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16. Abstract <p>Despite the increased interest in performance indicators for large transit systems, there has not been an equal effort at establishing similar techniques for small and rural systems. In response to this problem, this project developed a methodology to evaluate the relative performance of the Section 18 operators. It was found that the agencies could be compared using measures of cost efficiency, cost effectiveness, service utilization, vehicle utilization, quality of service, labor productivity, and accessibility. The transit agencies and the Texas State Department of Highways and Public Transportation can use these measures for analysis of performance trends, evaluation of overall system performance, transit planning, and technical assistance.</p> <p>The procedure uses a standard score methodology to compare the performance of individual agencies to the mean of all rural transit operators in Texas. It was determined that the use of peer groups of similar agencies would not significantly change the conclusions regarding agency performance. Peer groups would, however, increase the time to prepare a performance evaluation and the agencies within each peer group would change annually, making trend comparisons more difficult.</p> <p>The transit operators indicated a desire for information and suggestions from staff members of the Public Transportation Division of the Texas State Department of Highways and Public Transportation on methods to improve performance. More review of the statistics provided by the operators and greater communication between the operators and Public Transportation Division staff would increase the usefulness of the performance measures.</p>			
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**PERFORMANCE MEASURES
FOR RURAL TRANSIT OPERATORS**

Dave N. Carter
Research Assistant

Timothy J. Lomax
Associate Research Engineer

and

Ronald K. Jenson
Research Assistant

Research Report 2008-1F

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Rural & Municipal Transit System Performance Indicators

Sponsored By

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Urban Mass Transportation Administration

Texas Transportation Institute
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METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

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

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

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

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

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

TEMPERATURE (exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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APPROXIMATE CONVERSIONS TO SI UNITS

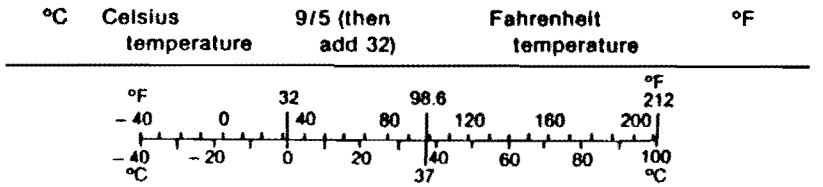
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimetres	0.039	inches	in
m	metres	3.28	feet	ft
m	metres	1.09	yards	yd
km	kilometres	0.621	miles	mi

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

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

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

TEMPERATURE (exact)



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

* SI is the symbol for the International System of Measurements

ABSTRACT

Despite the increased interest in performance indicators for large transit systems, there has not been an equal effort at establishing similar techniques for small and rural systems. In response to this problem, this project developed a methodology to evaluate the relative performance of the Section 18 operators. It was found that the agencies could be compared using measures of cost efficiency, cost effectiveness, service utilization, vehicle utilization, quality of service, labor productivity, and accessibility. The transit agencies and the Texas State Department of Highways and Public Transportation can use these measures for analysis of performance trends, evaluation of overall system performance, transit planning, and technical assistance.

The procedure uses a standard score methodology to compare the performance of individual agencies to the mean of all rural transit operators in Texas. It was determined that the use of peer groups of similar agencies would not significantly change the conclusions regarding agency performance. Peer groups would, however, increase the time to prepare a performance evaluation and the agencies within each peer group would change annually, making trend comparisons more difficult.

The transit operators indicated a desire for information and suggestions from staff members of the Public Transportation Division of the Texas State Department of Highways and Public Transportation on methods to improve performance. More review of the statistics provided by the operators and greater communication between the operators and Public Transportation Division staff would increase the usefulness of the performance measures.

Key Words: performance measures, performance indicators, public transit, public transportation, rural transit, transit system evaluation

IMPLEMENTATION STATEMENT

In order to provide the efficient and effective transit service, the rural Section 18 agencies must continuously monitor and evaluate their performance. The procedure developed in this report will provide the Texas State Department of Highways and Public Transportation and individual transit agencies the data to monitor and evaluate the efficiency and effectiveness of transit system operations. They can be used for analysis of performance trends, evaluation of overall system performance, transit planning, and technical assistance from the Texas State Department of Highways and Public Transportation.

Transit providers will be able to compare their performance with that of their peers and monitor trends in their performance over time.

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the opinions, findings and conclusions presented herein. The contents do not necessarily reflect the official views of the Texas State Department of Highways and Public Transportation or the Urban Mass Transportation Administration. This report does not constitute a standard, specification or regulation.

SUMMARY

Current uses of performance measures include fund allocation, administrative planning, and comparison to peers. The ability of one agency to compare its performance to other agencies is important to the planning process. Performance measures may be used by transit administrators in several ways, including the evaluation of goals and objectives, performance trends, overall system performance, individual route performance, transit functions, and fare policy changes.

Despite the increased interest in performance indicators for large transit systems, there has not been an equal effort at establishing similar techniques for small and rural systems. The metropolitan transit authorities in Texas are, with their dedicated funding sources and large staffs, typically able to collect and analyze more performance data than rural transit agencies.

The objectives of this project were to investigate the transit operating data that is being collected from rural Texas transit providers, identify the most descriptive data, analyze the operating and financial guidelines that have been developed for rural transit agencies in Texas and other states, and develop a methodology to evaluate rural transit systems.

It was found that performance measures are used by other states in fund allocation formulas, bonus funding, and performance evaluation. Several states are required to use performance measures by legislative mandate while others are discretionary. Several states use peer grouping to decrease the number of inappropriate comparisons made in the evaluation process.

In order to determine whether or not peer groupings were necessary in Texas, seven possible peer identifiers were analyzed for five available measures of performance. The results showed that peer groups are not currently necessary, but that of the peer identifiers, fleet size produced the least number of values that were significantly different than the others.

It was determined that the relative performance of the rural agencies could be evaluated using statistics. A standard score is calculated by subtracting the mean performance level from the agency's performance level and dividing by the standard deviation (Equation S-1). A standard score represents how many standard deviations the performance is above or below the mean.

$$\text{Standard Score} = \frac{\text{Agency Value} - \text{Peer Group Mean}}{\text{Peer Group Standard Deviation}} \quad (\text{Eq. S-1})$$

Graphics were utilized to display the relative performance of each agency. These graphs will provide the transit agencies and the Texas State Department of Highways and Public Transportation the data to monitor and evaluate the efficiency and effectiveness of transit system operations. They can be used for analysis of performance trends, evaluation of overall system performance, transit planning, and technical assistance from the Texas State Department of Highways and Public Transportation.

The measures and indicators recommended for evaluation of the Texas Section 18 agencies are shown in Table S-1. The first four measures, cost efficiency, vehicle utilization, cost effectiveness, and service utilization reflect the major goals of an agency (i.e., to provide efficient and effective service at the lowest cost feasible while meeting the needs of the public). The quality of service and productivity measures are also important for evaluation. Quality of service includes both safety and reliability of the systems. Accessibility is a more important measure for larger, fixed-route systems than it is for the rural agencies due to the large variance in population density in rural areas of Texas.

Table S-1. Recommended Performance Measures and Associated Indicators

Measure	Indicator
Cost Efficiency	Cost per vehicle mile
Vehicle Utilization	Miles per vehicle
Cost Effectiveness	Cost per passenger trip
Service Utilization	Passenger trips per mile
Quality of Service	Accident rate
	Mech. breakdown rate
Labor Productivity	Pass. trips per employee
Accessibility	Miles per capita

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CHAPTER 1

INTRODUCTION

The collection and evaluation of performance statistics has become a more important part of transit system planning and management in the past two decades. Government subsidies for transit operating assistance and capital improvements created the need for accountability and control of transit management (1,2). Despite the increased interest in performance indicators for large transit systems, there has not been an equal effort at establishing similar techniques for small and rural systems. The metropolitan transit authorities in Texas are, with their dedicated funding sources and large staffs, typically able to collect and analyze more performance data than municipal or rural transit agencies.

Current uses of performance measures include fund allocation, administrative planning, and comparisons to agencies of similar size or composition. The ability of one agency to compare its performance to other agencies and to previous operating characteristics is important to the planning process. Performance measures may be used by transit administrators for planning in several ways, including the following:

- Evaluation of overall system performance.
- Evaluation of individual route performance (fixed-route operations).
- Evaluation of a single transit function (i.e. maintenance or procurement).
- Examination of the effects of a fare policy change (fare elasticity).
- Trace changes in performance over time.
- Evaluate the goals and objectives of an agency.

General Rural System Characteristics

There are significant service and demographic differences between rural and urban transit systems which should be considered in the development of appropriate planning and evaluation techniques.

- Rural transit providers operate in larger areas of lower population.
- Residents of rural areas generally have lower income levels than their urban counterparts.
- Rural transit providers often do not operate a fixed-route service. Operations are usually demand-responsive or subscription service.
- The objectives of rural systems are more concerned with providing transportation to transit dependent groups (elderly, youth, low income, handicapped, etc.) than reducing traffic congestion.

Performance Measurement

Performance is a general term referring to any evaluation or comparison measure (1). Specific measures which define performance include effectiveness, efficiency, impact, productivity, and quality of service (3). Each of these measures has certain indicators which are used to signify transit performance for that measure. It should be noted that not all agencies, states, and research studies use the same terms for performance measures. Some previous studies have used only efficiency or effectiveness as performance measures. Indicators which describe impact, productivity, and the quality of service may be used but are classified as either efficiency or effectiveness measures.

Three elements -- demographic factors, service descriptors, and performance indicators are necessary to fairly compare transit services. There are several very important differences between demographic factors, service descriptors, and performance indicators.

Demographic factors (service area size, population, etc.) describe the inherent characteristics of a service area. These factors can be used to establish peer groups for comparison. Agencies with similar service and area characteristics may be grouped together to avoid the comparison of agencies which lack similar demographic factors or performance expectations.

Service descriptors (simple input or output data such as total vehicle-miles or passengers) indicate the quantity of service provided. They do not, however, give an indication of efficiency, effectiveness, impact, or quality. They, therefore, cannot be considered performance indicators. Descriptors may show the quantity of service provided, but they do not indicate the quality of the service provided.

Performance indicators can measure the efficiency, effectiveness, impact, or quality of transit service. Service descriptors and demographic factors are used to calculate performance indicators. For example, the result of dividing total passengers by total miles produces a performance indicator for service utilization (i.e., passengers per mile of service). Indicators of effectiveness typically include passenger descriptors, such as total passengers, fare paying passengers, elderly or handicapped passengers, or transfers. Cost per passenger would, therefore, be a measure of cost effectiveness while cost per mile would measure cost efficiency.

Efficiency is a measure of how well a system is using its resources to provide transit service. Effectiveness can be defined as the use of output to accomplish goals, or the benefit the public actually derives from services. Briefly stated, efficiency is "doing things right" and effectiveness is "doing the right things" (4).

This report examined the performance measure categories and their associated indicators listed in Table 1. A performance measure may have more than one indicator associated with it. For example, cost per passenger trip, revenue per passenger trip, and revenue recovery ratio are indicators of cost effectiveness.

Table 1. Performance Measures and Indicators

Performance Measure	Performance Indicators
Cost Efficiency	Cost per mile Cost per hour Cost per vehicle Revenue recovery ratio
Cost Effectiveness	Cost per passenger trip Revenue per passenger trip Revenue recovery ratio
Service Utilization/Effectiveness	Passenger trips per mile Passenger trips per hour Passenger trips per capita
Vehicle Utilization/Efficiency	Miles per Vehicle
Quality of Service	Average speed Vehicle-miles between road calls Vehicle-miles between accidents
Labor Productivity	Passenger trips per employee Vehicle-miles per employee
Accessibility	Vehicle-miles per capita Vehicle-miles per service area

The objective of this research was to assure that descriptive and comparable transit operating data are being collected by Texas transit providers and that these indicators can be used to increase their performance. Recognizing the need for good evaluation techniques and the limited funding available for collection and analysis of performance data in rural and small municipal cities, two primary areas of research were identified.

- Examine the data collected by municipal and rural transit agencies in Texas and other states to identify the most useful descriptive data for transit performance.
- Analyze operating and financial guidelines that have been developed for municipal and rural transit agencies in Texas and other states.
- Develop a methodology to evaluate rural transit systems in Texas.

Non-Urbanized Transit Systems in Texas

There are currently 37 transit providers in Texas which receive federal financial assistance through the Section 18 program. The Section 18 program was established by the Surface Transportation Assistance Act of 1978 for public transportation in non-urbanized areas. The Section 18 program is not just a social service program for the elderly or handicapped, and should not be confused with the Section 16(b)2 program. The goal of the program is to increase the access of people in rural areas to health care, shopping, education, recreation, and employment, as well as public services.

The non-urbanized Section 18 systems in Texas are listed in Table 2. The service area of each agency is considered to be the counties in which they operate (Figure 1).

Table 2. Section 18 Grant Contractors

Contractor	Location
1. Panhandle Community Services, Inc.	Amarillo
2. South Plains Community Action Association, Inc.	Levelland
3. Caprock Community Action Association, Inc.	Crosbyton
4. Aspermont Small Business Development Center, Inc.	Aspermont
5. Rolling Plains Management Corporation	Crowell
6. Texoma Area Paratransit Systems, Inc. (TAPS)	Denison
7. Services Program for Aging Needs in Denton County (SPAN)	Denton
8. Hunt County Committee on Aging	Greenville
9. West Texas Opportunities, Inc.	Lamesa
10. People for Progress, Inc.	Sweetwater
11. Palo Pinto County Transportation Council, Inc.	Mineral Wells
12. Parker County Transportation Service, Inc.	Weatherford
13. Somervell County Transit System, Inc.	Glen Rose
14. City of Cleburne	Cleburne
15. Kaufman County Senior Citizens Services, Inc.	Terrell
16. East Texas Council of Governments	Kilgore
17. Concho Valley Council of Governments	San Angelo
18. Hill Country Community Action Association, Inc.	San Saba
19. Heart of Texas Council of Governments	Waco
20. Lufkin Transit System	Lufkin
21. Capital Area Rural Transportation System (CARTS)	Austin
22. Brazos Transit	Bryan
23. Montgomery County Transit	Conroe
24. City of Eagle Pass	Eagle Pass
25. Community Council of Southwest Texas, Inc.	Uvalde
26. Alamo Area Council of Governments	San Antonio
27. Golden Crescent Regional Planning Commission	Victoria
28. Colorado Valley Transit, Inc.	Columbus
29. Gulf Coast Regional MHMR Center	Galveston
30. Bee Community Action Agency	Beeville
31. San Patricio County Committee	Sinton
32. Laredo-Webb County Community Action Agency	Laredo
33. Community Action Council of South Texas	Rio Grande City
34. Rural Economic Assistance League, Inc. (REAL)	Alice
35. Kleberg County	Kingsville
36. Lower Rio Grande Valley Development Council	McAllen
37. Town of South Padre Island	S. Padre Island

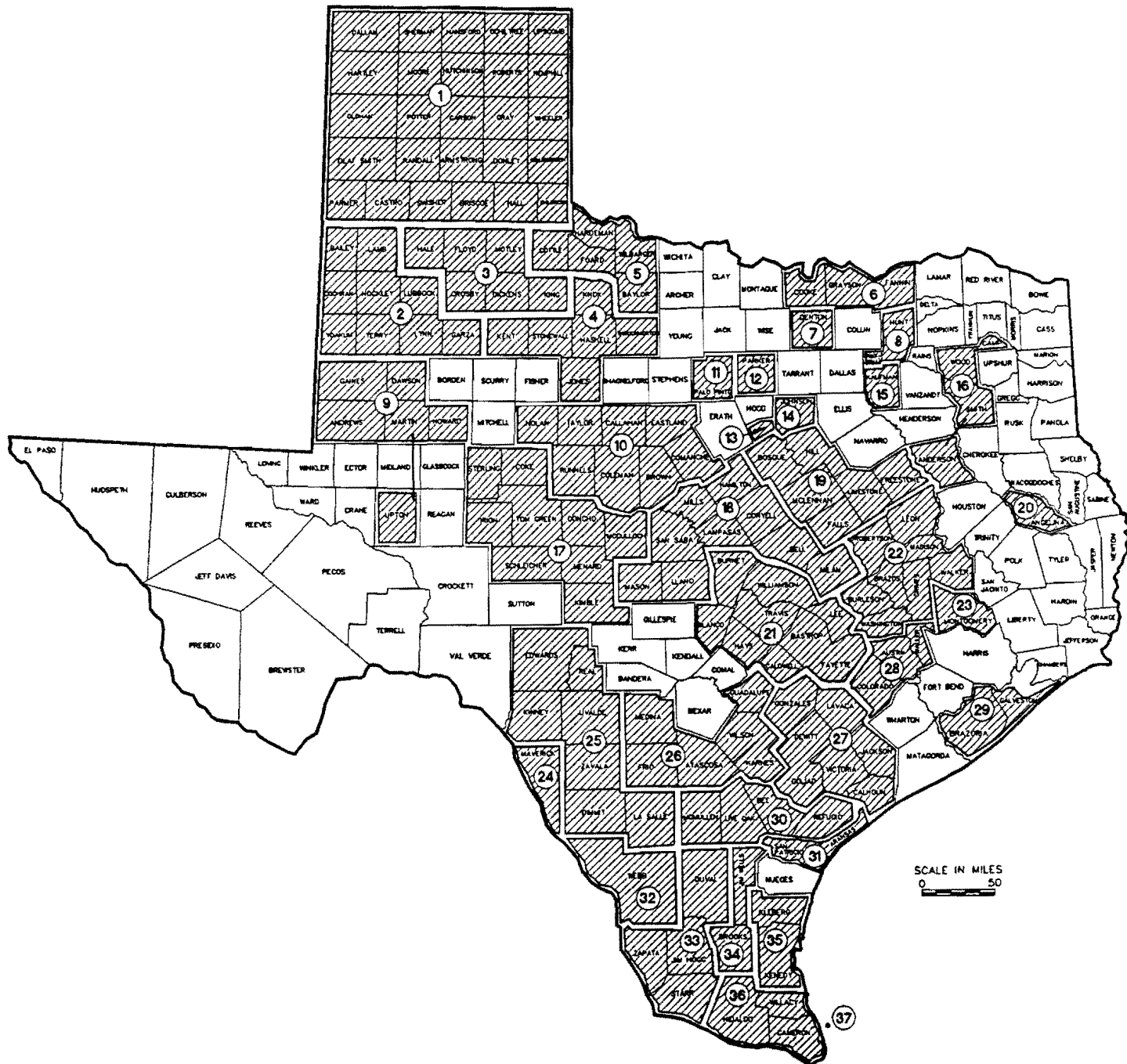


Figure 1. Section 18 Contractor Locations in Texas.

CHAPTER 2

FUND ALLOCATION FACTORS AND PERFORMANCE MEASURES USED BY THE STATE OF TEXAS

Fund Allocation

The Texas State Department of Highways and Public Transportation (TSDHPT) is responsible for the allocation of Urban Mass Transportation Administration's Section 18 funds to eligible recipients. The Department distributes Section 18 funds using an allocation formula. An annual funding base and upper limit based on a percentage of the previous year's expenditures is set as high as feasible given available funding. A typical base may be 95% of the previous year's allocation while the cap may be set at 110%. In 1990, the base was set at 100% of each agency's previous year's allocation while the cap was set at 110%. For the 1991 fiscal year the base will be 105% and the cap will be 110%.

The formula-based allocation method is intended to ensure a fair and relatively stable distribution of funds, while producing an incentive for better performance. The formula contains two demographic factors and three performance indicators with equal weight given to all five components. The performance data used in the formula are now provided by each agency in their quarterly reports. This section will summarize each of the factors used for fund allocation and discuss the rationale behind their use.

Summary of Existing Fund Allocation Factors

The five factors included in the fund allocation formula are non-urbanized population, service area size, revenue recovery ratio, cost per vehicle-mile, and passenger trips per capita. Each of these factors either rewards an agency for certain behaviors or compensates the agency for certain demographic conditions. Table 3 lists the conditions or behaviors which are rewarded by each factor.

Table 3. Rewards of the Fund Allocation Formula

Fund Allocation Factor	Condition or Behavior Rewarded
<p>Non-Urbanized Population</p> <p>Service Area Size</p> <p>Revenue Recovery Ratio</p> <p>Cost per Vehicle-Mile</p> <p>Passenger Trips per Capita</p>	<p>Potential for passengers</p> <p>Dispersion of potential passengers</p> <p>Offsetting expenses with fares</p> <p>Operating efficiency</p> <p>Service utilization</p>

The fund allocation formula is intended to provide incentive for the agencies to improve their performance. This is to be accomplished by rewarding behaviors the Public Transportation Division feels should be encouraged. It can be seen from Table 3 that each of the factors rewards different behaviors or conditions. It would not be as efficient if the same behavior or condition was rewarded or covered in more than one factor.

Non-Urbanized Population

The rural population of the service area is used as a demographic comparison for Section 18 agencies. The non-urbanized population for each contractor’s authorized service area is calculated using census figures available from the state data center (5). The urbanized population of the service area is subtracted from the total population of the county(s) within which the agency provides service to estimate the rural population.

The population of transit dependent groups may be a more important measure of the need for public transportation, but the differential impact of using service area population instead is considered negligible by TSDHPT. The Section 18 program was established as a general public service for non-urbanized areas. The objective of each agency should include service to all rural residents who request transportation.

The manner in which non-urbanized population is determined may underestimate the actual service area population of agencies located in or near urbanized regions, and may overestimate the population of agencies that do not provide service to all areas of the

counties in which they operate. An underestimate of population would result in a lower allocation of funds based on the population factor.

Non-urbanized population is also used in the passenger trips per capita factor for fund allocation. Since non-urbanized population is the denominator of the trips per capita factor, the overall negative affect of a possible misrepresentation of the true service area population is reduced; an agency whose population is underestimated would receive a higher allocation of funds based on the passenger trips per capita factor. Systems with large populations and a high passenger trips per capita factor are rewarded for their performance.

Service Area Size

Service area size (square miles) is also a demographic factor. Although service area size, like population, does not indicate performance, the factor is required in order to consider contractors who serve populations dispersed throughout a large geographical area. A large service area influences most performance indicators since additional vehicle-miles are required to reach passengers. Cost per mile, vehicle, and trip may be higher and passengers per mile may be lower for one transit agency when its service area is significantly larger than another agency's if they have similar populations and demand for service.

The service area of an agency is considered to be the counties in which it operates. This may overestimate an agency's actual service area if it does not provide service to all areas of the counties. On the other hand, many operators travel outside their "home" counties.

Revenue Recovery Ratio

The revenue recovery ratio (revenue per expense) is an indicator of both cost efficiency and cost effectiveness since it reflects how efficiently service is being provided and how effectively it is being consumed. The ratio is now based on data collected on the quarterly reports. Revenue includes income received by the operator either from or for

passengers (e.g. fares, donations). Expenses include costs incurred to administrate and operate the transit system (e.g. salaries, fuel/oil, maintenance, supplies, insurance). Capital costs for vehicles are not included in this indicator.

The revenue recovery ratio is influenced by several factors. The factors listed below have some impact on the income and expense from which the indicator is derived.

- Fare policy
- Special fares
- Ridership
- Policy decisions

The revenue recovery ratio rewards agencies that collect on-board fares and donations. Private donations and contributions made by the local governments directly to the agencies are not included. If these local share revenues were included in the revenue recovery ratio, the agencies that receive support from the local community would also be rewarded. Many of the Section 18 agencies are supported by their local city governments, a council of governments, or private enterprise. This type of local support is beneficial and should be encouraged. The addition of these revenues to the quarterly reports for inclusion in the revenue recovery ratio would encourage the agencies to utilize all sources of local revenue.

Cost per Vehicle-Mile

Cost per mile is a measure of cost efficiency. It indicates how efficiently the transit agency is providing service. Cost includes all administrative and operating expenses excluding capital costs for vehicles. Vehicle-miles is the mileage incurred by all revenue vehicles during the reporting period including non-service mileage (e.g., "dead head" and travel to and from a storage facility). Charter service mileage is not included in the factor.

The following factors influence the cost per vehicle-mile indicator.

- Vehicle-miles
- Non-service mileage
- Administrative and operating cost
- Frequency of service
- System size
- Service area size

Passenger Trips per Capita for the Service Area

Passenger trips per capita is an indicator of system effectiveness and service utilization. It exhibits how well or poorly the service area population is being served by the public transit agency. Passenger trips is the total number of passengers using the transit system during the reporting period. Each time a person boards a service vehicle it is considered a passenger trip. This definition, therefore, counts transferring passengers as new riders, which may overstate the actual number of trips served. This is not a significant problem in non-urbanized areas; transit service does not usually involve many transferring riders. Service area population is the non-urbanized population for the counties which a contractor serves. It is calculated using census data available from the state data center (5).

A low value for this factor may indicate poor performance, a lack of demand for the service provided, or that the service has not been marketed to the potential client population. A low factor may also indicate that there is a demand for service, but only from a small segment of the population.

Passenger trips per service area population is influenced by the following factors.

- Service area population density
- Passenger trips
- Service quality

- Transit demand
- Marketing program
- System size
- Service frequency

Base Level of Funding

In order to maintain a relatively stable distribution of funds, a funding base and upper limit is set based on a percentage of the previous year's allocation. In 1990, the base was set at 100% of each agency's previous year's allocation, while for the 1991 fiscal year the base will be 105%. Whether or not the fund allocation formula can produce an incentive to improve performance when each agency receives at least as much money as it did previously, is questionable. With the base set at 105% even poor performers receive a 5% raise in allocation.

Performance Evaluation

TSDHPT uses several performance measures to monitor each contractor's efficiency and effectiveness. Data submitted on the quarterly operation reports are compiled in statewide totals, and then TSDHPT determines standard statistical ranges for the following performance indicators.

- Cost per vehicle-mile (cost efficiency)
- Cost per passenger trip (cost effectiveness)
- Passenger trips per vehicle-mile (service utilization)

The ranges are used as an ongoing measure of each contractor's relative efficiency and effectiveness and as part of the evaluation criteria for new grant applications (5).

The Texas Legislature enacted House Bill 1263 on September 1, 1989 which requires transit providers that receive state funds in Texas report the additional performance indicators listed below.

- Operating cost per passenger trip
- Operating cost per revenue-mile
- Fare recovery rate
- Average vehicle occupancy
- On-time performance
- Number of accidents per 100,000 vehicle-miles
- Number of vehicle-miles between mechanical road calls.

Fare recovery rate, also known as revenue recovery ratio, is an indicator of cost efficiency and effectiveness. The ratio is used in the fund allocation formula for Section 18 contractors. It is now available from the quarterly reports and could be used for performance evaluation in the future.

Average vehicle occupancy and on-time performance are measures of service utilization and service quality. They are, however, better suited for large fixed-route transit agencies than rural demand-responsive transit providers. The collection of this data may be difficult for Section 18 contractors due to the nature of their service and limited staff size.

The number of accidents per 100,000 vehicle-miles is a performance indicator for the measure of service safety. Number of vehicle-miles between road calls indicates service quality. When a full year of data for these performance measures are available they may be used for the evaluation of transit agencies.

Service safety and service quality are important measures of performance. It should be noted, however, that accidents and breakdowns are random events which cannot be entirely controlled by the transit agency's administration. Driver training courses and proper

maintenance procedures may reduce the probability of an accident or breakdown, but occasional incidents will occur. If only a few agencies experience an incident, their relative performance would appear poor. Service safety and service quality are good measures of performance and should be monitored on a regular basis for evaluation and comparison purposes. If an agency experiences a significant number of incidents corrective actions should be taken.

CHAPTER 3

USE OF PERFORMANCE MEASURES BY STATE AND RURAL TRANSIT ADMINISTRATORS

The use of performance measures for transit service dates back to the 1950s (1). In 1958, the Commission on Urban Transportation published two manuals (6,7) on procedures for measuring transit service and establishing warrants for new services. These manuals were written primarily for administrators to use in monitoring transit operations.

The use of performance measures has increased in the past few decades due primarily to the predominance of public ownership and funding (1). The Federal Highway Administration's Rural Public Transportation Demonstration Program (Section 147), the Urban Mass Transportation Administration's 16(b)2 Program, and UMTA's Public Transportation for Non-Urbanized Areas Program (Section 18) have all stimulated growth in rural transit service (3).

The current use of transit performance standards and guidelines by other state transportation agencies is important for comparison to Texas procedures. The use of performance and demographic data by the Texas State Department of Highways and Public Transportation for fund allocation and performance measurement was discussed in a previous chapter of this report.

Use of Performance Indicators in Other States

A total of 15 states including Texas were contacted regarding their use of transit performance measures. The extent to which transit performance indicators are used by the states contacted in this study is indicated in Table 4. A discussion of each states individual use of performance measures is included in Appendix A.

Table 4. Summary of State Funding Formula and Performance Evaluation Variables

DEMOGRAPHIC FACTORS	<u>TX</u>	<u>FL</u>	<u>GA</u>	<u>IN</u>	<u>IA</u>	<u>LA</u>	<u>MI</u>	<u>MN</u>	<u>MT</u>	<u>NY</u>	<u>NC</u>	<u>OH</u>	<u>OK</u>	<u>OR</u>	<u>PA</u>	
Population	F	F	-	-	-	-	-	-	F	-	F	-	-	F	-	
Service Area	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
SERVICE DESCRIPTORS																
Passenger Trips	-	-	-	-	P	F	-	-	F	-	-	-	P	F	-	
Miles ¹	-	-	-	-	P	F	-	-	-	-	-	-	P	F	-	
Net Public Debt	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-	
PERFORMANCE MEASURES																
<u>Cost Efficiency</u>																
Revenue Recovery Ratio	F	-	-	F	-	-	-	-	-	-	P	-	-	-	P	
Derived Income	-	-	-	-	-	-	-	-	F	-	-	-	-	-	-	
Cost per Mile	F	-	P ²	-	-	-	-	-	-	-	-	P	P	-	P	
Cost per Hour	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-	
<u>Cost Effectiveness</u>																
Cost per Passenger	P	-	-	-	-	-	-	-	-	-	P	P	P	-	P	
<u>Service Utilization</u>																
Passengers per Capita	F	-	-	F	-	-	-	-	-	-	-	-	-	-	-	
Passengers per Mile	P	-	-	F	-	-	-	-	-	-	P ³	P	-	-	P	
Passengers per Hour	-	-	-	-	-	-	-	-	-	-	P ³	P	-	-	-	
<u>Vehicle Utilization</u>																
Miles per Vehicle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<u>Quality</u>																
Average Speed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vehicle-Miles per Road Call	P ⁴	-	-	-	-	-	-	-	-	-	-	P	-	-	-	
<u>Safety</u>																
Accidents per 100,000 Miles	P ⁴	-	-	-	-	-	-	-	-	-	-	P	-	-	-	
<u>Labor Productivity</u>																
Miles per Employee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Passengers per Employee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<u>Accessibility</u>																
Vehicle-Miles per Capita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Vehicle-Miles per Service Area Size	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

F - Used in a fund allocation formula

P - Used for performance evaluation

1 - Vehicle, Revenue, and/or Passenger Miles

2 - The Georgia DOT sets a cap on cost per vehicle-mile which transit providers must not exceed if state funding is received.

3 - North Carolina's Public Transportation Division requires that each transit route meet a baseline of 1.5 passengers per mile and 10 passengers per hour.

4 - Texas is now collecting accident and breakdown rates which can be used for measures of service quality and safety.

Some of the states contacted are required by legislative mandate to use performance measures for evaluation or fund allocation. Other states, however, use performance measures on a discretionary basis. The Indiana Legislature gave the Indiana Department of Transportation (INDOT) the authority to establish a fund allocation methodology. In response, INDOT implemented a performance-based allocation formula. The distribution of funds in North Carolina is also discretionary. The North Carolina Department of Transportation's Public Transportation Division uses a population-based allocation formula.

The states that use performance measures typically rely on cost efficiency, cost effectiveness, and service utilization, along with some service descriptors. Performance measures of vehicle utilization, labor productivity, and accessibility are not currently used by any of the states contacted. Ohio is the only state which currently uses measures of service quality and safety. Texas transit agencies are now required by the Legislature to collect accident and breakdown rates which may be used as measures of service quality and safety when a complete year of data is compiled.

Some of the states contacted do not have a pre-set procedure or guideline for rural transit system evaluation and comparison. Michigan, for example, determines which performance indicators are important and which transit providers should be used for comparison depending on the objective of the evaluation. Table 4, therefore, may not credit each state with all of the indicators they may use for evaluation. It should also be noted that individual transit agencies may monitor their own performance and set their own goals and standards without guidelines from their State's DOT.

Fund Allocation

Each state's allocation procedure varies according to administrative objectives, available funds, available transit data, and commitment to the program. Some states have an allocation formula which is used to determine each transit agency's grant based on several demographic factors, service descriptors, and performance measures. There are several very important differences between demographic factors, service descriptors, and

performance measures which were discussed in Chapter 1 of this report. All three elements are necessary to fairly compare transit services.

Only four states contacted (Texas, Louisiana, Montana, and Indiana) currently use performance-based fund allocation methods. Oregon discontinued using a formula due to dramatic shifts in passenger and mileage values. Michigan has an incentive bonus program to encourage transit providers to improve performance.

The purpose of any performance-based allocation procedure should be to give agencies of all sizes incentive to improve performance. The degree to which each state achieves this goal, however, is uncertain. Montana's formula, for example, does not consider cost effectiveness or service utilization. Louisiana's formula uses two service descriptors (passenger trips and vehicle-miles) but does not use any performance indicators. The allocation method used in Texas, on the other hand, uses 3 performance indicators as well as 2 demographic factors in order to distribute funds to rural transit agencies.

Peer Grouping

The use of peer groups for service comparison may be necessary if transit agencies have significantly different operations or service area characteristics. Transit providers should be compared to similar agencies. However, administrators should be careful in the determination of peer groups and what constitutes a "similar" agency. Simply dividing agencies into operation groups (fixed-route, demand-responsive, etc.) may not provide fair comparisons since demographic and service characteristics may vary within these groups. Service area size, population characteristics, and service objectives may also be required in order to evaluate or compare an agency.

CHAPTER 4

METHODOLOGY FOR COMPARISON OF NON-URBANIZED TRANSIT SYSTEMS

This chapter discusses the procedures developed in this research project to compare the non-urbanized Section 18 transit agencies in Texas. Data collection, performance measurement, standardized scores, and peer grouping are explained in the following sections. The transit system profiles developed for the comparison of similar agencies are presented in Chapter 5.

Source of Data

In 1988 and 1989, the TSDHPT collected data from service providers in two forms. The providers were required to submit both quarterly reports and semi-annual survey reports. The latter of these were submitted in March and September and contained only information from these months. Included in the semi-annual survey reports are the following:

- Operating expense by category
- Administrative expense by category
- Income from all sources
- Ridership by passenger type
- Number of vehicles
- Vehicle-miles

In comparison, the quarterly reports are comprised of less detailed information. Included in these reports are:

- Number of vehicles
- Fares received (beginning in 4th quarter of 1989)
- Passenger trips

- Total vehicle-miles
- Total expenses
- Cost per trip
- Cost per mile
- Passengers per mile

When combined, the quarterly reports represent an entire year of data.

The Public Transportation Division provided the Texas Transportation Institute with quarterly reports collected in 1988 and 1989. The data were condensed and analyzed to determine which service descriptors could be utilized for performance evaluation and comparison.

Data availability was a problem with the 1988 and 1989 quarterly reports. Two transit providers failed to submit a quarterly report in 1988 and 12 contractors failed to submit one or more 1989 quarterly reports. It would seem to be unreasonable to compare the performance of the 36 agencies when one-third of the contractors have incomplete data.

Although it would be advantageous to evaluate each agency's change in performance over time, two years of data is insufficient to indicate a trend. The agencies can be compared to their peers and eventually to their performance in previous years. Guidelines for the preparation and interpretation of trend data are presented, and illustrations with performance data are included in this document.

Performance Measures

The seven performance measures which have been identified for this report are cost efficiency, cost effectiveness, service utilization, vehicle utilization, quality of service, labor productivity, and accessibility. Each type of performance measure should be analyzed to evaluate the performance of a transit provider in all areas of service.

The indicators used to represent each performance measure are listed in Table 5. The indicators were chosen based on data availability and how well they represent the performance measure. Only data which is either currently available or required by Texas legislative mandate were used. The data appears to be adequate for performance evaluation; additional collection for this purpose is not considered warranted.

Quality of service and labor productivity are not represented by an indicator due to insufficient data collection in 1988 and 1989. Effective September 1, 1989, Texas House Bill 1263 requires recipients of public transportation funds to collect data concerning the number of accidents per 100,000 vehicle-miles and the total miles between mechanical breakdowns. When these data are available, they will indicate the safety and quality of transit service and should be monitored on a regular basis for evaluation and comparison purposes.

Table 5. Performance Indicators Used in this Study

Performance Measure	Performance Indicators
Cost Efficiency	Total vehicle-miles per total expenses
Cost Effectiveness	Passenger trips per total expenses
Service Utilization/Effectiveness	Passenger trips per total vehicle-miles
Vehicle Utilization/Efficiency	Total vehicle-miles per vehicle
Quality of Service	Accident rate per 100,000 vehicle-miles ¹
	Mechanical break down rate ¹
Labor Productivity	Passenger trips per employee ²
Accessibility	Total vehicle-miles per capita

¹ Not available in 1988 or 1989. Will be available in future years.

² Plans to collect this data for rural Texas transit operators are not currently being considered.

Cost Efficiency

Total vehicle-miles per total expense measures the amount of output for each dollar of expense. It is the inverse of the more familiar cost per vehicle-mile. The inverted form provides for better graphic presentation and comparison. When a system's performance improves, the value for the indicator increases.

Cost per service vehicle was considered for use as an indicator of cost efficiency. However, vehicle-miles per expense is more descriptive as an indicator of amount of output

per cost. Total cost per vehicle-mile is also used in the current Section 18 funding allocation formula. Legislative mandate through Texas House Bill 1263 requires that all service providers receiving federal funding must report operating cost per revenue-mile. Cost per hour is also an indicator of cost efficiency, but is not currently available because hours of operation are not included in the quarterly report.

Cost Effectiveness

Passenger trips per total expense indicates the number of passengers which are served per dollar of expense. It is the inverse of cost per passenger trip. The inverted form is used for graphic presentation and comparison. Cost per passenger trip is dependent upon the length of the trip as well as the ridership. This may bias the factor against agencies who operate in counties with a dispersed population.

Revenue recovery ratio (revenue per expense) also indicates cost effectiveness. Revenue data were included on the quarterly report forms beginning in 1989. Revenue recovery ratio could be used in future evaluations of transit service, and is being used in the fund allocation formula.

Cost per passenger trip was used as an illustration of cost effectiveness in this report. In the future, revenue recovery ratio should be as illustrative as cost per passenger trip and will be required for purposes other than performance measures. All Section 18 contractors are now required by Texas House Bill 1263 to report both operating cost per passenger and revenue recovery ratio.

Service Utilization/Effectiveness

Passenger trips per vehicle-mile indicates the extent to which transit service is utilized by transit system patrons. Service utilization may also be represented by passenger trips per capita and passenger trips per hour.

Passenger trips per vehicle-mile is used in this study because it is more representative of service utilization for non-urbanized transit agencies than passenger trips per capita. This is due to problems in the current procedure used to determine the non-urbanized service area population. The current funding allocation formula includes passenger trips per service area population.

Vehicle Utilization/Efficiency

Total miles per vehicle indicates the extent to which each transit vehicle is being utilized. The transit service provided is summarized by the number of miles traveled annually per vehicle. A high value may not indicate superior performance. It may be indicative of an agency with fewer vehicles than is desirable for the amount of passengers carried or area served.

Accessibility

Accessibility is the measure of how available transit service is to the service area population. Accessibility can be indicated by vehicle-miles per capita or vehicle-miles per square mile of service area. Both indicators utilize a demographic factor (e.g., population or service area) to determine accessibility.

Vehicle-miles per capita was used in this analysis rather than vehicle-miles per square mile of service area. This indicator better reflects an agency's performance, because the service area populations have been adjusted by the Public Transportation Division to reflect only non-urbanized areas. Service area size, on the other hand, includes any urbanized area within the agency's jurisdiction. For this reason, vehicle-miles per capita was chosen as the performance indicator to measure accessibility in this report.

Standardized Scores

Comparison between a group of similar agencies requires that an average performance be estimated. An individual agency's performance can then be compared with the average performance of the group. The agency can determine if it is performing above or below average, but it may be difficult to determine if its performance is significantly higher or lower than average. Eventually, levels of desirable performance indicators could be established, but enough data are not currently available for such an analysis.

