NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

METROPOLITAN PLANNING ORGANIZATION

REQUEST FOR QUALIFICATIONS
FOR AN EVALUATION OF TRAVEL SURVEY NEEDS
IN THE DALLAS-FORT WORTH METROPOLITAN AREA

November 1993

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The North Central Texas Council of Governments (NCTCOG) intends to retain the services of an individual consultant or consultant team to assist in the development of a program design for new household and transit surveys. The actual surveys will be conducted in the fall of 1994 by other consultants and will serve primarily to improve the transportation planning process in the Dallas-Fort Worth Metropolitan Area. The 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.

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 sewed 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. Estimated 1993 population (as of January 1, 1993) was 4.2 million for the 16-county NCTCOG region, 4.0 million for the nine-county Dallas-Fort Worth Consolidated Metropolitan Statistical Area (CMSA), and 3.8 million for the Metropolitan Area.

Backaround

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, as well as summaries of 1980 U.S. Census Journey-to-Work data, 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 Intermodal Surface Transportation Efficiency Act of 1991 has provided additional funding to Metropolitan Planning Organizations (MPOs) for planning projects. In coordination with the Federal Highway Administration (FHWA), the Texas Department of Transportation (TxDOT), and local agencies, NCTCOG has programmed new surveys for calendar year 1994 (see Figure 2). Two Requests for Proposals have been mailed to a list of candidate consultants:

1. The consultant proposal for an **external travel survey** is due November 16,1993. The last survey of this type was conducted by TxDOT in 1964, when inbound and outbound motor vehicle drivers were interviewed at 37 roadway locations. Data collected included trip origin/destination, vehicle type (automobiles or commercial vehicles), vehicle occupancy, and trip purpose (work, business, medical-dental, school, social-recreation, change travel mode, eat meal, shopping, and serve passengers). The survey scheduled for the spring of 1994 will include personal roadside interviews of a sample of drivers heading outbound from the Metropolitan Area at 62 external station locations. The new weekday non-holiday data will be used to recalibrate the trip generation and

distribution models, especially for the 'other' trip purpose, and to determine if additional trip purposes will be necessary.

2. The consultant proposal for a **workplace travel survey** is also due November 16, 1993. The last survey of this type was conducted by NCTCOG (with consulting assistance) in the summer and fall of 1984, when a total of 474 nonresidential establishments and seven special generators were surveyed. Since arrival count data was not available for 120 of these surveyed establishments, only 354 establishments were actually used to estimate trip attraction rates. Figures 3 through 7 show the survey forms that were used. The survey scheduled for the spring of 1994 will be similar to the 1984 survey, but with some modifications to the questions and forms. Approximately 500 establishments representing 30,000 usable employee and nonemployee surveys are expected to be surveyed. The new weekday nonholiday data will be used to recalibrate the trip generation and distribution models currently utilized by NCTCOG. The data may also provide better information on the causes for variations in weekday person trip attraction rates per employee, such as:

   - Type of employment (basic, retail, or service) and geographic location (CBD, suburban, rural, etc.)
   - 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

Requests for Proposals will be prepared in the spring of 1994 for additional surveys:

- A **household survey** is proposed for the fall of 1994. The last survey of this type was conducted by NCTCOG (with consulting assistance) in the spring and summer of 1984, when a total of 6,403 persons over the age of four residing in 2,471 households were interviewed at their place of residence. Figures 8 through 10 show the survey forms that were used. The survey was originally designed to be completed by Memorial day, before schools closed; however, a high 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 were intended to represent school year travel patterns, the post-Memorial Day trip records were deleted and all trip rates were developed from the pre-Memorial Day sample. The format and questions for the 1994 survey have not been determined, but an activity based survey should improve our understanding of variations in observed weekday person trip production rates per household for **a** particular household size, median household income range, and trip purpose. Other explanatory factors may also be involved:
  - The inherent variability of the decision-making process of daily activities
  - Single-family versus multifamily dwelling units
  - Auto availability

- Geographic location of the household (e.g., CBD versus rural)
- Location (and severity) of actual and perceived traffic congestion
- Availability of alternative travel modes (e.g., transit)
- Race, age, sex, education, and disabilities of household members
- Number and occupation of workers in the household
- Number of licensed drivers
- Familiarity of household members with the area
- Induced demand caused by recent transportation improvements

- A **transit survey** is also proposed for the fall of 1994. In 1984, approximately 10,000 riders on four fixed-route bus systems were surveyed to determine various ridership characteristics including trip purpose, access mode, and percentage of trips made by transit (Figure 11 shows the survey form). More recent on-board surveys were conducted in 1986 and 1991 for the Fort Worth Transportation Authority (FWTA) and in 1991 for the Dallas Area Rapid Transit Authority (DART). The format and questions for the 1994 survey 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.

- Other regional travel surveys may also be conducted in the fall of 1994. One such survey is a commercial vehicle survey to obtain information on the number of trips and trip lengths for commercial vehicles in the Metropolitan Area. Other surveys under consideration may use global positioning system technology, aerial photographs, and video surveillance to collect travel information that is not readily available through more traditional types of surveys.

Purpose and Scope of Project

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 include the following:

- To provide the data needed for travel model calibration activities.
- To develop broader, more management oriented forecasting procedures to be fully integrated into other modeling tasks.
- To document travel trends since the 1964 and 1984 surveys.
- To help us monitor future changes in travel behavior and transportation conditions.
- To compare travel behavior in the Dallas-Fort Worth area with other areas.
- To help us continue to prepare realistic projections of future transportation conditions.
- To help us understand household travel behavior and perhaps implement major improvements to the existing travel model process (if warranted).

The purpose of this project is for a consultant to assist NCTCOG staff in determining the need and general format for new surveys to be conducted in the fall of 1994. A detailed scope of work will be negotiated with the selected consultant(s) and is expected to include the following:

- The consultant(s) will serve **as a** "coach" to help NCTCOG staff better understand state-of-the-art household and transit survey techniques. New techniques may, for example, include two-day activity diaries, longitudinal (urban panel) surveys, and stated preference (attitude) questionnaires.

- The consultant(s) will share his/her understanding of the decision-making processes for individuals within a household, e.g.:
  - Why to make a trip
  - How to make a trip
  - When to make a trip
  - Where to make a trip
  - Whether to make the trip right now, later today, tomorrow, next week, or never

- The consultant(s) will lead a one-day peer review panel of four to six nationally recognized travel survey experts, who will provide NCTCOG staff with recommendations on how to obtain valuable travel behavior data in an efficient manner. The first peer review panel is expected to meet in the Dallas-Fort Worth area in late January or early February. Other peer review panels may also be scheduled.

- The consultant(s) may assist in the preparation of work plans for the household and transit survey RFPs, as well as evaluation of the proposals.

- The consultant(s) may assist in the review of household and transit survey pilot tests that are scheduled for June and July of 1994.

- The consultant(s) will meet periodically with a local Project Review Committee that will be formed to monitor the project.

- The consultant will prepare a draft and final report that documents all findings and recommendations regarding new travel surveys. Federal and state financial assistance must be acknowledged in the front of the report.

Schedule and Estimated Budget

NCTCOG's proposed schedule is based on **a** Notice to Proceed in early January of 1994 and an overall time frame of seven months (i.e., January to July of 1994). The funds available for all travel survey-related consultant projects in the Dallas-Fort Worth area are approximately $1.5 million for calendar year 1994. The funds to be allocated to this particular project will depend on the work accomplished.

