Transit Performance Monitoring System (TPMS) Results

Summary Report
Phase III

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Executive Summary

This report presents the results of the third phase of a project to implement a transit performance monitoring system (TPMS). The TPMS was designed to collect data on transit customers through the use of on-board surveys. The long-term goal of the TPMS initiative is to standardize the collection of data and, thereby, provide a basic, but comprehensive analysis of the performance and benefits of transit service.

The TPMS project was funded through a cooperative agreement between the Federal Transit Administration (FTA) and the American Public Transit Association (APTA). FTA funded the project to obtain information —the characteristics of passengers, their trip purposes, and the benefits of these trips — that would provide an objective and meaningful portrayal of the performance of transit in serving communities' transportation needs. APTA and FTA managed the project to develop an approach that local transit systems could use to assess the performance and identify the benefits of transit service.

A total of 30 transit systems participated in the third phase of the project, which was conducted in 2002 and 2003. A voluntary approach was used which gave participating transit systems the responsibility for designing, conducting, and analyzing the on-board surveys. APTA asked transit systems to provide the data from past surveys that was similar to the data needed by TPMS. APTA also encouraged transit systems to use the standard TPMS questions in upcoming on-board surveys and share the results of these surveys with the TPMS project.

BACKGROUND

In 1993, FTA funded research to develop and test a plan for collecting data on transit benefits that could be implemented by transit systems at minimal cost. The resulting data collection concept was named the **Transit Performance Monitoring System (TPMS).** Since data on benefits only can be collected using passenger surveys, the TPMS relies on on-board passenger surveys

FTA agreed to fund a test of the TPMS concept at the Port Authority of Allegheny County (PAT) in Pittsburgh. In an effort to reduce costs, the TPMS surveys were distributed in coordination with the existing National Transit Database (NTD) data collection activities using existing transit agency staff. The test trial was conducted from September 1993 through September 1994.

Based on the results of the PAT trial, FTA decided to implement the TPMS concept. It entered into a cooperative agreement with APTA to further develop and implement the TPMS.

In the first phase (1996-1998) of the TPMS project, the concept was tested at nine transit systems and the surveys were distributed in coordination with the existing NTD data collection activities for 14 system-modes. In the second phase (2000), the concept was tested at 11 systems and the surveys were distributed to 14 system-modes in a concentrated time period ranging from to one to several days. In both phases, the TPMS project provided individual assistance to the transit systems including designing and printing the survey questionnaires and processing the returned questionnaires.

A third approach was tried in the third and final phase of the project, which was conducted in 2002 and 2003. A voluntary approach was tried in which no TPMS project assistance was provided to participating transit systems as was done in the first two phases. A total of 30 transit systems participated in the third phase.

McCollom Management Consulting has been the contractor for the TPMS project. McCollom Management Consulting sub-contractors were M. Davis and Company, NuStats International, and Dr. Peter Furth. M. Davis and Company and NuStats International supported the transit systems in the design and implementation of the on-board surveys. NuStats International also conducted the longitudinal telephone survey of Buffalo bus users. Dr. Peter Furth provided technical guidance on sampling issues.

IMPLEMENTATION OF VOLUNTARY PROGRAM

The third phase of the TPMS project was implemented in four tasks:

- **Develop a Standard Set of TPMS Questions.** The survey design was based on the eleven survey questions used in the previous two phases of the project. One of the design guidelines was to minimize the number of questions to increase response rate and to provide an opportunity for the participating transit systems to add their own questions to the survey. Twelve questions were used in the third phase. (See page 18 for a list of these questions.)

- **Prepare a Question Screening Approach.** A voluntary approach was tried in the third phase of the project. Participating transit systems were responsible for the design, conduct, and analysis of the on-board surveys. This was unlike earlier phases when the TPMS project provided individual assistance to the transit systems, including designing and printing the survey questionnaires and processing the returned questionnaires. Since the TPMS project did not control the design of the surveys, it was expected that many transit systems would not use all of the TPMS questions or would not use the exact TPMS questions response categories. Therefore, a screening approach was developed to identify transit systems from which some information could be used, even if they did not use all of the TPMS questions or the exact TPMS question response categories in their surveys.

- **Promote Participation in TPMS**. A variety of methods were used to promote participation in the TPMS, including targeted emails to members of appropriate APTA committees, presentations on TPMS at APTA meetings, direct telephone calls to 60 transit systems, and the recruitment of systems that participated in the first two phases. A total of 30 transit systems participated in the third phase.

- **Manage the Collection and Analysis of Industry Data.** The surveys were conducted over a four-year period ranging from February 2000 (Madison, Wisconsin) to November 2003 (San Mateo County, California). This time span was necessary in order to maximize the amount of information that could be collected on a voluntary basis. TPMS requested data from past surveys conducted within the last three years or new surveys that could be completed by December 2003. McCollom Management Consulting managed the data collection and analysis.

SURVEY RESULTS

The objective of the TPMS project is to provide a basic, but comprehensive analysis of: 1) transit user characteristics, 2) the performance of transit in serving community needs, and 3) the benefits that people receive from transit service. A summary of the results of the surveys collected in the third phase are presented in the next two sections — Key Passenger Characteristics and Key Policy Topics.

Key Passenger Characteristics (Phase 3)

- **Gender**. Women tended to use transit more often than men at most of the participating transit systems. On average, women consumed 55.5% of total public transportation trips.

- **Age**. More than half of the public transportation users were of working age. About 63 percent of

users were between the ages of 25 and 64.

- **Household Income.** Most transit trips were made by users from low-income households. On average, about half of transit trips were made by people from households with incomes of less than $20,000 per year. Low-income users (under $20,000) account for a larger percentage of users at small transit systems (54.4 percent) than at medium (43.0 percent) and large (45.1 percent) systems. This relationship likely reflects the tendency of larger systems, and particularly rail systems in larger metropolitan areas, to attract choice riders — people with cars available — who typically have moderate to high incomes. Areas with large transit systems generally have problems with road congestion and public transportation often is a competitive alternative to the automobile.

- **Household Size**. Most transit trips were made by users from small households. On average, almost two-thirds of these trips were made by people living in households with three people or less.

- **Trip Frequency**. Most transit trips were made by frequent users of public transportation. About 70 percent of transit trips at the participating transit systems trips were made by customers who ride transit five days a week or more.

- **Duration of Transit Use.** Most transit trips were made by relatively new riders. On average, 38.1 percent of transit trips are made by customers who have been making the surveyed transit trip for one year or less. An additional 30.1 percent of trips are made by users who have been riding one to four years. This duration of use profile suggests that there is constant turnover in the transit customer base.

- **Trip Purpose**. Work, shopping, and school (college and other) account for 80 percent of all trips. The largest portion of transit trips were made for work (51.7 percent).

  There are differences in the balance of work trips by size of system. Work trips account for a greater percentage of transit trips in medium and large systems (58.9 percent and 57.0 percent) than in small (48.4 percent) and large suburban systems (48.4 percent).

  Trip purpose also appears to vary according to trip frequency. Work trips comprise 60.7 percent of frequent (five or more days per week) trips, but only 32.0 percent of infrequent trips (four or less days per week) (Exhibit 14). This result is expected since most people work five days per week.

- **Car Availability.** About one-third (29.9 percent) of the transit trips at the average transit system were made by *choice* riders, i.e., riders who had an automobile available for making their trip, but chose to use transit instead. On average, more transit trips were made by choice riders on medium (32.2 percent), large (35.9 percent), and large suburban systems (29.7 percent) than on small systems (24.8 percent). These results suggest that the level of road congestion and parking cost and availability influence transit ridership. Areas with congested roads, high parking costs and limited parking availability are likely to have higher levels of transit ridership than areas where the reverse is true.

- **Access/Egress Mode-Home End**. Walking was the most popular access/egress mode for the home end of trips. Walking to and from transit service was the access/egress mode from home on 63.5 percent of the transit trips. When transfer trips (rode bus/train) are excluded from the analysis, over 80 percent of transit trips started or ended at home by walking.

  Car access/egress — drive cars or receive rides — is important for rail service. While only 8.2 percent of bus trips were made by car access/egress users, over 40 percent of rail transit trips were made by

car access/egress users. Caution should be used in interpreting these results since they come from only three rail surveys in which the percent of trips made by car access/egress ranged from 27.3 percent to 64.8 percent. Nonetheless, the differences in the use of the car between bus and rail trips are consistent with results from the first two phases of the project and plausible in view of the high automobile availability of rail customers.

- **Access/Egress Mode-Non-Home End.** The results for the non-home end access/egress mode are similar to those for the home end. Walking was the most popular mode — about two-thirds of trips were made by riders walking to and from transit service at the non-home end of their trip. Another 22 percent of trips were made by riders transferring from another transit vehicle. If the transfer riders are excluded, most trips were made by users who walk at the non-home end of their trips.

- **Trip Alternatives**. Almost half of the passengers surveyed reported that if transit service had not been available they would have made their trip by automobile, either as a driver or as a passenger. These responses suggest that transit plays a strong role in reducing traffic congestion. The percentages of users who reported that they would make their trip by automobile also were higher at large transit systems and on rail systems, probably because automobile availability is higher for riders of these systems

  Transit service at the participating systems also provided basic mobility for some transit users. One of every five transit riders stated that they would not have made their trip if transit service had not been available.

Key Policy Topics

- **People Served in the Community**. Transit systems serve more *different* individuals in the community than is suggested by the average daily ridership, because there is "turnover" from one day to the next in the individuals riding transit. From the concept of sampling, it may be concluded that a rider who reports that he uses transit once a week on a system that operates 6 days a week actually represents a total of 6 *different* individuals, each of whom rides on transit only one day of the week.

  On average, the ratio of the number of *different* people using transit to the average number of daily transit trips is 3.06. There is no apparent trend in this factor by system size.

  The ratio of different people served in a community to the number of daily trips is high because a large percentage of transit users are infrequent riders. On average, only 30.7 percent of transit trips were made by riders who used transit less than 5 days per week. However, when these trips are converted to people, these infrequent riders represented 67.0 percent of all persons using transit. Thus, the experiences of infrequent riders are likely to have a strong effect on how service is perceived.

- **Key Policy Objectives**. Surrogate measures of three public policy objectives — congestion management, and location efficiency — can be developed using cross tabulations of the user characteristics *trip purpose*, *automobile availability*, and *trip alternative*. It is important to recognize that these policy objectives are not mutually exclusive and overlap.

  Mobility is, perhaps, the most fundamental reason for offering transit service. In phase three, riders who had no car available accounted for 70.9 percent of total transit trips. As system size increases, the percentage of riders using transit for these purposes decreases. This decrease reflects the higher percentage of users who have an automobile available in larger systems.

Another reason for the public funding of transit service is to encourage people with automobiles to use transit to help manage road congestion. On average, in phase three, 51.6 percent of all transit trips helped take drivers off the road while traveling to work, generally during time of peak road congestion.

Almost half (46.3 percent) of the riders in phase three were in "location efficient" areas where they chose to use transit even though they could have made their trip in a private vehicle.

IMPLEMENTATION PROBLEMS

A number of problems were encountered during the project including:

- Recruiting methods used to encourage participation in the TPMS project,
- Variability in survey questions and response categories, and
- Frequency of on-board surveys.

More direct contact with the transit systems would be needed to address these problems. Participation in any continuation of TPMS likely could be increased if every transit system in the country was called once a year.

BUFFALO LONGITUDINAL TELEPHONE SURVEY

NuStats conducted a telephone survey in late July and early August 2003 that asked riders in the Buffalo-Niagara Falls region about benefits they had received from public transportation over the past three years and over their lifetimes. The respondents were identified from an on-board survey of bus users that was conducted by the Niagara Frontier Transportation Authority (NFTA) between November 1999 and February 2000.

The longitudinal telephone survey consisted of 16 questions that focused on the benefits that the users had received over the past three years (2001-2003) and over their lifetimes due to their access to transit. The survey interviewers asked most questions in an open-end format in which the interviewer waited for the responses to the questions (e.g., household income = $25,100) before placing them in the response categories (e.g., $20,000-$39,999).

The survey specialists completed 118 (25.1 percent) surveys from the sample pool of 470 respondents to the 1999/2000 onboard survey (Exhibit 27). The specialists reached an additional 25 people who did not complete the surveys because they either refused or could not be reached after asking to be called back. The respondents in the telephone survey were relatively comparable to the participants in the original on-board survey in terms of key characteristics such as gender, age, income, and transit use

Respondents who had continued to use transit were first asked the open-ended question *When you think about the last 3 years, in what ways did having access to transit improve your life situation.* The most popular benefits were *Expanded Job Opportunities* (38.0 percent of respondents) and *Economic Stability* (38.0 percent of respondents). About 83.7 percent of the telephone respondents indicated that they had received at least one benefit over the past three years. On average, 1.4 benefits were cited by each respondent.

Respondents were subsequently asked about the benefits that they had received over the past three years with aided questions. The nine specific benefit categories developed in the Pilot Study as well as the category *Other* were read to them in order to facilitate their ability to remember reasons that they may not have thought of or did not mention in their response to the previous question. Almost all telephone respondents (97.8

percent) reported receiving at least one benefit, an increase from 83.6 percent of respondents who cited benefits when asked the open-ended question. On average, 5.1 specific benefits were cited by each respondent.

The higher response rates are more apparent when the aided-question responses are categorized into the five basic categories used for the open-ended question (Exhibit 39). Over 90 percent of respondents cited *Economic Stability* as a benefit when the aided question was asked compared to only 25 percent when the open-ended question was asked. Similar large increases occurred for the benefits *Social Relationship Building* (83.9 versus 10.9 percent) and *Health Maintenance* (57.6 versus 13.0 percent). These large increases suggest that these benefits are not foremost (or, perhaps, important) in the minds of transit users since they recognized these benefits only after prompting. In contrast, using the aided question did little to increase the recognition of the important benefit *Expanded Job Opportunities*.

All telephone respondents — riding or not riding transit after three years — were asked an open-ended question *When you think about your life of riding the bus, how has having access to transit improved your life?* Their responses were post coded by NuStats into the five basic categories used for three-year benefits. About 80.5 percent of the respondents reported that they had received at least one benefit from the use of transit during their life. With the exception of the benefit *Expanded Job Opportunities*, the results were very similar to the results from the questions regarding benefits received in the past three years. On average, 1.4 benefits were cited by each respondent, again similar to the results for the three-year benefit question.

The Buffalo telephone survey demonstrated that a longitudinal survey is feasible. Through a specialized search service such as Lexis/ Nexis, NuStats International estimated that the completed survey percentage could be increased 10 percentage points, from 25 to 35 percent.

A comparison of the people who were and were not reached by the telephone survey did not show any big differences between the two groups. The results also appeared reasonable and consistent with transit industry experience.

Introduction

This report presents the results of the third phase of a project to implement a transit performance monitoring system (TPMS). The TPMS was designed to collect data on transit customers through the use of on-board surveys. The long-term goal of the TPMS initiative was to standardize the collection of data and, thereby, provide a basic, but comprehensive analysis of the performance and benefits of transit service. This target proved more difficult to achieve than originally anticipated.

The TPMS project was funded through a cooperative agreement between the Federal Transit Administration (FTA) and the American Public Transit Association (APTA). FTA funded the project to obtain information — characteristics of passengers, their trip purposes, and the benefits of these trips — that would provide an objective and meaningful portrayal of the performance of transit in serving communities' transportation needs. FTA and APTA managed the project to develop an approach that local transit systems could use to assess the performance and identify the benefits of transit service.

The TPMS project was a continuation of research started by FTA. In 1993, FTA funded research to develop and test a plan for collecting data on transit benefits that could be implemented by transit systems at minimal cost. The resulting data collection concept was named the Transit Performance Monitoring System (TPMS). Since data on benefits only can be collected using passenger surveys, the TPMS relies on on-board passenger surveys.

FTA agreed to fund a test of the TPMS concept at the Port Authority of Allegheny County (PAT) in Pittsburgh. In an effort to reduce costs, the TPMS surveys were distributed in coordination with the existing National Transit Database (NTD) data collection activities using existing transit agency staff. The test trial was conducted from September 1993 through September 1994.

Based on the results of the PAT trial, FTA decided to implement the TPMS concept. It entered into a cooperative agreement with APTA to further develop and implement the TPMS.

The TPMS project has tested three different approaches for collecting on-board customer data. In the first phase, the onboard surveys were collected in coordination with the ride checks (on/off counts) needed to collect data for the annual National Transit Database reports. Nine systems were involved in the first phase testing in 1997 and 1998. The TPMS project worked closely with the nine systems in the design of the survey, printing of questionnaires, and processing of data results.

A more traditional approach was taken in the second phase in which ten systems participated in 2000. The surveys were conducted in concentrated periods of the fall and spring seasons of the year. This was done to make it easier for transit systems to make survey commitments and to avoid surveyor and passenger fatigue. Many transit professionals believe that data collected during these concentrated periods are representative since they believe that transit customers in the spring and fall seasons reflect the profile of "typical" transit users and resulting benefits of transit service.

A third approach was tried in the final and third phase of the project, which was conducted in 2002 and 2003. In this phase, a voluntary approach was tried in which the participating transit systems were responsible for the design, conduct and analysis of the on-board surveys. No TPMS project assistance was provided to participating transit systems as was done in the first two phases. Instead, APTA asked transit systems to provide the results of past surveys that collected data similar to that needed for TPMS. APTA also

encouraged transit systems to use the standard TPMS questions in upcoming surveys and share the results with the TPMS project.

