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16. Abstract

The study area is a bi-state, four-county region located in northeast Texas and southwest Arkansas. The four contiguous counties in the study area are Bowie County in Texas, and Miller, Little River, and Sevier Counties in Arkansas. The largest urban area located within the study region is Texarkana, which straddles the state line.

Part I of this report analyzes the demographic, geographic, and economic characteristics of the entire study region and of each of the individual counties. It describes economic and employment trends in the region and considers the implications of these patterns for a rural public transit system.

Part II of this report identifies and analyzes existing transportation services in the region, centering on four types: certificated motor carriers, noncertificated commuter bus services, taxi services, and social service agency transportation systems.

Part III of this report describes the travel-demand-forecasting methodologies used to predict the number and distribution of work and nonwork trips within the four-county region.

Part IV of this report considers six major classes of transportation options that would allow the Texarkana Human Development Center to expand into a rural public transportation system. Each of the options is analyzed to determine appropriate travel corridors within the study region, noncompetition with existing carriers, and financial feasibility. The ridership, cost, and service parameters of promising "packages" are evaluated.

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RURAL PUBLIC TRANSPORTATION FOR TEXARKANA AND SURROUNDING AREA

by

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C. Michael Walton
Eugene R. Peters
How-ming Shieh

Technical Study Report Number 902-1F

Rural Public Transportation for
Texarkana and Surrounding Area

Research Project TX-ARK-81-902

conducted for

Arkansas State Highway and Transportation Department
and
Texas State Department of Highways and Public Transportation

in cooperation with the
U. S. Department of Transportation
Federal Highway Administration
and
Urban Mass Transportation Administration

by the

CENTER FOR TRANSPORTATION RESEARCH
BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

October 1982

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

There was no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plant which is or may be patentable under the patent laws of the United States of America or any foreign country.

PREFACE

This is the final report for Research Project TX-ARK-81-902, Rural Public Transportation for Texarkana and the Surrounding Area. The objective of the study was to explore the feasibility of a rural public transportation system for the counties of Miller, Little River, and Sevier in Arkansas and Bowie in Texas, in and around the Texarkana urban area. The study, conducted over a ten-month period, involved the analysis of the area demographic, geographic, and economic characteristics; identification and analysis of existing local and regional transportation services; modeling the travel-demand characteristics; and evaluating six major classes of transportation options. The ridership, cost, and service parameters of promising "packages" of work and non-work options are evaluated.

The authors wish to acknowledge and extend their appreciation to the many professionals who have assisted in providing information, data, and technical guidance. Appreciation is extended to

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ABSTRACT

The study area is a bi-state, four-county region located in northeast Texas and southwest Arkansas. The four contiguous counties in the study area are Bowie County in Texas, and Miller, Little River, and Sevier Counties in Arkansas. The largest urban area located within the study region is Texarkana, which straddles the state line.

Part I of this report analyzes the demographic, geographic, and economic characteristics of the entire study region and of each of the individual counties. It describes economic and employment trends in the region and considers the implications of these patterns for a rural public transit system.

Part II of this report identifies and analyzes existing transportation services in the region, centering on four types: certificated motor carriers, noncertificated commuter bus services, taxi services, and social service agency transportation systems.

Part III of this report describes the travel-demand-forecasting methodologies used to predict the number and distribution of work and nonwork trips within the four-county region.

Part IV of this report considers six major classes of transportation options that would allow the Texarkana Human Development Center to expand into a rural public transportation system. Each of the options is analyzed to determine appropriate travel corridors within the study region, noncompetition with existing carriers, and financial feasibility. The ridership, cost, and service parameters of promising "packages" of work and nonwork options are evaluated.

EXECUTIVE SUMMARY

INTRODUCTION

The study area is a bi-state, four-county region located in northeast Texas and southwest Arkansas. The study area is composed of four counties: Bowie in Texas, and Miller, Little River, and Sevier in Arkansas. The total study area is 2,522 square miles. The 1980 population was 141,079 or 55.9 persons per square mile.

The largest urban area located within the study area is Texarkana, which straddles the Texas-Arkansas state line. Texarkana is the central axis for interaction within the four-county region.

PART I. REGIONAL TRENDS AND CHARACTERISTICS

The first section of this part of the report describes the demographic and geographic characteristics of the four-county rural study region and then discusses each of the individual counties. The first section analyzes trends in population growth and presents population projections through the year 2030 for the study area and for the individual counties.

An analysis of the regional characteristics of the study area indicates that rural areas, particularly Little River and Sevier Counties, are growing at a faster overall rate than the Texarkana urban area, which is in Bowie and Miller Counties. Population changes recorded from 1970 to 1980 indicate that growth rates for both Little River and Sevier are double that of Miller County and triple that of Bowie County.

The region, as a whole, is predominantly white, although 22.1 percent of the population are nonwhite. The Texarkana area has slightly more than half of the 1980 nonwhite population. Approximately 18.4 percent of the regional population have incomes below the poverty level. More than half of those people live in the Texarkana urban area.

The young (under 18) and the old (over 65) represent 46 percent of the 1970 population. The urban area has 42 percent of the under 18 population and 47 percent of those over 65 years of age.

The Arkansas counties can be clearly distinguished from both the Texarkana urban area and Bowie County. Although the Arkansas counties are experiencing a faster overall growth rate than either the urban area or their Texas counterparts, they also lead in the percentage of those over 65 and in the percentage of households below the poverty level. Little River leads all four counties in the percentage of households below the poverty level.

The second section of this part describes the economic base of the region. The economic growth and character of an area or region directly impact travel in that region. A detailed and comprehensive examination of each of the individual counties is presented. First, the basic economy of the region is analyzed and the strengths of the region identified. Second, industrial or commercial activities that have shown significant changes, either increasing or decreasing from 1960 to 1970, are identified. These analyses indicate whether major employment centers are likely to grow, remain stable, or lose employment. These insights are coupled with other employment analyses and data in later sections of this report to suggest growing or stable work-trip routes which might be served by a rural public transit system. Economy problems in the region have more effect on Miller and Bowie Counties than the other two counties. For the region as a whole, the industries showing the largest employment totals and, generally, the largest percentage increases over the ten-year period from 1960 to 1970 were not industries which contributed to the economic growth of the region or in which the region maintained a competitive advantage.

Those industries or sectors which are considered export or basic industries are assumed to be the source of economic growth and development in the region; growth in other industries is assumed to have weak secondary impacts on regional development. For the region as a whole and for Bowie and Miller Counties, the only major employment sources that are also basic industries are "public administration" and "metal industries." But the region as a whole shows competitive advantage for only one of those two sectors, "public administration." In other words, while there may be increased employment in the basic

"metal industry" sector, additional jobs in that growing industry will be lost to other areas which enjoy a competitive advantage over the Texarkana region.

On the other hand, Little River and Sevier Counties are in slightly better relative positions. All of the five largest employment sectors in Little River are also basic industries contributing to economic growth in the county. However, only the "metal industries" sector is also a competitive one in the bi-state region. This means that increased employment in that sector will bring larger percentage growth in employment in "metal industries" in Little River than it will in the region as a whole or in Miller or Bowie County.

Three of Sevier County's largest employment sources are also basic industries contributing to economic development in the county. However, only two of those industries are also competitive in the bi-state region. Again, increases in employment may be seen in the largest employment industries but these will not be as large as found in the same industries in other parts of the bi-state region outside Texarkana.

Overall, the Texarkana region is forced to depend for further economic growth on just a few sectors; in only one of those five or six sectors does the region enjoy a competitive position.

PART II. EXISTING TRANSPORTATION SERVICES

In order to avoid duplication of services, prevent conflict with certificated providers, and allow the development of effectively coordinated transportation services, all major existing transportation providers in the region are analyzed and described in this section. The four principal types of existing providers are certificated motor coach services, noncertificated home-to-work services, taxi operations, and social service agency transportation providers.

Texarkana, because of its strategic position along the interstate system, has become a logical stop-over and transfer point for interstate and regional motor coach travel. Twenty-seven routes traverse the region and cross the State line. Intraregional service is provided by 52 scheduled daily routes connecting Texarkana with communities throughout the region. With few

exceptions, the intercity bus system serves the major communities in the region. Each of these routes and services is described.

