TRANSIT COOPERATIVE RESEARCH PROGRAM

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# TCRP Report 34

# Assessment of the Economic Impacts of Rural Public Transportation

Transportation Research Board
National Research Council

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# Assessment of the Economic Impacts of Rural Public Transportation

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## TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration—now the Federal Transit Administration (FTA). A report by the American Public Transit Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB), and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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## NOTICE

The project that is the subject of this report was a part of the Transit Cooperative Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council. Such approval reflects the Governing Board's judgment that the project concerned is appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical advisory panel selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and while they have been accepted as appropriate by the technical panel, they are not necessarily those of the Transportation Research Board, the National Research Council, the Transit Development Corporation, or the Federal Transit Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical panel according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

To save time and money in disseminating the research findings, the report is essentially the original text as submitted by the research agency. This report has not been edited by TRB.

### Special Notice

The Transportation Research Board, the National Research Council, the Transit Development Corporation, and the Federal Transit Administration (sponsor of the Transit Cooperative Research Program) do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the clarity and completeness of the project reporting.

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# FOREWORD

*By Staff*
*Transportation Research Board*

This report will be of interest to state and local transportation planners, analysts, and decisionmakers to assist them in matters pertaining to the introduction and expansion of public transportation services in rural areas. Almost 1,200 public transportation systems now exist in rural communities across the United States and receive Federal funding. Many of these systems have been in operation since the 1970s and 1980s, but their economic impacts have seldom been quantified. This report examines the economic impacts of selected rural public transportation services at the local level through case studies, and it estimates the national economic impact of rural public transportation on an average annual per county basis.

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The primary objectives of TCRP Project H-11, *Assessment of the Economic Impacts of Rural Public Transportation*, were to (1) identify and quantify the economic impacts of rural public transportation in the United States on both a local and a national level and (2) develop and present a practical economic impact methodology to enable rural transportation providers, planners, and community decisionmakers to plan, design, and evaluate rural public transportation to maximize economic benefits.

The research report begins by addressing the diversity of rural communities in the United States, using Beale Codes, developed by the U.S. Department of Agriculture (USDA), to categorize rural counties based on population size and proximity to urban areas. Of the 3,141 counties and county equivalents in the 1990 Census, 2,288 were classified as nonmetropolitan or rural counties. In the early 1900s, most rural residents were involved in farming, forestry, and mining; and they lived in small communities with few outside contacts. Today, rural economies have a wide diversity of economic activities and demography, and rural life is much more connected to national markets.

Chapter 3 of the research report presents concepts and methods for identifying and measuring the economic impacts of public transportation systems. This section is important in that it provides an overview of the techniques of benefit measurement and describes how the researchers measured the economic impacts of rural public transportation systems for this study. The credibility of these methods are of utmost importance to the credibility of the research results. To avoid double counting of benefits, the approach focused on primary, major benefits and did not attempt to quantify all benefits.

The estimate of economic benefits is approached in two ways. An aggregate approach employs correlation analysis between county-level economic growth trends in rural commuting zones, as defined by the USDA, and the presence of rural public transportation. A case-study approach estimates local benefits, employing data available in each area and making assumptions as necessary to compensate for missing information. National estimates of rural public transportation benefits are made by using the results of the commuting zone analysis and by extrapolating the case study findings to the national level.

The heart of the research report presents the results of 8 in-depth case studies and 14 desk audits of the economic impacts of rural public transportation services. The results of the case studies demonstrate greater economic impacts than had been shown in previous

literature. Among the in-depth case studies, the benefit cost ratios ranged from 4.2 to 1 to 1.7 to 1, with an average ratio of benefits to costs of 3.1 to 1. Rural transit systems that offered significant employment benefits, contributed to independent living, and provided access to critical medical services scored highly in the analyses.

The commuting zone analysis showed an average net earning growth differential between rural counties with transit and rural counties without transit of more than 11 percent. This difference averages out to approximately $1 million per county annually. Using this difference to estimate the maximum benefits of rural public transit systems, the benefits exceed the costs of all federal, state, and local government expenditures on rural transportation by the ratio of 3.4 to 1. We still cannot say for certain that rural public transit systems cause economic growth, but the report examines the issue of causality and concludes that there is a real possibility that rural transit systems have positive impacts on the economies of the communities they serve.

The final section of the report provides guidance to local transportation professionals in rural areas on how to measure the benefits of rural public transit systems and how to maximize the benefits generated by their own transit systems. Transit agencies can maximize benefits by tailoring services to the needs of their communities. Agencies should focus on particular trip types (e.g., employment, education, medical services, and promoting independent living), provide services at the times required by customers at fares appropriate to the customers served, and focus on a small mumber of system variables that can be locally controlled (e.g., destinations, hours of service, and fares).

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## AUTHOR ACKNOWLEDGMENTS

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We would like to thank many people for substantial contributions to this report. Our TCRP Project Officer, Stephen J. Andrle, deserves many thanks for his thoughtful and professional direction of the Project Panel's efforts in a cooperative working relationship, as well as his support and encouragement throughout the project. We are grateful for the guidance and assistance provided by the members of our Project Panel and those transportation providers and planners who reviewed our works in progress. We sincerely appreciate the time and consideration given to us by many rural transportation operators, particularly those visited by the research team.

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# Report 34

# Assessment of the Economic Impacts of Rural Public Transportation

# SUMMARY OF FINDINGS

For many years, public transportation operations have been known to provide substantial benefits to the communities they serve, including rural communities. But the economic impacts (benefits and disbenefits) of rural public transportation services have seldom been quantified, particularly on an aggregate national level. Almost 1,200 public transportation systems now exist in rural communities across the United States, most receiving matched Federal funding administered by the Federal Transit Administration, U.S. Department of Transportation. Many of these systems have been in operation since the 1970s and 1980s, but their economic impacts have seldom been quantified. The small size of these projects, the heterogeneous rural settings in which they operate, and their frequent emphasis on access of people to services and shopping rather than economic benefits combine to make this a challenging economic assessment.

The interrelationship between rural public transportation and the economic vitality of communities must be understood by the decision makers and by the transportation community itself in order to answer the following types of questions:

- How does rural public transportation make a difference in the quantity and quality of rural economic activity?
- How does rural public transportation affect specific segments of the economy?
- What are the opportunities for rural public transportation to better facilitate economic growth?

## ECONOMIC IMPACTS ON A NATIONAL LEVEL

### ECONOMIC IMPACTS ON A COUNTY LEVEL

We analyzed the impacts of rural public transportation systems on local economies by looking at the differences in economic growth between rural counties with and counties without public transit systems. We focused on the 268 rural commuting zones that included both counties with transit and counties without

transit systems. That analysis showed that, within a given commuting zone, **the average net earnings growth differential between rural counties with transit and rural counties without transit systems was 11 percent**. Using that result, we calculated impact figures for individual counties and for the nation as a whole.

From the perspective of the total net earnings growth for all of the rural counties in the United States between 1980 and 1994, we calculated an **average annual economic impact per county from transit of $1,092,293.** Looking only at the average net earnings growth for those rural counties with public transit systems, we estimated an overall national economic impact from transit of $17,602,632,500 in the 1980 to 1994 time period, which averages $1,179,170 on a per-county basis per year, which is close to the $1.09 million per county per year figure derived by the first method described above.

There are obvious problems using an average annual figure, since rural transit operations were minuscule in 1979 compared to their current level. There has been steady and consistent growth in rural transit since its inception. Still, the average annual figure is useful for making some comparisons, as long as it is recognized that this figure probably overstates the benefits in the initial years and understates the benefits at this point in time.

## IMPACTS OF FEDERAL INVESTMENTS

The total obligations for FTA's Section 5311 Program during the time frame that we are considering (which is equivalent to the Federal fiscal years FY 79 through FY 93) were $1,307,900,000. Comparing the estimated overall national economic impacts to the total Federal investment gives a leveraged impact of Federal funds of approximately 13.46 to one over the life of the Section 5311 program (formerly known as Section 18).

The current (FY 97) Federal appropriations for the FTA's Section 5311 program are $115,122,907 (from which administrative funds of one-half percent of the total, or $575,615 should be subtracted, to give a total level of funding available for program expenditures affecting localities in FY 97 of $114,547,292). Current overall annual Federal, state, and local expenditures on rural public transportation are about $375,000,000, according to estimates by AASHTO and FTA. Dividing the estimate of the national economic impacts of rural transit of $1,257,330,900 per year by the expenditure level of $375,000,000 gives a benefit/cost ratio of 3.35 to one.

This is a significant level of benefits. The ratio of 3.35 to one exceeds by a large margin the returns for many governmental programs that are considered successful. This indicates that investments in rural public transportation have unusually high returns, and that conclusion supports the notion of at least continuing, if not actually increasing, the current level of investments in rural public transportation services.

## ESTIMATES OF ECONOMIC BENEFITS BASED ON OUR CASE STUDIES

In this study, we examined eight rural transit systems in depth and conducted desk audits on another 14 operations. We calculated benefit/cost ratios for each of these systems, although not too much weight should be placed on the specific benefit/cost ratios: we did not attempt to provide exhaustive lists of benefits but rather an estimation of the **major benefits** of each system. Compared to the desk audits, the in-depth case studies include a more extensive enumeration of the major types of benefits. Some types of benefits simply defy estimation of benefit values.

Among the in-depth case studies, the benefit cost ratios ranged from 4.22 to one (two systems) to 1.67 to one. The relative consistency of these ratios is notable. Four of the eight systems had benefit/cost ratios in the narrow range from 3.03/ 1 to 3.55/1.

The average ratio of benefits to costs among the eight systems studied in depth was 3.12 to one. Because our approach focused on the primary types of benefits for each transit system and did not attempt to exhaustively quantify all benefits, **it is likely that our calculations slightly understate the actual benefits of these systems.**

All but one of these systems focused on employment trips. Such trips included traditional rural to urban (town) commuting as well as more experimental welfare to work programs, and even a special (and successful) demonstration program of employment transportation for those with disabilities. The system with the lowest benefit/cost ratio served a university community. This system did not emphasize employment transportation.

Using the same kind of overall benefit estimation approach as before, if we take the total of $1.752 billion in Federal funding that has been spent on rural public transportation since Fiscal Year 1979, then the return on the total Federal investment has been approximately $5.5 billion, using the case study average figure (3.12 to one) for the benefit/cost ratio. For FY 1998, with an estimated Federal Section 5311

appropriation of $119 million (representing approximately 40 percent of the amount now being spent on rural public transit systems), then the total national economic impact of rural public transportation would be nearly $928 million on an annual basis.

The results from our case studies demonstrate greater economic impacts than had been shown in the previous literature. Furthermore, the approach used here should generate a good bit more confidence in the results, since a substantially larger number of sites, types of services, and types of communities were included in the analysis.

## SUMMARY

Both our aggregate approach and our case study approach have produced benefit/cost ratios for rural public transit systems that are in excess of three to one. While this ratio is greater than those documented in previous research efforts, the approach used in the case studies was designed to produce conservative estimates of the true total level of economic impacts.

**Rural transit systems that were able to offer significant levels of employment benefits to their riders scored highly in our analyses, as did those systems which made important contributions to the ability of local residents to live independently and to access critical medical services (including dialysis treatment).** These two factors should be seen as keys to success in generating economic impacts in the localities served by rural transit systems.

# 1

# THE NEED FOR ECONOMIC IMPACT METHODS

For many years, public transportation operations have been known to provide substantial benefits to the communities they serve, including rural communities. But even after all this time, the economic impacts (benefits and disbenefits) of rural public transportation services have seldom been quantified, particularly on an aggregate national level. This report estimates the economic impacts of rural public transit systems and develops a practical economic impact methodology to enable rural transportation providers, planners, and community decision makers to plan, design, and evaluate a wide range of rural transportation systems to maximize their economic impacts.

Nearly 1,200 public transportation systems now exist in rural communities across the United States, funded through the U. S. Department of Transportation in the Federal Transit Administration's Formula Grant Program for Areas Other than Urbanized Areas (Section 5311 of Title 49 of the U. S. Code). About one-half of the non-urban counties in the country are now served by rural public transit systems. These systems create significant benefits where they exist, and many communities without such systems are working to have them implemented as soon as possible. (There are also about 3,500 other systems, funded by FTA's Elderly and Persons with Disabilities Program (Section 5310) and by human service agencies, which serve special client groups, but not the general public, in urban and rural areas. As the Section 5311 projects are the truly public services, they will be the focus of this project.)

**The pervasiveness of rural public transportation operations is a strong testimonial to their perceived value and benefits** — most rural communities have limited resources, and they spend them only on services that are truly useful and popular. To be so widely accepted, rural public transportation has to have been seen as highly beneficial by persons across the broad spectrum of rural communities and their different political persuasions. The fact that States and localities now contribute well over half of all funding for rural public transit operations is another testimonial to the broad acceptance of the value of rural transit operations.

This report describes both the large and the small economic impacts of rural public transit operations. By identifying the largest impacts, it provides examples that rural transit operators can follow to increase the level of economic benefits they provide to their communities. With more detailed impact assessment, it will become easier to identify which rural transportation services are most appropriate for particular types of rural communities.

This report begins with materials that describe the diversity currently found in rural areas and among rural transit services. Chapter 3 discusses the concepts and measures useful for evaluating the economic impacts of rural transportation systems. In Chapter 4, 22 case studies of current rural transit systems are presented. The benefits are calculated for each, as are their costs. The following chapter summarizes the results of the case studies. The focus changes in Chapter 6 from economic impacts observable on a local level to economic impacts observable on a national level. Then, various means of estimating the national economic impacts or rural public transportation services are examined in Chapter 7. Our final chapter, Chapter 8, examines how rural transportation providers, planners, and community decision makers can plan, design, and operate a wide range of rural transportation systems to maximize their economic impacts.

# 2

# RURAL COMMUNITIES AND THEIR TRANSIT SERVICES

In recent years, there have been only limited examinations of the economic benefits that rural public transportation operations provide to their local communities. In order to understand the existing and potential linkages between rural public transportation services and the economic vitality of their rural communities, we need to understand the nature of

- rural communities,
- rural transportation services and the nature of variables that influence and control their operations and impacts, and
- the potential linkages between rural economies and the transportation services within them, especially with regard to economic impacts.

## SOCIOECONOMIC CHARACTERISTICS OF LOCAL RURAL COMMUNITIES

To fully understand the economic impacts of public transportation systems that provide passenger services in rural areas, it is important to understand what is meant by the term "rural." While most Americans have some notion of what this means, few persons can provide definitions that clearly differentiate between rural and urban areas, especially at the boundaries where one type of area merges into another.

When walls surrounded cities, it was easier to tell the town from the open country. Today, it is widely recognized that **places vary on a continuum** ranging from very rural to very urban. Certainly few would argue that areas peopled by hunting and gathering societies are rural, and certainly the area called Manhattan in New York City is urban. The problem is that, for other areas, the issue is less clear cut. (It is possible to classify **people** as rural or urban in their orientation. However, most researchers agree that the essence of rurality resides in **an area and its social organization**; and it is only reflected by its

individual residents to a greater or lesser degree.)

The quality of life that we call "rural" is generally considered to result from factors such as size, density, and isolation, from an agricultural economic base, and from a social system and culture with certain qualities. While many people tend to equate rural communities with farming communities, this generalization is no longer valid. The number of persons living on farms in 1990 was only 14 percent of that in 1910; this number is down 50 percent in the last 20 years and 24 percent in the last 10. *(1)* As late as 1870, more than half of all workers in the United States worked on farms; in 1990, the figure was 3 percent. In rural areas, non farm residents now outnumber farm residents by more than 10 to one. Therefore, farming activities alone cannot be used to define rural communities.

In a useful summary article, Bealer, Willits, and Kuvelsky *(2)* stress that early uses of the term **rural** implied low population density, small population size, relative isolation, an economic base tied to the land through agriculture, mining, or other "field" occupations, and a way of life based on homogeneity of population characteristics and/or of culture. An operational definition of "rural" would thus consist of three types of defining criteria: ecological, occupational, and sociocultural. To a certain extent, these various definitions — ecological, occupational, and sociocultural — reflect assumptions about what is causing what.

We should keep in mind that we are trying to differentiate life in the open country from life in the city. It is possible to have life in the open country without agriculture or without tradition-oriented social systems, but it is impossible to have open country without small populations with low density. In addition, relative isolation nurtures the development of local rather than cosmopolitan norms and values. As long as transportation and communication involve costs, there will be areas of the country that are relatively isolated.

In short, then, **small population size** and **relative isolation** in rural areas are sufficient in their own right to produce significant qualitative social and cultural differences from life in urban areas. Economic bases tied to the land and sociocultural criteria add additional richness for conceptually describing rural areas.

## OPERATIONAL DEFINITIONS OF RURAL PLACES

The most commonly used operational criterion for classifying areas as rural is the U.S. Census Bureau's urban-rural dichotomy. Urban areas consist of 1) both incorporated and unincorporated places of 2,500 people or more and 2) the urban fringe around cities of 50,000 or more. The remainder is classed

as rural. Rural areas can be further classified as metropolitan or nonmetropolitan. Metropolitan rural areas are rural areas in urbanized areas (counties with a city of 50,000 or more), or rural areas in counties that are adjacent to a county with a city of 50,000 or more and that are economically and socially integrated with the county containing the central city.

More stratification is provided through the "Beale Codes" which are used by the U. S. Department of Agriculture (and others) to distinguish urban and rural areas. The 1993 Beale Code definitions are as follows:

- metropolitan counties (codes 0 through 3)
  - central counties of metropolitan areas of one million persons or more (code 0),
  - fringe counties of metropolitan areas of one million persons or more (code 1),
  - counties in metropolitan areas of 250,000 - 1,000,000 persons (code 2),
  - counties in metropolitan areas of less than 250,000 persons (code 3), and
- nonmetropolitan counties (codes 4 through 9)
  - urban population of 20,000 or more, adjacent to a metropolitan area (code 4),
  - urban population of 20,000 or more, not adjacent to a metropolitan area (code 5),
  - urban population of 2,500 to 19,999, adjacent to a metropolitan area (code 6),
  - urban population of 2,500 to 19,999, not adjacent to a metropolitan area (code 7),
  - completely rural (no places with a population of 2,500 or more) adjacent to a metropolitan area, and
  - completely rural (no places with a population of 2,500 or more), not adjacent to a metropolitan area. *(3)*

As can be seen, these categories express both population size and proximity to metropolitan areas as the factors of significance.

These operational indicators express both the size and relative isolation criteria of rurality. Obviously, any attempt to create a simple classification from a continuum must be concerned with two types of errors: 1) including areas as rural that, in fact, are not, and 2) excluding areas from the rural category that are, in fact, rural. The Census definitions do a good job of avoiding errors of the second type. For example, areas with less than 2,500 people and areas of open country are very likely to be rural, especially if they are not near a city of 50,000 or more. But a town of 4,000 located 50 miles from the nearest town of more than 15,000 is probably rural too. Here the Census definitions are less effective. Nevertheless, urban-rural comparisons which use Census definitions are reasonably valid, **especially if nonmetropolitan areas are used for the rural category**, because Census definitions stress the rural end of the continuum and because misclassified rural areas make a minuscule contribution to the urban data.

There are many other operational definitions of the term "rural," and there is, indeed, no consistent

definition of the term in use by Federal agencies. Some of the other definitions use different size groupings than the Census definition, while others focus on factors such as population density, distances to nearest large urban area, and non land-based employment. Numeric values of these variables used to differentiate urban and rural areas also vary from source to source.

The Federal Transit Administration (FTA) of the U. S. Department of Transportation (USDOT) uses the following definition in determining the eligibility of an area for funds from its Formula Grant Program for Areas Other than Urbanized Areas (the Section 5311 program, formerly referred to as the Section 18 program):

> "The terms "nonurbanized areas" and "rural and small urban areas" are used synonymously to mean any area outside an urbanized area, as designated by the Bureau of the Census. An urbanized area consists of a core area and the surrounding densely populated area with a total population of 50,000 or more, with boundaries fixed by the Bureau of the Census or extended by state and local officials. Areas not currently within the urbanized area . . . are eligible for Section 5311 funding . . .
>
> "Since the goal of Section 5311 is to enhance access of people living in nonrubanized areas to activities, Section 5311 projects may include transportation to and from urbanized areas." *(4)*

The U. S. Department of Agriculture published a 1995 report entitled ***Understanding Rural America*** *(5)* which provides a good beginning to the understanding of the diverse and changing nature of rural communities and their economies. Of the nation's 3,141 counties and county equivalents, 2,288 of them were classified as nonmetropolitan or rural according to the 1990 Census. Rural areas accounted for 83 percent of the nation's land, 21 percent of its population, 18 percent of its jobs, and 14 percent of its earnings. When compared to urban areas, rural areas contain greater percentages of males, whites, elderly, persons in poverty, households with income below the national median, homeowners, and car owners.

Many rural parts of the U.S. had stable or declining populations and economic bases from the 1920s until the 1970s, when the economic revitalization of some rural areas began. Rural areas not touched by such revitalization are characterized by high proportions of dependent population groups and limited tax bases. **The presence or absence of such characteristics in particular localities may have significant implications for determining appropriate public transportation services for these localities.**

## SIGNIFICANT TRENDS IN RURAL COMMUNITIES

Rural America has changed dramatically during this century. In the 1900s, most rural residents

were involved in producing food and fiber, and lived their lives in small communities with few contacts beyond their localities. Rural economies have shifted away from a strong dependence on farming, forestry and mining to a wide diversity of economic activities, and rural life is now much more connected to overall national markets and mores. The ***Understanding Rural America*** report describes the changes and trends in the following categories: **employment, population, well-being, and diversity**. These elements are summarized below.

### ***Employment in Rural Areas***

To some persons, "rural" has always meant "farming." That perception has not been accurate for many rural areas for some time, and it is even less so recently, as farm employment has now declined to only 7.6 percent of the rural workforce. Services, government, and manufacturing all have substantially larger proportions of the rural labor force than does farming. Even among current farm households, the proportion of their incomes from off-farm employment is quite significant.

The services sector in rural areas — with almost 51 percent of the rural workforce — contributes the largest share of jobs and employment growth. Services related to recreation, retirement, and natural amenities are important new sources of employment and economic growth. Financial, real estate, insurance, retail, and restaurants are other important service industries in rural areas, and advances in telecommunications are allowing telemarketing and data processing corporations to move to rural settings.

### ***Rural Population***

On a per square mile basis, more rural areas lost population than gained it in the 1980 to 1992 period. Among rural counties, the Plains states and parts of the Midwest had actual population losses (while the U. S. as a whole gained 12.6 percent). Rural areas in Arizona, New Mexico, Colorado, Utah, Nevada, northern California, central Idaho, western Montana, Alaska, the northern part of Michigan's lower peninsula, and the nonmetro areas of Florida showed rapid growth (greater than the national average). Overall, rural and small-town areas grew faster than urban areas during the 1970s, lost population in the 1980s, and are growing again in the 1990s. Rural communities with recreation and retirement economies and those near urban areas have shown the greatest recent growth.

## ***Rural Well-Being***

The Department of Agriculture reports wide variations in well-being throughout rural America. Although the economic growth of rural areas has generally been less than the growth in urban areas since the 1970's, some types of rural communities have done quite well, whereas others have done poorly. Housing and unemployment statistics have improved substantially. High school education has increased. But real wages remain about 20 percent lower in rural than in urban areas, college completion rates are substandard, and at-risk populations — families headed by single parents and minorities — are increasing. Some rural areas are still struggling with problems of poverty, unemployment, inadequate infrastructure, and lack of viable economic opportunities. Rural communities vary dramatically from one another.

## ***Rural Diversity***

The ***Understanding Rural America*** report states that ". . . no one industry predominates the rural economy, no single pattern of population decline or growth exists for all rural areas, and no statement about improvements and gaps in well-being holds true for all rural people . . . The result: Rural areas differ in terms of their needs and the resources they possess to address those needs." *(6)* This report discusses some of the USDA types of rural counties that are important to the rural economy and/or rural development policy; other types are included in another Department of Agriculture report. *(7)*

USDA has identified six mutually exclusive economic types of rural counties and five overlapping rural policy-relevant types. The mutually exclusive county types based on economic specialization (a county's economic dependence on a particular industry) are **farming-dependent counties, mining-dependent counties, manufacturing-dependent counties, government-dependent counties, services-dependent counties**, and **nonspecialized counties**. The policy-relevant types are **retirement-destination counties, Federal lands counties, commuting counties, persistent poverty counties, and transfers-dependent counties;** they are based on their special relevance to policy and are not mutually exclusive.

## ***Economic County Types***

***Farming Counties —*** The number of farming counties has shrunk dramatically since 1950. Now, only 556 of the nation's counties derive 20 percent or more of their earned income from farming. These counties are mostly located in the Great Plains. The Department reports that the remoteness of these

counties creates a barrier to development, low average population densities increase per capita costs of infrastructure, and outmigration of young adults is high.

***Mining Counties —*** These 146 counties accounted for about half of the nonmetro mining jobs in 1989. They are mostly in the southern and western portions of the U. S. Most of these counties lost population and declined economically in the 1980s.

***Manufacturing Counties —*** These 506 counties, concentrated in the eastern half of the country (particularly in the Southeast), receive more than 30 percent of their earnings from manufacturing. They are more likely than other nonmetro counties to have larger urbanized populations, to be adjacent to urban centers, and to have high population densities. Recently, real earnings in nonmetropolitan manufacturing jobs have declined, and job growth in the manufacturing counties came primarily from the nonmanufacturing sectors.

***Government-Dependent Counties —*** Scattered across the nation, these 224 counties specialized in government activities. All levels of government were represented; about 25 percent of earnings from government jobs came from Federal jobs. Their populations and economies grew during the 1980s, but their general levels of economic well-being remained lower than the averages for all nonmetro counties.

***Services Counties —*** Services jobs accounted for 83 percent of the new nonmetro jobs between 1979 and 1989. The 323 services-dependent counties that derived 50 percent or more of their earned income from the services sector are scattered across the U. S., with no particular regional focus. Some of these counties function as regional trading centers, while others focus on retirement or recreational services. Real earnings, earnings from services, and the number of jobs all grew faster in these counties than in the other economic types. Many of the socioeconomic indicators of these counties (such as unemployment, high school educations, per capita income, and per capita earnings) are higher in the services counties than in counties of the other economic types.

***Nonspecialized Counties —*** These 484 counties did not qualify for one of the economic specialization types listed above. While these counties are located across the nation, a large number of them are located in the South. Two-thirds of these counties experienced job growth in the 1980s.

## ***Classification of Counties by Policy Types***

***Retirement-Destination Counties —*** Natural amenities draw tourists and recreationists to these counties, which are primarily located in the South and the West. They experienced 15 percent or more inmigration of persons 60 years of age or older in the 1980s. These counties did very well economically during the 1980s in terms of earnings growth and job growth. Population in these counties grew an average of 23 percent in the 1980s, far in excess of the 0.6 percent rural average.

***Federal Lands Counties —*** These are counties in which 30 percent or more of the land is owned by the Federal Government. There were 270 of these counties in 1987 and they were primarily located in the West. Median family incomes in these counties are higher than the nonmetro average and job growth has been strong, a testament to the growth in tourism and recreation that these areas have experienced. Population also grew in these counties, especially among persons age 65 and older.

***Commuting Counties —*** The USDA ***... Typologies*** report describes these 381 counties has having economies in which more than 40 percent of workers commuted to jobs in other counties in 1990. "About 65 percent of commuting counties are in the South, and 28 percent in the Midwest. Because of the southern geographic orientation, counties have much smaller land areas and are more apt to adjoin a metro area than all nonmetro counties." *(8)* These counties have lower levels of economic activity when considered by themselves but are not necessarily disadvantaged when the incomes of the commuters are taken into account.

***Persistent Poverty Counties —*** In 1990, the number of nonmetro counties with 20 percent or more of their population living below the poverty level was 765, a large decline from the 2,083 reported in 1960. Still, poverty is a long-term problem in 535 of these counties in that 20 percent or more of their population was below the poverty level in 1960, 1970, 1980, and 1990. These counties are primarily located in the Southeast, Appalachia, and the Southwest, with others including Native-American reservations in the North and West. Unemployment rates in these counties were high, and low-skill, low-wage jobs predominate. These counties are generally not near urbanized areas where better jobs might be found. There is a general lack of basic necessities such as health care, nutrition, education, and essential public services. People living in these areas tend to have characteristics that make them prone to economic disadvantage, such as no high school education and residing in female-headed households. Minority populations are also overrepresented in these areas.

***Transfers-Dependent Counties* —** There were 381 of these counties in 1993, the majority of which were in the South. Their economies were largely based on ". . . unearned income from government transfer payments, including social security, unemployment insurance, medicare, medicaid, food stamps, government pensions, and welfare benefits . . . They are more likely to be remote from metro areas and to be sparsely populated. Three-fifths of the transfers-dependent counties are also in the persistent poverty category." *(9)* The transfers-dependent counties exhibit the same types of characteristics as the persistent poverty counties, except that they often contain more elderly persons.

## SUMMARY OF THE USDA TYPOLOGIES

The overall distribution of all of these county types is shown in Table 1, which also provides an overall summary of the factors discussed above. (Note that 17 counties could not be classified as an economic type because of data suppression and only 1,197 of 2,276 counties were classified into one of the five policy types.)

We suspect that rural transit systems might be likely to have greater economic impacts in the rapidly-growing services and retirement communities where transit can complement the expansion trends by taking people to jobs, job training, and education programs as well as servicing the overall increase in economic activity by providing people more options and greater access.

**Table 1**

**USDA TYPOLOGIES OF NON-METRO U. S. COUNTIES**

| Types of Counties (Economic or Policy Types) | Number of Counties* | Percent of Counties | Regional Focus | Earnings Income Per Job or Per Family | 1979 - 1989 trends in number of jobs |
|---|---|---|---|---|---|
| ***Economic Types*** | | | | | |
| Farming | 556 | 24.4 | Great Plains | Farm jobs pay well | Fewer and fewer jobs |
| Manufacturing | 506 | 22.2 | Eastern Southeast | Manufacturing jobs pay slightly more than other rural jobs | Most of the increase in jobs in manufacturing counties comes from the service sector |
| Services | 323 | 14.2 | Scattered | Jobs pay slightly less than other rural jobs | Rapid growth in jobs |
| Mining | 146 | 6.4 | Southern Western | Mining jobs pay about average | Fewer and fewer jobs |
| Government-Dependent | 244 | 10.7 | Scattered | Jobs pay less than other rural jobs | Gradual increase in jobs |
| Nonspecialized | 484 | 21.3 | South | Jobs pay a little less than rural average | About 10% growth |
| Not classified | 17 | 0.1 | | | |

**Table 1 (Continued)**

**USDA TYPOLOGIES OF NON-METRO U. S. COUNTIES**

| Types of Counties (Economic or Policy Types) | Number of Counties* | Percent of Counties | Regional Focus | Earnings Income Per Job or Per Family | 1979 - 1989 trends in number of jobs |
|---|---|---|---|---|---|
| ***Policy Types*** | | | | | |
| Retirement Destination | 190 | 8.3 | South<br>West | Jobs pay less than the rural average | Very rapid growth in retirement county jobs |
| Federal Lands | 270 | 11.9 | West | Family incomes are higher in Federal lands | Strong growth in jobs |
| Commuting | 381 | 16.7 | South<br>Midwest | Earnings a little below rural average | Rapid growth in jobs |
| Persistent Poverty | 535 | 23.5 | Southeast<br>Appalachia<br>Southwest | Family income very low, unemployment is high | Poverty persists |
| Transfers-Dependent | 381 | 16.7 | South | Income and earnings far below rural average | Growth in service jobs in transfers counties |
| Not classified | 1079 | 47.4 | | | |

***Note**: 2,276 of the 3,089 U.S. Counties are classified as nonmetro

# GOVERNMENTAL ASSISTANCE TO RURAL PUBLIC TRANSPORTATION SYSTEMS

## BACKGROUND

The genesis of public efforts to support rural passenger transportation can be found in 1964, a banner year for significant legislation. Passage of the Urban Mass Transportation Act (P.L. 88-365) and the Economic Opportunity Act (P.L. 88-452) created the foundation for our current efforts. But neither piece of legislation specifically addressed the needs of the transportation disadvantaged. Not until after Watts riots in Los Angeles in 1965 was transportation was seen as a means of combating poverty. Shortly thereafter, the U.S. Department of Housing and Urban Development sponsored demonstration projects in almost two dozen urban areas to meet the "transportation needs of the low income neighborhoods."

The connection between transportation and poverty in rural areas was recognized later, by 1967, by the Office of Economic Opportunity and the Appalachian Regional Commission. After OEO sponsored a large number of demonstration projects, interest then seemed to wane at the Federal level, but after the enactment of the Section 147 program, studies by Federal Highway Administration (FHWA) and others followed. *(10)* Some states began to actively investigate and sponsor rural transportation projects. *(11)*

After the passage of Section 147 of the Federal Aid Highway Act of 1973 (P.L. 93-87), known as the Rural Highway Public Transportation Demonstration Program, the long process of bringing rural public transportation to the forefront of national attention began. In 1974, Congress appropriated the funds they authorized the previous year for the program. The FHWA (chosen as the lead agency for the program) issued administrative guidelines for the program in November 1974 and again in April 1975, and, in September, the first 45 project awards were announced. The first transportation operations of a Section 147 project began in March 1976. From the more than 500 applications received by FHWA, 102 grants (which resulted in 134 projects) were awarded by 1979. Total expenditures for the Section 147 program were nearly $25 million, approximately the total amount Congress eventually appropriated (which was only one-third of the amended program authorization of $75 million.)

In the meantime, the National Mass Transportation Act of 1974 (P.L. 93-503) became law on December 10, 1974. In a move to recognize some of the transportation needs in rural areas, this act made available up to $500 million (out of the total of $11 billion authorized) for grants between 1974 and 1980 "exclusively for assistance [with capital expenses] in areas other than urbanized . . ." (See Section 101(b) of the Act). However, these nonurbanized areas were instructed to use the procedures urban areas used

to apply for these funds, eligibility was limited to public bodies only, and, while funds in the Act could pay for operating expenses in urban areas, no such provision existed for those areas designated as "other than urbanized." UMTA eventually allocated less than 10 percent of the $500 million and most of this money went to small urban areas; little was spent in rural areas. Use of these set-aside funds for rural areas was, in effect, terminated when the Section 18 program began.

The practical and political successes of the Section 147 demonstration projects led directly to creation of the nonurbanized area public transportation program as part of the Surface Transportation Assistance Act of 1978 (P.L. 95-599), which was approved November 6, 1978. That program became Section 18 ("Formula Grant Program for Areas other than Urbanized") of the Urban Mass Transportation Act, the Federal assistance program for public transportation in rural areas. FHWA was originally designated as the lead agency for the joint administration of the Section 18 program. The lead role was later transferred to UMTA, since renamed the Federal Transit Administration (FTA), a change that reflected the agency's shift to a concern with rural as well as urban areas.

In 1994, the Federal Transit Act was reenacted as part of Chapter 53 of Title 49 of the United States Code. At that time, the Section 18 program officially became Section 5311 of Title 49 of the Code. We will generally refer to the Federal-funded transit assistance to rural communities in those terms rather than as the Section 18 or 5311 programs.

## THE FEDERAL ASSISTANCE PROGRAM

Federal financial assistance for public transportation in rural and small urban areas comes through the Federal Transit Administration of the USDOT. The states administer the formula grant program by establishing a state program of projects. The goals of the program are to "enhance access of people in nonurbanized areas for purposes such as health care, shopping, education, recreation, public services and employment by encouraging the maintenance, development, improvement, and use of passenger transportation systems." The program has continued to be reauthorized since its original four-year authorization (FY79 through FY82).

By the end of December 1980, more than 600 projects had been approved, including 500+ projects for capital and operating expenses. As of late 1981, all states had initiated capital and operating assistance projects. By 1994, there were 1,196 Federally-funded local rural transportation operations around the United States, at least one in every state and territory. The numbers of rural public transportation systems

are growing, but many rural areas still have little or no local public passenger service at all in 1996.

In the 18 years of program funding (Fiscal Years 1979 through 1996), $1.548 billion in Federal funds have been appropriated. In the early years of program funding, Federal funds far outstripped state and local contributions; non-Federal governmental appropriations now account for nearly 60 percent of all governmental support for rural public transportation, even though there still are a number of states that put no state funds into rural public transportation.

The total funding for the Section 5311 program is small in comparison to the overall funding needed to maintain and develop viable public transportation systems in rural and small urban areas. Because of the relatively low level of funding, major themes of the program include coordination with other funding sources by or with the Section 18 projects and simplicity and flexibility in administering the program.

The authorizations for Section 18 and 5311 (the total amount that Congress legally allows to be spent on a program in a particular year) have never been matched by the actual appropriations for the program (the amount of money Congress actually provides). Over the first several years of the program, the budget authorizations showed a pattern of steady increases, but the funds actually made available by Congress remained at about the same level. For example, the FY81 appropriations were $72.5 million, a far cry from the $110 million authorization; in 1982, $120 million was authorized but only $68.5 million was appropriated. The FY 1996 appropriation was just over $115 million, which means that the size of the program did not even double in a dozen years. This constitutes a very slow level of growth; overall program expenditures are still very small when compared to other programs, such as urban public transportation or the transportation expenditures of the Medicaid program. Although the program was criticized for starting slowly — perhaps unjustly, given the history of similar programs — most of the funds appropriated have now been spent as the program eventually obligated the unexpended balances from previous years.

Funds may be used for capital and operating assistance by State agencies, nonprofit organizations, and public transportation authorities operating services. For capital and administrative expenses, the Federal share is 80 percent and the local share is 20 percent; for net operating expense, up to 50 percent is supplied by the Federal government. Up to 15 percent of the State apportionment may be used for State administrative and technical assistance activities, with the Federal share for these funds at 100 percent.

# CHARACTERISTICS OF LOCAL RURAL TRANSPORTATION SYSTEMS THAT ARE RELEVANT TO LOCAL ECONOMIES

It is clear that **no one transportation strategy could appropriately address the diversity of counties found across rural America**, and that **no single transportation option could be expected to help develop the same types of economic impacts in such different and changing communities**. Obviously, some strategies will work better in some communities than others. To determine the potential dynamics of these relationships, we first need to examine the kinds of rural transportation services that are currently available.

It's important to note that the most prevalent mode used for transporting people in rural areas is the automobile. Most rural households own one or more cars and trucks, and they own them at higher rates than do residents of urban areas. At the same time, one of every 14 households in rural America has no car. When looking at the rural elderly, the percent without cars rises to 45 percent; the percent of the rural poor without autos is 57 percent. Fifty-two percent of all rural households own only one car. Despite these needs, 38 percent of the nation's rural residents live in areas without any public transit service and 28 percent live in areas in which the service level is negligible (less than 25 yearly trips for each household without a vehicle. *(12)*

There are few other options. The smallest rural communities seldom have taxi services, and intercity bus services reach fewer and fewer small rural areas. Therefore, public transit services are needed for a significant proportion of the population who do not have access to an auto, have trouble driving it, or have trouble affording automotive transportation.

## RURAL PUBLIC TRANSPORTATION SYSTEMS AROUND THE UNITED STATES *(13)*

### ***Where Are They?***

Among the Federally-funded rural transportation systems in the United States, 21 percent are in the Midwest (Illinois, Indiana, Michigan, Minnesota, and Ohio), almost 18 percent are in the Great Plains states (Iowa, Kansas, Missouri, and Nebraska), and 17 percent are in the Southeast region (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee).

In which rural communities are the rural public transportation systems located? As can be seen

from Table 2, the counties with small urban areas of 20,000 persons or more most frequently have Federally funded rural transportation systems. About two-thirds of these counties have rural transit systems within their boundaries. (Table 2 shows that some rural transit systems are located within the rural portions of 46 percent of the counties which are actually classified as urban or metropolitan counties by the Census Bureau.) The counties that are least likely to have rural public transportation systems are those that are the most rural, those that have no urban places with populations of more than 2,500 persons. Less than 50 percent of these counties have public transportation services. The most urban counties are also likely not to have rural transit services within their borders. Half of all counties in the U. S. have rural public transit services; 46 percent of metropolitan and 52 percent of nonmetropolitan counties have rural public transit services.

### ***Types of Services Provided***

Demand-responsive services predominate in rural areas. Thirty-four percent of all 1,098 services reporting were demand-responsive only, another 31 percent were demand-responsive and fixed-route, and another 22 percent were demand-responsive and other service types (not fixed route). Fixed-route only systems accounted for only 9 percent of those responding (partially because fixed route systems receiving Federal funding are to provide "complementary paratransit services," that is, demand-responsive operations, under the provisions of the Americans with Disabilities Act). Systems that were not fixed-route or demand-responsive, route or schedule-deviation systems, subscription, charter, or some combination of these, accounted for 4 percent of the total. Table 3 shows a distinct regional focus to the types of services provided, with only Regions 8 and 9 mirroring the national distribution.

### ***Operational Results Summaries***

Table 4 shows a variety of statistics for all rural public transit operations, including fleet size numbers of riders, annual budgets, trips per vehicle, budget per vehicle, and costs per trip. The influence of a number of large systems makes the mean (average) value significantly higher than the median values (the value in the middle of each range).

**Table 2**

**DISTRIBUTION OF RURAL TRANSIT SYSTEMS AMONG TYPES OF URBAN AND RURAL COUNTIES**

| County types | Beale Code | Counties with Section 5311 Services | | Counties with No Section 5311 Services | |
|---|---|---|---|---|---|
| | | Number | Percent | Number | Percent |
| ***Metropolitan*** | | | | | |
| • Center of 1,000,000+ person metro area | 0 | 60 | 37.50 | 100 | 62.50 |
| • Fringe of 1,000,000+ person metro area | 1 | 70 | 53.03 | 62 | 46.97 |
| • In metro area of 250,000-1,000,000 | 2 | 174 | 55.24 | 141 | 44.76 |
| • In metro area of less than 250,000 | 3 | 105 | 54.12 | 89 | 45.88 |
| *Total Metropolitan* | | 409 | 51.06 | 392 | 48.93 |
| ***Non Metropolitan*** | | | | | |
| • 20,000+ urban persons, adjacent to metro area | 4 | 75 | 57.25 | 56 | 42.75 |
| • 20,000+ urban, not adjacent to metro area | 5 | 75 | 66.37 | 38 | 33.63 |
| • 2,500-19,999 urban, adjacent to metro area | 6 | 366 | 60.30 | 241 | 39.70 |
| • 2,500-19,999 urban, not adjacent to metro area | 7 | 381 | 58.98 | 265 | 41.02 |
| • no urban places over 2,500, adjacent to metro area | 8 | 140 | 56.68 | 107 | 43.32 |
| • no urban places over 2,500, not adjacent to metro area | 9 | 290 | 55.24 | 235 | 44.76 |
| *Total Non Metropolitan* | | 1327 | 58.48 | 942 | 41.51 |
| **Total U.S.** | | 1736 | 56.54 | 1334 | 43.45 |

Source: Tabulations by Ecosometrics, Incorporated.

**Table 3**

**PREVALENCE OF SERVICE TYPES AMONG RURAL PUBLIC TRANSIT SYSTEMS**

| Region | Percent of All Systems |
|---|---|
| **Nationally** | |
| Demand-Responsive only | 34 |
| Fixed Route and Demand-Responsive | 31 |
| Demand-Responsive and Other | 22 |
| Fixed-Route Only | 9 |
| **Regional Focus** | |
| Demand-Responsive Only | Regions 6,7 |
| Fixed-Route and Demand-Responsive | Regions 1,10 |
| Demand-Responsive and Other | Regions 4, 5 |
| Fixed-Route Only | Regions 2, 3 |
| Average Distribution (like the nation as a whole) | Regions 8, 9 |

**Table 4**

**NATIONAL SUMMARY STATISTICS FOR FEDERALLY FUNDED RURAL TRANSPORTATION OPERATIONS* FY 1993**

| | Mean | Median |
|---|---|---|
| Fleet Size | 11 | 6 |
| No. of Riders/Year | 82,196 | 33,274 |
| Annual Budget | $315,000 | $153,500 |
| Trips per Vehicle/Year | 7,875 | 5,395 |
| Budget per Vehicle/Year | $31,500 | $25,000 |
| Cost per Trip | $7.00 | $4.62 |

* 1,092 of 1,196 systems reporting.

### ***Numbers of Vehicles***

There are numerous systems with only one vehicle; there are also several systems with more than 50 vehicles. Those systems providing more than one type of service tend to have the most vehicles. The demand-responsive only services tend to have more vehicles than the fixed-route only services; the largest systems are those offering both fixed route and demand-responsive services

### ***Total Trips***

The demand-responsive plus fixed-route services tend to be the largest. They are followed by demand-responsive and others (not fixed-route), fixed-route, and demand-responsive. The median ranges of trips shown are between 75 and 425-500 trips per day, based on 252 days of service per year. There are huge differences between the largest and smallest systems.

### ***Total Expenses***

One system with mixed services reported total annual expenses of more than $8 million (based on our knowledge of this particular operation, that is probably an accurate figure), while other systems reported less than $1,000 of annual expenses. Table 5 shows system expenditures broken down by quintiles for all rural public transit operators. We see that, while the first quintile has average operations greater than one million dollars per year, the second quintile does not even reach a $400,000 annual expenditure level. Average systems in the fourth and fifth quintiles — at $75,000 and $20,000, respectively — could not be expected to have many impacts on local or regional economies because of their limited services and expenditures.

**Table 5**

**RURAL PUBLIC TRANSPORTATION SYSTEMS:**
**TOTAL EXPENDITURES BY QUINTILE**

| Quintile | First | Second | Third | Fourth | Fifth |
|---|---|---|---|---|---|
| High | $8,362,955 | $499,083 | $228,857 | $110,955 | $42,364 |
| Low | $500,000 | $230,000 | $110,963 | $42,420 | $850 |
| Average | $1,095,351 | $344,290 | $161,430 | $75,486 | $20,965 |

## PERFORMANCE MEASURES FOR THE MOST COST-EFFECTIVE SYSTEMS

The systems reporting the most effective and productive services tended to be those that provided demand-responsive and other services, too. Some of the best were reporting

- costs per trip of less than $1.00,
- costs per mile around $0.65,
- costs per hour in the $5-6 range,
- about three passengers per vehicle mile, and
- 25-30 passengers per vehicle hour.

These top performers have obviously

- made concerted efforts to keep their costs as low as possible, and
- have employed special strategies to attract as many passengers as possible.

