considered within a reasonable distance to serve workplace being surveyed.
21. Bus Routes	66	67	Numeric RJ	I2	Number of bus routes which provide service to workplace being surveyed.

Record Type 10

ACTIVITY CENTER GENERAL INFORMATION SURVEY FORM

Traffic Count¹: _____ Commercial Truck Count²: _____ Person Count² (if applicable): _____

Workplace to Be Surveyed on: _____
month / day

_____ Name

_____ Site Number

Other Workplaces

1) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

2) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

3) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

4) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

5) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

6) Name: _____

Employment Type: _____ Total Employees: (Full- and Part-Time) _____ No. Employees at Work on Survey Day: _____

¹ 24-Hour Count
² Total for Hours of Operation

FIGURE 10

Workplace Survey Data File Format
Activity Center Data

This file will contain the data collected on workplaces in the same activity center as the workplace being surveyed. Each workplace will have a single record with the following format used to store the data in an ASCII data file.

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates the type of record, here it should be 10.
2. Month	3	4	Numeric RJ	I2	Month workplace is being surveyed.
3. Day	5	6	Numeric RJ	I2	Day of the month workplace is being surveyed.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace <u>being surveyed</u> in this activity center.
<u>5. Zone</u>	11	15	Numeric RJ	I5	Zone where activity center is located.
6. Truck Count	16	20	Numeric RJ	I5	Total number of commercial trucks counted entering and exiting the activity center during the 24 hour period the workplace was surveyed.
7. Vehicle Count	21	25	Numeric RJ	I5	Total number of vehicles (non-commercial trucks) counted entering and exiting the activity center during the 24 hour period the workplace was surveyed.
8. Person Count	26	30	Numeric RJ	I5	Total number of persons counted entering and exiting the activity center during its hours of operation. This will only apply to certain activity centers.
9. Number	31	33	Numeric RJ	I3	Unique non-zero number assigned to this workplace in the activity center. The data in this record is for this workplace.
10. Employment Type	34	34	Numeric RJ	I1	Code indicating type of employment at this workplace; 1 - Basic, 2 - Retail, 3 - Service.
11. Total Employment	35	39	Numeric RJ	I5	Total employment at <u>this</u> workplace. Includes employees not at site on day of survey.
12. Employees at Work	40	44	Numeric RJ	I5	Total number of employees at work at this workplace on day of survey.

SPECIAL GENERATOR GENERAL INFORMATION SURVEY FORM

Record Type 12

Survey Date: _____

Special Generator:

Address:

Site #: _____

SIC Code: _____

Serial Zone: _____

Area Type: _____

Employment Type: _____

CEO / Administrator:

Personnel Manager:
(or Other Contact)

Security Director:

Weekday Hours of Operation:

24-Hour Counts:

Employment Information

Employees:
(Full and Part-Time)

Military Personnel:

Civilian Employees:

If Shifts:

Miscellaneous

Total Student Enrollment:

Students Living On-Campus:

Number of Hospital Beds:

Number of Flights Per Day:

Number of Deplaning Passengers:

Delivery Information

Dock Delivery Hours (if restricted):

Transit Information

Bus Stops / Bus Routes:

Parking Information (Optional)

Amount:

Cost:

Layout / Site Plan

Requested:

Received:

	Name	
	Street Address	
	City	State
		Zip Code
	Telephone	
	Name	
	Title	Telephone
	Name	
	Title	Telephone
	Name	
	Title	Telephone
	Vehicles	Persons
	Total	Survey Day
	Living On-Base	Living Off-Base
	Living On-Base	Living Off-Base
	Times	Employees (# / shift)
		Commercial Truck Count
	Location(s) / Numbers / Names	Location(s) / Numbers / Names
	Spaces / Type	Spaces / Type
	Date	Location
	Date	Location

FIGURE 12

Special Generator Survey General Information File

This file will contain the general information data collected from each special generator included in the survey. The following format will be used in storing the data in an ASCII data file:

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code indicating type of record. Here it should be 12.
2. Month	3	4	Numeric RJ	I2	Month generator was surveyed.
3. Day	5	6	Numeric RJ	I2	Day of month generator was surveyed.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to each special generator.
5. SIC Code	11	14	Numeric RJ	I4	Standard Industrial Classification of the special generator.
6. Area Type	15	15	Numeric RJ	I1	Code indicating the area type where the generator is located.
7. Employment Type	16	16	Numeric RJ	I1	Code indicating the type of employment at the special generator. 1 - Basic; 2 - Retail; 3 - Service.
<u>8. Zone</u>	17	20	Numeric RJ	I4	Zone number where special generator is located.
9. Name	21	50	Alphanum. LJ	A30	Name of special generator.
10. Hours of Operation	51	52	Numeric RJ	I2	Number of hours in operation during a normal weekday.
11. Number of Vehicles	53	57	Numeric RJ	I5	Total number of vehicles entering and exiting the generator during the 24 hours the travel survey was conducted.
12. Number of Persons	58	63	Numeric RJ	I6	Total number of persons counted entering and exiting the special generator during the 24 hour period the travel survey was conducted.
13. Total Employment	64	68	Numeric RJ	I5	Total number of persons (full and part time) employed at the special generator.
14. Employees at Work	69	73	Numeric RJ	I5	Total number of employees at work on day the travel survey was conducted.
15. On Base Military	74	78	Numeric RJ	I5	If special generator is a military base, this is the total number of military personnel living on base. Otherwise this value is blank.
16. Off Base Military	79	83	Numeric RJ	I5	If special generator is a military base, this is the number of military personnel living off base. Otherwise it is blank.
17. On Base Civilians	84	88	Numeric RJ	I5	If special generator is a military base, this is the number of civilian employees who live and work on base. Otherwise it is blank.
18. Off Base Civilians	89	93	Numeric RJ	I5	If special generator is a military base, this is the number of civilian employees who live off base and work on base. Otherwise it is blank.
19. Number of Shifts	94	94	Numeric RJ	I1	Number of work shifts at special generator.
20. Employees per Shift	95	99	Numeric RJ	I5	Number of employees per work shift.
21. Student Enrollment	100	104	Numeric RJ	I5	If special generator is a school, this is the total number of students enrolled in the school. Otherwise it is blank.
22. Living On-Campus	105	109	Numeric RJ	I5	If special generator is a school, this is the total number of students living on campus. Otherwise it is blank.
23. Hospital Beds	110	114	Numeric RJ	I5	If special generator is a hospital, this is the total number of hospital beds in the hospital. Otherwise it is blank.
24. Number of Flights	115	117	Numeric RJ	I3	If special generator is an airport, this is the number of flights per day served at the airport. Otherwise it is blank.
25. Airline Passengers	118	123	Numeric RJ	I6	If special generator is an airport, this is the number of deplaning passengers per day. Otherwise it is blank.
26. Number of Trucks	124	128	Numeric RJ	I5	This is the number of commercial trucks counted entering and exiting the special generator during the 24 hour period the survey was done.
27. Bus Routes	129	131	Numeric RJ	I3	Number of bus routes serving the special generator.
28. Short Term Parking	132	137	Numeric RJ	I6	Number of short term parking spaces.
29. S. T. Parking Cost	138	143	Numeric RJ	F6.2	Cost per hour for short term parking.
30. Long Term Parking	144	149	Numeric RJ	I6	Number of long term parking spaces.
31. L. T. Parking Cost	150	155	Numeric RJ	F6.2	Cost per hour for long term parking.

- The “Workplace Employee Travel Survey, Part 1: Household Information” and “Workplace Survey Data File Format, Workplace Employee Surveys” forms are shown in Figures 13 and 14 (the Part 1 Special Generator forms are not shown since they are identical).
- The “Workplace Employee Travel Survey, Part 2: Trip Information” and “Workplace Survey Data File Format, Employee Travel Survey” forms are shown in Figures 15 and 16 (the Part 2 Special Generator forms are not shown since they are identical).
- The “Workplace Visitor Travel Interview Form, Free Standing Workplace” and “Workplace Survey Data File Format, Free Standing Non-Employee Survey” forms are shown in Figures 17 and 18.
- The “Workplace Visitor Travel Interview Form, Non-Free Standing Workplace” and “Workplace Survey Data File Format, Non-Free Standing Non-Employee Survey” forms are shown in Figures 19 and 20.
- The “Special Generator Visitor Questionnaire” and “Special Generator Survey Data File Format, Non-Employee Travel Survey” forms are shown in Figures 21 and 22.

The proposer is encouraged to comment on the survey formats and questions, and recommend changes that may be warranted. Suggestions raised by NCTCOG staff about the proposed survey forms include the following:

- Questions related to the year, make, and model of a vehicle and the gas versus diesel designation on Part 1 of the employee surveys may be useful for air quality modeling

**WORKPLACE EMPLOYEE TRAVEL SURVEY
PART 1: HOUSEHOLD INFORMATION**

(If you have participated in prior surveys, please fill this form out anyway)

Employee's

Home Address: _____

Street Address

City

State

ZIP

How many people live at your home address? (Do not count guests) _____

How many people in your household (including yourself) are employed? _____
(Include full- and part-time.)

How many vehicles (cars, vans, light trucks, motorcycles) are available for use by members of your household? _____

Please list all vehicles available to your household (including company cars, rental cars, motorcycles, etc.) and complete the following:

Vehicle Number	Year	Make	Model	Circle One	Odometer Readings On Travel Day	
					Beginning	Ending
1				Diesel Gas		
2				Diesel Gas		
3				Diesel Gas		
4				Diesel Gas		
5				Diesel Gas		
6				Diesel Gas		
7				Diesel Gas		

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

- | | |
|--|--|
| 1) <input type="checkbox"/> Less than \$5,000 | 6) <input type="checkbox"/> \$25,000 to \$29,999 |
| 2) <input type="checkbox"/> \$5,000 to \$9,999 | 7) <input type="checkbox"/> \$30,000 to \$34,999 |
| 3) <input type="checkbox"/> \$10,000 to \$14,999 | 8) <input type="checkbox"/> \$35,000 to \$39,999 |
| 4) <input type="checkbox"/> \$15,000 to \$19,999 | 9) <input type="checkbox"/> \$40,000 to \$49,999 |
| 5) <input type="checkbox"/> \$20,000 to \$24,999 | 10) <input type="checkbox"/> \$50,000 or more |

This completes the general information needed. Please fill out the attached travel questionnaire to record the trips you make on the travel day. Thank you for your help.

Workplace Survey Data File Format
Workplace Employee Surveys

February 14, 1993

This file will contain the data collected from employees on the workplace employee information form. The following format will be used in storing the data in an ASCII data file.

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be a value of 5.
2. Month	3	4	Numeric	I2	Month of travel day.
3. Day	5	6	Numeric	I2	Day of the month of travel.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace where this employee works.
5. Sample Number	11	15	Numeric RJ	I5	Unique non-zero number assigned to this sample (i.e.employee). This number will be assigned to the form handed out to the employee to complete and return. This is followed by a blank space.
6. Address	17	46	Alphanum. LJ	A30	Home address of employee including zip code.
<u>7. Zone</u>	47	51	Numeric RJ	I5	Zone where home is located.
8. No of Persons	52	53	Numeric RJ	I2	Number of persons residing at this address.
9. No Employed	54	55	Numeric RJ	I2	Number of persons residing at this address that are employed (including the person completing the form).
10. Vehicles Available	56	57	Numeric RJ	I2	Number of vehicles available for use by members of this household.
11. Income	58	59	Numeric RJ	I2	Code indicating the combined annual household income of all members of this household. See code definitions below.

The above record is followed by records containing the vehicle information completed by the employee. There should be one record for each vehicle in the following format.

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates the type of record, here it should be a value of 6. It should be followed by 4 blank spaces.
2. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace where this employee works. (Same as above)
3. Sample Number	11	15	Numeric RJ	I5	Unique non-zero number assigned to this sample (i.e. employee). This number will be assigned to the form handed out to the employee to complete and return. (Same as above)
4. Vehicle Number	16	16	Numeric RJ	I1	Unique non-zero number assigned to vehicle.
5. Year	17	20	Numeric RJ	I4	Year vehicle was manufactured.
6. Make	21	45	Alphanum. LJ	A25	Make of vehicle used for trip.
7. Model	46	70	Alphanum. LJ	A25	Model of vehicle used for trip.
<u>8. Classification</u>	71	72	Numeric RJ	I2	Code indicating vehicle classification. See below for definitions.
9. Beginning Mileage	73	80	Numeric RJ	I8	Odometer reading on vehicle at beginning of travel day.
10. Ending Mileage	81	88	Numeric RJ	I8	Odometer reading on vehicle at end of travel day.

Household Income Codes

- 1 - Less than \$5,000
- 2 - \$5,000 to \$9,999
- 3 - \$10,000 to \$14,999
- 4 - \$15,000 to \$19,999
- 5 - \$20,000 to \$24,999
- 6 - \$25,000 to \$29,000
- 7 - \$30,000 to \$34,999
- 8 - \$35,000 to \$39,999
- 9 - \$40,000 to \$49,999
- 10 - \$50,000 or More
- 99 - No Response

Vehicle Classifications

- 1 - Light Duty Gas Vehicle
- 2 - Light Duty Gas Truck Type 1
- 3 - Light Duty Gas Truck Type 2
- 4 - Heavy Duty Gas Truck
- 5 - Light Duty Diesel Vehicle
- 6 - Light Duty Diesel Truck
- 7 - Heavy Duty Diesel Truck
- 8 - Motorcycle

FIGURE 15

Record Type 7

WORKPLACE EMPLOYEE TRAVEL SURVEY

PART 2: TRIP INFORMATION

SITE #: _____

SAMPLE #: _____

BEGIN: MY FIRST TRIP TODAY BEGAN AT: (1) Home (9) Other Location

PLEASE ENTER YOUR:

(Fill in address)

TRAVEL DAY: _____ a.m.

(Place/address or nearest intersection) (city/state/zip code)

DEPARTURE TIME: _____ p.m.