A standardized score can be calculated to determine how many standard deviations the performance of an agency is above or below the mean. A standard score is calculated by subtracting the peer group average (sample mean) from the agency's indicator value and dividing by the peer group sample standard deviation for a particular indicator. (Eq. 1).

$$\text{Standard Score} = \frac{\text{Agency Value} - \text{Peer Group Mean}}{\text{Peer Group Standard Deviation}} \quad (\text{Eq. 1})$$

A standard score of zero represents the mean of the peer group for any performance indicator. A standard score above zero represents above average performance for the system. A very strong performance exists when an agency's standard score is greater than one standard deviation above the mean. A negative standard score indicates comparatively poor (but perhaps explainable) performance.

Determination of Peer Groups

The advantage of using peer groups for the evaluation of more than one agency is that fewer inappropriate comparisons may be made. A comparison of two or more transit agencies would not seem to be as useful if the agencies were not similar in size and service characteristics. It would not appear appropriate to compare the City of Eagle Pass, which operates only two vehicles to provide transportation for medical and social services, to a large agency such as Capital Area Rural Transit (Austin), which covers nine counties and

operates 66 vehicles. The use of peer groups, however, does have several disadvantages as listed below.

- Additional work for evaluation and fund allocation
- Reduced size of comparison group
- Peer groups may change annually

Several possible factors which might produce relevant peer groups were identified. Demographic factors (service area population, service area size, and service area population density) were used as possible peer group indicators due to their availability and use in the current fund allocation procedure. In addition, service descriptors (total vehicle-miles, passenger trips, and number of service vehicles) could also be used.

Dividing the agencies using population would seem to eliminate the advantage that operators in relatively large rural population areas would have in comparisons dependent upon high ridership. Using service area size as a peer group determinant would possibly reduce the negative appearance of high vehicle mileage for operators in large counties, particularly in West Texas and the Trans-Pecos area. The use of population density to group similar agencies could balance the inequity between agencies that operate in sparsely developed rural areas and those that provide service in somewhat more populated areas.

Grouping agencies by total vehicle-miles would tend to lessen the possibility of an unfair comparison of agencies which provide more specialized services, such as transporting one or two passengers per week to a distant hospital. The use of passenger trips as a peer grouping indicator tends to ignore any relation to average trip length. Using the previous example, agencies which transport a few passengers to a distant location could be grouped unfairly with agencies which simply have low ridership. Using service fleet size (number of vehicles) would group providers of like size with one another, but could also ignore important factors such as population density.

Evaluation of contractors was also performed without peer groups as a means of determining the desirability of using peer grouping to enhance the comparisons.

Analysis of Peer Group Identifiers

An analysis was performed to determine which peer identifier(s) would be the most useful for grouping purposes. The analysis procedure is summarized below.

Step 1

Before any standardized scores were calculated, peer identifiers were compared to performance indicators to determine if any relationship between them exists. For instance, vehicle utilization (vehicle-miles per vehicle) is probably not related to the population of the service area. For this reason, it would not be appropriate to use service area population as a peer identifier for vehicle utilization even if the standard scores appeared to be reasonable for that particular indicator.

Step 2

Standard scores for each performance indicator were calculated in all possible peer groups, and all in one group, to determine if any peer identifier produced a considerable number of outliers. An outlier is a value which deviates from the sample mean to such an extent that it would be statistically improbable. For example, a contractor's standard score of 2.5 for one indicator (assuming a normal distribution) would imply that the agency performed better than 99.4 percent of the other contractors in the same peer group. One agency with such a score would not be considered outside expected values. The presence of two outliers is less desirable, but not unacceptable. However, the presence of three or more outliers would give cause to question whether or not the peer identifier being considered is effectively grouping similar agencies. The tables used for this procedure are located in Appendix B.

Step 3

Outliers, however, may cause the appearance that one contractor is outstanding in a peer group while the rest are performing poorly. Peer group indicators which produced the greatest number of deviant standard scores for each performance measure relative to the other groups, or the highest occurrence of outliers, were dropped from further consideration. The scores calculated using all agencies in one group did not differ significantly from those calculated in peer groups. These tables can be found in Appendix B.

The results of this analysis indicate that the use of peer groups for the Section 18 contractors is not necessary at this time. Of the possible peer group identifiers, however, fleet size appears to be the best alternative if peer grouping is desired.

CHAPTER 5

TRANSIT SYSTEM COMPARISON

This chapter presents the standard scores calculated for the Texas Section 18 transit systems in 1988. The performance of the agencies was compared in the following five areas.

- Cost Effectiveness
- Cost Efficiency
- Service Utilization
- Vehicle Utilization
- Accessibility

Tables 6 and 7 present the performance indicator values calculated for each performance measure for 1988 and 1989, respectively. The standard score for each agency's performance is also shown in Tables 6 and 7. The standard score compares the agency's performance to the mean performance of the peer group. Each standard score represents the number of standard deviations the value is away from the mean.

A standard score of zero represents the mean performance of the peer group. Therefore, a positive standard score represents above average performance and a negative standard score represents below average performance. In general, a positive score greater than one standard deviation above the mean indicates a strong performance. A negative score indicates comparatively poor (although perhaps explainable) performance.

It should be noted that a negative score does not necessarily mean that an agency is performing poorly relative to the goals and objectives of that agency. It is possible that the agency is performing well (meeting its goals and objectives), but is still performing below the mean of its peer group. Likewise, it is also possible that an agency with a positive score is performing poorly, but has performance indicator values better than the mean of the peer

group. A strong performance is, therefore, considered to be greater than one standard deviation above the mean.

When several years of data are available, it will be possible to evaluate each agency's trend in performance. This trend is an important measure of performance. An agency whose performance improves due to the effort of its administration should be commended for its improvement. An agency whose performance is better than average, but is declining, should evaluate its service and attempt to improve.

It is important that all of the performance measures and their indicators be examined before a conclusion or corrective action is made to improve the overall performance. There are certain relationships between the performance measures which must be considered when evaluating an agency. Each performance measure and indicator is influenced by several common factors (e.g., vehicle-miles). For example, if an agency travels more miles, its total expense will increase. This may increase the cost per passenger trip (if passenger trips do not significantly increase) and decrease the agency's cost effectiveness. The agency's cost efficiency, however, may actually increase since its total expense may increase in a smaller proportion than its total vehicle-miles. The additional vehicle-miles will also decrease its measure of service utilization (passenger trips per vehicle-mile) and increase its measure of vehicle utilization (vehicle-miles per service vehicle).

The following sections of this chapter graphically present the five performance measures. Each agency's performance is displayed separately in Appendix C.

Table 6. 1988 Performance Indicator Values and Standard Scores

Contractor Location	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Alice	0.15	-0.47	0.83	0.25	0.18	-0.60	23,034	0.63	4.87	-0.28
Amarillo	0.04	-1.58	0.90	0.50	0.04	-1.36	29,991	1.50	2.13	-0.42
Aspermont	0.05	-1.48	0.77	0.01	0.07	-1.25	17,430	-0.08	5.03	-0.27
Austin	0.17	-0.34	0.76	-0.03	0.22	-0.41	18,513	0.05	9.34	-0.06
Beeville	0.21	0.13	0.58	-0.68	0.37	0.40	15,533	-0.32	4.35	-0.31
Bryan	0.20	0.03	0.78	0.06	0.26	-0.18	20,878	0.35	6.19	-0.22
Cleburne	0.11	-0.89	0.43	-1.23	0.26	-0.21	13,851	-0.53	0.61	-0.50
Columbus	0.12	-0.80	0.60	-0.60	0.20	-0.53	18,768	0.09	9.09	-0.07
Conroe	0.47	2.59	0.68	-0.30	0.68	2.09	23,074	0.63	3.18	-0.37
Crosbyton	0.14	-0.58	0.93	0.62	0.15	-0.78	13,819	-0.54	7.82	-0.13
Crowell	0.27	0.71	0.34	-1.56	0.80	2.76	5,984	-1.53	1.50	-0.45
Denison	0.15	-0.54	0.67	-0.37	0.22	-0.41	14,789	-0.42	6.00	-0.23
Denton	0.16	-0.44	0.81	0.17	0.19	-0.55	21,273	0.40	0.94	-0.48
Galveston	0.25	0.50	1.32	2.02	0.19	-0.56	22,666	0.58	102.00	4.66
Glen Rose	0.12	-0.81	0.82	0.20	0.15	-0.82	22,476	0.55	34.12	1.21
Greenville *										
Kingsville	0.20	-0.06	0.62	-0.53	0.31	0.10	10,595	-0.95	3.46	-0.35
Lamesa	0.19	-0.13	0.38	-1.41	0.49	1.06	8,790	-1.17	1.82	-0.44
Laredo	0.11	-0.88	0.49	-1.02	0.23	-0.36	14,203	-0.49	20.22	0.50
Levelland	0.09	-1.10	0.56	-0.77	0.16	-0.73	16,647	-0.18	3.69	-0.34
Lufkin	0.32	1.20	0.69	-0.28	0.47	0.94	23,944	0.74	3.15	-0.37
McAllen	0.43	2.25	1.37	2.22	0.31	0.11	33,164	1.90	47.19	1.87
Mincral Wells	0.25	0.48	1.16	1.44	0.22	-0.43	25,928	0.99	6.97	-0.18
Rio Grande City	0.33	1.22	0.76	-0.01	0.43	0.71	10,449	-0.96	3.43	-0.36
San Angelo	0.25	0.44	0.40	-1.33	0.61	1.72	5,440	-1.60	2.20	-0.42
San Antonio *										
San Saba	0.23	0.29	0.56	-0.76	0.41	0.65	9,969	-1.02	4.92	-0.28
Sinton	0.14	-0.57	0.65	-0.42	0.22	-0.40	37,653	2.47	2.45	-0.41
Sweetwater	0.30	0.99	0.52	-0.90	0.58	1.55	12,867	-0.66	0.89	-0.49
Terrell	0.31	1.04	1.20	1.61	0.26	-0.22	9,488	-1.09	11.93	0.08
Uvalde	0.13	-0.75	1.03	0.98	0.12	-0.95	13,485	-0.58	4.82	-0.29
Victoria	0.25	0.50	1.06	1.09	0.24	-0.31	15,464	-0.33	3.80	-0.34
Waco *										
Weatherford	0.11	-0.93	1.05	1.05	0.10	-1.05	30,389	1.55	5.08	-0.27
Average	0.20		0.77		0.30		18,082		10.43	
Std. Deviation	0.10		0.27		0.18		7,918		19.63	

* New System in 1989, No 1988 Data.

Table 7. 1989 Performance Indicator Values and Standard Scores

Contractor Location	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Alice	0.21	0.01	1.05	0.47	0.20	-0.54	24,436	1.02	6.72	-0.15
Amarillo	0.03	-1.48	0.66	-0.35	0.05	-1.59	23,547	0.90	2.38	-0.46
Aspermont	0.05	-1.36	0.79	-0.08	0.06	-1.52	17,877	0.15	5.68	-0.22
Austin	0.17	-0.31	0.72	-0.22	0.24	-0.28	19,580	0.38	9.28	0.04
Beeville	0.19	-0.15	0.47	-0.76	0.41	0.93	12,438	-0.57	4.02	-0.34
Bryan	0.13	-0.64	0.48	-0.73	0.27	-0.01	16,725	-0.00	3.23	-0.40
Cleburne	0.15	-0.51	0.56	-0.57	0.26	-0.08	14,305	-0.32	0.63	-0.59
Columbus	0.12	-0.73	0.83	0.01	0.15	-0.91	16,088	-0.08	1.56	-0.52
Conroe	0.29	0.69	0.45	-0.80	0.64	2.59	26,031	1.23	2.61	-0.44
Crosbyton	0.11	-0.83	0.69	-0.29	0.16	-0.81	11,672	-0.67	7.23	-0.11
Crowell	0.24	0.27	0.44	-0.83	0.55	1.92	14,390	-0.31	3.15	-0.40
Denison	0.16	-0.44	0.70	-0.26	0.22	-0.39	13,967	-0.36	5.67	-0.22
Denton	0.15	-0.53	0.81	-0.04	0.18	-0.68	22,027	0.70	1.16	-0.55
Galveston	0.21	-0.00	0.78	-0.10	0.26	-0.08	16,059	-0.09	56.21	3.41
Glen Rose	0.09	-0.99	0.79	-0.07	0.12	-1.14	24,893	1.08	43.18	2.48
Greenville	0.55	2.98	2.95	4.52	0.19	-0.62	6,569	-1.34	0.48	-0.60
Kingsville	0.16	-0.39	0.51	-0.68	0.32	0.31	7,541	-1.21	1.79	-0.50
Lamesa	0.17	-0.29	0.42	-0.86	0.41	0.97	8,312	-1.11	2.00	-0.49
Laredo	0.25	0.38	0.84	0.02	0.30	0.19	19,826	0.41	44.35	2.56
Levelland	0.12	-0.78	0.91	0.19	0.13	-1.06	19,009	0.30	7.29	-0.11
Lufkin	0.34	1.13	0.79	-0.07	0.43	1.08	38,151	2.82	3.90	-0.35
McAllen	0.36	1.35	1.17	0.74	0.31	0.25	14,467	-0.30	35.29	1.91
Mineral Wells	0.23	0.23	0.96	0.29	0.24	-0.23	21,613	0.64	4.98	-0.27
Rio Grande City	0.27	0.54	0.60	-0.49	0.45	1.26	8,883	-1.03	3.21	-0.40
San Angelo	0.25	0.38	0.47	-0.76	0.54	1.85	6,411	-1.36	2.85	-0.43
San Antonio	0.33	1.04	1.40	1.23	0.23	-0.29	11,533	-0.69	0.88	-0.57
San Saba	0.23	0.20	0.58	-0.53	0.40	0.89	10,416	-0.83	4.91	-0.28
Sinton	0.14	-0.61	0.54	-0.61	0.25	-0.17	36,110	2.56	1.88	-0.50
Sweetwater	0.21	0.03	0.54	-0.60	0.39	0.80	11,573	-0.68	1.41	-0.53
Terrell	0.12	-0.76	0.63	-0.42	0.19	-0.61	14,134	-0.34	15.55	0.49
Uvalde	0.14	-0.59	0.98	0.32	0.14	-0.95	13,359	-0.44	5.23	-0.26
Victoria	0.22	0.15	0.93	0.23	0.24	-0.24	16,763	0.00	3.43	-0.38
Waco	0.54	2.88	1.72	1.90	0.32	0.29	7,432	-1.23	1.24	-0.54
Weatherford	0.11	-0.86	0.92	0.20	0.12	-1.13	22,660	0.78	4.92	-0.28
Average	0.21		0.83		0.28		16,729		8.77	
Std. Deviation	0.12		0.47		0.14		7,584		13.90	

COST EFFECTIVENESS

Cost effectiveness is the measure of cost per consumed unit. Passenger trips per total expense is an indicator of cost effectiveness and represents the number of passengers served per dollar of expense. The performance indicator used is the inverted form of the more familiar cost per passenger trip. The inverted form is used for graphical representation and ease of interpretation since a higher value indicates better performance.

Figures 2A, 2B, and 2C illustrate the cost effectiveness of the Section 18 contractors for 1988 and 1989. From these graphs it can be seen that the transit agencies located in Conroe, Greenville, Lufkin, McAllen, Rio Grande City, San Antonio, Terrell, and Waco all performed at least one standard deviation above the mean in 1988 and/or 1989. On the other hand, agencies in Amarillo, Aspermont, and Levelland performed at least one standard deviation below the mean in 1988 and/or 1989.

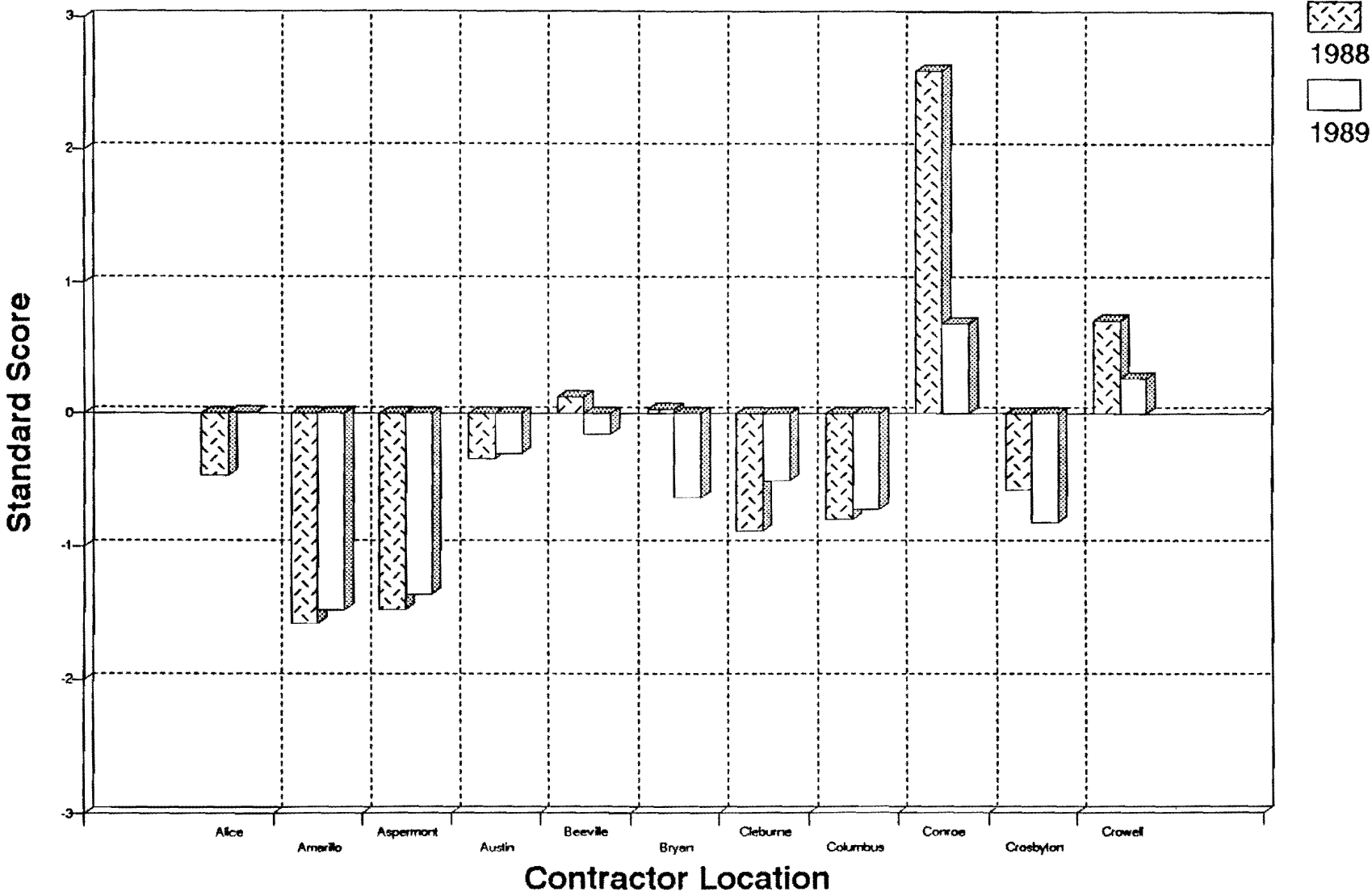
Eleven of the 31 agencies improved their standard scores between 1988 and 1989. All of these agencies had a negative score in 1988 possibly indicating improvements in performance among the systems with lower performance levels.

The cost effectiveness of a transit system may be influenced by factors such as service area size, number of passenger trips, transit demand, and service quality. Operating in a large, lightly populated service area might be more costly per passenger than operating in a small, dense area due to the expense of traveling additional miles for an equal number of passenger trips.

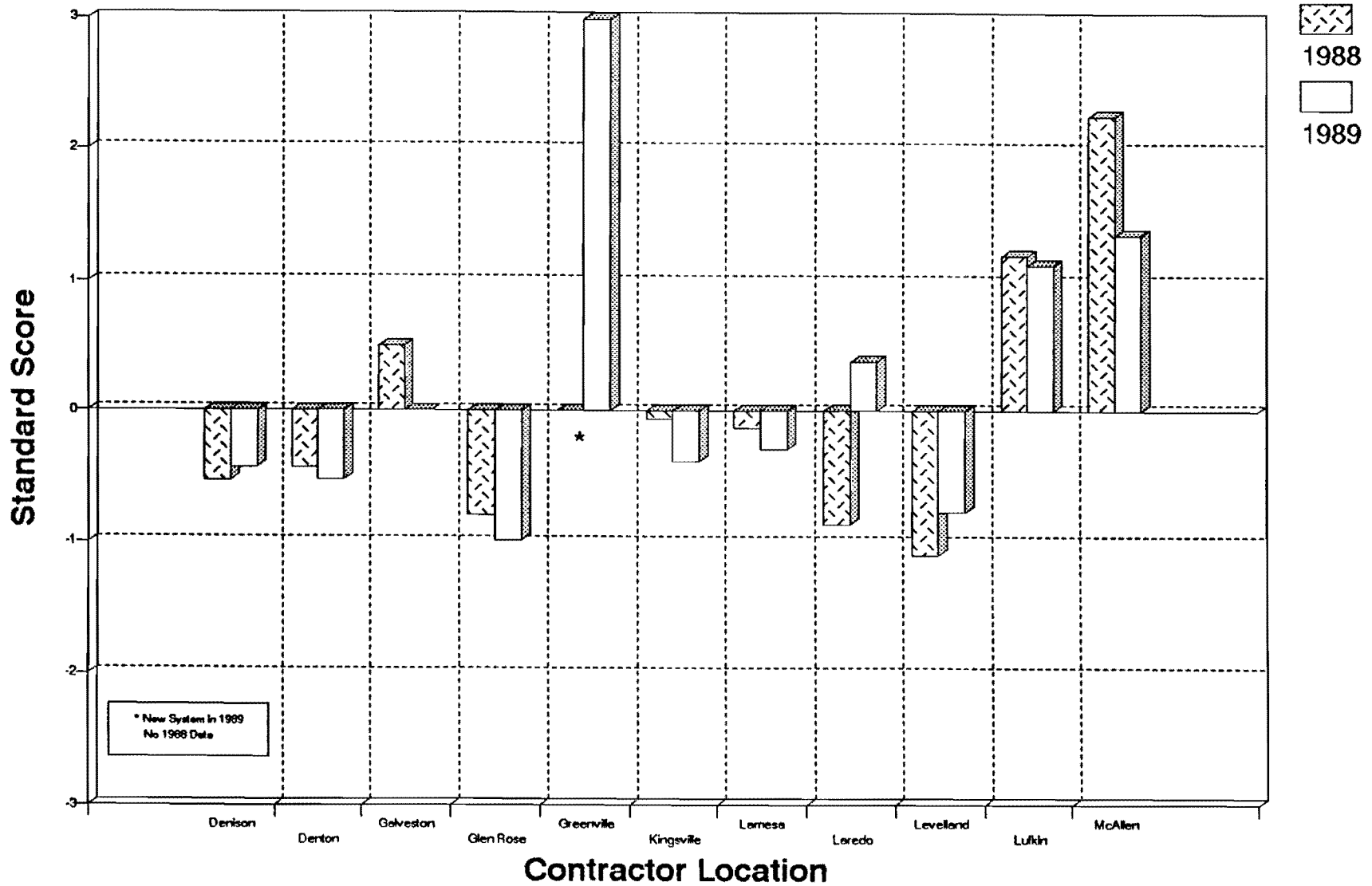
A low value for cost effectiveness may be caused by a high cost of providing service or by low utilization of service. A low number of passenger trips could increase the cost per passenger.

**Figure 2A - Cost Effectiveness
(Passenger Trips per Expense)**

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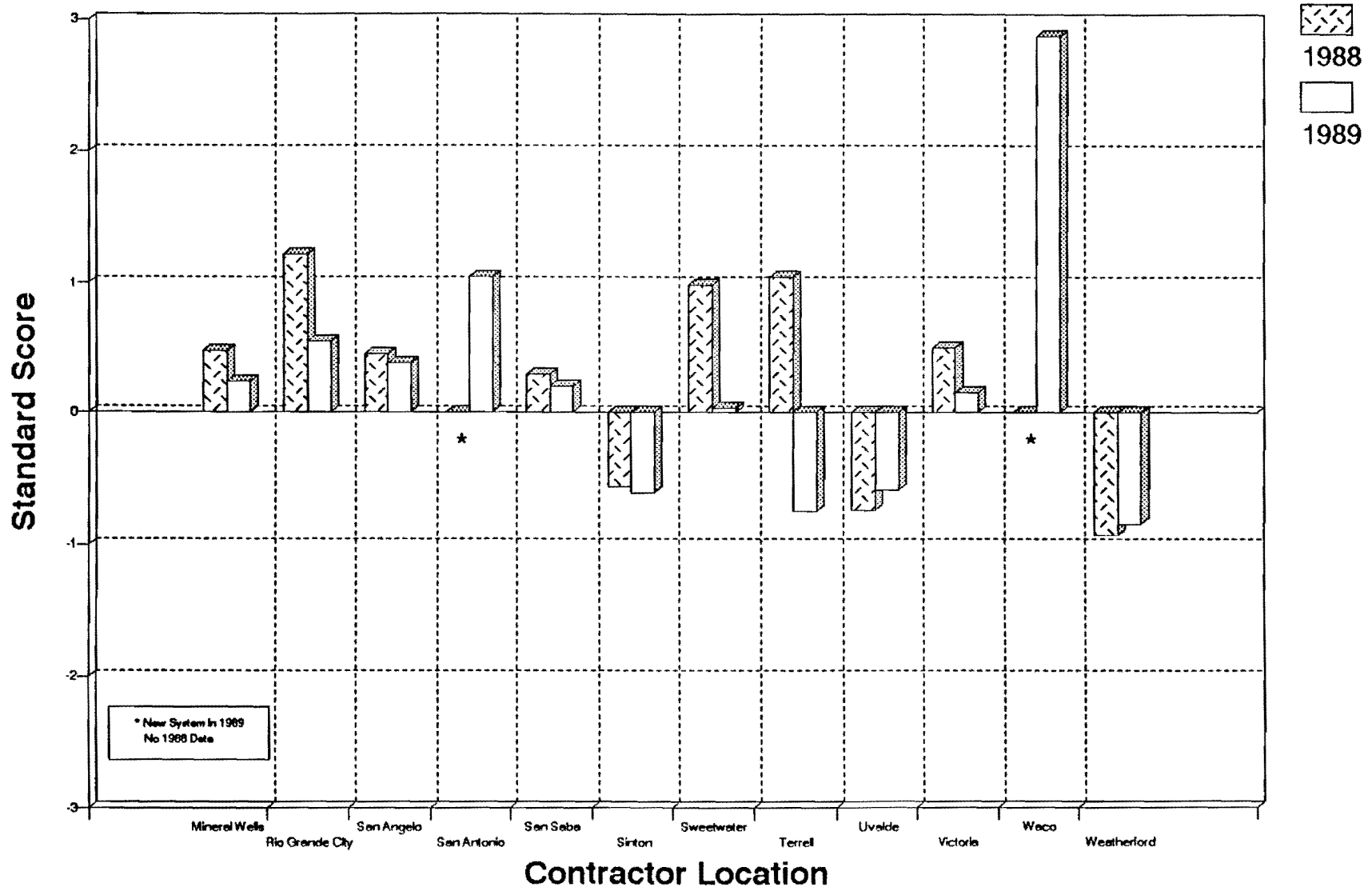


**Figure 2B - Cost Effectiveness
(Passenger Trips per Expense)**



**Figure 2C - Cost Effectiveness
(Passenger Trips per Expense)**

38



COST EFFICIENCY

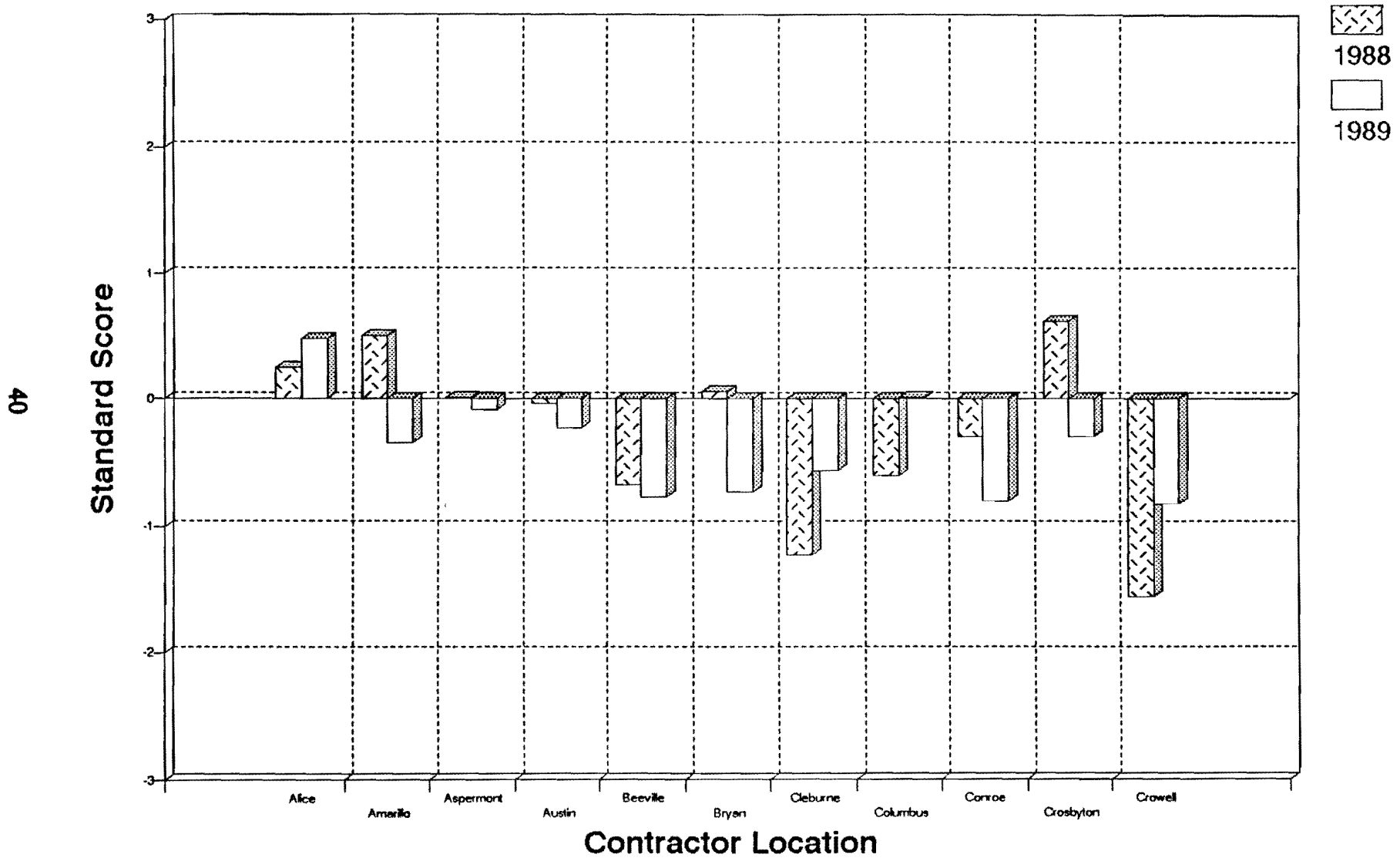
Cost efficiency is the measure of cost per produced unit. Vehicle-miles per expense is an indicator of cost efficiency and represents the number of miles produced for each dollar of expense. Vehicle-miles per total expense is the inverted form of the more familiar cost per mile indicator. The inverted form is used for graphical representation and ease of interpretation since a higher value indicates better performance.

The cost efficiency of the Section 18 contractors is illustrated in Figures 3A, 3B, and 3C. These graphs show that the agencies located in Galveston, Greenville, McAllen, Mineral Wells, San Antonio, Terrell, Victoria, Waco, and Weatherford performed greater than one standard deviation above the mean in 1988 or 1989. The agencies located in Cleburne, Crowell, Lamesa, Laredo, and San Angelo performed more than one standard deviation below the mean in 1988. No agency performed more than one standard deviation below the mean in 1989.

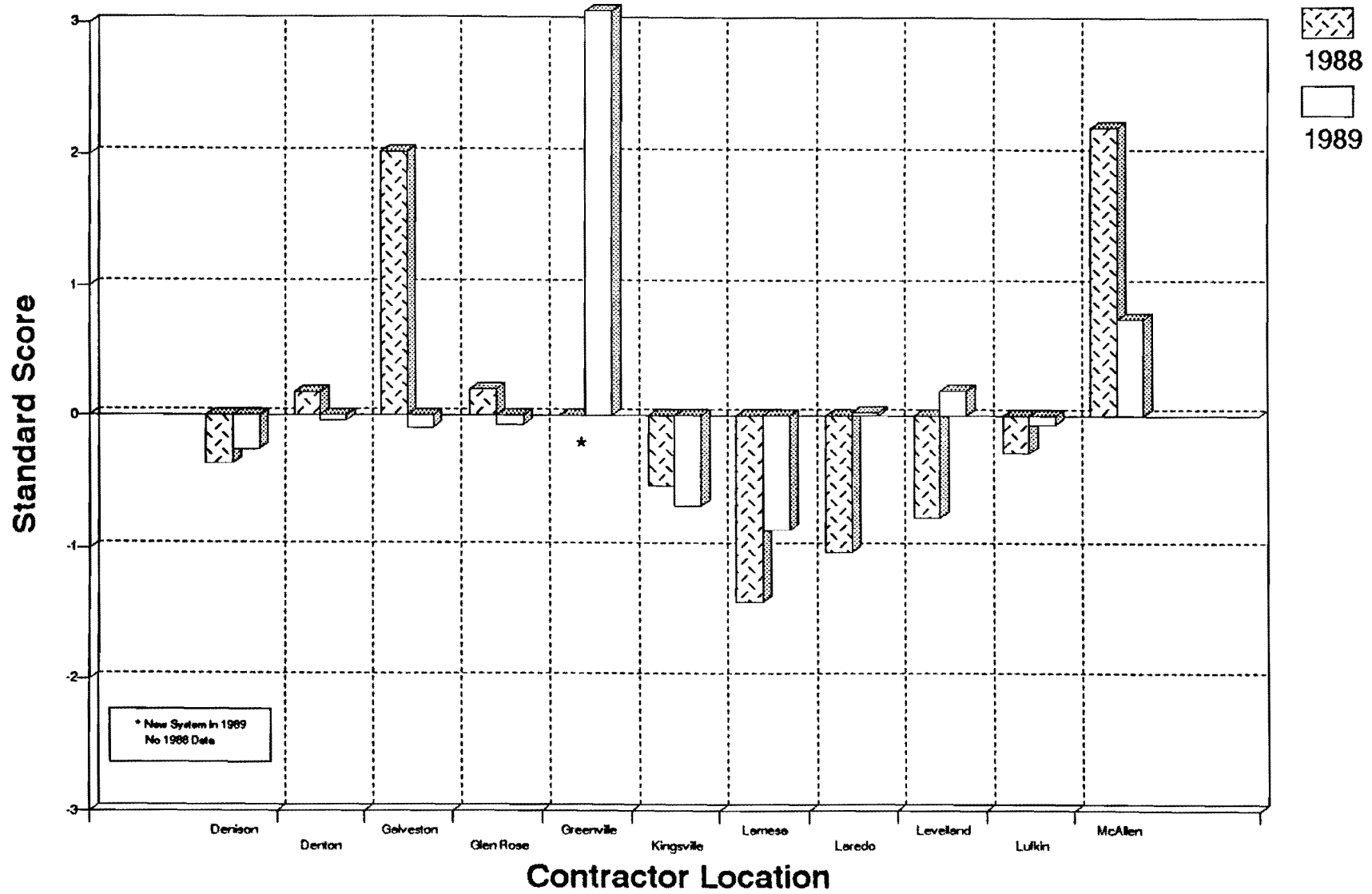
Eleven of the 31 agencies in operation during both 1988 and 1989 improved their standard score. The contractors in Laredo and Levelland each raised their score approximately one standard deviation to slightly positive values. Their 1989 performance was therefore above the mean.

The cost efficiency of an agency is influenced by several factors including service area size, the number of service vehicles, and non-service mileage. Cost efficiency is not impacted by service area size in the same manner as cost effectiveness. Travelling additional miles due to a large service area may increase an agency's total expense in a smaller proportion than its total miles, and therefore actually increase its cost efficiency.

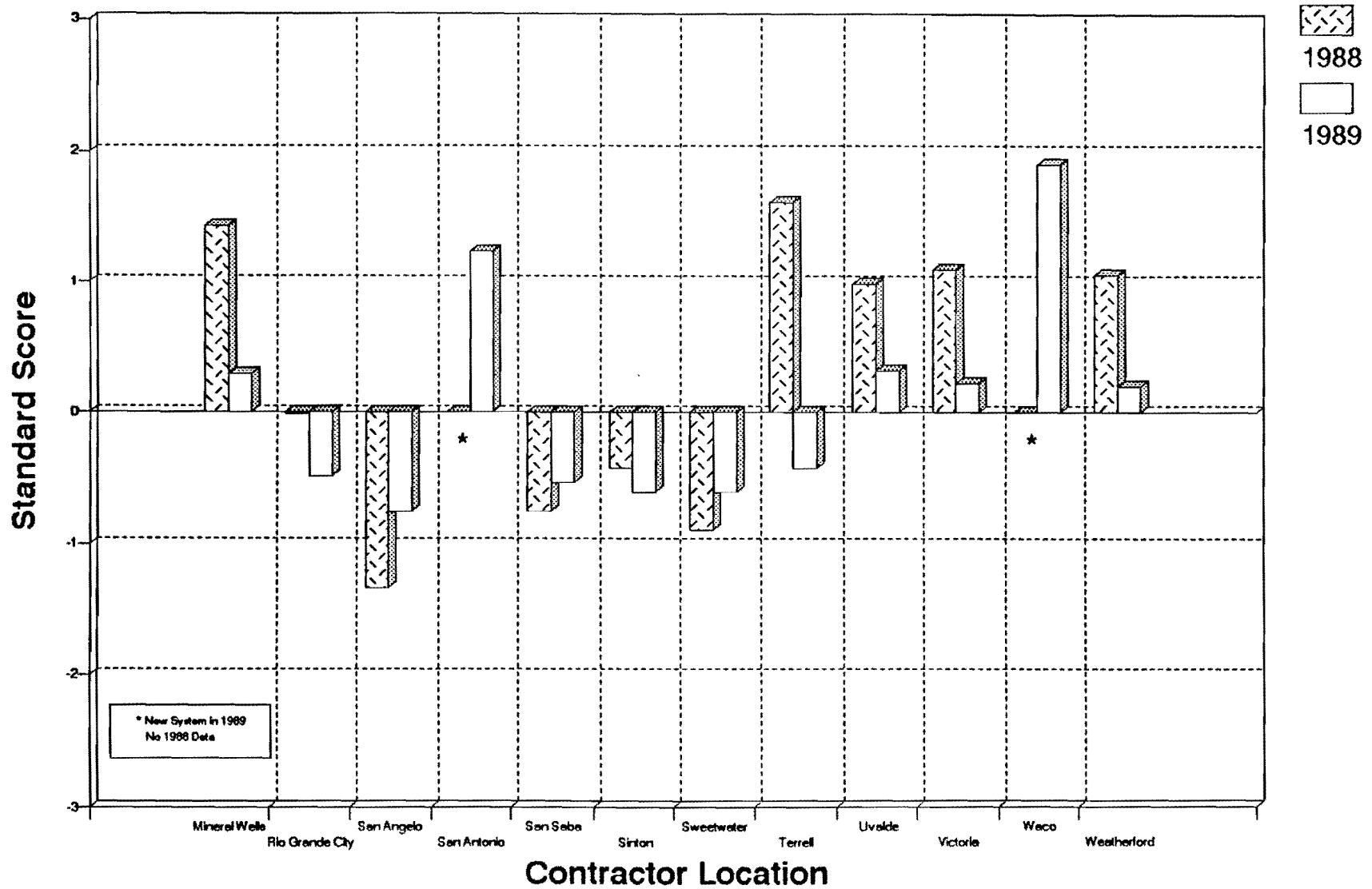
**Figure 3A - Cost Efficiency
(Miles per Expense)**



**Figure 3B - Cost Efficiency
(Miles per Expense)**



**Figure 3C - Cost Efficiency
(Miles per Expense)**



SERVICE UTILIZATION

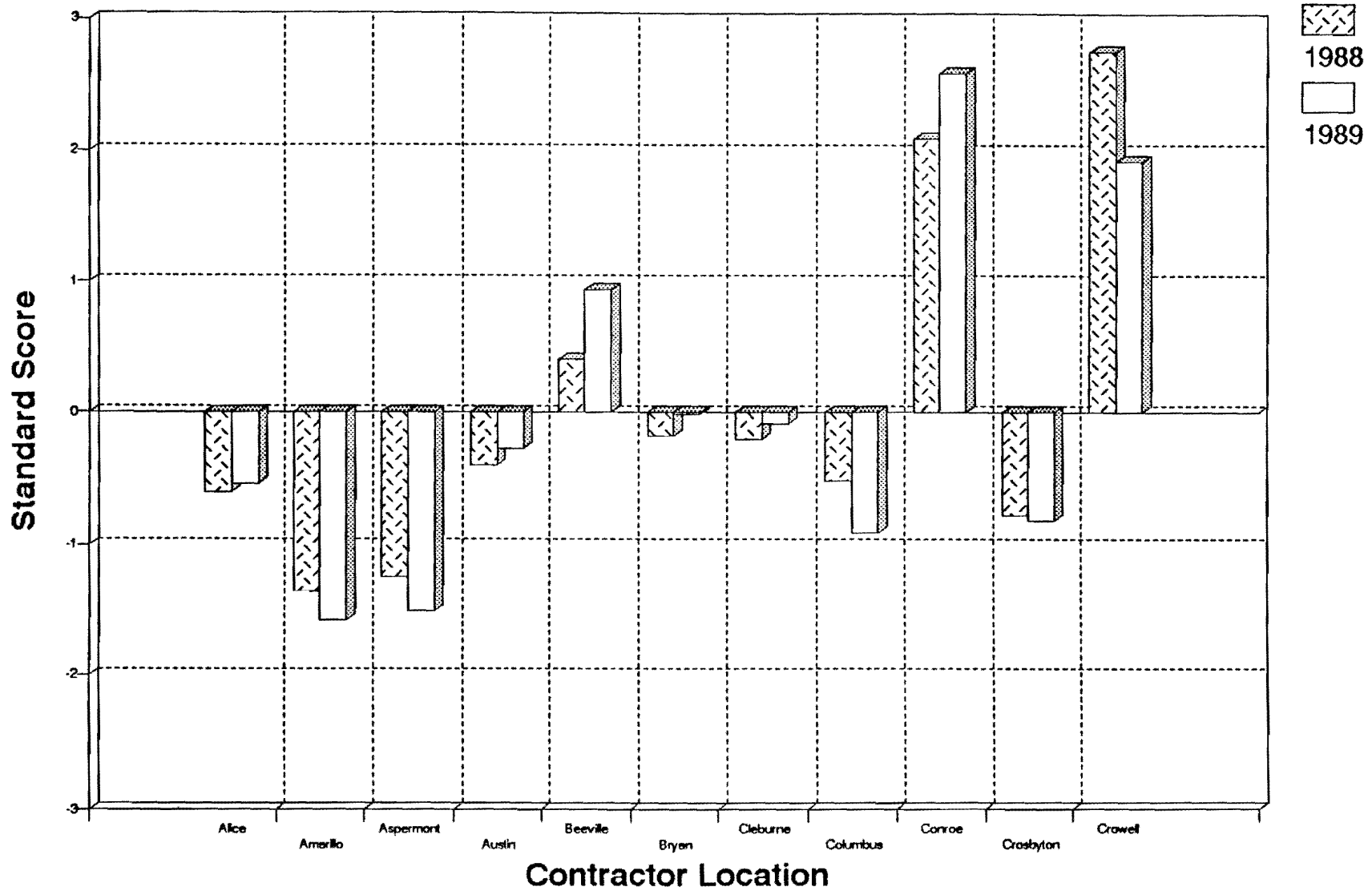
Service utilization measures the extent to which transit service is utilized by transit patrons. Service utilization is indicated by the total passenger trips per vehicle-mile. Figures 4A, 4B, and 4C illustrates the service utilization performance of the Section 18 agencies.

