

| | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------|
| 1. Report No. TX-92/1940-3 | | 2. Government Accession No. | | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle U.S. 75 North Central Expressway Reconstruction: Northwest Highway Screen Line Automobile and Transit User Panels, May 1992 Survey Results | | | | 5. Report Date December 1992 | |
| | | | | 6. Performing Organization Code | |
| 7. Author(s) G.L. Ullman, K.M. Collins, and R.A. Krammes | | | | 8. Performing Organization Report No. Research Report 1940-3 | |
| 9. Performing Organization Name and Address Texas Transportation Institute The Texas A&M University System College Station, TX 77843-3135 | | | | 10. Work Unit No. (TRAIS) | |
| | | | | 11. Contract or Grant No. Study 2-18D-92/93-1940 | |
| 12. Sponsoring Agency and Address Texas Department of Transportation: Transportation Planning Division P.O. Box 5051, Austin, TX 78763 | | | | 13. Type of Report and Period Covered Interim Report (May 1992-December 1992) | |
| | | | | 14. Sponsoring Agency Code | |
| 15. Supplementary Notes Research performed in cooperation with the state of Texas. Study Title: Highway Planning and Operations for District 18 | | | | | |
| 16. Abstract <p>This report summarizes the results of the survey of the North Central Expressway automobile and transit panelists conducted in May 1992. The results of the survey indicate that travel conditions in the corridor have not deteriorated significantly since the start of Expressway construction south of I-635. Details regarding the survey analysis and results are presented herein.</p> | | | | | |
| 17. Key Words Freeway reconstruction, motorist travel patterns, Freeway Corridor Management | | | 18. Distribution Statement No Restrictions. This document is available to the public through the National Technical Information Service Springfield, VA 22161 | | |
| 19. Security Classif. (of this report) Unclassified | | 20. Security Classif. (of this page) Unclassified | | 21. No. of Pages 42 | 22. Price |

**U.S. 75 NORTH CENTRAL EXPRESSWAY RECONSTRUCTION:
NORTHWEST HIGHWAY SCREEN LINE AUTOMOBILE AND
TRANSIT USER PANELS
MAY 1992 SURVEY RESULTS**

Report 1940-3

Prepared for

North Central Project Office
Texas Department of Transportation
District 18, Dallas

Prepared by

Gerald L. Ullman, P.E.

Kent M. Collins

Raymond A. Krammes, P.E.

Texas Transportation Institute
Texas A&M University System
College Station, TX 77843

December 1992

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

| Symbol | When You Know | Multiply By | To Find | Symbol |
|---------------|---------------|-------------|-------------|--------|
| LENGTH | | | | |
| in | inches | 2.54 | centimetres | cm |
| ft | feet | 0.3048 | metres | m |
| yd | yards | 0.914 | metres | m |
| mi | miles | 1.61 | kilometres | km |

| AREA | | | | |
|-----------------|---------------|--------|---------------------|-----------------|
| in ² | square inches | 645.2 | centimetres squared | cm ² |
| ft ² | square feet | 0.0929 | metres squared | m ² |
| yd ² | square yards | 0.836 | metres squared | m ² |
| mi ² | square miles | 2.59 | kilometres squared | km ² |
| ac | acres | 0.395 | hectares | ha |

MASS (weight)

| | | | | |
|----|----------------------|-------|-----------|----|
| oz | ounces | 28.35 | grams | g |
| lb | pounds | 0.454 | kilograms | kg |
| T | short tons (2000 lb) | 0.907 | megagrams | Mg |

VOLUME

| | | | | |
|-----------------|--------------|--------|--------------|----------------|
| fl oz | fluid ounces | 29.57 | millilitres | mL |
| gal | gallons | 3.785 | litres | L |
| ft ³ | cubic feet | 0.0328 | metres cubed | m ³ |
| yd ³ | cubic yards | 0.0765 | metres cubed | m ³ |

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

| | | | | |
|----|------------------------|----------------------------|---------------------|----|
| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |
|----|------------------------|----------------------------|---------------------|----|

APPROXIMATE CONVERSIONS TO SI UNITS

| Symbol | When You Know | Multiply By | To Find | Symbol |
|---------------|---------------|-------------|---------|--------|
| LENGTH | | | | |
| mm | millimetres | 0.039 | inches | in |
| m | metres | 3.28 | feet | ft |
| m | metres | 1.09 | yards | yd |
| km | kilometres | 0.621 | miles | mi |

AREA

| | | | | |
|-----------------|-----------------------------------|--------|---------------|-----------------|
| mm ² | millimetres squared | 0.0016 | square inches | in ² |
| m ² | metres squared | 10.764 | square feet | ft ² |
| km ² | kilometres squared | 0.39 | square miles | mi ² |
| ha | hectares (10 000 m ²) | 2.53 | acres | ac |

MASS (weight)

| | | | | |
|----|----------------------|--------|------------|----|
| g | grams | 0.0353 | ounces | oz |
| kg | kilograms | 2.205 | pounds | lb |
| Mg | megagrams (1 000 kg) | 1.103 | short tons | T |

VOLUME

| | | | | |
|----------------|--------------|--------|--------------|-----------------|
| mL | millilitres | 0.034 | fluid ounces | fl oz |
| L | litres | 0.264 | gallons | gal |
| m ³ | metres cubed | 35.315 | cubic feet | ft ³ |
| m ³ | metres cubed | 1.308 | cubic yards | yd ³ |

TEMPERATURE (exact)

| °C | Celsius temperature | 9/5 (then add 32) | Fahrenheit temperature | °F |
|----|---------------------|-------------------|------------------------|----|
| | | | | |

These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

SUMMARY

This report presents the results of the May 1992 survey of automobile and transit user panels, two years after the start of construction on North Central Expressway south of I-635. On the average, the total number of trips being made per day by automobile users in May 1992 was not significantly different from the number made in May 1990. The number of those trips made on the North Central Expressway was also not significantly different in May 1992 than in May 1990. There were a few panelists (20 to 30 percent), however, who believed they were making fewer trips in total and on the Expressway in particular.

Panelists' departure times for the trips to and from work do not appear to have been significantly affected by construction. Median departure times overall in May 1992 were actually 10 minutes later than those in May 1990. Likewise, no changes were detected when considering only those panelists who use the Expressway for all or part of their work trips.

Overall, travel times to and from work have decreased slightly overall throughout construction. This held true for Expressway user's as well as those who utilized other routes. Although reported work trip travel times have decreased, approximately 20 percent of the panelists believe that travel times have increased (an average of 8 and 10 minutes to and from work, respectively) since construction began. Considering the travel times of just these panelists, however, travel times had still not increased significantly between May 1990 and May 1992.

The number of stops made on the way to and from work in May 1992 was not significantly different than in May 1990. Meanwhile, the single occupant automobile continues to be the preferred mode of travel within the corridor. No significant differences in the percent of panelists driving alone were detected between the May 1990 and May 1992 surveys. The percentage of panelists utilizing the Expressway for trips to and from work in May 1992 was almost identical to that recorded in May 1990. Likewise, no significant shifts in utilization of other roadways in the corridor occurred in May 1992, relative to the data collected in May 1990.

The sources of construction information provided by TxDOT were perceived positively by panelists. Approximately 92 percent of the panel believe the messages presented on the changeable message signs around the construction project are clear and understandable. Only a small percentage of the panel reported using the new telephone hotline number in the Dallas area established by TxDOT, but two-thirds of those who did call felt the information provided was useful. Almost 90 percent of those receiving the newsletter EXPRESSIONS perceived the information contained in it to be useful.

Finally, transit users continued to give overall service in the corridor high marks. About 75 percent of the transit panel responding to the May 1992 survey rated transit service as "excellent" or "good."

DISCLAIMER

This study was conducted in cooperation with the Texas Department of Transportation. The report is not intended to constitute a standard, specification, or regulation, and does not necessarily reflect the official views and policies of the Texas Department of Transportation. This report is not intended for construction bidding or permit purposes. Mr. Gerald L. Ullman (Texas Professional Engineer #66876) was the responsible engineer for the preparation of the report.

TABLE OF CONTENTS

| | |
|---------------------------------------------|----|
| INTRODUCTION | 1 |
| STUDY METHODOLOGY | 1 |
| Automobile User Survey Instrument | 1 |
| Transit User Survey Instrument | 4 |
| Sampling Procedure | 4 |
| RESULTS | 5 |
| Panel Attrition | 5 |
| Automobile User Survey | 6 |
| Overall Tripmaking Characteristics | 6 |
| Work Trip Characteristics | 10 |
| Transit User Survey | 26 |
| Effect of Attrition on Survey Results | 26 |
| SUMMARY | 29 |
| REFERENCES | 31 |
| APPENDIX: SURVEY FORMS | 32 |

LIST OF TABLES

| | | |
|-----------|-----------------------------------------------------------------------------------------------------------------|----|
| TABLE 1. | AUTOMOBILE PANEL RESPONSE RATES | 5 |
| TABLE 2. | AVERAGE TRIPMAKING FREQUENCIES FOR SUBJECTS PERCEIVING MAKING FEWER TRIPS | 10 |
| TABLE 3. | SUMMARY OF DEPARTURE TIMES TO AND FROM WORK | 11 |
| TABLE 4. | AVERAGE TRAVEL TIMES FOR PANELISTS PERCEIVING LONGER HOME-TO-WORK AND WORK-TO-HOME TRAVEL TIMES | 19 |
| TABLE 5. | INTERMEDIATE STOPS MADE ON THE WAY TO AND FROM WORK | 20 |
| TABLE 6. | SINGLE-OCCUPANT AUTOMOBILE USAGE ON THE WAY TO AND FROM WORK | 21 |
| TABLE 7. | ROUTE UTILIZATION: HOME-TO-WORK TRIPS | 23 |
| TABLE 8. | ROUTE UTILIZATION: WORK-TO-HOME TRIPS | 24 |
| TABLE 9. | ASSESSMENT OF CONSTRUCTION INFORMATION SOURCES | 25 |
| TABLE 10. | COMPARISON OF MAY 1990 SURVEY RESPONSES | 28 |

LIST OF FIGURES

| | | |
|------------|--------------------------------------------------------------------------------------------|----|
| FIGURE 1. | North Central Expressway Corridor | 2 |
| FIGURE 2. | Average Total Trips/Day and Expressway Trips/Day | 7 |
| FIGURE 3. | Perceptions of Changes in Total Tripmaking Activity | 8 |
| FIGURE 4. | Perceptions of Changes in Expressway Tripmaking Activity | 9 |
| FIGURE 5. | Perceptions of Changes in Home-to-Work Departure Times | 12 |
| FIGURE 6. | Perceptions of Changes in Work-to-Home Departure Times | 13 |
| FIGURE 7. | Average Home-to-Work Travel Times | 15 |
| FIGURE 8. | Average Work-to-Home Travel Times | 16 |
| FIGURE 9. | Perceptions of Changes in Home-to-Work Travel Times | 17 |
| FIGURE 10. | Perception of Changes in Work-to-Home Travel Times | 18 |
| FIGURE 11. | Percent Utilization of the Expressway for Home-to-Work and Work-to-Home Trips | 22 |
| FIGURE 12. | Transit Quality Ratings | 27 |

INTRODUCTION

The reconstruction of the North Central Expressway south of Interstate 635 (I-635) in Dallas, TX is well into its third year. The Texas Transportation Institute (TTI) continues to monitor the impacts of this project upon motorists throughout the north Dallas area and surrounding suburbs. An important component of this monitoring activity is the periodic survey of a "panel" of automobile and transit users traveling in the corridor. The panel includes individuals who utilize the North Central Expressway extensively as well as those who rely on the other roadways in the corridor. The purpose of the periodic surveys is to closely monitor public perception of the travel impacts caused by reconstruction and to assess the type and severity of motorist reactions to these perceived impacts.