Mean and median figures for the performance measures have been shown in the ***Service Delivery Systems*** report. *(14)*

## IMPLICATIONS OF THESE STATISTICS FOR THIS ECONOMIC IMPACT STUDY

Strong implications concerning the economic impacts of rural public transportation can be drawn from the above statistics about rural transit operations. First, even the largest of these systems are relatively small in contrast to the overall level of economic activity that occurs in rural communities. This creates large challenges in terms of recognizing and then quantifying the economic benefits of rural transit operations at the national level. National estimates of the economic benefits of rural transit systems will be discussed in the next chapter.

Second, the diversity of rural transit systems is remarkable. The largest systems are many times larger than the smallest systems. Very different services are offered in different communities. Some of the systems are so small, and offer such infrequent service, that their chance of having a **measurable impact** on their local economy is slight. These systems undoubtedly provide benefits at the micro level to their riders, but noticing and then attributing changes in a county's volume of economic activity at the macro level will be difficult, at best. On the other hand, the larger systems should indeed have noticeable effects within their localities. In these cases, the first big question is **which system characteristics actually create impacts on what kinds of local economies?** The second big question is **what can local planners and operators do to influence the type and level of economic impacts that their rural transportation systems could have?** These issues will be addressed in Chapters 4, 5, and 8.

# 3

# IDENTIFYING AND MEASURING THE ECONOMIC IMPACTS OF PUBLIC TRANSPORTATION SYSTEMS

This chapter establishes the economic framework for identifying and measuring the economic impacts of rural public transportation systems. We begin with a general review of the conceptual framework for measuring economic impacts: the economic basis for benefit or impact valuation of local transportation projects; an identification of types of economic impacts follows; an overview of the techniques of benefit measurement. The next section describes the benefit measurement approach for of this project. The third section describes in detail how we plan to measure the economic impacts of rural public transportation systems at the local level.

## CONCEPTS NEEDED FOR MEASURING ECONOMIC IMPACTS

### THE ECONOMIC BASIS FOR BENEFIT VALUATION

Economic theory assumes that a truly competitive economy best serves to allocate scarce resources. There is a role for governmental expenditure/investment or governmental regulatory intervention **only** if the private market is not functioning "properly." Some cases in which this might occur are:

1. Instances when there is **imperfect knowledge** of the market by buyers and sellers.

2. Where market structures other than competition dominate, such as monopoly (single seller) or monopsony (single buyer) or where just a few buyers or sellers dominate the market.

3. When society (collectively) demands products/services that are not fully reflected in the private market transactions — such as national defense — since an individual may

assume that others will not contribute so he or she does not contribute alone. Thus, the argument goes, the government should step in and fill this void.

4. Society, collectively, may desire a different distribution of income/wealth than the private market provides, thus creating the rationale for programs that redistribute wealth/income. Such redistribution programs are sometimes call "equity" programs as opposed to "efficiency" programs which serve to allocate resources based on the signals provided by the market.

Rural transportation services fall into categories 3 and 4. The collective demand argument (category 3) includes such effects as regional economies of scale, community multipliers, and reductions in air pollution or traffic congestion. Such impacts provide an important justification for rural transit; rural transit programs create a "collective demand" market for rural public transit systems where, usually, none would exist without it. Category 4, distribution of income/wealth, is also important since 1) rural transit often targets those persons with the least access to transportation and/or those with the lowest incomes, greatest physical/mental disabilities or other transportation impediments, and 2) since urban areas have long had public transit, public transit for rural areas is, implicitly, an equity program that provides rural areas with transportation service as well.

The problem is that these "public good" characteristics of rural public transportation make it difficult to evaluate the benefits to such programs using traditional, private market pricing techniques. Comparing "equity" programs to "efficiency" programs is like mixing oil and water. For equity objectives, often the best that can be done is to examine national policy and program goals to determine whether they are being achieved, and being achieved in a cost-effective manner, independently of the question of economic efficiency. Many rural transit projects will serve both equity and efficiency objectives; since there is no easy way to approximate tradeoffs between the two, one has to essentially establish separate and independent objectives for equity and efficiency.

Valuation of the efficiency goals for rural public transit is also difficult to do using traditional economics. This is because of the "public good" nature of public transit whereby the government basically establishes this market; that is, it is not established as a private competitive market where economic theory applies. This government-created market can be evaluated as to how it interacts with both private and public markets, thus providing a way of quantifying the benefits, even though the "competitive norm" has limited applicability.

## TYPES OF ECONOMIC IMPACTS

We find it useful to consider the economic impacts of rural transit systems in terms of their direct, indirect and induced economic benefits and impacts. Community benefits and nationwide impacts also need to be examined.

In this schema of impacts, our focus will be on the **net economic benefits**, which are the actual benefits to society from investing in rural public transportation. They measure real increases in economic productivity, and they produce real economic growth. These net economic benefits are sometimes referred to as "generative impacts" (for example, see Cambridge Systematics *(15)* to connote their ability to create net value to society by applying underutilized resources or by using resources more efficiently. They can be contrasted to "redistributive impacts" which represent impacts that would have occurred anyway but are shifted in terms of land use or development patterns by the transit investment and "financial/transfer impacts" which generally represent intergovernmental monetary transfers (for example, from Federal programs to local communities), and might have gone to another locality if not to the locality which actually received the funds.

### ***Direct Economic Benefits***

These benefits accrue to the users and providers of the system via the operations of the system. The economic and social services made accessible by transit — employment, human investment, health, social services, shopping, entertainment/community, and visits to friends/relatives — are each associated with direct users, the riders, who receive the direct economic benefits of the system. Also, the operators and administrators of this system, their jobs and related resources, are direct beneficiaries.

### ***Indirect Economic Benefits or Disbenefits***

These benefits accrue to those who are affected by the transit-related activities of the direct beneficiaries. Thus, for the employees who are riders of rural public transit (direct beneficiaries), their employers are impacted as indirect beneficiaries since these employers work hours and reliability of attendance are likely impacted by the system (either positively, e.g., indirect benefits, or negatively, e.g., indirect disbenefits). Likewise, some service providers, like health or social services, may gain more

customers or their customers may demand more services via the access provided by transit — leading to indirect benefits or disbenefits, depending on perspective.

### ***Induced Economic Benefits or Disbenefits***

These benefits accrue to those who receive either direct or indirect benefits as they adjust over the long run to accommodate the impacts of a transit system that continues in existence. For example, if transit systems serve business by transporting their employees or customers, this may contribute, in the long run, to creating an environment conducive to attracting business that value such services. If transit services help to improve the environment in rural resort or retirement areas, it may, in the long run, be conducive to influencing people to move to these areas. Education and training programs, supported by transit, may encourage business to locate in rural areas. Similarly, helping people to lead independent lives in their older years via transit may help to delay going to expensive care facilities, thus saving substantial resources. It also may enable them to continue to reside in these rural areas, at lower cost and greater satisfaction. Note, however, that rural transit is likely to be only one of a multitude of factors that contribute to these induced economic impacts.

### ***Community Impacts***

These benefits accrue to the community as a whole as a result of the addition of the transit system. Subsidy funding for transit from federal and state programs is a direct impact. Indirect impacts on the community include the possible reduced congestion in the streets and the reduction in air pollution. **Induced benefits** to the community might include help in enticing business to the community, help in enticing new residents to the community (such as retirees), and help in enticing shopping centers to the community. Also, transit systems can be expected to result in **economic multipliers** as additional economic activity is generated by the above actions, thus raising the total level of the community's economic activity. (For example, a driver spends part of her wages on groceries which the grocer uses to purchase more food from farmers. A farmer who sells more crops will make more purchases, some of which will increase the profits of local businesses. This sequence of events can continue through several iterations.)

### ***Nationwide Impacts***

These benefits accrue to the nation as a whole as a result of rural transit systems. Because each of the local transit systems has generally been developed on its own, we would not expect to find a synergy effect where the national impact is greater than the sum of the parts. In fact, many of the community impacts actually cancel each other out because funds being spent in one community are not being spent in another. Such impacts should not be counted at the national levels; these include transit cost subsidies which have community impacts but, at the national level, are simply funds that could have been expended in any community and for any program; thus, subsidies should not be counted as national economic impacts. Likewise, community-induced effects such as enticing industry, residents, and shopping centers are sometimes only shifts from one community to another and, as such, often don't add much to national economic activity; thus, only the **net economic impacts** of these community effects should be counted at the national level.

## TECHNIQUES OF BENEFIT MEASUREMENT

Netting out economic impacts to prevent double counting such impacts is the real art of the benefit measurement process. If one adds up the above benefits without correcting for the possibility of double counting, the true economic impact would probably be appreciably overstated. Particularly, adding benefits from the direct beneficiaries to those of the indirect beneficiaries can lead to this result, since we are often looking at the same "coin" from both sides. Because of these difficulties, economists sometimes resort to using a single measure to quantify the **total** economic effect of the addition of the transit system: two such measures are **consumer surplus**, which measures the total amount consumers would be able and **willing to pay** for transit in excess of the actual cost of these systems; and **land value** increases attributable to the economic phenomena, whereby transit program benefits to the local economy usually become capitalized into land values by the market process.

Another measurement approach is to estimate the overall increase or decrease in the level of economic activity in the community from **before** to **after** public transit is introduced (holding constant the other factors affecting the local economy during this time). This approach is similar to the "with" transit versus "without" transit valuation, which compares the community with a transit system to a similar

community without a system, the difference in economic indicators being a measure of the economic contribution of the transit system.

## OUR BENEFIT ESTIMATION APPROACH

We reviewed alternative approaches to benefit estimation at both the conceptual and the operational levels to develop the following methodology for this project. For each potential beneficiary, whether it is an individual using the system, those operating the system, the community in which the system operates, or overall national interests, we will examine the effect of the system against the alternative most likely to exist in the absence of the local transit system.

For the individual using the system, their use of the system may fall in one or more of the following categories:

- Employment - commuting to work, other work related
- Human Investment - education, training, other
- Health - hospitals, doctors, pharmacies, other
- Social Services - social security, Temporary Assistance to Needy Families, older Americans programs, many others
- Shopping - retail, other
- Entertainment/Community Activities - libraries, parks, theaters, many other destinations
- Visiting - trips to friends and relatives.

For each use that an individual makes of the transit system, would that individual have access to alternative transportation for, say, his/her particular employment opportunity if the system were not available? If the answer is **"no**," then the benefit to that individual is estimated in the employment arena. (The follow-up question would be, "Could that individual secure alternative employment, or, if not, would that individual be likely to find part time employment, or become unemployed?") On the other hand, if the answer is **"yes**," then the benefit is estimated in terms of the value offered by the rural public transit service relative

to that offered by alternative forms of transportation. Both the relative cost of each transportation service and the relative service level provided by that operator need to be considered. Yet a third situation is that of **uncertainty**; the individual may not know whether he or she can reach employment (or other use) without the system. In this case, it might be assumed that the individual finds alternative transportation after a search period but that he or she risks losing his job in the meantime.

The same logic applies to the benefits to the community. The benefits to the community are essentially the net benefits from the operation of the system (e.g., jobs and resources added over and above the costs and resources contributed by the community), plus the external benefits from the system itself such as less traffic congestion and lower air pollution, plus the multiplier benefits as the direct and indirect benefits to users work their way through the local economy.

At the societal or national level, only the net economic benefits are of interest. A fundamental question is whether the nation, overall, benefits from the commitment of resources to local rural transit operations. Thus, only real resource savings and real benefit additions are calculable as benefits; and these are, conceptually, compared to other types of national projects and ranked for priority of funding. (It should be noted that local planners and officials are often interested in adding in the redistributive and transfer benefits when assessing the impacts within their communities — viewed solely from the local perspective, these other effects certainly appear to benefit the locality, even if this benefit is at the expense of another community.)

The above approach is analogous to dropping a rock in a pool of water and watching the ever-widening ripples in the pool — the transit system is the rock and the direct effects on users is the first set of ripples, the community effect the second set, and the national effect the third set. In the overall scheme of things, rural transit is a very small rock, so that the ripples are going to be very small and difficult to detect. Also, there are many other programs causing ripples on the pond, so that the transit ripples may be very difficult to detect. An important lesson learned from the literature search, is that the effects of governmental investments are hard to detect in the real economy, even in the instance of large-scale investments; so that the impact of relatively small investments, such as a rural transit system, is very difficult to detect at the macro level. Thus, we must do a sound practical job of capturing the first and second ripples using the micro approach outlined above if we are to detect the impacts of rural public transit.

# MEASURING LOCAL ECONOMIC IMPACTS

This section lays out the methodology for measuring economic impacts of rural transit at the local level. This is followed by an enumeration of possible types of economic impacts in rural areas, which expands the general economic framework and terms discussed previously into more specific measurement formulations. We begin with the direct effects and "measure the ripples" outward from uses and users and the transit system itself to the indirect beneficiaries and the community in general. The approach is simple, direct, and practical. These materials provide the blueprint for the forthcoming chapters on economic impacts at specific sites and estimates of overall national impacts.

## MEASURING IMPACTS BY IMPACTED PARTIES

### *Uses and Users*

Public transit systems in rural areas are basically people movers that enable rural residents to access, or to better access, economic and community activities such as employment, education/training, health services, social/income maintenance services, shopping, entertainment/community, and friends/relatives. If these systems were removed, those who use them would either 1) have to find **alternative means of transportation** to reach the activities they now access via transit, (and face the consequences of different costs and levels of service) or 2) they would have to turn to **alternative activities** if alternative means of transportation were not available. Because of the large number of no-automobile or one-automobile families in rural areas and because of the very limited options to the automobile, persons in communities without public transit services may often be forced to alternative activities or no activity at all. Each of these choices — **alternative transportation or alternative activities** — provides distinct economic and/or social impacts; thus, the above choice structure provides a starting point for benefit measurement.

Assuming that public transit is no longer available to users, but that alternative means of transportation are available, typically by automobile, both the cost and service conditions associated with this alternative are likely to be affected. The total costs of automobile ownership and use should be calculated if the user chooses to own and operate his/her own vehicle as the chosen alternative to transit. The costs of riding with others or the costs of other modes of transportation need to be calculated if these

are the alternatives open to the transit users. Both the level and quality of the transportation service need to be compared between transit and the next best alternative. How does this alternative compare with transit based on reliability factors such as dependability, time required to get to destination, and timeliness of arrival (particularly important for employment and education/training)? Often, tradeoffs must be made between costs and service quality, since in many cases the costs of one means of transportation may be lower than costs of the second, whereas the service quality may favor the second means of travel.

Thus, when alternatives to transit are available, the benefit to users of having a transit system can be measured by the cost and service quality differences between transit and the next best alternative. The cost difference can be measured in dollars, a common denominator, but a way must be found to measure service quality. Probably the best way to do this is to derive an estimate from the implicit tradeoffs that these users make between costs and service. For example, a transit rider now favors transit over an automobile, even though the direct out-of-pocket costs may be more; but he or she believes that the service quality is sufficient to more than offset the cost; thus, the quality value of the alternative is greater than the added costs to this user, providing a dollar measure of its worth.

In many rural areas, there may simply be no viable non-auto alternative to public transportation, particularly for the rural poor and elderly. In these cases, the alternative is either to do without the trips now provided by rural transit or to turn to second-best alternative destinations and activities. Such alternatives will vary appreciably by type of trip purpose. For example, those persons who use transit for employment (or training/education) and lack alternative transportation would have to turn to another job, or another training or education program, or simply retire (if eligible), or become unemployed (probably the most likely alternative for many faced with no available transportation). For those now in training or education programs, if there is no alternative transportation available, they may have to discontinue the training or education. For those who depend on transportation for other uses — health, social services, shopping entertainment/community, and visits to friends/relatives — the alternatives to transportation are usually nonexistent or very limited (such as depending on the mail and telephone for part of this access).

In some cases, the transit system users are not the rural residents themselves. A number of rural public transit systems are devised primarily for tourists who visit rural areas either for the natural attributes, such as parks, or for recreation, such as skiing. In these cases, it is useful to capture the economic benefits to users in a manner similar to those used by the Park Service, or the Forest Service, when they estimate the value of outdoor recreation.

### ***The Transit System***

In addition to the benefits to the users, we need to add the unique benefits provided by the transit system itself. This is not easy to do while avoiding double counting effects. In the absence of rural transit, the resources employed by the system would, to some extent, be reallocated to other uses — transit managers would find other employment, the system's vehicles would revert to other uses, etc. To the extent that these resources are **more productively employed** in rural public transit, there is a benefit to the system from that employment. How might this materialize and how might it be evaluated? The following are some examples.

Rural transit systems provide rural residents — particularly the poor, disabled, and the very isolated — with transportation access to the benefits of mainstream America. In fact, many statutes and actions taken at the federal, state, and local levels imply that it is a public policy objective to provide such access for many groups. (In economics terminology, this represents an "equity objective" since it provides rural residents with transportation access to mainstream services on a basis roughly comparable to the access available to urban residents.) Usually, the private sector does not find it profitable to provide this access, so the responsibility falls to the public sector to provide these services.

In many instances, it is believed that the specialized (not public) client-based transit systems that have separately developed around services for seniors, programs for Medicaid, Medicare, and Head Start clients, and many others are, taken as a whole, inefficient in providing the transportation access function in comparison with rural public transportation systems. This proposition needs to be assessed in field cases and, to the extent that these alternative client-based access routes are less efficient and less effective than rural public transit, this is countable as a benefit of rural public transit (under the equity assumption). Once again, care must be counted to avoid double counting such impacts and user benefits since, if the cost of alternative transportation has already been counted as a benefit to users, only the additional cost/quality differential between public and special purpose systems is countable as the system benefit.

Special purpose regional collection systems may create economic benefits that otherwise might not materialize. The trend in retailing is toward regional malls; the trend in medical service is toward regional medical centers; the trend is aviation is toward regional airports. In much of rural America, public intercity transportation has greatly declined and private mass transportation providers have, for the most part, almost abandoned rural areas. Thus, the potential for multi-county rural public transportation

collector systems exists; however, there are few operational examples. The potential benefits from these regional transit systems could be quite great.

### ***Indirect Beneficiaries***

The indirect beneficiaries of rural public transit are many. For each of the direct users described above, there is an indirect beneficiary (or beneficiaries) who is also affected.

For employment, employers are also affected by transit system operations. In some situations, the employer may not even have the employee were it not for transit. The employer may highly value some of the service quality benefits of transit such as on-time arrival at work and reliable attendance. If a number of the employer's workers use transit system, there may be some additional benefits such as a reduced need for on-site parking and related roads; however, this is likely to be a fairly unusual situation in rural communities.

Transportation is such an integral part of local service delivery for human service programs — such as training, health, or social services — that those who run such programs need to have the public transit link to be assured that they are reaching the intended target groups, that everyone has the opportunity to participate, and that large enough groups can be assembled to take advantage of potential economies of scale in the delivery of human service programs. There are a large number of rural transit systems that serve human service programs; in fact, most such systems have users who participate in these programs. If these effects can be shown to be in addition to the direct user benefits, they should be added to the benefit computations.

If persons who are old, isolated, or poor and who now depend on rural transit for their needs are no longer provided this service, then their friends, relatives, volunteers, and others will have to try to meet some of these needs; the full resource costs to these indirect "disbeneficiaries" can be quite large. The time and other costs incurred by these persons to transport others need to be factored into such analyses.

### ***The Community***

In addition to the net of the above benefits to users and others, the community itself may accrue several types of unique benefits. The transit system may serve as a sort of security blanket since it provides a backup transportation system for moving people in case of local emergencies.

A transit system serves as an enticement for encouraging new residents to consider the community as a place of residence, particularly for the elderly who are more likely to be transit dependent. The same may hold for encouraging certain types of businesses or industries to locate there.

Another potential community effect occurs when the transit system provides services that are compatible with the principal economic bases of the locality. For example, a retirement community typically places a high demand on service workers. If it is growing rapidly, as many such communities are, it may need to draw on surrounding counties to provide these services. If the rural public transit system has been designed to accommodate this community economic need, we call it "compatible."

The community may sometimes benefit from transit via reduced congestion on the streets and lesser demands on parking; such congestion benefits would be particularly important when the community's potential for growth is limited by a highway, a river, mountain, or other natural feature that makes expansion of community facilities difficult. In other communities, transit systems may help to lower air pollution levels. Typically, neither this benefit nor the reduction in automotive congestion is as important to rural areas to the same degree as these benefits are in urban areas.

Public transit services provide transportation for older (or disabled) persons who may be experiencing declining physical and mental capabilities. Such persons represent a potential safety hazard if they continue to drive automobiles. The value of reducing the expected number of crashes and saving lives should also be examined.

### ***Induced Effects***

When transit systems become an important component of the local transportation system and an important part of the local economy, they can be expected to lead to more than the immediate effects that are noted above; that is, they can lead to long-term impacts on the community and its residents. As noted previously, this can materialize in any number of ways, including the following possibilities:

- Contribute to people deciding to live in the community, or to move within the community.
- Contribute to business/industry deciding to set up in the community, or to move within the community.
- In a tourist community, contribute to increased tourism.

- Independent living and better access to health care among older residents may contribute to reduced health care requirements such as the postponement of moving to a nursing home and/or better health status, potentially leading to a longer life.

These potential types of induced effects are examined in our case studies to see how frequently they actually occur.

## POSSIBLE ECONOMIC IMPACTS IN RURAL AREAS FROM PUBLIC TRANSPORTATION SERVICES

### *Types of Economic Impacts*

***Prior Rural Transportation Research —*** The development of a comprehensive list of potential economic impacts of rural transit operations is one of the key efforts of this project. There has been no comprehensive examination of the economic benefits that rural public transportation operations provide to their local communities. The original (1969) work on this subject, ***The Transportation Needs of the Rural Poor***, *(16)* discussed the economic impacts that could be seen within a locality that stemmed from the initiation of rural public transit services. This study showed an overall benefit/cost ratio of greater than two to one. Within the county in which this program operated, direct benefits were more than three times greater than the disbenefits. Benefits that were documented included

- savings in transportation expenses for the system's riders,
- the value of trips that would not have been made without the system,
- increased income to the system's users from participation (which would not have occurred without the transportation service) in public programs,
- the value of health care that would not have otherwise been obtained,
- the intangible benefits of the reduction of social isolation,
- salaries to drivers and other employees,
- benefits to the suppliers of equipment and services, and
- benefits to merchants in areas served by the transportation system.

Losses were also documented. They included

- losses in income to individuals and operators who had formerly supplied trips to those persons now using the public transit services, and
- losses to small merchants in less urbanized areas who formerly served the system's riders before the riders could access the more economical services in the central urban area. *(17)*

A recent study by the Georgia Institute of Technology entitled, *Development of a Methodology for Evaluating the Economic Impact of Rural Public Transportation in Georgia Counties* concludes as follows:

> "This study has estimated two important impacts of rural transit service in Georgia from the standpoint of local (county) government: the overall economic impacts and the fiscal revenue impacts. The economic impact of rural transit service is large and positive. It indicates rural transit service is a significant means to retain the vitality of rural area economic development." *(18)*

The authors qualified this finding as follows:

> "It should be noted, however, that some other economic and non-economic benefits resulting from transit service are not quantified in this study. For example, non-work trips such as shopping, medical and/or recreational trips taken by non-elderly transit dependents will generate benefits for transit users and economic benefits for the local economy, but they are not quantified in this study for the lack of data. The non-economic benefits include environmental benefits, benefits of reducing auto dependence, parking requirement impacts, land use impacts, and so on, are not quantified either. Furthermore, the benefits and costs to individual commuters, including the economic, social and human benefits of providing rural residents accessibility and mobility, travel time costs and monetary costs, are not dealt with in this study either. Further study needs to address those benefits and costs more thoroughly." *(19)*

This study was limited to Georgia and did not include estimation of some of the economic impacts of interest to this study. Still, it is important to note that this study found that the "economic impacts of rural transit service are large and positive."

Another recent study, ***Transportation and Rural Revitalization***, *(20)* investigated ways in which rural public transportation could be an economic stimulator by examining a number of case studies. The ways in which transit could stimulate the economies of rural communities are not quantified in this report, but the following categories of impacts can be derived from the case studies presented:

- increasing the opportunities for employment, especially for persons with disabilities and other without access to autos,
- providing access to training and education, the precursors to employment,
- providing cost savings to transit riders over their alternative modal options,
- generate additional activity levels for existing businesses and caregivers by creating better access for customers, clients, and employees,
- attract additional businesses to the area,
- attract tourists to the area,
- allow for the more productive use of scarce land,
- provide access to medical facilities (which are sometimes located at great distances from the persons who need them),
- help persons with disabilities and other functional problems continue to maintain independent lives within the community, and
- through the synergism created by all of the above activities, increase the overall level of economic activity in the community.

***Urban Transportation Studies —*** Little other economic impact research exists in the rural transit field, but urban transit impact studies offer some guidance about the economic benefits of rural public transit. For example, many of the impact studies conducted in conjunction with the development of the BART rail subway system in the San Francisco metropolitan area are of some use because of the extensive effort devoted to impact assessment in that region.

A new publication by Horowitz and Beimborn *(21)* describes the following benefits of mass transit operation: they are said to provide alternative means of travel, changed auto-transit modal splits, direct and indirect employment, and land-use impacts. A number of the impacts listed by these authors are difficult to quantify; in particular, the benefits of "independent living" and "recreational riding" are hard to express in dollar terms, even though such impacts obviously apply to rural populations as much as they do to those living in urban areas. Among the effects shown by the authors to be most often considered in alternatives analyses and environmental impact statements for major urban transit investments in 15 metropolitan areas — auto facility needs, environmental effects, effects on transit users, and employment impacts — the last two appear to be quite important in rural areas.

The economic impact study in *TCRP Report 35,* "Economic Impact Assessment of Transit Investments" *(15)* reported the following categories of transit-related economic impacts:

- generative impacts (net economic benefits)
  - user benefits
    - travel time savings
    - safety benefits
    - changes in operating costs
  - employment and income growth (unrelated to system construction, operation, or maintenance)
  - agglomeration/urbanization benefits
    - higher productivity
    - lower infrastructure costs
  - external benefits (e.g., air quality)
  - accessibility benefits (e.g., access to employment)
  - reduced development costs due to reduced parking
- redistributive impacts (shifts in land use and development patterns)

- land development (e.g., clustered development around stations)
- employment and income growth due to land development
- increased economic activity within the corridor

- financial/transfer impacts (intergovernmental monetary transfers)
  - employment and income growth related to system construction, operation, or maintenance
  - joint development income to local agencies, and
  - property tax impacts.

While not all of these impacts are applicable to rural communities, this framework is useful for the overall consideration of types of economic impacts from rural transit systems.

A recent study suggested that, for the Washington, D.C. metropolitan area, "The $7 million a year spent by federal, state, and local governments on the Washington area transit system returns $3.2 billion in measurable benefits . . ." *(22)* Without transit, the costs of congestion would grow by more than one-third, to a total of $55 billion for the region. In addition, this study reported "low-cost mobility benefits" to the region of $1.3 billion annually for those persons who do not drive because they are too old, too young, or disabled or cannot afford a car. Finally, the study found savings of $1.2 billion for persons who live withing walking distance of a transit station. These persons were said to save an average of $250 per month in car costs.

A different approach is that of estimating the impacts of **not having** public transit services. In a study of the Philadelphia region, *(23)* which looked at the options of rehabilitating the system for the purpose of continuing the existing services, reducing services by 50 percent, shutting down all services within 10 years, and an immediate permanent shutdown, it was found that rehabilitation and continuation of services provided a three to one benefit-cost ratio in transportation benefits alone and a nine to one ratio in terms of total economic impact. The kinds of impacts considered in this study were

- transportation cost impacts,
- traffic impacts,
- loss of mobility,
- economic impacts

- increased cost of doing business,
- reduced business access to labor markets,
- increased cost of living,
- reduced "quality of life,"
- loss of SEPTA jobs,
- shifts in personal spending patterns, with more money spent on purchases from outside the region, and
- reduced attraction of visitors.

Of these impacts, those involving auto traffic are most likely not to be a major concern in most rural areas, but the rest provide valuable examples of kinds of effects that may be relevant.

In a study of service reductions by AC Transit in California *(24)* a 12 percent reduction in service (all service after midnight, most service after 8 p.m., most weekend service, and some reduced frequencies) resulted in a cost to displaced riders of $50 million per year. Losses included increased travel expenses, jobs lost, and increased travel time. The transit agency's projected savings are $11 million per year.

A study for Central New York's Regional Transportation Authority concluded that as many as 14 percent of mass transit users could become unemployable without mass transit services. *(25)* The results of the loss of mass transit services were said to include increased unemployment expenses and increased demands on social service programs such as welfare and food stamps. This paper reported that "The cost of supporting an unemployed New Yorker is over $20,000 per year."

Finally, going back to one of the oldest innovative transit operations, sponsored by what was then called the Service and Methods Demonstration Program of the Urban Mass Transportation Administration, we find an interesting list of community impacts identified by the Director of the Westport, Connecticut Community Transportation System (certainly not a rural area, but a system that grew from a demand-responsive service to one that serves multiple community needs). The impacts that he reported *(26)* include the following:

- a fourfold economic impact

  - the transit district employs between 30 and 50 individuals,
  - the system enables women to work, no longer being tied to chauffeuring their children,
  - the system provides trips to and from work, and

- comprehensive service coverage eliminates the need for a second auto;

- the system has impacted land uses by
  - increasing real estate values,
  - reducing plans for parking facilities,
  - influencing locational decisions for elderly housing, and
  - contributing to the revitalization of Westport;

- social and personal impacts
  - the presence of the transportation service helped to initiate four day-care centers,
  - elderly and disabled persons are now much more mobile, and
  - both the young and the old are much more mobile since the system's inception; and

- utilization of community resources
  - many agencies have seen increased utilization of their resources, including summer school.

Once again, some of the impacts cited above are obviously more applicable to urban settings than to the rural communities of concern to us in this study.

***Perspectives of Practitioners —*** We contacted individuals in state Departments of Transportation to learn what economic impacts they saw from rural public transit systems. While many types of possible benefits were mentioned (see Table 6), it was obvious that the topic of the economic impacts of rural transit operations was not a subject that had received much time and attention before this study. As shown in the table, access to employment, with the concomitant expectation of decrease in unemployment, was one of the major expected economic impacts. Access to education and access to personal services (medical, shopping, and human services) were the other benefits mentioned most often. It is interesting to note that representatives of three states felt that there were no observable economic impacts resulting from the operations of the rural public transit systems in their states.

***Summary of Types of Impacts*** — Based on these studies and others examined, the kinds of impacts we will look for in rural communities will include

- **growth of the local economy** (beyond that expected without public transportation services),

**Table 6**

**POSSIBLE ECONOMIC IMPACTS OF RURAL PUBLIC TRANSIT SYSTEMS LISTED BY STATE DOT STAFF MEMBERS**

| Possible Impacts | Number of States Expecting this Impact |
|---|---|
| Improved access to employment | 4 |
| Reduction in unemployment | 2 |
| Jobs for persons with disabilities | 2 |
| Employers would move out without transit | 1 |
| Access to education for students | 5 |
| Access to medical services, shopping, human services | 4 |
| Increase in tourism | 2 |
| More jobs in tourist areas | 1 |
| Reduced living costs (can live in less expensive areas) | 1 |
| Reduced cost to tax payers from greater access to services | 1 |
| Improve air quality | 1 |
| Reduce parking needs on high cost land | 1 |
| No economic impacts expected | 3 |

- **employment effects**, both from the transit system itself and from those who use it for journey-to-work trips,

- **transportation cost impacts for the users of the system**,

- **benefits from increased mobility**

  - increased participation in social service programs,
  - health benefits of increased access to medical care,
  - personal independence (which may be extremely difficult to quantify in economic terms), and

- **impacts on expenditure patterns**.

***Where Impacts Are Likely to be Greatest***

The materials presented in this chapter have shown that

- features of rural economies,

- features of rural transit systems, and

- the types of trips for rural riders

all serve to influence the economic impacts of rural transportation. These three influences can be combined into categories called ***target groups impacted***. These groups represent "hypotheses" about **settings in which the economic impacts of rural transportation systems are expected to be the largest**, such as:

- transit systems which provide rural commuters with access to their jobs, either in rural areas or in town/cities,

- communities served by transit which have a service or manufacturing base rather than an agricultural or natural resource base,
- transportation systems which provide relatively high levels of service to their localities (to permit measurable economic impacts),
- substantial economies of scale offered by the transportation services (such as providing service to the regional airports, medical centers, and outlet malls),
- transit services which focus on education, job training, or other "human investment" programs,
- transit systems which serve expanding retirement, recreation and/or tourism communities,
- transit systems which provide cost-effective access to public services, health services, and shopping for rural, often older, people with limited transportation options, and
- communities where environmental or traffic congestion costs appear to be appreciable.

## A CHECK ON ECONOMIC IMPACTS

This chapter has described a variety of techniques for estimating the economic impacts of rural public transportation systems. From the micro level, it should be possible to observe the economic impacts by following the "ripples" from the provision of service outward. The next several chapters will look at economic impacts from the micro level.

The overall or macro perspective concerning a community's economic growth related to public transit services needs to be done in contrast with one or more nearby counties, currently without transit systems of their own, that had similar county economic characteristics prior to the inception of the first community's transit system. Using this technique, we can see how well the changes in the basic economic indicators for the county with transit services stack up against economic changes in the "control" counties without rural transit systems. Several techniques for looking at the economic impacts from the macro level will be investigated in Chapter 6.

# 4

# CASE STUDIES OF LOCAL ECONOMIC IMPACTS OF RURAL PUBLIC TRANSIT SYSTEMS

We selected 22 rural transit systems for case study investigations — 8 from site visits and 14 for "desk audits," meaning data collection by telephone fax, mail, and printed sources. This chapter describes how we selected the sites for these investigations and summarizes the results of these investigations for each of the 22 systems. Summary tables describe the systems according to their principal economic purposes. Distinctions are made between specialized economic development projects (e.g., those with over half of their trips in a single functional area — education, health, employment, training, and planned development) and human resource projects with economic benefits. Each of the 22 field projects is discussed in detail, including project background, trip purposes, types of economic impacts, and actual benefit measures.

## FACTORS CONSIDERED IN SELECTING SITES

To provide the information we need to assess economic impacts of rural transit operations, the selected case studies should address the myriad of economic, demographic, and geographic criteria that exist in rural America. One initial hypothesis held that systems oriented toward employment, training and education are more likely to have major user economic impacts than are projects directed toward other objectives; thus, we selected systems based on these objectives to the extent that they were detectible from available information. Also, we included systems with a high likelihood of having community impacts such as tourism, reduction in traffic congestion and air pollution, and regional collection systems such as access to shopping malls and regional health centers. Projects were selected that reflected the information that the states and sites provided concerning projects with potential economic effects. We identified other projects from Ecosometrics' own experience with rural transportation, as well as case studies of rural transit projects drawn from the literature. All of these sources, in addition to data on the characteristics

of the transit projects themselves, provided the basis for selecting transit systems for field investigations.

Operational and economic impact data came from the individual projects themselves, from the state data files, from Ecosometrics' prior experiences, from user trip purpose data provided by some states and individual systems, and from case studies found in the literature review. Table 7 illustrates the types of economic impact information that was provided by the states.

## SITE SELECTION PROCESS

Since the field studies are a major part of this study, we carefully developed a strategy for carrying them out that reflects all of the dimensions that are trying to incorporate and that maximizes the number of sites to be included to accommodate these many dimensions. We visited 8 sites and conducted in-depth telephone and secondary data analyses at an additional 14 sites, called desk studies, for a total of 22 sites.

Prior to our field visits, we called each of the candidate sites to determine the availability of basic data that were unavailable from secondary data sources. We requested information describing the objectives of the transit system and the basic operating and cost information on the performance of the system. For multi-county systems, we requested information on resources from, and services provided to, each county. To support the objectives of each system, we requested ridership data on trip purposes from either a ridership survey or supportable estimates from those who operate the system. (Often, the identification of contracts for transit services helps to specify the system purposes.) These basic data were often not available. In such cases, we excluded that particular transit system from the field survey (unless other information could suffice). Other sites were eliminated from consideration because reported potential economic benefits had not materialized, could not be documented, or the conditions that had once led to economic impacts had changed. This was difficult process because of the scarcity of information available on economic impacts and benefits as well as ridership trip purposes; and (sometimes) the lack of basic operating data on the transportation systems themselves.

## SITES SELECTED

Tables 8 and 9 show the 22 systems that were selected for the case studies, organized by the principal economic benefits of these systems.

Table 7:

## STATE SURVEY RESPONSES

| State | Systems having Impacts | Remarks by the State |
|---|---|---|
| Alabama | Baldwin Rural Area Transportation<br>Shelby Chilton Area Transportation<br>Northwest Alabama Council of Local Governments<br>West Alabama Health Services<br>Lawrence County Commission Public Transportation<br>Exceptional Children, Inc. | "As a result of the efforts of each, significant impacts have been realized in terms of measurable reductions regarding unemployment, fuel consumption, and overcrowded highways." |
| Arkansas | Eureka Springs Transit<br>Hot Springs Intercity Transit | Both support tourism. |
| Colorado | Avon/Beaver Creek Transit<br>City of Durango<br>Summit Stage<br>Roaring Fork Transit Agency<br>Town of Crested Butte (Mtn Express)<br>Town of Telluride (San Miguel Transit)<br>Town of Vail<br>Northeastern Colorado Transportation Authority (County Express) | " All public transit operators in resort areas have been recognized for their significant impact. They play a vital role in the economies of their towns and regions. They bring in employees unable to find affordable housing in the resort towns. In some areas, the employers help pay for the employees transit passes as a benefit. The resort transit operations allow the towns and resorts to limit the space needed for parking (with the price of land in the resort towns very high, this can be a significant savings). Because of their size some provide a significant number of jobs within the towns. The transit operation is also viewed as an economic benefit as it improves air quality in towns that are non-attainment areas for PM-10. Rural public transit agencies in areas other than resorts can also have an economic impact, such as the Northeastern Colorado Transportation Authority operating under the name County Express, which covers a six county area. While service is located in a number of small and medium sized towns, it also takes riders across county boundaries into regional economic centers for medical, shopping and connections to longer haul trips. Its own staffing needs provide employment and it supports local businesses by using these local vendors for vehicle maintenance work." |
| Connecticut | Northeastern CT Transit District | " The Northeastern CT Transit District has nine commuter runs on which many of the riders are transit dependent and would perhaps be unemployed if this service was unavailable. It could be further speculated that their employers would have to relocate or shut-down if a large enough number of their employees were not able to avail themselves of these services to get to work. The Northwestern CT Transit District also has several commuter runs, one of which is totally subsidized by an area employer. It is difficult to ascertain how significant an impact these systems have on their local employers, employees, and economy in general without some sort of quantities analysis" |
| Florida | | (All rural systems have economic impacts in their respective counties.) " The Commission for the Transportation Disadvantaged has 53 coordinated systems in place that cover all 67 counties in Florida. These systems provide transportation to transportation disadvantaged citizens." |
| Idaho | North Idaho Community Express<br>Palouse Clearwater Environmental Inst.<br>Pocatello Regional Transit (PRT)<br>Community & Rural Transp. (CART)<br>Treasure Valley Transit (TVT)<br>Ketchum-Sun Valley Transit Authority | NICE and PCEI provide vanpools for commuters.<br>PRT supports a local disabled work center.<br>TVT provides access to services to very rural counties. |
| Illinois | Rides Mass Transit District<br>South Central Illinois | (no specific remarks) |
| Iowa | Ames Transit Agency | Serves a University town (Ames, Iowa State University) |
| New Mexico | Angel Fire Transit<br>Las Vegas<br>Navajo<br>Zuni Entrepreneurial Enterprises (ZEE) | " The Village of Angel Fire located in rural northern New Mexico and home to Angel Fire Corporation the largest employer in the area find most of the labor force and much of the tourist base comes from outside the immediate area."<br>" The City of Las Vegas with its growth in popularity among tourists, has seen the need for transit to and from major places of interest increase seasonally. Much of the lodging is located in the northeastern more remote areas of the City, while the tourist attractions are in the downtown plaza area and towards the small community of Montezuma."<br>" Zuni Entrepreneurial provides access to places of employment for currently unemployed and underemployed citizens of the Pueblo of Zuni and the Zuni Reservation through the availability of daily trips to and from the Gallup area." |

Table 7 *(continued)*

| | | |
|---|---|---|
| North Carolina | | " All of the rural transit programs carry people to employment sites, educational opportunities, & shopping; Section 18 systems tend to have greater impact due to availability of state rural general public funds to assist with the cost of some of the trips." |
| Oklahoma | Kibois Area Transit System (KATS)<br>Southwest Transit (SW)<br>Pelivan Transit (PEL)<br>Call-A-Ride Public Transit (CAR)<br>Muskogee County Transit (MCT)<br>Red River Public Transportation Service (RED) | " These projects have provided shuttle services for both work and education. They have also provided various transportation services through contracts with the private sector. These services have helped the economic development within the respective service areas." |
| Oregon | City of Florence<br>SMART System | " The City of Florence recently had a transit system close down. The city representative told me that the system made a big difference in the community. The failure of that system exposed many people who relied upon the system."<br>" The general manager of the SMART system in Wilsonville has said that rural transit has made a significant impact there." |
| South Dakota | Aberdeen Ride Line<br>Beadle Transit<br>Arrow Transit<br>Community Transit<br>Interlakes Community Action<br>Palace Transit<br>Rosebud Sioux Tribe Transportation<br>Rocs Transit<br>Sanborn County Public Transportation<br>Spink County Senior Citizens | provide employment and work trips |
| Tennessee | (no specific projects identified) | " The rural public transportation network in Tennessee has allowed many rural citizens to reach health care facilities and to take a preventive maintenance approach to their own health care. Rural providers that serve all 95 counties in the state contract with the TennCare (Medicaid) program to transport clients to doctor appointments, kidney dialysis centers, cancer treatment, physical therapy, and pharmacies. Access to better preventive care costs to the taxpayers and to insurance companies. Additionally, the rural system provides transportation to employment sites and to commercial developments which contributes to the local economies. Finally, the rural providers allow many elderly citizens to maintain their independence and to access needed resources. This mobility reduces the dependence and drain on the support systems (family/friends/state and federal government programs) that are available to senior citizens." |
| Texas | Brazos Valley Community Action Agency (BVCAA)<br>Central Texas Opportunities<br>SPAN | BVCAA provides commuter runs & student transportation; Central Texas provides shopping and work trips; and SPAN provides work, student, and shopping trips. |
| Utah | Utah Transit Authority<br>Park City Transit<br>Bethphage Mission West<br>UTE Transit | (No overall remarks) |
| Washington | Pullman Transit | " This system has been exceptional in meeting the transportation needs of the community's major employer and trip generator, Washington State University. There are agreements covering service and pre-paid fares for WSU employees, faculty and students - thus freeing up WSU revenues for other necessary activities. Similar arrangement applies to Pullman public schools for students." |
| West Virginia | Central WV Transit Authority<br>Mountain Transit Authority | " A study is currently underway to improve and enhance transportation services in Harrison County. The FBI finger printing center was relocated to the area and the potential is there for growth and renewal." |
| Wyoming | Sweetwater Transit<br>Southern Teton Area Rapid Transit (START) | " I believe Sweetwater Transit has had a significant economic impact on their community. They are in the throes of buying a garage facility and a going business (transportation)."<br>" Jackson, Wyoming's transit system is run by the City of Jackson and is very important to the area as it is the only public transportation out from the city to the outlying ski areas. This system is considering very strongly selling to private enterprise." |

**Table 8**

**CASE STUDY SYSTEMS SELECTED:**
**SPECIAL PURPOSE ECONOMIC IMPACTS**

| Economic Impact Type | System and Location |
|---|---|
| Commuter Employment | DARTS, Clarksdale MS |
| Medical/Dialysis | East Central, AR<br>Tri-County Community Council, FL |
| Higher Education | Zuni Entrepreneurial Enterprises, NM |
| Tourist/Traffic Reduction and Planned Development | Eureka Springs, AR<br>Village of Angel Fire, NM |
| University/Traffic Reduction and Planned Development | Blacksburg Transit, (Virginia Tech), VA<br>Ames Transit (Iowa State University), IA<br>Pullman Transit (Washington State University), WA |

**Table 9**

**CASE STUDY SYSTEMS SELECTED:**
**HUMAN SERVICE WITH SPECIAL PURPOSE ECONOMIC IMPACTS**

| Economic Impact Type | System and Location |
|---|---|
| Employment | JAUNT, Charlottesville, VA<br>Pee Dee Regional, Florence, SC<br>El Aguilla, Webb Co, TX<br>County Commuter, Washington Co, MD |
| Medical | Aberdeen Area, SD<br>Coordinated Transportation System. FL |
| Balanced Human Services, Small County | COLTS, Lee Co., NC |
| Balanced Human Services, Large County | Sweetwater County Transit Authority, WY<br>Aroostock, ME, |
| Balanced Human Services, Multi-County | Northern Idaho, ID, Upper Cumberland, TN, Western Iowa, IA, County Express, CO |

The benefits accruing at each of these field sites are presented in detail in the following section. Tables 8 and 9 serve to introduce these field systems by showing the principal type of economic impacts that each addresses via its operations. In most cases, the subsequent benefit estimates follow directly from the types of economic impacts shown in these two tables.

Table 8 presents those systems that have specialized types of economic impacts defined as systems having a major purpose that represents over about **half** of the system's trip purposes. For example, DARTS in Mississippi provides well over one-half of its trips for **employment commuting** by rural residents primarily, to gambling casinos and, secondarily, to a state prison; other purposes, including the original impetus for initiating the system in 1990 — medical trips — comprise much less than one-half the DART trips. The **medical/dialysis** category includes two systems that have over half of their trips as medical; and trips for kidney dialysis treatment represent a high proportion of all medical trips. The Zuni Indian Reservation in New Mexico recently initiated a transit system focused on **higher education** that, primarily connects the reservation to other communities; the principal purpose that has evolved is the transport of reservation students to classes at the University of New Mexico about 50 miles away in Gallup. In the **tourist/traffic** category, Eureka Springs in Arkansas and the Village of Angel Fire (New Mexico) systems are both oriented toward transporting tourists, thus relieving traffic and parking congestion on the streets of these very small communities and thus, enabling orderly planning and development. The final category, **university/traffic reduction and planned development** includes three systems which attempt to achieve the same type of impacts as tourist systems — reduce the parking/traffic congestion (and associated accidents) and improve the orderly development of the University (for example, permitting use of land for classroom buildings instead of parking lots and roads).

Thirteen human service systems are shown in Table 9. We defined two functional categories — employment and training — and three size/scale categories — small county, large county, and multi-county. All 13 systems provide balanced human service purposes including (usually) employment, training/education, health and other economic impact categories. The larger county and multi-county systems typically cover very rural and sparsely-populated large geographic areas that create transportation challenges to rural systems and to rural people.