Consultant Selection Criteria

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

1. Project Understanding	30 percent
2. Scope of Services	25 percent
3. Project Manager/Staff Qualifications	20 percent
4. Knowledge of DFW Area	10 percent
5. Firm Qualifications/Consultant References	10 percent
6. Study Schedule	5 percent

Consultant interviews may be required to make a final consultant selection. Following negotiation of a work plan and costs satisfactory to NCTCOG, the consultant will be asked to execute a contract with NCTCOG.

Consultants that may be involved with the external travel and workplace surveys to be conducted in the spring of 1994 will not be excluded from consideration for this project. However, the consultant selected for this project will not be allowed to bid on any NCTCOG travel surveys scheduled for implementation in the fall of 1994.

FIGURE 1

TRANSPORTATION AND AIR QUALITY PLANNING AREAS

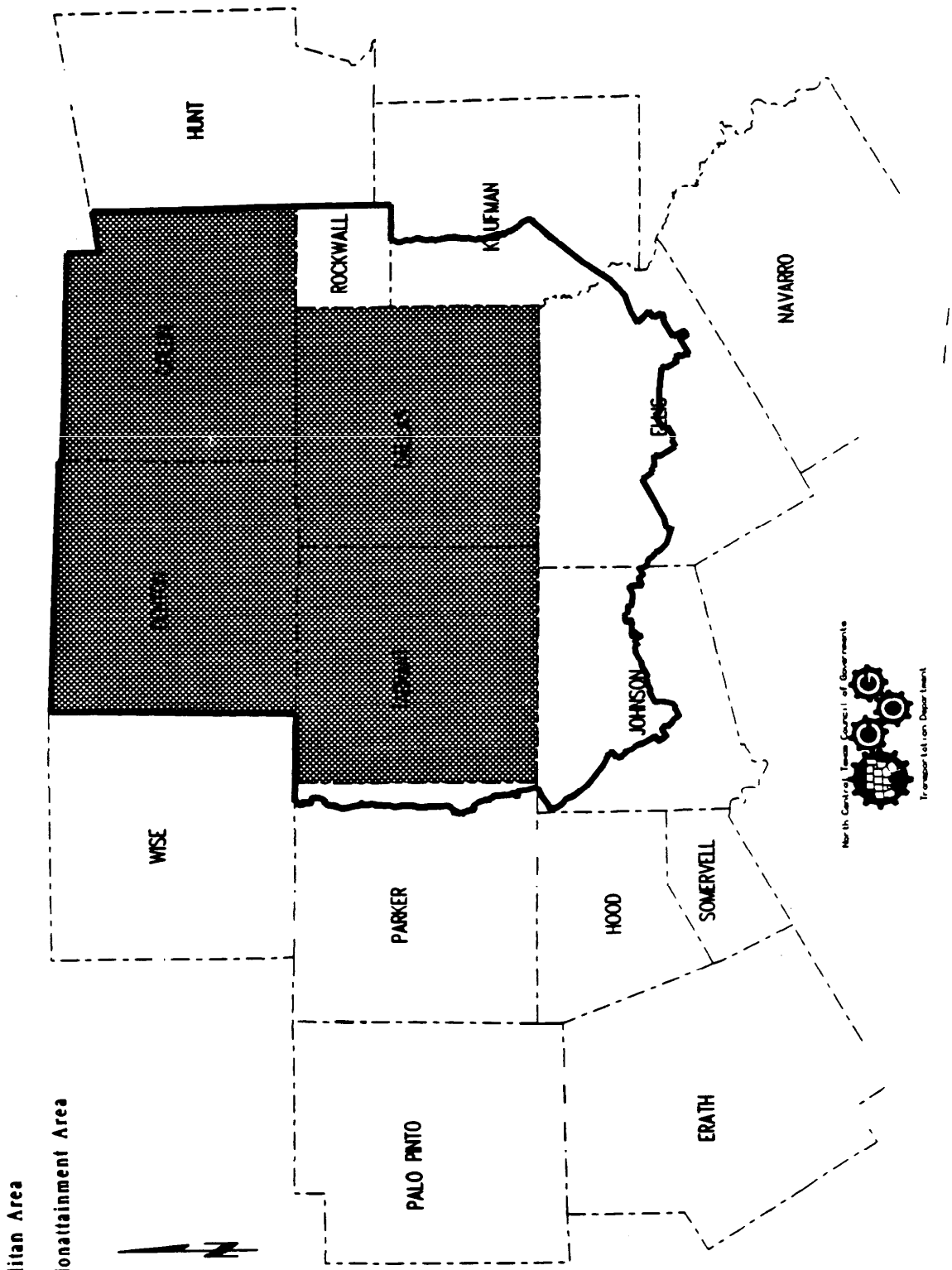

FIGURE 2

PROPOSED SCHEDULE FOR 1994 REGIONAL TRAVEL SURVEYS

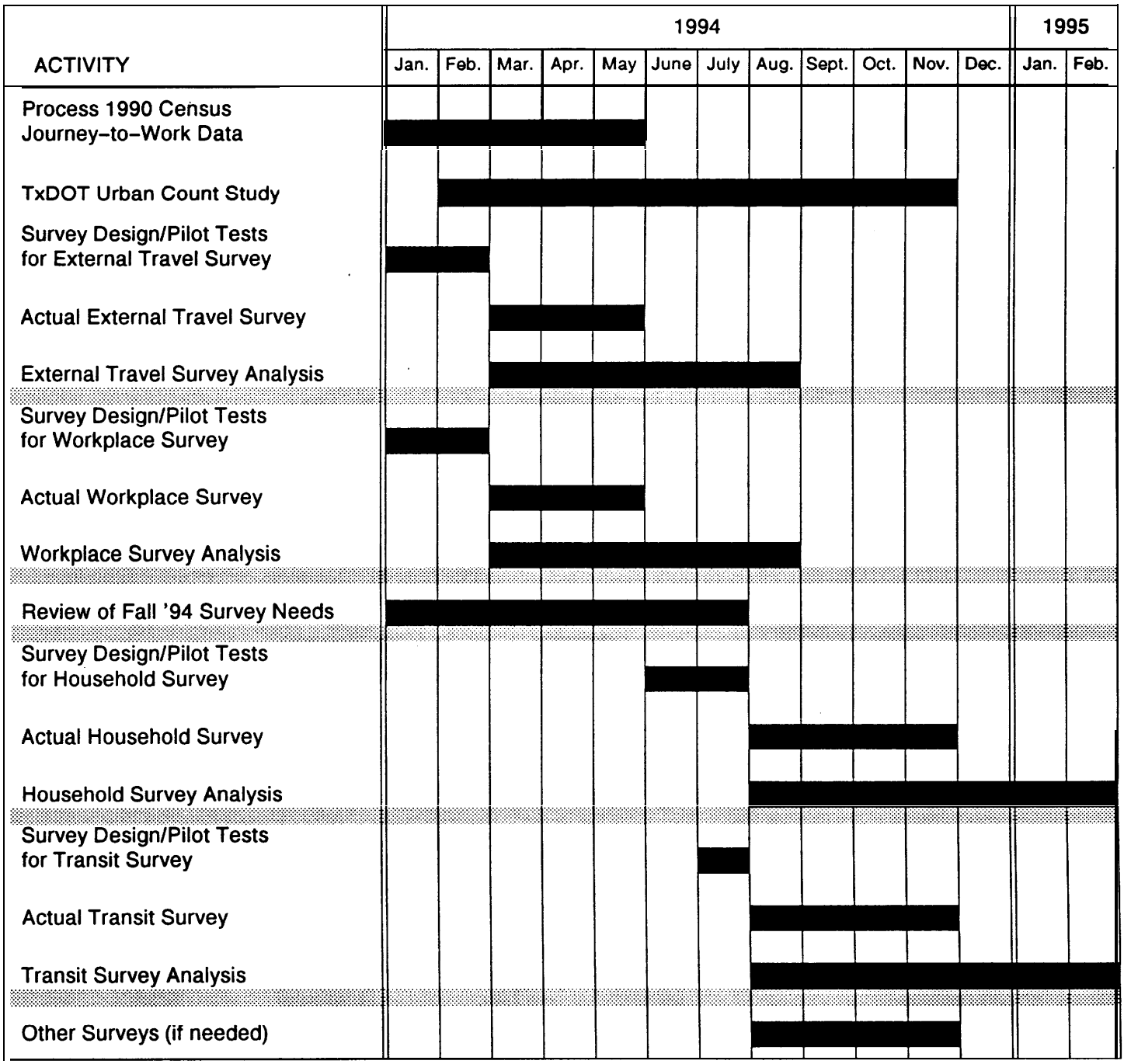

FIGURE 3

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: _____

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North Central Texas Council of Governments

1994 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?