①

FIRST I WENT TO:
22

②

THEN I WENT TO:

③

THEN I WENT TO:

Location Address	When did you get here/leave here?	Purpose of Trip (check one)	Mode of Transportation (check one)	Total number of people in car/truck/van (including driver)	If Driver, what vehicle was used? (make/model)	If Bus, what was the fare? How did you get to the bus stop?	
Name of Place Address or nearest intersection City/State/Zip Do you normally work at or out of this location? <input type="checkbox"/> Yes <input type="checkbox"/> No	Arrive a.m. p.m.	<input type="checkbox"/> (1) Return Home <input type="checkbox"/> (2) Go to Work <input type="checkbox"/> (3) Work Related <input type="checkbox"/> (4) School <input type="checkbox"/> (5) Social/Recreation <input type="checkbox"/> (6) Shop <input type="checkbox"/> (7) Pick up/Drop off Passenger <input type="checkbox"/> (8) Change Travel Mode <input type="checkbox"/> (9) Other _____	<input type="checkbox"/> (1) Driver (car/truck/van/motorcycle) <input type="checkbox"/> (2) Passenger (car/truck/van/motorcycle) <input type="checkbox"/> (3) Walk <input type="checkbox"/> (4) Bicycle <input type="checkbox"/> (5) Bus <input type="checkbox"/> (6) School Bus <input type="checkbox"/> (7) Taxi <input type="checkbox"/> (8) Commercial Vehicle (over 1 ton) <input type="checkbox"/> (9) Other _____	number of people	Year Make Model	Fare: \$ _____	
							Depart a.m. p.m.
	If you paid parking, what was parking cost? \$ _____						
Name of Place Address or nearest intersection City/State/Zip Do you normally work at or out of this location? <input type="checkbox"/> Yes <input type="checkbox"/> No	Arrive a.m. p.m.	<input type="checkbox"/> (1) Return Home <input type="checkbox"/> (2) Go to Work <input type="checkbox"/> (3) Work Related <input type="checkbox"/> (4) School <input type="checkbox"/> (5) Social/Recreation <input type="checkbox"/> (6) Shop <input type="checkbox"/> (7) Pick up/Drop off Passenger <input type="checkbox"/> (8) Change Travel Mode <input type="checkbox"/> (9) Other _____	<input type="checkbox"/> (1) Driver (car/truck/van/motorcycle) <input type="checkbox"/> (2) Passenger (car/truck/van/motorcycle) <input type="checkbox"/> (3) Walk <input type="checkbox"/> (4) Bicycle <input type="checkbox"/> (5) Bus <input type="checkbox"/> (6) School Bus <input type="checkbox"/> (7) Taxi <input type="checkbox"/> (8) Commercial Vehicle (over 1 ton) <input type="checkbox"/> (9) Other _____	number of people	Year Make Model	Fare: \$ _____	
							Depart a.m. p.m.
	If you paid parking, what was parking cost? \$ _____						
Name of Place Address or nearest intersection City/State/Zip Do you normally work at or out of this location? <input type="checkbox"/> Yes <input type="checkbox"/> No	Arrive a.m. p.m.	<input type="checkbox"/> (1) Return Home <input type="checkbox"/> (2) Go to Work <input type="checkbox"/> (3) Work Related <input type="checkbox"/> (4) School <input type="checkbox"/> (5) Social/Recreation <input type="checkbox"/> (6) Shop <input type="checkbox"/> (7) Pick up/Drop off Passenger <input type="checkbox"/> (8) Change Travel Mode <input type="checkbox"/> (9) Other _____	<input type="checkbox"/> (1) Driver (car/truck/van/motorcycle) <input type="checkbox"/> (2) Passenger (car/truck/van/motorcycle) <input type="checkbox"/> (3) Walk <input type="checkbox"/> (4) Bicycle <input type="checkbox"/> (5) Bus <input type="checkbox"/> (6) School Bus <input type="checkbox"/> (7) Taxi <input type="checkbox"/> (8) Commercial Vehicle (over 1 ton) <input type="checkbox"/> (9) Other _____	number of people	Year Make Model	Fare: \$ _____	
							Depart a.m. p.m.
	If you paid parking, what was parking cost? \$ _____						

FIGURE 16

Workplace Survey Data File Format
Employee Travel Survey

This file will contain the data collected from employees on the workplace employee travel interview form. The following format will be used in storing the data in an ASCII datafile.

Item	Field Columns		Type	Format	Description
	Begin	End			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be a value of 7.
2. Month	3	4	Numeric RJ	I2	Month that travel occurred.
3. Day	5	6	Numeric RJ	I2	Day of the month that travel occurred.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace where this employee works.
5. Sample Number	11	15	Numeric RJ	I5	Unique non-zero number assigned to this sample (i.e. employee). This number will be assigned to the form handed out to the employee to complete and return.
6. Trip Number	16	17	Numeric RJ	I2	Trip number. Beginning trip will be recorded as 0 with each subsequent trip numbered sequentially as 1, 2, 3, etc.
7. Location	18	47	Alphanum. LJ	A30	Description of location.
8. Zone	48	52	Numeric RJ	I5	Zone number of location.
9. Work Indicator	53	53	Numeric RJ	I1	Code which indicates if this location is place employee works, 1 - Yes, 2 - No.
10. Arrival Hour	54	55	Numeric RJ	I2	Hour that employee arrived at this location. This hour should be in terms of military time.
11. Arrival Minute	56	57	Numeric RJ	I2	Minute that employee arrived at this location.
12. Departure Hour	58	59	Numeric RJ	I2	Hour that employee departed this location. This hour should be in terms of military time.
13. Departure Minute	60	61	Numeric RJ	I2	Minute that employee departed this location.
14. Trip Purpose	62	62	Numeric RJ	I1	Code indicating purpose of trip. See definitions below. For trip number 0 (first trip), this should be coded as a 1 if it began at home or as 9 if it began at another location.
15. Mode	63	63	Numeric RJ	I1	Code indicating mode of travel used in traveling to this location. See travel mode code definitions below.
16. No. People	64	65	Numeric RJ	I2	If mode of travel was driver, passenger, taxi, or commercial vehicle, this is the number of persons in the vehicle, including the person completing the form. A zero/blank should be recorded for all other modes of travel.
17. Vehicle Used	66	66	Numeric RJ	I1	If mode is driver, this is the number of the vehicle used. Must correspond to one of the vehicle numbers indicated by employee in household information record.
18. Vehicle Year	67	70	Numeric RJ	I4	Year vehicle was manufactured. This information will have to come from part 1 of employee survey.
19. Vehicle Make	71	95	Alphanum. LJ	A25	Make of vehicle used for trip.
20. Vehicle Model	96	120	Alphanum. Lj	A25	Model of vehicle used for trip.
21. Parking Cost	121	126	Numeric RJ	F6.2	Cost of parking if parking was paid.
22. Bus Fare	127	132	Numeric RJ	F6.2	Bus fare cost if trip was by bus.
23. Arrival Mode	133	133	Numeric RJ	I1	Code indicating the mode used by the person to get to the location where they boarded the bus. This should be zero/blank for all modes of travel except bus. See arrival mode code definitions below.

Codes Shown On Next Page

FIGURE 16 (cont'd)

Trip Purpose Codes

- 0 - No Response
- 1 - Return Home
- 2 - Go To Work
- 3 - Work Related
- 4 - School
- 5 - Social/Recreation
- 6 - Shopping
- 7 - Pickup/Drop Off Passenger
- 8 - Change Travel Mode
- 9 - Other

Mode of Transportation Codes

- 0 - No Response
- 1 - Driver (car/truck/van/motorcycle)
- 2 - Passenger (car/truck/van/motorcycle)
- 3 - Walk
- 4 - Bicycle
- 5 - Bus/Public Transportation
- 6 - School Bus
- 7 - Taxi
- 8 - Commercial Vehicle (over 1 ton)
- 9 - Other

Arrival Mode Codes

- 1 - Drove Auto & Parked
- 2 - Dropped Off
- 3 - Carpoled with Bus Riders
- 4 - Walked
- 5 - Other

FIGURE 17

Record Type 8

WORKPLACE VISITOR TRAVEL INTERVIEW FORM FREE STANDING WORKPLACE

site #: _____

Date: ____/____/____

Area Type: _____

Interviewer: _____

Date: _____ Location: _____

Questions	Person 1	Person 2	Person 3	Person 4
1. Do you work in this building? a. Yes - stop interview b. No - continue interview	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
2. Did you travel straight from your home or from another location to get here today?	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other
3. Where did you start your trip that brought you to _____? (place/address or nearest intersection/city/state/zip code)	_____ Address	_____ Address	_____ Address	_____ Address
4. What approximate time did you arrive at this location today?	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.
5. How did you arrive here today? (Choose from Arrival Options below)				
a. If car/truck/van: How many persons including yourself were in the vehicle? b. If bus: What fare did you pay?	a. # People _____ b. Fare \$_____	a. # People _____ b. Fare \$_____	a. # People _____ b. Fare \$_____	a. # People _____ b. Fare \$_____
6. What is your reason for coming here today? (Choose from Trip Purpose Options below)	No. Other	No. Other	No. Other	No. Other
7. When you leave here, are you going immediately home?	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
8. What is the address of the place you will be going?	_____ Address	_____ Address	_____ Address	_____ Address
	Arrival Options 1) Driver (car/truck/van/motorcycle) 2) Passenger (car/truck/van/motorcycle) 3) Walk 4) Bicycle 5) Bus 6) School Bus 7) Taxi 8) Commercial Vehicle (over 1 ton) 9) Other (specify in block)		Trip Purpose Options 1) Work related 2) School 3) Social/recreational/meal 4) Shop 5) Pick up/Drop off Passenger 6) Change travel mode 7) Delivery 8) Other (specify in block)	

FIGURE 18

**Workplace Survey Data File Format
Free Standing Non-Employee Survey**

This file will contain the data collected from the interviewing of non-employees at free standing workplaces. The following format will be used in storing the data in an ASCII data file.

<u>Item</u>	<u>Field Columns</u>		<u>Type</u>	<u>Format</u>	<u>Description</u>
	<u>Begin</u>	<u>End</u>			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be 8.
2. Month	3	4	Numeric RJ	I2	Month workplace is being surveyed.
3. Day	5	6	Numeric RJ	I2	Day of the month workplace is being surveyed.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace where these interviews are being conducted.
5. Person Number	11	11	Numeric RJ	I1	Number of person being interviewed. This corresponds to the column number on the interview form.
6. Origin Code	12	12	Numeric RJ	I1	Code indicating origin of trip; 1 - Home, 2 - Other.
7. Origin Location	13	42	Alphanum. LJ	A30	Location that trip originated from, i.e. name, address, etc.
<u>8. Origin Zone</u>	43	47	Numeric RJ	I5	Zone where trip originated.
9. Arrival Hour	48	49	Numeric RJ	I2	Hour person arrived at this worksite. This hour should be in terms of military time.
10. Arrival Minute	50	51	Numeric RJ	I2	Minute person arrived at this worksite.
11. Mode	52	52	Numeric RJ	I1	Code indicating mode of travel to this location. See definitions below.
12. No. Persons	53	54	Numeric RJ	I2	If mode of travel was driver, passenger, taxi, or commercial vehicle, this is the number of persons in the vehicle including the person being interviewed.
13. Bus Fare	55	60	Numeric RJ	F6.2	If mode of travel was bus/public transportation, this is the bus fare paid.
14. Trip Purpose	61	61	Numeric RJ	I1	Code indicating purpose of trip. See code definitions below.
15. Depart Destination	62	62	Numeric RJ	I1	Code indicating destination when person departs from this site; 1 - Home, 2 - Other.
16. Destination Location	63	92	Alphanum. LJ	A30	Location of destination person is going.
<u>17. Destination Zone</u>	93	97	Numeric RJ	I5	Zone where individual is going when they leave this workplace.
18. Form Number	98	104	Numeric RJ	I7	Survey form number which contains raw survey data.

Mode of Transportation Codes

- 0 - No Response/Refusal
- 1 - Driver (car/truck/van/motorcycle)
- 2 - Passenger (car/truck/van/motorcycle)
- 3 - Walk
- 4 - Bicycle
- 5 - Bus/Public Transportation
- 6 - Taxi
- 7 - School Bus
- 8 - Commercial Vehicle (over 1 ton)
- 9 - Other

Trip Purpose Codes

- 0 - No Response/Refusal
- 1 - Work Related
- 2 - School
- 3 - Social/Recreation/Meal
- 4 - Shop
- 5 - Pick up/Drop off Passenger
- 6 - Change Travel Mode
- 7 - Delivery
- 8 - Other

FIGURE 19

Record Type 11

**WORKPLACE VISITOR TRAVEL
INTERVIEW FORM
NON-FREE STANDING WORKPLACE**

site #: _____
Date: ____/____/____
Area Type: _____
Interviewer: _____

Date: _____ Location: _____

Questions	Person 1	Person 2	Person 3	Person 4
1. Do you work in this center? a. Yes - stop interview b. No - continue interview	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
2. Did you travel straight from your home or from another location to get here today?	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other
3. Where did you start your trip that brought you to _____ (place/address or nearest intersection/city/state/zip code)	_____ Address	_____ Address	_____ Address	_____ Address
4. What approximate time did you arrive at this location today?	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.
5. How did you arrive here today? (Choose from Arrival Options below)				
a. If car/truck/van: How many persons including yourself were in the vehicle? b. If bus: /What fare did you pay?	a. # People _____ b. Fare \$_____/trip	a. # People _____ b. Fare \$_____/trip	a. # People _____ b. Fare \$_____/trip	a. # People _____ b. Fare \$_____/trip
6. What is your reason for coming here today? (Choose from Trip Purpose Options below)	No. Other	No. Other	No. Other	No. Other
7. How many stores/businesses will you visit in this center during this trip?				
8.				
9. When you leave here, are you going immediately home?	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
10. What is the address of the place you will be going?	_____ Address	_____ Address	_____ Address	_____ Address
Arrival Options 1) Driver (car/truck/van/motorcycle) 2) Passenger (car/truck/van/motorcycle) 3) Walk 4) Bicycle 5) Bus 6) School Bus 7) Taxi 8) Commercial vehicle (over 1 ton) 9) Other _____		Trip Purpose Options 1) Work related 2) School 3) Social/recreational/meal 4) Shop 5) Pick up/Drop off Passenger 6) Change travel mode 7) Delivery 8) Other (specify in block)		

FIGURE 20

**Workplace Survey Data File Format
Non-Free Standing Non-Employee Survey**

This file will contain the data collected from the interviews with non-employees at the activity center where the non-tree standing workplace is being surveyed. The following format will be used in storing the data in an ASCII data file.