An initial corridor-wide license plate survey was performed during May 1990 to identify motorists operating in the corridor. Figure 1 illustrates the North Central Expressway corridor. The license plate numbers recorded in the corridor were used to determine mailing addresses of the motorists (based on vehicle ownership records). Surveys were then mailed to these vehicle owners to collect baseline travel data prior to the start of construction, and to request participation on a panel which would be sent follow-up surveys to determine if and how ongoing reconstruction was affecting their travel patterns. In addition, an on-board bus survey of park-and-ride and local transit routes in the corridor was performed to obtain a transit user panel. These efforts were documented in an initial survey report (1). Subsequent surveys have been performed at six-month intervals (i.e., each May and October-November), the results of which have also been previously documented (2-4). This report presents the results of the fourth follow-up survey, performed in May 1992.

STUDY METHODOLOGY

Automobile User Survey Instrument

Since the beginning of this monitoring project, the same basic survey instrument has been used to test automobile panelist perceptions and behaviors in the corridor. A two-part instrument is used; the first part requests information regarding the panelist's

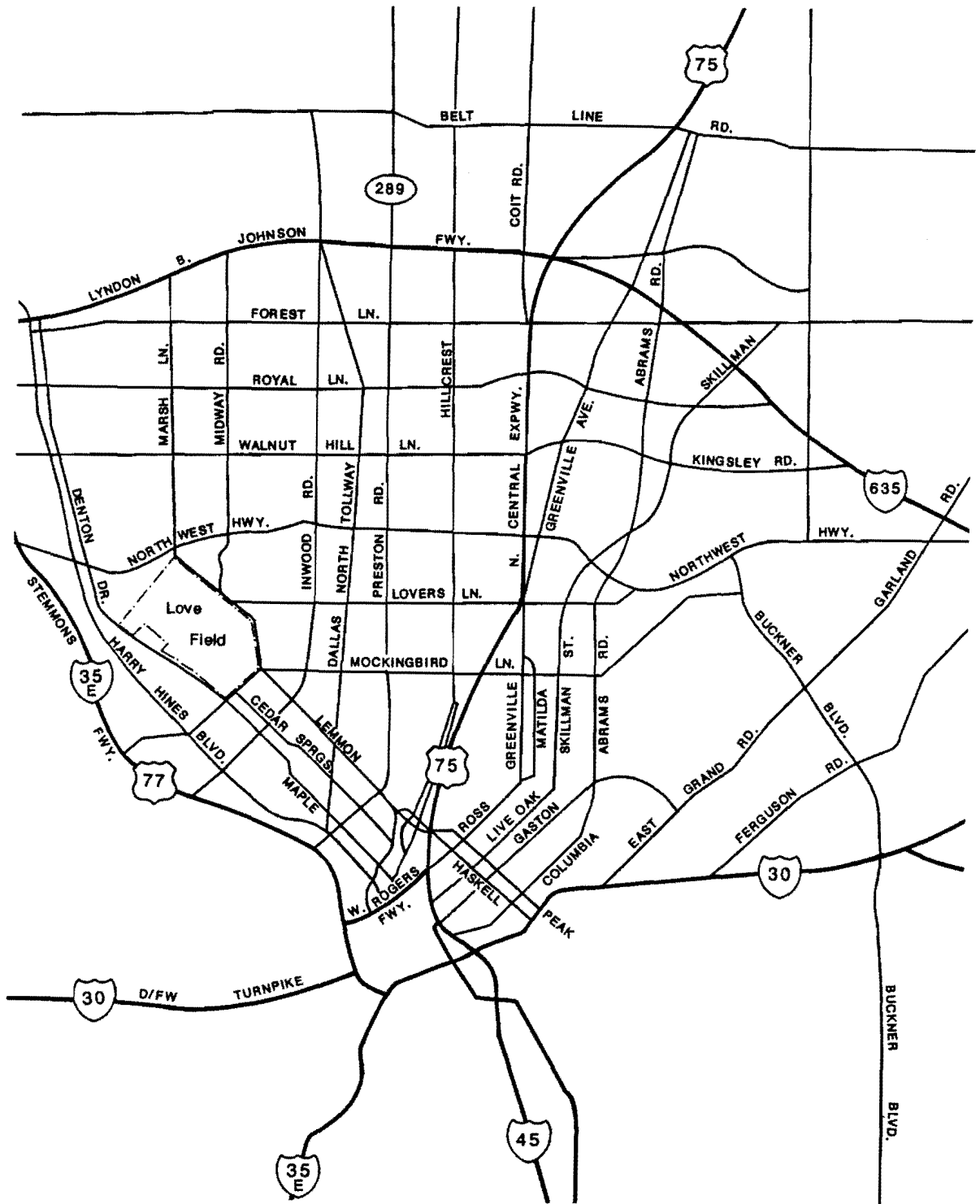


Figure 1. North Central Expressway Corridor.

overall tripmaking activity (i.e., the number of trips being made per day for various reasons), the number of trips per day being made on the North Central Expressway, and panelist perceptions as to whether they have changed the frequency of these trips. In this way, it is possible to observe how motorists' behavior and perceptions of their behavior correlate. Also, because the same individuals are sampled in each follow-up survey, it is possible to observe how these behaviors and perceptions change over time.

The second part of the automobile panel survey is devoted to home-to-work and work-to-home commuting perceptions and behaviors (i.e., peak period travel). In this part of the survey, panelists are questioned regarding their current:

- Departure times,
- Travel times,
- Number and types of intermediate stops on the way to and from work,
- Mode of travel (drive-alone, carpool, vanpool, transit, or other),
- Vehicle occupancy,
- Entrance and exit ramps utilized (if traveling on the North Central Expressway),
and
- Use of other roadways in the corridor.

Panelists are also asked whether they believe their departure times and travel times have changed since the start of Expressway reconstruction south of I-635.

The May 1992 survey also included a few questions to explore panel perceptions and use of traffic information being provided in Dallas by TxDOT. Several portable changeable message signs placed throughout the corridor inform motorists of upcoming lane closures and other information concerning Expressway reconstruction. In addition, TxDOT has established a regional telephone hotline number (214-374-4100) to provide severe weather road conditions, North Central Expressway construction information, daily lane closures throughout the region, and other information of interest to the public. Finally, a construction newsletter ("EXPRESSIONS") is published quarterly by TxDOT which also provides information on current and future activities related to Expressway construction. Questions were placed on the May 1992 survey to ask panelists (1) whether they had used these various information sources, and (2) whether the information

provided by each was useful to the panelists as part of their daily driving. A copy of the two-part survey of automobile panelists used in May 1992 is provided in the appendix.

Transit User Survey Instrument

A one-page survey instrument is used to monitor perceptions and behaviors of transit user panelists. Transit user panelists are polled to evaluate the quality of transit service in the North Central Expressway corridor, and to estimate their approximate travel times via transit. As with the automobile panelists, transit panelists are also asked if they believe transit quality in the corridor and travel times have changed since the start of North Central Expressway construction in June 1990. A copy of the transit survey is also included in the appendix.

Sampling Procedure

A decision was made at the start of this monitoring effort to accept the gradual attrition of panelists from the panel over time (due to changes in panelist work and home addresses, requests to be removed from the panel, etc.) rather than attempt to maintain a constant sample size by replacing those leaving the panel with "representative" subjects. Furthermore, the sampling procedure has been to send surveys only to those who responded to all previous surveys. The combination of these two decisions has resulted in a high attrition rate throughout the two-year period. For example, of the 1825 motorists who initially agreed to be a member of the automobile panel in June 1990, only 416 panelists returned usable responses to the October 1991 survey (4). A similar reduction in membership has occurred in the transit panel. Overall, sample sizes of the panel have decreased from 597 transit users in May 1990 to 137 users responding to the October 1991 survey (4).

To possibly retain more panelists for a longer period of time, the administration of the May 1992 survey was altered slightly. Rather than send surveys only to those who responded to the last survey in October 1991, surveys were sent to all panelists who responded to the earlier May 1991 survey. The responses from October 1991 and May 1992 were then compared to determine the extent to which the attrition rate was reduced.

RESULTS

Panel Attrition

In the past, the sample size for each survey was dependent upon the number of responses received in the most recent survey. As indicated, however, the May 1992 survey was administered in a different manner, being distributed to those responding in the May 1991 survey rather than the more recent October 1991 survey. Table 1 summarizes the effect of this approach upon response rates. Whereas previous surveys experienced about a 35 percent attrition rate (measured relative to the previous survey), the May 1992 attrition rate was approximately 16 percent. Of the 380 surveys received back from panelists, 306 were from those who had also returned surveys in October 1991. The other 74 responses were from panelists who did not return the October 1991 survey. These individuals may have never received the survey in the mail, or may have just forgotten to return it. Whatever the reason, it is evident that the attrition rate can be reduced dramatically by recontacting panelists who did not respond to a previous survey.

TABLE 1. AUTOMOBILE PANEL RESPONSE RATES

| Follow-up Survey Date | Number Returned | Percent Loss in Sample from Prior Survey |
|-----------------------|-----------------|------------------------------------------|
| Nov. 1990 | 1049 | 57.5 |
| May 1991 | 687 | 64.9 |
| Oct. 1991 | 455 | 66.2 |
| May 1992 | 380 | 83.5* |

* Survey was sent to the 687 subjects responding to May 1991 survey.

Automobile User Survey

Overall Tripmaking Characteristics

Figure 2 presents a summary of the average number of trips per day reported by panelists for the initial May 1990 (prior to construction) as well as in November 1990, May 1991, October 1991, and May 1992. The average reported for each survey reflects the values provided by only those panelists who responded to the most recent (May 1992) survey. Also shown in Figure 2 is a summary of the average number of trips per day reportedly made on the North Central Expressway (again for those subjects responding to the most recent survey). The average total trips reported were slightly lower for May 1992 as compared to those for May 1990 (2.66 versus 2.77, respectively), whereas the average number of trips on the Expressway was slightly higher in May 1992 (1.34 trips/day as compared to 1.27 trips/day in May 1990). This change is not statistically significant (according to a test of means at a 0.05 level of significance), however, indicating that construction has not significantly affected panel daily tripmaking activity as of May 1992.

In comparison to these actual tripmaking frequencies, panelist perceptions of the changes they have made in their total daily tripmaking activity and tripmaking frequency on the North Central Expressway are presented in Figures 3 and 4. The data in these figures show that approximately 20 percent of the panelists perceive that they were making fewer trips/day in May 1992 than they were in May 1990, and that 30 percent believe they were making fewer trips/day on the Expressway in May 1992 than in May 1990.

