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**U.S. 75 NORTH CENTRAL EXPRESSWAY RECONSTRUCTION:
NORTHWEST HIGHWAY SCREENLINE
AUTOMOBILE AND TRANSIT USER PANELS
INITIAL SURVEY RESULTS**

Report 984-1

Prepared for

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ABSTRACT

This report documents the creation of separate automobile and transit user panels for monitoring the effect of North Central Expressway construction upon travel behavior in the corridor. The report also summarizes the results of the initial pre-construction survey of these panel members against which future surveys will be compared. The typical automobile user panel member make 2.67 trips/day, 50 percent of which involve travel on North Central Expressway. Work trips in the corridor average 13.9 miles in length, and take 29 minutes in the morning and 33 minutes in the afternoon. The North Central Expressway is the most frequently used roadway for all or part of the panel members' work trips. Expressway usage is slightly less for the work-to-home trip than the home-to-work trip, suggesting that some panel members opt for alternative routes on their way home.

Transit user survey results indicate that most patrons utilize transit for their work trips on a daily basis. Transit quality in the corridor is rated fairly highly by members of the panel. Most express/local route transit users have one vehicle or less in the household, making transit utilization a necessity for them. In contrast, the majority of park-and-ride users have two or more vehicles available, making transit utilization more of a matter of choice for them.

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DISCLAIMER

This report is not intended to constitute a standard, specification, or regulation, and does not necessarily represent the official views and policies of the Texas Department of Transportation. This report is not intended for construction bidding or permit purposes.

INTRODUCTION

The long-awaited reconstruction of the North Central Expressway began in June 1990. When completed, the expressway will provide dramatic benefits to the public in terms of safer and more efficient travel. However, during the next several years, it is likely that travel in the corridor will be adversely affected as the existing mainlanes, ramps, and frontage roads are completely rebuilt.

The Texas Transportation Institute (TTI) is undertaking an extensive monitoring program to measure how traffic conditions and travel patterns change and to determine how motorists in the corridor alter their travel habits in response to this lengthy reconstruction project. This information will be useful in (1) evaluating and improving traffic impact mitigation measures during the project, (2) better predicting motorist responses at similar reconstruction projects in the future, and (3) developing an improved understanding of how motorists react when congestion levels increase (as a result of reduced freeway capacity during parts of reconstruction).

The monitoring plan being followed by TTI includes travel time, volume, vehicle classification, and occupancy data collection efforts on a periodic basis before and throughout the construction project. In conjunction with the collection of these operational data, motorist surveys will be conducted to understand the perceptual and behavioral changes in travel at an individual level and to determine the reasons behind these changes. A longitudinal study design is being employed, which involves the creation and periodic survey of a "panel" of commuters (automobile users and transit users).

This report documents the creation of the North Central automobile user panel and reports the results of the initial survey that was performed to gather pre-construction baseline data against which future surveys will be compared. Also included in the report is a summary of the travel characteristics of a North Central transit user panel which was established for this monitoring effort.

BACKGROUND

A longitudinal study has two important advantages when applied to the analysis of the impacts of major freeway construction. First, it is an efficient and accurate method of determining changes in both perceptions (such as estimated travel times) and behavior over time. Also, longitudinal studies permit the estimation of certain statistical parameters that cannot be measured using standard cross-sectional studies of different groups of drivers at different points in time (1). Second, the development of an automobile user panel provides quick access to travel information. Because baseline data and address information from each individual on the panel is already on file, it is possible to quickly determine the impacts of changes in traffic control or other aspects of a construction project upon motorist behavior (1).

Longitudinal analysis of commuter travel patterns has been performed as part of the monitoring activities for previous reconstruction projects in Houston, TX, and Pittsburgh, PA (2-4). In both cases, separate panels were established for the different travel mode groups in the corridor (drive-alone automobile users, carpoolers, vanpoolers, and transit users). Information was collected on travel attributes such as departure times, travel times, routes used, and trip origins and destinations. Data collected before and during construction were compared to determine how commuter perceptions of travel conditions were altered and how travel behavior was affected.

The traffic control plan for the Pittsburgh project required the closure of one of two lanes in each direction throughout the duration of the project. In comparison, the Houston project (on I-45 North Freeway) did not require permanent lane closures during construction. Consequently, changes were far less dramatic during the construction in Houston than in Pittsburgh. Table 1 summarizes the changes in pertinent travel characteristics for commuter work trips at both projects. Travel times did not change dramatically for either project. Travel distances were about 3 miles longer for the Pittsburgh project and were essentially unchanged for the Houston project. However, departure times in Pittsburgh reportedly were 29 minutes earlier during construction, while departure times during the Houston project were only 1 minute earlier. Much more diversion from the freeway was detected at the Pittsburgh project than at the Houston project. Finally, vehicle occupancy during construction increased in Pittsburgh but decreased in Houston.

TABLE 1. COMPARISON OF CHANGES IN WORK TRIPS

Travel Characteristic	Pittsburgh	Houston
Average Travel Time	4 Min. Longer	1.2 Min. Longer
Average Travel Distance	3.3 Mi. Longer	0.2 Mi. Longer
Average Departure Time	29 Min. Earlier	1 Min. Earlier
Use of Freeway	25% Reduction	7% Reduction
Single Occupant Vehicle Usage	8% Reduction	15% Increase

References: (2,4)

STUDY METHODOLOGY

Two separate commuter panels were created for this project, an automobile user panel and a transit user panel. Participants were recruited from actual users of transportation facilities in the north Dallas area, via license plate and onboard transit surveys administered in the corridor at a screen line cutting across the North Central Expressway and several parallel routes immediately north of Northwest Highway (Loop 12).

Data Collection

License Plate Survey

The license-plate survey, performed to obtain a representative sample of automobile drivers using the North Central Expressway and seven adjacent parallel routes, was conducted during the third week of May 1990. Observers stationed at strategic observation points recorded license plates of vehicles traveling southbound (the peak direction) on all routes during the morning peak (6:30 a.m. - 8:30 a.m.) and midday off-peak (11:00 a.m. - 12:00 noon, 1:00 p.m. - 2:00 p.m.) periods. In addition, automobiles traveling northbound on North Central Expressway during the same periods were also sampled, as the Expressway is heavily utilized in both directions throughout the day. To the extent possible, commercial vehicles (autos, vans, pick-ups, etc.) were excluded. Figure 1 illustrates the routes where vehicle license plates were recorded.