Table 10 provides transit operating statistics for the 22 selected systems, showing the 13 single-county systems and the 9 multi-county systems selected. Fleet size, one way passenger trips, revenue service miles and total operating expenses are presented to depict the size and scale of the selected systems. (For a few of these systems we were unable to obtain all of these operating statistics.)

Table 10:

## TRANSIT OPERATING STATISTICS FOR 22 SELECTED PROJECTS

| FIPS Code | BEL | Agency | County | State | Fleet Size | Total One-Way Passenger Trips | Total Revenue Service Miles | Total Operating Expenses |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | ***SINGLE-COUNTY SYSTEMS*** | | | | | | |
| | | | | | | | | |
| 19169 | 4 | Ames Transit Agency (Cy-Ride) | Story | IA | 38 | 2,415,215 | 830,130 | 2,863,257 |
| 23003 | 5 | Aroostook Regional Transportation | Aroostook | ME | 25 | 85,923 | 460,581 | 982,000 |
| 46013 | 5 | Aberdeen Area Ride Line | Brown | SD | 6 | 48,681 | 95,767 | 150,490 |
| 51121 | 4 | Blacksburg Transit | Montgomery | VA | 33 | 1,470,000 | | 1,677,975 |
| 24043 | 4 | County Commuter | Washington | MD | 10 | 308,416 | 442,002 | 1,089,201 |
| 37105 | 6 | County of Lee | Lee | NC | 15 | 54,339 | 184,995 | 258,986 |
| 48479 | 6 | El Aguila | Webb | TX | 6 | 150,000 | 235,500 | 343,527 |
| 5015 | 7 | Eureka Springs Transit | Carroll | AR | 13 | 449,197 | 129,288 | 398,840 |
| 53075 | 4 | Pullman Transit | Whitman | WA | 27 | 1,029,550 | 189,697 | 1,177,236 |
| 56037 | 9 | Sweetwater Co. Transp. Authority (STAR) | Sweetwater | WY | 15 | 83,059 | | 158,584 |
| 35007 | 7 | Village of Angel Fire | Colfax | NM | 4 | 21,209 | 107,769 | 88,384 |
| 35031 | 5 | Zuni Entrepreneurial Enterprise | McKinley | NM | 4 | 15,998 | 135,035 | 115,726 |
| | | | | | | | | |
| | | ***MULTI-COUNTY SYSTEMS*** | | | | | | |
| | | | | | | | | |
| 12001 | 3 | Coordinated Transportation System (CTS) | Alachua | FL | 38 | 47,868 | 853,327 | $ 700,856 |
| 12041 | 8 | Coordinated Transportation System (CTS) | Gilchrist | FL | -- | -- | -- | -- |
| 12075 | 8 | Coordinated Transportation System (CTS) | Levy | FL | -- | -- | -- | -- |
| 8075 | 7 | County Express - NE Colorado Transp. Authority | Logan | CO | 23 | 109,978 | 194,000 | $ 337,000 |
| 8087 | 6 | County Express - NE Colorado Transp. Authority | Morgan | CO | -- | -- | -- | -- |
| 8095 | 9 | County Express - NE Colorado Transp. Authority | Phillips | CO | -- | -- | -- | -- |
| 8115 | 9 | County Express - NE Colorado Transp. Authority | Sedgwick | CO | -- | -- | -- | -- |
| 8121 | 9 | County Express - NE Colorado Transp. Authority | Washington | CO | -- | -- | -- | -- |
| 8125 | 7 | County Express - NE Colorado Transp. Authority | Yuma | CO | -- | -- | -- | -- |
| 28027 | 7 | Delta Area Rural Transit | Coahoma | MS | 15 | 109,930 | 760,620 | $ 800,350 |
| 28143 | 8 | Delta Area Rural Transit | Tunica | MS | -- | -- | -- | -- |
| 28119 | 9 | Delta Area Rural Transit | Quitman | MS | -- | -- | -- | -- |
| 28135 | 9 | Delta Area Rural Transit | Tallahatchie | MS | -- | -- | -- | -- |
| 28107 | 7 | Delta Area Rural Transit | Panola | MS | -- | -- | -- | -- |

Table 10:

## TRANSIT OPERATING STATISTICS FOR 22 SELECTED PROJECTS

| FIPS Code | BEL | Agency | County | State | Fleet Size | Total One-Way Passenger Trips | Total Revenue Service Miles | Total Operating Expenses |
|---|---|---|---|---|---|---|---|---|
| 5035 | 1 | East Central Arkansas Transit | Crittenden | AR | 4 | 51,816 | 887,737 | $ 818,825 |
| 5037 | 6 | East Central Arkansas Transit | Cross | AR | -- | -- | -- | -- |
| 5077 | 6 | East Central Arkansas Transit | Lee | AR | -- | -- | -- | -- |
| 5123 | 6 | East Central Arkansas Transit | St. Francis | AR | -- | -- | -- | -- |
| 51901 | n/a | JAUNT | Albemarle | VA | 60 | 210,000 | | $ 1,698,120 |
| 51065 | 3 | JAUNT | Fluvana | VA | -- | -- | | -- |
| 51109 | 8 | JAUNT | Louisa | VA | -- | -- | | -- |
| 51125 | 8 | JAUNT | Nelson | VA | -- | -- | | -- |
| 16055 | 4 | North Idaho Community Express(NICE) | Kootenai | ID | 25 | 120,741 | 402,157 | $ 555,279 |
| 16017 | 6 | North Idaho Community Express(NICE) | Bonner | ID | -- | -- | -- | -- |
| 16079 | 7 | North Idaho Community Express(NICE) | Shoshone | ID | -- | -- | -- | -- |
| 45041 | 3 | Pee Dee Regional Transp. Authority | Florence | SC | 89 | 252,019 | 2,088,741 | $ 3,808,025 |
| 45031 | 4 | Pee Dee Regional Transp. Authority | Darlington | SC | -- | -- | -- | -- |
| 45033 | 6 | Pee Dee Regional Transp. Authority | Dillon | SC | -- | -- | -- | -- |
| 45069 | 7 | Pee Dee Regional Transp. Authority | Marlboro | SC | -- | -- | -- | -- |
| 45025 | 6 | Pee Dee Regional Transp. Authority | Chesterfield | SC | -- | -- | -- | -- |
| 45067 | 6 | Pee Dee Regional Transp. Authority | Marion | SC | -- | -- | -- | -- |
| 45089 | 6 | Pee Dee Regional Transp. Authority | Williamsbur | SC | -- | -- | -- | -- |
| 12131 | 6 | Tri County Community Council, Inc. | Walton | FL | 48 | 175,778 | 1,593,081 | $ 1,351,006 |
| 12133 | 6 | Tri County Community Council, Inc. | Washingon | FL | -- | -- | -- | -- |
| 12059 | 7 | Tri County Coummunity Council, Inc. | Holmes | FL | -- | -- | -- | -- |
| 47015 | 8 | Upper Cumberland Human Resource Agency | Cannon | TN | 50 | 203,610 | n/a | $ 1,106,874 |
| 47027 | 9 | Upper Cumberland Human Resource Agency | Clay | TN | -- | -- | n/a | -- |
| 47035 | 7 | Upper Cumberland Human Resource Agency | Cumberland | TN | -- | -- | n/a | -- |
| 47041 | 6 | Upper Cumberland Human Resource Agency | Dekalb | TN | -- | -- | n/a | -- |
| 47049 | 9 | Upper Cumberland Human Resource Agency | Fentress | TN | -- | -- | n/a | -- |
| 47087 | 9 | Upper Cumberland Human Resource Agency | Jackson | TN | -- | -- | n/a | -- |
| 47111 | 6 | Upper Cumberland Human Resource Agency | Macon | TN | -- | -- | n/a | -- |
| 47133 | 7 | Upper Cumberland Human Resource Agency | Overton | TN | -- | -- | n/a | -- |
| 47137 | 9 | Upper Cumberland Human Resource Agency | Pickett | TN | -- | -- | n/a | -- |
| 47141 | 5 | Upper Cumberland Human Resource Agency | Putnam | TN | -- | -- | n/a | -- |
| 47159 | 8 | Upper Cumberland Human Resource Agency | Smith | TN | -- | -- | n/a | -- |

Table 10:

**TRANSIT OPERATING STATISTICS FOR 22 SELECTED PROJECTS**

| FIPS Code | BEL | Agency | County | State | Fleet Size | Total One-Way Passenger Trips | Total Revenue Service Miles | Total Operating Expenses |
|---|---|---|---|---|---|---|---|---|
| 47175 | 9 | Upper Cumberland Human Resource Agency | Van Buren | TN | -- | -- | n/a | -- |
| 47177 | 7 | Upper Cumberland Human Resource Agency | Warren | TN | -- | -- | n/a | -- |
| 47185 | 7 | Upper Cumberland Human Resource Agency | White | TN | -- | -- | n/a | -- |
| 19009 | 7 | Western Iowa Transit System | Audubon | IA | 35 | 352,519 | 837,567 | $ 784,370 |
| 19027 | 7 | Western Iowa Transit System | Carroll | IA | -- | -- | -- | -- |
| 19047 | 7 | Western Iowa Transit System | Crawford | IA | -- | -- | -- | -- |
| 19073 | 7 | Western Iowa Transit System | Greene | IA | -- | -- | -- | -- |
| 19077 | 8 | Western Iowa Transit System | Guthrie | IA | -- | -- | -- | -- |
| 19161 | 9 | Western Iowa Transit System | Sac | IA | -- | -- | -- | -- |

FIPS, Federal Information Processing Standard; BEL, Beale code.

Table 10 also shows the ERS Beale Codes (Economic Research Service, U.S. Dept. of Agriculture) for the 22 related systems. The selected systems are well distributed across the various types of rural counties (Beale Codes 4-9). Beale Code 7 includes the largest number of rural counties nationwide.

Table 11 shows another set of dimensions for these 22 selected systems — the ERS economic and policy codes for the counties served. This table shows that the rural counties for the 22 selected system are well represented in each of the ERS codes. This kind of balance is needed to assure national representativeness in terms of economic and policy categories.

## THE SITE VISIT CASE STUDIES

Eight rural transit systems were visited in the last quarter of the 1996 calender year. The key information obtained on each system was the user trip purpose, including the following, as applicable: medical, kidney dialysis, employment, welfare reform (where applicable), nutrition/shopping/senior services, education, and training. In addition, for those cases in which major economic benefits accrue to the community as external effects from the operations of the transit system, as in tourist or university settings, the following information on trip purpose effects was obtained: traffic congestion, traffic accidents, parking, facility and transportation planning, and, in one case (Pee Dee Transit), community transportation service to meet major emergencies (hurricane, nuclear reactor, etc.).

By thus establishing the major trip purposes, or effects, as base information at the onset, we were able to develop benefit estimates that pertain to **each** of these purposes that applied to local situations using, to the extent available, data developed locally. This approach, which provided discrete benefit estimates for each trip purpose, helped to prevent "double counting" of benefits that can occur in economic studies. Further, it helped to make maximum use of all available local information on ridership purpose/benefit and community impact/benefit; where information was lacking locally, we were able to abstract and adapt information from similar cases where such data were available.

The principal differences between the site visit case studies presented in this section and the desk audit case studies in the following section are: 1) site visit case studies provide benefit estimates for **all** of the major types of trip and community benefits that apply to the particular system (desk audit studies provide benefits for the principal trip purposes only); and 2) site visit case studies, compared to the desk studies, provide greater depth of information on local economic situations, the local transit system as it

Table 11:

## ERS ECONOMIC AND POLICY CATEGORIES FOR THE COUNTIES INCLUDED IN THE 22 SELECTED SYSTEMS

| FIPS Code | Single (s)/ Multi (m) County | BEL | Agency | County | State | FM | MI | MF | GV | TS | NS | RT | FL | CM | PV | TP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *single county systems* | | | | | | | | | | | | | | | |
| 19169 | s | 4 | Ames Transit Agency (Cy-Ride) | Story | IA | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23003 | s | 5 | Aroostook Regional Transportation | Aroostook | ME | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 46013 | s | 6 | Aberdeen Area Ride Line | Brown | SD | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 51121 | s | 4 | Blacksburg Transit | Montgomery | VA | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24043 | s | 3 | County Commuter | Washington | MD | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 37105 | s | 6 | County of Lee | Lee | NC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 48479 | s | 3 | El Aguila | Webb | TX | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 5015 | s | 7 | Eureka Springs Transit | Carroll | AR | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 53075 | s | 4 | Pullman Transit | Whitman | WA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 37167 | s | 6 | Stanly Co. Umbrella Service Agency | Stanly | NC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 56037 | s | 5 | Sweetwater County Transportation Authority | Sweetwater | WY | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 35007 | s | 7 | Village of Angel Fire | Colfax | NM | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 35031 | s | 5 | Zuni Entrepreneurial Enterprise | McKinley | NM | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | *multi-county systems* | | | | | | | | | | | | | | | |
| 12001 | m | 3 | Coordinated Transportation System (CTS) | Alachua | FL | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 12041 | m | 8 | Coordinated Transportation System (CTS) | Gilchrist | FL | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 12075 | m | 8 | Coordinated Transportation System (CTS) | Levy | FL | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 8075 | m | 7 | County Express - NE Colorado Transp. Authority | Logan | CO | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8087 | m | 6 | County Express - NE Colorado Transp. Authority | Morgan | CO | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 8095 | m | 9 | County Express - NE Colorado Transp. Authority | Phillips | CO | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8115 | m | 9 | County Express - NE Colorado Transp. Authority | Sedgwick | CO | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8121 | m | 9 | County Express - NE Colorado Transp. Authority | Washington | CO | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8125 | m | 7 | County Express - NE Colorado Transp. Authority | Yuma | CO | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28027 | m | 7 | Delta Area Rural Transit System | Coahoma | MS | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 28143 | m | 8 | Delta Area Rural Transit System | Tunica | MS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 28119 | m | 9 | Delta Area Rural Transit System | Quitman | MS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 28135 | m | 9 | Delta Area Rural Transit System | Tallahatchie | MS | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 28107 | m | 7 | Delta Area Rural Transit System | Panola | MS | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 51901 | m | n/a | JAUNT | Albemarle | VA | ----------*NA*---------- | | | | | | | | | | |
| 51065 | m | 3 | JAUNT | Fluvana | VA | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 51109 | m | 8 | JAUNT | Louisa | VA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 51125 | m | 8 | JAUNT | Nelson | VA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |
| 16017 | m | 6 | North Idaho Community Express(NICE) | Bonner | ID | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 16055 | m | 4 | North Idaho Community Express(NICE) | Kootenai | ID | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| 16079 | m | 7 | North Idaho Community Express(NICE) | Shoshone | ID | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 45041 | m | 3 | Pee Dee Regional Transp. Authority | Florence | SC | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 45031 | m | 4 | Pee Dee Regional Transp. Authority | Darlington | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45033 | m | 6 | Pee Dee Regional Transp. Authority | Dillon | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 45023 | m | 6 | Pee Dee Regional Transp. Authority | Chester | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45057 | m | 6 | Pee Dee Regional Transp. Authority | Lancaster | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45043 | m | 6 | Pee Dee Regional Transp. Authority | Georgetown | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 45069 | m | 7 | Pee Dee Regional Transp. Authority | Marlboro | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 45025 | m | 6 | Pee Dee Regional Transp. Authority | Chesterfield | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45067 | m | 6 | Pee Dee Regional Transp. Authority | Marion | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 45089 | m | 6 | Pee Dee Regional Transp. Authority | Williamsburg | SC | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 12131 | m | 6 | Tri County Community Council, Inc. | Walton | FL | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 12133 | m | 6 | Tri County Community Council, Inc. | Washingon | FL | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 |
| 12059 | m | 7 | Tri County Coummunity Council, Inc. | Holmes | FL | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |

Table 11:

**ERS ECONOMIC AND POLICY CATEGORIES FOR THE COUNTIES INCLUDED IN THE 22 SELECTED SYSTEMS**

| FIPS Code | Single (s)/ Multi (m) County | BEL | Agency | County | State | FM | MI | MF | GV | TS | NS | RT | FL | CM | PV | TP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47015 | m | 8 | Upper Cumberland Human Resource Agency | Cannon | TN | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| 47027 | m | 9 | Upper Cumberland Human Resource Agency | Clay | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 47035 | m | 7 | Upper Cumberland Human Resource Agency | Cumberland | TN | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 47041 | m | 6 | Upper Cumberland Human Resource Agency | Dekalb | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 47049 | m | 9 | Upper Cumberland Human Resource Agency | Fentress | TN | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 47087 | m | 9 | Upper Cumberland Human Resource Agency | Jackson | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 47111 | m | 6 | Upper Cumberland Human Resource Agency | Macon | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47133 | m | 7 | Upper Cumberland Human Resource Agency | Overton | TN | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 47137 | m | 9 | Upper Cumberland Human Resource Agency | Pickett | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 47141 | m | 5 | Upper Cumberland Human Resource Agency | Putnam | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47159 | m | 8 | Upper Cumberland Human Resource Agency | Smith | TN | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 47175 | m | 9 | Upper Cumberland Human Resource Agency | Van Buren | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 47177 | m | 7 | Upper Cumberland Human Resource Agency | Warren | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 47185 | m | 7 | Upper Cumberland Human Resource Agency | White | TN | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19027 | m | 7 | Western Iowa Transit System | Carroll | IA | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19047 | m | 7 | Western Iowa Transit System | Crawford | IA | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 19009 | m | 7 | Western Iowa Transit System | Audubon | IA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19073 | m | 7 | Western Iowa Transit System | Greene | IA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19077 | m | 8 | Western Iowa Transit System | Guthrie | IA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 19161 | m | 9 | Western Iowa Transit System | Sac | IA | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | TOTAL | | 53 | 42 | 63 | 45 | 48 | 50 | 46 | 44 | 49 | 59 | 51 |

FM, farming; MI, mining; MF, manufacturing; GV, government-dependent; TS, services; NS, nonspecialized; RT, retirement destination; FL, federal lands; CM, commuting; PV, persistent poverty; TP, transfers dependent.

relates to the economy/community, and special local studies and analyses of economic effects (where available).

Each of the eight systems described in this section have created substantial economic benefits for the community it serves. These cases should be examined from the perspective of generating new ideas for other systems and localities. From the perspective of this study, their most significant common thread is their ability to generate economic benefits that can be observed and measured. Therefore, understanding the ways in which they succeeded in creating significant economic benefits for the communities that they serve should enable rural systems elsewhere to emulate some of the best practices noted here. Other rural systems should relate their respective situations to those of these cases, and should examine most closely the economic benefits for those cases whose trip purposes and local community/economic situations are most similar to their own situation. (This applies to the desk audit cases as well.)

For ease in presentation, the systems are discussed in alphabetical order. System maps are provided to depict the geographic coverage of each of the systems examined in depth. For each case, we provide a background on the community served and the transit system that serves it, the applicable trip purposes for riders and/or community, the areas of potential economic benefits, the estimates of economic benefits (including the assumptions used to generate these estimates), and a summary of economic benefits relative to the costs incurred.

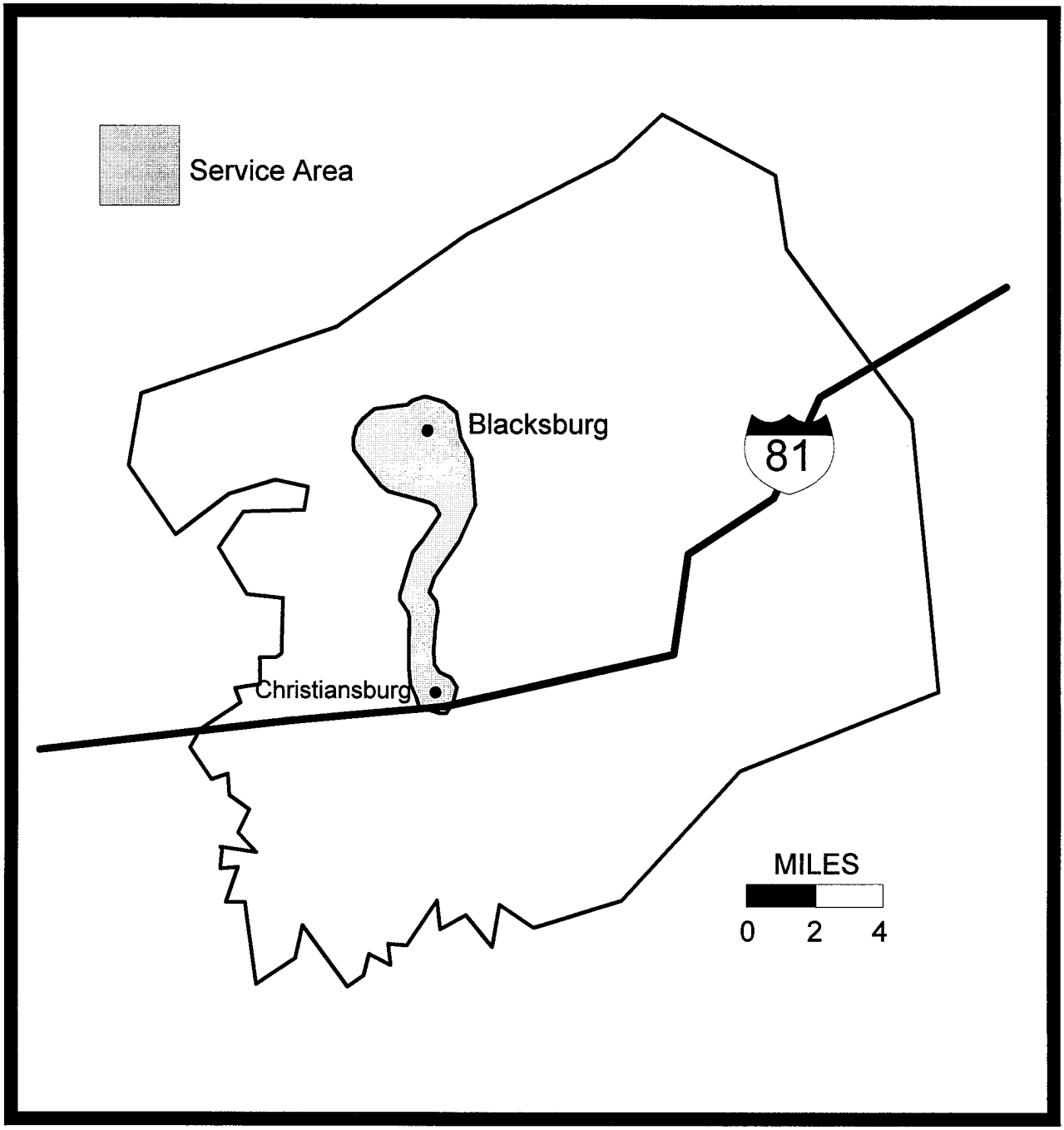
## BLACKSBURG TRANSIT, BLACKSBURG, VIRGINIA

### ***Background***

Blacksburg Transit is a system that is built around the needs of Virginia Tech University. The system is predominantly a fixed route system with all routes culminating on the University campus. About 95 percent of the ridership consists of University students and staff. The Virginia Tech contract, which is provided out of student tuition funds, provided $995,260 (59%) of the total annual operating costs of $1,677,975 in FY96. Students and staff ride the system by showing their ID cards. A map showing the service area is presented in Figure 1. Blacksburg Transit operates a fleet of 33 vehicles (buses).

**Figure 1**

## Blacksburg Transit



### ***Trip Purposes***

The principal trip purpose of Blacksburg Transit, by the very nature of the way the system is established, is access to the Virginia Tech campus for students and staff. Other purposes are minimized by nature of the routes in this fixed-route system, but one route does provide for public transportation between Christiansburg and Blacksburg.

Trip percentages are estimated as follows:

| | |
|---|---|
| Education | 95% |
| Other | 5%. |

### ***Areas of Potential Economic Benefits***

The benefits of Blacksburg Transit are not really education since, without the system, students would likely be attending the University. Also, benefits are not likely to be appreciable for the riders of the system since, in this small rural community, the auto ride to campus is convenient and is sometimes quicker than using the system because of the bus wait. However, students that use Blacksburg Transit do not have to purchase cars or pay others to take them to the campus so there is a small cost-related savings that is considered an efficiency benefit from transporting both the student/staff rider and the general public riders who use the system (only about 5% of the users, as indicated above.)

What, then, are the principal benefits of this system? The principal benefits of the system result from the external effects of the system's operations on the University. These can be visualized by looking at the University and surrounding community **without** Blacksburg transit and comparing that to the actual situation **with** Blacksburg transit. **Without** Blacksburg transit there would be much more traffic on the University streets since the system replaces about 10% of the cars on the few roads of the University and surrounding Blacksburg. With less traffic on the roads, one can expect fewer accidents and shorter travel times for all campus commuters — leading to appreciable benefits as described below. (In the long run, there is even a greater need for more roads without the system.) Also, **without** Blacksburg transit the increase in number of cars on the road would expand the need for more campus parking; but providing parking is costly and, because of the dwindling available land on campus, part of the parking need would likely be met by adding a parking building — a more expensive alternative than surface parking. Finally, in the long run, the transit system takes some of the land-use pressure off of campus planning and development by reducing future traffic (and related road) requirements as well as reducing future parking

needs; thus freeing up land for classrooms which are believed to bring in more revenues to the University than any other land use.

### ***Direct Benefit to Users***

The direct benefit to users is the efficiency benefit from the lower real transportation costs that result from riding the transit system to and from the campus (for students and staff) and between Blacksburg and Christiansburg for the general public. As indicated above, these savings are minimal since, with the system there is likely a bus wait at the point of origin whereas driving does not entail such a wait. However, for the bus rider, there is no parking time and no long walk from a parking lot at the campus; so these convenience factors essentially balance out. Thus, we are assigning a minimal direct benefit to the efficiency of transporting users based on the alternative cost of driving the relatively short distances involved in this rural community. It appears that the average trip is about 4 miles and we apply $.34 per mile as the cost of owning and operating a private auto (the rate that the Federal Government uses to reimburse its employees for use of private vehicles) to get a per trip alternative cost of $1.36. Blacksburg Transit system provides about 1,470,000 trips per year at a total operating cost of $1,677,975, for a per trip cost of $1.14. Thus, the direct benefit of this system is computed as number of trips (1,470,000) times the lower system cost per trip of $.22 ($1.36 auto less $1.14 Blacksburg transit) producing $323,400 as the direct efficiency benefit.

### ***Traffic Estimate Without Transit***

Based on Blacksburg Transit's traffic records for a week in October 1996, about 6,000 trips are taken daily by Virginia Tech students and staff (Monday through Friday, during commuting hours). Assuming that most commuters take the system round-trip to campus, we divide the number of trips by two to obtain an estimate of 3,000 daily commuters. Without the transit system, it is unlikely that there would be 3,000 fewer cars used for commuting since 1) Transit buses would no longer be road users, and 2) some current transit riders would ride with others rather than obtain cars. Thus, we assume that two-thirds of the current transit users — 2,000 students and staff — would use cars to drive themselves to campus without the transit system. These 2,000 additional cars in the absence of transit provide the basis for the Blacksburg Transit traffic and parking benefit computations which follow.

### ***Benefits from Reducing Traffic Congestion***

Data provided by Virginia Tech show that there are about 24,000 cars registered to students and staff on campus. We assume that about 20,000 of these will be used for commuting to campus on any given weekday. Thus, the 2,000 reduction in cars used for commuting (computed in the section above) attributable to Blacksburg Transit is 10% of the total campus commuting volume.

We are measuring the effect of this reduction in traffic congestion by the additional time needed to commute to the campus without Blacksburg Transit. The average daily commute to this rural campus is relatively brief; we estimate that it is about 20 minutes each way from door to door, or 40 minutes per commute. The 10% increase in traffic volume without this system likely increases the commute slightly more than proportionately — say 13% — since the added volume on the limited street system can be expected to result in a more than proportionate increase in traffic congestion (measured by travel time). Finally, we developed a dollar value for the additional commute time involved; a recent literature review study concluded that the "bulk of values of time fall between 12.5% and 50% of the prevailing wage rate. Many transit studies have adopted standard values of time — one third of the wage rate for work trips..." But wage rates for students and staff are not really applicable so we conservatively valued their wage at $9 per hour, and the value of their time at $3 an hour.

Using the above data/assumptions, we computed the value of the reduction in traffic congestion from Blacksburg Transit as follows: For all 22,000 cars used for commuting (20,000 current plus the 2,000 additional without the system), the 13% increase in commuting time converts into 1,916 hours longer per day to commute times 200 commuting days per year (383,200 hours yearly); which, times the value of time at $3 per hour, provides a traffic congestion reduction estimate of $1,149,600 per year.

### ***Benefits from Reducing Accidents***

The benefits from accident reduction are also based on the removal of commuter traffic from the campus streets. (There is also likely to be a reduction in accidents on the surrounding Blacksburg streets adjacent to the campus, but we did not attempt to estimate this type of reduction.)

It is assumed that accidents will increase in proportion to the increase in traffic congestion computed above — 13%. A recent study of benefits for the state of Indiana provided estimates, based on national data, of the costs associated with accidents — both personal injury accidents and property-only

accidents. *(27)* We obtained data from the Virginia Tech police department on the campus incidence of both types of accidents for the three most recent years.

The above data and assumptions were used to compute the benefits associated with the reduction in accidents attributable to Blacksburg Transit as follows: for the average of years 1993 through 1995, there were 36 personal injury accidents per year and 165 property-only accidents; applying the 13% increase in such accidents expected without the transit system, we get 21.5 more property accidents and 4.4 more personal injury accidents per year; applying the $6,500 estimate of each property-only accident and the $29,500 estimate of personal injury accidents (both from the Indiana study, cited above), we get an estimate of $139,750 in property-only accident transit benefits and $129,800 in personal injury accident benefits, for a total accident reduction benefit of $269,550.

### ***Benefits from Reduction in Parking***

Parking reduction is an important effect of Blacksburg transit. If the 2,000 cars removed by Blacksburg Transit required parking facilities, the following analysis estimates the costs of such parking.

We estimate that the additional parking need would be met in two ways: most of the need (80%) would be met by adding spaces to parking lots and the remainder (20%) would be met by constructing a parking building which is needed because of the dwindling land available for parking on the campus. (Note: a campus committee is now assessing the need for a parking building, an indication of the need for such a facility.) The Indiana study estimates that the cost of constructing and maintaining a parking space is $5,000; if we assume that such a space has a 15-year life, the annual cost of that space is $333. Further, the Indiana study estimates that the cost of a space in a parking garage is $20,400; again assuming a 15-year life, the annual cost is $1,360.

The following analysis of benefits is based on the above assumptions and data: to provide the 2,000 needed parking spaces, 1,600 (80%) are assumed to be in surface lots and 400 (20%) are assumed to be in a parking building; at an annual cost of $333 per lot space, the cost for 1,600 spaces is $532,800 per year; at an annual cost of $1,360 for a parking garage space, the cost for 400 spaces is $544,000 annually; the total parking benefits from Blacksburg transit, then, are $1,076,800 from parking space benefits attributable to Blacksburg Transit.

### ***Total Benefits***

The total benefits from Blacksburg Transit's operations are estimated to be $2,819,350: $323,400 as the direct benefit from lower cost transportation for system riders; and community benefits of $1,149,600 from congestion reduction; $269,550 from accident reduction; and $1,076,800 from reduced need for parking. In addition, there are appreciable, but unquantifiable, community/university benefits from the development and planning of Blacksburg and university facilities, roads, and parking that are attributable to the reduced land-use pressure contributed by the transit system. This benefit of $2,819,350 compares favorably with the system's annual operating costs of $1,677,975.

## COUNTY COMMUTER, HAGERSTOWN, MARYLAND

### ***Background***

County Commuter, located in Hagerstown, Maryland, provides fixed route service to the city of Hagerstown and Washington County, using a fleet of 10 vehicles. For Fiscal Year 1995, County Commuter provided 308,416 unlinked, one-way passenger trips, and 442,002 revenue vehicle miles of service. Total operating expenses for the same period amounted to $1,089,201. The cost per trip for the County Commuter amounts to $3.53, which is less than the national average, and about right for a fixed route system. The cost per mile figure for County Commuter amounts to $2.46, which is higher than the national average of $1.87. The trips per mile figure of 0.70 is nearly three times higher than the National average of 0.277, but is not outstanding for a fixed route system in a small urban area. A map showing the service area is presented in Figure 2.

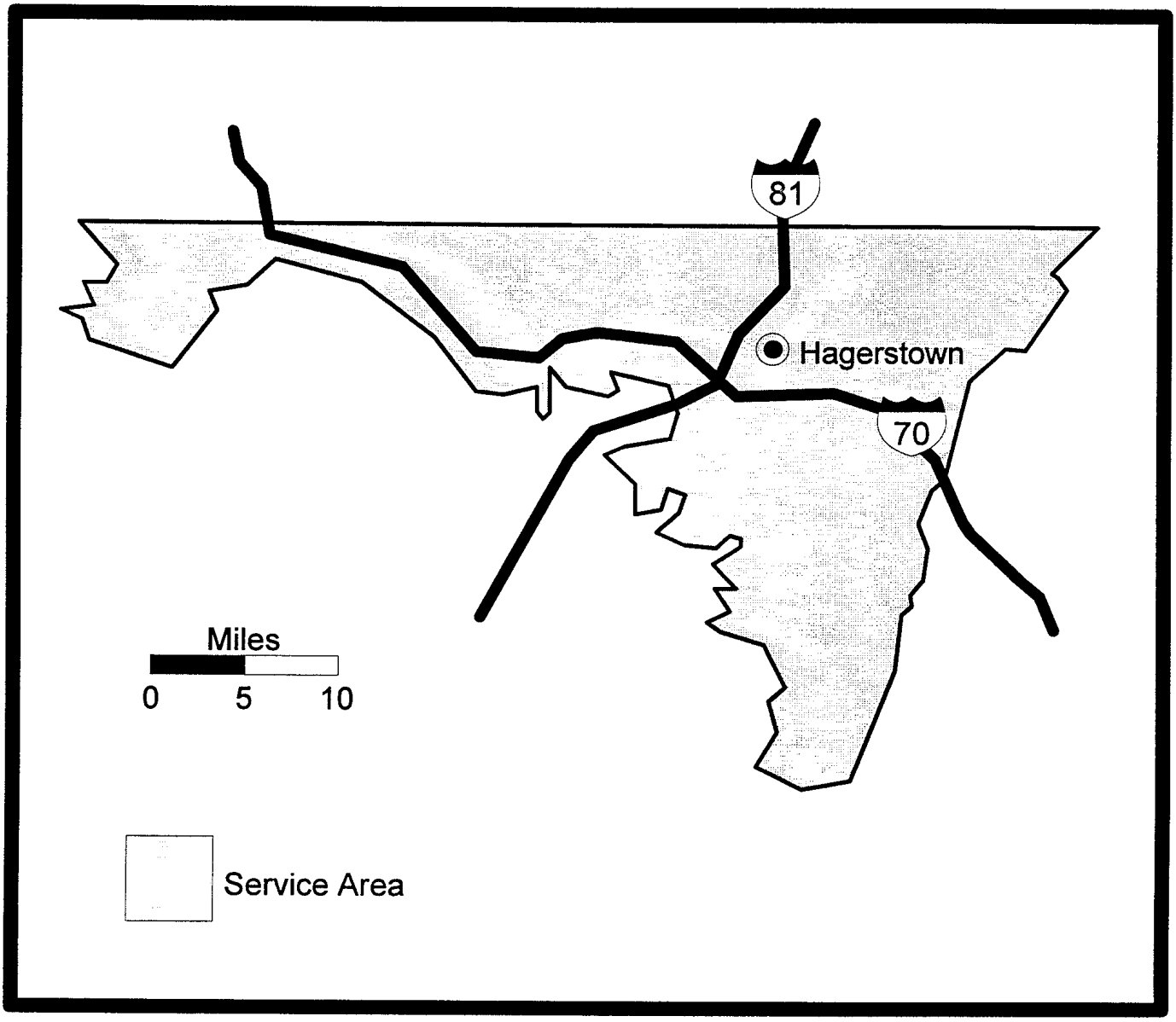
### ***Trip Purposes***

Trip purposes are as follows:

| | |
|---|---|
| Employment | 40% |
| Shopping | 25% |
| Medical | 15% |
| Training | 10% |
| Other | 10%. |

**Figure 2**

**Hagerstown, MD - County Commuter**



### ***Areas of Potential Economic Benefits***

The system's high percentage of employment, medical, and other trips indicate that a use-by-use approach to benefit measurement would be useful. The fixed route system that provides extensive scheduled route service from the surrounding rural areas into Hagerstown, location of the county's major employers, is well suited to serve employment trip demands. But the system also could be expected to have substantial community economic benefits as well as these direct benefits since it alleviates some of the traffic and parking pressures on Hagerstown and the routes into this city. (This is similar to the fixed route component of JAUNT which serves Charlottesville, VA and the surrounding counties; and, as with JAUNT, we estimate only the parking benefit of the system for lack of data on traffic congestion and traffic accidents, the other likely community benefits.)

### ***Benefits from Employment***

County commuter provides 123,366 employment trips per year, which when divided by two, gives 61,683 round trips per year to work. Dividing by 210 workdays per year, we get 294 as an estimated number of commuters. Our survey in this county shows that 80 percent of the system's riders do not even own a car, thus, 60% would be a conservative estimate of the percent who would not even have a job were it not for the transit system. Applying the 60% to the number of commuters, we get 176 as the number of commuters without jobs in the absence of transportation. Applying a conservative estimate of annual earnings of $9,000 per year (just above minimum wage), we get $1,584,000 as the loss in earnings without transit. If we estimate that public assistance benefits would drop by 50% of earnings in the absence of transit, we get an additional benefit of $792,000. These two total $2,376,000 in employment benefits.

### ***Benefits from Shopping***

Benefits from shopping are estimated on an economic efficiency basis: How much is saved in terms of the real cost of transportation as a result of the fixed route transit system? The County Commuter provided 77,104 shopping trips. If we assume that only half of these trips would be taken in the absence of the system, we get an estimated 38,552 trips in the absence of transit. The savings per trip are estimated to be $6.50 which is computed as follows: $10 via taxi (few of the riders have autos) less the $3.53 cost per trip incurred by the system (rounded to $3.50 per trip.) Thus, the benefits from shopping trips are estimated as 38,552 trips times $6.50 per trip for a total of $250,588.

### ***Medical Benefits***

Medical benefits are also estimated on an efficiency, or cost-saving basis. The County Commuter provided 46,252 trips for medical purposes. Since medical trips typically appointment trips, we assume that, compared to shopping, a greater percentage of these trips would be required in the absence of transit; thus, we assume that 75% of these trips, or 34,689 trips, would still be made. The savings per trip are estimated to by $6.50, just as for shopping trips. Thus, benefits are calculated as $6.50 times the 34,689 trips for a total medical benefit of $225,478.

### ***Benefits from Training***

The County Commuter provides 30,842 training trips per year. If we assume that 90 % of these trips would be made in the absence of transit, this figure reduces to 27,758. Dividing this figure by two, we get 13,879 training roundtrips. If we apply the training benefit per roundtrip -- $24 -- that we developed for the Pee Dee Regional system in South Carolina, we obtain a total training benefit of $333,096 for the County Commuter.

### ***Parking Benefits***

For parking, we distinguish between employment trips which generally require all day parking and other types of trips which may only be for an hour or two.. Since the County Commuter brings employees from the rural areas of the county into Hagerstown for work, we assume that the all day parking for an roundtrip would be $3 in the absence of transportation for the 61,683 roundtrips incurred, for a parking avoidance benefit of $185,049. For the other types of benefits, enumerated above, we calculated 55,498 roundtrips at $1 parking per roundtrip for a benefit of $55,498. The total of these two parking benefits is $240,547.

### ***Benefits Relative to Costs***

The benefits computed above total $3,462,717 for the County Commuter system, which compares favorably with the operating costs of the system which are $1,089,201.

## COUNTY OF LEE TRANSIT SYSTEM (COLTS), LEE COUNTY, NC

### ***Background***

COLTS was formed in 1992 to replace an uncoordinated group of overlapping and duplicative human service transportation activities. Today, it is a smoothly operating system that provides most of the human service transportation for Lee County, operating primarily through purchase of service agreements from COLTS. This system is operated out of the Lee County Senior Services agency. The system has 15 vehicles, provides over 54 thousand trips per year, at a total operating cost of almost $259 thousand. The System charges the participating agencies a rate of $1.15 per mile. A map showing the service area is presented in Figure 3.

### ***Trip Purposes***

COLT trip purposes are as follows:

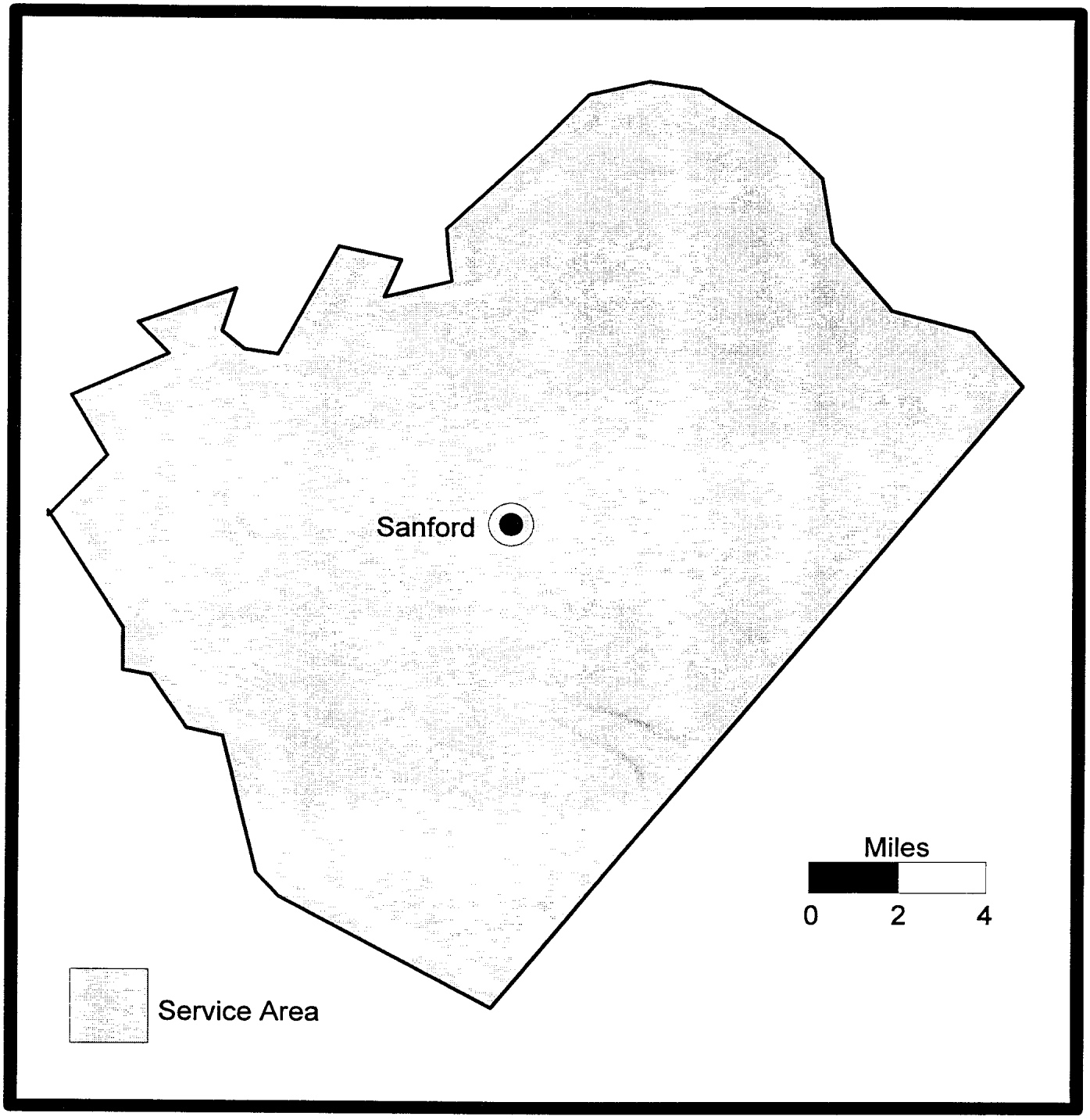
| | |
|---|---|
| WorkFirst Training/Employment | 10% |
| Employment | 10% |
| Nutrition/Shopping | 40% |
| Dialysis | 13% |
| Other Medical | 7% |
| Training | 20%. |

Medical trips are the one type of trip that goes outside the county boundaries — to medical facilities in Chapel Hill, Raleigh, and Durham. The system works closely with the Sanford Dialysis Center to identify dialysis patients needing transport and to develop a route that includes several of these patients at a time. As with most human service systems, Medicaid clients at the Department of Social Services comprise a major part of the medical trips (70-80%).

Nutrition and shopping trips are primarily for senior citizens. COLTS is administratively, and physically, located in the County's new Senior Citizen Center and provides extensive support to this Center including nutrition trips to a mid-day meal at the Center plus transportation for a broad range of activities at the Center.

**Figure 3**

## COLTS - Lee County, NC



COLTS provides transportation to a range of recipients of social service agencies including Lee County Industries (sheltered workshop, training, job placement), Center for Independent Living (educ/train/adult dev for persons with disabilities), Dept of Social Services (WorkFirst Program, the North Carolina Welfare Reform), Employment Security Commission (Job Placement, JTPA), and the Central Carolina Community College (adult education). The System provides limited employment trips at present, but as the WorkFirst Program graduates the AFDC recipients, this part of its clientele will likely grow.

### ***Areas of Potential Economic Benefits***

Two of the COLTS activities are chosen to illustrate, in depth, the economic benefits that this system produces: 1) transportation for kidney dialysis patients and 2) WorkFirst (welfare reform) transportation. In each area, economic benefit estimates are made based on data from the site visit, using assumptions only when actual data are not available. In the next section, the benefits for the remaining types of trips are estimated based on the findings of other case studies.

### ***Kidney Dialysis***

COLTS presently provides regular transportation for 23 dialysis patients, 9 in wheel chairs and 14 who are ambulatory. Since dialysis treatment is usually three times a week for 52 weeks a year, this is a major transit commitment with major economic benefits as estimated below.

