NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
REPORT 82

NATIONAL SURVEY OF TRANSPORTATION ATTITUDES AND BEHAVIOR

PHASE II ANALYSIS REPORT

IGHWAY RESEARCH BOARD
ATIONAL RESEARCH COUNCIL
ATIONAL ACADEMY OF SCIENCES—NATIONAL ACADEMY OF ENGINEERING

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
REPORT 82

NATIONAL SURVEY OF TRANSPORTATION ATTITUDES AND BEHAVIOR

PHASE II ANALYSIS REPORT

ROBERT K. McMILLAN AND HENRY ASSAEL
CHILTON RESEARCH SERVICES
PHILADELPHIA, PA.

RESEARCH SPONSORED BY THE AMERICAN ASSOCIATION
OF STATE HIGHWAY OFFICIALS IN COOPERATION
WITH THE BUREAU OF PUBLIC ROADS

SUBJECT CLASSIFICATION:
TRANSPORTATION ADMINISTRATION, FINANCE,
AND ECONOMICS
ROAD USER CHARACTERISTICS
TRAFFIC MEASUREMENTS
URBAN TRANSPORTATION PLANNING

HIGHWAY RESEARCH BOARD
DIVISION OF ENGINEERING NATIONAL RESEARCH COUNCIL
NATIONAL ACADEMY OF SCIENCES—NATIONAL ACADEMY OF ENGINEERING 1969

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Bureau of Public Roads, United States Department of Transportation.

The Highway Research Board of the National Academy of Sciences-National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to its parent organization, the National Academy of Sciences, a private, nonprofit institution, is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway departments and by committees of AASHO. Each year, specific areas of research needs to be included in the program are proposed to the Academy and the Board by the American Association of State Highway Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are responsibilities of the Academy and its Highway Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

This report is one of a series of reports issued from a continuing research program conducted under a three-way agreement entered into in June 1962 by and among the National Academy of Sciences-National Research Council, the American Association of State Highway Officials, and the U. S. Bureau of Public Roads. Individual fiscal agreements are executed annually by the Academy-Research Council, the Bureau of Public Roads, and participating state highway departments, members of the American Association of State Highway Officials.

This report was prepared by the contracting research agency. It has been reviewed by the appropriate Advisory Panel for clarity, documentation, and fulfillment of the contract. It has been accepted by the Highway Research Board and published in the interest of an effectual dissemination of findings and their application in the formulation of policies, procedures, and practices in the subject problem area.

NCHRP Project 20-4 FY '68
NAS-NRC Publication 309-01779-3
Library of Congress Catalog Number: 77-603754

FOREWORD

By Staff

Highway Research Board

The findings of this study and the relationships of people's attitudes with demographic characteristics will be of special interest and of practical use to highway department administrators, transportation and planning officials, and highway engineers faced with making decisions on matters regarding resource allocation for improving existing or providing new transportation facilities. It will also aid those officials when they are required to present public works programs or projects to legislative bodies, before public hearings, or to the news media. The results obtained from this comprehensive national survey on transportation attitudes and behavior, conducted by two independent research agencies, are dramatic proof of the important role that the automobile plays in the American household—how the American public holds the automobile in high regard and personally identifies with it.

Reliable information is needed on public attitudes and behavior related to transportation to permit more effective planning for the allocation of resources for transportation purposes. The objective of the research reported here was to determine the attitudes and behavior of the public as they relate to transportation, and to identify the factors that influence such attitudes and behavior.

In May 1967, as part of the National Cooperative Highway Research Program, the National Academy of Sciences contracted with two independent survey organizations—Chilton Research Services and National Analysts, Inc.—to conduct hour-long interviews with two multi-stage area probability samples of 2,500 people each, 18 years of age and older, living in households in the continental United States. Interviewing was done from August through October 1967. Identical questionnaires were used by both organizations so that the data collected by the two survey organizations could first be compared to insure that unbiased results were obtained. Each organization coded, punched, and tabulated its results separately. Analysis was performed by Chilton Research Services. *NCHRP Report 49,* "National Survey of Transportation Attitudes and Behavior—Phase I Summary Report," published in 1968, presented a preliminary summary analysis of the national survey, and was based primarily on a cross-tabulation of transportation attitudes, behavior, and demographic characteristics.

This Phase II Analysis Report considers the findings tabulated in the earlier report, yet goes beyond them in presenting results of a more advanced statistical analysis of the data. The analysis is multivariate in nature; that is, it considers many variables simultaneously to obtain a comprehensive view of transportation attitudes, their relation to behavior, and profiles of people holding these views.

The report is in two parts. The first part presents a summary of the findings in non-statistical terms. This portion of the report will be useful to readers not specifically interested in methodology and statistical analysis. Included are 16

charts showing the attitudes towards spending for roads and highways and public transportation by eight demographic variables. The second part deals more comprehensively with the data by describing the analysis methodology, statistical methods, and more detailed findings. An appendix describes the survey plan and contains questionnaires used in the study. Should qualified researchers have an interest in pursuing the work further, some 1,700 tables of cross-tabulations are available for review in the NCHRP offices of the Highway Research Board.

CONTENTS

ACKNOWLEDGMENTS

The study for which this constitutes the second phase analysis report was performed by Chilton Research Services, for whom Robert K. McMillan, Senior Research Plans Director, acted as Principal Investigator. He was assisted in the planning and analytical phases of the study by Dr. Henry Assael, Associate Professor of Marketing, New York University.

Grateful acknowledgment is also made to James M. Marshall, Vice President, National Analysts, Inc., who had the responsibility for a separate 2,500-individual sample; to Alan M. Voorhees, President, Alan M. Voorhees Associates, for helping with the planning, pretesting, and development of the questionnaires, and with the analysis of the data; to Dr. Martin Wachs for contributing to the development of Questions 7 and 8 on attitudes towards quality and allocations to transportation; and to David Werdegar, Vice President, HDC Associates for computer programming.

NATIONAL SURVEY OF TRANSPORTATION ATTITUDES AND BEHAVIOR

PHASE II ANALYSIS REPORT

SUMMARY

The automobile is by far the most important mode of travel to the American household. Not only is it an important dimension of pride, material ownership, and personal involvement, but also attitudes towards the automobile are very positive, their intensity differing by region, population density, and other demographic factors. Nevertheless, although the automobile is favored most as a mode of transportation, it is not favored at the expense of public transportation, as shown by the following:

The individual who rates the automobile high as a mode of transportation (Q. 13-17),* does not necessarily rate public transportation low.

The person who is dissatisfied with the transportation attributes of public transportation (Q. 18) is not necessarily satisfied with the attributes of the automobile.

The individual who rates public transportation facilities high does not necessarily rate roads and highways low (Q. 7). The only conflict between the two modes appeared in the ratings on allocation of money and effort (Q. 8). People who wanted more money allocated to roads and highways tended to have a more negative view of existing public transportation facilities.

Those who wanted to allocate more money to public transportation placed a higher value on that mode. Thus, attitudes towards transportation facilities are tied to the individual's feelings regarding the allocation of public funds. Yet even here, the person who felt more should be allocated to one mode did not feel less should be allocated to the other. A significant proportion of people (30%) took the view that greater effort was required in both directions.

The fact that roads and highways and public transportation are not viewed as competitive modes by most people is significant when one considers problems of resource allocation to transportation facilities. Additional allocations to roads and highway facilities are not likely to be viewed as a threat to public transportation requirements by urban dwellers relying on mass transit. Conversely, any increased emphasis on public transportation is not likely to bring protests from those relying heavily on automobile transportation.

One important objective of the study was to determine attitudes towards spending more for roads and highways and public transportation (Q. 8), and to describe the types of people holding these attitudes. Fifty-four percent felt more should be spent on roads and highways, and 46% felt more should be spent on public trans-

* "Q" numbers refer to questions in the questionnaire (Appendix A).

portation. Most of the remaining groups felt the same amount should be spent on these facilities. Only 3% felt less should be spent on roads and highways, and 6% felt less should be spent on public transportation.

People favoring an increase in spending for roads and highways were more likely to live in the South, live in rural areas, travel more by automobile, and place a somewhat lower value on public transportation. They were also more likely to be men and to be under 40 years old. Those favoring greater expenditures for public transportation were more likely to live in the East or West, in metropolitan areas, travel more by public transportation, and have less favorable attitudes towards highway planning and towards the role of the automobile in American society.

Attitudes towards highway planning and planners were positive (Q. 11), yet they were not as positive as attitudes towards the automobile. Attitudes towards the automobile's role in American society (Q. 10) averaged 80 on a 100-point scale, while attitudes towards the automobile as a mode of transportation (Q. 13-17) averaged 89. The average rating for highway planning, however, was 67. One cannot automatically assume that a positive view of the automobile will produce a positive view of roads and highways. It is evident that many people distinguish between this mode of transportation and the facilities used.

People in general tend to be more critical of the facilities than of the mode of transportation. The automobile is often viewed as an item of ownership and pride going beyond its purely transportational function. Planning for road and highway facilities is more likely to be the subject of criticism. It is true that people relying more heavily on the automobile are also more likely to favor increased highway expenditures. Yet increased automobile use will not necessarily forecast a more favorable attitude towards the quality of road and highway facilities.

In addition, it is significant that those most critical of highway planning are more likely to favor increased expenditures for public transportation. These metropolitan residents do not favor a decrease in allocations to roads and highways. (In fact, most favor an increase.) Rather, they are more critical of the way these allocations are spent.

People most likely to favor the way roads and highways are planned and built lived in the North Central or South, in non-metropolitan areas, and rated the automobile somewhat higher than the rest of the sample. They also tended to have a somewhat lower level of education and income.

Another important finding was that automobile use, as defined by total vehicle-miles driven by households (Q. 22-25), tends to be independent of attitudes towards the automobile or highway planning. The number of miles driven was related more to demographic and use patterns. Extensive highway users were more willing to allocate more money to roads and highways. They were more likely to have higher incomes, larger families, live farther from their place of work, have more education, travel more for work purposes, and work in non-blue-collar occupations. The dominance of demographics rather than transportation attitudes in defining the extensive highway user suggests that automobile use is conditioned by the particular business and family requirements of the respondent, rather than specific attitudes and opinions.

There may be two reasons for this. First, family and business requirements may permit little deviation in transportation use, despite attitudes. People may have no real alternative to the mode of transportation for certain use conditions. Use,

therefore, becomes more a function of the occasion and other specific restraints and is not likely to be conditioned by attitudes. Second, people tend to divorce the automobile from the facilities it uses. Therefore, people may be dissatisfied with the facilities yet maintain a high rate of vehicle use because of satisfaction of other needs. This suggests that the level of use of road and highway facilities cannot be regarded as an indication of the degree of satisfaction with these facilities.

Attitudes towards public transportation facilities were more closely related to use of these facilities compared to roads and highways. People placing a higher value on public transportation (Q. 9) tended to use these facilities more frequently and were willing to allocate more money to them. They also were more likely to live in metropolitan areas, travel more by public transportation, live in Eastern states, and express dissatisfaction with the transportation attributes of the automobile (Q. 18) and with highway planning (Q. 11). The greater influence of transportation attitudes in describing people with more favorable attitudes to public transportation demonstrates that the perceptual separation between mode and facility that existed for the automobile was not as evident for public transportation. This is logical, because people do not associate pride of ownership with public transportation modes. As a result, use of the mode is perceptually tied to use of the facilities. Experiences with public transportation are therefore more likely to be reflected in attitudes towards the mode compared with the automobile.

The interrelationships between various opinions and attitudes concerning transportation modes and facilities were examined. For instance, people rating the quality of roads and highways poor were more likely to want to increase spending for roads and highways. The same held true for public transportation. A negative attitude towards the quality of the facility was more likely to produce a positive attitude towards increased spending. Thus, the heaviest users of roads and highway facilities are likely to be critical of these facilities yet desire greater allocations. This is logical, because the frequent driver is more aware of and, therefore, more discriminating in evaluating these facilities.

In addition, agreement with statements favorable to the automobile's role in society (Q. 10) was likely to produce agreement with statements positive to highway planning and also result in a higher value placed on the automobile compared to public transportation (Q. 9).

When attitudes towards specific transportation modes for particular occasions were interrelated, it was found that people favoring a certain mode tended to favor it for most use occasions. Favorable attitudes towards one mode were not won at the expense of other modes. People favoring the automobile for local use rated it positively for all use occasions. Those favoring subways also rated commuter trains positively for all local occasions.

The relationship between long-distance automobile and air travel was the only case where transportation modes were viewed in a competitive manner. Persons rating automobiles positively for long-distance travel for family or business occasions were more likely to rate air travel negatively. It is significant that attitudes towards long-distance modes of transportation are more likely to be competitive than attitudes towards local modes. Local modes may be regarded in a more complementary fashion for several reasons—it is possible that alternative modes for local travel may be very limited compared to long-distance travel. Moreover, local

travel may represent a combination of modes for single-use occasion—auto to public transportation, bus to subway, etc. In contrast, the alternatives for long-distance travel may be more clearcut—air vs auto or auto vs train—thus creating a competitive perception.

Transportation attitudes were cross-tabulated by demographic characteristics. Location, population density and occupation were the characteristics that most sharply differentiated people by their transportation attitudes. Easterners generally held the most positive attitudes towards public transportation and the least positive attitudes towards the automobile compared to other regional groups. They were also less favorable to highway planning and planners. Southerners held the most positive attitudes towards the automobile.

Metropolitan area residents placed a higher value on public transportation. They also tended to be more critical of the automobile's role in society and of highway planning. Rural people displayed the opposite tendencies.

Data on people in five metropolitan areas with rail mass transportation (RMT) were separated from the rest of the sample. They were found to have attitudes similar to those of people in other large metropolitan areas, but placed a somewhat higher value on public transportation and displayed greater willingness to increase spending for this mode.

Higher income groups also tended to be more critical of all modes of transportation and of highway planning and planners. They were somewhat more favorable to improvements in public transportation over improvements for roads and highways. People with less education held more positive attitudes towards the automobile, but were less willing to spend more on roads and highways.

Considering occupational categories, professional people were more critical of the automobile and highway planning and felt greater emphasis should be placed on public transportation. Blue-collar workers demonstrated the opposite attitudes.

Younger people tended to be more critical of all transportation modes and were more willing to spend more for roads and highways compared to the rest of the sample.

Cross-tabulations by race produced some differences by transportation attitudes. Non-whites expressed more favorable attitudes to public transportation than whites. They felt more money should be spent on these facilities.

Males were somewhat more positively oriented to the automobile and were more willing compared to females to increase spending for all transportation facilities.

Significantly, those most critical of transportation facilities in general tend to be younger, higher income, professional, and more educated. The question is whether the opinions of this group are conditioned by the fact they are more frequent travelers, or whether they are more likely to be hypercritical of all allocation and policy processes. Any changes in highway policy and allocations are not likely to improve the attitudes of the "professional critics." On the other hand, should frequent travel make this group more aware of required facilities, shifts in their attitudes become an important criterion for evaluating the effectiveness of highway planning.

CHAPTER ONE

INTRODUCTION AND RESEARCH APPROACH

OBJECTIVES OF THE STUDY

This survey was undertaken because reliable information is needed by highway planners relating to the public's attitudes towards, and use of, transportation modes and facilities.

The major objective of this analysis was to determine the nature of transportation attitudes, the relationship of these attitudes to the use of transportation facilities, and the underlying factors that influence attitude and behavior patterns. Attitudinal information will allow highway planning to be sensitive to public needs. The analysis will also determine whether use of transportation facilities is greatly affected by transportation attitudes, by demographic characteristics, or by a combination of both. This, in turn, will permit highway administrators to adjust plans and allocations on the basis of region, use, or expressed need. Hopefully, this will permit more effective planning and allocation of resources for transportation purposes. To accomplish these objectives, the analysis had to determine:

1. Attitudes towards specific transportation modes and facilities (i.e., roads and highways, public transportation, highway planning, the automobile for specific occasions, satisfaction of needs by automobile and public transportation, etc.)
2. The interrelationship between these various categories of attitudes. (Do those who have positive attitudes towards roads and highways hold negative attitudes towards public transportation? Are those who favor the automobile as a mode of transportation satisfied with highway facilities?)
3. The interrelationship of transportation attitudes to behavior. (Are attitudes reflected in the pattern of use, or is use independent of perceptions and contingent on the use occasion or other environmental constraints? For instance, do extensive highway users hold different attitudes towards highway facilities compared to the rest of the sample?)
4. User characteristics as defined by commonly held demographic, attitudinal, and use patterns. (Do extensive highway users have common attitudinal and demographic traits? Do people with positive attitudes towards public transportation constitute a homogeneous subsegment of the sample as defined by common attitudes or use patterns?)
5. The views of people regarding allocation of resources to roads and highways and public transportation. (To what extent do people feel more time and money should be allocated to roads and highways and public transportation? More specifically, what emphasis should be placed on highway maintenance, construction, parking facilities, adjunct highway services, law enforcement, etc.? Is the emphasis on roads and highways and the emphasis on public transportation viewed as competitive or complementary?)

ANALYTICAL PLAN

A rigorous analytical plan was required to fulfill these objectives. It was necessarily complex, because a person's transportation attitudes are made up of a broad range of opinions, experiences, and perceptions regarding transportation modes and facilities. The determination of the nature of these attitudes required exploratory interviews in the early phase of the study. The transportation attitude and value questions in the National Survey (Q. 9-12, 18, 19, 30, and 31)* were based on these early discussions.

Given the means to measure attitudes, the results of the survey produced a cross-tabulation analysis presented in Phase I of the study.† Attitudes were cross-tabulated against use to determine if there was any variation by extent of use of transportation facilities. Demographic characteristics such as age, income, education, and distance from place of work were cross-tabulated with attitude and use categories to determine if user and attitudinal types had fairly homogeneous characteristics. The reporting in Phase I did not differentiate between people living in the five metropolitan areas with rail transportation available for local trips (New York, Philadelphia, Boston, Chicago, and Cleveland) from the other metropolitan areas and the remainder of the United States. This task was reserved for Phase II. Comparisons were made for attitudes and behavior of people in the five metropolitan areas having rail as part of the local mass transportation system, other large metropolitan areas, and the rest of the United States. The cross-tabulated variables are similar to those included in the Phase I report.

The major part of the Phase II analysis consisted of applying more advanced statistical techniques (multivariate methods) to determine the interrelationships between various categories of transportation attitudes and the total range of attitudes, demographics, and behavior use. The profile analysis of attitudinal and user types was also undertaken in this second phase. Multi-variate statistical methods were required because the nature of the problem required dealing with more than one variable simultaneously. (In fact, one portion of the analysis dealt with 50 variables simultaneously in determining their relationship to vehicle-miles driven.) This analysis thus went well beyond the one-by-one type cross-tabulation of the Phase I report.

The second step in the Phase II analysis involved a factor analysis to develop well-defined attitudinal categories. Based on this analysis, each individual could be assigned

* "Q" numbers refer to questions in the questionnaire (Appendix A).

† Results of the cross-tabulation analyses appear in "National Survey of Transportation Attitudes and Behavior—Phase I Summary Report. *NCHRP Report 49* (1968).

a specific attitudinal category such as positive, neutral, or negative to the idea of greater allocations to roads and highways; favorably or unfavorably oriented towards the role of the automobile in society; etc. Attitudinal types were developed by attitudes towards:

1. Allocations to public transportation, roads and highways, environmental safety features, and adjunct highway services such as parking, services on rural freeways, etc. (Q. 8 and 12).
2. Allocations to other public services such as education, urban renewal, parks and recreation, etc. (Q. 8).
3. Road and highway and public transportation facilities in general (Q. 9).
4. The role of the automobile in society (Q. 10).
5. Highway planning and planners (Q. 11).
6. Specific modes of transportation for general uses (i.e., automobile for local shopping trips or long-distance business trips; subway; long-distance train for family trips; etc.) (Q. 13-17).
7. Attributes of automobile and public transportation (Q. 18).

Some of these categories were then used as inputs for the third step—the development of the profiles. The purpose in this part of the analysis was to determine the degree to which the attitudinal types previously defined were homogeneous in their demographic and use characteristics. Profiles were also developed by extent of automobile use. This produced a profile of the type of person who was favorable to allocating more money to roads and highways, or the type who was favorably disposed to allocating more to environmental needs and law enforcement. Profiles were developed by:

1. Persons with high (or low) average annual vehicle-miles per household.
2. Those who are favorable (unfavorable) towards public transportation as a mode of travel.
3. Those who favor (disfavor) greater allocations to roads and highways.
4. Those who favor (disfavor) greater allocations to public transportation.
5. Those who favor (disfavor) more allocation to services associated with roads and highways (parking facilities, highway beautification, services on rural freeways).
6. Those who favor (disfavor) more emphasis on law enforcement and safety features.

CHAPTER TWO

RESULTS

DEMOGRAPHIC CHARACTERISTICS AND TRANSPORTATION ATTITUDES

Region

A larger proportion of people from the East and South showed a willingness to allocate more money to roads and highways. Figures for people from the Western and North Central regions were closer to the sample average. Easterners also favored greater expenditures to public transportation. They rated these facilities more positively than did people in other regions.

People in the East expressed the least favorable attitude in evaluating the social role of the automobile (Q. 10). They also felt greater priority should be given to improvements in public transportation (Q. 9).* Easterners were least favorable to highway planning and planners. In contrast, Southerners were most favorable and also had a more favorable disposition to the social role of the automobile.

When the automobile was compared to an ideal mode of transportation, people in the South tended to rate the automobile closer to such an ideal; Easterners were less disposed to do so. In rating public transportation, Westerners showed by far the greatest amount of dissatisfaction. When considering trip purpose, people in the East and South expressed greater dissatisfaction with the automobile for local use.

Attitudes towards highway planning and facilities demonstrate that a greater proportion of Easterners and Southerners feel the automobile is paying more than its fair share for maintenance and construction. People in the East were more likely to agree that highways in urban areas are ugly. A larger proportion of Southerners compared to Easterners supported the Interstate Highway System. Southerners also placed greater emphasis on law enforcement and training procedures. Westerners placed the least emphasis on these items.

In general, Easterners were less satisfied with the automobile and with highway facilities. They were more likely to give greater priority to improvements in highways and public transportation. Southerners also expressed more dissatisfaction with highways, yet expressed the greatest degree of satisfaction with the automobile.

* The results should not be interpreted as "Easterners were not favorably oriented to the social role of the automobile"; although on the average they were less favorably disposed compared to people in other areas, their over-all opinion was still on the positive side.

Population Density

Of all demographic variables, location in terms of region and population density differentiate people's transportation attitudes most sharply. It would, therefore, be an important variable in allocating transportation resources in line with user needs. The sharpest division in transportation attitudes and values was between residents of large metropolitan areas (1 million or more) and those in rural areas. People in the five large metropolitan areas with rail mass transportation (RMT) (New York, Philadelphia, Boston, Chicago, and Cleveland) shared attitudes with other large metropolitan area residents. In general, the first group held the most favorable attitudes towards public transportation, rated its quality higher, and were those most likely to emphasize the need for improvements in it. Moreover, people in these large metropolitan areas were most critical of the automobile's role in society and of highway planning and planners.

People in the five RMT cities placed a higher value on public transportation compared to people in the rest of the country. They held less favorable attitudes towards the automobile (both as a mode of transportation and in relation to the satisfaction of specific transportation and personal needs in terms of its social role). In addition, 54% supported greater expenditures for public transportation compared to 45% in the rest of the sample. These people emphasized, in particular, the construction of additional parking facilities at train or rapid transit stations and the building of additional new rapid transit lines.

Because 45% of the rest of the sample also favored more allocation to public transportation, it cannot be said that those without these mass transportation facilities favor ignoring them. In fact, few people favored an actual decrease in expenditures to either public transportation or roads and highways. Practically all favored maintaining the *status quo* or an increase.

Consistent with these findings, RMT city residents rated the automobile farther from the ideal mode than other areas and were more critical of the Interstate Highway System. Rural and non-metropolitan urban residents differed from those in large metropolitan areas in all these attitudinal categories.

Annual Household Income

People in the low (under $2,000) and low-middle $6,000-$7,500) income groups rated both the automobile and public transportation closer to the ideal mode than did the other groups. This group viewed transportation in general more favorably, suggesting a lack of discrimination between modes. They tended to rate highway planning and planners more positively compared to the rest of the sample, yet they were less willing to allocate money for highway improvements and construction.

In fact, both the low- and high-income groups expressed greater reluctance to allocate money and effort to public services in general compared to the middle-income group, and were somewhat more disposed to favor improvements in public transportation over roads and highways. A greater proportion of lower-income people also felt that the automobile was paying more than its fair share for highway construction and maintenance.

Education

Findings by education reflected those by income, demonstrating the close interrelationship between the two variables. But discrimination between transportation attitudes was not great. People with less education (those who did not complete high school) were somewhat less willing to allocate more money and effort to roads and highways compared to the other groups. They rated the social role of the automobile more favorably and placed the automobile closer to an ideal mode compared to the other groups. Paradoxically, they were less willing to accept the extreme negative consequences of the automobile when asked whether the automobile was worth it (Q. 28).

The less-educated group paralleled the lower-income group in feeling that the automobile was paying more than its fair share. They were also more likely to agree that highway problems exist primarily in urban areas.

Occupation

People were defined more sharply in their transportation attitudes by occupation than by education, income, or age. Professionals were proportionately more critical of the social role of the automobile compared to the craftsmen and operatives. A larger proportion also tended to be critical of highway planning and planners and felt greater emphasis should be placed on public transportation improvements, yet not at the expense of roads and highways. Managers also placed greater emphasis on allocation to roads and highways in general and construction in particular. Those in service occupations evidenced the opposite tendency.

Consistent with the foregoing, professionals were less prone to rate the automobile as an ideal mode and viewed public transportation more favorably than people in other occupations. They were much less satisfied with the transportation attributes afforded by the automobile in terms of satisfaction of specific needs. Operatives, and to a lesser extent those in craft and service jobs, were more highly satisfied with these attributes. Craftsmen in particular tended to rate the automobile much closer to the ideal mode.

A smaller proportion of professionals felt that the automobile was paying more than its fair share. They were more prone to agree that highways were ugly and to disagree with the statement that the Interstate Highway System is a great public work. They also emphasized the need for better driver examinations. A greater proportion of the crafts-operative groups exhibited the opposite attitudes.

As for public transportation, the managerial and professional groups tended to rate its quality lower, and operatives rated it higher than the other groups. The same held true for the evaluation of satisfaction of transportation needs by public transportation. A smaller proportion of professionals and managers expressed satisfaction compared to the service, crafts, and operative groups.

Age

Transportation attitudes were most sharply differentiated between people 30 years and under and those over 30. The younger group was more willing to allocate greater expenditures and effort to roads and highways. They were somewhat more favorably disposed to the automobile as compared to public transportation, yet were more critical of all transportation modes compared to the older group. In fact, they expressed less satisfaction with the transportation attributes afforded by both the automobile and public transportation. This may suggest that those under 30 are more aware of transportation requirements and more sensitive to the facilities offered.

Race

Race was a distinguishing factor in regard to attitudes towards public transportation. Non-whites were significantly more favorable to public transportation, felt more improvements should be made in its facilities, and were more willing to allocate money and effort to this end. In addition, they were more satisfied by the specific advantages afforded by public transportation.

Attitudes towards the automobile and roads and highways were not as sharply differentiated by race. However, non-whites did tend to feel the automobile was paying more than its fair share and viewed the automobile as attractive. They saw highways problems as primarily urban in nature and were more likely to say that the automobile is not worth the problems it tends to create.

Sex

A greater proportion of men were willing to allocate more money to both roads and highways and public transportation. They particularly emphasized construction of new roads and highways. In general, more men tended to be favorably disposed to the automobile and more women to public transportation. Women were satisfied with the specific transportation attributes of both public transportation and the automobile, suggesting less discrimination in evaluating these modes. Women were also more likely to state that the automobile is not worth the problems it creates.

THE NATURE OF TRANSPORTATION ATTITUDES

One of the aims of the analysis was to determine the dimensions of transportation attitudes and values. This requires analyzing the interrelationship between all the specific categories of attitudes in Q. 7-18 and determining if a general set of attitudes can be defined. For instance, is the person who agrees with the statement in Q. 9 that "the real answer to transportation problems is more and better public transportation" also likely to agree or disagree with the statement in Q. 11 that "the way highways are being planned and built just doesn't make any sense." If there is an interrelationship between these statements, what is its exact nature and what is the degree of the relationship? Are they in turn related to several of the many other attitudinal statements? In short, how do these statements "hang together"? Is there any type of relationship between attitudes towards highway allocations, the quality of public transportation, the social role of the automobile, highway planning, transportation modes, and the degree of need-satisfaction derived from these modes?

Answers to these questions require the application of multi-variate methods of analysis—that is, the introduction of more than one variable simultaneously. Hitherto, except in the "Summary," the report has described findings based on cross-tabulations of the data. This type of analysis compares one variable to another to determine if they are related (a univariate method of analysis). Yet transportation attitudes and behavior are conditioned not by one characteristic such as age or income, but by many different characteristics. Whether an individual is a heavy or light highway user and whether he views roads and highways favorably or unfavorably are not likely to be conditioned by just one demographic or attitudinal variable. Therefore, it was logical that the next concern of the analysis should be a total view of the interrelationships between transportation attitudes, in addition to the relation of the total set of demographic characteristics to attitudes and use of transportation modes.

Factor analysis is a multi-variate statistical method particularly well-suited to determining the interrelationship between attitudes. The nature of factor analysis and its applications to the study are described in detail in Appendix B. It is important to note, however, that, unlike findings from cross-tabulations, results from the factor analysis can not be translated into percentage terms relating to specific segments of the population. Factor analysis will demonstrate whether a set of attitudinal characteristics are all interrelated. Once having established this interrelationship, it does not refer to specific proportions of the sample. It only demonstrates that people who are likely to answer positively to A are also likely to answer positively to B, C and D. Because these items "hang together," A, B, C, and D constitute an attitudinal set.

Following is a summary of the general transportation attitudes and values uncovered by the factor analysis.

There was an inverse relationship between the quality of roads and highways and allocations to roads and highways. People who rated the quality of roads and highways poor felt more should be spent on roads and highways and vice versa. (The converse of the findings is true in this type of analysis.) The same relationship held true for public transportation. Those rating the facility poorly expressed the opinion that more money and effort should be directed to improving these facilities. Here, the negative attitudes towards the quality of public transportation facilities and attitudes reflecting the desire for increased allocations were in turn related to other attitudinal categories. They were particularly related to agreement with statements in Q. 9 regarding desired improvements in public transportation. This again suggests that people's perceptions of public transportation as a mode and facility are interrelated. The same does not hold true for the automobile and roads and highways.

Those who agreed with the statements favorable to the automobile's role in American society in Q. 10 also tended to agree with statements reflecting positive opinions of highway planning and planners (Q. 11) and placed a

higher value on automobile improvements relative to public transportation in Q. 9. Thus, attitudes towards the social role of the automobile, improvements in automobile facilities, and highway planning and planners were all interrelated in a logical framework.

An analysis of the interrelationships of the 15 needs (Q. 18) potentially satisfied by the automobile and public transportation revealed the following:

1. Those who were confident that public transportation would require no repairs in transit also tended to be satisfied with the safety, speed, pride, comfort, and relaxation provided by this mode.

2. Those who were satisfied with the crowdedness of public transportation facilities also tended to be satisfied with protection from the elements, the chance to ride with people you like, cost, lack of traffic, and the feeling of independence provided by the mode. Admittedly, people falling in this category were a small minority of the sample; more people expressed dissatisfaction with the ability of public transportation to satisfy these attributes. It is significant that the analysis dichotomized the attributes relative to public transportation. The first group relates more to personal transportation needs, whereas the second relates more to environmental conditions such as crowds and weather.

3. People who were satisfied that the automobile required no change of vehicles in transit were also satisfied with the same set of environmental elements described for public transportation—crowdedness of the vehicle, protection from weather, cost, chance to ride with people you like, and the feeling of independence. Thus, environmental protection provided by the automobile is closely tied to the social convenience (independence, people I like) afforded by the automobile.

4. People satisfied with the relaxation afforded by the automobile also tended to be satisfied with the traffic situation and the chance to look at scenery. The emphasis on attributes related to relaxation may indicate that these people are riders rather than drivers.

5. People confident that the automobile requires no repairs also take pride in it and are satisfied by its newness, safety, comfort, and speed. This would appear to be a more personally-oriented satisfaction dimension in that it applies to the pride of ownership and performance of the automobile independent of the facilities used by it. It is interesting to note that confidence and relaxation appear on the same dimension for public transportation, but not for the automobile. Apparently, relaxing while driving is not part of the personal satisfaction derived from the vehicle for a majority of people.

It is significant that public transportation attributes were in no way related to automobile attributes. Those who rate public transportation negatively on any of the attributes cannot be expected to rate the automobile positively. Once again, the analysis demonstrates that the automobile and public transportation are not viewed competitively. They appear to satisfy different transportation requirements for different occasions.

Highway planners must consider the fact that satisfaction of needs in one transportation area does not necessarily satisfy needs in another, because use differs by occasion and personal attributes. This would reinforce the majority view that simultaneous effort is needed in improving both roads and highways and public transportation.

The eleven items in Q. 12 relating to specific improvements in highway facilities and construction of additional facilities were also analyzed. Determination of people's attitudes towards allocating more money and effort to each of these areas produced the following interrelationships:

1. Those who favored more spending for roads and highways in general (Q. 8) also favored building additional highways and improving maintenance on existing highways (Q. 12).

2. Those favoring more spending for public transportation (Q. 8) also favored building additional new rapid transit lines. Thus, the attitudes toward allocations in Q. 8 and 12 were logically connected.

3. People who favored building additional parking areas at rapid transit stations also emphasized building additional downtown parking facilities, adding more services for users of rural freeways, and beautifying highways. All these areas are services adjunct to the use of roads and highways. They provide greater convenience and enjoyment in the use of roads and highways.

4. People who placed most emphasis on improving traffic law enforcement also emphasized improvements in testing and training procedures for drivers, adding safety features to streets and highways, and improving traffic signals. They were more concerned with traffic safety and control than people in the previous category, who placed more emphasis on convenience and enjoyment of highway facilities.

Attitudes towards automobile, bus, train, subway, and air travel were also factor analyzed. People were asked to rate these modes for local travel (social, work, and shopping trips) and long-distance travel (family and business). Generally people favorable to a certain mode tended to favor it regardless of the use occasion. Attitudes towards one mode were not generally related to attitudes towards another. The following relationships were found:

1. People favorable to bus travel viewed it positively for all use occasions.

2. People who rated subways positively also rated commuter trains positively. They therefore favored public transportation for local use.

3. People favoring the automobile for local use rated it positively for all types of occasions. Yet there was only a marginal relationship between favorable attitudes to both local and long-distance automobile travel.

4. Those who rated air travel positively tended to rate the automobile negatively for long-distance travel and vice versa. No distinction was made between family and business trips. This was the only case where one mode was viewed as competitive to another.

The specific occasion, whether it was for business, family, or shopping trips, did not greatly affect attitudes towards specific modes.

PROFILES OF USER CHARACTERISTICS

Another important objective of this phase of the analysis was determining the attitudinal, behavioral and demographic characteristics of those people who could be described as favorable or unfavorable to highway planning, those who want much more money and effort allocated to roads and highways, etc. If individuals who display common attitudes regarding the automobile, for instance, also display common attitudes and use patterns for other facilities and modes as well as similar demographics, one could infer that these homogeneous characteristics were instrumental in affecting the nature of attitudes towards the automobile.

Say, for instance, that people with the most favorable attitudes towards public transportation live in urban areas, feel more money should be spent on public transportation, and have negative attitudes towards highway planning (as is in fact the case). These individuals with a common attitude towards public transportation have these three characteristics in common, thereby defining the profile of the "pro-public transportation" person. Similar profiles could be developed for any attitudinal or behavioral category.