Item	Field Columns		Type	Format	Description
	Begin	End			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be 11.
2. Month	3	4	Numeric RJ	I2	Month survey was done.
3. Day	5	6	Numeric RJ	I2	Day of month survey was done.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the workplace being surveyed in the activity center where these interviews are being conducted.
5. Person Number	11	11	Numeric RJ	I1	Number of person being interviewed. This corresponds to the column number on the interview form.
6. Origin Code	12	12	Numeric RJ	I1	Code indicating origin of trip; 1 - Home, 2 - Other.
7. Origin Location	13	42	Alphanum. LJ	A30	Location that trip originated from, i.e. name, address, etc.
<u>8. Origin Zone</u>	43	47	Numeric RJ	I5	Zone where trip originated.
9. Arrival Hour	48	49	Numeric RJ	I2	Hour person arrived at this worksite. This hour should be in terms of military time.
10. Arrival Minute	50	51	Numeric RJ	I2	Minute person arrived at this worksite.
11. Mode	52	52	Numeric RJ	I1	Code indicating mode of travel to this location. See definitions below.
12. No. Persons	53	54	Numeric RJ	I2	If mode of travel was driver, passenger, taxi, or commercial vehicle, this is the number of persons in the vehicle including the person being interviewed.
13. Bus Fare	55	60	Numeric RJ	F6.2	If mode of travel was bus/public transportation, this is the bus fare paid.
14. Trip Purpose	61	61	Numeric RJ	I1	Code indicating purpose of trip. See code definitions below.
15. No. Stores Visited	62	67	Numeric RJ	I6	Number of stores in activity center visited on this day.
16. Depart Destination	68	68	Numeric RJ	I1	Code indicating destination when person departs from this site; 1 - Home, 2 - Other.
17. Destination Location	69	98	Alphanum.LJ	A30	Location of destination person is going.
<u>18. Destination Zone</u>	99	103	Numeric RJ	I5	Zone where individual is going when they leave this activity center.
19. Form Number	104	110	Numeric RJ	I7	Survey form number which contains the raw survey data.

Mode of Transportation Codes

Trip Purpose Codes

- 0 - No Response/Refusal
- 1 - Driver (car/truck/van/motorcycle)
- 2 - Passenger (car/truck/van/motorcycle)
- 3 - Walk
- 4 - Bicycle
- 5 - Bus/Public Transportation
- 6 - Taxi
- 7 - School Bus
- 8 - Commercial Vehicle (over 1 ton)
- 9 - Other

- 0 - No Response/Refusal
- 1 - Work Related
- 2 - School
- 3 - Social/Recreation/Meal
- 4 - Shop
- 5 - Pick up/Drop off Passenger
- 6 - Change Travel Mode
- 7 - Delivery
- 8 - Other

FIGURE 21

Record Type 17

SPECIAL GENERATOR VISITOR QUESTIONNAIRE

site #: _____
 Date: ____/____/____
 Area Type: _____
 Interviewer: _____

Date: _____ Location: _____

Questions	Person 1	Person 2	Person 3	Person 4
1. Do you work here at _____? a. Yes - stop interview b. No - continue interview	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
2. Did you just arrive here by plane? a. Yes - stop interview b. No - continue interview	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
3. Did you travel straight from your current residence or from another location?	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other	1) Home 2) Other
4. Where did you start your trip that brought you to _____? (place/address or nearest intersection/city/state/zip code)	Address	Address	Address	Address
5. What approximate time did you arrive at this location today?	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.	1) a.m. 2) p.m.
6. How did you arrive here at the _____ today? (choose from Arrival Options below)				
a. If car/truck/van, ask: How many persons including yourself were in the vehicle? b. If bus, ask: what fare did you pay?	a. # People _____ b. Fare \$ _____	a. # People _____ b. Fare \$ _____	a. # People _____ b. Fare \$ _____	a. # People _____ b. Fare \$ _____
7. What is your reason for coming here today? (Choose from Trip Purpose Options below)	No. Other	No. Other	No. Other	No. Other
8. When you leave here, are you going immediately home?	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No	1) Yes 2) No
9. What is the address of the place you will be going?	Address	Address	Address	Address
	Arrival Options 1) Driver (car/truck/van/motorcycle) 2) Passenger (car/truck/van/motorcycle) 3) Walk 4) Bicycle 5) Bus 6) School Bus 7) Taxi 8) Commercial vehicle (over 1 ton) 9) Other _____		Trip Purpose Options 1) Work related 2) School 3) Social/recreational/meal 4) Shop 5) Pick Up/Drop Off Passenger 6) Change travel mode 7) Delivery 8) Other (specify in block)	

FIGURE 22

Special Generator Survey Data File Format
Non-Employee Travel Survey

This file will contain the data collected from interviews with non-employees at the special generator worksites. The following format will be used in storing the data in an ASCII data file.

Item	Field Columns		Type	Format	Description
	Begin	End			
1. Record Type	1	2	Numeric RJ	I2	Code which indicates type of record, here it should be 17.
2. Month	3	4	Numeric RJ	I2	Month workplace is being surveyed.
3. Day	5	6	Numeric RJ	I2	Day of the month workplace is being surveyed.
4. Site Number	7	10	Numeric RJ	I4	Unique non-zero number assigned to the special generator where these interviews are being conducted.
5. Person Number	11	11	Numeric RJ	I1	Number of person being interviewed. This corresponds to the column number on the interview form.
6. Origin Code	12	12	Numeric RJ	I1	Code indicating origin of trip; 1 - Home, 2 - Other.
7. Origin Location	13	42	Alphanum. LJ	A30	Location that trip originated from, i.e. name, address, etc.
8. Origin Zone	43	47	Numeric RJ	I5	Zone where trip originated.
9. Arrival Hour	48	49	Numeric RJ	I2	Hour person arrived at this worksite. This hour should be in terms of military time.
10. Arrival Minute	50	51	Numeric RJ	I2	Minute person arrived at this worksite.
11. Mode	52	52	Numeric RJ	I1	Code indicating mode of travel to this location. See definitions below.
12. No. Persons	53	54	Numeric RJ	I2	If mode of travel was driver, passenger, taxi, or commercial vehicle, this is the number of persons in the vehicle including the person being interviewed.
13. Bus Fare	55	60	Numeric RJ	F6.2	If mode of travel was bus/public transportation, this is the bus fare paid.
14. Trip Purpose	61	61	Numeric RJ	I1	Code indicating purpose of trip. See code definitions below.
15. Depart Destination	62	62	Numeric RJ	I1	Code indicating destination when person departs from this site; 1 - Home, 2 - Other.
16. Destination Location	63	92	Alphanum. LJ	A30	Location of destination person is going.
17. Destination Zone	93	97	Numeric RJ	I5	Zone where individual is going when they leave this workplace.
18. Form Number	98	104	Numeric RJ	I7	Survey form number which contains raw survey data.

Mode of Transportation Codes

- 0 - No Response/Refusal
- 1 - Driver (car/truck/van/motorcycle)
- 2 - Passenger (car/truck/van/motorcycle)
- 3 - Walk
- 4 - Bicycle
- 5 - Bus/Public Transportation
- 6 - Taxi
- 7 - School Bus
- 8 - Commercial Vehicle (over 1 ton)
- 9 - Other

Trip Purpose Codes

- 0 - No Response/Refusal
- 1 - Work Related
- 2 - School
- 3 - Social/Recreation/Meal
- 4 - Shop
- 5 - Pick up/Drop off Passenger
- 6 - Change Travel Mode
- 7 - Delivery
- 8 - Other

but are not necessary for determination of travel behavior; the beginning/ending odometer readings are not necessary, but may be useful for validating the geocoding of trip records.

- ^a The question on Part 1 of the employee surveys regarding household income may need additional income categories for the “\$50,000 or more” group, since 1990 Census data shows that this group includes 28 percent of all households in the Dallas-Fort Worth Consolidated Metropolitan Statistical Area (see Figure 23).
- Part 2 of the employee surveys includes addresses for a trip origins and destinations during the survey day; while this level of detail is not necessary for determination of workplace trip rates, it may help the employee identify all linked trips that actually originated from the workplace.
- Additional questions related to employee and nonemployee access to/from the workplace may be desired, such as location of parking and use of multiple transportation modes.
- Additional questions for nonemployees may be desired to determine why a particular establishment was selected over others.
- Other questions may be needed to better understand why a workplace has a “trips per employee” rate that may differ significantly from other workplaces with the same area type and employment category.

FIGURE 23

Household Income for the Dallas-Fort Worth CMSA (1989\$)

Income Range	Distrib.	Income Range	Distrib.	Income Range	Distrib.
Less than \$5,000	5.2%	Less than \$5,000	5.2%	Less than \$5,000	5.2%
\$5,000 to \$9,999	6.5%	\$5,000 to \$9,999	6.5%	\$5,000 to \$9,999	6.5%
\$10,000 to \$12,499	4.0%	\$10,000 to \$14,999	7.6%	\$10,000 to \$14,999	7.6%
\$12,500 to \$14,999	3.5%	\$15,000 to \$19,999	8.4%	\$15,000 to \$19,999	8.4%
\$15,000 to \$17,499	4.4%	\$20,000 to \$24,999	8.8%	\$20,000 to \$24,999	8.8%
\$17,500 to \$19,999	4.0%	\$25,000 to \$29,999	8.3%	\$25,000 to \$29,999	8.3%
\$20,000 to \$22,499	4.9%	\$30,000 to \$34,999	8.0%	\$30,000 to \$34,999	8.0%
\$22,500 to \$24,999	4.0%	\$35,000 to \$39,999	7.1%	\$35,000 to \$39,999	7.1%
\$25,000 to \$27,499	4.6%	\$40,000 to \$49,999	11.7%	\$40,000 to \$49,999	11.7%
\$27,500 to \$29,999	3.7%	More than \$50,000	28.3%	\$50,000 to \$59,999	8.8%
\$30,000 to \$32,499	4.6%		100.0%	\$60,000 to \$74,999	8.2%
\$32,500 to \$34,999	3.4%			\$75,000 to \$99,999	6.0%
\$35,000 to \$37,499	4.0%			\$100,000 or more	5.3%
\$37,500 to \$39,999	3.0%				100.0%
\$40,000 to \$42,499	3.7%				
\$42,500 to \$44,999	2.7%				
\$45,000 to \$47,499	2.9%				
\$47,500 to \$49,999	2.4%				
\$50,000 to \$54,999	4.9%				
\$55,000 to \$59,999	3.8%				
\$60,000 to \$74,999	8.2%				
\$75,000 to \$99,999	6.0%				
\$100,000 to \$124,999	2.3%				
\$125,000 to \$149,999	1.0%				
\$150,000 or more	2.0%				
	100.0%				

The proposer should also identify the information and assistance that will be requested from NCTCOG, TxDOT, and other agencies.

Task 1 - Final Survey Design

Development of the final survey design will be a part of this project. One of the consultant's first tasks will be to produce survey forms that are suitable for pilot testing. The consultant's proposal should include a methodology for development of these survey forms, conduct of a pilot testing program, review of the preliminary results, and subsequent modifications to the pilot-tested forms (if improvements to the procedures or interview questions are warranted).

Task 2 - Site Selection and Recruitment

All surveys will be performed at randomly selected places of employment (excluding DFW Airport), cross classified by type of employment and area type. The workplace sample selection process will be performed by NCTCOG based on existing NCTCOG data sets supplemented (if possible) with employer listings from the Texas Employment Commission (TEC). The consultant's role will consist of identification of the sampled workplaces as free-standing or nonfree-standing workplaces and recruitment of employers.

The consultant's visual observation of workplaces will determine the free-standing or nonfree-standing designation according to the following definitions:

- Free-standing workplace: A workplace where the points of vehicle access can clearly be established and those points of vehicle access are designed to serve that workplace only; examples might include a restaurant, a service station, or a convenience type

grocery store where the points of vehicle access and parking are clearly defined as being for that establishment only.

- Nonfree-standing workplace: A workplace located in an area where the vehicle access points and parking are designed to serve more than just that establishment; an example would be a grocery store located in a community shopping center.

The consultant will be responsible for contacting the employers and determining if they will participate in the survey. Each business establishment from NCTCOG's sample selection will be recruited to participate in the survey through telephone and formal correspondence, with telephone recruiters trained in proper telephone and screening procedures. Once the telephone recruiters have made initial contact, they should explain the nature and purpose of the survey to the owner or manager of the workplace, complete a general information survey of the business, and then mail a survey information packet to the contact person. It is very important that all personnel affected by the survey are informed, especially security personnel. This will help to minimize disruptions during site evaluations and survey execution.

After an employer has been recruited, a site evaluation will be performed to facilitate survey organization and will consist of collecting or sketching maps or site plans of the workplace, These maps will help determine whether a survey is feasible at a particular site, whether mechanical or manual traffic counts would be more accurate, whether person or vehicle counts would be appropriate, and where traffic counters and interviewers should be located.

For development of the detailed work plan and cost estimates, the proposer should assume that 500 establishments (some of which may be special generators) will be successfully

surveyed, resulting in approximately 30,000 usable employee and nonemployee surveys. Additions or deletions to the number of establishments may be considered by NCTCOG during negotiation of the final work plan and budget.

Task 3 - Conducting the Survey

The consultant will be responsible for scheduling all interviewers and traffic counters and arranging all survey materials. These survey materials include visitor survey questionnaires, interviewer name tags, sharp pencils, clip boards, a map of the generator with specific interview stations designated, and business cards. Interviewers will carry business cards to hand out to people interested in explicit survey details.