Table 2 presents the average total trips per day and trips per day on the Expressway for those panelists perceiving lower trip frequency. As the table illustrates, perceptions of these individuals correlate with slightly lower reported tripmaking frequencies (in total and on the Expressway) in May 1992 relative to May 1990. Even though the differences between studies were more substantial, they were still not found to be statistically significant, due in large part to the high variability in the number of trips reported from panelist to panelist.

2

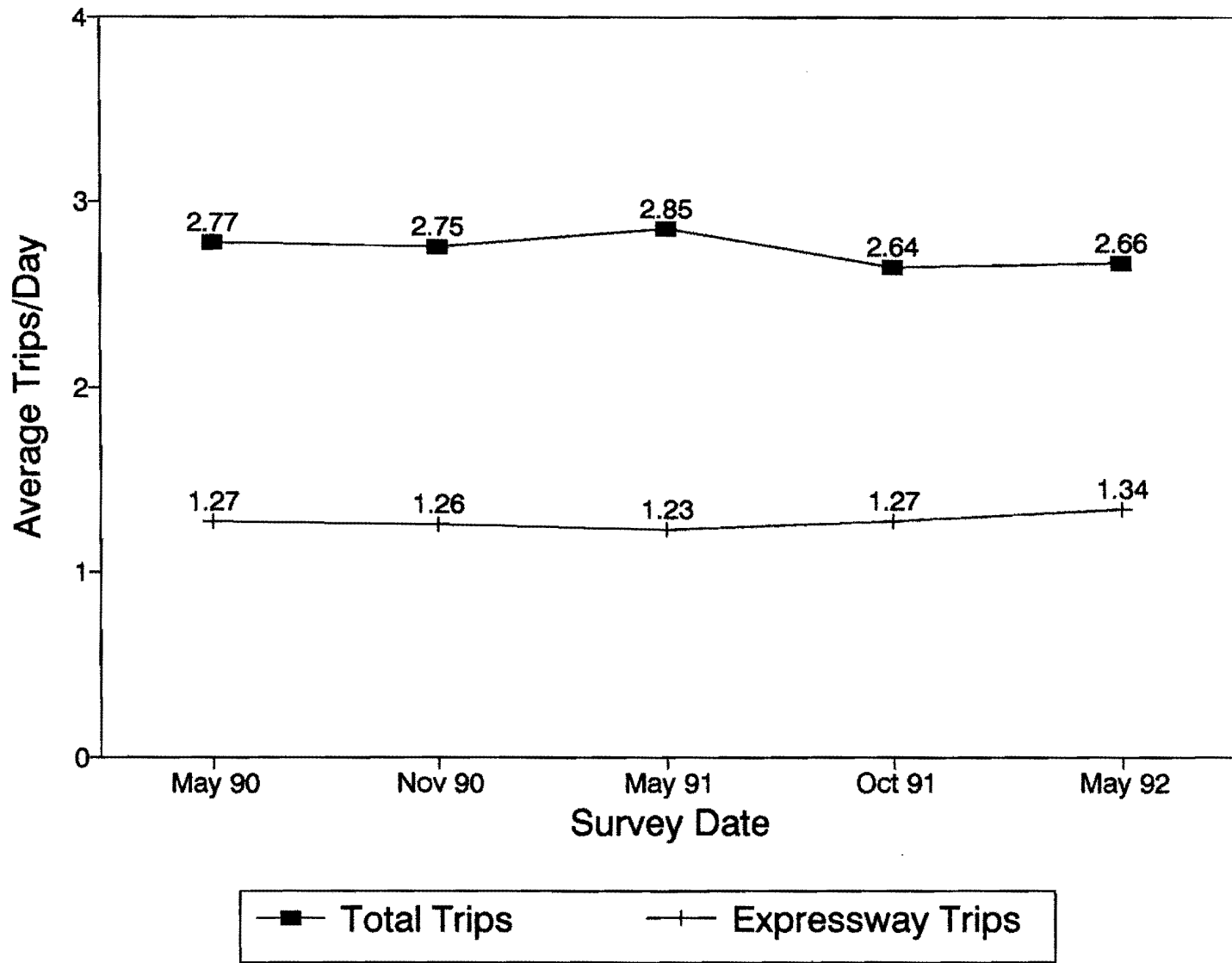


Figure 2. Average Total Trips/Day and Expressway Trips/Day.

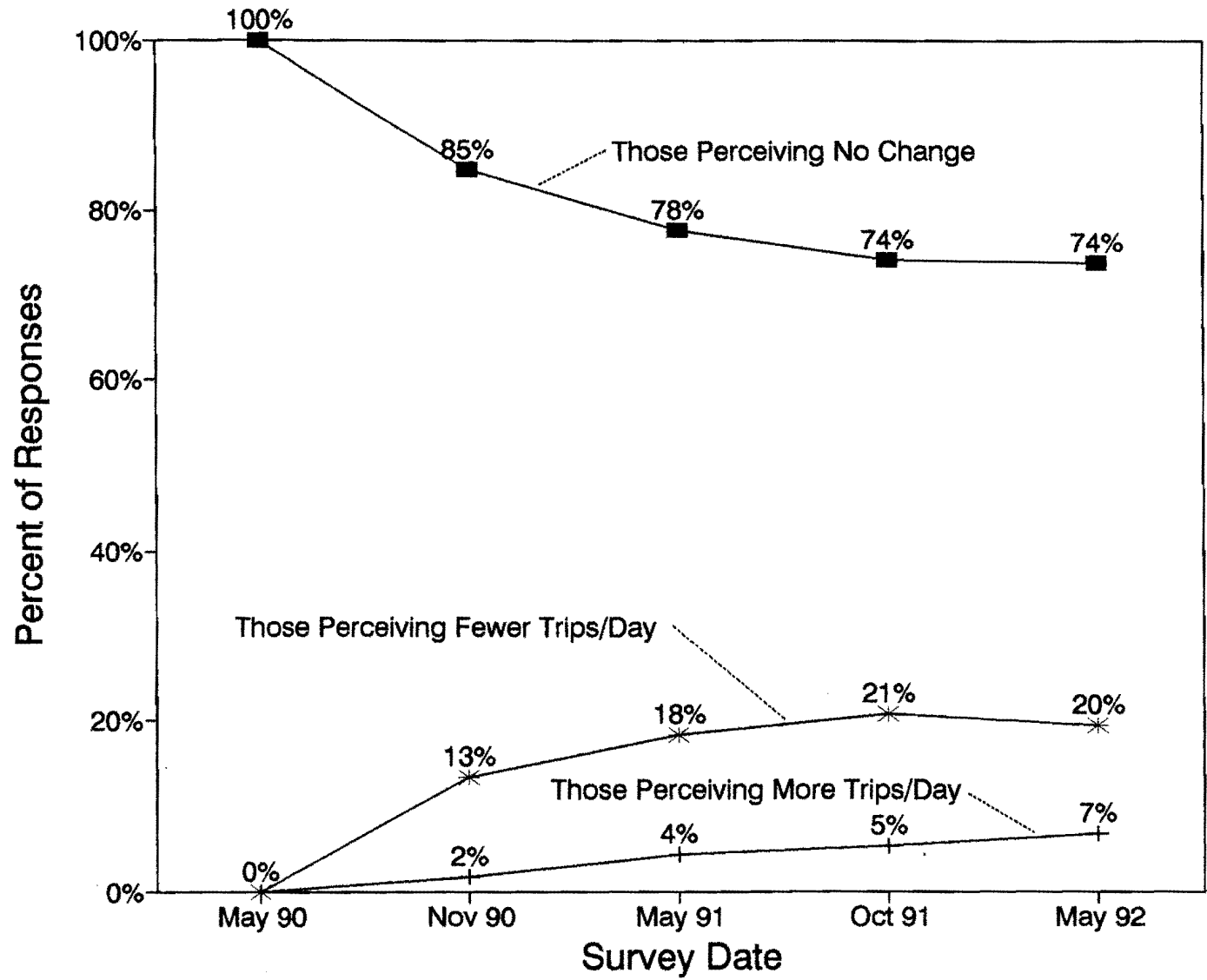


Figure 3. Perceptions of Changes in Total Tripmaking Activity.

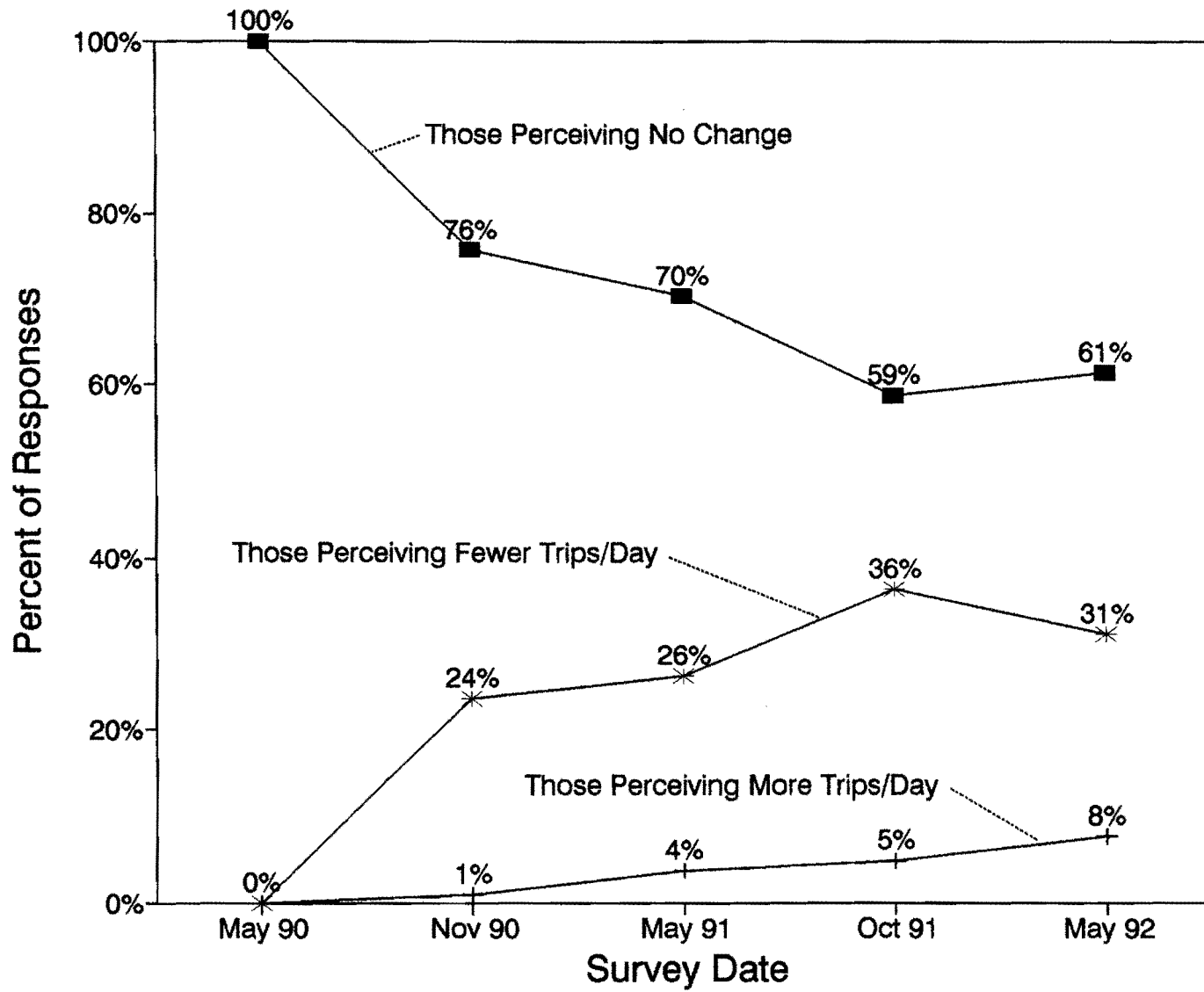


Figure 4. Perceptions of Changes in Expressway Tripmaking Activity.