Once again a multi-variate method of analysis was required, because a large number of demographic and attitudinal variables had to be examined simultaneously to determine the profiles. Seven such profile analyses were performed by a unique computer program—an Automatic Interaction Detector (AID) program (for a nontechnical description, see Appendix B). The attitudinal and behavioral categories analyzed produced profiles by:

1. Heavy driver households vs light driver households.
2. Attitudes towards public transportation.
3. Attitudes towards highway planning.
4. Attitudes towards increased allocations to roads and highways.
5. Attitudes towards increased allocations to public transportation, particularly rapid transit lines.
6. Emphasis on law enforcement and traffic control.
7. Desire for adjunct highway services, additional parking facilities, additional services on rural freeways, and more highway beautification.

These profiles are valuable in suggesting the priorities placed on highway activities. If one were concerned with problems of resource allocation along regional lines, Easterners show the greatest concern about public transportation; Westerners were least concerned about safety and law enforcement. Similarly, therefore, if one were to view transportation attitudes along racial lines, areas with a higher preponderance of non-whites would most likely express greater concern with safety features, traffic control, and law enforcement. In this way, the highway administrator can evaluate the profiles in assessing the priority of needs by locational and demographic characteristics.

A summary of the findings for each of the seven areas is presented in the following:

1. *Profile by heavy- vs light-driver households.*—The variables that most sharply discriminated between heavy- and light-driver households were demographic rather than attitudinal. Households where the most vehicle-miles were driven tended to be higher-income and large-family households. The wage earner lived farther from work and was not employed in a service, crafts, or operative occupation. In addition, those who traveled more vehicle-miles tended to be better educated, younger, traveled more for work purposes. They traveled less on public transportation. People in rural areas also traveled significantly more than others. The fact that demographics provided the basis for differentiating by vehicle-miles driven demonstrates that it is the environmental requirements of family and business that condition automobile use rather than general perceptions and attitudes towards the automobile and roads and highways.

In terms of a commonly held set of attributes, people in the heaviest-driver households had incomes of over $12,500 and drove a significant proportion of their total vehicle-miles to work. These individuals, representing 13% of the sample, drove over 50% more than the sample average. People in the lightest-driver households had incomes under $12,500, lived in non-rural areas and worked in operative, service, or crafts occupations. They represented 12% of the sample, driving approximately one-half less than the sample average.

2. *Profiles by attitudes towards public transportation and automobile* (Q. 9).—Attitudes towards allocations for public transportation was the variable that best discriminated between people whose attitudes favored public transportation and those whose attitudes favored the automobile. Those who favored improvements in public transportation in Q. 9 wanted more money allocated to public transportation in Q. 8. These individuals had a less favorable attitude towards highway planning and planners, were not as satisfied with the transportation attributes afforded by the automobile, and rated the automobile less favorably when compared to an ideal mode. Yet they were somewhat more likely to emphasize greater expenditures for roads and highways. This again demonstrates that allocations to one mode are not made at the expense of the other.

Demographically, individuals more favorable to public transportation lived in large metropolitan areas, had higher incomes, and lived in the East. They traveled more frequently on public transportation and traveled less by automobile. Compared to the rest of the sample this group preferred the automobile for business use. Evaluations of the quality of public transportation were low among all groups. Yet there is a logical relationship between attitudes towards public transportation and behavior. Those with more favorable attitudes to public transportation use the mode more frequently and were less favorably disposed to automobile travel. As noted previously, the same close relationship between attitudes and behavior did not appear for the automobile.

People with a highly favorable attitude towards public transportation had two characteristics in common. They felt greater spending for public transportation was required and they lived in large metropolitan areas. They accounted for about 20% of the sample and scored 25 points above the rest of the sample on a 100-point attitudinal scale.

On the other extreme, white persons living in non-metropolitan areas who want the same amount or less spent on public transportation and travel less by this mode scored 25 points below (less favorable) the rest of the sample. People having these four characteristics in common constituted one-fourth of the sample.

3. *Profiles by attitude towards highway planning and planners* (Q. 11).—The most powerful factor differentiating between people with positive and negative attitudes towards highway planning was region. People in the North Central and South had significantly more favorable attitudes towards highway planning and planners compared to those in the East and West. In addition, people who viewed the automobile favorably, both as an ideal mode (Q. 13-17) and in terms of its social role (Q. 10) were more likely to view highway planning positively. Demographic variables likely to increase the probability of a favorable response were a non-metropolitan location, a less-than-college education, and annual income under $10,000. Interestingly, among Easterners and Westerners, where favorability to highway planning was lower to begin with, those more critical of public transportation (Q. 18) also tended to be more critical of highway planning. These comprise 14% of the sample.

The typical person with a more favorable attitude towards highway planning lived in the North Central or South, held positive attitudes towards the social role of the automobile, and was less critical of the environmental needs served by public transportation. People holding these three characteristics in common represented 20% of the sample. It is significant that positive views of highway planning seem to be directly rather than inversely related to positive views regarding the needs satisfied by public transportation.

4. *Profiles by attitudes towards increased spending for roads and highways* (Q. 8).—Region again was the most important criterion for distinguishing attitudes towards spending. People in the South were much more likely to favor spending more for roads and highways. People living in rural areas, those who travel more by automobile, males, and those who are very dissatisfied with the personal needs served by public transportation were also more willing to increase spending in this area. If a person outside the South traveled more by automobile and lived more than 10 miles away from work, his attitudes towards increased allocations for roads and highways tended to be more favorable compared to other people outside the South.

5. *Profiles by attitudes towards increased spending for public transportation* (Q. 8).—Those who felt greater money and effort should be spent on public transportation also felt most strongly that public transportation improvements deserved greater attention than those relating to the automobile. They tended to rate the quality of public transportation low (Q. 7). These people were markedly less favorable to automobile travel. They traveled less by automobile, were more critical of the social role of the automobile, and were dissatisfied with the opportunity to relax and avoid traffic when traveling by automobile compared to the rest of the sample. A greater proportion of people holding these attitudes towards public transportation lived in the East and in large metropolitan areas.

6. *Profiles by emphasis on law enforcement and traffic controls* (Q. 12).—People who placed the greatest emphasis on improving traffic law enforcement also emphasized improvements in traffic signals, safety features, and testing and training of drivers (Q. 12). A greater proportion of people in non-Western states emphasized these features. Non-whites, persons very critical of highway planning, and those critical of the environmental needs satisfied by public transportation also tended to place greater emphasis on law enforcement and safety. Transportation attitudes and demographic characteristics did not sharply define people by attitudes towards enforcement and safety.

7. *Profiles by emphasis on adjunct highway services* (Q. 12).—People who felt more money should be spent on parking facilities at rapid transit stations also favored construction of downtown parking facilities, additional services on freeways, and highway beautification. This group was defined by demography rather than transportation attitudes. More people favoring these services lived in metropolitan areas, were somewhat younger, and had higher incomes compared to the rest of the sample. Among non-metropolitan residents, higher income and education tended to produce a greater likelihood of emphasizing these features.

PREDICTING FUTURE ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS AND FOR PUBLIC TRANSPORTATION

The final objective of the analysis was to determine whether future attitudes towards allocation of public funds for transportation could be predicted. If a number of variables were found to be closely related to attitudes towards spending for roads and highways, shifts in these variables might forecast significant shifts in attitudes. This would, of course, be meaningful to highway planners in indicating changes in priorities for transportation facilities and the direction in which such changes seem to be moving. Of course, the final criterion rests on an actual attempt to predict attitudes towards allocations.

A number of demographic and attitudinal variables were related to attitudes towards increased allocations for roads and highways and for public transportation. Two step-wise multiple regression analyses were run using 45 predictor variables. Primary attention focused on the demographic variables, because these could be more readily measured and would, therefore, produce a more meaningful basis for predicting attitudes towards allocation.

Statistically speaking, the ability of the variables to predict these two attitudinal categories was poor. Although many of the relationships described in previous sections were meaningful and statistically significant, apparently the combinations of variables used were not sufficiently related to produce encouraging results for predictive purposes.

The seven most important variables described in predicting attitudes favorable to an increase in spending for roads and highways were, in order of importance:

1. A favorable attitude towards increased spending for public transportation.
2. Dissatisfaction with the safety and confidence in public transportation.
3. Sex: males were more likely to be favorable to an increase in spending.
4. Population density: those in rural areas were more likely to be favorable to increase in spending.
5. Greater emphasis on safety features of highways, law enforcement, and testing and training of drivers.
6. A more critical attitude towards highway planning and planners.
7. A favorable attitude towards the automobile compared to an ideal mode of transportation.

Significantly, the best predictor of a shift in attitudes towards spending for roads and highways would be a shift in the same direction for spending on public transportation. Although this relationship was not a strong one, it is consistent with the previous findings that the two facilities are viewed as complementary rather than competitive.

The five most important variables in predicting a shift in attitudes favorable to an increase in spending for public transportation were:

1. A more favorable attitude towards improvements in public transportation relative to the automobile.
2. A favorable attitude towards increased spending for roads and highways.
3. Less emphasis on services adjunct to highways (such as parking facilities, highway beautification).
4. Greater emphasis on highway safety and law enforcement.
5. Population density: individuals living in metropolitan areas were more favorable to increased spending on public transportation.

CHAPTER THREE

SUGGESTED RESEARCH

The wealth of data collected in the survey precluded a thorough analysis of all items in the questionnaire. A decision was made to concentrate primarily on the attitudinal items, because the major objective of the survey was to determine user attitudes, their interrelationship, and how they varied with transportation behavior. Therefore, analyses centered particularly on Questions 7-18 (attitudinal items) and Questions 22-27 (describing transportation behavior).

A number of transportation-related items bear further examination. The following may be suggested:

1. Distance from various public and private facilities (Q. 4) may have a bearing on transportation attitudes and behavior. The strength of these associations could be determined through techniques similar to those used in this analysis.
2. The mobility and locational history of the people from birth (Q. 5) is likely to affect transportation attitudes and behavior. This analysis has demonstrated that present location and population density are among the leading determinants of attitudinal patterns. Therefore, it would be important to relate the past history of the individual to transportation attitudes and behavior by region and size of place.
3. The effect of changes in people's patterns of life affects the use of public transportation and the automobile (Q. 6). The association between changes in location, automobile ownership, or in the age of family members and changes in transportation use is bound to affect attitudes towards transportation facilities. The attitudes of a father towards the automobile may change markedly once his son becomes a teenager. Or the attitudes of a driver towards highway planning may change if the moves a greater distance from his place of work.

In addition, a number of items in the second form of the questionnaire (the so-called blue form) require further analysis.* These items centered on people's knowledge of sources of funds for highways, the agency responsible for various highway- and traffic-related activities, and attitudes towards sources of funds and towards the highway system (Q. 23B-30B). It would be important from the standpoint of the highway administrator to determine how the level of knowledge regarding highway activities varies by the number of miles driven and by demographic factors.

A number of questions regarding transportation behavior warrant further re-examination, particularly the complete history of travel in the last 48 hours provided in Q. 20 and 21. These questions provide a valuable opportunity to relate the purpose of specific trips and the method and distance of travel to other attitudinal and behavioral items in the questionnaire. The behavioral variables used in this study centered on total miles by modes. Questions 20 and 21 provide specific instances

* Two questionnaire forms were used. A number of items on one form were not included on the other.

of travel, which can perhaps better pinpoint alternative modes selected for specific situations.

Information on the foregoing categories are stored on computer tape derived directly from the questionnaires. In fact, cross-tabulations were run for many of the foregoing items, but the results were too voluminous to include in this analysis and will have to be left for future examination.

In addition, the study offers an opportunity for refinement in methods of analysis. The multi-variate techniques used in this study can be applied to other items in the questionnaire. In addition, other multi-variate methods can be applied to the attitudinal categories. Multiple discriminant analysis might be an alternative method for examining interrelationships and predicting the likelihood of an individual falling into a particular attitudinal category. Multi-dimensional scaling procedures could be applied to determine the relative distance of various attitudinal concepts in considering their interrelationships. The size of the sample also permits replicating the analyses on two or three randomly generated subsamples as a more rigorous method of checking the validity of the findings. In short, much can be done to improve and extend the methods of analysis.

The present study also furnishes a reference point against which to compare future transportation attitudes and behavior. In this way, *changes* in attitudes and use can be measured.

REFERENCES

1. "User-Determined Attributes of Ideal Transportation Systems." Unpubl. report for the U.S. Bureau of Public Roads; Dept. of Business Administration, Univ. of Maryland (1966).
2. DIXON, W. J. (ed.), "BMD Biomedical Computer Programs." *Publications in Automatic Computation No. 2*, Univ. of California Press (1967).
3. SONQUIST, J. A., and MORGAN, J. N., *Detection of Interaction Effects*. Inst. for Social Research, Univ. of Michigan (1964).
4. WACHS, M., "Evaluation of Engineering Projects Using Perceptions of and Preferences for Project Characteristics." NCHRP Project 8-4 (1967).
5. MCMILLAN, R. K., and ASSAEL, H., "National Survey of Transportation Attitudes and Behavior—Phase I, Summary Report." *NCHRP Report 49* (1968).

APPENDIX A

SAMPLING METHODOLOGY AND QUESTIONNAIRE

SAMPLING

Chilton Research Sample

Chilton Research Services' sample was a national, self-weighting probability sample of housing units. This sample represented all private households in the (conterminous) United States. The North Central and West regions were as defined by the Bureau of the Census. The states of Delaware, Maryland, and the metropolitan District of Columbia were included in the Northeast region, rather than in the South. Within each region, the sample housing units were allocated to four community-size strata proportionate to the 1960 Census distributions of dwelling units. These four community-size strata are: (1) Standard metropolitan statistical areas (SMSA's) of more than 1 million population; (2) standard metropolitan statistical areas of less than 1 million population; (3) all urban places as defined for Census purposes outside SMSA's; and (4) rural territory as defined for Census purposes outside SMSA's.

Through the use of equal probability of selection, and replicated samples, this design provided sampling efficiency and reduced the amount of work necessary for the calculation of sampling errors.

In describing the essential characteristics of this sample, two key terms are used: "zone" and "local frame."

A *zone* is similar to a stratum or a combination of strata (for those familiar with multi-stage sampling), except that all the zones are of equal size (they have paper boundaries, not physical boundaries).

A *local frame* is similar to a primary sampling unit, except here again all local frames are equal in size in terms of 1960 Census housing units.

The master frame of 1960 Census housing units was built by listing housing units within each of the nine Census regions (New England, Middle Atlantic, etc.) starting with metropolitan areas of more than 1 million population, followed by metropolitan areas having less than 1 million population, followed by non-metropolitan urban places, followed by non-metropolitan rural places and areas. The nine region groups were arranged in order so as to facilitate the building of the four region groups.

The metropolitan area part of the frame in each region started with the largest metropolitan area, followed by the other metropolitan areas in the region in descending population size. Within each metropolitan area, cities (including urbanized areas) were listed first, in order from largest to smallest, followed by rural places, followed by the population outside of any place or urbanized area.

The non-metropolitan urban part of the frame was ordered on a county basis, beginning with the county in the northeast corner of the region, working state-by-state, east to west, north to south, in a contiguous serpentine order.

The non-metropolitan rural part of the frame used the same county order as the non-metropolitan urban part of the frame.

Within each city or place defined by the Census, housing units were taken in the order listed by the Census, or in a geographic order when Census listings were not published. Within the areas outside of defined cities or places, a geographic ordering was used.

For this sample, a workload consisted of 10 Census housing units, a local frame consisted of 1,000 workloads, and a zone consisted of 52 local frames (52,000 workloads).

Workloads were cumulated for the master frame, and zones and local frames of equal size were struck off from this master listing. The local frame consisted of a part of a metropolitan area, or a part of a county, or parts of several contiguous counties. Within each of the 113 zones, two random draws, with replacement, were made to determine the two local frames in the sample. This procedure gave each local frame in the master frame an equal chance of being selected for the sample.

Two random draws were made from all workloads in the sample local frame to identify the two sample workloads. Table A-1 gives the universe and sample distributions of zones and sampling units by population density groups.

If a sample workload selected consisted of an entire city block or area the identification is complete. However, if a workload (i.e., 10 Census housing units) was part of a larger cluster of CHU's (i.e., a block containing 60 CHU's) the workload was defined to be every kth housing unit, k being the number of workloads in a large cluster (the foregoing example of 60 CHU's contains 6 workloads, hence $k = 60/10 = 6$). All housing units in an area or block (or blocks) in which a sample workload falls were listed in a predetermined order (one housing unit per line) by the interviewers on the listing sheet. Prior to sending the interviewers the listing sheets, an "X" was marked on every kth line and an interview was attempted at each such housing unit. (k was determined so as to make the expected segment size 8 1960 CHU's).

Workload distributions and identification were made from block statistic books (for places where these exist), and maps and Census enumeration district information for places and areas where block statistics are not available.

The sample workloads were identified on maps for the interviewer's use.

TABLE A-1

UNIVERSE AND SAMPLE DISTRIBUTIONS BY POPULATION DENSITY GROUPS

SMSA, 1960 POPULATION SIZE	NO. OF METRO AREAS	UNIVERSE 1960 HOUSING UNITS (NO.)	(%)	NO. OF ZONES	NO. OF LOCAL FRAMES	SAMPLE NO. OF LOCAL FRAMES	WORK-LOADS (NO.)	(%)
1,000,000 and over	24	20,058	34.4	39	2,006	78	156	34.5
800,000-999,999	6	1,797	3.1	3	180	6	12	2.6
500,000-799,999	24	3,058	5.2	6	306	12	24	5.3
250,000-499,999	46	4,724	8.1	9	472	18	36	8.0
100,000-249,999	92	4,608	7.9	9	461	18	36	8.0
50,000-99,999	27	786	1.3	2	78	4	8	1.8
Total metropolitan areas	219	35,031	60.1	68	3,503	136	272	60.2
Non-metro urban	—	9,882	16.9	19	988	38	76	16.8
Non-metro rural	—	13,413	23.0	26	1,342	52	104	23.0
Total, metropolitan and non-metropolitan	—	58,326	100.0	113	5,833	226	452	100.0

Within each sample household, all individuals over 14 years of age were listed. The individual to be interviewed was selected from those 18 years of age and older by a procedure which gave each such individual in the household an equal chance of being selected. (See Q. 1 and 2 and related procedures on second page of Questionnaire.)

Listing procedures yielded 3,414 housing units in the 442 sample segments. Up to five attempts were made to complete an interview. After carrying out these operational procedures, interviews had been completed in 2,513 households with the randomly designated person 18 years of age and older. The accounting for the 3,414 housing units is as follows:

Total housing units listed	3,414
Vacant	220
Randomly selected individual out of town during interviewing period, ill or in hospital, could not speak English	124
Refused to be interviewed	352
Not found at home after 5 calls	205
Completed interviews	2,513

National Analysts Sample

National Analysts' sample was also a multi-stage area probability sample. The universe of housing units was first arranged by three major zones, as follows:

1. All cities with 50,000 or more population in SMSA's.
2. The rest of the housing units in SMSA's.
3. Housing units outside SMSA's.

Within each major zone, strata were formed averaging 500,000 households in size; 106 strata were formed. Each stratum was divided into first-stage units averaging 10,000 households. One first-stage unit was drawn into the sample from each stratum. Within each sample first-stage unit, segments were formed large enough to yield 11 Census housing units (CHU's) on the average. In total, 350 segments were drawn into the sample. Up to five calls were made in attempting to complete an interview in a sample household. The accounting for the 3,796 listed housing units is as follows:

Total sampling housing units	3,796
Vacant	330
Ill, can't speak English	170
Not found at home after 5 calls	395
Refused to be interviewed	379
Completed interviews	2,522

Developmental Work and Questionnaires

During the first two months of this project, Chilton Research Services made an extensive literature search and contacted several governmental agencies to uncover information that would be helpful in providing groundwork on which to build the study. Three group interviewing sessions were held in Philadelphia during the questionnaire development stage. At these sessions, in addition to group discussions, 30 structured interviews were completed.

A draft of a pretest questionnaire was developed using the experience learned from the group sessions. The draft was tested in the Philadelphia metropolitan area during the last week in June 1967, with about 30 interviews representing low- and high-income groups, whites and non-whites, and center city and suburban areas, being

completed. The major points of interest were the degree of difficulty encountered by people in both understanding and answering the questions, as well as the length of time the questioning procedures required. This pretest version took considerably more than 60 min of interviewing time, so question reduction was considered. (It was believed that 60 min was about as long an interview time as a person would reasonably accept.)

A final questionnaire review was held with the NCHRP project advisory committee in July 1967. As a result, the committee recommendation to divide the contents of the 90-min pretest questionnaire between two different questionnaire forms was adopted. It was decided that each version of the questionnaire would be used with a probability subsample of one-half the people by both research firms engaged in the data collection.

In August 1967, both Chilton Research Services and National Analysts pretested the final questionnaire forms on independent national subsamples. Also, both conducted interviewer training sessions in various cities throughout the United States. Field editing and coding procedures were worked out jointly by the two survey firms involved. The actual field interviews were conducted during August, September, and October 1967.

The questions considered as being most important to the study appear on both questionnaire forms. Table A-2 indicates which questions appeared on both forms and which were included only on form A or only on form B. The complete questionnaire (form A) is presented in the following pages of this appendix, together with only those pages from form B which include questions not appearing on form A.

TABLE A-2

LOCATOR INDEX AND CROSS-COMPARISON OF QUESTIONS ON QUESTIONNAIRE FORMS A AND B

QUESTION		PAGE	
FORM A	FORM B	FORM A	FORM B
—	—	A[a,b]	B[b]
1	1	1A[a]	1B
2	2	1A[a]	1B
Sel.[c]	Sel.[c]	1A[a]	1B
3	3	2A[a]	2B
4	—	2A[a]	—
4[a]	—	3A[a]	—
5	—	3A[a]	—
6	—	4A[a]	—
7	4	5A[a]	2B
8	5	6A[a]	3B
9	6	7A[a]	4B
10	7	8A[a]	5B
11	8	9A[a]	6B
12	—	10A[a]	—
13	9	11A[a]	7B
13[b]	10	11A[a]	7B
14	11	11A[a]	7B
15	12	12A[a]	8B
16	13	12A[a]	8B
17	14	12A[a]	8B
18	—	13A[a], 14A[a]	—
19	—	15A[a]	—
20	15	16A[a]	9B
21	16	17A[a]	10B
21[a]	16[a]	18A[a]	11B
22	17	18A[a]	11B
23	18	18A[a]	11B
24	19	19A[a]	12B
25	20	19A[a]	12B
26	21	19A[a]	12B
27	22	20A[a]	13B[a]
—	23	—	13B[a]
—	24	—	13B[a]
—	25	—	13B[a]
—	26	—	14B[a]
—	27	—	14B[a]
—	28	—	14B[a]
—	29	—	14B[a]
—	30	—	15B[a]
28	31	20A[a]	15B[a]
29	32	21A[a]	16B
30	33	21A[a]	16B

[a] Included in following pages. [b] Cover sheet. [c] Random selection of respondent by line number in Q. 1.

Study #8760
Sept. - Oct., 1967
NCHRP-20-4

Check in #_____
(2 - 5)

TRANSPORTATION STUDY
QUESTIONNAIRE FORM

From Listing Sheet

Segment # _____
(6 - 11)

Line # _____

Timing

Time Interview
Began at Q. 3 _____a.m. _____p.m.

Time Interview
Ended _____a.m. _____p.m.

_____
(12- 14)

INTRODUCTION: Good_____, my name is _____ from_____
We are conducting a survey for the National Academy of Sciences in Washington to obtain information on how people feel about varicus forms of transportation. We're interviewing a cross-section of people, and your home was selected as part of this cross-section. (GO TO Q. 1 WITHOUT PAUSING WITH RESPONSIBLE ADULT).

1. Please tell me the persons in your household, 14 years of age and older and their approximate ages. Start with the oldest member of your household and work down to the youngest member 14 or older. Just give me their relationship to you.
(OBTAIN ALL MEMBERS RELATIONSHIP AND AGE 14 YEARS OF AGE AND OLDER FROM OLDEST TO YOUNGEST. INDICATE SEX OF EACH. RECORD THOSE 18 AND OLDER ABOVE THE DOUBLE LINE. RECORD THOSE 17 TO 14 BELOW THE DOUBLE LINE.)

Line #	Relationship	Age	Sex M	Sex F	License Driver Yes	License Driver No	Years Driven	Last Grade Completed (Degree if any)	Employed Full	Employed Part	Employed Not	Occupation*
1			1	2	1	2			1	2	3	
2			1	2	1	2			1	2	3	
3			1	2	1	2			1	2	3	
4			1	2	1	2			1	2	3	
5			1	2	1	2			1	2	3	
6			1	2	1	2			1	2	3	

RECORD MEMBERS 18 AND OLDER ABOVE. RECORD MEMBERS 17 TO 14 BELOW THESE LINES.

			1	2	1	2			1	2	3	
			1	2	1	2			1	2	3	
			1	2	1	2			1	2	3	

2. Now, for each member, please tell me the following:

a. Is_____a licensed driver or not? (CIRCLE ABOVE)
b. (IF DRIVER) How long has_____been a licensed driver? (RECORD ABOVE)
c. What was the last grade of school completed by _____? (ENTER YEARS ABOVE)
d. Is_____employed full or part time? (CIRCLE ABOVE)
e. (FOR EACH EMPLOYED) What is the occupation of _____? (RECORD ABOVE)

*OCCUPATION -- GET USUAL OCCUPATION FOR "NOT EMPLOYED" AND LAST OCCUPATION FOR "RETIRED".

(OBTAIN THE ABOVE FOR EACH PERSON 14 YEARS OF AGE AND OVER.
f. How many household members do you have under 14 years of age? 71-

Number under 14	
None	0

72-

RANDOM SELECTION OF RESPONDENT:

Up to this point, the interview may be conducted with any responsible member in the household. Starting with Question 3 and for the remainder of the interview, the respondent must be randomly selected from those persons in the household 18 years of age & older according to the following procedure.

RANDOM SELECTION TABLE:

Number of Persons in Household 18 years of age and older	1	2	3	4	5	6 Or More
Interview Person on Line #	1	2	3	1	5	4

Follow across on the top line to the number of persons in the household 18 years of age and older. The number written below the number is the line # of the person with whom you must complete the interview. CIRCLE THE LINE # OF THE PERSON SELECTED FOR THE INTERVIEW IN THE ANSWER GRID UNDER Q. 1.

3. What type of structure do you live in?

	74-
Single family	1
2 to 4 family	2
Apartment, 5 to 19 families	3
Apartment, 20 families & over	4
Other (SPECIFY)	0

3a. Do you rent or do you own your home?

	74-
Own	1
Rent	2
Other	3

79-1
End Cd I 80-1

(HAND CARD FOR Q. 4)

4. We are interested in how far you live from your shopping center, your church or synagogue and other places. Approximately how far are you from (READ LIST AND ENTER MILES OR FRACTIONS OF MILES)?

		Miles or Fraction of Miles
The shopping center which your family uses most often	6-8	
The place of recreation which your family visits most often	9-11	
Your Church or Synagogue	12-14	
Nearest local bus stop	15-17	
Nearest subway station	18-20	
Nearest commuter train station	21-23	
Commercial airport	24-26	
Railroad station	27-29	
Inter-city bus depot	30-32	
Nearest freeway, expressway, or toll road entrance	33-35	
IF CHILDREN IN ELEMENTARY SCHOOL: Elementary school	36-38	
IF CHILDREN IN SECONDARY SCHOOL: Secondary school	39-41	
IF CHILDREN IN COLLEGE: College	42-44	
Place of work of chief wage earner (Miles from home)	45-47	

Is this place of work in the (Name of Central City) or suburbs? 48-

Central City	1
Suburbs	2
Rural	3

(IF RESPONDENT LIVES IN A METROPOLITAN AREA)
4a. How far is the downtown shopping area of (Name of Central City) from your home?

_____ Mile

49-51

(HAND CARD FOR Q. 5)

5. On the card are a number of size places a person could live in. Please tell me, by calling off the number next to the place sizes, where you have lived from birth. In what size places did you live from birth to age 10? (OBTAIN SIZE OF PLACE FOR EACH AGE INTERVAL AND CIRCLE APPROPRIATE CODE)

	52-	53-	54-	55-	56-	57-
Size of Place	Birth to Age 10	11-19	20-35	36-50	51-64	65 & over
Rural	1	1	1	1	1	1
Small Town (under 10,000)	2	2	2	2	2	2
Small City (10,000 to 50,000)	3	3	3	3	3	3
Medium Size City (50,000 to 250,000)	4	4	4	4	4	4
Suburbs of Medium City	5	5	5	5	5	5
Large City (250,000 and over)	6	6	6	6	6	6
Suburbs of Large City	7	7	7	7	7	7
Military Service Special	8	8	8	8	8	8

79-1

End Cd 2 80-2

(HAND CARD FOR Q. 6)

6. On this card are a list of changes that could have taken place in your life. Please tell me which of these took place in your life during the past five years? (CIRCLE CODE IN COL. 1)

(FOR EACH CHANGE, ASK Q. 6a &6b)

6a. Did the (READ CHANGE) mean more use, less use, or no change in your use of public transportation? Public transportation is any transportation for which you pay a fare. (CIRCLE CODE IN COL. 2)

6b. Did this mean more use, less use, or no change in your use of automobile transportation? (CIRCLE CODE IN COL. 3)

Changes	Column 1 Change Took Place	Column 2 Public Transportation			Column 3 Automobile Transportation			Office use only
		More	Less	No Change	More	Less	No Change	
Change of job status 6-	1 8-	1	2	3	5	6	7	x
Change of work location	2 9-	1	2	3	5	6	7	x
Change of home location	3 10-	1	2	3	5	6	7	x
Did not have an auto, but bought an automobile	4 11-	1	2	3	5	6	7	x
Increased number of autos	5 12-	1	2	3	5	6	7	x
Decreased number of autos	6 13-	1	2	3	5	6	7	x
Replaced an auto	7 14-	1	2	3	5	6	7	x
Children becoming teenagers	8 15-	1	2	3	5	6	7	x
Children becoming school age	9 16-	1	2	3	5	6	7	x
Children leaving home	0 17-	1	2	3	5	6	7	x
Changed school location 7-	1 18-	1	2	3	5	6	7	x
Close friends or relatives moving	2 19-	1	2	3	5	6	7	x
IN YOUR AREA OR COMMUNITY:								
ew or more convenient air or rain terminals	3 20-	1	2	3	5	6	7	x
ew shopping center	4 21-	1	2	3	5	6	7	x
ew entertainment or recre-tional facilities	5 22-	1	2	3	5	6	7	x
hange in public transportation	6 23-	1	2	3	5	6	7	x
ew freeway facilities	7 24-	1	2	3	5	6	7	x
ighway improvements	8 25-	1	2	3	5	6	7	x

THIS PAGE IS SELF ADMINISTERED -- SHOW TO RESPONDENT AND READ QUESTION WITH RESPONDENT LOOKING ON.

7. On this page are a number of services provided to you and others in your area. Please read each and indicate what you think is the quality of each in your area. If you think the quality is "very good" circle the number 5. If you think it is "very poor" circle the number 1. And if you think it is somewhere between these two points, circle any number between 5 and 1. Now lets start with Education. (CIRCLE ONE NUMBER FOR EACH SERVICE)

	Very Good ←				Very Poor
Education 26-	5	4	3	2	1
The air you breathe 27-	5	4	3	2	1
Water for drinking and recreation 28-	5	4	3	2	1
Police and fire protection 29-	5	4	3	2	1
Parks and recreation facilities 30-	5	4	3	2	1
The roads and highways 31-	5	4	3	2	1
Public transportation (fare paid) 32-	5	4	3	2	1
Health and hospital services 33-	5	4	3	2	1
Welfare programs 34-	5	4	3	2	1
Urban renewal 35-	5	4	3	2	1

(SELF ADMINISTERED)

8. Now again for these same services, please circle the number under the heading which indicates how much more or less money and effort you think should be spent in your area for each item? (CIRCLE ONE NUMBER FOR EACH SERVICE)

		Money and Effort to be Spent:				
		Much More	More	Same	Less	Much Less
Education	36-	5	4	3	2	1
The air you breathe	37-	5	4	3	2	1
Water for drinking and recreation	38-	5	4	3	2	1
Police and fire protection	39-	5	4	3	2	1
Parks and recreation facilities	40-	5	4	3	2	1
The roads and highways	41-	5	4	3	2	1
Public transportation (fare paid)	42-	5	4	3	2	1
Health and hospital services	43-	5	4	3	2	1
Welfare programs	44-	5	4	3	2	1
Urban renewal	45-	5	4	3	2	1

(SELF ADMINISTERED -- SHOW PAGE TO RESPONDENT AND READ)

9. Here are some statements people have made about the automobile and public transportation. Public transportation is any type of transportation you pay a fare. Please read them.

-- Now, in Column A check the one statement you most agree with.

-- In Column B check any others you may agree with.

-- Then, in Column C check the one statement you most disagree with.

-- In Column D check any other statements you may disagree with.

	46- COL. A One Most Agree	47- COL. B Other Agree	48- COL. C One Most Disagree	49- COL. D Other Disagree
The real answer to our passenger transportation problem is more and better public transportation				
If needed improvements are made in our public transportation facilities, it will help a great deal.				
More attention to public transportation rather than automobile transportation is desirable.				
As between automobile and public transportation, public transportation is the more important.				
Continued planning and building of both automobile transportation and public transportation facilities are what is needed.				
More attention to automobile transportation facilities rather than public transportation is desirable.				
As between automobile and public transportation, automobile transportation is the more important.				
Public transportation improvements -- no matter how great, won't help solve the problem.				
The real answer to our transportation problem is more and better automobile transportation.				

IF YOU HAVE NO FEELINGS ABOUT A STATEMENT ONE WAY OR ANOTHER, PLEASE LEAVE IT BLANK.

(SELF ADMINISTERED)

10. Here are some things people say about the automobile.

-- Now, in Column A check the one statement you most agree with.

-- In Column B check any others you may agree with.

-- Then, in Column C check the one statement you most disagree with.

-- In Column D check any other statements you may disagree with.

	50- COL. A One Most Agree	51- COL. B Other Agree	52- COL. C One Most Disagree	53- COL. D Other Disagree
The automobile is the best form of transportation invented by man.				
If it weren't for the automobile, modern transportation would be impossible.				
The automobile has made a great contribution to America's growth and freedom.				
The automobile has its shortcomings but, in general, it is a boon to mankind.				
The automobile is here to stay but there will have to be a lot of improvements.				
The automobile is more trouble than it is worth.				
The automobile represents a real health hazard to mankind.				
The automobile is a deadly weapon.				
The automobile is the worst form of transportation invented by man.				

IF YOU HAVE NO FEELINGS ABOUT A STATEMENT ONE WAY OR ANOTHER, PLEASE LEAVE IT BLANK.

(SELF ADMINISTERED)

11. Here are some things people have said about highway planning and building.

-- Now, in Column A check the one statement you most agree with.

-- In Column B check any others you may agree with.

-- Then, in Column C check the one statement you most disagree with.

-- In Column D check any other statements you may disagree with.

	54- COL. A One Most Agree	55- COL. B Other Agree	56- COL. C One Most Disagree	57- COL. D Other Disagree
The way highways are being planned and built just doesn't make any sense.				
In general, highway planning is stupid and too shortsighted.				
Highway planners do not always use their best judgement and should seek the advise of others.				
The biggest problem in highway planning is that they're obsolete by the time they get built.				
Under the circumstance, highway planning is satisfactory.				
Highways are generally built in time for the average motorist's needs.				
If highway planners could use their own judgement and expertese, they'd do a better job.				
In general, highway planning is intelligent and far-sighted.				
Highways are being planned and built in the best possible way.				

IF YOU HAVE NO FEELINGS ABOUT A STATEMENT ONE WAY OR ANOTHER, PLEASE LEAVE IT BLANK.

(SELF ADMINISTERED)

12. If a transportation engineer or planner asked you how much more or less money and effort should be spent in your area on the following transportation improvements, what would you tell him? Indicate your answer for each line by circling the number which best expresses your feelings. If you feel that much more money should be spent, circle a 5. If you feel that much less money and effort should be spent, circle 1. If you feel that the same amount of money and effort should be spent, circle 3. The other numbers indicate different amounts of money and effort. Be sure to circle a number for each improvement.