The survey of free standing places will involve four primary data collection efforts:

1. Employee survey: On the survey day, employees will use a self-administered survey form to provide trip information.
2. Nonemployee survey: Every Nth person arriving at the work place will be surveyed. The value for N will vary by location and will be based on the number of arrivals. If the number of arrivals is small (some judgment will be required), an attempt will be made to interview every arrival. If the establishment is a 24-hour operation, the nonemployee survey will be conducted in two 8-hour shifts. The first will run from 6 a.m. until 2 p.m. The second will run from 4 p.m. until 12 midnight. If the establishment is open for business only 8 to 10 hours per day, the nonemployee survey will be conducted during two 4-hour shifts. The time of the shifts will be determined jointly by the consultant and NCTCOG on a site-by-site basis. The consultant should recognize that some of the visitors may only be able to speak Spanish.

3. Employer survey: The employer will be interviewed to obtain general information concerning the work place. If the number of commercial trucks servicing the work place on the day of the survey is not available, a means will have to be devised by the consultant in cooperation with NCTCOG staff to obtain this information for the survey day.

4. Vehicle/person movement survey: On the day of the survey, 24-hour vehicle counts (recorded at 15-minute intervals) will be made at each access point serving the work place. A determination will be made jointly by the consultant and NCTCOG as to whether this may be done by mechanical counter or by another method. For example, a combination of mechanical counts with visual observation and/or video cameras may be required to accurately collect the data. If it is not possible to obtain 24-hour vehicle counts and the establishment is not open for 24 hours, the persons entering and exiting the establishment will be counted during its hours of operation. Some consideration should be given to the need for conducting both vehicle and person movement counts at selected locations, especially if there is significant pedestrian or bicycle activity. In some cases, a site may be dropped from the survey and replaced with another randomly chosen site.

The survey of nonfree standing places will involve five primary data collection efforts:

1. Activity center survey: A visual inspection of the work place site should be done to determine the number of work places in the center by employment type. The work places in the center will be surveyed to obtain the number of full- and part-time employees and the number of employees at work on the survey day.

2. Employee survey: On the survey day, employees will use a self-administered form to provide trip information in a manner similar to that used for free-standing workplaces.
3. Nonemployee survey: This will be conducted as an intercept survey of nonemployees selected randomly at different locations in the center. The hours during which the survey will be conducted will depend on the hours of operation for all work places in the center, and will be determined jointly by the consultant and NCTCOG staff.
4. Employer survey: This will be similar to the employer survey for free-standing workplaces.
5. Vehicle/person movement survey: On the day of the survey, 24-hour vehicle counts (recorded at 15-minute intervals) will be made at each access point serving the activity center. A determination will be made jointly by the consultant and NCTCOG as to whether this may be done by mechanical counter or by another method. For example, a combination of mechanical counts with visual observation and/or video cameras may be required to accurately collect the data. If it is not possible to obtain 24-hour vehicle counts, and the establishment is not open for 24 hours, the persons entering and exiting the establishment will be counted during its hours of operation. Some consideration should be given to the need for conducting both vehicle and person movement counts at selected locations, especially if there is significant pedestrian or bicycle activity. In some cases, a site may be dropped from the survey and replaced with another randomly chosen site.

All surveys are to be performed Mondays through Thursdays in March, April, and May of 1994. While the surveys are in progress, the consultant's task leader will check on each interviewer's/counter's accuracy and progress, and edit the completed surveys at day's end. The task leader will also check that all mechanical traffic counters are in place and working.

Task 4 - Correcting Survey Data

The workplace and special generator survey data obtained will be coded and entered by the consultant in a prespecified microcomputer format. After clerical and other edit checks are made by the consultant, the file will be forwarded to NCTCOG every two weeks. NCTCOG, with TxDOT's assistance, will process the files using computer programs designed to identify missing or inconsistent information. Those records identified as incomplete, illogical, etc., will be returned to the consultant for correction or further editing. The consultant will be responsible for correcting errors found in the data by NCTCOG and/or TxDOT during the survey and within three months following the completion of the survey (completion of the survey means the entire survey and not just a particular site).

The consultant should also develop a plan for determining the magnitude of any survey biases that may have occurred due to the nonresponse (i.e., refusals) of employers, employees, or visitors.

Task 5 - Processing and Geocoding Survey Data

The geocoding of trip addresses from all of the usable responses to NCTCOG's traffic survey zone structure is an important element of this project. Due to NCTCOG's access to an existing address geocoding program (Arc/Info) on a Sun minicomputer system, NCTCOG staff will actively participate in the geocoding of survey data.

Development of the final work plan and budget regarding the consultant's involvement in the geocoding of the surveyed trip records will be subject to negotiation prior to contract award. The proposer is asked to develop a preliminary work plan and budget for a procedure in which NCTCOG will be able to automatically geocode a high percentage of the surveyed trip records. The proposer is encouraged, for example, to consider modified procedures (such as the use of maps) to improve the accuracy of addresses obtained during the nonemployee intercept survey.

Task 6 - Media Coverage

The workplace and special generator surveys to be conducted in the Dallas-Fort Worth area in 1994, as well as other travel surveys, will involve large numbers of private citizens and businesses. It is important that a concentrated effort be undertaken to inform the public of the surveys, their general purposes, some of the procedures involved, the use of the information, and the benefits to be derived. The intent is to let people know, before the survey, what is happening in the community and try to alleviate fears and misapprehensions and create a level of confidence for individuals that may be asked to participate in the survey. The consultant, in cooperation with TxDOT and NCTCOG, will be responsible for designing and implementing a public awareness campaign. The proposal should include specific details as to the efforts and methods that will be used to accomplish this campaign.

Task 7 - Survey Documentation and Reporting

The consultant is expected to meet periodically with a Project Review Committee that will be developed to monitor the work effort. During the time period over which the actual surveys are conducted, the consultant should hold progress report meetings every two weeks with this committee at NCTCOG offices.

Ten (10) draft copies of the workplace/special generator survey report must be provided to NCTCOG within one month of the last field survey (the last survey is expected to be completed in May of 1994) for review and comment. Following acceptance of the final report, fifty (50) reports must be prepared and delivered to NCTCOG with all corrections and comments incorporated in the final version. Final reports should be neatly bound with attractive covers.

The report should contain tables, charts and/or graphs wherever applicable to improve clarity and address the following:

- ' Executive Summary
- 0 Survey training and pilot survey results
- ' Final survey design and survey instruments
- Sampling of workplaces
- Business recruitment and refusal summaries
- Survey implementation, timetable, and quality control
- Geocoding process
- Survey results and analysis

Federal financial assistance must be acknowledged in the front of the report in the following format:

Prepared in cooperation with the Texas Department of Transportation and the United States Department of Transportation, Federal Highway Administration and the Federal Transit Administration.

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions herein. The contents do not necessarily reflect the

views or policies of the Federal Highway Administration, the Federal Transit Administration, or the Texas Department of Transportation.

In addition to the 50 copies, the final report will also be delivered as a reproducible copy and on a microcomputer floppy disk in WordPerfect or Microsoft Word format. Completed workplace and special generator survey forms (both those returned by mail and those created during the interview process), computer data files, and video tapes shall become the property of NCTCOG. All forms shall be sorted by ID Number before they are turned over to NCTCOG.

Schedule and Budget

The consultant will develop in the proposal, a schedule of tasks, with completion deadlines for each task. The consultant's schedule should be based on a Notice to Proceed in late December of 1993 and an overall time frame of eight months (January to August of 1994). Pilot workplace surveys and final survey design should be completed in January and February of 1994, with the actual workplace surveys performed on non-holiday weekdays in March, April, and May of 1994. The consultant will be responsible for correcting any errors found in the data for a period of up to three months following the completion of the survey.

The funds available for all travel survey-related consultant projects in the Dallas-Fort Worth area are approximately \$1.5 million in calendar year 1994. The funds to be allocated to the workplace/special generator survey will depend on the consultant's approach proposed for this project. Proposers are encouraged to submit their proposal in the best terms possible as cost will be one of the basis of evaluation of the proposals. To assist the Consultant Selection Committee in their evaluation;, the proposal should identify total costs for each project task.

Consultant Selection Criteria

The Consultant Selection Committee will review all proposals and select a firm it considers qualified to undertake the project. The following criteria will be used to evaluate all proposals:

1. Project Understanding	25 percent
2. Scope of Services	25 percent
3. Project Managers/Staff Qualifications	20 percent
4. Project Cost	15 percent
5. Firm Qualifications/Consultant References	10 percent
6. Study Schedule	5 percent

Other Requirements

- Disadvantaged Business Enterprise participation meets 13 percent goal
- Affirmative Action Plan included

Consultant interviews may be required in order to make a final consultant selection at NCTCOG's offices. Following final negotiations of the work plan and costs satisfactory to NCTCOG, the consultant will be asked to execute a contract with NCTCOG. A Notice to Proceed will be issued immediately upon execution of the contract by the NCTCOG Executive Board and approval by TxDOT and the Federal Highway Administration. NCTCOG reserves the right to reject any and all proposals, to contract for any or all portions of the project with the selected consultant(s), or to call in additional firms.

The successful responder(s) to this RFP must understand that they are expected to provide qualified personnel to accomplish each portion of the work in this study. NCTCOG will maintain the right to request the removal of any personnel found, in their opinion, during the course of work on this project, to be unqualified to perform the work.

APPENDIX A

Travel Demand Forecasting Process for the Dallas-Fort Worth Metropolitan Area

October 1993

**North Central Texas Council of Governments
616 Six Flags Drive
Arlington, Texas 76011
(817) 640-3300**

INTRODUCTION

The Dallas-Fort Worth Regional Travel Model is used to prepare long-range vehicle and transit ridership forecasts for a 3,200 square mile metropolitan area with a population of over three million people. The four-step model consists primarily of mainframe FORTRAN programs that are similar to the Urban Transportation Planning System (UTPS) software package. Recent updates have been based on the results of the 1984 home interview, workplace, and transit on-board surveys, as well as the 1980 U.S. Census Journey-to-Work data. Future updates will be guided by ISTEA (Intermodal Surface Transportation Efficiency Act) and EPA (Environmental Protection Agency) requirements and based on 1990 Census findings, new 1994 travel surveys, and ongoing highway and transit counts.

ACTIVITY ALLOCATION

Demographic and land-use forecasts are made for the 16-county North Central Texas region of 13,000 square miles and 4.1 million people (as of 1990). The forecasting methodology used in 1987 and 1993 had three stages:

1. Develop regional control totals of employment (five land-use types) and households (four income groups) that are based on estimates from national models.
2. Use EMPAL (Employment Allocation Model) and DRAM (Disaggregated Residential Allocation Model) to allocate control totals to districts in five-year increments, based on relative attraction factors such as district-to-district peak-period travel times and proximity to existing population and employment.
3. Within each district, allocate employment and households to traffic survey zones (**TSZs**) after accounting for local factors such as availability of developable land, policy and zoning constraints, and local government review.

TRIP GENERATION

The cross-classification trip generation model calculates weekday person trip productions and attractions for each of the 6,000 TSZs that make up the metropolitan area. Seven trip purposes are used:

- Home-Based Work -- Low Income (HBW1 = Income Quartile 1)
- Home-Based Work -- Low-Median Income (HBW2 = Income Quartile 2)
- Home-Based Work -- High-Median Income (HBW3 = Income Quartile 3)
- Home-Based Work -- High Income (HBW4 = Income Quartile 4)
- Home-Based Nonwork (HNW)
- Nonhome-Based (NHB)
- OTHER (truck, taxi, internal-external, external-internal, and external-external)

Four income categories for HBW trips are maintained so that the trip distribution model can balance the household incomes of residences with the household incomes of employees working at specific locations.

Input data for each TSZ includes total area, households, population, and employment, with employment grouped according to Standard Industrial Classification code: Basic (SIC 13-51), Retail (SIC 52-59), and Service (SIC 60-99). Each TSZ record also identifies average socioeconomic characteristics for the larger-sized Regional Analysis Area (RAA) that encloses the TSZ (each RAA generally contains nine to ten TSZs).

Trip Productions. The RAA averages for household income, household size, and area type are used to identify the trip production rates in Tables 1 and 2 to apply to a TSZ:

- Income -- Each zone's households are distributed among the four income quartiles according to a set of curves developed from the 1980 Census data; the ratio of RM income divided by regional income is the independent variable that is used to predict the fraction of households that fall in each income quartile.
- Household Size -- In a manner similar to income distribution, the RAA's average household size is the independent variable that is used to predict the fraction of households in a zone that fall in each household size category.
- Area Type -- An activity density based on the combined population and employment density of an RAA is calculated, with employment factored by the regional population/employment ratio; five area types are used:
 - 1 = Central Business District (Density > 125 per acre)
 - 2 = Outer Business District (Density = 30-125 per acre)
 - 3 = Urban Residential (Density = 7.530 per acre)
 - 4 = Suburban Residential (Density = 1.8-7.5 per acre)
 - 5 = Rural (Density < 1.8 per acre)

Trip Attractions. The RIM averages for employment income and area type are used to identify the trip attraction rates in Table 3 to apply to a TSZ. The percent of each zone's employment that falls within a particular income quartile is calculated from regression equations that account for the proximity of the zone to households of each income quartile. The underlying assumption is that people live relatively close to the place they work, and low-income neighborhoods are more likely to have low-income jobs than high-income jobs.