☐ 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	1 ☐	1 ☐	1 ☐	1 ☐
Shopping	2 ☐	2 ☐	2 ☐	2 ☐
School	3 ☐	3 ☐	3 ☐	3 ☐
Social/Recreational	4 ☐	4 ☐	4 ☐	4 ☐
Personal Business	5 ☐	5 ☐	5 ☐	5 ☐
Eat a Meal	6 ☐	6 ☐	6 ☐	6 ☐
Pick-Up or Drop Off a Passenger	7 ☐	7 ☐	7 ☐	7 ☐

If Mailed, Please Fold Along Dashed Line

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 ☐	1 ☐	1 ☐	1 ☐
Shopping	2 ☐	2 ☐	2 ☐	2 ☐
School	3 ☐	3 ☐	3 ☐	3 ☐
Social/Recreational	4 ☐	4 ☐	4 ☐	4 ☐
Personal Business	5 ☐	5 ☐	5 ☐	5 ☐
Eat a Meal	6 ☐	6 ☐	6 ☐	6 ☐
Pick-Up or Drop Off a Passenger	7 ☐	7 ☐	7 ☐	7 ☐

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 ☐ Work Related	1 ☐ Work Related	1 ☐ Work Related	1 ☐ Work Related
2 ☐ Shopping	2 ☐ Shopping	2 ☐ Shopping	2 ☐ Shopping
3 ☐ School	3 ☐ School	3 ☐ School	3 ☐ School
4 ☐ Social/Recreational	4 ☐ Social/Recreational	4 ☐ Social/Recreational	4 ☐ Social/Recreational
5 ☐ Personal Business	5 ☐ Personal Business	5 ☐ Personal Business	5 ☐ Personal Business
6 ☐ Eat a Meal	6 ☐ Eat a Meal	6 ☐ Eat a Meal	6 ☐ Eat a Meal
7 ☐ Pick-Up/Drop Off a Passenger	7 ☐ Pick-Up/Drop Off a Passenger	7 ☐ Pick-Up/Drop Off a Passenger	7 ☐ Pick-Up/Drop Off a Passenger
8 ☐ Home	8 ☐ Home	8 ☐ Home	8 ☐ Home
MEANS OF TRAVEL	**MEANS OF TRAVEL**	**MEANS OF TRAVEL**	**MEANS OF TRAVEL**
1 ☐ Auto	1 ☐ Auto	1 ☐ Auto	1 ☐ Auto
2 ☐ Bus	2 ☐ Bus	2 ☐ Bus	2 ☐ Bus
3 ☐ Other	3 ☐ Other	3 ☐ Other	3 ☐ Other
AND THEN:	**AND THEN:**	**AND THEN:**	**AND THEN:**
1 ☐ Back to Work	1 ☐ Back to Work	1 ☐ Back to Work	1 ☐ Back to Work
2 ☐ To 2nd Trip	2 ☐ To 3rd Trip	2 ☐ To 4th Trip	2 ☐ 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
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

WPS-1

FIGURE 4

FIGURE 5

North Central Texas Council of Governments

1964 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 6

North Central Texas Council of Governments

1984 Workplace Survey

ARRIVAL COUNT

☐☐☐☐ Sample Number _____ Day ☐☐☐ Date

☐ Number of Entrances _____

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

☐☐☐☐

☐☐☐

_____ Name of Establishment

_____ Location

_____ Type of Establishment (Retail, Basic, or Service)

_____ Contact Person

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

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 Operation From ____ : ____ AM PM To ____ : ____ AM PM

_____ Surveyor

_____ Supervisor

FIGURE 7

North Central Texas Council of Govenments

Workplace Survey
TRUCK COUNT

☐☐☐☐ _____ ☐☐☐
Sample Number Day Date

☐ Number of Entrances _____

_____
Name of Establishment

☐☐☐☐ _____
Location of Establishment

☐☐☐ _____
Type of Establishment

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

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 PM

To ___:___ AM PM

_____
Surveyor

_____
Supervisor

Travel Day _____ and Date ☐☐☐

Sample Number ☐☐☐☐

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS HOME INTERVIEW SURVEY

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

Relation Codes

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

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

FIGURE 8

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
HOME INTERVIEW SURVEY

TRAVEL DIARY

INSTRUCTIONS:

PLEASE CARRY THIS DIARY WITH YOU THROUGHOUT THE TRAVEL DATE SHOWN AT THE LEFT. PLEASE USE IT TO RECORD EACH TRIP YOU MAKE INCLUDING THE ITEMS SPECIFIED BELOW. DO NOT RECORD WALKING OR BICYCLE TRIPS UNLESS TO GO TO WORK. PLEASE LEAVE THE FILLED IN CARD IN A CONVENIENT PLACE AT HOME SO IT WILL BE AVAILABLE WHEN OUR INTERVIEWER CALLS. USE THE BACK OF THIS CARD AND AN EXTRA CARD IF NECESSARY.

NAME _____ TRAVEL DAY _____ TRAVEL DATE _____

SAMPLE NUMBER ☐☐☐☐ I AM ____ YEARS OLD I AM ☐ MALE ☐ FEMALE

WHERE DID THIS TRIP BEGIN?	WHERE DID THIS TRIP END?	TRIP PURPOSE (Enter Number)	DESTINATION ACTIVITY: Restaurant, Auto Repair, Office, etc.	TRIP TIME (Circle AM or PM) BEGIN	TRIP TIME (Circle AM or PM) END	MODE OF TRAVEL (Enter Number)	IF AUTO DRIVER No. in Car, Include Driver)	IF CAR OR VANPOOL (No. in Car, Include Driver)	IF BUS HOW DID YOU GET TO BUS STOP? (Enter Number)	TRANSIT FARE PARKING COST
Address City Zip	Address City Zip	1 Home 2 Work 3 Shop 4 School 5 Social/ Recreation 6 Personal Business 7 Eat Meal 8 Serve Pasgr. 9 Change Mode (e.g., Auto to Bus)		AM PM :	AM PM :	1 Auto Drive 2 Auto Pasgr. 3 Bus 4 School Bus 5 Taxi 6 Motorcycle 7 Car/Van-pool 8 Walk/Bike to Work 9 Other			1 Walk 2 Drove Auto and Parked 3 Auto But Not Parked 4 Car Pool 5 Other	$. $. $.
Address City Zip	Address City Zip			AM PM :	AM PM :					
Address City Zip	Address City Zip			AM PM :	AM PM :					