		Much more Money		Same Amount		Much less Money
Improve maintenance on existing highways	58-	5	4	3	2	1
Build additional new rapid transit lines	59-	5	4	3	2	1
Improve traffic signals and signs	60-	5	4	3	2	1
Beautify highways	61-	5	4	3	2	1
Build additional parking areas at train or rapid transit stations	62-	5	4	3	2	1
Build additional downtown parking facilities	63-	5	4	3	2	1
Add safety features to existing streets and highways	64-	5	4	3	2	1
Improve traffic law enforcement	65-	5	4	3	2	1
Build additional highways	66-	5	4	3	2	1
Add more services (stations, rest stops, information) for users of rural freeways	67-	5	4	3	2	1
Improve training and testing procedures related to auto drivers	68-	5	4	3	2	

79-1

End Cd 3 80-3

13. What method of transportation do you usually use for family trips to points 500 or more miles away? 6- _____

13a. How would you describe your ideal method for taking these family trips to points 500 or more miles away? (PROBE FOR TYPE OF TRANSPORTATION)

_____

_____ 7-

(HAND CARD FOR Q.'s 13 TO 17. LEAVE IN FRONT OF RESPONDENT UNTIL AFTER Q. 17)

Here is a card which has on it numbers from 1 through 9. You can see that the number "9" represents the ideal method of travel and the "1" represents the method furthest from the ideal. You may pick the number 9; the number 1, or any number between 9 and 1 depending on how you feel.

13b. Which number from this card would you choose to show how close or how far automobile transportation is from your ideal method for making family trips to points 500 or more miles away? (OBTAIN RATING FOR ALL FORMS LISTED)

Automobile 8- _____

Train 9- _____

Bus 10- _____

Airplane 11- _____

14. What method of transportation do you usually use for business trips to points 500 or more miles away? _____ 1

14a. How would you describe your ideal method for taking these business trips to points 500 or more miles away? (PROBE FOR TYPE OF TRANSPORTATION)

_____ 13

_____

14b. Which number from this card would you choose to show how close or how far automobile transportation is from your ideal method for making business trips to points 500 or more miles away? (OBTAIN RATING FOR ALL FORMS LISTED)

Automobile 14- _____

Train 15- _____

Bus 16- _____

Airplane 17- _____

15. What method of transportation do you usually use to go to:

	Method Used	Does not do	
Work (School)		9	18-
Shopping		9	19-
Social Trips		9	20-

(DO NOT ASK Q.16 & 17 IF CIRCLED HERE)

(ASK FOR EACH OF THE ABOVE THE RESPONDENT DOES)

16. How would you describe your ideal method for going:

To Work (School)_____ 21-

Shopping_____ 22-

On a Social Trip_____ 23-

(ASK FOR EACH OF THE TRIPS THE RESPONDENT TAKES IN Q. 15)

17. Which number on the card would you choose to show how close or how far the following form of transportation are from your ideal way of:

	Going to Work (School)	Going Shopping	Going on a Social Trip
Automobile	24-	28-	32-
Bus	25-	29-	33-
Subway	26-	30-	34-
Commuter Train	27-	31-	35-

OBTAIN RATINGS FOR EACH FORM OF TRANSPORTATION FOR EACH TRIP TAKEN IN Q. 15.

BEFORE ASKING Q. 18 & 19, COMPLETE THE FOLLOWING:

1. In Col. A, check those trips taken in Q. 15.

2. Ask Q. 18 & Q. 19 for the trip checked in Col. A having the lowest number in Col. B.

3. Write in the selected trip in line provided in Questions 18 and 19.

	Col. A	Col. B
Work Trip (School)		1
Shopping Trip		3
Social Trip		2

36

(SELF-ADMINISTERED)

18. Please look at this page. Along the side are statements about people's feelings in regard to automobile and public transportation for a _____ trip.
(WRITE IN SELECTED TRIP)

Across the top are different degrees of satisfaction. The first statement is "The comfort of the vehicle". Please circle the number in the box which best expresses your feeling of satisfaction about automobile transportation. Then for the same statement please circle the number in the box which best expresses your feeling of satisfaction with public transportation. Continue the procedure for each statement listed

HOW SATISFIED WERE YOU WITH:		Not at all satisfied	Very little satisfied	Little satisfied	Somewhat satisfied	Generally satisfied	Very much satisfied	Completely satisfied
The comfort of the vehicle--								
--Auto satisfies?	37	1	2	3	4	5	6	7
--Public transportation satisfies?	38	1	2	3	4	5	6	7
The feeling of pride you had in the vehicle you rode in--								
--Auto satisfies?	39	1	2	3	4	5	6	7
--Public transportation satisfies?	40	1	2	3	4	5	6	7
The confidence you had that the vehicle would not need to be stopped for repairs--								
--Auto satisfies?	41	1	2	3	4	5	6	7
--Public transportation satisfies?	42	1	2	3	4	5	6	7
The speed with which you traveled--								
--Auto satisfies?	43	1	2	3	4	5	6	7
--Public transportation satisfies?	44	1	2	3	4	5	6	7
The feeling of safety you had in the vehicle you rode in--								
--Auto satisfies?	45	1	2	3	4	5	6	7
--Public transportation satisfies?	46	1	2	3	4	5	6	7
The chance to relax in the vehicle you rode in--								
--Auto satisfies?	47	1	2	3	4	5	6	7
--Public transportation satisfies?	48	1	2	3	4	5	6	7

OW SATISFIED WERE YOU WITH:		Not at all satisfied	Very little satisfied	Little satisfied	Somewhat satisfied	Generally satisfied	Very much satisfied	Completely satisfied
he chance to look at the scenery--								
-Auto satisfies?	49-	1	2	3	4	5	6	7
-Public transportation satisfies?	50-	1	2	3	4	5	6	7
he newness of your vehicle--								
-Auto satisfies?	51-	1	2	3	4	5	6	7
-Public transportation satisfies?	52-	1	2	3	4	5	6	7
he number of times you had to change vehicles during your trip--								
-Auto satisfies?	53-	1	2	3	4	5	6	7
-Public transportation satisfies?	54-	1	2	3	4	5	6	7
he feeling of independence you had--								
-Auto satisfies?	55-	1	2	3	4	5	6	7
-Public transportation satisfies?	56-	1	2	3	4	5	6	7
he crowdedness of the vehicle--								
-Auto satisfies?	57-	1	2	3	4	5	6	7
-Public transportation satisfies?	58-	1	2	3	4	5	6	7
he cost of the trip--								
-Auto satisfies?	59-	1	2	3	4	5	6	7
-Public transportation satisfies?	60-	1	2	3	4	5	6	7
he amount of protection you had from bad weather before getting a ride--								
-Auto satisfies?	61-	1	2	3	4	5	6	7
-Public transportation satisfies?	62-	1	2	3	4	5	6	7
he amount of traffic--								
-Auto satisfies?	63-	1	2	3	4	5	6	7
-Public transportation satisfies?	64-	1	2	3	4	5	6	7
he chance you had to ride with people you like--								
-Auto satisfies?	65-	1	2	3	4	5	6	7
-Public transportation satisfies?	66-	1	2	3	4	5	6	7

79-1

End Cd 4 80-4

(SELF-ADMINISTERED)

19. Please look at this page. We would like to determine how important certain factors are to you when taking a _____ trip. Down the side are feelings or (WRITE IN SELECTED TRIP) situations that could exist during this trip. Across the top are different degrees of importance that you can pick for each of those feelings or situations.

Now, the first situation or feeling is "The feeling of pride you get from riding in your own vehicle." Please circle the number in the box that indicates how important this feeling is for this trip. Please continue for the remaining items remembering that you are answering for the trip I have written in above.

6- How IMPORTANT was it --	Not at all important	Of very little importance	Of minor importance	Of some importance	Important	Very important	Of greatest Importance
The feeling of pride you get from riding in your own vehicle 7-	1	2	3	4	5	6	7
To feel confident the vehicle will get you to your destination without an accident 8-	1	2	3	4	5	6	7
To feel confident that the vehicle would not need to be stopped for repairs 9-	1	2	3	4	5	6	7
To have a comfortable vehicle (seats, ride, noise, air conditioning, etc. 10-	1	2	3	4	5	6	7
To make the trip as fast as possible 11-	1	2	3	4	5	6	7
To be able to look at the scenery as you travel 12-	1	2	3	4	5	6	7
To ride in a new modern vehicle 13-	1	2	3	4	5	6	7
To not have to change vehicles 14-	1	2	3	4	5	6	7
To feel independent of anyone else for your transportation 15-	1	2	3	4	5	6	7
To travel in an uncrowded vehicle 16-	1	2	3	4	5	6	7
The cost of the trip 17-	1	2	3	4	5	6	7
To be protected from the weather while waiting for a ride 18-	1	2	3	4	5	6	7
To travel in a vehicle at times when traffic is light 19-	1	2	3	4	5	6	7
To ride with people you like 20-	1	2	3	4	5	6	7
To be able to relax 21-	1	2	3	4	5	6	7

(ASK Q. 20 FOR YESTERDAY. WRITE WHAT DAY OF WEEK YESTERDAY WAS HERE:) _____ 22-

20. I would like you to think back to <u>all</u> the trips you took yesterday. A trip is the one-way travel between two points. By all trips I mean by auto, by public transportation or by walking. Now starting with the first trip in the morning:

a. What was the purpose of the trip?
b. What was the method of travel on this trip?
c. How far did you go?

Please take your time and give me first all your morning trips; all your afternoon trips; and finally all trips before you went to bed. To aid you in your thinking, here is an example of another respondents trips. (SHOW EXAMPLE CARD FOR Q. 20)

22-

No trips taken	0

Trip #	Purpose of Trip	Method of Travel	Miles or Part of Miles
1st			
2nd			
3rd			
4th			
5th			
6th			
7th			
8th			
9th			
0th			

79-1

End Cd 5 80-5

Card 6

79-1
80-6

(ASK Q. 21 FOR DAY BEFORE YESTERDAY. THAT DAY WAS)_____ 6-

21. Now I would like you to do the same thing for the day before yesterday. First all your morning trips; then your afternoon trips; and finally those before you retired.

6-

No trips taken	0

	Trip #	Purpose	Method of Travel	Miles or Part of Miles
7-11	1st			
12-16	2nd			
17-21	3rd			
22-26	4th			
27-31	5th			
32-36	6th			
37-41	7th			
42-46	8th			
47-51	9th			
52-56	10th			
57-61	11th			
62-66	12th			
67-71	13th			
72-76	14th			

79-1

End Cd 7 80-7

21a. How many automobiles do you or anyone in your household own or use?

6-

	Number of Autos	
GO TO Q. 23	None	0

22. Please tell me the make of each automobile owned or used by your household?

22a. What is the year model?
22b. Was it a new or used automobile when acquired?
22c. How long have you owned or used the auto?
22d. How many miles has it been driven in the past 12 months?

	Make	22a Year Model	22b Bought New	22b Bought Used	22c Number of years owned	22d Past 12-month Miles Driven
7-14			1	2		
15-22			1	2		
23-30			1	2		
31-38			1	2		
			1	2		
			1	2		
						TOTAL--

(39-41)

23. Does your household own any other motor driven vehicles such as a pick-up truck, motor cycle, motor scooter, airplane, boat, etc. that is used to provide transportation for you and any member of your family?

42-

ASK Q. 23b	Yes	1
	No	2

23b. Please give me your estimate of the number of miles each of these types of vehicles have been driven in the past 12 months for providing transportation for you and your family?

Vehicle 43-	Past 12-Month Miles
Total	

44-46

24. Did you rent an automobile in the past 12 months for business use?

47-

ASK Q. 24b	Yes	1
	No	2

24b. How many miles has it (have they) been used in the past 12 months for business use?

_____ miles
(48-50)

25. Did you rent an automobile in the past 12 months for family use?

51-

ASK Q. 25b	Yes	1
	No	2

25b. How many miles has it (have they) been used in the past 12 months for family use?

_____ miles
(52-54)

RECORD TOTAL MILES FROM:

Q. 22d _____

Q. 23b _____

Q. 24b _____

Q. 25b _____

Total _____ (USE TOTAL IN Q. 26)
(55-57)

(HAND CARD FOR Q. 26)

26. Now, think of the total miles you have just given me for all vehicles used to transport people, (TELL RESPONDENT THAT TOTAL) and tell me what percent of these miles you estimate were used for the following on this card? (OBTAIN PERCENT FOR EACH. PERCENTS MUST TOTAL TO 100. IF RESPONDENT WISHES TO GIVE ANSWER IN MILES, USE THE MILES COLUMN BELOW).

Trip Purpose		Percents	Miles
Work and Related Business	58-59	%	
Family or Personal Business (shopping, doctors, etc.)	60-61	%	
Social and/or Recreation	62-63	%	
Education, civic, religious	64-65	%	
Vacation	66-67	%	
Total		100%	

79-1

End Cd 8 80-8

(HAND CARD FOR Q. 27)

27. Now, I would like you to think of travel done by you during the past 12 months for both business and non-business . . . alone or with someone else. Try to estimate the total miles that you traveled during the last 12 months by each type of transportation on this card.

Mode		12-Month Miles
Auto	6-8	
Train	9-11	
Air	12-14	
Intercity (Long Distance bus	15-17	
Local public transportation	18-20	
Total	21-23	

Rej 24-42

28. The automobile pollutes the air, and creates traffic congestion. Highway development demolishes homes and often destroys previously attractive landscapes. The increasing number of automobiles, together with inadequate highways, kill over 50,000 people every year. In your opinion, is the contribution the automobile makes to our way of life worth this?

43-

Yes	1
No	2

28a. Why do you feel this way? (PROBE)

44- _____

45- _____

46- _____

28b. What about the future? What steps do you think should be taken to solve these problems I mentioned?

47- _____

48- _____

49- _____

(HAND CARD FOR Q. 29)

29. Please indicate approximate yearly household income BEFORE TAXES.

50-

Under $2,000	1
$2,000 to $2,999	2
$3,000 to $3,999	3
$4,000 to $4,999	4
$5,000 to $5,999	5
$6,000 to $7,499	6
$7,500 to $9,999	7
$10,000 to $12,499	8
$12,500 to $14,999	9
$15,000 to $19,999	0
$20,000 and over	V

30. By observation: Race

51-

White	1
Non-White	2

Name of Respondent:_____

Address:_____City_____State_____

Interviewers Name:_____Date_____

Respondent's Telephone No._____

79-1

End Cd 8 80-9

(HAND CARD FOR Q. 22)

22. Now, I would like you to think of travel done by you during the past 12 months for both business and non-business . . . alone or with someone else. Try to estimate the total miles that you traveled during the last 12 months by each type of transportation on this card.

Mode		12-Months Miles
Auto	6-8	
Train	9-11	
Air	12-14	
Intercity (Long Distance) bus	15-17	
Local public transportation	18-20	
Total	21-23	

23. Have you ever gone to a public hearing or meeting to express your views on proposed highways?

24-

Yes	1
No	2

24. Would you take a more active part in public hearings if you thought that your opinions would ever carry any weight?

25-

Yes	1
No	2

25. From which of the following kinds of taxes and charges do you think the money to build highways comes? (READ LIST)

26-

Motor Fuel Tax	1
Motor Vehicle Registration or License Fees	2
Income Tax	3
Toll Charges, etc.	4
Property Tax	5
Some Other Type of Tax or Charge	
_____	0
_____	

26. If more money is needed to build highways, from which of these sources should additional money be obtained? (READ LIST)

27-

Motor Fuel Tax	1
Motor Vehicle Registration or License Fees	2
Income Tax	3
Toll Charges, etc.	4
Property Tax	5
Some Other Type of Tax or Charge _____	0
_____	

27. Do you think the (LEVEL OF GOV'T) has major responsibility for (READ EACH DUTY)? (OBTAIN FOR EACH LEVEL OF GOV'T)

Level of Government		Highway Location		Highway Construction		Highway Maintenance		Law Enforcement on Highways in Urban Areas		Traffic Signals on Highways	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Federal	28-29	1	2	4	5	7	8	1	2	4	5
State	30-31	1	2	4	5	7	8	1	2	4	5
Local Government (City, County, Township)	32-33	1	2	4	5	7	8	1	2	4	5

28. Of the total money spent for road maintenance and construction, do you feel private automobiles are paying: (READ LIST)

34-

More than their fair share	1
About their fair share	2
Less than their fair share	3
No opinion	4

29. Of the total money spent for road maintenance and construction do you feel trucks are paying: (READ LIST)

35-

More than their fair share	1
About their fair share	2
Less than their fair share	3
No opinion	4

(HAND CARD FOR Q. 30)

30. On this card are a number of statements made by people regarding highways, automobiles and traveling. Please read this list and tell me from the scale at the top of the card how strongly you agree or disagree with each statement?

		Strongly Agree		Neither Agree or Disagree		Strongly Disagree
I think highways in urban areas are ugly	36-	5	4	3	2	1
I think automobiles are attractive	37-	5	4	3	2	1
I feel that the Interstate Highway System is one of our nations greatest public works	38-	5	4	3	2	1
Our present highway system is necessary to maintain my present way of life	39-	5	4	3	2	1
I feel highway problems are primarily in urban areas	40-	5	4	3	2	1
I think that better training and testing procedures are needed in automobile driver training	41-	5	4	3	2	1
I think that more frequent re-examination of automobile drivers should be made	42-	5	4	3	2	1

31. The automobile pollutes the air, and creates traffic congestion. Highway development demolishes homes and often destroys previously attractive landscapes. The increasing number of automobiles, together with inadequate highways, kills over 50,000 people every year. In your opinion, is the contribution the automobile makes to our way of life worth this? 43-

Yes	1
No	2

31a. Why do you feel this way? (PROBE)

44-

45-

46-

31b. What about the future? What steps do you think should be taken to solve these problems?

47-

48-

49-

APPENDIX B

STATISTICAL REVIEW

DEMOGRAPHIC CHARACTERISTICS AND TRANSPORTATION ATTITUDES

Statistical Resume of Socio-Economic Cross-Tabulations

The following charts and tables summarize the statistical data discussed in Chapter Two under "Demographic Characteristics and Transportation Attitudes." They are presented in the same order as they are discussed in the text. Data on attitudes towards spending for roads and highways and for public transportation (Q. 8) are shown in Figures B-1 through B-16 and also are given in Tables B-1, B-2, B-3, B-4, B-5, B-6, B-8, B-9, B-17, B-18, B-26, B-27, B-35, B-36, B-44, and B-45 for those characteristics run on the cross-tabulations. Tables for educational level, occupation, age, race, and sex are given for the following:

Question 6. Average change in the use of automobile and public transportation caused by life changes during the past five years (Tables B-7, B-16, B-25, B-34, B-43).

Question 9. Attitude towards public transportation (Tables B-10, B-19, B-28, B-37, B-46).

Question 10. Attitudes towards the social role of the automobile (Tables B-11, B-20, B-29, B-38, B-47).

Question 11. Attitudes towards highway planning and planners (Tables B-12, B-21, B-30, B-39, B-48).

Question 12. Amount of money that should be spent for transportation building and improvements (Tables B-13, B-22, B-31, B-40, B-49).

Questions 20-21. Average length of weekday trips (Tables B-14, B-23, B-32, B-41, B-50).

Question 28. Negatively biased question (Tables B-15, B-24, B-33, B-42, B-51).

Attitudes and Behavior of People in Rail Mass Transportation Cities

Attitudes and behavior of people in five standard metropolitan areas offering the maximum choice of public transportation modes were selected for special study. New York, Philadelphia, Boston, Chicago, and Cleveland have rail mass transportation facilities. People to whom a greater number of transportation alternatives are available might be expected to hold attitudes and opinions that differ from those in the rest of the population. Their travel behavior would show different patterns and the relationship between attitudes and behavior should prove worthy of investigation. These 5 rail mass transportation

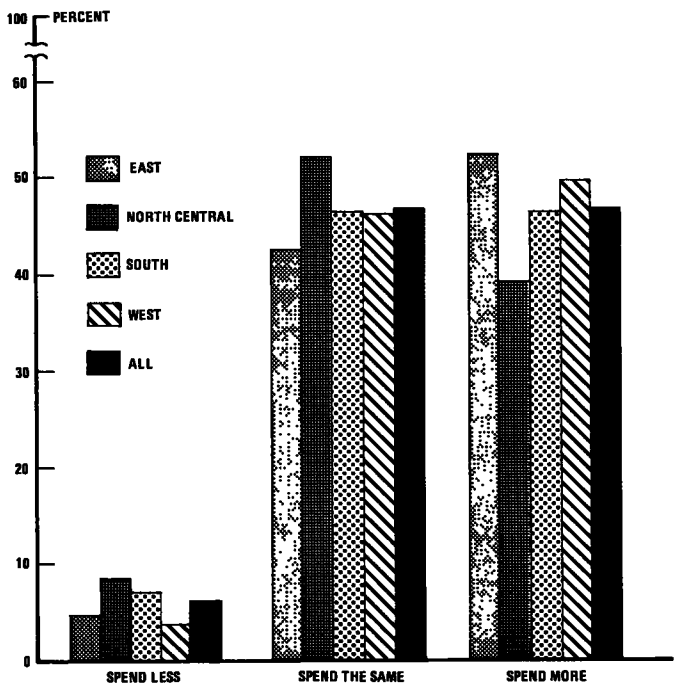


Figure B-1. Attitudes towards spending for public transportation (Q. 8) by region (Source: Table B-1).

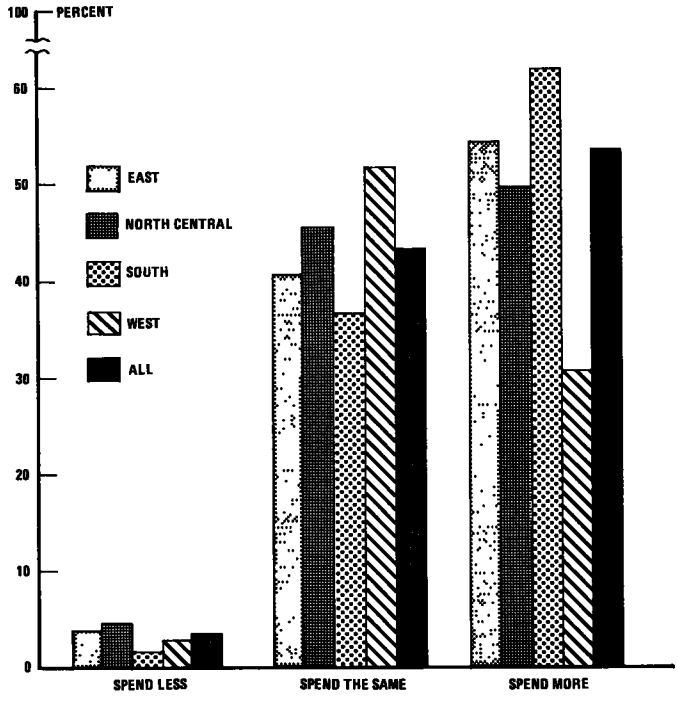


Figure B-2. Attitudes towards spending for roads and highways (Q. 8) by region (Source: Table B-2).

TABLE B-1

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY REGION (QUESTION 8)

REGION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
East	804	5.0	42.8	52.2
North Central	701	8.8	52.2	39.0
South	608	7.2	46.5	46.3
West	400	4.0	46.3	49.7
All	2,513	6.4	46.9	46.7

TABLE B-2

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY REGION (QUESTION 8)

REGION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
East	804	3.7	41.7	54.6
North Central	701	4.5	45.6	49.9
South	608	1.5	36.5	62.0
West	400	2.8	51.9	40.3
All	2,513	3.1	43.2	53.7

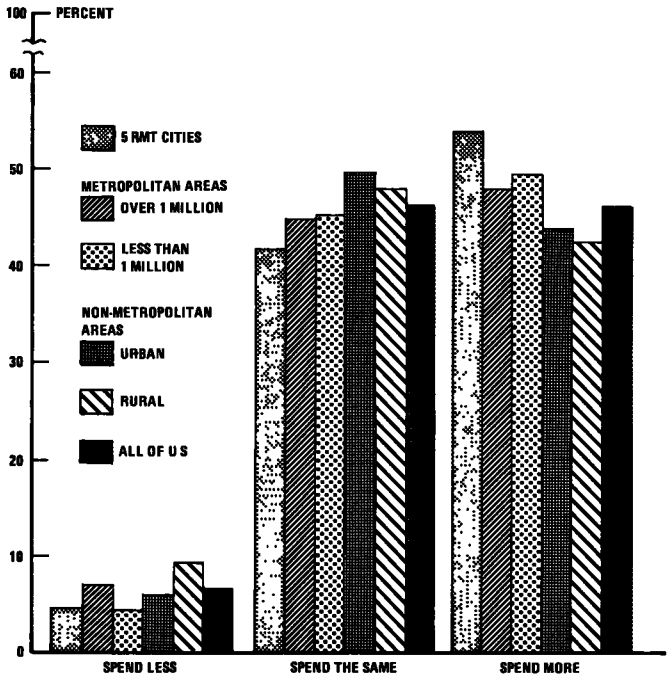


Figure B-3. Attitudes towards spending for public transportation (Q. 8) by population density (Source: Table B-3).

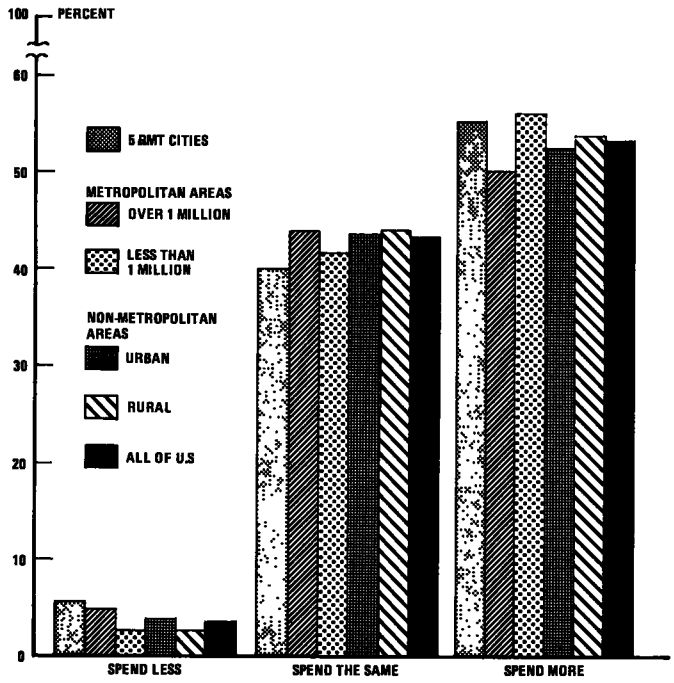


Figure B-4. Attitudes towards spending for roads and highways (Q. 8) by population density (Source: Table B-4).

TABLE B-3

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY POPULATION DENSITY (QUESTION 8)

POPULATION DENSITY	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
5 RMT cities [a]	395	4.6	41.4	54.0
Metropolitan areas: [b]				
1 Million and over	885	2.7	45.5	48.1
Less than 1 million	703	4.2	45.9	49.9
Non-metropolitan areas:				
Urban	322	5.9	50.0	44.1
Rural	603	9.1	48.9	42.5
All	2,513	6.4	46.9	46.7

[a] Rail mass transit cities.
[b] Metropolitan areas 1 million and over include the 5 RMT cities.

TABLE B-4

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY POPULATION DENSITY (QUESTION 8)

POPULATION DENSITY	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
5 RMT cities	395	5.1	39.8	55.1
Metropolitan area: [b]				
1 Million and over	885	4.7	43.9	51.4
Less than 1 million	703	2.2	41.6	56.2
Non-metropolitan areas:				
Urban	322	3.5	43.6	52.9
Rural	603	2.2	43.8	54.0
All	2,513	3.1	43.2	53.7

[a] Rail mass transit cities.
[b] Metropolitan areas 1 million and over include the 5 RMT cities.

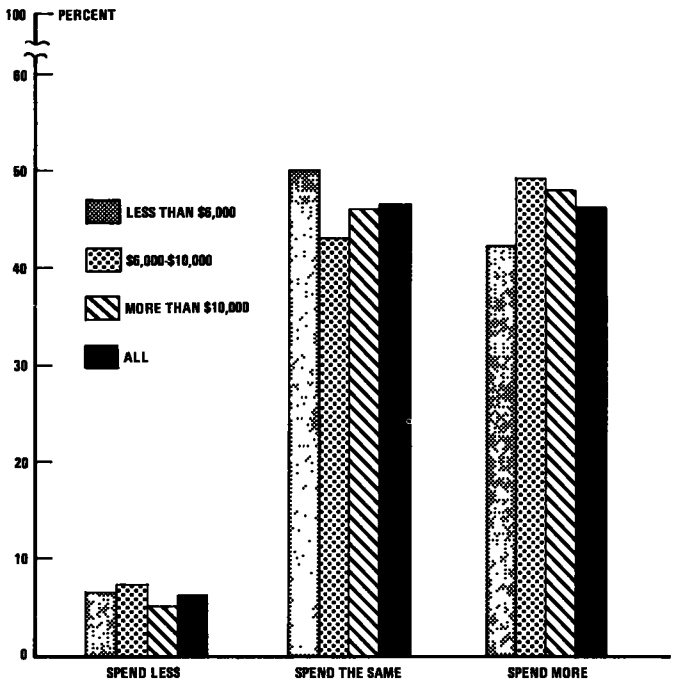


Figure B-5. Attitudes towards spending for public transportation (Q. 8) by income group (Source: Table B-5).

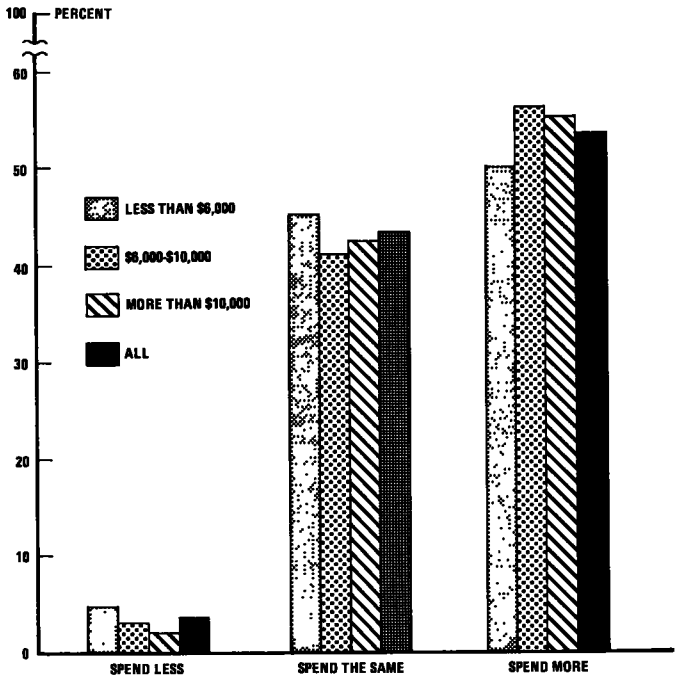


Figure B-6. Attitudes towards spending for roads and highways (Q. 8) by income group (Source: Table B-6).

TABLE B-5

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY INCOME GROUP (QUESTION 8)

		DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
INCOME GROUP	RESPONSES	LESS	SAME	MORE
Under $6,000	1,010	6.7	50.8	42.5
$6,000-$10,000	759	7.2	43.1	49.7
$10,000 and over	744	5.1	46.6	48.3
All	2,513	6.4	46.9	46.7

TABLE B-6

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY INCOME GROUP (QUESTION 8)

		DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
INCOME GROUP	RESPONSES	LESS	SAME	MORE
Under $6,000	1,010	4.7	45.1	50.2
$6,000-$10,000	759	2.7	41.1	56.2
$10,000 and over	744	1.8	42.4	55.8
All	2,513	3.1	43.2	53.7

TABLE B-7

AVERAGE CHANGE IN USE OF AUTOMOBILE AND PUBLIC TRANSPORTATION CAUSED BY LIFE CHANGES DURING THE PAST FIVE YEARS, BY EDUCATIONAL ATTAINMENT (QUESTION 6)

		DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF					
		AUTOMOBILE			PUBLIC TRANSPORTATION		
EDUCATION	RESPONSES	DECREASE	NO CHANGE	INCREASE	DECREASE	NO CHANGE	INCREASE
Some grade school	131	10.4	48.1	41.5	8.6	75.2	16.2
Grade school completed	158	10.5	46.5	43.0	7.9	80.7	11.4
Some high school	252	10.2	44.0	45.8	13.0	70.8	16.2
High school completed	420	5.2	36.1	58.7	12.3	69.2	18.5
Some college or other beyond high school	170	7.6	39.5	52.9	10.3	73.1	16.6
College and postgraduate	125	16.2	30.6	53.2	7.2	73.9	18.9
All	1,256	8.7	39.7	51.6	10.8	72.3	16.9

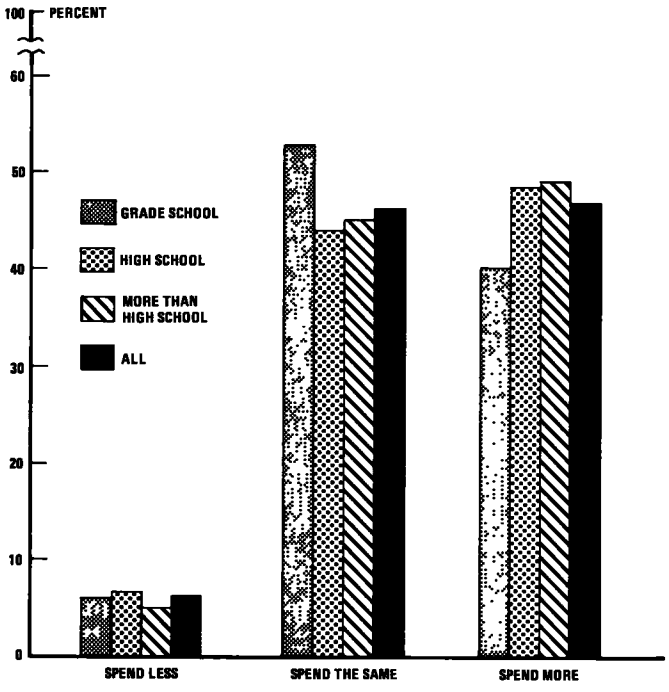


Figure B-7. Attitudes towards spending for public transportation (Q. 8) by educational attainment (Source: Table B-8).

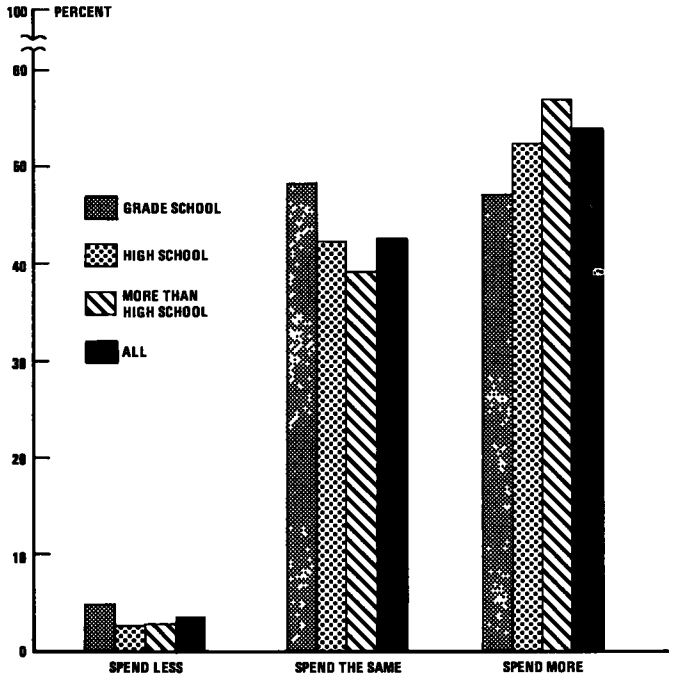


Figure B-8. Attitudes towards spending for roads and highways (Q. 8) by educational attainment (Source: Table B-9).