People on dialysis must get regular treatment or they may die. Some are trained in home dialysis, but most choose to — or need to — get to a dialysis facility for treatment. Sanford has a dialysis facility and most of Lee County's residents on dialysis go to this facility. About one-forth (23) of these patients take the COLTS system to treatment — almost all of the wheelchair patients (9) go by COLTS. The Dialysis Facility reports that: 1) at least 2 dialysis patients have been known to move to Sanford to be closer to the Facility; 2) a few patients are known to have missed dialysis treatments for lack of adequate, affordable transportation, at potential risk to their health; 3) a few patients with poor vision or high blood pressure or other physical impediments are known to be driving themselves to dialysis treatment; or 4) a few patients are on home dialysis because they lack adequate, affordable transportation. Thus, transportation is a key component of dialysis treatment.

COLTS provides door-to-door transit to dialysis patients — handling both wheelchair and ambulatory cases. This system has developed routes which combine several dialysis patients so that COLTS is able to provide this transit service on a cost basis comparable to its other types of trips. Without

this system, dialysis patients, particularly those in wheelchairs, must turn to either 1) much more costly alternative transportation alternatives, such as ambulance, or 2) much more risky alternatives such as self driving with health impairments, incurring the risk of traffic accident.

The following benefit calculations are based on the lower cost (e.g. greater efficiency) of COLTS versus alternatives; the more desirable data on increased health/accident risk — and associated economic cost — comparisons between COLTS and alternatives are unavailable. However, if such risk/cost data were available, it appears likely that it would also demonstrate a high magnitude of economic benefits since COLTS has provided this service in a timely, professional, and incident-free basis for several years (per the dialysis facility) — no alternative offers the promise of greater cost-effectiveness.

***Dialysis Analysis***

For dialysis patients, alternative transportation to COLTS would likely involve the following:

— For wheelchair patients, the only realistic alternative is that of scheduled ambulance. Scheduled ambulance likely costs about $91 per round trip to the dialysis Center in Sanford. For three times a week, 52 weeks a year this totals $19,196 per patient, per year. For the 9 wheelchair dialysis patients, this would total $127,764 per year.

— For the 14 non-wheelchair patients, the realistic alternatives are taxicab or friends/family since there is no public transit in this county and since many on dialysis either have no auto or have health conditions that make self-transportation by auto infeasible. (The Dialysis Center screens patients as to their need for COLTS transit and only refers those patients who need the transit service.) Transport by either taxi or friends/family would cost about $30 per dialysis treatment, based on the following: Average trip of COLTS patient to dialysis is about 18 miles round trip at a taxi cost of about $30 (both figures reported by COLTS coordinator and verified by the Dialysis Center); a friend/ family trip would total about 5 hours — 1 in transit, 1 waiting before/after treatment, and 3 during treatment — applying about the minimum wage for the alternative value of this person's time ($5/hour) and $.25 per mile for auto (X 20 miles), this would also total $30. For three times a week, 52 weeks a year, this totals $4,689 per patient, per year. For the 14 non-wheelchair patients, this totals $65,520 per year.

COLTS combines dialysis passengers in to routes and provides this door-to-door dialysis service for both wheelchair and non-wheelchair patients at a cost of $10 per round trip. For the 23 dialysis patients, this totals $35,880 per year. Alternatives, shown above, would cost $127,764 for wheelchair patients and $65,520 for non-wheel patients for a total of $193,284, about 5.4 times the cost of the COLT system.

The economic benefits from COLTS dialysis transportation thus total $157,404 ($193,284 alternate transportation less the $35,880 COLTS cost) based on conservative estimates of the costs of providing this service in a comparably safe and effective manner via alternative means. In the absence of the COLTS service, it may well be that less costly alternatives would be used (particularly for the non-Medicaid patients whose transportation costs are seldom covered), but, by so doing, patients are increasing the risks that they and others face due to the increased likelihood of traffic accidents, wheelchair accidents, missed dialysis treatments, and others.

### ***WorkFirst Welfare Reform***

COLTS presently supports the WorkFirst Program via contract agreement with the Sanford Dept. of Social Services, providing 5,320 trips in FY 1996-97. The WorkFirst Program is North Carolina's Welfare Reform initiative and it was initiated in the fall of 1995. This program is expanding rapidly (for reasons described below). Transportation — particularly COLTS — is an important integral component of WorkFirst, and the potential economic benefits of the program are substantial since it is expected that many public assistance recipients will be receiving pay checks from employers instead of assistance checks from the government.

How does WorkFirst operate in Lee County, and how does COLTS support this program? The program begins with a 4 week training/orientation program at the local community college. Training is concentrated in developing job attaining skills such as building self-esteem, being punctual, personal appearance, job search approaches, job interview skills, and so forth. COLTS provides transportation to the Community College for those participants who need it. Phase 2 of the program, applicable to some participants but not to others, is the provision of additional employability training at the Social Services Dept. This phase lasts up to 8 weeks and is supported by COLTS for those participants that need transportation from their residences to the training sessions. In Phase 3, the WorkFirst participants must either do volunteer work (usually at a local government agency) or must obtain a paying job. As the program has operated to date, many of the participants are still doing volunteer work and it still remains to be determined how many will be able to get/keep paid employment. In this third phase, a local taxicab company (instead of COLTS) is providing most of the transportation to employment for the first 30 days (for those who need it); after that, the individual is on his/her own. (Principal reason for this is that COLTS does not operate after 5 PM, and many jobs require later transportation.) Note: Day Care is not a required service for Work First; parents on AFDC with children under the age of 5 are encouraged to participate, but not required to do so; they may apply for day care and may be eligible for assistance.

Of the pre-WorkFirst case load of 400 AFDC recipients, 200 had still not participated in the program as of the fourth quarter of 1996; 72 are not required to participate and are not participating; and the rest — 128 — have participated, about 75 of whom have jobs and the remaining 53 are serving as volunteers or are still in training. In November 1996, the Dept. Of Social Services held a massive orientation meeting to try to get the 200 "holdouts" to sign up for the Program. To the extent that this is successful, it will likely increase the demand for COLTS to support this program at a greater level than at present.

Thus, COLTS is an important integral part of the WorkFirst Program and, as such, deserves some percentage of the overall economic benefit of the program as it materializes. But exactly what percent this should be is subjective since the contribution of transportation cannot be separated from the contribution of the rest of the program. In the following analysis, we make the subjective judgment that this contribution is 30% and we base this on the following: the fact that the only required component of the program — limited training in job orientation skills — is not a major training program; that day care is not a required component; and that transportation is essential in getting many participants to training/employment but that local cab companies are providing most of the participants' initial 30-day employment trips.

### ***WorkFirst Analysis***

The purpose of the WorkFirst Program is to move AFDC recipients off the rolls and into jobs. However, this program is too new to have a "track record" as to what extent it will be successful in accomplishing this in different counties and settings. The economic benefits of achieving this goal are twofold: Increases earnings from employment and elimination of AFDC payments. Annually, this might be expected to average out as follows: $8,000 earnings (assuming $5/hour, 8 hour days and 200 work days/year) and $3,264 reduced in AFDC payments based on NC payments for a family with 2 children. Thus, the annual program benefits for those successful in getting/keeping employment is estimated to be $8,000 earnings plus $3,264 payments no longer needed for a total of $11,264.

However, in the real world, not everyone in WorkFirst will be successful in getting/keeping a job. Also, in the absence of the WorkFirst program, not everyone remains on the AFDC rolls forever — in fact, 2 to 3 years is an oft-quoted average. Thus, we make a basic assumption that the benefits of the WorkFirst program will last one year — that is, we assume that the caseload average time on AFDC will be reduced by a year so that the program will be credited with getting recipients out into employment a year faster, on the average, than would have been the case without the WorkFirst program. (It will take

a comprehensive evaluation of the total program (not possible for a couple of years) to provide a more refined estimate of the program's success.) The total economic benefit is assumed to be the annual benefit calculated above — $11,264. The share of this annual benefit credited to COLTS is assumed to be 30% of this, or $3,379.

How many recipients might be expected to utilize COLTS transit and what, then, might be the total benefit to the system, based on the current caseload? As shown above, there are 328 potential WorkFirst participants in Lee County. If we assume that 60% graduate to a paying job and that about half of these take the COLTS (remaining get their own transportation); we get a figure of 100 graduates taking transit. This provides a benefit estimate of $337,900 to COLTS ($3,379 benefit per participant × 100 COLTS participants).

However, the long-term economic benefits might be less if we assume that WorkFirst will be successful in reducing the present caseload from the present level of 328 eligible for WorkFirst down to a lower level of, say, 200. (Reminder: the present program has 72 families with dependent children under 5 years of age who are not required to participate in WorkFirst and who are not participating). If we apply the same factors to the 200 "long term" caseload level— 60% graduate to a paying job and half of these take COLTS, we get a "long term" benefit level attributable to COLTS of $202,740 ($3,379 benefit per participant × 60 COLTS participants.) Again, the WorkFirst program has not had time to settle down, so that these estimates are just initial estimates made with the assistance of local officials, and are subject to refinements as the Program develops. In our summary of benefits which follows, we shall use this mor conservative estimate of COLTS benefits (rather than the $337,900 figure developed above) since a comparison with the South Carolina welfare reform estimates for the Pee Dee system (which follows under the Pee Dee case study) shows that the South Carolina computed welfare reform benefits more closely align with the $202,740 figure.

### ***Training Analysis***

The COLTS system provided an estimated 10,982 training trips which, when adjusted for the 90 percent of such trips expected in the absence of COLTS transportation and when converted into roundtrips, provides an estimate of 4,942 roundtrips. We apply the $24 per roundtrip figure computed for the Pee Dee system in nearby South Carolina to arrive at a training benefit of $118,600 for the COLTS system.

### ***Nutrition and Shopping--Independent Living***

Nutrition and shopping trips are an important component of the COLTS system since they provide seniors with ready and significant access to the senior center and thus permit independent living. Thus, we are using the methodology developed for the Sweetwater, Wyoming case study to place a benefit value on senior trips for nutrition and shopping. Nutrition and shopping trips of 21,736 comprise about 40 % of the system's trips. The Sweetwater Wyoming case found that the independent living enabled by that system's trips enabled seniors to stay out of nursing homes and other institutional settings and thus provided a transit benefit for independent living of about $24 per trip devoted to independent living activities. When we apply this $24 per trip to the 21,736 nutrition and shopping trips of COLTS, we get an independent living benefit of $521,664.

### ***Other Medical***

Medical trips other than dialysis accounted for 3,692 trips. Assuming that 75 % of these trips would be made in the absence of transit, we get 2,769 trips, or 1,385 roundtrips. These trips are given an efficiency value of $20 per roundtrip based on an estimate of $30 roundtrip by taxi (or friend/family) less the $10 roundtrip cost of COLTS. The resultant medical benefit is $27,700.

### ***Employment***

Employment trips are 5,434 per year. From the Pee Dee system, we found that an average employment trip resulted in $18 per trip in benefits. However, Pee Dee is a multi-county system with many long-distance employment trips; thus, we assumed that a single county system like COLTS would have a lesser benefit per trip. Using $12 per trip as this lesser benefit, we get an employment trip benefit to COLTS of $65,208.

### ***Benefit Summary***

The above benefits total to $1,093,316. This figure includes a dialysis benefit of $157,404, other medical of 27,700, nutrition and shopping (independent living) of $521,664, WorkFirst of $202,740, other training of $118,000, and other employment of $65,208. This annual benefit compares favorably with the $258,986 annual operating costs of the system.

## DARTS, INC., CLARKSDALE, MISSISSIPPI

### ***Background***

With the demise of sharecropping in the 1950s, the Mississippi Delta region was faced with a growing dilemma. As the Delta's system of agriculture became increasingly mechanized with the Federal subsidies of the 1960s, the need for farm-labor diminished, and the Delta region was left with a largely uneducated, unemployed, and unskilled labor force. Few industries located to the Delta, most doing so only to avoid the labor laws and unions of the North. Unemployment rates for the Delta region tended to be understated, as there were so many persons classified as "not in the labor force", or missed entirely by the system. In spite of this, official unemployment rates for counties in the Delta region frequently exceeded 30% until the 1980s.

Riverboat gambling arrived in the Delta in 1993. Tunica, the only county in the region to allow casinos, has seen enournmous growth in employment. In 1994, Tunica had 8,300 residents, but provided 11,387 jobs. Recent development in Tunica County suggests that the number of jobs has risen in the past two years, with several new casinos moving in. With no jobs available in surrounding counties, Tunica has become the employment center for the entire Delta region. The question for the surrounding counties is how to get their residents to the jobs.

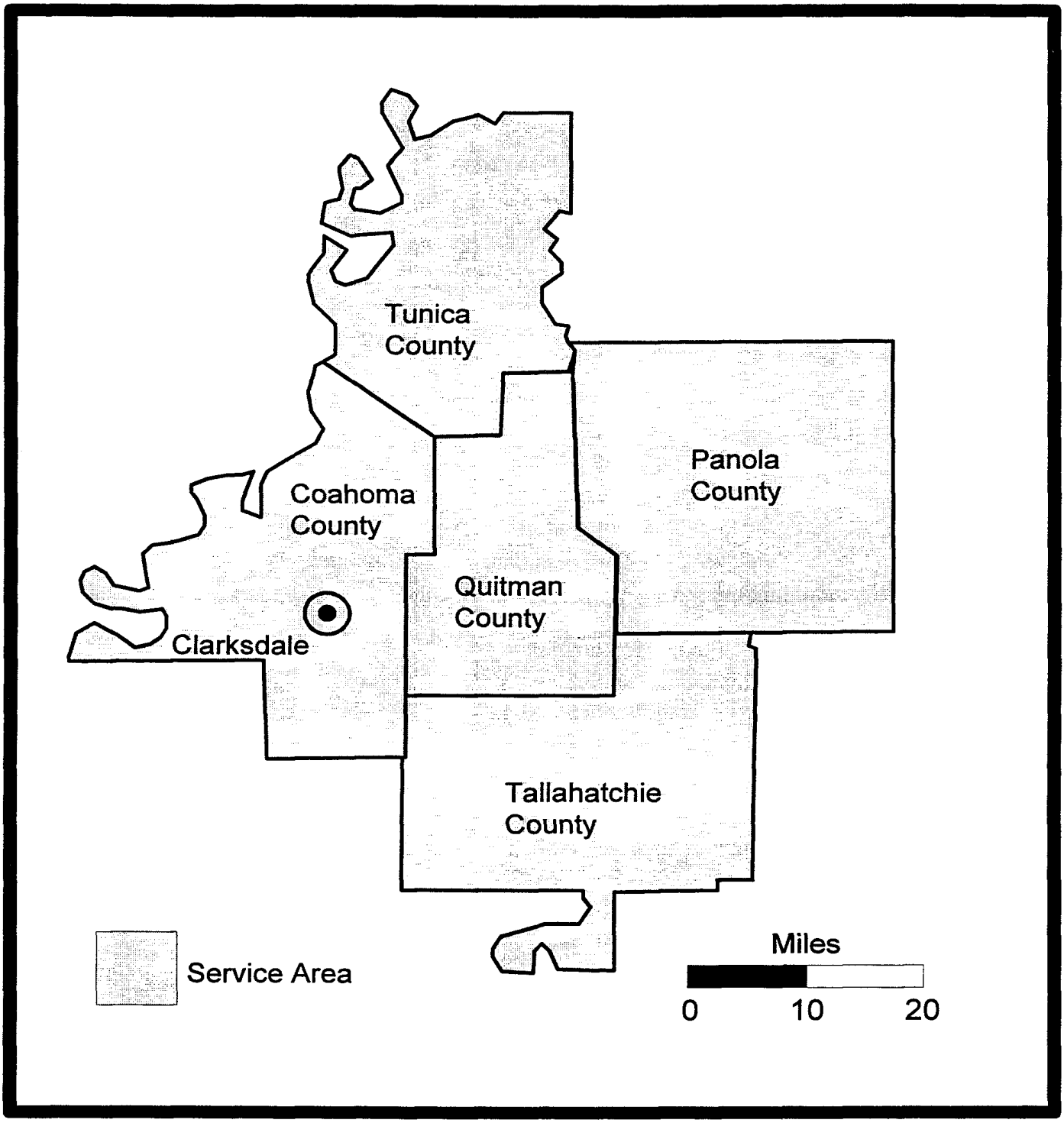
### ***Delta Area Rural Transportation System***

Clarksdale Mississippi, located in Coahoma County approximately 60 miles South of Tunica County, is home to the Delta Area Rural Transportation System (DARTS), which was established in 1990. DARTS operates out of the offices of the Aaron E. Henry Community Health Center, named for a prominent local civil rights activist. They provide transportation services for employment, job-training, medical purposes, and undefined (personal) purposes. The system operates a fleet of 21 vehicles (10 cutaways, 6 vans, and 5 full-size coaches) eight of which are wheelchair lift-equipped. DARTS employs 27 drivers for their fleet, 15 of which are full-time and 12 of which are part-time. They also employ two dispatchers, an accountant, a transit coordinator, a full-time preventive maintenance mechanic, and an executive director. A map showing the service area is presented in Figure 4.

Of the 109,930 trips provided by DARTS between October 1995 and September 1996, 87,513 (80 %) were employment-related.

**Figure 4**

## Delta Area Rural Transit System



Since the introduction of casino-gambling in the Delta area, the number and percentage of employment trips have increased sharply. In 1993, for example, DARTS provided 4,051 employment trips, which was 17% of the total trips provided (23,355). In 1994, after the inception of casino-gambling, DARTS provided 44,603 employment trips, which was 64% of the total trips provided for that year (69,810).

DARTS does keep an individual record for each employment transportation client, but these records are not computerized, and cannot be tabulated. Based on the annual number of one-way passenger trips provided in FY 1996, we estimate that DARTS provides employment transportation for 175 individuals. According to DARTS officials, 99% of their employment transportation clients are African-American, and 65% of them live below the poverty level. The current unemployment rate for the City of Clarksdale is 6.5%, which is the lowest figure in the City's history.

DARTS operates 7 separate fixed routes: 2 kidney care routes for dialysis transportation, and 5 "employment" routes. No figures are kept for individual ridership by route. Fares are based on a per-mile cost of approximately $3.50, and are available as a one-way, bi-weekly, or monthly pass. Fixed route service runs from 5:00 am, when the first casino run begins, until 2:00 am, when the last casino employees are dropped off. The average run time for a fixed route circuit is 3.5 hours. The fixed routes serving the casinos were determined based on the results of an employee survey, which was left at the casinos. DARTS has arranged with three of the outlying counties (Tallahatchie, Panola, and Quitman) to park their vehicles at County facilities, such as jailhouses. Local drivers can then begin service in the early hours, without having to drive to Clarksdale to retrieve the bus. DARTS has also made arrangements with the casinos that allow late-running drivers to call ahead and alert the employer of the situation. Late arriving employees are not penalized in such situations.

In addition to the fixed routes, DARTS also operates a charter service, with a minimum hourly and mileage-based charge. Medicaid trips are scheduled through the local Department of Human Services, and no fares are charged. Fares for other medical trips are based on the same per-mile charge as the fixed route trips. Out-of-town medical trips are scheduled for certain weekdays (i.e. Clarksdale to Oxford-Thursday & Friday) according to the destination. The number of DARTS medical trips dropped between 1995 and 1996, from 15,192 to 10,196 when they stopped going to Memphis, due to State regulations. DARTS officials stated that service to Memphis would resume in the near future.

DARTS will be initiating transportation services for the local JOBS program (Job Opportunities and Basic Skills) starting in April. This program, one of six demonstration projects nationwide, is intended to move persons off of the welfare rolls, and into job training programs and full-time employment. DARTS will be working in conjunction with Mississippi Jobs, Coahoma Community College, and Tri County Work Force. Transportation is a crucial component in the success of the JOBS program. DARTS

will be responsible for transporting JOBS participants, who will be referred by the local Department of Social Services. DARTS has set a goal of serving 150 JOBS clients by June.

### ***Trip Purposes***

The trip purposes of DARTS are as follows:

| | |
|---|---|
| Employment | 80 % |
| Dialysis | 3 % |
| Other Medical | 5 % |
| Shopping, Misc | 6 % |
| Training | 6 %. |

### ***Employment Transportation Benefits***

In terms of economic impacts, it is clear that the DARTS system plays a vital role, in terms of connecting potential employees with employers. As stated earlier, DARTS does not keep records of the number of distinct, individual clients served by their employment transportation programs. Based on the annual number of trips provided (87,513), we estimate that DARTS serves approximately 175 employment transportation clients annually. Conversations with DARTS officials indicate that the average employment transportation client earns between thirteen and fifteen thousand dollars annually. For the purposes of these calculations, the figure of $14,500 will be used, as it is the middle of the range. This amounts to a total earnings figure of ($14,500 × 175) = $2,537,500 for DARTS employment transportation clients. DARTS officials estimate that 60% of their employment transportation clients live below the poverty level. In addition, the average length of the employment trips (three to six hours, round trip) and the cost of these trips, $50 prepaid for two weeks, provides a strong indication that the vast majority of DARTS employment transportation clients are captive riders. It is difficult to imagine that anyone with a choice would elect to catch a bus at 4:00 in the morning, ride for 4 hours, and pay for the privilege. For the purposes of these calculations, we will assume that 80% of the employment transportation clients would become unemployed in the absence of DARTS services. This gives a figure of ($2,537,500 × .8) = $2,030,000 as the total earnings that would be lost in the absence of DARTS employment transportation.

These people no longer working would likely go on public support — unemployment and probably Medicaid/AFDC — support that is conservatively estimated at $700,000 based on $5,000 per

person times the 140 persons assumed to be unemployed. Total economic benefits for the DARTS employment transportation services are estimated at $2,030,000 based on earnings lost in the absence of the service plus $700,000 based on increased public support costs associated with this loss in employment and earnings, for a total of $2,730,000.

### ***Dialysis Transportation Benefits***

Dialysis transportation requires 3 round-trips per week to the kidney dialysis facility, every week of the year. For this reason, one dialysis patient can account for a large number of annual trips (312), and dialysis transportation is a major commitment for an agency such as DARTS. Our calculations estimate that DARTS serves 12 kidney dialysis patients with their two "Kidney Care" routes.

DARTS provides door-to-door transit to dialysis patients — handling both wheelchair and ambulatory cases. The following benefit calculations are based on the lower cost (e.g. greater efficiency) of DARTS versus alternative modes of transportation in the private sector.

Private transit operators typically charge a base rate of about $55 for a round trip via wheelchair van and $3 per mile as a distance charge. As DARTS officials do not keep separate mileage for each trip purpose, the average round trip figure of 15 miles for non employment trips on the DARTS system will be used for these calculations. Based on this private transit operator's charges, multiplied by the expected number of dialysis round trips per year, gives a total cost of $93,600 for the 6 wheelchair patients.

For the remaining 6 ambulatory dialysis patients, the assumed alternative cost of $30 roundtrip times the annual trips provides a total annual cost of $28,080. Adding the $93,600 for wheelchair patients to this gives a total alternative dialysis transportation cost of $121,080.

The average cost per trip for DARTS amounts to $7.28. Based on this figure, the average annual cost for the dialysis transportation for 12 patients amounts to $27,256. The total difference between the DARTS costs ($27,256) and the private operator costs ($121,080), which also could be considered the net benefit of the dialysis transportation service, amounts to $93,824.

### ***Other Medical***

Other medical trips total $5,050. We assume, as for other case studies, that 75 % of these trips would be made in the absence of transit. We further assume that the cost per trip of alternative transportation would be $15 and that all trips are for ambulatory persons not requiring wheelchairs. The

private sector costs under these assumptions is $56,820 and the DARTS cost is $36,764 -- the difference of $20,056 is taken as a benefit of the system.

### ***Total Benefits***

Thus, the total benefits of the DARTS system is computed to be $2,843,880, based on employment benefits plus dialysis and other medical benefits. Because of the relatively few trips for other purposes, it is assumed that the benefits from them is minimal. Total operating expenses for the DARTS system for Fiscal year 1996 are reported as $800,350. Therefore, for each dollar spent on DARTS, there is a much greater economic benefit.

## JAUNT, INC, CHARLOTTESVILLE, VIRGINIA

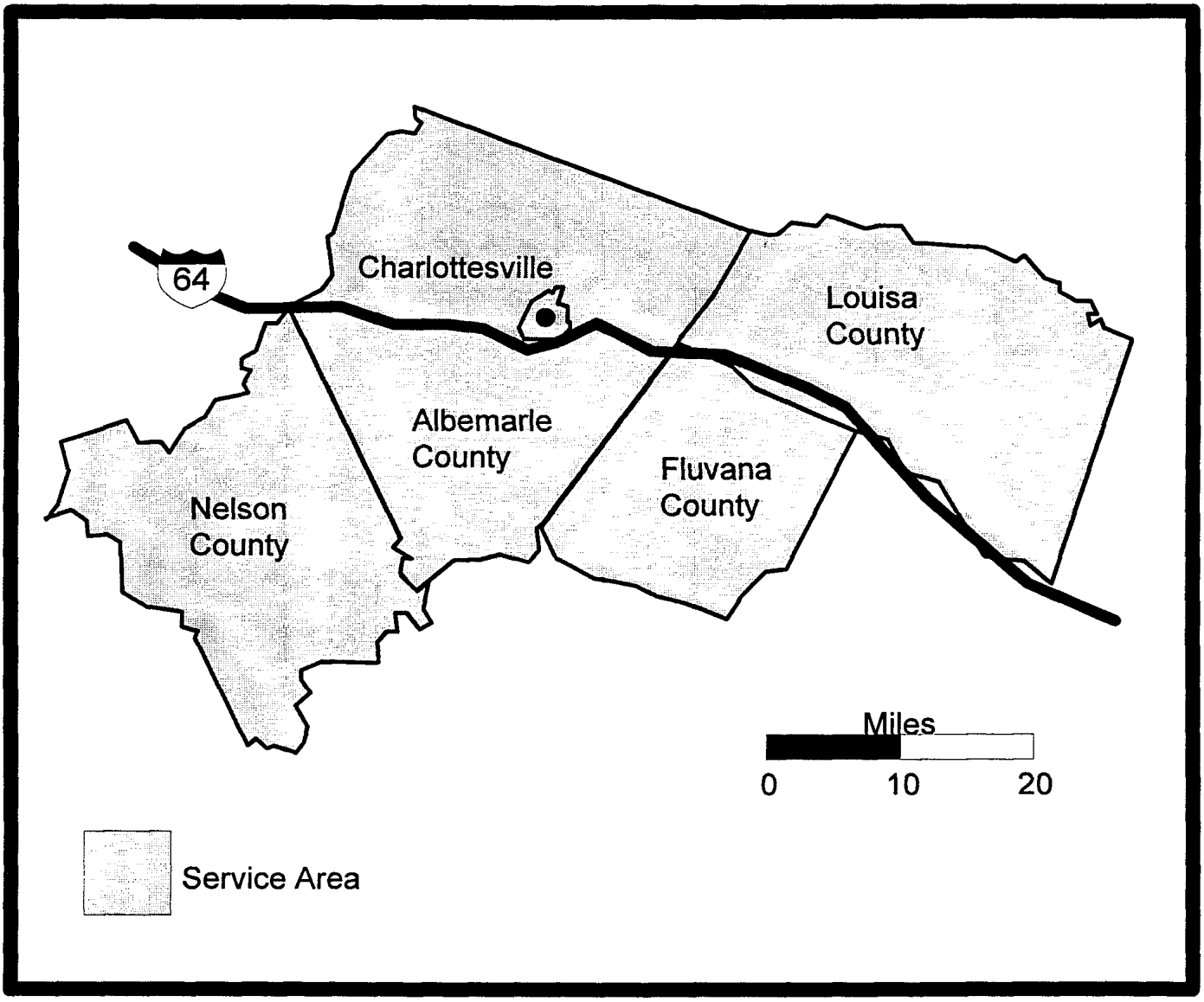
### ***Background***

JAUNT was founded in 1975 to serve human service agency clients in Charlottesville and the counties of Albemarle (in which Charlottesville is located), and the adjacent counties in Virginia Planning District 10 — Nelson, Fluvanna, and Louisa. JAUNT is owned by these participating city/counties and is governed by a Board comprised of members appointed by each locality. This system has about 60 vehicles which provide about 210,000 trips a year, at a total operating cost of about $1,641,710. A map showing the service area is presented in Figure 5.

Charlottesville and, increasingly, Albemarle County comprise the urban "hub" of this system with the other, very rural, counties employing the system primarily to access services and reach employment at the hub. To support this, the system has evolved several commuter routes which provide residents with job access to Charlottesville/Albemarle on a regular work day basis. The system also provides extensive human service trips including demand responsive trips in each of the participating jurisdictions. Charlottesville has a separate transit system (CTS) which provides fixed route service within the city, and the University of Virginia in Charlottesville also has a fixed route system (UTS) which serves the University.

**Figure 5**

**JAUNT, Inc.**



***Trip Purposes***

JAUNT trip purposes in 1996 are as follows:

| | |
|---|---|
| Medical | 36% |
| Work | 33% |
| Social/recreation | 12% |
| Adult day care/nutrition | 7% |
| Shopping and other | 5% |
| School/day care | 6%. |

However, medical trips only surpassed work trips for the first time in 1996. Averaging the past 6 years, work trips are 35% of all trips and medical trips are 26%. Thus, fairly consistently, work trips via the commuter routes are a little over one-third of all trips and medical trips are about one-fourth of all trips, with the remaining trip purposes accounting for just under 40% of the total.

In terms of demographics, the JAUNT system provides its trips to the following groups in the percentages shown:

| | | |
|---|---|---|
| Household annual incomes below $15,000 | 68% | |
| Female | 76% | |
| Race | | |
| African American | 44% | |
| Caucasian | 40% | |
| Native American | 12% | |
| Disabled | 51% | (24% in wheelchairs) |
| Frequency of riding — 2 to 5 days/week | 83% | |
| Length of time using JAUNT — over a year | 71% | |
| Alternative transportation: | | |
| None | 34% | |
| Sometimes | 43% | |
| Age — 65 and over | 45%. | |

### ***Areas of Potential Economic Benefits***

Several JAUNT activities contribute to the economic benefits that this system produces: 1) Employment trips via fixed commuter routes and via the demand response activities of the system; 2) Employment trips provided by a recently-completed JobStar demonstration through which disabled persons are provided transit via JAUNT; 3) Transportation for regularly-scheduled treatment of kidney dialysis patients; 4) Transportation for other medical purposes; and 5) Parking costs not incurred in the community (primarily Charlottesville) because of the operations of the JAUNT system. In each of these areas, economic benefit estimates are made based on data from the site visit, using assumptions only when actual data are not available.

### ***JAUNT Commuter Routes and Other Employment Trips***

On each workday, JAUNT provides commuter runs from Louisa County (1 route), Nelson County (2 routes), Fluvanna County (2 routes), and Albemarle County (routes). These rural to urban commuter routes have been in operation since the early 1980s and represent a somewhat unique feature of the JAUNT System — few Section 18 counterparts have fixed employment routes and fewer yet are believed to provide over one-third of their total trips in this category. Most of these fixed routes terminate in Charlottesville at or near the University and its hospital/health services complex. Some routes terminate in Albemarle County just outside of Charlottesville where the most rapid economic growth has been occurring. One exception to the Charlottesville area termination of commuter routes is a commuter route from Augusta County to the Wintergreen ski resort area in that county bordering the George Washington National Forest. A second van is added to this route during the three-month ski season. A unique feature of this system is that the employment vans terminating in the Charlottesville area are reassigned to local demand responsive uses during the day and then returned in the evening for the return trip.

The number of trips generated by these employment routes, by county, are as follows:

| | |
|---|---|
| Albemarle | 8,508 trips |
| Nelson | 6,300 trips |
| Wintergreen | 8,840 trips |
| Fluvanna | 5,700 trips |
| Louisa | 3,000 trips |
| | |
| TOTAL | 32,348 trips. |

In addition to these fixed route employment trips, there are an estimated 36,881 employment trips that are provided annually by the demand responsive component on this system. Thus, in the analysis which follows, the benefit values of the employment trips are based on the total of these two types of employment trip sources, or 69,229 employment trips.

***Employment Benefit Analysis***

These employment trips via JAUNT are a very important factor contributing to the JAUNT riders' ability to get and to keep their jobs. It appears that, in the absence of JAUNT, many would have difficulty getting to work and many others would have difficulty affording the cost of alternative transportation. In the survey reported above, 51% of the JAUNT users indicated that they had a disability. Among the new riders, 20% reported that they started using JAUNT because they became unable to drive. Also, 68% reported that their household made less than $15,000 per year. (However, these figures apply to the general JAUNT user and not specifically to the JAUNT commuters.) The following table shows the additional cost that commuters would have to incur if they drove automobiles rather than taking JAUNT in the absence of this system. The automobile costs are based on $.25 per mile times the approximate mileage in the commute to Charlottesville plus an estimated $2 per day for parking:

**Table 12**

**ADDITIONAL COSTS FOR JAUNT'S RIDERS IN AUTOS**

| Origin County | Town | JAUNT FEE | AUTO COST | AUTO COST LESS JAUNT COST |
|---|---|---|---|---|
| Louisa | Louisa | $3.00 | $17.00 | $14.00 |
| Fluvanna | Palmyra | $4.00 | $14.50 | $10.50 |
| | Fork Union | $4.00 | $20.00 | $16.00 |
| Nelson | Lovington | $4.00 | $19.50 | $15.50 |
| | Piney River | $4.00 | $23.00 | $19.00 |

The Metropolitan Planning Organization for Charlottesville-Albemarle Co. reports that 70% of the area's commuters drove alone in 1990; thus, the single car and one driver assumed above is probably the most realistic alternative to JAUNT. The JAUNT economic impact survey for 1996 reports that the average JAUNT commuter makes $5.47 per hour. As shown above, the average JAUNT fee is $3 for Louisa County and $4 for each of the other counties — less than an hour's earnings for the commuters. However, in the absence of JAUNT, the cost to the commuter, who is assumed to pay $.25 per mile and $2 per day to park, would increase to $14.50 to $23.00 per day or almost three to almost five times the individuals average hourly wage. These costs, then would likely cause many commuters to: 1) quit work altogether and go on unemployment and possibly Medicaid or AFDC; 2) get jobs closer to home (not too likely in these rural non-growth counties); or 3) find carpools to lower costs (not too likely in these very rural counties). Given the fact that many of these individuals have disabilities and other personal and transit difficulties (described in the preceding paragraph), the most likely alternative is #1 — quitting work and going on public support programs. Thus, in the following analysis, we will assume that 60% of these commuters will fall in the category of quitting work and reverting to unemployment and public support.

### ***JAUNT Benefit Analysis***

Based on the above assumptions and supporting data, the following economic benefits are estimated for JAUNT commuting trips. In 1996, JAUNT provided 69,229 employment trips, mostly to Charlottesville, Albemarle County but including the Wintergreen resort trips for Nelson County residents. Dividing this number by 2 gives 34,614 daily round trips provided by JAUNT. Each of these round trips is associated with individual earnings of $38 per day ($5.47 per hour times an average 7 hours per day, per JAUNT economic survey). Earnings per day ($38) times number of daily round trips (34,614) gives $1,315,332 as total earnings associated with JAUNT employment trips. It is assumed, based on the above analysis, that 60% of the commuters riding JAUNT would become unemployed in the absence of the commuter runs; thus, 60% times total earnings of $1,315,332 gives $789,119 as the total earnings expected to be lost in the absence of the JAUNT commuter service. And these people no longer working would likely go on public support — unemployment and probably Medicaid/AFDC — support that is estimated at $394,600 based on one-half of the earnings amount. Thus, total benefits of JAUNT commuting trips are estimated at $789,199 based on earnings lost in the absence of the service plus $394,600 based on increased public support costs associated with this loss in employment and earnings, for a total of $1,183,799.

***JAUNT JobStar Program***

At the end of FY 1996, JAUNT completed a three-year JobStar demonstration program for the U. S. Department of Education, Rehabilitation Services Administration. This demonstration provided door-to-door transportation only for certified ADA-eligible individuals with disabilities and only for the purposes of employment and training access. This service was provided 24 hours a day, 7 days a week. In all 295 unduplicated passengers used this service over the three years, far exceeding the program goal of 70.

The following demographics depict the characteristics of the JobStar participants:

| | |
|---|---|
| Household annual incomes below $15,000 | 50% |
| Female | 50% |
| | |
| Race: | |
| African American | 31% |
| Caucasian | 58% |
| Native American | 12% |
| Disabled 100% | |
| Frequency of riding — 2 to 5 days /week | 100% |
| Length of time using JobStar — over a year | 73% |
| Alternative transportation: | |
| None | 62% |
| Sometimes | 19% |
| Trip purposes: | |
| Work | 77% |
| Training | 23% |
| Age — 65 and over | 4%. |

Thus, compared to the average JAUNT rider (shown at the beginning), the demographics of JobStar participants are quite different: The JobStar participant is younger (4% 65 and over vs. 45% 65 and over; JobStar 50-50 male/female vs. 76% female for JAUNT; 100% disability for JobStar vs. 51%; 62% with no transportation alternative vs. 34% for JAUNT; and 50% income under $15,000 vs 68% for JAUNT. Note: statistics for the JAUNT system's administration of JobStar were kept separate from the overall

system; thus, the JAUNT data for participants and costs/operations do not include data for the JobStar program.

### ***JobStar Benefit Analysis***

JobStar participants report an average hourly wage of $5.31 for an average work week of 35 hours. Because of the total disabilities of JobStar participants and because 62 % report a lack of any alternative transportation, it is believed that these participants are even less likely than JAUNT commuters to be able to find alternative transportation suitable to their disability in the absence of JobStar; thus it was assumed that 75% would not keep their jobs in the absence of this program (vs. 60% assumed for the JAUNT commuter). In September 1996, there were 62 JobStar participants regularly using JAUNT for work trips. They worked an average of 35 hours per week (times 52 weeks a year), for 112,840 work hours per year; multiplying this by the $5.31 average wage per hour provides total earnings of $599,180 per year. Crediting 75% of these earnings to the JobStar program gives an estimated benefit of $449,385 per year. Add to this an assumed government assistance payment to unemployed JobStar participants of $224,692 (50% of earnings benefits as was assumed for JAUNT commuters) provides a total benefit estimate of $674,077 for JobStar.

In terms of costs to produce this benefit, the 62 persons taken to employment by JobStars at 10 roundtrips per week and 52 weeks a year produces a total of 32,240 trips. The average JobStar trip costs $13.48 — much higher than the average JAUNT trip because JobStar provides service 24 hours a day, 7 days a week (often single passenger trips) vs. JAUNT which does not provide night and weekend service. Thus, JobStar job-related trips cost $434,595 (32,240 trips at $13.48 per trip). The annual benefits of this program — $674,077 — thus are about one and one-half times these costs of $434,595. This is truly a demonstration of the effective employment demand for transportation by the disabled; the ability of a regional transit company to effectively tailor its services to address the latent demand of those with disabilities and to convert this latent demand into reality; and to do so in a way that benefits well exceed the costs.

### ***Kidney Dialysis Transportation***

In response to a questionnaire completed by the JAUNT Executive Director, JAUNT transports about 30 kidney dialysis patients to dialysis centers in Charlottesville. Twenty of these patients require wheelchair equipped vans and 10 do not. Twenty of the patients travel about 15 miles round trip to

treatment and 10 travel about 60 miles round trip to treatment. Since dialysis treatment is usually about 3 times a week, 52 weeks a year, this transportation is a major commitment by JAUNT.

JAUNT provides door-to-door transit to dialysis patients — handling both wheelchair and ambulatory cases. The following benefit calculations are based on the lower cost (e.g. greater efficiency) of JAUNT versus alternative modes of transportation in the private sector.

### ***Dialysis Analysis***

We asked JAUNT to identify a private sector transit provider that furnishes transportation to wheelchair patients on a door-to-door basis as does JAUNT, since 20 of the 30 dialysis patients require wheelchairs. There was only one such provider in the area and the following analysis is based on the costs reported by this provider.

The private transit operator charges a base rate of $55 for a wheelchair van and $3 per mile as a distance charge. The JAUNT system reports that about two-thirds of the dialysis patients travel about 15 miles round trip to dialysis, and the remaining one-third travel about 60 miles round trip.

For the wheelchair van patients (20 of the 30 dialysis patients taking JAUNT), the alternative cost per year, based on this private transit operator's charges, multiplied by the expected number of dialysis round trips per year, gives a total alternative cost of $202,800 for the 13 patients traveling an average of 15 miles round trip, and a total alternative cost of $256,620 for the 7 patients traveling 60 miles round trip. The total cost of transporting these wheelchair patients would be $202,800 plus $256,620, or $459,420.

For the 10 non-wheelchair patients taking JAUNT to dialysis treatment, we assume that the alternative cost of transportation would be $20 per trip for the cross-county trips involved. Based on this we calculate a total cost of $62,400 for transporting the 10 non-wheelchair patients via alternative means.

The JAUNT costs of providing transportation for these 30 dialysis patients is $7.83 per trip which, for the dialysis trips discussed above, totals $73,289. The efficiency benefit, then, is the cost of alternative transportation less the costs incurred by JAUNT — $459,420 for wheelchair patients (alternative) plus $62,400 for non-wheelchair patients (alternative) less $73,289 JAUNT operating costs for a net dialysis transportation benefit of $448,531.

### ***Other Medical Trips***

In addition to dialysis trips, JAUNT provided 66,160 trips for other medical purposes. This is not surprising since the University of Virginia Hospital and the surrounding medical complex is a major regional medical entity. We shall place a benefit value on these trips using the same assumptions as in the

other case studies. We assume that 75 % of these trips would be made in the absence of the transit system, and that 10 % of the trips are by wheelchair (90 % without wheelchair). Also, we use the same assumptions as for the dialysis trips as to the costs of the wheelchair and non-wheelchair trips. Applying this methodology, we obtain a figure of $1,178,475 as the total cost of alternative transportation and a figure of $518,033 as the cost of JAUNT transportation, the difference of $660,442 being an estimate of the benefits of other medical transportation.

### ***Parking***

In the absence of JAUNT, there would likely be increased traffic and increased need for parking in the Charlottesville area. The increased traffic — and traffic accident — cost is difficult to estimate, and it is not likely to be appreciable since public transit, including JAUNT, makes up only about 3% of the traffic in the area. Parking in Charlottesville is becoming scarce and expensive, and the parking pressure is increasing in Albemarle county, so that there would be a need for increased parking in the absence of JAUNT — the following analysis of benefits to parking makes a rough estimate of these JAUNT benefits in terms the increased need for parking in the absence of the system.

### ***Parking Analysis***

For JAUNT employment trips, we have already assumed in the above benefit computation that 60% of those now working would lose their jobs in the absence of JAUNT commuter transit ant that 75% of the JobStar disabled employees would lose their jobs in the absence of JAUNT. For those that continue to work, it is assumed that each will drive and park (70% of the employees in the area drive to work alone and park). Further, it is assumed that the economic cost of a parking space is $3 per day in the Charlottesville area. (Economic costs are defined as the alternative use of the land used for parking plus the costs of developing, maintaining and operating parking lots). Finally, for the non-employment JAUNT trips, it is assumed that half of these trips would result in additional automobile parking in the absence of JAUNT (the other half would either not be made of would not result in parking) and that the economic cost of such trips would be $1 per round trip (assuming that the average trip purpose would result in about a two hour parking time vs. all day for employment trips). Based on these assumptions, the following annual parking benefits are derived: $29,073 commuter, $9,450 JobStar, and $35,138 for other trips for a total of $73,651 in JAUNT benefits. In this case, there are no offsetting costs.

### ***Other Trip Purposes***

The above analyses of benefits has demonstrated that JAUNT provides major economic benefits via employment transit ($1.183.799), JobStar transit ($674,077), dialysis transit ($448,531), other medical trips ($660,442) and parking ($73,651) for a total estimated benefit of $3,040,500 — a benefit that well exceeds the total JAUNT operating cost of $1,641,710.

## PEE DEE REGIONAL TRANSPORTATION AUTHORITY, FLORENCE, SC

### ***Background***

Pee Dee was founded in June 1974 and began operations in August 1976. Today, Pee Dee serves the counties of Chesterfield, Darlington, Dillon, Florence, Marion, Marlboro, Chester, and Lancaster. The system also provides limited service to the counties of Georgetown (Medicaid), Williamsburg (Medicaid), and Union (Family Independence Act). In 1996, Pee Dee added to its system the above-listed counties of Chester, Lancaster, and Union, primarily in response to the transit need created by South Carolina's welfare reform program, called the Family Independence Act. Also, York County, adjacent to Charlotte, NC, joined the Pee Dee Authority in July 1996, and will soon begin service. Florence, is a metropolitan county and the remainder are rural counties.

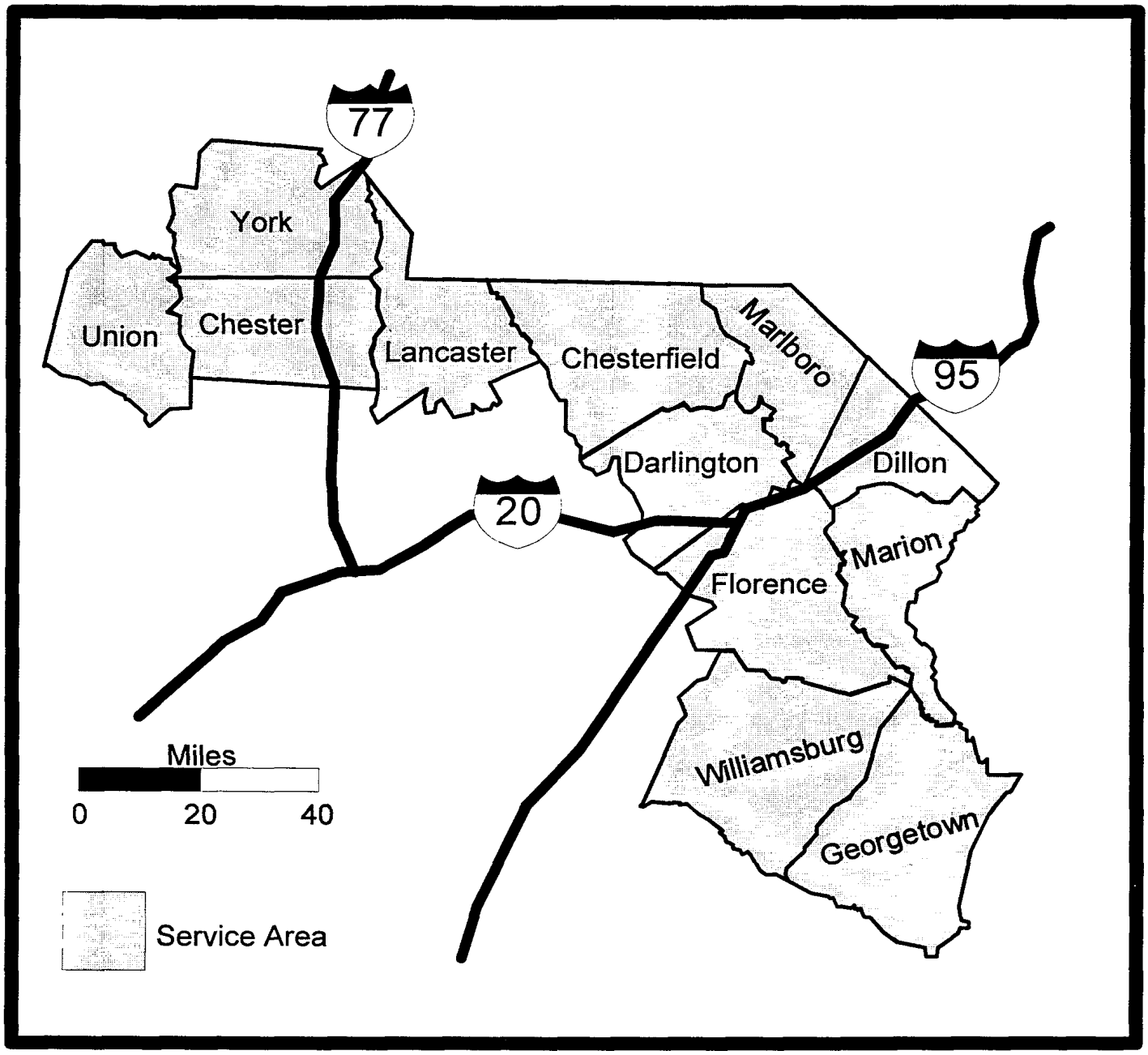
Pee Dee operates 89 vehicles providing 891.190 trips per year. The system has annual revenues of $3.1 million, 78% of which is covered by revenues from contracts. Pee Dee provides virtually every type of service provided by transit including charter, subscription, and other in addition to demand responsive and fixed route. A map showing the service area is presented in Figure 6.