Each route is analyzed in terms of its usefulness as a work-trip carrier. Few current routes are useful for work-trips. Residents of DeKalb and New Boston who work in Texarkana have a route available, and both Maud and Redwater are serviced by carriers with schedules adequate for employment in Texarkana. None of these would facilitate travel from Texarkana to Lone Star Ammunitions Plant or Red River Army Depot. Mandeville and Fulton have motor carrier service that would facilitate employment in Texarkana. Foreman, Arkinda, Alleene, and Horatio have no intercity service. DeQueen and Ashdown have limited motor carrier service to and from employment opportunities.

A noncertificated carrier, Industrial Bus Lines, provides commuter service between Texarkana and both the Red River Army Depot and the Lone Star Ammunitions plant. It is estimated that this service makes 50,000 one-way passenger trips daily at a fare of $2.00.

There are two affiliated taxi companies in Texarkana: Yellow Cab and Black and White. Both provide service primarily in Bowie and Miller Counties, making between 20,000 and 40,000 passenger trips yearly.

Six nonprofit human service agencies provide some limited transportation service in the region. Each service provider is described and the potential for involvement in a coordinated rural transit service is analyzed. On a county basis, social service transportation is most extensive in Sevier County.

PART III. RURAL TRAVEL DEMAND

The estimation of travel demand for the study area, presented in Part II of the report, represented an opportunity to blend existing data files from various sources in order to check the utility of several transportation modeling routines.

These modeling routines ranged from the variety of rural public transportation models (e.g., Burkhardt), innovative approaches to capture the information contained in the National Passenger Transport Survey, to the conventional and sequential transportation planning models. The selected process consists of numerous modifications to the traditional process. It is deemed the most appropriate overall process, given the resources available, which include

data, time, and funds. The assumptions which were used are clearly presented in order to provide the user with insight into the modeling process. The results are trip tables for the trip interchange between the 29 districts comprising the study area. Total work-trip interchanges and work-trips by public transportation are included to provide input in the evaluation of alternatives in the concluding part of the study. In addition, more than 15 tables and figures are summarized and included in this part of the report.

PART IV. ALTERNATIVE RURAL PUBLIC TRANSPORTATION OPTIONS

This part of the report analyzes the various options available to the Texarkana Human Development Center to allow its evolution to a public system. The emphasis of the analysis is the identification of complementary "packages" of transportation services that could be added to the existing THDC infrastructure.

The report identifies six classes of services that could be added, in stages if necessary and prudent, to existing THDC service to allow the evolution of a genuine rural public transit service. These services fall into two major categories of travel, work and nonwork trips:

Work-trip travel

- Feeder service to intercity motor coach service
- Subscription home-to-work service from outlying rural areas to concentrated employment sites
- Route-deviation fixed-route service, peak periods, into Texarkana

Nonwork travel

- Subscription nonwork or midday travel from outlying areas into Texarkana
- Route-deviation fixed-route service, off-peak periods, within rural counties
- Demand-responsive service, off-peak, in Texarkana and in rural centers

Many of these services will have to be combined with each other or with existing THDC services to be practical; it is unlikely that any service by itself will be immediately feasible.

The two major types of trips to be served are analyzed and "packaged" separately in this section. First, work-trips and work-trip routes are analyzed using both the findings of the travel demand modeling described in Part III and the results of a regional employment survey undertaken in 1982. Based on these analyses, various work-trip routes and services are suggested which could be added to THDC's current or expanded operations.

Next, nonwork and midday trips are analyzed based on an identification of such flows derived from the demand modeling undertaken in Part III. These data are augmented by an analysis of the major commercial, business, medical, and service trip attractors in various areas in the four-county region. Various nonwork services that could complement either existing THDC service or the potential work-trip services identified above are described.

This two-part process allows THDC to pick combinations of work and non-work-trip services that will effectively utilize existing resources. New public services can be added in stages, as primary new services become operational.

The financial implication of each option is also investigated. The fares that could be charged for each service as well as the costs that will be incurred by each service option are discussed.

There are a number of attractive and potentially feasible home-to-work routes which could be efficiently served by a rural public transit system, but the cost parameters of the suggested routes are very sensitive to the use to which the vehicles and drivers can be put during the remainder of the day. Home-to-work trips must be matched to potential corridors of nonwork and mid-day travel to effectively use vehicles throughout the service area.

CONCLUSIONS

THDC is a special system serving social service agencies and disadvantaged individuals. The evolution to a rural system open to the general public is not only possible but extremely feasible. The evolution to a public system serving members of the general riding public unaffiliated with social service agencies can be accomplished. (1) in a limited way with existing resources using excess capacity and (2) in a more acceptable manner with an expansion of capacity.

This report identifies complementary work and nonwork demand patterns that will allow THDC to continue in its traditional role in the social service community and also expand into a public service eligible for Section 18 operating funds.

It is recognized that THDC must grow and expand without providing effective competition to existing public or common carriers in Texas or Arkansas. All of the analyses in this report were conducted with the non-competitive objective firmly in mind. No public services are offered or considered that would compete with existing carriers.

It is clear that THDC could offer service to the general public with existing resources in a limited way. Services offered to the public would have to be structured to fill excess capacity in a way that does not interfere with THDC's contractual obligations to the many service agencies with which it contracts. However, as THDC begins expanding its vehicle fleet, it will gain the ability to serve the complementary packages of work and nonwork services suggested in this report.

With an expanded vehicle fleet and additional staff resources, THDC could begin to provide a number of additional services to the public. Among the possibilities which the data analysis in this report shows as possible are

(1) subscription home to work trips for concentrated employment generators in Little River, Sevier, and Miller Counties as well as Texarkana;

(2) subscription group services from senior centers, nursing homes, and other facilities in outlying Miller and Bowie Counties into Texarkana; and

(3) flexible routes from outlying areas into Texarkana at times and along routes not in conflict with existing motor carriers.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The residents of rural areas are particularly disadvanteged in terms of transportation resources. The populations of rural areas like many of those surrounding Texarkana are often characterized by a high percentage of handicapped people and an even higher percentage of those at or below the poverty level. These characteristics often overlap so that rural areas tain a large number of people too old, too poor, or too handicapped to drive themselves. At the same time most rural areas offer few transportation alternatives to those without access to cars.

In some rural areas a few human service and social service agency providers are all that stand between disadvantaged people and total immobility. In other areas, there are simply no available transportation providers.

The U.S. Congress has recognized this problem by establishing Section 18 of the 1974 Surface Transportation Act, a rural public transit assistance program to provide increased mobility for rural residents. Most rural areas, however, must carefully plan for the development of rural public transportation services. Resources are limited and transportation expertise is often unavailable. The intensity of rural need is understood but the actual dimensions of that need, the types and number of trips and the frequencies, times, and locations of trips required by rural citizens, are largely unknown.

In recognition of this fact, the Section 18 program provides planning assistance funds to allow rural areas to evaluate the needs of their specific communities, to identify the resources available, and to carefully plan for the development of a rural public transportation system. In areas where social and human service agencies are already providing limited transportation services, the plan must show how these resources and the transportation expertise of current providers can be best incorporated into or developed into a genuine public transportation system. The existence of such providers offers both a challenge and the promise of better transportation services to all residents of the area.

There are some transportation resources available to residents of the Texarkana area unable to drive or without access to a private car. There is

intercity bus transportation available and there are some local taxi services. But the real transportation provider to the disadvantaged citizens of these rural counties is the Texarkana Human Development Center (THDC), which has been providing specialized transportation services to the elderly and handicapped clients of social service agencies in the area since 1971.

While THDC services are currently limited to participant social and human service agencies, it is clear that the THDC system has the potential to develop into a full and comprehensive public transportation system for rural residents. This study addresses the ways in which THDC can best become a genuine rural public transportation system.