The figures illustrate that the contractors located in Conroe and Crowell performed better than two standard deviations above the mean in 1988. Conroe and Crowell both repeated their strong performance in 1989 even though Crowell slipped down to below two standard deviations above the mean. Crowell and Conroe scored very well in each of the seven peer groups analyzed, indicating that their performance is good regardless of what agencies they are compared to.

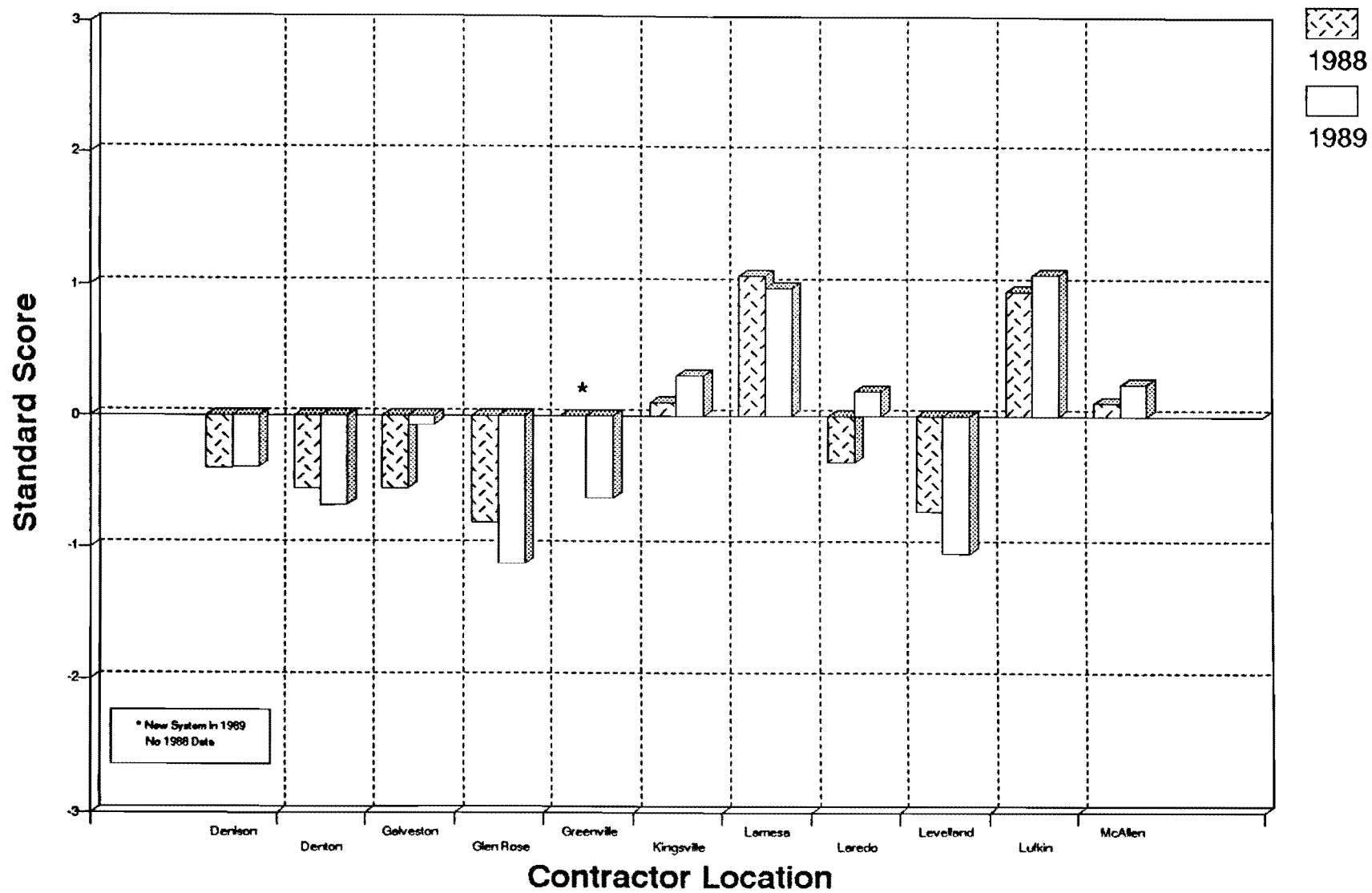
Contractors located in Lamesa, Lufkin, Rio Grande City, San Angelo, and Sweetwater performed better than one standard deviation above the mean in 1988 and/or 1989. Agencies located in Amarillo, Aspermont, and Weatherford performed more than one standard deviation below the mean in both 1988 and 1989. Glen Rose and Levelland performed more than one standard deviation below the mean in 1989.

Eighteen of the 31 agencies operating during both 1988 and 1989 improved their standard score for service utilization. None of the increases, however, were dramatic.

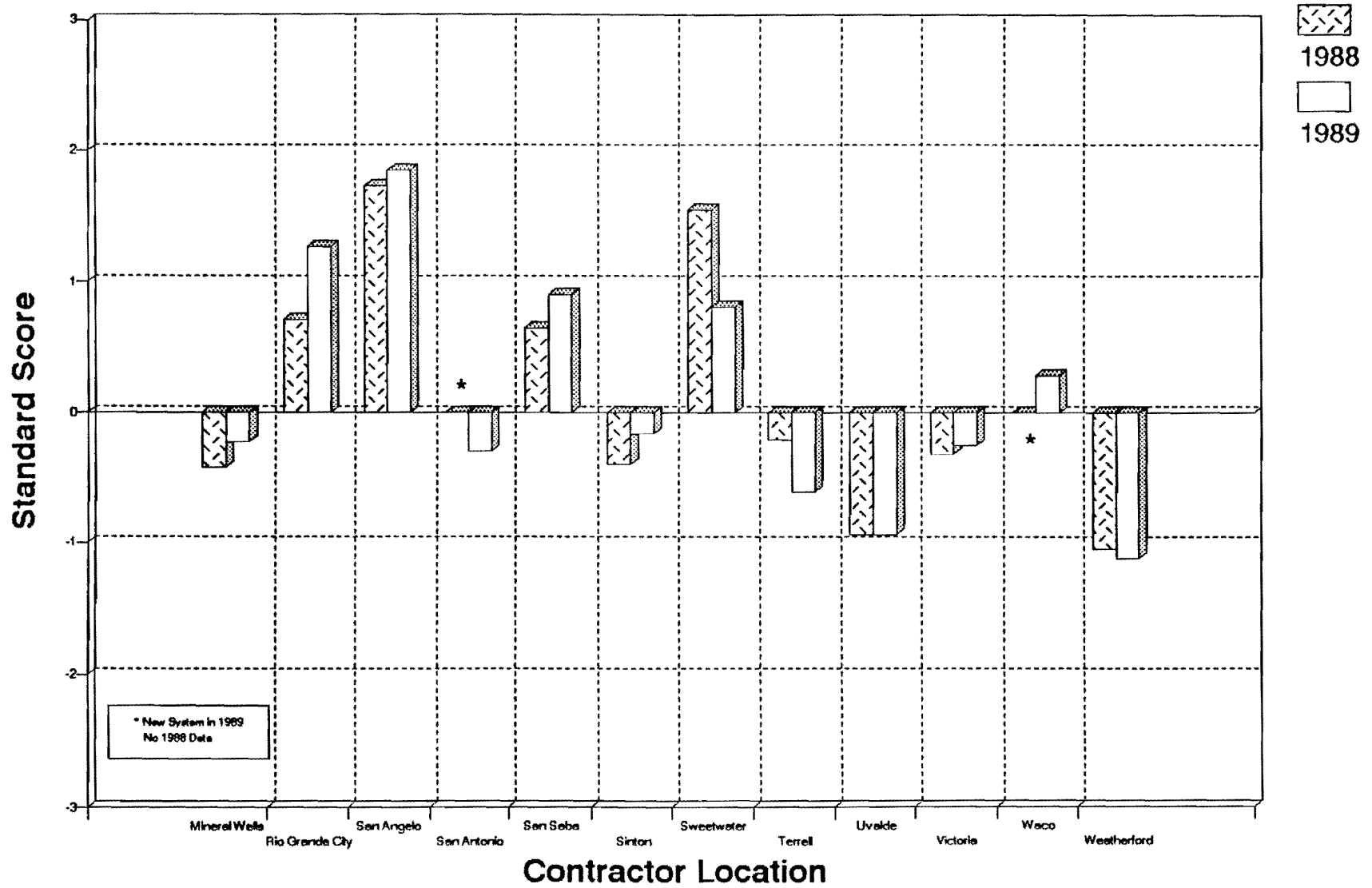
**Figure 4A - Service Utilization
(Passenger Trips per Mile)**



**Figure 4B - Service Utilization
(Passenger Trips per Mile)**



**Figure 4C - Service Utilization
(Passenger Trips per Mile)**



VEHICLE UTILIZATION

Vehicle utilization measures the extent to which each transit vehicle is being utilized to provide service. Total miles per vehicle is the performance indicator used to represent vehicle utilization. Figures 5A, 5B, and 5C display the vehicle utilization performance for the Section 18 transit systems in Texas.

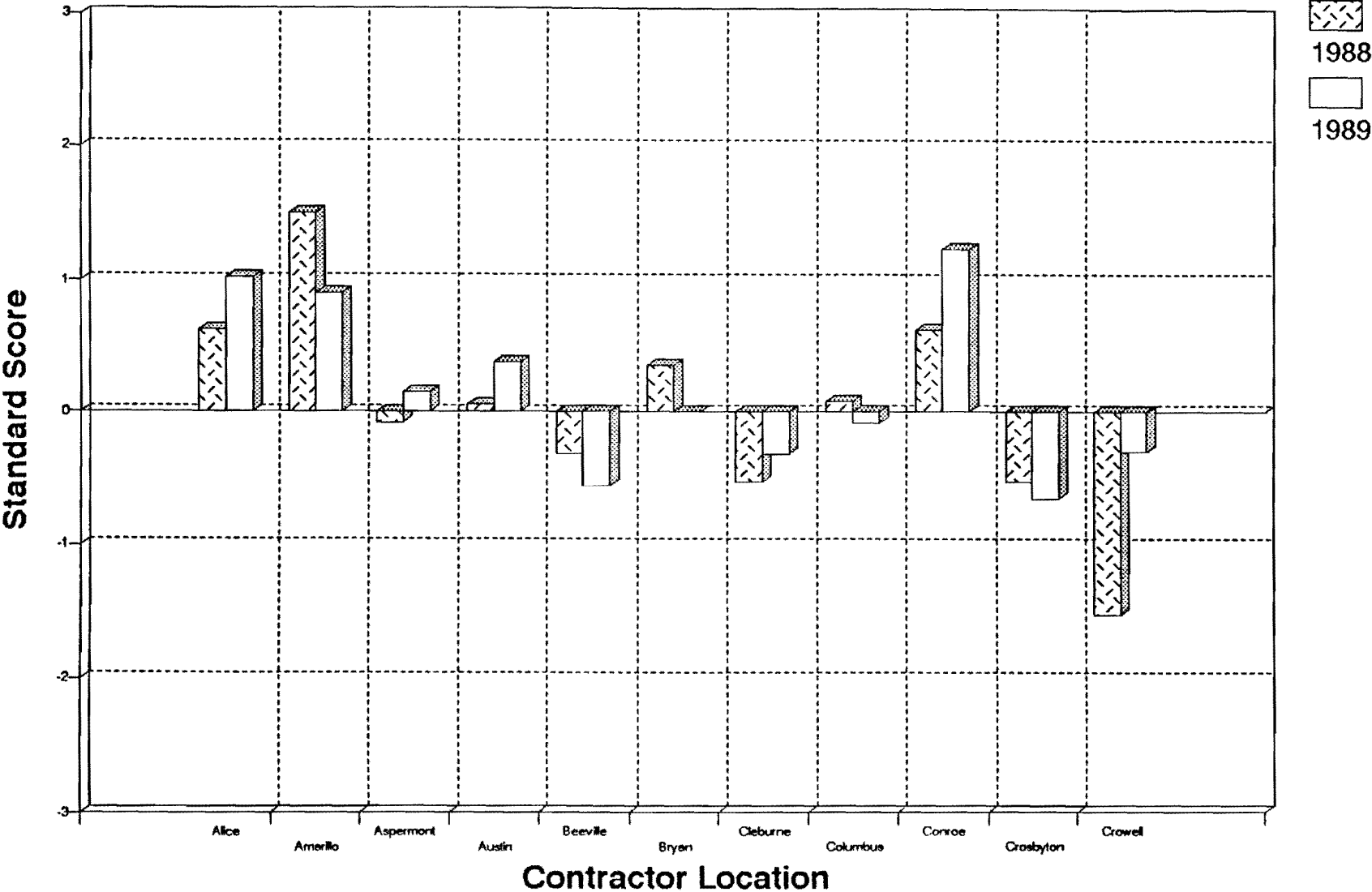
Vehicle utilization is influenced by several factors including service area size, trip length, total miles, and fleet size.

In general a high score is advantageous, although a very high score in vehicle utilization is not necessarily an indication of good performance or good practice. A very high score may mean that the system is providing service in a low population density area and must travel a significant number of miles to pick up passengers. It may also indicate that the vehicles are being over utilized and the system may need additional vehicles to serve the area. A more in-depth analysis of an agency is necessary to determine the cause of a high vehicle utilization value.

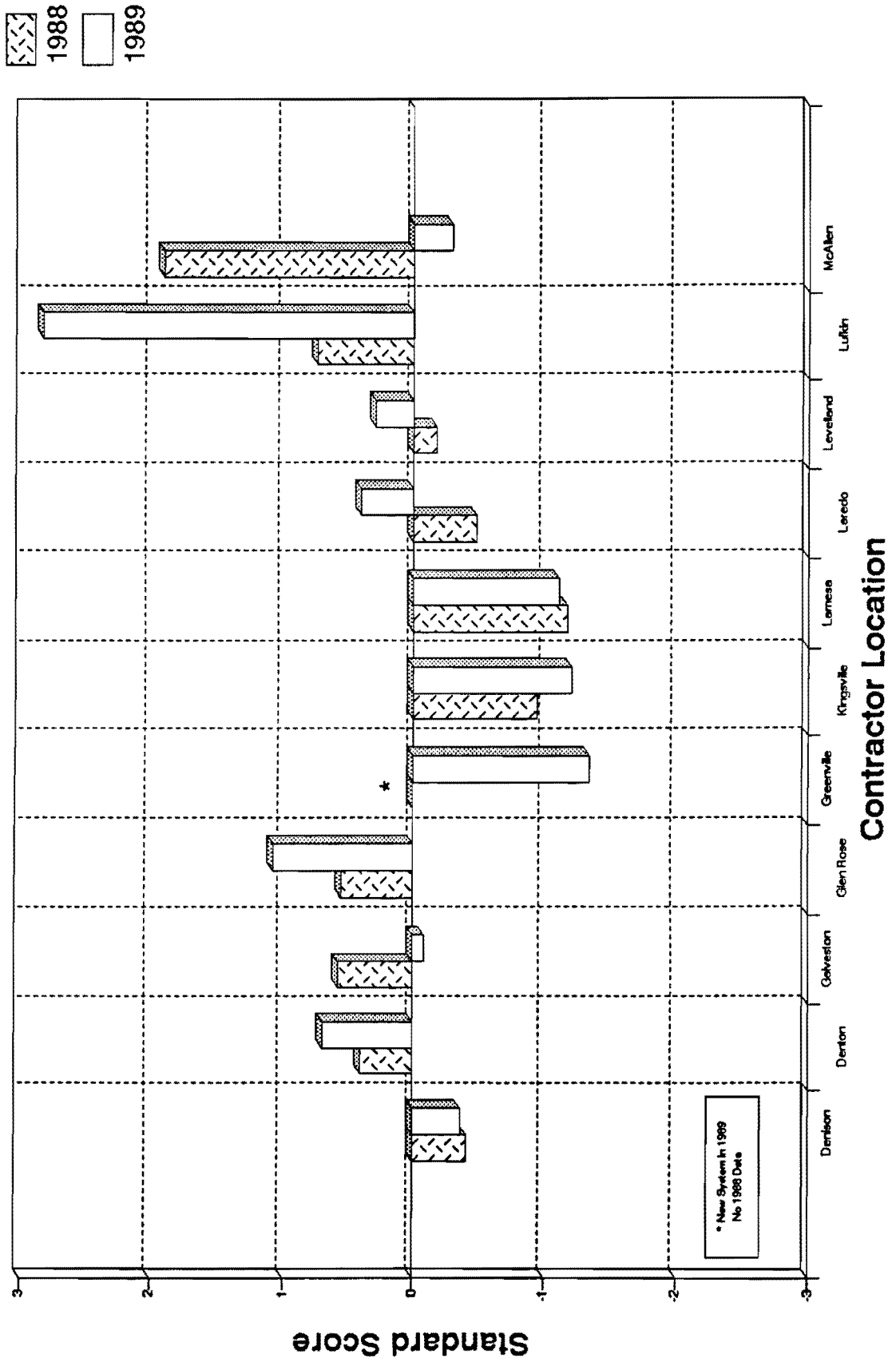
Contractors located in Alice, Amarillo, Conroe, McAllen, Glen Rose, and Sinton scored better than one standard deviation above the mean in 1988 and/or 1989. Crowell, Greenville, Kingsville, Lamesa, Rio Grande City, San Angelo, San Saba, Terrell, and Waco performed more than one standard deviation below the mean in 1988 and/or 1989.

Nineteen of the 31 agencies which were in operation during 1988 and 1989 improved their standard score. Lufkin showed the most dramatic increase raising their score by 2.1 standard deviations to almost 2.9 standard deviations above the mean.

**Figure 5A - Vehicle Utilization
(Miles per Vehicle)**

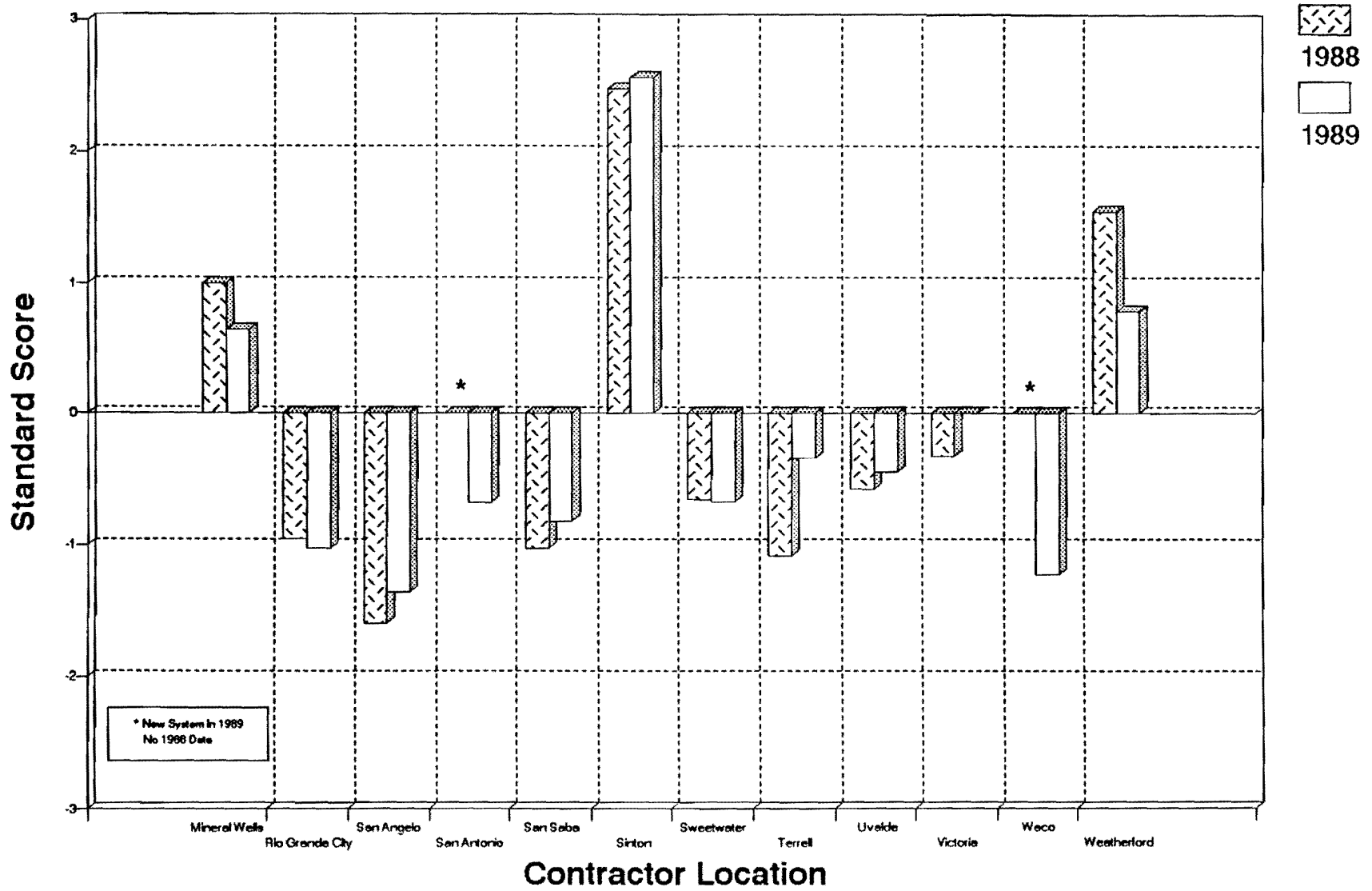


**Figure 5B - Vehicle Utilization
(Miles per Vehicle)**



**Figure 5C - Vehicle Utilization
(Miles per Vehicle)**

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ACCESSIBILITY

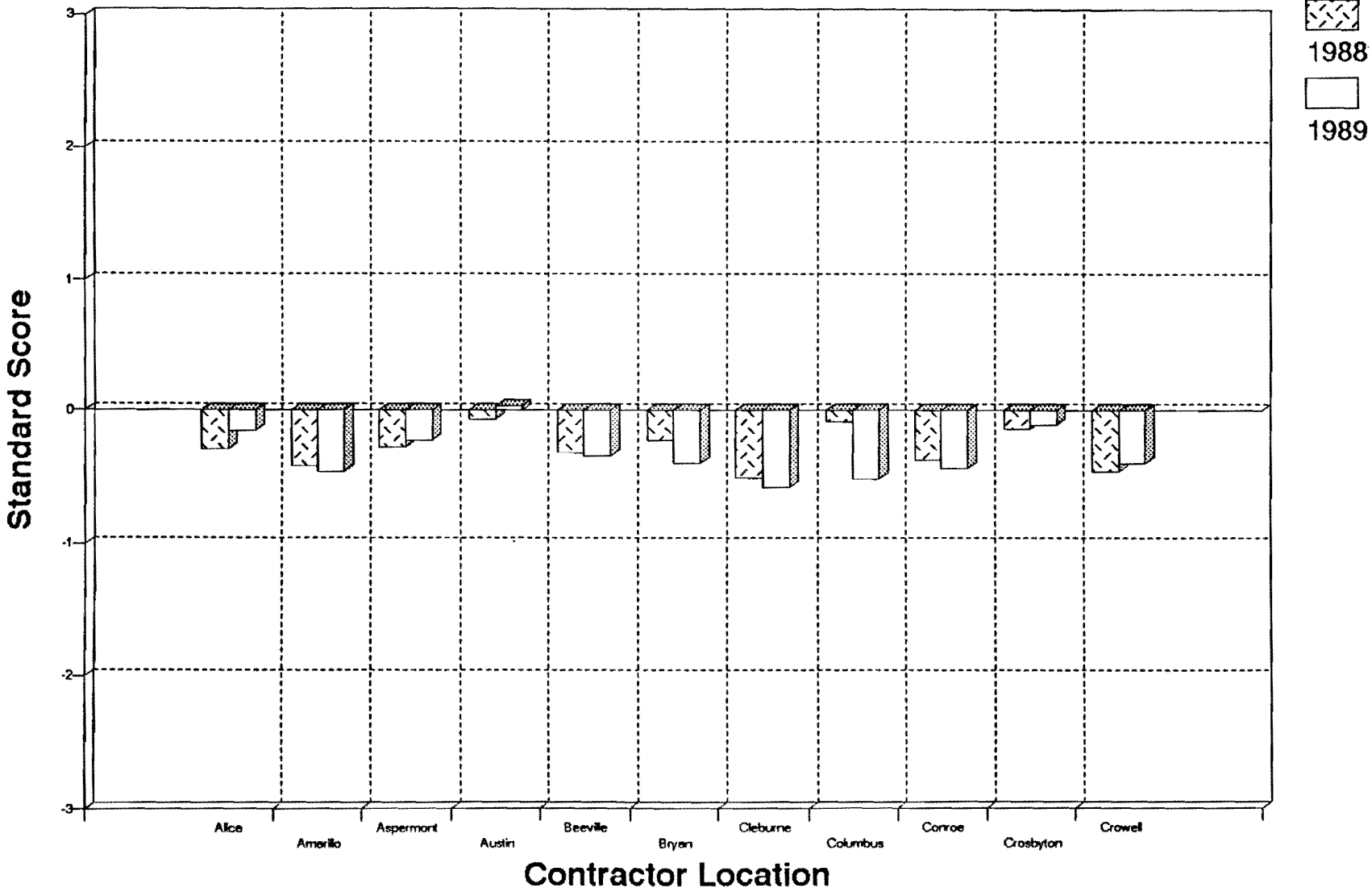
Accessibility is the measure of how available transit service is to the service area population. Vehicle-miles per capita is the performance indicator used to measure accessibility. Figures 6A, 6B, and 6C illustrate the standard scores developed for this performance measure.

Accessibility is an important measure of performance to large fixed-route systems. However, accessibility may not be a practical measure for non-urbanized transit agencies. The non-urbanized Section 18 systems generally do not operate a strictly fixed-route service. Many of the contractors provide only a demand responsive or subscription service.

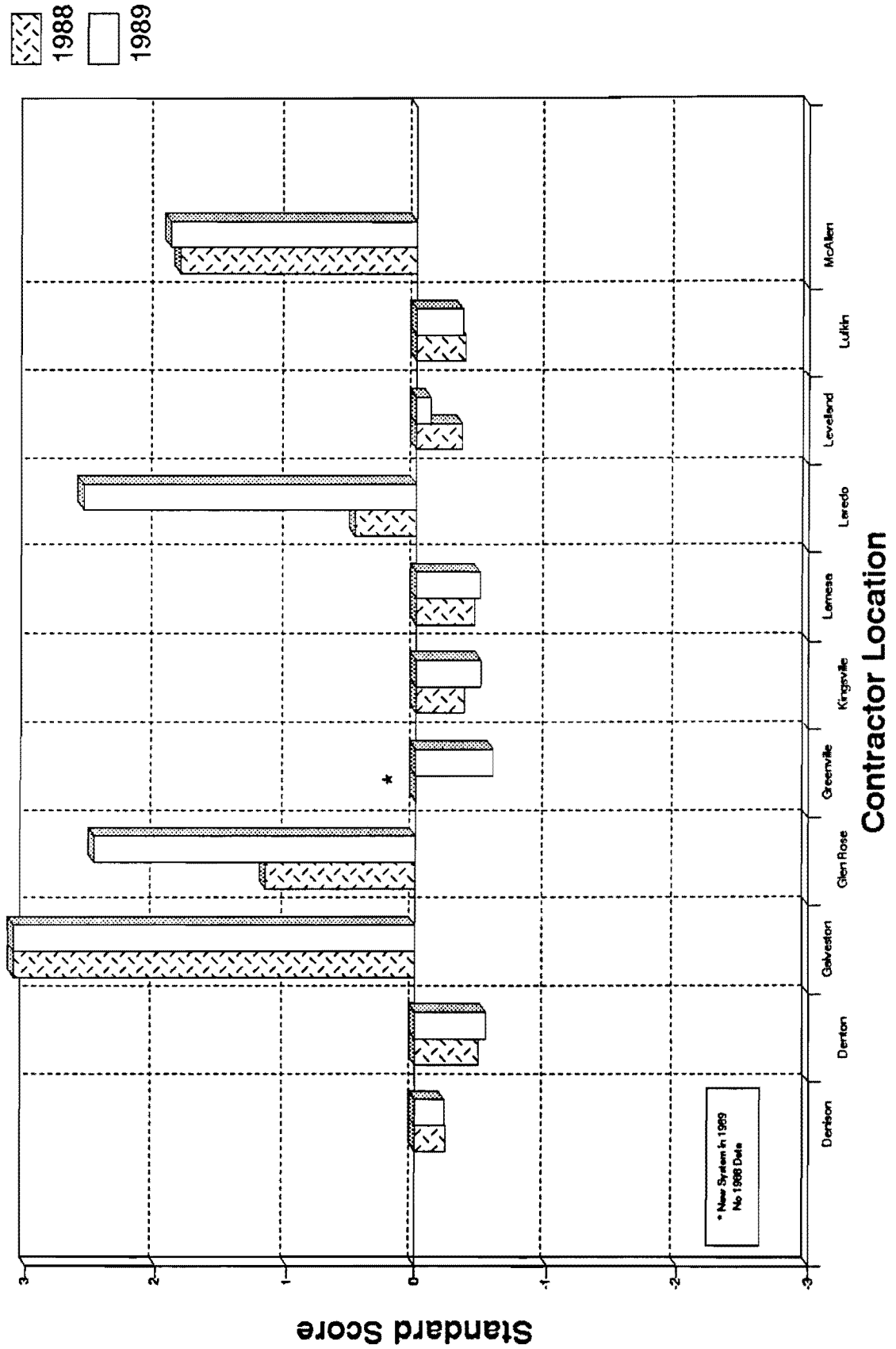
The performance indicator for accessibility, vehicle miles per capita, is very sensitive to the type of service being provided and the service area population. Figure 6B illustrates how sensitive the indicator is to population. The transit system in Glen Rose scored extremely high (over 3 standard deviations above the mean) since it travels a considerable number of miles to provide service and its non-urbanized population is only 4,612. The Galveston transit agency also scored very high due to its low non-urbanized population.

The non-urbanized population of a service area is calculated by determining the population of the county(s) in which the system operates and subtracting the urbanized population. This may misrepresent the actual population served by an agency located in or near an urbanized region. The Galveston system, for instance, operates within two counties that have a combined population of 397,500 but have a non-urbanized population of only 4,000. The low estimate of service area population greatly increases the vehicle-miles per capita value for Galveston. This high value of vehicle-miles per capita pulls the mean of the performance values up and makes the other agencies appear to be performing poorly in comparison.

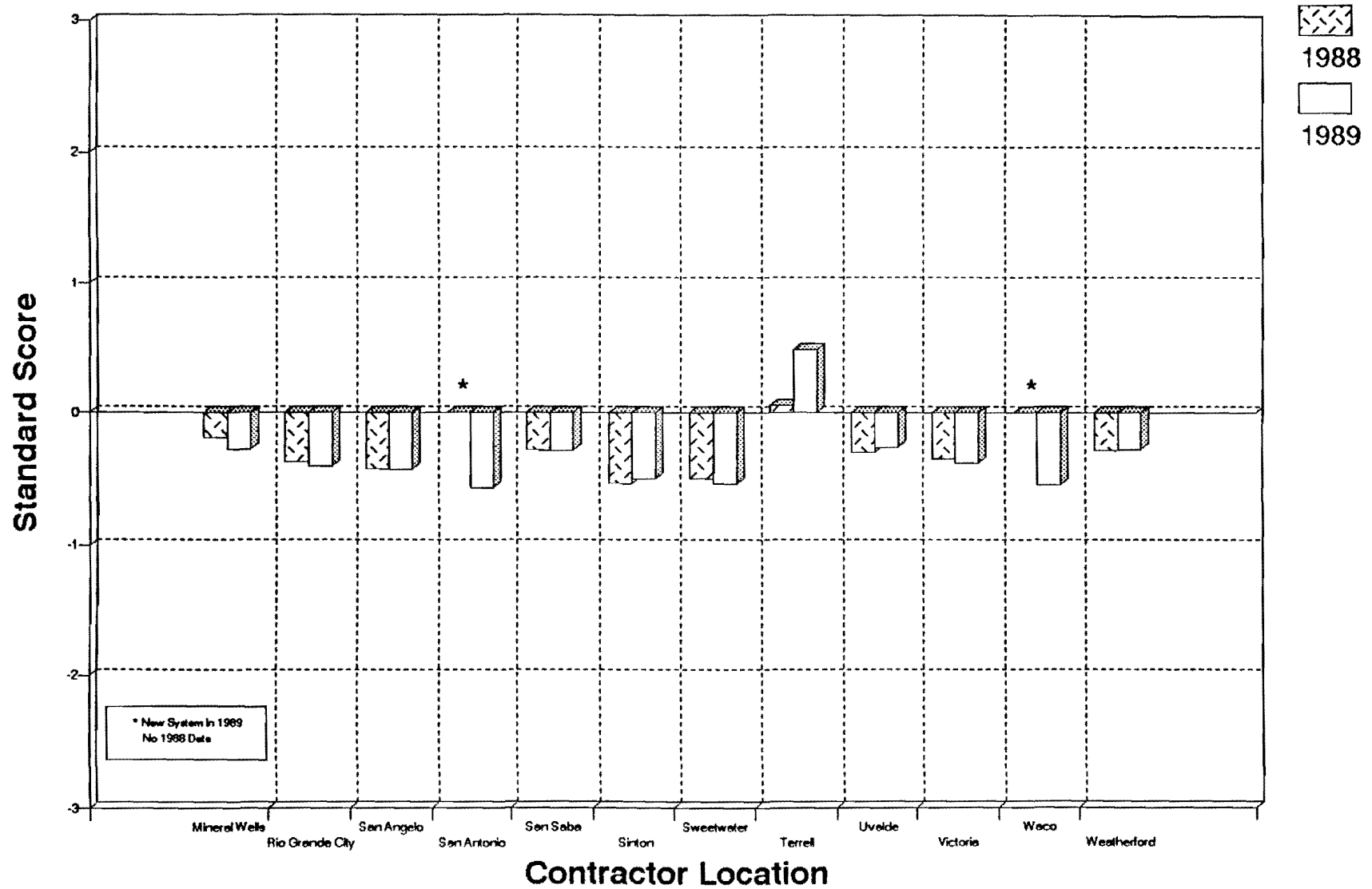
**Figure 6A - Accessibility
(Miles per Capita)**



**Figure 6B - Accessibility
(Miles per Capita)**



**Figure 6C - Accessibility
(Miles per Capita)**



CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

Data Availability

This report utilized 1988 and 1989 quarterly report data submitted by Section 18 systems to the Texas State Department of Highways and Public Transportation. Two Section 18 systems failed to submit a 1988 quarterly report while 12 Section 18 systems failed to submit one or more quarterly reports in 1989. It would seem to be unreasonable to compare the performance of 34 agencies when more than one-third of them are represented by incomplete data so the Public Transportation Division (D-11) provided annualized 1989 data. The annualized data is determined by averaging the existing quarterly data and estimating the missing data for an agency who failed to submit a report. The Section 16(b)2 transit providers were not analyzed in this project due to their diverse service objectives and characteristics.

It is recommended that TSDHPT improve the collection of quarterly report data from all agencies receiving state funds. This would improve the ability of TSDHPT to compare and evaluate the performance of the agencies on a yearly basis, as well as ensure the fair and equitable allocation of funds using the fund allocation formula. The formula is based on data submitted in the quarterly reports so incomplete data may jeopardize the results of the allocation process.

Performance Indicators

The Section 18 transit agencies were compared using the following five performance measures.

- Cost Effectiveness (passenger trips per expense)
- Cost Efficiency (vehicle-miles per expense)
- Service Utilization (passenger trips per vehicle-mile)

- Vehicle Utilization (vehicle-miles per service vehicle)
- Accessibility (vehicle-miles per capita)

Two additional performance measures (quality of service and labor productivity) were identified in this project but were not utilized in the comparison of transit agencies due to insufficient data. Quality of service is indicated by the number of accidents per 100,000 vehicle-miles and number of vehicle-miles between breakdowns. In 1989, the Texas Legislature mandated that transit providers receiving state funds report these indicators. It is recommended that when one full year's worth of data is available that quality of service also be used as a performance measure for transit service evaluation.

The cost efficiency and effectiveness of an agency can also be indicated by its fare recovery ratio (revenue per expenses). This indicator represents the percentage of expenses incurred to provide transit service that is recovered from the collection of fares. Data reported on the quarterly reports are now used to calculate this indicator for use in the fund allocation formula.

Revenue recovery ratio was not used for performance evaluation in this report because the 1988 and 1989 revenue data reported semi-annually could not be expanded to a yearly basis. In the 4th quarter of 1989, agencies began reporting revenue data in their quarterly reports. It is recommended that the revenue data available on the quarterly reports be used to represent this indicator in future service evaluations as well as in the fund allocation formula.