TABLE B-8

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY EDUCATIONAL ATTAINMENT (QUESTION 8)

EDUCATION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Grade school	578	6.8	53.1	40.1
High school	1,345	7.0	44.3	48.7
More than high school	590	5.3	45.5	49.2
All	2,513	6.4	46.9	46.7

TABLE B-9

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY EDUCATIONAL ATTAINMENT (QUESTION 8)

EDUCATION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Grade school	578	4.8	48.1	47.1
High school	1,345	2.6	42.2	55.2
More than high school	590	2.9	39.1	58.0
All	2,513	3.1	43.2	53.7

TABLE B-10

ATTITUDES TOWARDS PUBLIC TRANSPORTATION (SUMMATED SCORES), BY EDUCATIONAL ATTAINMENT (QUESTION 9)

EDUCATION	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Some grade school	262	17.0	29.4	53.6
Grade school completed	316	22.0	34.5	43.5
Some high school	505	17.0	31.9	51.1
High school completed	840	15.1	36.1	48.8
Some college or other beyond high school	340	14.0	35.5	50.5
College and postgraduate	250	10.2	35.2	54.6
All	2,513	15.9	34.2	49.9

TABLE B-11

ATTITUDES TOWARDS THE SOCIAL ROLE OF THE AUTOMOBILE (SUMMATED SCORES), BY EDUCATIONAL ATTAINMENT (QUESTION 10)

EDUCATION	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Some grade school	262	—	28.6	71.4
Grade school completed	316	3.6	17.0	79.4
Some high school	505	1.3	14.6	84.1
High school completed	840	1.1	16.4	82.5
Some college or other beyond high school	340	2.0	20.4	77.6
College and postgraduate	250	1.8	23.3	74.9
All	2,513	1.7	17.0	81.3

TABLE B-12

ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS (SUMMATED SCORES), BY EDUCATIONAL ATTAINMENT (QUESTION 11)

EDUCATION	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Some grade school	262	9.4	18.8	71.8
Grade school completed	316	15.4	18.2	66.4
Some high school	505	12.6	21.8	65.6
High school completed	840	13.9	24.7	61.4
Some college or other beyond high school	340	13.5	30.4	56.1
College and postgraduate	250	14.4	33.7	51.9
All	2,513	13.4	24.3	62.3

TABLE B-13

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS, BY EDUCATIONAL ATTAINMENT (QUESTION 12)

EDUCATION	RESPONSES	DISTRIBUTION (%) OF RESPONDENTS WILLING TO SPEND MORE ON	
		BUILDING	IMPROVEMENTS
Some grade school	131	68.1	88.5
Grade school completed	158	57.2	84.4
Some high school	252	67.2	88.2
High school completed	420	71.9	91.5
Some college or other beyond high school	170	71.1	89.5
College and postgraduate	125	80.8	88.4
All	1,256	69.9	89.1

TABLE B-14

AVERAGE LENGTH OF WEEKDAY TRIPS, BY EDUCATIONAL ATTAINMENT (QUESTIONS 20 AND 21)

EDUCATION	RESPONSES	DISTRIBUTION (%) BY TRIP LENGTH OF				
		1.0 MI.	1.1-3.0 MI.	3.1-5.0 MI.	5.1-10.0 MI.	10.1-25.0 MI.
Some grade school	262	30.7	29.9	16.8	22.6	—
Grade school completed	316	28.3	27.8	18.9	25.0	—
Some high school	505	20.9	31.1	19.3	28.4	0.3
High school completed	840	20.2	31.8	20.9	27.1	—
Some college or other beyond high school	340	18.6	28.6	24.2	28.6	—
College and postgraduate	250	23.9	31.9	19.0	25.2	—
All	2,513	22.4	30.6	20.2	26.7	0.1

TABLE B-15

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY EDUCATIONAL ATTAINMENT (QUESTION 28)

EDUCATION	RESPONSES	AGREE (%)
Some grade school	262	79.9
Grade school completed	316	83.4
Some high school	505	82.9
High school completed	840	85.2
Some college or other beyond high school	340	88.6
College and postgraduate	250	85.9
All	2,513	84.5

TABLE B-16

AVERAGE CHANGE IN USE OF AUTOMOBILE AND PUBLIC TRANSPORTATION CAUSED BY LIFE CHANGES DURING THE PAST FIVE YEARS, BY OCCUPATION (QUESTION 6)

OCCUPATION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF AUTOMOBILE			DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF PUBLIC TRANSPORTATION		
		DECREASE	NO CHANGE	INCREASE	DECREASE	NO CHANGE	INCREASE
Professional, technical, and kindred workers	180	14.2	38.8	47.0	9.1	75.8	15.1
Farmers and farm managers	68	6.9	41.4	51.7	6.9	79.3	13.8
Managers, officials, and proprietors, except farm	132	9.1	39.0	51.9	6.6	78.9	14.5
Clerical	219	8.5	41.9	49.6	11.0	70.1	18.9
Sales	62	6.9	24.1	70.0	20.7	62.1	17.2
Craftsmen, foremen, and kindred workers	183	7.2	41.4	51.4	9.8	76.8	13.4
Operatives	208	10.2	36.4	53.4	13.6	71.2	15.2
Service workers	154	11.6	46.3	42.1	15.8	65.3	18.9
Farm laborers and foremen	9	—[a]	—[a]	—[a]	—[a]	—[a]	—[a]
Laborers other than farm and mine	41	5.0	35.0	60.0	10.0	85.0	5.0
All	1,256	8.7	39.7	51.6	10.8	72.3	16.9

[a] Sample too small for significance.

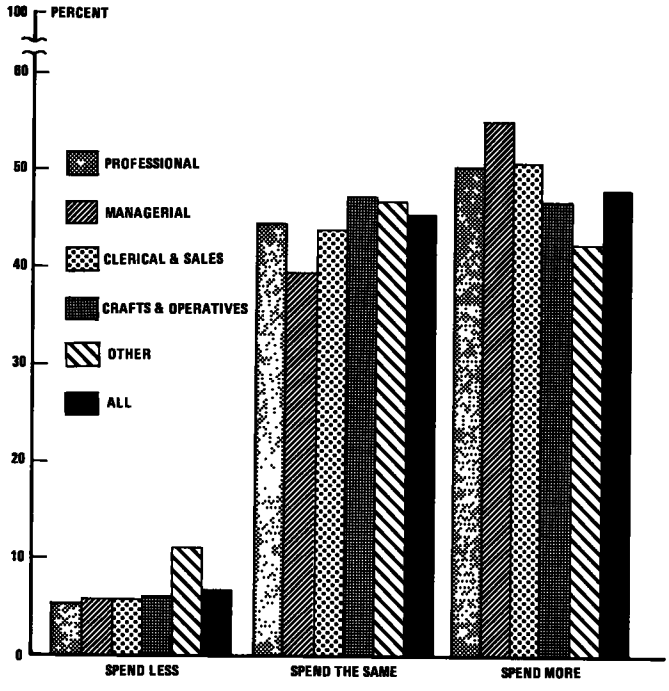


Figure B-9. Attitudes towards spending for public transportation (Q. 8) by occupational group (Source: Table B-17).

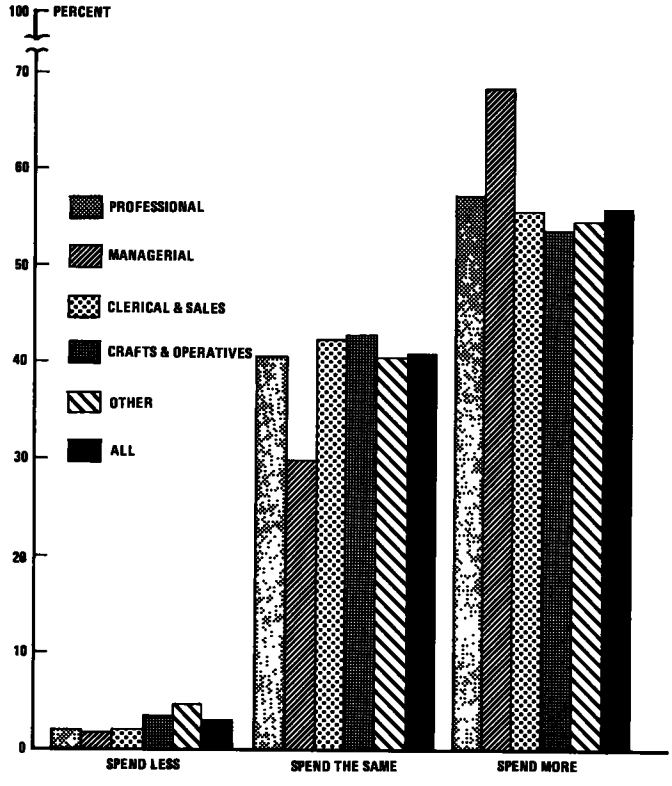


Figure B-10. Attitudes towards spending for roads and highways (Q. 8) by occupational group (Source: Table B-18).

TABLE B-17

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY OCCUPATION (QUESTION 8)

OCCUPATION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Professional	359	5.0	44.8	50.2
Managerial	264	5.3	39.7	55.0
Clerical and sales	560	5.3	44.0	50.7
Crafts and operatives	784	5.6	47.6	46.8
Other	546	11.0	46.9	42.1
All	2,513	6.4	46.9	46.7

TABLE B-18

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY OCCUPATION (QUESTION 8)

OCCUPATION	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Professional	359	2.0	40.7	57.3
Managerial	264	1.9	29.9	68.2
Clerical and sales	560	2.1	42.4	55.5
Crafts and operatives	784	3.5	42.9	53.6
Other	546	4.8	40.6	54.6
All	2,513	3.1	43.2	53.7

(RMT) cities contained 15.7% of the sample; other metropolitan areas with over 1 million population contained 19.5%.

This regrouping and comparison within the total sample was done to determine the extent to which the existence of extended mass transportation affected attitudes towards modes of travel, highway facilities, and highway planning. In order to view the total spectrum of individual transportation characteristics, answers to the following questions were compared for people in the 5 RMT cities and the rest of the country, with some comparisons with other large metropolitan areas. The category "rest of the coun-

TABLE B-19

ATTITUDES TOWARDS PUBLIC TRANSPORTATION (SUMMATED SCORES), BY OCCUPATION (QUESTION 9)

OCCUPATION	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Professional, technical and kindred workers	359	10.7	32.6	56.7
Farmers and farm managers	136	24.0	45.0	31.0
Managers, officials and proprietors, except farm	264	14.0	38.5	47.5
Clerical	437	14.9	27.2	57.9
Sales	123	13.1	36.2	50.7
Craftsmen, foremen and kindred workers	367	20.8	36.4	42.8
Operatives	417	18.3	35.3	46.4
Service workers	309	15.9	34.1	50.0
Farm laborers and foremen	18	40.0	30.0	30.0
Laborers other than farm and mine	83	18.6	37.2	44.2
All	2,513	15.9	34.2	49.9

TABLE B-20

ATTITUDES TOWARDS THE SOCIAL ROLE OF THE AUTOMOBILE (SUMMATED SCORES), BY OCCUPATION (QUESTION 10)

OCCUPATION	RESPONSES	DISTRIBUTED (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Professional, technical, and kindred workers	359	2.0	22.9	75.1
Farmers and farm managers	136	—	8.2	91.8
Managers, officials, and proprietors, except farm	264	1.4	15.6	83.0
Clerical	437	1.6	13.9	84.5
Sales	123	—	19.4	80.6
Craftsmen, foremen, and kindred workers	367	2.8	13.7	83.5
Operatives	417	1.3	23.5	75.2
Service workers	309	2.9	19.3	77.8
Farm laborers and foremen	18	—	10.0	90.0
Laborers other than farm and mine	83	2.3	34.9	62.8
All	2,513	1.7	17.0	81.3

TABLE B-21

ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS (SUMMATED SCORES), BY OCCUPATION (QUESTION 11)

OCCUPATION	RESPONSES	DISTRIBUTED (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Professional, technical, and kindred workers	359	10.7	34.2	55.1
Farmers and farm managers	136	13.8	20.9	65.3
Managers, officials, and proprietors, except farm	264	15.6	22.7	61.7
Clerical	437	17.3	22.8	59.9
Sales	123	10.0	26.6	63.4
Craftsmen, foremen, and kindred workers	367	20.3	22.4	57.3
Operatives	417	12.6	22.3	65.1
Service workers	309	8.0	28.9	63.1
Farm laborers and foremen	18	—	10.0	90.0
Laborers other than farm and mine	83	11.9	16.7	71.4
All	2,513	13.4	24.3	62.3

try" includes other large metropolitan areas. "Other large metropolitan areas" are the SMSA's having over 1 million population, excluding the 5 RMT cities. Previous tabulations presented in the Phase I Summary Report (*5*) included the 5 RMT cities in the category of metropolitan areas with over 1 million population.

1. Quality of and allocations to roads and highways (Q. 7 and 8).
2. Quality of and allocations to public transportation (Q. 7 and 8).
3. Attitudes towards public transportation (Q. 9).
4. Attitudes toward the social role of the automobile (Q. 10).
5. Attitudes towards highway planning and planners (Q. 11).
6. Allocations to eleven specific transportation building and improvement categories (Q. 12).
7. Attitudes towards the automobile and public transportation as compared to an ideal mode for five transportation occasions (Q. 13 through 17).
8. Degree of satisfaction with 15 transportation attributes for the automobile and public transportation (Q. 18).
9. Is the automobile worth several negative values? (Q. 28).
10. Degree of agreement with seven statements about transportation (Q. 30, alternate form).

In general, people in the RMT cities rated the automobile higher than public transportation, yet farther from the ideal mode as compared with the ratings of the rest of the sample. In general, therefore, they were more critical (or less satisfied) with all modes of transportation

TABLE B-22

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS, BY OCCUPATION (QUESTION 12)

OCCUPATION	RESPONSES	DISTRIBUTION (%) OF RESPONDENTS WILLING TO SPEND MORE ON	
		BUILDING	IMPROVEMENTS
Professional, technical, and kindred workers	180	80.2	90.7
Farmers and farm managers	68	67.5	73.2
Managers, officials, and proprietors, except farm	132	79.5	93.0
Clerical	219	80.1	91.0
Sales	62	81.2	93.7
Craftsmen, foremen, and kindred workers	183	72.4	87.9
Operatives	208	71.4	90.9
Service workers	154	58.0	92.2
Farm laborers and foremen	9	—	—
Laborers other than farm and mine	41	63.6	81.8
All	1,256	69.9	89.1

TABLE B-23

AVERAGE LENGTH OF WEEKDAY TRIPS, BY OCCUPATION (QUESTIONS 20 AND 21)

OCCUPATION	RESPONSES	DISTRIBUTION (%) BY TRIP LENGTH OF 1.0 MI.	1.1-3.0 MI.	3.1-5.0 MI.	5.1-10.0 MI.	10.1-25.0 MI.
Professional, technical, and kindred workers	359	20.0	28.3	22.1	29.6	—
Farmers and farm managers	136	26.3	18.4	23.7	31.6	—
Managers, officials, and proprietors, except farm	264	16.2	25.7	20.0	38.1	—
Clerical	437	18.8	26.4	18.8	36.0	—
Sales	123	13.6	34.1	25.0	27.3	—
Craftsmen, foremen, and kindred workers	367	13.7	30.9	25.2	30.2	—
Operatives	417	17.4	32.9	18.0	31.1	0.6
Service workers	309	23.3	33.1	20.3	23.3	—
Farm laborers and foremen	18	28.6	28.6	—	42.8	—
Laborers other than farm and mine	83	25.0	30.5	16.7	27.8	—
All	2,513	22.4	30.6	20.2	26.7	0.1

TABLE B-24

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY OCCUPATION (QUESTION 28)

OCCUPATION	RESPONSES	AGREE (%)
Professional, technical, and kindred workers	180	87.9
Farmers and farm managers	68	89.7
Managers, officials, and proprietors, except farm	132	89.0
Clerical	219	86.3
Sales	62	90.1
Craftsmen, foremen, and kindred workers	183	91.5
Operatives	208	82.6
Service workers	154	77.5
Farm laborers and foremen	9	80.0
Laborers other than farm and mine	41	79.6
All	1,256	84.5

TABLE B-25

AVERAGE CHANGE IN USE OF AUTOMOBILE AND PUBLIC TRANSPORTATION CAUSED BY LIFE CHANGES DURING THE PAST FIVE YEARS, BY AGE (QUESTION 6)

AGE	RESPONSES	DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF AUTOMOBILE DECREASE	AUTOMOBILE NO CHANGE	AUTOMOBILE INCREASE	PUBLIC TRANSPORTATION DECREASE	PUBLIC TRANSPORTATION NO CHANGE	PUBLIC TRANSPORTATION INCREASE
18-21	84	6.0	20.2	73.8	23.8	58.3	17.9
22-30	226	8.1	35.1	56.8	14.6	70.3	15.1
31-40	264	8.0	36.0	56.0	7.6	71.0	21.4
41-50	238	6.2	42.1	51.7	6.7	73.6	19.7
51-65	284	10.2	49.4	40.4	9.5	79.3	11.2
65 and over	160	15.3	54.1	30.6	9.3	77.3	13.4
All	1,256	8.7	39.7	51.6	10.8	72.3	16.9

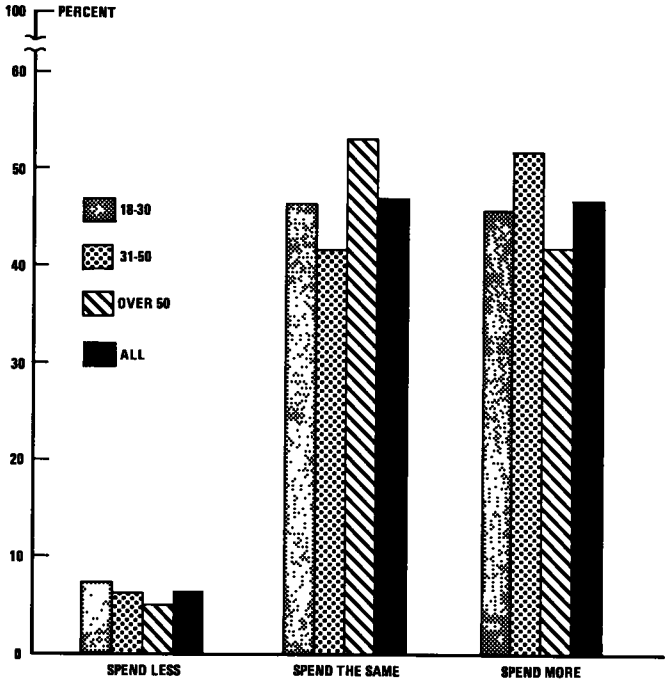


Figure B-11. Attitudes towards spending for public transportation (Q. 8) by age (Source: Table B-26).

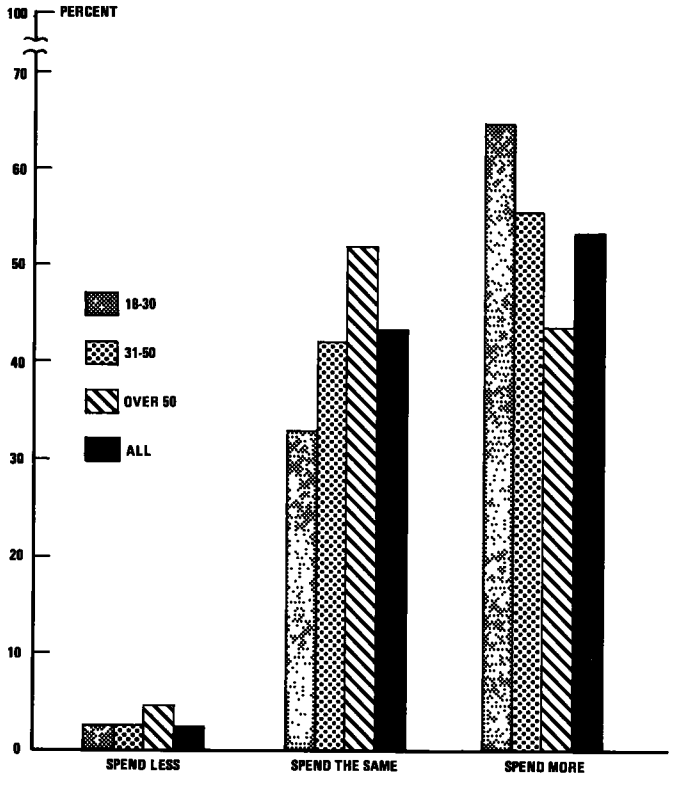


Figure B-12. Attitudes towards spending for roads and highways (Q. 8) by age (Source: Table B-27).

TABLE B-26

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY AGE (QUESTION 8)

AGE	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
18-30	620	7.5	46.6	45.9
31-50	1,005	6.1	41.9	52.0
51 and over	888	5.0	53.1	41.9
All	2,513	6.4	46.9	46.7

TABLE B-27

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY AGE (QUESTION 8)

AGE	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
18-30	620	2.6	32.8	64.7
31-50	1,005	2.6	42.0	55.4
51 and over	888	4.6	51.9	43.5
All	2,513	3.1	43.2	53.7

TABLE B-28

ATTITUDES TOWARDS PUBLIC TRANSPORTATION (SUMMATED SCORES) BY AGE (QUESTION 9)

AGE	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
18-21	168	16.4	37.9	45.7
22-30	452	18.8	38.7	42.5
31-40	527	13.8	38.0	48.2
41-50	478	12.4	36.1	51.5
51-65	568	18.2	29.3	52.5
65 and over	320	16.9	27.0	56.1
All	2,513	15.9	34.2	49.9

TABLE B-29

ATTITUDES TOWARDS THE SOCIAL ROLE OF THE AUTOMOBILE (SUMMATED SCORES), BY AGE (QUESTION 10)

AGE	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
18-21	168	2.5	15.2	82.3
22-30	452	1.2	18.8	80.0
31-40	527	0.8	19.8	79.4
41-50	478	2.6	15.0	82.4
51-65	568	1.4	14.7	83.9
65 and over	320	2.3	18.0	79.7
All	2,513	1.7	17.0	81.3

TABLE B-30

ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS (SUMMATED SCORES), BY AGE (QUESTION 11)

AGE	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
18-21	168	6.1	22.8	71.1
22-30	452	15.4	21.6	63.0
31-40	527	9.3	26.9	63.8
41-50	478	15.8	26.2	58.0
51-65	568	15.3	23.0	61.7
65 and over	320	13.9	23.8	62.3
All	2,513	13.4	24.3	62.3

TABLE B-31

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS, BY AGE (QUESTION 12)

AGE	RESPONSES	DISTRIBUTION (%) OF RESPONDENTS WILLING TO SPEND MORE ON	
		BUILDING	IMPROVEMENTS
18-21	84	81.3	93.0
22-30	226	74.0	91.6
31-40	264	77.1	91.1
41-50	238	67.5	85.9
51-65	284	62.8	86.5
65 and over	160	61.4	99.0
All	1,256	69.9	89.1

TABLE B-32

AVERAGE LENGTH OF WEEKDAY TRIPS, BY AGE (QUESTIONS 20 AND 21)

AGE	RESPONSES	DISTRIBUTION (%) BY TRIP LENGTH OF				
		1.0 MI.	1.1-3.0 MI.	3.1-5.0 MI.	5.1-10.0 MI.	10.1-25.0 MI.
18-21	168	20.9	28.6	22.9	27.6	—
22-30	452	17.5	34.4	18.2	29.6	0.3
31-40	527	19.4	29.1	23.5	28.0	—
41-50	478	18.3	32.5	19.6	29.6	—
51-65	568	24.9	31.2	21.2	22.7	—
65 and over	320	39.1	23.0	14.3	23.6	—
All	2,513	22.4	30.6	20.2	26.7	0.1

TABLE B-33

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY AGE (QUESTION 28)

AGE	RESPONSES	AGREE (%)
18-21	168	79.9
22-30	452	84.9
31-40	527	88.0
41-50	478	83.4
51-65	568	85.5
65 and over	320	80.7
All	2,513	84.5

TABLE B-34

AVERAGE CHANGE IN USE OF AUTOMOBILE AND PUBLIC TRANPORTATION CAUSED BY LIFE CHANGES DURING THE PAST FIVE YEARS, BY RACE (QUESTION 6)

RACE	RESPONSES	DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF					
		AUTOMOBILE			PUBLIC TRANSPORTATION		
		DE-CREASE	NO CHANGE	INCREASE	DE-CREASE	NO CHANGE	INCREASE
White	1,099	9.1	39.2	51.7	11.2	72.8	16.0
Non-white	157	5.5	45.3	49.2	8.0	70.4	21.6
All	1,256	8.7	39.7	51.6	10.8	72.3	16.9

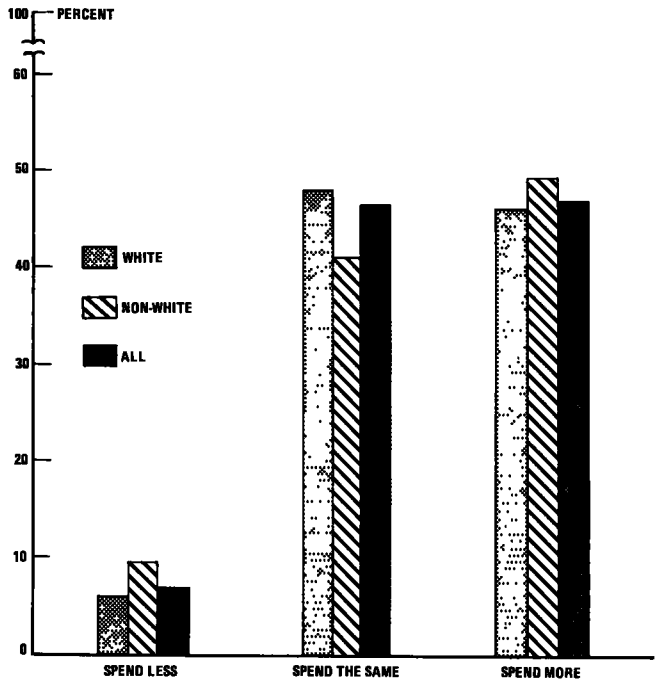


Figure B-13. Attitudes towards spending for public transportation (Q. 8) by race (Source: Table B-35).

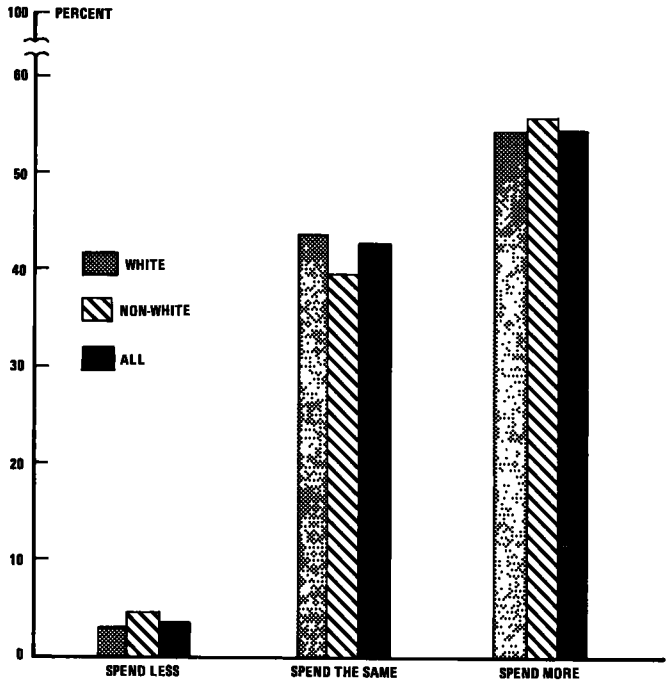


Figure B-14. Attitudes towards spending for roads and highways (Q. 8) by race (Source: Table B-36).

TABLE B-35

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY RACE (QUESTION 8)

		DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
RACE	RESPONSES	LESS	SAME	MORE
White	2,199	5.9	48.0	46.1
Non-white	314	9.5	41.1	49.4
All	2,513	6.4	46.9	46.7

TABLE B-36

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY RACE (QUESTION 8)

		DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
RACE	RESPONSES	LESS	SAME	MORE
White	2,199	3.0	43.5	53.1
Non-white	314	4.6	39.2	56.2
All	2,513	3.1	43.2	53.7

TABLE B-37

ATTITUDES TOWARDS PUBLIC TRANSPORTATION (SUMMATED SCORES), BY RACE (QUESTION 9)

		DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
RACE	RESPONSES	LOWER THIRD	MIDDLE THIRD	UPPER THIRD
White	2,199	17.5	34.2	48.3
Non-white	314	9.0	30.8	60.2
All	2,513	15.9	34.2	49.9

TABLE B-38

ATTITUDES TOWARDS THE SOCIAL ROLE OF THE AUTOMOBILE (SUMMATED SCORES), BY RACE (QUESTION 10)

		DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
RACE	RESPONSES	LOWER THIRD	MIDDLE THIRD	UPPER THIRD
White	2,199	1.7	16.4	81.9
Non-white	314	2.2	18.6	79.2
All	2,513	1.7	17.0	81.3

TABLE B-39

ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS (SUMMATED SCORES), BY RACE (QUESTION 11)

RACE	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
White	2,199	14.3	24.6	61.1
Non-white	314	9.6	23.7	66.7
All	2,513	13.4	24.3	62.3

TABLE B-40

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS, BY RACE (QUESTION 12)

RACE	RESPONSES	DISTRIBUTION (%) OF RESPONDENTS WILLING TO SPEND MORE ON	
		BUILDING	IMPROVEMENTS
White	1,099	60.8	88.4
Non-white	157	67.5	94.8
All	1,256	69.9	89.1

TABLE B-41

AVERAGE LENGTH OF WEEKDAY TRIPS, BY RACE (QUESTIONS 20 AND 21)

RACE	RESPONSES	DISTRIBUTION (%) BY TRIP LENGTH OF				
		1.0 MI.	1.1-3.0 MI.	3.1-5.0 MI.	5.1-10.0 MI.	10.1-25.0 MI.
White	2,199	22.2	30.7	20.2	26.8	0.1
Non-white	314	23.9	30.4	18.3	27.4	—
All	2,513	22.4	30.6	20.2	26.7	0.1

TABLE B-42

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY RACE (QUESTION 28)

RACE	RESPONSES	AGREE (%)
White	2,199	86.2
Non-white	314	75.2
All	2,513	84.5

TABLE B-43

AVERAGE CHANGE IN USE OF AUTOMOBILE AND PUBLIC TRANSPORTATION CAUSED BY LIFE CHANGES DURING THE PAST FIVE YEARS, BY SEX (QUESTION 6)

SEX	RESPONSES	DISTRIBUTION (%) OF PEOPLE WITH CHANGE IN USE OF					
		AUTOMOBILE			PUBLIC TRANSPORTATION		
		DE-CREASE	NO CHANGE	INCREASE	DE-CREASE	NO CHANGE	INCREASE
Male	563	9.8	39.0	51.2	11.1	73.9	15.0
Female	693	7.7	41.5	50.8	10.5	71.4	18.1
All	1,256	8.7	39.7	51.6	10.8	72.3	16.9

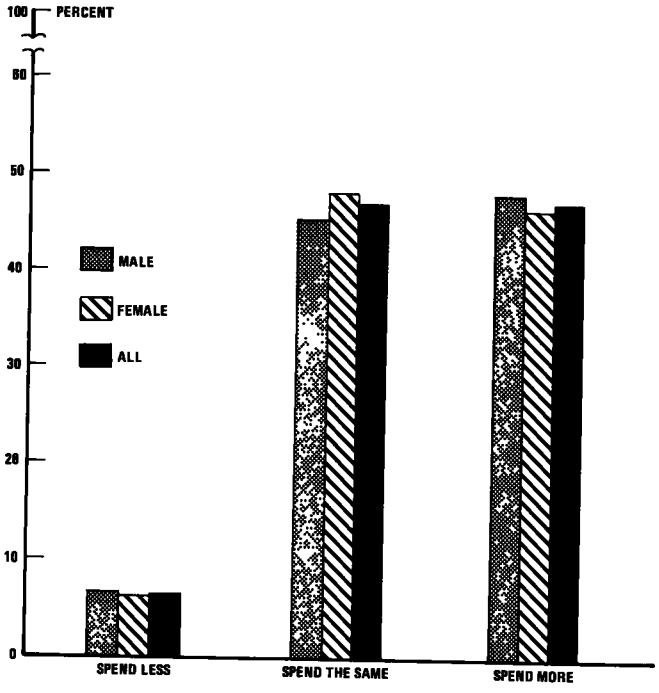


Figure B-15. Attitudes towards spending for public transportation (Q. 8) by sex (Source: Table B-44).

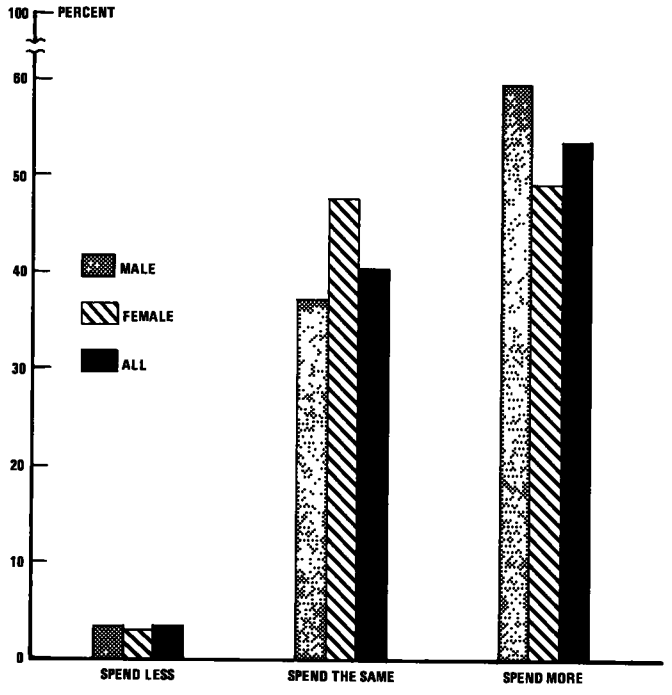


Figure B-16. Attitudes towards spending for roads and highways (Q. 8) by sex (Source: Table B-45).

TABLE B-44

ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION, BY SEX (QUESTION 8)

SEX	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Male	1,126	6.9	45.2	47.9
Female	1,387	6.1	47.9	46.0
All	2,513	6.4	46.9	46.7

TABLE B-45

ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS, BY SEX (QUESTION 8)

SEX	RESPONSES	DISTRIBUTION (%) OF PEOPLE WHO WANT TO SPEND		
		LESS	SAME	MORE
Male	1,126	3.3	37.1	59.6
Female	1,387	3.1	47.8	49.1
All	2,513	3.1	43.2	53.7

TABLE B-46

ATTITUDES TOWARDS PUBLIC TRANSPORTATION (SUMMATED SCORES), BY SEX (QUESTION 9)

SEX	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Male	1,126	17.4	36.2	46.4
Female	1,387	14.9	32.6	52.5
All	2,513	15.9	34.2	49.9

TABLE B-47

ATTITUDES TOWARDS THE SOCIAL ROLE OF THE AUTOMOBILE (SUMMATED SCORES), BY SEX (QUESTION 10)

SEX	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Male	1,126	1.8	18.0	80.2
Female	1,387	1.7	16.2	82.1
All	2,513	1.7	17.0	81.3

TABLE B-48

ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS (SUMMATED SCORES), BY SEX (QUESTION 11)

SEX	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP		
		LOWER THIRD	MIDDLE THIRD	UPPER THIRD
Male	1,126	14.9	24.4	60.7
Female	1,387	11.9	24.4	63.7
All	2,513	13.4	24.3	62.3

TABLE B-49

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS, BY SEX (QUESTION 12)

SEX	RESPONSES	DISTRIBUTION (%) OF RESPONDENTS WILLING TO SPEND MORE ON	
		BUILDING	IMPROVEMENTS
Male	563	74.4	89.0
Female	693	66.6	89.2
All	1,256	69.9	89.1

TABLE B-50

AVERAGE LENGTH OF WEEKDAY TRIPS, BY SEX (QUESTIONS 20 AND 21)

SEX	RESPONSES	DISTRIBUTION (%) BY TRIP LENGTH OF				
		1.0 MI.	1.1-3.0 MI.	3.1-5.0 MI.	5.1-10.0 MI.	10.1-25.0 MI.
Male	1,126	17.8	25.9	21.2	35.0	0.1
Female	1,387	25.7	34.4	19.3	20.6	—
All	2,513	22.4	30.6	20.2	26.7	0.1

TABLE B-51

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY SEX (QUESTION 28)

SEX	RESPONSES	AGREE (%)
Male	1,126	87.1
Female	1,387	82.5
All	2,513	84.5

because they were less predisposed, on the average, to rate a mode of transportation as ideal.