### ***Trip Purposes***

Pee Dee serves a variety of employment and employment-related services including: 1) employment trips to Myrtle Beach and the Grand Strand, supported by the employers, the Department of Social Services and employment/training agencies in counties served, as well as fares to the riders; 2) employment and training trips for the Family Independence Act participants, including trips across the state line into Charlotte, NC for the counties of Chester, Lancaster, and Union; 3) a variety of training and education support services, even including contracts with parent groups to transport public school students to activities not supported by the school bus system and JTPA / Vocational Rehabilitation trips.

**Figure 6**

## Pee Dee Regional Transportation Authority



Overall, the Pee Dee trip purpose percentages for September 1996 are as follows:

| | |
|---|---|
| Work (non-FIA) | 13 % |
| FIA work/training | 9 % |
| Job training | 6 % |
| Education | 13 % |
| | |
| Dialysis | 3 % |
| Other Medical | 42 % |
| Seniors — Adult Day Care | 3 % |
| Special Operations | 11 %. |

***Employment Transportation Benefits***

Pee Dee employment trips are identified in the Pee Dee computer runs. From these, we have derived an estimate of 123,406 employment trips per year, of which about two-thirds are summer employment trips to beach resorts. Dividing by two, we get an estimate of 61,703 employment round trips per year. Pee Dee has conducted surveys to show that the persons who take these trips average $6.06 wage per hour. We assume that the transit system deserves credit for 60% of the wage received because most of those who use the system are transit dependent and would be unable to get to work at the beach area without the Pee Dee system. This 60% credit computes to $29.09 per day for each of the 61,703 employment round trips per year, for a total employment wage benefit of $1,794,940 per year. In addition, we are assuming that most of these employees would be on public assistance in the absence of the transit program; thus, there is an assumed reduction in public assistance benefits amounting to about 50% of the employment wage benefit, for an annual total of $897,470. Thus, we estimate that the total economic benefit attributable to Pee Dee employment trips is $2,692,410 — derived by summing wage and public assistance benefits.

***Trips for Family Independence Act (Welfare Reform)***

Pee Dee has taken an active role in providing transportation to support South Carolina's Welfare Reform Program, called Family Independence Act. This Act requires that those persons in the Aid to Families with Dependent Children (AFDC) attend training and obtain employment, or relinquish their

AFDC payments. The counties most recently added to the Pee Dee system — Chester, Lancaster and Union — participate with Pee Dee solely to receive transportation services for this program. All of these counties are in the northern area of South Carolina, just south of the rapidly-growing city of Charlotte, NC, and most of the FIA trips are employment trips to Charlotte. Many of the other counties in the Pee Dee system also have FIA trips, but at a lower level than the "new" group of counties, described above.

Since the Family Independence program is growing rapidly, it was important to develop the latest available data on this program. Extrapolating the Oct 1996 through January 1997 number of Pee Dee Family Independence passenger trips to a full year basis, we calculated that this program would be responsible for about 93,240 trips per year. Since a job or a training trip is usually a round trip, the number of round trips for the program would be 46,620 per year (93,249 divided by 2). Making the assumption that 4 months of Family Independence training and program participation would, in the long-run, result in a one-year reduction in the welfare roles via the substitution of employment for public assistance payments, these 46,620 round trips per year would be assumed to generate 139,860 earnings days per year attributable to FIA (46,620 $\times$ 3). The additional earnings per day would be about $5.50 per hour (just above minimum wage) times 7.5 hours per day, or $41.25 per day. This would generate a total additional earnings attributable to the program of $5,769,225 (139,860 $\times$ $41.25). However, since this is total earnings attributable to the overall Family Independence program, this would have to be reduced by the percentage contribution of Pee Dee transportation to the program. Assuming, conservatively, that transportation contributes 30% of the total FIA program benefits; the Pee Dee-attributable earnings benefit would be $1,730,767 ($5,769,225 $\times$ 30 %). But there is the additional benefit of reduced Public Assistance payments, which, if assumed to be 50% of the earnings benefit, would add $865,384 to the earnings benefit, for a total benefit of $2,596,151 attributable to Pee Dee Regional transportation provided for the Family Independence Program.

### ***Trips for Kidney Dialysis Treatment***

Pee Dee data indicate that 195 patients are provided round trip service to dialysis treatment each year. Pee Dee provides full service to the dialysis patients, including "through door" service as needed and wheelchair service as needed. The following analysis makes the assumption that the dialysis efficiency benefits materialize in two ways: 1) as the cost differential between private sector wheelchair service and Pee Dee wheelchair service for patients requiring wheelchair transport; and 2) as the cost differential between private taxi and Pee Dee transit service for non-wheelchair patients. It is assumed that 20% of the dialysis patients require wheelchair service, based on some available data.

Pee Dee annual operating costs are $3,808,025 and the annual trips provided are 981,190, representing and average annual cost per trip of $3.88. For a dialysis treatment trip, the cost would be $7.76 for a round trip (twice the per trip cost). Thus, the Pee Dee costs for transporting dialysis patients would be $109,183 (14,070 dialysis roundtrips times $7.76 per roundtrip.)

The costs from using private wheelchair van has been estimated from limited available data as $55 per round trip plus $2 per mile. Pee Dee data show that the average dialysis round trip is 18 miles. Thus, the cost per private wheelchair van is estimated to be $91 per round trip. The annual costs for each of the dialysis patients would be $14,196 ($91 per round trip × 3 treatments per week × 52 weeks per year). For the 39 wheelchair patients, this would total $553,644 (39 × $14,196).

For the non-wheelchair dialysis patients, assumed to represent 80% of the dialysis trips, there is also likely to be an efficiency benefit from Pee Dee service. It is assumed that the average cost for these trips via taxi would be $40 per roundtrip (greater than the $30 roundtrip cost estimated for single county systems). These figures and assumptions generate a private sector cost of $973,440 for non-wheelchair patients.

Thus, the private sector costs of $1,527,084 (wheelchair plus non-wheelchair costs) less the actual Pee Dee costs of transporting these patients ($109,183) gives $1,417,901 as the efficiency benefit from providing transportation to dialysis patients.

### ***Training Benefits***

Pee Dee provides training benefits via JTPA, vocational rehabilitation, and work support programs. These programs provide 55,910 trips per year, or 27,955 roundtrips. If we credit one day of subsequent employment to one day of access to training, and if we assume that the average wage is $6.50 after training versus $4.00 before training, and if we assume that there is $4.00 per day less public assistance that will be needed following training, we then derive $24 per roundtrip as the benefit to transportation When this $24 per roundtrip is multiplied by the 27,955 roundtrips provided by Pee Dee, we get a total training benefit of $670,920.

### ***Education Benefits***

Pee Dee provides 125,560 education trips a year. These trips are mostly related to school and preschool activities. In the Sweetwater Wyoming case study, we found that there was a benefit to parents from less disruption to their employment from this type of school transportation support — a $29,372

benefit from 22,594 trips for a per trip benefit of $1.30. Applying this per trip benefit to the 125,560 trips of Pee Dee, we derive an education benefit of $163,228.

***Shopping and Nutrition — leading to Independent Living Benefit***

Pee Dee provides 30,466 trips for nutrition, shopping, and (mostly) adult day care trips oriented to senior citizens. The Sweetwater Wyoming case study shows that such trips have appreciable benefits in terms of enabling seniors to remain in their own homes rather than to be institutionalized. The Sweetwater case provided a benefit estimate of $24 per trip related to independent living. Applying this estimate to the 30,466 trips of Pee Dee provides an independent living benefit of $731,184.

***Other Medical Trips***

Pee Dee provides a very substantial number of medical trips annually — 403,240 — in addition to the dialysis trips discussed above. If we assume, as for other case studies, that 75 % of these trips would be taken in the absence of the Pee Dee service, that 90 % are non-wheelchair trips and 10 % are wheelchair trips, that the alternative private sector cost of these trips is $40 per roundtrip for non-wheelchair and $91 per roundtrip for wheelchair ($55 base cost and $2 per mile for 18 miles), then we obtain an estimate of $6,819,771 as the private sector cost. We compute the actual Pee Dee costs for these 403,240 trips to be $3,129,142. If we subtract the actual costs from the alternative estimated costs, we obtain a figure of $3,690,629 as the estimate of the medical trip efficiency benefit from Pee Dee's operations.

***Community Benefits***

Pee Dee provides a wide array of community services whose benefits are difficult to quantify. One such service area is community emergency backup — and emergency support when necessary. Following a major hurricane that hit Charleston, SC, Pee Dee delivered drinking water to residents of that city. Following another hurricane that caused major damage to Myrtle Beach and the Grand Strand, Pee Dee carried the National Guard to that area to provide assistance. Pee Dee transit is included in the emergency accident plan of a nuclear power plant. The emergency capability that this system provides is difficult to quantify, but its demonstrated services and associated benefits are substantial. This community emergency service might conservatively be estimated to be worth $400,000 per year to the local economy.

Further, the entrepreneurial approach that Pee Dee takes to transit services means that whenever a transportation need arises, Pee Dee is willing to consider it, to attempt to negotiate a service, and to effectively provide that service if agreements can be reached. This has been manifested in many community support activities, including the following: 1) Recent expansion to 3 counties in the western part of the state at some distance from the main Pee Dee headquarters to meet the need for transportation to support the Family Independence Act, a need that is growing very rapidly (without transportation, this program may not work for many on welfare in these counties) and a need that includes substantial transport across the state line to Charlotte, NC; 2) Long-standing agreements with beach employers — both food and lodging — to provide funds to help support summer transportation from the inland counties in the Pee Dee system for persons who otherwise would likely be unemployed; 3) special education agreements to provide transit to support public and private schools in a variety of ways including a contract with parents to provide early morning transport for children to special school activities, transporting special needs students in Florence and Darlington, and negotiating service to a university to possibly include a campus trolley system; 4) providing transportation to adult day care, transport for Veterans Administration clients, and many others. These services facilitate economic, education, and community activities, help to assure transportation competition and lower costs, and help to alleviate traffic from streets (with the associated costs of traffic delays, accidents, and parking problems). The benefits are likely to be substantial but are difficult to quantify.

### ***Total Benefits***

The total benefits from Pee Dee's operations are estimated to be $12,362,423 versus the annual operating costs of $3,808,025. This total benefit is comprised of employment benefits of $2,692,410,, welfare reform benefits of $2,596,151, dialysis trips of $1,417,901, other medical benefits of $3,690,629, training benefits of $670,920, education benefits of $163,228, senior services benefits of $731,184 and overall community benefits approximated to be $400,000.

## SWEETWATER COUNTY TRANSIT AUTHORITY (STAR), ROCK SPRINGS, WYOMING

### ***Background***

The Sweetwater County (Wyoming) Transit Authority (STAR) serves a very sparsely-populated rural county with a land area larger than many of the states in the Northeastern United States. Sweetwater County, located in southwestern Wyoming, has a land area of 10,426 square miles; STAR serves almost 2,900 square miles within the county, and may soon coordinate service with other counties in Wyoming and Utah, giving it a total service area greater than the state of South Carolina. There are about 45,000 persons living in STAR's service area.

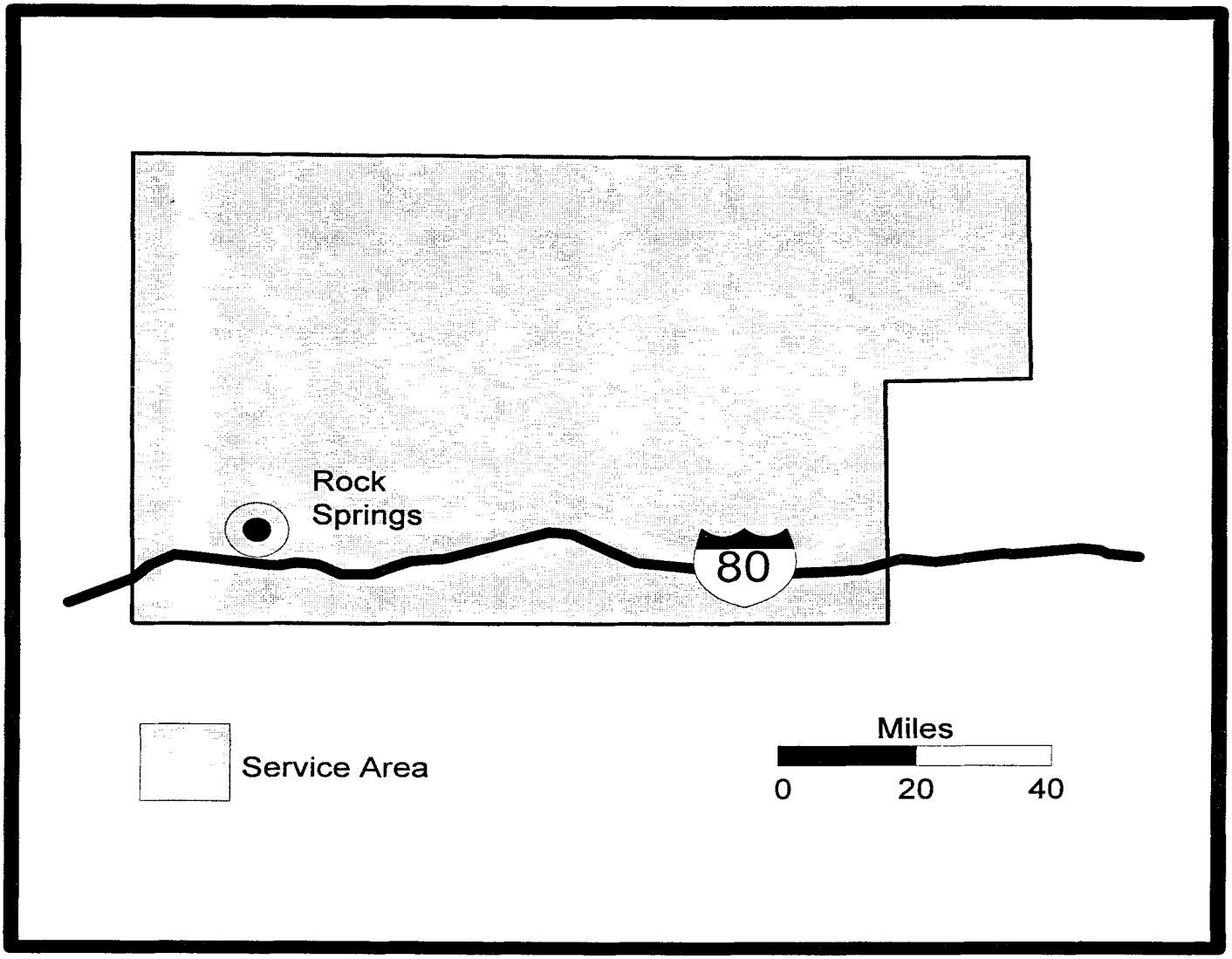
Initiated in 1989, STAR has managed to replace a large number of client-based, agency-operated systems with a single coordinated public transit system that reduced the previous level of expenditures and dramatically increased the numbers of trips provided. In 1995, over 70 percent of the Sweetwater county residents surveyed by the Cooperative Extension Service of the University of Wyoming believed that Sweetwater County needed a public transit system. (This is probably a higher positive response than would be achieved in most rural communities.)

The system provides general public demand-responsive services with low costs (just over $4 per trip and $26.50 per vehicle hour) and high productivities (between 5 and 6 passengers per vehicle hour). Fares to general public riders are $2.00 per one-way trip. The system also transports a large number of agency clients as well. In the year ending June 1996, the system provided 83,059 trips (up from 50,112 in 1991). STAR now has 15 vehicles (buses, vans, and one auto) currently in use; all buses and vans are wheelchair lift equipped. STAR's current annual operating expenses are $398,683; total expenditures including capital costs and depreciation are $554,859. A map showing the service area is presented in Figure 7.

The system is highly computerized, and maintains detailed records on every trip taken. There are plans to substantially increase the level of technology of this already technologically advanced rural transit system, which will assist in the plans to significantly expand the geographic scope of services.

**Figure 7**

## Sweetwater County Transit Authority



### ***Trip Purposes***

In the system's most recent Transit Development Plan, *(28)* STAR reported the following distribution of trip purposes for the 12 months ending June 30, 1996:

| | |
|---|---|
| Child Development Center | 27% |
| Work | 19% |
| Personal/shopping/recreation | 18% |
| Nutrition | 13% |
| Education | 9% |
| Medical | 7% |
| Counseling | 7% |
| Shopping and other | 5% |
| Aides & Escorts | 0.5%. |

Of all these rides, 46 percent were to members of the general public, 31 percent were to persons with disabilities but not elderly, and 23 percent were provided to elderly persons. Just over 9 percent of the riders were minority persons (12.6 percent of Sweetwater County's population are minority group members).

### ***Areas of Potential Economic Benefits***

STAR Transit provides a large variety of economic benefits to individuals, agencies, and businesses in Sweetwater County. The major categories of benefits are the following:

- **Access to employment**, enabling the travelers to increase their incomes and reduce their dependence on welfare, especially for persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons,

- **Access to medical care and other social services**, enabling the travelers to use services that increase their health and quality of life, again particularly impacting those persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons,

- **Providing rides to the school age children of working parents**, which enables the parents to generate a full day's work instead of taking time off from work to provide for their child's transportation or hiring a taxi,

- **Access to shopping, recreation, and other personal services**, which enables the travelers to travel to these destinations at lower cost and with greater frequency than would be possible otherwise,

- **Access to educational and counseling services**, enabling the travelers to increase their long-term chances of employment at a decent wage, and

- **Enabling the continuation of independent living** by enabling persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons to continue to live in their own homes rather than to live in nursing homes.

While STAR Transit does serve a large proportion of general public riders (almost half its total riders), the ability of the system to assist persons with disabilities obtain and maintain their independence is probably among the most powerful benefits of this system.

### ***Calculation of Benefits***

Benefits are calculated in each of the categories listed above. We will calculate the category by category benefits and then examine the totals. In some cases, relatively precise calculations can be made because of the superior level of detail maintained by STAR Transit about its rides and riders.

***Access to Employment —*** According to STAR's records, 15,960 of its 83,059 FY 96 trips (19.2 percent) were work trips. This works out to 7,980 round trips that would have been taken by about 32 separate persons if each of those persons worked full time 250 days per year. If we assume that 50 percent of the system's work trip riders are transit dependent with no other means of transportation and thus subject to the probable loss of their job without STAR Transit, then the wages of 16 persons should be attributed as benefits to the operation of the system. As this county has a generally higher wage structure than many rural areas, we are assuming an average hourly wage of $6.50 for STAR's 16 work trip riders, which provides an estimate of $10,020 in employment benefits per person times the 16 riders for a total of $174,720 in annual benefits. In addition, STAR has recorded 28 persons moved off of public assistance through their use of transit (4 wheelchair users, 4 blind persons, and 20 persons on general assistance). *(29)* If we assume as we did in the other case studies, that the welfare benefits equal one-half of the employment benefits per person, we multiply $5,460 in welfare benefits per person times the 28 documented persons moved off the rolls, for a total of $152,880. Adding the employment and welfare reduction benefits together, we get an employment benefit of $327,600.

Note that an alternative calculation not used in this study would have provided a much higher estimate of the total costs of welfare reductions, as follows. Using figures prepared by the Cato Institute *(30)* which indicate that the value of welfare benefits in the State of Wyoming were equal to $17,780 in 1995, STAR calculated the benefits of moving these 28 persons off the welfare rolls. The total benefit from that change is $497,840 per year. STAR's figures claim all those impacts as a benefit of the system.

***Access to Medical Care and Other Social Services —*** Medical trips account for about 7 percent of STAR's trips; nutrition trips account for 13 percent. Together they represent 17,477 or 21 percent of the system's trips (equal to 8,739 round trips). These trips assist in maintaining good health and thus preventing much higher expenses in the future. In the absence of STAR's services, many of these trips — most of the nutrition trips and about on third of the medical trips — would probably not have been taken at all. The remainder of the trips would probably have been made but at a much higher cost to the passenger. If we assume that the extra per trip cost above STAR's fare would be $5.00 (a very conservative estimate in light of the prevailing taxi rates in the area), then a value of the trips made by different modes would total $36,000 for about 7,200 trips. The value of the increased health from these trips is so subjective that we will not address it at this time, leaving us with the increased trip costs needed if the transit services were not available, which is surely a very conservative estimate concerning these trips.

***Providing Rides to the School Age Children of Working Parents —*** The largest single category of trips on STAR is to the Child Development Center. Using the $6.50 per hour wage rate specified above, and assuming that transporting the child in the family auto interrupts 4 working hours each time a trip like that is necessary, and assuming that five percent of the 22,594 CDC trips represent trips that would otherwise involve a parent taking off work, the benefit here totals $29,372.

***Access to Shopping, Recreation, and Other Personal Services —*** Travelers would go to these destinations less frequently or at greater costs than would be possible using the transit services. Assuming that one-third of these trips would still be made but at the additional cost of $5.00 more than the cost by transit, the value of having transit for these trips in Sweetwater County is approximately $25,475.

***Access to Educational and Counseling Services —*** These trips will enable the travelers to increase their long-term chances of employment at a decent wage. Using the same kinds of assumptions as in Lee County, North Carolina, that 60 percent of those in these programs graduate to a paying job and

that half of these graduates take transit, and the calculation that approximately 90 individuals are using STAR for these purposes at this time, then benefits would accrue to 27 individuals. This would equal $365,040 in annual wages. If we assume that 10 of these individuals would be welfare recipients without this transportation, then an additional $177,800 should be credited to the system, for a total of $542,840.

***Enabling the Continuation of Independent Living —*** STAR Transit maintains extremely detailed records on its riders (including, in come instances, where the extra key to the house is hidden). As such, it is in an excellent position to be able to assess whether or not its services have enabled some riders to continue to live in their own homes rather than to live in nursing homes. In fact, they calculate that their services are currently allowing over 30 persons, primarily frail and disabled elderly, to remain in their own homes and out of nursing homes. Using 30 persons as the number of persons receiving this benefit, we then estimated the level of benefits as $3,000 per month or $36,000 per year, which is the approximate cost of nursing home care at this point in time. *(31)* A person living in their own home would incur some costs, so that it would not be accurate to count the avoidance of all nursing home costs as a benefit. Still, since over 70 percent of elderly persons (the prime candidates for nursing homes) own their own homes free and clear of any mortgage payments, the differences between nursing home costs and at-home costs could be very large. Furthermore, if one member of an older couple goes into the nursing home and the other person remains at home, almost the entire costs of nursing home care will need to be paid **in addition to** the regular housing costs. Therefore, we will use two-thirds of the regular nursing home costs, or $24,000 per year, as the avoidance costs attributable to the maintenance of independent living. Multiplying this number times 30 persons gives an annual benefit for STAR Transit of $720,000 for this type of impact.

***Summary of Benefits —*** The total benefits provided by STAR Transit are substantial. Using conservative benefit estimates, we have documented the following annualized amounts:

Access to Employment — $327,600
Access to Medical Care and Other Social Services — $36,000
Providing Rides to the School Age Children of Working Parents — $29,372
Access to Shopping, Recreation, and Other Personal Services — $25,475
Access to Educational and Counseling Services — $542,840, and
Enabling the Continuation of Independent Living — $720,000.

The total of all these benefits is $1,681,287 per year, which is a substantial figure.

### ***Benefits Relative to Costs***

STAR Transit has performed its own economic impact analyses, and maintains that it saves Sweetwater County and its municipalities more than $1.6 million per year (primarily through public welfare benefits, such as nursing home care not required due to the new mobility services provided to residents by STAR) through its $400,000 plus annual operation. This would give the system a benefit/cost ratio of almost 3.5 to one, according to the system's own calculations.

These figures are quite comparable to our own calculations which are summarized above.

## ZUNI ENTREPRENEURIAL ENTERPRISES, NEW MEXICO

### ***Background***

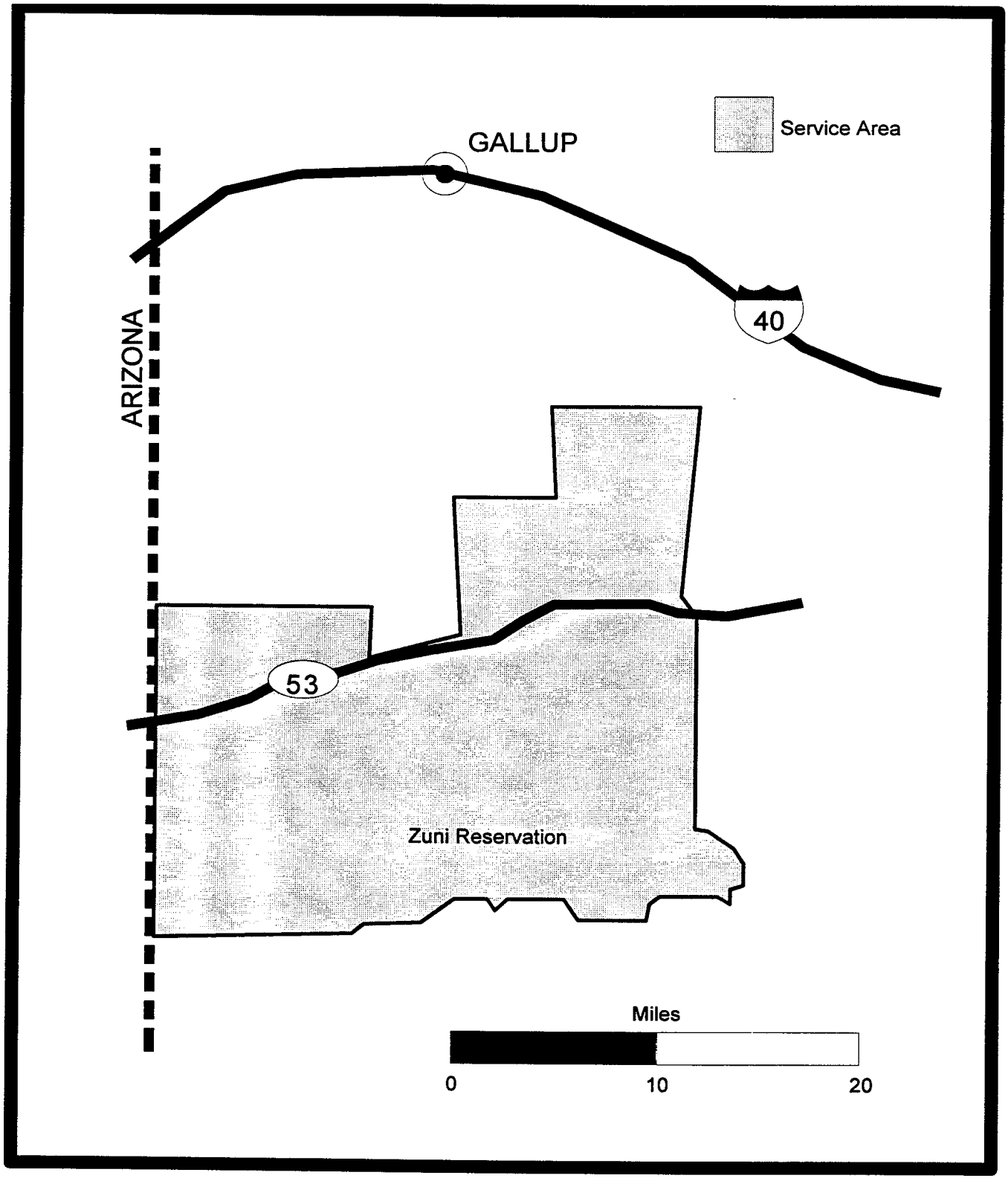
Zuni Entrepreneurial Enterprises, Inc, is a Tribal transit system for the Zuni Indian tribe in western New Mexico. Prior to the initiation of this system, there was no public transportation that connected the Zuni Indian Reservation to the "rest of the world." This system began service in 1994 primarily as a means for young tribal members to access employment and educational opportunities off the Reservation. The principal educational destination served by the system is the University of New Mexico in Gallup (about 50 miles from the Reservation) accounting for about 37% of the FY 95-96 trips. The principal employment locations served are the Public Health Service, the Tribal Government, the Tribal School System and WalMart; such employment trips accounted for about 20% of all trips. This system, although small (4 vehicles) concentrates on access to economic activities (education and employment) for a highly transit dependent population with a high unemployment rate. Thus, the opportunity for economic contribution is great. A map showing the service area is presented in Figure 8.

### ***Trip Purposes***

The trip purposes had to be approximated from discussions with system officials since the principal services provided are general public trips for which the system does not collect data on specific uses and users; however, because of the small community involved, these officials were able to make fairly sound approximations.

**Figure 8**

## Zuni, NM



Generally, the system provides 87 percent of its trips to general public riders. The two main types of general public riders are: 1) students who are transported about 50 miles (each way) to Gallup to attend the University of New Mexico (UNM)— accounting for 50 passenger trips daily and 2) employees that are taken to work at several off-reservation employment sites. Many of the remaining trips are within the Reservation for services and shopping, such as visits to the Public Health Service facility for medical service.

### ***Areas of Potential Economic Benefits***

In a short period of time, and with a limited system, Zuni Enterprises is providing transportation services that have the potential for giving access to new opportunities for reservation residents. In the two principal trip areas — University and employment — the economic opportunities may have been expanded for these residents, particularly for the younger residents. The 50 UNM trips daily have the potential for increasing the lifetime earnings of reservation youth and the 26 employment trips daily have the potential for moving unemployed persons to employment opportunities off the Reservation. Unfortunately, this is a relatively new system and there has been no assessment of the potential economic benefits, so that the following analysis has to depend on the assumptions specified; but these assumptions are intended to be fairly conservative so as not to overstate benefits.

### ***Education Benefit Analysis***

The 50 passenger trips daily to UNM would provide round trip transportation for 25 students. Assuming that not all students travel every day (some might have Tues/Thus/Sat classes and some may only go Mon/Wed/Fri); thus, we assume that 30 students are using the system to attend class. Further, we assume that half of these students would be unable to attend UNM in the absence of the transportation system since they are assumed to be transit dependent as a result of limited incomes and automobiles on the Reservation. For the 15 students who, we assume could only go to college because of the system, we assume that only 4 graduate, 6 attend at least two years, and 5 dropout before two years. (Limited data indicate high dropout rates for native Americans at UNM.)

Further, we must assume what the graduating, or the two-year completing, students would earn over their lifetimes (discounted to present value) compared to the high school graduate's lifetime earnings (similarly discounted). Since we lack this information, we shall estimate (conservatively) that the lifetime earnings of the graduating student would be $150,000 greater than the high-school graduate and that the

two-year completion student would earn half as much more, $75,000, over his/her lifetime compared to the high school graduate.

In this analysis, then, the Zuni system is credited with enabling 4 reservation residents to attend UNM who, otherwise, would be unable to attend, at a present value benefit of $150,000 per student (graduate lifetime earnings compared to non-graduate, e.g., high-school graduate); and, in addition, the 6 two year achievers would have a benefit of $75,000 each. Thus, the total education benefit under these assumptions would be $600,000 for the graduates and $450,000 for the two-year students, for a total of $1,050,000. Since in other case studies we are placing benefits on a comparable **annual** basis to costs, we divide the $600,000 by 4 (4 years of college required to graduate) and the $450,000 by two years to get $375,000 as the annual education benefit.

### ***Employment Benefits***

Employment benefits are also likely achieved by this system. The 26 passenger trips per day equates to round trips for 13 employees who are transported to both on and off Reservation employment locations. We assume that 60% of these would be unemployed without the transportation service provided by the system. (Unemployment rates are high on the Reservation.) For these 8 employees who are assumed to owe their job opportunities to the system, we assume that their wage is $5.50 per hour (just above the minimum wage); and that their annual earnings are $9,240 plus the low income and unemployment benefits that they no longer need as employees. (conservatively estimated at half the earnings as in other case studies, or $4,620 per year). The total annual benefit of $13,860 is multiplied by the number of employees enable to work by the system — 8 — to provide a total employment benefit of $110,880.

### ***Other Benefits***

The system does not have data on the trip purposes for the remaining system trips which comprise 6,879 trips per year (43 % of all trips.) However, we were told that these trips were probably mostly medical and shopping trips within the Zuni Reservation. Since we lack this data and since there are no available data on the costs of alternative transportation, we will not attempt to approximate a value for these remaining trip purposes.

### ***Benefits Relative to Costs***

The total computed benefits then are $375,000 from education and $110,880 from employment for a total economic benefit of $488,880. This compares quite favorably with the annual system operating costs of $115,726. Because of the tenuous nature of these benefit estimates and because of the demonstrated potential benefits of this system to the education and employment of Zuni tribal members, this system warrants further assessment in the future as additional data become available.

# DESK AUDIT CASE STUDIES

This sections represents a summary of each of the 14 "desk audit" cases which were developed from secondary sources including fax, telephone, mail, and published reports.

## ABERDEEN AREA, SOUTH DAKOTA

### ***Background***

Aberdeen Area Ride Line, located in Aberdeen, South Dakota, provides demand-responsive and subscription service to Brown County, using a fleet of 6 vehicles. The Aberdeen system is a multi-purpose system that provides a range of social and economic services in rural South Dakota. For Fiscal Year 1995, Aberdeen provided 48,681 unlinked, one-way passenger trips, and 95,767 revenue vehicle miles of service. Total operating expenses over the same period amounted to $150,490. The cost per trip figure for Aberdeen amounted to $3.09, which is outstanding for a demand-responsive paratransit system operating in a rural area, and well below the national average figure of $5.23. The cost per mile figure of $1.57 is also below the National average figure of $1.87. The trips per mile figure of .51 is well above the national average of .277, and again shows outstanding performance for a demand-responsive paratransit system operating in a rural area.

### ***Ridership***

The following breakdown shows the percent of trips provided by this balanced system:

| | |
|---|---|
| Medical | 24% |

| | |
|---|---|
| Employment | 16% |
| Nutrition | 11% |
| Education | 24% |
| Shopping | 22% |
| Other | 2%. |

The system provides 48,681 trips annually.

### ***Areas of Potential Economic Benefits***

The following analysis develops benefit estimates for both medical and employment benefits.

### ***Medical Benefit Analysis***

We make the assumption that 50% of the Aberdeen medical trips are either for dialysis treatment or for other critically needed medical services — often for persons that are totally transit-dependent — service access that are possible only because of the service that this transit system provides. Thus, these needed trips are crucial to the health of those receiving the services; there is no realistic alternative but to provide this transportation; and, as for dialysis computations, benefits are computed based on alternative costs of providing this critical service.

Since we have no specific private sector transportation cost data for South Dakota for comparison to the system's costs, we turn to Lee County, NC, a single county system where we found that the benefit of providing transportation to dialysis patients averaged $48 per trip (the low-range estimate). Applying this to 50% of the Aberdeen critically-needed medical trips (described above), we get 5,837 needed medical trips at $48 per trip for a medical benefit of $280,176.

### ***Employment Benefit Analysis***

For employment trips, we turn to the in-depth site visit to the JAUNT system in Charlottesville, VA for a model benefit calculation for use in Brown County, SD. In Charlottesville (see the discussion beginning on page 4-44), we calculated that the economic benefit per employment trip was $17 per trip. Applying this to the 7,795 trips provided by the Aberdeen system, we compute an employment benefit of $132,515.

### ***Benefit Summary***

The medical benefits of $280,176 plus the employment benefits of $132,513 add to a total economic benefit of $412,691 which compares favorably with the annual operating costs of $150,490 for this system. Medical and employment trips together account for only 40% of the systems total trips, as shown.

## AMES TRANSIT AGENCY (CY-RIDE), STORY, IOWA

### ***Background***

Ames Transit Agency (Cy-Ride), located in Story, Iowa, provides fixed route and demand-responsive service to the City of Ames using a fleet of 38 vehicles. The system is primarily built around the needs of Iowa State University. Cy-Ride is predominantly a fixed route system with most routes culminating on the University campus. About 85 to 90% of the ridership consists of University students and staff.

For Fiscal Year 1995, Cy-Ride provided 2,415,215 unlinked one-way passenger trips, and 830,130 revenue service miles. Ames Transit reported a total of $2,863,257 in operating expenses for that period. The cost per trip figure for Cy-Ride amounts to $1.19, which is outstanding when compared to the National average cost per trip figure of $5.32. Cy-Ride's cost per mile figure of $3.45 is substantially higher than the National average figure of $1.87, but it appears that this may be an artifact of the density of the service area, as the trips per mile figure for Cy-Ride (2.91) is over ten times higher than the National average trips per mile figure of 0.277.

### ***Areas of Potential Economic Benefits***

The benefits of Ames transit are not really educational since, without the system, students would likely to be still attending the University. (The benefit categories and the benefit logic are discussed in detail in the Blacksburg transit write-up. The reader should turn to this for the logic behind the areas of potential economic benefits for a university-based system.)

### ***Direct Benefit to Users***

The direct benefit to users is the efficiency benefit from the lower real transportation costs that result from riding the transit system to and from the campus (for students and staff), and for the general public. As indicated above, these savings are minimal since, with the system there is likely a bus wait at the point of origin whereas driving does not entail such a wait. However, for the bus rider, there is no parking time and no long walk from a parking lot at the campus; so these convenience factors essentially balance out. Thus, we are assigning a minimal direct benefit to the efficiency of transporting users based on the alternative cost of driving the relatively short distances involved in this rural community. It appears that the average trip is about 4 miles and we apply $.34 per mile as the cost of owning and operating a private auto (the rate that the Federal Government uses to reimburse its employees for use of private vehicles) to get a per trip alternative cost of $1.36. The Cy-Ride system's operating costs are $1.19 per trip as shown in the background. Thus, the direct benefit of this system is computed as number of trips (2,418,215) times the lower system cost per trip of $.17 ($1.36 auto less $1.19 Ames transit cost) producing $323,400 as the direct efficiency benefit.

### ***Traffic Estimate Without Transit***

Of the system's 2,600,000 trips for FY 1995-96, 2,214,285 appear to be student and faculty trips. If we divide the student/faculty trips by 200 days per year, we get 11,071 trips per school day. Assuming that most commuters take the system round-trip to campus, we divide the number of trips per day by two to obtain an estimate of the number of commuters that the system handles — 5,536. As with Blacksburg Transit, we assume that the number of cars removed from the road would be fewer than this since transit buses would no longer be road users and since some current riders would ride with others rather than obtain cars. Thus we assume that two-thirds of their current transit users — 3,709 — would use cars to drive themselves to campus without the transit system. These 3,709 additional cars in the absence of transit provide the basis for the Blacksburg Transit traffic and parking benefit computations which follow.

### ***Benefits from Reducing Traffic Congestion***

Iowa State University has an enrollment of 24,900 students and has an additional 6,000 person faculty/staff. If we assume that 80% of these have cars enrolled on the campus and that 95% of those with cars use them to commute on any given day, the number of cars used to commute to the campus on any

given day is 23,484. Further, we assume that the average door-to-door round trip commute to the campus via car is 50 minutes. Then we add in the "new" commuters — the 3,709 who now take their cars without the transit system. For all of these commuters, we assume that the average commute per day is lengthened by 20%, since we estimate that an additional 16% of traffic would be added to the roads from the former transit users who now drive and that this 16% results in a more than proportionate increase in traffic; hence the 20%. The above assumptions, when applied, result in 4,532 additional hours per day commuting, which at $3 per hour (value of time — see Blacksburg Transit) provides a daily estimate of traffic congestion cost of $13,597. For the year this totals to $2,719,300. This congestion cost amount is an estimated benefit of the transit system.

***Benefits from Reduction in Parking***

If the 3,709 cars that are removed by Ames Transit require parking in the absence of this system, the following analysis estimates the costs of such parking. As with Blacksburg Transit, we estimate that the additional parking need would be met in two ways: 20% of the need would be met by constructing a parking building which is required because of the dwindling land available for parking on the campus; the remaining 80% of the need would be made by adding spaces to parking lots. As with Blacksburg Transit, we calculate based on the Indiana study that the annual cost of a parking space is $333 and that the annual cost of a space in a parking building is $1,360. Based on these assumptions, the additional annual costs of parking are $988,011 for surface lots and $1,009,120 for building lots for a total cost of $1,997,131, a cost which represents an estimate of the parking-saved benefit of Ames Transit.

***Benefits from Reduction in Accidents***

We lacked data on accidents on the Iowa State campus and surrounding community. However, we obtained such data and calculated accident-related benefits for Blacksburg Transit. For Blacksburg Transit, we estimated that 2,000 vehicles were removed from the streets by the system and we got an accident benefit estimate of $269,550 per year. Ames Transit removes and estimated 3,709 vehicles from the streets. When we apply the ratio of Blacksburg vehicles removed to Ames vehicles removed — 1.85 to one and we multiply the 1.85 times the Blacksburg accident benefit, we derive an accident benefit of $498,667 per year.

### *Total Benefits*

The total benefits from Ames Transit's operations are estimated to be $5,614,685: $410,587 from efficiency benefits to users, $2,719,300 from traffic congestion reduction, $1,997,131 from reduction in need for parking, and $498,667 from fewer accidents. This compares favorably with the operating costs of Ames Transit of $2,863,257.

## AROOSTOOK REGIONAL TRANSPORTATION, PRESQUE ISLE, MAINE

### *Background*

Aroostook Regional Transportation System, Inc., located in Presque Isle, Maine, is a private nonprofit agency providing transportation services to the general public, handicapped, and elderly in Aroostook County. Aroostook emphasizes the coordination of services to the elderly, handicapped, low income, and the general public in a low-density, large geographic county (6,600 square miles with a population of about 87,100) bordering on the Canadian border. Aroostook provides demand-responsive service to Aroostook County using a fleet of 25 vehicles. For Fiscal Year 95, Aroostook provided 85,923 unlinked one-way passenger trips, and 460,581 revenue vehicle miles of service. Total operating expenses for FY 95 were not available, but the current budget projects a total operating expenses figure of $982,000. While we cannot calculate exact efficiency measures without FY 95 budget data, we can estimate based on the more recent budget projections. The estimated cost per trip for Aroostook amounts to $11.43, which is more than double the National average figure of $5.23. The estimated cost per mile figure for Aroostook amounts to $2.13, which is slightly higher than the National average figure of $1.87, although not as disproportionate as the cost per trip figure, which suggests a low density service area, and longer than normal trip lengths. This is evident in the trips per mile figure of 0.19, which is well below the national average of 0.277.

### *Trip Purposes*

Since this system is principally a fixed-route system with schedules for most of its services, detailed data on trip purposes is generally lacking. However, because it provides a special fare to seniors (over 60)

and even special fares to seniors with handicaps, it does have data on senior trips. Mentally handicapped are also separately identified by the system.

The following are summary trip percentages:

| | |
|---|---|
| Over 60 | 39% |
| Under 60 handicapped | 11% |
| Over 60 med/meal/RSVP | 8% |
| Mentally handicapped | 32% |
| Other | 10%. |

Trips to persons over age 60, then, account for 47% of the system's trips, and the two handicapped categories account for 43% of the trips.

### ***Areas of Potential Economic Benefits***

Two categories of potential economic benefits are implicit in the above trip purposes: 1) elderly persons being enabled by the services provides by transit to stay in their own homes longer then they would without transit, thus avoiding higher cost nursing homes; and 2) those with handicaps — both mental and physical — being enabled by transit to live at home and attend training, rehabilitation, and jobs, thus often avoiding higher cost institutionalization.

### ***Benefits of Home Living For Older Persons***

Using a methodology similar to that applied in Sweetwater, Wyoming, we calculate the benefits from transportation that serves to assist older persons to stay in their own homes longer compared to the without-transit situation where institutionalization at a nursing home facility often becomes the only realistic alternative, but one that carries a greater economic cost. Based on Census data for this county, we approximate that 13% of the over-60 population is over 80 years of age. We roughly estimate that the over-60 users of the transit system take about 60 trips per year. Applying these two factors to the number of over-60 trips, we get an estimate of 86 over-eighty persons using the system annually. If we assume that about 50% of these are kept out of nursing homes by these trips and that the annual cost savings of home versus nursing home is $24,000, we multiply to get a total annual system benefit of $1,032,000 for older persons.

### ***Benefits of Home Living for Handicapped Persons***

The transit system also has a similar at-home benefit for handicapped persons. These persons are enabled by the system to stay at home and still attend rehabilitation, sheltered workshops, training, and employment; without the system, many would have to reside at institutions to attend these functions, and at a higher cost. For those with physical handicaps, we assume that the system will provide about 60 trips per year and that this transportation service will enable about 20% of these individuals to stay out of institutions and thus forego a higher institution-versus-home cost of, say, $15,000 per year per person, for a calculated benefit of $450,000. For those with mental handicaps, we assume that the system will provide about 90 trips per year (more frequent training trips, compared with physical handicaps) and that this service will enable 20% of these persons to stay out of institutions at a higher institution-versus-home cost of $15,000 per year per person, for a calculated benefit of $915,000.