Improvement is another important measure of performance. When several years of data are available, it will be possible to evaluate each agency's trend in performance. An agency whose performance is better than average, but, is declining should evaluate its service and attempt to improve. If an agency has negative standard scores (below average performance) that are improving there is an indication that the agency's administration is attempting to correct and improve its performance. It is recommended that Texas use the

procedure developed in this project on an annual basis in order to evaluate each agency's trend in performance.

Accessibility is a performance measure which indicates how available the transit service is to the service area population. Accessibility is an important measure of performance to large fixed-route systems. However, accessibility may not be a practical measure for non-urbanized transit agencies. The non-urbanized Section 18 systems generally do not operate a strictly fixed-route service. Many of the contractors provide only a demand-responsive or subscription service. More research is necessary to determine if this measure is acceptable for use with non-urbanized systems. It is recommended, however, that this measure be calculated with several years of data before it is determined to be a poor indicator of performance.

Use of Performance Measures

The standard score profiles developed in this report only provide a relative indication of performance for each contractor. The evaluation of an agency should consider the individual operations and objectives of that agency. It is important to evaluate the overall performance of the agency and not just one indicator of service.

There is a desire among the contractors to know how they can improve their performance, not simply that they need to improve. Since each agency operates under different conditions and objectives, TSDHPT should consider counseling each contractor on an individual basis. One agency contacted during this research project recommended that TSDHPT visit each contractor and evaluate its operations. This process has generally been well received when implemented in other states.

The performance measure technique developed in this report uses relative, rather than absolute, measures. Transit operators can be compared to previous year operations of their system and to other generally similar operators. There are not, however, any standards to estimate what a "good" level of cost effectiveness or efficiency is for a rural

transit operator. As performance measures become more widely utilized, there may be more information available to evaluate absolute performance values. These will also be subject to the problems of peer group determination and differing transit provider goals and objectives that are inherent in performance comparisons.

Fund Allocation Formula

The formula-based allocation method is intended to ensure a fair and relatively stable distribution of funds, while producing an incentive for better performance. It is questionable whether or not the formula can create an incentive to improve when each agency receives at least as much allocation as the previous year. The base level of funding was set at 105% for the 1991 fiscal year. This means that even poor performers will receive a 5% raise in funds. In order for the formula to work as designed, the base level must be set below 100%. Agencies which don't perform well would have to improve to compete for the funds. The systems should be encouraged to conform to the desired behaviors by being rewarded for good performance.

It is recommended that the revenue recovery ratio factor include locally derived revenue contributed by city governments, councils of government, or private enterprise. This would reward agencies who have the support of their community, as well as those agencies which collect a large percentage of operating revenue from fares. A recovery ratio using all local revenue would encourage each agency to utilize all possible sources of revenue.

Service area size and non-urbanized population are two demographic factors which are used in the funding allocation method currently used by TSDHPT. There are, however, inconsistencies in the values as they are developed for fund allocation.

The service area population of each contractor is calculated by determining the population of the county(s) in which the system operates and subtracting the urbanized population. Some contractors feel this misrepresents the actual population served by their agency since the population of systems which are located in or near an urbanized region

may be underestimated. The Galveston system, for instance, operates within two counties that have a combined population of 397,500 of which only 4,000 are considered non-urbanized.

This low population value has two effects on the fund allocation formula. It reduces the agency's percentage of the allocation based on the non-urbanized population. The second effect, however, is that it increases the agency's percentage of funds based on the passenger trips per service area population factor. The overall impact of using this calculation to estimate the non-urbanized population may, therefore, be minimized as the results of the population differences may be canceled.

The service area of Section 18 transit contractors is considered to be the counties in which the contractor operates. This may overestimate the service area of contractors who do not provide service to all areas of the counties in which they operate. It may, however, underestimate the service area of contractors who travel outside their "home" counties. The exact delineation of each agency's actual service area along census tract boundaries to determine the service area size and population may be more accurate than using the entire county, however, it would be *extremely* time consuming, costly and may not be warranted for use in the fund allocation formula.

The fund allocation formula is a good method of distributing funds to the Section 18 contractors. It is recommended that TSDHPT continue using the procedure with the inclusion of local share revenue in the recovery ratio factor, and a base funding level that would provide incentive for contractors to improve the operations rewarded by the fund allocation formula.

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APPENDIX A USE OF PERFORMANCE INDICATORS IN OTHER STATES

The current use of transit performance standards and guidelines by other state transportation agencies is important for comparison to Texas procedures. The use of performance and demographic data by the Texas State Department of Highways and Public Transportation for fund allocation and performance measurement was discussed in Chapter 2 of this report.

Florida

The State of Florida funds transit based only on service area population. Performance measures are not currently used for funding, evaluation, or comparison of rural transit providers.

Georgia

The Georgia Department of Transportation (GDOT) funds rural transit systems based on their funding needs. GDOT sets a cap on cost per vehicle mile which transit providers must not exceed. If the provider meets this requirement, GDOT will determine their fund allocation after examining their proposed service plans. GDOT does not base fund allocation on performance indicators.

Indiana

The Indiana legislature gave the Indiana Department of Transportation (INDOT) the authority to establish a Public Mass Transportation Fund (PMTF) allocation methodology. In response, INDOT implemented a performance-based allocation formula in 1985. The formula was reviewed and revised in 1989 for allocation of 1990 PMTF funds.

The bus transit systems eligible for PMTF funding are divided into four peer groups: large, medium, small fixed-route and demand-responsive/county-wide systems. Indiana does not subdivide its demand responsive systems according to size. The Northern Indiana Commuter Transportation District (NICTD), a high speed/high demand electric rail system, is considered separately from the four bus-based peer groups. In 1990, NICTD received 12.3% of the PMTF amount. The remaining funds were divided between the four peer groups based upon the percentage of PMTF funding each group received in the previous year. The 1990 allocation for the demand-responsive/county-wide systems was 9% of the remaining PMTF (7.9% of the total PMTF).

A portion of the funding each system receives is not subject to performance criteria, to promote stability in rural transit system provision. This base level of funding serves as a minimum operating budget. Additional subsidy is given to the transit systems using an allocation formula. The following indicators are used in the formula, to compare each system to other systems in its peer group.

- Locally derived income as a percent of total operating expense
- Passenger trips as a percent of service area population
- Passenger trips as a percent of total vehicle-miles

Indiana uses the first measure (operating ratio) to indicate "...the self-sufficiency of the transit system as well as the extent of local commitment to the provision of transit service" (8). Passengers per capita measures the extent to which residents in a particular area patronize transit. Passengers per total vehicle-mile measures service utilization.

INDOT feels this formula encourages similar systems to compete for a fixed amount of funds, thereby, improving performance.

Iowa

The Iowa Department of Transportation (IDOT) does not rely heavily on performance indicators because of the unique differences between transit agencies. IDOT does use ridership (passenger trips), revenue miles, and net public debt for evaluation of individual agencies. Comparisons between agencies are avoided because the transit providers do not believe it is fair.

Louisiana

The State of Louisiana funds transit providers based on a formula which is weighted 40% with passenger trips and 60% with vehicle-miles. The Louisiana Public Transportation Division is considering the use of alternative methods that might indicate performance efficiency.

Michigan

Michigan's 1991 operating assistance program will allocate a base level of funds to both urban and non-urban transit systems (9). Non-urban systems will receive the lesser of either 50% of eligible expenses (legal cap) or the 1990 fund allocation plus 3% (growth cap). The minimum assistance amount will consist of the system's 1987 fund level.

In addition to the base level of funds, each transit system is eligible for assistance from a bonus program. The bonus program rewards transit providers (urban and non-urban) using a few performance and agency size statistics. The program is designed to encourage local government funding and cost effective service, while recognizing that large providers require more assistance. A total of \$2 million is available to providers through the bonus program described below.

Local Share Bonus Programs (a total of \$500,000 each)

1. **System-to-system comparison:** Each system receives a portion of the funds based on the percent of statewide local share contributed by that system's local government and community during the previous year.
2. **Each system compared to itself:** Each system receives a portion of the funds based upon the percentage of their local share to their total eligible costs. The factors are weighted by their service area population. Weighting the factors with service area population ensures that a system with a larger service area population would receive more funding than a system with a similar local share and a smaller service area population.

Effective Service Bonus Programs (a total of \$500,000 each)

1. **System-to-system comparison:** Each transit system receives a portion of the funds based upon the percent of total statewide farebox revenue collected by that system during the previous year.
2. **Each system compared to itself:** Each system receives a portion of the funds based on the percentage of their farebox revenue to their total eligible expenses. These factors are weighted by their annual mileage. Weighting the percentage of expenses recovered by farebox revenue with annual mileage ensures that a system which covers a lot of miles will receive more funding than a system with a similar expense recovery ratio and travels less miles to serve its patrons.

The Michigan DOT bus transit division also uses performance indicators for the evaluation and comparison of individual transit agencies. The evaluation of a specific provider usually has a certain objective. This objective is used to determine which performance indicators are important and which transit providers should be used for comparison. Comparison is only made between similar providers (fleet size, geographic area, financing, etc).

Minnesota

The Minnesota Department of Transportation performs statistical analyses on transit agency performance measures. The data are presented in a yearly transit report (10). The report includes data and statistics for metropolitan, small urban, rural, and private operators. The report does not evaluate or compare transit systems.

Montana

The State of Montana's Department of Commerce Transportation Division is in the process of updating its Section 18 Management Plan. The Passenger Bureau is responsible for the distribution of Section 18 program funds received from UMTA. According to the draft of the new plan (11), the Passenger Bureau will use up to 15% of Montana's annual Section 18 appropriation to administer the program and provide technical assistance to applicants. The remaining 85% of the fund is allocated to current grantees by a distribution formula. The draft of the management plan did not mention a base level of annual funding for each system. The formula uses the following factors.

- Service area population
- Annual passenger trips
- Derived income (previous year's operational cost minus its Section 18 funding)

Overall, the formula may not be considered fair by all transit agencies. Montana's distribution formula is based on one demographic factor (population), one service descriptor (passenger trips), and one measure of cost efficiency (derived income). The formula does not significantly reward small demand-responsive systems for good performance. Systems operating in areas of low population cannot generate the number of passenger trips or income of which larger rural systems are capable. They may, however, be performing very efficiently and effectively.

New York

Transit providers in New York are funded by considering their projected deficit based on previous audit results. Performance measures are not used for allocation of funds.

North Carolina

Section 18 transit funding is administered by the North Carolina Department of Transportation's Public Transportation Division (PTD). The distribution of funds is discretionary as determined and recommended by the PTD and approved by the North Carolina Board of Transportation. The PTD appropriates the funds using a population based formula (12).

All applicants for funding must submit a Section 18 application which reveals the following items.

- Project description
- Project coordination efforts
- Extent of public involvement
- Extent of private involvement
- Proposed one-year budget

The application must be consistent with a transportation development plan currently filed with PTD by the area provider (city, county, public corporation, etc.). The PTD then examines each individual route for satisfactory performance. The following indicators are evaluated on an annual basis.

- Passengers per mile
- Passengers per hour
- Net cost per passenger
- Recovery ratio

A baseline of 1.5 passengers per mile and 10 passengers per hour must be met by each route segment. If routes or route segments do not meet these criteria, they may be eliminated (12).

North Carolina also stresses coordination. The area provider is responsible for this task. It must ensure that service by funded contractors is not duplicated. The Interagency Transportation review committee examines the Section 18 application for evidence of coordination and makes a final recommendation to the PTD.

Ohio

The Ohio DOT Public Transportation Division divides its 32 Section 18 agencies into four peer groups for comparison. The groups are based on type of operation (i.e. fixed-route, demand-responsive, combination of fixed-route and demand-responsive, and user-side). Ohio uses the following performance indicators for evaluation and comparison:

- Cost per vehicle hour, vehicle-mile, and passenger
- Passenger per vehicle hour and vehicle-mile
- Breakdown per vehicle and per 100,000 vehicle-miles
- Accidents per vehicle and per 100,000 vehicle-miles

Ohio is the only state contacted for this study which currently uses breakdowns and accidents in comparison of transit agencies. The breakdown rate and accident rate indicators represent measures of transit service safety and quality.

Oklahoma

The State of Oklahoma has considered using some type of performance indicators for the comparison of rural transit service providers in the past. However, Oklahoma's budget for Section 18 agencies exceeds the demand for funding. Therefore, there is a lack

of incentive for the state to implement a performance indicator allocation procedure. The method used for evaluating inefficient agencies is to scan for gross financial problems.

In July of 1989 the Transit Planning Division of the Oklahoma Department of Transportation prepared a report, "Public Transportation in Oklahoma," which briefly described the service provided by the 15 Section 18 programs in the state (13). Included in the report were some service statistics. The following is a list of the data which is provided for each agency.

- Vehicle-miles
- Passenger miles
- Passenger trips (elderly/handicapped and other)
- Expenses (administrative and operating)
- Revenue (percent local and federal)
- Passengers per mile
- Cost per mile
- Cost per passenger

Oregon

The Oregon DOT Public Transportation Division has used fund allocation formulas based on performance in the past. Their most recent method used population, mileage, and ridership weighted equally to allocate additional funds above a set base level. The allocation formula was abandoned for the 1990 fiscal year due to a "shift" in mileage and ridership values. If the formula had been used as in the past, fund allocation would not have been stable and several providers would have suffered dramatic reductions in funding. In order to avoid this problem, funds were frozen at the 1989 allocation.

The Public Transportation Division publishes a performance measures report each year summarizing each transit providers' service statistics. The report includes the indicators cost per mile, cost per hour, cost per passenger, operating ratio, passengers per mile,

passengers per hour, and passengers per vehicle. The report lists each provider in peer groups determined by the type of operation provided (fixed-route, demand-responsive, special services). Transit agencies use the report to evaluate themselves with respect to other providers.

Pennsylvania

The Pennsylvania Department of Transportation (Penn DOT) has been providing technical, operating, and capital assistance for rural public transportation services since the early 1970s (14). In 1976, the Pennsylvania Legislature enacted the "Pennsylvania Rural and Intercity Common Carrier Transportation Assistance Act" (Act 10). Penn DOT was authorized by Act 10 to assure the continuation and improvement of rural and public transportation in Pennsylvania. In 1978, the Surface Transportation Assistance Act amended the Urban Mass Transportation Act of 1964 and added federal (Section 18) financial assistance to the existing Act 10 program in Pennsylvania.

The combined Section 18 and Act 10 program is administered by Penn DOT. Currently 18 transit systems, operating in 23 counties, are being assisted by the program. The Bureau of Transportation Division of Penn DOT published a statistical report (14) in February 1989 which provides service and performance data for each of these agencies. Statistics presented in the report represent data obtained from the 1987 and 1988 fiscal years. The following is a list of the performance indicators presented in Pennsylvania's Statistical Report.

- Total passengers per revenue vehicle hour
- Total passengers per revenue vehicle-mile
- Cost recovery ratio (operating expense per operating revenue)
- Expense per passenger trip, vehicle-mile, and vehicle hour
- Revenue per passenger trip, vehicle-mile, and vehicle hour
- Deficit per passenger trip, vehicle-mile, and vehicle hour
- Average speed

The Bureau of Transportation in Pennsylvania does not have a rural transit fund allocation formula based on performance measures. They do, however, use performance indicators for administrative purposes. Measures of cost effectiveness, including hourly and mileage expenses, are analyzed and evaluated periodically. The Department may suggest that changes be made (routing, scheduling, fares, marketing, etc.) to improve system performance (15).

Summary

A total of 15 states including Texas were contacted regarding their use of transit performance measures. The extent to which transit performance indicators are used by the states contacted in this study is indicated in Table A-1. The states that use performance measures typically rely on cost efficiency, cost effectiveness, and service utilization, along with some service descriptors. Performance measures of vehicle utilization, labor productivity, and accessibility are not currently used by any of the states contacted. Ohio is the only state which currently uses measures of service quality and safety. Texas transit agencies are now required by the Legislature to collect accident and breakdown rates which may be used as measures of service quality and safety when a complete year's worth of data is compiled.

Only four states contacted (Texas, Louisiana, Montana, and Indiana) currently use performance based fund allocation methods. Oregon discontinued using a formula due to dramatic shifts in passenger and mileage values. Michigan has an incentive bonus program to encourage transit providers to improve performance.

The purpose of any performance-based allocation procedure should be to give agencies of all sizes incentive to improve performance. The degree to which each state achieves this goal, however, is uncertain. Montana's formula, for example, does not consider cost effectiveness or service utilization. Louisiana's formula uses two service descriptors (passenger trips and vehicle-miles) but does not use any performance indicators. The allocation method used in Texas, on the other hand, uses three measures of performance

indicators as well as two demographic factors in order to distribute funds to rural transit agencies.

Some of the states contacted do not have a pre-set procedure or guideline for rural transit system evaluation and comparison. Michigan, for example, determines which performance indicators are important and which transit providers should be used for comparison depending on the objective of the evaluation. Table 4, therefore, may not credit each state with all of the indicators they may use for evaluation. It should also be noted that individual transit agencies may monitor their own performance and set their own goals and standards without guidelines from their State's DOT.

The use of peer groups for service comparison may be necessary if transit agencies have significantly different operations or service area characteristics. Transit providers should only be compared to similar agencies. However, administrators should be careful in the determination of peer groups and what constitutes a "similar" agency. Simply dividing agencies into operation groups (fixed-route, demand-responsive, etc.) may not provide fair comparisons since demographic and service characteristics may vary within these groups. Service area size, population characteristics, and service objectives may also be required in order to evaluate or compare an agency.

Table A-1. Summary of State Funding Formula and Performance Evaluation Variables

DEMOGRAPHIC FACTORS	<u>TX</u>	<u>FL</u>	<u>GA</u>	<u>IN</u>	<u>IA</u>	<u>LA</u>	<u>MI</u>	<u>MN</u>	<u>MT</u>	<u>NY</u>	<u>NC</u>	<u>OH</u>	<u>OK</u>	<u>OR</u>	<u>PA</u>
Population	F	F	-	-	-	-	-	-	F	-	F	-	-	F	-
Service Area	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SERVICE DESCRIPTORS															
Passenger Trips	-	-	-	-	P	F	-	-	F	-	-	-	P	F	-
Miles ¹	-	-	-	-	P	F	-	-	-	-	-	-	P	F	-
Net Public Debt	-	-	-	-	P	-	-	-	-	-	-	-	-	-	-
PERFORMANCE MEASURES															
<u>Cost Efficiency</u>															
Revenue Recovery Ratio	F	-	-	F	-	-	-	-	-	-	P	-	-	-	P
Derived Income	-	-	-	-	-	-	-	-	F	-	-	-	-	-	-
Cost per Mile	F	-	P ²	-	-	-	-	-	-	-	-	P	P	-	P
Cost per Hour	-	-	-	-	-	-	-	-	-	-	-	P	-	-	-
<u>Cost Effectiveness</u>															
Cost per Passenger	P	-	-	-	-	-	-	-	-	-	P	P	P	-	P
<u>Service Utilization</u>															
Passengers per Capita	F	-	-	F	-	-	-	-	-	-	-	-	-	-	-
Passengers per Mile	P	-	-	F	-	-	-	-	-	-	P ³	P	-	-	P
Passengers per Hour	-	-	-	-	-	-	-	-	-	-	P ³	P	-	-	-
<u>Vehicle Utilization</u>															
Miles per Vehicle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Quality</u>															
Average Speed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicle-Miles per Road Call	P ⁴	-	-	-	-	-	-	-	-	-	-	P	-	-	-
<u>Safety</u>															
Accidents per 100,000 Miles	P ⁴	-	-	-	-	-	-	-	-	-	-	P	-	-	-
<u>Labor Productivity</u>															
Miles per Employee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Passengers per Employee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<u>Accessibility</u>															
Vehicle-Miles per Capita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vehicle-Miles per Service Area Size	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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F - Used in a fund allocation formula

P - Used for performance evaluation

1 - Vehicle, Revenue, and/or Passenger Miles

2 - The Georgia DOT sets a cap on cost per vehicle-mile which transit providers must not exceed if state funding is received.

3 - North Carolina's Public Transportation Division requires that each transit route meet a baseline of 1.5 passengers per mile and 10 passengers per hour.

4 - Texas is now collecting accident and breakdown rates which can be used for measures of service quality and safety.

APPENDIX B

PEER GROUP IDENTIFIER COMPARISON

An analysis was performed to determine which peer identifier(s) would be the most useful for grouping purposes. The analysis procedure is summarized below.

Step 1

Before any standardized scores were calculated, peer identifiers were compared to performance indicators to determine if any relationship between them exists. For instance, vehicle utilization (vehicle-miles per vehicle) is probably not related to the population of the service area. For this reason, it would not be appropriate to use service area population as a peer identifier for vehicle utilization even if the standard scores appeared to be reasonable for that particular indicator.

Step 2

Standard scores for each performance indicator were calculated in all possible peer groups, and all in one group, to determine which peer identifier produced a considerable number of outliers (Tables B-1 through B-7). An outlier is a value which deviates from the sample mean to such an extent that it would be statistically improbable. For example, a contractor's standard score of 2.5 for one indicator (assuming a normal distribution) would imply that the agency performed better than 99.4 percent of the other contractors in the same peer group. One outlier for a performance indicator standard score within a particular peer group is acceptable. The presence of two outliers is less desirable, but not unacceptable. However, the presence of three or more outliers would give cause to question whether or not the peer identifier being considered is effectively grouping similar agencies. Since outliers may cause the appearance that one contractor is outstanding in a peer group while the rest are performing poorly, the analysis in step 3 was performed to minimize their presence.

Step 3

All calculated standard scores were summarized by performance measure (Tables B8 through B12). By performing this analysis, the overall effect of each peer identifier on standard scores could be determined. Peer group indicators which produced the greatest number of deviant scores relative to the other groups, or the highest occurrence of outliers, were dropped from further consideration. The scores calculated using all agencies in one group did not differ significantly from those calculated in peer groups.

The results of this analysis indicate that the use of peer groups for the Section 18 contractors is not necessary at this time. Of the possible peer group identifiers, fleet size appears to be the best alternative.

Table B-1. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Number of Vehicles.

Peer Group	Contractor Location	Number of Vehicles	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)		
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	
0-10	Cleburne	4	0.11	-0.80	0.43	-1.17	0.26	-0.18	13851	-0.52	0.61	-0.67	
	Columbus	5	0.12	-0.71	0.60	-0.54	0.20	-0.44	18768	0.13	9.09	0.31	
	Glen Rose	7	0.12	-0.71	0.82	0.26	0.15	-0.68	22476	0.63	34.12	3.21	
	Mineral Wells	7	0.25	0.68	1.16	1.50	0.22	-0.36	25928	1.09	6.97	0.06	
	Crowell	8	0.27	0.94	0.34	-1.50	0.80	2.23	5984	-1.58	1.50	-0.57	
	Sweetwater	8	0.30	1.24	0.52	-0.84	0.58	1.25	12867	-0.65	0.89	-0.64	
	Terrell	8	0.31	1.29	1.20	1.68	0.26	-0.19	9488	-1.11	11.93	0.64	
	Lufkin	9	0.32	1.46	0.69	-0.22	0.47	0.76	23944	0.83	3.15	-0.38	
	Alice	10	0.15	-0.35	0.83	0.31	0.18	-0.51	23034	0.71	4.87	-0.18	
	Aspermont	10	0.05	-1.44	0.77	0.07	0.07	-1.03	17430	-0.04	5.03	-0.16	
	Denton	10	0.16	-0.31	0.81	0.23	0.19	-0.46	21273	0.47	0.94	-0.64	
	San Angelo	10	0.25	0.65	0.40	-1.27	0.61	1.39	5440	-1.65	2.20	-0.49	
	Weatherford	10	0.11	-0.85	1.05	1.12	0.10	-0.87	30389	1.69	5.08	-0.16	
	AVERAGE			0.19		0.75		0.30		17761		6.42	
11-25	Kingsville	11	0.20	-0.25	0.62	-0.67	0.31	0.09	10595	-0.94	3.46	-0.40	
	Beeville	13	0.21	-0.10	0.58	-0.79	0.37	0.41	15533	-0.30	4.35	-0.37	
	Amarillo	14	0.04	-1.45	0.90	0.23	0.04	-1.44	29991	1.56	2.13	-0.45	
	Galveston	18	0.25	0.20	1.32	1.57	0.19	-0.60	22666	0.62	102.00	2.88	
	Lamesa	19	0.19	-0.30	0.38	-1.43	0.49	1.10	8790	-1.17	1.82	-0.46	
	Rio Grande City	20	0.33	0.76	0.76	-0.21	0.43	0.73	10449	-0.96	3.43	-0.40	
	McAllen	21	0.43	1.58	1.37	1.74	0.31	0.10	33164	1.97	47.19	1.06	
	Uvalde	21	0.13	-0.79	1.03	0.66	0.12	-1.00	13485	-0.57	4.82	-0.36	
	Conroe	22	0.47	1.85	0.68	-0.46	0.68	2.18	23074	0.67	3.18	-0.41	
	Levelland	22	0.09	-1.07	0.56	-0.88	0.16	-0.78	16647	-0.16	3.69	-0.39	
	Denison	23	0.15	-0.63	0.67	-0.52	0.22	-0.44	14789	-0.40	6.00	-0.32	
	Victoria	24	0.25	0.20	1.06	0.76	0.24	-0.34	15464	-0.31	3.80	-0.39	
	AVERAGE			0.23		0.83		0.30		17887		15.49	
	26+	Crosbyton	32	0.14	-1.11	0.93	1.14	0.15	-0.99	13819	-0.41	7.82	0.39
San Saba		44	0.23	1.14	0.56	-1.29	0.41	1.37	9969	-1.20	4.92	-1.11	
Bryan		48	0.20	0.47	0.78	0.15	0.26	-0.00	20878	1.04	6.19	-0.46	
Austin		66	0.17	-0.49	0.76	-0.00	0.22	-0.38	18513	0.56	9.34	1.18	
AVERAGE				0.19		0.76		0.26		15795		7.07	

Table B-2. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Passenger Trips.

Peer Group	Contractor Location	Passenger Trips	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
0-25,000	Aspermont	11,358	0.05	-0.82	0.77	0.09	0.07	-1.20	17,430	-0.01	5.03	-0.41
	Cleburne	14,231	0.11	-0.14	0.43	-1.17	0.26	0.97	13,851	-0.51	0.61	-0.78
	Columbus	18,642	0.12	-0.04	0.60	-0.53	0.20	0.31	18,768	0.18	0.91	-0.75
	Amarillo	18,805	0.04	-0.94	0.90	0.59	0.04	-1.43	29,991	1.74	2.13	-0.65
	Terrell	19,306	0.31	2.10	1.20	1.72	0.26	0.95	9,488	-1.12	11.93	0.16
	Glen Rose	22,887	0.12	-0.04	0.82	0.28	0.15	-0.30	22,476	0.69	34.12	2.01
	AVERAGE		0.12		0.74		0.17		17,502		9.96	
25,000-25,000	Weatherford	30,671	0.11	-1.22	1.05	1.00	0.10	-0.93	30,389	1.69	5.08	-0.21
	San Angelo	33,288	0.25	0.91	0.40	-1.29	0.61	1.53	5,440	-1.56	2.20	-0.32
	Uvalde	34,292	0.13	-0.94	1.03	0.93	0.12	-0.84	13,485	-0.51	4.82	-0.22
	Kingsville	36,653	0.20	0.13	0.62	-0.52	0.31	0.09	10,595	-0.89	3.46	-0.27
	Beeville	36,653	0.21	0.42	0.58	-0.66	0.37	0.36	15,533	-0.25	4.35	-0.24
	Crowell	38,440	0.27	1.33	0.34	-1.50	0.80	2.44	5,984	-1.49	1.50	-0.35
	Mineral Wells	39,257	0.25	0.96	1.16	1.37	0.22	-0.38	25,928	1.11	6.97	-0.14
	Denton	41,138	0.16	-0.45	0.81	0.16	0.19	-0.49	21,273	0.50	0.94	-0.37
	Alice	42,319	0.15	-0.51	0.83	0.23	0.18	-0.54	23,034	0.73	4.87	-0.22
	Levelland	58,929	0.09	-1.48	0.56	-0.75	0.16	-0.65	16,647	-0.10	3.69	-0.27
	Sweetwater	59,668	0.30	1.75	0.52	-0.87	0.58	1.37	12,867	-0.59	0.89	-0.38
	Crosbyton	67,270	0.14	-0.67	0.93	0.58	0.15	-0.69	13,819	-0.47	7.82	-0.10
	Galveston	71,234	0.25	1.00	1.32	1.93	0.19	-0.50	22,666	0.68	102.00	3.60
	Denison	74,951	0.15	-0.61	0.67	-0.36	0.22	-0.36	14,789	-0.34	6.00	-0.17
AVERAGE		0.19		0.77		0.58		17,422		10.43		
75,000+	Lamesa	82,003	0.19	-0.94	0.38	-1.40	0.49	0.67	8,790	-1.18	1.82	-0.51
	Victoria	87,904	0.25	-0.33	1.06	0.98	0.24	-1.03	15,464	-0.35	3.80	-0.38
	Rio Grande City	89,043	0.33	0.36	0.76	-0.07	0.43	0.24	10,449	-0.98	3.43	-0.40
	Lufkin	101,430	0.32	0.34	0.69	-0.33	0.47	0.53	23,944	0.71	3.15	-0.42
	San Saba	181,478	0.23	-0.53	0.56	-0.79	0.41	0.16	9,969	-1.04	4.92	-0.30
	McAllen	220,465	0.43	1.34	1.37	2.05	0.31	-0.51	33,164	1.86	47.19	2.64
	Bryan	262,167	0.20	-0.78	0.78	-0.01	0.26	-0.86	20,878	0.33	6.19	-0.21
	Austin	270,250	0.17	-1.13	0.76	-0.09	0.22	-1.14	18,513	0.03	9.34	0.01
	Conroe	345,586	0.47	1.67	0.68	-0.35	0.68	1.95	23,074	0.60	3.18	-0.42
	AVERAGE		0.29		0.78		0.39		18,249		9.22	

Table B-3. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Vehicle-Miles.

Peer Group	Contractor Location	Vehicle Miles	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
0-125,000	Eagle Pass	35579	0.08	-1.35	0.85	0.81	0.10	-1.20	17,790	1.20	3.52	0.11
	Crowell	47873	0.27	0.76	0.34	-0.99	0.80	1.69	5,984	-1.19	1.50	-0.44
	San Angelo	54401	0.25	0.46	0.40	-0.77	0.61	0.91	5,440	-1.30	2.20	-0.25
	Cleburne	55405	0.11	-1.03	0.43	-0.67	0.26	-0.54	13,851	0.41	0.61	-0.67
	Terrell	75904	0.31	1.13	1.20	2.05	0.26	-0.55	9,488	-0.48	11.93	2.36
	Columbus	93842	0.12	-0.94	0.60	-0.07	0.20	-0.78	18,768	1.40	0.91	-0.59
	Sweetwater	102934	0.30	1.07	0.52	-0.36	0.58	0.78	12,867	0.21	0.89	-0.60
	Kingsville	116542	0.20	-0.10	0.62	-0.00	0.31	-0.31	10,595	-0.25	3.46	0.09
	AVERAGE		0.20		0.62		0.39		11,848		3.13	
125,000-400,000	Glen Rose	157355	0.12	-0.71	0.82	0.10	0.15	-0.70	22,476	0.64	34.12	3.41
	Lamesa	167018	0.19	0.11	0.38	-1.89	0.49	1.78	8,790	-1.59	1.82	-0.55
	Aspermont	174296	0.05	-1.52	0.77	-0.13	0.07	-1.27	17,430	-0.18	5.03	-0.15
	Mineral Wells	181496	0.25	0.85	1.16	1.63	0.22	-0.19	25,928	1.20	6.97	0.08
	Beeville	201935	0.21	0.42	0.58	-0.99	0.37	0.91	15,533	-0.49	4.35	-0.24
	Rio Grande City	208982	0.33	1.74	0.76	-0.16	0.43	1.32	10,449	-1.32	3.43	-0.35
	Denton	212727	0.16	-0.25	0.81	0.07	0.19	-0.36	21,273	0.44	0.94	-0.66
	Lufkin	215492	0.32	1.71	0.69	-0.49	0.47	1.62	23,944	0.88	3.15	-0.39
	Alice	230335	0.15	-0.30	0.83	0.16	0.18	-0.42	23,034	0.73	4.87	-0.17
	Uvalde	283175	0.13	-0.64	1.03	1.06	0.12	-0.87	13,485	-0.82	4.82	-0.18
	Weatherford	303886	0.11	-0.85	1.05	1.15	0.10	-1.02	30,389	1.93	5.08	-0.15
	Levelland	336242	0.09	-1.06	0.56	-1.10	0.16	-0.59	16,647	-0.31	3.69	-0.32
	Denison	340151	0.15	-0.38	0.67	-0.61	0.22	-0.16	14,789	-0.61	6.00	-0.04
	Victoria	371126	0.25	0.87	1.06	1.20	0.24	-0.04	15,464	-0.50	3.80	-0.30
	AVERAGE		0.18		0.80		0.24		18,545		6.29	
400,000	Galveston	407982	0.25	0.07	1.32	1.39	0.19	-0.48	22,666	0.15	102.00	2.25
	Amarillo	419871	0.04	-1.41	0.90	-0.04	0.04	-1.24	29,991	1.10	2.13	-0.59
	San Saba	438614	0.23	-0.07	0.56	-1.22	0.41	0.67	9,969	-1.50	4.92	-0.51
	Crosbyton	442220	0.14	-0.69	0.93	0.07	0.15	-0.68	13,819	-1.00	7.82	-0.43
	Conroe	507617	0.47	1.56	0.68	-0.79	0.68	2.04	23,074	0.20	3.18	-0.56
	McAllen	696451	0.43	1.32	1.37	1.57	0.31	0.15	33,164	1.52	47.19	0.69
	Bryan	1002148	0.20	-0.26	0.78	-0.45	0.26	-0.12	20,878	-0.08	6.19	-0.47
	Austin	1221872	0.17	-0.52	0.76	-0.53	0.22	-0.33	18,513	-0.39	9.34	-0.38
	AVERAGE		0.24		0.91		0.29		21,509		22.85	

Table B-4. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Service Area Population.

Peer Group	Contractor Location	Service Area Population	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
0-50,000	Galveston	4000	0.25	0.48	1.32	1.36	0.19	-0.50	22666	0.67	102.00	2.79
	Glen Rose	4612	0.12	-0.87	0.82	-0.01	0.15	-0.72	22476	0.64	34.12	0.48
	Terrell	6361	0.16	-0.48	1.20	1.06	0.13	-0.79	9488	-0.84	11.93	-0.27
	McAllen	14759	0.43	2.29	1.37	1.51	0.31	0.08	33164	1.87	47.19	0.93
	San Angelo	24711	0.25	0.43	0.40	-1.17	0.61	1.47	5440	-1.31	2.20	-0.60
	Mineral Wells	26037	0.25	0.46	1.16	0.92	0.22	-0.38	25928	1.04	6.97	-0.44
	Crowell	32001	0.27	0.70	0.34	-1.34	0.80	2.37	5984	-1.25	1.50	-0.62
	Kingsville	33658	0.20	-0.10	0.62	-0.57	0.31	0.08	10595	-0.72	3.46	-0.56
	Aspermont	34632	0.05	-1.57	0.77	-0.15	0.07	-1.09	17430	0.07	5.03	-0.50
	Beeville	46464	0.21	0.10	0.58	-0.68	0.37	0.33	15533	-0.15	4.35	-0.53
Alice	47289	0.15	-0.52	0.83	0.02	0.18	-0.54	23034	0.71	4.87	-0.51	
	AVERAGE		0.20		0.82		0.30		16854		19.88	
50,000-100,000	Crosbyton	56526	0.14	-0.48	0.93	0.83	0.15	-0.85	13819	-0.40	7.82	1.97
	Denison	56683	0.15	-0.43	0.67	-0.30	0.22	-0.37	14789	-0.27	6.00	1.05
	Uvalde	58804	0.13	-0.70	1.03	1.24	0.12	-1.07	13485	-0.45	4.82	0.45
	Weatherford	59830	0.11	-0.92	1.05	1.33	0.10	-1.21	30389	1.91	5.08	0.59
	Rio Grande City	60846	0.33	1.74	0.76	0.12	0.43	1.10	10449	-0.87	3.43	-0.24
	Lufkin	68494	0.32	1.71	0.69	-0.19	0.47	1.40	23944	1.01	3.15	-0.39
	San Saba	89156	0.23	0.60	0.56	-0.74	0.41	1.01	9989	-0.94	4.92	0.51
	Cleburne	90314	0.11	-0.87	0.43	-1.28	0.26	-0.10	13851	-0.40	0.61	-1.67
	Levelland	91238	0.09	-1.13	0.56	-0.76	0.16	-0.79	16647	-0.01	3.69	-0.12
	Lamesa	91629	0.19	0.07	0.38	-1.48	0.49	1.56	8790	-1.10	1.82	-1.06
Victoria	97608	0.25	0.85	1.06	1.38	0.24	-0.24	15464	-0.17	3.80	-0.06	
	AVERAGE		0.18		0.74		0.27		16707		3.92	
100,000+	Columbus	103320	0.12	-0.58	0.60	-0.65	0.20	-0.49	18768	-0.38	0.91	-0.76
	Sweetwater	115130	0.92	2.04	2.22	2.24	0.58	1.17	12867	-1.52	0.89	-0.76
	Austin	130763	0.17	-0.42	0.76	-0.37	0.22	-0.40	18513	-0.43	9.34	1.84
	Conroe	159696	0.47	0.56	0.68	-0.50	0.68	1.61	23074	0.44	3.18	-0.06
	Bryan	161991	0.20	-0.30	0.78	-0.33	0.26	-0.21	20878	0.02	6.19	0.87
	Amarillo	197484	0.04	-0.84	0.90	-0.12	0.04	-1.16	29991	1.77	2.13	-0.38
	Denton	226970	0.16	-0.46	0.81	-0.27	0.19	-0.51	21273	0.10	0.94	-0.75
	AVERAGE		0.30		0.97		0.31		20766		3.37	

Table B-5. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Service Area Size.

Peer Group	Contractor Location	Service Area	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
0-2000	Glen Rose	188	0.12	-0.90	0.82	-0.29	0.15	-0.71	22,476	0.15	34.12	0.54
	Cleburne	731	0.11	-0.97	0.43	-1.70	0.26	-0.07	13,851	-1.31	0.61	-0.53
	Terrell	788	0.31	0.71	1.20	1.10	0.26	-0.08	9,488	-2.05	11.93	-0.17
	Lufkin	807	0.32	0.84	0.69	-0.76	0.47	1.14	23,944	0.39	3.15	-0.45
	Weatherford	902	0.11	-1.01	1.05	0.55	0.10	-0.96	30,389	1.48	5.08	-0.39
	Denton	911	0.16	-0.57	0.81	-0.32	0.19	-0.44	21,273	-0.06	0.94	-0.52
	Mineral Wells	949	0.25	0.22	1.16	0.93	0.22	-0.30	25,928	0.73	6.97	-0.33
	Conroe	1047	0.47	2.06	0.68	-0.78	0.68	2.35	23,074	0.25	3.18	-0.45
	Galveston	1806	0.25	0.24	1.32	1.51	0.19	-0.44	22,666	0.18	102.00	2.70
	Alice	1809	0.15	-0.61	0.83	-0.24	0.18	-0.49	23,034	0.24	4.87	-0.40
	AVERAGE		0.22		0.90		0.27		21,612		17.28	
2000-7500	Kingsville	2242	0.20	-0.17	0.62	-0.42	0.31	-0.04	10,595	-0.69	3.46	-0.33
	Denison	2722	0.15	-0.65	0.67	-0.26	0.22	-0.53	14,789	-0.10	6.00	-0.13
	McAllen	3063	0.43	2.18	1.37	2.21	0.31	-0.03	33,164	2.52	47.19	3.13
	Columbus	3220	0.12	-0.92	0.60	-0.48	0.20	-0.64	18,768	0.47	0.91	-0.53
	Beeville	7534	0.21	0.02	0.58	-0.56	0.37	0.25	15,533	0.01	4.35	-0.26
	Crowell	4095	0.27	0.62	0.34	-1.40	0.80	2.51	5,984	-1.35	1.50	-0.49
	Rio Grande City	5156	0.33	1.13	0.76	0.08	0.43	0.55	10,449	-0.71	3.43	-0.33
	Aspermont	5392	0.05	-1.61	0.77	0.10	0.07	-1.34	17,430	0.28	5.03	-0.21
	Crosbyton	5675	0.14	-0.69	0.93	0.68	0.15	-0.88	13,819	-0.24	7.82	0.02
	Bryan	5866	0.20	-0.07	0.78	0.15	0.26	-0.31	20,878	0.77	6.25	-0.11
	Victoria	6079	0.25	0.40	1.06	1.14	0.24	-0.44	15,464	-0.00	3.80	-0.30
	Lamesa	6966	0.19	-0.24	0.38	-1.25	0.49	0.88	8,790	-0.95	1.82	-0.46
		AVERAGE		0.21		0.74		0.32		15,472		7.63
7500+	Austin	7534	0.17	-0.05	0.76	0.36	0.22	-0.38	18,513	0.42	9.34	1.92
	Sweetwater	7854	0.30	1.39	0.52	-0.68	0.58	1.20	12,867	-0.31	0.89	-1.11
	Levelland	7892	0.09	-0.88	0.56	-0.53	0.16	-0.64	16,647	0.18	3.69	-0.11
	San Saba	8438	0.23	0.64	0.56	-0.51	0.41	0.47	9,969	-0.68	4.92	0.33
	San Angelo	8613	0.25	0.80	0.40	-1.20	0.61	1.34	5,440	-1.26	2.20	-0.64
	Uvalde	9862	0.13	-0.50	1.03	1.57	0.12	-0.82	13,485	-0.23	4.82	0.29
	Amarillo	25712	0.04	-1.40	0.90	0.99	0.04	-1.15	29,991	1.89	2.13	-0.67
	AVERAGE		0.17		0.68		0.31		15,273		4.00	

Table B-6. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. Peer Grouped by Population Density.