Residents of the 5 RMT cities rated the quality of public transportation more favorably when compared to the quality of roads and highways than did the rest of the country. Their average rating for the two transportation modes was almost the same. This means that residents in the 5 RMT cities look more favorably upon public transportation as a facility, but their attitude is not more favorable than the attitude of the rest of the country when rating public transportation as an alternative mode of transportation.

Quality-Spending Ratings (Tables B-52 and B-53)

On a five-point scale from very poor (1) to very good (5) the average rating of the quality of public transportation for people in the 5 RMT cities is 3.35 and for the remainder of the country 2.80, an extremely significant difference. More than one-half of the 5 RMT cities' residents felt that the quality of public transportation was good, whereas only one-third of the rest of the country felt this way (Table B-52).

There is little difference between the ratings of these two groups for quality of roads and highways, indicating perhaps that accessibility and use influence favorable dispositions towards travel facilities. Despite this fact, the automobile is viewed as being significantly closer to the ideal mode of transportation by all groups.

There was little difference of opinion on the relative amount of money to be spent on roads and highways. More significant differences occurred when attitudes toward public transportation were combined with the amount to be allocated for it (Table B-53). Twenty-one percent of the people in the RMT cities rated public transportation positively and felt far more should be spent on it, whereas only 9% in the remainder of the country held the same opinion, and 11% in the other large metropolitan areas. On a 9-point scale from those who displayed a negative attitude toward public transportation and felt less should be allocated (scale position 1) to those who displayed

a positive attitude and felt more money should be allocated (scale position 9) the average scale score for people in the 5 RMT cities was 6.25 compared to 5.19 for the rest of the U. S. and 5.54 for the other large metropolitan areas. This represents a highly significant difference.

The attitudes towards future allocation for public transportation are not as sharply polarized between large metropolitan areas and the rest of the country as might have been expected (Table B-53). Although a greater proportion of people in the 5 RMT cities felt that more money should be allocated to public transportation (54%), a large proportion of the remainder of the United States (45%) also felt more money should be allocated for this purpose. Apparently people in urban areas without substantial public transportation facilities feel more effort is required. Only 7% of all the people outside RMT cities felt there should be an actual reduction of allocations to public transportation.

TABLE B-52

QUALITY AND SPENDING RATINGS FOR ROADS AND HIGHWAYS AND PUBLIC TRANSPORTATION, BY FIVE RMT CITIES AND THE REST OF THE COUNTRY (QUESTIONS 7 AND 8)

CHARACTERISTIC AND AREA	RESPONSES	DISTRIBUTION (%) BY RATING: LOW OR LESS 1	2	3	4	HIGH OR MORE 5	MEAN OF FIVE GROUPS
Quality of roads and highways:							
5 RMT cities	395	6.8	10.1	26.3	33.7	23.0	3.56
Rest of country	2,118	5.9	7.8	24.0	34.8	27.4	3.70
Quality of public transportation:							
5 RMT cities	395	11.9	14.5	21.8	29.9	21.8	3.35
Rest of country	2,118	27.1	13.5	25.5	20.2	13.7	2.80
Spending for roads and highways:							
5 RMT cities	395	1.5	3.6	39.8	37.6	17.5	3.66
Rest of country	2,118	1.0	1.9	43.7	34.2	19.2	3.69
Spending for public transportation:							
5 RMT cities	395	0.8	3.9	41.4	26.0	28.0	3.77
Rest of country	2,118	3.0	3.7	48.2	26.4	18.7	3.54

TABLE B-53

QUALITY BY SPENDING RATINGS FOR ROADS AND HIGHWAYS AND PUBLIC TRANSPORTATION, BY 5 RMT CITIES, OTHER LARGE METROPOLITAN AREAS, AND THE REST OF THE COUNTRY (QUESTIONS 7 AND 8)

TRANSP. MEANS AND AREAS	RESPONSES	DISTRIBUTION (%) BY RATING GROUP: LOW QUAL., SPEND: LESS	SAME	MORE	AVG. QUAL., SPEND: LESS	SAME	MORE	HIGH QUAL., SPEND: LESS	SAME	MORE	MEAN OF NINE GROUPS
Roads and highways:											
5 RMT cities	395	0.5	1.5	14.5	2.3	7.4	16.8	2.3	31.1	23.5	6.71
Other large metro areas	490	0.4	1.0	9.0	0.9	9.8	11.6	3.1	34.5	25.9	7.01
Rest of country	2,118	0.2	1.4	12.2	0.4	7.6	16.2	2.3	34.8	25.0	6.95
Public transportation:											
5 RMT cities	395	1.5	3.6	21.3	1.8	8.0	12.1	1.3	29.8	20.6	6.25
Other large metro areas	490	3.4	6.8	24.5	2.1	14.1	8.3	2.1	28.0	10.7	5.54
Rest of country	2,118	3.2	10.6	26.8	1.7	13.6	10.0	1.8	23.7	8.6	5.19

Transportation Modes and Highway Planning (Table B-54)

Residents in the 5 RMT cities were more favorable to public transportation than people in the rest of the country (Q. 9). The average public transportation score on a 6-point scale was 4.76 versus 4.07 (any average score greater than 3.5 means that more people were favorable than unfavorable). People in other large metropolitan areas without local rail mass transportation are slightly less favorable to public transportation than those in the RMT cities. However, the same proportion of people (90%) in both the 5 RMT cities and the rest of the country agreed with the statement: "Continued planning and building of both automobile transportation and public transportation facilities are what is needed" (Q. 9).

Attitudes Towards Transportation Building and Improvements (Table B-55)

The average scores of 4.27 for people in the 5 RMT cities and 4.17 for those in the remainder of the country reflect a similarity of opinion towards transportation improve-

TABLE B-54

ATTITUDE (SUMMATED SCORE) DISTRIBUTIONS FOR QUESTIONS 9, 10, AND 11, BY FIVE RMT CITIES, OTHER LARGE METROPOLITAN AREAS, AND THE REST OF THE COUNTRY

CHARACTERISTIC AND AREA	RESPONSES	DISTRIBUTION (%) BY SUMMATED ATTITUDINAL SCORE GROUP: LEAST FAVORABLE LOWEST SIXTH 1	2	3	4	5	MOST FAVORABLE HIGHEST SIXTH 6	MEAN OF SIX GROUPS
Qu. 9—Attitudes towards public transportation:								
5 RMT cities	395	0.5	3.3	10.1	18.3	41.7	26.1	4.76
Other large metrop. areas[a]	490	3.0	9.0	10.8	15.4	33.9	27.9	4.52
Rest of country[b]	2,118	5.2	13.4	16.1	18.9	27.4	19.0	4.07
Qu. 10—Attitudes towards social role of automobile:								
5 RMT cities	395	0.8	2.4	9.4	14.2	40.9	32.3	4.89
Other large metrop. areas[a]	490	0.4	1.5	2.4	15.7	32.2	47.7	5.21
Rest of country[b]	2,118	0.3	1.1	3.1	12.4	32.0	51.1	5.28
Qu. 11—Attitudes towards highway planning and planners:								
5 RMT cities	395	6.2	12.7	21.4	16.1	23.8	19.8	3.98
Other large metrop. areas[a]	490	5.6	10.4	10.2	13.8	24.2	35.8	4.48
Rest of country[b]	2,118	3.9	8.6	8.7	13.7	27.0	38.1	4.66

[a] Other large metropolitan areas are SMSA's having over one million population, excluding 5 RMT metropolitan areas.
[b] Rest of country includes other large metropolitan areas.

TABLE B-55

AMOUNT OF MONEY THAT SHOULD BE SPENT FOR TRANSPORTATION BUILDING AND IMPROVEMENTS (QUESTION 12)

ITEM AND AREA	RESPONSES	DISTRIBUTION (%) BY AVERAGE RATING: SPEND MUCH LESS 1	2	3	4	SPEND MUCH MORE 5	MEAN OF FIVE GROUPS
Transportation improvements (avg. of seven types):							
5 RMT cities	197	—	—	6.9	58.9	34.2	4.27
Other large metrop. areas[a]	245	—	0.8	10.5	60.8	27.9	4.16
Rest of country[b]	1,059	0.1	0.6	10.8	59.0	29.5	4.17
Transportation building (avg. of four types):							
5 RMT cities	197	—	2.5	14.4	45.8	37.3	4.18
Other large metrop. areas[a]	245	—	2.5	25.4	55.4	16.7	3.86
Rest of country[b]	1,059	1.2	2.8	28.5	47.0	20.6	3.83

[a] Other large metropolitan areas are SMSA's having over 1 million population, excluding the 5 RMT cities.
[b] Rest of country includes other large metropolitan areas.

ments. Scores for transportation building were more divergent (4.18 versus 3.83). For specific items, such as more construction of parking facilities at rail or rapid transit stations and downtown, opinion in the 5 RMT cities differed sharply with the rest of the country: 36% favored more station parking compared with 17% in the rest of the country, and 41% wanted greater expenditures for downtown parking as compared with 28% in other areas. These people also favored greater allocations to public transportation, but so did people in the other areas.

Ratings for Specific Types of Trips (Table B-56)

In answer to a series of questions (Q. 13-17) on the choice of travel modes, public transportation (bus, subway, train) was viewed significantly more favorably by people in the 5 RMT cities compared with residents in other large metropolitan areas and differed even more on this question with the rest of the country.

The automobile was rated more favorably for shopping purposes, although people in the 5 RMT cities rated it somewhat lower than those outside these areas (7.83 to 8.58 on a 1-9 rating scale). Attitudes towards the bus as a mode of transportation for shopping demonstrated the same degree of discrimination, with residents in the 5 RMT cities rating it closer to ideal than the rest of the sample. Preferences for subway and train, however, showed little difference according to population density and transportation facilities.

The only instance in which people in the 5 RMT cities rated all modes of public transportation significantly higher than the rest was for social occasions, with train and subway considered significantly better. When the comparisons were made on a business versus social purpose of trips, the 5 RMT cities' residents favored the automobile more for social than business purposes. The automobile was regarded by all as the most ideal mode of transportation.

TABLE B-56

MEAN SCORES FOR IDEAL TRANSPORTATION MODE SCALE, BY FIVE RMT CITIES AND THE REST OF THE COUNTRY (QUESTION 17)[a]

TYPE USE AND MODE	MEAN SCORE 5RMT CITIES	REST OF COUNTRY	TOTAL SAMPLE
To work:			
Automobile	6.94	8.30	8.07
Bus	4.19	3.84	3.90
Subway	4.15	4.00	4.03
Train	4.25	4.02	4.07
To shop:			
Automobile	7.83	8.58	8.46
Bus	4.03	3.58	3.65
Subway	3.49	3.20	3.26
Train	3.21	3.16	3.17
To social:			
Automobile	8.48	8.70	8.67
Bus	3.97	3.40	3.49
Subway	3.25	2.89	2.95
Train	3.38	2.94	3.02
Questions 13-17:			
Over-all avg. for automobile	7.50	8.14	8.04
Over-all avg. for public transp.	4.98	4.74	4.78

[a] Scale ranged from 1 to 9; larger values indicate ratings closer to the ideal.

Fifteen attributes of the automobile and public transportation were rated on a 7-point scale from not at all satisfied (1) to completely satisfied (7) (Table B-57). People in areas outside the 5 RMT cities again demonstrated significantly greater satisfaction with the automo-

TABLE B-57

AVERAGE SATISFACTION RATINGS OVER 15 TRANSPORTATION ATTRIBUTES FOR THE AUTOMOBILE AND PUBLIC TRANSPORTATION, 5 RMT CITIES, OTHER LARGE METROPOLITAN AREAS, AND THE REST OF THE COUNTRY (QUESTION 18)

CHARACTERISTIC AND AREA	RESPONSES	DISTRIBUTION (%) BY SATISFACTION RATING: VERY DISSATISFIED 1	2	3	4	5	6	VERY SATISFIED 7	MEAN OF SEVEN GROUPS
Degree of satisfaction with the automobile:									
5 RMT cities	197	0.5	—	2.0	3.5	18.7	39.9	35.4	6.01
Other large metrop. areas[a]	245	—	—	1.2	1.2	12.7	36.1	48.8	6.30
Rest of country[b]	1,059	0.3	—	0.8	1.6	12.6	30.6	54.2	6.35
Degree of satisfaction with public transportation:									
5 RMT cities	197	1.0	4.6	12.7	22.3	40.1	16.8	2.5	4.56
Other large metrop. areas[a]	245	2.0	4.1	11.9	26.2	29.9	20.5	5.3	4.61
Rest of country[b]	1,059	5.1	4.7	10.7	22.5	31.7	19.2	6.2	4.53

[a] Other large metropolitan areas are the SMSA's having over 1 million population, excluding the 5 RMT metropolitan areas.
[b] Rest of country includes other large metropolitan areas.

bile; 54% were very or completely satisfied with the transportation attributes of the automobile as compared to only 35% of such satisfaction among people in the 5 RMT cities. The average scale score for the 5 RMT cities was 6.01 compared to 6.30 for the other large metropolitan areas and 6.35 for the rest of the country.

The average degree of satisfaction with public transportation attributes is about the same in the RMT cities as for other large metropolitan areas and the rest of the country (4.56, 4.61, 4.53).

Travel Behavior (Table B-58)

When travel behavior (business and non-business total annual miles traveled by the individual) is compared the automobile is found to be overwhelmingly the choice mode of transportation for all. Residents of the 5 RMT cities used automobiles for 71% of their total mileage, compared with 86% for people in the rest of the country. Local public transportation, conversely, accounted for a larger proportion (18%) of miles traveled for people in the 5 RMT cities, and only 6% for the rest of the country. Train and plane travel represented a somewhat greater proportion of total travel miles for residents of the 5 RMT cities (7% versus 4%). There was no significant difference in the proportion of travel accounted for by intercity bus. Although residents of the 5 RMT cities travel less by car, they make up their mileage by train, plane, and local public transportation, because the two groups traveled almost the same average number of annual miles.

Attitudes Towards Highways and Automobiles (Tables B-59 and B-60)

There were no sharp differences of opinion between people in the 5 RMT cities and the remainder of the country when rating agreement with a series of statements about highways. The general acceptance of the automobile as being worth several negative values (Q. 28) was only slightly greater for residents in large metropolitan areas outside the 5 RMT cities (78% in the 5 RMT, 84% in all other metropolitan areas over 1 million, 86% for the rest of the country) (Table B-59).

The statement that highways are ugly was rejected by both groups, and the statement that automobiles are attractive was accepted by both segments of the sample. The need for better training procedures and more frequent re-examination of drivers was universally accepted.

Different attitudes emerged on other statements, however. Of the people in the rest of the country, 53% strongly agreed that the "Interstate Highway System is one of our nation's greatest public works," compared to strong agreement on this question by only 36% of the residents in the 5 RMT cities and 42% in other large metropolitan areas. The statement that "our present highway system is necessary to maintain my present way of life" had slightly more than 40% of the people in the 5 RMT cities strongly agreeing, whereas 45% of the people in other large metropolitan areas and 50% of those outside the 5 RMT cities were in strong agreement with the statement.

A MULTI-VARIATE ANALYSIS OF TRANSPORTATION ATTITUDES AND BEHAVIOR

A uni-variate analysis of the data was not sufficient, because transportation attitudes cannot be described by a single opinion or a single statement in the various attitudinal scales in the questionnaire. Multi-variate analysis is designed to evaluate a number of specific attitudes simultaneously. In turn, it establishes a set of broader attitudinal dimensions and then examines their relationship to the person's transportation behavior and demographic characteristics. In this way, the interrelationship between transportation attitudes can be determined, and the demographic and behavioral characteristics of respondents holding these broader attitudes ascertained.

A secondary purpose of the analysis was to compare the results of the samples generated by the two organizations responsible for data collection—Chilton Research Services and National Analysts. (Both organizations generated a national probability sample of 2,500 people independently. Identical questionnaires were used by both organizations. Chilton was responsible for data analysis and the interpretive report.) A number of the multi-variate analyses were replicated for the two samples to determine whether the results were sufficiently comparable to consider both a representation of the same population.

The analysis was performed in a sequential manner, inasmuch as one part served as input for the next. The first step was a factor analysis of practically all the attitudinal items in the questionnaire. Factor analyses were performed for the Chilton and National Analysts samples separately and for both samples combined. This analysis demonstrated the broader dimensions of transportation attitudes by determining the interrelationships between the various items in the attitudinal scales.

TABLE B-58

DISTRIBUTION OF INDIVIDUAL BUSINESS AND NON-BUSINESS TOTAL ANNUAL MILES TRAVELED, BY MODE OF TRAVEL, 5 RMT CITIES AND REST OF COUNTRY (QUESTION 27)

			DISTRIBUTION (%) BY				
AREA	RESPONSES	AVG. MILES TRAVELED	AUTO-MOBILE	LOCAL PUB. TR.	TRAIN	AIRPLANE	INTERCITY BUS
5 RMT cities	395	10,500	71.4	17.6	6.2	1.1	3.7
Rest of country	218	10,600	85.6	5.6	3.7	0.6	4.5

Having established these dimensions, the second part of the analysis sought to determine the demographic and behavioral profile of those people who held positive, neutral, or negative views towards roads and highways and public transportation on those attitudinal dimensions. The input into this analysis was a factor score for each person on each attitudinal dimension (positive, neutral, or negative).

The final step of the multi-variate analysis sought to determine the predictive power of a select group of attitudinal, demographic, and behavioral variables in forecasting shifts in attitudes towards allocations for roads and highways and public transportation.

TABLE B-59

RESPONSE TO QUESTION ABOUT CONTRIBUTION OF AUTOMOBILE TO WAY OF LIFE BEING WORTH SEVERAL NEGATIVE VALUES, BY 5 RMT CITIES, OTHER LARGE METROPOLITAN AREAS, AND THE REST OF THE COUNTRY (QUESTION 28)

AREA	RESPONSES	AGREE (%)
5 RMT cities	395	77.7
Other large metrop. areas[a]	490	83.9
Rest of country[b]	2,118	86.0

[a] Other large metropolitan areas are SMSA's having over one million population, excluding 5 RMT metropolitan areas.
[b] Rest of country includes other large metropolitan areas.

TABLE B-60

DEGREE OF AGREEMENT WITH SEVEN STATEMENTS ABOUT TRANSPORTATION, BY FIVE RMT CITIES, OTHER LARGE METROPOLITAN AREAS AND THE REST OF THE COUNTRY (QUESTION 30 ALTERNATE FORM)

STATEMENT AND AREA	RESPONSES	DISTRIBUTION (%) BY DEGREE OF AGREEMENT					MEAN OF FIVE GROUPS
		STRONGLY DISAGREE 1	2	3	4	STRONGLY AGREE 5	
I think highways in urban areas are ugly:							
5 RMT cities	197	17.3	18.4	40.8	11.7	11.7	2.82
Other large metrop. areas[a]	245	15.6	18.6	44.6	15.6	5.6	2.77
Rest of country[b]	1,059	17.3	19.9	37.9	14.6	10.2	2.80
I think automobiles are attractive:							
5 RMT cities	197	2.6	3.6	24.0	36.2	33.7	3.95
Other large metrop. areas[a]	245	1.3	2.2	21.6	38.5	36.4	4.06
Rest of country[b]	1,059	1.4	2.4	17.9	40.2	38.2	4.11
I feel that the Interstate Highway System is one of our nation's greatest public works:							
5 RMT cities	197	1.0	4.6	26.0	32.1	36.2	3.98
Other large metrop. areas[a]	245	1.7	2.2	16.4	38.1	41.6	4.16
Rest of country[b]	1,059	1.3	1.8	12.4	31.1	53.3	4.33
Our present highway system is necessary to maintain my present way of life:							
5 RMT cities	197	11.3	6.7	12.3	29.2	40.5	3.81
Other large metrop. areas[a]	245	3.0	4.8	15.6	32.0	44.6	4.10
Rest of country[b]	1,059	3.2	3.4	12.9	30.8	49.6	4.20
I feel highway problems are primarily in urban areas:							
5 RMT cities	197	15.0	16.6	34.2	18.7	15.5	3.03
Other large metrop. areas[a]	245	10.9	20.5	31.5	22.3	14.8	3.07
Rest of country[b]	1,059	13.5	19.3	29.8	19.6	17.8	3.09
I think that better training and testing procedures are needed in automobile driver training:							
5 RMT cities	197	3.1	5.6	13.8	20.9	56.6	4.22
Other large metrop. areas[a]	245	3.4	4.7	11.6	25.0	55.3	4.23
Rest of country[b]	1,059	2.8	4.5	11.9	23.9	57.0	4.28
I think that more frequent re-examination of automobile drivers should be made:							
5 RMT cities	197	5.6	4.6	12.2	23.0	54.6	4.16
Other large metrop. areas[a]	245	3.9	7.4	9.1	24.3	55.3	4.20
Rest of country[b]	1,059	5.6	6.9	14.2	23.4	49.9	4.05

[a] Other large metropolitan areas are SMSA's having over 1 million population, excluding the 5 RMT metropolitan areas.
[b] Rest of country includes other large metropolitan areas.

DETERMINING THE DIMENSIONS OF TRANSPORTATION ATTITUDES

Factor Analysis

Factor analyses were performed on the various measures of attitudes towards modes of transportation, highway planning, and public services, for the following reasons:

1. To demonstrate the interrelationships between attitudinal items. For instance, will the individual who rates automobiles as the best form of transportation (Q. 10) also be likely to rate highway planning as intelligent and farsighted (Q. 11)? Will he also tend to allocate more money to roads and highways (Q. 8)?

2. This will determine the underlying dimensions of attitudes and values. For instance, is there a positive highway planning dimension, a "let's spend more on public services" dimension, etc. The factor analysis would demonstrate how the various attitudinal items "hung together."

3. The factor analysis also provides a means of comparing results for the Chilton and National Analysts samples, as well as a comparison of the total sample against each subsample. It provides another check on the reliability of both samples.

Nature of Factor Analysis

Factor analysis is a method of determining a smaller set of underlying variables (called factors) from a much larger set of original variables. It indicates what sets of variables are closely interrelated and can therefore be treated as one variable, and what measures are not interrelated and should be regarded as separate variables. The set of factors which result (the single variable resulting from a group of interrelated variables) incorporates most of the information of the original variables, creating a more parsimonious representation of the original data.

For example, if demographics were to be related to transportation attitudes on a one-to-one basis, one might logically find that certain of the items were closely related, i.e., income and education. If the relationship was sufficiently strong, income and education might be considered the "same" variable, because the relationship of either income or education on any other variable might be similar. In turn, both these variables may be related to a third or fourth variable. Because they are interrelated, these four variables would thus form a new dimension which would closely represent the variables of income, education, and the other two variables in the example. For instance, Factor 11 from Table B-63 shows a close relationship between ratings for subways and local train travel (Q. 17). People rating subways positively for shopping trips also tend to rate it positively for social trips and also tend to rate local train travel for shopping and social trips positively. Simple correlations of these four items to each other demonstrated that the lowest correlation was 0.60. Thus, all items are closely correlated. (In fact, the correlation matrix is the actual input into the factor analysis program, because the nature of the interrelationships—i.e., correlations—must be determined.) It would therefore be wrong to say that there are four separate attitudes here. There is only one: an attitude toward local subway and train transportation in general. In short, one attitudinal dimension was formed from four specific and closely interrelated attitudes. In any analysis, it would be much more efficient to analyze this one dimension than the four separate attitudes towards subways and trains for shopping and social trips.

The degree to which the new dimension represents these attitudes is designated by the *factor loading* given in the tables. Thus, for Factor 11, the factor loading for attitudes towards subways for shopping trips is 0.88, an extremely high loading. If one were to square this loading ($0.88^2 = 0.774$), one could then make the statement that 77.4% of the variance in attitudes towards subway travel for shopping trips is explained by the new dimension that was formed (a loading of 1.00 is the maximum possible, meaning the new dimension explains 100% of the variance). The new dimension—Factor 11—explains all four attitudes to about the same degree. Examining Factor 12, one finds a close relationship between attitudes for local automobile travel for social and shopping trips (loadings of 0.85 and 0.82). There is also a marginal relationship towards attitudes to long-distance travel by automobile; marginal because the factor loadings are much lower (in the 0.40 range). Thus, Factor 12 explains 64% to 72% of the variance in attitudes towards local automobile travel (considering the findings for the two samples as well) but only 16% to 35% of the variance in attitudes towards long-distance automobile travel. Loadings with a minus sign indicate an inverse relationship. In Factor 13 (Table B-62) those favorable to air travel tend to be unfavorable to automobile travel for longer distances. The reverse would also be true: those favorable to longer-distance automobile travel would tend to be unfavorable to air travel. Similarly, in Factor 11, those whose attitudes are unfavorable to subways would also be unfavorable to local trains. The converse relationship will always be the case in factor analysis.

It will be noticed in Table B-63 that an attitudinal item can appear in more than one dimension. Attitudes towards long-distance automobile travel are marginally related to attitudes towards local automobile travel (Factor 12) and inversely related to attitudes towards air travel (Factor 13). If a single dimension does not explain a great deal of the variance in the item, it is possible for the item to appear again, because the total variance can equal 100%. Thus, an item can easily appear twice, with a factor loading of 0.60 each time. But it is unlikely that an item such as attitudes towards subways—with a factor loading of 0.85—will appear on another dimension.

The analysis also generates a *factor score* (as distinct from a factor loading). The factor score is the designation each person receives for the new dimension. The magnitude of the score indicates whether that new dimension is representative of that individual. In the foregoing example, each person in the sample would receive a factor score for Factors 11, 12, and 13 (and for every other

factor generated). A high positive factor score on Factor 11 means the individual had a positive attitude towards local transportation. The individual could now be represented on the new dimension, which reflects a summary of his separate scores on each of the four items contained in Factor 11. A high negative score means the individual had a strongly negative attitude towards local subway and train transportation. A score close to zero means the individual was neutral and could not be represented as either positive or negative on this dimension. It could also mean that for a small minority of the sample the factor was not representative, possibly because the individual was positive to subways and negative to local trains. This would have to occur in a small minority of cases, because the generation of the factor itself meant that there was a strong positive relationship between the two modes for the total sample.

These factor scores could be used in any subsequent analysis to represent the attitudes of people in terms of the

TABLE B-61

COMPARISON OF FACTOR LOADINGS FOR CHILTON, NATIONAL ANALYSTS, AND COMBINED SAMPLES, PUBLIC SERVICE FACTORS (QUESTIONS 7 AND 8)

FACTOR AND SUBFACTOR	FACTOR LOADING		
	TOTAL SAMPLE	CHILTON	NATIONAL ANALYSTS
Factor 1—Spend less (more) money on social services:			
Allocation to health and hospital	0.70	0.65[a]	0.50
Allocation to education	0.62	0.53	0.52
Allocation to police and fire	0.60	0.40[a]	0.59
Allocation to urban renewal	0.60	0.68	(0.58)[b]
Allocation to welfare programs	0.56	0.70	(0.66)[b]
Allocation to parks and recreation	0.56	0.60	0.67
Allocation to roads and highways	0.45	—[a, c]	0.73
Factor 2—Good (poor) quality public services:			
Quality of health and hospital services	0.71	0.68	0.70
Quality of welfare programs	0.66	0.66	0.63
Quality of urban renewal	0.65	0.65	0.64
Quality of police and fire	0.59	0.57	0.56
Quality of parks and recreation	0.51	0.57	0.56
Quality of education	0.47	0.54	0.44
Quality of public transportation	0.46	—[a, b]	0.56
Factor 3—Good (poor) quality; spend less (more) on air, water:			
Quality of air	0.79	0.77	0.77
Allocation to air	−0.70	−0.76	−0.70
Quality of water	0.69	0.68	0.68
Allocation to water	−0.54	−0.60	−0.55
Factor 4—Poor (good) quality; spend more (less) on roads and highways:			
Quality of roads and highways	−0.67	−0.67[a]	—[d]
Allocation to roads and highways	0.61	0.73	—[d]
Factor 5—Good (poor) quality; spend less (more) on public transportation and negative (positive) value placed on public transportation:			
Allocation to public transportation	−0.55	−0.76[a]	—[d]
Quality of public transportation	−0.40	0.70[a]	—[d]
Real answer is more and better public transportation (Q. 9)	−0.63	−0.65	−0.67
If improvements made in public transportation, it will help a great deal (Q. 9)	−0.52	−0.59	−0.58
More attention to public rather than automobile transportation is desirable (Q. 9)	−0.52	−0.66	−0.65
As between automobile and public transportation, latter is more important (Q. 9)	−0.45	−0.62	−0.59

[a] Statistically significant difference between factor loadings for Chilton Research Services and National Analysts samples.
[b] In certain cases, two different factors in one sample were combined when it was evident that both represented an individual factor in the other sample; factor loadings of the combined items are in parentheses.
[c] Factor loading below 0.40.
[d] No equivalent factor for National Analysts.

more parsimonious set of factors rather than the larger original number of specific attitudes. In this analysis, there were 64 specific attitudinal items in Questions 7, 8, 9-11, and 13-17. These 64 items were reduced to 14 factors for each respondent. Any subsequent attitudinal analysis could therefore deal with 14 factors rather than 64 variables.

Types of Analyses Investigated

Three factor analyses were run separately for the Chilton and National Analysts samples, as follows:

1. Questions 7 and 8: ratings of quality and allocation of money to ten public services (20 items).

TABLE B-62

COMPARISON OF FACTOR LOADINGS FOR CHILTON, NATIONAL ANALYSTS, AND COMBINED SAMPLES, FACTORS RELATED TO ATTITUDES TOWARDS PUBLIC TRANSPORTATION, AUTOMOBILE'S SOCIAL ROLE, AND HIGHWAY PLANNING (QUESTIONS 9-11)

FACTOR AND SUBFACTOR	FACTOR LOADING		
	TOTAL SAMPLE	CHILTON	NATIONAL ANALYSTS
Factor 6—Negative (positive) towards automobile in society and negative (positive) towards highway planning and planners:			
Automobile represents real health hazard to mankind (Q. 10)	0.64	0.48	0.48
In general, highway planning is stupid and shortsighted (Q. 11)	0.61	0.59	0.58
Way highways planned and built doesn't make sense (Q. 11)	0.61	0.51	0.57
Highway planners don't always use best judgment (Q. 11)	0.60	0.59	0.62
Automobile is a deadly weapon (Q. 10)	0.59	0.46	0.43
Highways obsolete by the time they get built (Q. 11)	0.58	0.66	0.68
If highway planners could use own judgment, do better job (Q. 11)	0.58	0.43	0.47
Automobile here to stay, but there will have to be lots of improvements (Q. 10)	0.57	0.44	0.47
Highways generally built in time for motorists' needs (Q. 11)	0.55	—[a]	0.42
Automobile has shortcomings, but in general is boon to man (Q. 10)	0.54	—[a]	0.48
Automobile more trouble than it is worth (Q. 10)	0.52	—[a]	—[a]
Factors 7 and 8—Positive (negative) towards highway planning and automobile vs public transportation:			
Highways are planned and built in best possible way (Q. 11)	0.65	0.62	0.64
Under circumstances, highway planning satisfactory (Q. 11)	0.50	0.54	0.66
As between automobile and public transportation, the automobile is more important (Q. 9)	(0.61)[b]	(0.61)[b]	(0.70)[b]
More attention to automobile rather than public transportation desirable (Q. 9)	(0.61)[b]	0.49	(0.59)[b]
Real answer to transportation problems more and better automobile transportation (Q. 9)	(0.60)[b]	0.56	(0.64)[b]
Highway planning is intelligent and farsighted (Q. 11)	0.43	0.52	0.55
Highways are built in time for motorists' needs (Q. 11)	—[a]	0.50	0.45
Automobile best form of transportation invented by man (Q. 10)	—[a]	0.60	(0.57)[b]
Factor 9—Negative-biased question (Q. 31)	0.45	0.46	—[a]

[a] Factor loading below 0.40.
[b] Statistically significant difference between factor loadings for Chilton Research Services and National Analysts samples.

2. Questions 9-11: ratings of attitudes and values towards public transportation, the social role of the automobile, and highway planning and planners. The negatively biased question (Q. 28) was included in this category for a total of 28 attitudinal items.

3. Questions 13-17: ratings of modes of transportation for long-distance family and business trips and local shopping and social trips (16 items).

In addition, one general factor analysis was run on all three categories simultaneously (64 attitudinal items) for the combined samples (5,000 people). This general factor analysis was run to determine if there were any interactions between the foregoing three categories and to supply the factor analysis results for the total sample for each of the three categories. For instance, are attitudes towards public services related to attitudes towards highway planning?

Two other factor analyses were run for the total sample —satisfaction with specific transportation attributes provided by public transportation and the automobile (Q. 18); and attitudes towards further allocations for specific improvements for roads and highways and public transportation facilities (Q. 12).

Results of these factor analyses are presented in Tables B-65 and B-66 for the total sample and in Tables B-62, B-63, and B-64 for each of the two subsamples as well. The results are analyzed in two sections: First, an analysis of the total sample, outlining the dimensions of transportation attitudes developed by the factor analysis; and second, a comparison of results for the two subsamples.

TABLE B-63

COMPARISON OF FACTOR LOADINGS FOR CHILTON, NATIONAL ANALYSTS, AND COMBINED SAMPLES, FACTORS RELATED TO ATTITUDES TOWARDS MODES OF TRANSPORTATION (QUESTIONS 13-17)

FACTOR AND SUBFACTOR	FACTOR LOADING		
	TOTAL SAMPLE	CHILTON	NATIONAL ANALYSTS
Factor 10—Positive (negative) attitudes towards bus travel:			
Favorable to bus for long-distance family trips	0.73	0.67	0.76
Favorable to bus for long-distance business trips	0.73	0.66	0.77
Favorable to bus for local shopping trips	0.79	0.80	0.79
Favorable to bus for social trips	0.82	0.84	0.82
Factor 11—Positive (negative) towards local subway and train:			
Favorable to subway for shopping trips	0.88	0.87	0.90
Favorable to subway for social trips	0.89	0.88	0.89
Favorable to local train for shopping trips	0.87	0.87	0.88
Favorable to local train for social trips	0.88	0.87	0.89
Factor 12—Positive (negative) towards automobile travel:			
Favorable to local auto for social trips	0.85	0.80	0.85
Favorable to local auto for shopping trips	0.82	0.80	0.83
Favorable to long-distance auto for business trips	—[a]	0.50	0.40
Favorable to long-distance auto for family trips	0.40	0.59	0.49
Factor 13—Negative (positive) towards long-distance automobile and positive (negative) towards air travel:			
Favorable to air travel for family trips	0.77	0.83	0.81
Favorable to air travel for business trips	0.76	0.84	0.79
Favorable to long-distance automobile for family trips	−0.57	−0.47	−0.57
Favorable to long-distance automobile for business trips	−0.64	−0.57	−0.63
Factor 14—Positive (negative) towards long-distance train travel:			
Favorable to long-distance train for family trips	0.86	0.86	0.89
Favorable to long-distance train for business trips	0.85	0.84	0.87

[a] Factor loading below 0.40.