TABLE 2. AVERAGE TRIPMAKING FREQUENCIES FOR SUBJECTS PERCEIVING MAKING FEWER TRIPS

| | May 1990 | May 1992 | Difference |
|---------------------------------------|----------|----------|-------------------|
| Total Trips/Day | 2.81 | 2.52 | -0.29 (-10.3%) |
| Trips/Day on North Central Expressway | 1.44 | 1.15 | -0.29 (-20.3%) |

Work Trip Characteristics

Departure Times

Median departure times to and from work as reported in each survey are presented in Table 3. Examining the panel responses as a whole, median departure times to and from work have remained relatively stable throughout construction. An initial 15 minute shift to earlier departures in the morning was detected in the first during construction survey of November 1990, but surveys in May and October 1991 showed that median departure had returned to pre-construction departure times. The May 1992 survey found that panelists reported leaving later than in May 1990. This held true for those who used the Expressway for all or part of their trip as well as those who indicated that they did not use the Expressway at all. Meanwhile, there has not been a change of any kind in departure times from work to home.

TABLE 3. SUMMARY OF DEPARTURE TIMES TO AND FROM WORK

| | All Panelists | Expressway Users | Non-Expressway Users |
|----------------------------|---------------|------------------|----------------------|
| Home-to-Work Trips: | | | |
| May 1990 | 7:15 am | 7:05 am | 7:15 am |
| Nov 1990 | 7:00 am | 7:00 am | 7:15 am |
| May 1991 | 7:15 am | 7:05 am | 7:25 am |
| Oct 1991 | 7:15 am | 7:00 am | 7:30 am |
| May 1992 | 7:25 am | 7:15 am | 7:30 am |
| Work-to-Home Trips: | | | |
| May 1990 | 5:00 pm | 5:00 pm | 5:00 pm |
| Nov 1990 | 5:00 pm | 5:00 pm | 5:00 pm |
| May 1991 | 5:00 pm | 5:00 pm | 5:00 pm |
| Oct 1991 | 5:00 pm | 5:00 pm | 5:00 pm |
| May 1992 | 5:00 pm | 5:00 pm | 5:00 pm |

Figure 5 summarizes panelist perceptions as to whether they had altered their home-to-work departure times in response to construction. Most of the panel responding to the May 1992 survey (80 percent) did not believe they had changed departure times since construction began, whereas 15 percent indicated that they thought they were leaving earlier now than before construction. For this 15 percent of the panel, comparison of median departure times indicates that these individuals as a group have indeed adjusted departure times. Whereas the median departure time for this group was 7:20 am in May 1990, it was found to be 7:10 am in May 1992, a change of 10 minutes.

Figure 6 reports the percentages of panelists perceiving earlier, identical, or later departure times from work to home since the beginning of construction. More than 90 percent of the panel perceived no change in their departure times. Meanwhile, the few remaining panelists were about evenly divided between those perceiving earlier departures (3 percent) and later departures (5 percent).

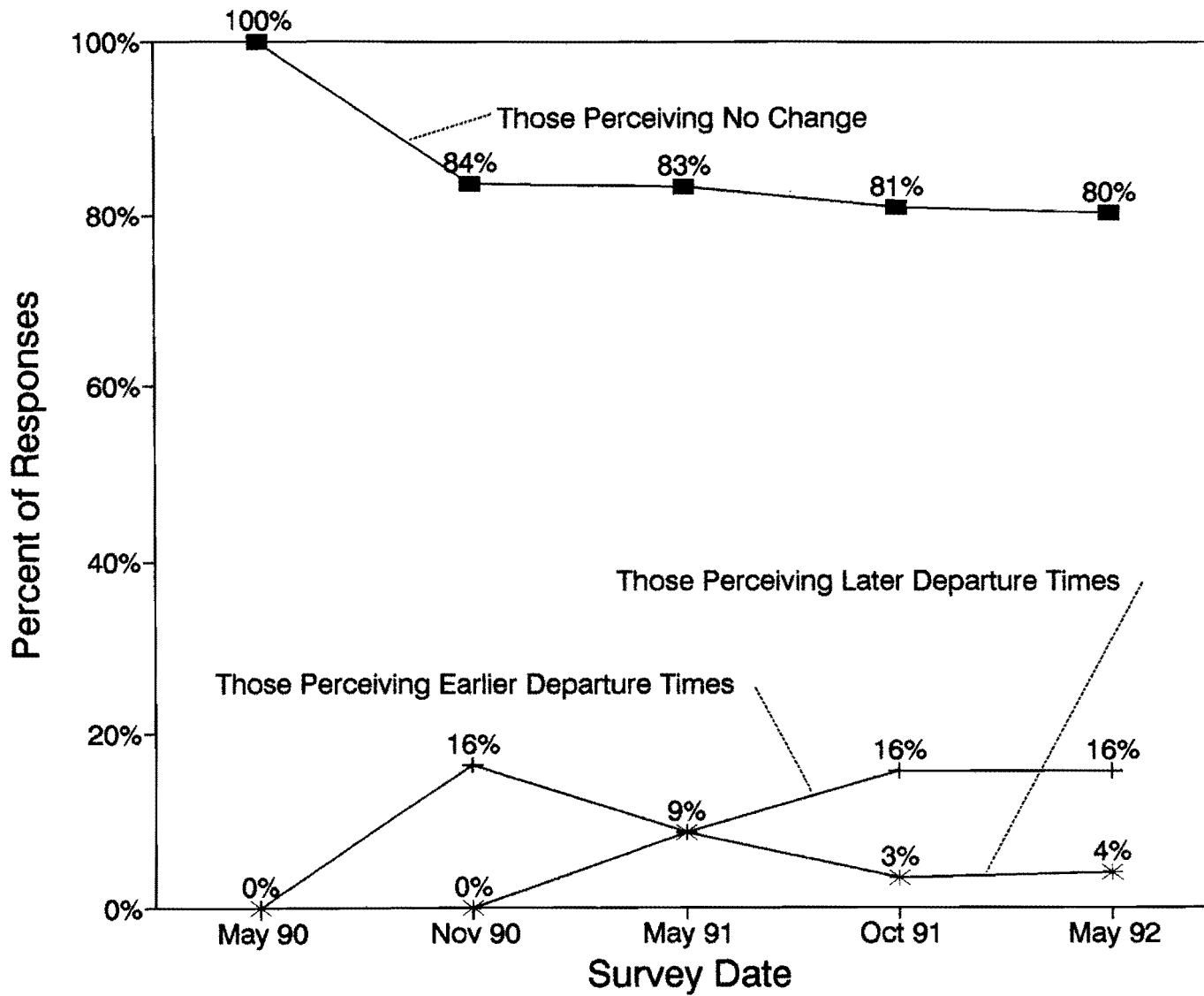


Figure 5. Perceptions of Changes in Home-to-Work Departure Times.

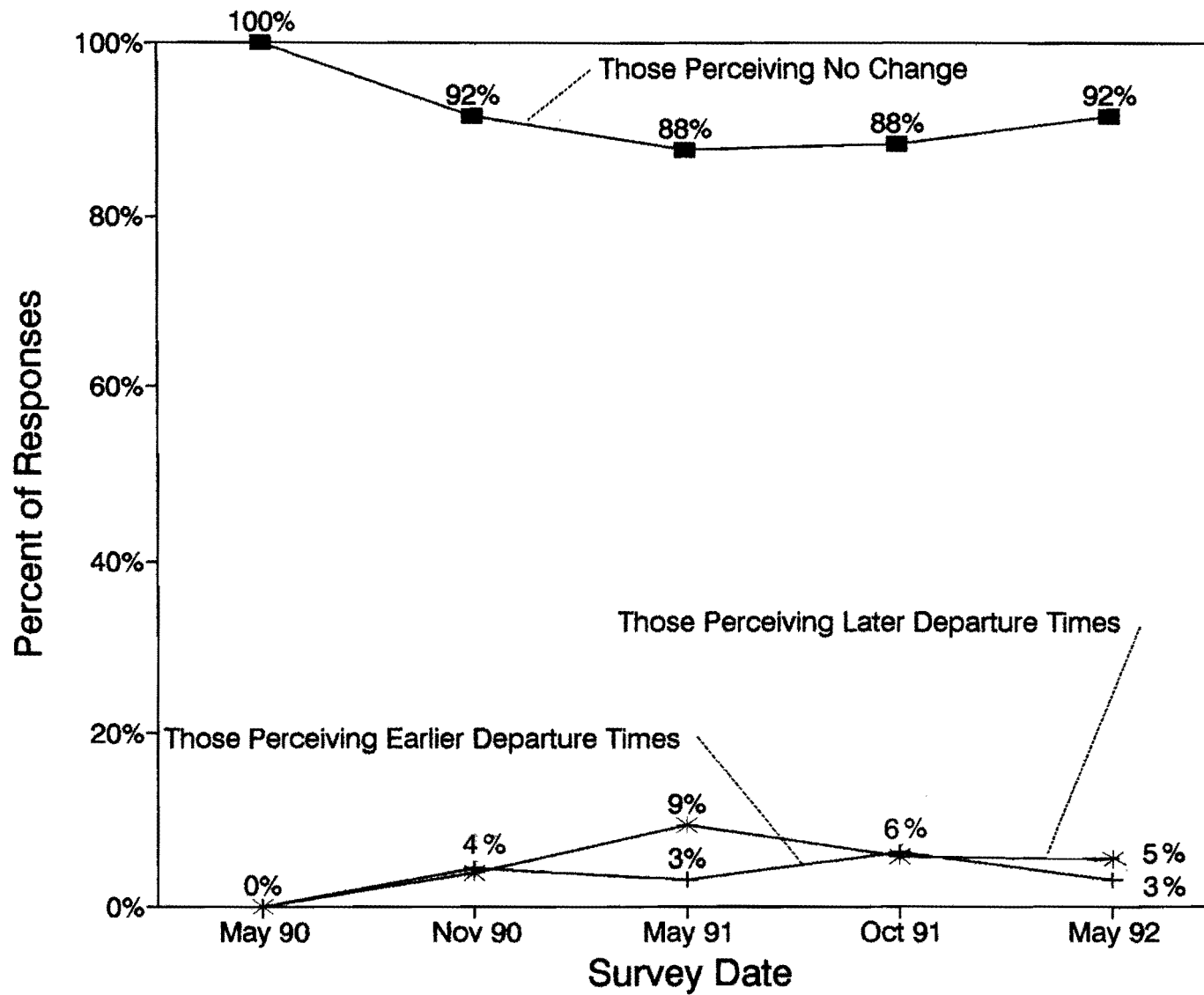


Figure 6. Perceptions of Changes in Work-to-Home Departure Times.