Peer Group	Contractor Location	Population Density	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessibility (Miles per Capita)	
			Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
0-10	Galveston	2.21	0.25	0.35	1.32	1.08	0.19	-0.36	22,666	0.59	102.00	2.42
	San Angelo	2.87	0.25	0.30	0.40	-1.41	0.61	1.27	5,440	-1.14	2.20	-0.54
	McAllen	4.82	0.43	1.74	1.37	1.23	0.31	0.12	33,164	1.64	47.19	0.79
	Uvalde	5.96	0.13	-0.65	1.03	0.31	0.12	-0.63	13,485	-0.34	4.82	-0.47
	Aspermont	6.42	0.05	-1.23	0.77	-0.41	0.07	-0.85	17,430	0.06	5.03	-0.46
	Amarillo	7.68	0.04	-1.30	0.90	-0.05	0.04	-0.93	29,991	1.32	2.13	-0.54
	Crowell	7.81	0.27	0.52	0.34	-1.57	0.80	2.00	5,984	-1.09	1.50	-0.56
	Terrell	8.07	0.31	0.78	1.20	0.78	0.26	-0.11	9,488	-0.74	11.93	-0.25
	Crosbyton	9.96	0.14	-0.51	0.93	0.04	0.15	-0.51	13,819	-0.30	7.82	-0.38
	AVERAGE			0.21		0.92		0.28		16,830		20.51
10-50	San Saba	10.57	0.23	0.50	0.56	-0.74	0.41	0.90	9,969	-1.21	4.92	-0.18
	Levelland	11.56	0.09	-1.59	0.56	-0.76	0.16	-1.03	16,647	0.06	3.69	-0.33
	Rio Grande City	11.80	0.33	1.90	0.76	0.26	0.43	1.00	10,449	-1.12	3.43	-0.36
	Beeville	12.00	0.21	0.25	0.58	-0.63	0.37	0.56	15,533	-0.15	4.35	-0.25
	Lamesa	13.15	0.19	-0.14	0.38	-1.60	0.49	1.48	8,790	-1.43	1.82	-0.56
	Sweetwater	14.66	0.30	1.55	0.52	-0.93	0.58	2.17	12,867	-0.66	0.89	-0.68
	Kingsville	15.01	0.20	-0.03	0.62	-0.44	0.31	0.14	10,595	-1.09	3.46	-0.36
	Victoria	16.06	0.25	0.81	1.06	1.72	0.24	-0.45	15,464	-0.16	3.80	-0.31
	Austin	17.36	0.17	-0.44	0.76	0.23	0.22	-0.57	16,513	0.42	9.34	0.38
	Denison	20.82	0.15	-0.75	0.67	-0.22	0.22	-0.58	14,789	-0.29	6.00	-0.04
	Glen Rose	24.53	0.12	-1.16	0.82	0.53	0.15	-1.15	22,476	1.17	34.12	3.47
	Alice	26.14	0.15	-0.65	0.83	0.60	0.18	-0.85	23,034	1.28	4.87	-0.18
	Bryan	27.33	0.20	0.11	0.78	0.34	0.26	-0.26	20,878	0.87	6.25	-0.01
	Mineral Wells	27.44	0.25	0.78	1.16	2.17	0.22	-0.61	25,928	1.83	6.97	0.08
	Columbus	32.09	0.12	-1.15	0.60	-0.53	0.20	-0.74	18,768	0.47	0.91	-0.68
AVERAGE			0.20		0.71		0.30		16,313		6.32	
50+	Weatherford	66.33	0.11	-0.80	1.05	1.41	0.10	-1.02	30,389	1.33	5.08	1.35
	Lufkin	84.87	0.32	0.58	0.69	-0.20	0.47	0.55	23,944	0.24	3.15	0.30
	Cleburne	123.55	0.11	-0.77	0.43	-1.34	0.26	-0.36	13,851	-1.46	0.61	-1.08
	Conroe	152.53	0.47	1.48	0.68	-0.22	0.68	1.46	23,074	0.10	3.18	0.32
	Denton	249.14	0.16	-0.48	0.81	0.35	0.19	-0.63	21,273	-0.21	0.94	-0.90
	AVERAGE			0.23		0.73		0.34		22,506		2.59

Table B-7. 1988 Performance Indicator Values and Corresponding Standard Scores for Section 18 Contractors. All Contractors in One Group.

Peer Group	Contractor Location	Cost Effectiveness (Passengers per Dollar)		Cost Efficiency (Miles per Dollar)		Service Utilization (Passengers per Mile)		Vehicle Utilization (Miles per Vehicle)		Accessability (Miles per Capita)	
		Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
None	Alice	0.15	-0.47	0.83	0.19	0.18	-0.58	23,034	0.77	4.87	-0.26
	Amarillo	0.04	-1.56	0.90	0.44	0.04	-1.31	29,991	1.74	2.13	-0.40
	Aspermont	0.05	-1.46	0.77	-0.05	0.07	-1.20	17,430	-0.02	5.03	-0.26
	Austin	0.17	-0.34	0.76	-0.09	0.22	-0.38	18,513	0.14	9.34	-0.04
	Beeville	0.21	0.12	0.58	-0.74	0.37	0.40	15,533	-0.28	4.35	-0.29
	Bryan	0.20	0.02	0.78	-0.00	0.26	-0.16	20,878	0.47	6.19	-0.20
	Cleburne	0.11	-0.88	0.43	-1.29	0.26	-0.19	13,851	-0.52	0.61	-0.48
	Columbus	0.12	-0.80	0.60	-0.66	0.20	-0.50	18,768	0.17	9.09	-0.05
	Conroe	0.47	2.53	0.68	-0.36	0.68	2.04	23,074	0.77	3.18	-0.35
	Crosbyton	0.14	-0.57	0.93	0.56	0.15	-0.74	13,819	-0.52	7.82	-0.12
	Crowell	0.27	0.69	0.34	-1.62	0.80	2.68	5,984	-1.62	1.50	-0.43
	Denison	0.15	-0.54	0.67	-0.43	0.22	-0.38	14,789	-0.39	6.00	-0.21
	Denton	0.16	-0.44	0.81	0.11	0.19	-0.53	21,273	0.52	0.94	-0.46
	Eagle Pass	0.08	-1.16	0.85	0.26	0.10	-1.04	17,790	0.03	3.52	-0.33
	Galveston	0.25	0.48	1.32	1.97	0.19	-0.53	22,666	0.72	102.00	4.62
	Glen Rose	0.12	-0.80	0.82	0.14	0.15	-0.78	22,476	0.69	34.12	1.21
	Kingsville	0.20	-0.07	0.62	-0.59	0.31	0.11	10,595	-0.98	3.46	-0.34
	Lamesa	0.19	-0.14	0.38	-1.47	0.49	1.04	8,790	-1.23	1.82	-0.42
	Levelland	0.09	-1.09	0.56	-0.83	0.16	-0.70	16,647	-0.13	3.69	-0.32
	Lufkin	0.32	1.16	0.69	-0.34	0.47	0.93	23,944	0.90	3.15	-0.35
	McAllen	0.43	2.19	1.37	2.17	0.31	0.11	33,164	2.19	47.19	1.86
	Mineral Wells	0.25	0.46	1.16	1.38	0.22	-0.41	25,928	1.18	6.97	-0.16
	Rio Grande City	0.33	1.18	0.76	-0.07	0.43	0.70	10,449	-1.00	3.43	-0.34
	San Angelo	0.25	0.43	0.40	-1.40	0.61	1.68	5,440	-1.70	2.20	-0.40
	San Saba	0.23	0.28	0.56	-0.82	0.41	0.64	9,969	-1.06	4.92	-0.26
	Sweetwater	0.30	0.96	0.52	-0.96	0.58	1.51	12,867	-0.66	0.89	-0.47
	Terrell	0.31	1.01	1.20	1.56	0.26	-0.20	9,488	-1.13	11.93	0.09
	Uvalde	0.13	-0.74	1.03	0.92	0.12	-0.91	13,485	-0.57	4.82	-0.27
	Victoria	0.25	0.48	1.06	1.04	0.24	-0.29	15,464	-0.29	3.80	-0.32
	Weatherford	0.11	-0.92	1.05	1.00	0.10	-1.01	30,389	1.80	5.08	-0.25
	AVERAGE	0.20		0.78		0.29		17,550		10.13	

Table B-8. 1988 Standard Scores for Cost Effectiveness
(Passenger Trips per Dollar) by Peer Group

Contractor Location	Number of Vehicles	Vehicle Miles	Passenger Trips	Service Area Population	Service Area Size	Population Density	No Peer Group
Alice	-0.35	-0.30	-0.51	-0.52	-0.61	-0.65	-0.47
Amarillo	-1.45	-1.41	-0.94	-0.84	-1.40	-1.30	-1.56
Aspermont	-1.44	-1.52	0.82	-1.57	-1.61	-1.23	-1.46
Austin	-0.49	-0.52	-1.13	-0.42	-0.05	-0.44	-0.34
Beeville	-0.10	0.42	0.42	0.10	0.02	0.25	0.12
Bryan	0.47	-0.26	-0.78	-0.30	-0.07	0.11	0.02
Cleburne	-0.80	-1.03	-0.14	-0.87	-0.97	-0.77	-0.88
Columbus	-0.71	-0.94	0.04	-0.58	-0.92	-1.15	-0.80
Conroe	1.85	1.56	1.67	0.56	2.06	1.48	2.53
Crosbyton	-1.11	-0.69	-0.67	-0.48	-0.69	-0.51	-0.57
Crowell	0.94	0.76	1.33	0.70	0.62	0.52	0.69
Denison	-0.63	-0.38	-0.61	-0.43	-0.65	-0.75	-0.54
Denton	-0.31	-0.25	-0.45	-0.46	-0.57	-0.48	-0.44
Galveston	0.20	0.07	1.00	0.48	0.24	0.35	0.48
Glen Rose	-0.71	-0.71	-0.04	-0.87	-0.90	-1.16	-0.80
Kingsville	-0.25	-0.10	0.13	-0.10	-0.17	-0.03	-0.07
Lamesa	-0.30	0.11	-0.94	0.07	-0.24	-0.14	-0.14
Levelland	-1.07	-1.06	-1.48	-1.13	-0.88	-1.59	-1.09
Lufkin	1.46	1.71	0.34	1.71	0.84	0.58	1.16
McAllen	1.58	1.32	1.34	2.29	2.18	1.74	2.19
Mineral Wells	0.68	0.85	0.96	0.46	0.22	0.78	0.46
Rio Grande City	0.76	1.74	0.36	1.74	1.13	1.90	1.18
San Angelo	0.65	0.46	0.91	0.43	0.80	0.30	0.43
San Saba	1.14	-0.07	-0.53	0.60	0.64	0.50	0.28
Sweetwater	1.24	1.07	1.72	2.04	1.39	1.55	0.96
Terrell	1.29	1.13	2.10	-0.48	0.71	0.78	1.01
Uvalde	-0.79	-0.64	-0.94	-0.70	-0.50	-0.65	-0.74
Victoria	0.20	0.87	-0.33	0.85	0.40	0.81	0.48
Weatherford	-0.85	-0.85	-1.22	-0.92	-1.01	-0.80	-0.92

Table B-9. 1988 Standard Scores for Cost Efficiency
(Vehicle-Miles per Dollar) by Peer Group

Contractor Location	Number of Vehicles	Vehicle Miles	Passenger Trips	Service Area Population	Service Area Size	Population Density	No Peer Group
Alice	0.31	0.16	0.23	0.02	-0.24	0.60	0.19
Amarillo	0.23	-0.04	0.59	-0.12	0.99	-0.05	0.44
Aspermont	0.07	-0.13	0.09	-0.15	0.10	-0.41	-0.05
Austin	0.00	-0.53	-0.09	-0.37	0.36	0.23	-0.09
Beeville	-0.79	-0.99	-0.66	-0.68	-0.56	-0.63	-0.74
Bryan	0.15	-0.45	-0.01	-0.33	0.15	0.34	0.00
Cleburne	-1.17	-0.67	-1.17	-1.28	-1.70	-1.34	-1.29
Columbus	-0.54	-0.07	-0.53	-0.65	-0.48	-0.53	-0.66
Conroe	-0.46	-0.79	-0.35	-0.50	-0.78	-0.22	-0.36
Crosbyton	1.14	0.07	0.58	0.83	0.68	0.04	0.56
Crowell	-1.50	-0.99	-1.50	-1.34	-1.40	-1.57	-1.62
Denison	-0.52	-0.61	-0.36	-0.30	-0.26	-0.22	-0.43
Denton	0.23	0.07	0.16	-0.27	-0.32	0.35	0.11
Galveston	1.57	1.39	1.93	1.36	1.51	1.08	1.96
Glen Rose	0.26	0.10	0.28	-0.01	-0.29	0.53	0.14
Kingsville	-0.67	0.00	-0.52	-0.57	-0.42	-0.44	-0.59
Lamesa	-1.43	-1.89	-1.40	-1.48	-1.25	-1.60	-1.47
Levelland	-0.88	-1.10	-0.75	-0.76	-0.53	-0.76	-0.83
Lufkin	-0.22	-0.49	-0.33	-0.19	-0.76	-0.20	-0.34
McAllen	1.74	1.57	2.05	1.51	2.21	1.23	2.17
Mineral Wells	1.50	1.63	1.37	0.92	0.93	2.17	1.38
Rio Grande City	-0.21	-0.16	-0.07	0.12	0.08	0.26	-0.07
San Angelo	-1.27	-0.77	-1.29	-1.17	-1.20	-1.41	-1.40
San Saba	-1.29	-1.22	-0.79	-0.74	-0.51	-0.74	-0.82
Sweetwater	-0.84	-0.36	-0.87	2.24	-0.68	-0.93	-0.96
Terrell	1.68	2.05	1.72	1.06	1.10	0.78	1.56
Uvalde	0.66	1.06	0.93	1.24	1.57	0.31	0.92
Victoria	0.76	1.20	0.98	1.38	1.14	1.72	1.04
Weatherford	1.12	1.15	1.00	1.33	0.55	1.41	1.00

Table B-10. 1988 Standard Scores for Service Utilization
(Passenger Trips per Mile) by Peer Group

Location	Number of Vehicles	Vehicle Miles	Passenger Trips	Service Area Population	Service Area Size	Population Density	No Peer Group
Alice	-0.51	-0.42	-0.54	-0.54	-0.49	-0.85	-0.58
Amarillo	-1.44	-1.24	-1.43	-1.16	-1.15	-0.93	-1.31
Aspermont	-1.03	-1.27	-1.20	-1.09	-1.34	-0.85	-1.20
Austin	-0.38	-0.33	1.14	-0.40	-0.38	-0.57	-0.38
Beeville	0.41	0.91	0.36	0.33	0.25	0.56	0.40
Bryan	0.00	-0.12	-0.86	-0.21	-0.31	-0.26	-0.16
Cleburne	-0.18	-0.54	0.97	-0.10	-0.07	-0.36	-0.19
Columbus	-0.44	-0.78	0.31	-0.49	-0.64	-0.74	-0.50
Conroe	2.18	2.04	1.95	1.61	2.35	1.46	2.04
Crosbyton	-0.99	-0.68	-0.69	-0.85	-0.88	-0.51	-0.74
Crowell	2.23	1.69	2.44	2.37	2.51	2.00	2.68
Denison	-0.44	-0.16	-0.36	-0.37	-0.53	-0.58	-0.38
Denton	-0.46	-0.36	-0.49	-0.51	-0.44	-0.63	-0.53
Galveston	-0.60	-0.48	-0.50	-0.50	-0.44	-0.36	-0.53
Glen Rose	-0.68	-0.70	-0.30	-0.72	-0.71	-1.15	-0.78
Kingsville	0.09	-0.31	0.09	0.08	-0.04	0.14	0.11
Lamesa	1.10	1.78	0.67	1.56	0.88	1.48	1.04
Levelland	-0.78	-0.59	-0.65	-0.79	-0.64	-1.03	-0.70
Lufkin	0.76	1.62	0.53	1.40	1.14	0.55	0.93
McAllen	0.10	0.15	-0.51	0.08	-0.03	0.12	0.11
Mineral Wells	-0.36	-0.19	-0.38	-0.38	-0.30	-0.61	-0.41
Rio Grande City	0.73	1.32	0.24	1.10	0.55	1.00	0.70
San Angelo	1.39	0.91	1.53	1.47	1.34	1.27	1.68
San Saba	1.37	0.67	0.16	1.01	0.47	0.90	0.64
Sweetwater	1.25	0.78	1.37	1.17	1.20	2.17	1.51
Terrell	-0.19	-0.55	0.95	-0.79	-0.08	-0.11	-0.20
Uvalde	-0.10	-0.87	-0.84	-1.07	-0.82	-0.63	-0.91
Victoria	-0.34	-0.04	-1.03	-0.24	-0.44	-0.45	-0.29
Weatherford	-0.87	-1.02	-0.93	-1.21	-0.96	-1.02	-1.01

Table B-11. 1988 Standard Scores for Vehicle Utilization
(Vehicle-Miles per Vehicle) by Peer Group

Contractor Location	Number of Vehicles	Vehicle Miles	Passenger Trips	Service Area Population	Service Area Size	Population Density	No Peer Group
Alice	0.71	0.73	0.73	0.71	0.24	1.28	0.77
Amarillo	1.56	1.10	1.74	1.77	1.89	1.32	1.74
Aspermont	-0.04	-0.18	-0.01	0.07	0.28	0.06	-0.02
Austin	0.56	-0.39	0.03	-0.43	0.42	0.42	0.14
Beeville	-0.30	-0.49	-0.25	-0.15	0.01	-0.15	-0.28
Bryan	1.04	-0.08	0.33	0.02	0.77	0.87	0.47
Cleburne	-0.52	0.41	-0.51	-0.40	-1.31	-1.46	-0.52
Columbus	0.13	1.40	0.18	-0.38	0.47	0.47	0.17
Conroe	0.67	0.20	0.60	0.44	0.25	0.10	0.77
Crosbyton	-0.41	-1.00	-0.47	-0.40	-0.24	-0.30	-0.52
Crowell	-1.58	-1.19	-1.49	-1.25	-1.35	-1.09	-1.62
Denison	-0.40	-0.61	-0.34	-0.27	-0.10	-0.29	-0.39
Denton	0.47	0.44	0.50	0.10	-0.06	-0.21	-0.52
Galveston	0.62	0.15	0.68	0.67	0.18	0.59	0.72
Glen Rose	0.63	0.64	0.69	0.64	0.15	1.17	0.69
Kingsville	-0.94	-0.25	-0.89	-0.72	-0.69	-1.09	-0.98
Lamesa	-1.17	-1.59	-1.18	-1.10	-0.95	-1.43	-1.23
Levelland	-0.16	-0.31	-0.10	-0.01	0.18	0.06	-0.13
Lufkin	0.83	0.88	0.71	1.01	0.39	0.24	0.90
McAllen	1.97	1.52	1.86	1.87	2.52	1.64	2.19
Mineral Wells	1.09	1.20	1.11	1.04	0.73	1.83	1.18
Rio Grande City	-0.96	-1.32	-0.98	-0.87	-0.71	-1.12	-1.00
San Angelo	-1.65	-1.30	-1.56	-1.31	-1.26	-1.14	-1.70
San Saba	-1.20	-1.50	-1.04	-0.94	-0.68	-1.21	-1.06
Sweetwater	-0.65	0.21	-0.59	-1.52	-0.31	-0.66	-0.66
Terrell	-1.11	-0.48	-1.12	-0.84	-2.05	-0.74	-1.13
Uvalde	-0.57	-0.82	-0.51	-0.45	-0.23	-0.34	-0.57
Victoria	-0.31	-0.50	-0.35	-0.17	0.00	-0.16	-0.29
Weatherford	1.69	1.93	1.69	1.91	1.48	1.33	1.80

Table B-12. 1988 Standard Scores for Accessibility
(Vehicle-Miles per Capita) by Peer Group

Contractor Location	Number of Vehicles	Vehicle Miles	Passenger Trips	Service Area Population	Service Area Size	Population Density	No Peer Group
Alice	-0.18	-0.17	-0.22	-0.51	-0.40	-0.18	-0.26
Amarillo	-0.45	-0.59	-0.65	-0.38	-0.67	-0.54	-0.4
Aspermont	-0.16	-0.15	-0.41	-0.50	-0.21	-0.46	-0.26
Austin	1.18	-0.38	0.01	1.84	1.92	0.38	-0.04
Beeville	-0.37	-0.24	-0.24	-0.53	-0.26	-0.25	-0.29
Bryan	-0.46	-0.47	-0.21	0.87	-0.11	-0.01	-0.2
Cleburne	-0.67	-0.67	-0.78	-1.67	-0.53	-1.08	-0.48
Columbus	0.31	-0.59	-0.75	-0.76	-0.53	-0.68	-0.05
Conroe	-0.41	-0.56	-0.42	-0.06	-0.45	0.32	-0.35
Crosbyton	0.39	-0.43	-0.10	1.97	0.02	-0.38	-0.12
Crowell	-0.57	-0.44	-0.35	-0.62	-0.49	-0.56	-0.43
Denison	-0.32	-0.04	-0.17	1.05	-0.13	-0.04	-0.21
Denton	-0.64	-0.66	-0.37	-0.75	-0.52	-0.90	-0.46
Galveston	2.88	2.25	3.60	2.79	2.70	2.42	4.62
Glen Rose	3.21	3.41	2.01	0.48	0.54	3.47	1.21
Kingsville	-0.40	0.09	-0.27	-0.56	-0.33	-0.36	-0.34
Lamesa	-0.46	-0.55	-0.51	-1.06	-0.46	-0.56	-0.42
Levelland	-0.39	-0.32	-0.27	-0.12	-0.11	-0.33	-0.32
Lufkin	-0.38	-0.39	-0.42	-0.39	-0.45	0.30	-0.35
McAllen	1.06	0.69	2.64	0.93	3.13	0.79	1.86
Mineral Wells	0.06	0.08	-0.14	-0.44	-0.33	0.08	-0.16
Rio Grande City	-0.40	-0.35	-0.40	-0.24	-0.33	-0.36	-0.34
San Angelo	-0.49	-0.25	-0.32	-0.60	-0.64	-0.54	-0.4
San Saba	-1.11	-0.51	-0.30	0.51	0.33	-0.18	-0.26
Sweetwater	-0.64	-0.60	-0.38	-0.76	-1.11	-0.68	-0.47
Terrell	0.64	2.36	0.16	-0.27	-0.17	-0.25	0.09
Uvalde	-0.36	-0.18	-0.22	0.45	0.29	-0.47	-0.27
Victoria	-0.39	-0.30	-0.38	-0.06	-0.30	-0.31	-0.32
Weatherford	-0.16	-0.15	-0.21	0.59	-0.39	1.35	-0.25

APPENDIX C

INDIVIDUAL SYSTEM PROFILES

The graphs presented in this Appendix provide the Section 18 transit agencies and the Texas State Department of Highways and Public Transportation the data to monitor and evaluate the efficiency and effectiveness of transit system operations. They can be used for analysis of performance trends, evaluation of overall system performance, transit planning, and technical assistance from the TSDHPT.

Figures C-1 through C-34 display each agencies relative performance for measures of cost effectiveness, cost efficiency, service utilization, vehicle utilization, and accessibility. The graphs are presented in alphabetical order by location of each agency.

Interpretation

A standard score represents the number of standard deviations an agency's performance is above or below the mean. A score of zero is the mean performance of the group. A strong performance is indicated by a score greater than one. A negative score indicates below average (but perhaps explainable) performance.

Figure C-1 displays the performance of the Rural Economic Assistance League, located in Alice. This graph indicates that Alice improved its relative performance in each of the five measures. Its cost efficiency and vehicle utilization were both above the mean for 1988 and 1989. Its cost effectiveness improved from slightly below the mean to just above the mean. Its service utilization was below average, but did show improvement. The fact that Alice increased its score in all areas is a positive indication that it is attempting to improve performance. It should be noted, however, that Alice's 1989 scores do not represent a strong overall performance in comparison to the mean since they are not more than one standard deviation above the mean, and their service utilization is below average. Alice should continue its good work and improve its performance in the future.

A more typical example of how an agency's scores appear is shown in Figure C-9 for Montgomery County Transit located in Conroe. It is not as easy to interpret since some of the measures increased in score while others decreased. In order to evaluate its performance this agency will have to determine why its scores reacted this way. A few questions should be considered. For example,

- Why did its cost efficiency and cost effectiveness both decrease when its service utilization and vehicle utilization both increased?
- Did its expenses increase in a higher proportion than its passenger trips? -- If the agency attempted to serve a new market area and thereby incurred a higher cost increase than ridership, its cost effectiveness may decrease even though its service utilization increased.
- Why did its vehicle utilization increase while its cost efficiency decreased?
- Did it incur a higher cost due to maintenance of its vehicles?
- Were vehicles sold or were additional vehicles purchased?
- Did it travel more or less miles to provide service.

Answering these types of questions will help the agency determine why its scores reacted this way and thereby set planning objectives accordingly. The staff at the Public Transportation Division of TSDHPT could assist the agencies in this evaluation process. Performance trends are very important to the planning process. The agency should continue to evaluate its trends in the future.

Figure C-1. Performance Measures for the Rural Economic Assistance League - Alice

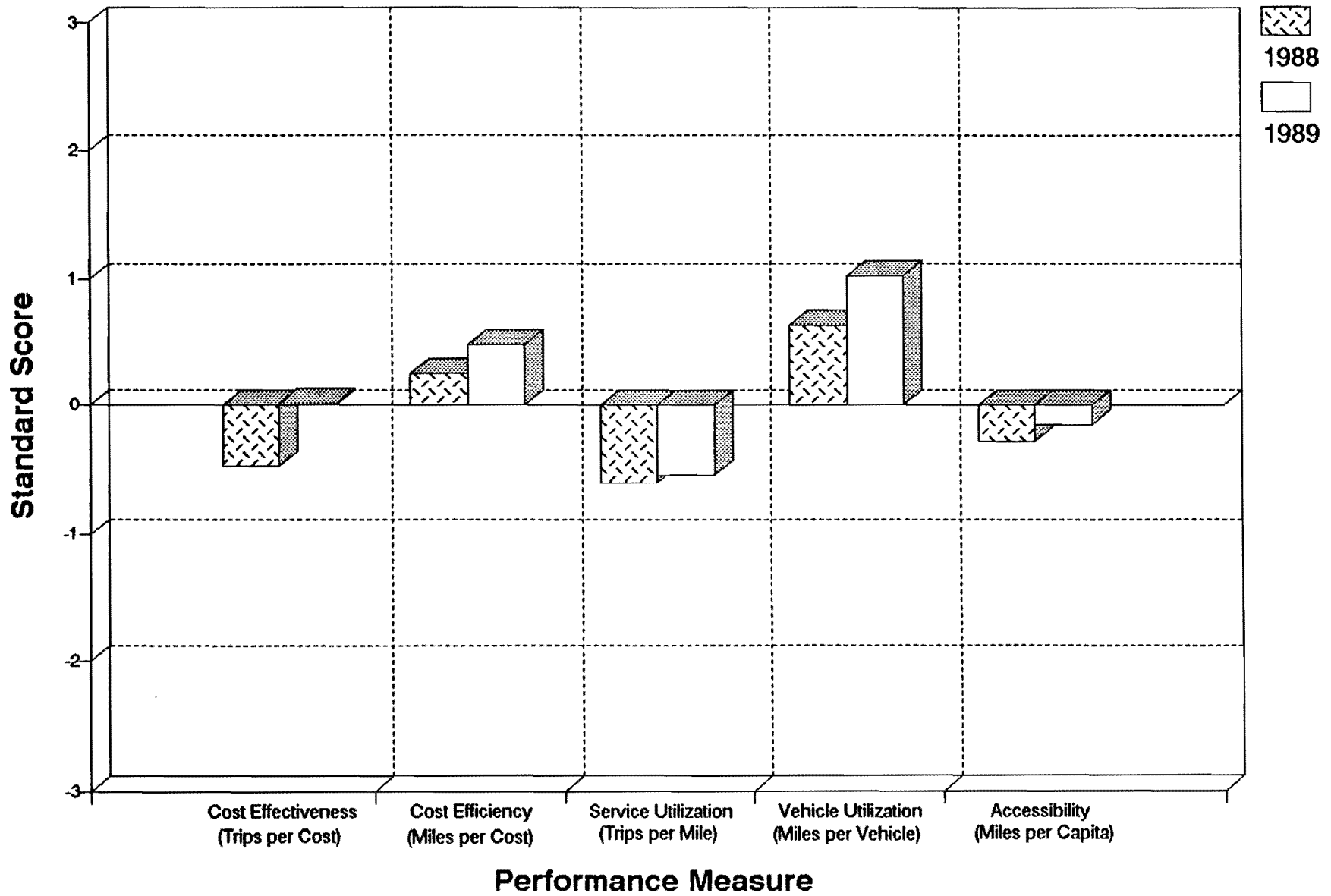
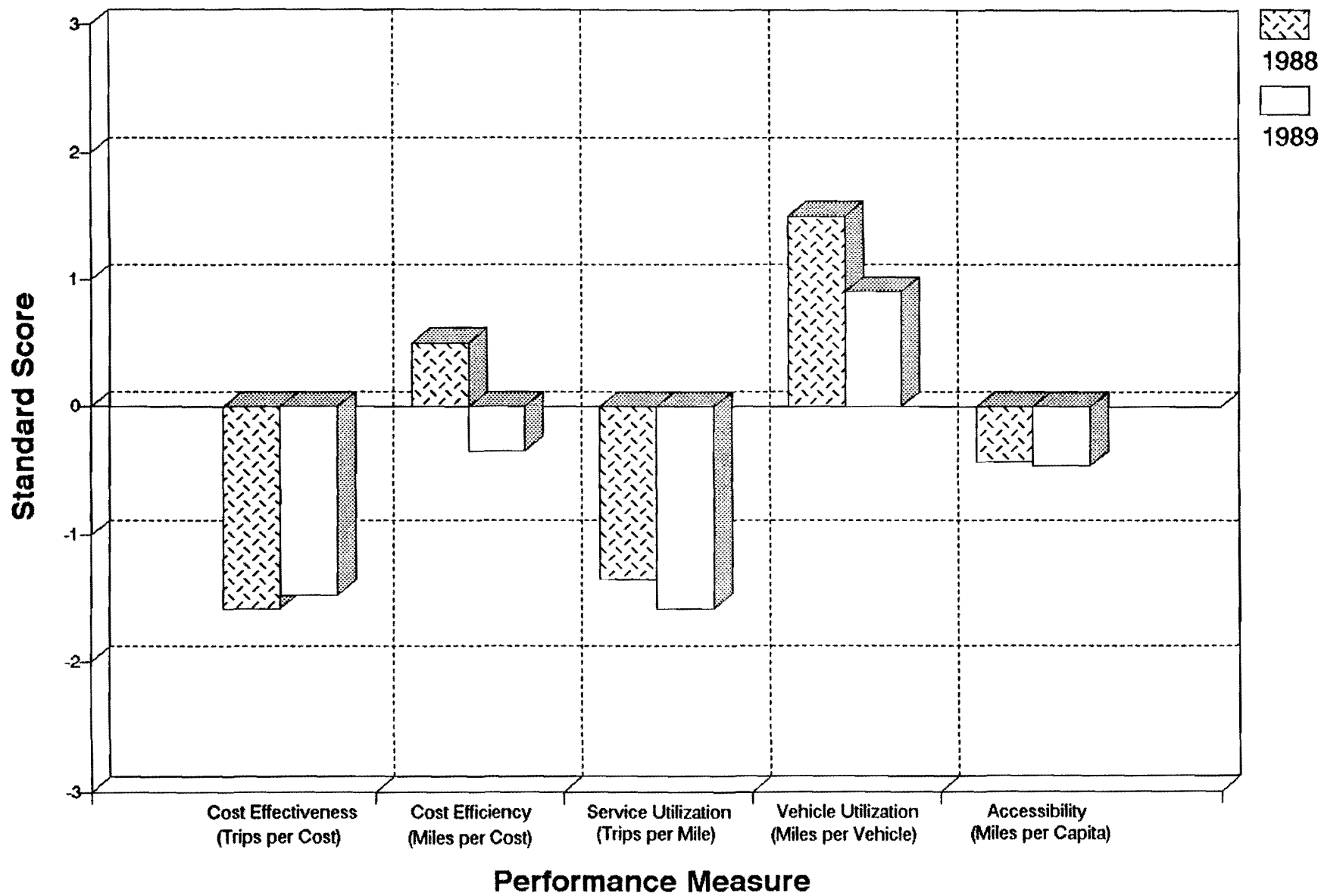
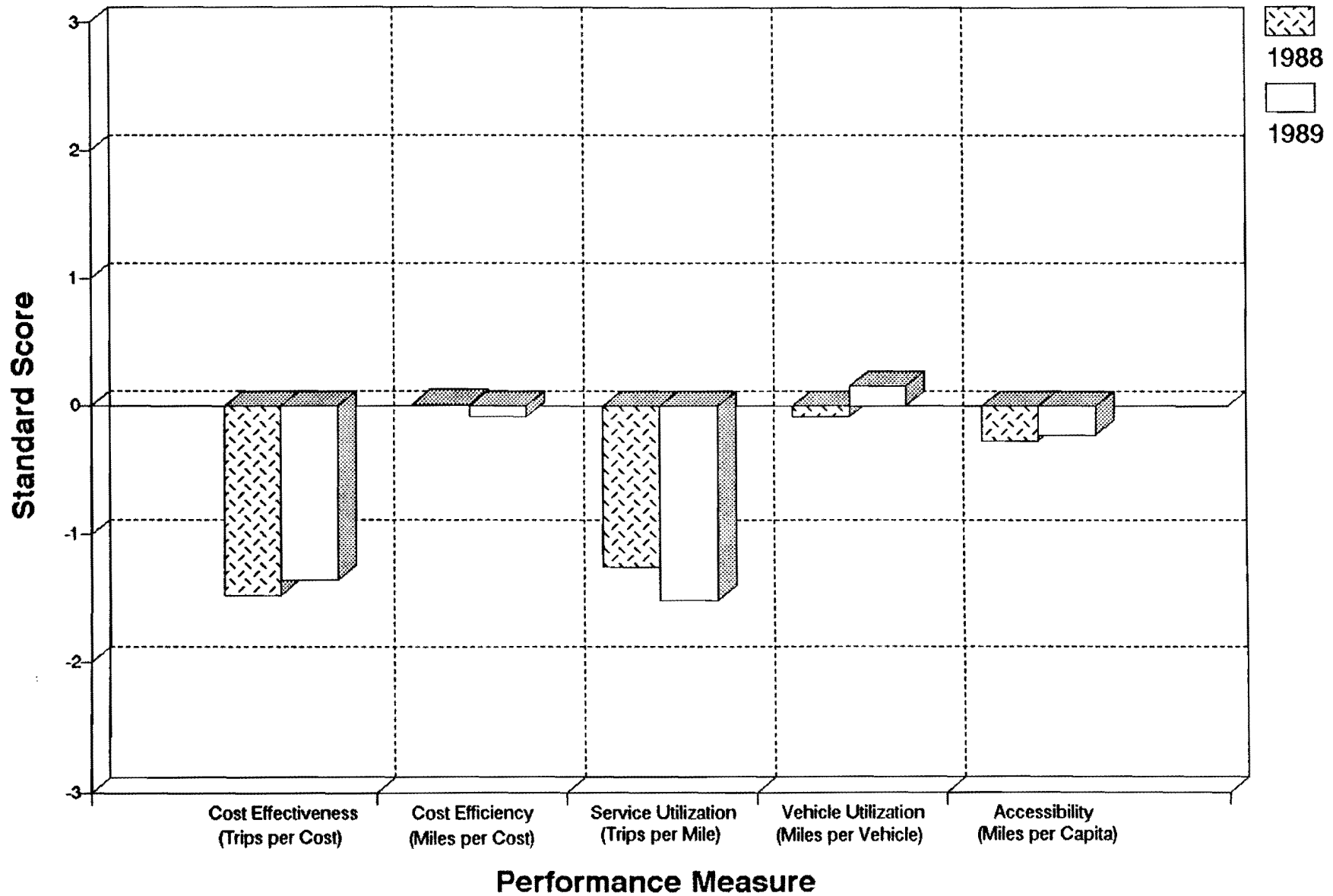


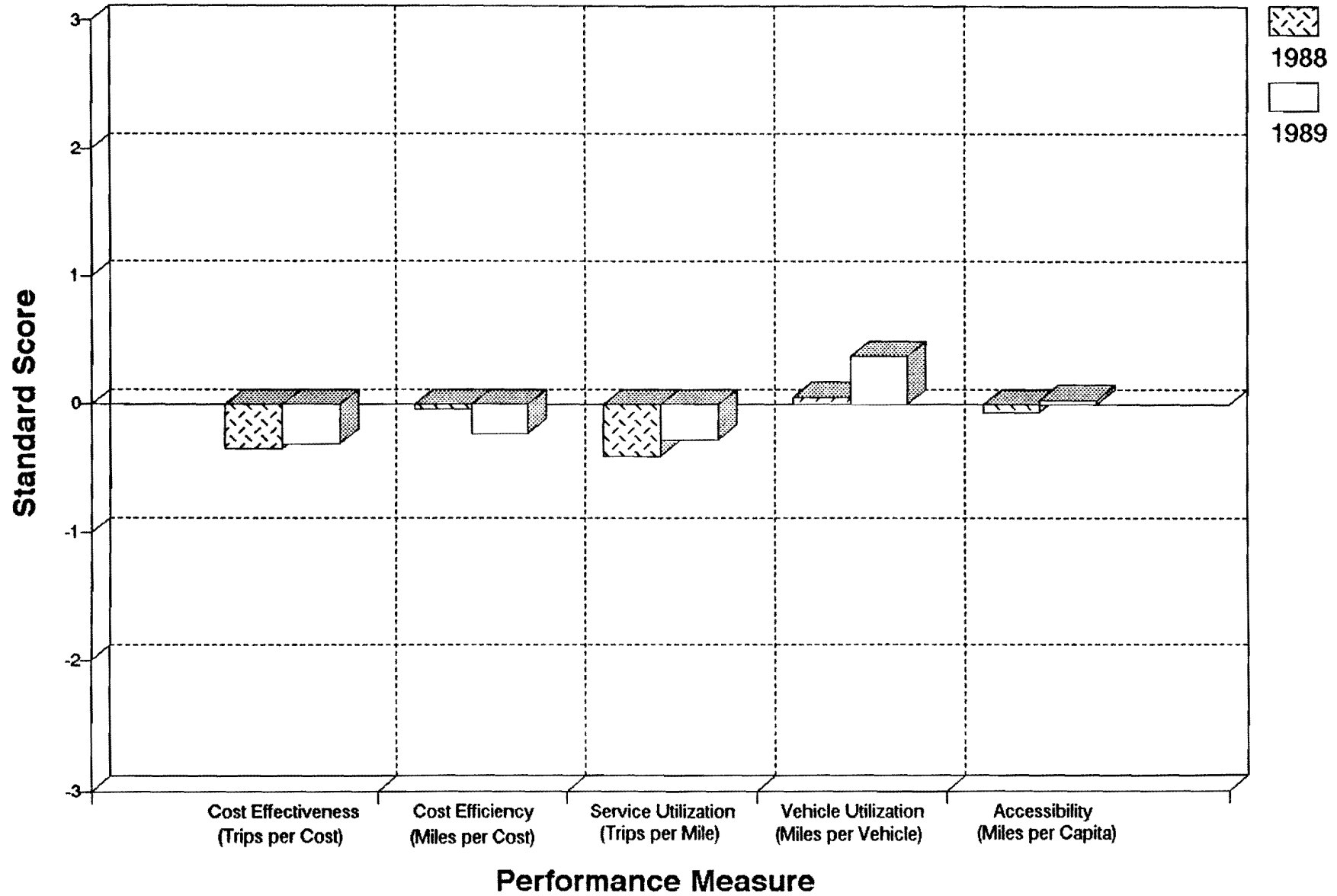
Figure C-2. Performance Measures for Panhandle Transit - Amarillo