A total of 30 transit systems participated in the third phase of the project. The approach used and results of the third phase are summarized in this report. The remaining five chapters of this report are organized as follows:

- **TPMS Approach** provides a summary of the background of TPMS and the approach taken.
- **Implementation** describes the approach used in the implementation tests.
- **Survey Results** presents selected results of the surveys conducted in the third phase. The results include key passenger characteristics such as trip purpose, access and egress modes, trip frequency, age, income, and gender. They include a targeted analysis of two important policy topics: 1) people served in the community versus passenger boardings; and 2) key policy functions served as defined by trip purpose and automobile availability.
- **Implementation Problems** discusses problems encountered during the collection of the conduct of the surveys.
- **Buffalo Longitudinal Telephone Survey** presents the results of a 2003 telephone survey of bus users who responded the 2000 on-board survey. The objective of the telephone survey was to determine the long-term benefits of public transportation provided to users in 2000 who may or may not have been users in 2003.

TPMS Approach

This project evolved from previous research efforts funded and managed by FTA's Office of Budget and Policy. This chapter provides a summary of the previous research efforts and an overview of the three phases of TPMS project.

BACKGROUND AND PREVIOUS RESEARCH EFFORTS

In the early 1990s, FTA's Office of Budget and Policy became concerned that its reporting of transit performance to the public and to Congress was incomplete and did not provide a complete picture of the benefits provided by public transportation. Most of its reports relied on national aggregate measures, such as passengers and operating costs, which were reported to the National Transit Database. However, public transportation is provided by more than 600 individual transit systems of varying sizes and organizational structures that are trying address different local needs. Therefore, it seemed appropriate to collect and report data on how public transportation was meeting local needs in different types of communities. It was also felt that decision makers and the public would be able to relate better to statistics from transit systems that operated in areas similar to their own communities rather than to aggregate national statistics.

FTA's first research effort was the preparation of case studies of eight transit systems. The case studies focused primarily on traditional measures of performance by route service type (e.g., local, express, crosstown).
Key results of the case studies were included in an FTA report to Congress entitled *Public Transportation in the United States: Performance and Condition*, June 1992. The complete analysis was documented in the report *To Classify Transit Services: Eight Case Studies* and was printed by FTA for national distribution.

Efforts also were made in the case studies to identify basic functions provided by these systems (e.g., basic mobility, work commuting). Since passenger survey data were limited and, in most cases, unavailable, assumptions were made about the basic functions served by different types of bus routes. For example, it was assumed that suburban express routes primarily served work commuters with middle-to-high incomes while inner city local routes were assumed to serve all trip purposes for low-to-middle income city residents.

FTA recognized that the assumption that only one basic function and only one type of rider is served by a route type was a key weakness in this approach. Experience suggested the opposite — bus routes serve multiple functions and types of riders. Therefore, FTA next initiated research on how data could be collected routinely on the needs that transit serves as a way to address this weakness.

In 1993, FTA funded research to develop and test a plan for collecting data on transit benefits that could be implemented by transit systems at minimal cost. The resulting data collection concept was named the **Transit Performance Monitoring System (TPMS)**. The TPMS relied on self-administered on-board surveys, an effective and statistically valid way of collecting data on transit ridership. In an effort to reduce costs, the TPMS surveys were distributed in coordination with the existing National Transit Database (Section 15) data collection activities using existing transit agency staff.

FTA agreed to fund a trial test of the TPMS concept at the Port Authority of Allegheny County (PAT) in Pittsburgh. This test trial was successfully conducted from September 1993 through September 1994. The response rate of almost 50 percent was much higher than the 28 percent response rate achieved in a 1988 PAT

on-board survey. The survey processing went smoothly and over 10,000 survey cards were processed and analyzed.

During the time of the PAT test trial, FTA also funded the preparation of a report on transit service in San Diego that served as a template for reporting the results of future TPMS surveys. San Diego was chosen as the test metropolitan area because on-board surveys had been conducted in 1985 and 1990. The heart of the San Diego report focused on the public policy objectives of public transportation service and the types of markets accommodated by transit service. Drawing on a blend of on-board survey results and operational data, the public policy objectives for transit — low-cost mobility, congestion management, and livable communities — were examined. The report also provided supporting material for the discussion of the public policy objectives. A profile of user characteristics and subsidy levels for key characteristics such as household income and automobile availability was presented.

FTA/APTA TPMS PROJECT

Based on the results of the PAT trial and the development of the San Diego report, FTA decided to implement the TPMS concept. It entered into a cooperative agreement with APTA in 1995 to further develop and implement the TPMS at 12 to 15 transit systems.

In the first phase of the FTA/APTA cooperative agreement, the PAT approach was tried — onboard surveys were collected in coordination with the ride checks (on/off counts) needed to collect data for the annual National Transit Database reports. The surveys were distributed over a 12-month period. Nine systems were involved in the first phase testing in 1997 and 1998. The TPMS project worked closely with the nine systems in designing the survey, printing the questionnaires, and processing the results.

However, the "ongoing PAT approach" proved problematic for several reasons. Some transit systems found it difficult to commit to continuous surveying over a one year time period. For those able to make this commitment, other local demands on transit system staff often made it difficult for systems to comply with TPMS survey sampling plans. Furthermore, both the surveyors and the passengers experienced fatigue due to the continuous nature of this ongoing survey approach.

A more traditional approach was taken in the second TPMS phase in which 11 systems participated in 1999 and 2000. In this phase, surveys were conducted in concentrated periods during the spring and the fall. This concentrated approach was adopted to make it easier for transit systems to commit to undertaking a survey and to avoid surveyor and passenger fatigue. The data collected during these concentrated periods were considered to be representative of transit customers because the passengers who ride on transit in the spring and fall are believed by professional transit analysts to reflect the profile of "typical" transit users and, therefore, the benefits that transit service provides.

Although the problems of surveyor and passenger fatigue were avoided in the second phase, the problem of systems committing to participate in the survey still remained. After considerable project consultant resources were expended on recruiting transit systems and working to develop the survey questionnaires, some systems declined to participate at the last minute. Other systems, which had agreed to conduct the surveys in the spring, ended up conducting the surveys in the summer due to changes in local priorities.

The results of the first two phases of the project were documented in the report *Transit Performance Monitoring System: Results of First Two Rounds (February 2002)*. This report was an internal report submitted to APTA and FTA.

A third approach was tried in the final phase of the TPMS project, which was conducted in 2002 and 2003. This phase adopted a voluntary approach and did not offer project assistance to participating transit systems as in the first two phases. Transit systems were asked to provide the results of their most recent past survey

that had collected data similar to the data being requested by TPMS. APTA also encouraged transit systems to use the standard TPMS questions in upcoming on-board surveys and to share the results with the TPMS project.
A total of 30 transit systems participated in the third phase of the project. All of the participating transit systems provided information from onboard passenger surveys on their bus routes and three transit systems also provided information from customer surveys on their rail routes.

A special longitudinal telephone survey also was undertaken in the third phase of the TPMS project to collect data to identify and analyze the longer term benefits of public transportation to users. The participants in this longitudinal survey were identified from an earlier (2000) onboard survey of bus passengers in Buffalo, which was included in the second TPMS phase. These riders had been asked to provide their telephone numbers and were told that they may be called for a follow-up survey. Selected respondents were contacted by phone in 2003 and asked about long-term benefits they had received (e.g., better job, chance to earn a college degree) from public transit over: 1) the three year period since they had participated in the onboard survey and 2) over their lifetime. This survey did not exclude 2000 users based on whether or not they were still using transit, since the focus of the survey was on identifying long-term benefits.

McCollom Management Consulting (MMC) was the contractor for all three phases of the TPMS project. The sub-contractors were M. Davis and Company, NuStats International, and Dr. Peter Furth.

Implementation of Voluntary Program

The focus of the third phase of the TPMS project was to develop an ongoing systematic and voluntary program. Efforts were made to encourage local transit systems to use the standard TPMS questions in their customer surveys and to share the results of these surveys with FTA and APTA. The transit systems were asked to bear the costs of questionnaire design, survey printing, and data processing. The TPMS project supported the solicitation of transit systems and the TPMS analysis and summary of the survey results

The implementation work for the third phase can be divided into four separate work tasks:

- Develop a Standard Set of TPMS Questions
- Prepare a Question Screening Approach
- Promote Participation in TPMS
- Manage the Collection and Analysis of Industry Data

DEVELOP A STANDARD SET OF TPMS QUESTIONS

The eleven survey questions used in the previous two phases of the project were taken as the starting point in developing the third phase questionnaire (Exhibit 1). An effort was made to minimize the number of questions that TPMS required to increase passenger response rate and to allow participating transit systems to add their own questions to the survey. The rationale for these questions was as follows:

- Questions 1, 3, 6, and 7 were used to determine trip purpose, automobile availability, and level of added mobility that transit provides to customers. The responses to these questions are used to define the functions or benefits provided to the customer such as congestion management, low cost mobility, and livable communities. These functions or benefits are discussed in the chapter entitled ***Survey Results.***
- Questions 2 and 4 were asked to provide information on access and egress modes.
- Question 5 was used to address trip frequency and to estimate the number of people in the community that use transit service. For example, each response of one day a week might be given a weight of 7.0 to estimate the total number of people using transit service one day a each week.
- Question 8 was used to estimate the degree of turnover in transit ridership.
- Questions 9, 10, and 11 were used to analyze the characteristics of survey respondents in terms of age, gender, and income.

A working group of representatives from the APTA Marketing and the APTA Policy and Planning Committees was formed to review the TPMS questions with the purpose of developing a standard set of questions for phase three. The working group made three changes to the questions used in the first two phases (Exhibit 1):

Exhibit 1
Comparison of Phase I/II and Phase III Questions

1) Where did you come from before you got on this bus/train?

□ Work/Work-Related □ College/Other School □ Medical Services □ Other_____
□ Home □ Shopping □ Social, religious worship, personal business

2) How did you get to this bus/train?

□ Walked □ Dropped off by someone □ Rode a bus/train
□ Drove my car □ Rode my bicycle □ Rode with someone who parked

3) Where are you going now?

□ Work/Work-Related □ College/Other School □ Medical Services □ Other_____
□ Home □ Shopping □ Social, religious worship, personal business

4) When you get off this vehicle, how will you get to your final destination?

□ Walk □ Get picked up by someone □ Ride a bus/train
□ Drive my car □ Ride my bicycle □ Ride with someone who parked

5) (Phase I/II) How many days a week do you usually make this trip?

□ 7 days a week □ 4 days a week □ 1 day a week □ First time riding
□ 6 days a week □ 3 days a week □ Twice a month
□ 5 days a week □ 2 days a week □ Once a month

5) (Phase III) How often do you use transit?

□ 7 days a week □ 4 days a week □ 1 day a week □ First time riding
□ 6 days a week □ 3 days a week □ Twice a month
□ 5 days a week □ 2 days a week □ Once a month

6) Do you have a car or other personal vehicle that you could have used to make this trip?

□ Yes □ No

7) If transit service were not available how would you make this kind of trip?

□ Use a car □ Ride with a friend □ Bicycle
□ Walk □ Use a taxi □ I would not make this trip

8) (Phase I/II) How long have you been using the bus/train to make this trip?

□ Less than a month □ 7-12 months □ 3-4 years
□ 1-6 months □ 1-2 years □ More than 4 years

8) (Phase III) How long have you been a regular transit rider —at least once a week?

□ Less than a month □ 7-12 months □ 3-4 years
□ 1-6 months □ 1-2 years □ More than 4 years

9) I am… □ Male □ Female

10) My age is:

□ Under 15 □ 19 to 24 □ 35 to 49 □ 65 or more
□ 15 to 18 □ 25 to 34 □ 50 to 64

11) What is your total household income?

□ Under $20,000 □ $30,000 - $39,999 □ $50,000 - $59,999 □ $80,000 or greater
□ $20,000 - $29,999 □ $40,000 - $49,999 □ $60,000 - $79,999

12) (Phase III) Including yourself, how many people live in your household?

____

Note: Unless indicated otherwise — Phase I/II or Phase III — the questions were used in the questionnaires for all three phases of the TPMS project. The shaded Phase I/II questions were revised in Phase III.

- Question 5, which addresses trip frequency, was revised from asking the trip frequency of the trip being surveyed to how often the customer uses public transportation overall.

- Similar to Question 5, Question 8, which addresses turnover, was revised from asking how long the customer has been making the trip being surveyed to how long the customer has been using public transportation overall.

- A new Question 12 was added to determine household size. When combined with the response to Question 12 regarding income, this question provided another measure of household income — annual household income per person.

PREPARE A QUESTION SCREENING APPROACH

A voluntary approach was tried in the third phase of the project. Participating transit systems were fully responsible for the design, conduct, and analysis of the on-board surveys. APTA asked transit systems to provide the results of past surveys that had collected data similar to the data needed for TPMS. APTA also encouraged transit systems to use the standard TPMS questions in upcoming surveys and to share the results with the TPMS project.

Since the TPMS project did not have control over the design of the surveys, it was expected that many transit systems would not use all of the TPMS questions or would not use the exact TPMS questions response categories. Preliminary discussions with representatives of selected transit systems, which had participated in the first two phases, confirmed these assumptions.

Therefore, a screening approach was developed to deal with transit systems that did not use all of the TPMS questions or did not use the exact TPMS questions response categories. It was agreed that that the TPMS project would encourage systems to use all 12 TPMS questions. However, when systems did not ask all of the questions or did not use the TPMS response categories, the following three guidelines were used to determine when a system's results would be included in TPMS.

- **Guideline 1: Minor differences in wording from the TPMS questions and responses are acceptable as long as the intent of the questions is maintained.** This guideline also applied to Questions 5 (frequency) and 8 (turnover) for which the question wordings used in the first two phases were considered acceptable in the third phase.

- **Guideline 2: Different question response categories are acceptable as long as they can be aggregated into a standard set of minimum (larger) categories.** The larger, minimum categories (Exhibit 2) were based on the categories used in the summary report for the first two phases of the project.

- **Guideline 3: The survey results are acceptable as long as a minimum number of TPMS questions are asked.** The priorities given to different questions were developed jointly by APTA and FTA. The questions were divided into three groups with different priorities assigned to each group.

  The following three questions were required from all systems:
  - 1. Where did you come from before you got on this bus/train?
  - 3. Where are you going now?
  - 6. Do you have a car or other personal vehicle that you could have used to make this trip?

Exhibit 2

Minimum (Larger) Response Categories
Phase III Questions

1) Where did you come from before you got on this bus/train?
□ Work/Work-Related □ College/Other School □ Other_____
□ Home □ Shopping

2) How did you get to this bus/train?
□ Walked □ Rode a bus/train
□ Car – Drove/Rode with someone □ Other

3) Where are you going now?
□ Work/Work-Related □ College/Other School □ Other_____
□ Home □ Shopping

4) When you get off this vehicle, how will you get to your final destination?
□ Walk □ Ride a bus/train
□ Car – Drive/Ride with someone □ Other

5) How often do you use transit?
□ 6-7 days a week □ 3-4 days a week □ 1-2 days a month
□ 5 days a week □ 1-2 days a week □ First time riding

6) (Unchanged) Do you have a car or other personal vehicle that you could have used to make this trip?
□ Yes □ No

7) (Unchanged) If transit service were not available how would you make this kind of trip?
□ Use a car □ Ride with a friend □ Bicycle
□ Walk □ Use a taxi □ I would not make this trip

8) How long have you been a regular transit rider —at least once a week?
□ 0-6 months □ 1-4 years
□ 7-12 months □ More than 4 years

9) (Unchanged) I am… □ Male □ Female

10) My age is:
□ Under 19 □ 25 to 64
□ 19 to 24 □ 65 or more

11) What is your total household income?
□ Under $20,000 □ $40,000 - $59,999
□ $20,000 - $39,999 □ $60,000 or greater

12) (Unchanged) Including yourself, how many people live in your household?
____

Note: Unless indicated as unchanged, the response categories were collapsed from the recommended response categories in Exhibit 1.

Three of the following six questions were required from all systems:

- 5. How often do use transit?
- 7. If transit service were not available, how would you make this kind of trip?
- 8. How long have you been a regular transit rider — at least once a week?
- 10. My age is:
- 11. What is your total household income?
- 12. Including yourself, how many people live in your household?

Responses for the remaining three questions were encouraged, but not required:

- 2. How did you get to this bus/train?
- 4. When you get off this vehicle, how will you get to your final destination?
- 9. I am: (gender)

PROMOTE PARTICIPATION IN TPMS

In the first two phases, individual transit systems were selected and invited to participate in the TPMS project. In an effort to select transit systems that might be representative of the transit industry, transit systems were based on three factors — geographical location, system size, and system type, that have been successfully used in other studies.

- **Geographical location.** The country was divided into three areas — East, Midwest, and West.

- **System size (service area population).** Three size categories were used — under 500,000 persons, 500,000 to 1,250,000 persons, and over 1,250,000 persons.

- **System type.** Both bus and rail systems were included. In Phase II, an additional system type, "Large Suburban", was added to assure representation of this newly emerging transit sector.

In the third phase, no effort was made to select transit systems. Instead, efforts were made to encourage as many transit systems as possible to participate.

A total of 30 transit systems participated in the third phase (Exhibit 3). The results from 33 surveys were analyzed since three systems — Atlanta, Buffalo, and St. Louis — conducted individual bus and rail surveys. The systems covered all geographical locations, system sizes, and system types. There were no small systems (systems serving areas with populations below 500,000) in the west. About one third of all systems were categorized as large suburban systems. These systems serve suburban areas of large metropolitan areas.

A variety of methods were used to promote participation in the TPMS. These methods included sending targeted emails to members of select APTA committees, presentations on TPMS at APTA meetings, direct telephone calls to selected transit systems, and recruitment efforts targeted towards systems that had participated in the first two phases.

APTA emailed invitations to participate in the TPMS project to members of two APTA committees: the Marketing Committee and the Policy and Planning Committee. These committees were targeted because on-board passenger surveys are normally implemented by planners and marketers at local transit agencies.

APTA emailed the committee members two times during the third phase. The first email solicitations were sent in March 2002 shortly after the survey questions were reviewed by the APTA working group. Reminder emails were sent in October 2003 as a last effort to solicit survey results before the third phase ended.

The email approach was not very successful in increasing participation. Only three of the thirty systems that participated in the third phase were recruited through the emails. Although five other transit systems responded to the emails and volunteered to participate, their surveys did not pass the question screening approach.