### ***Benefits Relative to Costs***

The benefits computed above sum to $2,397,000 for the Aroostook System. This compares favorably with the system's operating costs of $1,512,000.

## COORDINATED TRANSPORTATION SYSTEM, GILCREST AND LEVY COUNTIES, FLORIDA

### ***Background***

Coordinated Transportation System, located in Gainesville, Florida, provides demand-responsive and subscription services to the very rural Gulf coast counties of Alachua, Gilchrist, and Levy Counties, using a fleet of 25 vehicles. Sixty percent of the trips provided by this system are for disabled riders and 44% of the trips are for medical purposes. Twenty percent of the trips are for low-income persons. Fifty-five percent of the fleet is lift equipped. This is truly a system that focuses on providing transportation for the rural disabled; even the education trips concentrate on sheltered workshops for the disabled.

For Fiscal Year 1995, CTS provided 47,868 unlinked, one-way passenger trips, and 853,327 revenue vehicle miles of service. Total operating expenses for the same period amounted to $700,856. The CTS spends an average of $14.64 per passenger trip, which is quite high, and reflects the long nature of the medical trips being provided. The cost per mile figure of 0.82 again reflects the high-mileage nature of the medical trips provided, well below the National average figure of $1.87. The trips per mile figure

of 0.06, well below the National average figure of 0.277, again indicated that the CTS is making long trips to serve its medical clients.

### ***Trip Purposes***

The principal trip purposes of this system are as follows:

| | |
|---|---|
| Medical | 44% |
| Employment | 3% |
| Education/training | 37% |
| Shopping | 5% |
| Nutritional | 4% |
| Other | 7%. |

Total annual trips provided by this two-county system are 47,868.

### ***Medical Benefit Analysis***

Coordinated Transportation provides 20,925 medical trips annually. These medical trips are critically needed based on the following factors: 25% of these trips are for life-critical dialysis patient treatments (per State); 60% of the system's trips are for disabled persons (likely a higher percentage than this involving disabled persons on medical trips); and 20% of the system's clients are low-income. Thus, we shall value these trips based on the approach that has been used in other case studies to assess the dialysis benefits. That is, we will view them as necessary, life-critical trips for clients who, otherwise, may be unable to get to medical services without the system; thus, the most realistic alternative is to get to this service by the least expensive comparable private sector alternative — not to skip the medical service and seriously risk incurring severe health consequences.

Of the 20,9254 medical trips, we estimate that 55% will be made for persons in wheelchairs requiring wheelchair vans as the alternative private sector means of transportation. This percentage is developed from the fact that the system reports that 60% of its riders are disabled and that 52% of its fleet is lift equipped. The remaining 45% will be assumed to travel by taxi. The principal destination for most of the medical trips is Gainesville which is about a 25 mile ride from the mid-points of each of these two counties. By wheelchair van, we calculate that this trip would cost about $105 per trip for this distance,

which when applied to the 5,754 wheelchair-type trips provides an alternate cost estimate of $602,170. By taxi, the same trip will likely average about $30 per trip or $141,241 in costs. These cost estimates provide the alternative yardstick for the system so that these costs represent estimates of the economic benefits of this system. These two forms of benefits total $743,410.

### ***Benefit Summary***

The estimated benefits of this system as calculated from the medical trips above is $743,410, which compares favorably with the total costs of operating the system — $700,856.

## COUNTY EXPRESS, STERLING, COLORADO

### ***Background***

County Express, located in Sterling, Colorado, serves a six-county area of northeastern Colorado. The population of this area is only 58,118 and two of its counties only have about 2,500 residents. The system provides demand-responsive and subscription service to the Counties of Logan, Morgan, Phillips, Sedgwick, Washington and Yuma, using a fleet of 23 vehicles.

For Fiscal Year 1996, County Express provided 9,700 unlinked one-way passenger trips, and 194,000 revenue vehicle miles of service. Total operating expenses were reported as $337,000 for the same period. The cost per trips for County express amounts to $34.74, more than six times the National average figure of $5.23, which is indicative of the enormous service area served by this demand-responsive system. The cost per mile figure of $1.74 is below the National average figure of $1.87, again indicating that County Express travels a disproportionate number of miles for the amount of trips provided. The trips per mile figure of 0.05 is the lowest of any system discussed here, and again indicates high trip lengths (the average trip length is 20 miles).

### ***Trip Purposes***

Trip purposes are as follows:

| | |
|---|---|
| Medical | 15% |
| Employment | 12% |

| | |
|---|---|
| Nutrition | 15% |
| Education | 28% |
| Shopping | 22% |
| Other | 7%. |

### ***Areas of Potential Economic Benefits***

This system's high percentages of medical, nutrition, shopping, and other trips — together with the older rural population that the system serves — indicate that a principal benefit is that of helping older persons to stay in their own homes as an alternative to higher cost nursing homes. An additional benefit is that of employment; the 12% of employment trips in above table constitute 13,432 trips.

### ***Benefits of Home Living For Older Persons***

Using a methodology similar to that applied in Sweetwater, WY, we calculate the benefits from transportation that enable older persons to stay in their homes as an alternative to more expensive nursing homes. Based on census data for these counties, we approximate that 7.5% of the population in the over-80 group use the transit system. We assume that they average 60 trips per year so that an estimated 137 persons use the system. If half of these are assumed to be in nursing homes in the absence of transit, the transit benefit is calculated as 68 persons times the $24,000 average annual cost savings from staying out of nursing homes (see Sweetwater case for basis of $24,000). This calculation provides a benefit estimate of $1,632,000 from County Express senior services.

### ***Benefits From Employment***

County Express provides 13,432 employment trips per year. This equates to 6,716 round trips. Dividing by number of workdays per year (210) gives 32 as the number of commuters using the system. If, as we assume, half of these would be unable to get to work without transit, then 16 commuters represent the beneficiaries and, we assume, that they would earn about $9,000 for a total earnings attributable to the program of $144,000. To this, we add $72,000 in public benefits that would be needed to support these persons in the absence of transit, for a total economic benefit of $216,000.

### ***Benefits Relative to Costs***

The benefits computed above total $1,848,000 which exceeds the County Express operating cost of $696,000.

## EAST CENTRAL ARKANSAS TRANSIT (ECAT), CRITTENDEN, ARKANSAS

### ***Background***

East Central Arkansas Transit (ECAT), located in Crittenden, Arkansas, provides demand-responsive service to the Counties of Crittenden, Cross, Lee and St. Francis, using a fleet of four vehicles. For Fiscal Year 1995, ECAT provided 51,816 unlinked one-way passenger trips, and 887,737 revenue vehicle miles of service. Total operating expenses for the same period amounted to $818,825. The cost per trip for ECAT amounts to $15.80, which indicates a small demand-responsive system operating in a large service area. The cost per mile figure for ECAT amounts to $0.92, less than half of the National average, again indicating high-mileage passenger trips over a large service area. The trips per mile figure of 0.06, a fraction of the National average of 0.277, reinforces these indications.

### ***Trip Purposes***

East Central Arkansas Transit trip purposes are as follows:

| | |
|---|---|
| Medical | 77% |
| Employment | 1% |
| Nutrition | 1% |
| Education | 12% |
| Shopping/Personal | 9%. |

Of the medical trips, the system reports that 70% of the medical trips are for dialysis treatments. Thus, overall, 70% of the 74% of the systems trips — 54% — are reported as being used to transport patients to dialysis facilities to get kidney dialysis treatments to live. This is, indeed, a major and challenging undertaking for a transit system for some of the reasons discussed below.

### ***Areas of Potential Economic Benefits***

On a regular basis, the system transports 84 passengers to dialysis treatment, for an average of three times a week, and for 52 weeks a year. Nine of these passengers are non-ambulatory and need special assistance to get in and out of vehicles as well as the more expensive wheelchair-lift vans for transport. Many of these patients are sick and/or overweight, and many are elderly. The driver assists them from their residence to the vehicle, as needed, and from the vehicle into the dialysis treatment facility. After treatment, the operator transports the passengers to get something to eat and then to home, again assisting them into their residence. Sometimes, a patient gets weak or sick after treatment. Distances are great; 24 of these patients must be transported 20-40 miles each way to the treatment facility; 21 of the patients must be transported over 40 miles each way.

The system organizes routes so that 5 to 10 passengers are transported on a single vehicle. Fifty eight dialysis patients are Medicaid patients and the remaining 26 are non-Medicaid. In Arkansas, the state only reimburses for one passenger per trip, so that if multiple passengers take the vehicle, the state only reimburses for one — not exactly an efficiency incentive.

This system, then, provides a very intensive dialysis transportation and access service to a very large group of demanding customers who must get treatment or risk dying. Thus, the alternative without the system is, realistically, not that of doing without treatment (and risk death) but that of finding alternative means of getting to treatment. The benefit measure, then, is the cost of providing this transportation — and the associated access service — via the transit system versus the cost of providing this service via some other alternative.

### ***Dialysis Benefit Analysis***

Since dialysis trips account for most of the system's trips (54%), we decided to limit our benefit estimates to dialysis trips. Without this transit service, we shall assume that the ambulatory patients would only have the option of taking a taxi (or paying friends/relatives) to take them to treatment. Non-ambulatory patients would need a wheelchair van or an ambulance to take them to treatment. Lacking detailed data on the costs of these two private sector alternatives in Arkansas — taxi or wheelchair van — we draw conservative estimates of these costs from elsewhere.

The system reported that 9 of the 84 dialysis patients were non-ambulatory; so we assumed, conservatively, that each of these patients would require use of a wheelchair van at a cost of $55 per round trip plus $2 per mile. (The figure of $55 per round trip plus $3 per mile was obtained from a

Charlottesville, VA private wheelchair van company. We arbitrarily reduced this to $2 per mile to apply to assumed lower costs in Arkansas.) For the remaining 75 ambulatory dialysis patients, we assumed that they could reach dialysis treatment by taxi at a one-way cost of $15 for 0-10 miles, $25 for 10-20 miles, $35 for 20-40 miles, and $45 for over-40 miles. Applying the above assumed alternative transportation costs for the 84 dialysis patients traveling to treatment 156 times per year (3 times a week times 52 weeks per year) results in a total private sector cost of $877,500 to provide the same service as the transportation provides. Note: this is a very conservative estimate since private taxis and wheelchair van services are unlikely to provide the full range of services (described above) that this system does.

### ***Benefits Relative to Costs***

The total operating costs of East Central Arkansas Transit are $818,825. The dialysis benefits — as computed above using conservative estimates of private sector alternative transportation means — are $877,500 per year. Dialysis trips comprise about 54% of the system's trips. Thus, only 54% of the system's trips used for dialysis transportation provide benefits more than sufficient to cover the total costs of operating the system.

## EL AGUILA, WEBB COUNTY, TEXAS

### ***Background***

El Aguila (Laredo-Webb Community Action Agency), located in Laredo, Texas, provides fixed route service to Webb County, using a fleet of 22 vehicles. The El Aguila fixed route system provides long-distance work and human resource round-trips from the small, very low income, heavily Hispanic, outlying rural communities of Webb County into the only major employment destination in the County — the city of Laredo, Texas. Although this system does not keep exact data on employment commutes, it does estimate that a very high proportion of its ridership is comprised of commuters to work, and it operates to increase its morning and evening commuting fleet to accommodate the increased ridership during commuting hours. The system uses 12 of its 14 vehicles for its fixed public routes, and the remaining 2 are used for a wide range of demand-responsive services to this low-income community. (Webb County ranks 245th among the 254 Texas counties in per capita income.)

For Fiscal year 1996, El Aguila provided 167,986 unlinked, one-way passenger trips, and 393,522 revenue vehicle miles of service. Total operating expenses for that period amounted to $343,527. The cost per passenger figure for El Aguila amounts to $2.04, which is less than jhalf of the National average figure of $5.32. The cost per mile figure of $0.87 is less than half of the National average figure of $1.87, again demonstrating efficiency of service for the Texas system. The passengers per mile figure of 0.43 is nearly double the National average figure of .277, again indicating an efficient service design.

### ***Areas of Potential Economic Benefits***

The principal economic benefit that this system provides is employment created by the fixed routes from major points in Webb County into the city of Laredo, using early morning and late evening "rush hour" service, with greater service during the peak morning and evening hours.

### ***Employment Benefit Analysis***

Of the 150,000 annual trips provided by this system, we estimate that about 60% are commuter-type work trips carrying mostly very low income Hispanic workers from rural locations into and out of Laredo. It is likely that a very high percentage of these persons are truly transit-dependent. Thus, 70% are assumed to owe their ability to even get from their residence to a job on a regular basis to the operations of this system. Thus, by multiplying 150,000 trips by 60% commuter and by 70% transit-dependent, we get an estimate of 31,000 employment trips that are enabled by the system. Dividing by two for round trips and dividing by the number of employment days per year (210), we get 150 as the number of persons whose jobs depend on transportation by El Aguila.

For this 150 persons, we assume that they receive a very low wage ($4.50 per hour), for 8 hours per day, for 210 days per year for an annual income of $7,560. This times 150 equals an annual earnings benefit of $1,134,000. Taking one-half of this as an approximation of public assistance benefits without these jobs results in an additional benefit of $567,000, for a total annual employment benefit of $1,701,000.

### ***Benefit Summary***

The total employment benefit, provided by about 60% of the El Aguila systems trips, provides an estimated $1,701,000 to the economy and compares favorably with the system's annual operating costs of $343,527.

## EUREKA SPRINGS TRANSIT, EUREKA SPRINGS, ARKANSAS

### ***Background***

Eureka Springs Transit located in Eureka Springs, Arkansas, provides fixed route transit service to the City of Eureka Springs using a fleet of 13 vehicles. The sole purpose of the system is to transport tourists to visit this historic town. Service is provided from the motels and public facilities located along US 64, about 4 to 11 miles from the downtown, to the downtown historic district which has only 1,889 residents. The system director says that the estimate of tourists visiting Eureka Springs is 500,000 annually, and that the system serves about 163,000 of these tourists using trolly-type buses and providing service between the motels and the downtown district at 15 minute intervals.

For Fiscal Year 1996, Eureka Springs provided 449,197 unlinked one-way passenger trips, and 129,288 revenue vehicle miles of service. Total operating costs for the same period amount to $398,840. The cost per trip figure for Eureka Springs amounts to $0.89, which is a fraction of the National average figure of $5.32. The cost per trip figure for Eureka Springs is the lowest for any system discussed here. The cost per mile figure for Eureka Springs amounts to $3.08, which is substantially higher than the National average figure of $1.87. The high cost per mile figure is likely an indication of the short trip distances that this system runs in order to serve the local tourist industry. The trips per mile figure of 3.47, over twelve times greater than the National average of 0.277, also indicates a high-density service area.

### ***Trip Purpose***

The sole purpose of this system is to provide tourist transportation to the downtown historic district.

### ***Areas of Potential Economic Benefits***

This system transports about one-third of the annual tourist traffic into the downtown historic district. The benefits from the system are fairly simple to visualize but difficult to calculate. Without the system, Eureka Springs would be faced by at least a one-third increase in downtown traffic, leading to congestion on the streets and difficulties in getting around this small town for both residents and tourists. This congestion would give rise to more accidents and loses in travel time for all — plus it would put both pedestrians and motorists at greater risk of accident. And more traffic would give rise to more demand for parking in the downtown area, but more parking in the downtown area, besides its cost, would tend to reduce the historic district's value as a tourist destination. The increased traffic would create the same depressing effect on tourists; so that, in combination, these impacts would tend to reduce the number of tourists visiting Eureka Springs. Benefits arise from the fact that the system minimizes these traffic and parking problems and helps ensure that Eureka Springs is a place where tourists want to go.

### ***Tourist Benefit Analysis***

The benefits of this system could be estimated in either of two ways: 1) assessing the traffic congestion that would be created in the absence of the system — and the 163,000 tourists that would be added to the traffic/parking situation; or 2) assessing the impact of tourists leaving Eureka Springs because of the traffic and parking problems created by the absence of transit. We chose the second approach. We assume that about 100,000 of the 500,000 tourists now visiting would turn away because of these problems. This would remove about $100 per tourist from the area's income — say that the average stay is about a day and a half and that each tourist would spend about $50 on a motel room, $30 on meals and the rest on souveniers and transit ($3 for all day pass on transit system). In the absence of the transit system, then, about $10,000,000 would be removed from the Eureka Springs tourist expenditures. If we assume that, say 90%, of this tourist business would move elsewhere, and that the remaining 10% would disappear, the net economic benefit would be $1,000,000. (Also, we would have a community multiplier effect of this income loss, but we have not included multiplier effects in these field studies.)

### ***Benefits Relative to Costs***

The conservative calculation of tourism benefits of $1,000,000 from this system compares favorably with the system operating costs of $398,840.

## NORTH IDAHO COMMUNITY EXPRESS (NICE), COEUR D'ALENE, IDAHO

### ***Background***

North Idaho Community Express (NICE), which is located in Coeur D'Alene, Idaho, provides demand-responsive service to three very rural, sparsely-populated counties — Kootenai, Bonner, and Shoshone — using a fleet of 25 vehicles. For Fiscal Year 1996, NICE provided 120,741 unlinked, one-way passenger trips, and 402,157 revenue vehicle miles of service. Total operating expenses for the same period amounted to $555,279. The cost per trip for NICE amounts to $4.60, slightly below the National average figure of $5.32. The cost per mile figure of $1.32 is also below the National average figure ($1.87). Trips per mile for NICE amount to 0.30, slightly above the National average. Overall, this is excellent performance for a demand-responsive system serving such a large area.

### ***Trip Purposes***

This system has very balanced trip purposes as follows:

| | |
|---|---|
| Medical | 21% |
| Employment | 12% |
| Nutrition | 6% |
| Education | 21% |
| Shopping | 19% |
| Tourist | 1% |
| Other | 19%. |

### ***Areas of Potential Economic Benefits***

This system's high percentages of medical, nutrition, shopping, and other trips — together with the older rural population that the system serves indicate that a principal type of benefit is that of enabling older people to stay in their own homes as an alternative to higher cost nursing homes. As a second type of benefit, this system provides 12% of its trips for employment — 18,074 trips per year.

### ***Benefits of Home Living for Older Persons***

Using a methodology similar to that applied for Sweetwater, Wyoming and Aroostook, Maine, we calculate the benefits from transportation that serves to assist older persons to stay in their own homes longer compared to the without-transit situation where institutionalization at a nursing home facility often becomes the only realistic alternative for older persons, but one that carries a greater economic cost. Based on census data for the three counties, we approximate that 3% of the total population is over 80 years of age. We estimate that this group uses transit 50% more than the average person, and we estimate the number of over-80 trips by multiplying this 4.5% by the total number of system trips to get 6,619 trips per year for this group. We assume that this group uses transit an average of 60 times a year; thus we calculate that 110 over-80 persons use this system and that 50% of these (55) are enabled to stay out of nursing homes because of the system, at an annual savings per person of $24,000. (See Sweetwater for the basis of the $24,000 figure.) Finally, the total benefit derived from this analysis is $1,320,000.

### ***Benefits from Employment***

Employment trips comprise 18,074 trips per year, of 9,037 round trips to work. Divided by an assumed 210 work days per year, we obtain an estimate of 43 commuter served by the system. If we assume that 50% of these persons in this very rural area would be unemployed without the system, we get 21 commuters who can only get to jobs with transit. Assuming an annual earnings just above the minimum wage — $9,000 — for each person, we get an earnings benefit of $189,000. To this we add (as we did for other systems) 50% as an estimate of public benefits that would be paid in the absence of each job to get a total employment benefit of $283,500.

### ***Benefits Relative to Costs***

The benefits computed for this system total $1,603,500 which compares favorably with the system's operating costs of $650,000.

## PULLMAN TRANSIT, PULLMAN, WASHINGTON

### ***Background***

Pullman Transit, located in Pullman, Washington, provides fixed route, subscription, and demand-responsive service to the City of Pullman, using a fleet of 27 vehicles. This system is built primarily around the needs of Washington State University, with most of the fixed routes of the system culminating on the University campus. We estimate that about 80% of the ridership consists of University students and staff.

For Fiscal Year 1996, Pullman transit provided 1,029,550 unlinked one-way passenger trips, and 189,697 revenue vehicle miles of service. Total operating expenses were reported as $1,177,236 for that period. Like Eureka Springs, Pullman transit has outstanding efficiency measures, probably due to the fact that it serves a high-density area featuring a prominent trip-generator, Washington State University. The cost per trip figure of $1.14 is far below the National average of $5.32. The cost per mile figure of $6.21 is far above the National average figure of $1.87, but this is an indication of the short trip lengths for Pullman Transit. The trips per mile figure of 5.43 is among the highest of any system discussed here, nearly twenty times higher than the National average of 0.277.

### ***Ridership***

Pullman Transit operates both a fixed route and a small demand-responsive service as part of its system. The fixed route system provides 1,060,511 trips a year and the demand-responsive — called Dial-a-Ride — handles 10,595 trips a year, broken down as follows:

| | |
|---|---|
| Medical | 26% |
| Employment | 16% |
| Education | 19% |
| Shopping | 24% |
| Other | 14%. |

The Dial-a-Ride service is limited to use by the poor and the truly transportation-dependent elderly and disabled persons. Because the predominant service of this system is the fixed route service that serves,

primarily, the University; the following benefit analysis is based on this service, even though the Dial-a-Ride service likely provides substantial benefits for its small size.

### ***Areas of Potential Economic Benefits***

The benefits of Pullman Transit, like Blacksburg transit and Ames Transit, are not really education since, without the system, students would likely be attending the University. (The benefit categories and the benefit logic are presented in detail in the Blacksburg Transit write-up.)

### ***Direct Benefit to Users***

The direct benefit to users is the efficiency benefit from the lower real transportation costs that result from riding the transit system to and from the campus (for students and staff), and for the general public. As indicated above, these savings are minimal since, with the system there is likely a bus wait at the point of origin whereas driving does not entail such a wait. However, for the bus rider, there is no parking time and no long walk from a parking lot at the campus; so these convenience factors essentially balance out. Thus, we are assigning a minimal direct benefit to the efficiency of transporting users based on the alternative cost of driving the relatively short distances involved in this rural community. It appears that the average trip is about 4 miles and we apply $.34 per mile as the cost of owning and operating a private auto (the rate that the Federal Government uses to reimburse its employees for use of private vehicles) to get a per trip alternative cost of $1.36. Pullman Transit system's costs per trip is $1.14 as shown above. Thus, the direct benefit of this system is computed as number of trips (1,060,511) times the lower system cost per trip of $.22 ($1.36 auto less $1.14 Pullman Transit cost) producing $233,312 as the direct efficiency benefit.

### ***Traffic Estimate Without Transit***

Of the system's 1,060,511 fixed route trips for FY 1995-96, we estimate that 80% — 848,409 are student and faculty commuting trips. Dividing these trips by 200 days per year, we get 4,242 trips per school day. Assuming that most commuters take the system round-trip to campus, we divide by two to obtain 2,121 as an estimate of the number of commuters that this system handles. As with Blacksburg and Ames systems, we assume that the number of cars removed from the road would be fewer than this due to the absence of buses and riding with others. Thus, we assume that two-thirds of the current Pullman

Transit University commuters — 1,421 — would use cars to drive themselves to campus without the transit system.

***Benefits from Reducing Traffic Congestion***

Washington State University has an enrollment of 17,300 students and about 4,325 faculty/staff, for a total of 21,625. If we assume that 80% have registered cars and that 95% of these use these cars to commute on the average day, we get an estimate of 16,435 cars commuting daily. Without the system, we add the 1,421 previous transit commuters to this traffic to get 17,856 total commuters. If we assume that each now has a 50 minute commute and that this would be increased by 12% daily (3% over the increase in number of cars since the congestion would likely be greater than the average); we get an average daily commute increase per person of 6 minutes. On an annual basis this totals to 357,120 commuting hours saved by the system. If, as for Blacksburg and Ames, we place a $3 per hour value on this time, the total traffic congestion benefit savings from Pullman Transit's operations is $1,071,360.

***Benefits from Reduction in Parking***

If the 1,421 cars removed by Pullman Transit each require parking in the absence of this system, the costs of parking additions are estimated as follows. We assume that 80% of this need would be met by surface parking and that 20% would be met by parking buildings. (Same percentages as that assumed for Blacksburg and Ames.) Based on the Indiana study, we use $333 as the annual cost of a surface space and $1,360 as the cost of a building space. (Same assumptions as with the other university systems.) These assumptions provide $378,621 as the total cost of surface parking and $386,240 as the cost of building parking that is saved on the University campus by the Pullman Transit system for a total parking benefit of $764,861.

***Benefits from Reduction in Accidents***

We lacked data on accidents on the Washington State campus and surrounding community. However, we obtained such data and calculated accident-related benefits for Blacksburg Transit. Using the relative percentage of vehicles removed — Pullman Transit 71% as many vehicle removed as removed by Blacksburg transit — and applying that percentage to the Accident savings benefit calculated for Blacksburg Transit ($269,550) provides $191,381 as the traffic benefit estimate for Pullman Transit.

### ***Total Benefits***

The total benefits from Pullman Transit's operations are estimated to be $2,260,914 versus the annual operating costs of $1,177,236. This total benefit is comprised of direct user benefits of $233,312, traffic benefits of $1,071,360, parking benefits of $764,861, and accident benefits of $191,381.

## TRI-COUNTY COMMUNITY COUNCIL, FLORIDA

### ***Background***

Tri County Community Council, Inc., located in Bonifay, Florida, provides fixed route, demand-responsive and subscription service to the Counties of Holmes, Walton, and Washington, using a fleet of 48 vehicles. For Fiscal Year 1996, Tri County provided 175,778 unlinked, one-way passenger trips, and 1,593,081 revenue miles of service. Total operating expenses for the same period amount to $1,351,006. Tri County's cost per trip figure of $7.69 is somewhat high for a fixed route system. The cost per mile figure of $0.85 is less than half of the National average ($1.87), and along with the low trips per mile figure of 0.11, indicates the high nature of the trip lengths for this system.

The total population for the three counties in 1990 was 60,457. Medical trips comprise about 40% of the systems trips in Walton County, 86% of the trips in Washington County and 31% of the trips in Holmes County. Since this is an older, low income population, and since there are few medical facilities in these counties, many of the medical trips are long-distance trips to Pensacola, Panama City, and Tallahassee.

### ***Trip Purposes***

Tri-County trip purposes are as follows:

| | |
|---|---|
| Medical | 56% |
| Employment | 2% |
| Nutrition | 8% |
| Education | 31% |
| Other | 3%. |

Of the medical trips, the system reports that 75% of the medical trips are for dialysis treatments. The system also reported detailed information on the length of each of the dialysis routes that the system has developed. Most treatment facilities are in Pensacola and the average dialysis treatment round trip from these originating rural counties is calculated from these routes as 114 miles.

### ***Areas of Potential Economic Benefits***

On an annual basis the system provides 73,514 dialysis trips, or 36,757 round trips from the three counties to the treatment areas which average, round trip, 114 miles. We assume that 15% of these patients are non-ambulatory, requiring at least a wheelchair van for transport by the private sector (percentage based on data obtained from several dialysis transport providers). Thus, the remaining 85% are assumed to be ambulatory patients and could, as an alternative to Tri-County, use private taxis to get to treatment.

This system, then provides a very intensive dialysis transportation and access service to a very large group of demanding customers who must get treatment or risk dying. The alternative without the system is not realistically that of doing without treatment and running a high risk of death, but that of finding alternative means of transportation such as taxis for the ambulatory and wheelchair vans for the non-ambulatory patients.

### ***Dialysis Benefit Analysis***

Since medical trips account for 56% of the systems trips and dialysis trips account for 75% of all medical trips, we decided to limit our benefit estimates to dialysis trips. Without this transit service, we assume that private sector carriers — taxis and wheelchair vans — would provide the service now furnished by the system.

Of the 36,757 dialysis round trips provided annually by Tri-County, we assumed that 15% involved non-ambulatory patients and that the remaining 85% were for ambulatory patients. In this analysis, we use the same cost factors as we used for the dialysis computations for East Central Arkansas — $90 round trip by taxi for the average round trip of 114 miles and $55 base round trip cost plus $2 per mile for the non-ambulatory patients via wheelchair van. The costs of providing these trips by these alternative means are $2,811,870 per year for taxis and $1,560,452 for wheelchair vans — for a total cost of $4,372,322.

### ***Benefits Relative to Costs***

The total operating costs of the Tri-County system are $1,351,036 per year. The benefits from dialysis treatment transportation alone, accounting for 42% of the system's trips, are calculated above to be $4,372,322 per year.

## UPPER CUMBERLAND HUMAN RESOURCE AGENCY, COOKEVILLE, TENNESSEE

### ***Background***

The Upper Cumberland Human Resource Agency (UCARTS), located in Cookeville, Tennessee, provides demand-responsive service to fourteen counties in Tennessee, using a fleet of 56 vehicles. This is the largest number of counties in any of our field sites. For the Fiscal Year 1996, UCHRA provided 147,114 unlinked, one-way passenger trips, and 1,428,746 revenue vehicle miles of service. Total operating expenses for the same period amount to $1,176,912. Cost per trip for the UCHRA amounts to $8.00, while the cost per mile figure amounts to $0.82. These numbers are indicative of the large service area for the demand-responsive system, and are very similar to the figures for Tri County, as is the trips per mile figure of 0.10.

### ***Trip Purposes***

UCARTS serves the following trip purposes:

| | |
|---|---|
| Medical | 18% |
| Employment | 3% |
| Nutrition | 13% |
| Education | 14% |
| Shopping | 35% |
| Tourism | 1% |
| Other | 17%. |

### ***Areas of Potential Economic Benefits***

This system's high percentages of medical, nutrition, shopping, and other trips — together with the older rural population that the system serves — indicate that a principal type of benefit is that of enabling older persons to stay in their won homes as an alternative to higher cost nursing homes. As an additional, but smaller, benefit, this system provides 5,000 employment trips per year.

### ***Benefits of Home Living for Older Persons***

Using a methodology similar to that applied in Sweetwater, WY, we calculate the benefits from transportation that serves to enable older persons to stay in their own homes longer then they would be able to stay without transportation, thus postponing institutionalization at nursing homes. Bases on Census data for these counties, we approximate that 13% of the population is in the over-80 age bracket. We assume that each of these averages 70 trips per year on UCARTS. These two assumptions provide an estimated 162 persons-over-80 taking the system annually. If half of these are kept out of nursing homes by this transportation service, 81 would benefit from the system at a savings of $24,000 per year. (See Sweetwater for the basis for this annual savings.) This calculation provides a benefit estimate of $1,944,000 per year from UCARTS service to seniors.

### ***Benefits from Employment***

For 5,000 employment trips per year (2,500 round trips to work) and an assumed 210 workdays per year, 12 full-time commuters are calculated to use the system. We assume that 50% of these would not be able to reach employment without the system. Thus, 6 commuters each earning $9,000 per year (just above the minimum wage) are beneficiaries of this system for a total earnings of $54,000 per year and an additional $27,000 (50% of earnings) for public assistance payments no longer needed. Thus, the employment benefit is calculated to be $81,000 per year.

### ***Benefits Relative to Costs***

The benefits computed above total $2,025,000, which is larger than the UCARTS operating cost of $1,176,512.

## VILLAGE OF ANGEL FIRE TRANSIT, COLFAX, NEW MEXICO

Village of Angel Fire Transit located in Colfax, New Mexico, provides route-deviation service to the City of Colfax, using a fleet of four vehicles. Angel Fire Transit serves the Village of Angel Fire in rural northern New Mexico, home of a ski resort. The principal focus of this system is to move tourists around the town of Angel Fire and to/from the town of Eagles Nest. The town of Eagles Nest contributes toward system costs and discussions are underway with the ski resort to contribute as well.

For Fiscal year 1996, Angel Fire provided 21,209 unlinked one-way passenger trips, and 107,769 revenue vehicle miles of service. Total operating expenses were reported as $88,384 for the same period. The cost per trip for Angel Fire amounts to $4.17, which is lower than the National average figure of $5.23. The cost per mile for Angel Fire amounts to $0.82, which is substantially lower than the National average figure of $1.87, and indicates the low-density nature of the Angel Fire service area. The trips per mile figure of 0.20 is substantially lower than the National average figure of 0.277, and again indicates high trip lengths, usually resulting from a low-density service area.

### ***Trip Purposes***

The principal purpose of this system is to move tourists around this small town and thus alleviate traffic and parking problems. During the month of January through March, 1997, the system carried an average of 4,800 passengers per month, indicative of the in-season passenger load. The director of the system said that about 400 employees use this system together with the tourists, but that there are few other users. In the summer, the number of passengers dwindles down to the area's permanent employees — about 400 per month.

### ***Areas of Potential Economic Benefits***

Tourism and employment provide the principal focus of this system and thus provide the principal areas of economic benefits.

### ***Tourism Benefit Analysis***

The tourism benefits of this system could be calculated in either of two ways: 1) assessing the traffic congestion and parking problems that would be created in the absence of the system; or 2) assessing

the impact of tourists leaving Angel Fire because of the traffic and parking problems created by the absence of transit. We chose the second approach. We assume that about one-fifth of the (about) 72,000 tourists that visit Angel Fire would abandon this resort town in the absence of transit because of the traffic and parking hassle that they would incur in this very small community with its limited roads and its very limited parking (same assumption as used for Eureka Springs, AR). Thus, 14,400 tourists would leave together with their average expenditures per trip, which we estimate for a ski area to be $200 per person per visit. Thus, the loss to Angel Fire would be $2,880,000. If we further assume that, say 80%, of this tourist business would move elsewhere, and that the remaining 20% of this tourist business would permanently disappear, the net economic benefit would be $460,800.

### ***Employment Benefit Analysis***

Employment benefits likewise comprise a benefit of this system. The employment trips per month (400) equate to 20 trips per work day. This is round trips for 10 employees. If we assume that 50% would not be able to reach work without the system and that the average employee gets $9,000 per year, the economic benefit is 5 × $9,000, or $45,000. If we further assume the these employees would receive unemployment and public assistance payments of one-half this amount in the absence of the program, the benefit would be $45,000 plus $22,500, or $67,500.

### ***Benefits Relative to Costs***

The conservative calculation of tourism benefits of $460,800 plus the employment benefits of $67,500 equals $528,300, which compares favorably in size to the relatively low operating cost of this small rural system — $88,384.

## WESTERN IOWA TRANSIT SYSTEM (REGION XII COG), CARROLL, IOWA

### ***Background***

The Western Iowa Transit System (Region XII COG), located in Carroll, Iowa, provides subscription and demand-responsive service to the Counties of Audubon, Carroll, Crawford, Greene, Guthrie and Sac, using a fleet of 35 vehicles. This very rural six-county area has a very high proportion of older residents. The largest of the six counties, Carroll, only has a population of 21,368.

For the Fiscal Year 1996, WITS provided 352,519 unlinked, one-way passenger trips, and 837,567 revenue vehicle miles of service. Total operating expenses for that period amount to $784,370. The efficiency measures for WITS are outstanding for a multi-county system serving a large area. Cost per trip amounts to $2.23, the lowest figure for any of the multi-county systems reviewed here, and well below the National average figure of $5.23. Cost per mile amounts to $0.94, half of the National average figure of $1.87. The trips per mile figure of 0.42 is outstanding performance for such a large, multi-county demand-responsive system.

### ***Trip Purposes***

The following are the reported trip purposes for Western Iowa Transit System (WITS):

| | |
|---|---|
| Medical | 37% |
| Employment | 24% |
| Nutrition | 9% |
| Education | 8% |
| Shopping | 13% |
| Head Start | 5% |
| Other | 3%. |

This system provides total annual trips of 307,500.

### ***Areas of Potential Economic Benefits***

This system's high percentages of medical, nutrition, and shopping trips — together with the area's unusually high percentage of older residents — indicate that a principal type of benefit is that of enabling older people to stay in their own homes as an alternative to higher cost nursing homes. The system also provides a very large percentage of employment trips, 24%, and that also is an area of potential economic benefit.

### ***Benefits of Home Living For Older Persons***

Using a methodology similar to that applied for Sweetwater, Wyoming, we calculate the benefits that result from transportation that enables older persons to live longer in their own homes because the system provides them with access to medical, shopping, and social services as an alternative to costly nursing home care. Based on census data, we calculate that about 6% of the area's population is over 80. We assume that those over 80 use the system 50% more than the average citizen. Applying 9% to the total number of system trips, we get 27,675 as an estimate of over-80 trips. If we assume that a person in this group takes 70 trips per year, we derive 393 and the number of users. If the system helps half of these persons over 80 to stay out of nursing homes, then 197 persons benefit. The average cost-saving benefit for each person is calculated as $24,000 per year (see Sweetwater case for details). Thus, 197 times $24,000 provides a benefit of $4,728,000 per year.

### ***Benefits from Employment***

The system provides 75,000 employment trips per year, 37,500 round trips to work. When round trips are divided by 210 days per year, we get 179 commuters using the system. If we assume annual earnings of $9,000 and that 50% of the commuters could not get to work regularly without the system, we get a total annual earnings benefit of $801,000. To this we add, as we did for other systems, 50% of earnings, $400,500, as an estimate of public benefits that would be paid in the absence of each job to get a total employment benefit of $1,201,500.

### ***Benefits Relative to Costs***

The benefits computed for this system total $5,929,500 which is far larger than the system's operating costs of $784,370.

## SUMMARY

We have looked at the economic impacts produced by a large number of rural transit systems. These systems were chosen to represent a variety of communities and operating circumstances. In all the cases shown, these systems' benefits exceeded their operating costs by a substantial amount. In the next chapter, we will summarize these benefits and examine their relative impacts.

# 5

# SUMMARIZING THE ECONOMIC IMPACTS OF RURAL PUBLIC TRANSPORTATION SYSTEMS

This chapter reviews the economic impacts of rural public transportation systems that we described in the previous chapter in our case studies. As noted in chapter 4, the systems that we studied in depth were selected as candidates which could be expected to demonstrate economic impacts in the following areas:

- **employment effects**, both from the transit system itself and from those who use it for journey-to-work trips, including services to commuters,
- **benefits from increased mobility**
  - participation in education and training programs,
  - increased participation in social service programs,
  - health benefits of increased access to medical care, and
  - personal independence,
- **transportation cost impacts for the users of the system**,
- **impacts on expenditure patterns,** and
- **growth of the local economy** (beyond that expected without public transportation services)
  - local development impacts and reduced congestion, and
  - access for tourists and related employees.

We examined 22 systems purported to have economic impacts, and found that they generally did meet the expectations. Let's look at these systems again in terms of a variety of characteristics.

# IMPACTS BY IMPACT TYPE

## EMPLOYMENT EFFECTS

### *Access to Employment*

As employment is a primary means to income and self-sufficiency in this society, access to employment is vital to achieve a number of societal goals. The converse is that a lack of transportation can be a serious barrier to employment; finding additional ways to provide access to jobs has become one of the "hot topics" of 1997, with a number of regional conferences sponsored by the Federal Transit Administration, the Department of Health and Human Services, and the Department of Housing and Urban Development. If the choices for obtaining income and sustenance are seen as employment or welfare, and with much fanfare about reducing welfare dependency, the roles of transit systems in offering connections to job sites had gained added emphasis.

The use of transit to increase incomes and reduce dependency on welfare applies especially to persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons. If these "transportation disadvantaged" persons can be moved from a position of dependence on welfare funding to one of supporting themselves (and paying taxes!), the benefits of this change are obviously substantial for the individual and society as a whole. Those transit systems that focused on trips to work generally had very large economic impacts. This was true for the following systems: County Commuter, County Express, DARTS, El Aguila, STAR, the Village of Angel Fire, and Zuni Entrepreneurial Enterprises.

### *Services to Commuters*

In some rural areas, the distances between residential locations and jobs can be very large. We found systems where one-way journey-to-work trips approached two hours. This is strong testimony to the benefits that individuals perceive from employment, even though they may incur some substantial inconveniences for the privilege of working. DARTS and El Aguila were among the systems that carried workers substantial distances to work and did so in a fashion that produced large benefits. The Pee Dee RTA is another system that has focused on long-distance trips that link areas with labor shortages with communities with labor surpluses to the benefit of both areas.

## BENEFITS FROM INCREASED MOBILITY

### *Education and Training*

Access to education, training, and counseling services enables travelers to increase their long-term chances of employment at a decent wage. We saw very large benefits from these kinds of trips at the Zuni Indian reservation, in Lee County, North Carolina, and in Sweetwater County, Wyoming. Even when considering that not all persons involved in such programs will graduate and obtain full-time employment, the benefits of such trips are very large. This is indicative of the kinds of benefits that can be expected by designing significant transportation components into programs that address welfare reform and job creation initiatives.

### *Dialysis and Other Medical Treatments*

Access to medical care and other social services enables the travelers to use services that increase their health and quality of life. Once again, this type of access is particularly vital for those persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons. Trips to dialysis treatments are extremely beneficial to those receiving them, as dialysis often requires a three day a week regimen of treatments, and some patients are too ill after the treatments to safely drive home.

Dialysis transportation is a particular challenge for rural transportation systems, as it may involve long distance trips that can cross county or even state boundaries. Dialysis centers are much more often located in urban than rural areas. The programmatic issues of how to ensure full passenger loads and how to productively employ the driver and the vehicle while waiting the three or four hours for treatments to take place are issues that must be squarely addressed to provide cost-effective transportation services.

### *Enhancement of Opportunities for Independent Living*

Living in one's own home is very often much more cost-effective than other alternatives, one of the most costly of which is nursing home care. Rural transit systems assist in enabling the continuation of independent living by providing persons without autos or those persons unable to drive because of disabilities, poverty, or other reasons the ability to continue to live in their own homes rather than to live in nursing homes. Benefits like these are especially relevant in areas with large elderly populations. We observed the beneficial impacts of such trips in Florida, Iowa, Maryland, Maine, New Mexico, Tennessee,

and Wyoming. Areas with large numbers of persons of advanced age can obtain substantial benefits from providing accessibility to medical treatment, shopping, social services, and personal needs, without which the travelers would not be able to stay in their own homes. In addition, the ability of rural transit systems (such as JAUNT, STAR Transit, and CTS in Florida) to assist persons with disabilities obtain and maintain their independence is probably among the most powerful benefits of these systems.

## TRANSPORTATION COST IMPACTS FOR THE USERS OF THE SYSTEM

In most of the communities studied, the riders of the rural transit systems traveled for much lower costs on a per trip basis than they would have if they had traveled by another mode. In general, the other modes that can be considered involve hiring someone to drive them for these trips. That someone is often a friend or a relative; in some communities, they could travel by taxi, although taxi services are not available in many rural communities. Whatever the specific mode, these "for hire" options are generally very expensive in terms of cash payments (and they may also be expensive in terms of the psychic costs involved in asking for rides and then being indebted to the person providing the rides). So the cost impact benefits to the riders from using rural public transit services are often substantial.

These gains are offset by the same amount of income lost by those persons formerly providing the rides. Therefore, since we are focusing in this research on **net economic benefits** (also referred to as "generative impacts" in Chapter 3), and the net economic benefits are zero in this case, we did not generally make specific estimates of the cost savings to riders from the use of rural public transit services in our case studies.

## IMPACTS ON EXPENDITURE PATTERNS

The impacts on expenditure patterns are similar to the transportation cost savings for the riders. Transit system riders will derive benefits from the increased accessibility offered by the transit service to shopping areas offering more costs at more competitive prices than are generally found in the smallest rural communities. Once again, there are offsetting impacts: the savings to the transit system rider are offset by losses to the shopkeepers in the most rural locations, creating an overall net benefit of zero. Therefore, this type of benefit was also not calculated for our case study sites.

## GROWTH IMPACTS ON THE LOCAL ECONOMY

### ***Local Development Impacts and Reduced Congestion***

Even in rural areas, certain resources — like land — can be scarce. While land is generally not scarce in rural areas, it is more frequently scarce in resort communities and in university communities. In such areas, transit services can avoid the need for large investments in parking, and can reduce traffic congestion and accidents. In our university communities — Ames, Iowa, Blacksburg, Virginia, and Pullman, Washington — these were substantial benefits. Resort communities in California, Colorado, Tennessee, and Vermont, as well as in other locations, have implemented or are in the process of implementing transit services to better serve their clients and maintain the original attractiveness of these areas.

### ***Access for Tourists and Related Employees***

With rural transit services, communities that depend on tourism can experience greater levels of economic activity than they would otherwise. They can offer more attractive environments, including less congestion, to visitors. These tourist areas can also offer increased levels of personal services, whether in restaurants or hotels or other business establishments, since such businesses have a greater labor market from which to draw if there are transit services for the potential employees. (Many persons who work in tourist-related occupations cannot afford to live in the resort communities in which they work.) There are now a number of instances around the U. S. in which transit systems are being developed in resort areas that are being funded privately instead of with governmental funds. In the case of Eureka Springs, the local transit system obviously creates a more attractive environment for tourism, resulting in greater overall economic activity for the community. The Pee Dee RTA takes some persons great distances to serve as employees for businesses that focus on tourists, and the long-distance work trips in Clarksdale, Mississippi allow the new gaming enterprises much larger staffs.

## OTHER IMPACTS

We investigated a number of other impacts. In general, these are important to those receiving the benefits, but they are not of the magnitude of the other impacts listed above in terms of their economic benefits. These impacts would include the following:

- **Providing rides to the school (or preschool) age children of working parents**, which enables the parents to generate a full day's work instead of taking time off from work to provide for their child's transportation or hiring a taxi. This would apply to any working person who serves as a caregiver for others. It will more and more often apply to persons who provide care for their elderly parents.

- **Access to shopping, recreation, and other personal services**, which enables the travelers to travel to these destinations at lower cost and with greater frequency than would be possible otherwise. Some health and nutrition benefits will also accrue to especially isolated individuals from this increased accessibility.

- **General community support**, including the kinds of special assistance provided by systems like the Pee Dee RTA, in emergencies such as storm damage and for other purposes such as transportation for special needs students.

## IMPACTS BY SYSTEM TYPE

The important news here is that all types and sizes of rural transit systems can generate significant economic impacts, from systems with less than 10,000 riders per year to systems with millions of annual riders. Systems that showed high average trip lengths generated significant economic benefits, as did systems that had lower trip lengths and thereby had lower per trip costs. Our high-impact systems come from all around the country and serve various kinds of communities. Their service emphasis varies, from an almost exclusive emphasis on work trips to a primary focus on human services trips. **Therefore, we conclude that it is possible for many different kinds of rural transit systems to generate significant economic impacts for the communities which they serve.**

Those systems that were most successful in generating economic impacts do have some common characteristics:

- **They provide frequent service.** Not all of these systems provide many trips, but they do provide them frequently to their patrons, enabling the riders to conduct key activities on a daily basis, including working, attending schools and training courses, and obtaining regular medical services.