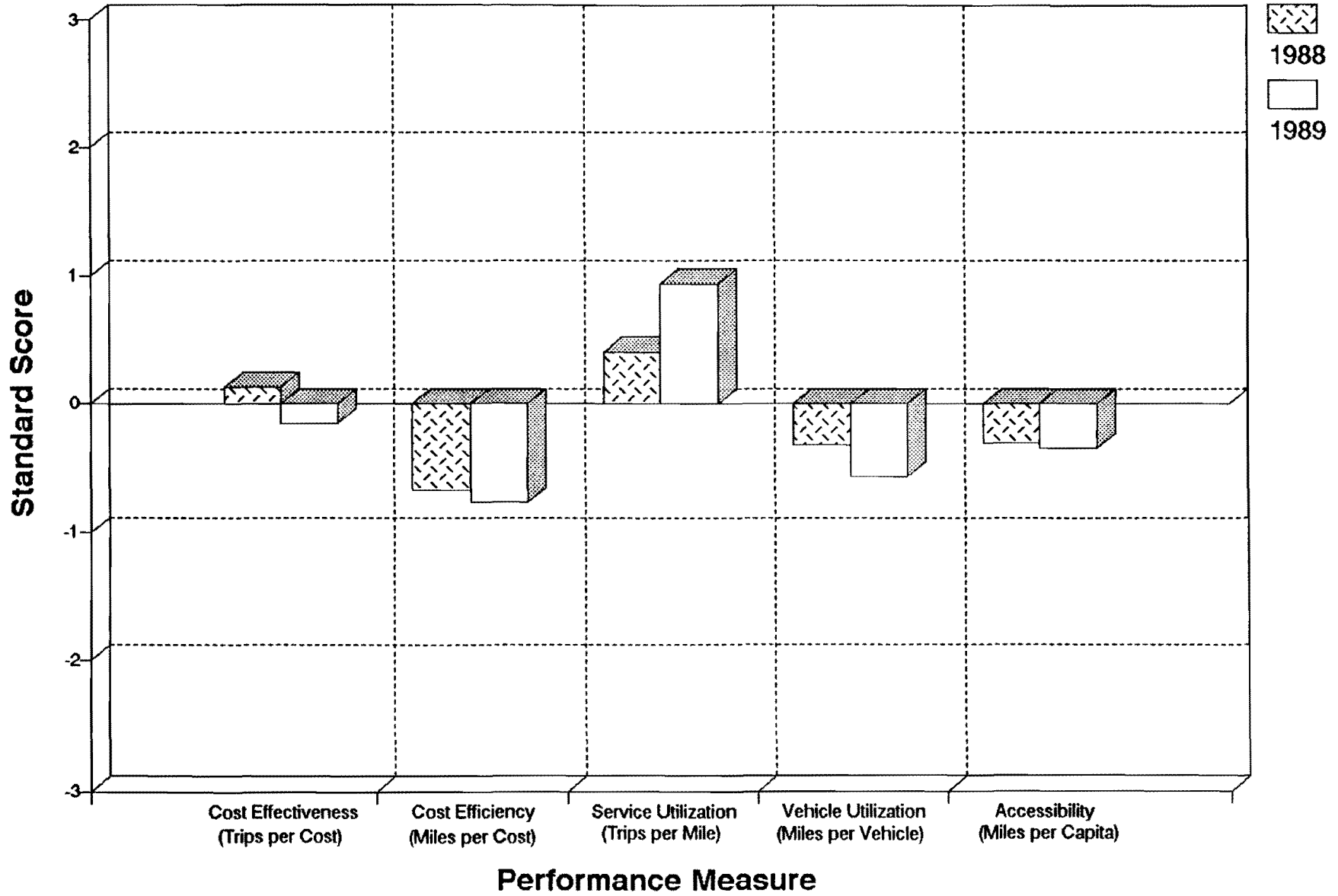
**Figure C-3. Performance Measures for the
Aspermont Small Business Development - Aspermont**



**Figure C-4. Performance Measures for the
Capital Area Rapid Transit - Austin**

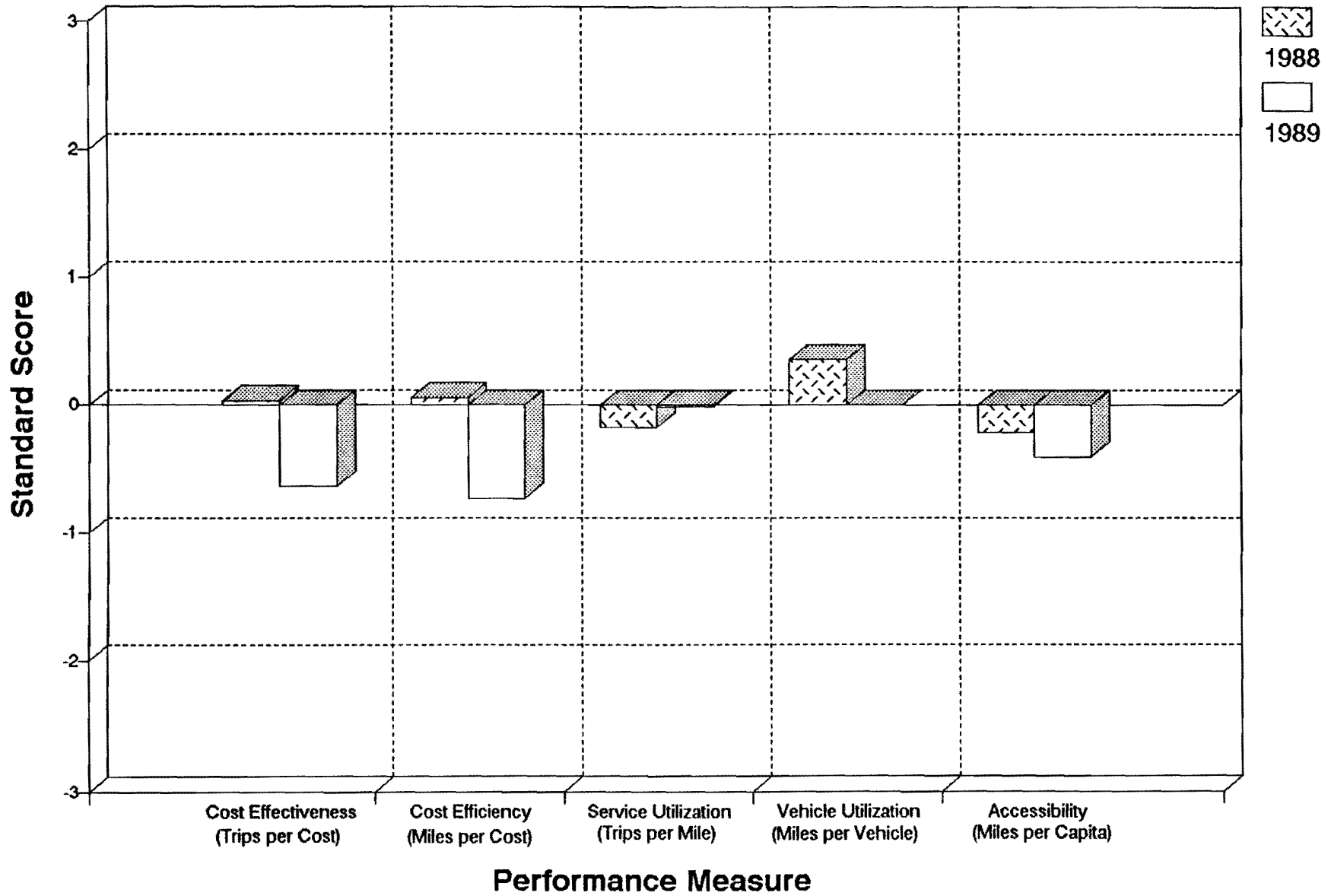


**Figure C-5. Performance Measures for the
Bee Community Action Agency - Beeville**



**Figure C-6. Performance Measures for the
Brazos Transit System - Bryan**

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**Figure C-7. Performance Measures for the
City of Cleburne - Cleburne**

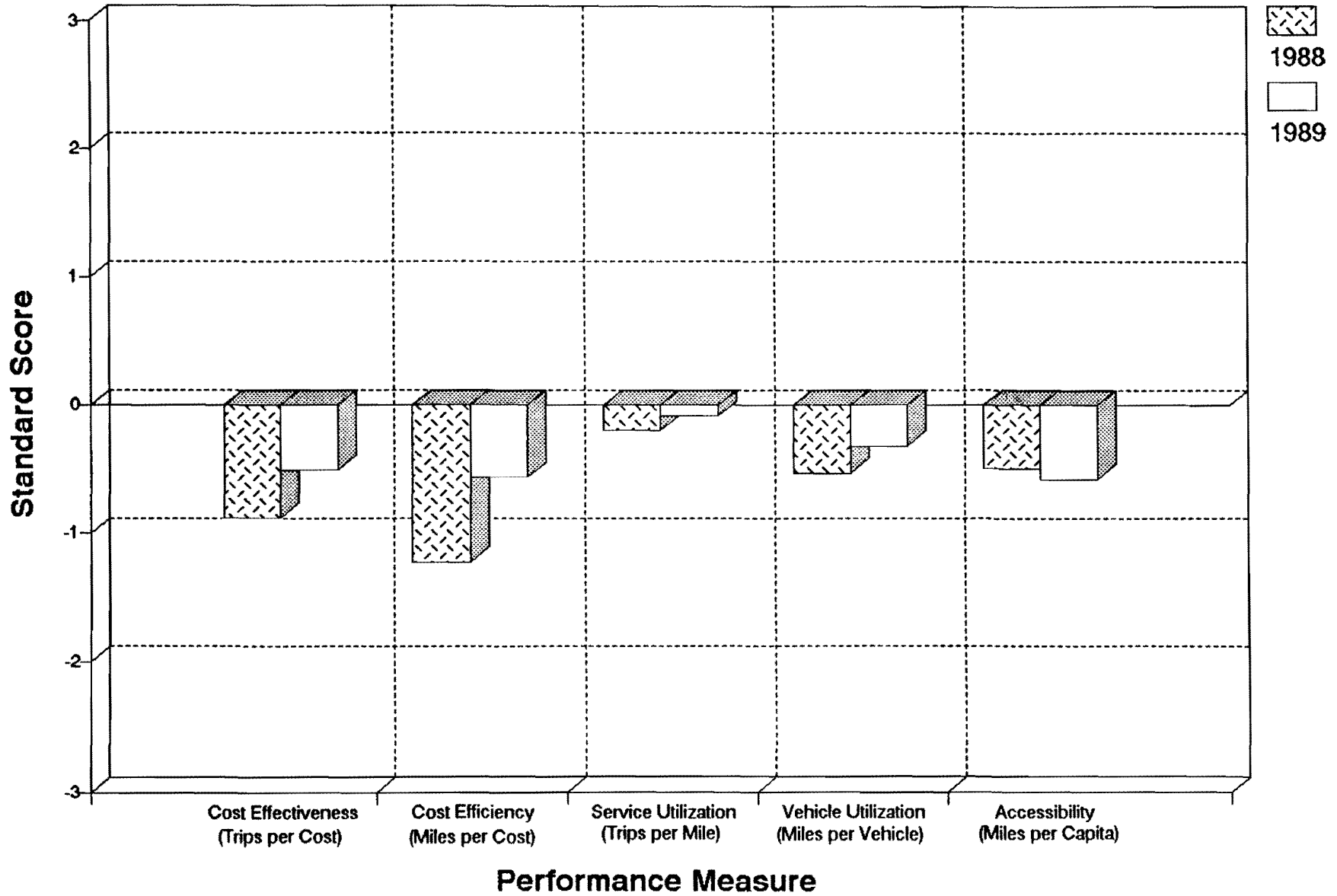


Figure C-8. Performance Measures for the Colorado Valley Transit - Columbus

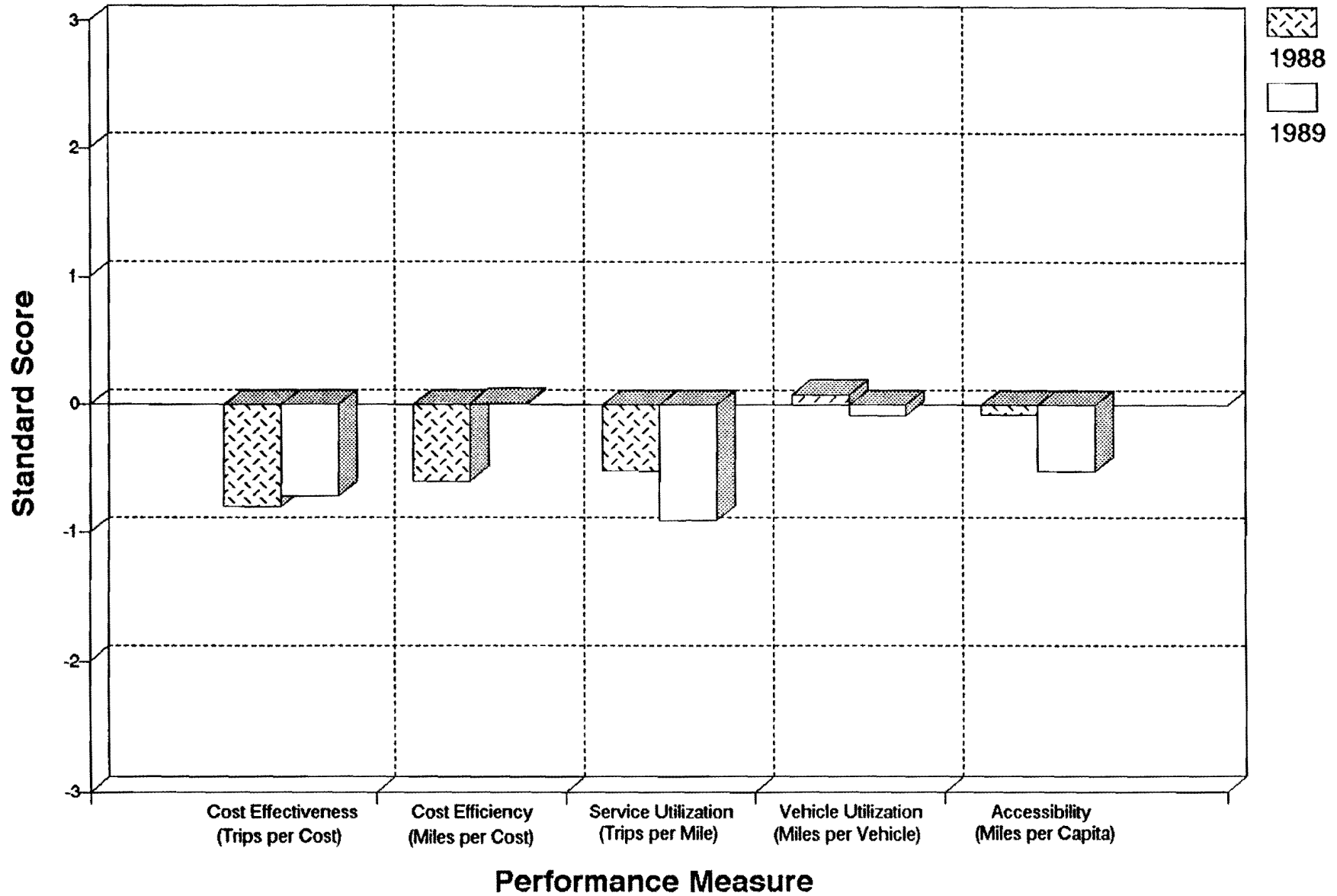


Figure C-9. Performance Measures for the Brazos Transit / Montgomery Co. - Conroe

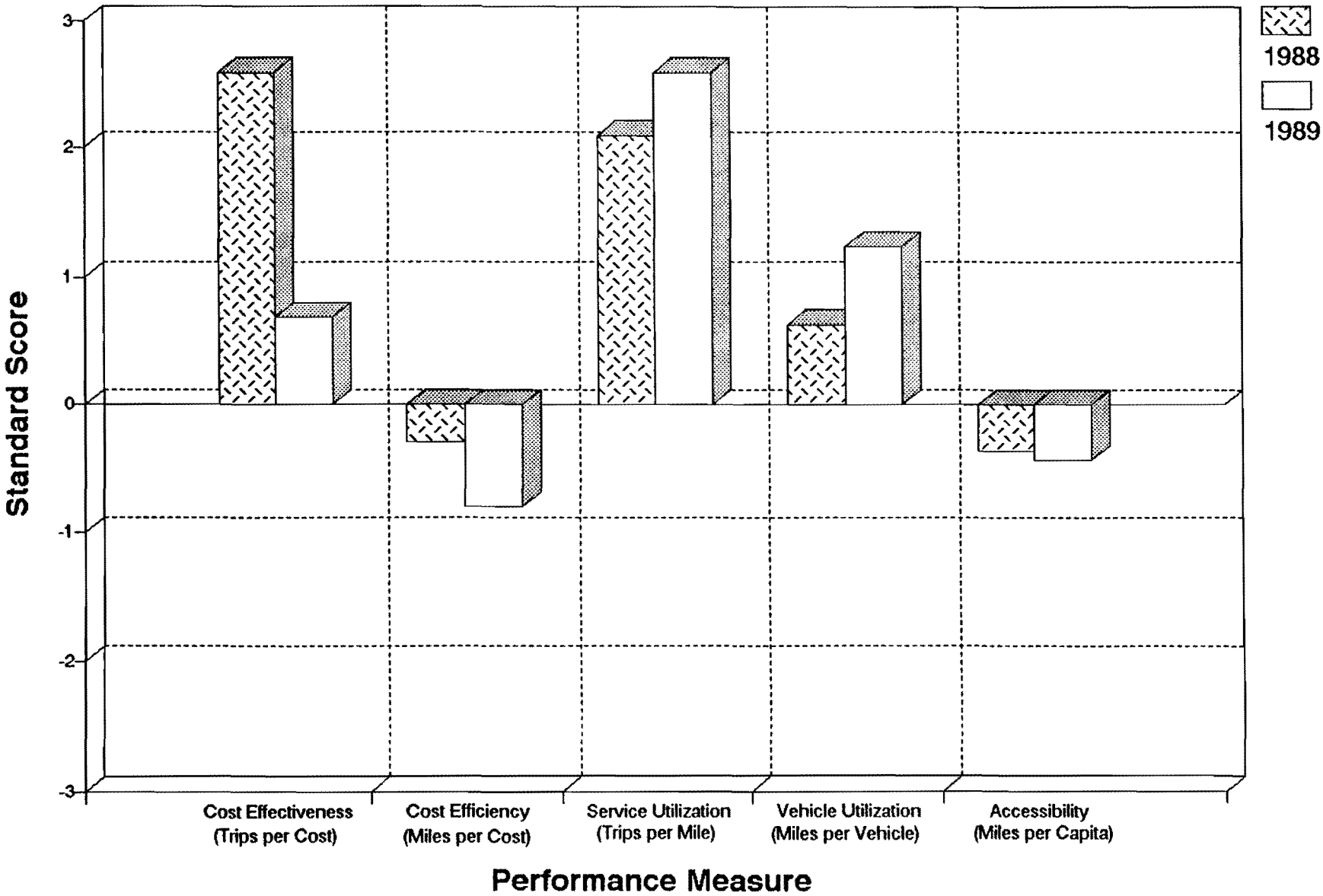


Figure C-10. Performance Measures for the Caprock Community Action Association - Crosbyton

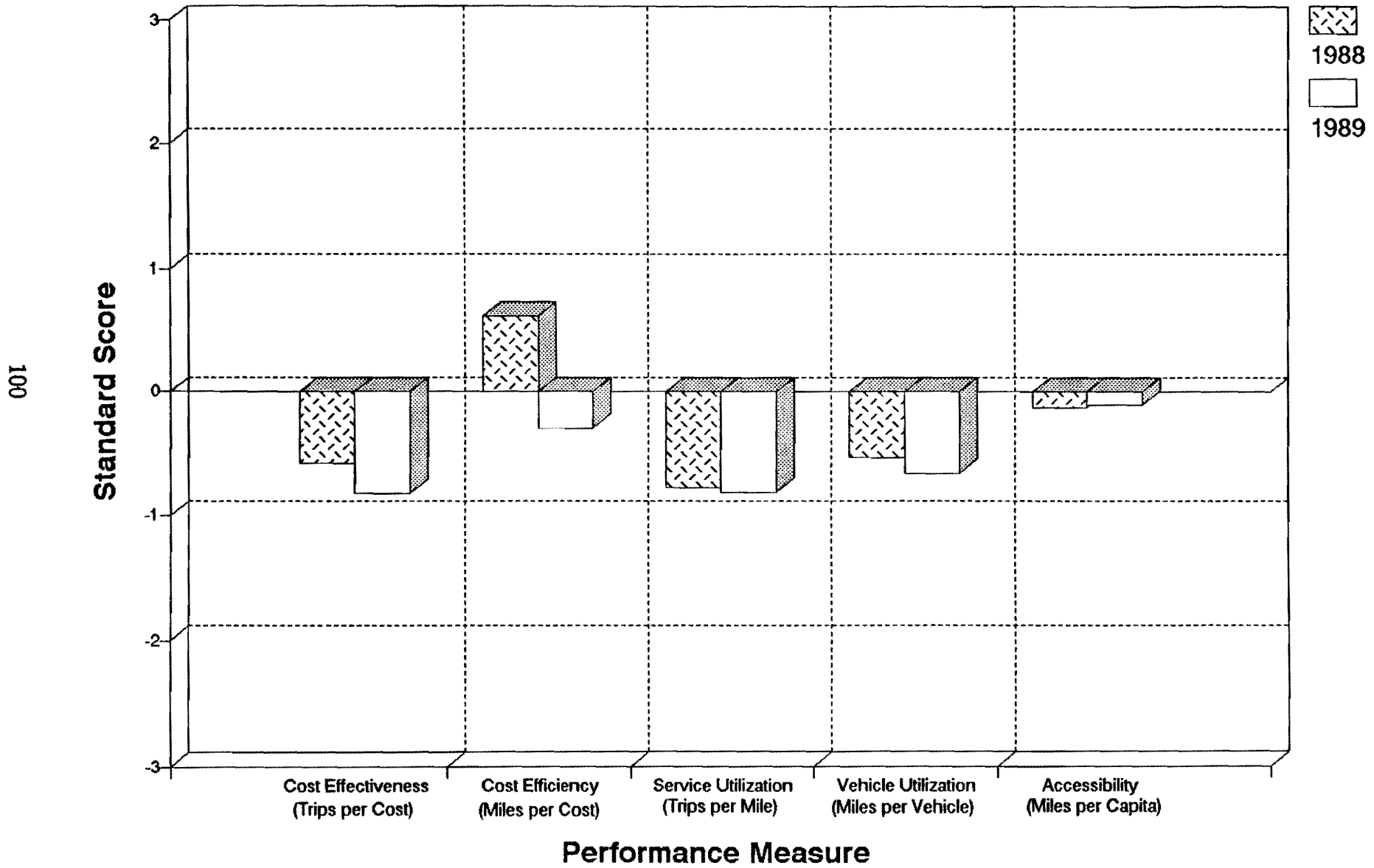
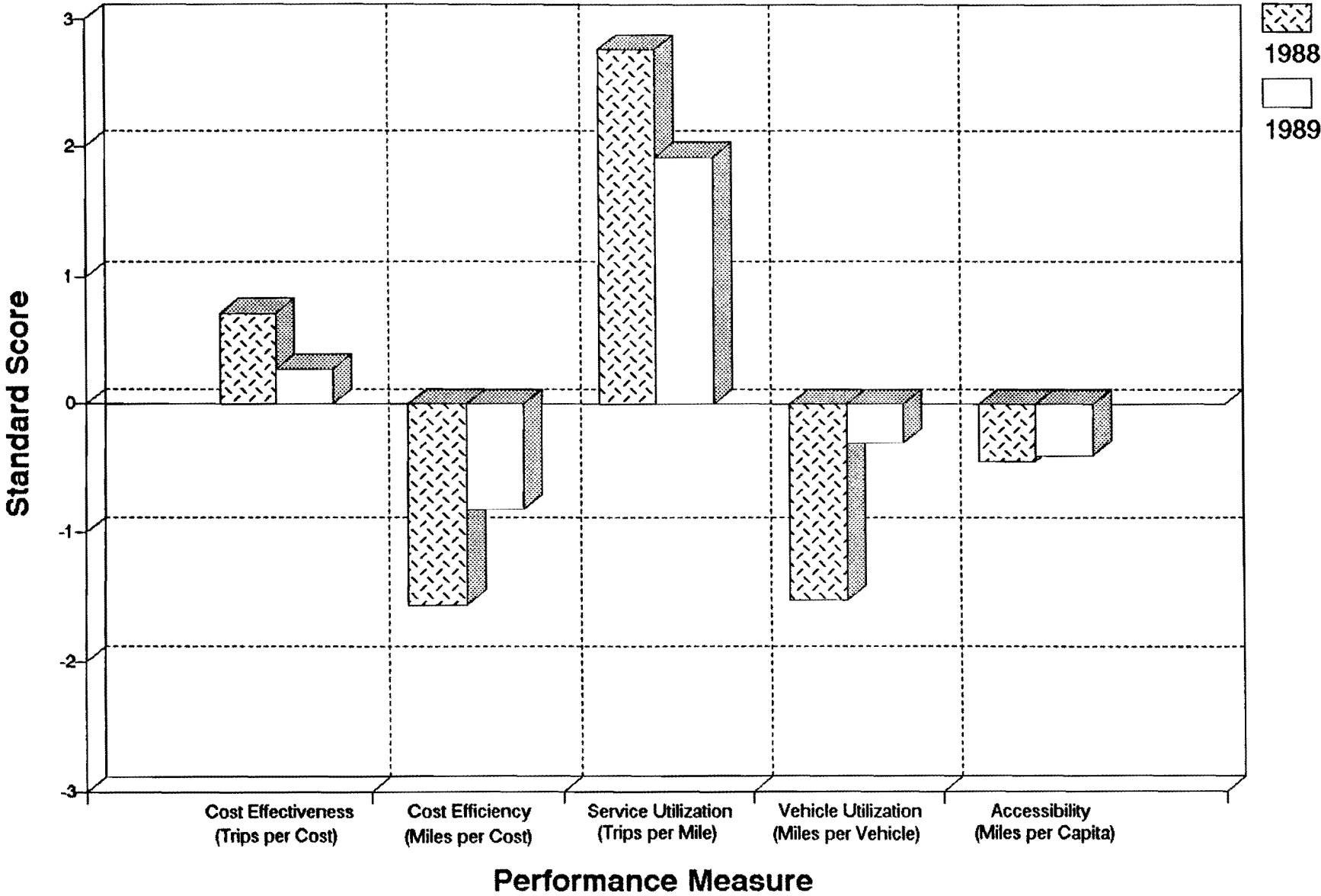


Figure C-11. Performance Measures for the Rolling Plains Management Corp. - Crowell



**Figure C-12. Performance Measures for the
Texoma Area Paratransit System - Denison**

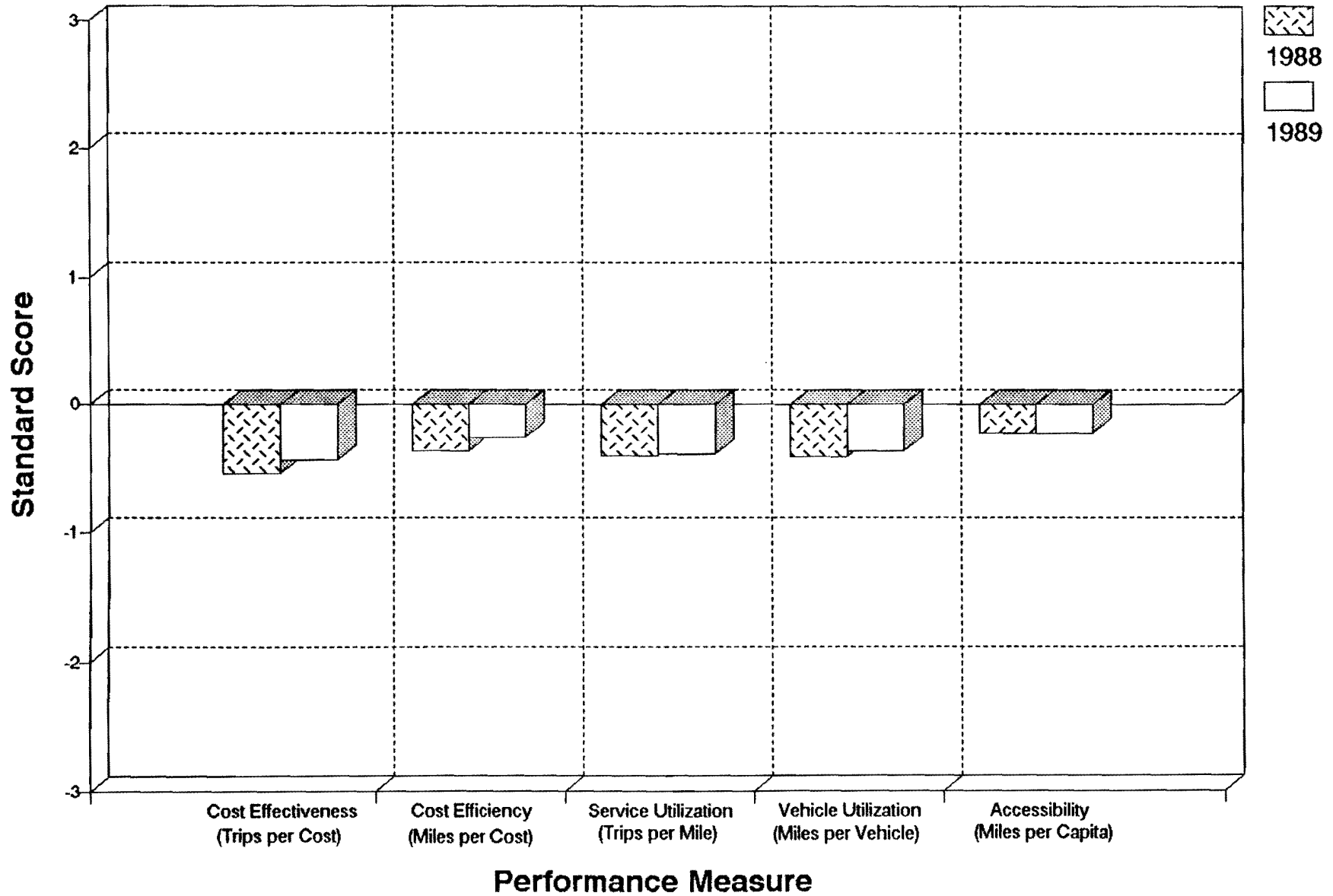


Figure C-13. Performance Measures for the Services Program for Aging Needs - Denton

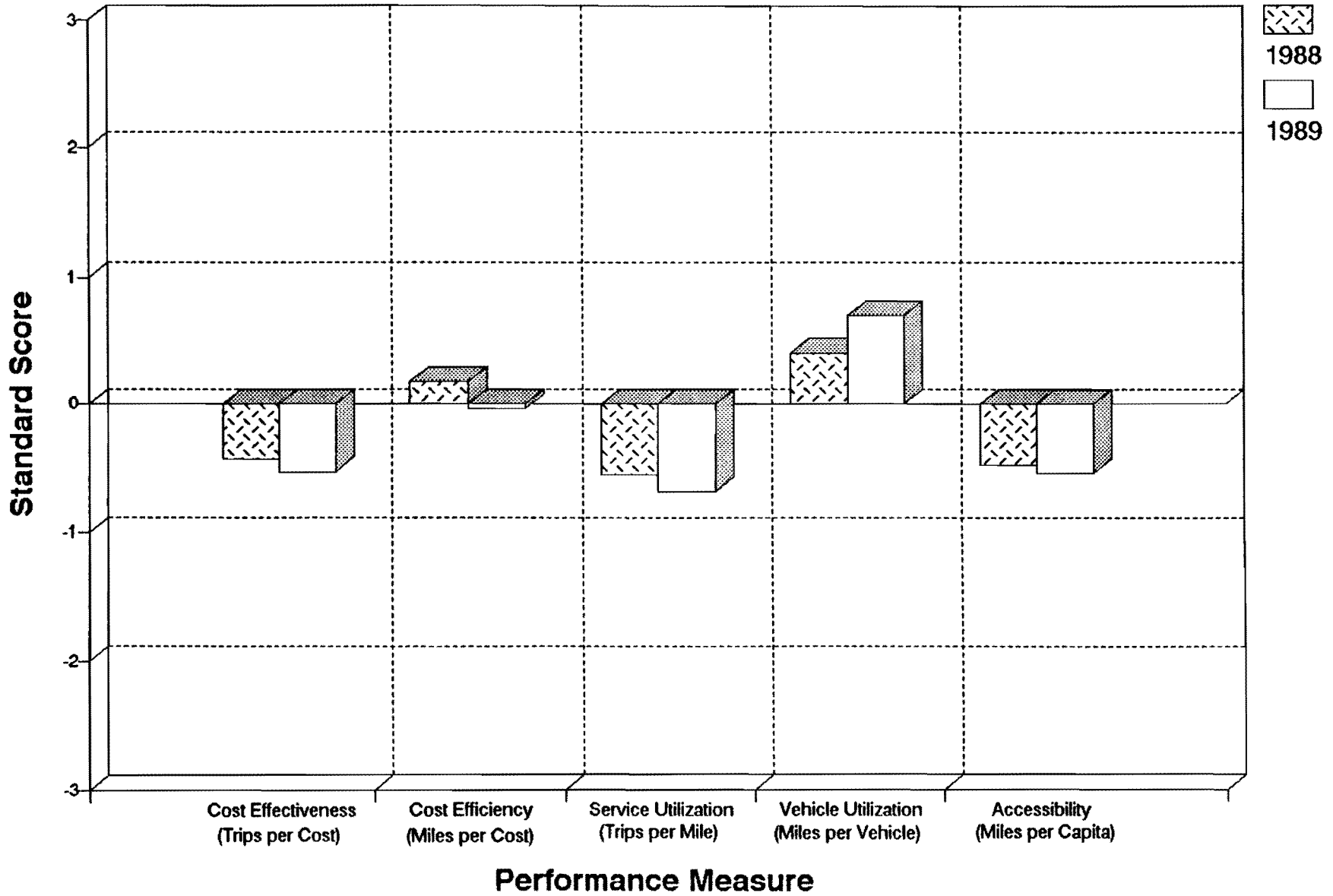


Figure C-14. Performance Measures for the Gulf Coast Regional MHMR Center - Galveston