In order to promote the development and implementation of a comprehensive rural public transportation system, THDC needed a variety of planning information and analyses including

- the needs of the residents of the study area;
- the resources currently available in the area, i.e., vehicles, funds, and expertise, considering both private and nonprofit providers;
- the ways in which current services and systems and the THDC system can become a rural public system;
- additional resources required to develop and implement the most feasible alternative.

The study area is a bi-state, four-county region located in northeast Texas and southwest Arkansas. The four contiguous counties in the study area are Bowie County in Texas, and Miller, Little River, and Sevier Counties in Arkansas. The largest urban area located within the study region is Texarkana, which straddles the state line.

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PART I. REGIONAL TRENDS AND CHARACTERISTICS OF THE TEXARKANA RURAL TRANSPORTATION STUDY AREA

INTRODUCTION

The study area is a bi-state, four-county region located in northeast Texas and southwest Arkansas, as shown in Figure I-1. The study area, illustrated in Figure I-2, is composed of four counties: Bowie in Texas, and Miller, Little River, and Sevier Counties in Arkansas. The total study area is 2522 square miles. The total 1980 Census population was 141,079 or 55.9 persons per square mile.

The largest urban area located within the study area is Texarkana, which straddles the Arkansas-Texas state line. Texarkana is the central axis for interaction within the four-county region. The 1980 Texarkana standard metropolitan statistical area (SMSA) (designated by the Bureau of the Census) was composed of three of the four counties in our study: Bowie, Miller, and Little River. The Texarkana SMSA is 2000 square miles and has a majority of the study area population, with 127,019 inhabitants.

Important metropolitan areas located within a radius of 300 miles of Texarkana, and in part illustrated by Figure I-3, are: Dallas, Texas, which is 160 miles from Texarkana; Beaumont, Texas, 265 miles; Shreveport, Louisiana, 71 miles; Little Rock, Arkansas, 132 miles; and Oklahoma City, Oklahoma, 300 miles from Texarkana. (1)*

DEMOGRAPHIC, CLIMATALOGICAL, AND LAND USE PATTERNS

The first section of this part of the study report describes the demographic and geographic characteristics of the four-county rural study region and then discusses each of the individual counties. The first section analyzes trends in population growth and present population projections through the year 2030 for the study area and for the individual counties.

The second section of this part of the study report describes the econo-

*number refers to reference list, which is located at the end of this part

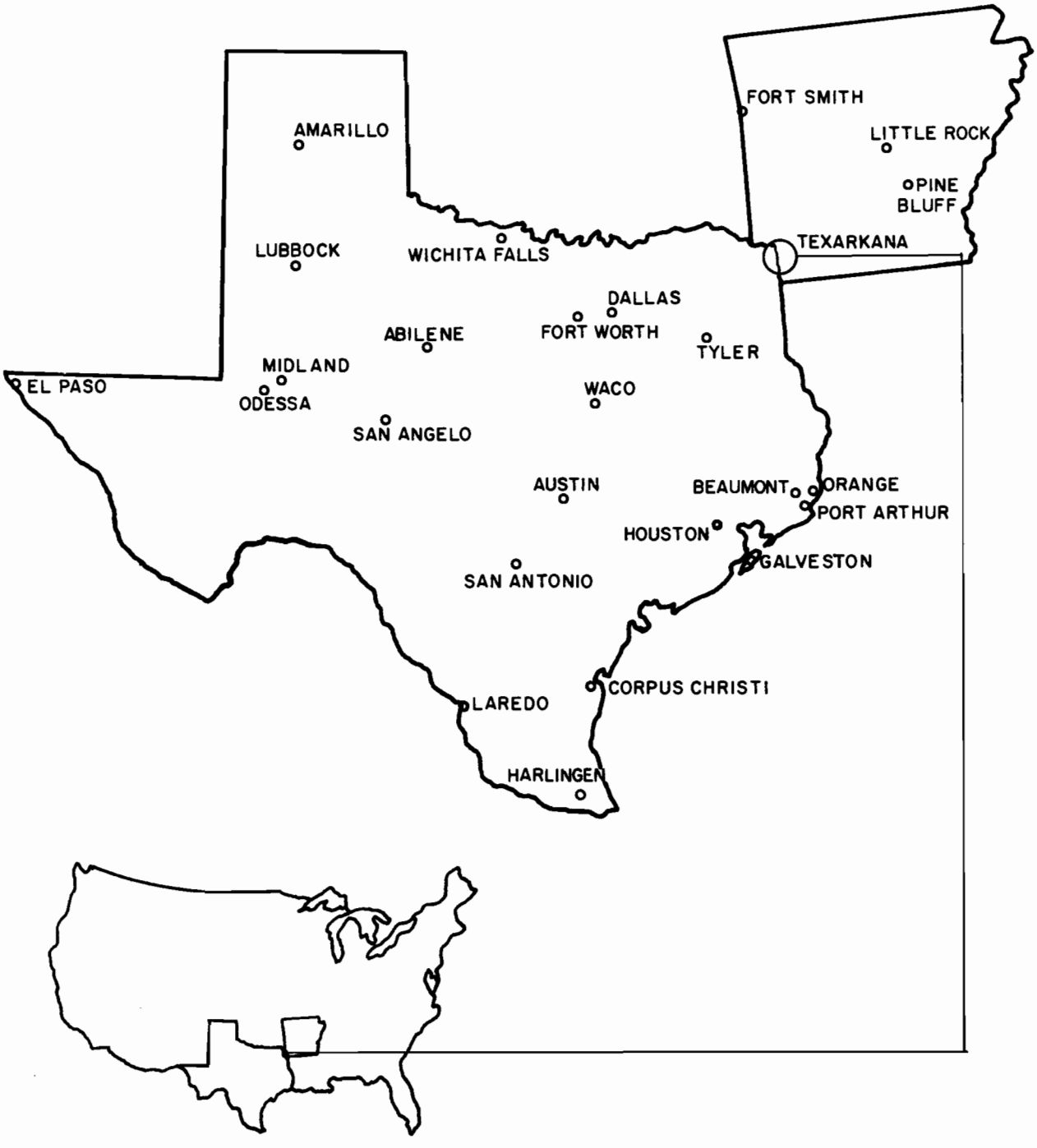

Fig I-1. The Texarkana region in relation to Texas, Arkansas, and the United States (Ref 1).