Travel Times

The previous surveys (2-4) indicated that travel times to and from work were not being significantly impacted by Expressway construction. This same trend continued with the May 1992 survey. Average travel times to work for the entire panel from May 1990 to May 1992 are shown in Figure 7. Overall, average travel times for all panel members combined continued to decrease gradually throughout construction, with the average in May 1992 being almost two minutes less than in May 1990 (26.5 minutes versus 28.4 minutes, respectively).

Considering only those panelists who use the Expressway for all or part of their trip, the decrease in travel time was only 1 minute between May 1990 and May 1992, whereas it was nearly a 3 minute decrease for those not using the Expressway. Several construction projects on arterial streets in the corridor (Skillman Ave., Abrams Rd., and Preston Rd. as examples) have been completed over the two-year monitoring period, which may explain the trend towards lower travel times for non-Expressway users. Similarly, ramp closures on the Expressway near downtown may be partially responsible for the slightly lower travel times reported for that group. Regardless of the reasons, the data do illustrate that average travel times have not been adversely affected by the presence of construction on the North Central Expressway.

Average travel time trends are very similar for the work-to-home trip. Figure 8 presents these travel times. The overall panel reported lower travel times in May 1992 than in May 1990 (31 minutes versus 33 minutes). The reduction was less dramatic for Expressway users (from 37 minutes in May 1990 to 35 minutes in May 1992) than for the non-Expressway users (30 minutes in May 1990 to 26 minutes in May 1992).

Panelist perceptions as to how travel times have changed to and from work since the beginning of construction are presented in Figures 9 and 10, respectively. Even though average reported travel times have actually decreased slightly since construction began, a significant percentage of panelists believed that their home-to-work and work-to-home travel times had increased. This perception was evident immediately after construction began in June 1990 and has existed throughout the monitoring project. It is interesting to note, however, that the percentage of the panelists perceiving longer travel times decreased slightly in the May 1992 survey. For the home-to-work trip, this

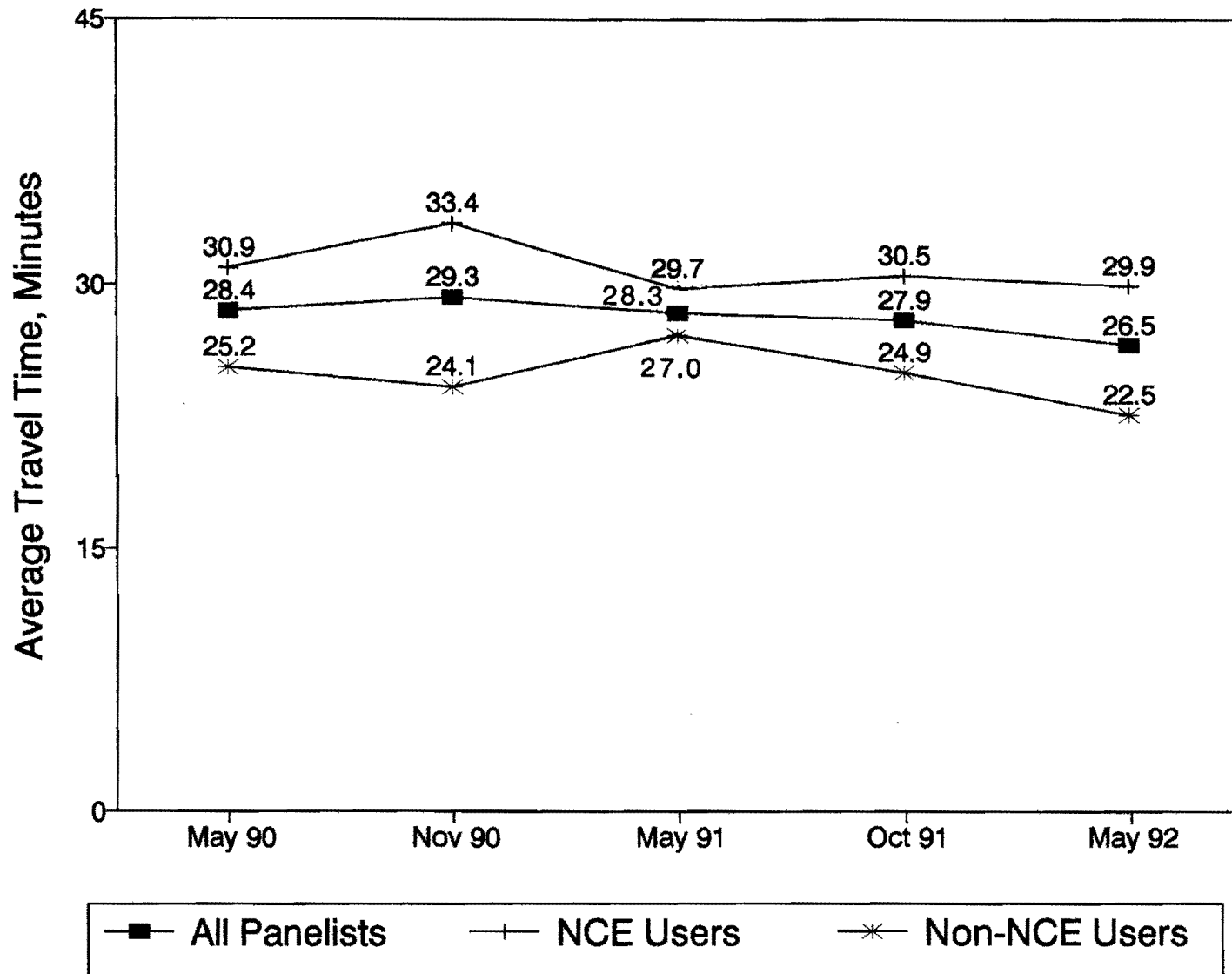


Figure 7. Average Home-to-Work Travel Times.

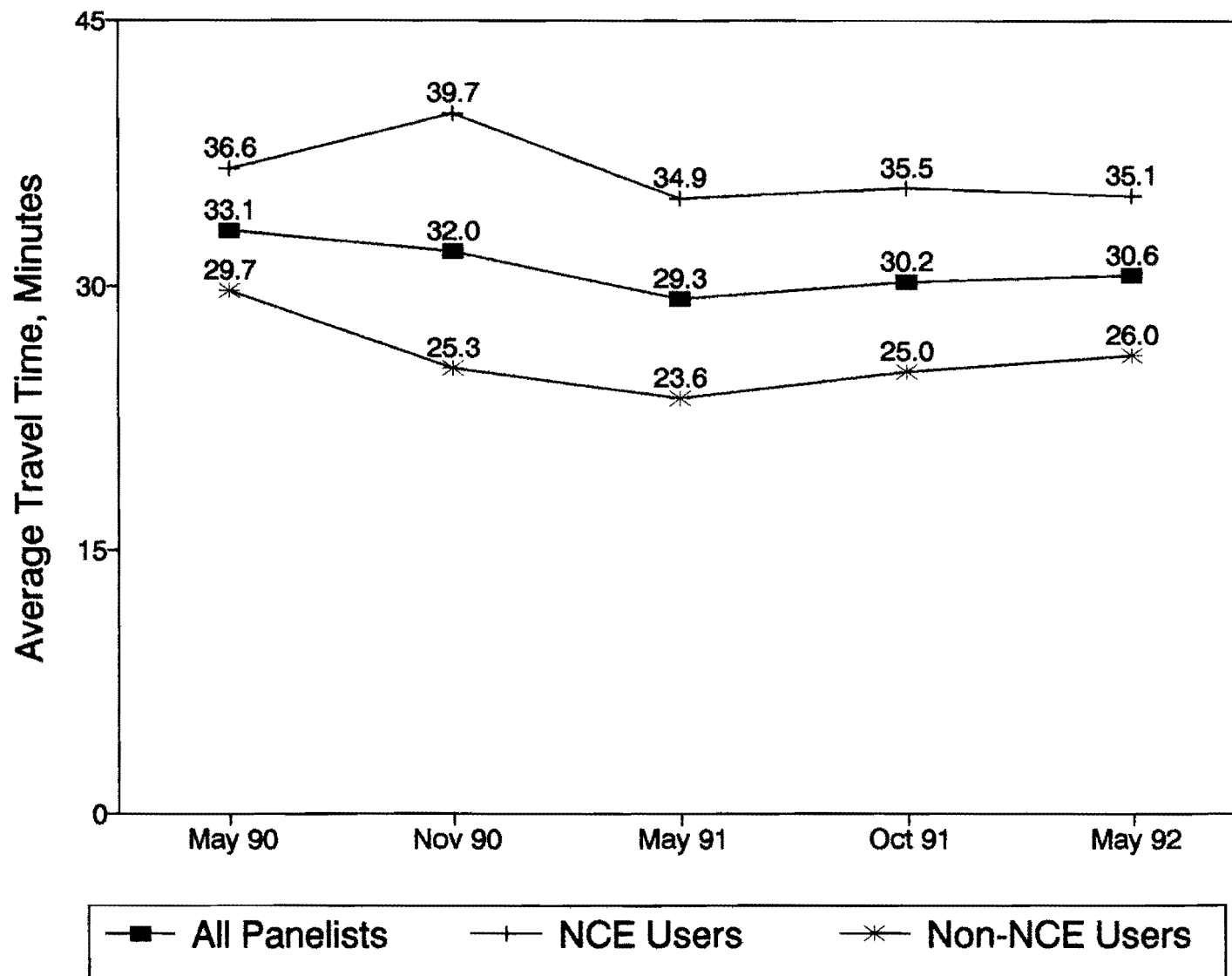


Figure 8. Average Work-to-Home Travel Times.