Table 2 summarizes the data collected from each route. Also shown in the table is the relative contribution of each route to the total data set collected, and the relative contribution of each route to the total corridor volumes. Overall, the sample collected across the corridor appears to be fairly representative of the distribution of volumes across the corridor. The arterial streets were slightly over-represented, while the North Central Expressway and Dallas North Tollway were slightly under-represented. It was much easier to read license plates on the arterial streets, where operating speeds were lower and where traffic stopped intermittently, which resulted in the slight bias towards arterial streets. Because the focus of the study is on the changes in travel characteristics that occur as a result of construction, it is believed that this slight bias is not a significant problem.

The license plate numbers were entered into computer files which were consolidated and sorted to eliminate duplicate entries. The consolidated file was loaded onto magnetic tape and shipped to the Texas Department of Motor Vehicles (DMV) to obtain vehicle registration information for each plate. This vehicle registration information was then used to print mailing labels for the survey. Although more than 14,000 plates were read and addresses matched in the DMV database, it was decided that only 8,500 were needed for purposes of this study. The 8,500 mailing labels used were selected from the 14,000 entries on a random basis.

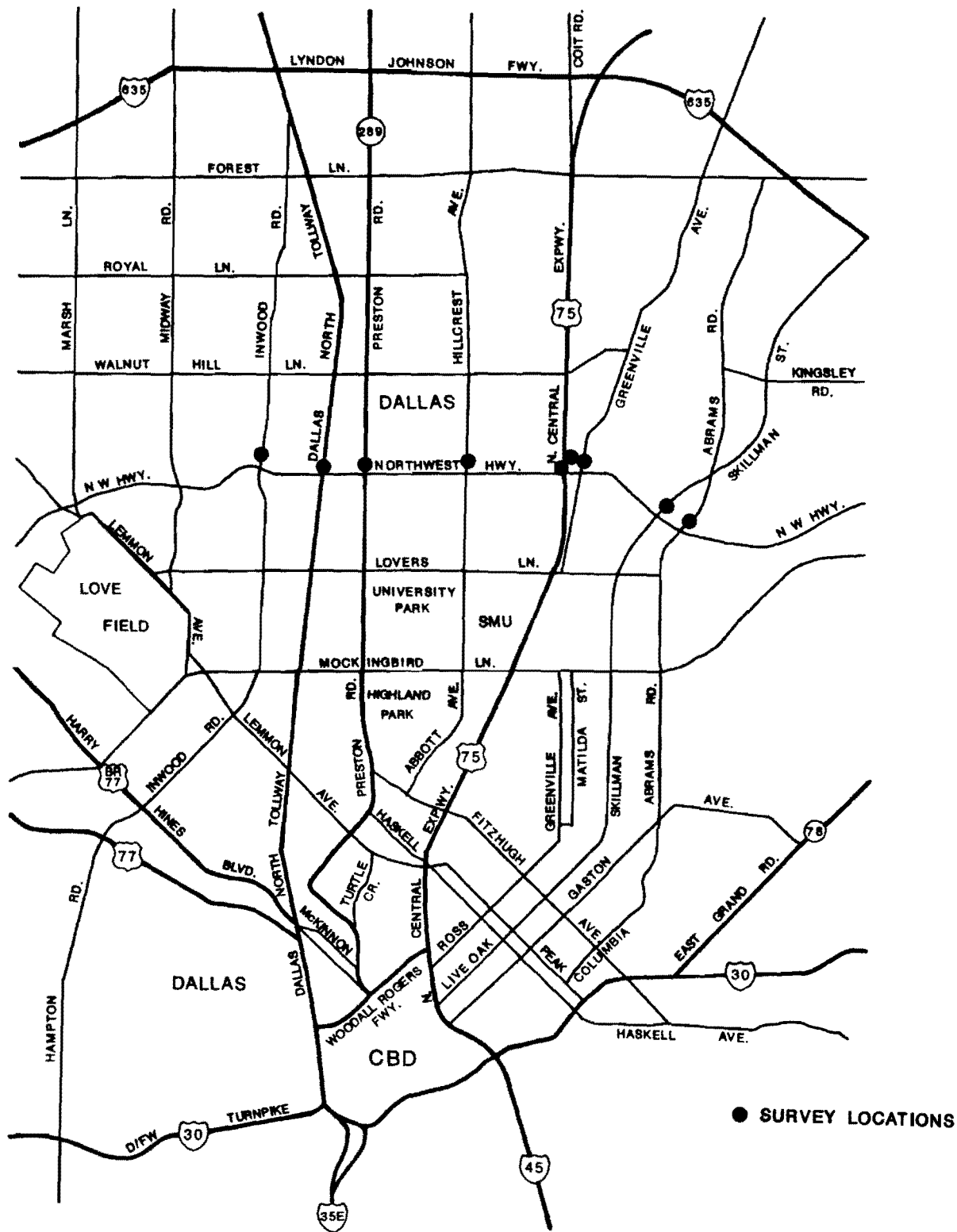


Figure 1. License Plate Data Collection Locations

TABLE 2. LICENSE PLATE DATA DISTRIBUTION

Route	Sample Collected	Percent of Total Sample	Contribution to Corridor ADT
SB NCE: AM Peak <u>Off-Peak</u> Total	1875 <u>1329</u> 3204	12.8% <u>9.1%</u> 21.9%	24.0%
NB NCE: AM Peak <u>Off-Peak</u> Total	1697 <u>539</u> 2236	11.6% <u>3.7%</u> 15.3%	26.2%
Dallas North Tollway: AM Peak <u>Off-Peak</u> Total	570 <u>749</u> 1319	3.9% <u>5.1%</u> 9.0%	16.5%
Inwood: AM Peak <u>Off-Peak</u> Total	647 <u>601</u> 1248	4.4% <u>4.1%</u> 8.5%	4.2%
Abrams: AM Peak <u>Off-Peak</u> Total	524 <u>597</u> 1121	3.6% <u>4.1%</u> 7.7%	5.1%
Hillcrest: AM Peak <u>Off-Peak</u> Total	645 <u>694</u> 1339	4.4% <u>4.8%</u> 9.2%	4.2%
Greenville: AM Peak <u>Off-Peak</u> Total	687 <u>718</u> 1405	4.7% <u>4.9%</u> 9.6%	7.9%
Skillman: AM Peak <u>Off-Peak</u> Total	641 <u>552</u> 1193	4.4% <u>3.8%</u> 8.2%	6.9%
Preston: AM Peak <u>Off-Peak</u> Total	870 <u>678</u> 1548	6.0% <u>4.6%</u> 10.6%	4.9%