TABLE B-64

FACTOR LOADINGS FOR AUTOMOBILE AND PUBLIC TRANSPORTATION ATTRIBUTES (COMBINED SAMPLE)

FACTOR AND SUBFACTOR	FACTOR LOADING
Factor 1—Confidence in public transportation as a mode satisfied (dissatisfied) with public transportation regarding:	
Confidence	0.82
Safety	0.80
Chance to relax	0.71
Speed	0.69
Newness	0.67
Feeling of pride	0.66
Comfort	0.65
Chance to look at scenery	0.61
Factor 2—Satisfaction (dissatisfaction) with environmental and social facilities provided by the automobile:	
Protection from bad weather	0.77
Chance to ride with people you like	0.69
No change of vehicles required	0.67
No crowds	0.67
Feeling of independence	0.56
Cost	0.54
Factor 3—Satisfaction (dissatisfaction) with relaxation aforded by automobile:	
Chance to look at scenry	0.76
Chance to relax	0.63
No traffic	0.52
Factor 4—Confidence and pride (or lack of) in automobile:	
Confidence	0.78
Pride	0.76
Newness	0.71
Safety	0.68
Comfort	0.67
Speed	0.62
Factor 5—Dissatisfaction (satisfaction) with environmental and social facilities provided by public transportation:	
No crowds	−0.77
Protection from bad weather	−0.74
No change of vehicles	−0.70
Feeling of independence	−0.70
Chance to ride with people you like	−0.68
Cost	−0.60
No traffic	−0.56

Dimensions of Transportation Attitudes

When all 64 attitudinal items in Questions 7-11 and 13-17 were analyzed for the total sample, logical and significant attitudinal dimensions emerged. Yet there was little "cross-over" in terms of the three basic attitudinal categories. A factor would generally be composed of either public services in Questions 7 and 8, or transportation attitudes in Questions 9-11, or transportation modes in Questions 13-17. Of the 14 factors generated, only one represented an interaction among these three categories. This suggests that dimensions of transportation attitudes exist separately for modes (Q. 13-17), for facilities (Q. 7, 8), and for values (Q. 9-11).

Public Service Factors (Table B-61)

Five factors emerged in the factor analysis of the total sample represented by the 20 public service items in Questions 7 and 8.

Factor 1: Spend More (Less) Money on Public Services.—This factor had high loadings on the allocations for health, education, police and fire, urban renewal, parks, and welfare (in the order of importance). A person who felt more should be spent on one of these public services (i.e., a person with a high factor score) was likely to feel the same regarding the other. Conversely, people who felt less should be allocated to one service (people with low factor scores) tended to allocate less to the others as well. This factor thus represents a "let's spend more" or "let's spend less" dimension, depending on the magnitude of the factor score. These six may be regarded as social services and therefore are grouped together. It is significant that the two transportation items—public transportation and roads and highways—did not appear on this factor. Roads and highways, public transportation, and air and water pollution control are perceptually divorced from these types of services.

Factor 2: Good (Poor) Quality of Social Services.—This factor paralleled Factor 1, except it related to quality of services rather than allocation of funds. The same social services appeared except for education, which had a marginally high loading of 0.47. (Items with loadings of under 0.40 were not included in the definitions of the factors.) Because these social services appeared on separate factors, one cannot assume that a person who tended to rate a social service high on quality is likely to allocate more or less funds to that service. For these six social services, quality and allocation ratings are independent.

Factor 3: Good (Poor) Quality Air and Water: Spend Less (More) on Air and Water.—For air and water pollution control quality and allocation, ratings are inversely related. Those who rate air and water high feel less should be spent on these facilities, and vice versa.

Factor 4: Poor (Good) Quality Roads and Highways: Spend More (Less) on Roads and Highways.—Ratings for roads and highways showed an inverse relationship between quality and allocation of funds. People with positive factor scores are dissatisfied with the quality of roads and highways and want to spend more, and vice versa.

Factor 5: Spend Less (More) on Public Transportation: Negative (Positive) Attitude Towards Public Transportation in Relation to Automobile.—Of the 14 factors generated in the factor analysis, this was the only one to demonstrate a significant interaction among the three basic attitudinal categories. Those who felt less money should be spent on public transportation rate the quality of public transportation facilities higher. They also place a low value on public transportation, disagreeing with items favorable to public transportation in Question 9. As far as public transportation is concerned, there does appear to be an interaction between attitudes towards the facility (Q. 7 and 8) and the value placed on the facility as a mode of transportation (Q. 9). This confirms a finding of the Phase I report that people's perceptions of

TABLE B-65

FACTOR LOADINGS FOR SPECIFIC EXPENDITURES FOR ROADS AND HIGHWAYS AND PUBLIC TRANSPORTATION (QUESTION 12) (COMBINED SAMPLE)

FACTOR AND SUBFACTOR	FACTOR LOADING
Factor 1—Favor an increase in spending for roads and highways:	
Spend more for roads and highways in general (Q. 8)	0.78
Improve maintenance on existing highways	0.70
Build additional highways	0.67
Factor 2—Favor increased spending for traffic control and better law enforcement:	
Improve traffic law enforcement	0.77
Add safety features to streets and highways	0.71
Improve training and testing of automobile drivers	0.69
Improve traffic signals and signs	0.59
Factor 3—Favor increased spending for adjunct highway services:	
Build additional parking areas at train or rapid transit stations	0.68
Build additional downtown parking facilities	0.66
Beautify highways	0.61
Add more services for users of rural freeways	0.57
Factor 4—Favor increased spending for Public Transportation	
Spend more for public transportation in general (Q. 8)	0.78
Build additional new rapid transit lines	0.68

public transportation as a mode and as a public facility were closely interrelated, primarily because of a lack of personal ownership and involvement. In the case of the automobile, people tended to divorce perceptions of roads and highway facilities (Q. 7 and 8) from attitudes towards the automobile (Q. 9 and 10). This was borne out in the factor analysis.

Public Transportation, Social Role of the Automobile, and Highway Planning Factors (Table B-63)

Factor 6: Negative (Positive) Towards Automobile in Society: Negative (Positive) Towards Highway Planning and Planners.—This factor had high loadings on Items 1-4 and 6-7 in Question 11 and Items 4-8 in Question 10. The highest loadings were on Items 1-3 in Question 11 ("Highway planning doesn't make any sense"; "Highway planning is stupid"; "Highway planners do not use their best judgment") and Item 7 in Question 10 ("The automobile is really a health hazard to mankind"). Clearly, people who view the automobile as having a poor societal effect also view highway planning poorly, and vice versa. Attitudes towards the automobile's effects on society and towards highway planning form a single value dimension.

Factor 7: Positive (Negative) Towards Highway Planning.—This factor had high loadings on Item 9 ("Highways are being planned in the best possible way") and Item 5 ("Highway planning is satisfactory") (Q. 11). The fact that these items were not part of Factor 6 suggests that people who disagree with the negatively oriented highway planning items should not be expected to agree with the positively oriented items. The reverse is also true.

Factor 8: Positive (Negative) Towards Automobile as Opposed to Public Transportation.—This factor had high loadings on Items 6, 7, and 9 in Question 9 ("more attention to automobile rather than public transportation"; automobile more important than public transportation"; "real answer to transportation problems is more and better automobile transportation"). Therefore, this represents a dimension positioned on attitudes towards the automobile versus public transportation. People with positive scores on this factor would appear to be favorable to the automobile; those with negative scores, unfavorable. Factor 5 was centered on negative public transportation items. Because they appeared on separate factors, one cannot assume that agreement with the positive automobile items will necessarily mean disagreement with the positive public transportation items.

Factor 9: Agreement (Disagreement) With Negatively Biased Question.—This was a marginally significant factor in that only one item of any significance was loaded on it—the negatively biased question with a loading of 0.45. It indicates that this question was not strongly interrelated to public services, transportation values, or attitudes toward modes. Interestingly, agreement with the statement was marginally related (factor loading between 0.30 and 0.50) to a negative attitude towards long-distance automobile travel, to a negative attitude towards the automobile in society (Q. 10), and towards a positive attitude to spending more on welfare and urban renewal.

Transportation Mode Factors (Table B-63)

People who were favorable towards a particular mode of transportation favored this mode for most occasions. Attitudes towards the mode seemed to be independent

TABLE B-66

ANALYSIS BY AVERAGE ANNUAL HOUSEHOLD TRAVEL (QUESTIONS 22-25)

CHARACTERISTIC	NATIONAL ANALYSTS HOUSEHOLD TRAVEL[a] (VEH-MI)	NATIONAL ANALYSTS BSS/TSS	CHILTON RES. SERV. HOUSEHOLD TRAVEL[a] (VEH-MI)	CHILTON RES. SERV. BSS/TSS
Age		0.021		0.014
50 and under	18,785		19,113	
Over 50	15,394		15,184	
Years driven		0.021		0.016
5-35 years	18,976		19,075	
Under 5 or over 35	14,876		15,811	
Population density		—[b]		0.025
Rural			22,460	
Non-rural			17,121	
Education		0.013		0.021
High school and over	19,073		19,544	
Less than high school	15,864		15,305	
Occupation		0.020		0.026
Other than services, operatives	19,027		19,190	
Services, operatives	14,460		13,613	
Distance to work		0.018		0.026
More than 10 miles	20,606		21,480	
10 Miles or less	16,732		16,713	
Life changes affecting public transportation use		—[b]		0.022
Automobile changes			18,953	
Other			12,328	
Life changes affecting automobile use		0.020		0.021
Few changes	14,493		13,132	
Intermediate to many	18,293		18,510	
Attitudes towards public transportation		0.014		—[b]
Dissatisfied	20,686			
Intermediate to satisfied	17,276			
Long-distance vs local automobile use		—[b]		0.022
Long-distance much better			16,663	
Local better			20,347	
Number of weekday trips		0.010		0.019
More than 5	22,859		24,607	
5 or less	17,836		18,032	
Number of weekend trips		—[b]		0.019
More than 5			29,360	
5 or less			18,096	
Percent vehicle-miles to work		0.031		0.020
Over 25%	19,167		19,340	
25% or less	13,276		14,863	
Percent-vehicle miles, social		0.015		—[b]
15% or less	19,124			
Over 15%	15,615			
Percent vehicle-miles, automobile		0.010		0.015
Over 60%	18,345		18,656	
60% and under	14,175		15,215	
Percent vehicle-miles, pub. transp.		0.025		0.022
5% and under	18,505		18,860	
Over% 5	10,670		11,483	
Income		0.067		0.074
$12,500 and over	24,914		25,719	
Under $12,500	16,214		16,383	

[a] Average annual household travel. [b] BSS/TSS under 0.010 and not significant.

of the transportation occasion. The only exception was a distinction between local and long-distance trips for the automobile and train. Also, there were few interactions between modes. Attitudes towards one mode were not dependent on attitudes towards another. The exceptions here were an interrelationship between negative attitudes towards air travel and positive attitudes towards long-distance automobile trips.

Factor 10: Positive (Negative) Attitudes Towards Bus Travel.—Attitudes towards bus travel were fairly homogeneous for all occasions. People who tended to view the bus positively for local shopping and social occasions also viewed it positively for long-distance family and business travel.

Factor 11: Positive (Negative) Attitudes Towards Local Subway/Train.—Subways and trains were grouped together on this factor for local travel occasions. No distinction was made between shopping and social occasions. This factor was unrelated to attitudes towards long-distance train travel.

Factor 12: Positive (Negative) Attitudes Towards Local Automobile.—No distinction was made between social and shopping trip purposes in determining attitudes. The basic distinction in most cases appeared to be between local and long-distance travel rather than between the specific nature of the travel occasion. The factor was marginally related to attitudes towards long-distance automobile travel.

Factor 13: Negative (Positive) Attitudes Towards Long-Distance Automobile: Positive (Negative) Attitudes Towards Air Travel.—There was an inverse relationship between attitudes towards automobile and air travel for long-distance trips. No distinction was made between family and business trips. To persons represented by this dimension, one mode is favored clearly at the expense of the other.

Factor 14: Positive (Negative) Towards Long-Distance Train Travel.—People had similar attitudes towards the train for family and business purposes. Attitudes towards long-distance train travel were unrelated to attitudes towards commuter train travel.

Attitudes Towards Automobile and Public Transportation Attributes (Table B-64)

As noted, a separate factor analysis was performed to determine the dimensions of attitudes towards automobile and public transportation attributes (Q. 18). This analysis determined the manner in which transportation and personal needs satisfied by the automobile and public transportation are grouped together. A separate factor analysis was necessary, because this question was asked of only one-half the sample and could not be included in the general factor analysis of the total sample.

Five factors emerged—three related to satisfaction with automobile transportation attributes; one to satisfaction, and one to dissatisfaction, with public transportation attributes.

Factor 1: Confidence in Public Transportation as a Mode.—This factor centered on satisfaction with the confidence and safety provided by public transportation. People with high positive factor scores on this item were generally confident in public transportation facilities. (The opposite would hold for people with negative factor scores.) Those who responded positively to public transportation on these two attributes also tended to react favorably to the speed, newness, pride, relaxation, comfort, and scenery afforded by public transportation. The confidence dimension also involves an ability to relax and to enjoy both the scenery and the vehicle itself, as well as feeling safe in the vehicle.

Factor 2: Satisfied with Convenience Afforded by Automobile.—People who were satisfied with the automobile's facility to provide protection in bad weather also rated the automobile positively in providing a chance to ride with people you like, requiring no change of vehicles, no crowds, a feeling of independence, and satisfaction with cost.

Factor 3: Satisfied with Relaxation Afforded by the Automobile.—This factor was centered on satisfaction with the chance to look at scenery while riding in the automobile. People who were satisfied with this attribute also felt that the automobile provided relaxation and freedom from traffic. People with low factor scores on this dimension would of course see the automobile in the opposite light.

Factor 4: Confidence and Pride in the Automobile.—This factor was somewhat analogous to the confidence dimension for public transportation, except that pride was more closely associated with confidence. Also, the relaxation-scenery attributes were not associated with confidence for the automobile, but appeared as a separate dimension. People who felt a sense of confidence and pride in the automobile also tended to be satisfied with its newness, comfort, safety, and speed. Confidence in both modes of transportation is closely related to satisfaction with the vehicle itself. Yet confidence in public transportation is also associated with relaxation. This is not true for the automobile. Those who are satisfied with the vehicle do not necessarily derive relaxation from it, because relaxation and confidence appeared on separate dimensions.

Factor 5: Dissatisfaction with Environmental and Social Facilities Provided by Public Transportation.—Factor 1 related to satisfaction with public transportation as a vehicle. Factor 5 refers to the environmental and social attributes associated with public transportation. It was centered on dissatisfaction with the crowdedness of the vehicle, protection from foul weather, and the number of changes of vehicles. People dissatisfied with these attributes also tended to be dissatisfied with a facility for riding with people you like, a feeling of independence, the amount of traffic, and the cost of the trip. People with high factor scores expressed dissatisfaction with these attributes; people with low factor scores expressed satisfaction.

Attitudes Towards Increased Expenditures for Specific Highway and Public Transportation Facilities (Table B-65)

The final factor analysis was run to determine the grouping of attitudes towards increased expenditures for specific

highway and public transportation improvements. The eleven items in Question 12 relating to specific areas for increased expenditures were grouped together with general attitudes towards an increase in expenditures for roads and highways and for public transportation (as determined in Q. 8). Four distinct factors emerged.

Factor 1: Increase Spending for Roads and Highways.—People with high scores on this factor favored an increase in allocations for roads and highways (Q. 8). Logically, they also favored building additional highways and improving maintenance on existing highways (Q. 12).

Factor 2: Increase Spending for Traffic Control and Law Enforcement.—Those people who favored greater expenditures for improved traffic law enforcement also wanted more money and effort to be devoted to safety features, improved training and testing of drivers, and improved traffic signals and signs. These items "hang together" in that they all relate to safety and control features in the use of roads and highways. People with positive factor scores on this factor would appear to be concerned with safety and control of other drivers in the use of roads and highways.

Factor 3: Increase Spending for Adjunct Highway Services.—People with positive factor scores on this attitudinal dimension favored building additional parking areas at rapid transit stations, building additional downtown parking facilities, beautifying highways, and adding more services for users of freeways. The common theme here is the need for additional services in conjunction with the use of highways. For instance, parking facilities and freeway services facilitate the use of roads and highways, and beautification makes their use more pleasurable.

Factor 4: Increase Spending for Public Transportation.—Persons favoring an increase in expenditures for public transportation in general in Question 8 logically favored building additional new rapid transit lines in Question 12. It is important to note that attitudes towards allocations for roads and highways and for public transportation appeared on two separate factors. This means that individuals who favor an increase in expenditures for one mode can not be assumed to either favor or disfavor an increase in expenditures for the other. Had these facilities been viewed as competitive, they would have appeared on the same factor in an inverse relationship. Actually, they were marginally related; that is, a greater proportion of people who favored an increase in expenditures for roads and highways also favored an increase in expenditures for public transportation, and vice versa. Once again, the study demonstrated that public transportation and roads and highways are viewed more in a complementary rather than a competitive manner.

Comparison of Results of the Factor Analysis for the Chilton and National Analyst Samples

Three parallel factor analyses were run on the Chilton sample, the National Analysts sample, and both samples combined (Tables B-61, B-62, and B-63). Expecting the factor loadings in both samples to be statistically equivalent would be too rigorous a test of the reliability of both samples. Because factors are generated by determining the intercorrelations between a set of variables, one would expect general comparability, not identity. It is possible that statistical tests would permit one to conclude that both samples are representative of the same population, although results of the factor analyses differ.

The results comparing the two samples by the 14 factors generated were remarkably close. Of these factors, only two were not comparable. Both related to public services: in the Chilton sample, ratings on quality and allocation for both roads and highways and public transportation tended to be inversely related and emerged as two separate factors (Table B-62, Factors 4 and 5). These same factors emerged for the total sample, yet did not occur when the National Analysts sample was analyzed separately. In the latter case, the two transportation items tended to cluster with the other social service items and formed no distinctive transportation dimension.

A comparison was also made of individual factor loadings for the two samples on an item-by-item basis. A difference of 0.15 or greater between the two samples is statistically significant. Of the 63 items in the 14 factors generated, 10 showed significant differences in the factor loadings between the samples. Eight of the 10 differences appeared in the public service items. There were only two significant differences between the samples among the 23 automobile, public transportation, and highway planning items, and no significant differences among the 18 transportation mode items.

Thus, the public service factors were only marginally comparable, whereas the value and transportation dimensions for the two samples were remarkably similar, almost identical.

DEVELOPMENT OF TRANSPORTATION ATTITUDE AND BEHAVIOR PROFILES

Once the basic dimensions of transportation attitudes were defined, the next step was to determine the characteristics of people holding these attitudes. For instance, what are the common demographic characteristics and transportation behavior patterns of individuals who feel more money should be spent on roads and highways? In addition, what are the positions held in common by these people on other transportation attitudes?

It would have been a simple matter to take the positive, neutral, or negative attitudes of people to the various dimensions of transportation derived in the factor analysis, and cross-tabulate these individuals by their income, or age, or miles traveled in the last year. These cross-tabulations would have represented one-to-one relationships between the attitudinal dimension and demographics. Such an analysis might have been misleading in the following way. Assume the cross-tabulation demonstrates that a disproportionate share of people in suburban areas favor greater allocations to roads and highways; in addition, a disproportionate share of people in the low-income categories favor increased expenditures for roads and highways (these are hypothetical statements). One might then assume that the profile of the individual most likely to favor increased allocations is a low-income person living in the suburbs.

This makes the assumptions that the two findings overlap and that the same persons are being referred to in both cross-tabulations. In fact, people living in the suburbs favoring increased allocations, and low-income people favoring increased allocations may be two separate groups —that is, a minimum of overlap. There is no logical basis for the assumption that these low-income people lived in the suburbs. To assume that the profile represents a combination of these characteristics would be misleading.

A uni-variate analysis would be insufficient, because the definition of the profile would require determining commonly held characteristics among several distinct groups by attitudes towards expenditures for roads and highways. Suppose one could say that people placing the highest value on public transportation live in metropolitan areas, feel more money should be spent on public transportation, and have negative attitudes towards highway planning (as is in fact the case). Further, let us say that these people represent about 20% of the sample and their attitudinal score on public transportation is one-fourth higher than the sample average. Thus, the one-fifth of the sample having these three demographic and attitudinal characteristics in common have significantly more favorable attitudes towards public transportation. This would constitute the definition of the profile.

A computer program was thus required with the ability to:

1. Segment the sample so that the sharpest discrimination (positive to negative) could be attained by attitudes.
2. Insure that such a segmentation would produce commonly held characteristics for each homogeneous group by transportation attitudes.
3. Demonstrate at what point the greatest discrimination is achieved. That is, if income is related to attitudes towards expenditures for roads and highways, at what point in the income range is greatest discrimination attained between positive and negative attitudes—at $5,000 and over versus under $5,000; or $10,000 and over versus under $10,000; or $15,000 and over versus under $15,000; etc. The same question would apply to any variable with a range of values.

The assumption in this analysis is that commonly held attitudinal, demographic, or behavioral variables have some causal relationship in conditioning transportation attitudes. In the preceding example, metropolitan versus non-metropolitan location, attitudes towards expenditures for public transportation, and attitudes towards highway planning are likely to condition the value placed on public transportation, because these characteristics provide the sharpest discrimination by value for public transportation.

Nature of AID Program

The Automatic Interaction Detector (AID) program (*3*) is a computer program uniquely suited to examining a large number of variables simultaneously. In particular, it can examine up to 36 profile variables simultaneously and relate them to a dependent variable (transportation attitudes). The program examines all 36 variables and splits the sample into two groups by the independent variable that most sharply discriminates.

Consider Figure B-18. The dependent variable is the summated attitudinal score for Question 9 (value placed on public transportation—the higher the score the greater the value placed on public transportation). In developing various segments by these attitudes, the program found that attitudes towards expenditures for public transportation was the most important discriminator and split the sample into groups of those who feel more should be spent (48% of the sample) versus those who feel the same or less should be spent (52% of the sample). The average attitudinal score for those who felt more should be spent rose to 28.33 and for those who felt the same or less should be spent dropped to 23.16. Thus, there is a sharp division of the sample (with an average score of 25.64) on the value placed on public transportation based on attitudes towards expenditures for public transportation.

At this point, the AID program now studies the two groups separately. Of the remaining 35 profile variables, it asks which one is the best discriminator of value placed on public transportation among those 48% of the people who want to spend more. It selected location, and split the "spend more" subgroup into those people living in large metropolitan areas versus the rest of the sample. Now 19.1% of the sample can be defined by two commonly held characteristics—they live in large metropolitan areas and want more spent on public transportation. For this group, the average attitudinal score for value of public transportation is 31.69, about one-fourth larger than the sample average of 25.64. This group constitutes the most homogeneous subsample by high value placed on public transportation. It includes about one-fifth of the total sample. Another segment is the 28.9% of the people who live in other than large metropolitan areas and also want more spent on public transportation. The value rating for this group is 26.11, close to the sample average of 25.64. This would thus represent an intermediate grouping.

One can similarly define segments along the lower branch of the chart in Figure B-18. For instance, among the people (49% of the sample) who want the same or less spent on public transportation and who travel 5% or less of their total mileage on public transportation, race was the most important discriminator. Within this subgroup the value score was 22.47. But if the subgroup is split by whites versus non-whites, the value score among non-whites jumps to 28.19, significantly higher than the sample average. According to the analysis, the segment that placed the lowest value on public transportation (value score of 19.20) was defined by four commonly held characteristics: they felt the same or less should be spent on public transportation; they traveled less than 5% of their total vehicle-miles on public transportation; they were white; and they lived in other than large metropolitan areas. This group, representing 26.9% of the sample, had a value score towards public transportation approximately one-fourth lower than the sample average of 25.64.

The AID program proceeds in this iterative fashion, creating ever smaller and more homogeneous subgroups. But it does not continue *ad infinitum*. There are two kinds

of statistical limits. Either the number of people in the subgroup is too small for any further splits; or in examining the remaining profile variables, the program finds that none of the variables was statistically significant in discriminating further—i.e., none of the remaining variables are closely enough related to the dependent variable. Thus, in Figure B-18 there were no further splits past the 19.1% of the sample living in large metropolitan areas who want to spend more on public transportation. The sample size of this subgroup was large enough for further splits; but in examining the remaining variables for these people, the program found none had sufficient discriminatory power to split this 19.1% of the sample into two subgroups.

The AID Runs

The AID analysis was used to develop profiles for six attitudinal categories and one behavioral category. The behavioral category was the total number of vehicle-miles driven by household members in personally-owned and leased vehicles in the last year. This permitted segmenting the sample by households with heavy, medium, and light number of vehicle-miles. The six attitudinal categories emphasized allocations for transportation facilities. Four of these AID runs were based on the attitudinal dimensions developed in the factor analysis for the allocation items in Question 12. These were attitudes towards increased spending for:

1. Roads and highways.
2. Traffic control and law enforcement.
3. Adjunct highway services.
4. Public transportation.

The inputs into these four AID analyses were factor scores for each person, rather than the raw attitudinal scores. This was necessary because each of these categories represented an attitudinal dimension; that is, a summation of several interrelated attitudinal items in Questions 8 and 12. Had AID been run on an individual item in Question 12 rather than the attitudinal dimension resulting from the factor runs, the analysis would have been much less powerful. It could not have represented the broad spectrum of attitudes reflected in the factor scores.

Two additional AID analyses were performed on attitudinal items—an AID run on the value placed on public transportation (Q. 9) and on attitudes towards highway planning and planners (Q. 11). For these two AID analyses, a summated attitudinal score served as the dependent variable. This score was determined as follows. First, the nine items in both scales were weighted as to the degree to which they represented favorable or unfavorable statements towards public transportation and highway planning. These weights were predetermined by a group of judges prior to the questionnaire going into the field. The degree to which a person agreed or disagreed with each statement was weighted by the favorability or unfavorability of the statement and the values of all nine items were summed, producing a summated attitudinal score for each individual. This score was used as the input for an AID run for Question 9 and again for Question 11.

In all, nine AID analyses were run. The AID runs for vehicle-miles and for value placed on public transportation were performed on both the Chilton and the National Analysts samples, providing yet another basis for comparison (see Tables B-6 and B-7). The other five AID runs (the four allocation factors and attitudes towards highway planning) were performed on the total sample.

Household Vehicle-Miles Profiles

Figure B-17 shows the results of the AID run for the Chilton sample for total vehicle-miles driven by household vehicles in a 12-month period. This household mileage figure will be greater than the average automobile mileage generally used, because it is based on all vehicles owned or rented by the household and used for the transportation of people.

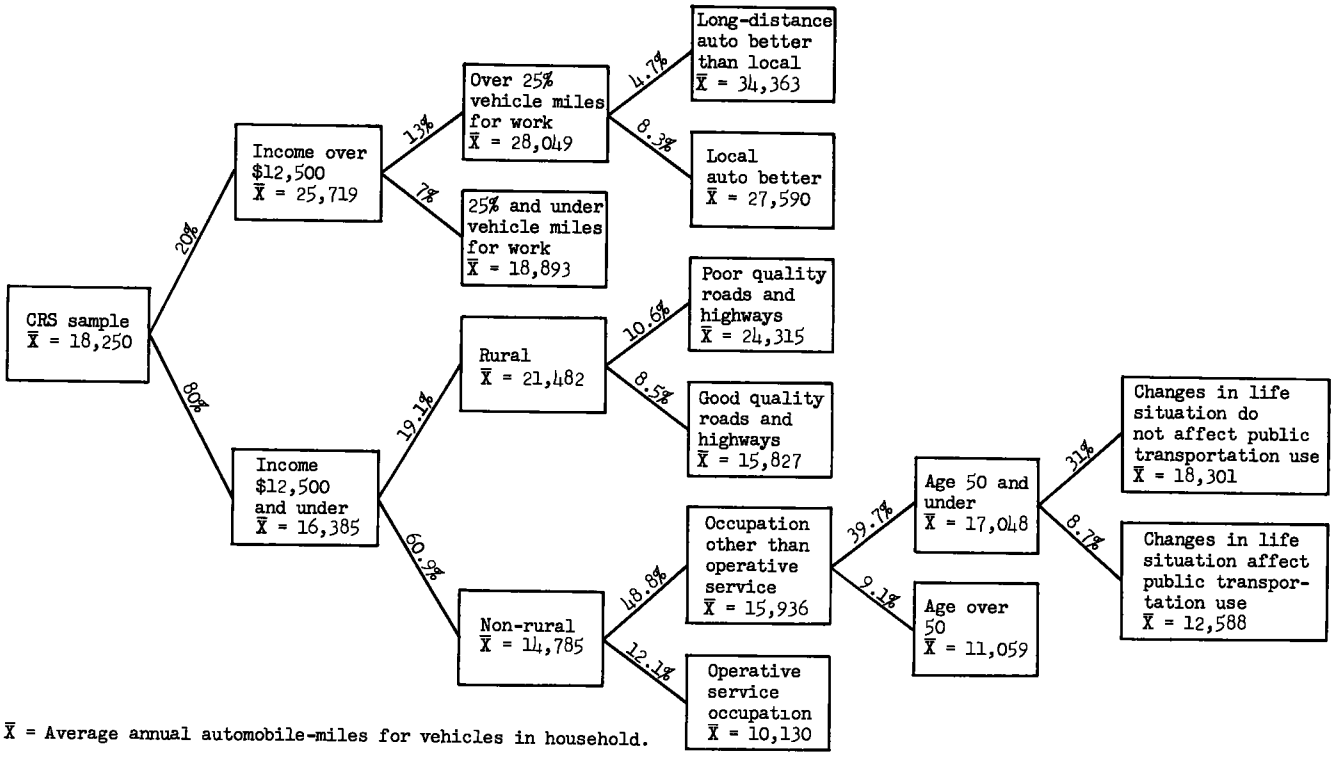
Figure B-17 shows the average annual miles driven for each group as defined by the characteristics cited. The percentage figure on the line between boxes is the percentage of the total sample represented. Thus, the sample average was 18,250 vehicle-miles per household in the last year. One-fifth of the sample households had income over $12,500. For this group, the average annual vehicle-miles driven is 25,719, compared to 16,385 for those with incomes of $12,500 and under. Among those households with incomes over $12,500 using 25% or more of their total vehicle-miles for work trips, the average number of miles driven increases to 28,049. Based on this tree diagram, the following six profiles have been developed:

1. *Heaviest Vehicle-Miles Households.*—The households in this group represent 13% of the sample and drive an average of 28,049 miles annually, compared to the sample average of 18,250. More than 25% of the vehicle-miles for each household in this group are for work trips, and each household had an annual income exceeding $12,500. The AID program further split this 13% into those who favor the automobile for long-distance purposes (4.7%), with the average annual mileage for this group being 34,363.

2. *Fairly Heavy Vehicle-Miles Households.*—The households in this group represent 19.1% of the sample and drive an average of 21,482 miles annually. This group has an income of $12,500 and under and lives in rural areas. The AID program further split this group into those who rate the quality of roads and highways as poor to intermediate (10.6%) versus those who rate roads and highways good (8.5%), with the average annual mileage for those rating it poorly being 24,315. Thus, heavier users of roads and highways among this group give these facilities a poorer rating than those who use them less.

3. *Average Vehicle-Miles Households, Higher Income Group.*—Of the sample households, 7% had average annual incomes above $12,500 and less than 25% of their vehicle-miles accounted for by work trips. For this group, the average mileage was 18,893, fairly close to the sample average of 18,250.

4. *Average Vehicle-Miles Households, Lower Income Group.*—Of the sample, 39.8% had the following four characteristics in common: income under $12,500; live in non-rural areas; occupation other than operative and service; and age 50 or younger. This group annually



X̄ = Average annual automobile-miles for vehicles in household.

Figure B-17. Profiles by household vehicle-miles (CRS sample, Table B-66, Q. 22-25).

traveled an average of 17,048 vehicle-miles, somewhat lower than the sample average. Vehicle-miles increased to 18,301 for those who said changes in their life patterns had no effect on public transportation use. Thus, people within this group who do not consider public transportation as an alternative transportation mode, given environmental changes, logically drive more.

5. *Fairly Light Vehicle-Miles Households.*—This group represents 9.1% of the sample and drives an average of only 11,059 vehicle-miles yearly. This group was identical to the previous profile except that it was significantly older; people in this subsample were over 50 years old.

6. *Lightest Vehicle-Miles Household.*—This group represents 12.1% of the sample and drives an average of only 10,130 vehicle-miles annually, compared to the sample average of 18,250. T his group also had incomes under $12,500 and lived in non-rural areas, but had an operative or service category occupation.

These six profiles provide fairly sharp and homogeneous definitions of individual characteristics by vehicle-miles. On the extremes, the heavy and light vehicle-miles households represented approximately equal proportions of the sample and were most sharply divided by vehicle-miles, the heaviest group driving almost three times as many miles, on the average, as the lightest. The demographic characteristics of age, income, urban-rural location, and occupation were dominant in explaining transportation behavior by vehicle-miles. The only important attitudinal variable to appear in the profiles was attitude towards the quality of roads and highways. Here an inverse relationship appeared. The more people use roads and highways, the more critical they tend to be of these facilities.

Because demographic rather than attitudinal variables were related to vehicles-miles driven, it suggests that automobile use is tied more closely to environmental needs and circumstances than to the perceptions of users regarding the automobile.

Relationship of Individual Variables to Vehicle-Miles Driven

The AID program first split the sample by income in examining vehicle-miles. This means that income was most significant in defining the heavy and light vehicle-miles household. Other variables of almost equal significance may exist, yet may never "come in first" in defining the profile. The program permits an examination of the importance of all variables, even those not included in the profile definitions in Figure B-17. Table B-66 presents these findings for both the Chilton and National Analysts samples. Each variable is split in the optimal fashion defined by the AID program in explaining variance in vehicle-miles driven. The first column presents the average vehicle-miles driven for each group in the National Analysts sample. The second column presents the between sum of squares (BSS) statistic for each variable. This is a ratio of the between sum of squares for the particular subgroup defined by the variable to the total sum of squares (TSS) for the subgroup (BSS_i/TSS_i). The higher the BSS statistic the more significant the variable. Any BSS statistic below 0.010 is not considered significant; between 0.010 and 0.019 is marginally significant; and 0.020 and

greater is significant. The variable with the highest BSS is the one chosen for splitting by the AID program, inasmuch as it is this variable that provides the greatest discrimination between groups by the dependent variables. The third and fourth columns in Table B-66 are the equivalent data for the Chilton sample.

Table B-66 (Chilton sample) demonstrates that income was the most important variable in discriminating by vehicle-miles driven as determined by the magnitude of the BSS statistic. In households with incomes over $12,500 people traveled 50% more vehicle-miles than those in households with incomes under $12,500.

Distance to work was the second most important discriminator. People living more than 10 miles from their place of work traveled about one-third more vehicle-miles than those located less than 10 miles away. Occupation was of equal importance; people in service and operative occupations traveled about 30% less than persons in other occupations. This was true primarily for the lower income group.

Additional variables of importance in discriminating between heavy versus light vehicle-miles households were:

1. Population density: people in rural areas traveled significantly more than those in nonrural areas.
2. Education: people who completed high school or better traveled significantly more than those with a less than high school education.
3. Those who described changes in their life situation as affecting changes in automobile use traveled significantly more vehicle-miles. This is true because such changes generally meant increased use.
4. Among people whose life changes affected their use of public transportation, those with automobile changes traveled more. This result appeared in the Chilton sample only.
5. Those who had favorable attitudes towards local automobile use as compared to long-distance automobile use traveled more vehicle-miles on the average. This finding was significant for the Chilton sample only.
6. Those who took more trips on weekdays and weekends traveled more vehicle-miles. This demonstrates that the heavy user of roads and highways is also the frequent user.
7. Those with a greater proportion of total vehicle-miles for work purposes traveled more.
8. Those with a smaller proportion of vehicle-miles for social purposes traveled more miles. This finding was marginally significant and was true for the National Analysts sample only.
9. Those who traveled less on public transportation traveled more vehicle-miles.
10. People 50 years and under traveled somewhat more on the average than those over 50.
11. People dissatisfied with public transportation as compared to an ideal mode traveled somewhat more vehicle-miles than respondents who were satisfied. This finding was marginally significant and was true for the National Analysts sample only.
12. When the automobile accounted for 60% or more of annual mileage, people traveled somewhat more vehicle-miles. Because this finding was marginally significant, one would have expected the spread between the two groups to be greater. Apparently, a significant proportion of the sample must be heavy users of roads and highways, yet frequent users of other modes as well.