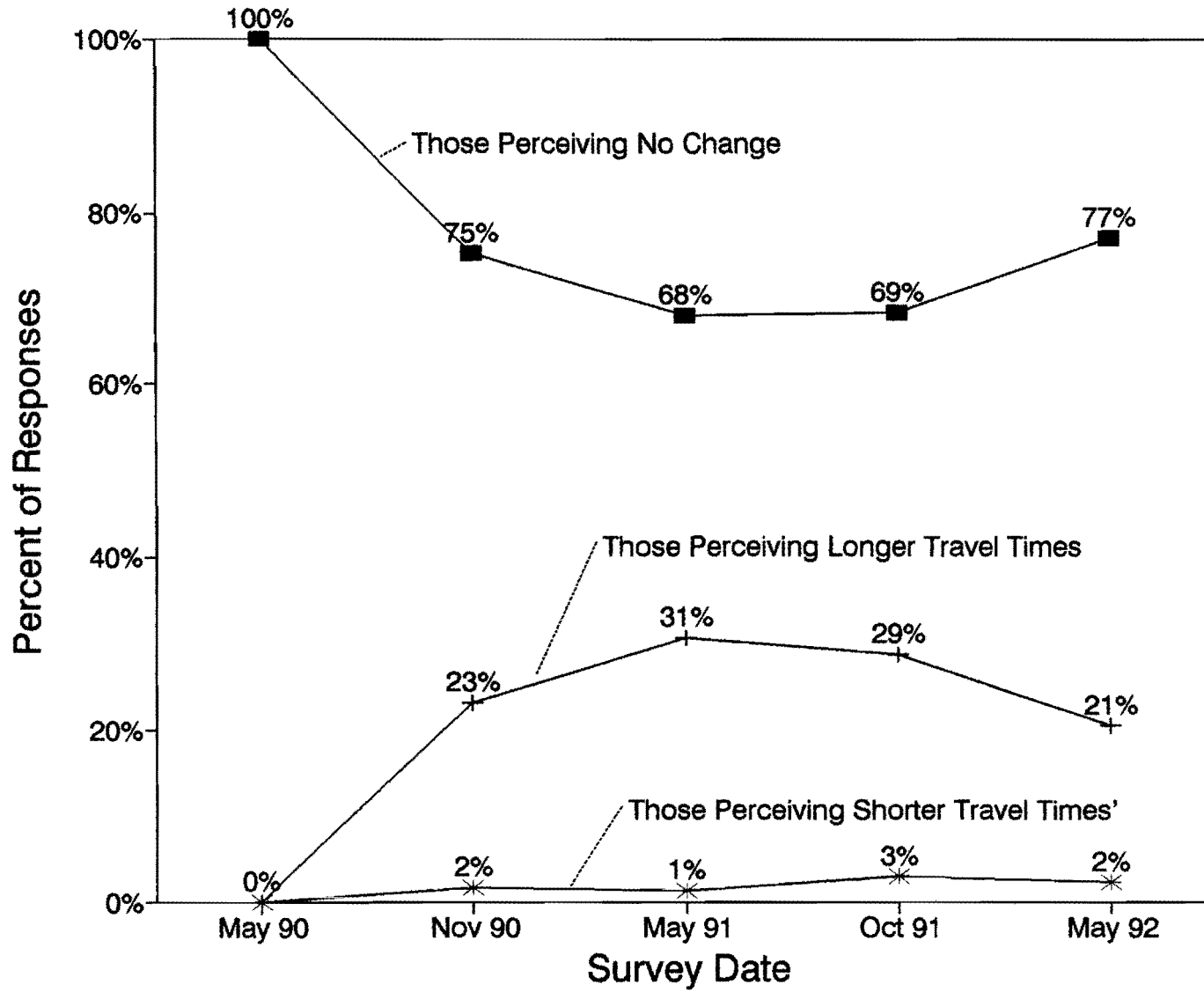


Figure 9. Perceptions of Changes in Home-to-Work Travel Times.

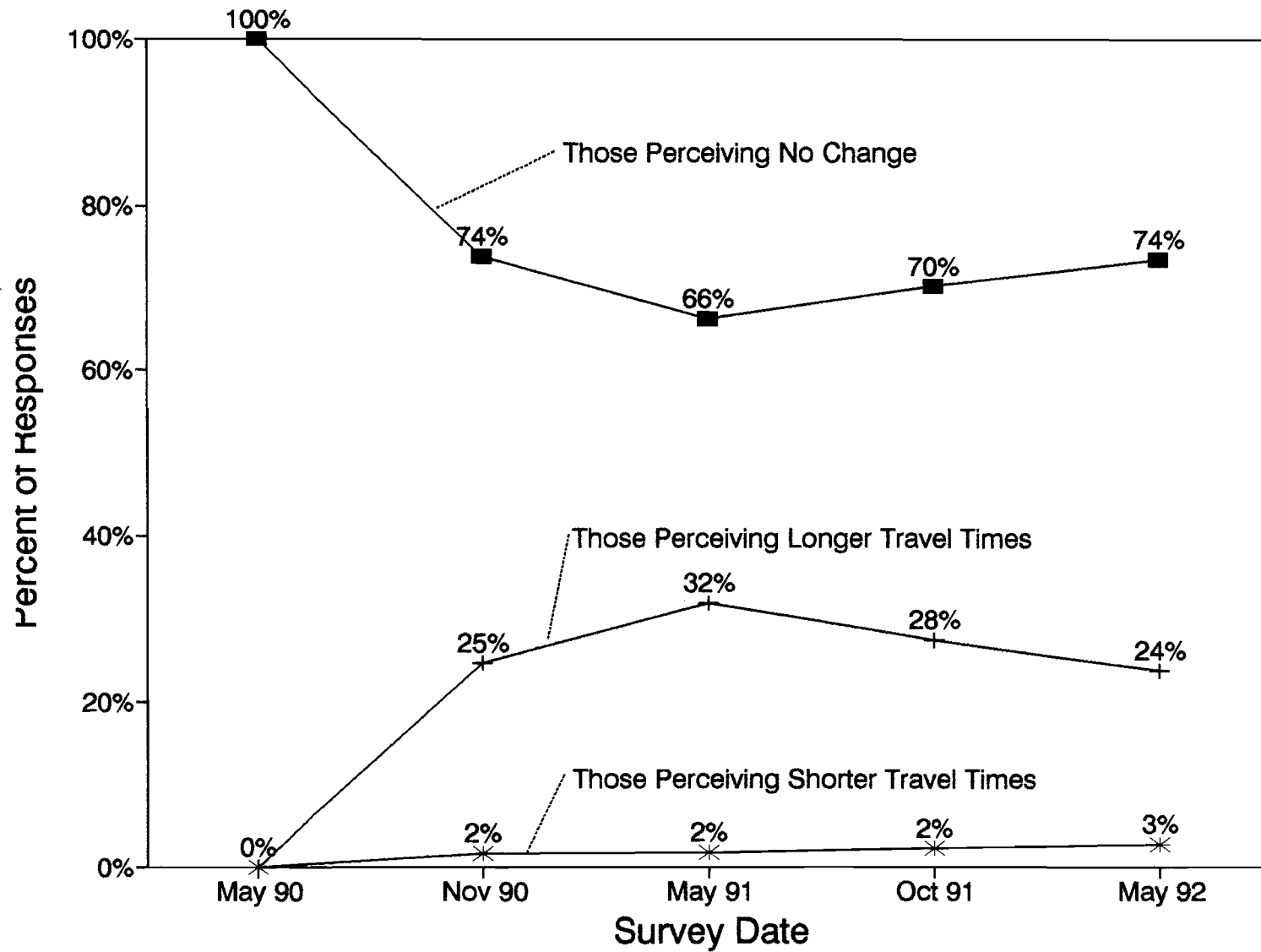


Figure 10. Perception of Changes in Work-to-Home Travel Times.

percentage decreased from 31 percent in May 1991 to 21 percent in May 1992. For the work-to-home trip, the percentage has decreased from 32 percent in May 1991 to 24 percent in May 1992.

In order to determine whether those who perceived longer travel times actually experienced them, the average travel times for these groups were computed for May 1990 and May 1992. The averages, shown in Table 4, indicate that the average reported home-to-work travel times actually diminished for those panelists who thought travel times had increased since May 1990. The average home-to-work travel time of these panelists was 30 minutes in May 1990, whereas it was 29 minutes in May 1992. However, average work-to-home travel times reported by panelists perceiving longer travel times did increase, from 37 minutes in May 1990 to 38 minutes in May 1992. It should be noted that in both situations, panelists tended to overestimate the magnitude of changes they believed had occurred. As indicated in the last column in Table 4, panelists who believed that their home-to-work travel time had increased estimated the increase to be an average of about 8 minutes, whereas the work-to-home travel time was estimated to have increased an average of 10 minutes by those panelists perceiving longer travel times.

TABLE 4. AVERAGE TRAVEL TIMES FOR PANELISTS PERCEIVING LONGER HOME-TO-WORK AND WORK-TO-HOME TRAVEL TIMES

| Trip | Average Travel Time May 1990 | Average Travel Time May 1992 | Actual Average Change | Perceived Average Change |
|--------------|------------------------------|------------------------------|-----------------------|--------------------------|
| Home-to-work | 30.1 min | 29.3 min | -0.8 min | +7.9 min |
| Work-to-home | 37.1 min | 38.4 min | 1.3 min | +10.3 min |

Intermediate Stops to and from Work

Table 5 presents the average number of stops reportedly made on the way to and from work by the panelists in May 1990 and in each subsequent survey. It was hypothesized that increasing congestion in the corridor due to construction may result in some motorists consolidating their trips, possibly increasing the number of stops they made to and from work. However, relative to May 1990, the average number of stops made by panelists on the way to work was unchanged in May 1992. For the work-to-home trip, the average number of stops reported by panelists was slightly lower in May 1992 as compared to May 1990, although the reduction was not statistically significant.

TABLE 5. INTERMEDIATE STOPS MADE ON THE WAY TO AND FROM WORK

| Survey Date | Average No. of Stops/Day | |
|-------------|--------------------------|-------------------|
| | Home-to-Work Trip | Work-to-Home Trip |
| May 1990 | 0.42 | 0.77 |
| Nov 1990 | 0.33 | 0.83 |
| May 1991 | 0.37 | 0.88 |
| Oct 1991 | 0.44 | 0.74 |
| May 1992 | 0.42 | 0.67 |

Mode Choice

The vast majority of the panelists travel alone in their automobile to and from work, and construction has not had an appreciable effect upon this pattern over the two-year monitoring period. Table 6 summarizes the percentage of panelists traveling to and from by single-occupant automobile in May 1990 and in subsequent surveys. No statistically significant differences are evident between the percentage noted in May 1990 and that found in the May 1992 survey.

TABLE 6. SINGLE-OCCUPANT AUTOMOBILE USAGE ON THE WAY TO AND FROM WORK

| Survey Date | Percent of Subjects Driving Alone | |
|-------------|-----------------------------------|-------------------|
| | Home-to-Work Trip | Work-to-Home Trip |
| May 1990 | 92 | 93 |
| Nov 1990 | 92 | 92 |
| May 1991 | 93 | 91 |
| Oct 1991 | 93 | 95 |
| May 1992 | 91 | 91 |

Route Utilization

Figure 11 illustrates the percentage of panelists who use the North Central Expressway for some or all of their trips to and from work. Relative to May 1990, utilization of the Expressway was not appreciably different for either home-to-work or work-to-home trips. The trend illustrates that utilization dipped in May 1991 (due to poor weather, accidents, etc.), but returned to pre-construction levels in subsequent surveys. The figure also shows that panelists used the Expressway to a greater degree for their morning home-to-work trips than for their evening work-to-home trips.

The Expressway is certainly not the only roadway utilized by panelists for their work trips. The degree to which Expressway construction has affected use of these other routes for the home-to-work and work-to-home trips is summarized in Tables 7 and 8. These percentages add to more than 100 percent, reflecting a tendency by many motorists to use one of several different routes to work and back home on any given day, depending on the travel conditions on each at the time they choose to travel. Overall, there is no consistent trend with respect to utilization of any of the routes monitored in this survey.