Transit User Survey

During the last week in May 1990, an on-board survey was distributed to transit riders on eight transit routes in the north Dallas area. Park-and-ride routes, express bus routes, and local bus routes were all sampled. Surveys were distributed midweek (Tuesday-Thursday) between 6:00 a.m. and 9:00 a.m. Park-and-ride patrons were handed surveys as they boarded the bus, which they completed and returned to the bus driver as they exited the bus. Express and local bus riders were handed surveys en route by TTI personnel who boarded the buses at predetermined locations. These riders also handed the bus driver the completed surveys as they departed. Table 3 identifies the transit routes and individual bus times surveyed.

Survey Instruments

Automobile User Survey

The two-part survey instrument shown in Appendix A was utilized. The first part requested information about the number of different types of trips taken by the survey respondent on the previous weekday. It was intended that the respondents would report all trips, whether or not they had included travel on the North Central Expressway. However, there was evidence that some respondents only reported those trips that occurred on the Expressway. In general, the types of trips specified in the survey were similar to, but not exact duplicates of, those utilized in the 1984 Regional Household Travel Survey (5). The frequency that the respondents used North Central on the previous weekday was the final question asked in part 1 of the survey.

The second part of the survey focused exclusively on work-related trips. Detailed information was requested about the following:

- o Origins and destinations of the work trip (by zip code),
- o Departure times,
- o Perceived travel distance,
- o Perceived travel times,
- o Number and types of intermediate stops,
- o Mode of transportation,
- o Vehicle occupancy,
- o Entrance and exit ramps used for trips made on North Central Expressway, and
- o Usage of alternative routes.

This information was requested both for the work-to-home as well as the home-to-work trip. To establish the automobile user panel, the final question requested name and address information from the respondent if he or she was willing to participate in an

TABLE 3. SUMMARY OF TRANSIT ROUTES SURVEYED

Route	Primary Roadway(s) Used	Survey Location	Buses Surveyed		
Park-and-Ride: Plano East	N. Central Expressway	Park-and-ride lot at Parker	6:10 am 6:40 am 7:00 am 7:50 am 8:40 am	6:30 am 6:50 am 7:15 am 8:00 am 9:20 am	6:35 am 6:55 am 7:35 am 8:15 am
Richardson	N. Central Expressway	Park-and-ride lot at Arapaho and Greenville	6:00 am 6:30 am 7:00 am 7:15 am	6:15 am 6:50 am 7:05 am 8:30 am	6:25 am 6:55 am 7:10 am
N. Central P&R	N. Central Expressway	Park-and-ride lot at Coit and Churchill	6:17 am 6:43 am 7:14 am 7:43 am	6:25 am 7:04 am 7:19 am 8:00 am	6:28 am 7:05 am 7:30 am
Spring Creek	N. Central Expressway	Park-and-ride lot at Coit and Churchill	6:12 am 7:58 am	7:13 am 8:15 am	7:40 am
Express/Local: Fair Oaks	Fair Oaks, Shady Brook, and N. Central Expressway	Between Ridgecrest and Northwest Hwy.	6:17 am 7:05 am 8:48 am	6:30 am 7:35 am	6:40 am 7:53 am
Richland	Abrams, Skillman, and N. Central Expressway	Between Kingsley and Northwest Hwy.	6:09 am 7:00 am 7:27 am 8:00 am	6:20 am 7:05 am 7:35 am	6:52 am 7:24 am 7:45 am
Royal Hills	Edgemere, Thackery, Northwest Hwy., and N. Central Expressway	Between Hillcrest and Northwest Hwy.	6:20 am 7:25 am 8:18 am	6:47 am 7:50 am 8:50 am	7:17 am 7:56 am
Spring Creek	Meandering, Coit, and N. Central Expressway	Between Belt Line and Churchill	6:12 am	6:47 am	8:15 am

ongoing traffic monitoring effort. The respondent was also invited to provide any comments or suggestions about travel in the North Central Expressway corridor.

Transit Survey

The on-board transit survey consisted of eight basic questions concerning the current trip. The information requested included:

- o Trip purpose,
- o Origin and destination (by zip codes),
- o Trip frequency,
- o Number of vehicles available for use in household,
- o Rating of overall transit service in corridor,
- o Distance from residence to bus stop or park-and-ride lot, and
- o Total trip time from residence to destination.

Again, respondents were asked to provide their name and address if they would be willing to participate in future surveys about their commuting activities. Appendix A presents an example of the transit survey utilized in this study.

Data Reduction

Overall, response rates to both the automobile and the transit user surveys equalled or exceeded expectations, based on results from previous surveys of similar design. Table 4 summarizes the response rates for each survey. Thirty percent of the automobile user surveys were returned, slightly above the 25 percent rate which was targeted at the beginning of this study. Response rates for the park-and-ride and express/local transit user surveys exceeded 90 and 70 percent, respectively.

A substantial proportion of those responding also volunteered to participate in the automobile user panel. More than 1800 volunteers were obtained for the automobile user panel and nearly 600 for the transit user panel. These numbers represent 21.5 and 50.6 percent of all surveys distributed. If only those surveys that were returned are considered, the volunteer rate exceeded 69 percent for the automobile user survey and 60 percent for the transit user survey.