HIS -

WHERE DID THIS TRIP BEGIN?	WHERE DID THIS TRIP END?	TRIP PURPOSE (Enter Number)	DESTINATION ACTIVITY: Restaurant, Auto Repair, Office, etc.	TRIP TIME (Circle AM or PM) BEGIN	TRIP TIME (Circle AM or PM) END	MODE OF TRAVEL (Enter Number)	IF AUTO DRIVER No. in Car, Include Driver)	IF CAR OR VANPOOL (No. in Car, Include Driver)	IF BUS HOW DID YOU GET TO BUS STOP? (Enter Number)	TRANSIT FARE/ PARKING COST
Address City Zip	Address City Zip	1 Home 2 Work 3 Shop 4 School 5 Social/ Recreation 6 Personal Business 7 Eat Meal 8 Serve Passenger 9 Change Mode (e.g. Auto to Bus)		AM PM :	AM PM :	1 Auto Drive 2 Auto Passenger 3 Bus 4 School Bus 5 Taxi 6 Motorcycle 7 Car/Van-pool 8 Walk/Bike to Work 9 Other			1 Walk 2 Drove Auto and Parked 3 Auto But Not Parked 4 Car Pool 5 Other	$. $. $. $.
Address City Zip	Address City Zip			AM PM :	AM PM :					
Address City Zip	Address City Zip			AM PM :	AM PM :					
Address City Zip	Address City Zip			AM PM :	AM PM :					
Address City Zip	Address City Zip			AM PM :	AM PM :					

FIGURE 9

FIGURE 10

Section V: Trip Report

NORTH CENTRAL TEXAS
COUNCIL OF GOVERNMENTS

Trip Report

CONFIDENTIAL
The information obtained in this survey will be accorded confidential treatment, and will be used for statistical purposes only.

Travel Day ________ and Date ________ Sheet ____ of ____

A	B	C	D	E		F		G		H	I	J	K	L
PERSON NUMBER	TRIP NUMBER	WHERE DID THIS TRIP BEGIN? (ORIGIN)	WHERE DID THIS TRIP END? (DESTINATION)	TRIP PURPOSE		LAND USE (Type of Activity)		TIME OF TRIP		Mode of Travel	If Auto Driver, Number of Passengers in Car Including Driver	If Car Van Pool, Number of Passengers Including Driver	If Transit, Mode of Access	Transit Fare/ Parking Cost
				From	To	ORIGIN	DESTINATION	START	ARRIVAL					
		Address Intersection ____ Place (City) ____ Zip Code	Address/Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address/Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address/Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __
		Address Intersection ____ Place (City) ____ Zip Code	Address Intersection ____ Place (City) ____ Zip Code			Type of Activity	Type of Activity	Circle AM PM N M : Time	Circle AM PM N M : Time					$ __ . __

PURPOSE CODES:

1 HOME
2 WORK
3 SHOP
4 SCHOOL
5 SOCIAL/REC
6 PERSONAL BUS
7 EAT MEAL
8 SERVE PASSENGER
9 CHANGE MODE
0 RIDE

MODE OF TRAVEL CODES:

1 AUTO DRIVER
2 AUTO PASSENGER
3 BUS TROLLEY
4 SCHOOL BUS
5 TAXI
6 MOTORCYCLE
7 CAR/VAN POOL
8 WALK/BICYCLE
9 OTHER

TRANSIT ACCESS CODES:

1 WALK
2 DROVE AUTO & PARKED
3 AUTO BUT NOT PARKED
4 CAR POOL
5 OTHER

HOME INTERVIEW SURVEY
TRID REPORT

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.

1. I got on this bus at _____ & _____
   Nearest Street Intersection

2. The place I have come from is _____ Is this home? ☐ Yes ☐ No
   Address or Street Intersection

3. I am getting off this bus at _____ & _____
   Nearest Street Intersection

4. The place I am going to is _____ Is this home? ☐ Yes ☐ No
   Address or Street Intersection

5. The reason for this trip is: ☐ Work related ☐ Shopping ☐ School ☐ Social/Recreational
   ☐ Personal Business ☐ Eat a Meal ☐ Other

6. How did you get to this bus? ☐ By Auto/Parked ☐ By Auto/Dropped Off
   ☐ Transfer from Another Bus(es) _____ ☐ Walk ☐ Other
   Route Name(s)

7. 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)

8. How did you pay for this bus ride?

		Type	Zone (Dallas Only)
☐ Cash _____ *How much?*	☐ Monthly Pass *(Please circle type and zone)*	Adult Senior Citizen Handicapped	1 2 3
☐ Token (Citran Only)			
☐ Transfer	☐ Punch Card *(Please circle type and zone)*	Type Adult Student	Zone (Dallas Only) 1 2 3
☐ Other _____ *Please specify*			

9. 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

10. How many cars, pickups, and vans are available to your household?
    ☐ None ☐ 1 ☐ 2 ☐ 3 ☐ 4 or More

11. Sex: ☐ M ☐ F

12. What is your age? _____

13. How many persons in your household? _____

14. To which major ethnic group do you belong:
    ☐ White ☐ Black American ☐ Hispanic-American ☐ Other _____
    Please specify

15. 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

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

1. Yo borde este autobus en: _____ y _____
   Calle *Esquina*

2. El lugar de donde va es: _____ ¿Es este lugar su casa? ☐ Si ☐ No
   (Direccion o Esquina)

3. ¿Donde se va abajar de este autobús? _____ y _____
   Calle *Esquina*

4. El lugar abonde Ud. va es: _____ ¿Es este lugar su casa? ☐ Si ☐ No
   (Direccion o Esquina)

5. El proposito de su viaje es: ☐ Trabajo ☐ De Compras ☐ Escuela ☐ Social/Recreacion
   ☐ Negocio Personal ☐ Ir a Comer ☐ Otro

6. ¿Como llego Ud. a este autobus? ☐ Automovil y lo estaciono ☐ Pasajero de Automovil
   ☐ Transbordo a otro Autobus _____ ☐ En Pie ☐ Otro Modo
   Nombre de la ruta

7. Despues de que abaje este autobús, ¿como va Ud. terminar su viaje?
   ☐ Automovil y lo estaciono ☐ Pasajero de Automovil
   ☐ Transbordare a otro Autobus _____ ☐ En Pie ☐ Otro Modo
   Nombre de la ruta

8. ¿Como pago Ud. por este autobus?

		Tipo	Zona
☐ En Efectivo _____ *Cuanto*	☐ Pase de un mes *(Marque el tipo y la zona)*	Adulto Anciano Desabilitado	(Dallas solamente) 1 2 3
☐ Ficha (Citran solamente)			
☐ Transborde	☐ Tarjeta de ponchar *(Marque el tipo y la zona)*	Tipo Adulto Estudiante	Zona (Dallas solamente) 1 2 3
☐ Otro Modo _____ *Explique*			

9. ¿Cuantos viajes por volver usa el autobús en una semana (Lunes a Viernes)?
   ☐ 1 ☐ 2-4 ☐ 5-7 ☐ 8-10 ☐ 10 o Mas

10. ¿Cuantos Carros, Trocas, o Vans tiene en su familia?
    ☐ Ninguno ☐ 1 ☐ 2 ☐ 3 ☐ 4 o Mas

11. Sexo: ☐ Hombre ☐ Mujer

12. ¿Que es su edad? _____

13. ¿Cuantas personas hay en su familia? _____

14. ¿Qual es su grupo ethnico? ☐ Hispano ☐ Otro
    Explique

15. ¿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.