Profiles by Value Placed on Public Transportation

Figure B-18 shows the results of the AID analysis for the Chilton sample by attitudes towards public transportation (Q. 9). The higher the summated attitudinal score, the more favorable is the attitude towards public transportation.

The program examined the 36 variables and selected attitudes towards spending on public transportation as most important. The average attitudinal score is 25.64. Among the 48% of the sample that feel more money should be spent on public transportation, the average score increases to 28.33. Significantly more favorable attitudes are expressed towards public transportation among those who feel more money should be allocated to this mode. The following six profiles may be delineated from Figure B-18:

1. *Place Highest Value on Public Transportation, Spend More.*—This group represented 19.1% of the sample, and had an attitudinal score one-fourth higher than the sample average. This group favored spending more on public transportation and lived in metropolitan areas of 1 million and over.

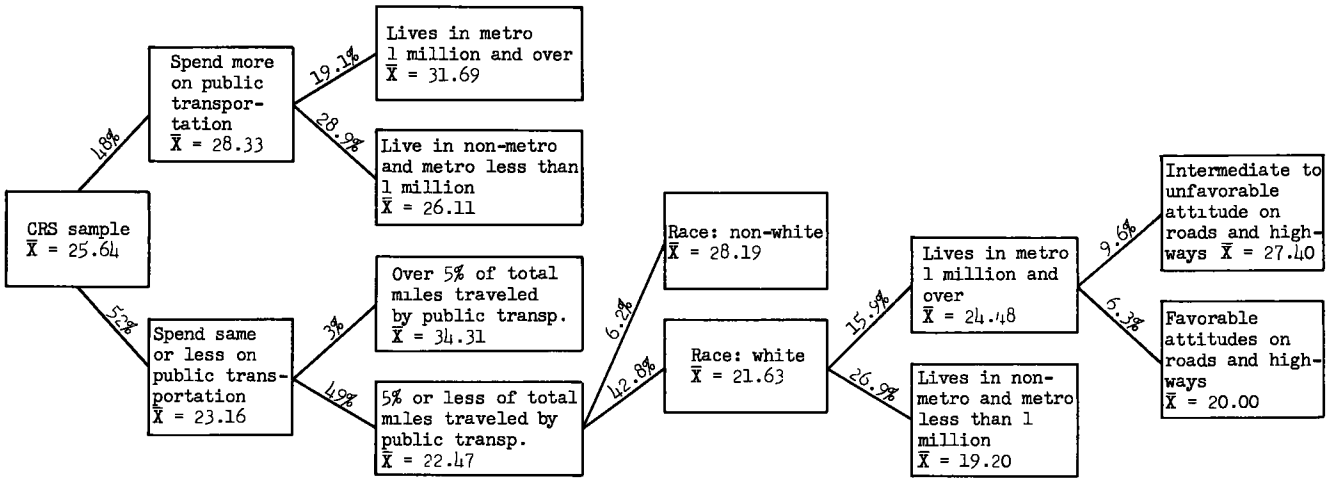
2. *Place a High Value on Public Transportation, Spend Same or Less.*—A small proportion of the sample (3%) felt that the same amount of money or less should be spent on public transportation and traveled frequently on this mode. The average attitudinal score for this group was 34.31, demonstrating the close relationship between positive attitudes and frequency of use for this mode.

3. *Moderately Favorable Towards Public Transportation, Spend Same or Less.*—This group, represented by 6.2% of the sample, with an average score of 28.19, felt that the same or less money should be spent on public transportation, and were non-white. In addition, public transportation represented 5% or less of their total mileage.

4. *Average Attitude, Spend More.*—Of the sample, 28.9% felt more money should be allocated to public transportation and lived in non-metropolitan areas and metropolitan areas of less than 1 million. The average attitude score for this group was 26.11, close to the sample average of 25.64.

5. *Average Attitude, Spend Less.*—A subsegment of the "spend less" group, representing 15.9% of the sample, had public transportation represent 5% or less of their total mileage, were white, and lived in metropolitan areas of 1 million and over. Their average attitudinal score was 24.48, close to the sample average. If this group is further split into those people who were noncommittal or critical of highway facilities and planning (9.6%) versus those who were favorable (6.3%), the former group is significantly more favorable to public transportation. Thus, an inverse relationship exists for this group between attitudes towards public transportation and roads and highways.

6. *Place Lowest Value on Public Transportation.*—The group most critical of public transportation (26.9%) had



X̄ = Mean attitudinal scores; higher score indicates greater value placed on public transportation; individual scores range from 0 to 50.

Figure B-18. Profiles by value placed on public transportation—attitude factor (CRS sample, Table B-67, Q. 9).

the identical profile to Group 5, except that they lived in non-metropolitan areas and metropolitan areas of less than 1 million. Their average attitude score was only 19.20—significantly lower than the sample average.

Attitudinal and demographic variables were equally important in developing these profiles. Most significant among the attitudinal dimensions were opinions of allocations to public transportation, and attitudes towards roads and highways as they affected the value placed on public transportation. The dominant demographic factors were population density of place of residence, and, to a lesser extent, race.

Relationship of Variables to Value Placed on Public Transportation

As noted, the AID program permits examination of the relationship of all variables to the dependent variable, not just the variables included in the profile. Table B-67 gives the average attitudinal scores for the subgroups represented by each variable. Data are given for both the Chilton and National Analysts samples. As before, the magnitude of the BSS statistic is a measure of the importance of the variable in discriminating between those with favorable and unfavorable attitudes towards public transportation.

Table B-67 demonstrates that attitudes towards allocations was the most important variable in discriminating by attitudes towards public transportation. Those who wanted more money allocated to public transportation had an average attitude score approximately one-fourth higher than those who wanted the same level of expenditures or less. Population density was almost as important. People living in metropolitan areas of 1 million and over had significantly more favorable attitudes towards public transportation.

In addition to the foregoing variables, individuals placing a higher value on public transportation (Table B-67):

1. Traveled on public transportation facilities for 5% or more of their total mileage. This demonstrates the direct relationship between attitudes towards public transportation and heavy of use of such facilities.
2. Lived in the East.
3. Were not as satisfied with the transportation attributes of the automobile.
4. Used the automobile less frequently for work trips. This relationship was significant in the Chilton sample only.
5. Were in professional, managerial, and clerical occupations.
6. Had negative attitudes towards highway planning and planners.
7. Had positive perceptions of public transportation as a mode compared to the ideal mode of transportation. This was significant for the Chilton sample only.
8. Viewed the automobile for business use more favorably than for social use. This was marginally significant for the Chilton sample only.
9. Had a lower proportion of total mileage represented by automobile travel and a higher proportion by public transportation than those less favorable to public transportation.
10. Had an annual average income of $10,000 and over.
11. Were inclined to allocate more money to building road and highway facilities compared to those placing a lower value on public transportation. This was significant for the National Analysts sample only.
12. Rated the automobile unfavorably as a mode compared to the ideal mode of transportation. This was marginally significant for the National Analysts sample only.
13. Were more likely to be non-white. Whites in general were less favorable to public transportation. This was marginally significant for the Chilton sample only.

There were also a few basic discriminators within the "spend more" and "spend less" groups. Among those who wished to spend more on public transportation, satisfaction with public transportation attributes tended to be a more

TABLE B-67

ANALYSIS BY ATTITUDE TOWARDS PUBLIC TRANSPORTATION (QUESTION 9)

CHARACTERISTIC	NATIONAL ANALYSTS MEAN ATTITUDE SCORE	NATIONAL ANALYSTS BSS/TSS	CHILTON RESEARCH SERVICES MEAN ATTITUDE SCORE	CHILTON RESEARCH SERVICES BSS/TSS
Age		—[a]		0.025
30 and under	—		23.58	
Over 30	—		26.73	
Region		0.017		0.034
East	27.03		28.08	
Rest of U. S.	24.16		24.30	
Population density		0.041		0.066
1 million and over	28.62		28.73	
Under 1 million	24.08		23.51	
Education		0.041		0.012
Post-graduate	27.92[b]		27.46	
College and under	23.79[c]		25.41	
Occupation		0.021		0.019
Professional, managerial, clerical	25.61		26.62	
Others	23.76		23.80	
Quality of roads and highways		—[a]		0.017
Positive	—		26.56	
Neutral and negative	—		23.91	
Spend on public transportation		0.035		0.067
Spend more	26.74		28.33	
Spend same or less	23.63		23.16	
Attitude towards social role of automobile		0.018		0.017
Negative and neutral	27.42		26.86	
Positive	23.55		24.28	
Attitude towards highway planning and planners		0.018		0.026
Negative and neutral	25.92		26.92	
Positive	23.14		23.64	
Attitude towards highway building and improvements		0.020		—[a]
Spend much more	27.54		—	
Spend same or less	24.11		—	
Automobile score vs ideal mode		0.015		—[a]
Negative and intermediate	27.42		—	
Positive	24.40		—	
Public transportation score vs ideal mode		—[a]		0.028
High	—		27.25	
Low	—		23.91	
Automobile for business and social use		—[a]		0.019
Business more than social	—		28.10	
Social more than business	—		24.83	
Local vs long-distance automobile use		0.015		—[a]
Local better	26.29		—	
Long-distance better	24.11		—	
Satisfaction with automobile		0.012		0.030
Neutral	26.12		27.84	
High	24.79		24.92	
Satisfaction with public transportation		—[a]		0.012
Low and neutral	—		25.94	
High	—		22.46	
Percent vehicle-miles to work		—[a]		0.030
40% and under	—		27.66	
Over 40%	—		24.42	
Percent vehicle-miles for social		—[a]		0.014
Over 15%	—		27.40	
15% and under	—		24.84	
Percent total vehicle-miles for automobile		0.017		0.025
80% and under	27.71		28.78	
Over 80%	24.29		24.92	
Percent total vehicle-miles for pub. transp.		0.024		0.050
Over 5%	30.53		33.04	
5% and under	24.48		24.96	
Income		0.048		0.025
$10,000 and over	26.26[d]		27.41	
Under $10,000	24.06[e]		24.50	
Race		—[a]		0.018
Non-white	—		29.03	
White	—		25.11	

[a] BSS/TSS under 0.010 and not significant. [b] College and over. [c] Less than college. [d] $6,000 and over. [e] Under $6,000.

significant discriminator than for the sample as a whole. That is, a willingness to spend more on public transportation was a prerequisite for a favorable rating on specific public transportation attributes (Q. 18), if this was to have an effect on perceptions of public transportation in general.

Among those who wanted to spend the same or less on public transportation, race was a more significant discriminator. Given the fact an individual was unwilling to allocate funds to public transportation, attitudes were more likely to be favorable towards the mode if this individual was non-white.

The foregoing relationships demonstrate the close interactions between the transportation attitude dimensions; attitudes towards public transportation conditioned and were conditioned by attitudes towards roads and highways (Q. 11), towards allocations to public transportation (Q. 8), towards specific transportation attributes of the automobile and public transportation (Q. 18), towards the automobile and public transportation as modes compared to an ideal, and towards automobile and public transportation use for specific occasions (Q. 13-17). This clearly demonstrates the multi-dimensionality of transportation attitudes. Perceptions of public transportation facilities are conditioned by perceptions of roads and highways. Attitudes towards these modes are influenced by transportation experiences.

Comparison of Chilton and National Analysts Samples For Two AID Runs

Comparison of mean scores for the various subgroups formed by AID analysis show that, in most cases, the results were closely comparable for both samples. Mean scores for average vehicle-miles driven (Table B-66) were particularly close. The BSS scores for the two samples are not comparable because the sample sizes of the two AID runs were not the same. (A number of people who did not answer certain critical variables had to be dropped from AID analysis because the program interprets "no answer" as a legitimate category to be split. The resulting Chilton sample was larger than the resulting National Analysts sample.) In 5 out of 25 comparative cases, the sample means differed by more than 1,000 miles, and in only one case did they differ by more than 2,000 miles.

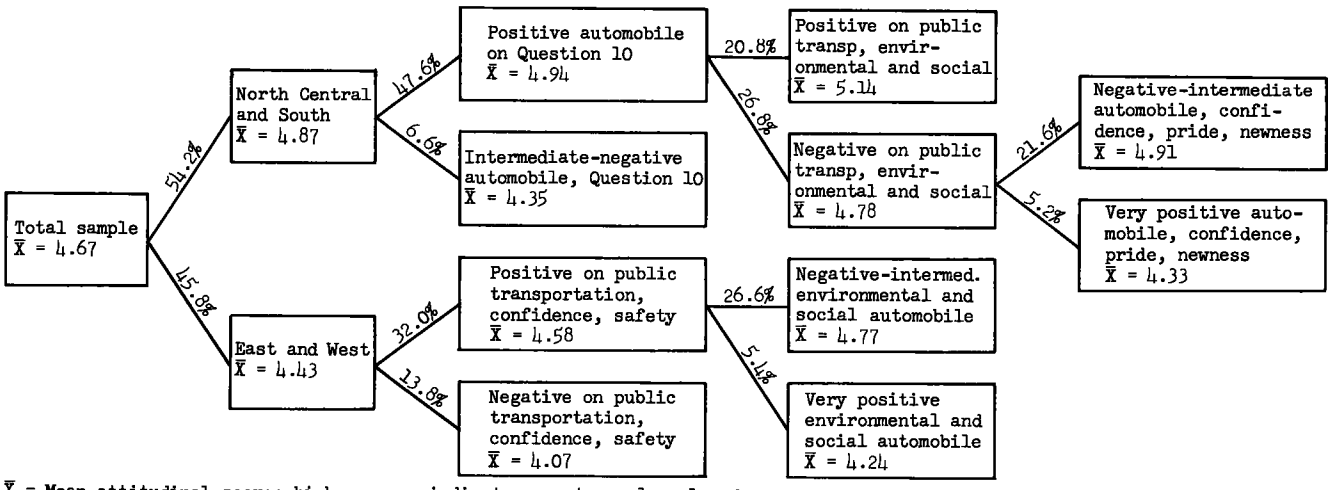
The results in Table B-67 for value placed on public transportation were also close. In only 2 out of 22 comparative cases did the attitudinal scores differ by more than 10%. Although judgments as to sample comparability from the AID analysis are relative, they do seem to confirm the earlier conclusion that both samples are representative of the same population.

PROFILES BY ATTITUDES TOWARDS HIGHWAY PLANNING AND PLANNERS

Attitudes towards highway planning and planners profiles (Q. 11) are shown in Figure B-19 for the total sample. The attitudinal scores representing summated ratings for each person based on the average rating for each of the nine items in Question 11, were distributed into six categories from highly unfavorable (1) to highly favorable (6). These categories were used in the AID run.

Region was most important in discriminating by attitudes towards highway planning. People in the North Central and South had significantly more favorable attitudes towards highway planning and planners compared to those in the East and West. The following profiles were derived from Figure B-19:

1. *Most Favorable Attitudes Towards Highway Planning.*—About one-fifth of the sample lived in the North Central and South, held positive attitudes towards the social role of the automobile (Q. 10) and also rated public transportation positively on the environmental and social facilities provided (see Factor 5). For this group, a favorable attitude towards highway planning was associated



X̄ = Mean attitudinal score; higher score indicates greater value placed on public transportation; individual scores range from 1 to 6.

Figure B-19. Profile by attitudes towards highway planning and planners (Table B-68, Q. 11).

with a favorable attitude towards needs satisfied by public transportation.

2. *Moderately Favorable Attitudes, North Central and South.*—Of the sample, 26.8% lived in the North Central or South and had positive attitudes towards the automobile's social role, yet held negative attitudes towards the ability of public transportation to satisfy social and environmental needs. This group's average attitudinal score of 4.78 was only slightly higher than the sample average of 4.67.

3. *Moderately Favorable Attitudes, East and West.*—A significant proportion of people living in Eastern and Western states held more positive attitudes towards the confidence and safety features provided by public transportation and intermediate to negative attitudes towards the convenience and social needs satisfied by the automobile. The average attitudinal score for this group (26.6% of the sample) was 4.77, again close to the sample average.

4. *Unfavorable to Highway Planning, North Central and South.*—About 7% of the sample lived in the North Central and South and had intermediate to negative attitudes towards the social role of the automobile. The average score for this group was 4.35, significantly lower than the sample average.

5. *Most Unfavorable to Highway Planning.*—About 14% of the sample lived in the East and West and held unfavorable attitudes towards the confidence and safety afforded by public transportation. The average attitudinal score for this group was 4.07, significantly lower than the sample average of 4.67.

The AID analysis clearly demonstrates that attitudes towards highway planning are related to perceptions of the degree to which the automobile and public transportation satisfy transportation and social needs (Q. 18). Yet, once again, the relationship is complementary rather than competitive. Positive attitudes towards highway planning are more likely to evoke positive rather than negative attitudes towards the need-satisfaction dimensions for public transportation.

Table B-68 presents the average attitudinal score by each of the significant variables. Each variable is divided into two subgroups at the point where the greatest discrimination is achieved between those people who have favorable and unfavorable attitudes towards highway planning.

This table shows that, based on the magnitude of the between sum of squares (BSS) statistic, region was the most important variable in discriminating between people holding favorable and unfavorable attitudes. As previously noted, those in the North Central and South held significantly more favorable attitudes. Yet the BSS score also demonstrates that attitudes towards the social role of the automobile was almost as important a discriminator: people who reacted favorably to the automobile in Question 10 were more likely to rate highway planning positively. In addition, people holding more favorable attitudes towards highway planning and planners:

1. Lived outside large metropolitan areas.
2. Rated the automobile higher as a mode of transportation (Q. 13-17).
3. Had lower incomes and were somewhat less educated.
4. Were satisfied with the relaxation, scenery, and lack of traffic afforded by the automobile (Factor 3).
5. Were also satisfied with the environmental and social facilities provided by public transportation (Factor 5).

Among people living in the North Central and South (where attitudes were more favorable to begin with) it was found that the additional characteristic of fewer vehicle-miles driven further increases the chance of a favorable attitude towards highway planning.

Among residents in the East and West, the following characteristics which did not appear for the total sample tended to identify those favorable to highway planning:

1. A larger proportion of vehicle-miles for work purposes.
2. Satisfaction with the confidence and safety provided by public transportation.
3. Satisfaction with the confidence, pride, and newness afforded by the automobile.

Profiles by Attitudes Towards Allocations for Maintenance and Building of Highways (Factor 1)

One of the most important objectives of the analysis was the determination of people's characteristics by their attitudes towards spending for transportation facilities. The last four AID runs all relate to spending criteria. The first of these is based on attitudes towards spending more for roads and highways in general, and for improved maintenance and more building in particular (Q. 8 and 12). Ratings for increased expenditures for these three items were all closely interrelated and formed the first factor described earlier under "Dimensions of Transportation Attitudes, Attitudes Towards Increased Expenditures for Specific Highway and Public Transportation Facilities." Using the separate attitudinal scores for each of these three items would have required three separate AID analyses. This would have been wasteful, because the items were interrelated. Therefore, it made sense to use the factor scores as input into the AID program. These scores would represent the total attitudinal dimension represented by the three items for any given expenditure.*

Figure B-20 shows the tree diagram yielding the profiles of individual types by attitudes towards increased expenditures for road and highway building and maintenance. The scores listed for each subgroup are the average factor scores for that subgroup. These scores vary from 0 to 2 with a mean of 1.

The characteristic that most sharply divided the sample was region. People in the South were much more favorable towards increased expenditures for roads and highways. Their average spending score was 1.25 compared to 0.92 for the rest of the sample. The following major profiles were developed:

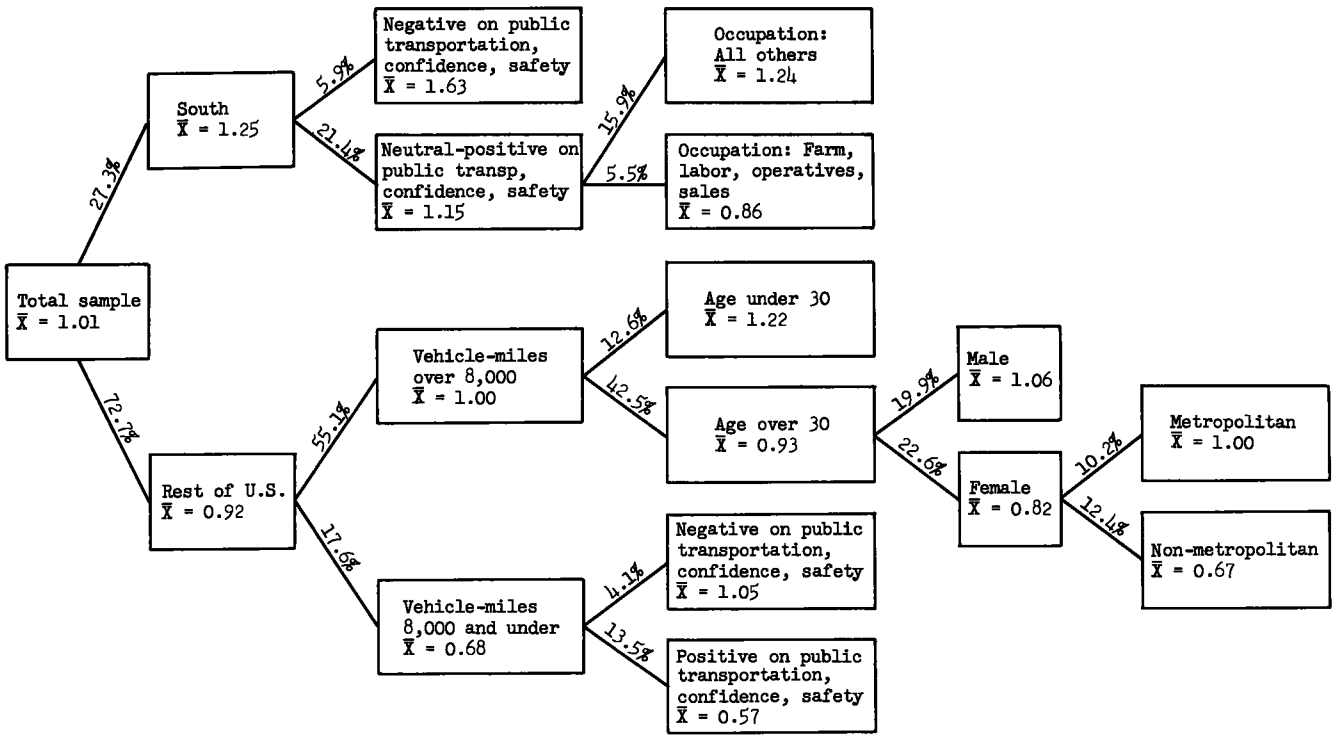
1. *Most Favorable to Increased Spending for Roads and Highways.*—The 6% of the sample living in the South and demonstrating an unfavorable attitude towards the ability of public transportation to meet confidence and safety needs were those most favorable to increased spend-

* Standard deviations are not included in Figures B-17 through B-23.

TABLE B-68

ANALYSIS BY ATTITUDE TOWARDS HIGHWAY PLANNING AND HIGHWAY PLANNERS (QUESTION 11)

CHARACTERISTIC	MEAN SCORE	NO. IN SAMPLE	BSS/TSS
Total sample:			
Region			0.024
South and North Central	4.87	961	
East and West	4.43	813	
Population density			0.011
Metrop., 1 million and over	4.44	520	
Remainder of U.S.	4.76	1,254	
Education			0.007
Less than college	4.73	1,406	
College and over	4.44	368	
Attitude towards social role of automobile			0.023
Negative and neutral	4.15	268	
Positive	4.75	1,506	
Attitude towards automobile as a mode of transportation for specific occasions			0.009
Negative	4.23	116	
Positive	4.70	1,658	
Income			0.009
Under $10,000	4.75	1,257	
$10,000 and over	4.46	517	
Satisfaction with relaxation afforded by automobile			0.013
Very dissatisfied	4.34	346	
Other	4.74	1,428	
Satisfaction with environmental and social facilities provided by pub. transp.			0.009
Satisfied	4.82	724	
Neutral and dissatisfied	4.56	1,050	
North Central and South:			
Region			0.014
North Central	5.01	484	
South	4.71	477	
Population density			0.008
Metropolitan areas	4.74	423	
Non-metropolitan areas	4.97	538	
Occupation			0.012
Professional, manager, sales, and craftsman	4.72	612	
Others	5.06	349	
Attitudes towards social role of automobile			0.022
Negative	4.35	117	
Positive	4.94	844	
Attitudes towards automobile as mode of transportation for specific occasion			0.012
Negative	4.71	437	
Positive	4.99	524	
Satisfaction with relaxation afforded by automobile			0.015
Very dissatisfied	4.52	168	
Others	4.94	793	
Satisfaction with environmental and social facilities provided by public transportation			0.018
Dissatisfied	5.07	410	
Neutral and satisfied	4.72	551	
Total vehicle-miles			0.015
Under 18,000	5.01	519	
18,000 and over	4.70	442	
East and West:			
Attitude towards social role of automobile			0.022
Negative	3.55	50	
Positive	4.49	763	
Number of trips, weekdays			0.011
11 or less	4.48	747	
More than 11	3.91	66	
Percent travel for work			0.015
0-5%	3.99	119	
6% and over	4.51	694	
Satisfaction with confidence and safety of pub. transp.			0.025
Dissatisfied	4.07	244	
Neutral and satisfied	4.59	569	
Satisfaction with confidence and pride in automobile			0.011
Dissatisfied to moderately satisfied	4.35	638	
Very satisfied	4.74	175	



X̄ = Mean attitudinal score; higher score indicates greater value placed on public transportation; individual scores range from 0 to 2.

Figure B-20. Profiles by attitudes towards increased spending for maintenance and building of roads and highways—Factor 1 (Table B-69, Q. 8 and 12).

ing for roads and highways. Their attitudinal score was 1.63, compared to the sample average of 1.01. Apparently these people value highway facilities at the expense of public transportation.

2. *Somewhat Favorable to Increased Spending, South.*—Among the 21.4% of the sample living in the South and holding neutral to positive attitudes towards the confidence-safety dimension for public transportation the spending score dropped to 1.15, still somewhat above the sample average.

3. *Somewhat Favorable to Increased Spending, Rest of U.S.*—People living in states outside the South, driving more than 8,000 miles annually, and under 30 years old constituted another homogeneous profile group in the intermediate attitudinal category. These persons, with an attitudinal score of 1.22, made up 12.6% of the sample.

4. *Somewhat Unfavorable to Increased Spending.*—People outside the South, driving more than 8,000 miles annually, and over 30 years old constituted 42.5% of the sample. The spending score for this group was 0.93, close to the sample average of 1.01.

5. *Most Unfavorable to Increased Spending.*—People least likely to approve increased expenditures for roads and highways lived outside the South, drove less than 8,000 miles annually, and held positive attitudes towards the confidence and safety provided by public transportation. This subgroup, representing 13.6% of the sample, had a spending score of 0.57, almost one-half lower than the sample average.

In addition, people more favorable towards an increase in spending were more likely to be (Table B-69):

1. Males.
2. Live in rural areas.
3. Live farther from work.
4. Travel more by automobile compared to other modes.
5. Place a somewhat lower value on public transportation (Q. 9).
6. Express dissatisfaction with the confidence and safety provided by public transportation.
7. Travel more vehicle-miles annually.

Occupation tended to discrimate more within the South compared to the rest of the sample. People in other than operative or labor occupations were more likely to favor increased expenditures for roads and highways. In addition, Southerners with more negative attitudes towards highway planning and positive attitudes towards the automobile as a mode of travel had higher spending scores. Southerners who were dissatisfied with the environmental and social attributes of public transportation also tended to allocate more to roads and highways.

Whereas demographic variables are dominant in discriminating between attitudes towards spending outside the South, Southerners' attitudes towards spedning are more closely related to perceptions of other modes and facilities. Demographics are more closely related to attitudes towards spending among those who are less predisposed to spend for

TABLE B-69

ANALYSIS BY ATTITUDES TOWARDS ALLOCATIONS FOR MAINTENANCE AND BUILDING OF ROADS AND HIGHWAYS (QUESTION 12)

CHARACTERISTIC	MEAN SCORE	NO. IN SAMPLE	BSS/TSS
Total sample:			
Sex			0.012
Male	1.14	768	
Female	0.92	1,006	
Region			0.022
South	1.25	484	
Other	0.93	1,290	
Population density			0.018
Rural	1.24	439	
Other	0.93	1,335	
Distance to work			0.007
10 miles or less	0.96	1,386	
More than 10 miles	1.18	388	
Percent travel by automobile			0.010
80% and under	0.83	406	
Over 80%	1.08	1,281	
Satisfaction with confidence and safety of pub. transp.			0.013
Very dissatisfied	1.25	327	
Other	0.96	1,447	
Value placed on public transportation			0.008
Negative	1.21	295	
Other	0.97	1,479	
Total vehicle-miles			0.009
Under 12,000	0.90	713	
12,000 and over	1.09	1,061	
South:			
Population density			0.032
Rest of U.S.	1.07	302	
Rural	1.49	182	
Occupation			0.014
Sales, operators, laborers, farmers	1.00	398	
Other	1.31	86	
Attitudes towards highway planning and highway planners			0.015
Negative	1.48	108	
Positive	1.19	376	
Attitudes towards automobile as mode of transportation for specific occasions			0.010
Negative	1.14	217	
Positive	1.34	267	
Attitudes towards subway and local train travel			0.010
Very positive	1.07	123	
Other	1.32	361	
Satisfaction with confidence and safety of pub. transp.			0.039
Very dissatisfied	1.63	105	
Other	1.15	379	
Satisfaction with convenience and social needs derived from automobile			0.010
Dissatisfied	1.11	154	
Neutral and satisfied	1.32	330	
Satisfaction with environmental and social facilities provided by pub. transp.			0.015
Dissatisfied	1.45	346	
Other	1.18	138	
Value placed on public transportation			0.010
Negative	1.45	100	
Positive	1.20	384	
Rest of U.S.:			
Sex			0.014
Male	1.05	557	
Female	0.81	733	
Age			0.012
22-30 years	1.13	265	
18-21; 31 and over	0.86	1,025	
Number of years as driver			0.008
4 or less	0.79	402	
More than 4	0.98	780	
Population density			0.010
Metropolitan area	0.84	779	
Non-metropolitan area	1.04	511	
Occupation			0.010
Manager, sales, operators, laborers	1.07	418	
Professionals, farmers, clericals, and service	0.85	872	
Distance to work			0.012
10 Miles and under	0.87	1,017	
Over 10 miles	1.13	273	
Percent travel by automobile			0.010
80% and under	0.76	330	
Over 80%	0.99	893	
Total vehicle-miles			0.019
Under 8,000	0.69	313	
8,000 and over	1.00	977	

roads and highways. This suggests that the environmental condition of the individual as defined by non-metropolitan locations, specific occupations, and distance from work may create restraints on the use of highway facilities and thus color perceptions.

Profiles by Attitudes Towards Increased Spending for Public Transportation and Rapid Transit (Factor 4)

Profiles of individuals by attitudes towards increased spending for public transportation in general and rapid transit lines in particular (Q. 8 and 12) were also determined. These two items formed an attitudinal factor, and once again the AID program was run using factor scores rather than the original scale scores.

Figure B-21 shows the profile for this attitude factor. The value placed on public transportation (Q. 9) was the most important discriminator in distinguishing attitudes towards spending. The average spending score among the 83% of the sample which placed a high to intermediate value on public transportation was 1.14. In contrast, among the 17% who placed a low value on public transportation the spending score was only 0.44, less than one-half the sample average of 1.02. The only other important variable that defines individuals in Figure B-21 is location of residence. People in non-rural areas, particularly those in metropolitan locations, are much more willing to increase spending for public transportation.

The following profiles may be defined from the tree diagram:

1. *Most Favorable to Increased Spending for Public Transportation.*—Of the sample, 11.1% placed a high value on public transportation and lived in large metropolitan or urban non-metropolitan locations. The spending score for these people was about 70% higher than the sample average.

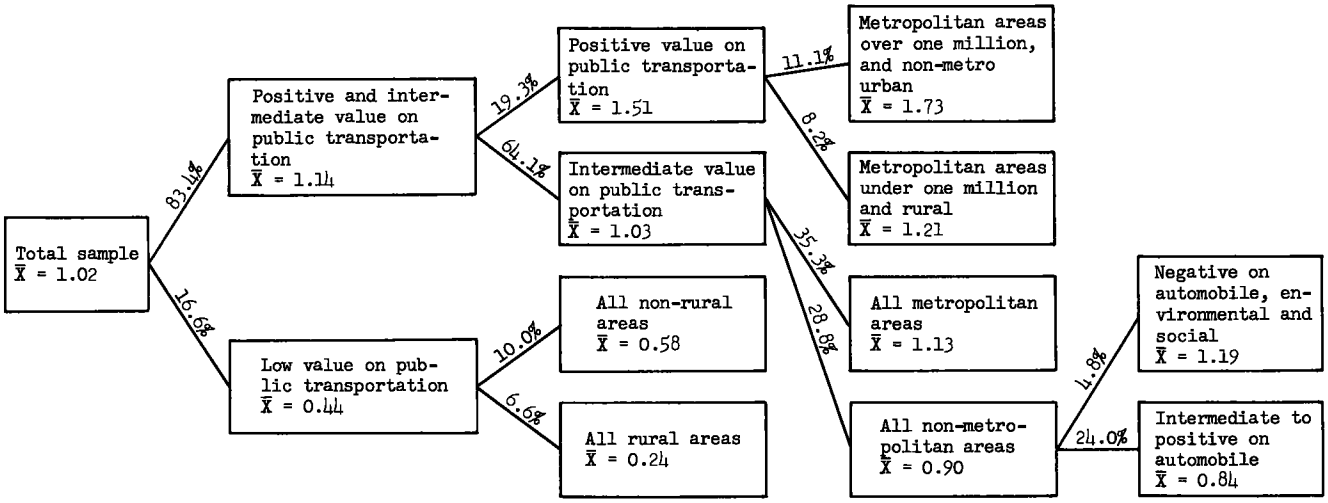
2. *Somewhat Favorable to Increased Spending for Public Transportation.*—More than one-third of the sample placed an intermediate value on public transportation and lived in metropolitan areas. The spending score for this group was 1.13, somewhat higher than the sample average.

3. *Somewhat Unfavorable to Increased Spending for Public Transportation.*—People placing an intermediate value on public transportation, living in non-metropolitan areas, had a spending score somewhat below average (0.90). Among this group (accounting for 28.8% of the sample) a positive attitude towards the relaxation, scenery, and lack of traffic afforded by the automobile further reduced the spending score to 0.84. A negative attitude towards increased spending for public transportation does seem to be marginally associated with a positive attitude towards the automobile for this subgroup.

4. *Most Unfavorable to Increased Spending for Public Transportation.*—Among the 16.6% of the sample placing a low value on public transportation, the spending score was only 0.44. For the people within this group living in non-rural areas, the spending score increased slightly to 0.58. Yet among individuals placing a low value on public transportation living in rural areas (6.6% of the sample), the spending score was 0.24, a score which is in marked contrast to the sample average of 1.02.

According to Table B-70, people favoring an increase in spending for public transportation and rapid transit were also more likely to:

1. Live in the East and West.
2. Live in non-rural areas.
3. Have somewhat less favorable attitudes towards highway planning.
4. Have somewhat less favorable attitudes towards the social role of the automobile.
5. Travel less by automobile.



X̄ = Mean attitudinal score; higher score indicates greater value placed on public transportation; individual scores range from 0 to 2.

Figure B-21. Profiles by attitudes towards increased spending for public transportation and rapid transit lines—Factor 4 (Table B-70, Q. 8 and 12).