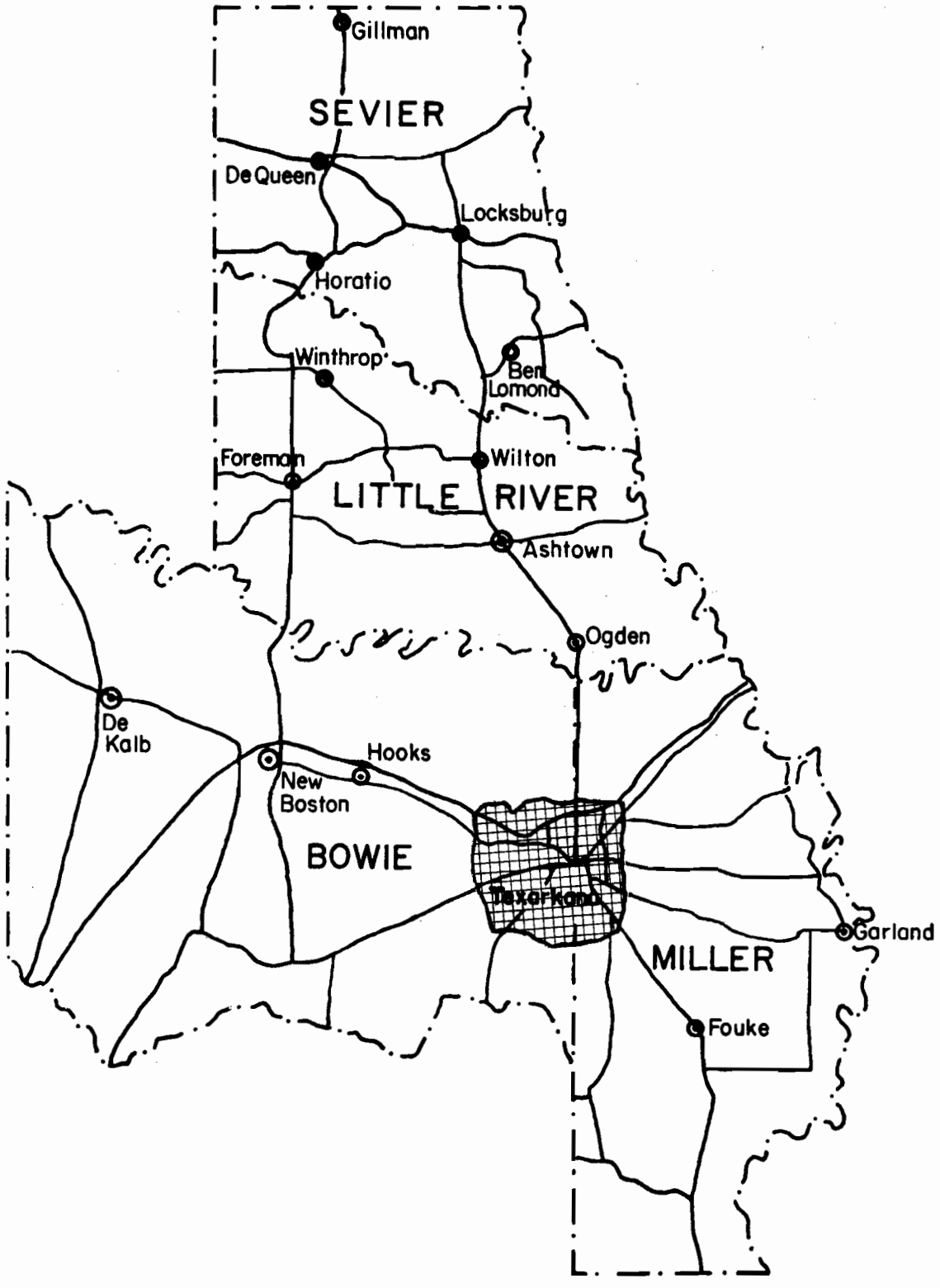

Fig I-2. The Texarkana rural transportation study area.

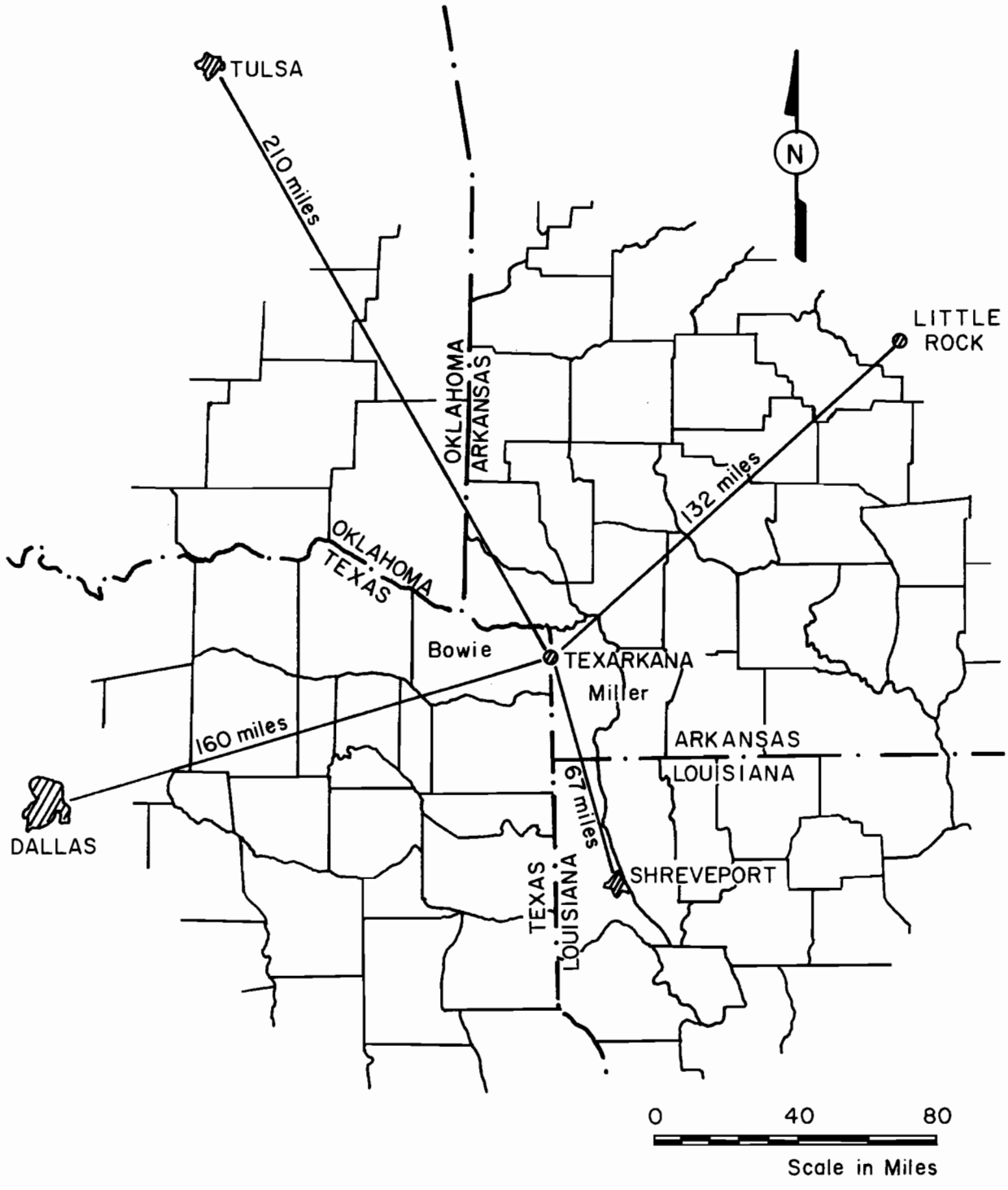

Fig I-3. Texarkana in relation to other metropolitan areas.

mic base of the region and of the individual counties. It describes employment trends in the region and analyze changes in employment patterns by industry. Finally this section will use regional economic tools to analyze the underlying causes of changes in the economies of the entire region and the individual counties and to suggest the implications of these findings.

An analysis of the demographic and economic trends and projections for the region is crucial to the developing of sound transportation plans.

The area is characterized by mild winters and moderate summers. The mean average temperature is 64.8°F, the noontime average humidity is 57%. Annual average rainfall is 48.93 inches and the annual average snowfall is 2.08 inches. A growing season of 254 days creates conditions favorable to a variety of crops: cotton, corn, feed grains, rice, peaches, apples, pears, blackberries, strawberries, sweet potatoes, and peanuts. (2)

In the following sections, the Study Team analyzes regional characteristics which often reveal important trends. These significant characteristics include changes in population, ethnicity, urban versus rural composition, those under 18 or 65 and over, employment, income, the poverty level, and land uses. These characteristics help identify the potentially transportation dependent and where they are located.

A significant limitation on this study was the inability to use detailed 1980 census data because they have not as yet been released. Hence, many parameters identified by the 1970 census cannot be compared with 1980 data. Table I-1 gives basic 1970 demographic data on the Texarkana region as a whole, the cities, and the four individual counties. Table I-2 displays changes from 1970 to 1980 where 1980 census data are available.

In the following sections, the history and characteristics of the urbanized area and each of the individual counties are discussed.