To facilitate processing the basic origin and destination information requested in the survey, the zip codes in the Dallas area were collapsed into 16 large zones. These zones are illustrated in Figure 2. In this way, a very coarse trip table could be computed. In addition, it was then possible to focus analysis on the travel characteristics of certain groups of drivers with similar O-D patterns.

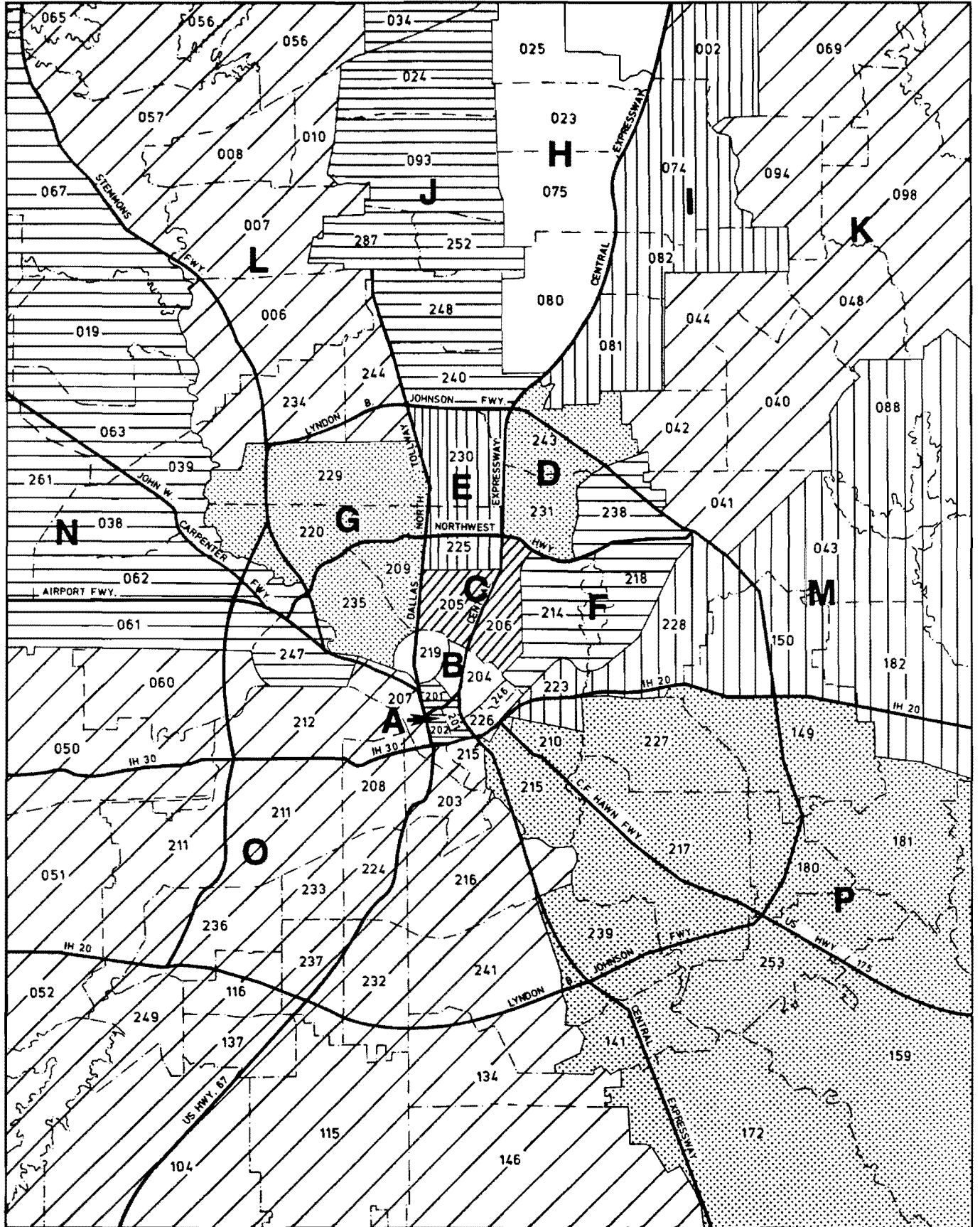


Figure 2. Major Zip Code Zones

TABLE 4. SURVEY RESPONSE RATES

Survey	Number Distributed	Number Returned	Percent Returned	Number Volunteering	Percent Volunteering
Automobile:	8500	2658	31.3	1825	21.5
Transit:					
P&R	735	678	92.2	428	58.2
<u>Express</u>	<u>413</u>	<u>290</u>	<u>70.2</u>	<u>153</u>	<u>37.1</u>
Total	1,148	968	84.3	581	50.6

SURVEY RESULTS

Automobile User Survey

Total Tripmaking Activity

A total of 2544 individuals provided information about their daily tripmaking activity. Table 5 summarizes the average number of times the respondents made a trip to each type of destination. As would be expected, work was the most frequent destination, occurring an average of 1.14 times/day. This is slightly greater than the 0.80 vehicle work trips/day or the 0.90 person work trips/day reported in the 1984 regional household survey (5). Given that the respondents come from a group of drivers observed on the freeway, the sample would be expected to reflect a slightly higher average work trip rate than the region as a whole. The second most frequent destination was to eat a meal, made an average of 0.47 times/day. Average trip frequencies for the remaining trip types are shown in the table. Summing over all trip types, respondents reported making trips an average of 2.67 times/day. This value is also consistent with values reported in the regional survey (2.50 total vehicle trips/day and 3.40 person trips/day) (5).

The survey also requested information about the frequency with which motorists used the North Central Expressway. The results, shown in Table 5, indicate that motorists used the North Central Expressway for an average of 1.31 trips/day. Based on these reported values, then, it appears that the North Central Expressway was utilized for about one-half of all trips made by the survey panel each day.