TABLE B-70

ANALYSIS BY ATTITUDES TOWARDS INCREASED SPENDING FOR PUBLIC TRANSPORTATION AND RAPID TRANSIT LINES, FACTOR 4 (QUESTIONS 8 AND 12)

CHARACTERISTIC	MEAN SCORE	NO. IN SAMPLE	BSS/TSS
Total sample:			
Region			0.023
East and West	1.19	813	
North Central and South	0.88	961	
Population density			0.030
Rural	0.72	439	
Other	1.12	1,335	
Attitudes towards highway planning and highway planners			0.008
Negative and neutral	1.14	579	
Positive	0.96	1,195	
Attitudes towards social role of automobile			0.013
Negative and neutral	1.29	268	
Positive	0.97	1,506	
Percent travel by automobile			0.025
80% and under	1.31	406	
Over 80%	0.93	1,281	
Percent travel by public transportation			0.010
5% and under	1.97	1,460	
Over 5%	1.33	228	
Satisfaction with relaxation afforded by automobile			0.012
Satisfied	1.17	638	
Neutral to dissatisfied	0.94	1,136	
Value placed on public transportation			0.068
Very negative	0.44	295	
Other	1.14	1,479	
Positive and neutral attitudes towards public transportation (Question 9):			
Region			0.018
East and West	1.27	714	
North Central and South	1.02	765	
Population density			0.024
Metropolitan 1 million and over	1.35	479	
Other	1.03	1,000	
Attitudes towards highway planning and planners			0.009
Negative and neutral	1.26	493	
Positive	1.07	986	
Attitudes towards the social role of the automobile			0.010
Negative and neutral	1.36	248	
Positive	1.09	1,231	
Percent travel by automobile			0.018
80% and under	1.36	375	
Over 80%	1.06	1,025	
Satisfaction with relaxation afforded by automobile			0.010
Satisfied	1.26	551	
Neutral and dissatisfied	1.06	928	
Value placed on public transportation			0.044
Intermediate	1.03	1,137	
Positive	1.51	342	
Negative attitudes towards public transportation (Question 9):			
Region			0.012
East and West	0.58	99	
North Central and South	0.36	196	
Population density			0.030
Rural	0.24	117	
Other	0.58	178	
Occupation			0.027
Manager, sales, service	0.67	95	
professionals, farmers, clerical, operatives	0.33	200	
Favorable attitude towards air travel; unfavorable attitude towards long-distance automobile travel			0.012
Negative and neutral	0.35	173	
Positive	0.56	122	
Satisfaction with relaxation afforded by automobile			0.014
Very satisfied	0.70	46	
Other	0.39	249	
Total vehicle-miles			0.015
30,000 and under	0.36	194	
Over 30,000	0.60	101	

6. Travel less by public transportation.
7. Express somewhat more dissatisfaction with the ability of the automobile to afford relaxation, scenery, and no traffic.

A favorable attitude towards increased spending for public transportation does seem somewhat related to an unfavorable attitude towards the automobile. This may appear to contradict earlier findings that the two modes are not viewed as competitive. It is important here to distinguish between attitudes towards allocations for facilities and attitudes towards the facilities themselves. It has been pointed out that attitudes towards the facilities are not competitive; a negative view of public transportation does not necessarily evoke a positive view towards roads and highways, and vice versa. Yet when attitudes towards spending are evaluated, people critical of the automobile are somewhat more likely to favor increased spending for public transportation. To a lesser degree, people critical of public transportation are more likely to favor increased spending for roads and highways. Therefore, although the facilities and modes themselves are not generally viewed as competitive, critical attitudes towards one mode or another are likely to be reflected in attitudes towards spending.

Profiles by Attitudes Towards Increased Spending for Traffic Control and Law Enforcement (Factor 2)

People favoring greater expenditures for better traffic law enforcement (Q. 12) also felt more should be spent on safety features, improved driver training, and improved traffic signals. Factor scores for this attitudinal dimension served as the input into the AID program.

Figure B-22 shows that few demographic or attitudinal variables are related to this dimension. There was some discrimination by region. People in non-Western states were more likely to agree that more should be spent on traffic control and enforcement. The spending score for Westerners was about one-fifth lower than the sample average. In addition, among people in the rest of the United States, non-whites had a higher spending score. Thirteen percent of the sample lived in non-Western states and were non-white. The spending score for this group on enforcement and control was 25% above the sample average.

Other than region, no variable discriminated by attitude towards control and enforcement for the total sample. Among non-Westerners, those who held positive attitudes towards the social role of the automobile (Q. 10) were somewhat more likely to feel that greater expenditures for control and enforcement were required. Among Westerners the following characteristics increased the likelihood that greater expenditures for enforcement and control would be favored:

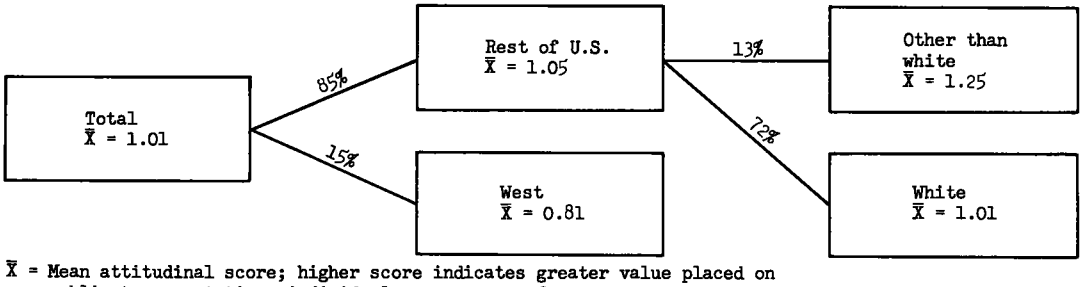
1. A farm, managerial, or service occupation.
2. Metropolitan less than 1 million and non-metropolitan urban location.
3. Lower educational level.
4. A negative attitude towards highway planning.
5. A positive attitude towards the automobile in satisfying the need for relaxation, scenery, and lack of traffic.
6. A positive attitude towards public transportation in satisfying social requirements and protection from the weather.

Profiles by Attitudes Towards Increased Spending for Adjunct Highway Services (Factor 3)

People favoring increased spending for parking facilities at rapid transit stations also favored more downtown parking facilities, added services for users of rural freeways, and greater expenditures on highway beautification (see Factor 3). These items in Question 12 form an attitudinal dimension related to the desire for greater spending on facilities which increase the convenience and enjoyment of highway use.

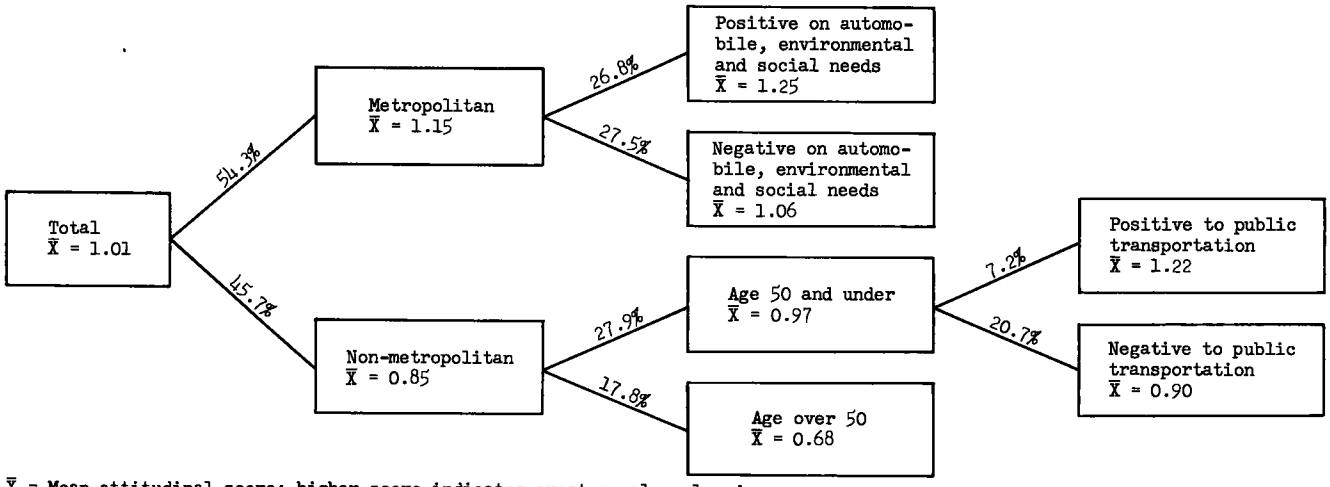
Factor scores on this dimension served as input in creating the profiles in Figure B-23. Attitudes towards greater spending for these services were most sharply differentiated by metropolitan versus non-metropolitan location; residents in metropolitan areas had a spending score 30% higher than those in non-metropolitan locations. The following profiles were developed by the AID program:

1. *Most Favorable to Increased Spending for Adjunct Highway Services, Metropolitan Location.*—Of the sample, 26.8% lived in metropolitan areas and held positive attitudes towards the ability of the automobile to satisfy environmental and social needs (Factor 2). The spending



X̄ = Mean attitudinal score; higher score indicates greater value placed on public transportation; individual scores range from 0 to 2.

Figure B-22. Profiles by attitudes towards increased spending for traffic control and law enforcement—Factor 2 (Table B-71, Q. 12).



X̄ = Mean attitudinal score; higher score indicates greater value placed on public transportation; individual scores range from 0 to 2.

Figure B-23. Profiles by attitudes towards increased spending for adjunct highway services—Factor 3 (Table B-72, Q. 12).

score for these people was 1.25 compared to the sample average of 1.01. Those metropolitan residents appear to be more favorably disposed to the automobile and are more willing to spend money on highway-related facilities.

2. *Most Favorable to Increased Spending for Adjunct Highway Services, Non-Metropolitan Location.*—A small minority of the sample (7.2%) living in non-metropolitan areas held favorable attitudes (a spending score of 1.22) toward increased spending for adjunct services. These were 50 years of age and also held positive attitudes towards public transportation as a mode of transportation (Q. 13-17).

3. *Moderately Favorable to Increased Spending for Adjunct Highway Services.*—The 27.5% of the sample living in metropolitan areas and holding more negative attitudes towards the environmental and social satisfaction derived from the automobile had a spending score of 1.06, very close to the sample average.

4. *Somewhat Unfavorable to Increased Spending for Adjunct Highway Services.*—People living in non-metropolitan areas, under 50 years of age, who held more negative attitudes towards public transportation as a mode of transportation (20.7% of the sample) had an average spending score of 0.90, 10% lower than the total sample.

5. *Most Unfavorable to Increased Spending for Adjunct Highway Services.*—Older non-metropolitan residents (17.8% of the sample) had a spending score of 0.68, one-third lower than the sample average.

In addition to a metropolitan location, Table B-72 demonstrates that a more favorable attitude towards increased spending for these services exists among those under 50 years of age, and those with incomes over $3,000. Among non-metropolitan residents, a better than grade school education is also likely to result in a more favorable attitude towards increased spending for these services.

PREDICTING FUTURE ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS AND PUBLIC TRANSPORTATION

As noted in Chapter Two, another objective of the analysis was to determine whether the attitudinal and demographic variables could be used in predicting future attitudes towards increased spending for roads and highways and public transportation.

A selective number of demographic and attitudinal variables had to be related simultaneously to attitudes towards increased spending for roads and highways, and again for public transportation. To increase the predictive power of the total set of variables in the analysis, factor scores rather than the scale scores were used in many cases. A smaller set of attitudinal variables could then be used, because a factor usually represented several variables. Factor scores were used to represent attitudes towards modes of transportation (Q. 13-17), attitudes towards spending for specific public transportation and road and highway requirements (Q. 8 and 12), and satisfaction with the transportation needs fulfilled by the automobile and public transportation (Q. 18). Attitudes towards highway planning, towards the social role of the automobile, and towards public transportation were included as predictors, as well as the full range of demographic variables in the questionnaire.

The basic requirement in attempting to predict attitudes towards spending is the establishment of a relation between these attitudes and the set of predictors described in the previous paragraph. As attitudes towards spending for roads and highways become more positive, will attitudes towards highway planning also be more positvie? As attitudes become more positive, is age or income likely to increase or decrease? In short, is there a strong relationship between the total set of predictors and these attitudes? If there is, and if a causal relation can be imputed, a functional relationship can be established which can be used

TABLE B-71

ANALYSIS BY ATTITUDES TOWARDS IMPROVING TRAFFIC SIGNALS, ADDING SAFETY FEATURES, IMPROVING TRAINING AND TESTING OF DRIVERS, IMPROVING LAW ENFORCEMENT (QUESTION 12)

CHARACTERISTIC	MEAN SCORE	NO. IN SAMPLE	BSS/TSS
Total sample:			
Region			0.008
West	0.81	266	
Other	1.05	1,508	
Rest of U. S. (Non-Westerners):			
Attitudes towards social role of automobile			0.007
Satisfied and neutral	1.25	220	
Dissatisfied	0.95	1,288	
Race			0.008
White	1.01	1,278	
Non-white	1.25	230	
Westerners:			
Number of years as a driver			0.013
Under 15	0.69	135	
15 and over	0.93	131	
Population density			0.026
Metropolitan less 1 million; non-metropolitan, urban	0.96	145	
metropolitan 1 million and over; rural	0.62	121	
Education			0.030
Grade school or less	1.01	35	
More than grade school	0.76	231	
Occupation			0.042
Farmers, managers, service, and farm labor	1.27	47	
Professionals, clericals, sales, operators, crafts, laborers	0.71	219	
Attitudes towards highway planning and highway planners			0.023
Negative	0.99	41	
Intermediate and positive	0.74	225	
Percent travel for work			0.016
60% and under	0.72	182	
Over 60%	1.00	84	
Income			0.011
Under $10,000	0.89	175	
$10,000 and over	0.66	91	
Attitudes towards long-distance train travel			0.012
Very unfavorable	1.04	50	
Other	0.75	216	
Satisfaction with convenience and social needs derived from automobile			0.014
Very dissatisfied	0.49	37	
Other	0.86	229	
Satisfaction with relaxation afforded by automobile			0.021
Very satisfied	1.13	48	
Other	0.74	218	
Satisfaction with environmental and social facilities provided by public transportation			0.027
Very satisfied	1.09	71	
Other	0.70	195	

to predict future shifts in spending. This functional relationship would be in the form:

$$Y = a + b_1 X_1 + B_2 X_2 + \ldots + b_n X_n \quad \text{(B-1)}$$

in which Y is the dependent variable (the variable that is to be predicted; in this case, spending attitudes); a is a constant; $X_1, X_2 \ldots X_n$ are the predictor variables (attitudes and demographics), there being n predictor variables in the equation; and $b_1, b_2 \ldots b_n$ are the regression coefficients associated with each independent variable. The more important the variable in the relationship, the higher the b weight.

If such a relationship were found to be strong, shifts in the X's (the predictor variables) would forecast shifts in Y. If, for instance, it were found that spending attitudes were closely correlated to income, vehicle-miles driven, and education, future shifts in these variables in a given region may reflect potential changes in attitudes towards allocations for transportation facilities.

Step-Wise Linear Regression Program

Functional relationships were derived for spending attitudes towards roads and highways and towards public transportation through the use of a step-wise multiple regression program (*2*). The output of the program is a functional relationship in the form of Eq. B-1. The program simultaneously associates the set of predictor variables to spending attitudes scores in a correlational manner.

A step-wise regression program was selected because the program has the advantage of associating predictor variables with the spending score one at a time. In this way, one can determine the reliability and amount of variation explained by the first term, the second term, etc. The first variable added is the one which is most closely correlated to the dependent variable (spending score). The second variable added in the equation is that variable which has the highest partial correlation with the dependent variable partialed on the variables already added. In running the program in this step-wise manner, the analyst can select a relationship composed of any number of dependent variables, depending on what step he believes offers the most parsimonious yet efficient formula for predictive purposes.

One of the basic outputs of the program is a coefficient of multiple regression, r; the higher the value, the closer the relationship between the predictors and the dependent variable. This value squared represents the percentage variance accounted for by all the predictors in the functional relationship. A high r-value would be encouraging for predictive purposes because it would indicate that the predictors explain shifts in the spending score to a significant degree. Yet a high r-value in itself is no guarantee of an accurate prediction; neither is a low r-value a guarantee that any future prediction will be inaccurate. The only test of the predictive efficacy of the functional relationship is to attempt a prediction and then test it against real data. This would involve predicting shifts in attitudes towards allocations and then subsequently determining through a survey if the prediction reflected an actual change in attitudes.

TABLE B-72

ANALYSIS BY ATTITUDES TOWARDS INCREASED SPENDING FOR ADJUNCT HIGHWAY SERVICES, FACTOR 3 (QUESTION 12)

CHARACTERISTIC	MEAN SCORE	NO. IN SAMPLE	BSS/TSS
Total sample:			
Age			0.010
50 and under	1.09	1,180	
Over 50 years	0.87	594	
Population Density			0.023
Metropolitan areas	1.15	964	
Other	0.85	810	
Income			0.012
$3,000 and under	0.76	267	
Over $3,000	1.06	1,507	
Non-metropolitan areas:			
Age			0.019
50 and under	0.96	496	
Over 50 years	0.68	314	
Education			0.010
Grade school or less	0.68	219	
More than grade school	0.91	591	
Income			0.018
Under $3,000	0.43	162	
$3,000 and over	0.59	648	

Tables B-73 and B-74 give the findings of the step-wise multiple regression runs for attitudes towards spending for roads and highways and for public transportation. Each table presents the actual functional relationship. For each table there are given the percentage of variance accounted for by all the predictor terms (r^2); the standard error of the estimate of the prediction (S.E.); the a-value in the equation, which is the constant (or intercept on the Y axis in a least-squares diagram); and the standard deviation of the spending score (S.D.). The first column is the b weight in the equation. The second column is the standard error of the coefficient; the higher the standard error, the less reliable is the predictor in the equation.* The third column gives the additional percentage variance accounted for by the inclusion of that term in the equation. The total for this last column should equal r^2. The predictor variables in each table are listed in the order in which they appeared.

Predicting Attitudes Towards Increased Spending for Roads and Highways and for Public Transportation

Tables B-73 and B-74 clearly demonstrate that the predictive power of the demographic and attitudinal variables appears to be low. The number of variables to be included in Eq. B-1 was selected by including all variables which added at least 0.3% in explaining the variance in the spending scores. There were nine variables included in the

* To be significant at the 95% level, the b weight should be approximately twice the standard error of the coefficient.

TABLE B-73

FUNCTIONAL RELATIONSHIPS ESTABLISHED IN PREDICTING ATTITUDES TOWARDS SPENDING FOR ROADS AND HIGHWAYS [a]

PREDICTOR VARIABLE (IN ORDER OF INCLUSION IN PROGRAM)	REGRESSION COEFFICIENT,[b] *B*-WEIGHT	STANDARD ERROR OF REGRESSION COEFFICIENT	VARIANCE ADDED BY INCLUDING PREDICTOR VARIABLE (%)
1. Those wanting to spend more for public transportation likely to want to spend more for roads and highways	0.13	0.02	2.0
2. Dissatisfaction with safety, confidence, and relaxation afforded by public transportation	0.05	0.01	1.4
3. Age (younger respondents want to spend more)	0.07	0.01	1.3
4. Sex (males likely to want to spend more)	0.17	0.04	1.1
5. Population density (closer to rural=greater likelihood want to spend more)	0.07	0.02	0.9
6. Positive attitude towards spending more for law enforcement and traffic control related to spending more for roads and highways	0.06	0.02	0.5
7. Dissatisfaction with highway planning increases likelihood of wanting to spend more on roads and highways	0.04	0.01	0.5
8. Those with positive attitude towards automobile want to spend more	0.04	0.02	0.4
9. Those with positive attitudes towards long distance automobile and negative towards air travel likely to want to spend more	0.03	0.01	0.03

[a] $r^2 = 8.4\%$; S.D. = 0.814; $a = 2.902$; S.E. = 0.78.
[b] Regression coefficient significant at the 0.05 level of significance.

TABLE B-74

FUNCTIONAL RELATIONSHIPS ESTABLISHED IN PREDICTING ATTITUDES TOWARDS SPENDING FOR PUBLIC TRANSPORTATION [a]

PREDICTOR VARIABLE (IN ORDER OF INCLUSION IN PROGRAM)	REGRESSION COEFFICIENT,[b] *B*-WEIGHT	STANDARD ERROR OF REGRESSION COEFFICIENT	VARIANCE ADDED BY INCLUDING PREDICTOR VARIABLE (%)
1. Greater value placed on public transportation vs automobile (Q. 9); greater likelihood want to spend more on public transportation	0.198	0.017	6.0
2. Greater spending score for roads and highways; greater likelihood want to spend more on public transportation	0.210	0.021	4.7
3. Less emphasis on spending for adjunct highway services (Factor 3); greater likelihood want to spend more on public transportation	0.141	0.021	2.0
4. Greater emphasis on highway safety and traffic enforcement; greater likelihood want to spend more on public transportation (Factor 2)	0.074	0.020	0.6
5. Those living in metropolitan areas more likely to favor increased spending for public transportation	0.050	0.017	0.4
6. Those with positive attitudes towards bus travel more likely to favor increased spending for public transportation	0.035	0.014	0.3

[a] $r^2 = 14.0\%$; S.E. = 0.851; S.D. = 0.916; $a = 2.117$.
[b] Regression coefficient significant at the 0.05 level of significance.

spending score for roads and highways, accounting for 8.4% of the variance. Six variables were included in the equation for attitudes towards spending on public transportation, accounting for 14.0% of the variance in this spending score. Thus, the predictor variables did a significantly better job in predicting attitudes towards spending for public transportation than for attitudes towards spending for roads and highways. Yet the level of relationship was fairly low in both cases, suggesting that any predictions based on these functional relationships are unlikely to be accurate.

A comparison of the *b* weights of the predictor variables to their standard errors demonstrates that although the level of relationship was low, the coefficient for each of the predictors was significant at the 0.05 level. Thus, the relationship of each of the predictor variables to attitudes towards spending cannot be attributed to random error, but represents a significant association.

The most important variable in establishing a functional relationship in predicting attitudes towards increased spending for roads and highways was attitudes towards spending for public transportation. Similarly, in predicting attitudes towards spending for public transportation, spending attitudes for roads and highways was the second more important variable. In both cases, the relationship was direct. Those favoring an increase in spending for one transportation facility were more likely to favor an increase in spending for the other. Again, the consistent finding is that the two facilities are viewed as complementary by a majority of people. In addition, dissatisfaction with the confidence and relaxation afforded by public transportation and with highway planning were marginally associated with a desire to spend more for roads and highways.

A comparison of Tables B-73 and B-74 demonstrates that demographics were more important in predicting spending attitudes for roads and highways than for public transportation. Age, sex, and population density were all demographic variables associated with attitudes towards spending for roads and highways. Yet population was the only demographic characteristic appearing in Table A-1. This seems to reinforce a previous suggestion that attitudes towards roads and highways are more likely to be conditioned by environmental conditions than attitudes towards public transportation.

The extremely low level of relationship in Table A-1 warrants reemphasis. The most significant variable accounted for only 2% of the variance in the spending score and only three other variables accounted for more than 1%. In contrast, the most important variable in Table B-74—the value placed on public transportation—accounted for 6% of the variance in attitudes towards spending for roads and highways. This was also the most important variable in the AID run, being the first variable to split (see Fig. B-21). The value placed on public transportation is closely associated with the willingness to spend more for this facility. Attitudes towards spending for the facility and evaluation of the facility itself seem to be more closely tied together for public transportation than for roads and highways.

Published reports of the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

are available from:

Highway Research Board
National Academy of Sciences
2101 Constitution Avenue
Washington, D.C. 20418

Rep. No.	*Title*
—*	A Critical Review of Literature Treating Methods of Identifying Aggregates Subject to Destructive Volume Change When Frozen in Concrete and a Proposed Program of Research—Intermediate Report (Proj. 4-3(2)), 81 p., $1.80
1	Evaluation of Methods of Replacement of Deteriorated Concrete in Structures (Proj. 6-8), 56 p., $2.80
2	An Introduction to Guidelines for Satellite Studies of Pavement Performance (Proj. 1-1), 19 p., $1.80
2A	Guidelines for Satellite Studies of Pavement Performance, 85 p.+9 figs., 26 tables, 4 app., $3.00
3	Improved Criteria for Traffic Signals at Individual Intersections—Interim Report (Proj. 3-5), 36 p., $1.60
4	Non-Chemical Methods of Snow and Ice Control on Highway Structures (Proj. 6-2), 74 p., $3.20
5	Effects of Different Methods of Stockpiling Aggregates—Interim Report (Proj. 10-3), 48 p., $2.00
6	Means of Locating and Communicating with Disabled Vehicles—Interim Report (Proj. 3-4), 56 p. $3.20
7	Comparison of Different Methods of Measuring Pavement Condition—Interim Report (Proj. 1-2), 29 p., $1.80
8	Synthetic Aggregates for Highway Construction (Proj. 4-4), 13 p., $1.00
9	Traffic Surveillance and Means of Communicating with Drivers—Interim Report (Proj. 3-2), 28 p., $1.60
10	Theoretical Analysis of Structural Behavior of Road Test Flexible Pavements (Proj. 1-4), 31 p., $2.80
11	Effect of Control Devices on Traffic Operations—Interim Report (Proj. 3-6), 107 p., $5.80
12	Identification of Aggregates Causing Poor Concrete Performance When Frozen—Interim Report (Proj. 4-3(1)), 47 p., $3.00
13	Running Cost of Motor Vehicles as Affected by Highway Design—Interim Report (Proj. 2-5), 43 p., $2.80
14	Density and Moisture Content Measurements by Nuclear Methods—Interim Report (Proj. 10-5), 32 p., $3.00
15	Identification of Concrete Aggregates Exhibiting Frost Susceptibility—Interim Report (Proj. 4-3(2)), 66 p., $4.00
16	Protective Coatings to Prevent Deterioration of Concrete by Deicing Chemicals (Proj. 6-3), 21 p., $1.60
17	Development of Guidelines for Practical and Realistic Construction Specifications (Proj. 10-1), 109 p., $6.00
18	Community Consequences of Highway Improvement (Proj. 2-2), 37 p., $2.80
19	Economical and Effective Deicing Agents for Use on Highway Structures (Proj. 6-1), 19 p., $1.20
20	Economic Study of Roadway Lighting (Proj. 5-4), 77 p., $3.20
21	Detecting Variations in Load-Carrying Capacity of Flexible Pavements (Proj. 1-5), 30 p., $1.40
22	Factors Influencing Flexible Pavement Performance (Proj. 1-3(2)), 69 p., $2.60
23	Methods for Reducing Corrosion of Reinforcing Steel (Proj. 6-4), 22 p., $1.40
24	Urban Travel Patterns for Airports, Shopping Centers, and Industrial Plants (Proj. 7-1), 116 p., $5.20
25	Potential Uses of Sonic and Ultrasonic Devices in Highway Construction (Proj. 10-7), 48 p., $2.00
26	Development of Uniform Procedures for Establishing Construction Equipment Rental Rates (Proj. 13-1), 33 p., $1.60
27	Physical Factors Influencing Resistance of Concrete to Deicing Agents (Proj. 6-5), 41 p., $2.00
28	Surveillance Methods and Ways and Means of Communicating with Drivers (Proj. 3-2), 66 p., $2.60
29	Digital-Computer-Controlled Traffic Signal System for a Small City (Proj. 3-2), 82 p., $4.00
30	Extension of AASHO Road Test Performance Concepts (Proj. 1-4(2)), 33 p., $1.60
31	A Review of Transportation Aspects of Land-Use Control (Proj. 8-5), 41 p., $2.00
32	Improved Criteria for Traffic Signals at Individual Intersections (Proj. 3-5), 134 p., $5.00
33	Values of Time Savings of Commercial Vehicles (Proj. 2-4), 74 p., $3.60
34	Evaluation of Construction Control Procedures—Interim Report (Proj. 10-2), 117 p., $5.00
35	Prediction of Flexible Pavement Deflections from Laboratory Repeated-Load Tests (Proj. 1-3(3)), 117 p., $5.00
36	Highway Guardrails—A Review of Current Practice (Proj. 15-1), 33 p., $1.60
37	Tentative Skid-Resistance Requirements for Main Rural Highways (Proj. 1-7), 80 p., $3.60
38	Evaluation of Pavement Joint and Crack Sealing Materials and Practices (Proj. 9-3), 40 p., $2.00
39	Factors Involved in the Design of Asphaltic Pavement Surfaces (Proj. 1-8), 112 p., $5.00
40	Means of Locating Disabled or Stopped Vehicles (Proj. 3-4(1)), 40 p., $2.00
41	Effect of Control Devices on Traffic Operations (Proj. 3-6), 83 p., $3.60

* Highway Research Board Special Report 80.

Rep. No. *Title*

42 Interstate Highway Maintenance Requirements and Unit Maintenance Expenditure Index (Proj. 14-1), 144 p., $5.60

43 Density and Moisture Content Measurements by Nuclear Methods (Proj. 10-5), 38 p., $2.00

44 Traffic Attraction of Rural Outdoor Recreational Areas (Proj. 7-2), 28 p., $1.40

45 Development of Improved Pavement Marking Materials—Laboratory Phase (Proj. 5-5), 24 p., $1.40

46 Effects of Different Methods of Stockpiling and Handling Aggregates (Proj. 10-3), 102 p., $4.60

47 Accident Rates as Related to Design Elements of Rural Highways (Proj. 2-3), 173 p., $6.40

48 Factors and Trends in Trip Length (Proj. 7-4), 70 p., $3.20

49 National Survey of Transportation Attitudes and Behavior—Phase I Summary Report (Proj. 20-4), 71 p., $3.20

50 Factors Influencing Safety at Highway-Rail Grade Crossing (Proj. 3-8), 113 p., $5.20

51 Sensing and Communication Between Vehicles (Proj. 3-3), 105 p., $5.00

52 Measurement of Pavement Thickness by Rapid and Nondestructive Methods (Proj. 10-6), 82 p., $3.80

53 Multiple Use of Lands Within Highway Rights-of-Way (Proj. 7-6), 68 p., $3.20

54 Location, Selection, and Maintenance of Highway Guardrail and Median Barriers (Proj. 15-1(2)), 63 p., $2.60

55 Research Needs in Highway Transportation (Proj. 20-2), 66 p., $2.80

56 Scenic Easements—Legal, Administrative, and Valuation Problems and Procedures (Proj. 11-3), 174 p., $6.40

57 Factors Influencing Modal Trip Assignment (Proj. 8-2), 78 p., $3.20

58 Comparative Analysis of Traffic Assignment Techniques with Actual Highway Use (Proj. 7-5), 85 p., $3.60

59 Standard Measurements for Satellite Road Test Program (Proj. 1-6), 78 p., $3.20

60 Effects of Illumination on Operating Characteristics of Freeways (Proj. 5-2) 148 p., $6.00

61 Evaluation of Studded Tires—Performance Data and Pavement Wear Measurement (Proj. 1-9), 66 p., $3.00

62 Urban Travel Patterns for Hospitals, Universities, Office Buidings and Capitols (Proj. 7-1), 144 p., $5.60

63 Motorists' Needs and Services on Interstate Highways (Proj. 7-7), 88 p., $3.60

Rep. No. *Title*

64 One-Cycle Slow-Freeze Test for Evaluating Aggregate Performance in Frozen Concrete (Proj. 4-3(1)), 21 p., $1.40

65 Identification of Frost-Susceptible Particles in Concrete Aggregates (Proj. 4-3(2)), 62 p., $2.80

66 Relation of Asphalt Rheological Properties to Pavement Durability (Proj. 9-1), 45 p., $2.20

67 Relation of Asphalt Rheological Properties to Pavement Durability (Proj. 9-1), 45 p., $2.20

68 Application of Vehicle Operating Characteristics to Geometric Design and Traffic Operations (Proj 3-10), 38 p., $2.00

69 Evaluation of Construction Control Procedures—Aggregate Gradation Variations and Effects (Proj. 10-2A), 58 p., $2.80

70 Social and Economic Factors Affecting Intercity Travel (Proj. 8-1), 68 p., $3.00

71 Analytical Study of Weighing Methods for Highway Vehicles in Motion (Proj. 7-3), 63 p., $2.80

72 Theory and Practice in Inverse Condemnation for Five Representative States (Proj. 11-2), 44 p., $2.20

73 Improved Criteria for Traffic Signal Systems on Urban Arterials (Proj. 3-5/1), 55 p., $2.80

74 Protective Coatings for Highway Structural Steel (Proj. 4-6), 64 p., $2.80

75 Effect of Highway Landscape Development on Nearby Property (Proj. 2-9), 82 p., $3.60

76 Detecting Seasonal Changes in Load-Carrying Capabilities of Flexible Pavements (Proj. 1-5(2)), 38 p., $2.00

77 Development of Design Criteria for Safer Luminaire Supports (Proj. 15-6), 82 p., $3.80

78 Highway Noise—Measurement, Simulation, and Mixed Reactions (Proj. 3-7), 78 p., $3.20

79 Development of Improved Methods for Reduction of Traffic Accidents (Proj. 17-1), 163 p., $6.40

80 Oversize-Overweight Permit Operation on State Highways (Proj. 2-10), 120 p., $5.20

81 Moving Behavior and Residential Choice—A National Survey (Proj. 8-6), 129 p., $5.60

82 National Survey of Transportation Attitudes and Behavior—Phase II Analysis Report (Proj. 20-4), 89 p., $4.00

Synthesis of Highway Practice

1 Traffic Control for Freeway Maintenance (Proj. 20-5, Topic 1), 47 p., $2.20

2 Bridge Approach Design and Construction Practices (Proj. 20-5, Topic 2), 30 p., $2.00

3 Traffic-Safe and Hydraulically Efficient Drainage Practice (Proj. 20-5, Topic 4), 38 p., $2.20

THE NATIONAL ACADEMY OF SCIENCES is a private, honorary organization of more than 700 scientists and engineers elected on the basis of outstanding contributions to knowledge. Established by a Congressional Act of Incorporation signed by President Abraham Lincoln on March 3, 1863, and supported by private and public funds, the Academy works to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance.

Under the terms of its Congressional charter, the Academy is also called upon to act as an official—yet independent—adviser to the Federal Government in any matter of science and technology. This provision accounts for the close ties that have always existed between the Academy and the Government, although the Academy is not a governmental agency and its activities are not limited to those on behalf of the Government.

THE NATIONAL ACADEMY OF ENGINEERING was established on December 5, 1964. On that date the Council of the National Academy of Sciences, under the authority of its Act of Incorporation, adopted Articles of Organization bringing the National Academy of Engineering into being, independent and autonomous in its organization and the election of its members, and closely coordinated with the National Academy of Sciences in its advisory activities. The two Academies join in the furtherance of science and engineering and share the responsibility of advising the Federal Government, upon request, on any subject of science or technology.

THE NATIONAL RESEARCH COUNCIL was organized as an agency of the National Academy of Sciences in 1916, at the request of President Wilson, to enable the broad community of U. S. scientists and engineers to associate their efforts with the limited membership of the Academy in service to science and the nation. Its members, who receive their appointments from the President of the National Academy of Sciences, are drawn from academic, industrial and government organizations throughout the country. The National Research Council serves both Academies in the discharge of their responsibilities.

Supported by private and public contributions, grants, and contracts, and voluntary contributions of time and effort by several thousand of the nation's leading scientists and engineers, the Academies and their Research Council thus work to serve the national interest, to foster the sound development of science and engineering, and to promote their effective application for the benefit of society.

THE DIVISION OF ENGINEERING is one of the eight major Divisions into which the National Research Council is organized for the conduct of its work. Its membership includes representatives of the nation's leading technical societies as well as a number of members-at-large. Its Chairman is appointed by the Council of the Academy of Sciences upon nomination by the Council of the Academy of Engineering.

THE HIGHWAY RESEARCH BOARD, organized November 11, 1920, as an agency of the Division of Engineering, is a cooperative organization of the highway technologists of America operating under the auspices of the National Research Council and with the support of the several highway departments, the Bureau of Public Roads, and many other organizations interested in the development of transportation. The purpose of the Board is to advance knowledge concerning the nature and performance of transportation systems, through the stimulation of research and dissemination of information derived therefrom.

HIGHWAY RESEARCH BOARD
NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL
2101 Constitution Avenue Washington, D. C. 20418

ADDRESS CORRECTION REQUESTED