FIGURE 11

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 1964 home interview, workplace, and transit on-board surveys, as well as the 1960 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 1967 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 (HBWl = 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-l 25 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 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

TRIP PURPOSE	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 Productions (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

TRIP PURPOSE	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

TRIP PURPOSE	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 600 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 TRANPLAN 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-l 5 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

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, 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, 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 5

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, 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, 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

TABLE 6

NONHOME-BASED MODE CHOICE MODEL COEFFICIENTS AND PARAMETERS

VARIABLE DESCRIPTION	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, cents	-0.004350	-0.004350	-0.004350
OCCUPANCY = Number of Persons in an Automobile	1.000000	2.200000	0.000000
PARKCOST = Posted Parking Cost, cents	-0.007020	-0.007020	0.000000
DALLAS CBD PRODUCTION FLAG (1 = in CBD)	0.000000	-0.971410	1.301880
DALLAS CBD ATTRACTION FLAG (1 = in CBD)	0.000000	-1.835180	0.349430
FT. WORTH CBD PRODUCTION FLAG (1 = in CBD)	0.000000	-0.549750	0.491930
FT. WORTH CBD ATTRACTION FLAG (1 = 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
BIAS CONSTANT	0.000000	-0.285670	-2.242330

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 volumedelay equation for high-capacity facilities is:

Delay (in minutes/mile)
= Minimum of [0.015 X EXP(5.30 X (hourly volume/hourly capacity)), 601

The volumedelay equation for low-capacity facilities is:

Delay (in minutes/mile)
= Minimum of [0.05 X EXP(3.00 X (hourly volume/hourly capacity)), 10]

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 "F" 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 volumedelay 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:

Delay (in minutes/mile)
= Minimum of [0.015 X EXP(7.00 X (hourly volume/hourly capacity)), 601

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

Delay (in minutes/mile)
= Minimum of [0.05 X EXP(4.50 X (hourly volume/hourly capacity)), l0]

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 mites by functional class;
- Lane miles at levels of service A, B, C, D, E, or F by functional class;

TABLE 7

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 or One-Way	550	600	625	700	750
Undivided	500	550	575	625	675
Principal Arterial					
Divided or One-Way	550	600	650	725	800
Undivided	500	550	600	675	725
Minor Arterial					
Divided or One-Way	550	600	625	700	750
Undivided	500	550	575	625	675
Collector Street					
Divided or One-Way	450	475	500	550	575
Undivided	400	425	450	500	525
Local Street					
Divided or One-Way	450	475	500	550	575
Undivided	400	425	450	500	525

- **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 PROPOSALS

TO CONDUCT A
TRANSIT ONBOARD SURVEY

FOR THE FORT WORTH TRANSPORTATION AUTHORITY

February 1996

REQUEST FOR PROPOSALS
TO CONDUCT A TRANSIT ONBOARD SURVEY
FOR THE FORT WORTH TRANSPORTATION AUTHORITY

The North Central Texas Council of Governments (NCTCOG) is requesting written proposals from consultants to conduct a transit onboard survey of the fixed-route system of the Fort Worth Transportation Authority (the T). The project will be funded through the NCTCOG 1995-96 Unified Planning Work Program. The consultant's primary activities will include the development of survey instruments, the onboard distribution of these instruments to transit riders, and the processing and analysis of the collected data. Weekday, Saturday, and Sunday transit passenger activity will be treated as independent units of analysis.

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 Fort Worth Transportation Authority

The Fort Worth Transportation Authority (FVVTA) was created by public referendum by the voters **of Fort Worth,** Texas on **November 8, 1993, with a** sales tax **of one-half of one percent** dedicated to supporting public transportation. The City of Lake **Worth joined the Authority** in 1991 with the approval of the sales tax, followed by the Cities of Blue Mound and Richland Hills in 1992. Under the auspices of FWTA, the T operates fixed-route bus service, Mobility

Impaired Transportation Services (MITS), Rideshare services, and other special services in an area encompassing 276 square miles and **a** 1990 population of 455,585.

The T has an $18 million annual operating budget and employs approximately 450 people. The T's fleet includes 135 buses, 13 minibuses, and 33 paratransit vans, with 56 fixed routes operating on weekdays. Annual ridership is currently over 5.5 million passenger trips, including over 200,000 rides for the mobility impaired. Additionally, vanpools and carpools are formed and sustained from the dynamic Rideshare matching data base of 45,000 people. Personal vehicles are used in the Rideshare program, except for vans leased to drivers by a vanpool management firm with which the T coordinates services for commuters.

Background and Project Description

In 1991, a consultant was retained by NCTCOG to conduct four travel surveys for the T:

1. Onboard travel survey of local (fixed-route) bus service
2. Onboard travel survey of Airporter service
3. Travel survey of vanpool users
4. Survey of MITS passengers

Details regarding the 1991 survey of local fixed-route bus service are as follows:

1. Following a one-day pretest on April 19, 1991 (eleven bus trips on four routes), the onboard data collection for the main survey took place from May 6 to May 24, 1991.
2. The data collection covered a sample of 445 bus trips on weekdays, Saturdays, and Sundays. Five express routes were sampled individually, as were the special routes to Bell Helicopter and General Dynamics. All remaining routes were sampled as a group.
3. A self-completion, bilingual survey instrument was used to collect trip data, socio-economic data, and attitudinal data from a sample of transit riders. The total number of survey forms handed out was 5,848. The number of completed returned questionnaires was 2,929, which translates into a 50 percent response rate.
4. The geocodable sample data was then factored by route (or route group), direction, time of day (6 a.m. to 9 a.m., 9 a.m. to 2 p.m., 2 p.m. to 6 p.m., and 6 p.m. to 9 p.m.),

and day of week (weekday versus weekend) to expand the data to represent the full universe of transit riders.

The information gathered from the 1991 surveys allowed the T to review its marketing strategies and determine which approaches were the most appropriate.

The proposed 1996 onboard transit survey of fixed routes will be much more focused on the data needed for operational decisions in transit planning and scheduling. The four (4) primary objectives are as follows:

1. To profile the travel habits of current fixed-route transit riders for use in service planning and market research.
2. To profile the demographics of current fixed-route transit riders for use in service planning and market research.
3. To structure the survey instrument to allow for compatibility with previous transit origin-destination surveys so that trend analyses can be performed.
4. To identify travel patterns of current fixed-route transit riders for use in travel demand forecasting models.

The consulting work to be done for this project is separate from the transit intercept recruitments at selected bus stops that will be done as part of the spring 1996 Dallas-Fort Worth Household Travel Survey.

Scope of Services

Task 1.0 -- Project Administration

A Project Review Committee (PRC), composed of staff selected by NCTCOG and the T, will review and guide the progress of the consultant on this study. This task provides for monitoring of the study's progress (costs, schedules, and milestones) and meetings with the PRC. Project start-up includes a meeting with the PRC to refine project objectives, finalize a detailed project work plan, and review existing data. Additional meetings should be held to present and discuss preliminary and final results with the PRC. To assist the PRC in

monitoring the survey administration process, the consultant **will provide periodic progress** reports.

Task 2.0 - Develop Survey Design and Sampling Plan

The consultant shall develop a survey design and sampling plan that is reflective of the final budget to be negotiated for the data collection effort. Primary activities include the following:

- The consultant shall review previous survey methodologies and sample designs.
- The consultant shall review the updated transit route, service, and ridership information to be provided by the T.
- The consultant shall develop a sampling plan that provides for statistically adequate coverage of the system by day of week (weekdays, Saturdays, and Sundays), time of day (before 6 a.m., 6:00 a.m. - 8:59 a.m., 9:00 a.m. - 2:59 p.m., 3:00 p.m. - 5:59 p.m., and 6:00 p.m.+), subsystem (local, express, and park-and-ride), route, and direction **of** travel. Target confidence levels for routes (or groups of routes) **will be established, with** a resulting sampling plan that specifies the number of surveys to be distributed **on** weekdays, Saturdays, and Sundays. The sampling plan shall include allowances for unusable returns, in which a questionnaire is unusable if either trip origin or destination data is not geocodable.
- The consultant shall develop a plan for expansion (factoring) of the data, which may require an accurate count of passenger boardings while the forms are being distributed.
- Following consultation with the PRC and approval of the design and sampling methodology, the consultant shall identify driver runs, which are a series of trips involving one or more routes, to be surveyed.
- The consultant will then assign personnel to specified driver runs for distribution and collection of surveys. The consultant must also ensure adequate staffing and supervision to complete all field work.