TABLE 5. SUMMARY OF TOTAL TRIPMAKING ACTIVITY

Type of Trip	Trips/Day
Work	1.14
Eat a meal	0.47
Shopping	0.40
Personal business	0.40
Other	0.13
<u>School</u>	<u>0.13</u>
TOTAL	2.67
Trips on N. Central Expressway	1.31
Proportion of TOTAL Trips	49.7%

Work Trip Travel Characteristics

A total of 2258 individuals provided information about their trip to work on the previous weekday. On the basis of home and work zip codes provided by the respondents and the grouping of zip codes into large zones as depicted in Figure 3, a generalized origin-destination trip table was developed. The complete table is provided in Appendix B. The major origins and destinations of these work trips are summarized in Table 6. Zones with 5 percent or more of the total responses are reported. As Table 6 indicates, the survey group consists primarily of residents of north and east Dallas, University Park, Richardson, Plano, Garland, and areas in southwest Dallas (including Desoto, Duncanville, etc.). Most work trips are being made to the Dallas CBD or points just north, Highland Park, University Park, northeast Dallas, northwest Dallas, and southwest Dallas. These results are expected, given the screen line license plate data collection methodology used to identify survey respondents.

Table 7 summarizes the average departure times, travel distances, and travel times of the work trip for the entire survey panel. Overall, respondents reported travelling an average of 13.9 miles to and from work each day. Motorists departed about 7:30 a.m. for work, and left work for home about 5:00 p.m. Motorists reported an average home-to-work trip travel time of about 29 minutes, and a slightly longer travel time (33 minutes) for the work-to-home trip.

TABLE 6. MAJOR HOME AND WORK LOCATIONS BY ZONE

Zone	Percent of Survey Responses
<p>Home zones:</p> <p>D (Northeast Dallas) 16.6</p> <p>E (University Park/North Dallas) 12.0</p> <p>H (Richardson/Plano) 11.2</p> <p>J (North Dallas/Plano) 11.2</p> <p>I (Richardson/Plano) 7.1</p> <p>K (Garland) 7.0</p> <p>O (Southwest Dallas et al) 5.0</p> <p>All others 29.9</p>	
<p>Work zones:</p> <p>A (Dallas CBD) 15.1</p> <p>C (Highland Park/University Park) 9.8</p> <p>E (University Park/North Dallas) 8.5</p> <p>D (Northeast Dallas) 8.3</p> <p>B (North and east of CBD) 7.8</p> <p>G (Northwest Dallas) 6.1</p> <p>O (Southwest Dallas et al) 5.5</p> <p>All others 38.9</p>	

TABLE 7. BASIC WORK TRIP TRAVEL CHARACTERISTICS

Characteristic	Home-to-Work Trip	Work-to-Home Trip
Median departure time	7:30 am	5:00 pm
Average travel distance	13.9 miles	13.9 miles
Average travel time	29.1 minutes	32.8 minutes
Average vehicle occupancy	1.13 persons/vehicle	1.13 persons/vehicle

The frequency of intermediate stops motorists made on their way to or from work is summarized in Table 8. Overall, the rates are fairly small, as many motorists did not make any intermediate stops. On the average, 0.40 stops were made on the way to work, compared to 0.86 stops on the way home from work. The most common reasons for the stops on the way to work were for school or personal business. On the way home, shopping and personal business were the most common reasons for intermediate stops.

TABLE 8. FREQUENCY OF INTERMEDIATE STOPS ON WAY TO OR FROM WORK

Purpose of Stop	Home-to-Work Trip (stops/trip)	Work-to-Home Trip (stops/trip)
Shopping	0.041	0.237
School	0.084	0.056
Eat a meal	0.065	0.129
Personal business	0.123	0.225
Social/recreation	0.019	0.121
<u>Other</u>	<u>0.064</u>	<u>0.093</u>
TOTAL	0.396	0.861

The relative usage of the different travel routes available in the North Central Expressway corridor for the home-to-work and work-to-home trips is presented in Table 9. Some motorists marked more than one route, so the sum of the values shown in the table exceeds 100 percent. One sees that the North Central Expressway was reportedly used by 50 percent of the respondents for the home-to-work trips and for 48 percent of the work-to-home trips. These numbers are similar to those obtained in a recent telephone survey of north Dallas residents. In that survey, 43 percent of the commuters polled reported using North Central Expressway for their work trip (6). These numbers are also similar to the corridor ADT distributions across routes shown in Table 2. However, since those values represent the distribution at a single screen line location, they are not directly comparable to the values in Table 9.

TABLE 9. ROUTE USAGE IN NORTH CENTRAL EXPRESSWAY CORRIDOR

Route	Percent of Respondents Using Each Route		Percent of Corridor ADT
	Home-to-Work Trip	Work-to-Home Trip	
North Central Expressway	50.1	48.3	32.5
Dallas North Tollway	15.4	16.0	22.4
Skillman	11.2	10.3	9.3
Abrams	8.0	8.8	6.9
Greenville	14.4	11.8	10.7
Hillcrest	12.0	10.9	5.7
Inwood	8.5	8.5	5.7
Preston	13.9	12.8	6.7

As a final note, Table 10 presents a comparison of average travel speeds (computed by dividing reported travel distance by reported travel time) for selected O-D trip combinations, separating those who utilized North Central Expressway from those who did not. The results of this analysis were mixed. For those in the Plano and Richardson area living fairly close to North Central Expressway, the Expressway provided slightly higher travel speeds to the downtown area. In comparison, for Plano and Garland residents who lived as far away from downtown but further from the Expressway, average travel speeds to their destinations using alternative routes were as fast or faster than similar trips on the Expressway. The same was also true for those living close to the freeway but south of Plano and Richardson (north Dallas).

Motorist Comments

A large number of motorists chose to comment on their experiences and perceptions of North Central Expressway. Overall, 571 comments were received, representing 21.5 percent of all surveys returned. The comments were reviewed and then categorized. Upon review of these comments, it was noted that a few comments were made numerous times. In fact, nearly two-thirds of the comments could be categorized into 12 basic types of comments. For example, a large number of survey respondents expressed dissatisfaction with the North Central Expressway and indicated that they avoid the Expressway if at all possible. Also, numerous comments related to the substandard

**TABLE 10. AVERAGE TRAVEL SPEED COMPARISONS:
NORTH CENTRAL EXPRESSWAY VERSUS ALTERNATIVE ROUTES**

Trip Interchange	Travel Speed on North Central Expressway	Travel Speed on Alternative Routes
<p>North Dallas Residents (Zones D & E) with Central Dallas Destinations (Zones A & B)</p> <p>Home-to-Work: Work-to-Home:</p>	<p>24.3 mph 21.0 mph</p>	<p>24.7 mph 22.1 mph</p>
<p>Richardson and Plano Residents Near Expressway (Zones H & I) with Central Dallas Destinations (Zones A & B)</p> <p>Home-to-Work: Work-to-Home:</p>	<p>29.5 mph 26.5 mph</p>	<p>24.2 mph 22.5 mph</p>
<p>Plano and Garland Residents (Zones J & K) with Central Dallas Destinations (Zones A & B)</p> <p>Home-to-Work: Work-to-Home:</p>	<p>28.1 mph 22.9 mph</p>	<p>28.4 mph 26.9 mph</p>

exit and entrance ramps along the Expressway, and motorists expressed desires that they be made longer.