APTA also tried to solicit participation with presentations at APTA meetings. During the third phase, TPMS presentations were made at the following meetings:

Exhibit 3
Phase III Participating Transit Systems

Service Area Population	Region		
	West	**Midwest**	**East**
Less than 500,000		Lincoln, NE (Bus) Madison, WI (Bus)	Daytona Beach, FL (Bus) Nashua, NH (Bus) Panama City, FL (Bus)
500,000 to 1,250,000		Grand Rapids, MI (Bus) Indianapolis, IN (Bus)	Buffalo, NY (Bus/Rail) Hartford, CT (Bus) New Haven, CT (Bus) Stamford, CT (Bus) Wilmington, DE (Bus)
Over 1,250,000	Chula Vista, CA (LS Bus) MDTB San Diego, CA (LS Bus) National City, CA (LS Bus) North San Diego, CA (LS Bus) Sacramento, CA (Bus Only) San Diego (Bus/Rail) San Diego County, CA (LS Bus) San Mateo County, CA (LS Bus) Torrance, CA (LS Bus)	Cleveland, OH (Bus Only) Madison County, IL (LS Bus) St. Clair County, MO (Bus) St. Louis, MO (Bus/Rail)	Atlanta, GA (Bus/Rail) Clayton County, GA (LS Bus) Cobb County, GA (LS Bus) Gwinnett County, GA (LS Bus)

(mode) = mode(s) surveyed LS = Large Suburban

- 2001, 2002, and 2003 Bus Conferences
- 2001 and 2002 Annual Conferences
- 2002 and 2003 Marketing Meetings
- 2002 Rail-Volution Conference
- 2003 Legislative Conference
- 2003 Rail Conference
- 2003 State Public Transit Partnerships Conference

The presentation approach also was not very successful at attracting participants. Only one transit system was attracted this way. Four additional transit systems volunteered to participate as a result of a conference presentation, but their surveys did not pass the question screening procedure.

Direct phone calls were the most successful method of convincing new transit systems to participate. In January 2002, two senior consultants from McCollom Management called 40 transit systems where they had personal contacts. During the summer of 2002, APTA staff also called 20 transit systems. These personal telephone calls generated 16 of the 30 transit systems that participated in the third phase.

The remaining ten transit systems that participated in the third phase were transit systems that had also participated in the first two phases. These systems were experienced in the TPMS approach and generally were eager to participate. Systems which had participated in one of the earlier phases, but did not participate in phase three, were willing in principle, but were unable to participate either because they had not conducted a recent survey or because their survey did not pass the question screening approach.

While the overall participation in the third phase was disappointing, there was significant interest expressed in sharing survey data with APTA and FTA. Over 80 transit systems — about 13 percent of the transit systems in the country — expressed interest in the TPMS. The main reasons given for not participating were:

- **No recent survey conducted.** Most transit systems do not conduct annual on-board surveys because of cost considerations. Instead, they conduct surveys every three to five years and even longer.

- **The questions used in a recent survey did not match the TPMS questions.** The TPMS questions commonly not asked by transit systems were:

    - 6. Do you have a car or other personal vehicle that you could have used to make this trip?
    - 7. If transit service were not available how would you make this kind of trip?
    - 8. How long have you been a regular transit rider — at least once a week?
    - 12. Including yourself, how many people live in your household?

- **The response categories did not match the TPMS response categories.** The most problematic questions were Questions 5 (frequency) and 11 (income).

- **The priorities at transit systems changed.** The third phase of the TPMS project was conducted during a period of economic downturn, which adversely affected public transportation ridership and funding. Several transit systems agreed to use the TPMS questions in surveys that were planned, but later postponed due to budget cuts and changes in system priorities.

MANAGE THE COLLECTION AND ANALYSIS OF INDUSTRY DATA

The major ongoing work in the TPMS project was the analysis of the survey results. The participating transit systems were responsible for actual conduct and processing of the survey.

The original work program for the third phase assigned APTA most of the responsibility for this task. McCollom Management Consulting was responsible for developing a template to help manage data received from the transit systems. The template would insure that data were consistently coded and analyzed and, thereby, provide APTA with the tools to manage the survey data on an ongoing basis.

Unfortunately, when the first survey results arrived, it became clear that significant processing work was needed to recode the data to make it useful for TPMS analysis. This work involved recoding data using the specialized SPSS computer program. APTA did not have staff with the skills in SPSS to perform this recoding. Therefore, the work program was revised and the responsibility for the analysis of data was given to McCollom Management Consulting.

In the third phase, the questionnaire results were from surveys that were conducted during concentrated time periods of generally less than one month (Exhibit 4). Only the survey in Lincoln, which was conducted in coordination with its ongoing National Transit Database collection effort, was conducted over a longer period.

The TPMS surveys were performed during "typical" transit usage months, which are generally considered to be spring (before school lets out) or fall (after school returns). In warmer climates, such as in the South and Southwest, the winter months after December also are considered typical.

The surveys were conducted over a four-year period ranging from February 2000 (Madison, Wisconsin) to November 2003 (San Mateo County, California). This range of times occurred because the TPMS requested data from past surveys conducted within the last three years or new surveys that could be completed by December 2003.

Exhibit 4 Phase III Survey Starting and Ending Dates		
System	**Start Date**	**End Date**
Atlanta, GA	10/13/2001	12/9/2001
Buffalo, NY	4/22/2002	5/10/2002
Chula Vista, CA	5/21/2001	7/2/2002
Clayton County, GA	2/15/2002	2/28/2002
Cleveland, OH	10/17/2002	10/17/2002
Cobb County, GA	10/13/2001	12/9/2001
Daytona Beach, FL	2/26/2002	2/28/2002
Grand Rapids, MI	6/1/2002	6/30/2002
Gwinett County, GA	2/15/2002	2/28/2002
Hartford, CT	10/10/2002	10/10/2002
Indianapolis, IN	9/21/2001	10/7/2001
Lincoln, NE	9/11/2002	8/31/2003
Madison County, IL	3/25/2002	4/26/2002
Madison, WI	2/2/2000	3/10/2000
MDTB, CA	3/5/2001	12/6/2002
Nashua, NH	5/7/2002	5/7/2002
National City, CA	5/22/2001	5/14/2002
New Haven, CT	10/8/2002	10/8/2002
North San Diego, CA	10/22/2001	4/16/2002
Panama City, FL	2/19/2002	2/21/2002
St. Clair County, IL	3/25/2002	4/26/2002
St. Louis, MO	3/25/2002	4/26/2002
Sacramento, CA	10/4/2002	10/31/2002
San Diego County, CA	5/22/2001	12/10/2002
San Diego Trolley, CA	9/25/2001	10/12/2001
San Diego, CA	9/27/2000	12/27/2001
San Mateo County, CA	11/12/2003	11/20/2003
Stamford, CT	10/3/2002	10/3/2002
Torrance, CA	3/7/2002	3/16/2002
Wilmington, DE	5/20/2002	7/1/2002

Survey Results

The objective of the TPMS project is to provide a basic, but comprehensive analysis of the characteristics of transit riders, the performance of transit in serving these riders, and public policy benefits of transit service. This chapter presents selected results of the surveys in two sections:

- **Key Passenger Characteristics** which covers factors such as trip purpose, access and egress modes, trip frequency, age, income, and gender, and

- **Key Policy Topics** which focuses on two important issues: 1) people served in the community versus passenger boardings; and 2) key policy functions served as defined by trip purpose and automobile availability

The information shown in this "Survey Results" section uses only the data from the third phase of the TPMS project. Data were collected from 30 transit systems (Exhibit 5). The data represented 33 modal surveys since data were obtained from bus and modes operated by the multi-modal systems in Atlanta, Buffalo, and St. Louis.

The results are presented in several ways:

- Individual modes (33 systems),
- System size — small (5), medium (8), large (8), and large suburban (12), and
- Mode — bus and rail only for multi-modal systems (3).

SURVEY CONSIDERATIONS

Four features of the TPMS survey should be considered in the evaluation of the survey results:

- Survey return rate
- System use of questions
- Question completion rate
- Percentage of young riders

Survey Return Rate

Survey return rates varied from a low of 19.9 percent to a high of 71.3 percent for the 27 surveys for which return rates were tabulated (Exhibit 6). These results represent an adequate response rate and are sufficient to ensure that most of the proportions estimated from the sample (e.g., proportion of passengers making a work trip) are accurate with a tolerance of +/- 5 percent, at the 95 percent confidence level. Data needed to calculate survey return rates were not collected for six surveys. However, the managers of these surveys reported that they believed that the response rates were adequate for most of the proportions estimated from survey returns.

Exhibit 5
Categories of Transit Systems Used to Present Survey Results

System	Mode		Peak Vehicles[1]	Service Area Population[1]	System Size			
	Bus	Rail			Small	Medium	Large	Large Suburban
Atlanta, GA	X		590	1,354,871			X	
Atlanta, GA		X	186	1,354,871			X	
Buffalo, NY	X		271	1,182,165		X		
Buffalo, NY		X	23	1,182,165		X		
Chula Vista, CA	X							X
Clayton County, GA	X							X
Cleveland, OH	X		544	1,412,140			X	
Cobb County, GA	X		44	277,226				X
Daytona Beach, FL	X		44	443,343	X			
Grand Rapids, MI	X		86	539,080		X		
Gwinett County, GA	X							X
Hartford, CT	X		184	851,535		X		
Indianapolis, IN	X		128	1,218,919		X		
Lincoln, NE	X		47	231,800	X			
Madison County, IL	X		59	232,298				X
Madison, WI	X		167	219,185	X			
MDTB, CA	X		91	2,041,128				X
Nashua, NH	X		5	80,000	X			
National City, CA	X		9	131,703				X
New Haven, CT	X		87	531,314		X		
North San Diego, CA	X		154	821,380				X
Panama City, FL	X		4	132,419	X			
Sacramento, CA	X		193	1,393,498			X	
Sam Mateo County, CA	X		273	737,100				X
San Diego County, CA	X		72	2,041,128				X
San Diego Trolley, CA		X	83	2,102,396			X	
San Diego, CA	X		231	2,674,636			X	
St. Clair County, IL	X							X
St. Louis, MO	X		376	1,562,961			X	
St. Louis, MO		X	44	1,562,961			X	
Stamford, CT	X		38	888,890		X		
Torrance, CA	X		54	606,847				X
Wilmington, DE	X		164	796,165		X		
Totals	**29**	**4**			**5**	**8**	**8**	**12**

[1] *2002 National Transit Database. Peak Vehicles = Vehicles Operated in Maximum Service*

Exhibit 6
Respondent Survey and Question Completion Rates

System	Mode	Surveys		Question Completion Rate for Returned, Usable Surveys									
		Number Returned	Percent Returned	Gender	Age	Household Income	Household Size	Trip Frequency	Duration of Transit Use	Trip Purpose [1]	Car Availability	Access/Egress Modes [2]	Trip Alternative
Atlanta, GA	Bus	21,409	29.0%	75.5%	QNA	65.0%	54.7%	77.7%	QNA	80.4%	74.1%	55.2%	75.8%
Atlanta, GA	Rail	7,470	46.0%	75.0%	QNA	59.6%	49.5%	61.3%	QNA	70.6%	58.6%	42.2%	68.2%
Buffalo, NY	Bus	3,508	19.9%	97.8%	88.4%	QNA	QNA	88.5%	83.8%	95.0%	79.9%	70.2%	QNA
Buffalo, NY	Rail	2,158	63.0%	98.5%	90.9%	QNA	QNA	91.6%	90.3%	93.7%	83.7%	70.5%	QNA
Chula Vista, CA	Bus	1,857	46.4%	96.1%	95.3%	80.9%	QNA	97.1%	QNA	98.2%	96.7%	80.6%	QNA
Clayton County, GA	Bus	439	62.0%	73.8%	QNA	44.6%	39.9%	59.9%	QNA	64.5%	56.5%	37.1%	56.5%
Cleveland, OH	Bus	1,209	40.3%	93.6%	89.8%	81.0%	87.0%	68.4%	68.4%	87.5%	91.7%	75.0%	80.8%
Cobb County, GA	Bus	1,216	38.0%	82.7%	QNA	73.7%	66.4%	86.8%	QNA	86.8%	82.5%	60.6%	86.0%
Daytona Beach, FL	Bus	1,371	33.8%	81.2%	85.8%	70.9%	QNA	92.5%	93.0%	83.3%	85.2%	76.1%	88.6%
Grand Rapids, MI	Bus	451	UNK	96.9%	96.9%	85.8%	QNA	99.1%	97.1%	96.9%	97.8%	85.8%	97.8%
Gwinett County, GA	Bus	116	62.0%	94.0%	QNA	81.0%	91.4%	98.3%	QNA	99.1%	98.3%	85.3%	95.7%
Hartford, CT	Bus	2,736	22.8%	93.2%	95.9%	82.1%	89.6%	98.7%	97.3%	96.2%	95.0%	88.8%	100.0%
Indianapolis, IN	Bus	10,955	UNK	90.3%	78.5%	QNA	QNA	86.2%	83.6%	75.8%	77.7%	58.2%	78.6%
Lincoln, NE	Bus	607	71.3%	97.5%	99.3%	67.1%	98.8%	99.8%	98.5%	99.2%	99.8%	70.3%	100.0%
Madison County, IL	Bus	1,176	UNK	97.8%	93.5%	QNA	QNA	QNA	93.5%	97.7%	91.6%	81.1%	QNA
Madison, WI	Bus	13,708	40.8%	99.1%	96.1%	QNA	96.2%	QNA	QNA	97.7%	100.0%	82.8%	98.1%
MDTB, CA	Bus	3,384	59.9%	96.0%	93.6%	85.3%	QNA	97.0%	QNA	98.6%	96.5%	87.0%	QNA
Nashua, NH	Bus	410	45.9%	95.6%	77.6%	80.5%	97.6%	QNA	QNA	94.9%	94.9%	83.4%	QNA
National City, CA	Bus	921	38.8%	96.7%	94.9%	82.4%	QNA	97.5%	QNA	98.3%	95.7%	86.3%	QNA
New Haven, CT	Bus	1,466	20.9%	89.7%	93.4%	79.7%	86.9%	96.5%	95.6%	89.2%	93.3%	77.9%	100.0%
North San Diego, CA	Bus	14,774	UNK	77.2%	66.7%	52.3%	63.8%	69.5%	QNA	71.6%	71.0%	56.8%	66.9%
Panama City, FL	Bus	94	28.5%	90.4%	95.7%	77.7%	87.2%	91.5%	96.8%	92.6%	100.0%	73.4%	96.8%
Sacramento, CA	Bus	2,000	UNK	88.1%	95.5%	85.6%	80.5%	97.9%	96.5%	93.5%	83.8%	78.9%	97.1%
Sam Mateo County, CA	Bus	2,542	26.5%	90.8%	90.2%	QNA	QNA	93.4%	QNA	95.9%	86.0%	QNA	92.9%
San Diego County, CA	Bus	3,831	UNK	97.4%	92.7%	82.6%	QNA	97.7%	QNA	98.0%	97.8%	86.7%	QNA
San Diego Trolley, CA	Rail	1,551	46.7%	96.1%	94.7%	88.1%	QNA	97.5%	QNA	98.0%	97.2%	85.0%	QNA
San Diego, CA	Bus	10,953	38.2%	96.9%	95.7%	87.5%	QNA	97.1%	QNA	98.2%	94.6%	86.1%	QNA
St. Clair County, IL	Bus	1,358	UNK	99.5%	91.3%	QNA	QNA	QNA	91.4%	95.4%	84.0%	72.6%	QNA
St. Louis, MO	Bus	11,001	UNK	99.5%	90.4%	QNA	QNA	QNA	89.7%	95.1%	82.6%	72.0%	QNA
St. Louis, MO	Rail	1,759	UNK	99.9%	89.8%	QNA	QNA	QNA	84.4%	96.7%	82.8%	73.3%	QNA
Stamford, CT	Bus	730	24.3%	90.7%	95.3%	78.8%	85.9%	96.8%	95.5%	94.9%	93.6%	80.4%	100.0%
Torrance, CA	Bus	3,183	UNK	91.5%	91.8%	73.1%	QNA	84.8%	QNA	92.6%	84.6%	82.7%	QNA
Wilmington, DE	Bus	845	4.2%	98.1%	99.4%	89.9%	QNA	97.8%	97.6%	90.8%	98.8%	QNA	QNA
Total UNK/QNA			***10***	***0***	***5***	***9***	***15***	***6***	***16***	***0***	***0***	***1***	***15***

[1] Trip Purpose determined from the answers to two questions

[2] Lowest completion rate presented for Access/Egress Modes that were dermined from the answers to three questions.

UNK = Unknown survey response rate

QNA = Question not asked

System Use of Questions

Since the TPMS project did not have control over the design of the surveys, results were included from transit systems that did not ask all of TPMS questions or response categories if the systems passed the TPMS screening approach (discussed in the chapter *Implementation of Voluntary Program*).

Most transit systems asked the TPMS questions regarding gender, age, household income, trip frequency, trip purpose, car availability, and access and egress modes (Exhibit 6). In most cases when this information was not collected, it was because the transit system used different response categories for these questions, which could not be converted to the TPMS response categories. Only a small number of the 30 transit systems did not ask these questions at all.

However, almost half of the phase three transit systems did not ask the questions regarding household size, duration of transit use, and alternative way of making the trip. Many transit systems did not use the household size question because it is not commonly asked on on-board transit surveys. The systems that asked about household size were those that conducted their surveys after agreeing to participate in the TPMS project. Transit systems for which information is not reported on duration of transit use or trip alternative either used different response categories or did not ask the question at all.

Question Completion Rate

Partially completed surveys were accepted based on the judgment of the managers at the local transit systems. The completion rates for many questions — gender, age, trip frequency, years using transit, trip purpose — were high, generally greater than 90 percent and, in most cases, greater than 80 percent. For other questions — household size, trip alternative — the typical completion rates were above 80 percent, but there were 10 occasions in which the completion rates ranged from 40 to 79 percent.