**Table 1. Trip Production Rates by Household Size
and Income Quartile**

	Household Size					
	1	2	3	4	5	6+
Home-Based Work Trip Productions (Person Trips per Household)						
Income Quartile 1 (low)	1.000	1.700	1.800	1.846	2.500	2.875
Income Quartile 2	1.204	1.970	2.423	2.864	2.667	3.300
Income Quartile 3	1.552	2.267	2.812	2.824	3.696	3.846
Income Quartile 4 (high)	1.600	2.800	2.848	3.198	3.439	5.286
Home-Based Nonwork Trip Prod's (Person Trips per Household)						
Income Quartile 1 (low)	2.185	3.167	3.524	4.500	4.833	6.875
Income Quartile 2	1.620	2.791	4.028	5.682	8.000	7.700
Income Quartile 3	1.724	2.740	4.205	6.500	8.478	8.385
Income Quartile 4 (high)	2.455	3.145	4.527	6.840	8.927	14.143
Nonhome-Based Trip Productions (Person Trips per Household)						
Income Quartile 1 (low)	1.300	1.600	1.714	2.000	1.500	0.750
Income Quartile 2	1.611	1.657	2.014	2.500	2.208	1.800
Income Quartile 3	1.690	2.093	2.188	2.989	3.522	2.077
Income Quartile 4 (high)	3.364	3.275	2.866	2.821	3.463	3.357

Table 2. Trip Production Rates by Area Type

	Area Type				
	1	2	3	4	5
Other Person Trip Productions					
Per Basic Employee	0.264	0.298	0.395	0.488	1.007
Per Retail Employee	0.395	0.632	0.791	0.969	1.318
Per Service Employee	0.264	0.290	0.380	0.527	0.796
Per Household	0.375	0.375	0.375	0.375	0.375

Table 3. Trip Attraction Rates by Area Type

	Area Type				
	1	2	3	4	5
Home-Based Work Trip Attractions (Person Trips per Basic Employee)					
Income Quartile 1 (low)	1.677	1.384	1.413	1.312	1.389
Income Quartile 2	1.695	1.454	1.300	1.277	1.464
Income Quartile 3	1.545	1.421	1.300	1.260	1.530
Income Quartile 4 (high)	1.378	1.296	1.300	1.388	1.521
Home-Based Work Trip Attractions (Person Trips per Retail Employee)					
Income Quartile 1 (low)	1.500	1.486	1.643	1.400	1.455
Income Quartile 2	1.500	1.363	1.400	1.400	1.400
Income Quartile 3	1.467	1.435	1.736	1.634	1.400
Income Quartile 4 (high)	1.500	1.300	1.344	1.358	1.286
Home-Based Work Trip Attractions (Person Trips per Service Employee)					
Income Quartile 1 (low)	1.732	1.296	1.424	1.402	1.422
Income Quartile 2	1.700	1.322	1.430	1.295	1.338
Income Quartile 3	1.700	1.341	1.365	1.456	1.566
Income Quartile 4 (high)	1.704	1.258	1.265	1.323	1.244
Home-Based Nonwork Person Trip Attractions					
Per Basic Employee	0.453	0.442	0.300	0.200	0.139
Per Retail Employee	0.811	1.144	8.796	8.060	6.164
Per Service Employee	1.574	1.005	1.000	1.059	1.812
Per Household	0.442	0.500	0.511	0.627	0.682
Nonhome-Based Person Trip Attractions					
Per Basic Employee	0.500	0.655	0.858	0.589	0.500
Per Retail Employee	1.100	1.462	4.272	3.717	2.978
Per Service Employee	0.600	0.877	1.167	1.243	1.095
Per Household	0.100	0.104	0.216	0.261	0.235
Other Person Trip Attractions					
Per Basic Employee	0.208	0.235	0.312	0.385	0.795
Per Retail Employee	0.312	0.499	0.624	0.765	1.040
Per Service Employee	0.208	0.229	0.300	0.416	0.628
Per Household	0.299	0.299	0.299	0.299	0.299

Special Generators and External Stations. The 1984 workplace survey identified six special generator categories:

1. Regional shopping malls (15 locations)
2. Universities and colleges (ten locations)
3. Hospitals (six locations)
4. Commercial airports (three locations)
5. Regional recreation facilities (one location)
6. Military installations (two locations)

To handle special generators, the trip generation model first applies the trip attraction rates from Table 3 to the employment from these generators; the model user must then directly input any additional trips associated with special generators to each trip purpose.

External station data is added by the model user to the "OTHER" trip purpose category. The projected station volumes take into account trends both within and external to the metropolitan area.

Trip Balancing. The trip generation model goes through a final routine in which trip productions and attractions are balanced (i.e., normalized) by trip purpose:

- For HBW trips, total person trip productions within each income quartile are factored so that they equal total person trip attractions within each income quartile.
- For HNW and OTHER trips, total person trip attractions are factored so that they equal total person trip productions.
- For NHB trips, total person trip attractions are first factored so that they equal total person trip productions; the original person trip productions in each zone are then discarded and reset to equal the zone's NHB attractions.

ZONE AND NETWORK PREPARATION

The data sets known as the Transportation Information System (TIS) contain over 6,000 TSZs, 20,000 roadway link segments, and 14,000 network nodes. A focusing technique has been developed in which the activity of the entire Dallas-Fort Worth region can be handled in a manageable and computationally efficient problem size. Two modeling approaches have been developed:

1. The regional model consists of aggregating the 6,000 TSZs into 800 analysis zones, with the zones defined so that each one contains approximately the same level of trip activity in the forecast year. The region's Regional Transportation Plan, "Mobility 2010," is based on this approach.

2. A subarea model may also contain 800 zones, but with a zone structure that increases in size as one gets away from the area of interest. The recent Regional Arterial Needs Assessment (RANA) project consisted of 12 separate subarea models, with TSZs defined as analysis zones in each subarea's area of interest. For six of these subareas, the mainframe network and zonal data was downloaded to the microcomputer DOS environment so that the TRANPIAN software package could be used to perform trip distributions and traffic assignments.

To prevent unusual highway loading problems, the link level must be matched with the zone level whenever possible. Special FORTRAN programs have been written to automate the process of generating a balanced network and zone structure.

TRIP DISTRIBUTION

The trip distribution gravity model uses a "second order" Bessel function as the decay curve to estimate the number of person trips between each pair of zones for each of the seven trip purposes. The model uses cumulative minimum travel times between zones:

- For the four HBW trip purposes, link speeds are calculated by multiplying the link's free flow speed by a peak-period estimated loaded speed (ELS) factor. The ELS factor is obtained from a look-up table that varies by functional class, number of lanes on a roadway, location of the roadway in the region, and the forecast year.
- For the HNW, NHB, and OTHER trip purposes, link speeds are calculated by multiplying the link's estimated free flow speed by an off-peak ELS factor obtained from a look-up table that is similar to the peak-period table.
- All zone-to-zone travel times include the "terminal" time spent locating a parking space, paying for parking, and walking from the car to the office; these estimated times vary by area type and trip end (production versus attraction) and were derived from the 1984 workplace survey.

Each roadway link's estimated free flow speed is calculated as $(\text{link length}) / (\text{total travel time})$, in which total travel time is equal to travel time at the speed limit plus total traffic control delay. Traffic control delay is estimated as follows:

- Intervening controls represent stop delays experienced at an intersection with streets not coded in the network; each intervening control is assumed to equal 12 seconds of delay.
- End-node intersection control delays are assumed to be 22 seconds at a two-way stop and 14 seconds at a four-way stop; if a traffic signal is coded, the delay varies by functional class and area type and ranges from 7-15 seconds.

For each trip purpose, the distribution model is iterated **7-10** times to ensure that the estimated number of trips received by each zone equals the projected number of trip attractions.

MODE CHOICE

The mode choice model calibrated in 1988 (based on the 1984 home interview survey and 1984 on-board transit survey) is a simple multinomial logit model providing various choice sets for three trip purposes:

HBW - Five modes: drive alone, 2 occupant shared ride, 3+ occupant **shared** ride, walk access to transit, and auto access to transit.

HNW -- Four modes: drive alone, 2+ occupant shared ride, walk access to transit, and auto access to transit.

NHB -- Three modes: drive alone, 2+ occupant shared ride, and transit.

Model Coefficients. Tables 4, 5 and 6 present the model coefficients and constants used for each trip purpose. Impedances for HBW trips are based on peak periods, while impedances for HNW and NHB trips are based on off-peak periods. Four types of variables are represented:

1. Variables that describe the transportation system, such as times and costs
2. Location-specific variables that capture otherwise unmeasurable effects of travel to or from certain types of areas, such as the CBD
3. Socioeconomic characteristics of the traveler's household, such as autos Per person
4. Mode-specific constants for travelers with no restrictions on their choice sets, for zero-car households (captive to transit-walk access and shared ride modes), and for managers/self-employed persons (captive to drive alone and shared ride modes)

HOV Assignment. To permit analysis of HOV lane impacts, the HBW mode choice model can read two sets of highway impedances. One set represents the highway travel times available to travelers in mixed-flow traffic, while the other represents the reduced travel times available to travelers with occupancies that qualify for the HOV lanes. The model assigns the appropriate travel time to each occupancy alternative and computes mode shares that recognize the impact of HOV time savings.

**Table 4. Hourly Service Volume Per Lane
(Level of Service E)**

Functional Class	Area Type				
	1	2	3	4	5
Freeway	1,800	1,850	1,875	1,950	2,000
Freeway Ramp	1,100	1,200	1,250	1,400	1,500
Frontage Road					
Divided	550	600	625	700	750
Undivided	500	550	575	625	675
Principal Arterial					
Divided	550	600	650	725	800
Undivided	500	550	600	675	725
Minor Arterial					
Divided	550	600	625	700	750
Undivided	500	550	575	625	675
Collector Street					
Divided	450	475	500	550	575
Undivided	400	425	450	500	525
Local Street					
Divided	450	475	500	550	575
Undivided	400	425	450	500	525

**Table 5. Home-Based Work Mode Choice Model
Coefficients and Constants**

VARIABLE DESCRIPTION	Drive Alone	Shared Ride (2 pers.)	Shared Ride (3+ pers.)	Transit/Walk	Transit/Drive
IVT = In-Vehicle Travel Time, Excluding Drive Time to Transit, minutes	-0.029670	-0.029670	-0.029670	-0.029670	-0.029670
TERMINAL = Time at Both Ends of a Trip, minutes	-0.055240	-0.055240	-0.055240	0.000000	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	0.000000	-0.055240	-0.055240
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.004649	-0.004649	-0.004649	-0.004649	-0.004649
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.000000	3.100000	0.000000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.011623	-0.011623	-0.011623	0.000000	0.000000
AUTOS/PERSON = Number of Autos per Person in the Household	0.000000	-1.256000	-1.256000	-0.721800	0.000000
AUTOS/HOUSEHOLD = Numbers of Autos in the Household	0.000000	0.000000	0.000000	-0.866000	-0.529700
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-0.258900	-0.362680	3.516120	3.234250
FT. WORTH CBD FLAG (1 = Attraction in CBD)	0.000000	0.491750	0.354340	2.669160	1.870840
FWAITLT7 = First Wait Time for Transit, Seven Minutes or Less	0.000000	0.000000	0.000000	-0.054920	-0.054920
FWAITGT7 = First Wait Time for Transit, Excluding the First Seven Minutes	0.000000	0.000000	0.000000	-0.028730	-0.028730
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	0.000000	-0.059090	-0.059090
HOV = Time Savings per Mile for Vehicles Using HOV, minutes	0.000000	0.130000	0.130000	0.000000	0.000000
INCOME QUARTILE for the Household (1 = Low, 4 = High)	0.000000	0.000000	0.000000	-0.493400	-0.100000
DETERRENT = Auto Access Time - Transit IVT for NonCBD Zones, Minutes	0.000000	0.000000	0.000000	0.000000	-0.660400
CHOOSERS (1 = Yes)	0.000000	-0.693560	-1.705190	0.358150	-3.361420
ZERO-CAR HHOLDS (1 = Yes)	0.000000	-2.073120	-2.261870	3.117990	0.000000
SELF EMPLOYED (1 = Yes)	0.000000	-1.024280	-1.491550	0.000000	0.000000

**Table 6. Home-Based NonWork Mode Choice Model
Coefficients and Constants**

VARIABLE DESCRIPTION	Drive Alone	Shared Ride (2+ pers.)	Transit/Walk	Transit/Drive
IVT = In-Vehicle Travel Time, Excluding Drive Time To Transit, minutes	-0.003680	-0.003680	-0.003680	-0.003680
TERMINAL = Time at Both Ends of a Trip, minutes	-0.007360	-0.007360	0.000000	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	-0.007360	-0.007360
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.002300	-0.002300	-0.002300	-0.002300
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.200000	0.000000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.005750	-0.005750	0.000000	0.000000
AUTOS/PERSON = Number of Autos per Person in the Household	0.000000	-0.953600	-0.678000	0.000000
AUTOS/HOUSEHOLD = Numbers of Autos in the Household	0.000000	0.000000	-0.269400	-0.269400
HOUSEHOLD SIZE = Persons per Household	0.000000	0.254200	0.418900	0.482500
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-1.838400	1.667260	0.958500
FT. WORTH CBD FLAG (1 = Attraction in CBD)	0.000000	-1.020430	1.354110	0.422540
RURAL AREA FLAG (1 for Area Type 5)	0.000000	0.659200	0.000000	0.000000
WAIT TIME = Wait Time for Transit, minutes	0.000000	0.000000	-0.014720	-0.014720
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	-0.014720	-0.014720
INCOME QUARTILE for the Household (1 = Low, 4 = High)	0.000000	0.000000	-0.884500	-0.884500
CHOOSERS (1 = Yes)	0.000000	0.375450	-2.234640	-4.881230
ZERO-CAR HHOLDS (1 = Yes)	0.000000	2.756830	3.496340	0.000000
SELF EMPLOYED (1 = Yes)	0.000000	0.459230	0.000000	0.000000

Transit Network Coding. The transit network is coded over the roadway links for those modes and lines which share the right-of-way with automobiles. Special links are added for nodes operating on an exclusive right-of-way. A supply-side simulation program processes each transit line to approximate actual operating characteristics.

Maximum transit access distances are assumed to be 2.5 miles for walk links and 15.0 miles for auto-access links. A FORTRAN program has been written to automatically generate up to four walk-to-local links, four walk-to-express links, and four drive-access links for each origin zone.

TRANSIT ASSIGNMENT

Four separate all-or-nothing assignments of weekday transit production-attraction person trips are performed:

- HBW walk-access transit trips loaded onto peak-period walk paths
- HBW drive-access transit trips loaded onto peak-period drive paths
- HNW and NHB walk-access transit trips loaded onto off-peak period walk paths
- HNW and NHB drive-access transit trips loaded onto off-peak period drive paths

After trip assignment, a time-of-day post-processing technique computes total peak and off-peak volumes on each transit link by reallocating the loadings according to the observed regionwide distribution of transit trips by purpose and access mode.

TRAFFIC ASSIGNMENT

The roadway assignment model uses a capacity-restrained incremental procedure to assign origin-destination vehicle trips to the roadway network. The minimum path-building routine uses a generalized cost equation (based on travel time, distance, and cost parameters) for the calculation of link impedance. The initial impedance for assignment purposes is based on free flow (uncongested) speeds. As traffic is loaded onto the links, the speed is reduced according to a volumedelay relationship and link impedances updated accordingly.