- **They target persons in need of service.** People who will rise very early and travel hours to find a job are obviously persons in need of transportation. Similarly, persons who must travel great distances for training courses that would improve their chances of escaping welfare through employability, and those persons who travel great distances for their

medical care derive significant benefits from the time and money they invest in travel.

- **They respond to specific needs.** While these high-impact rural transit systems do not necessarily provide demand-responsive services in the strict sense of the term, most of these services have been specifically designed with the daily schedules of their riders in mind. Special accommodations are often made for limitations of the riders in terms of physical abilities or income.

Although these transit system features would appear to be obvious, they are far from universal. Greater attention to these fundamental concepts would allow a number of other rural transit operators to measurably improve their levels of economic impacts within their communities.

# 6

# ECONOMIC IMPACTS: A NATIONAL PERSPECTIVE

## BASIC CONSIDERATIONS

From a national perspective, do rural public transportation systems have economic impacts? If we think that rural transit systems do have economic impacts, are these impacts significant enough that we could measure them?

Our analysis of the case studies indicated that rural public transit systems do have economic impacts and that they can be measured at the local level. If we believe that there are any observable economic impacts at the national level resulting from the operations of rural public transit systems, a number of thorny real-world considerations that affect the measurement process need to be addressed before these impacts can realistically be isolated and tabulated:

- Total expenditures on rural public transportation projects have not been large in comparison to other economic investments, such as highways. Overall expenditures for FY 1993 (local, state, and national funds combined) on all rural public transportation projects was approximately $406,775,662 (based on expenditure reports from 1,092 out of all 1,196 Section 18 operations). In contrast, 88 Federal rural development-type programs provided $29 billion in FY 1989. *(32)* In that year, Federal infrastructure spending was $11.1 billion. **Federal** Section 18 expenditures that year were about $150 million, meaning that the Federal expenditures on rural public transportation were about 1.35 percent of overall Federal infrastructure spending; **total** Section 18 expenditures were about 3.66 percent of all Federal infrastructure expenditures and 1.4 percent of all Federal rural development expenditures. Federal Section 18 expenditures equaled 0.52 percent of all Federal rural development expenditures. Documenting the impacts of expenditures of this relatively small magnitude will be difficult.

- Another way of describing the relative size of rural transit operations is to compare their annual budgets to aggregate measures of the size of a locality's economy. We compared the expenses of some of the largest rural transit systems to their local economies, measured in terms of total personal income. The Roaring Fork Transit Agency in Colorado had the largest proportion of the overall local economy devoted to transit expenditures, at about

6 percent, as shown in Table 13. Among ten counties in the U. S. where rural transit expenditures were the largest, the average system expenses were less than two percent of the local economy (as measured by total personal income). For all rural counties, the transit expenses are a very, very much smaller proportion of their local economies. This creates significant problems in identifying and measuring the impacts of rural transit expenditures on local rural economies, at least when looking from the perspective of the local economy.

- Most rural transportation systems were not established with specific economic objectives. In fact, many of their objectives are social in nature, such as access to community services. This does not preclude economic benefits, it simply means that economic benefits, where they occur, may be hard to find and to separate from social benefits.

- Rural areas in the U. S. are characterized by diversity in many dimensions — economic base, population and population density, income sources, geography and topography, demographics, government, and others. This diversity influences the types and levels of economic benefits that rural public transportation operations bring to different communities.

- Rural transportation systems are designed largely by local interests to reflect local needs; and thus, when viewed nationally, they are quite diverse in size, purpose, type system, type vehicles, and other dimensions. These variations need to be reflected.

- Rural transportation systems have developed in a project-specific manner to be relevant to local needs, not in some network or regional/national system. Thus, it cannot be expected that these projects will reflect regional or national integration effects. Therefore, the whole will not necessarily be greater than the sum of the parts.

- The fact that there has been no previous effort to estimate the national economic effects means that there is no tested methodology, no previously analyzed data, and, thus, no base on which to build a methodology.

In performing the analyses, we need to be careful to avoid a variety of errors. While it could be tempting to conclude that those cases in which counties with rural transit systems grew faster than the rest of the non metro (rural) counties demonstrate that there are national economic impacts, this could be a false conclusion unless we could show that this difference was attributable to the impacts of rural public transportation systems and not to other factors associated with this growth. Conversely, if we fail to see differences in economic growth for rural counties in the U. S. with rural systems versus those counties which do not have rural transit systems, that observation does not necessarily mean that there are no impacts at this overall national level: it only means that the differences are not discernible using the measures that have been employed at the moment. It could mean that the differences are small and that it will take sophisticated techniques to determine their existence.

Table 13:

**Top Ten Section 18 Systems Based on Section 18 Expenditures**

| System | County | State | Total Personal Income | Section 18 Expenses/ Total Personal Income |
|---|---|---|---|---|
| Roaring Fork Transit Agency | Pitkin | CO | $227,551,000 | 0.059 |
| Avon/Beaver Creek Transit | Eagle | CO | $667,115,000 | 0.010 |
| Clallam Transit System | Clallam | WA | $1,737,049,000 | 0.004 |
| Grays Harbor Transp. Authority | Lewis | WA | $193,610,000 | 0.024 |
| Ames Transit Agency (Cy-Ride) | Story | IA | $97,686,000 | 0.029 |
| Rogue Valley Transportation District | Jackson | OR | $1,019,604,000 | 0.002 |
| Summit Stage | Summit | CO | $282,440,000 | 0.007 |
| Island Transit | Island | WA | $619,983,000 | 0.003 |
| COMSIS Mobility Services, Inc. | Okeechobee | FL | $238,807,000 | 0.008 |
| Vail Transportation | Eagle | CO | $166,006,000 | 0.010 |
| *MEAN* | | | $564,871,667 | 0.016 |

We'll approach the national impact analysis as follows:

- **Period of analysis — 1979 to 1994.** Rural public transit programs in most communities were stimulated by the availability of Federal funding. Initial appropriations for the Section 18 program of Federal funding for rural public transit were provided in 1979.

- **Possible measures of economic progress to be considered:**

  Change in net earnings from 1980 to 1994
  Change in employment from 1979 to 1993
  Change in Total Personal Income from 1979 to 1993
  Change in Per Capita Personal Income from 1979 to 1993
  An important demographic variable also used:
  Change in total county population from 1979 to 1993.

  These are generally-accepted and generally applied measures of economic progress. We will use the changes in these variables to estimate the effects that have occurred under the period of Federal funding for rural transportation.

- **Counties with rural transit systems need to be examined separately from counties without such systems**. This provides the basis for comparison between those counties having such systems and those counties not having them.

- **Rural counties should be separated from urban counties using USDA's classifications of Metro and Non-metro areas.** We are interested in rural transportation in this project; thus urban areas need not be analyzed. The USDA definition of Urban (metro) vs. Rural (non-metro) provides a clear-cut and simple way of relating this definition to counties. The Census definition of rural, which focuses on places outside of cities, does not lend itself to specific county identification and thus is difficult to use.

- **Economic/Policy type rural counties should be specified**. We will use USDA's designations of economic type and policy type counties, discussed in Chapter 2, to capture some of the key economic features of rural counties because there is a need to go below the surface of simply describing rural counties in employment and income terms in order to incorporate the underlying economic "engine," whether it be farming, manufacturing, or another economic type, or whether it be retirement, commuting, or another policy type.

These elements of our basic approach are combined as follows: For the 1979 to 1994 period, we will assess the changes in economic/demographic variables including total personal income, personal income per capita, total employment, and population to determine whether such changes are associated with, and (to the extent possible) attributable to, the rural transportation projects in these rural

communities. The challenge is to determine what portions of these changes should be attributed to the influence of rural public transportation systems, and this can only be done by extracting the effects of transit out of the myriad of influences that contribute to changes in these economic and demographic variables in rural communities.

# OVERALL ESTIMATES FROM THE NATIONAL PERSPECTIVE

## ECONOMIC GROWTH PATTERNS

We first wanted to see if we could identify some overall economic growth patterns that might be associated with investments in rural public transportation services. We summarized changes from 1980 to 1990 in the principal economic measurements — per capita income, total personal income, employment, and population — for each of 2,276 nonmetropolitan counties in the U. S., with separate tabulations for counties with rural transportation systems funded through the Federal Section 5311 program and those counties without such transit systems.

### ***Levels of Economic Growth versus the Presence of Section 18-Funded Services***

The first comparison made was to look at the fastest-growing rural counties and to see if having a rural public transportation system had any apparent impact on this high-growth group of counties. The top 33 rural growth counties were identified using a combined ranking of population, employment, total personal income, and per capita personal income for the 1980-90 period. (These counties were distributed widely across the states and regions of the country, with many states represented.) Nineteen of these counties that grew the fastest from 1980 to 1990 on combination of the four measures had Federally-funded rural transit projects, but 14 did not.

We examined the four 1980-90 descriptors of economic changes for rural counties with public transit systems versus the rural counties without transit projects. Table 14 shows that there is very little difference in population growth, total personal income growth, total employment growth, or per capita income growth rates over this period between counties with transit systems and the rest of the rural counties.

We hypothesized that differences in economic impacts might be masked by the inclusion of very small transit systems in the analysis, and therefore proceeded to exclude them. Table 15 shows that the lack of difference in economic growth from 1980 to 1990 between counties with rural transit systems and those counties without such systems shown in Table 14 persists even after the very small counties with one-bus transit projects are removed from the list of transit counties and combined with non-transit counties.

### ***Levels of Economic Growth versus Total System Ridership***

Correlations were also run among the growth factors for all rural counties and total annual one-way passenger trips, a key descriptor of the size of a rural transit system's operations. The only correlation coefficients of even any slight interest, between trips and employment growth and trips and population growth, measured less than 0.1. These associations are so small that they effectively represent no relationship at all. Thus, on an aggregate national basis, correlations between rural transit system size and economic growth were not found for the 1980 to 1990 time period.

## ECONOMIC GROWTH PATTERNS BY COUNTY TYPE

Table 16 shows for the counties that USDA classified as **service-dependent economic type counties** how the growth rates for counties with rural transit operations compare to the other counties that do not have transit service. Again, there are few perceptible differences between these two groups of counties, although the counties without public transportation services hold a slight edge on three of the variables that express economic growth. Table 17 shows, for USDA's **retirement destination counties**, how the counties with transit compare with the counties without transit services.

**Table 14**

**PERCENT CHANGE IN ECONOMIC/DEMOGRAPHIC VARIABLES, 1980-1990 TRANSIT VS. NON-TRANSIT, RURAL COUNTIES**

| 1980-1990 Change | Rural Counties w/ Transit | Rural Counties w/o Transit |
|---|---|---|
| **Population** | 100.38% | 100.63% |
| **Total Personal Income** | 189.22% | 190.64% |
| **Total Employment** | 109.75% | 110.34% |
| **Per Capita Income** | 190.18% | 188.72% |

**Table 15**

**PERCENT CHANGE IN ECONOMIC/DEMOGRAPHIC VARIABLES, 1980-1990 TRANSIT (1-Bus Systems Excluded) VS. NON-TRANSIT, RURAL COUNTIES**

| 1980-1990 Change | Rural Counties w/ Transit | Rural Counties w/o Transit |
|---|---|---|
| **Population** | 99.81% | 100.63% |
| **Total Personal Income** | 190.28% | 190.64% |
| **Total Employment** | 109.03% | 110.34% |
| **Per Capita Income** | 190.26% | 188.72% |

**Table 16**

**SERVICE COUNTIES:**
**PERCENT CHANGE IN ECONOMIC/DEMOGRAPHIC VARIABLES, 1980-1990**
**TRANSIT VS. NON-TRANSIT, RURAL COUNTIES**

| 1980-1990 Change | Rural Counties w/ Transit | Rural Counties w/o Transit |
|---|---|---|
| **Population** | 102.94% | 102.01% |
| **Total Personal Income** | 113.11% | 115.72% |
| **Total Employment** | 195.96% | 197.56% |
| **Per Capita Income** | 192.92% | 196.73% |

**Table 17**
**RETIREMENT DESTINATION COUNTIES:**
**PERCENT CHANGE IN ECONOMIC/DEMOGRAPHIC VARIABLES, 1980-1990**
**TRANSIT (1-Bus Systems Excluded) VS. NON-TRANSIT, RURAL COUNTIES**

| 1980-1990 Change | Rural Counties w/ Transit | Rural Counties w/o Transit |
|---|---|---|
| **Population** | 101.11% | 99.69% |
| **Total Personal Income** | 110.71% | 107.69% |
| **Total Employment** | 191.05% | 189.53% |
| **Per Capita Income** | 191.31% | 190.30% |

Again, only very small differences are observable, but the counties with rural transit services do hold a slight advantage in all four economic growth variables.

### ***Summary of Aggregate and County Type Tabulations***

No matter what their outcomes, the tabulations above would be far too simplistic to be considered conclusive findings. They do not account for the size, the scale, and the economic focus of rural transit projects. They don't take into consideration "holding the effects of other influences constant" in order to examine the effects of rural public transportation. These tables imply a direct comparison between macro economic growth variables and rural transit projects; in reality, this comparison is quite misleading since rural transit expenditure growth is infinitesimal relative to the magnitude of these overall growth measures.

But we should note that, when viewed at this aggregate level of analysis, there was very little indication of observable differences in rural counties with and without public transit services. These tables do provide a starting point by demonstrating the difficulties in estimating aggregate national impacts by looking at aggregate national statistics.

## OTHER COUNTY GROUPINGS

Other county groupings — with and without transit — were included in this analysis. State, Beale Code, and economic type groupings as described below.

### ***Groupings of Counties by State***

We tried grouping the counties by state and comparing between transit and non-transit counties in terms of net income growth within a given state. This should eliminate any inherent economic advantages between states, advantages that have nothing to do with the presence of rural transit systems. Several problems occurred with this method of analysis. The States of Iowa, Missouri, and Tennessee could not be included in this analysis, as they had no counties without transit service to include in the comparison. This method also failed to account for differences between counties within a given state that have a dramatic effect on economic growth. These differences include the proximity of a given rural county to urban areas and other employment centers, and the primary economic type of a given rural county (i.e. farming, manufacturing). These factors probably have more to do with economic growth than does the presence of a small rural public transit system.

### ***Groupings of Counties by Beale Codes***

In order to account for the proximity of urban areas to a given rural county, we grouped the rural counties in our analysis according to Beale codes, a number between 0 and 9 denoting the degree of urbanization (population and proximity to a metropolitan area) for a particular county. For the purposes of our analysis, we were only interested in counties with Beale codes 4 through 9, those counties which are considered rural, with 9 being the most rural. There were sometimes appreciable differences between transit and non-transit counties within all Beale codes, but these differences were not consistent. In certain code categories, transit counties showed significantly higher net income growth, while in other code categories, non-transit counties showed higher net income growth. There was no discernible relationship between the degree of urbanization of a particular rural county and the impact of transit service on the net income of that county.

### ***Groupings of Counties by Economic Type***

We next sought to compare transit and non-transit counties within groups of similar economic types. The ERS Economic codes assign an economic type to a county, based on the primary source of employment for a given county. The six economic types assigned by ERS are as follows: Farming-dependent, Mining-dependent, Government-dependent, Services-dependent, and Nonspecialized. For certain economic types — Farming-dependent, Mining-dependent and Manufacturing-dependent — transit counties show a higher net income growth. For Government and Services dependent and Nonspecialized counties, non-transit counties show a higher rate of net income growth. We did not find any logical relationship to explain why transit counties of a certain economic type would experience a higher rate of net income growth than non transit counties, and vice versa. It is possible that in manufacturing, mining and farming counties, there is a greater need for mobility among low-income unskilled laborers, and when these needs are met through transit service, there is a county-wide increase in net income. However, if we are to accept this is as true, it is then necessary to explain why these factors do not apply to service-dependent counties. The idea that transit systems are beneficial only in counties with specific types of economies just doesn't seem to be valid.

***Summary of Tabulations by Other County Groupings***

In order to minimize the effects of external factors in our analysis of the impact of transit systems, it is necessary to compare groups of counties that are as similar as possible in terms of location, economic conditions, and infrastructure. State-by state groupings failed to account for vast differences in urbanization and economic conditions that occur within many states. Groupings by Beale codes (degree of urbanization) and ERS economic types showed some differences in net income growth between transit and non-transit counties, but these differences proved to be inconsistent from type to type. It is necessary to develop a grouping that would be more specific than the state groupings, but would still account for socio-economic factors. A serious common problem with these efforts was insuring that the kinds of communities within a specific category were more like each other than they were like other communities that had been defined as members of other categories.

# ESTIMATES OF IMPACTS BASED ON COMMUTING ZONES

## HOW COMMUTING ZONES ARE DEFINED

We found an attractive analytical approach for estimating the economic impacts of rural public transit systems in USDA's work on **commuting zones**. *(33)* Commuting zones are defined as "groups of counties with strong commuting ties" using journey-to-work data from the 1990 Census. "These commuting zones are intended for use as measures of local labor markets when researchers are not concerned with minimum population thresholds." *(34)* The commuting zones serve as "spatial proxies" for relationships between employers and employees. Based on central place theory, and using counties as the unit of analysis, commuting nodes are identified and their relationships to surrounding areas tabulated.

Many people mistakenly think of commuting to work as solely an urban phenomenon, but it is not. USDA specifically developed the commuting zone definition for conducting work on rural economic issues, particularly employment. *(35)* Tolbert and Sizer note that "A key purpose of this [commuting zone] delineation has been to identify those local labor markets operating beyond the boundaries of the cities, based on the assumption that the strengths and weaknesses of the labor force and the nature of opportunities available in rural, more sparsely settled economies continue to differ from those found in the larger, more

densely populated city economies." *(36)* Definitions of nonmetro and metro commuting zones (CZs) are shown in Table 18. Thus, commuting zones provide exactly the groups of market-linked counties that we were searching for to provide relatively homogeneous county groupings needed for isolating the economic impacts of rural public transit systems.

Table 19 provides overall descriptive statistics about commuting zones as defined by USDA. In 1990, the 3,141 counties and county equivalents in the U. S. were aggregated into 741 commuting zones, 483 of which — 65.1 percent — were classified as nonmetro. (The preponderance of rural to rural commuting zones clearly demonstrates the usefulness of the commuting zone concept for analyses like this study.) In Table 19, it can be easily seen that the nonmetro commuting zones have low populations and population densities, more nonurbanized population, and more rural population. In short, the nonmetro commuting zones appear to provide a solid representation of what we mean when we speak of "rural areas."

Using commuting zones, we are able to create geographic groupings of counties according to employment commuting patterns. These groupings indicate which counties are tied together in terms of their common economic interests and travel flows. Unlike the Metropolitan Statistical Area model, the commuting zones can account for differing commuting patterns between rural areas. Counties within a commuting zone share a common labor force, and regional infrastructure, and thus are tied together economically, which provides a reasonably homogeneous setting for sound transit/non-transit comparisons in terms of contributions to net income growth.

## Table 18:

## USDA CATEGORIES OF COMMUTING ZONES

| Description | Number | Definition |
|---|---|---|
| **Non metro CZ's** | | |
| Small Town/Rural | 132 | Population of largest place in the commuting zone/labor market area in 1990 was less than 5,000 |
| Small Urban Center | 243 | Population of largest place ranged from 5,000 to less than 20,000 in 1990 |
| Larger Urban Center | 108 | Population of largest place in 1990 was at least 20,000 but less than 50,000 in 1990 |
| **Metro CZ's** | | |
| Small Metro Center | 122 | Population of largest MSA in the commuting zone/labor market area was less than 250,000 in 1990 |
| Medium Metro Center | 87 | Population of largest MSA was at least 250,000 but less than 1,000,000 in 1990 |
| Major Metro Center | 49 | Population of largest MSA in 1990 was 1,000,000 or greater, or commuting zone/labor market area is part of a Consolidated Metropolitan Statistical Area |

Source: Tolbert and Sizer, ***U.S. Commuting Zones and Labor Market Areas***, 1996

## Table 19

## SIZE OF LARGEST PLACE IN COMMUTING ZONE BY NUMBER OF PERSONS, COUNTIES, LOCATION, AND RESIDENTIAL PATTERNS

| | NONMETRO CZ'S | | | METRO CZ'S | | |
|---|---|---|---|---|---|---|
| | Small Town/ Rural | Small Urban Center | Larger Urban Center | Small Metro Center | Medium Metro Center | Major Metro Center |
| **Number of CZs** | 132 | 243 | 108 | 122 | 87 | 49 |
| **Percent of Total CZs** | 17.8 | 32.8 | 14.6 | 16.5 | 11.7 | 6.6 |
| **CZ population size** | | | Number of Persons | | | |
| Mean | 16,994 | 63,705 | 120,324 | 257,770 | 660,809 | 2,633,737 |
| **Size of Largest Place** | | | Number of Persons | | | |
| Mean | 2,672 | 11,164 | 28,984 | 136,543 | 498,002 | 2,134,239 |
| **Geographic Size** | | | Number of Counties | | | |
| Mean | 2.04 | 3.48 | 4.34 | 5.21 | 6.37 | 7.57 |
| **Location** | | | Percent of CZs in Region | | | |
| Northeast | 2.3 | 2.9 | 3.7 | 6.6 | 10.3 | 22.5 |
| South | 18.9 | 42.8 | 38.9 | 50.0 | 51.7 | 30.6 |
| Midwest | 42.4 | 36.2 | 35.2 | 32.0 | 21.8 | 24.5 |
| West | 36.4 | 18.1 | 22.2 | 11.5 | 16.1 | 22.4 |
| **Residential Patterns** | | | Mean | | | |
| Density (Persons Per Sq. Mile) | 11.6 | 28.5 | 41.8 | 81.3 | 176.1 | 585.9 |
| Percent Rural Farm | 12.0 | 6.8 | 4.4 | 3.2 | 1.5 | 0.7 |
| Percent Rural Nonfarm | 72.3 | 54.9 | 44.0 | 39.1 | 26.7 | 16.1 |
| Percent Urban Living Outside Urbanized Area | 15.7 | 37.8 | 47.9 | 16.0 | 12.2 | 7.4 |
| Percent Urban Living Inside Ubanized Area | 0.0 | 0.4 | 3.7 | 41.7 | 59.5 | 75.8 |

Source: Tolbert and Sizer, ***U.S. Commuting Zones and Labor Market Areas***, 1996.

## ECONOMIC IMPACTS IN COMMUTING ZONES

If rural transit operations have measurable impacts on their local economies, we should be able to observe and measure those impacts by looking at similar sets of counties whose chief distinction is that one set of counties has rural public transportation services and the other set of counties does not. Similar sets of counties are counties within commuting zones: they are more likely to share economic ties with each other than they are with other counties that are nearby, or with other counties in that State. Therefore, we looked for commuting zones that included both rural counties with transit systems and rural counties without transit systems in that same commuting zone.

Starting with the 483 nonmetro commuting zones (CZs), we eliminated from consideration all one-county CZs, as well as all CZs where all counties had rural transit services or where all counties in the CZ did not have rural transit services. (In all these cases, we would have had no basis for comparing counties within the CZ.) This left us with a group of 268 commuting zones in which we could perform a county-by-county analysis of the economic impacts within than commuting zone.

Within each commuting zone, the net earnings growth from 1980 to 1994 of counties with rural transit systems was compared to the net earnings growth of counties without rural transit services. (**Net earnings** was chosen, as it reflects the job market more closely than do factors such as Total Personal Income or Per Capita Income, and — compared to employment growth — net earnings reflects **both** changes in wages and changes in number of jobs. Net earnings growth is expressed as a percentage of the 1980 net earnings, so that a positive number indicates that net earnings in that county grew from 1980 to 1994. During this period, net earnings grew substantially for many counties.) The average net earnings growth of the counties in the CZ without rural transit services was subtracted from the average net earnings growth of the counties in the CZ with rural transit services. If the resulting number is positive, this indicates that, for this particular commuting zone, counties with rural transit services are experiencing higher rates of growth. A negative number indicates that, for this particular commuting zone, counties without rural transit services experienced higher rates of growth than those counties with transit services.

We found that, within commuting zones having rural counties both with and without rural public transit systems, the average difference in economic growth (that is, the change in net earnings during the period from 1980 to 1994) between transit and non-transit counties in the same commuting zone was **16 per cent greater in counties with rural transit systems than in those counties without transit systems**. Removing those counties whose growth differentials were extremely positive or negative (those observations that were more than two standard deviations away from the mean) reduced the difference in

economic growth between transit and non-transit rural counties to **11 per cent** over the 1980-1994 time period. While there are commuting zones in which non-transit counties demonstrated higher rates of growth than the transit counties for the time period of our analysis, on the whole **there is greater economic growth in rural counties with public transit systems than without such systems**.

We examined more closely the commuting zones at the extreme ends of the first and second standard deviations within our data files. We find that most of these commuting zones are comprised of five or six counties. In nearly all of the commuting zones in which the transit counties grew faster than the non-transit counties, most counties have transit service in their county, and only one or two counties have no transit service. For that group of counties in which the non-transit counties grew faster than the transit counties, the pattern is perfectly reversed: only one or two of the counties in the commuting zone have transit service, and the other four or five counties have no transit service. We seem to be looking at transit systems that have reinforcing effects within a CZ such that additional county systems enhance the overall growth of the entire zone of counties. If further analyses can substantiate this observation, it could become a powerful argument in support of rural public transit systems.

## THE PROBLEM OF INFERENCES OF CAUSALITY

Our analysis of commuting zones has indicated a positive relationship between rural public transit systems and local economic growth: it appears that greater economic growth is likely to more often occur in communities that have rural transit services than those communities which do not. Does this mean that rural transit systems can be credited with **causing** higher levels of economic growth? We'd like to believe this, but we do not have the evidence at this point in time to make a solid claim for that conclusion. At this point, we have demonstrated that there is an association between rural transit systems and higher levels of economic growth, but not that having transit services actually causes the higher levels of growth.

Even having found a positive association between rural transit systems and higher levels of economic growth, the very nature of the circumstances should create cautionary signals on the issue of causality: Rural transit systems generally represent very, very small investments in local economies, these economies vary significantly from one part of rural America to another, and indeed, rural communities and their residents vary greatly from each other. Under such circumstances, causality needs to be addressed carefully.

### ***Do High-Growth Counties More Frequently Have Transit?***

What about the countervailing argument? Is it possible to maintain that, instead of rural transit services really having positive effects on local economies, what's happening in rural America is that healthy rural economies create the possibility of having rural public transportation in these localities?

Although it is conceptually possible that greater economic health (or growth) in a county allows that county to provide transit, that proposition is not supported by hard evidence. In fact, considering all rural counties in the country, **rural counties with low growth and small economies are equally as likely to have public transit systems as are rural counties with high growth and large economies**. Table 20 shows that **counties below median values** in terms of population growth, total personal income growth, or net earnings growth were actually slightly **more likely to have rural transit systems** than those counties above the median on each of these measures of economic growth.

We also looked at the frequency of rural public transit systems among the fastest growing rural counties in the U. S. Table 21 shows the country's top 33 rural growth counties, ranked using a combined index of four economic/demographic change variables — population, employment, total personal income,

**Table 20: RELATIVE INCIDENCE OF TRANSIT SYSTEMS IN LOW- AND HIGH-GROWTH COUNTIES**

| | Population Growth 1980-1994 | Total Personal Income Growth, 1980-1994 | Net Earnings Growth 1980-1994 |
|---|---|---|---|
| ***Counties Above the Median*** | | | |
| **Percent With Transit** | 49.78% | 51.90% | 51.46% |
| **Percent Without Transit** | 50.22% | 48.10% | 48.54% |
| ***Counties Below the Median*** | | | |
| **Percent With Transit** | 54.74% | 52.61% | 53.06% |
| **Percent Without Transit** | 45.26% | 47.39% | 46.94% |
| ***Median Level of Growth*** | 98.33% | 185.10% | 118.83% |

Table 21:

## TOP RURAL GROWTH COUNTIES, 1980-1990, BASED ON COMBINED INDEX OF POPULATION, EMPLOYMENT, TOTAL PERSONAL INCOME, AND PER CAPITA INCOME

| Combined Ranking | FIPS | COUNTY | STATE | SEC 18 | POPGROWTH | EMPGROWTH | TPIGROWTH | PCIGROWTH |
|---|---|---|---|---|---|---|---|---|
| **1** | 29029 | Camden County | MO | **NO** | 136.11% | 179.34% | 258.44% | 238.93% |
| **2** | 6069 | San Benito County | CA | **NO** | 145.62% | 147.54% | 254.15% | 231.82% |
| **3** | 2122 | Kenai Peninsula Borough | AK | **NO** | 158.76% | 173.01% | 249.13% | 213.10% |
| **4** | 6043 | Mariposa County | CA | **YES** | 127.70% | 158.67% | 233.56% | 267.04% |
| **5** | 4025 | Yavapai County | AZ | **YES** | 156.11% | 172.88% | 261.99% | 206.17% |
| **6** | 33003 | Carroll County | NH | **NO** | 126.01% | 155.14% | 283.08% | 213.70% |
| **7** | 2270 | Wade Hampton Census Area | AK | **NO** | 125.89% | 144.99% | 241.23% | 303.49% |
| **8** | 48031 | Blanco County | TX | **YES** | 127.06% | 143.41% | 235.29% | 284.77% |
| **9** | 32015 | Lander County | NV | **NO** | 149.19% | 132.54% | 256.17% | 226.34% |
| **10** | 12003 | Baker County | FL | **YES** | 120.04% | 152.63% | 248.94% | 227.44% |
| **11** | 49043 | Summit County | UT | **YES** | 150.66% | 212.21% | 302.63% | 196.28% |
| **12** | 8117 | Summit County | CO | **NO** | 143.12% | 186.42% | 254.84% | 199.53% |
| **13** | 12029 | Dixie County | FL | **NO** | 135.71% | 145.77% | 260.90% | 204.65% |
| **14** | 32005 | Douglas County | NV | **NO** | 141.73% | 129.69% | 260.76% | 213.17% |
| **15** | 16037 | Custer County | ID | **NO** | 118.09% | 157.08% | 216.03% | 306.95% |
| **16** | 20055 | Finney County | KS | **YES** | 137.22% | 144.67% | 234.33% | 209.29% |
| **17** | 32027 | Pershing County | NV | **NO** | 123.89% | 140.97% | 217.18% | 271.51% |
| **18** | 29213 | Taney County | MO | **NO** | 124.08% | 170.16% | 238.50% | 202.35% |
| **19** | 51109 | Louisa County | VA | **YES** | 113.55% | 140.46% | 230.50% | 272.35% |
| **20** | 12067 | Lafayette County | FL | **YES** | 139.45% | 131.42% | 254.97% | 205.05% |
| **21** | 12017 | Citrus County | FL | **YES** | 167.59% | 196.80% | 354.18% | 185.72% |
| **22** | 26055 | Grand Traverse County | MI | **YES** | 116.44% | 142.28% | 217.87% | 258.50% |
| **23** | 13129 | Gordon County | GA | **YES** | 116.13% | 156.69% | 256.51% | 200.88% |
| **24** | 37189 | Watauga County | NC | **YES** | 115.84% | 137.58% | 253.12% | 210.06% |
| **25** | 48053 | Burnet County | TX | **YES** | 126.69% | 138.13% | 216.58% | 223.76% |
| **26** | 28073 | Lamar County | MS | **YES** | 126.24% | 177.47% | 223.81% | 200.59% |
| **27** | 30031 | Gallatin County | MT | **NO** | 117.08% | 143.92% | 217.31% | 230.67% |
| **28** | 13213 | Murray County | GA | **YES** | 132.06% | 135.98% | 253.30% | 199.56% |
| **29** | 4005 | Coconino County | AZ | **YES** | 128.10% | 138.44% | 227.15% | 208.36% |
| **30** | 13157 | Jackson County | GA | **YES** | 118.13% | 139.34% | 248.94% | 204.45% |
| **31** | 12043 | Glades County | FL | **YES** | 126.52% | 123.12% | 291.51% | 207.28% |
| **32** | 8093 | Park County | CO | **NO** | 132.85% | 130.37% | 227.83% | 209.52% |
| **33** | 13313 | Whitfield County | GA | **YES** | 109.96% | 139.77% | 218.37% | 520.31% |

and per capita personal income — for the 1980-90 period. As shown in this table, 19 of these counties that grew the fastest from 1980 to 1990 on the four measures listed above have rural public transit systems, but 14 do not. It should also be noted that these projects are distributed widely across the states and regions of the country, with 18 states represented in this list of rural counties with the fastest growing economies.

Therefore, from reviewing both the entire set of rural counties as well as a small set of high-growth rural counties, the idea that rural transit systems would be more often found in those counties with healthier economies is distinctly **not supported**.

### ***The Level of Transit Service***

If there actually are economic impacts that result from the operation rural public transportation systems, then **how much transit service is actually provided** should make a difference. This does appear to be the case, based on a number of different types of observations:

- For all 268 commuting zones in our analysis, there was a strong positive correlation (correlation coefficient of 0.318) between the number of transit vehicles in the commuting zone and the growth in net earnings from 1980 to 1994.

- For those commuting zones in which the economic growth was greater in transit than in non-transit counties, the number of transit system vehicles in transit counties is about double the number of vehicles compared to commuting zones where non-transit counties grew faster. For the total group of commuting zones where transit counties grew faster, the overall reported number of Section 18-sponsored vehicles is 4,313; in the commuting zones where non-transit counties grew faster, the comparable number of vehicles is 2,119. In commuting zones where the transit counties grew faster, the average number of rural public transit vehicles is 31; in commuting zones where the non-transit counties grew faster, the average number of vehicles available is 16. Data on the numbers of rural transit vehicles are plotted in Figure 9, which shows the greater frequency of large-vehicle fleets in CZs with higher average growth differentials. Figure 10 shows that this relationship holds when the analysis is performed on the basis of vehicles per square mile as well.

- Particularly in those commuting zones in which the number of counties with transit service was smaller than the number of counties without, the number of transit vehicles was strongly associated with higher levels of net earnings growth.

- The 268 commuting zones were divided into quintiles based on the numbers of rural public transit vehicles in the commuting zone. The average net earnings growth differential (average transit minus average non-transit counties' net earnings growth) was calculated for each of these quintiles, and the results are quite dramatic, as shown in Table 22. Put simply, those commuting zones with large transit fleets more often had positive growth differentials than did CZs with small transit fleets: the differences are large and the progression is consistent.

Figure 9:

**Fleet Size vs. Growth Differential, 268 Rural Commuting Zones**

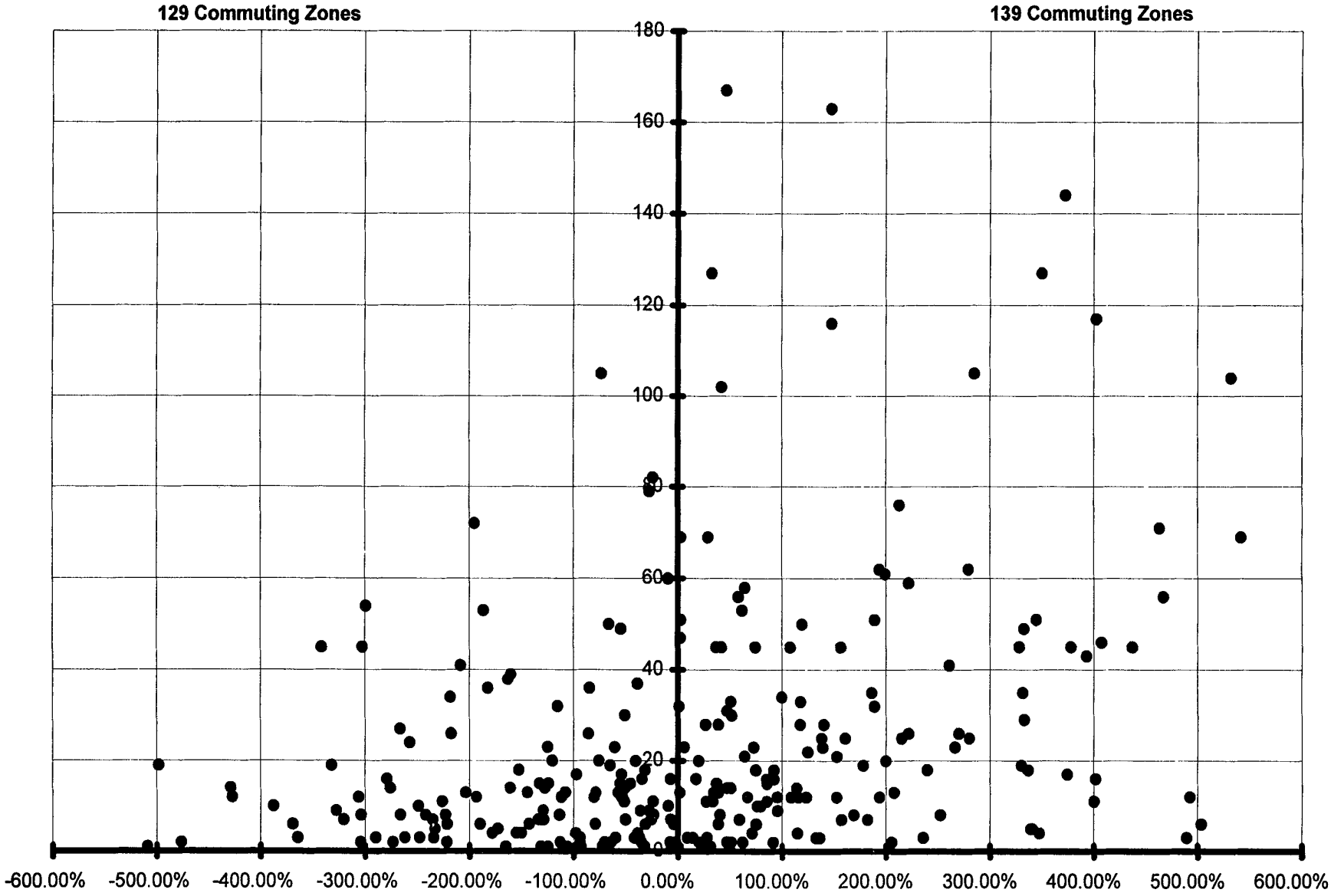


Figure 10:

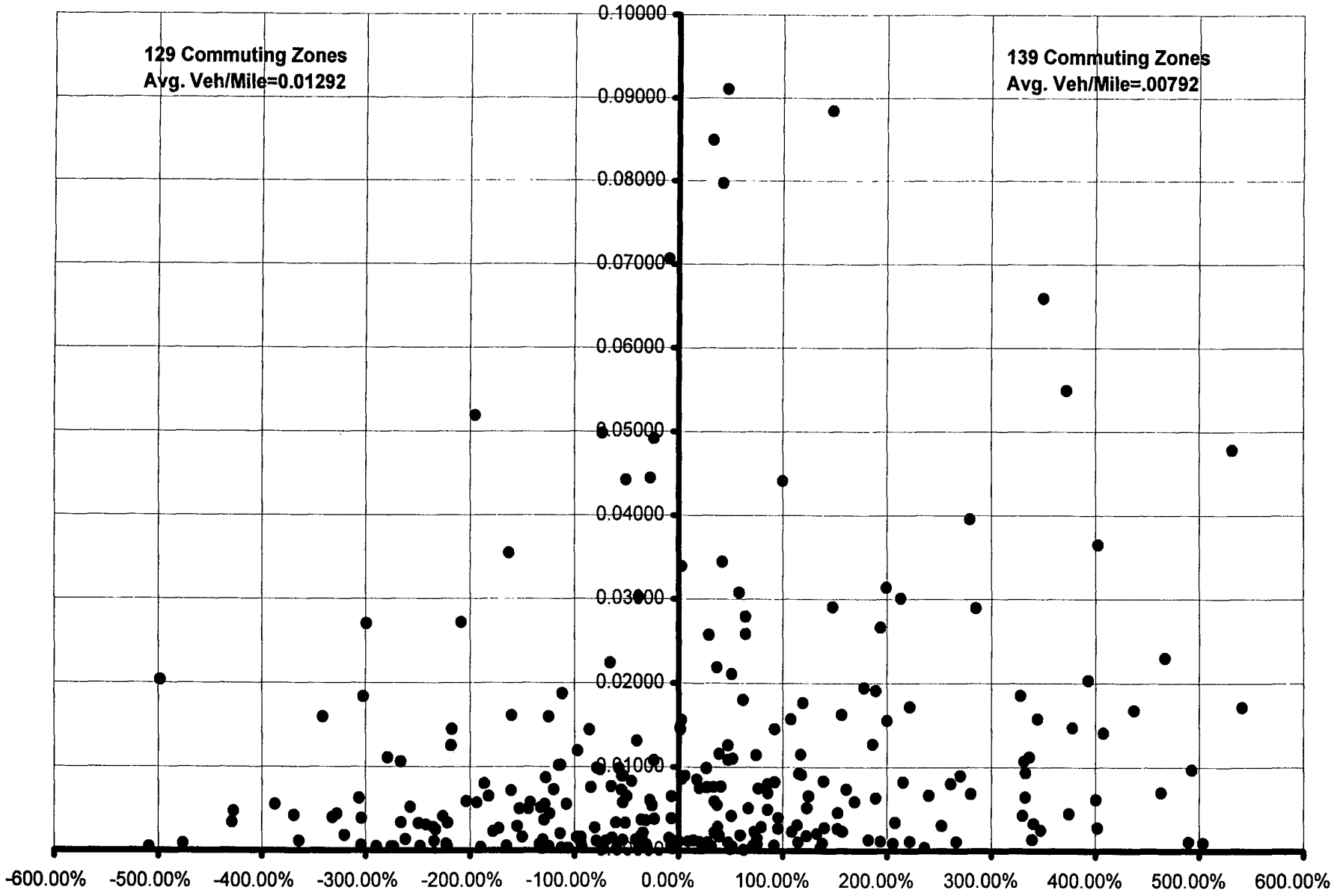

Fleet Per Square Mile vs. Growth Differential, 268 Commuting Zones
129 Commuting Zones
Avg. Veh/Mile=0.01292
139 Commuting Zones
Avg. Veh/Mile=.00792
0.10000
0.09000
0.08000
0.07000
0.06000
0.05000
0.04000
0.03000
0.02000
0.01000
-600.00%
-500.00%
-400.00%
-300.00%
-200.00%
-100.00%
0.00%
100.00%
200.00%
300.00%
400.00%
500.00%
600.00%

**Table 22:**

**FLEET SIZE VERSUS EARNING GROWTH DIFFERENTIAL**

| Quintile | Typical Fleet Size | Average Net Earnings Growth Differential |
|---|---|---|
| Top 20% | 39-167 | 123.13% |
| Next 20% | 18-38 | 41.70% |
| Middle 20% | 11-17 | -5.44% |
| 2nd Lowest 20% | 4-10 | -48.31% |
| Lowest 20% | 1-3 | -61.04% |

At this point in time, we still cannot say for certain that rural public transit systems **cause** economic growth. But while the proof may not yet be solid, a number of observations are logically consistent with the possibility that rural public transit systems have positive economic impact:

- commuting zones containing large numbers of systems and large numbers of vehicles have experienced greater economic growth than commuting zones with few rural public transit systems and few vehicles;

- among all commuting zones in our analysis, there was a strong positive correlation between the number of transit vehicles in the commuting zone and the growth in net earnings;

- and the converse of the argument, that greater economic health (or growth) in a county allows that county to provide transit, is distinctly not supported by the evidence at hand.

We therefore conclude that **there is a real possibility that rural transit systems have important positive impacts on the economies of the communities which they serve**.

# "NEXT GENERATION" APPROACHES

The broad-brush analyses we have performed to date (using commuting zones as definitions of similarly structured county economies) do have some conceptual attractiveness, but their broad scale does leave the influence of a wide number of variables untested. A key feature of rural America is its diversity, and this applies to its residents, its communities, its economies, and its transit services, too. An approach that took these variations into account would probably be more intellectually satisfying than one that operates on a higher level of generality.

For such reasons, the next analyses of the overall impacts of rural transit systems on local economies should probably focus on a multi-variate approach. From a conceptual standpoint, the regression analysis model comes close to providing the kind of overall framework that could take a larger variety of factors into account. An attempt should be made to use regression analysis to analyze the impacts of rural transportation projects upon the income, employment, and other economic variables that characterize rural economies at the county level. Measures of economic change (income, employment, earnings, and other economic variables) would be used as the variables to be predicted, and the characteristics of the transportation projects would be used as the independent variables, together with other variables whose effects are to be held constant, so that the contribution of project variables to explaining changes in the economic variables can be examined.

Tests should be performed of the influence of factors such as transportation project size as measured by total resource costs, number vehicles, passenger trips, regional, state, county and other geographic variables, population size, density, and demographic characteristics, industries specific to county(s) in which projects located, Federal, state, and local expenditures in the project county, and other variables to be identified. The economic variables would be associated with the transportation project variables while attempting to statistically "hold constant" the effects of "intervening" variables which may also explain variation in the economic variables. If the transportation project variables are statistically significant in this relationship, it indicates that these projects may have economic impacts.

It may be useful to consider the **size** of the transit system (measured by number of passenger trips) relative to the size of the rural county (measured by population). **Time in existence** could be measured by determining when public transit was first successfully introduced into the county and if it has remained in continuous existence since. The **economic purpose** of rural transit systems is defined by statements of economic objectives and by economic purposes implicit in way the system operates — for example, commuter trips, employment and training trips, medical trips, trips that help to maintain personal independence, reduction in traffic congestion, economies of scale, and so forth.

The selection of "time-in-existence" categories is important since it potentially represents the "intensity" of the study group impact — the longer the transit system has been in existence, the greater the potential impact as the system matures and as the riders and community adjust to its impacts. The Department of Commerce county-level income, population and employment data that we are using are available on an annual basis from 1969 through 1993. The time period of 1979 through the date of the most recently available data is likely to be the most useful for analysis since the program of Federal financial assistance for rural public transit became operational in 1979.

An approach that may prove useful would be to classify rural transportation projects by major economic emphasis. For example, some projects emphasize the linkage of people to jobs; others, the linkage of people to essential health services; and others, the linkage of people to education/training; these types of projects are hypothesized to have closer linkages to economic variables than are projects with mostly social purposes and attributes such as providing access to shopping and community services, and visits to friends and relatives.

The regression approach assumes that the independent variables are truly independent of each other. If there are statistical intercorrelations among these variables, as usually occurs in economic analyses of this nature, the independence assumption is violated and the statistical results achieved may be unstable or not make sense; so options that address this situation need to be considered. Sometimes applying different forms of the regression equation will reduce the intercorrelation. Using alternative independent and/or independent variables might be tried. Recombinations of the variables may sometimes ameliorate the problem.