The completion rate for the question on household income was about 10 percentage points lower than the completion rates for the other questions. The response rate for this question ranged from 39.9 percent to 89.9 percent. This lower response rate was expected since transit customers, and survey respondents in general, are often reluctant to report their household income.

The completion rates for the access/egress modes also were low. This was expected since the completion rates rely on the answers to four questions, while completion rates for the other questions depend on that question only.

Percentage of Young Riders

The surveyors at the participating systems did not distribute survey questionnaires to children and used their own procedures for identifying children. It is difficult to estimate how the exclusion of children affected the survey results since they were not counted. In the first two phases of the TPMS project, the surveyors did not give surveys to children 12 years of age or younger, but counted them. Based on these counts, the percentage of users who were children ranged from about 2 percent in Lincoln to about 18 percent in Juneau.

The absence of survey data from children affects the survey results in three ways:

- The age distribution is older without the children,
- The percentage of people making work trips is higher since children travel for non-work purposes, and
- The percentage of people with no automobile available is probably understated.

KEY PASSENGER CHARACTERISTICS

This section presents direct tabulations of the TPMS questions. The survey responses were summarized for the following key passenger characteristics:

- Gender
- Age
- Household Income
- Household Size
- Trip Frequency
- Duration of Transit Use
- Trip Purpose
- Car Availability
- Access/Egress Modes
- Trip Alternative

Gender

Women tend to use transit slightly more often than men at most of the participating transit systems (Exhibit 7). There were no obvious differences in transit use by gender by system size or by mode.

Exhibit 7
Direct Survey Results
Gender

Gender	All Systems	Size Of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban	Bus	Rail
Male	45.5%	46.9%	40.4%	48.4%	46.9%	47.9%	49.4%
Female	55.5%	53.1%	59.6%	51.6%	53.1%	52.1%	50.6%

Age

The survey respondents are concentrated in working ages between the ages of 25 and 64 (Exhibit 8). About 63 percent of transit trips were made by users in these working age groups.

Exhibit 8
Direct Survey Results
Age

Age	All Systems	Size of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban	Bus	Rail
Under 19	10.8%	11.3%	12.4%	9.8%	9.4%	13.3%	15.1%
19 to 24	21.4%	17.4%	15.9%	20.6%	29.6%	17.1%	18.0%
25 to 64	63.0%	64.6%	66.8%	65.7%	56.7%	67.1%	65.2%
65 or more	4.9%	6.7%	4.9%	3.9%	4.3%	2.6%	1.9%

There was a slightly higher concentration of transit users between the ages of 19 and 24 in large suburban systems (29.6%) than in systems of other sizes (15.9% to 20.6%). This was "offset" by a lower concentration

of transit users between 25 and 64 years of age in large suburban systems (56.7%) than in other sized systems (64.6% to 66.8%).

Household Income

Most transit trips are made by users living in low income households. On average, almost half of transit trips are made by people living in households with household incomes less than $20,000 per year (Exhibit 9).

Exhibit 9
Direct Survey Results
Household Income

Household Income	All Systems	Size of System				Multi-Modal Systems [1]	
		Small	Medium	Large	Large Suburban	Bus	Rail
Under $20,000	46.1%	54.4%	43.0%	45.1%	43.7%	47.1%	29.8%
$20,000-$39,999	29.1%	25.7%	34.1%	29.3%	28.2%	32.8%	27.4%
$40,000-$59,999	11.6%	9.6%	12.7%	12.1%	11.8%	10.9%	13.5%
$60,000 or greater	13.2%	10.3%	10.2%	13.5%	16.3%	9.2%	29.3%

[1] *Only the results from Atlanta are reported since results were not available from the other systems.*

Low income users (under $20,000) make up a larger percentage of transit trips at small transit systems (54.4 percent) than they do in medium (43.0 percent), large (45.1%) and large suburban (43.7 percent) systems. This relationship may reflect the greater ability of larger systems to attract choice riders — people with cars available — who typically have moderate to high incomes.

There were only income data from one multi-modal system (Atlanta) in phase three. In Atlanta, low income users (under $20,000) make up a much larger percentage of bus trips (47.1 percent) than of rail trips (29.8 percent). The Atlanta results are consistent with the general finding from the survey results from the first two phases of the TPMS project which showed that low income users (under $20,000) make up a much larger percentage of bus trips (50.7 percent) than rail trips in multi-modal systems, (35.5 percent. This relationship may reflect the greater ability of rail systems to attract choice riders — people with cars available — who typically have moderate to high incomes.

Household Size

Most transit trips are made by users living in small households. On average, almost two-thirds of transit trips are made by people living in households with three people or less (Exhibit 10). This may occur because people in small households are less likely to own an automobile than large households with larger collective incomes.

Caution, however, should be used in interpreting these results on household size since they come from 17 systems of which 16 provide only bus services and one (Atlanta) provides bus and rail services. Since this question was only requested in the third phase of the TPMS project, comparisons with prior results also cannot be made.

Exhibit 10 Direct Survey Results Household Size							
		Size of System				Multi-Modal Systems [1]	
Household Size (Persons)	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
One	20.4%	29.9%	21.9%	18.6%	12.9%	17.6%	17.5%
Two	27.9%	30.1%	27.2%	27.9%	27.2%	26.9%	33.7%
Three	20.1%	17.2%	18.1%	21.1%	24.1%	23.1%	20.2%
Four or more	31.6%	22.8%	32.8%	32.5%	35.9%	32.4%	28.7%

[1] *Only the results from Atlanta are reported since results were not available from the other systems.*

Trip Frequency

Most transit trips are made by passengers who ride frequently. About 70 percent of transit trips at the participating transit systems were made by customers who ride transit five days a week or more (Exhibit 11). Conversely, about 30 percent of trips were made by riders who ride transit four days per week or less.

Exhibit 11 Direct Survey Results Trip Frequency							
		Size of System				Multi-Modal Systems	
Trip Frequency	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
More than 5 days/week	29.0%	19.7%	29.0%	40.5%	26.8%	34.0%	17.2%
5 days/week	40.3%	35.2%	46.7%	31.4%	41.6%	37.7%	46.9%
3-4 days/week	15.8%	22.0%	13.3%	12.3%	17.1%	13.0%	13.2%
1-2 days/week	8.5%	15.9%	6.8%	7.9%	7.3%	8.3%	8.7%
1-2 days a month	6.4%	7.3%	4.0%	7.8%	7.3%	6.7%	14.1%

Noticeably more bus trips are made by users who ride more than five days per week (34.0 percent) than rail trips (17.2 percent). While this observation is based the survey results from only two multi-modal systems (Buffalo and Atlanta), it is consistent with the survey results from the first two phases of the TPMS project.

Duration of Transit Use

Most transit trips are made by relatively recent riders. On average, about 27.1 percent of transit trips were made by riders who had been using transit for six month or less. An additional 11.3 percent of trips are made by riders who used transit from seven to 12 months. This duration of use profile suggests that there is constant turnover in the transit customer base.

Exhibit 12 Direct Survey Results Years Using Transit to Make the Survey Trip							
		Size of System				Multi-Modal Systems	
Years Using Transit	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
0-6 months	27.1%	36.0%	18.3%	40.3%	24.7%	27.7%	25.6%
7-12 months	11.3%	10.8%	9.3%	14.3%	13.3%	11.8%	12.9%
1-4 years	30.1%	35.5%	28.7%	25.3%	32.8%	30.5%	33.9%
More than 4 years	31.5%	17.7%	43.2%	20.2%	29.4%	30.1%	27.7%

Caution, however, should be used in interpreting these results since they come from 13 systems of which 11 provide only bus services and two provide bus and rail services. However, the results generally are consistent with the results from the first two phases of the TPMS project.

Trip Purpose

The trip purpose for transit users was determined using the results of two questions — *Where are you coming from?* and *Where are you going to?* Trip purpose was defined to include all trip purposes except traveling to or from home using the following two-step method:

- The answer to the question *Where are you going to?* was used if the answer was not *Home*.
- If the answer was *Home*, then the response to the question *Where are you coming from?* was used.

Work trips are by far the major reason for transit trips. Work trips account for about half of all transit trips (Exhibit 13). The dominance of work trips holds true regardless of system size or mode operated.

Exhibit 13 Interpreted Survey Results Trip Purpose							
		Size of System				Multi-Modal Systems	
Trip Purpose	All Systems [1]	Small	Medium	Large	Large Suburban [1]	Bus	Rail
Work	51.7%	48.4%	58.9%	50.1%	48.4%	52.7%	54.9%
Shopping	11.3%	18.1%	7.8%	10.1%	11.9%	9.2%	6.1%
College/School	16.0%	17.2%	13.8%	12.7%	19.5%	11.6%	13.2%
Other	20.9%	16.3%	19.6%	27.1%	20.2%	20.5%	25.9%

[1] *Gwinnett County results are not included since its results — 100% work trips — are considered atypical.*

There are differences in the balance of work and school trips by size of system. Work trips account for a greater percentage of transit trips in medium and large systems (58.9 percent and 57.0 percent) than in small (48.4 percent) and large suburban systems (48.4 percent). The percentage of school trips generally decreases by system size, except this percentage increases in large suburban systems, perhaps reflecting ridership to suburban community colleges.

Trip purpose also appears to vary by trip frequency. Work trips account for 60.7 percent of frequent (five or more days per week) trips, but only 32.0 percent of infrequent trips (four or less days per week) (Exhibit 14). This is expected since most people work five days per week.

The relatively high percentage of infrequent trips that are made for work purposes might be explained in two ways:

- Many people only work part time and, therefore, commute less than five days a week.
- Full-time workers may only use public transportation on selected days and may commute by other means on the other days.

Exhibit 14
Interpreted Survey Results
Trip Frequency and Trip Purpose

Trip Purpose	All Systems [1]	Size of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban [1]	Bus	Rail
Work: Frequent	60.7%	61.6%	69.2%	55.4%	55.8%	60.9%	66.9%
Work: Infrequent	*32.0%*	*31.7%*	*35.2%*	*27.4%*	*31.8%*	*28.2%*	*33.9%*
Shopping: Frequent	12.1%	12.2%	5.4%	12.1%	18.1%	6.0%	4.2%
Shopping: Infrequent	*18.5%*	*23.2%*	*15.5%*	*16.1%*	*20.3%*	*16.4%*	*10.1%*
College/School :Frequent	12.6%	16.8%	11.8%	11.7%	11.9%	14.1%	16.3%
College/School: Infrequent	*15.2%*	*19.1%*	*12.2%*	*14.7%*	*16.4 %*	*9.7%*	*13.9%*
Other: Frequent	14.5%	9.6%	13.6%	20.8%	14.1%	19.2%	12.7%
Other: Infrequent	*34.4%*	*26.1%*	*37.1%*	*41.8%*	*31.5%*	*45.8%*	*42.2%*

[1] Gwinnett County results are not included since its results — 100% work trips — are considered atypical.
Frequent = Trips made five or more days per week Infrequent = Trips made four or less days per week

Automobile Availability

About one-third (29.9 percent) of the transit trips at the average transit system are made by *choice* riders — riders who had an automobile available for making their transit trip (Exhibit 15). However, the survey results indicate that there are generally more trips made by choice riders in medium (32.2 percent), large (35.9 percent), and large suburban (29.7%) systems than in small systems (24.8 percent). These results suggest that urban factors such as high parking cost and limited availability may be important reasons why many users choose to ride transit in medium and large systems.

Exhibit 15
Direct Survey Results
Automobile Availability

Automobile Availability	All Systems	Size of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban	Bus	Rail
Yes	31.0%	24.8%	32.2%	35.9%	29.7%	20.0%	52.3%
No	69.0%	75.2%	67.8%	64.1%	70.3%	80.0%	47.7%

There also are higher percentages of trips made by choice riders on rail (52.3 percent) than on bus (28.8 percent). This dramatic difference may be attributable to the speed advantages of rail service versus the automobile due to road congestion in the larger urban areas served by rail.

Home Access/Egress Mode

The home access/egress mode for transit trips (getting to and from transit and home) was determined using the results of four questions:

- *Where are you coming from?*
- *How did you get to this bus service?*
- *Where are you going to?*
- *How did you get to your final destination?*

Home access/egress mode was determined using the following two-step method:

- The answer to the question — *How did you get to your final destination?* — was used if the answer to the question — *Where are you going to?* — was *Home*.

- If the answer was not *Home*, then the response to the question — *How did you get to this bus service?* — was used unless the response to question — *Where are you coming from?*— was not *Home*.

Walking is the most popular way of traveling between transit and home both when starting a transit trip (access) and leaving a transit trip (egress). Sixty-three percent of all passengers surveyed reported that they had walked to transit either to start or to end a transit trip (Exhibit 16).

However, there are apparent differences in the access to and egress from transit systems by system size. People are most likely to walk between transit services and home in small systems. Eighty six percent of the survey participants in small systems reported getting to and from transit in this way. If the respondents accessing or egressing transit via another transit mode (rode bus/train) are excluded from the analysis, walking is the home access/egress mode for over 92 percent of transit trips.

Exhibit 16 Interpreted Survey Results Home Access/Egress Mode							
		Size of System				Multi-Modal Systems	
Mode	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
Walked	63.5%	86.1%	72.8%	54.1%	52.6%	74.9%	35.3%
Car	14.1%	4.5%	10.4%	20.9%	16.9%	8.2%	46.7%
Rode Bus/Train	21.0%	6.5%	16.6%	23.9%	29.0%	16.2%	17.1%
Other	1.3%	3.0%	0.3%	1.0%	1.5%	0.7%	1.0%

However, while walking is still the dominant way of getting between transit and in all systems regardless of size, fewer people walk between transit and home as system size increases. Seventy-three percent of transit trips in medium systems are made by users who reported walking between transit and home while 54 percent of transit trips are made by user who reported walking between transit and home in large systems. This decline in the number of passengers walking between transit and home is driven by increases in car usage and transfer trips from other modes. When transfer trips (rode bus/train) are excluded from the analysis, the decline in walling access/egress is less dramatic, but still apparent — small (92.1 percent), medium (87.2 percent), and large (71.1 percent).

Cars are an important way of getting to and from rail service. Over 40 percent of the rail transit trips in phase three were made by users who either drove cars to or were dropped off at a rail service. Caution should be used in interpreting these results, however, since they come from only three rail surveys in which there was a wide range of results for car access/egress — 27.3 percent (Buffalo) to 47.8 percent (Atlanta) to 64.8 percent (St. Louis). Nonetheless, the differences in the use of the car to travel to and from a bus service and to and from a rail service are consistent with results from the first two phases of the TPMS project and plausible in view of the high automobile availability of rail customers.

Non-Home Access/Egress Mode

The non-home access/egress mode (getting to and from transit at places other than home) was determined like the home access/egress mode using the results of the four questions. Non-home access/egress mode was determined using the following two steps:

- The answer to the question — *How did you get to your final destination?* — was used if the answer to the question — *Where are you going to?* — was not *Home*.

- If the answer was *Home*, then the response to the question — *How did you get to this bus service?* — was used unless the response to the question — *Where are you coming from?* — was *Home*.

The results overall are similar to those for home access/egress mode and vary by system size. Walking is the most popular mode — about two-thirds of trips in phase three were made by riders walking to and from transit service at the non-home end of their trip (Exhibit 17). Another 22 percent of these trips were made by riders transferring to or from another transit vehicle. If the transfer trips are excluded, most trips were made by users who walk at the non-home end of their trips.

Exhibit 17 Interpreted Survey Results Non-Home Access/Egress Mode							
		Size of System				Multi-Modal Systems	
Mode	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
Walked	67.8%	83.2%	75.0%	57.0%	62.5%	67.4%	57.5%
Car	8.4%	4.6%	5.8%	15.2%	7.7%	9.1%	26.3%
Rode Bus/Train	22.2%	8.2%	18.8%	26.5%	28.4%	22.8%	15.0%
Other	1.5%	4.0%	0.5%	1.2%	1.5%	0.7%	1.3%

Again, caution should be used in interpreting the multi-modal results since the rail results from St. Louis were clearly different than the systems in Atlanta and Buffalo and from the results reported in the first two phases of the TPMS project. St. Louis reported a much higher percentage of rail trips that involved car access/egress (45.1 percent) compared with Atlanta and Buffalo. In Atlanta and Buffalo, less than 20 percent of the transit trips are made by passengers who reported using a car to get to or from transit from a destination away from home.

Trip Alternative

Riders surveyed in phase three reported that if transit had not been available they would have made almost half their trips by automobile, either as the driver or as a passenger (Exhibit 18). These responses suggest the strong role that transit plays in reducing traffic congestion.

Exhibit 18 Direct Survey Results Trip Alternative							
		Size of System				Multi-Modal Systems [1]	
Mode	All Systems	Small	Medium	Large	Large Suburban	Bus	Rail
Car	23.9%	18.5%	21.1%	24.9%	31.0%	16.6%	47.0%
Walk	15.9%	18.5%	22.0%	7.0%	11.9%	14.1%	6.9%
Ride with someone	24.7%	26.0%	20.0%	33.1%	24.1%	30.8%	21.0%
Taxi	11.4%	10.4%	13.1%	8.7%	11.8%	13.6%	7.0%
Bicycle	4.6%	8.4%	5.1%	1.1%	3.0%	1.8%	1.5%
Not Make Trip	19.6%	18.4%	18.7%	25.2%	18.2%	23.1%	16.6%

[1] *Only the results from Atlanta are reported since results were not available from the other systems.*

The percent of trips made by users who would have made their trip by automobile if transit had not been available was higher at large transit systems and on rail probably because automobile availability is higher for these riders.

Transit provided a basic mobility service for users making a significant portion of transit trips. One of every

five transit trips are made by riders who stated that they would not make their trips if transit service were not available.