In addition to the general comments, a number of respondents submitted suggestions about how to improve travel conditions in the North Central Expressway corridor. One common suggestion was to complete construction on arterial streets adjacent to the Expressway (i.e., Greenville, Skillman, Abrams, etc.). Another common suggestion was to have contractors work throughout the night and on weekends so that construction of the Expressway be completed as fast as possible.

Table 11 presents a summary of the major comments made by survey respondents, along with the frequency with which they were reported. In addition to this summary, a technical memorandum is being prepared and forwarded to the Department under separate cover that presents all of the different complaints and suggestions received from the surveys.

TABLE 11. SUMMARY OF COMMENTS RECEIVED

Type of Comment	Number of Comments
North Central is a mess; I try to avoid it if at all possible.	163
The exit and entrance ramps need to be made longer.	63
Finish all construction on alternative routes (e.g., Greenville, Abrams, Skillman, Hillcrest, Meadow, Royal, Preston) before starting on the Expressway.	38
The traffic signals on the alternative routes need to be synchronized.	26
The ramp metering signals to the Expressway are useless.	20
The Expressway should be widened to three or more lanes.	16
Do construction at low volume times (nights, weekends).	16
The Expressway should be double-decked.	12
Construction on the Expressway should continue 24 hours a day until it is complete.	7
Certain north-south streets (e.g. Preston, Greenville, Hillcrest) should be made one-way thoroughfares during peak periods.	7
Two lanes on the Expressway should be kept open at all times during construction.	7
The Expressway should be closed completely so that construction can be finished as quickly as possible.	5

Transit Survey

As would be expected, most of the trips made by express/local and park-and-ride transit users were for work. Data presented in Table 12 indicates that almost 93 percent of the express/local trips and more than 97 percent of park-and-ride trips were for work. In addition, the vast majority of those using transit do so daily, as data in Table 13 illustrates. The results of the survey show nearly 80 percent of local/express transit patrons and 89 percent of park-and-ride patrons using transit five days per week.

TABLE 12. SUMMARY OF TRIP PURPOSES OF TRANSIT USERS

Trip Purpose	Express/Local Routes (%)	Park-and-Ride Routes (%)
Work	92.7	97.4
School	2.1	0.7
Shopping	0.3	0.2
Social/Recreation	1.0	0.0
Eat a Meal	0.0	0.0
Personal Business	2.8	0.4
Other	1.0	1.3

The home and destination zip code information was used to develop an aggregate trip table, utilizing the same zones as for the automobile user survey (refer back to Figure 3). The complete tables are presented in Appendix B. Summaries of the major home and destination zones (those producing or attracting more than 5 percent of the trips) for both express/local and park-and-ride transit trips are provided in Tables 14 and 15. Major home zones of express/local transit users were northeast Dallas (zone D), north Dallas (zone E), and Richardson/Plano (zone I). For park-and-ride transit patrons, major home zones were Richardson/Plano (zone I), Richardson/Plano (zone H), Plano/Garland (zone K), and Plano/north Dallas (zone J). For both types of transit users, the Dallas central business district (zone A) was the predominant destination.

The distribution of survey responses by time-of-day is shown in Table 16. The survey sample indicated fairly steady transit usage for the express/local transit users from 6:00 a.m. through 8:00 a.m. A more pronounced peak was detected in the park-and-ride data, with nearly 60 percent of the surveys obtained between 6:30 a.m. and 7:30 a.m.

TABLE 13. FREQUENCY OF TRANSIT USAGE

Trip Frequency (#/Week)	Express/Local Routes (%)	Park-and-Ride Routes (%)
1 or less	3.8	3.0
2	1.4	0.9
3	3.4	1.2
4	4.8	3.1
5	79.7	89.1
6 or more	6.9	2.8

**TABLE 14. MAJOR HOME ZONES:
EXPRESS/LOCAL AND PARK-AND-RIDE USERS**

Zone	Percent of Survey Responses
Express/Local Users:	
D (northeast Dallas)	52.8
E (north Dallas)	13.1
I (Richardson/Plano)	11.0
All others	23.1
Park-and-Ride Users:	
I (Richardson/Plano)	34.2
H (Richardson/Plano)	29.9
K (Garland/Plano)	13.4
J (North Dallas/Plano)	12.1
All others	10.4

**TABLE 15. MAJOR DESTINATION ZONES:
EXPRESS/LOCAL AND PARK-AND-RIDE USERS**

Zone	Percent of Survey Responses
Express/Local Users: A (Dallas CBD) All others	49.3 50.7
Park-and-Ride Users: A (Dallas CBD) All others	54.2 45.8

TABLE 16. DISTRIBUTION OF SURVEY RESPONSES OVER PEAK PERIOD

Time Period	Express/Local Routes	Park-and-Ride Routes
6:00-6:30 am	17.9	16.8
6:30-7:00 am	26.6	31.3
7:00-7:30 am	19.6	26.4
7:30-8:00 am	25.2	8.1
8:00-9:30 am	10.7	17.4

Information concerning vehicle availability of the transit survey respondents is shown in Table 17. Most of the express/local transit users (72.4 percent) indicated that they did not have a vehicle or only had one vehicle available for use at their household. In comparison, 73.6 percent of the park-and-ride transit users have two or more vehicles available for use at their household. These results indicate that transit usage for park-and-ride patrons appears to be primarily by choice, whereas express/local patrons utilize transit primarily out of necessity.