THE CITIES OF TEXARKANA

Texarkana, as shown in Figure I-4, is actually two separate but contiguous municipalities: Texarkana, Arkansas, and Texarkana, Texas. Fig. I-4 also shows major employment locations in the two cities; the numbers refer to individual employers, who are listed in the Appendix. There is close cooperation in the operation of most municipal services. Many systems, such

TABLE I-1. BASIC 1970 DEMOGRAPHIC DATA ON THE TEXARKANA SMSA AND BOWIE, MILLER, LITTLE RIVER, AND SEVIER COUNTIES

	1970 Pop.	Urban Pop.	% Urban	Rural Pop.	% Rural	Under 18	Percent	65 and over	Percent	Total Emp.
Texarkana, Tx	30,497	-	-	-	-	10,308	33.8	4,214	13.8	12,039
Texarkana, Ar	21,682	-	-	-	-	7,634	35.2	2,799	12.9	8,253
Total	52,179	-	-	-	-	17,942	34.4	7,013	13.4	20,292
Bowie County	68,909	43,132	62.6	24,681	35.8	22,983	33.4	7,781	11.3	25,775
Miller County	33,385	21,800	65.3	11,703	35.1	11,536	34.6	4,030	12.1	12,537
Little River Co.	11,194	3,493	31.2	7,702	68.8	4,161	37.2	1,299	11.6	3,703
Sevier County	11,272	3,821	33.9	7,451	66.1	3,653	32.4	1,705	15.1	4,015
Region Total	124,760	72,246	57.9	51,537	41.3	42,335	33.9	14,815	11.9	46.030
Texarkana——SMSA*	113,488	68,425	60.8	44,086	38.8	38,680	34.1	13,110	11.6	40,762

(continued)

TABLE I-1. (CONTINUED)

	Median Income	Mean Income	Family Size	Below Poverty Level: Number in Household	Below Poverty Level: Percent of Households	Below Poverty Level: Total Number
Texarkana, Tx	$8,009	$9,039	3.65	1,192	14.5	8,209
Texarkana, Ar	7,028	7,829	3.64	1,015	17.8	5,703
Total	7,518	8,434	3.645	2,207	16.1	13,912
Bowie County	8,942	8,942	3.58	2,627	14.5	9,405
Miller County	6,846	7,554	3.67	1,670	19.0	8,780
Little River Co.	6,586	7,195	3.61	703	23.9	2,538
Sevier County	6,552	7,036	3.61	617	19.9	2,227
Region Total	7,036	7,682	3.62	5,617	19.3	22,950
Texarkana——SMSA*	7,730	8,489	3.61	4,297	16.0	20,723

*1970 SMSA consisted of Bowie and Miller Counties

Source: 1970 Census of Population.
General Social and Economic Characteristics: Texas,
U.S. Department of Commerce, Bureau of the Census,
April 1971.

1970 Census of Population.
General Social and Economic Characteristics: Arkansas,
U.S. Department of Commerce, Bureau of the Census,
April 1971.

TABLE I-2. POPULATION CHARACTERISTICS, 1970 and 1980, OF CITIES AND COUNTIES IN THE TEXARKANA RURAL TRANSPORTATION STUDY AREA

	Population		%		1980 Race			Land	Pop/m2
	1980	1970	Change	White	Black	Spanish	Other	Area	1980
Texarkana——SMSA*	127,019	113,488	11.9	96,815	29,104	1,359	1,100	2,000	63.5
Texarkana, Ar	21,459	21,682	-1.0	15,398	5,886	179	175		
Texarkana, Tx	31,271	30,497	2.5	20,957	10,080	370	234		
Total:	52,730	52,179	1.1	36,355	15,966	549	409	19.8	2663.1
Outlying SMSA	74,389	61,309	21.2	60,460	13,138	810	691		
Bowie County	75,301	68,909	9.3	58,123	16,498	993	680	891	84.5
De Kalb	2,217	2,197	0.9						
Hooks	2,507	2,545	-1.5						
Leary	253	352	-40.6						
New Boston	4,628	4,034	14.7						
Maud	1,059	1,107	-4.3						
Nash	2,022	1,961	3.1						
Wake Village	3,865	2,408	60.5						
Miller County	37,766	33,385	13.1	28,322	9,136	278	308	623	60.6
Fouke	614	506	21.3						
Garland	660	321	105.6						
Little River Co.	13,952	11,194	24.6	10,370	3,470	88	112	486	28.7
Wilton	495	427	15.9						
Foreman	1,377	1,173	17.4						
Ashdown	4,218	3,522	12.5						
Ogden	334	286	16.8						
Winthrop	238	240	-0.8						
Sevier County	14,060	11,272	24.7	13,097	783	137	180	522	26.9
DeQueen	4,594	3,863	25.1						
Ben Lomond	155	155							
Horatio	989	852	16.1						
Gillham	252	200	26.0						
Locksburg	616	620	-0.6						
Region Total	141,079	124,760	13.1	109,912	29,887	1,496	1,280	2,522	55.9

(continued)

TABLE I-2. (CONTINUED)

	Housing Units		%	1980 Number of Persons... (H.H. = Households)			
	1980	1970	Change	In H.H.	In Grp Qtrs	Total H.H.'s	Per H.H.
Texarkana——SMSA*	50,236	40,329	24.8	125,312	1,707	45,660	2.74
Texarkana, Ar	8,810	8,046	9.5	21,116	343	8,069	2.62
Texarkana, Tx	13,508	11,563	12.9	30,779	492	12,144	2.53
Total:	21,868	19,609	11.5	51,895	835	20,213	2.41
Outlying SMSA	28,368	20,630	37.5	43,417	872	25,447	2.89
Bowie County	29,810	24,347	22.4	74,103	1,198	27,449	2.70
Miller County	14,695	11,875	23.7	37.387	379	13,476	2.77
Little River, Co.	5,731	4,017	42.7	13,822	130	4,735	2.92
Sevier County	14,060	11,272	24.7	13,910	150	5,057	2.75
Region Total	64,296	51,511	24.8	139,222	1,857	50,717	2.78

*1980 SMSA: Bowie, Miller, and Little River Counties
1970 SMSA: Bowie and Miller Counties

Source: 1980 Census of Population
Persons by Race and Spanish Origin and Housing
Unit Counts for Standard Metropolitan Statistical Areas
U.S. Department of Commerce, Bureau of the Census
May 1981

1970 Census of Population and Housing: Texas/Arkansas
Advance Reports
U.S. Department of Commerce, Bureau of the Census
March 1981