MAJOR POLICY TOPICS

This section presents the results of special analysis of two important policy topics:

- People served in the community; and
- Key policy objectives served as defined by trip purpose, automobile availability, and trip alternative.

People Served in the Community

Transit systems serve more *different* individuals in the community that is suggested by the daily ridership, because there is daily "turnover" in the individuals riding. From the concept of sampling, it may be concluded that a rider who reports using transit once a week on a transit system that operates six days a week actually represents a total of six *different* individuals, each of whom ride on only one day of the week. Extending this concept to all frequencies used in the survey yields the factors shown in Exhibit 19, which may be used to convert frequency of usage to number of different individual users. For example, a person who said that they rode five days a week represents 1.2 different people on a transit system that operates six days of the week and 1.4 different people on a transit system that operates on seven –days of the week.

This approach was used to estimate the ratio of the number of *different* people using transit to the average number of daily transit trips. The conversion factors in Exhibit 19 were applied to the frequency results for each modal survey.

Exhibit 19
Trip Frequency/People Conversion Factors

	Days Operated	
Trip Frequency	**Six Days**	**Seven Days**
7 days a week		1.00
6 days a week	1.00	1.17
5 days a week	1.20	1.40
4 days a week	1.50	1.75
3 days a week	2.00	2.33
2 days a week	3.00	3.50
1 day a week	6.00	7.00
Twice a month	12.00	14.00
Once a month	24.00	28.00

The average ratio of the number of *different* people using transit to the average number of daily transit trips is 2.89 (Exhibit 20). There is no apparent trend in this figure by system size. Rail systems appear to have a higher factor (4.60) than do bus systems (3.20). However, caution should be used in interpreting these results since they represent the results from only two systems — Atlanta and Buffalo. The higher factor for rail is consistent but the percent difference between the factors is not consistent with the results from the first two

phases of the TPMS project. The previous factors — bus = 3.13 and rail = 3.45 — were much closer together than those observed in the third phase.

Exhibit 20
People Served in the Community

	All Systems	Size of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban	Bus	Rail
People Served/Round Trips	2.89	3.09	2.52	3.21	2.95	3.20	4.60

The ratio of different people served in a community to the number of daily trips is high because a large percentage of transit users are infrequent riders. On average, only 30.7 percent of transit trips are made by riders who use transit less than 5 days per week, however, when these trips are converted to people using the multipliers in Exhibit 19, these infrequent riders represent 67.0 percent of all persons using transit. Thus, the experiences of infrequent riders may have a large impact on the perception of transit service in a community.

Exhibit 21
Transit Usage by Infrequent Transit Riders
(Less Than 5 Days per Week)

	All Systems	Size of System				Multi-Modal Systems	
		Small	Medium	Large	Large Suburban	Bus	Rail
Percent of Transit Trips	30.7%	45.0%	23.5%	28.0%	32.0%	28.0%	33.3%
Percent of Total Riders	67.0%	79.3%	56.9%	67.6%	70.0%	71.5%	80.4%

Key Policy Objectives

Surrogate measures of three public policy objectives can be developed using cross tabulations of the user characteristics *trip purpose*, *automobile availability*, and *trip alternative*. The three objectives are:

- **Mobility.** This objective can be measured by determining the percentage of riders who have no automobile available and who are using transit for work, school, shopping, or other trips. These users view transit service as the only means for satisfying basic mobility needs.

- **Congestion Management.** This objective can be gauged by determining the percentage of riders who: 1) have an automobile available for trip making but choose to use transit; or 2) ride transit to and from work and do not have an automobile available, but would make the trip by other means if transit service was not available. These riders, by favoring and using transit, reduce the level of overall congestion in the urban area.

- **Location Efficiency.** This objective can be measured by determining the percentage of users who select transit service for non-work school, shopping, and other types of trips, regardless of whether a car was available. These riders choose to use transit because of its convenience.

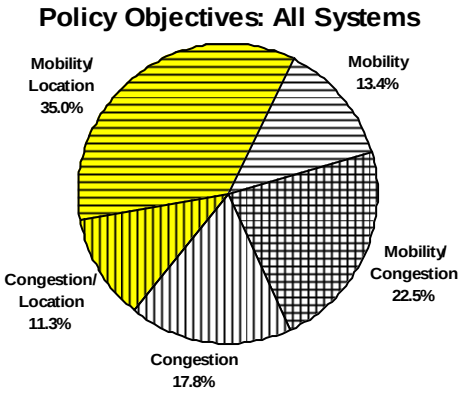
The assignment of the cross tabulation results to the three policy objectives is presented in Exhibit 22.

Exhibit 22
Key Policy Objectives Categories

Car Availability/Trip Purpose/Trip Alternative	All Systems [1]	Size of System				MultiModal System [2]	
		Small	Medium	Large	Large [1] Suburban	Bus	Rail
Combined Mobility/Location EfficiencyObjectives							
No Car/Non-Work/Make Trip	21.7%	29.7%	14.6%	21.5%	24.7%	28.0%	16.3%
No Car/Non-Work/ No Make Trip	13.3%	11.9%	16.6%	12.9%	10.1%	10.4%	7.1%
Total Mobility/Location	**35.0%**	**41.6%**	**31.2%**	**34.4%**	**34.8%**	**38.4%**	**23.4%**
"Pure" Mobility Objective							
No Car/Work/No Make Trip	13.4%	6.0%	22.1%	9.6%	10.7%	11.9%	7.3%
Total "Pure" Mobility	**13.4%**	**6.0%**	**22.1%**	**9.6%**	**10.7%**	**11.9%**	**7.3%**
Combined Mobility/Congestion Management Objectives							
No Car/Work/Make Trip	22.5%	30.9%	14.0%	19.4%	29.2%	29.4%	14.3%
Total Mobility/Congestion	**22.5%**	**30.9%**	**14.0%**	**19.4%**	**29.2%**	**29.4%**	**14.3%**
"Pure" Congestion Management Objective							
Car/Work/Make Trip	11.1%	11.1%	5.5%	18.0%	14.5%	10.1%	31.9%
Car/Work/ No Make Trip	6.7%	0.4%	17.2%	1.0%	1.4%	1.0%	0.8%
Total "Pure" Congestion	**17.8%**	**11.5%**	**22.7%**	**19.0%**	**15.9%**	**11.1%**	**32.7%**
Combined Congestion Management/Location Efficiency Objectives							
Car/Non-Work/Make Trip	8.4%	9.4%	4.1%	15.6%	8.2%	8.2%	20.9%
Car/Non-Work/ No Make Trip	2.9%	0.6%	5.9%	2.0%	1.3%	1.0%	1.4%
Total Congestion/Location	**11.3%**	**10.0%**	**10.0%**	**17.6%**	**9.5%**	**9.2%**	**22.3%**

[1] *Gwinett County results are not included since its results — 100% work trips — are considered atypical.*
[2] *Only the results from Atlanta are reported since results were not available from the other systems.*

There are three "overlap" areas in which trips serve two policy objectives or do "double-duty"— mobility/location efficiency, mobility/congestion management, and congestion management/location efficiency. Together, these overlap areas represent on average over two-thirds (68.8 percent) of the public transportation trips.



Caution, however, should be used in interpreting these results since they come from 16 systems of which 15 provide only bus services and one (Atlanta) provides bus and rail services. However, the results generally are consistent with the results from the first two phases of the TPMS project.

Mobility is, perhaps, the most fundamental reason for offering transit service. Not surprisingly, mobility is associated with the largest share of transit trips that are made. Riders who had no car available and were using transit for work, school, shopping, and other types of trips accounted for 70.9 percent of total transit

trips in phase three (Exhibit 23). As system size increases, the percentage of trips related to mobility decreased, except in the case of large suburban systems which have similar results to small systems.

Exhibit 23
Key Policy Objective Results

Objective ("Pure" or Combined) from Exhibit 22	All Systems [1]	Size of System				MultiModal System [2]	
		Small	Medium	Large	Large [1] Suburban	Bus	Rail
Mobility							
Mobility/Location Efficiency	35.0%	41.6%	31.2%	34.4%	34.8%	38.4%	23.4%
"Pure" Mobility	13.4%	6.0%	22.1%	9.6%	10.7%	11.9%	7.3%
Mobility/Congestion Management	22.5%	30.9%	14.0%	19.4%	29.2%	29.4%	14.3%
Total Mobility	**70.9%**	**78.5%**	**67.3%**	**63.4%**	**74.7%**	**79.7%**	**45.0%**
Congestion Management							
Mobility/Congestion Management	22.5%	30.9%	14.0%	19.4%	29.2%	29.4%	14.3%
"Pure" Congestion Management	17.8%	11.5%	22.7%	19.0%	15.9%	11.1%	32.7%
Congestion Mgmt/Location Effic.	11.3%	10.0%	10.0%	17.6%	9.5%	9.2%	22.3%
Total Congestion Management	**51.6%**	**52.4%**	**46.7%**	**56.0%**	**54.6%**	**49.7%**	**69.3%**
Location Efficiency							
Mobility/Location Efficiency	35.0%	41.6%	31.2%	34.4%	34.8%	38.4%	23.4%
Congestion Mgmt/Location Effic.	11.3%	10.0%	10.0%	17.6%	9.5%	9.2%	22.3%
Total Location Efficiency	**46.3%**	**51.6%**	**41.2%**	**52.0%**	**44.3%**	**47.6%**	**45.7%**
Totals Inlcuding Objective Overlaps							
Total Mobility/Location	**168.8%**	**182.5%**	**155.2%**	**171.4%**	**173.6%**	**177.0%**	**160.0%**

[1] Gwinett County results are not included since its results — 100% work trips — are considered atypical.

[2] Only the results from Atlanta are reported since results were not available from the other systems.

This inverse relationship between the percentages of trips made by users receiving a mobility benefit with size may reflect the higher percentage of users who have an automobile available in larger communities. A higher percentage of trips in larger areas are made by users who choose transit because it is competitive with or superior to automobile travel.

Another reason for the public funding of transit service is to encourage people with automobiles to use transit during periods of heavy road congestion. This public policy objective has gained increasing acceptance over time as the nation's highways have become clogged both in peak and off-peak periods. On average, 51.6 percent of public transportation trips in phase three were associated with managing congestion. Unlike the results for the first two phases of this project, there was not a noticeable difference by system size in the percentage of transit trips contributing to congestion management.

Many people consider the location efficiency objective to be less important than those associated with mobility and congestion. However, the survey results show that in phase three the percentage of trips related to location efficiency was significant at 46.3 percent. System size and mode does not appear to effect the percentage of trips related to location efficiency meaning that ease of access to public transportation is the same regardless of the type of community.

Implementation Problems

The TPMS was designed to collect data on transit customers through an ongoing, systematic program of on-board surveys. A voluntary approach was tried in the final phase of the project in which no TPMS project assistance was provided to participating transit systems as was done in the first two phases. Instead, APTA asked transit systems to provide the results of past surveys that collected data similar to that needed for TPMS. APTA also encouraged transit systems to use the standard TPMS questions in upcoming surveys and share the results with the TPMS project.

This chapter presents problems encountered during the third phase of the TPMS project with emphasis on those that relate to the development of a recurring and voluntary data collection program. These problems include:

- Recruiting methods used to encourage participation in the TPMS project,
- Variability in survey questions and response categories, and
- Frequency of on-board surveys.

It is concluded that more direct contact with the transit systems is needed to address these problems. It is recommended that every transit system in the country be called once a year.

RECRUITING METHODS

In the first two phases, individual transit systems were selected and invited to participate in the TPMS project. However, in the third phase, no effort was made to select transit systems. Instead, efforts were made to encourage transit systems to volunteer to participate in the TPMS project.

A variety of methods were used to promote participation in the TPMS. These methods included:

- **Targeted emails to members of select APTA committees (3 systems recruited)**. APTA emailed the committee members of the Marketing Committee and the Policy and Planning Committee two times (March 2002 and October 2003) during the third phase. Emails are a passive approach to recruitment that relies on the email message to generate participation. This approach likely failed because it was difficult to summarize the TPMS project requirements and benefits in a short email.

- **Presentations on TPMS at APTA meetings (1 system recruited).** Presentations were made at 11 APTA meetings during the third phase. Most presentations were very well attended. However, audience participation tended to focus more on the use and interpretation of the TPMS results rather than the details of how transit systems could participate in the project. Presentations also are a passive approach to recruitment with similar problems to emails. In addition, many of the managers at the meetings were not directly responsible for on-board surveys and, therefore, the responsible managers were one step removed from the TPMS presentation.

- **Direct telephone calls to selected transit systems (16 systems recruited)**. Direct phone calls were the most successful approach for soliciting new transit systems and generated over half of the transit

systems that participated. The success rate for phone calls was about 26 percent. This active recruitment approach was successful, probably for three reasons: 1) The calls removed procrastination as a reason for not participating; 2) Questions and concerns about participating could be addressed directly and immediately; and 3) Some of the transit systems had past relationships with the telephone callers.

- **Recruitment of systems that participated in the first two phases (10 systems recruited).** These systems had experience with the TPMS approach and generally were eager to participate. The prior phase systems that did not participate were willing, but could not, either because they had not conducted recent surveys or because their surveys did not pass the question screening approach. This suggests that once transit systems have participated, they will be more likely to continue to participate in the future.

While the overall participation in the third phase was disappointing, there was significant interest expressed in sharing survey data with APTA and FTA. Over 80 transit systems — about 13 percent of the transit systems in the country — expressed interest in the TPMS.

It is, therefore, recommended that recruitment of participating systems in future TPMS efforts focus on direct telephone calls. Based on the recent experience, it is suggested that if the TPMS were to be continued every transit system in the country would need to be called once a year to determine its interest in TPMS participation and when it plans to conduct its next on-board survey. This would require about 600 annual telephone calls. Subsequent telephone calls would be made based on the schedule for the survey, but would be made at least once a year.

VARIABILITY IN SURVEY QUESTIONS AND RESPONSE CATEGORIES

Some transit systems volunteered to participate in the TPMS project either because they had just, or were just about to, conduct an on-board survey. Unfortunately, the data from these systems were not used for one of two reasons:

- **The questions used in a recent survey did not match the TPMS questions.** The TPMS questions commonly not asked by transit systems were:
    - Do you have a car or other personal vehicle that you could have used to make this trip?
    - If transit service were not available how would you make this kind of trip?
    - How long have you been a regular transit rider — at least once a week?
    - Including yourself, how many people live in your household?

- **The response categories did not match the TPMS response categories.** The most problematic questions were the questions regarding trip frequency and household income.

Discussions revealed that most of these systems would have included the missing TPMS questions or changed their response categories if they had received adequate notice before their surveys were designed. For some systems, the lead times between survey design and survey implementation can be as long as six months.

This problem could be addressed in any future TPMS efforts if the recommendation in the previous section — annual telephone calling of all transit systems — is followed. In the third phase, there were a number of instances (e.g., Lincoln, San Diego) in which transit systems added TPMS questions and response categories to their surveys when given sufficient lead time.

FREQUENCY OF ON-BOARD SURVEYS

One of the most common reasons for not participating in the TPMS project was that no recent survey had been conducted and no survey was planned for the foreseeable future. Most transit systems do not conduct annual on-board surveys because of cost considerations. Instead, they conduct surveys every three to five years and occasionally even longer. Cost considerations, for some systems contacted in the third phase, also played a role in the postponement or cancellation of surveys due to unexpected budget problems that occurred during the recent economic downturn

Again, this problem can be addressed in future TPMS efforts if the recommendation in the first section — annual telephone calling of all transit systems — is followed. The tracking and updating of survey plans is particularly important when the surveys are conducted infrequently since failure to coordinate TPMS surveys may mean a wait for the next survey of three to five years, or, worse, ten years.

CONCLUSION

The common thread throughout the three problems is the need for ongoing direct contact with the transit systems. Direct telephone calls were found to be the most successful approach for soliciting new transit systems. Direct telephone calls also proved effective for retaining transit systems which participated in previous TPMS efforts. Ongoing contact also can insure that: 1) The transit systems will have adequate time to include TPMS questions and response categories in their surveys and 2) TPMS captures the results from transit systems that conduct surveys infrequently.

Therefore, it is recommended that, if the TPMS project is continued, every transit system in the country be called once a year to determine its interest in TPMS participation and when it plans to conduct its next on-board survey. Subsequent telephone calls would be made based on the schedule for the survey, again at a minimum of at least once a year.

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Buffalo Longitudinal Telephone Survey

This chapter summarizes the results of a "longitudinal" survey of the benefits of public transportation as a part of the broader analysis of public transportation benefits under the Transit Performance Monitoring System. The longitudinal survey work was undertaken by NuStats, an Austin, Texas, based research firm, under the general supervision of McCollom Management Consultants and the Federal Transit Administration (FTA).

NuStats conducted a telephone survey in late July and early August 2003 that asked riders in the Buffalo-Niagara Falls region about benefits they had received from public transportation over the past three years and over their lifetimes. The respondents were identified from an on-board survey of bus users that was conducted by the Niagara Frontier Transportation Authority (NFTA) between November 1999 and February 2000. The design of the longitudinal survey was guided by the results of a preliminary survey conducted in spring 2003.

The 2000 on-board survey asked users to provide their telephone numbers if they were willing to participate in a follow-up survey. Of the 661 participants who participated in this onboard survey, 619 provided their telephone numbers (Exhibit 24). The pilot study attempted to contact 149 respondents who, to avoid survey bias, were not contacted again in the full longitudinal survey. The full longitudinal survey contacted 118 (25.1 percent) of the remaining 470 respondents.