Weekday Assignment. Traffic assignments are generally performed for a weekday period, since most model validations by NCTCOG are made with weekday counts rather than peak-hour counts. Although an off-peak roadway network is used, the travel time estimates for the path-building routine are based on delays associated with peak periods. Separate volume-delay equations are used for high- and low-capacity facilities, in which high-capacity facilities (usually freeways) are normally defined as those exceeding 3,400 one-way vehicles per hour.

The volume-delay equation for high-capacity facilities is:

$$\begin{aligned} & \text{Delay (in minutes/mile)} \\ & = \text{Minimum of [} 0.015 \times \text{EXP}(5.30 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

The volume-delay equation for low-capacity facilities is:

$$\begin{aligned} & \text{Delay (in minutes/mile)} \\ & = \text{Minimum of [} 0.05 \times \text{EXP}(3.00 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

For the volume-delay equations, weekday link volumes are converted to hourly volumes using factors of 0.10 for freeway facilities and 0.12 for nonfreeway facilities (factors ranging from 0.08 to 0.14 have been used in some subarea studies). Hourly capacities are assumed to represent Level of Service 'E' volumes. The capacities vary by functional class, area type, number of lanes, and divided/undivided designation and are obtained from the look-up table shown in Table 7.

Peak-Hour Assignment. In addition to using different volume-delay equations and a peak-period roadway network, the peak-hour assignment process requires the use of a peak-hour trip table. Peak-hour distribution factors by time-of-day (morning or afternoon), trip purpose (HBW, HNW, NHB, and OTHER), and trip orientation (production versus attraction) are applied to the daily production-attraction person trip tables before the tables are converted to origin-destination vehicle trip tables. The distribution factors were obtained from the 1984 home interview survey.

The volume-delay equation for high-capacity facilities is:

$$\begin{aligned} & \text{Delay (in minutes/mile)} \\ & = \text{Minimum of [} 0.015 \times \text{EXP}(7.00 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

The volume-delay equation for low-capacity facilities is:

$$\begin{aligned} & \text{Delay (in minutes/mile)} \\ & = \text{Minimum of [} 0.05 \times \text{EXP}(4.50 \times (\text{hourly volume/hourly capacity})), 60] \end{aligned}$$

PERFORMANCE REPORTS

The travel model process includes various post-processing programs that are used to summarize traffic and transit assignment results. The PERF report, for example, prints highway performance summaries by various geographic aggregations of highway links and zones. Two model applications can be quickly compared in terms of:

- Total trips sent and received;
- Average trip length sent and received;
- Centerline roadway miles by functional class;
- Lane miles by functional class;
- Lane miles at levels of service A, B, C, D, E, or F by functional class;

**Table 7. Nonhome-Based Mode Choice Model
Coefficients and Parameters**

VARIABLE	Drive Alone	Shared Ride (2+ pers.)	Transit/ Walk-Auto
IVT = In-Vehicle Travel Time, Excluding Drive Time To Transit, minutes	-0.012160	-0.012160	-0.012160
TERMINAL = Time at Both Ends of a Trip, minutes	-0.024320	-0.024320	0.000000
ACCESS/EGRESS = Time to Transit, Including Drive Access Time, minutes	0.000000	0.000000	-0.024320
RUNCOST = Total Tolls, Bus Fares, Park-&-Ride Fees and Auto Running Costs, in cents	-0.004350	-0.004350	-0.004350
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.200000	0.000000
PARKCOST = Posted Parking Cost, in cents	-0.007020	-0.007020	0.000000
DALLAS CBD FLAG (1 = Production in CBD)	0.000000	-0.971410	1.301880
DALLAS CBD FLAG (1 = Attraction in CBD)	0.000000	-1.835180	0.349430
FORT WORTH FLAG (1 = Production in CBD)	0.000000	-0.549750	0.491930
FORT WORTH FLAG (1 = Attraction in CBD)	0.000000	-0.591560	0.920620
WAIT TIME = Wait Time for Transit, minutes	0.000000	0.000000	-0.085120
TRANSFER = Transfer Wait Time, minutes	0.000000	0.000000	-0.085120
DENSITY = Employment Density, employees/acre	0.000000	0.000042	0.000000
ALL GROUPS—CONSTANT	0.000000	-0.285670	-2.242330

- Hourly capacity by functional class;
- Vehicle miles of travel by functional class;
- Vehicle hours of travel by functional class;
- Average free speed and average loaded speed by functional class;
- Vehicle hours of traffic control delay and congestion delay by functional class; and
- Fuel consumption, accidents, and emissions by functional class.

**NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
METROPOLITAN PLANNING ORGANIZATION**

**REQUEST FOR PROPOSAL
FOR A HOUSEHOLD SURVEY
IN THE DALLAS-FORT WORTH METROPOLITAN AREA**

June 1994

**REQUEST FOR PROPOSAL
FOR A HOUSEHOLD SURVEY
IN THE DALLAS-FORT WORTH METROPOLITAN AREA**

The North Central Texas Council of Governments (NCTCOG) is requesting written proposals from consultants to conduct a household survey during the fall of 1994 and spring of 1995. In conjunction with major external, workplace, and transit surveys, the information collected from the household survey will serve primarily to improve the transportation planning process in the Dallas-Fort Worth Metropolitan Area. All surveys conducted by consultants for NCTCOG will be coordinated with the Texas Department of Transportation (TxDOT), the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), and local agencies.

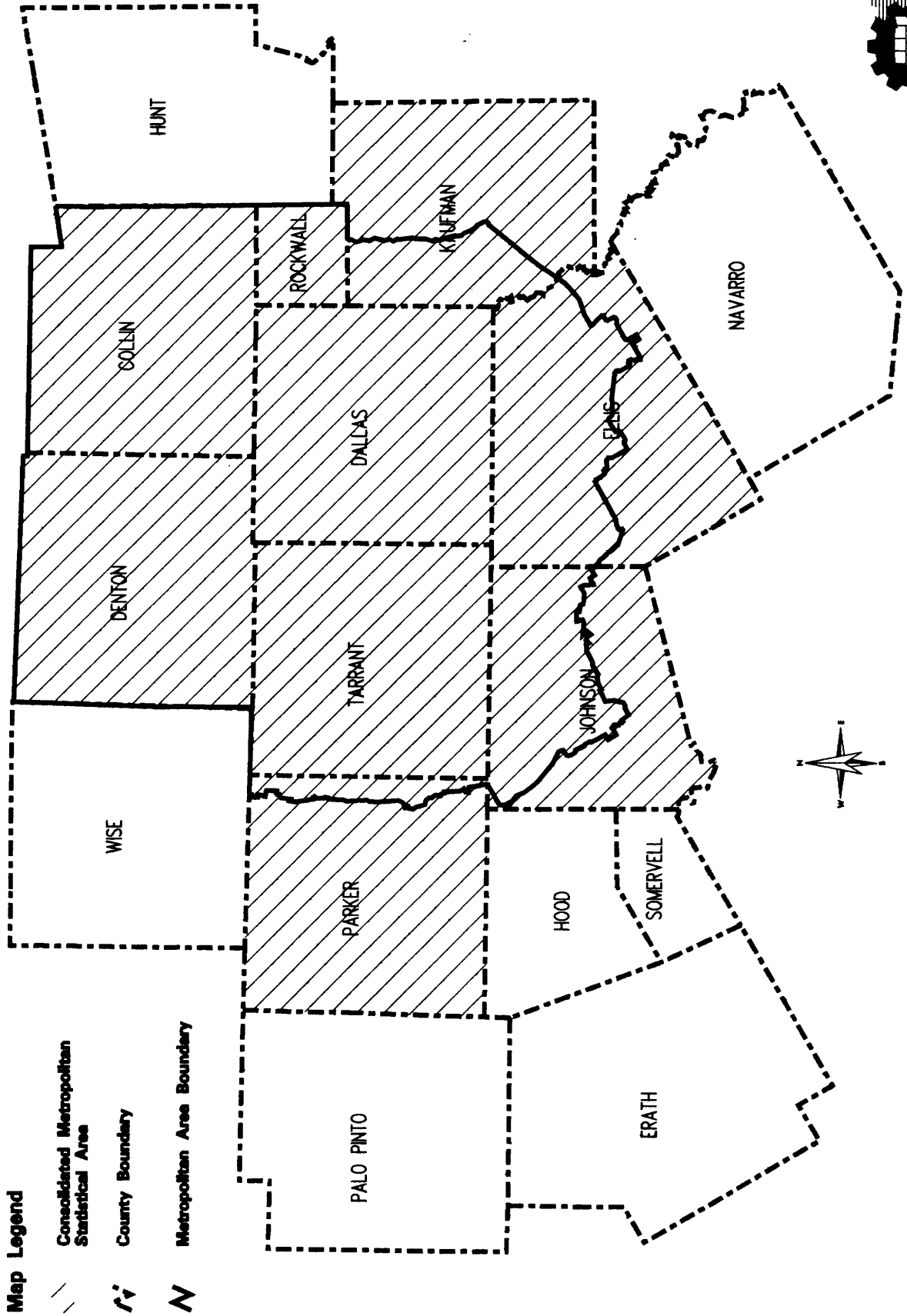
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

The North Central Texas Council of Governments was established in 1966 as a voluntary association of cities, counties, and school districts within the 16-county North Central Texas Region. Since 1974, NCTCOG has served as the Metropolitan Planning Organization (MPO) for the North Central Texas area, and provides technical assistance and staff support to the MPO policy-making structure known as the Regional Transportation Council. In addition, NCTCOG assists local governments and transportation providers in planning, coordinating, and implementing transportation decisions.

The boundaries for the 16-county NCTCOG region, the nine-county Dallas-Fort Worth Consolidated Metropolitan Statistical Area (CMSA), and the Metropolitan Area are shown in Figure 1. Estimated 1994 population (as of January 1, 1994) is 4.3 million for the 16-county region, 4.1 million for the CMSA, and 4.0 million for the Metropolitan Area. The 4,960 square-

FIGURE 1

Dallas - Fort Worth Region (16 Counties)



Map Legend

Consolidated Metropolitan Statistical Area

County Boundary

Metropolitan Area Boundary



mile Metropolitan Area (as adopted in 1992) includes all of Collin, Dallas, Denton, Rockwall, and Tarrant Counties and portions of Ellis, Johnson, Kaufman, and Parker Counties.

BACKGROUND

Comprehensive regional travel surveys in the Dallas-Fort Worth area were last conducted in 1984 and consisted of the following:

- The household survey was conducted in the spring and summer of 1984. A total of 6,403 persons over the age of four residing in 2,471 households were interviewed at their place of residence. Figures 2 and 3 show the survey forms that were used. The survey was originally designed to be completed by Memorial Day, before schools closed; however, a higher-than-expected household refusal rate prolonged the survey through the first half of July. In analyzing the data, a statistically significant difference was found between the pre- and post-Memorial Day trip rates. Since the rates for the travel model were intended to represent school year travel patterns, the post-Memorial Day trip records were deleted and all trip rates developed from the pre-Memorial Day sample of 1,600 households.
- The workplace survey was conducted in the summer and fall of 1984. A total of 474 nonresidential establishments and seven special generators were surveyed. Figures 4 and 5 show the survey forms that were used. Since arrival count data was not available for 120 of these surveyed establishments, only 354 establishments were actually used to estimate trip attraction rates.
- The on-board transit survey was conducted in the fall of 1984. Approximately 10,000 riders on four fixed-route bus systems were surveyed to determine various ridership characteristics such as trip purpose, access mode, and percentage of trips made by transit (Figure 6 shows the survey form). On-board surveys were also conducted in 1986 and 1991 for the Fort Worth Transportation Authority (FWTA) and in 1991 for the Dallas Area Rapid Transit Authority (DART).

The results of the 1984 surveys were compared against the results of regional surveys conducted 20 years earlier in 1964 (see Table I). The 1984 survey results, as well as summaries of 1980 U.S. Census Journey-to-Work data and traffic and transit ridership counts, were used extensively in the late 1980s to update the Dallas-Fort Worth Regional Travel Model (DFWRTM). Appendix A contains a description of the region's existing travel demand

FIGURE 2

Travel Day _____ and Date
 Sample Number



**NORTH CENTRAL TEXAS
 COUNCIL OF GOVERNMENTS
 HOME INTERVIEW SURVEY**

Section IV: Administrative

A. Household Telephone Number _____

B. Interviewer _____

C. Telephone Contacts (If Any) :

Date	Time	Purpose/Outcome
_____	_____	_____
_____	_____	_____
_____	_____	_____

D. Personal Contacts In Household:

Date	Time	Talked To/Comments:
_____	_____	_____
_____	_____	_____
_____	_____	_____

E. Completed Interview Submitted:

Date: _____ By: _____

I Certify That All Information
 On This Form Is Correct And True.

 Signature of Interviewer

F. If Interview Submitted Incomplete

Interviewer's Reason: _____

 Date Initials

Supervisor's Comments _____

 Date Initials

G. First Edit: Fail Pass

 Date Initials

H. Final Edit: Fail Pass

 Date Initials

I. Coding Complete

 Date Initials

Section I: Household Data

A. Sample Address _____
 House Number, Street Name, Apt. No. City/Town County Zip Code

B. Structure Type _____

C. Number of People Living at this Address _____

D. Number of People Age 5 and Over Living at this Address _____

E. Number of Out-of-Area Visitors Staying at this Address _____

F. Number of Passenger Cars, Vans, and Pickups Available for Use _____

G. Household Income: (Do Not Ask Until Interview Is Complete) _____

Section II: Data on Persons Age 5 and Over

A	B	C	D	E	F	G	H	I	J	K
Person Number	✓ If Interviewed	Relation To Head	Age	Sex	Licensed to Drive?	Occupation	Industry	Worked on Travel Day?	Made Trips While at Work?	Made Other Trips on Travel Day?
01		Head	1	1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
02				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
03				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
04				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
05				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
06				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
07				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
08				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
09				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO
10				1 M 2 F	1 YES 2 NO			1 YES 2 NO 3 Worked at Home	1 YES 2 NO	1 YES 2 NO

Age Codes

1 5 - 10	6 36 - 45
2 11 - 15	7 46 - 55
3 16 - 20	8 56 - 65
4 21 - 25	9 65 - OVER
5 26 - 35	0 UNKNOWN

Relation Codes

1 HEAD	6 GRANDCHILD
2 SPOUSE	7 OTHER RELATIVE
3 SON	8 UNRELATED
4 DAUGHTER	9 OUT-OF-AREA VISITORS
5 GRANDPARENT	0 UNKNOWN

Section III: Trip Summary

A. Total Vehicular Trips Reported _____
 B. Persons Age 5 and Over Making Trips _____
 C. Persons Age 5 and Over Not Making Trips _____
 D. Complete or Incomplete Interview Code _____

tr



North Central Texas Council of Governments
1984 EMPLOYEE TRAVEL SURVEY

The North Central Texas Council of Governments is sponsoring a survey of travel in the Dallas-Fort Worth area. We ask your cooperation by answering each of the questions below. If possible, please return this questionnaire to the person who gave it to you.