Task 3.0 - Develop Survey Instrument

The consultant shall develop English and Spanish survey instruments **to be** administered to the current users of the fixed-route bus system. The survey shall be self-administered, that is, a surveyor hands a form to a transit patron who is asked to independently complete the survey and deposit the completed form in a box on the bus.

A copy of the English and Spanish versions used for the 1991 onboard survey are shown in Figures 1 and 2. The consultant shall review these forms and recommend appropriate modifications, additions, or deletions for implementation in the 1996 survey. The high-priority items include the following:

- Initial origin and final destination
- Trip purpose at origin and destination
- Type of fare payment (not on 1991 form)
- Use of mobility aids (not on 1991 form)
- Mode of access to and egress from the surveyed transit trip
- Frequency of transit usage
- Age
- Gender
- Race/ethnic@
- Vehicles available in the person's household
- Household size
- Household income
- Reason(s) for using transit

Other items for consideration include:

- Availability of a household vehicle (not on 1991 form)
- Rating of bus service
- Space for respondents to comment on the T's service (not on 1991 form)
- Duration of transit use (not on 1991 form)
- Bus stop boarding location (cross streets)

FIGURE 1

Dear T Patron:

The T wants to plan service improvements. Please complete this questionnaire and place i in the "RETURN" box as you exit the bus. *When you do, you could be one of three lucky respondents who will be winners in "The T Rider Drawing."* The top winner will get **$300** two second place winners will get **$100** each. If you cannot complete it during this trip, finish it as soon as you can and drop it in a "RETURN" box on your next bus ride or mail it to: The T, P.O. Box 1477, Ft. Worth, Texas 76101. Thank you for your cooperation and continued patronage.

John P. Bartosiewicz, General Manager

IF YOU HAVE ALREADY COMPLETED ONE OF THESE FORMS, PLEASE CHECK HERE ☐ AND CONTINUE FILLING OUT THE QUESTIONNAIRE. THANK YOU.

1. WHERE did you get ON THIS BUS? *(Specify nearest intersection)*

Corner of _____ (First Street Name) and _____ (Second Street Name)

2. How many minutes did you wait for the bus? _____

3. Where did you COME FROM before you got on this bus? *(Check one only)*

1 ☐ Home 3 ☐ Shopping 5 ☐ Doctor/Dentist 7 ☐ Other _____ (Specify)
2 ☐ Work 4 ☐ School/College 6 ☐ Visiting/Recreation

4. What is the ADDRESS OF THAT PLACE? (Question 3)

_____ Number _____ Street (or intersection or place name) _____ City _____ Zip Code

5. How did you get to THIS BUS? *(Check one only)*

1 ☐ Walked ____ blocks 4 ☐ Had someone drop me off
2 ☐ Park & Ride, myself 5 ☐ Transferred from the _____ (Route Number or Name) bus
3 ☐ Park & Ride, with others 6 ☐ Other (*Specify*) _____

6. WHERE will you get OFF THIS BUS? *(Specify nearest intersection)*

Corner of _____ (First Street Name) and _____ (Second Street Name)

7. Where are you GOING TO now? *(Check one only)*

1 ☐ Home 3 ☐ Shopping 5 ☐ Doctor/Dentist 7 ☐ Other _____ (Specify)
2 ☐ Work 4 ☐ School/College 6 ☐ Visiting/Recreation

8. What is the ADDRESS OF THAT PLACE? (Question 7)

_____ Number _____ Street (or intersection or place name) _____ City _____ Zip Code

9. How will you get FROM THIS BUS to the place you are GOING TO? *(Check one only)*

1 ☐ Walk ___ blocks 4 ☐ Have someone pick me up
2 ☐ Park & Ride, myself 5 ☐ Transfer to the _____ (Route Number or Name) bus
3 ☐ Park & Ride, with others 6 ☐ Other (*Specify*) _____

10. On this one-way trip, HOW MANY BUSES WILL YOU RIDE to get to where you are going? 1 ☐ One bus 2 ☐ Two buses 3 ☐ Three or more buses

No. 01388

PLEASE TURN PAGE AND CONTINUE

FIGURE 1 (Continued)

11. How OFTEN do you RIDE the bus?

1 ☐ One day/week
2 ☐ Two days/week
3 ☐ Three days/week
4 ☐ Four days/week
5 ☐ Five days/week
6 ☐ Six days/week
7 ☐ Seven days/week
8 ☐ One-three days/month
9 ☐ This is my first time

12. What are the MOST IMPORTANT REASON(S) you ride the bus? *(Check any that apply)*

1 ☐ *Family has no car*
2 ☐ I don't drive
3 ☐ Bus is economical
4 ☐ *Someone else uses car*
5 ☐ Traffic is bad
6 ☐ Bus is convenient
7 ☐ *Parking is a problem*
8 ☐ Other _____ *(Specify)*

13. On a scale of 1 to 7, with 1 being poor, four being average, and 7 being excellent, how would you rate this bus service OVERALL? *(Circle only one)*

1 .....2 .....3 .....4 .....5 .....6 7
Poor Excellent

14. IF IT WERE UP TO YOU, what improvements would you like to make to The T bus service? *(Check any that apply)*

01 ☐ Lower fares
02 ☐ Reduced travel time
03 ☐ More courteous drivers
04 ☐ Expand service hours
05 ☐ More frequent service
06 ☐ Extend Service to (Specify Place):_____
07 ☐ None Needed
98 ☐ Other *(Specify)*_____

15. What RADIO STATIONS do you listen to MOST FREQUENTLY?

(1)_____ AM / FM (Circle One)
(2)_____ AM / FM (Circle One)
9 ☐ I rarely listen to the radio

16. How often do you read the FORT WORTH STAR-TELEGRAM?

1 ☐ Every Day 2 ☐ Almost Every Day 3 ☐ Occasionally 4 ☐ Never

17. Do you have a valid DRIVER'S LICENSE? 1 ☐ Yes 2 ☐ No

18. You are: 1 ☐ MALE 2 ☐ FEMALE

19. Your AGE is: 1 ☐ 6-16 2 ☐ 17-24 3 ☐ 25-34 4 ☐ 35-44 5 ☐ 45-64 6 ☐ 65+

20. Are you: *(Check one only)*

1 ☐ Employed Full-Time
2 ☐ Employed Part-Time
3 ☐ Homemaker
4 ☐ Student
5 ☐ Retired
6 ☐ Unemployed
8 ☐ Other _____ *(Specify)*

21. How many MOTOR VEHICLES (cars, vans, pick-ups) in running condition are available to members of YOUR HOUSEHOLD? *(Check one only)*

1 ☐ None 2 ☐ One 3 ☐ Two 4 ☐ Three or more

22. How many PEOPLE, including yourself, live in your HOUSEHOLD? _____

23. How many people, living in your household including yourself, are EMPLOYED FULL-TIME?_____

24. The combined TOTAL ANNUAL INCOME of all members of YOUR HOUSEHOLD is:

1 ☐ $5,000 per year or less
2 ☐ $5,001-$15,000 per year
3 ☐ $15,001-$25,000 per year
4 ☐ $25,001-$35,000 per year
5 ☐ $35,001-$45,000 per year
6 ☐ $45,001-$55,000 per year
7 ☐ $55,001-$65,000 per year
8 ☐ More than $65,000 per year

25. You consider yourself:

1 ☐ White
2 ☐ Black/African American
3 ☐ Hispanic
4 ☐ Asian
5 ☐ Native American
6 ☐ Other *(Specify)*_____

So that we may contact you in the event you are a winner in the drawing for either $300 or $100, may we have your

- Name: _____ Phone Number:_____

STOP - END OF SURVEY

FIGURE 2

Estimado cliente del "T":

El "T" quiere mejorar nuestros servicios. Por favor complete este cuestionario y póngalo en la caja marcada "RETURN" al salir del autobús. *Si lo hace, usted podra ser uno de tres afortunados premiados en LA LOTERIA DEL "T".* El premio principal será de $300; y también habrá dos premios de $100 cada uno. Si no puede llenarlo en este viaje, termínelo lo mas pronto posible y póngalo en la caja marcada "RETURN" durante su próximo viaje por autobús, ó mándelo por correo a: The T, P.O. Box 1477, Ft. Worth, Texas 76101. Gracias por su cooperación y por ser nuestro cliente.