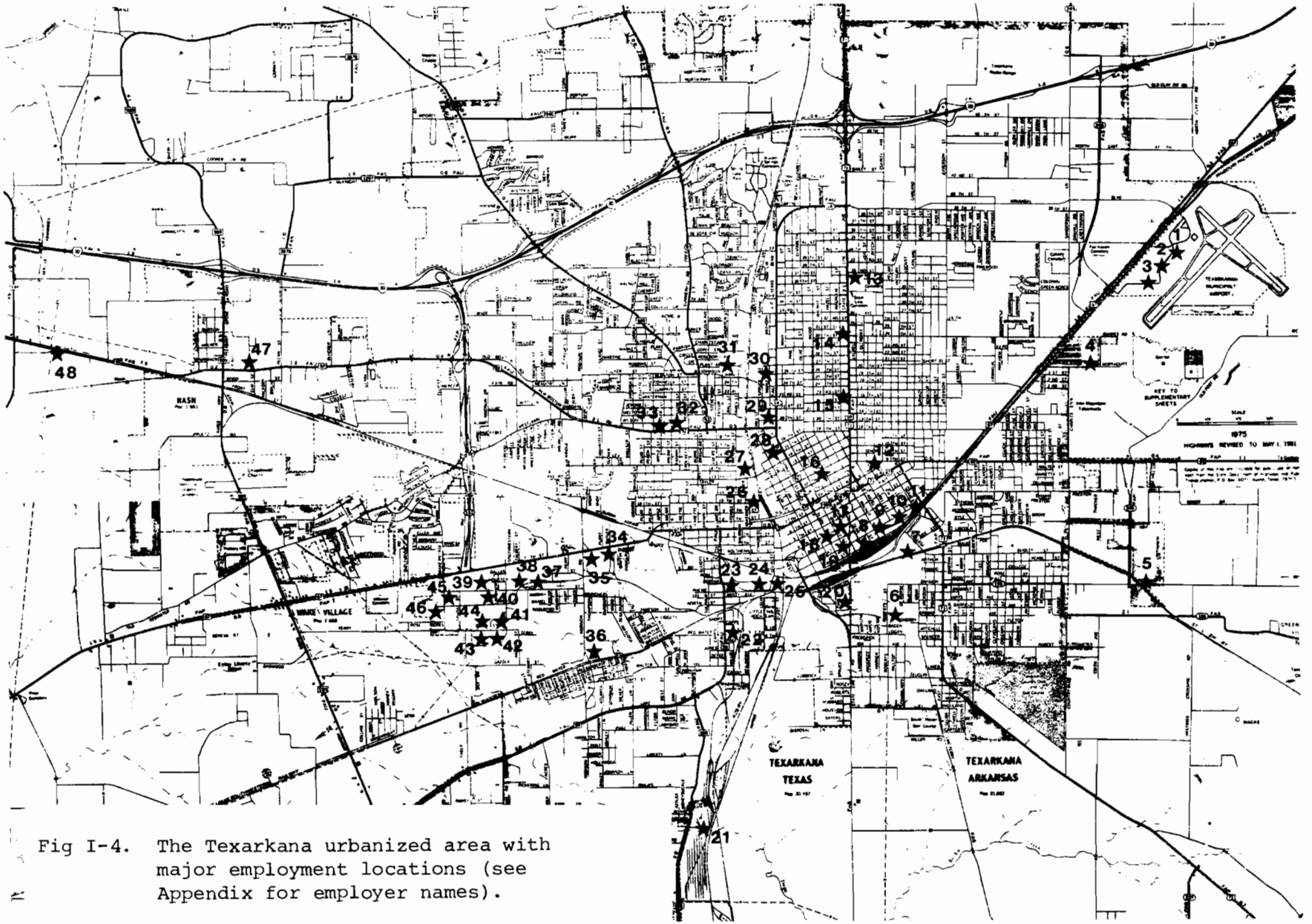

Fig I-4. The Texarkana urbanized area with major employment locations (see Appendix for employer names).

as water and sewage, are jointly owned. The cities remain, however, distinct municipalities, particularly with respect to local government organization. Texarkana, Arkansas, is organized under a city manager form of government, while Texarkana, Texas, operates under the traditional mayor-council approach.

The city was founded in 1873 at the junction of two railroads, the Texas and Pacific, and the Cairo and Fulton (now part of the Missouri Pacific Railway). Texarkana was named after Texas, Arkansas, and Louisiana. A permanent settlement was started in the area as early as 1840. But, for hundreds of years prior to this,

> The 'Great Southwest Trail' traversed the region around what is now Texarkana and served as the main route to travel between Indian villages of the Mississippi Valley and of the west and southwest. (1)

The early growth of the city was dependent upon a thriving lumber industry and the increasing importance of the city as a railroad center. Texarkana currently serves as an agribusiness center for rich farming, livestock, and timber enterprises and has developed into an important center of a diversified manufacturing base. (2)

As the "Gateway to the Southwest," Texarkana has strategic geographic proximity to several major metropolitan markets. Located on the Arkansas-Texas state line, the city is 28 miles south of the Oklahoma boundary and 25 miles north of the Louisiana boundary. Texarkana has subsequently become a trade center of a four state-area and the whole southwestern market area. (1)

The city's commercial and industrial foundation is built upon a strategic transportation location and three natural resources: abundant timber, fertile agricultural lands, and divers mineral deposits. (3) Industrial development has occurred primarily along railroad corridors. While commercial uses are located downtown along Broad Street and State Line Road (U.S. 59/71 - North/South), as well as other major arterial streets throughout the city, much of Texarkana is residential,

> Most older residential development occurred between the Kansas City Southern and Missouri Pacific Railroad and Interstate 30, while recent development has been concentrated north of Interstate 30. (4)

Texarkana is also a regional center for public and social services. Public and semi-public land uses, including the Texarkana Municipal Airport account for 11% of the total developed and area. The city is the site of East Texas University and Texarkana Community College. Also located in Texarkana are a Federal correctional unit, various governmental and social service agencies, and elderly and handicapped educational and workshop facilities. (3)

THE TEXARKANA METROPOLITAN AREA

The Texarkana metropolitan area is larger than the City and basically consists of Texarkana, Arkansas and Texas, Nash, and Wake Village, Texas, and all immediately adjoining unincorporated areas. The 1980 census places the combined Texarkana, Arkansas-Tx, population at 52,730 persons, an increase of only 1.1% over 1970's population of 52,179. This represents a 1980 population density of 2663 persons per square mile. Growth trends for the two Texarkanas showed dissimiliarities: Texarkana, Arkansas, lost 1% of its residents, decreasing from 21,682 in 1970 to 21,459 in 1980. Texarkana, Texas, meanwhile, increased 2.5%, going from 30,497 persons in 1970 to 31,271 in 1980. Table I-1 indicates that Wake Village experienced the greatest population growth, with a 60.5% increase from the 1970's population. Nash also increased, although only moderately, by 3.1%, from 1,961 in 1970 to 2,022 in 1980.

Table I-3 shows the population history for the twin cities, and indicates continued, albeit, slow growth since the 1900's. Figure I-5 depicts the actual population growth from 1930 to 1980 and then <u>projected</u> population totals for the study region from 1980 to 2030. The projections were calculated utilizing two very basic and well accepted estimation techniques: linear regression and non-linear, or exponential, analysis. The projections are based upon known population data from 1930 to 1950 (shown in Table I-3). Little River and Sevier Counties' projections however, are based only upon the 1950 to 1980 period because earlier population levels are inconsistent with current trends; the 1980 populations of both counties were below those in 1930.

Linear regression is a prediction technique which assumes a constant

Table I-3. THE POPULATION HISTORY OF THE TEXARKANA REGION, 1900-1980

	POPULATION								
	1980	1970	1960	1950	1940	1930	1920	1910	1900
Texarkana - SMSA	127,019	113,488							
Texarkana: Ar	21,459	21,682	19,788	15,875	11,821	10,764	8,257	5,655	4,914
Texarkana: Tx	31,271	30,497	30,218	24,753	17,019	16,602	11,480	9,790	5,256
Total	52,730	52,179	50,006	40,628	28,840	27,366	19,737	10,355	10,170
Outside Ar/Tx		6,391	3,414	1,066					
Nash	2,022	1,961	1,124						
Wake Village	3,865	2,408	1,140						
Metro Area		58,570	53,420						
Outlying SMSA	74,289	61,309							
Bowie County	75,301	68,909	59,971	61,966	50,208	48,563	39,472	34,827	26,676
Texarkana	31,271	30,497	30,218	24,753	17,019	16,602	11,480	9,790	5,256
De Kalb	2,217	2,197	2,042	1,928	1,287	1,023			
Hooks	2,507	2,545	2,048	2,319					
Leary	253	352							
New Boston	4,628	4,034	2,773	2,688	1,111	949			
Maud	1,059	1,107	951	713					
Nash	2,022	1,961	1,124						
Wake Village	3,865	2,408	1,140	1,066					

Source: 1970 Census of Population. Number of Inhabitants: Texas. U.S. Department of Commerce, Bureau of the Census. August 1971.

1970 Census of Population. Number of Inhabitants: Arkansas. U.S. Department of Commerce, Bureau of the Census. August 1971.

(continued)

TABLE I-3. (CONTINUED)

	POPULATION					
	1980	1970	1960	1950	1940	1930
Miller County	37,766	33,385	31,686	32,614	31,874	30,586
Texarkana	21,459	21,682	19,788	15,875	11,821	10,764
Fouke	614	506	394	336	368	363
Garland	660	321	377	351	325	425
Little River Co.	13,952	11,194	9,211	11,610	15,932	15,515
Ashdown	4,218	3,522	2,725	2,738	2,332	1,705
Wilton	495	427	329	328	319	313
Foreman	1,377	1,173	1,001	907	1,007	1,056
Ogden	334	286	282	296	225	305
Winthrop	238	240	225	284	336	331
Sevier County	14,060	11,272	10,156	12,293	15,248	16,364
DeQueen	4,594	3,863	2,859	3,015	3,055	2,938
Ben Lomond	155	155	157	284	406	
Horatio	989	852	722	776	809	1,028
Gillham	252	200	177	207	238	242
Locksburg	616	620	511	714	764	747
Paraloma		60	94	186	143	384

Source: U.S. Population of Census: 1960. Number of Inhabitants: Texas. U.S. Department of Commerce, Bureau of the Census. 1961.

ibed. Number of Inhabitants: Arkansas.