YOUR ANSWERS WILL BE KEPT CONFIDENTIAL AND WILL ONLY BE USED TO PRODUCE STATISTICAL DATA NEEDED TO IMPROVE TRANSPORTATION SERVICES IN THE AREA.

A. At what TIME do you usually arrive at work?

_____ A.M. P.M. (write time and circle A.M. or P.M.)

B. HOW did you travel to work this morning? (Circle number)

- | | |
|---|-------------------------|
| 1. I drove by myself. | 5. I rode a motorcycle. |
| 2. I drove a car with others as passengers. | 6. I rode in a vanpool. |
| 3. I was a passenger in a car driven by someone else. | 7. I rode in a taxi. |
| 4. I walked or bicycled. | 8. I rode a bus. |

C. If you traveled to work by auto, truck, or van, HOW MANY PERSONS were in the vehicle, including yourself? _____ (enter number of persons)

D. If you were the DRIVER today, how much did you PAY TO PARK?

Free I paid \$_____

E. If you were the DRIVER today, how many BLOCKS away from work did you park?

1 or less 2 3 4 more than 4

F. If you traveled BY BUS to get to work today, how did you get to your first bus stop? (Circle number)

- | | |
|---|-------------------------|
| 1. I drove by myself. | 5. I rode a motorcycle. |
| 2. I drove a car with others as passengers. | 6. I rode in a vanpool. |
| 3. I was a passenger in a car driven by someone else. | 7. I rode in a taxi. |
| 4. I walked or bicycled. | |

G. Did you make any STOPS on your way TO work today? (Check yes or no)

- No, I traveled directly to work.
 Yes, I made the following stops:

IF YES, please check the purpose for EACH stop

PURPOSE OF STOP	STOP MADE			
	1st Stop	2nd Stop	3rd Stop	4th Stop
Work Related	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Shopping	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
School	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>
Social/Recreational	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
Personal Business	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>
Eat a Meal	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>
Pick-Up or Drop Off a Passenger	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>

H. Did you make any STOPS on your way home FROM work yesterday (or your last weekday at work)?

- No, I traveled directly home.
 Yes, I made the following stops:

IF YES, please check the purpose for EACH stop

PURPOSE OF STOP	STOP MADE			
	1st Stop	2nd Stop	3rd Stop	4th Stop
Work Related	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>	1 <input type="checkbox"/>
Shopping	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
School	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>
Social/Recreational	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>
Personal Business	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>	5 <input type="checkbox"/>
Eat a Meal	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>	6 <input type="checkbox"/>
Pick-Up or Drop Off a Passenger	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>	7 <input type="checkbox"/>

I. Did you make a trip(s) during working hours yesterday (or your last weekday at work)?

- No Yes If yes, please check purpose for each trip.

1ST TRIP PURPOSE	2ND TRIP PURPOSE	3RD TRIP PURPOSE	4TH TRIP PURPOSE
1 <input type="checkbox"/> Work Related	1 <input type="checkbox"/> Work Related	1 <input type="checkbox"/> Work Related	1 <input type="checkbox"/> Work Related
2 <input type="checkbox"/> Shopping	2 <input type="checkbox"/> Shopping	2 <input type="checkbox"/> Shopping	2 <input type="checkbox"/> Shopping
3 <input type="checkbox"/> School	3 <input type="checkbox"/> School	3 <input type="checkbox"/> School	3 <input type="checkbox"/> School
4 <input type="checkbox"/> Social/Recreational	4 <input type="checkbox"/> Social/Recreational	4 <input type="checkbox"/> Social/Recreational	4 <input type="checkbox"/> Social/Recreational
5 <input type="checkbox"/> Personal Business	5 <input type="checkbox"/> Personal Business	5 <input type="checkbox"/> Personal Business	5 <input type="checkbox"/> Personal Business
6 <input type="checkbox"/> Eat a Meal	6 <input type="checkbox"/> Eat a Meal	6 <input type="checkbox"/> Eat a Meal	6 <input type="checkbox"/> Eat a Meal
7 <input type="checkbox"/> Pick-Up/Drop Off a Passenger	7 <input type="checkbox"/> Pick-Up/Drop Off a Passenger	7 <input type="checkbox"/> Pick-Up/Drop Off a Passenger	7 <input type="checkbox"/> Pick-Up/Drop Off a Passenger
8 <input type="checkbox"/> Home	8 <input type="checkbox"/> Home	8 <input type="checkbox"/> Home	8 <input type="checkbox"/> Home
MEANS OF TRAVEL	MEANS OF TRAVEL	MEANS OF TRAVEL	MEANS OF TRAVEL
1 <input type="checkbox"/> Auto	1 <input type="checkbox"/> Auto	1 <input type="checkbox"/> Auto	1 <input type="checkbox"/> Auto
2 <input type="checkbox"/> Bus	2 <input type="checkbox"/> Bus	2 <input type="checkbox"/> Bus	2 <input type="checkbox"/> Bus
3 <input type="checkbox"/> Other	3 <input type="checkbox"/> Other	3 <input type="checkbox"/> Other	3 <input type="checkbox"/> Other
AND THEN:	AND THEN:	AND THEN:	AND THEN:
1 <input type="checkbox"/> Back to Work	1 <input type="checkbox"/> Back to Work	1 <input type="checkbox"/> Back to Work	1 <input type="checkbox"/> Back to Work
2 <input type="checkbox"/> To 2nd Trip	2 <input type="checkbox"/> To 3rd Trip	2 <input type="checkbox"/> To 4th Trip	2 <input type="checkbox"/> To Next Trip (cont. on back)

J. How many AUTOS, PICKUPS, and VANS are available for use by members of your household? _____ (enter number)

K. What is your OCCUPATION? _____

L. What is your home ADDRESS?

Number and Street City Zip Code

M. What is your annual HOUSEHOLD INCOME? (Circle number)

- | | |
|----------------------|------------------------|
| 1. Less than \$5,000 | 6. \$25,000-\$29,999 |
| 2. \$ 5,000-\$ 9,999 | 7. \$30,000-\$34,999 |
| 3. \$10,000-\$14,999 | 8. \$35,000-\$39,999 |
| 4. \$15,000-\$19,999 | 9. \$40,000-\$50,000 |
| 5. \$20,000-\$24,999 | 10. More than \$50,000 |

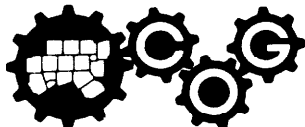


FIGURE 5

**North Central Texas Council of Governments
1984 NON-EMPLOYEE TRAVEL SURVEY**

The North Central Texas Council of Governments is sponsoring a survey of travel in the Dallas-Fort Worth area. We ask your cooperation by answering each of the questions below. If possible, please return this questionnaire to the person who gave it to you. If not, just place it in any mailbox.

YOUR ANSWERS WILL BE KEPT CONFIDENTIAL AND WILL ONLY BE USED TO PRODUCE STATISTICAL DATA TO IMPROVE TRANSPORTATION SERVICES IN THE AREA.

A. Is your regular place of employment at this address? (Circle number)

1. Yes
2. No

IF YOU ANSWERED "YES" TO QUESTION A, DO NOT ANSWER THE REMAINING QUESTIONS AND PLEASE RETURN THIS FORM TO THE PERSON WHO GAVE IT TO YOU.

IF YOU ANSWERED "NO," PLEASE CONTINUE.

B. At what TIME did you arrive here today? (Circle number)

- | | | |
|---------------------------|---------------------------|--------------------|
| 1. Before 7:00 A.M. | 3. 9:00 A.M. to 3:00 P.M. | 5. After 6:00 P.M. |
| 2. 7:00 A.M. to 9:00 A.M. | 4. 3:00 P.M. to 6:00 P.M. | |

C. Where did you START the trip that brought you to this address?

_____ Street Address (or nearest intersection or place name) _____ City _____ Zip Code

Is this your home? Yes No

D. HOW did you get here? (Circle number)

- | | |
|---|-------------------------|
| 1. I drove by myself. | 5. I rode a motorcycle. |
| 2. I drove a car with others as passengers. | 6. I rode in a vanpool. |
| 3. I was a passenger in a car driven by someone else. | 7. I rode in a taxi. |
| 4. I walked or bicycled. | 8. I rode a bus. |

E. If you traveled to this place by auto, truck, or van, HOW MANY PERSONS were in the vehicle, including yourself? _____ (enter number of persons)

F. If you were the driver today, how many BLOCKS away from here did you park?

- 1 or less 2 3 4 more than 4

G. If you traveled BY BUS to get to this place, how did you get to your first bus stop? (Circle number)

- | | |
|---|-------------------------|
| 1. I drove by myself. | 5. I rode a motorcycle. |
| 2. I drove a car with others as passengers. | 6. I rode in a vanpool. |
| 3. I was a passenger in a car driven by someone else. | 7. I rode in a taxi. |
| 4. I walked or bicycled. | |

H. What is the REASON for your trip here? (Circle number)

- | | |
|-----------------|------------------------------------|
| 1. I work here | 5. Social/recreational |
| 2. Work related | 6. Personal business |
| 3. Shopping | 7. Eat a meal |
| 4. School | 8. Pick up or drop off a passenger |

Transit Rider Survey

TO TRANSIT RIDERS: In order to better plan transit services, we need to learn more about your travel patterns. Please answer the following questions about the trip you are now making. Please complete this questionnaire, even if you have already filled one out in the last 8 weeks. Thank you for your help.

- I got on this bus at _____ & _____
Nearest Street Intersection
 - The place I have come from is _____ Is this home? Yes No
Address or Street Intersection
 - I am getting off this bus at _____ & _____
Nearest Street Intersection
 - The place I am going to is _____ Is this home? Yes No
Address or Street Intersection
 - The reason for this trip is: Work related Shopping School Social/Recreational
 Personal Business Eat a Meal Other
 - How did you get to this bus? By Auto/Parked By Auto/Dropped Off
 Transfer from Another Bus(es) _____ Walk Other
Route Name(s)
 - After leaving this bus, how will you get to your final destination?
 By Auto/Parked By Auto/Picked Up
 Transfer to Another Bus(es) _____ Walk Other
Route Name(s)
 - How did you pay for this bus ride?
 Cash _____ Monthly Pass _____
How much? (Please circle type and zone)
 Token (Citran Only)
 Transfer Punch Card _____
(Please circle type and zone)
 Other _____
Please specify
- | | | | |
|---|---|---|------------------------------------|
| <input type="checkbox"/> Cash _____
<i>How much?</i> | <input type="checkbox"/> Monthly Pass _____
<i>(Please circle type and zone)</i> | Type
Adult
Senior Citizen
Handicapped | Zone (Dallas Only)
1 2 3 |
| <input type="checkbox"/> Token (Citran Only) | <input type="checkbox"/> Punch Card _____
<i>(Please circle type and zone)</i> | Type
Adult
Student | Zone (Dallas Only)
1 2 3 |
- How many round trips do you take by bus during a typical week (Monday through Friday)?
 1 2-4 5-7 8-10 10 or More
 - How many cars, pickups, and vans are available to your household?
 None 1 2 3 4 or More
 - What is your age? _____
 - How many persons in your household? _____
 - To which major ethnic group do you belong:
 White Black American Hispanic-American Other _____
Please specify
 - What is your annual HOUSEHOLD income?
 Less than \$ 5,000 \$ 5,000 - \$ 9,999 \$ 10,000 - \$ 14,999
 \$ 15,000 - \$ 19,999 \$ 20,000 - \$ 24,999 \$ 25,000 - \$ 29,999
 \$ 30,000 - \$ 34,999 \$ 35,000 - \$ 39,999 \$ 40,000 - \$ 50,000
 More than \$50,000

If you have additional comments about transit service in your area or any suggestions on new services you would like to see, please write them on the back of this card.

After completing this card, please fold and return it to the survey worker on the bus or drop it in any mail box postage-free. Thank You.

Preguntas Para Personas Que Usan El Autobus

FIGURE 6

PARA PERSONAS QUE USAN EL AUTOBÚS: Necesitamos saber mas de sus viajes en los autobuses para poder darles mejor servicio. Por favor conteste las siguientes preguntas en relación a este viaje. Por favor llene este cuestionario aunque ya aiga llenado uno en las ultimas ocho (8) semanas. Gracias por su ayuda.