TABLE 17. DISTRIBUTION OF VEHICLE AVAILABILITY FOR TRANSIT USERS

Vehicles Available in Household	Express/Local Routes (%)	Park-and-Ride Routes (%)
0	22.4	3.9
1	50.0	22.5
2	19.3	53.1
3	6.6	15.0
4	1.4	4.8
5 or more	0.3	0.7

Overall, transit quality in the North Central Expressway corridor was rated fairly high by both the express/local and the park-and-ride lot transit patrons. As depicted in Table 18, transit quality was rated "good" or "excellent" by 65 percent of the express/local transit users and by 82 percent of those utilizing park-and-ride transit. These ratings likely reflect the fact that more express/local transit patrons are forced to use transit because an alternative travel mode (i.e. personal vehicle) does not exist. Most park-and-ride patrons, in comparison, have alternative travel modes available, and so those who are displeased with transit quality would be less inclined to make use of it and thus would have been less likely to have been surveyed.

TABLE 18. DISTRIBUTION OF REPORTED TRANSIT QUALITY RATINGS

Rating of Transit Quality in Corridor	Express/Local Routes (%)	Park-and-Ride Routes (%)
Excellent	13.3	24.1
Good	52.1	58.1
Fair	28.7	14.6
Poor	5.9	3.1

Total travel times from home to final destination are provided in Table 19. According to the responses received, most trips made by express/local riders were between 20 and 50 minutes long. For park-and-ride users, total trip times exceed 40 minutes. Trip times of this magnitude would be expected, since travel times from the various park-and-ride lots to downtown Dallas average 35 to 50 minutes in the peak period.

TABLE 19. DISTRIBUTION OF REPORTED TOTAL TRIP TIMES

Reported Trip Time	Express/Local Routes (%)	Park-and-Ride Routes (%)
Less than 10 minutes	2.4	4.0
10 to 20 minutes	7.3	4.3
20 to 30 minutes	17.7	1.9
30 to 40 minutes	31.9	10.2
40 to 50 minutes	21.9	28.5
50 to 60 minutes	11.5	33.1
More than 60 minutes	7.3	18.0

SUMMARY

This report documents the creation of automobile and transit user panels in order to monitor the effect of North Central Expressway construction upon travel behavior. The report also summarizes the results of the initial pre-construction survey against which future surveys will be compared. Out of 8500 surveys mailed to individual households in the Dallas area, more than 1800 volunteers have agreed to participate in the automobile user panel. The transit user panel currently consists of nearly 600 members. Panel members in both surveys live primarily in north and northeast Dallas, Richardson, Plano, and Garland, although all parts of Dallas are represented to some degree in the automobile user panel.

The results of the initial automobile user survey indicate that panel members made an average of 2.67 trips per day. Panel members utilize the North Central Expressway for about one-half of these trips. With respect to work trips, it appears that the typical panel member leaves for work at approximately 7:30 a.m. and has a 13.9 mile commute that takes about 29 minutes to complete. In the evening, this panel member leaves work

for home right at 5:00 p.m. and travels slightly longer (33 minutes) to cover that 13.9 mile route. A significant proportion of the panel members do make intermediate stops on their way to and from work, although most are made on the way home from work. About 50 percent of the panel members use North Central for all or part of their work trips for the home-to-work trip. This percentage is slightly less for the work-to-home trip, as some motorists apparently switch to alternative routes for the drive home.

The results of the transit user survey show that most trips made via transit are for work and are made five days per week. Based on reported automobile availability, most express/local transit users do not have alternative means of transportation. In comparison, the majority of park-and-ride transit patrons have two or more vehicles and so have a choice about whether or not to ride the bus. Overall, transit quality in the North Central Expressway corridor is rated highly, although express/local transit users rate the quality only "Fair" or "Poor" about twice as frequently as park-and-ride transit users.

FUTURE SURVEYS

The individuals who volunteered to participate in the panel will be surveyed approximately every six months to monitor how they are responding to the changing conditions in the North Central Expressway corridor. The panels can be used as a sounding board to gauge public attitudes and desires. The North Central Project Office, Public Affairs Officers, City of Dallas Transportation Department, DART, and other local agencies may want to incorporate questions about actions they have implemented or are planning into the periodic surveys. Care must be taken not to ask too much of the panel members, but opportunities do exist for using the panel surveys to satisfy multiple information needs. Plans are to establish a second automobile user panel for a screen line south of Mockingbird Lane prior to the start of construction and long-term closure of travel lanes on that section of freeway.

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5. Findings of the 1984 Regional Travel Survey. North Central Texas Council of Governments, Arlington, TX. 1984.
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APPENDIX A: AUTOMOBILE AND TRANSIT USER SURVEYS

NORTH CENTRAL EXPRESSWAY CORRIDOR TRAVEL SURVEY

Please provide us with information about your travel on the most recent weekday (Monday through Friday).

1. For which day of the week are you providing travel information?
 Monday Tuesday Wednesday Thursday Friday
2. How many times did you go to each of the following types of places on that day?
 work school shopping eat a meal to social/recreation events
 personal business (doctors appt., banking, etc.) other (specify _____)
3. How many times did you travel on the North Central Expressway on that day? _____

Questions 4 - 12 relate to trips made to and from work. If you did not travel to or from work on that day, please skip to Question 13.

4. What is the zip code of your home address? _____
 What is the zip code of your work? _____
5. At what time did you leave to go: (circle one)
 From home to work _____ AM or PM
 From work to home _____ AM or PM
6. How far is it from your home to your work? _____ miles
7. How much time did these trips take (to the nearest 5 minutes)?
 From home to work _____ minutes
 From work to home _____ minutes
8. How many stops did you make on the way to and from work for each of the following purposes?