John P. Bartosiewicz

John P. Bartosiewicz, Gerente General

SI YA HA LLENADO UNA DE ESTAS FORMAS, POR FAVOR CHEQUEE LA CAJA ☐ Y CONTINUE LLENANDO ESTE CUESTIONARIO. GRACIAS.

1. ¿En donde abordó este autobús? *(Nombre de la intersección mas cercana)*

Esquina de _____ y _____
(Nombre de la primera calle) (Nombre de la segunda calle)

2. ¿Por cuántos minutos esperó ud. el autobús? _____

3. ¿De donde venía cuando abordó este autobús? *(Solamente chequee uno)*

1 ☐ Casa 3 ☐ Compras 5 ☐ Doctor/Dentista 7 ☐ Otro _____ (Especifique)
2 ☐ Trabajo 4 ☐ Escuela/Universidad 6 ☐ Visita/Recreo

4. ¿Cuál es la dirección de ESE LUGAR? (Mencionado en la pregunta #3)

_____ _____ _____ _____
Número *Calle (o intersección o nombre del lugar)* Ciudad Código Postal

5. ¿Cómo llego para tomar ESTE BUS? *(Chequee solamente uno)*

1 ☐ Caminé ____ cuadras 4 ☐ Alguien me dejó
2 ☐ "Park & Ride", yo solo 5 ☐ Transfiriéndome del bus _____ (Número o nmbre de la ruta)
3 ☐ "Park & Ride", con otros 6 ☐ Otro(*Especifique*) _____

6. ¿EN DONDE va a BAJARSE de ESTE AUTOBUS? *(Indique la intersección mas cercana)*

Esquina de _____ y _____
(Nombre de la primera calle) (Nombre de la segunda calle)

7. ¿Adonde VA ahora? *(Solamente chequee uno)*

1 ☐ Casa 3 ☐ Compras 5 ☐ Doctor/Dentista 7 ☐ Otro _____ (Especifique)
2 ☐ Trabajo 4 ☐ Escuela/Universidad 6 ☐ Visita/Recreo

8. ¿Cuál es LA DIRECCION DEL LUGAR? (Mencionado en la pregunta #7)

_____ _____ _____ _____
Número Calle (o intersección o nombre del lugar) Ciudad Código Postal

9. ¿Cómo va a llegar DE ESTE BUS A DONDE VA ? *(Chequee solamente uno)*

1 ☐ Caminaré ___ cuadras 4 ☐ Alguien me recogerá
2 ☐ "Park & Ride", yo solo 5 ☐ Transfiriéndo al bus _____ (Número o nombre de la ruta)
3 ☐ "Park & Ride", con otros 6 ☐ Otro (*Especifique*) _____

10. Sin contar el viaje de regreso, en este viaje, ¿Cuántos autobuses tomará para llegar a donde va? 1 ☐ Uno 2 ☐ Dos 3 ☐ Tres ó más

FAVOR DE DAR LA VUELTA A LA PAGINA Y CONTINUE

FIGURE 2 (Continued)

11. ¿Con CUANTA frecuencia TOMA el autobús?

1 ☐ Un dia por semana
2 ☐ Dos días por semana
3 ☐ Tres días por semana
4 ☐ Cuatro días por semana
5 ☐ Cinco días por semana
6 ☐ Seis días por semana
7 ☐ Siete días por semana
8 ☐ Una a tres veces al mes
9 ☐ Esta es mi primera vez

12. ¿Cuales son SUS RAZONES MAS IMPORTANTES para tomar el autobús? *(Chequee todos las que apliquen)*

1 ☐ La familia no tiene coche
2 ☐ Yo no manejo
3 ☐ El bus es económico
4 ☐ Alguien más usa el coche
5 ☐ El tráfico esta muy malo
6 ☐ El bus es conveniente
7 ☐ Estacionar es problemático
8 ☐ Otro _____ *(Especifique)*

13. ¿En un escala del uno (1) al siete (7), en donde el uno es malo, el cuatro es average, y el siete es excelente, como calificaría este servicio de autobús EN GENERAL? *(Solamente circule uno)*

1 .....2 .....3 .....4 .....5 .....6 7
Malo Excelente

14. SI DEPENDIERA DE USTED, cuales mejoramientos haría en el servicio de autobús, el "T"

01 ☐ Bajar las tarifas
02 ☐ Menos tiempo en viaje
03 ☐ Chóferes mas corteses
04 ☐ Más horas de servicio
05 ☐ Servicio mas frecuente
06 ☐ Extender el servicio hasta _____ *(Especifique)*
07 ☐ No quiero cambios
98 ☐ Otro _____ *(Especifique)*

5. ¿Cuales ESTACIONES DE RADIO escucha usted con MAS FRECUENCIA?

1) _____ AM / FM (Circule uno)
2) _____ AM / FM (Circule uno)
9 ☐ Muy raravez escucho la radio

6. ¿Con que frecuencia lee usted el FORT WORTH STAR-TELEGRAM?

1 ☐ Cada Día
2 ☐ Casi todos los días
3 ☐ De vez en cuando
4 ☐ Nunca

7. ¿Tiene LICENCIA valida para manejar? 1 ☐ Si 2 ☐ No

8. Usted es: 1 ☐ HOMBRE 2 ☐ MUJER

9. Su EDAD es: 1 ☐ 6-16 2 ☐ 17-24 3 ☐ 25-34 4 ☐ 35-44 5 ☐ 45-64 6 ☐ 65+

0. Usted es: *(Chequee solamente uno)*

1 ☐ Trabajo tiempo completo
2 ☐ Trabajo medio tiempo
3 ☐ Ama de casa
4 ☐ Estudiante
5 ☐ Retirado
6 ☐ Desempleado
8 ☐ Otro _____ *(Especifique)*

1. ¿Cuántos VEHICULOS (carros, vans, camionetas) hábiles hay disponibles para la gente que vive en SU CASA? *(Solamente chequee uno)*

0 ☐ Ninguno
1 ☐ Uno
2 ☐ Dos
3 ☐ Tres o más

2. Incluyendose a ud., ¿Cuántas PERSONAS viven en su HOGAR? _____

3. Incluyendose a ud., ¿Cuántos personas que viven en su hogar TRABAJAN TIEMPO COMPLETO? _____

4. Los INGRESOS ANUALES TOTALES de SU HOGAR son:

1 ☐ $5,000 o menos al año
2 ☐ Entre $5,001-$15,000 al año
3 ☐ Entre $15,001-$25,000 al año
4 ☐ Entre $25,001-$35,000 al año
5 ☐ Entre $35,001-$45,000 al año
6 ☐ Entre $45,001-$55,000 al año
7 ☐ Entre $55,001-$65,000 al año
8 ☐ Más de $65,000 al año

5. Usted se considera:

1 ☐ Blanco
2 ☐ Negro/Afro-Americano
3 ☐ Hispano
4 ☐ Asiático
5 ☐ Indio Americano
6 ☐ Otro _____ *(Especifique)*

ra que podamos contactarle si usted es ganador en nuestra rifa por $300 o $100, favor de darnos:

u Nombre: _____ Su Número de teléfono: _____

- Bus stop alighting location (cross streets)
- Wait time for the bus
- Bus transfer activity
- Possession of a valid driver's license

Task 4.0 - Conduct Pilot Test Survey

A pilot survey shall be conducted to test the sample design and survey instruments. This test, with both English and Spanish forms, will show whether the correct questions are being asked and will give an indication of the response and acceptance of the survey. Following the pilot test, the consultant will submit a technical memorandum to the PRC detailing results of the pilot test and make recommendations, if any, for revisions to the survey instruments and/or sampling plan.