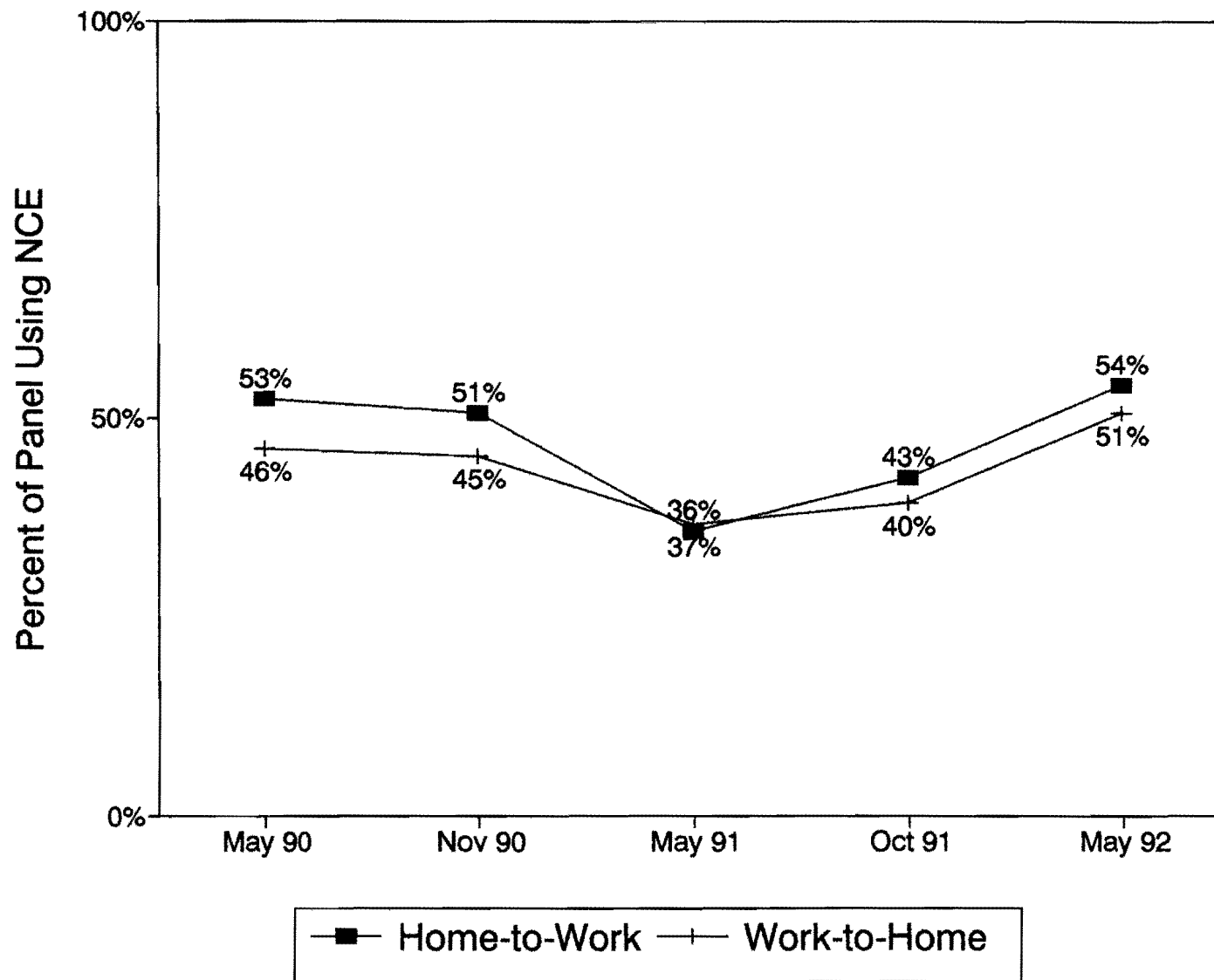


Figure 11. Percent Utilization of the Expressway for Home-to-Work and Work-to-Home Trips.

TABLE 7. ROUTE UTILIZATION: HOME-TO-WORK TRIPS

| Roadway | Percent Using Each Route | | | | |
|----------------------------|--------------------------|-------------|-------------|-------------|-------------|
| | May 1990 | Nov 1990 | May 1991 | Oct 1991 | May 1992 |
| North-South Routes: | | | | | |
| Greenville | 11.2 | 9.9 | 9.4 | 10.3 | 13.0 |
| Hillcrest | 9.0 | 6.7 | 8.1 | 7.2 | 9.4 |
| Skillman | 9.9 | 9.0 | 8.1 | 9.4 | 10.8 |
| Abrams | 6.3 | 8.5 | 6.7 | 8.5 | 9.4 |
| Dallas North Tollway | 5.8 | 9.4 | 6.7 | 8.5 | 9.4 |
| Inwood | 4.0 | 4.5 | 3.6 | 4.5 | 3.1 |
| Preston | 6.3 | 5.8 | 5.4 | 6.7 | 5.4 |
| East-West Routes: | | | | | |
| LBJ Freeway (I-635) | . | . | 4.5 | 4.0 | 4.5 |
| Forest | . | . | 4.0 | 3.1 | 4.0 |
| Walnut Hill | . | . | 5.4 | 4.9 | 4.9 |
| Northwest Hwy | . | . | 5.8 | 4.0 | 8.5 |
| Lovers | . | . | 3.6 | 1.4 | 3.1 |
| Mockingbird | . | . | 1.8 | 1.8 | 2.2 |

TABLE 8. ROUTE UTILIZATION: WORK-TO-HOME TRIPS

| Roadway | Percent Using Each Route | | | | |
|----------------------------|--------------------------|-------------|-------------|-------------|-------------|
| | May 1990 | Nov 1990 | May 1991 | Oct 1991 | May 1992 |
| North-South Routes: | | | | | |
| Greenville | 9.9 | 9.9 | 8.5 | 9.0 | 10.8 |
| Hillcrest | 9.4 | 9.0 | 7.6 | 7.6 | 10.3 |
| Skillman | 10.3 | 9.4 | 7.6 | 8.5 | 7.6 |
| Abrams | 9.4 | 7.6 | 7.6 | 7.6 | 12.6 |
| Dallas North Tollway | 9.9 | 14.8 | 8.5 | 9.0 | 13.0 |
| Inwood | 5.8 | 4.0 | 4.0 | 3.1 | 3.6 |
| Preston | 7.6 | 5.4 | 4.9 | 5.4 | 7.6 |
| East-West Routes: | | | | | |
| LBJ Freeway (I-635) | . | . | 5.8 | 3.6 | 5.4 |
| Forest | . | . | 4.9 | 3.1 | 4.9 |
| Walnut Hill | . | . | 5.4 | 3.1 | 5.4 |
| Northwest Hwy | . | . | 7.2 | 4.0 | 8.1 |
| Lovers | . | . | 2.7 | 1.8 | 2.7 |
| Mockingbird | . | . | 0.9 | 4.0 | 2.7 |

Motorist Information Sources

TxDOT continues to place a strong emphasis on disseminating accurate and understandable information to motorists throughout the north Dallas region. As part of this ongoing monitoring effort, several questions on the surveys were directed towards an assessment of these different information sources. Table 9 summarizes panelist responses to these questions from the October 1991 and May 1992 survey. Panelists in general perceive the information presented on the changeable message signs in and around the construction area to be clear and understandable. TxDOT had recently installed a voice-mail system to handle incoming calls from the public for information.

TABLE 9. ASSESSMENT OF CONSTRUCTION INFORMATION SOURCES

| Question | Percent of Responses | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------------|
| | Oct 1991 | May 1992 |
| Are the messages presented on the CMSs clear and understandable? | 88% yes 8% no | 92% yes 8% no |
| Prior to this survey (May 1992), had you heard about the new telephone hotline (374-1000) for construction and other information provided by the Texas Department of Transportation? | NA | 40% yes 60% no |
| [Of those hearing], have you tried to use this new hotline? | NA | 10% yes 90% no |
| [Of those trying it], has the information on the hotline been useful? | NA | 64% yes 36% no |
| Do you receive the monthly construction newsletter "EXPRESSIONS" provided by TxDOT? | 4% yes 96% no | 23% yes 77% no |
| (Of those receiving the newsletter) Is the information in the newsletter useful to you? | 88% yes 12% no | 87% yes 13% no |

NA = data not available

Based on the results of this survey, 40 percent were aware of the new telephone hotline number established by TxDOT for the voice mail system, suggesting that efforts to inform the public about this new number were fairly successful (a rolodex card with this new number was mailed to all panelists as part of the May 1992 survey as well). Of those who were aware of the new number, 10 percent had actually called the new number. Finally, of those trying the new number, nearly two-thirds (64 percent) felt that the information on the hotline was useful to them.

The October 1991 queried panelists about their knowledge and use of the Expressway construction newsletter EXPRESSIONS. At the bottom of that survey, subjects were allowed to request a copy of the newsletter. The May 1992 survey thus showed a marked increase in the percent of subjects who received the newsletter. As was found in the October 1991 survey, a large majority of the panelists receiving the newsletter (87 percent) also felt that the information was useful to them.

Transit User Survey

As with automobile commuters, a panel of transit users has been monitored regularly throughout the construction project. The transit panel consists of individuals utilizing park-and-ride facilities along the Expressway as well as a number of patrons of express route service provided to certain areas in north Dallas. Panel perceptions as to how construction has affected the overall quality of transit service in the Expressway corridor were the key issues of interest in this monitoring effort. Figure 12 presents the survey-by-survey trends of transit quality reported by panelists. Overall, quality ratings have remained stable. Most panelists perceive transit quality to be "good" or "fair," with smaller percentages rating service as either "excellent" or "poor."

Effect of Attrition on Survey Results

Concerns about the impact of panel attrition were described at the beginning of the report. The modified sampling procedure adopted for the May 1992 survey indicated that the attrition rate per survey can be decreased significantly (from 34 percent to about 16 percent). However, this approach would result in a database with missing values for subjects who failed to respond to one or more surveys. When attempting to backtrack through a series of surveys as is done in each of these reports, a question arises as to whether averages and percentages from such "incomplete" surveys would still be indicative of motorist perceptions and behaviors of construction over time.

To gain insight into this issue, selected results obtained from the initial survey in May 1990 (1) are compared to the May 1990 results documented in this report as shown in Table 10. The initial survey results reflect the averages and percentages of the entire