	From home to work	From work to home
school	_____	_____
shopping	_____	_____
eat a meal	_____	_____
personal business	_____	_____
social/recreation	_____	_____
other	_____	_____
9. How did you make these trips? (check one)
 From home to work: drove alone carpool/vanpool bus other
 From work to home: drove alone carpool/vanpool bus other
10. How many persons (including yourself) were in the vehicle? _____ person(s)
11. If you used the North Central Expressway for all or part of these trips, please indicate at what ramps you entered and exited the Expressway.
 From home to work: entered _____ exited _____
 From work to home: entered _____ exited _____

12. If you did not use the Expressway, check which of the roads listed (if any) you did use:

	From home to work	From work to home
Skillman St.	_____	_____
Abrams Rd.	_____	_____
Greenville Ave.	_____	_____
Hillcrest Ave.	_____	_____
Preston Rd.	_____	_____
Dallas North Tollway	_____	_____
Inwood Rd.	_____	_____

13. Would you be willing to respond to similar follow-up surveys about your driving activities as part of an ongoing traffic monitoring effort? If yes, please provide:
 Name (person filling out survey) _____
 Street Address _____
 City _____ State _____ Zip code _____
 Total number of automobiles available for use in your household _____
14. On the back of this questionnaire, please provide any additional comments or suggestions you wish to make about travel in the North Central Expressway corridor.

NORTH CENTRAL CORRIDOR TRANSIT SURVEY

The Texas Transportation Institute, Texas A&M University System, is conducting a survey of bus riders in the North Central Expressway corridor. The study is being sponsored by the Texas State Department of Highways and Public Transportation. The survey information being collected will be used to monitor the effects of the upcoming construction of the North Central Expressway. Please fill out this survey as you ride today and leave it with the bus operator as you exit the bus. The information you provide will be kept strictly confidential, and will be used for statistical purposes only. Thank you for your help.

1. **What is the purpose of your trip today?**
 work school shopping social/recreation
 eat a meal personal business other
2. **What is the zip code of your home address?** _____
3. **What is the zip code of your destination today?** _____
4. **How many days per week do you normally make this trip?**
 1 or less 2 3 4 5 6 or more
5. **How many vehicles are available for use in your household?** _____
6. **How would you rate the overall quality of transit service in the North Central Expressway corridor?**
 excellent good fair poor
7. **How far is the park-and-ride lot from your residence?**
 0 - 2 miles 2 - 5 miles
 5 - 15 miles more than 15 miles
8. **How long does it normally take you from the time you leave your home until you reach your destination on this trip?**
 less than 10 min. 10-20 min. 20-30 min.
 30-40 min. 40-50 min. 50-60 min.
 more than 60 min.
9. **Would you be willing to respond to similar follow-up surveys about your commuting activities as part of an ongoing monitoring effort?**
If yes, please provide:
Name _____
Address _____
City _____ State _____ Zip code _____

APPENDIX B: AUTOMOBILE AND TRANSIT USER PANEL TRIP TABLES

AUTOMOBILE USER PANEL TRIP TABLE

TABLE OF HZONE BY DZONE

HZONE/DZONE	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Total
A	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
B	5	1	1	10	1	0	0	3	1	2	0	0	0	0	1	1	3	29
C	4	5	8	8	6	0	0	5	2	4	0	2	0	2	3	0	10	59
D	88	33	39	28	19	13	26	3	4	8	1	6	0	16	31	6	53	374
E	58	23	25	15	43	5	16	3	2	21	1	4	0	5	11	4	34	270
F	17	9	13	16	13	7	6	4	3	10	1	5	1	6	5	3	18	137
G	14	4	7	7	10	0	8	0	2	4	0	5	2	1	4	1	10	79
H	45	21	21	9	20	7	14	11	12	5	1	5	0	6	11	3	62	253
I	38	22	9	6	7	4	7	5	8	5	3	1	0	5	7	2	31	160
J	35	21	38	14	18	2	25	5	1	23	0	9	2	8	13	2	37	253
K	14	17	17	10	13	3	10	4	7	3	5	4	0	6	13	4	28	158
L	2	8	17	7	12	0	7	1	2	6	0	14	0	2	4	1	22	105
M	3	3	6	8	9	2	5	5	1	3	3	0	5	1	1	1	12	68
N	2	2	2	6	3	0	3	1	0	1	0	2	0	6	0	0	4	32
O	10	0	8	27	10	0	6	3	4	3	0	1	0	3	12	2	37	126
P	0	4	3	2	5	1	0	2	0	2	0	0	1	0	2	1	14	37
Q	5	3	7	14	3	0	4	5	4	5	1	4	1	7	5	0	48	116
Total	340	176	221	187	192	44	137	60	55	105	16	62	12	74	123	31	423	2258

PARK-AND-RIDE TRANSIT USER PANEL TRIP TABLE

TABLE OF HZONE BY DZONE

HZONE/DZONE	A	B	C	D	E	F	G	H	I	J	K	N	O	P	Q	Total
B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
D	8	0	0	1	0	0	0	0	0	0	0	0	0	0	7	16
E	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
H	109	0	1	1	1	3	2	1	3	1	0	0	5	0	81	208
I	130	2	0	1	1	1	3	0	0	5	1	1	1	1	91	238
J	45	0	2	2	2	0	2	0	1	3	0	0	5	2	20	84
K	60	0	0	0	0	0	0	1	0	0	0	0	0	0	32	93
L	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Q	20	0	0	0	0	0	0	0	0	0	0	0	1	0	28	49
Total	377	2	3	5	4	4	7	2	4	9	1	1	12	3	261	695

EXPRESS/LOCAL TRANSIT USER PANEL TRIP TABLE

TABLE OF HZONE BY DZONE

HZONE/DZONE	A	B	C	D	E	F	G	H	J	L	M	N	O	P	Q	Total
B	15	0	0	0	0	0	0	0	0	0	0	0	1	0	11	27
C	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
D	66	5	3	4	3	1	5	2	0	1	3	0	10	5	45	153
E	31	2	0	0	0	0	0	0	0	0	0	0	0	0	5	38
F	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
H	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	6
I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
J	16	1	0	0	0	0	2	0	1	0	1	0	0	0	11	32
K	5	0	0	0	0	0	0	0	0	0	0	0	0	0	3	8
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
M	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
O	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	3
P	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Q	2	0	0	0	0	0	0	0	0	0	1	0	1	1	8	13
Total	143	8	3	4	3	1	7	2	1	1	5	2	13	7	90	290