U.S. Population of Census: 1950. Characteristics of the Population: Arkansas. Vol. II. U.S. Department of Commerce, Bureau of the Census. 1952

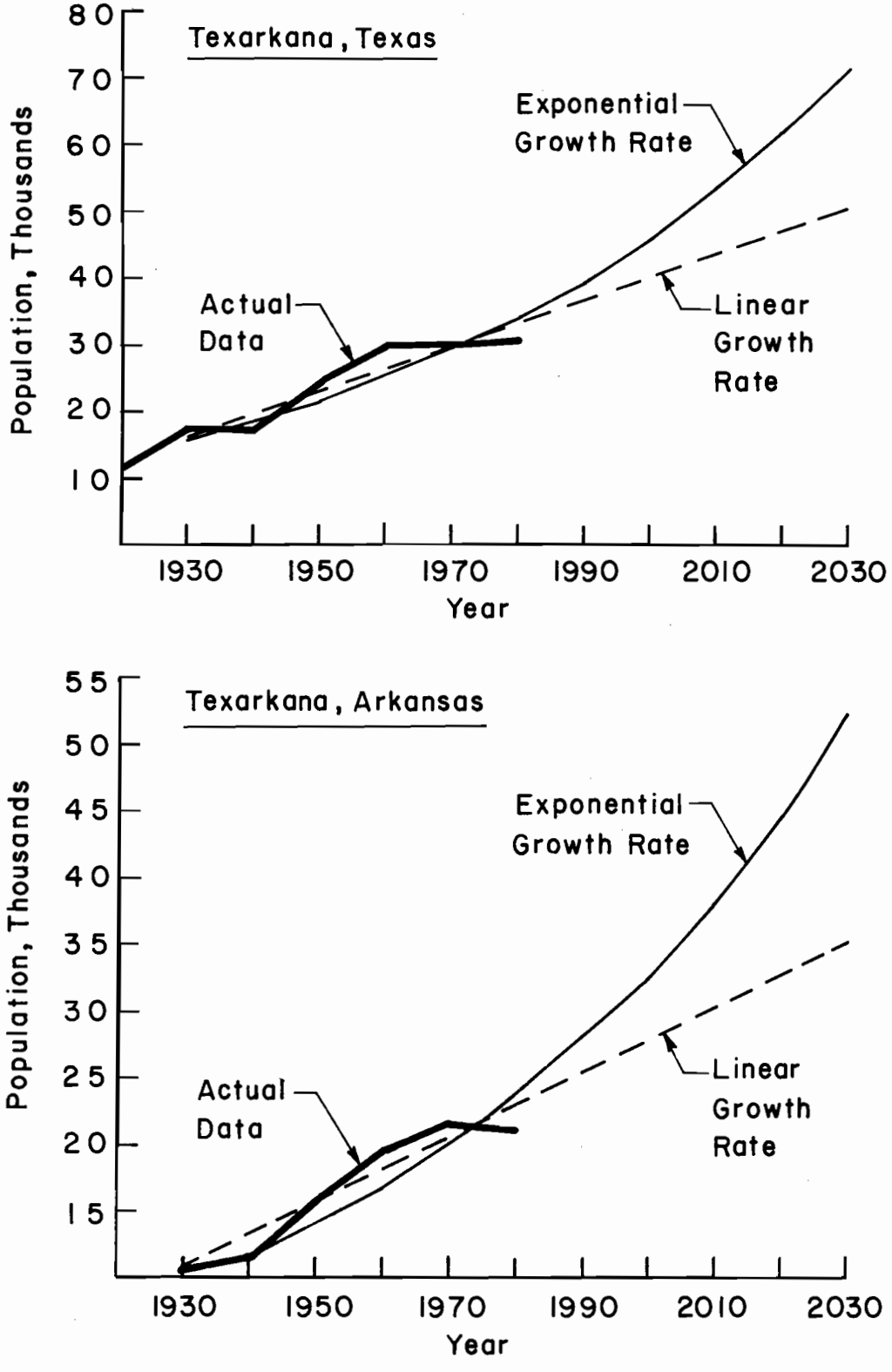

Fig I-5. Population trends, 1930-1980, and projections, 1980-2030, for Texarkana, Texas, and Texarkana, Arkansas.

incremental increase in population for each successive year. The projections represent a linear average extrapolated from available historical data.

Exponential projections differ in that they represent a prediction which assumes constant percentage increase for each successive year, also based upon historical population data. That is, the population is projected to increase by a constant percentage for each successive year. Exponential values tend to be greater than those derived by linear regression.

Of special note is the 1950-1960 decade, when the urban Texarkana population substantially increased while the regional county populations were experiencing dramatic decreases. This perhaps reflects movement away from rural areas to urban centers throughout the nation at the time. The combined Texarkana population is expected to increase by at least 29%, to more than 68,000, by the year 2000.

THE STANDARD METROPOLITAN STATISTICAL AREA (SMSA)

Texarkana is the central city for the SMSA, as well as the entire four county study region. The SMSA is the largest segment of the study area with 2000 square miles and a 1980 population of 127,019.

The Texarkana SMSA is 60.8% urban, due primarily to the major influence of the Texarkana metropolitan area. The 1970 urban population consisted of 68,425 residents, versus 44,086 who were classified as rural dwellers.

The SMSA is predominantly white, with the black population constituting 22.6%, or 25,384 persons. The under eighteen population is 38,680, while the 65 or over population is 13,110, or 11.6% of the population. Total employment within the SMSA for 1970 was 43,203; the median income was $7,730. The number of households listed as having income below the poverty level was 4,297, or 16% of all households in the SMSA.

BOWIE COUNTY

Bowie County, as shown in Fig I-6, is the northeastern most county in the state of Texas, with Oklahoma bordering on the north, and Arkansas (Miller County) on the east. Major employment sites are shown in Fig. I-6; the numbers refer to individual employers listed in the Appendix. The