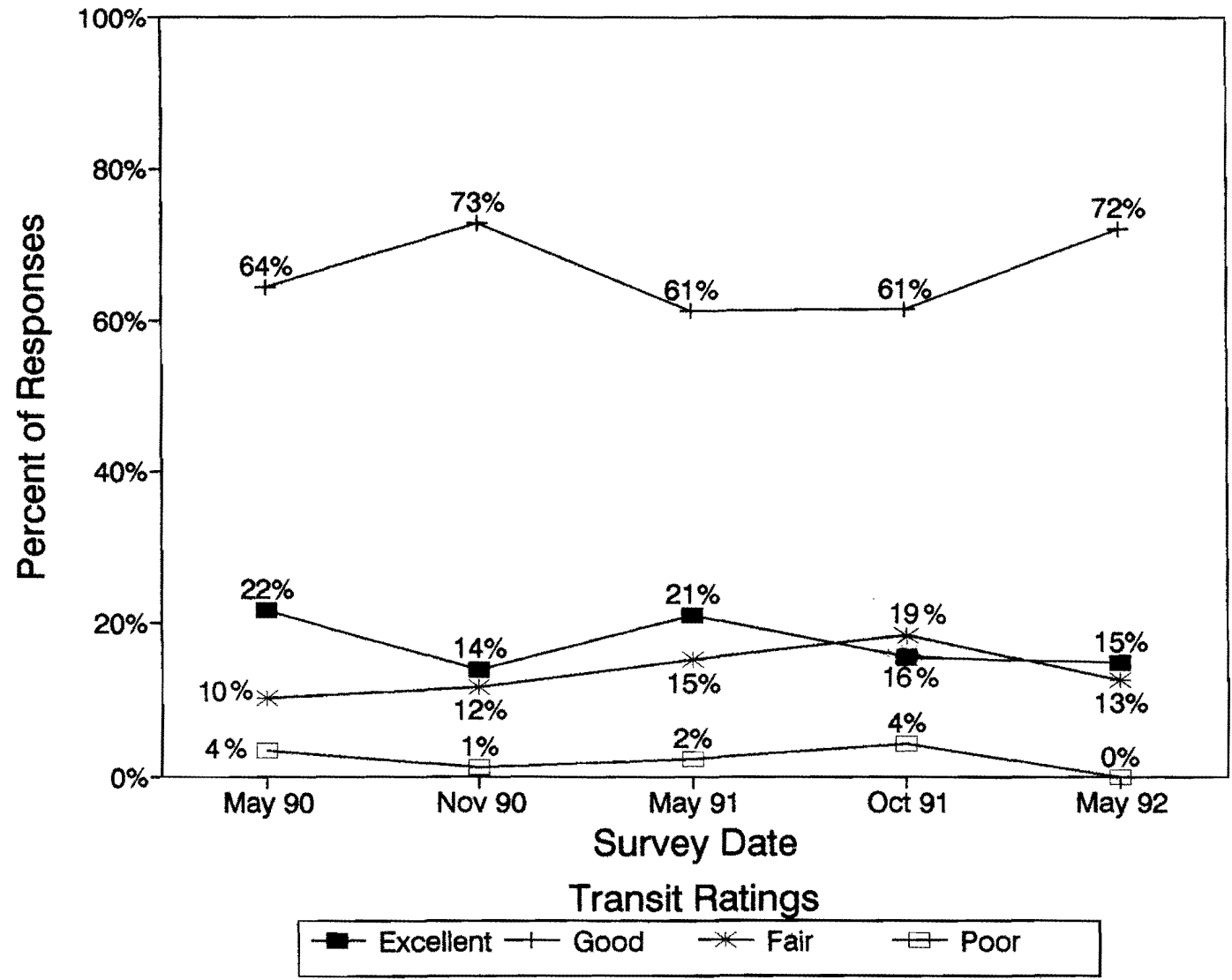


Figure 12. Transit Quality Ratings.

panel, whereas the results in this report reflect the initial response of those panelists remaining in the panel after two years.

TABLE 10. COMPARISON OF MAY 1990 SURVEY RESPONSES

| | Initial Panel Results (n=2544) | Remaining Panel Results (n=380) |
|---------------------------------------------|--------------------------------------|---------------------------------------|
| Average Trips Per Day: | | |
| Total | 2.7 | 2.8 |
| On North Central Expressway | 1.3 | 1.3 |
| Median Departure Times: | | |
| From Home to Work | 7:30 am | 7:15 am |
| From Work to Home | 5:00 am | 5:00 am |
| Average Travel Times: | | |
| From Home to Work | 29.1 min | 28.4 min |
| From Work to Home | 32.8 min | 33.1 min |
| Utilization of North Central Expressway: | | |
| From Home to Work | 50% | 53% |
| From Work to Home | 48% | 46% |

The values in Table 10 indicate only slight differences in the May 1990 responses obtained by the full panel and the portion remaining after two years. The only significant deviation occurs in the median home-to-work departure time (15 minutes). Otherwise, none of the differences between the two sample groups are statistically significant. Consequently, it appears that attempting to retain panelists who fail to respond to one or more surveys will not unduly bias the results of the monitoring effort, and will slow the attrition rate of the panel considerably.

SUMMARY

The following is a list of the principal findings of the May 1992 survey of automobile and transit users of the North Central Expressway corridor:

1. The total number of trips being made per day by automobile users in the corridor in May 1992 was not significantly different from those made in May 1990. When asked directly whether they believed construction had affected how many trips they were making per day, approximately one-fifth of the panel stated they were making fewer trips per day in May 1992 than in May 1990 (prior to the start of construction). Examining the responses of these panelists separately, a small (10 percent) decrease in total tripmaking activity was noted, although not found to be statistically significant.
2. Daily trip rates on the North Central Expressway were also not significantly different in May 1992 than in May 1990. However, about 30 percent of the panel believed they were making fewer trips per day on the Expressway than before construction began. Considering these panelists only, daily trip rates on the Expressway decreased 20 percent. This decrease, though, was not statistically significant either.
3. Departure times for the trips to and from work do not appear to have been significantly affected by construction. Median departure times overall in May 1992 were actually 10 minutes later than those in May 1990. More than 80 percent of the panel believed they were departing for work at the same time as prior to construction, whereas only 15 percent perceived themselves as leaving earlier. These 15 percent, however, reported leaving for work 10 minutes earlier in May 1992 than they did in May 1990.
4. Overall, travel times to and from work have actually decreased slightly overall throughout construction. In comparison to travel times in May 1990, morning trips were 1.9 minutes shorter and evening trips 2.5 minutes shorter in May 1992. Examining Expressway user and non-user travel times separately, non-users

reported a greater decrease in travel times to and from work than Expressway users.

5. Although reported work trip travel times have decreased, approximately 20 percent of the panelists believe that travel times have increased since construction began. These panelists estimate that their home-to-work travel time had increased an average of 8 minutes, and that the work-to-home travel time had increased 10 minutes. However, after examination of the actual travel times reported by these panelists, home-to-work travel times were 0.8 minutes less in May 1992 than in May 1990. In contrast, the work-to-home travel times of these panelists were slightly greater in May 1992 than in May 1990 (an average of 1.3 minutes), much less than the 10 minutes they estimated.
6. The number of stops made on the way to and from work in May 1992 was not significantly different than in May 1990. Meanwhile, the single occupant automobile continues to be the preferred mode of travel within the corridor. No significant differences in the percent of panelists driving alone were detected between the May 1990 and May 1992 surveys.
7. The percentage of panelists utilizing the Expressway for trips to and from work in May 1992 was almost identical to that recorded in May 1990. Likewise, no significant shifts in utilization of other roadways in the corridor occurred in May 1992, relative to the data collected in May 1990.
8. The sources of construction information provided by TxDOT were perceived positively by panelists. Approximately 92 percent of the panel believe the messages presented on the changeable message signs around the construction project are clear and understandable. Forty percent of the panelists reported hearing about the new telephone hotline number established by TxDOT in the Dallas area, with about ten percent of these panelists calling the new number. Of those who called the hotline, almost two-thirds of them felt the information provided was useful to them. Meanwhile, the TxDOT newsletter EXPRESSIONS increased its exposure among panelists (from 4 percent in October 1991 to 23 percent in May 1992). Almost 90 percent of those receiving the newsletter perceived the information to be useful to them.

9. Transit users continued to give overall service in the corridor high marks. About 75 percent of the transit panel responding to the May 1992 survey rated transit service as "excellent" or "good."
10. An adjustment of the study procedure to send surveys to those panelists who missed returning one or more previous surveys does not appear likely to bias survey results significantly from the procedure employed to date. However, it does appear capable of significantly reducing the rate of attrition experienced in each survey. Consequently, the new procedure is recommended for future surveys as well.

REFERENCES

1. Ullman, G.L. and R.A. Krammes. U.S. 75 North Central Expressway Reconstruction: Northwest Highway Screen Line Automobile and Transit User Panels, Initial Survey Results. Research Report TX-92/984-1. Texas Transportation Institute, College Station, TX. September 1990.
2. Ullman, G.L. and R.A. Krammes. U.S. 75 North Central Expressway Reconstruction: Northwest Highway Screen Line Automobile and Transit User Panels, November 1990 Survey Results. Research Report TX-92/984-3. Texas Transportation Institute, College Station, TX. May 1991.
3. Ullman, G.L. and R.A. Krammes. U.S. 75 North Central Expressway Reconstruction: Northwest Highway Screen Line Automobile and Transit User Panels, May 1991 Survey Results. Research Report TX-92/984-4. Texas Transportation Institute, College Station, TX. November 1991.
4. Ullman, G.L. and R.A. Krammes. U.S. 75 North Central Expressway Reconstruction: Northwest Highway Screen Line Automobile and Transit User Panels, October 1991 Survey Results. Research Report TX-92/1940-2. Texas Transportation Institute, College Station, TX. May 1992.

APPENDIX: SURVEY FORMS

PART 1: NORTH CENTRAL EXPRESSWAY CORRIDOR TOTAL TRAVEL SURVEY

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

1. Has your place of residence changed since the May 1990 survey?
 yes no
2. For which day of the week are you providing travel information?
 Monday Tuesday Wednesday Thursday Friday
3. How many times did you go to each of the following types of places on that day?
 work school shopping eat a meal social/recreation events
 personal business (doctors appt., banking, etc.) other (specify _____)
4. How many times did you travel on the North Central Expressway on that day? _____
5. Has your total number of trips made per day changed since the start of construction on North Central Expressway south of the LBJ Freeway in June 1990?
 increased stayed the same decreased
6. Has your number of trips made on the North Central Expressway per day changed since the start of construction on the Expressway south of the LBJ Freeway in June 1990?
 increased stayed the same decreased
7. Are the messages presented on the changeable message signs in and around the construction zones on North Central Expressway clear and understandable? yes no
8. Prior to this survey, had you heard about the new telephone hotline (374-1000) for construction and other information provided by Texas Department of Transportation?
 yes no
9. Have you tried to use this new hotline number? yes no
10. If so, has the information on the hotline been useful? yes no
11. Do you receive the monthly construction newsletter "EXPRESSIONS" provided by the Texas Department of Transportation? yes no
12. Is the information in the newsletter useful to you? yes no
13. Would you like to be put on the mailing list for this newsletter? yes no

On the back of this form, please provide any additional comments about how your travel has been affected by the ongoing North Central Expressway reconstruction project.

NORTH CENTRAL CORRIDOR TRANSIT SURVEY

Dear North Central Commuter:

In May 1990, the Texas Transportation Institute, Texas A&M University System, conducted a travel survey of bus riders in the North Central Expressway corridor. On that survey, you indicated a willingness to respond to follow-up surveys as part of an ongoing effort to monitor travel patterns in the area. Please take a few moments and fill out the survey below for the most recent weekday (Monday through Friday), and return it in the enclosed postage-paid envelope. The information you provide will be kept strictly confidential, and will be used for statistical purposes only. Thank you for your help.

1. Do you continue to use the bus for your morning commute? _____

2. Has the destination of your morning commute changed since June 1990?

3. Has your place of residence changed since June 1990? _____

4. How would you now rate the overall quality of transit service in the North Central Expressway corridor?
___ excellent ___ good ___ fair ___ poor

5. Has the quality of transit service changed since the beginning of construction on the North Central Expressway in June 1990?
___ Yes, it is of lower quality now.
___ No, it is about the same as before.
___ Yes, it is of better quality now.

6. How long does it normally take you from the time you leave your home in the morning until you reach your destination?
___ less than 10 min. ___ 10-20 min. ___ 20-30 min.
___ 30-40 min. ___ 40-50 min. ___ 50-60 min.
___ more than 60 min.

7. Has the travel time for your morning trip by bus changed since the beginning of construction on the North Central Expressway in June 1990?
___ Yes, it is _____ minutes longer now.
___ No, it is the same as before.
___ Yes, it is _____ minutes shorter now.

On the back of this survey, please provide any additional comments you wish to make about the effects of construction upon travel in the North Central Expressway corridor.