Exhibit 24
2003 Buffalo Telephone Survey
Participation of 1999/2000 Survey Respondents

1999/2000 Survey Respondents	Number	Percent of Respondents	
		Total	Full Survey
Total	661	100.0%	
No Telephone Number Provided	42	6.4%	
Telephone Number Provided	**619**	**93.6%**	
Respondents Surveyed During Pilot Study	149	22.5%	
Available for Full Study	**470**	**71.1%**	**100.0%**
Reached and Surveyed in Full Survey	***118***	***17.9%***	***25.1%***

PILOT STUDY

A preliminary survey was undertaken in April 2003 to estimate the percentage of respondents to the earlier onboard survey who could be reached by telephone and to refine and finalize the survey questionnaire for the full longitudinal survey. This pilot study took a random sample of 126 individuals from the 619 respondents in the 1999/2000 onboard survey who had agreed to participate in a follow-up survey. NuStats trained two survey specialists to conduct these preliminary interviews. The two specialists reached 26 of the 126 individuals randomly selected from the 1999/2000 onboard survey. This "hit rate" of 21 percent was judged adequate for the conduct of the full longitudinal survey.

The two specialists conducted the telephone interviews using a semi-structured questionnaire with 12 open-

ended questions (Exhibit 25) to determine: 1) the personal situation of respondents at the time they had participated in the original on-board survey, 2) the degree to which the personal situations of the respondents had changed since that survey, and 3) the role that public transportation had played in facilitating any improvements in the respondents' personal situations.

Exhibit 25
Pilot Questionnaire

Hello, my name is _____. I'm calling on behalf of the American Public Transportation Association. Three years ago [Respondent Name] participated in a survey on-board a Niagara Frontier Transportation Authority bus. I'd like to speak to [him/her] about [his/her] use of transit then and now.

[To Respondent/Proxy] Hi. I'm interviewing people who used transit three years ago to get a better understanding of how being able to get around by bus -- to work, to school, other places -- benefits people.

1. For what reasons did you [he/she] use transit***? PROBE: Work, School, Medical, Social, Recreation***
2. And how often did you [he /she] ride?
3. Think back to your [his /her] life at that time. In what ways did transit help you? *PROBE: Made life easier? Made life better? Improved future?*
4. What would have been different about your [his/her] life back then if transit were not available?
5. Are you [he/she] still using transit?
6. IF YES: For the same reasons as before?
7. IF YES: As frequently?
8. IF NO: Why not? SKIP TO Q.12
9. Would you say you [he/she] are still benefiting from transit today?
10. IF YES: In what ways?
11. IF NO: Why not?
12. What would be different about the life you have right now, if transit had not been available to you [him/her] back then?

An analysis of these open-ended pilot data indicated that the benefits that people received from public transportation could be organized into five categories (Exhibit 26). These five categories were expanded into a list of nine more detailed benefits to facilitate the most complete reporting for the full longitudinal survey.

Most of the respondents in the pilot study identified at least one benefit that he or she had received from using public transportation and many reported that they had received more than one benefit. As a result of these findings and to try to ensure the highest level of comparability between the pilot group and the original onboard survey group, NuStats slightly modified and validated the sampling plan by conducting nine additional pilot interviews from May 1, 2003 to May 9, 2003. The results of both pilot studies were analyzed and used to guide the implementation of the full study

Exhibit 26 Pilot Study Basic and Expanded Benefit Categories	
Basic Benefits	**Expanded Benefits**
Educational Attainment	Able to complete your college or post graduate education
Expanded Job Opportunities	Get type of job you wanted
	Got job in location you wanted
Economic Stability	Able to keep job because you could get to work
	Able to save money to buy things for your self or others
	Had more money to buy things because you could travel to work
Health Maintenance	Better health through walking to/from bus stop
Social Relationship Building	Able to keep up socially with friends or family because you could visit on transit
	Made new friends actually riding on the bus

FULL SURVEY

The full longitudinal survey was conducted between July 25 and August 5, 2003. The survey specialists under contract to NuStats, who performed this work, were trained in data collection techniques prior to collecting the data and were continually monitored during the interviewing process to ensure a high level of quality control.
The average length of each completed survey was 12 minutes. Data were collected interactively during the interview phase with the use of computer-assisted telephone interviewing (CATI) software, to ensure that the right information was collected in the most efficient manner.

The longitudinal telephone survey consisted of 16 questions that focused on the benefits that the users had received over the past three years (2001-2003) and over their lifetimes due to their access to transit (Exhibit 27). The survey interviewers asked most questions in an open-end format in which the interviewer waited for the responses to the questions (e.g., household income = $25,100) before placing them in the response categories (e.g., $20,000-$39,999). However, the survey interviewers did read the individual responses in Question 8 regarding specific benefits that the users received in the past three years.

The survey specialists completed 118 (25.1 percent) surveys from the sample pool of 470 respondents to the 1999/2000 onboard survey (Exhibit 28). The specialists reached an additional 25 people who did not complete the surveys because they either refused or could not be reached after asking to be called back.

Over one-third of the respondents could not be reached because the telephone numbers had been disconnected over the three-year interval between surveys. This probably reflects the mobile nature of bus users and, perhaps, urban residents as a whole.

No answer was the reason for missing one quarter of the respondents. While efforts were made to call these numbers at different times of day and days of week, this result was disappointing.

Exhibit 27
Full Longitudinal Survey

Hello, my name is _____. I'm calling on behalf of the American Public Transportation Association. Three years ago [Respondent Name] participated in a survey on-board a Niagara Frontier Transportation Authority bus. I'd like to speak to [him/her] about [his/her] use of transit then and now.

[To Respondent] Hi. I'm interviewing people who used transit three years ago to get a better understanding of how being able to get around by bus -- to work, to school, other places -- benefits people.

1. We know that you rode transit three years ago because you completed a survey on-board a NFTA bus. Are you still using transit?
YES (Skip to Q. 4) NO (Skip to Q. 7) DID NOT RIDE 3 YEARS AGO

2. Your name was included on a list of people who were surveyed on-board a bus in Buffalo. Are you sure you have never ridden a bus there before?
HAS RIDDEN BUS IN BUFFALO HAS NOT RIDDEN BUS IN BUFFALO (End interview)

3. How often would you say you currently ride transit?
5+ DAYS / WK 1-5 DAYS/ WK ONCE A MONTH OR MORE LESS THAN ONCE PER MONTH

4. Is this more or less often than you remember riding three years ago? Or are you riding with about the same frequency?
MORE LESS ABOUT THE SAME (Skip to Q.6) DK

5. Why has your ridership frequency changed? RECORD RESPONSE

6. For what purposes are you using transit now?
WORK SCHOOL SHOPPING OTHER

7. When you think about the last 3 years, in what ways did having access to transit improve your life situation?
EDUCATIONAL ATTAINMENT HEALTH MAINTENANCE NONE
EXPANDED JOB OPPORTUNITIES SOCIAL RELATIONSHIP BUILDING
ECONOMIC STABILITY OTHER, SPECIFY

8. Still thinking about the last 3 years, which of the following specific benefits have you experienced from riding transit?
Able to complete your college or post-graduate education
Got type of job you wanted
Got job in location you wanted
Able to keep job because you could get to work
Able to save money through transit to buy things for yourself or others
Better health through more walking to/from bus stop
Able to keep up socially with friends or family because you could visit on transit
Made new friends actually riding on the bus
Had more money to buy things because you could travel to work
OTHER, SPECIFY
NONE

9. For how many years have you been riding transit?

10. Were there times over these years when you stopped riding transit? YES NO (Skip to Q. 13)

11. For what reasons did you stop riding transit? RECORD RESPONSE

12. Why did you start riding transit again? RECORD RESPONSE

13. When you think about your life of riding the bus, how has having access to transit improved your life?
EDUCATIONAL ATTAINMENT HEALTH MAINTENANCE NONE
EXPANDED JOB OPPORTUNITIES SOCIAL RELATIONSHIP BUILDING
ECONOMIC STABILITY OTHER, SPECIFY

14. I'd like to get a little information about your current situation. MALE FEMALE

15. What is your current age?
Under 15 15-18 19-24 25-34 35-49 50-64 65+ Refused

16. What was your total annual household income in 2002, from all sources?
Less Than 20K 20-29,999 30-39,999 40-49,999 50-59,999 60-79,999 80K+ Refused

These are all the questions that we have for you today. Thank you for your time and have a great day/evening. Goodbye.

Exhibit 28
2003 Buffalo Telephone Survey
Response Rate and Calling Disposition

Calling Disposition	Number	Percent
Not Residential Telephone Number		
Disconnected Numbers	167	35.5%
Business/Government	5	1.1%
Computer Fax Machine	4	0.9%
Unsure if Residential Telephone Number		
Answering Machine	27	5.7%
Busy	3	0.6%
No Answer	121	25.7%
Residential Telephone Number		
Refusal	14	3.0%
Call Back, but Survey Not Completed	11	2.3%
Completed Survey	118	25.1%
Total	**470**	**100.0%**

KEY PASSENGER CHARACTERISTICS

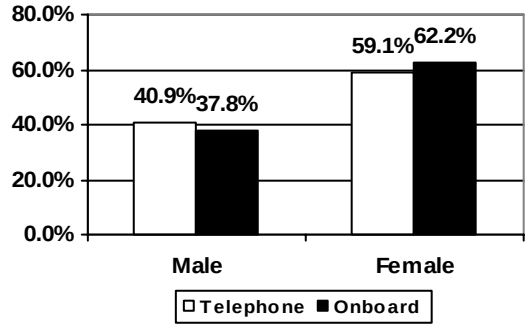
This section provides the key passenger characteristics of the telephone survey respondents in two ways. First, comparisons are made of key passenger characteristics between the sample of respondents that completed the longitudinal telephone survey (118 respondents) and the complete group of respondents (661 respondents) that participated in the 1999/2000 onboard survey. These comparisons are used to assess the degree to which the people interviewed for the longitudinal survey were a representative subgroup of all participants in the original onboard survey. The analysis used the data from the onboard survey to make the comparisons.

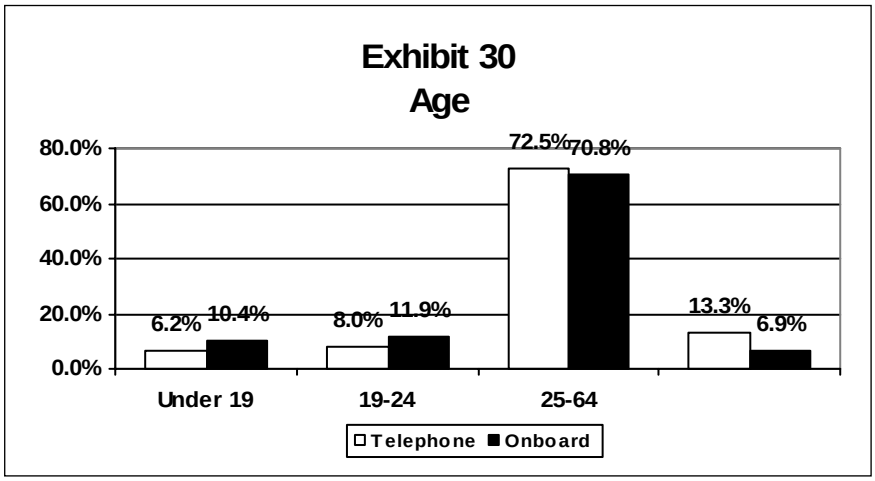
Second, the results of key questions in the telephone survey are presented. These results show how the use of public transportation by the survey respondents changed in the three-year interval between the onboard survey and the telephone survey.

Gender and Age

The respondents in the telephone survey had a relatively comparable distribution by gender and age as the participants in the original on-board survey (Exhibits 29 and 30). For the most part the respondent groups are very close with two exceptions. The telephone sample of respondents was comprised of a somewhat lower percentage of riders under age 19 than was the complete sample of onboard respondents and a somewhat higher percent of riders aged 65 and over. This may have led to a slightly larger estimate of the number of people receiving benefits that were cited by older users such as health maintenance and social benefits.

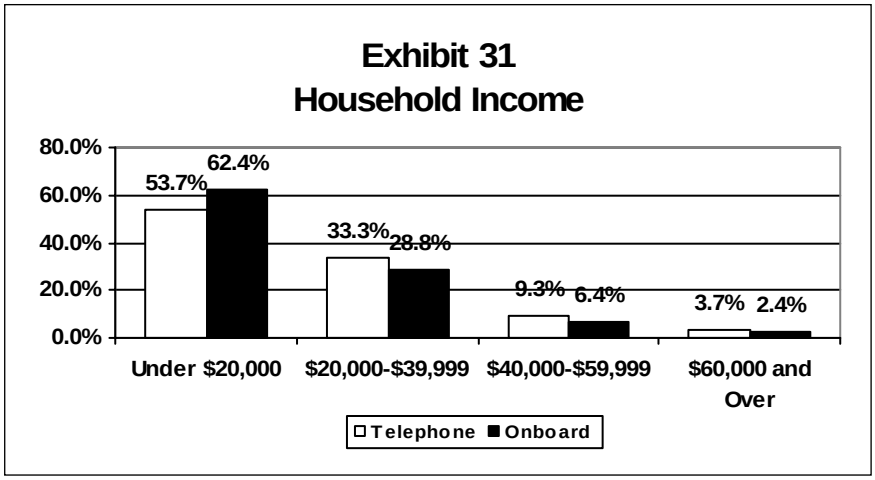
Exhibit 29
Gender





Household Income

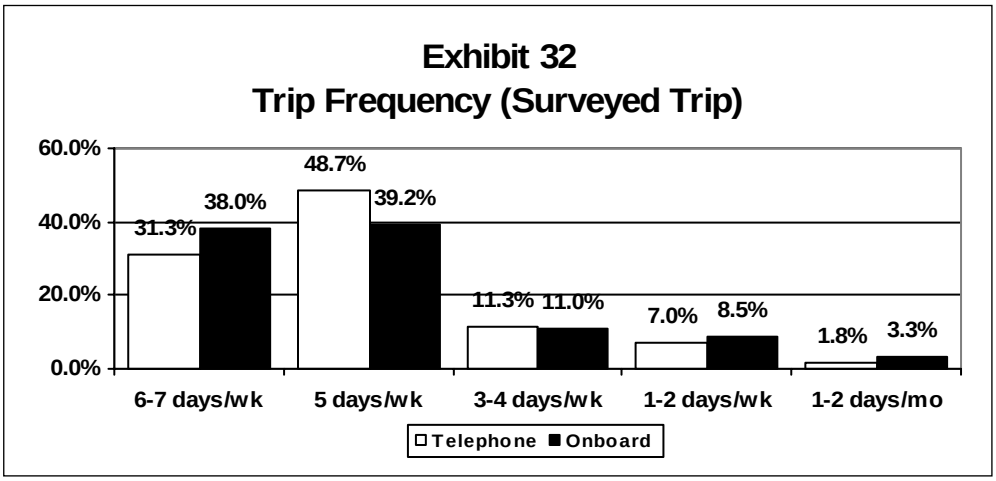
Many of the bus riders on the Buffalo system come from household with limited incomes, which would make to tend them heavily reliant on public transportation. Over 62 percent of the respondents to the onboard survey came from households with incomes of less than $20,000 (Exhibit 31). Only 2.4 percent of the respondents were from households were incomes of $60,000 or more.



The income distributions of the telephone and complete onboard survey respondents are roughly comparable. However, the telephone survey respondents had a lower percentage of people from households with incomes of less than $20,000 than the complete onboard survey respondents. This raises the possibility that the telephone respondents could be less dependent on public transportation than the onboard survey respondents as a whole.

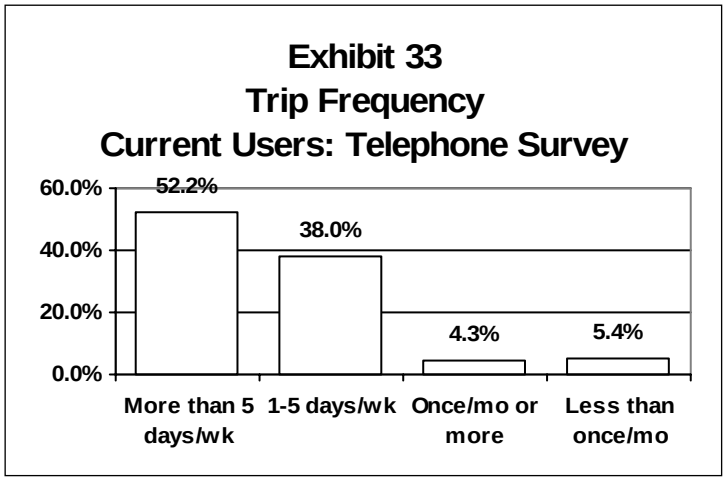
Frequency of Use

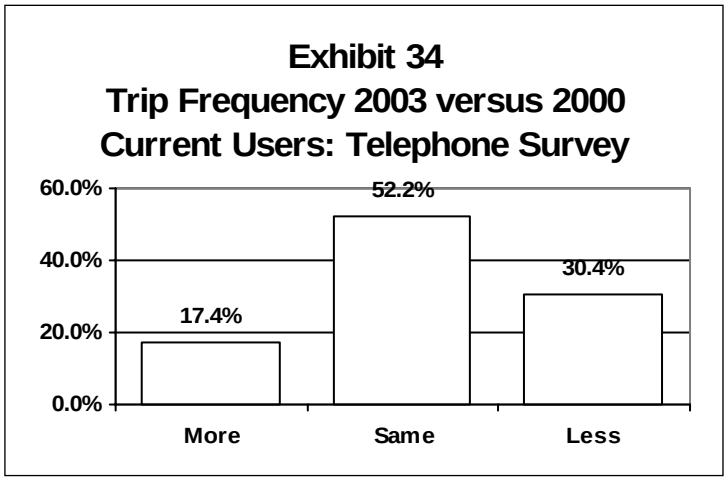
The trip frequency distributions of the telephone and complete onboard survey respondents are very comparable (Exhibit 32). While the percentages of frequent users (more than 5 days per week) are comparable — 80.0 percent (telephone) versus 77.2 percent (onboard), the telephone survey had a lower percentage of respondents making the surveyed trip 6-7 days per week and a higher percentage making the trip 5 days per week. These differences do not appear to be significant in terms of bias.