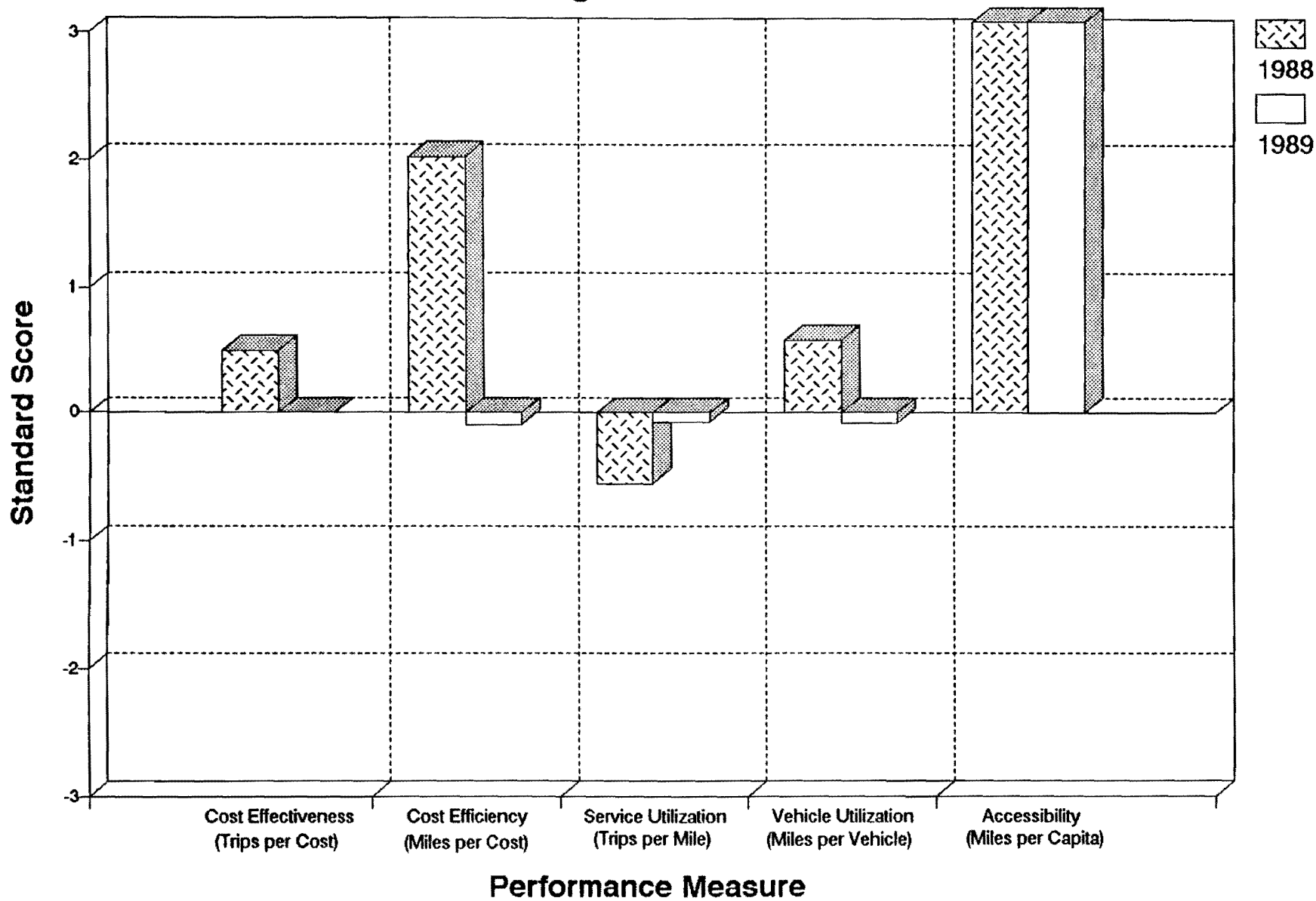


Figure C-15. Performance Measures for the Somervell County Transit - Glen Rose

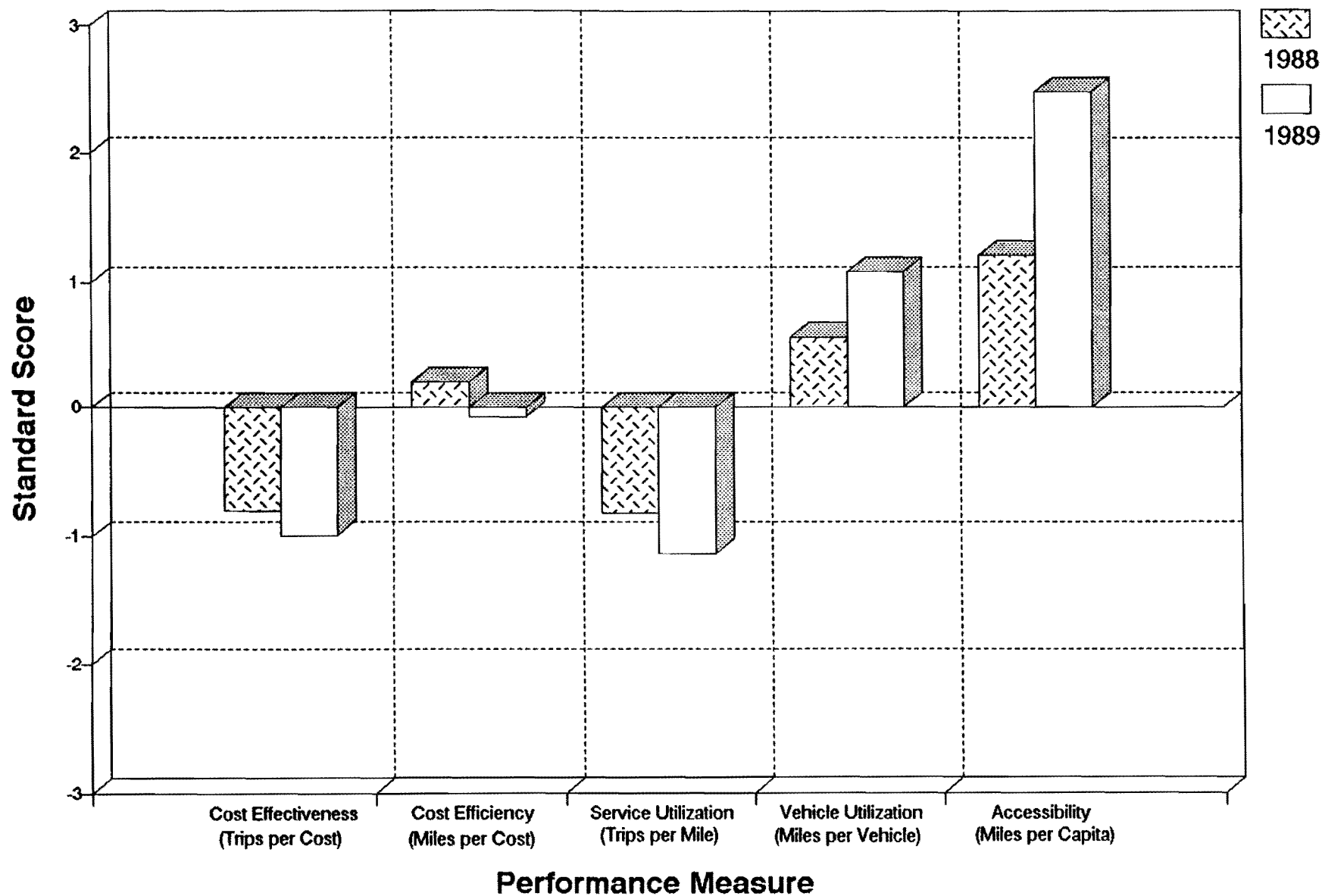
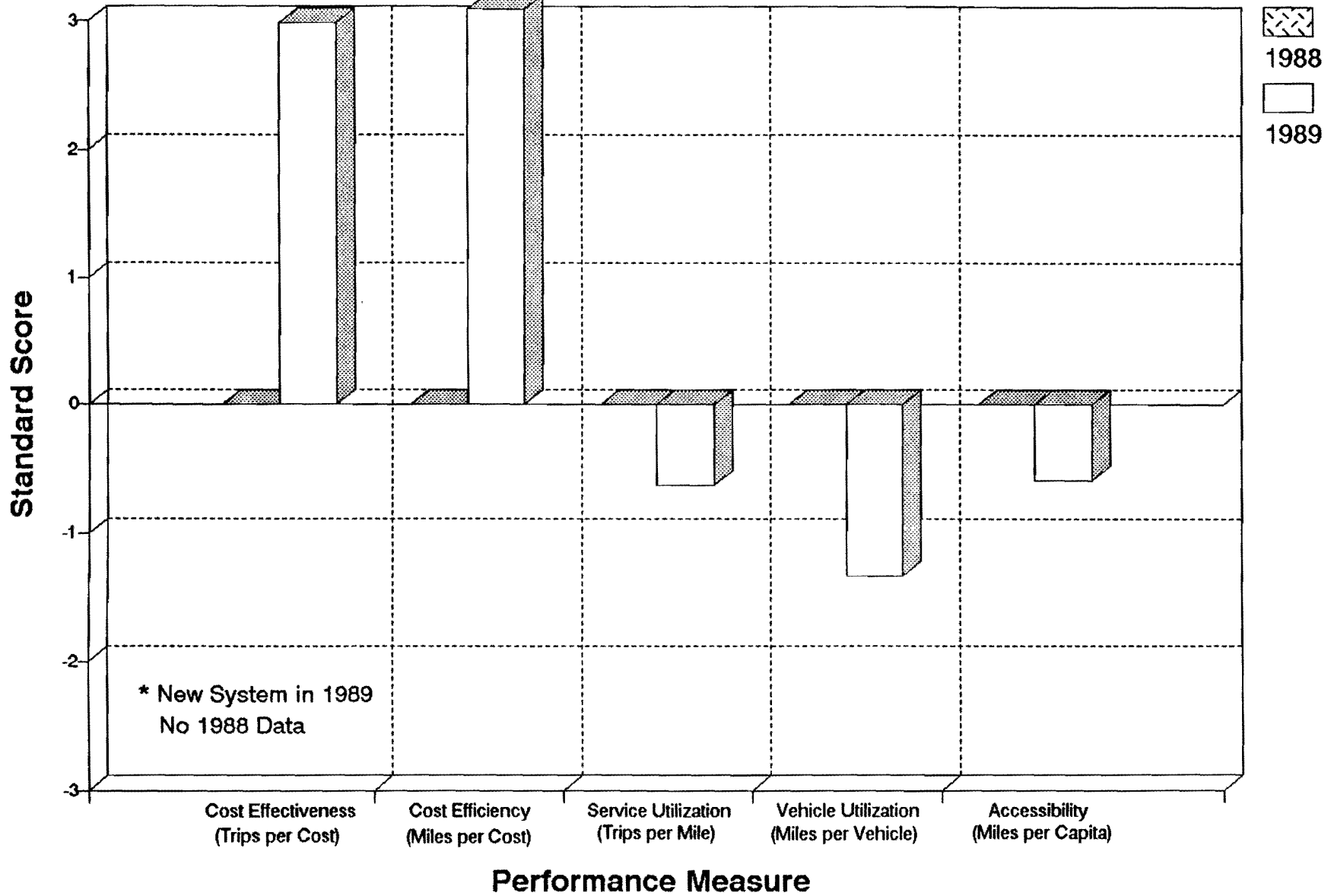


Figure C-16. Performance Measures for the Hunt County Family Services - Greenville



**Figure C-17. Performance Measures for the
Kleberg County Community Services - Kingsville**

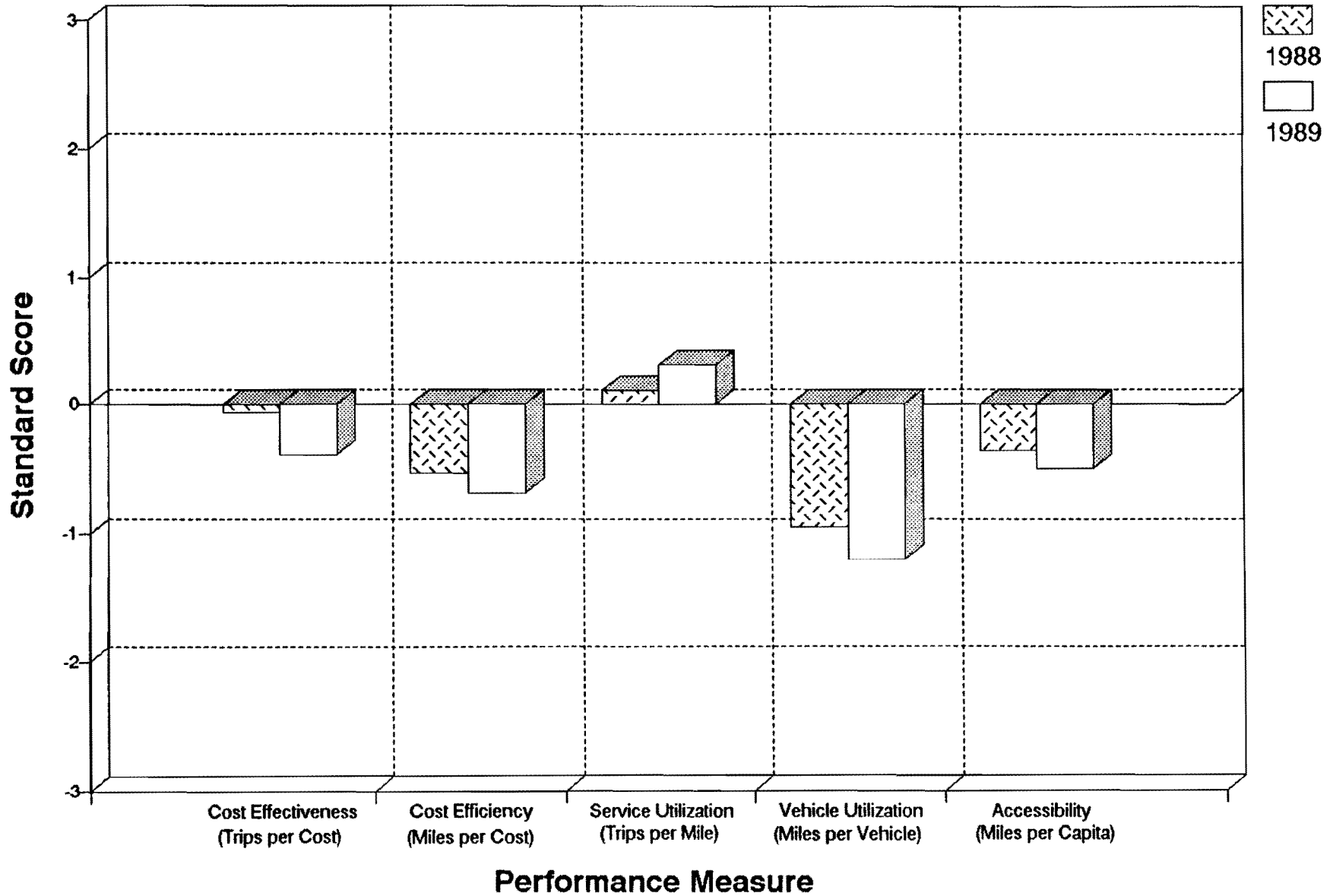
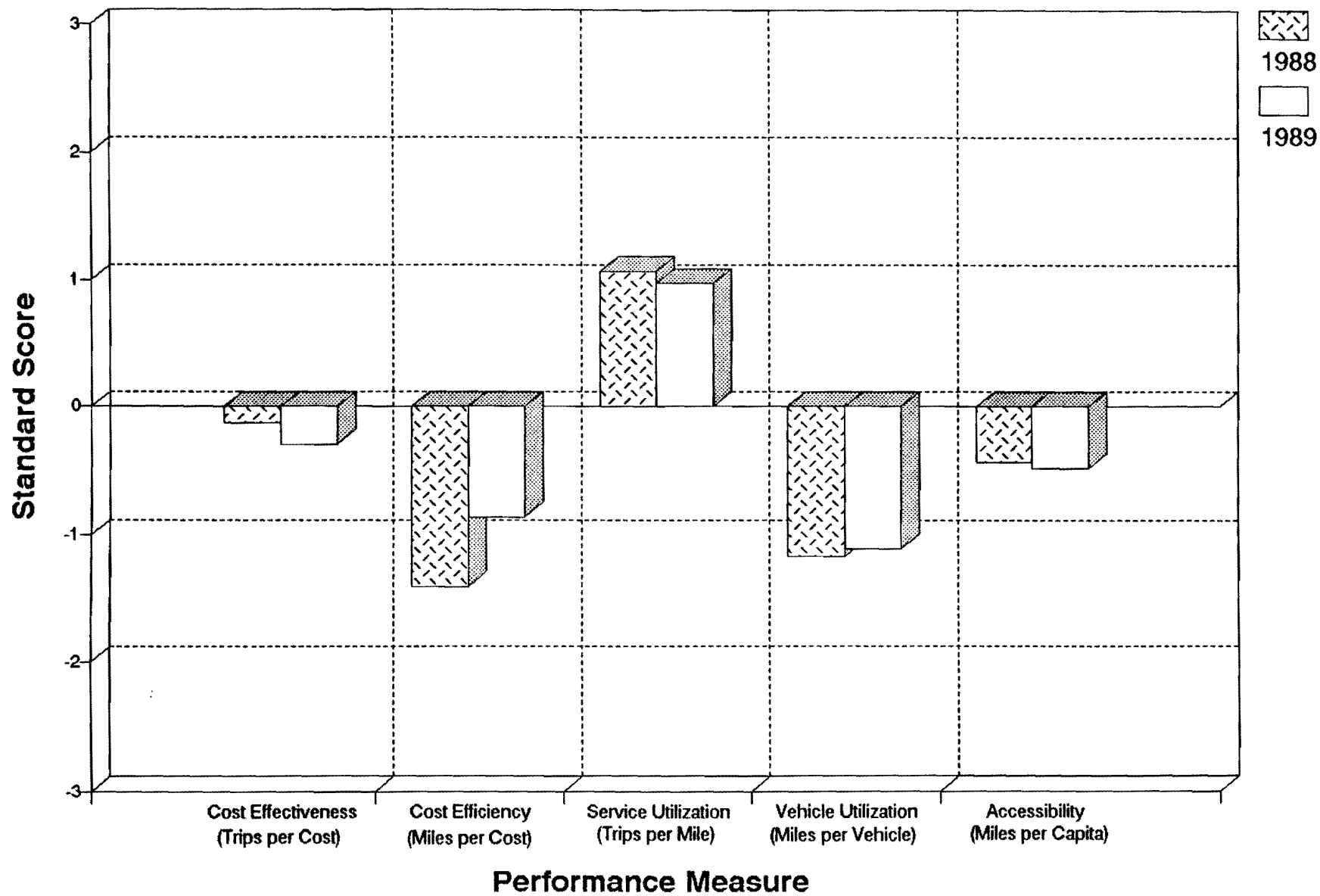
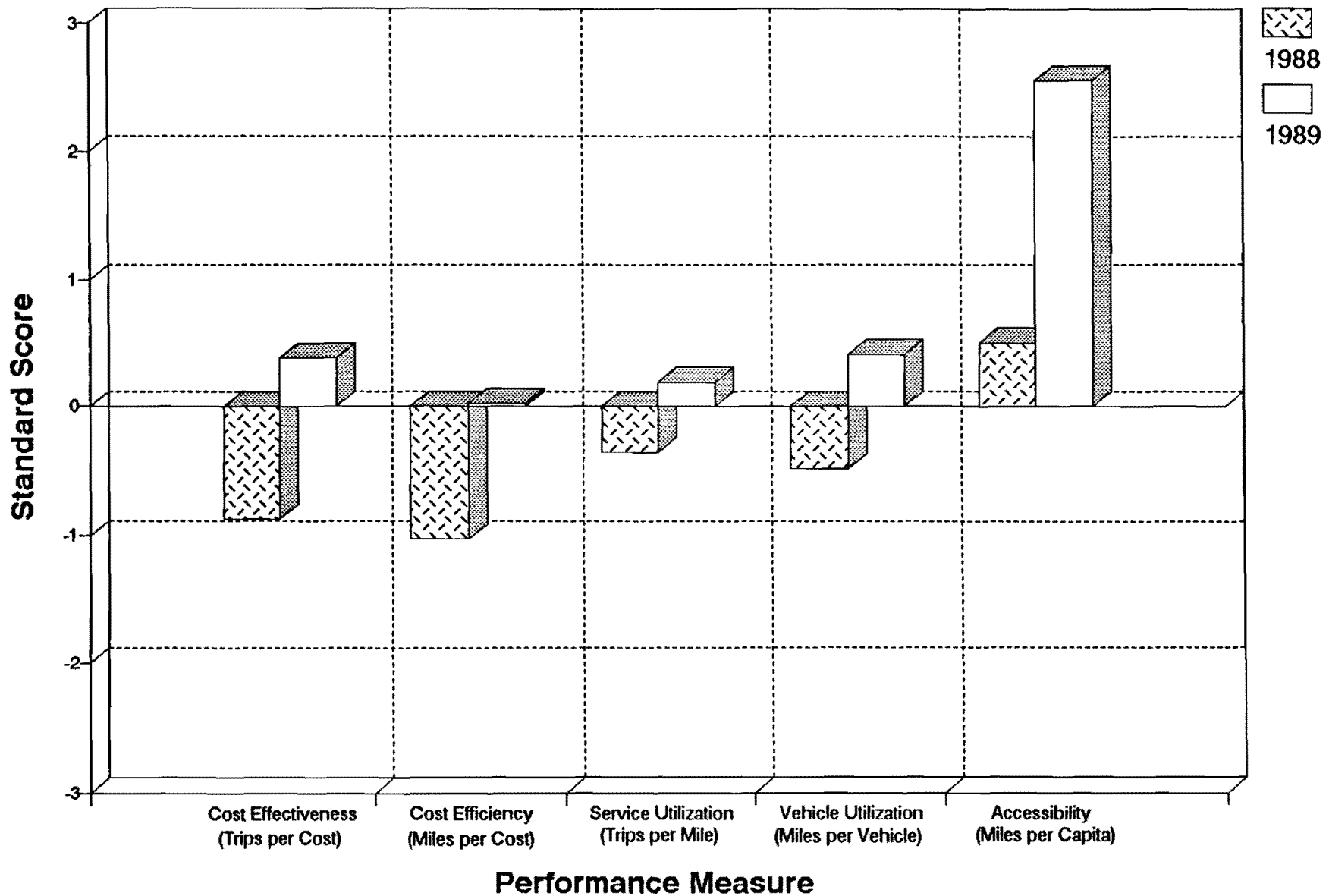


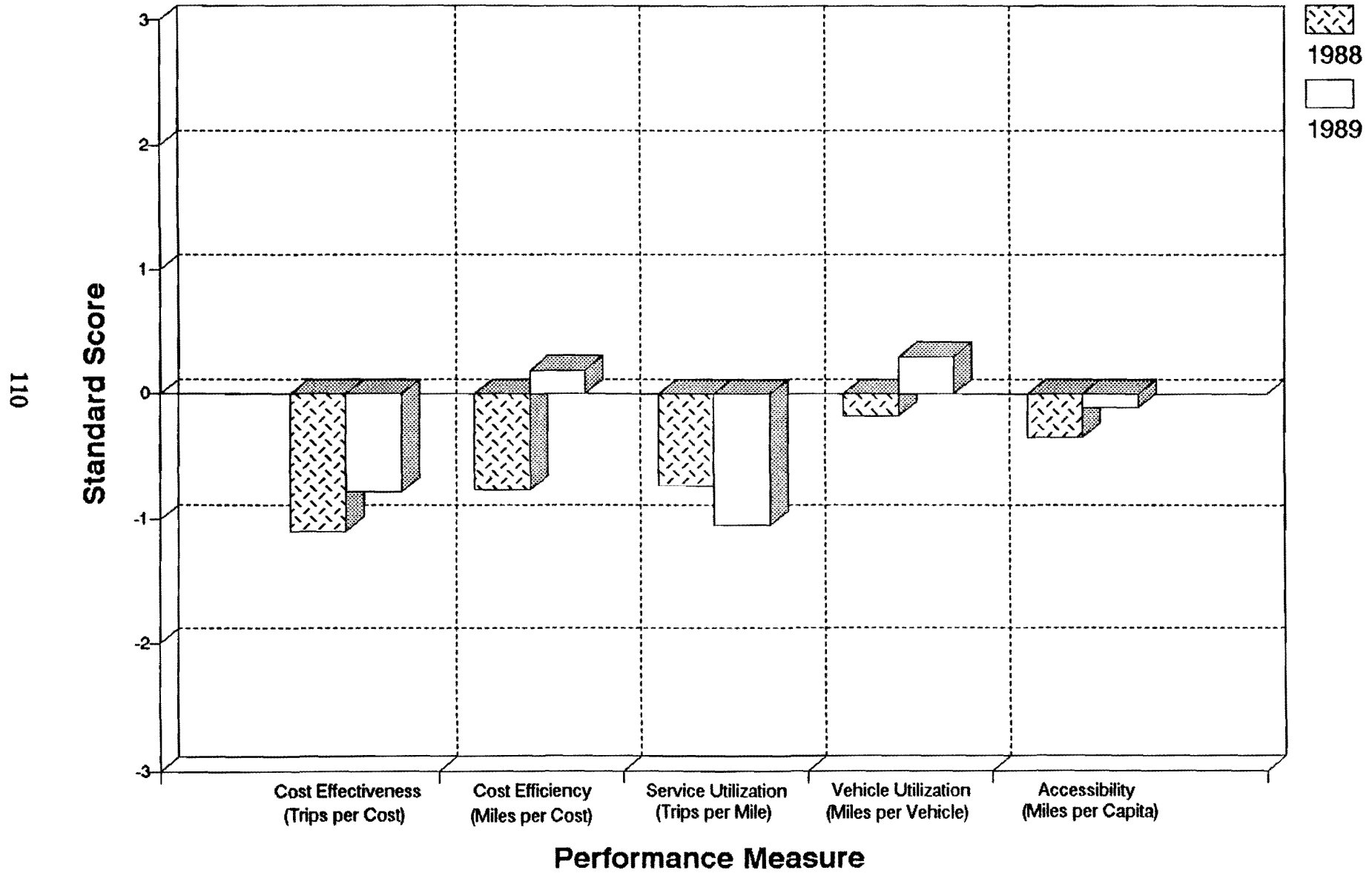
Figure C-18. Performance Measures for the West Texas Opportunities - Lamesa



**Figure C-19. Performance Measures for the
Laredo-Webb County Community Action Agency - Laredo**



**Figure C-20. Performance Measures for the
South Plains Community Action Agency - Levelland**



**Figure C-21. Performance Measures for the
Brazos Transit System - Lufkin**

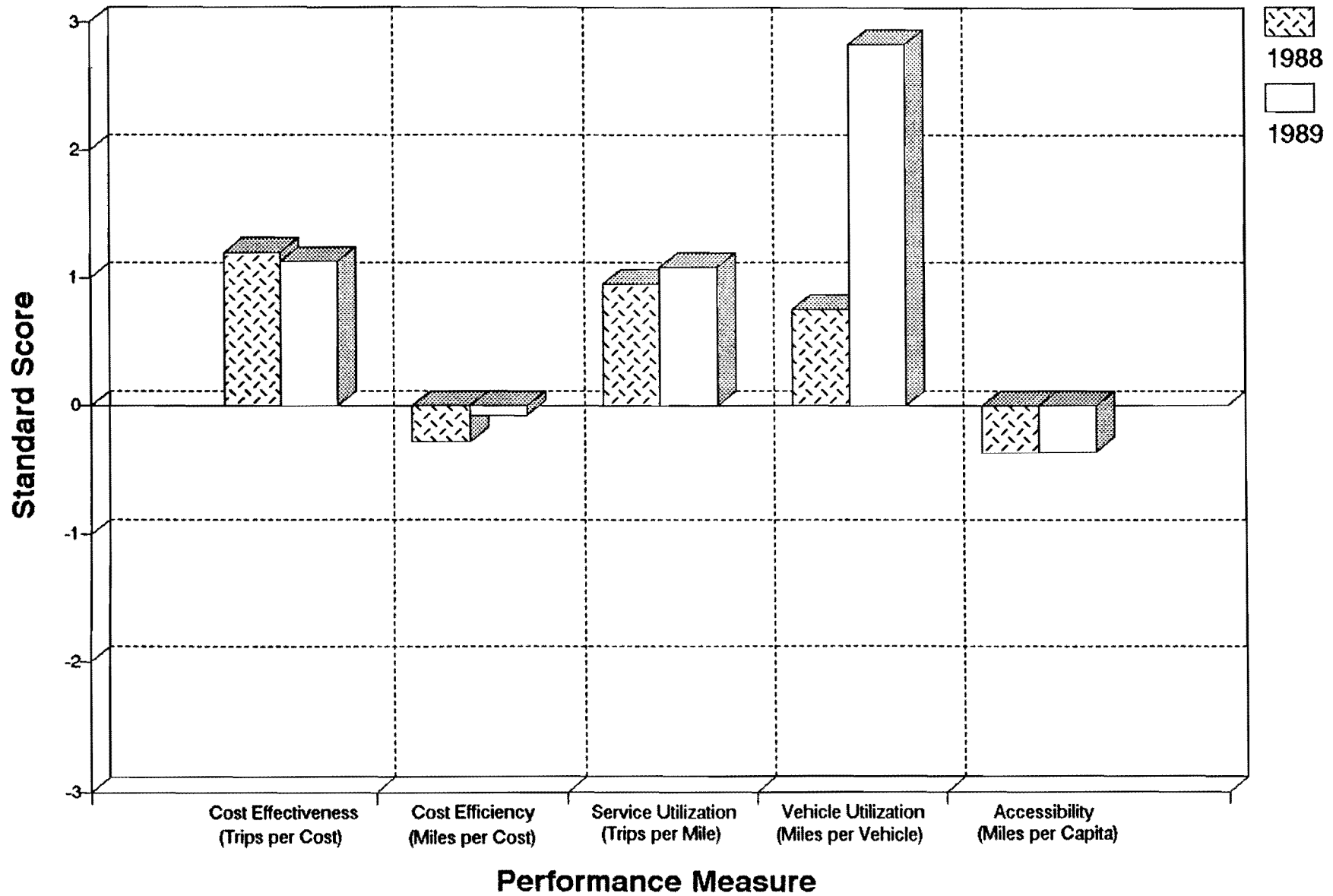
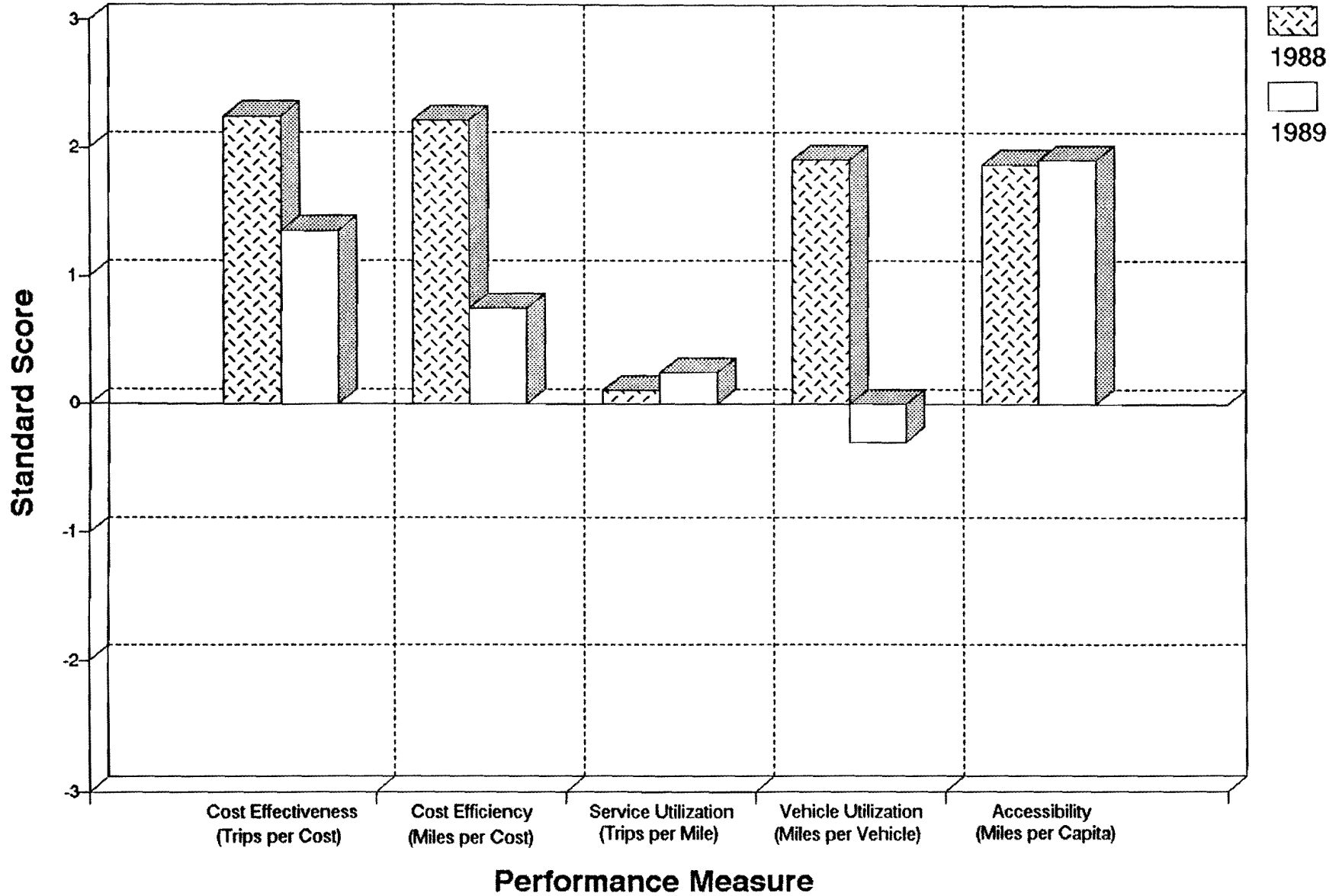
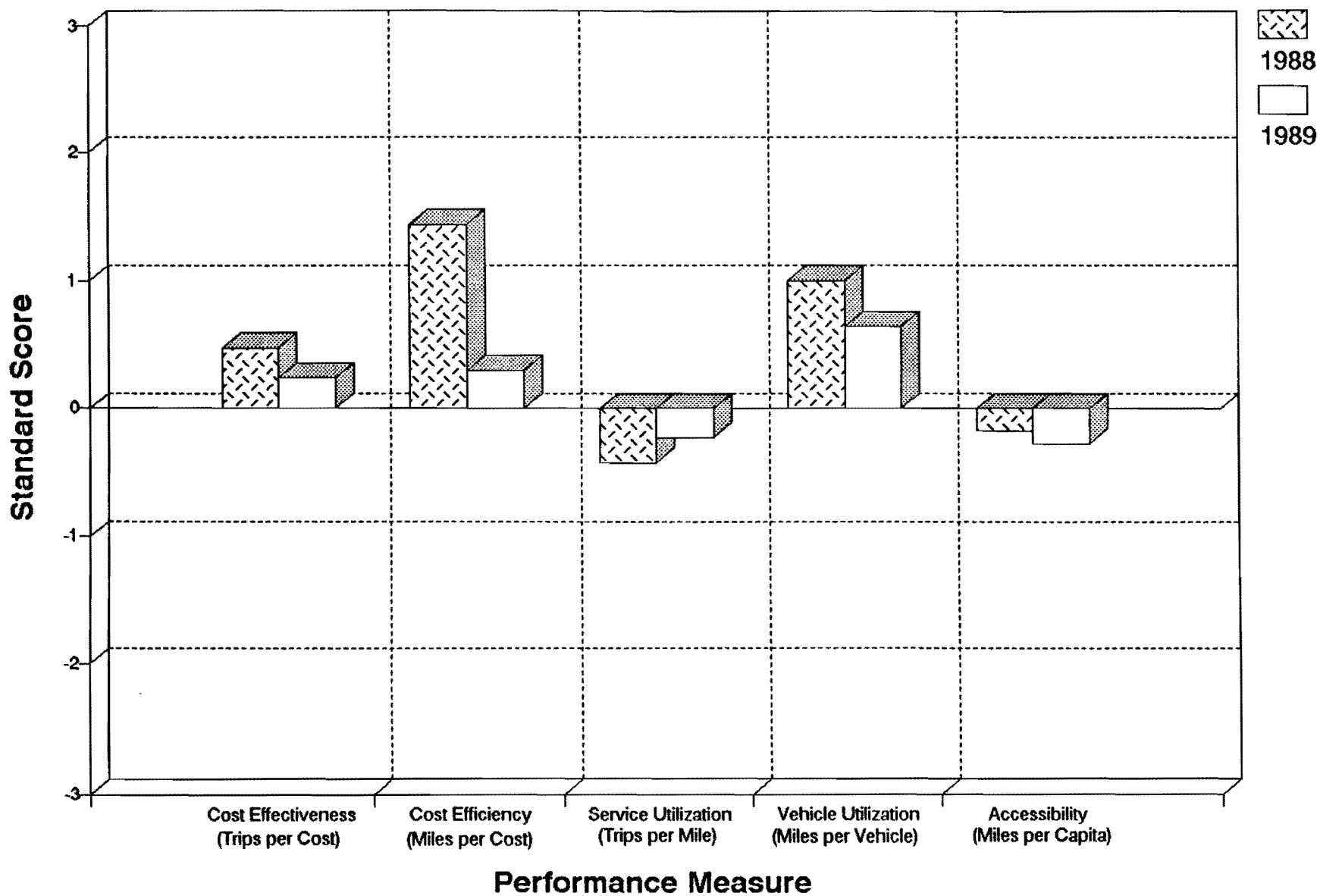


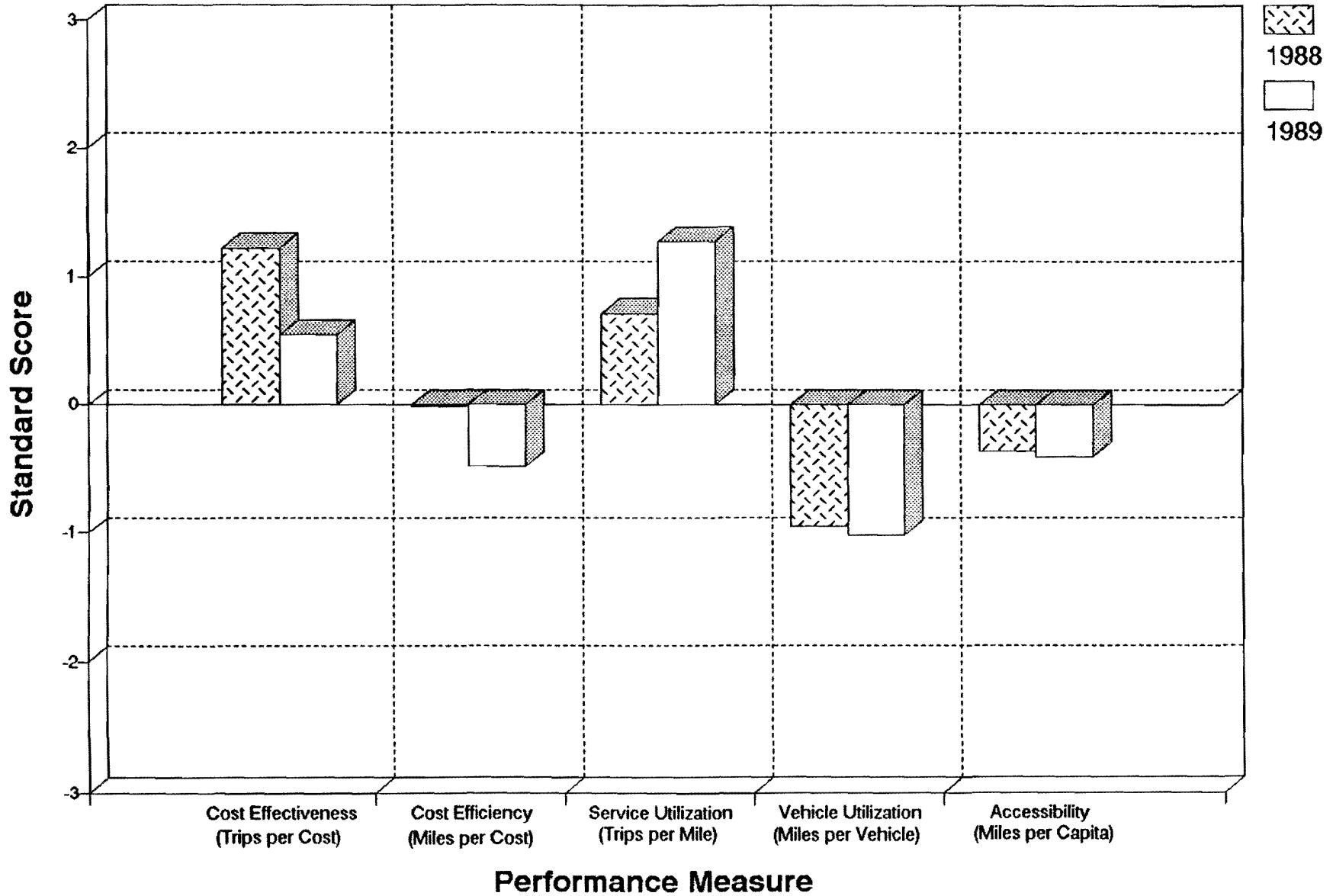
Figure C-22. Performance Measures for the Lower Rio Grande Development Council - McAllen



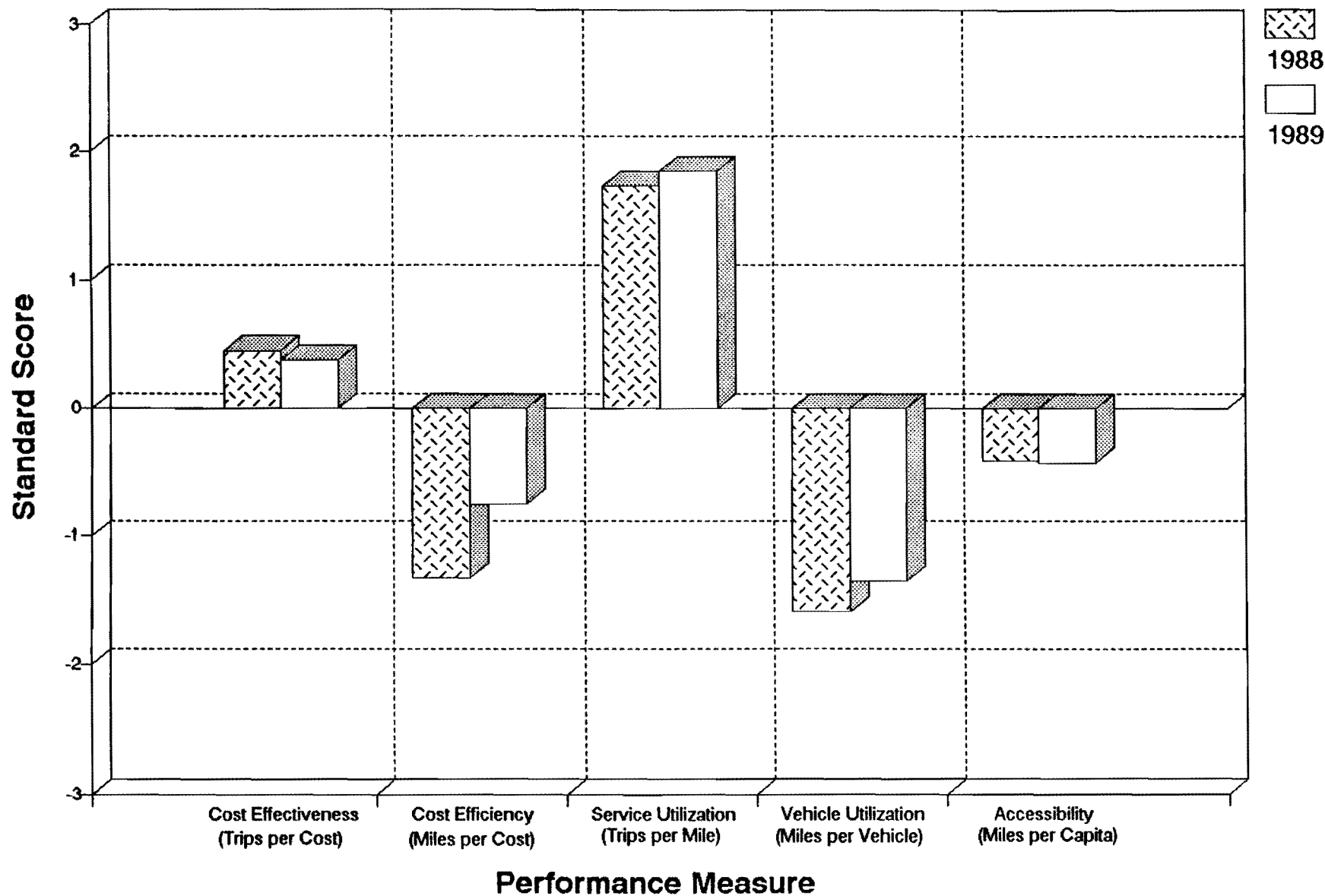
**Figure C-23. Performance Measures for the
Palo Pinto Transportation Council - Mineral Wells**