Further efforts need to recognize the problem of "looking for a needle in a haystack." Local transportation systems should be expected to be nothing more than **one of a whole host of influences** that serve to affect local economic variables; in most cases, the transit systems will be factors with lesser dollar magnitudes (as investments or as expenditures) than other influential factors, which adds a significant level of complexity to the challenge of observing and measuring the economic impacts of rural transportation systems.

# 7

# ESTIMATES OF NATIONAL ECONOMIC IMPACTS OF RURAL PUBLIC TRANSPORTATION SERVICES

There are a number of possible techniques for estimating the economic impacts of rural public transportation systems on a national basis. We will look at estimates derived from our analysis of rural commuting zones, and we will also examine estimates that could be derived from national aggregations of local analyses of the impacts of specific projects.

## USING THE COMMUTING ZONE RESULTS FOR AN ESTIMATE OF NATIONAL IMPACTS

In Chapter 6, we analyzed the impacts of rural public transportation systems on local economies by looking at the differences in economic growth between rural counties with and counties without public transit systems. We focused on the 268 rural commuting zones that included both counties with transit and counties without transit systems. That analysis showed that, within a given commuting zone, **the average net earnings growth differential between rural counties with transit and rural counties without transit systems was 11 percent**. Using that result, we can calculate impact figures for individual counties and for the nation as a whole.

### COUNTY BY COUNTY RESULTS

The first step is to determine the total net earnings growth for all of the rural counties in the United States between 1980 and 1994. According to the Regional Economic Information System of the U. S. Department of Commerce's Bureau of Economic Analysis, the total net earnings growth for all of the rural counties in the United States between 1980 and 1994 comes to $318,075,794,000. With 2,288 rural counties in this group, the net earnings growth for the average U. S. rural county in this time period was

$139,019,141. The average annual net earnings growth per rural county over this 14-year span is $9,929,939.

The Chapter 6 analysis showed that, within a given commuting zone, the average net earnings growth differential between rural counties with transit and rural counties without transit systems was 11 percent. Multiplying the average net earnings growth differential of 11 percent times the average net earnings growth for all rural counties gives an **average annual economic impact per county from transit of $1,092,293.**

This estimate of transit-related economic benefits on a county basis is, by definition, an average over all counties in the U. S.; some counties will have experienced greater net income growth, and some will have experienced less. When looking at economic impacts at the level of the entire country, the differences between counties with transit services and those without transit services are difficult to ascertain because of the many variations in county characteristics are not controlled for by an analysis at that broad national scale. The use of the commuting zones helps to reduce some of the variations that create large differences between counties in economic types and activities.

## THE OVERALL NATIONAL IMPACT OF RURAL TRANSIT OPERATIONS

### ***Average Impacts***

To calculate the nationwide economic impact of rural transit operations, we first took the total net earnings growth for all rural counties between 1980 and 1994 of $318,075,794,000. Since rural public transit systems exist in only 50.31 percent of all rural counties, they probably could have only had some impact on just that proportion of the overall national net earnings growth, or $160,023,932,000. The average net earnings growth differential between rural counties with transit and rural counties without transit systems was 11 percent. Multiplying the average net earnings growth differential of 11 percent times the average net earnings growth for all rural counties with public transit systems gives an overall national economic impact from transit of $17,602,632,500 in the 1980 to 1994 time period.

On an annual basis, this averages $1,257,330,900 for the entire country and $1,179,170 on a per-county basis (which is close to the $1.09 million per county per year figure derived by the first method described above). There are obvious problems using an average annual figure, since rural transit operations were minuscule in 1979 compared to their current level. There has been steady and consistent

growth in rural transit since its inception. Still, the average annual figure is useful for making some comparisons, as long as it is recognized that this figure probably overstates the benefits in the initial years and understates the benefits at this point in time.

### ***Impacts of Federal Investments***

The total obligations for FTA's Section 5311 Program during the time frame that we are considering (which is equivalent to the Federal fiscal years FY 79 through FY 93) were $1,307,900,000. *(37)* Comparing the estimated overall national economic impacts to the total Federal investment gives a leveraged impact of Federal funds of approximately 13.46 to one over the life of the Section 5311 program (formerly known as Section 18).

The current (FY 97) Federal appropriations for the FTA's Section 5311 program are $115,122,907 (from which administrative funds of one-half percent of the total, or $575,615 should be subtracted, to give a total level of funding available for program expenditures affecting localities in FY 97 of $114,547,292). Current overall annual Federal, state, and local expenditures on rural public transportation are about $375,000,000, according to estimates by AASHTO and FTA. Dividing the estimate of the national economic impacts of rural transit of $1,257,330,900 per year by the expenditure level of $375,000,000 gives a benefit/cost ratio of 3.35 to one.

This is a significant level of benefits. The ratio of 3.35 to one exceeds by a large margin the returns for many governmental programs that are considered successful. This indicates that investments in rural public transportation have unusually high returns, and that conclusion supports the notion of at least continuing, if not actually increasing, the current level of investments in rural public transportation services.

## NATIONAL ESTIMATES DERIVED FROM LOCAL ANALYSES

The estimates presented above result from national averages that obscure some of the significant effects of ways in which local operations have differing impacts on the communities which they serve. In fact, there are other means of estimating the aggregate national economic impact of rural public transportation expenditures, and they include procedures for estimating benefits at the local level and then

expanding these totals to an overall national number. We did this by examining past research studies and then applying the results of our current work, as discussed in detail in Chapters 4 and 5.

## PRIOR RESEARCH EFFORTS

As noted in Chapter 3, there have been very few prior research efforts assessing the economic impacts of rural public transportation systems, both in the aggregate and for individual local systems as well. In fact, there are only two sources that can be used to project national estimates from local-derived economic impacts: the original work by Burkhardt and Hedrick on this subject *(38)* and a 1996 study from Georgia. *(39)* Although conducted nearly 30 years apart, these two studies came to approximately the same conclusion in terms of the ratio of benefits to costs for rural public transportation services: the benefit/cost ratio is slightly more than two to one (2.06 in Burkhardt and Hedrick's 1969 study and 2.12 in Meyer, Nelson, and Peng's 1996 study). It should be noted that these studies used different assumptions and different methodologies, and were applied in different areas of the country at different periods in time.

Thus, if a total of $1.752 billion in Federal funding alone has been spent on rural public transportation since Fiscal Year 1979, then the return on the total Federal investment could be estimated to be approximately $3.6 billion, using the 2.06 benefit/cost ratio as a multiplier. For FY 1998, with an estimated Federal Section 5311 appropriation of $119 million (representing approximately 40 percent of the amount now being spent on rural public transit systems), then the total national economic impact of rural public transportation (again using the 2.06 multiplier) would be nearly $615 million on an annual basis.

There are obvious problems in using these previous works for estimating the national economic impacts of rural public transportation, especially because of their limited scope of analysis, both geographically and also with respect to the variety of rural transit systems and communities considered. These studies do provide a benchmark that can be used to compare the results we have obtained from a much broader review of system impacts in varying communities.

## RESULTS FROM THIS STUDY

In this study, we examined eight rural transit systems in depth and conducted desk audits on another 14 operations. We calculated benefit/cost ratios for each of these systems, although not too much

weight should be placed on the specific benefit/cost ratios: we did not attempt to provide exhaustive lists of benefits but rather an estimation of the **major benefits** of each system. Compared to the desk audits, the in-depth case studies include a more extensive enumeration of the major types of benefits. Some types of benefits simply defy estimation of benefit values.

Among the in-depth case studies, the benefit cost ratios ranged from 4.22 to one (two systems) to 1.67 to one, as shown in Table 23. The relative consistency of these ratios is notable. Four of the eight systems had benefit/cost ratios in the narrow range from 3.03/ 1 to 3.55/1. None of these systems had benefits in the two to one ratio.

The average ratio of benefits to costs among the eight systems studied in depth was 3.12 to one. Because our approach focused on the primary types of benefits for each transit system and did not attempt to exhaustively quantify all benefits, **it is likely that the figures shown in Table 23 slightly understate the actual benefits of these systems.**

All but one of these systems focused on employment trips. Such trips included traditional rural to urban (town) commuting as well as more experimental welfare to work programs, and even a special (and successful) demonstration program of employment transportation for those with disabilities (JAUNT, Virginia). The system with the lowest benefit/cost ratio served a university community (Virginia Tech and Blacksburg Virginia. This system did not emphasize employment transportation.

Using the same kind of overall benefit estimation approach as before, if we take the total of $1.752 billion in Federal funding that has been spent on rural public transportation since Fiscal Year 1979, then the return on the total Federal investment has been approximately $5.5 billion, using the case study average figure (3.12 to one) for the benefit/cost ratio. For FY 1998, with an estimated Federal Section 5311 appropriation of $119 million (representing approximately 40 percent of the amount now being spent on rural public transit systems), then the total national economic impact of rural public transportation would be nearly $928 million on an annual basis.

We see that the results from our more recent case studies demonstrate greater economic impacts than had been shown in the previous literature. Furthermore, the approach used here should generate a good bit more confidence in the results, since a substantially larger number of sites, types of services, and types of communities were included in the analysis.

## Table 23
## BENEFIT/COST RATIOS FOR CASE STUDY SYSTEMS

| SYSTEM'S NAME | ANNUAL OPERATING EXPENSE | NUMBER OF VEHICLES | NUMBER OF TRIPS/YEAR | BENEFIT ESTIMATE | BENEFIT/ COST RATIO | DATA YEAR | PRINCIPAL BENEFIT TYPES |
|---|---|---|---|---|---|---|---|
| **Blacksburg Transit**, Virginia | $1,677,975 | 33 | 1,470,000 | $2,819,350 | 1.67/1 | FY 96 | Traffic Reduction<br>Parking |
| **COLTS** (Lee County), North Carolina | $258,986 | 15 | 54,339 | $1,093,316 | 4.22/1 | FY 95 | Dialysis<br>Welfare to work<br>Nutrition<br>Training |
| **County Commuter**, Maryland | $1,089,201 | 12 | 290,000 | $3,462,717 | 3.18/1 | FY 94 | Employment<br>Medical<br>Training |
| **Delta Area Rural Transportation System**, Mississippi | $800,350 | 21 | 109,930 | $2,843,880 | 3.55/1 | FY 96 | Employment<br>Dialysis |
| **JAUNT, Inc.**, Virginia | $1,641,710 | 60 | 209,799 | $3,040,500 | 1.85/1 | FY 96 | Employment<br>Disabled Empl.<br>Dialysis/medical |
| **Pee Dee Regional Transportation Authority**, South Carolina | $3,808,025 | 89 | 531,455 | $12,362,423 | 3.25/1 | FY 96 | Employment<br>Welfare to work<br>Dialysis<br>Emergency |
| **STAR**, Sweetwater County, Wyoming | $554,859 | 14 | 83,659 | $1,681,287 | 3.03/1 | FY 96 | Employment<br>Medical<br>Indep. Living |
| **Zuni Entrepreneurial Enterprises**, New Mexico | $115,726 | 4 | 15,998 | $488,880 | 4.22/1 | FY 96 | Education<br>Employment |

# SUMMARY

Both our aggregate approach and our case study approach have produced benefit/cost ratios for rural public transit systems that are in excess of three to one. While this ratio is greater than those documented in previous research efforts, the approach used in the case studies was designed to produce conservative estimates of the true total level of economic impacts.

**Rural transit systems that were able to offer significant levels of employment benefits to their riders scored highly in our analyses, as did those systems which made important contributions to the ability of local residents to live independently and to access critical medical services (including dialysis treatment).** These two factors should be seen as keys to success in generating economic impacts in the localities served by rural transit systems.

# 8

# HOW TO MEASURE AND MAXIMIZE ECONOMIC IMPACTS OF RURAL TRANSIT SYSTEMS

This chapter provides information for the planners and operators of rural transportation systems about the economic benefits of those systems. In particular, we will be looking at two major issues: how local professionals can measure the benefits of rural transit systems and how rural transit operators can maximize the benefits they generate with their own systems. We'll discuss these issues after we first review the kinds of economic benefits that are possible.

## TYPES OF ECONOMIC IMPACTS TO CONSIDER

Based on the results of our cases studies and other analyses, the kinds of economic impacts from rural transportation systems that operators and planners should look for in rural communities will include

- **employment effects,**
- **benefits from increased mobility**
  - participation in education and training programs,
  - increased participation in social service programs,
  - health benefits of increased access to medical care, and
  - personal independence, including staying out of nursing homes,
- **transportation cost efficiencies for the users of the system,**
- **impacts on expenditure patterns,** and
- **growth of the local economy** (beyond that expected without public transportation services).

Among these impacts, it is the first three — employment effects, benefits from increased mobility, and transportation cost efficiencies for the users of the system — that are expected to produce the greatest benefits in most communities.

The transportation characteristics which most often lead to these impacts can include the following:

- transit systems which provide rural commuters with access to their jobs, either in rural areas or in town/cities,
- transportation systems which provide relatively high levels of service to their localities (to permit the generation of significant economic impacts),
- substantial economies of scale offered by the transportation services (such as providing service to the regional airports, medical centers, and outlet malls),
- transit services which focus on education, job training, or other "human investment" programs,
- transit systems which serve expanding retirement, recreation and/or tourism communities,
- transit systems which provide cost-effective access to public services, health services, and shopping for rural, often older, people with limited transportation options, and
- transit systems which relieve traffic in communities where environmental or traffic congestion costs appear to be appreciable.

## HOW TO MEASURE THE TYPICAL ECONOMIC IMPACTS

There are no simple formulas for measuring economic benefits. However, there are some some straight-forward benefit measurement approaches that lead to specific benefit estimation applications. These approaches, and the applications they spawn, need to be tailored to the specific features of each transit system and to the people, community, and economy each serves as we have demonstrated in the case studies discussed in Chapter 4. This section presents the underlying logic and philosophy of practical benefit measurement approaches and then the application of this logic to estimate several specific types of benefits in this report, including employment, dialysis, seniors staying in their own homes, welfare reform, and traffic congestion in tourist and university settings.

The basic strategy used to measure economic benefits is to examine the services that a system provides and the ridership it provides these services to — in the context of the local economy — and then attempt to visualize what would happen in the lives of these riders and in the economic transactions of the community if these services were not available to these riders. Since there are usually more types of riders and more system purposes than can be fully examined, it is important to focus of the key economic purposes of a system and, at least, try to estimate these as a first step. Secondary purposes can be pursued as a secondary economic estimation process.

The individual types of benefits described are employment, education and training Medical trips (including dialysis), trips to maintain independent living, and traffic congestion reduction. For each, we describe the benefit estimation approach and the practical data availability issues that influence the sources and types of data — and the data analyses — to use in implementing the approach.

## BENEFITS BY TRIP TYPES

The individual types of benefits described are employment, dialysis, seniors staying in their own homes, and traffic congestion reduction. For each, we describe the benefit estimation approach and the practical data availability issues that influence the sources and types of data — and the data analyses — to use in implementing the approach.

### ***Employment***

Employment trips take many different forms and occur in many different settings. Often, rural to urban — and even rural to rural — fixed route public systems have many commuters, and the system may not even know about these riders unless it does an on-board survey. Often, rural tourist systems take both tourists and the service workers who serve the tourist food and lodging facilities on the same system; some systems have special routes just for such service workers, since, often, it is too expensive for these workers to live at the tourist site Many systems have been, or will soon, carry employees to work as part of welfare reforms. In these and many other settings, it is important to estimate the economic benefits.

The first step in estimating the employment benefits is to determine how many persons take the transit system to get to work and what earnings they make. (This can often be estimated from an on-board survey of riders.)

The next step is to determine how many (or what percent of commuters) would not likely be able to get to work in the absence of transit? The most direct way to estimate this is to ask questions as part of the on-board survey of riders: Do you own a car? Do you have a driver's license? Do you think that you could get to work in the absence of transit? (And so forth.) In the absence of this direct input from riders, such information on ability to get to work w/o transit can often be estimated from Census data of number of households without cars, incomes below poverty, and so forth applicable to the blocks from which the commuting riders originate. Other ways of approximating this are described in some of the field case studies.

The third step is to estimate the reduced costs of providing public services to those who are unlikely to be able to get to work without transit (per step 2), and who, thus, would otherwise be unemployed. This is not an easy computation since different people may be in different situations. Some may be on public assistance, may/may not be receiving food stamps — others on unemployment insurance payments for some period and many in other situations. Look for any special studies by the state, or by others, for estimates of these reduced public payments for different groups of individuals. In the case studies, we made the simple assumption that these payments would approximate one-half of annual job earnings. This assumption may be too low, according to the results of the Cato Institute study cited in our Sweetwater Wyoming case study.

Thus, the employment benefits that are attributed to the transit system are calculated as the annual earnings for those who use the system to get to work times the percent of earnings for those individuals who would not likely be able to get to work without transit plus the reduction in public support payments for these persons. Note that these benefits are placed on an **annual** basis for all benefit categories to keep all categories on an equal time basis.

**How was this employment methodology applied in the case studies?** The following summaries serve to illustrate the employment analyses used in the case studies.

**The DARTS System in Mississippi** developed before the casinos; but its principal purpose has recently become that of providing fixed route employment transportation for workers from their residences over a five county area to provide them with access to employment in the casinos in Tunica County (the only county to allow gambling.) Transportation was a "must" for both the casinos and the employees. In 1994, Tunica had 8,300 residents but provided 11,387 jobs; and the number of jobs has since increased. But many of the workers in this area simply did not have reliable transportation that was readily available since this was one of the poorest areas in the country and since the unemployment rates were among the county's highest. Thus, the DARTS System modified and extended its routes and operations specifically

to address this community employment opportunity. Consequently, persons who previously were unemployed or severely underemployed (often in agriculture) were able to obtain casino employment at annual wages or approximately $14,500. (DARTS estimates that, 60 % of the 175 workers being transported by the system lived below the poverty level before their casino jobs.) Thus, for the "without transportation" situation, we estimated that 80 percent of these individuals would become unemployed in the absence of the program. In this case, then, we credited the transit system with providing a benefit of the total wage earnings of these employees ($14,500 × 175 = $2,537,500), less the estimated percent that would become unemployed in the absence of transit ($2,537,500 × .80 = $2,030,000). To this earnings benefit, we added an estimated $5,000 for each as the annual savings in public payments for each of the 140 persons assumed to be unemployed without the transit system's service; thus generating a total employment benefit of $2,730,000. (Note: In other cases, we used 50 % of the earnings amount as the estimate of public payments to the unemployed, but in this case, because of the relatively high annual earnings of casino employees, we limited this benefit estimate to $5,000 per person per year.)

Thus, DARTS modified and expanded its operations to meet this critical community, employer, and employee need; it moved from being a human service system to becoming primarily a successful employee transporter. The total DARTS annual benefits are $2,843,880 and the annual costs are $800,350. This system listened to the community and its residents and employers and responded to achieve this economic benefit.

For **other cases of employment benefits,** the reader should review the following case studies in Chapter 4:

- County Commuter, Hagerstown, MD -- $2,376,000 in commuter benefits
- County of Lee Transit System (COLTS), NC -- $202,740 in welfare-to-work benefits; $65,208 in employment benefits
- JAUNT, Charlottesville, VA -- $1,183,799 in commuter benefits; $674,077 in handicapped-to-work benefits
- Pee Dee Regional Transportation Authority, SC -- $2,596,151 in welfare-to-work transit; $2,692,410 in tourist-related seasonal employment benefits
- Sweetwater County Transit Authority (STAR), WY -- $327,600 in employment benefits
- Zuni Entrepreneurial Enterprises (ZEE), NM -- $110,880 in employment benefits.

There are also significant employment benefits among many of the other cases which were studied: Aberdeen Area, SD; County Express, CO; El Aguila, TX; North Idaho Community Express, ID; Upper Cumberland Human Resource Agency, TN; Village of Angel Fire, NM; Western Iowa Transit System, IA. The El Aguila system, which provides a rural-to-Laredo commute for low income persons in Webb County was the biggest employment benefit producer among the desk audit cases — $1,701,000.

### ***Kidney Dialysis***

Kidney dialysis is a major challenge since a growing number of persons — about 250,000 nationwide — require regular dialysis treatment three times a week or run the risk of dying. In rural areas, the dialysis facilities are often long distances from residences — sometimes hundreds of miles. For a rural transit system to serve these persons it must get these persons to treatment at a given time and return them to their residences after treatment — some 3 hours or more after delivery. This is a challenging requirement, but one that many rural transit systems are meeting regularly. The most important economic benefit of this service may be the saving of a life by taking transit-dependent persons to treatment, but we have insufficient information to estimate such a profound benefit. We don't know, for example, how many treatments must be missed before serious health consequences follow. Thus, we turn to our "second best" estimation procedure: How much would it cost to take these persons to treatment via alternative transportation modes versus the cost of this same service by transit?

The first step in estimating benefits is to determine how many dialysis patients are transported by the transit system and how many of these are non-ambulatory requiring wheelchair vehicles.

The second step is to estimate the transit system costs of transporting these patients, both ambulatory and non-ambulatory.

The third step is to examine alternative means of transporting these patients to treatment, and alternative costs of using these means. Usually, this involves private sector transportation — taxis for ambulatory patients and wheelchair vans, or ambulances, for non-ambulatory patients. The principal potential providers need to be contacted for their cost estimates and cost formulas for different distances.

The fourth step is to estimate the cost of transporting the transit dialysis patients via private sector transport using the cost factors provided by private providers in step #3. Since there are usually major cost differences between non-ambulatory and ambulatory transportation, these need to be analyzed separately. The economic benefit of the transit system is the lower cost of providing this service via the

transit system versus the private sector alternative. In all case studies, this benefit was substantial since the transit system's cost-effective scheduled routes for providing this service are seldom achieved by alternative providers.

**Note**: The reader should note that the difference between dialysis transportation and other medical trips is primarily that of necessity and urgency. Patients who do not receive dialysis treatments run the risk of death; whereas, most medical trips and other human service trips are less urgent. This enters the calculations of benefits in the assumption of the percent of trips that are expected to be made in the absence of transit; for dialysis trips, because of the necessity to life, we assume that 100 % of such trips would be made in the absence of transit; whereas, for the other types of trips we assume lower percentages because of their lesser urgency. This 100% assumption for dialysis trips serves to give such trips a relatively higher benefit.

**How was this dialysis methodology applied in the case studies?** The following serve to illustrate the dialysis benefit analyses used in the case studies.

**JAUNT, Charlottesville, VA.** The JAUNT system was developed as one of the original rural transportation systems. It serves four rural counties that surround the city of Charlottesville, and most of the trips terminate in the city. Charlottesville is a major regional medical center particularly as it is the location of the University of Virginia Hospital. The fixed route component of JAUNT is oriented to employment commutes to Charlottesville, and the demand response component (the larger part) is oriented around human service needs with a heavy medical component. The System Director estimates that about 30 persons are transported regularly for kidney dialysis treatment and that 20 of these are wheelchair patients and the others ambulatory. We contacted a private company that provides wheelchair vans for the Charlottesville and were told that the company charges a base rate of $55 roundtrip for a wheelchair van plus $3 per mile as a distance charge. The JAUNT Director estimates that about 13 patients travel about 15 miles roundtrip and that the remaining 7 patients travel about 60 miles roundtrip. Using the above calculation steps, we calculated a benefit to JAUNT of transporting the wheelchair patients of $459,420 and transporting ambulatory patients of $68,640 for a total dialysis benefit of $528,060.

For **other cases of dialysis benefits**, the reader should review the following indepth case studies in Chapter 4: COLTS, NC; DARTS, MS; JAUNT, VA; Pee Dee, SC. Also, the following desk audit cases included dialysis benefit measurements: East Central Arkansas Transit, AR; and Tri-County Community Council, FL. The Arkansas system was the "king" of dialysis transportation systems since it regularly transports 84 dialysis patients; thus providing an economic benefit of $877,500 which, from this benefit alone, exceeds the system's total operating costs.

## ***Benefits of Independent Living for Older Persons***

The principal potential economic benefit of many rural transit systems is to help keep older people in their own homes by providing them with access to shopping, medical services, social services, nutritional meals (often at senior centers), and even social visits with friends/relatives. It is assumed that these services help these older persons to stay in their homes for a longer period of their life and thus avoid nursing homes, hospitals, and institutional alternatives that are more costly both for the individual and for the economy. However, at present, there is insufficient research information available to permit estimates of this benefit.

***Estimating Procedure —*** Since this benefit is an important basic objective of many systems, we developed a "second-best" estimate of benefits using the following four steps: Estimate the number of persons who are over 80 who use the transit system regularly. The Census provides data on population by county and gives the percentage of persons 75 and over in each county. If the system does not have age breakdown on its ridership (which would be ideal), this data can be used to approximate the number of riders over 80.

As the second step, estimate the percentage of the riders over 80 who would likely be in nursing homes were it not for the transit system. The proportion of riders over 80 who require extensive medical treatment trips and/or are physically/mentally disabled may help to provide a basis for estimating this percentage. Alternatively, there may be special studies of,or data on, nursing home residents that provides some basis.

Third, multiply the number of over-80 regular transit users by the percentage who would likely be in nursing homes to estimate the number of 80 plus persons that the system keeps out of nursing homes via transportation.

Next, you need to estimate the total cost of keeping these persons in nursing homes versus the total cost of living at home. We used an estimate of $24,000 per year per person in the case studies (an annual nursing home cost of $36,000 minus an annual at-home cost of $12,000), but this estimate needs to be refined and to tailored to each community.

Finally, one simply multiplies the number of persons estimated as having been kept out of nursing homes (step 3)by the cost per year (step 4) to get an estimate of the total benefit of the system in keeping people at home.

***Comments on These Benefits —*** We need to draw the reader's attention to some important considerations concerning the estimates of these benefits. We made estimates of the benefits of dialysis and independent living based on the **costs saved** through use of transit services compared to the costs of alternatives (transportation and other services). If we had made the argument that the most expensive services should be used because they entail the greater economic impacts, it would be hard to find an upper limit to system size, the more you spend the greater the impacts. We believe that society as a whole benefits by choosing the most cost-effective option.

***A Review of How We Applied These Estimates —*** STAR Transit, in Sweetwater, Wyoming, maintains extremely detailed records on its riders. Therefore, it was in an excellent position to be able to assess whether or not its services have enabled some riders to continue to live in their own homes rather than to live in nursing homes. They calculated that their services are currently allowing over 30 persons, primarily frail and disabled elderly, to remain in their own homes and out of nursing homes. Using 30 persons as the number of persons receiving this benefit, we then estimated the level of benefits as $3,000 per month or $36,000 per year, which is the approximate cost of nursing home care at this point in time. A person living in their own home would incur some costs, so that it would not be accurate to count the avoidance of all nursing home costs as a benefit. Still, since over 70 percent of elderly persons (the prime candidates for nursing homes) own their own homes free and clear of any mortgage payments, the differences between nursing home costs and at-home costs could be very large. Furthermore, if one member of an older couple goes into the nursing home and the other person remains at home, almost the entire costs of nursing home care will need to be paid **in addition to** the regular housing costs. Therefore, we used two-thirds of the regular nursing home costs, or $24,000 per year, as the avoidance costs attributable to the maintenance of independent living. Multiplying this number times 30 persons provided an annual benefit for STAR Transit of $720,000 for this type of impact.

## ***Reducing Traffic Congestion***

Intuitively, most persons think of traffic congestion as an urban problem. However, in many rural settings, traffic is also a problem. Such settings include large universities that are located in small rural communities, and tourist areas — beaches, ski resorts, historic sites, etc. — in many small rural areas

to which a large number of tourists flock, particularly in peak season. In the case studies, we estimated the benefits for tourist and university systems based on the reduction in traffic congestion which, in turn, results in economic benefits including reduced cost of providing parking, reduced time (value) to commute to work, and reduced incidence of traffic accidents (value) all associated with having the transit system in place (versus without the system). We noted in these case studies that the transportation systems also enabled these communities to better plan their future growth and development by minimizing the role of traffic congestion and parking needs; however, we did not attempt to measure this type of benefit.

***Reduction in traffic time —*** To estimate this effect, we begin with an analysis of the commuters who use the system, using ridership data from the system by time of day and day of week. An analysis of peak hour traffic provides an estimate of the number of commuters who use the system. Secondly, we estimate the number of cars that would be added to the commute stream if the system were not in operation. Next, we estimate commuter traffic levels and estimate how much they would be increased by the new stream of traffic for those who would be driving were it not for the transit system. This increased traffic flow is converted into the added time to commute to destination. Next, we place a time value of money on this additional commute — most studies suggest that this is, to many people, worth about one-third of their earnings. The time value of congestion benefit, then, is computed by multiplying the average additional time of commute by the average annual earnings for all commuters affected.

***Reduction in need for parking —*** To estimate this, we take the number of cars added to the commute stream in the absence of transit (from above) and assume that all of these would require parking at the destination. We then develop estimates of the cost of providing this parking — whether a surface lot or a parking building --- as a benefit of the system.

***Reduction in accidents —*** To estimate this, we again begin with the number of cars added to the roads in the absence of the transit system. Then we estimate the number and types of accidents associated with increased levels of traffic. Studies have placed values on the costs associated with different types of accidents. Applying these costs to the number/type of accidents, we get an estimate of the economic benefit of preventing such accidents via use of transit.

**How was this traffic congestion methodology applied in the case studies?** For university settings, the reader should turn to the Blacksburg Transit (Virginia Tech) case study in the indepth group

and to the Ames Transit (Iowa State) and the Pullman Transit (Washington State) to review the benefit calculations used for traffic congestion.

(Note; For tourist systems, the Village of Angel Fire (NM) and Eureka Springs (AR) both desk audit case studies, we used a different methodology. The methodology used is that of assessing the impact of tourists not going to these communities, or not staying as long, because of the severe traffic congestion expected in the absence of transit.)

## BENEFIT ESTIMATION STRATEGY

For any given transportation system, one or more of the above types of benefits may apply. In a few cases, all may apply. How does one go about deciding which types of benefits to attempt to estimate for any given transit system? Even though there are no specific guidelines for this, there are some things to examine in a system that give strong clues as to what types of econmic benefits that system provides and how to go about estimating those benefits.

It is very useful to look at the stated objectives of a given transit system and the implied objectives of that system based on the nature and purpose of the trips that the system provides and the type of riders that use the system. The following are some hypothetical illustrations:

- System A has a balanced set of trip purposes including medical, nutrition, shopping, and other types of trips. The system serves a low income, declining economic base, very large geographic area with a low population density. Based on this, there is a high likelihood that this system has a high proportion of elderly/handicapped riders, and that a principal potential economic benefit of this system to be examined is whether this system is achieving benefits by keeping the elderly people out of nursing homes. The analyst may also examine the number and types of medical trips, including dialysis trips, taken by local residents. In doing this, he/she must be careful to avoid double-counting of benefits. In this case, benefits for independent living were counted **only** for those over 80 years of age, so trips for the over-80 group should be removed when counting benefits for the medical (and other) types of trips. For case study **examples** of this type of system, the analyst should review the following systems in Chapter 4: Sweetwater WY, County Express CO, North Idaho Community Express ID, Upper Cumberland Human Resource Agency TN, Aroostook ME, and Western Iowa Transit IA.

- System B is serving a university and the immediate surrounds. It uses several fixed, regularly-scheduled routes that culminate at the university. The students help to pay for the system from their tuition fees and ride free by showing their ID cards. The university parking department also contributes to the system's operations. There is little doubt but that the principal economic benefit category for this system is that of reducing traffic

congestion. The fixed route system enables a high-volume, low cost system that serves to substitute transit service for parking of cars, traffic congestion, and traffic accidents. For **examples** of this type of system, the reader should examine the following cases in Chapter 4: Ames Iowa Transit (Iowa State University), Blacksburg Transit (Virginia Tech), and Pullman Transit (Washington State University).

- System C serves several large beach communities with summer trips from poor inland counties. It also has expanded operations to several other counties after the state instituted a welfare reform program. One of the key benefits of this system is likely to be employment commuting for low-income persons since summer beach trips from inland locations implies seasonal trips to enable youth employment and since the increase in services following welfare reform and the system's efforts to support the reform usually entails training and employment trips from low-income rural areas to high-income urban areas. For an **example** of this type of system, see the Pee Dee South Carolina case study in Chapter 4.

Obviously, these examples can be expanded. But, most usefully, the reader should take the time to get involved in the various case studies and to work through the benefit selection and analysis process on his/her own.

## HOW TO INCREASE THE ECONOMIC IMPACTS OF RURAL TRANSIT SYSTEMS

In order to increase the economic impacts of rural transportation systems operating in their communities, public transportation planners and operators should undertake the following three steps:

- focus on particular trip types,
- establish strategies for serving these particular trips, and
- work with service characteristics that can be controlled by transportation system planners.

## STEP ONE: FOCUS ON PARTICULAR TRIP TYPES

Rural transportation systems can maximize the economic benefits they offer to their riders and their communities if they focus on generating the kinds of trips that were shown in this study to lead to the largest economic benefits:

- employment trips,
- education and training trips,
- trips for medical services, particularly dialysis, and
- trips that promote independent living, especially for the elderly and persons with disabilities.

It is clear other trip types also offer economic benefits. However, the four trip purposes listed above offer the greatest economic impacts. In order to maximize economic impacts, rural transit systems should focus on these trip types.

Focusing on these kinds of trips will mean changing service levels and operating procedures for many rural transit operators. Those rural systems with strict fiscal constraints will probably not be able to make the changes needed to have greater economic impacts — unless they can convince local policymakers that more resources should be provided in order to increase the level of economic impacts.

## STEP TWO: ESTABLISH STRATEGIES FOR SERVING THESE PARTICULAR TRIPS

In order to serve trips of the four types identified above, the transit system has to meet the specific requirements that must be fulfilled by for each type of trip. The most important requirements are destinations, hours of service, and costs. If these trip requirements cannot be met, the transit service will not be successful in attracting riders.

## ***Destinations***

First of all, **the transit planners must create an inventory of the destinations of the desired trips**. These then need to be matched to the probable origins (the residences) of the probable travelers. Most trips originate and end at someone's home; if their homes are not directly served by transit in front of their home, most persons need to be within a relatively short distance (such as one-quarter mile) of where they can board a bus to be attracted to transit services. Persons with disabilities often find it much more difficult to travel even short distances beyond their homes, thus more often requiring transit services that pick them up at their doorstep and leave them at the doorstep of the destination. The overall issue here is being responsive to the needs of the passengers. Let's look at the four key trip types.

***Employment Trips* —** Journey to work trips need to connect potential riders with actual job destinations. In rural areas, the job destinations tend to be dispersed: some are in small urban areas, others are outside of these areas, and still others are located some distance away in major metropolitan centers. These distinct employment destinations suggest the need for different service strategies for each. If the numbers of persons at any one job site are small, then small vehicles will probably be needed. Larger vehicles could be useful for the longer commutes into large urban areas, or for situations in which large numbers of persons are destined to the same location. (Private entrepreneurs formerly provided transit services to mines outside of many communities using large buses; some larger buses still run to mining operations and to food processing plants.)

***Education and Training* —** There are probably fewer education and training locations than there are employment locations (unless the training is offered at the job sites). Therefore, there may be opportunities to group larger numbers of persons in larger vehicles for travel to education and training sites. Often, community colleges or sheltered workshops will be the focal point of training/education trips.

***Medical Services* —** As the economics of medical care continue to create pressures for centralization to achieve economies of scale in the provision of services, more and more rural communities are finding themselves without hospitals and other facilities within their own town or county. In particular, dialysis facilities are much more often located in urban centers than in rural areas. Many rural residents will need to travel 100 miles or more to obtain dialysis treatments. This suggests the need for long-distance

services which may need to cross county and even State boundaries. As well as covering long distances, these trips will take many hours and may result in the driver having to wait at the destination for four hours or so until the treatments are completed, instead of being able to return to the home community to serve other passengers. This waiting time is not a productive use of valuable resources — both the driver and the vehicle are potentially out of service for hours — so other service options should be considered. These would include providing the dialysis runs with volunteer drivers, making two roundtrips to the dialysis facility so that the vehicle and driver are utilized for the full day in dialysis transit, or to find other employment possibilities for drivers during the waiting period, including providing transit services in the destination community. This kind of resource and service sharing between communities has the potential for significant benefits.

***Trips that Promote Independent Living —*** These trips are generally shorter than those mentioned above since they are focused on continuing to integrate the passenger into the local community. Trips to adult day care centers and to senior centers often involve daily roundtrips. Weekend service may be needed to meet some of the key demands for the continuation of independent living (such as visiting a spouse who has already moved into a nursing facility).

### ***Hours of Service***

Second, **trips must be offered at the times (hours of the day; days of the week) required by the nature of the trip purpose**. Each of these trip types requires separate consideration.

***Employment —*** A service that is offered once or twice a week will have difficulty attracting riders who work five days a week. Similarly, services provided Monday through Friday only are of little use to persons who work on weekends, and services provided only during the hours of 9 to 5 are of little use to persons who start work at 7 a.m. or those who end their workday at 11 p.m. There are numerous rural public transit systems that offer services that are quite limited in terms of hours of the day or days of the week. These systems will have great difficulty attracting work trip riders, and the lack of such riders will deny the system one of the largest potential categories of economic benefits for rural communities.

***Education and Training —*** The same comments made above about employment apply to education and training trips. For example, some community college courses are primarily offered at night. One potential solution to the difficulty of providing such trips is to look for a driver who is also attending classes in the evening or at the location of the education or training.

***Medical Services —*** Many medical services are consumed during normal business hours (9 to 5, Monday through Friday). If the treatment facilities are located at some distance from the rural community in question (such as dialysis services), the transportation services may need to pick up their passengers at an extremely early time in the morning to be able to arrive at the destination in time to begin the treatment (at 8:00 a.m., for example).

***Trips that Promote Independent Living —*** These trips are often not particularly time sensitive. However, adult day care and nutrition are typically daily requirements and require a roundtrip.

## ***Trip Costs***

Trips must be priced at costs affordable to the clientele. Many persons in rural areas, particularly those who are candidates for rural public transit, have limited incomes. Rural transit operators have usually been sensitive to such issues. Ways of addressing the price of service issue include **keeping the operating costs down**, which means to innovate with the costs of labor (the greatest single expense) and to ensure that the labor costs are spread among the largest number of riders (for example, to coordinate services among a variety of agencies within the community to achieve the highest possible levels of productivity in the provision of services).

Another way of lowering the fares for travel is to **spread the costs among a variety of parties**. A number of the systems we studied convinced employers to pay a portion of the costs of travel so that the fares would not be such a burden for the travelers. This strategy could also be used for those education and training services targeted to persons on welfare, so that the social services agency would pay most or all of the expenses of the trip. (In North and South Carolina, the states have supported transportation through their social service agencies as part of the state-initiated welfare reform initiatives.) Typically, there has not been appreciable trip cost sharing by medical facilities. This is an avenue worth exploring. Lastly, rural transit operators could consider cost-sharing arrangements with families of older adults or

persons with disabilities so that the traveler pays a portion of the trip cost and the family pays some also. Some (but not all) of the greatest benefits will come from serving persons who have no other means of travel: those too old, too young, too poor, or persons with disabilities. The benefits of assisting these persons to remain in their own home, living independently, are among the most significant economic impacts that rural transit services have to offer.

## STEP THREE: WORK WITH SERVICE CHARACTERISTICS THAT CAN BE CONTROLLED BY TRANSPORTATION SYSTEM PLANNERS

Local planners and operators have a variety of tools at their disposal to alter the impacts that their systems may have on local rural economies. There are seven key elements of a public transportation service plan. These elements are service modes, service availability, organizational and institutional context, service pricing, personnel and labor requirements, rolling stock, and other capital requirements. Changes to these fundamental elements can have profound effects on who rides, how often they ride, and the resulting revenues, costs, and economic impacts of the transit system.

***Service Availability —*** Small urban and rural transportation systems often use a combination of service modes and availabilities to meet the diverse needs of their passengers and customers. When and where transit service will be available is the place to start when considering how to increase economic impacts.

The **location, span, and frequency of service** are key factors in meeting the transportation needs of the public. Route and stop locations of fixed route service determine its general availability to the public. As noted above, careful attention must be given to the **days and hours** when service is operated because this **span** helps define who may or may not use the service. For example, transit services that do not operate each weekday will find it difficult to serve work trips.

If special services such as paratransit or taxi services for designated users are being considered, **response time** to passenger requests and reservation policies must be assessed to estimate the level of service required and its impact on operational resources such as vehicles and drivers. The **frequency** of fixed route service must be determined on a route-by-route basis, since high-frequency service results in higher labor and capital expenditures and, potentially, higher levels of ridership. When demand-responsive service is considered, the level of service availability and response time must be determined since these factors also affect resource requirements. If the demand is estimated to be greater than the service can

accommodate, then service availability constraints should be established, at least in terms of on-time performance and seat availability.

***Service Modes —*** The wide variety of service modes that exists to meet public transportation needs in rural communities ranges from regular transportation routes with schedules and stops to subscription bus service with check-stops to demand-response services to taxi, jitney, and auto service. Four basic types of service modes may be considered:

- fixed route, fixed schedule (traditional small urban or urban bus service)
- variable route, fixed schedule (route deviation service),
- variable route, variable schedule (demand-response, paratransit service), or
- no specific routes or schedules (taxi service).

The services (or service combinations) that are appropriate for a given community should be determined by community size, level of activity, population and employment (size, density, and location), and special service needs (including the elderly and disabled, human service agency clients, and students). For example, for large numbers of regularly scheduled trips (such as work trips), fixed routes and schedules often offer the most economical form of service. Having passengers sign up in advance for a certain number of trips per month (on a subscription basis) is often a productive strategy. Most rural transit operators offer some form of demand-responsive service to meet the needs of their community.

***Service Pricing —*** The pricing of transportation service — establishing fare policies and structures — influences both the level of ridership and revenue. Service pricing is complex because passengers are sensitive to trade-offs between service quality and service cost. These tradeoffs are known as service and price elasticities, and values for these variables do exist. Still, accurately estimating potential passenger responses to fare and service changes can be challenging. Rural transit services often attract passengers with limited incomes; this means that each system should try to keep their costs as low as is reasonable and should explore ways of sharing the costs of the trips between the passengers and the businesses or activities at the destinations, be they employers, shopkeepers, or human service agencies.

***Labor Requirements —*** The service plan must consider the human resources needed to operate the system. The largest cost element of transportation services is driver labor. By keeping labor costs low and/or by maximizing the numbers of riders served by each driver, the transit system can pass on these cost and cost-effectiveness savings to its passengers, thus increasing the numbers of persons within the local population who will be attracted to the service. This means that trips for long distances that serve only one or two persons should be served other than by a regular driver and vehicle if possible: this is a good opportunity to use volunteers. It may not make good economic sense to provide transit service all night long; services could be provided only on a subscription basis, or taxis could be substituted for transit services.

***Vehicles —*** The number and type of service vehicles required to meet operating conditions can also change depending on local decisions. Special equipment, including lifts, fareboxes, and radio equipment, also need to be considered in terms of their abilities to attract and serve passengers of the types expected by this particular system. Some parts of the service may require cars, others may require vans, and others may require small buses. It is doubtful that all types of demand could be fulfilled cost-effectively by the same type of vehicle.

***Other Capital Requirements —*** Other capital requirements necessary to provide transit services include garages, offices, shelters, benches, and stop signs. These items should be selected and placed with an eye to maximizing the comfort and convenience of the passengers, and thus maximizing the total ridership of the system. Otherwise, these factors will have very little economic impacts in rural communities.

***Organizational/Institutional Context —*** Service planning must also weigh relationships between organizational ownership, operations, and sponsoring agencies. Since the cost of public transportation service is normally greater than the revenues from passengers, the system will require operating and capital funds from governments and others, such as human service agencies or employers. Therefore, the interests of all of these actors will need to be considered in the development of service plans and operations. Community support is critical when expanding the type or transportation services to the community beyond the types of services usually provided. Often, when pursuing economic or education objectives, this is going to be the case. Transportation providers often have not endeavored to gain active participation from the Chamber of Commerce and the business/industry community. But this will have to change if the

system want to serve employment objectives. Employers will be asked to share in employee costs. Employee groups/unions may also need to participate. If the local community college wants to develop bus transportation for its students, both student and university officials must be willing to participate with the transit system to assure success. Thus, new partnerships must be formed in order to expand the system's benefits in ways suggested by this study.

***Summary of Local Control Variables —*** These above elements of system design are those that local planners and operators, in conjunction with politicians and other local decision-makers, can control to create economic impacts on the local rural economy. These transit system features are all subject to local determination and manipulation. The point is to **tailor the service to the needs of the area**. The key variables to be considered are the service destinations, the hours of service, and the costs that are charged to passengers and to others.

## SUMMARY

This chapter has described the considerations needed for measuring and maximizing the economic benefits of rural public transportation systems. Our major emphasis has been on those trip types shown in our case studies to have the greatest economic impacts: trips for employment, education and training, medical services, and maintenance of independent living. The first section of this chapter described how persons in rural communities can estimate the benefits from these and other transit trips in their own locality.

In order to achieve the maximum level of benefits, some rural transit operators will have to change their current system designs or service strategies: some of the systems are so small, and offer such infrequent service, that their chance of having significant impacts on their local economies is slight. These systems undoubtedly provide benefits at the micro level to their riders, but noticing and then attributing changes in a county's volume of economic activity at the macro level is difficult, at best. On the other hand, the larger transit systems can create noticeable effects within their localities by implementing the following strategies:

- **Focus on trips of particular types: employment, education and training, medical services, and trips that promote independent living.**

- **Create plans for providing service to the destinations, at the times required by the nature of the trip purpose, and at the fares appropriate to the clients being served.**

- **Focus on a small number of transit system variables that can be locally controlled.**

Using these techniques, rural transit planners and operators can maximize their impacts on their local economies.

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Abbreviations used without definitions in TRB publications:

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| AASHO | American Association of State Highway Officials |
| AASHTO | American Association of State Highway and Transportation Officials |
| ASCE | American Society of Civil Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| FAA | Federal Aviation Administration |
| FHWA | Federal Highway Administration |
| FRA | Federal Railroad Administration |
| FTA | Federal Transit Administration |
| IEEE | Institute of Electrical and Electronics Engineers |
| ITE | Institute of Transportation Engineers |
| NCHRP | National Cooperative Highway Research Program |
| NCTRP | National Cooperative Transit Research and Development Program |
| NHTSA | National Highway Traffic Safety Administration |
| SAE | Society of Automotive Engineers |
| TCRP | Transit Cooperative Research Program |
| TRB | Transportation Research Board |
| U.S.DOT | United States Department of Transportation |