Most of the telephone survey respondents who had continued to ride transit used it frequently. Over one half of the 92 telephone survey respondents, who were still riding transit, reported that they were riding it five days or more per week (Exhibit 33).

It is important to note that the frequency questions in the telephone and onboard surveys are slightly different. The onboard survey asks about the surveyed trip while the telephone survey asked respondents for their use of transit for all trips.

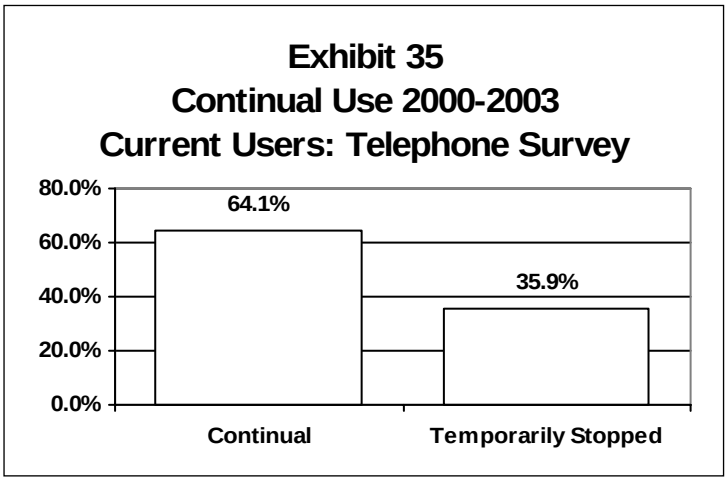




Almost half of those still riding stated that they had changed their frequency of use of public transportation between 2001 and 2003 (Exhibit 34). About 30 percent stated that they were riding it less and 17percent stated that they were using public transportation more.

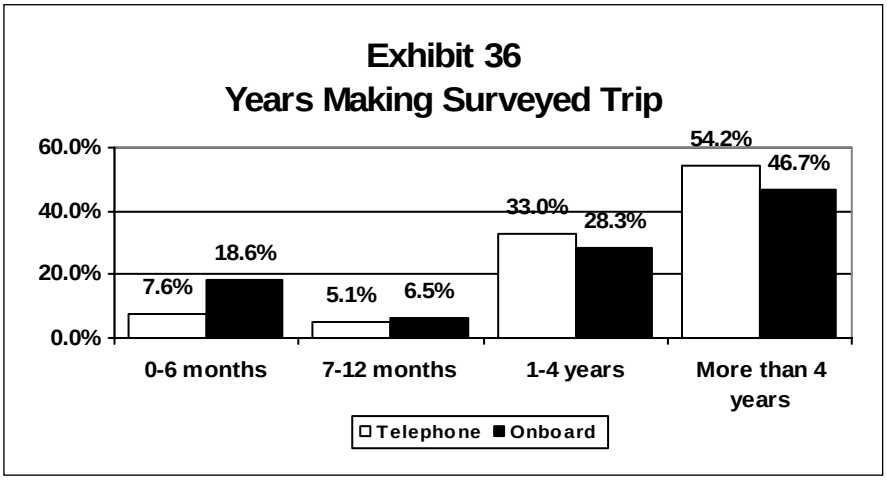
These results suggest that frequency of transit use changes significantly over a short time period (i.e., three years) for many transit users. The telephone survey asked the users the reasons for their frequency changes. The reasons were varied, but typically reflected some change in their life (e.g., new job, new car, physical condition). None of the users cited changes in bus service (e.g., number of routes, fare levels) as reasons for their change of use.

Almost two-thirds of the respondents in the telephone survey who were still riding transit had been doing so

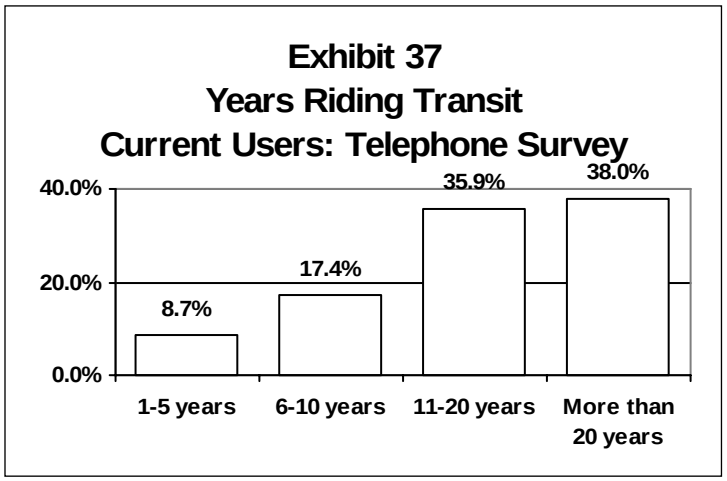


continually (Exhibit 35). Sixty-four percent of these respondents reported they had been riding transit continually, and 36 percent had stopped using it temporarily. Those who had temporarily discontinued riding transit cited purchasing a car, relying on a carpool, family or friends for transportation, leaving the Buffalo area, disability, or a transit strike as reasons for their break in use. These people had all started riding transit again for precisely the opposite reasons, i.e., they had lost the use of their vehicle, their friends or family had lost the use of their vehicles, they had returned to the Buffalo area, and the transit strike had ended.

Duration of Use



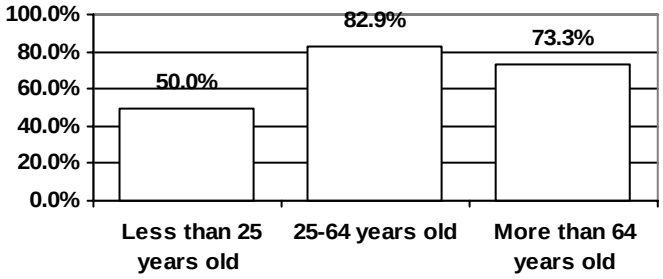
The telephone sample of respondents was roughly comparable to the complete onboard respondents based on the length of time that they rode the surveyed trip (Exhibit 36). However, the telephone sample of respondents had a higher concentration of long-term riders. This appears reasonable since long-term riders might be expected to continue to use transit into the future at a greater rate than short-term users.



Most telephone respondents were long-term transit users. Almost 75 percent of the telephone respondents indicated they had been using public transportation for more than 11 years, and 38.0 percent responded that they had been using it for more than 20 years (Exhibit 37). It is important to note that the distribution in Exhibit 35 relates to overall transit use rather than use for a particular trip and very likely explains the higher percentage of respondents reporting long-term transit use when compared to the results of the onboard survey (Exhibit 36).

Of the 118 people in the follow-up group, 92 were still using transit three years after completing the original on-board survey. The duration of transit use appears to be related to age. Younger riders appear to be more likely shift from transit to other transportation modes. Only 50 percent of the respondents under age 24 in the non-follow-up sample were still riding public transportation compared with 81 percent to those aged 25 to 64 and 72 percent of those over 65 (Exhibit 38).

Exhibit 38
Now Riding Three Years Later
Current Users: Telephone Survey



PASSENGER BENEFITS

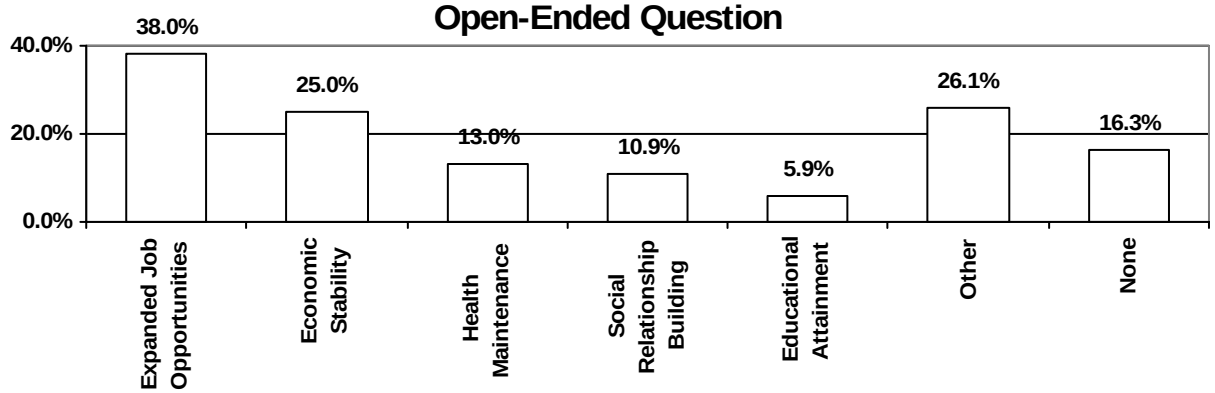
Respondents to the telephone survey were asked to identify benefits that they had received over the past three years and the benefits that they had received in their lifetime. In cases, many respondents replied that they had received more than one benefit.

Benefits in the Past Three Years

Respondents who had continued to use transit were first asked the open-ended question *When you think about the last 3 years, in what ways did having access to transit improve your life situation.* Their responses were post coded by NuStats into the five basic benefit categories developed in the Pilot Study (Exhibit 26) as well as the categories *Other* and *None*. Multiple responses were accepted and coded. About 83.7 percent of the telephone respondents indicated that they had received at least one benefit over the past three years. On average, 1.4 benefits were cited by each respondent. Selected responses are provided in Appendix A.

The most popular benefits mentioned (Exhibit 39) were *Expanded Job Opportunities* (38.0 percent of respondents) and *Economic Stability* (38.0 percent of respondents). These economic-related benefits were expected because of the high use of the Buffalo bus service by work commuters. *Social Relationship*

Exhibit 39
Benefits in the Past Three Years
Open-Ended Question

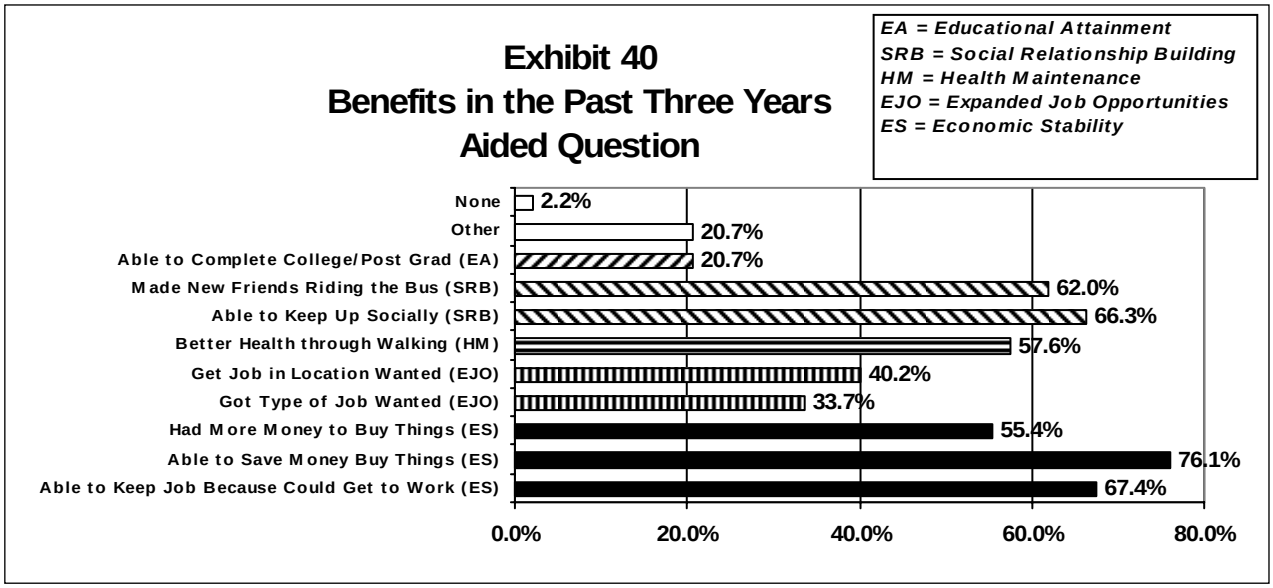


Building and *Health Maintenance* benefits also were important to over ten percent of the telephone survey respondents.

Respondents were subsequently asked about the benefits that they had received over the past three years with aided questions. The nine specific benefit categories developed in the Pilot Study (Exhibit 26) as well as the category *Other* were read to them in order to facilitate their ability to remember reasons that they may not have thought of or did not mention in their response to the previous question.

Almost all telephone respondents (97.8 percent) reported receiving at least one benefit, an increase from 83.6 percent of respondents who cited benefits when asked the open-ended question. On average, 5.1 specific benefits were cited by each respondent.

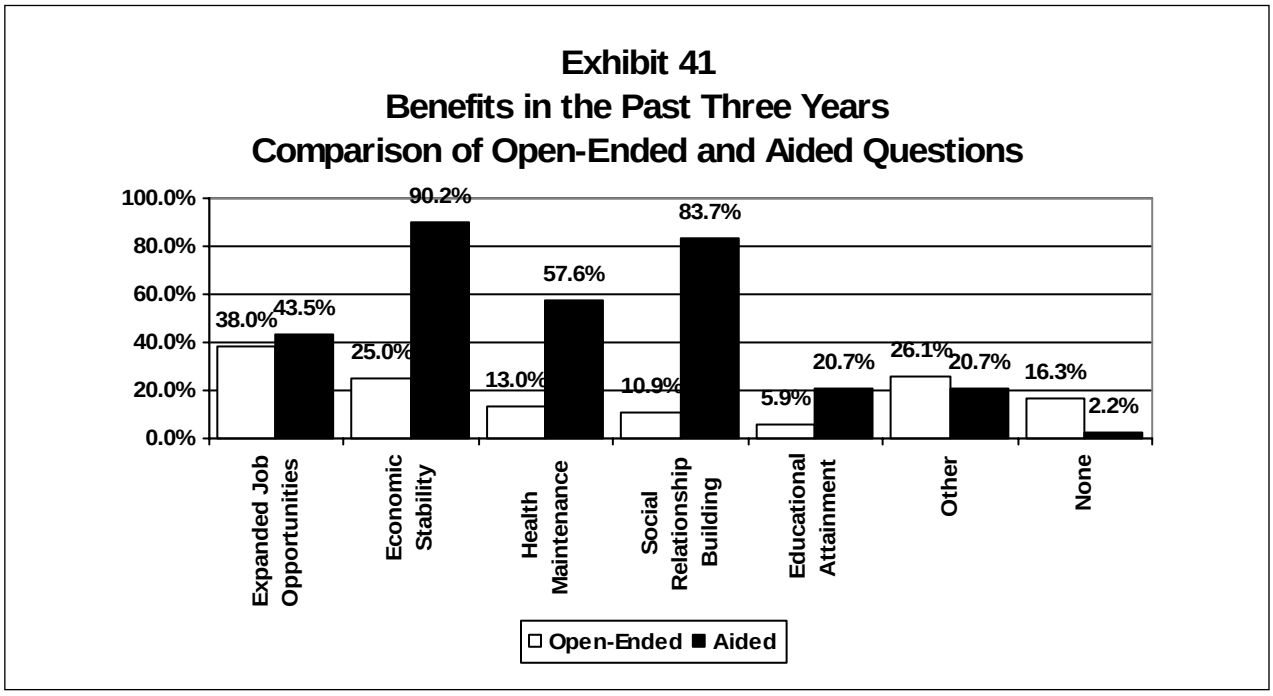
The higher response rate dramatically increased the percentages of telephone respondents who cited specific benefits. Between 55 and 76 percent of the respondents cited each of the three economic stability benefits related to keeping a job and saving/having money to buy things (Exhibit 40). Nearly two-thirds of the respondents cited each of the two social relationship benefits of making friends and keeping up socially. Health maintenance through walking was a benefit for 57 percent of the respondents.



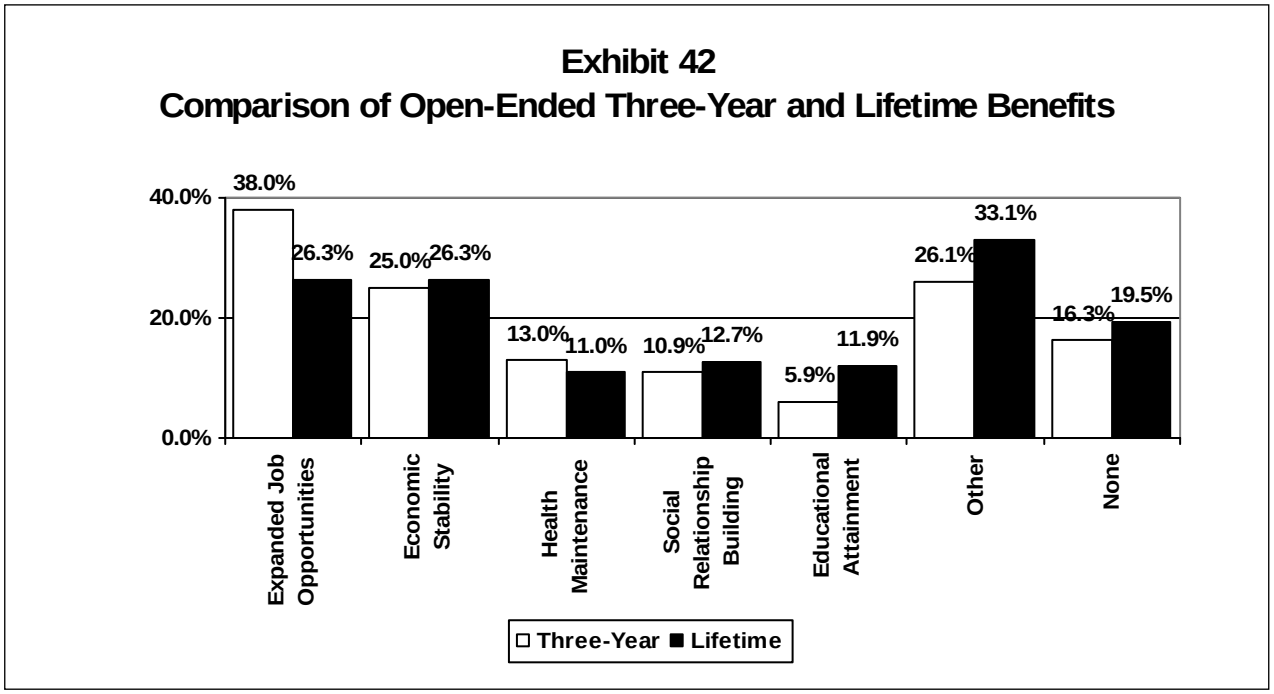
The higher response rates are more apparent when the aided-question responses are categorized into the five basic categories used for the open-ended question (Exhibit 41). Over 90 percent of respondents cited *Economic Stability* as a benefit when the aided question was asked compared to only 25 percent when the open-ended question was asked. Similar large increases occurred for the benefits *Social Relationship Building* (83.9 versus 10.9 percent) and *Health Maintenance* (57.6 versus 13.0 percent). These large increases suggest that these benefits are not foremost (or, perhaps, important) in the minds of transit users since they recognized these benefits only after prompting. In contrast, using the aided question did little to increase the recognition of the important benefit *Expanded Job Opportunities*.