- Yo borden este autobus en: _____ y _____
Calle Esquina
- El lugar de donde va es: _____ ¿Es este lugar su casa? Si No
(Dirección o Esquina)
- ¿Donde se va a bajar de este autobus? _____ y _____
Calle Esquina
- El lugar donde Ud. va es: _____ ¿Es este lugar su casa? Si No
(Dirección o Esquina)
- El proposito de su viaje es: Trabajo De Compras Escuela Social/Recreacion
 Negocio Personal Ir a Comer Otro
- ¿Como llego Ud. a este autobus? Automovil y lo estaciono Pasajero de Automovil
 Transbordo a otro Autobús _____ En Pie Otro Modo
Nombre de la ruta
- Despues de que abaje este autobus, ¿como va Ud. terminar su viaje?
 Automovil y lo estaciono Pasajero de Automovil
 Transbordare a otro Autobús _____ En Pie Otro Modo
Nombre de la ruta
- ¿Como pago Ud. por este autobus?
 En Efectivo _____ Pase de un mes _____
Cuanto (Marque el tipo y la zona)
 Ficha (Citran solamente)
 Transborde Tarjeta de ponchar _____
(Marque el tipo y la zona)
 Otro Modo _____
Explique
- ¿Cuantos viajes por volver usa el autobus en una semana (Lunes a Viernes)?
 1 2-4 5-7 8-10 10 o Mas
- ¿Cuantos Carros, Trocas, o Vans tiene en su familia? Ninguno 1 2 3 4 o Mas
- Sexo: M F
- Sexo: Hombre Mujer
- ¿Que es su edad? _____
- ¿Cuantas personas hay en su familia? _____
- ¿Qual es su grupo ethnico? Hispano Otro _____
Explique
- ¿Que es su ingreso por año de la familia?
 Menos de \$ 5,000 \$ 5,000 - \$ 9,999 \$ 10,000 - \$ 14,999
 \$ 15,000 - \$ 19,999 \$ 20,000 - \$ 24,999 \$ 25,000 - \$ 29,999
 \$ 30,000 - \$ 34,999 \$ 35,000 - \$ 39,999 \$ 40,000 - \$ 50,000
 \$ 50,000 o Mas

Si Ud. tiene comentarios adicionales sobre el servicio de tránsito en su area o sujestiones en otros servicios que desea, por favor escribalos atras de esta tarjeta.

Despues de que llene esta tarjeta, doble la tarjeta y regresca a la persona tomando o puede poner en cualquier caja de correo, no necesita estampilla. Gracias.

TABLE 1
DALLAS-FORT WORTH REGIONAL TRENDS
OBTAINED FROM TRAVEL SURVEYS

VARIABLE	1964 Survey	1984 Survey	1984/ 1964
AUTOS PER HOUSEHOLD	1.33	1.84	1.38
AUTOS PER PERSON	0.41	0.72	1.76
PERSON TRIPS PER HOUSEHOLD			
Home-Based Work Purpose	1.91	2.29	1.20
Home-Based Nonwork Purpose	5.42	4.32	0.80
Nonhome-Based Purpose	1.70	2.07	1.22
Total	9.03	8.68	0.96
PERSON TRIPS PER PERSON			
Home-Based Work Purpose	0.57	0.90	1.58
Home-Based Nonwork Purpose	1.62	1.69	1.04
Nonhome-Based Purpose	0.54	0.81	1.50
Total	2.73	3.40	1.25
AUTO OCCUPANCY			
Home-Based Work Purpose	1.18	1.13	0.96
Home-Based Nonwork Purpose	1.70	1.55	0.91
Nonhome-Based Purpose	1.46	1.39	0.95
Average	1.52	1.36	0.89
VEHICLE TRIPS PER PERSON			
Home-Based Work Purpose	0.48	0.80	1.67
Home-Based Nonwork Purpose	0.95	1.10	1.16
Nonhome-Based Purpose	0.37	0.60	1.62
Total	1.80	2.50	1.39
AVERAGE VEHICLE TRIP LENGTH, MILES			
Home-Based Work Purpose	8.50	10.40	1.22
Home-Based Nonwork Purpose	4.80	5.64	1.18
Nonhome-Based Purpose	5.70	6.65	1.17
Average	5.70	7.10	1.25
DISTRIBUTION OF PERSON TRIPS			
Home-Based Work Purpose	21%	27%	1.29
Home-Based Nonwork Purpose	59%	48%	0.80
Nonhome-Based Purpose	20%	25%	1.28
Total	100%	100%	1.00
DISTRIBUTION OF TRANSIT TRIPS			
Home-Based Work Purpose	45%	66%	1.46
Home-Based Nonwork Purpose	48%	19%	0.39
Nonhome-Based Purpose	7%	15%	2.35
Total	100%	100%	1.00

forecasting process. Appendix B contains tables and figures depicting general characteristics of the Dallas-Fort Worth area.

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 has provided additional funding to Metropolitan Planning Organizations (MPOs) to conduct major planning projects. In coordination with the Federal Highway Administration (FHWA), the Texas Department of Transportation (TxDOT), and local agencies, NCTCOG has programmed new regional travel surveys for 1994 and 1995:

- Data collection for the external travel survey was completed in March and April of 1994. Over 28,000 drivers were interviewed at 38 roadway locations at the point where the roadways exit the Metropolitan Area. The surveys generally took place on Tuesdays, Wednesdays, and Thursdays from 7 a.m. to 7 p.m. The survey form (see Figure 7) included questions on time of arrival, vehicle classification, vehicle occupancy, trip origin, trip purpose (for both last stop and next stop), time of departure from last stop, fuel type, vehicle year, and mileage.
- The workplace survey is scheduled to take place during the fall of 1994. Approximately 270 workplaces will be surveyed, with possible stratification by area type, establishment type, and number of employees. The survey design has not been finalized but is expected to include employer distribution of survey forms to employees, visitor interviews conducted by trained surveyors, and total weekday person trip and truck trip arrivals on the survey day.
- Data collection for the household survey is scheduled to take place during both the fall of 1994 and the spring of 1995, and is the subject of this Request for Proposal.
- An on-board transit survey is scheduled to take place during the spring of 1995. The survey questions have not been determined, but should be designed to improve our understanding of the decision-making process of individuals that have chosen to use
 - transit for a particular trip. The scope of work for the transit survey will be impacted by the work done for the household survey, especially if transit passenger intercepts are used to enrich the household survey sample.
- Other surveys are being considered for the spring of 1995. These include a commercial (fleet vehicle) survey and special generator (i.e., additional workplace) surveys. The specific purposes and procedures for these and other surveys have not been finalized.

FIGURE 7

External Travel Survey Form
 NCICOG External Travel Survey
 Dallas-Fort Worth Metropolitan

Dallas / Fort Worth Area
 External Station Travel Survey
 North Central Texas Council of Governments

Station No. _____ Interviewer _____

Station Location _____ Date _____

TIME OF INTERVIEW	VEHICLE CLASSIFICATION	TRAILER TYPE	TOTAL AXLES	VEHICLE OCCUPANCY	TRIP ORIGIN	TRIP PURPOSE	TIME	FUEL TYPE	VEHICLE YEAR	ODOMETER
	1. Passenger Vehicle 2. Other 2-Axis, 4-Tire 3. Buses 4. 2-Axis, 6-Tire 5. Heavy Vehicles 6. Motorcycles 7. Bicycle/ Nonmotorized	0. No Trailer 1. One Trailer 2. Multi-Trailer	2 Axles 3 Axles 4 Axles 5 Axles 6 Axles 7 Axles	Number of people in vehicle, (including driver)	<p>May I have the Address and City of the last place where you or a passenger got into or out of your vehicle?</p> <p>(If address is unknown, identify the specific name of the location along with the nearest street and/or intersection)</p>	1 Home/Return Home 2 Work/Return Work 3 Work Related 4 School 5 Meal 6 Recreation 7 Social 8 Shopping / Buy Gas 9 Banking, Post Office, Legal 10 Personal Business, Medical 11 Pick Up/Drop Off 12 Change mode of travel What was the purpose of	What time did you leave your last stop? (If unknown, (how long since the last stop)	What type of fuel does your vehicle use? 1 Unleaded 2 Leaded 3 Diesel 4 Other (Specify)	What is the year model of your vehicle?	What is the mileage of your vehicle?
	1 2 3 4 5 6 7	0 1 2	2 3 4 5 6 7		Address _____ City _____	your last stop ORIGIN your next stop DESTINATION		1 2 3 4		
	1 2 3 4 5 6 7	0 1 2	2 3 4 5 6 7		Address _____ City _____	your last stop ORIGIN your next stop DESTINATION		1 2 3 4		
	1 2 3 4 5 6 7	0 1 2	2 3 4 5 6 7		Address _____ City _____	your last stop ORIGIN your next stop DESTINATION		1 2 3 4		
	1 2 3 4 5 6 7	0 1 2	2 3 4 5 6 7		Address _____ City _____	your last stop ORIGIN your next stop DESTINATION		1 2 3 4		

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PURPOSE OF HOUSEHOLD SURVEY

Cost-efficient survey programs are essential because the funds available to collect and analyze large amounts of data in any particular year are limited. Objectives for all new surveys, especially the household survey, include the following:

1. To follow the guidelines and requirements of ISTEA and the 1990 Clean Air Act Amendments.
2. To obtain data needed for recalibration of the existing trip generation, trip distribution, mode choice, and assignment models for the Dallas-Fort Worth Metropolitan Area.
3. To provide the data needed for NCTCOG and TxDOT to test new demand model strategies.
4. To develop broader, more management-oriented (and policy-sensitive) forecasting procedures that can be integrated with other modeling tasks.
5. To help us better understand household travel behavior and an individual's activity-based decision-making process of why, where, how, and when (or whether) to make a trip.
6. To document Dallas-Fort Worth travel trends since the 1964 and 1984 surveys and compare 1994-95 results with surveys conducted in other regions. [While comparability to other surveys is a worthy goal, this should be subservient to using the best available capabilities for collecting the required data].

To facilitate the development of a strategy for the household survey, NCTCOG held a two-day peer-review meeting in Arlington, Texas last April of nationally recognized travel model and travel survey experts. The eight panel participants, none of whom are allowed to propose on NCTCOG's household survey, were:

- Peter Stopher, Consultant (Chairman of meeting and specialist survey consultant retained by NCTCOG), from Baton Rouge, Louisiana
- Dan Brand of Charles River Associates, from Boston, Massachusetts
- George Dresser of Texas Transportation Institute, from College Station, Texas
- Tom Golob of the University of California at Irvine, from Irvine, California
- David Hartgen of the University of North Carolina, from Charlotte, North Carolina

- Greig Harvey of Deakin, Haney, Skabardonis, from San Francisco, California
- Keith Lawton of Portland Metro, from Portland, Oregon
- Firouzeh Nourzad of Urban Analytics, from Dallas, Texas

The panel was directed to make recommendations for a program that represents current best practice and encourages consultants to offer “state-of-the-art” innovations in their proposals.

The general consensus of the panel was that the household survey was the most important of all programmed surveys and should have three integrated elements:

1. The **Revealed Preference (RP)** survey should include a two-day activity diary survey for all household members, with the two days running sequentially. Some of the households should have Friday-Saturday and Sunday-Monday sequences. The RP sample size should be as large as can be afforded, perhaps 7,500 households or more. Sample “enrichment,” possibly through intercept surveys, should be considered to obtain sufficient households that use the existing I.H. 30 HOV lane, the “non-HOV lane” shared ride mode, the park-and-ride mode, other transit options, the bicycle mode, and significant amounts of walking.
2. The **Stated Preference (SP)** survey should be integrated with the RP sample, so that context data are properly obtained through the RP survey. The SP survey should cover three to six issues of importance to the Dallas-Fort Worth area. Each person selected for the SP survey should be asked to respond on one issue only, with no more than one person from a household being selected.
3. A household-based **Annual Panel** (at least 1,500 households) should also be established, with a subset of the RP sample, surveyed annually at the same time each year as the original RP survey. The survey should concentrate on the activity pattern of the households and focus on changes in the number of autos, work location, residential location, and family structure.

Additional suggestions made by the panel are shown in Appendix C.

Proposals are being requested from firms with both general and specific experience to perform the revealed preference (RP) and stated preference (SP) elements of the household survey, as described in the Scope of Services identified below. The successful firm will be held

contractually responsible for providing clean, usable, and accurate data for use in determining travel model inputs. (The annual panel survey will be the subject of a future RFP.)

The tasks identified in the Scope of Services are believed to be the minimum necessary to accomplish this project. Those firms responding should base their proposals on these tasks. Any expansion or alternative methodologies will **be** accepted, provided they are clearly identified as variations so that a complete evaluation can be made by the Consultant Selection Committee.

SCOPE OF SERVICES

Task 1 - Project Administration

This task provides for development of a detailed Operations Plan and subsequent monitoring of the study's progress (costs, schedules, and milestones). The consultant's proposal should describe how quality control will be maintained throughout the study and how activities will be coordinated with the NCTCOG project manager. NCTCOG staff will be responsible for all media coverage and will seek input from the consultant on the schedule and content of press releases. The proposer should indicate whether a "1-800" telephone number will be provided for the consultant to respond to return calls from households with answering machines and to answer questions about the survey forms, as well as to verify survey authenticity.

Task 2 - Survey Design

The consultant will be responsible for development of integrated Revealed Preference (RP) and Stated Preference (SP) survey designs that will be subject to final approval by the NCTCOG project manager. The consultant should assume that a peer-review panel of two to five travel model/travel survey experts will convene in Arlington, Texas during the mid-point of

this task to discuss the selected consultant's preliminary recommendations for both RP and SP designs. Expenses for the panel participants (other than consultant team members) will be paid directly by NCTCOG and shall not be included in the proposer's budget.

Potential questions for the RP survey are shown in Table 2. In addition to collection of household and person data, a two-day activity diary will be obtained from all household members, including Friday - Saturday and Sunday - Monday sequences. The proposer should address the following RP design issues:

- An appropriate definition of the household that considers how the survey data should be expanded for travel forecasting purposes.
- Mailback versus telephone retrieval of data.
- Use of multilingual forms.
- Preparation of "attractive" forms that will encourage more complete responses.
- Items from Table 2 that are of major or minor interest. Also: additional questions that should be considered.
- The number of RP survey questions that are assumed, for the estimated budget, to be included in each of the five groups: initial recruitment, household variables, personal variables, activity diary questions, and additional probing questions on diary data.
- Staging or ordering of questions.
- The total number of households that are assumed to be "completed" for the estimated budget (the proposer should define "completed").

The consultant will be responsible for the design and development of the SP instruments. For budgeting purposes, the proposer should assume that three topics will be probed: congestion/road pricing; impacts of road congestion; and bicycle and pedestrian improvements. Each topic should be assumed to require 300 responses. The proposer should address the following SP design issues:

- Timing of re-contacts for the SP survey.
- General strategy for SP survey design (e.g., will focus groups be used to define questions).