Task 5.0 - Train Survey Personnel

The consultant is responsible for selecting and training all survey personnel. This training shall include development of a Survey Procedures Manual for personnel on surveying techniques. The consultant will provide bilingual personnel as needed to distribute the survey instrument(s).

Task 6.0 - Conduct the Survey

The consultant shall provide the labor necessary to hand out and collect the survey instruments, as well as conduct simultaneous boarding counts. The consultant shall also provide adequate supervision, quality control, and monitoring of the data collection effort.

The surveys and boarding counts shall be quickly reviewed to ensure data integrity and an adequate sample size, and to determine if a re-survey will be necessary. It is anticipated that

all field work will be done over a one month (or less) period, in accordance with the sampling plan that will be developed in Task 2.

Table 1 contains a summary of fixed-route transit system information for an average weekday, Saturday, and Sunday in October of 1995. For cost estimation purposes, the proposer should assume that the following collections will take place:

- Weekdays: 9,600 forms distributed and 4,800 completed forms returned during 628 bus service hours and 673 bus trips.
- Saturday: 4,800 forms distributed and 2,400 completed forms returned during 297 bus service hours and 375 bus trips.
- Sunday: 1,700 forms distributed and 850 completed forms returned during 159 bus service hours and 166 bus trips.

Task 7 - Process and Analyze the Survey Results

The consultant shall be responsible for ***reviewing, coding, cleaning,*** and ***validating*** the returned surveys. For cost estimation purposes, the proposer should assume a database of 8,050 records will be developed. Specific activities include the following:

- A Data Processing Manual detailing data editing, processing, and weighting procedures must be submitted to the PRC for review and approval prior to any data entry activity.
- The consultant shall provide all origin and destination data to NCTCOG. NCTCOG will use Desktop Mailer, Arc/Info, and the GDT (Geographic Data Technologies) Dynamap database to perform automated X-Y geocoding of addresses and cross streets. All location data not automatically geocoded will be returned to the consultant for manual geocoding to the X-Y coordinate of the closest cross street. To expedite the consultant's manual geocoding process, NCTCOG will provide a database containing all valid cross streets (and the corresponding X-Y coordinate) in Tarrant County. For cost estimation purposes, the proposer should assume that 15 percent of all fields with addresses (street names and numbers) and 40 percent of all fields with cross streets will need to be manually geocoded.
- The consultant will calculate the overall usable response rate and develop initial weighted expansion factors.
- A Data Dictionary will be created for all variables included in the survey and the data analysis process. This document should provide a complete description of each variable and the variable location within the master file.

TABLE 1

Fixed-Route Transit System Information For The T
(Estimates, Based on October 1995 Conditions)

	Weekday	Saturday	Sunday
Number of Separate Bus Routes	30	20	14
Number of Bus Routes	56	35	18
Number of Bus Trips			
Early AM (before 6:00 a.m.)	100	Not available	Not available
AM Peak (6:00 a.m. - 8:59 a.m.)	349	Not available	Not available
Midday (9:00 a.m. - 2:59 p.m.)	436	Not available	Not available
PM Peak (3:00 p.m. - 5:59 p.m.)	339	Not available	Not available
Late Night (6:00 p.m. and after)	122	Not available	Not available
	1,346	749	331
Number of Bus Service Hours			
Early AM (before 6:00 a.m.)	35	Not available	Not available
AM Peak (6:00 a.m. - 8:59 a.m.)	439	Not available	Not available
Midday (9:00 a.m. - 2:59 p.m.)	327	Not available	Not available
PM Peak (3:00 p.m. - 5:59 p.m.)	414	Not available	Not available
Late Night (6:00 p.m. and after)	40	Not available	Not available
	1,255	593	318
Number of Passenger Boardings			
Early AM (before 6:00 a.m.)	561	----	----
AM Peak (6:00 a.m. - 8:59 a.m.)	4,966	1,339	361
Midday (9:00 a.m. - 2:59 p.m.)	7,068	4,620	1,959
PM Peak (3:00 p.m. - 5:59 p.m.)	5,070	2,254	964
Late Night (6:00 p.m. and after)	1,500	1,362	185
	19,165	9,575	3,469

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- The consultant shall provide frequency tables for all variables and cross-tabulations of selected variables.

The quality control procedures for this task should be identified in the proposal.

Task 8 -- Produce the Report and Provide Data in a Computer Format

The consultant will prepare two deliverables: a Survey Results (statistics) report and a Survey Documentation report. The Survey Results report will detail the findings of the research. The Survey Documentation report will combine the Survey Procedures Manual, progress reports, technical memoranda, Data Processing Manual, Data Dictionary, and all related survey administration documents into a single document.

A reproducible copy of the draft' Survey Results report and Survey Documentation report shall be provided to both the T and NCTCOG. Following acceptance by the T and NCTCOG, twenty (20) copies of each final report 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. Federal and State 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 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 20 copies, each final report will be delivered to NCTCOG as a reproducible copy and on a microcomputer floppy disk. All data sets will be provided to both NCTCOG and the T on IBM-compatible diskettes in DBF (dBase Ill+ or FoxPro 2.5) format. All returned survey forms will become the property of NCTCOG.

Schedule and Budget

The proposer will develop a schedule of tasks, with completion deadlines for each task. The consultant's schedule should assume a Notice to Proceed on April 1, 1996, with all data collection completed before May 23, 1996. The consultant will be responsible for correcting any errors found in the data for a period of up to one month following the delivery of the final microcomputer diskettes.

A budget for this project is not being published. The proposer should prepare a budget based on the Scope of Services to be performed. To assist the Consultant Selection Committee in their evaluations, the proposal must identify total costs and manhours for each project task.

Consultant Selection Criteria

The five-member Consultant Selection Committee (two individuals from the T, two individuals from NCTCOG, and one individual from another agency) will review all proposals and select a firm it considers qualified to undertake the project. The following criteria will be used to evaluate the proposals:

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

The consultant must recognize that a proposal to complete data collection after May 23, 1996 may be considered nonresponsive.

Other requirements are that the Disadvantaged Business Enterprise (DBE) participation meets NCTCOG's 13-percent goal and that an Affirmative Action Plan is included in the Proposal.

If the Consultant Selection Committee decides that interviews will be required before a final decision can be made, the interviews will take place at NCTCOG offices on March 15, 1996. Consultants submitting proposals will be notified at the end of the day on March 12, 1996 as to whether or not an interview has been scheduled. Costs for developing the proposal and costs attributed to interviews and subsequent contract negotiations are at the proposer's own expense and will not be reimbursed by NCTCOG.

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 upon execution of the contract by the NCTCOG Executive Director. 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 Request for Proposals 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.