Lifetime Benefits

All telephone respondents — riding or not riding transit after three years — were asked an open-ended question *When you think about your life of riding the bus, how has having access to transit improved your life?* Their responses were post coded by NuStats into the same, five basic categories used for three-year benefits. About 80.5 percent of the respondents reported that they had received at least one benefit from the



use of transit during their life (Exhibit 42). With the exception of the benefit *Expanded Job Opportunities*, the results were very similar to the results from the questions regarding benefits received in the past three years. On average, 1.4 benefits were cited by each respondent, again similar to the results for the three-year



benefit question.

Over one-fourth of the telephone respondents listed lifetime benefits that were categorized as *Expanded Job Opportunities.* Most of people who said that they had received expanded job opportunities did not own a private vehicle and would have found it impossible or much more difficult to get to work if public transportation had not been available. Public transportation not only helped these individuals find and accept

jobs in the first place, but also provided them with a means of keeping these jobs over the longer term. Similarly, one-quarter of the telephone respondents provided answers that were categorized as providing *Economic Stability*. Nearly 75 percent of the respondents who said they had received an economic stability benefit during their life also reported that they depended on public transportation to get to and from work. These individuals were often of prime working age.

Public transit also helps individuals pursue further education. One in eight respondents provided answers that were categorized as *Educational Attainment*. While many of the respondents had depended on public transportation to attend school, many stopped using public transportation once they had graduated or completed their training program. Of those not riding (after three years since the on-board survey), a comparatively large percentage (23.1 percent) indicated educational attainment as a "lifetime" benefit (Exhibit 41). This compares to 11.9 percent of all respondents and 8.7 percent of those still riding.

Exhibit 43
Lifetime Benefits
Educational Attainment Versus Still Riding

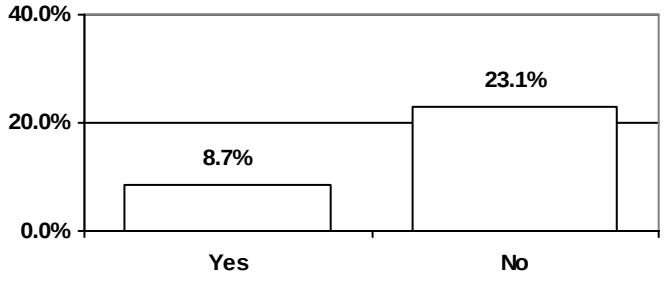
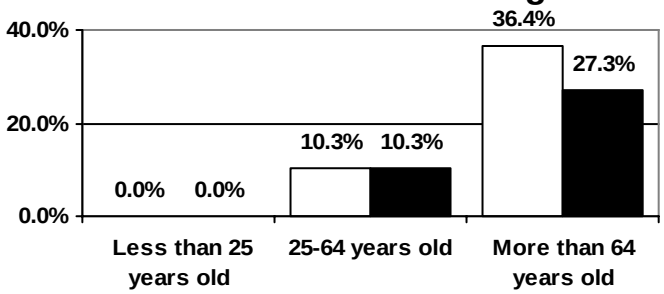


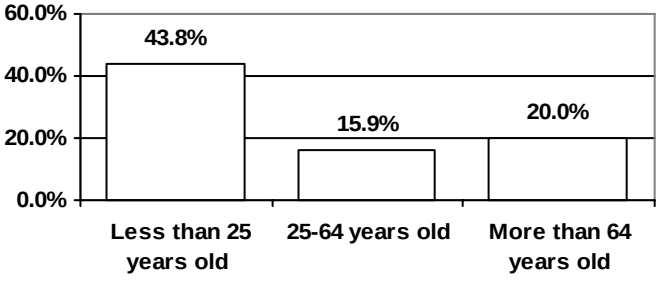
Exhibit 44
Lifetime Benefits
Social and Health Versus Age



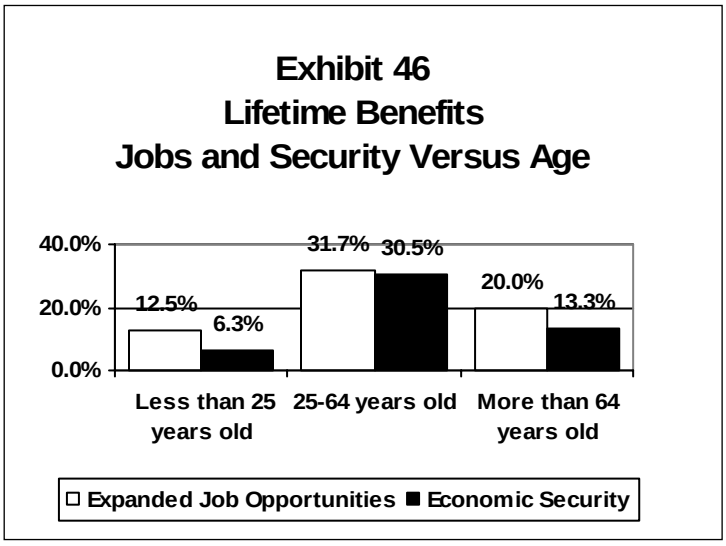
The final two areas in which transit has provided a benefit were *Social Relationship Building* and *Health Maintenance*. Eleven percent of respondents provided answers that were categorized as being used to receive medical attention (*Health Maintenance)* and thirteen percent were categorized as being used to keep up socially with family and friends (*Social Relationship Building*). These benefits were received by respondents who were of working age or older with a higher percentage of respondents who were over 64 years of age (Exhibit 44).

There was some variation in responses based on the age group of individuals. Younger respondents were far more likely than older respondents to reply that they had not received any benefits from transit (Exhibit 45). These results may reflect the longer time period over which older respondents have been able to see the long-term benefits received from transit usage.

Exhibit 45
Lifetime Benefits
Received No Benefit Versus Age



Respondents in the working age group (aged 25 through 64) were more likely to see public transportation providing long term job and economic benefits. They were



more likely to give *Expanded Job Opportunities* as a benefit of transit – 31.7 percent compared to 12.5 percent of those aged under 25, and 20.0 percent of those aged 65 years and older (Exhibit 46). Similar responses were provided for the benefit *Economic Stability.* There responses reflect the importance of transit to working families.

As mentioned earlier, older individuals were more likely to state *Health Maintenance* (i.e. access to doctor's offices or medical care) and *Social Relationship Building* as important lifetime benefits (Exhibit 42). Also, these older individuals have had the experience of being in working families and also felt that public transportation provided long term job and economic benefits (Exhibit 44).

RESEARCH CONCLUSION

The Buffalo telephone survey demonstrated that a longitudinal survey is feasible. The telephone survey was able to reach over 30 percent of the people who completed the on-board survey three years earlier (Exhibit 27). Even when the refusals and failures to respond to call-backs are considered, 25 percent of the on-board survey respondents completed the telephone survey.

No advanced methods were used to search for people who could not be reached (e.g., computerized name and address searches). Through a specialized search service such as Lexis/ Nexis, NuStats International estimated that the completed survey percentage could be increased 10 percentage points from 25 to 35 percent.

The number of completed surveys (118) was too small to make statistically significant conclusions. Typically, over 400 responses are needed for basic analysis. If the completed telephone survey response is assumed to be between 25 and 35 percent, then the on-board survey needs to have between 1,200 and 1,600 responses with telephone numbers.

In spite of the low number of completed surveys, the results appear reasonable. A comparison of the people who were and were not reached by the telephone survey did not show any big differences between the two groups. The results also appeared reasonable and consistent with transit industry experience.

Appendix A: Buffalo Longitudinal Survey Selected Open-End Responses

The following are selected responses to the open-ended question — *When you think about the last 3 years, in what ways did having access to transit improve your life situation?*

Ages 19-24

- I WOULDN'T KNOW HOW TO ANSWER THAT...IT MADE IT EASIER WHEN I NEEDED TO GET TO SCHOOL. I RODE THE BUS WHEN I WAS IN ELEMENTARY
- I DIDN'T NEED A RIDE HOME FROM SCHOOL. IT WENT RIGHT WHERE I NEED TO GO. I DIDN'T HAVE TO ASK FOR A RIDE
- I FEEL LIKE I'M IN BETTER HEALTH BECAUSE I AM FORCED TO WAKE UP EARLIER AND IT MAKES ME ALERT AND READY TO GO FOR WORK.
- WELL I WOULDN'T SAY IT'S IMPROVED MY LIFE BUT IT HAS MADE IT EASIER.

Ages 25-34

- I WOULD NEVER HAVE BEEN ABLE TO GET TO AND FROM CHEMOTHERAPY AT THE HOSPITAL WITHOUT THE BUS. YOU COULD SAY BEING ABLE TO USE THE BUS HAS SAVED MY LIFE.--I HAVE NO FAMILY AND FRIENDS THAT COULD HAVE GIVEN ME THE RIDES FREQUENTLY ENOUGH. I AM DISABLED
- IT GETS ME WHERE I NEED TO GO, IT'S RELIABLE. TO GET ME TO WORK, TO GET THE MALL, SEE FRIENDS.
- WHEN I NEEDED IT ENABLED ME TO GET BACK & FORTH TO WORK. I USED IT TO GET TO MY FRIENDS' HOUSES.
- WHEN I WAS YOUNGER I DEFINITELY NEEDED IT BECAUSE I WAS GOING TO SCHOOL AND WORKING TO JOBS.

Ages 35-49

- I'M ABLE TO GET BACK AND FORTH TO WORK WHICH GAVE ME MONEY TO BUY THINGS. I ALSO NEEDED TO TAKE THE BUS WHEN I WAS GOING TO SCHOOL. I RODE THE BUS FOR THREE YEARS WHILE I GOT MY ASSOCIATE'S DEGREE.
- I'VE FIGURED IT OUT AS WE'VE BEEN TALKING. I THINK IT IS JUST KNOWING THE BUS IS THERE TO USE. THAT IT IS AVAILABLE SEVEN DAYS A WEEK ON A SET SCHEDULE. I DON'T HAVE TO RELY ON ANYONE ELSE.
- I AM FORCED TO WALK FROM HERE TO THERE BECAUSE OF THE STOPS, SO I HAVE HAD BETTER EXERCISE.
- I HAVE NO RESPONSIBILITY FOR A CAR, I ACTUALLY FEEL MORE INDEPENDENT.

- I NEEDED TO GO TO SCHOOL SO, IN ORDER FOR ME TO GET TO SCHOOL, I HAD TO RIDE THE BUS FOR ABOUT A YEAR AND A HALF.
- I WOULD HAVE TO SAY THAT IT ALLOWED ME TO STAY EMPLOYED, I DEPENDED ON METRO.
- IT FOUND ME THE WOMAN THAT I NEEDED. I MET HER ON THE BUS, AND I MARRIED HER.
- IT HAS IMPROVED MY LIFE GREATLY BECAUSE I AM ABLE TO GO ALL OVER THE PLACE. I LIKE TO GO TO CONCERTS DOWNTOWN AND I CAN DO THAT ON THE BUS. WITHOUT IT, I COULDN'T GO ANYWHERE UNLESS I WALK.
- IT IMPROVED MY LIFE GREATLY BECAUSE I WOULDN'T BE ABLE TO GET TO VARIOUS JOBS WITHOUT IT.
- IT MADE SURE I HAD A JOB AND WAS ABLE TO GET TO WORK. I MADE ME FELT INDEPENDENT. I DIDN'T HAVE TO ASK NOBODY TO GIVE ME A RIDE.
- MY HUSBAND CALLS ME THE "BUS QUEEN." I JUST RECENTLY WENT TO A WAKE FOR A LADY THAT RODE MY BUS. I DEFINITELY HAVE MADE A SOCIAL LIFE OUT OF RIDING THE BUS.
- RIDING THE TRANSIT IT DEFINITELY CHEAPER THAN USING MY CAR. IT HAS IMPROVED MY LIFE BY ALLOWING ME TO GET TO AND FROM WORK.
- THE BUS GETS ME TO WHERE EVER I NEED TO GO BECAUSE I DON'T DRIVE. I ACTUALLY CHOSE THE APARTMENT THAT I AM IN BECAUSE IT WAS ON THREE MAJOR BUS LINES. I FEEL RIDING THE BUS IS DEFINITELY CHEAPER THAN DRIVING.
- THE BUS HAS GIVEN ME MORE TIME TO DO RECREATIONAL THINGS. NOT HAVING TO WORRY ABOUT THE HASSLES OF GOING INTO THE CITY FOR EVENTS LIKE MOVIES, CONCERTS, GAMES, AND TASTE OF BUFFALO FESTIVAL. I DO USE THE BUS FOR WORK WHICH IS A PLUS BUT THE ADDED BENEFIT
- THE BUS MADE ME ABLE TO EARN A PAYCHECK. FOR FIFTEEN YEARS I RODE THE BUS AND I WORKED AT A CLINIC IN THE INNER CITY.
- WELL I WAS ABLE TO GET MY EDUCATION USING THE TRANSIT. I NEEDED THE BUS TO GO TO WORK AND SCHOOL. INCOME INCREASE, IT MADE A BIG DIFFERENCE. THE ONLY REASON I BOUGHT A CAR IS BECOME I HAD TO TRAVEL
- WELL IT HELPED ME KEEP MY JOB
- WHEN I SEE WHAT CARS COST, WITH INSURANCE AND GAS AND REPAIRS I THINK IT IS A GOOD SAVINGS.
- YOU MEET A LOT OF DIFFERENT PEOPLE. IT'S A NICE THING.

Age 50-64

- I CAN DO A LOT. I DON'T HAVE TO DEPEND ON ANYBODY. I CAN TAKE THE BUS TO WORK AND BACK
- I GET AROUND TO MORE PLACES AND DIFFERENT PLACES WITH THE BUS. I HAVE ARTHRITIS AND AM ON DISABILITY SO I AM NOT ABLE TO WALK VERY FAR. WITHOUT THE BUS I WOULD BE VERY LIMITED IN WHERE I CAN GO.
- I WAS ABLE TO GET DIFFERENT PLACES, DO OTHER THINGS, ESPECIALLY YEARS BACK WHEN THE CONNECTIONS WERE BETTER

- IT GOT ME OUT OF THE HOUSE. OTHERWISE I'D BE STUCK IN THE HOUSE. NOT ALL THE TIME, BUT ALMOST. I WAS ABLE TO GO SHOP, JUST GET OUT
- IT HAS IMPROVED MY LIFE BECAUSE OF CONVENIENCE AND RELATIVE LOW COST. PUBLIC TRANSIT IS SO MUCH CHEAPER THAN OWNING A VEHICLE. JUST THE COST OF OPERATING A CAR IN TERMS OF GAS AND OIL I CAN TAKE THE BUS OR RIDE THE TRAIN FOR MUCH CHEAPER.
- IT WOULD BE TOO HARD TO GET TO WORK WITHOUT THE BUS. I ALSO USE IT TO VISIT MY GIRLFRIEND SO THAT WAY WE CAN JUST RELAX AT HER HOUSE

Age 65+

- I STARTED USING IT WHEN MY HUSBAND DIED 13 YEARS AGO. IT'S VERY HANDY FOR ME. THE ONLY ALTERNATIVE IS TO WALK, OR TAKE CABS.
- I WOULDN'T BE ABLE TO GET AROUND, OR TAKE CARE OF EVERYDAY THINGS.
- IT ALLOWS ME TO VENTURE OUT AND GO INTO DIFFERENT PARTS OF THE CITY TO SEE WHAT'S GOING ON. I KNOW A LOT OF PEOPLE AND A LOT PEOPLE I AM ACQUAINTED WITH. IT IS JUST A WAY OF LIFE FOR ME.I ENJOY RIDING BECAUSE IT GIVES ME A FREEDOM
- LET'S JUST PUT IT THIS WAY I DON'T HAVE TO BOTHER ANYBODY TO PICK ME UP AND TAKE ME HERE OR THERE. I ALWAYS TRY TO MOVE IN THE VICINITY WHERE THE BUS IS AVAILABLE. I'M HAPPY TO KNOW THAT I DON'T HAVE TO DEPEND ON ANYONE.
- NEVER REALLY RODE THE BUS TOO MUCH. DROVE A CAR UNTIL EYESIGHT WAS TOO BAD. IF I NEEDED TO GET AROUND AFTER I QUIT DRIVING I WOULD WALK TO THE STORE AND GET A CAB HOME BECAUSE YOU CAN'T TAKE TOO MANY GROCERIES ON THE BUS. I DON'T REALLY REMEMBER
- PRIMARILY THE FACT OF INDEPENDENCE. WHEN I HAD A VEHICLE IT WAS A SOURCE OF TRANSPORTATION IF I HAD PROBLEMS WITH THE VEHICLES, BUT I ALWAYS RODE EVEN WHEN I HAD VEHICLES.