**Figure C-24. Performance Measures for the
Community Action Council of South Texas - Rio Grande City**



**Figure C-25. Performance Measures for the
Concho Valley Council of Governments - San Angelo**



**Figure C-26. Performance Measures for the
Alamo Area Council of Governments - San Antonio**

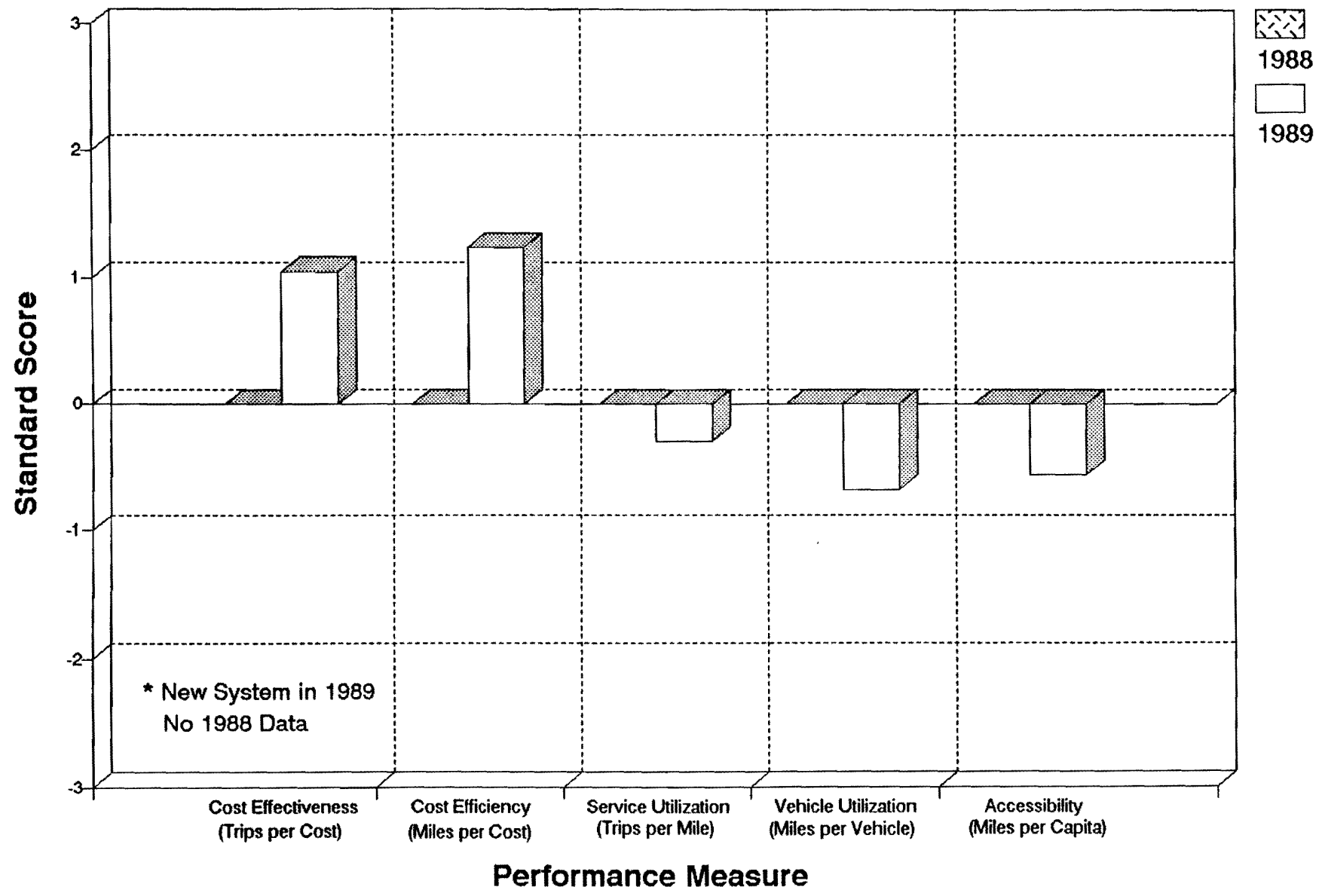


Figure C-27. Performance Measures for the Hill Country Community Action Agency - San Saba

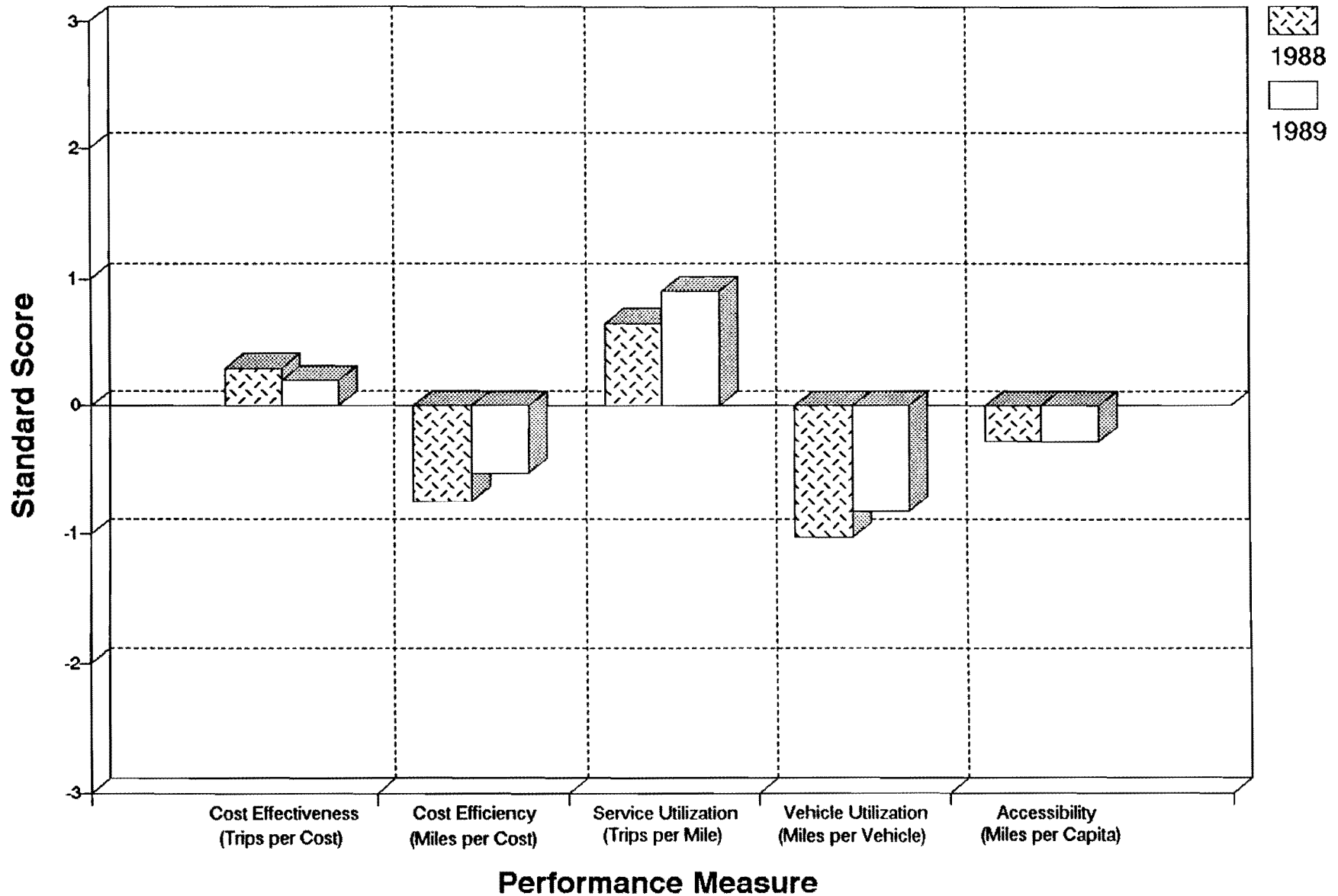
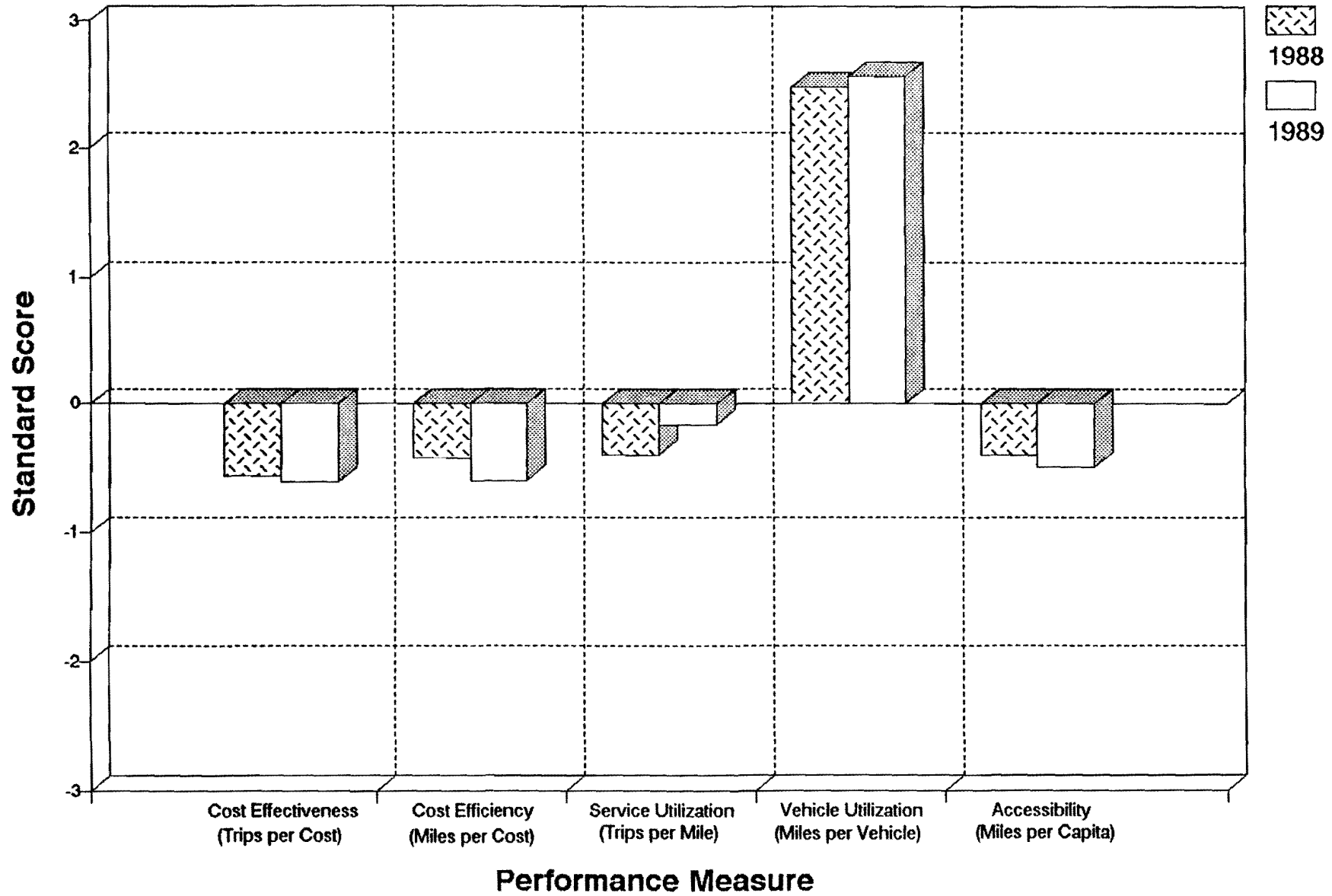


Figure C-28. Performance Measures for the San Patricio County Commision - Sinton



**Figure C-29. Performance Measures for the
People for Progress - Sweetwater**

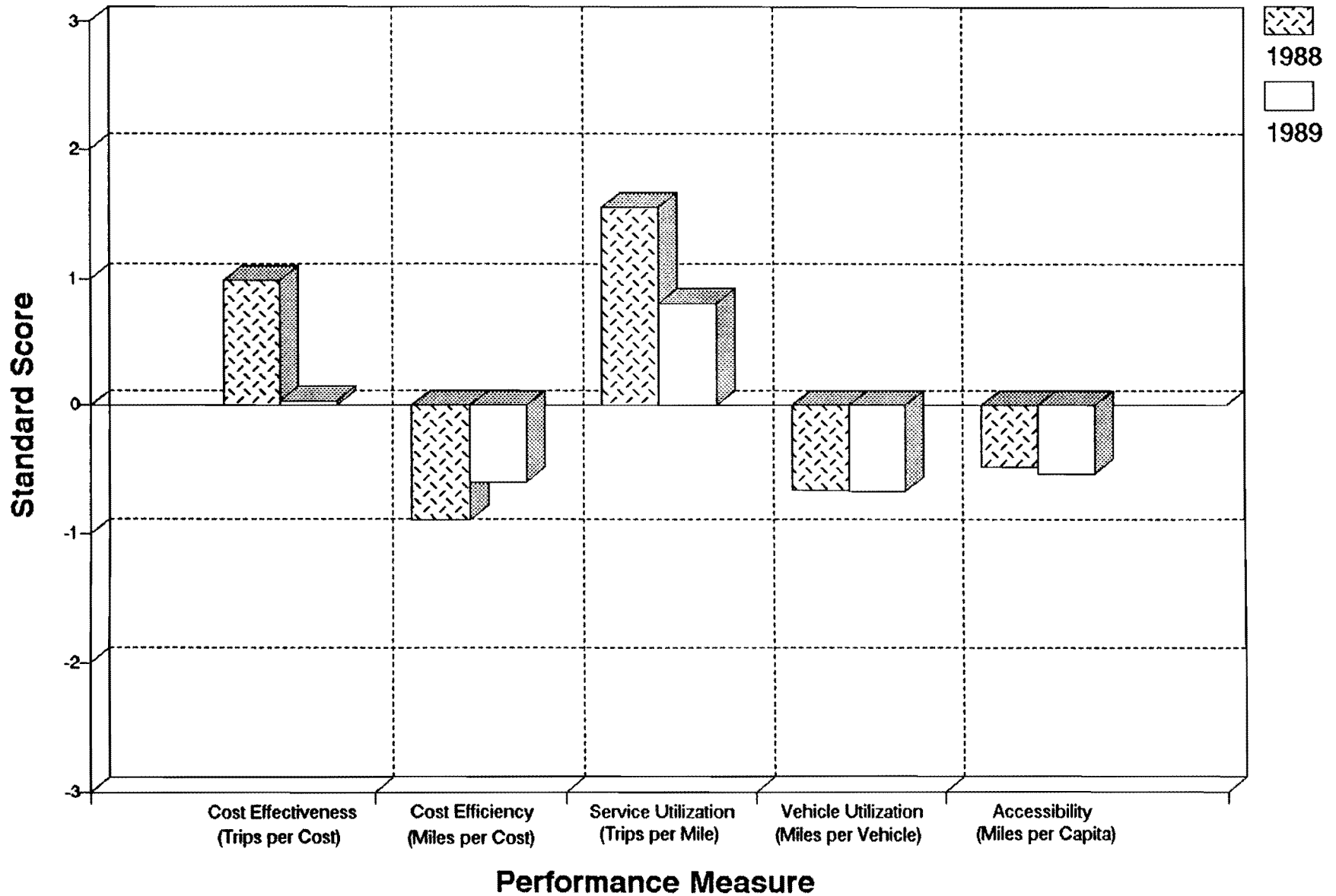
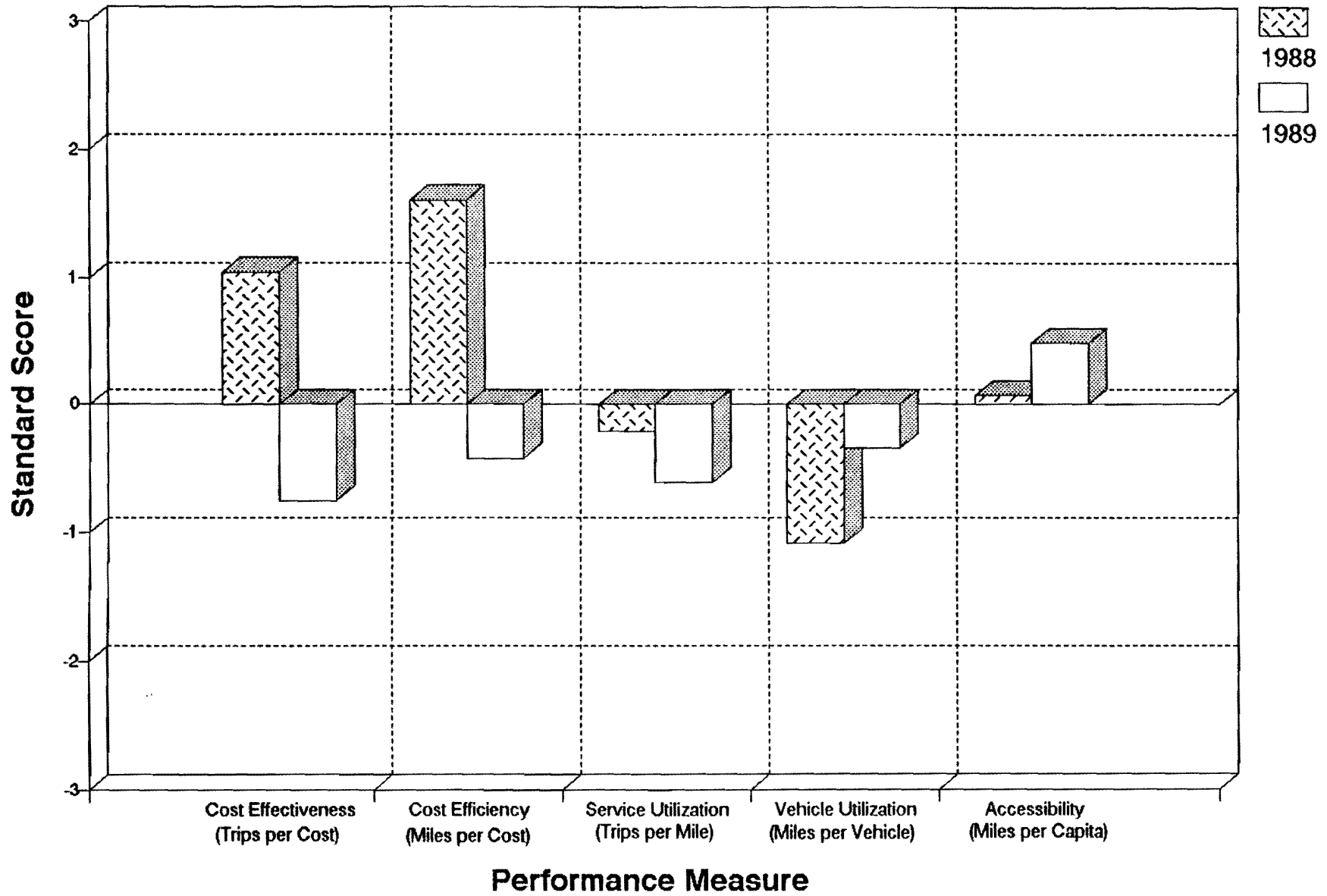


Figure C-30. Performance Measures for the Kaufman County Senior Citizens Services - Terrell



**Figure C-31. Performance Measures for the
Community Council of Southwest Texas - Uvalde**

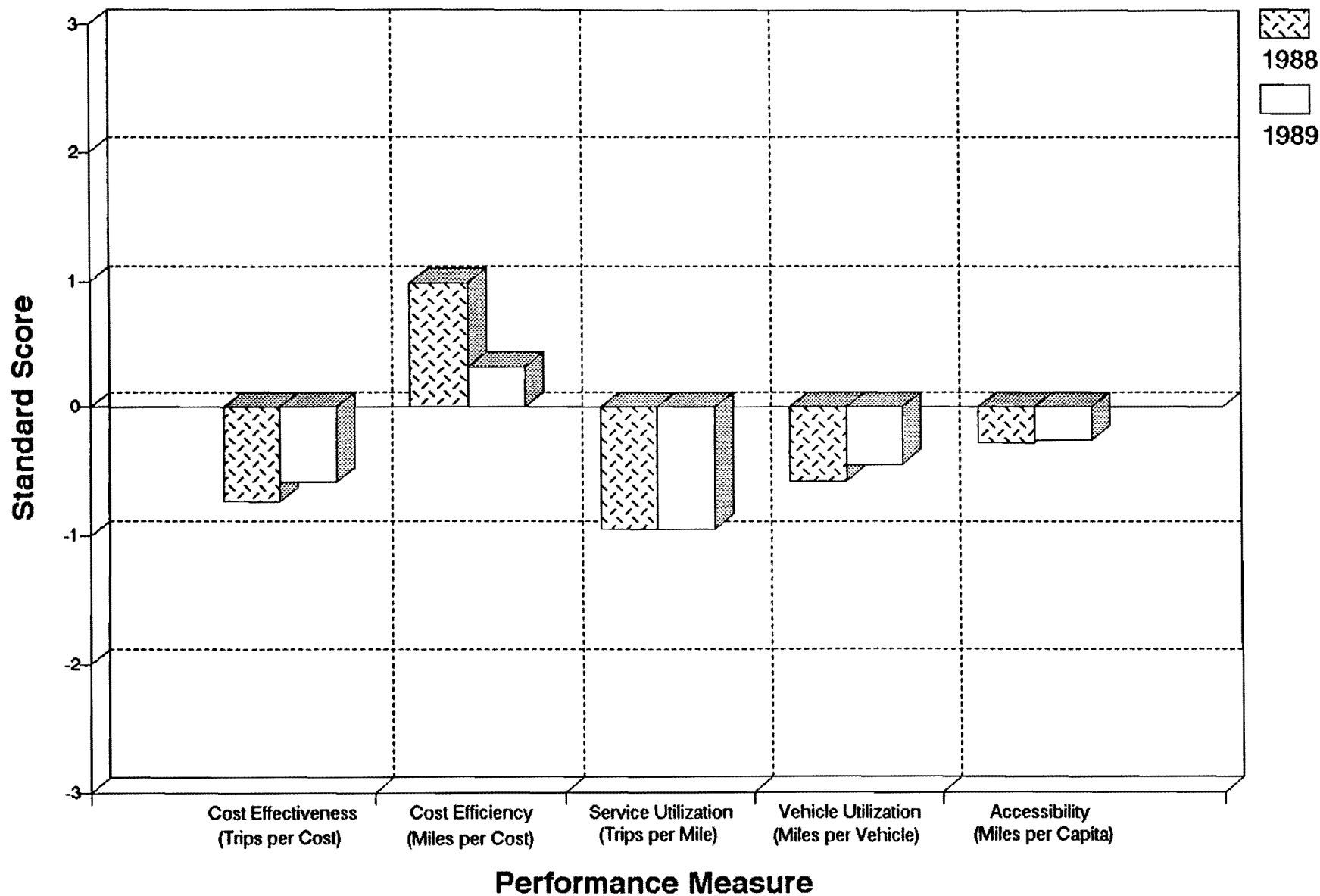


Figure C-32. Performance Measures for the Golden Crescent Regional Planning - Victoria

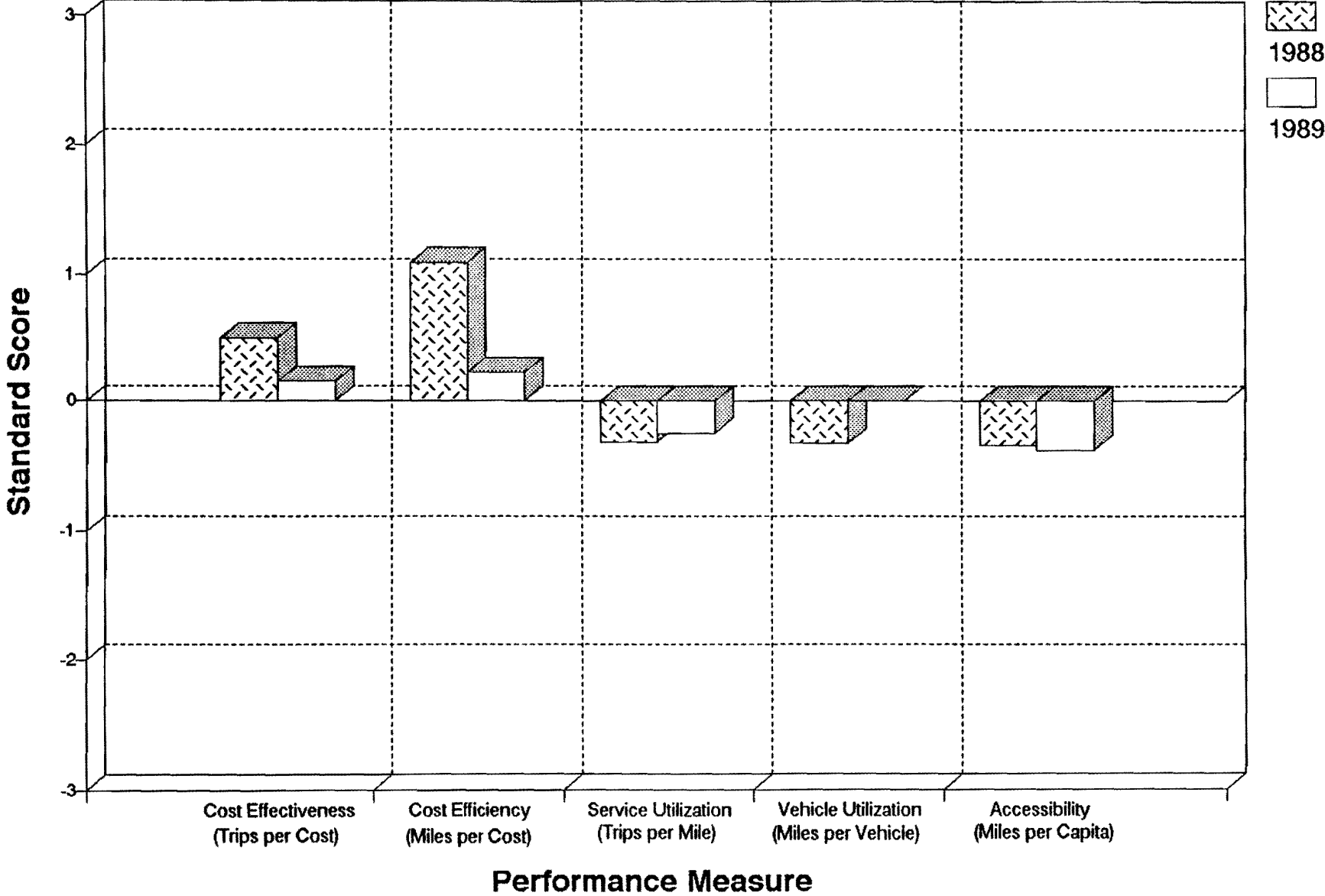
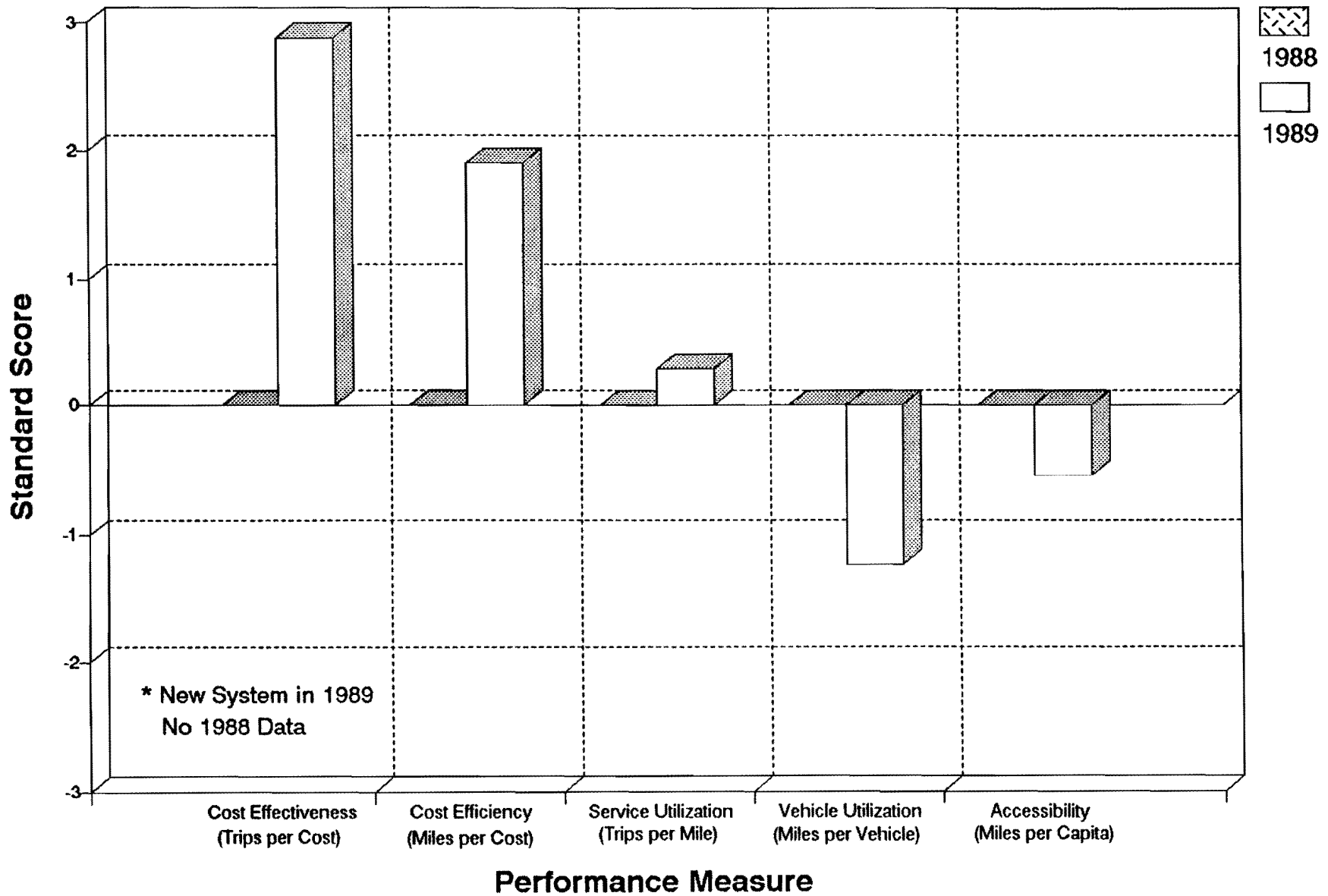
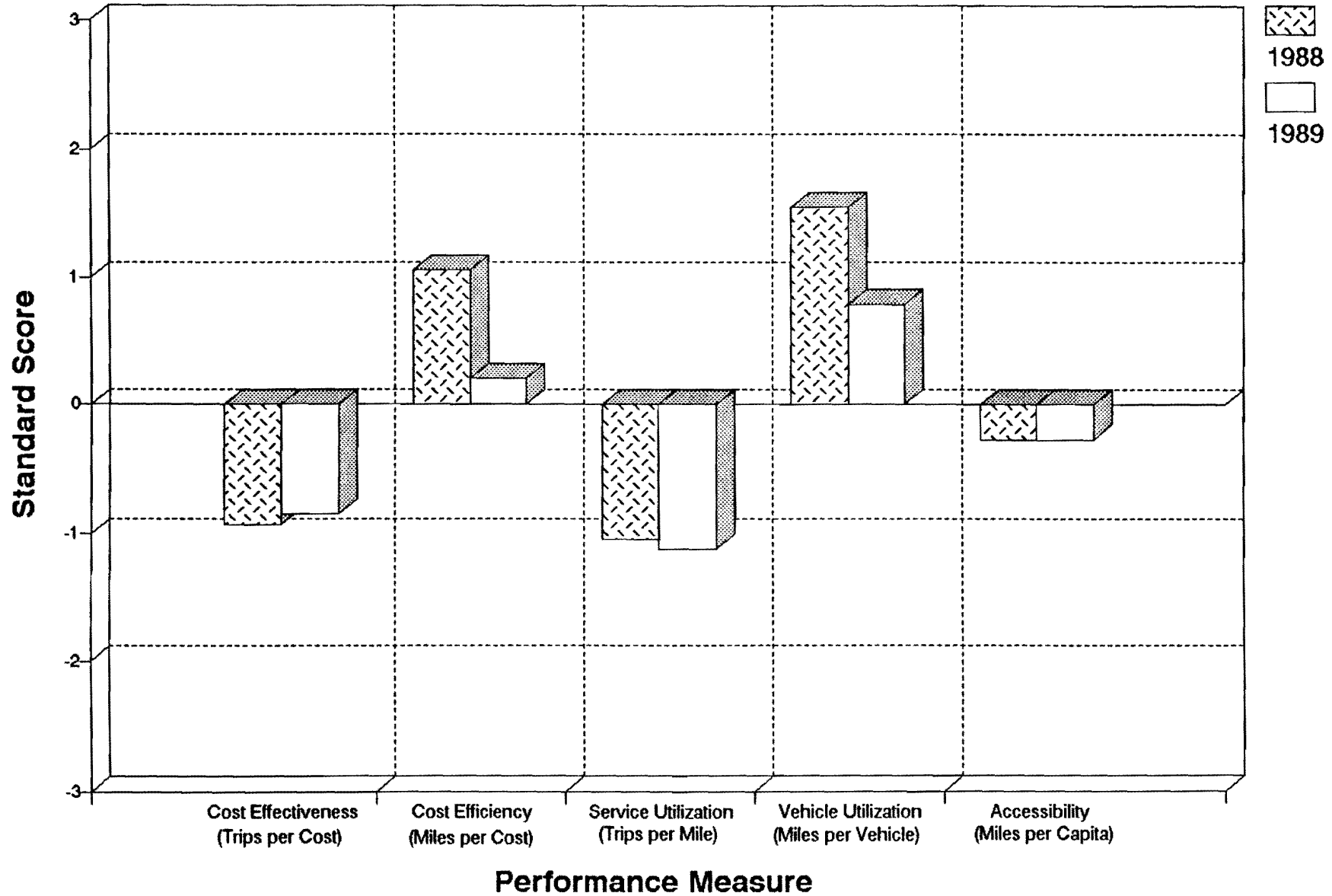


Figure C-33. Performance Measures for the Heart of Texas Council of Governments - Waco



**Figure C-34. Performance Measures for the
Parker County Transportation Services - Weatherford**



APPENDIX D

SECTION 18 CONTRACTOR ADDRESS LIST

ALICE: Ms. Gloria Cisneros
Rural Economic Assistance League, Inc.
1300 Wyoming Street
Alice, TX 78332
Tel: (800) 634-8082

AMARILLO: Mr. Bob Whorton
Panhandle Community Services, Inc.
P.O. Box 32150
Amarillo, TX 79120
Tel: (806) 372-2531

ASPERMONT: Mr. Don Cullis
Aspermont Small Business
Development Center, Inc.
P.O. Box 188
Aspermont, TX 79502
Tel: (817) 989-3538

AUSTIN: Mr. David Marsh
Capital Area Rural
Transportation System
5111 E. 1st Street
Austin, TX 78702
Tel: (512) 389-1011

BEEVILLE: Mr. Paul Sullivan
Bee Community Action Agency
P. O. Box 1540
Beeville, TX 78104
Tel: (512) 358-5530

BRYAN: Mr. John McBeth
Brazos Transit System
504 East 27th Street
Bryan, TX 77803-4025
Tel: (409) 779-7443

CLEBURNE: Mr. Ron Parnell
City of Cleburne
P.O. Box 657
Cleburne, TX 76031
Tel: (817) 641-3321, ext. 360

COLUMBUS: Ms. Vastine Olier
Colorado Valley Transit, Inc.
P.O. Box 940
Columbus, TX 78934
Tel: (409) 732-6281

CONROE: Mr. Lyle Nelson
Montgomery County Transit
2202 Timberloch Place, Suite 120
The Woodlands, TX 77380
Tel: (713) 363-0882

CROSBYTON: Mr. Jimmy Karr
Caprock Community Action
Association, Inc.
224 S. Berkshire
Crosbyton, TX 79322
Tel: (806) 675-2462

CROWELL: Mr. Felix Taylor
Rolling Plains Management
Corporation
P.O. Box 490
Crowell, TX 79227
Tel: (817) 684-1571

DENISON: Ms. Yvonne Caraway
Texoma Area Paratransit
System, Inc.
130 S. Burnett
Denison, TX 75020
Tel: (214) 465-9585

DENTON: Ms. Roberta Donsbach
SPAN
1800 Malone
Denton, TX 76201-1746
Tel: (817) 382-2224

EAGLE PASS: Mr. Alfonso G. Gonzalez
City of Eagle Pass
P.O. Box C
Eagle Pass, TX 78852
Tel: (512) 773-1111

GALVESTON: Ms. Carolyn Rose
Gulf Coast Regional MHMR Center
P. O. Box 2490
Galveston, TX 77553
Tel: (409) 763-2373

GLEN ROSE: Ms. Barbara Perry
Somervell County Transit
System, Inc.
P.O. Box 332
Glen Rose, TX 76043
Tel: (817) 897-2964

GREENVILLE: Ms. Bernice Carr
Hunt County Committee on Aging
3720 O'Neal Street
Greenville, TX 75401
Tel: (214) 454-1444

KILGORE: Mr. Claude Andrews
East Texas Council of Governments
3800 Stone Road
Kilgore, TX 75662
Tel: (214) 984-8641

KINGSVILLE: Mr. Ben Figueroa
Kleberg County
720 E. Lee
Kingsville, TX 78363
Tel: (512) 592-1328

LAMESA: Ms. Janet Everheart
West Texas Opportunities, Inc.
P.O. Box 1308
Lamesa, TX 79331
Tel: (806) 872-8354

LAREDO: Mr. Jose Valdez
Executive Director
Laredo-Webb County Community
Action Agency
P. O. Box 2578
Laredo, TX 78044
Tel: (512) 722-0021

LEVELLAND: Mr. Howard Maddera
South Plains Community Action
Association, Inc.
Box 610
Levelland, TX 79336
Tel: (806) 894-6104

LUFKIN: Mr. Billy Clemons
Lufkin Transit System
P.O. Box 190
Lufkin, TX 75901
Tel: (409) 639-3055

McALLEN: Ms. Martha Castillo
Lower Rio Grande Valley
Development Council
4900 North 23rd
McAllen, TX 78504
Tel: (512) 682-3481

MINERAL WELLS: Mr. Bob Walls
Palo Pinto County
Transportation Council
P.O. Drawer 1348
Mineral Wells, TX 76067
Tel: (817) 328-1391

RIO GRANDE CITY: Mr. Francisco Zarate
Community Action Council
of South Texas
P.O. Drawer S
Rio Grande City, TX 78582
Tel: (512) 487-2585

SAN ANGELO: Mr. Gordon Nelson
Concho Valley Council of Governments
P.O. Box 60050
San Angelo, TX 76906
Tel: (915) 944-9666

SAN ANTONIO: Ms. Barbara Hughes
Alamo Area Council of Governments
118 Broadway, Suite 400
San Antonio, TX 78205
Tel: (512) 225-5201

SAN SABA: Mr. Fred Wittenburg, Jr.
Hill Country Community Action
Association, Inc.
P.O. Box 846
San Saba, TX 76877
Tel: (915) 372-5167

SINTON: Ms. Lupita Paiz
San Patricio County Committee on
Youth Education and Job Opportunities
512 E. Sinton
Sinton, TX 78387
Tel: (512) 364-4290

SOUTH PADRE ISLAND: Mr. Eduardo A. Campirano
Town of South Padre Island
P.O. Box 3410
South Padre Island, TX 78597
Tel: (512) 761-6456

SWEETWATER: Ms. Gladys Gerst
People for Progress, Inc.
301 W. Arkansas
Sweetwater, TX 79556
Tel: (915) 235-8455

TERRELL: Ms. Omega A. Hawkins
Kaufman County Senior
Citizens Services, Inc.
P.O. Box 836
Terrell, TX 75160
Tel: (214) 563-1422

UVALDE: Mr. Jorge Botello
Community Council of
Southwest Texas, Inc.
429 West Main Street
Uvalde, TX 78801
Tel: (512) 278-6268

VICTORIA: Mr. Ray Rodriguez
Golden Crescent Regional
Planning Commission
P.O. Box 2028
Victoria, TX 77902
Tel: (512) 578-1587

WACO: Ms. Hazel Limback
Heart of Texas Council
of Governments
320 Franklin Avenue
Waco, TX 76701
Tel: (817) 756-7822

WEATHERFORD: Mr. Guy Jackson
Parker County Transportation
Service, Inc.
P.O. Box 1236
Weatherford, TX 76086
Tel: (817) 897-2964