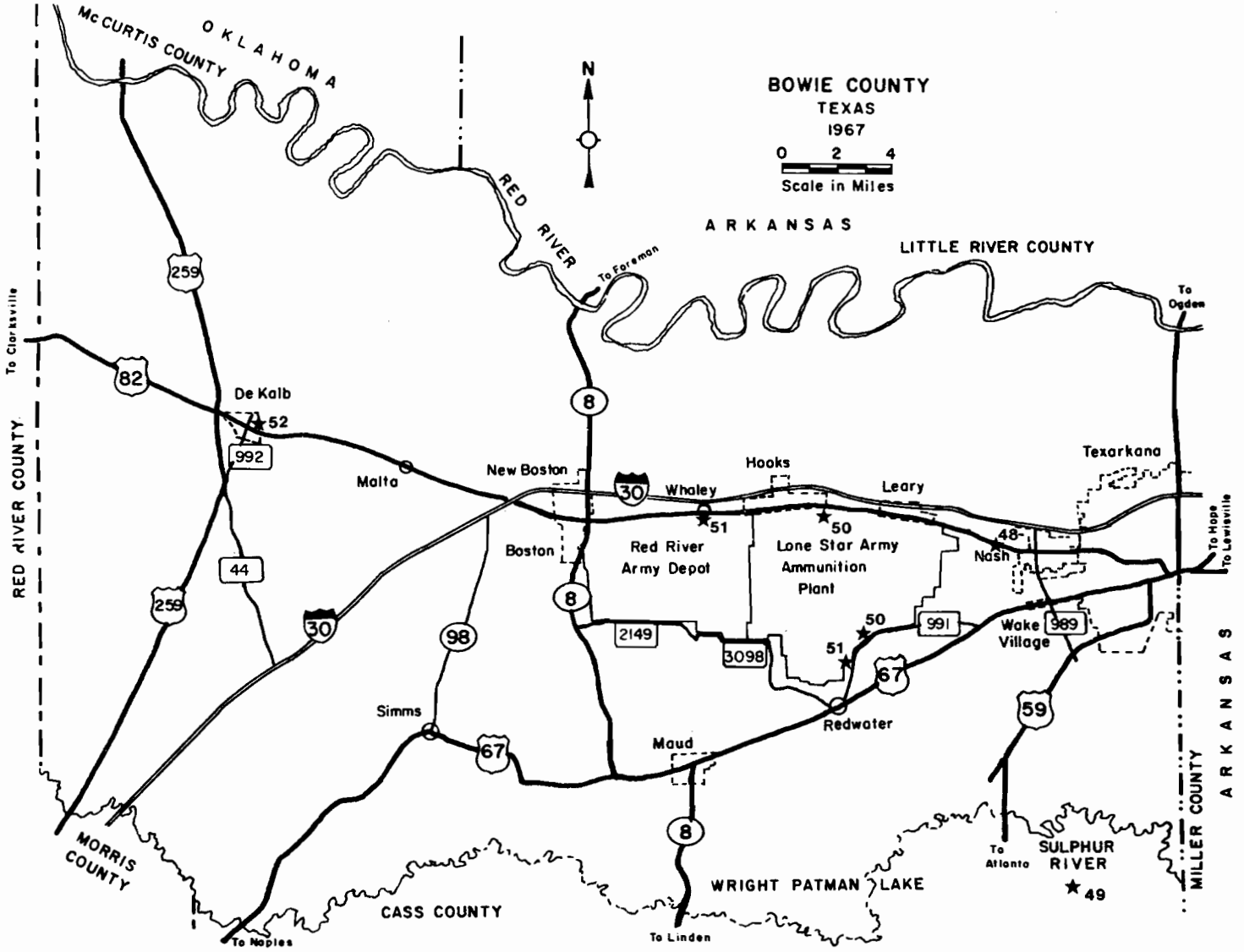

Fig I-6. Bowie County, Texas, with major employment locations (numbers indicate employers who are listed in the Appendix).

largest urban area is that of Texarkana. The county seat is located in Boston, approximately 22 miles west of Texarkana. Bowie County has a land area of 892 square miles. It was formed in 1840 and is named after the Alamo hero, James Bowie. (5)

Bowie County is the most populous of the four counties study area, with a 1980 population density of 84.5 persons per square mile. The county increased a moderate 7.3% in population, from 68,909 persons in 1970 to 75,301 in 1980.

As Table I-3 indicates, population trends for the county show consistent growth for the preceeding decades, excepting the 1950's. Although the Texarkana, Texas, area experienced only moderate growth during the last decade, the overall county growth rate maintained a level near that experienced during the 1960-1970 decade.

Figure I-7 shows population projections for Bowie County. Both population projection techniques show a 13% increase in the county's population, to more than 85,000 by the year 2000.

Bowie County is predominantly white, with 21.9%, or 16,498, black residents. The 1970 basic population data indicate that 62.6%, or 43,132 persons, were classified as urban, and 24,681 as rural inhabitants. A total of 11.3%, or 7,781 persons, were 65 or older, while 33.4%, or 2,983, were under 18 years of age. Total 1970 employment was 25,775 persons. Median income in 1970 was $8,159. The number of families wtih income below the poverty level was 2,627, or 18,124 individuals, representing 14.5% of all families living in Bowie County.

Cities located in Bowie County besides Texarkana include Dekalb, Hooks, Leary, New Boston, Maud, Nash, and Wake Village. For the entire county area, Wake Village showed the greatest percentage increase in population, 60.5%, or from 2,408 residents in 1970 to 3,865 in 1980. The second largest gain occurred in New Boston where the population increased by 14.7%, from 4,034 persons in 1970 to 4,628 in 1980. The greatest decrease occurred in Leary, 40.6%, from 352 persons in 1970 to 253 in 1980. Other municipalities experiencing population decreases from 1970 to 1980 include Hooks (1.5%) and Maud (4.3%).

Bowie County is hilly and forested, with clay, sandy, alluvial soils.

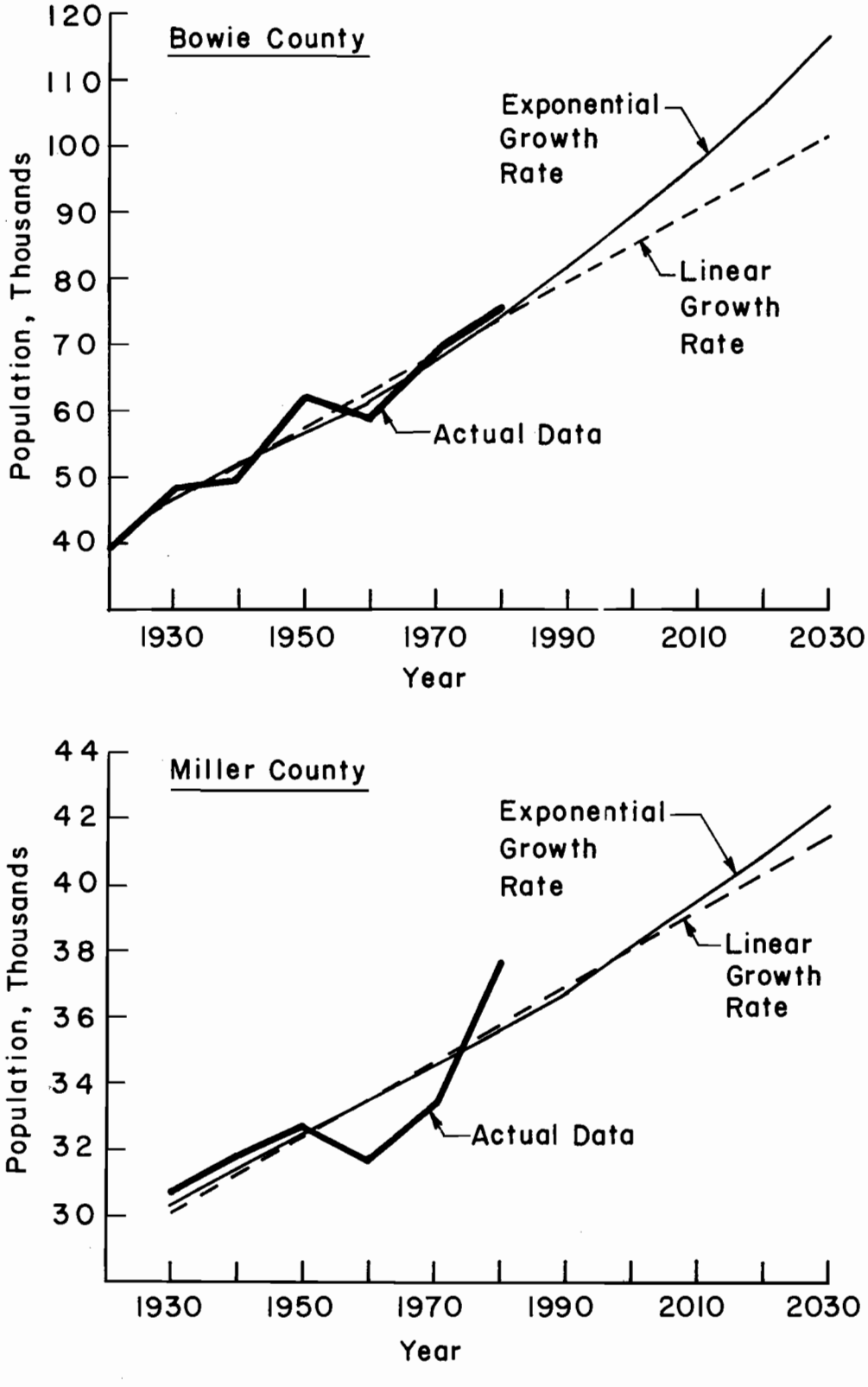

Fig I-7. Population trends, 1930-1980, and projections, 1980-2030, for Miller County, Arkansas, and Bowie County, Texas.

It is drained by both the Red and Sulphur Rivers. Forest land occupies 49.3%, or 280,998 acres, of the total 570,304 acres (891 square miles). A thriving paper manufacturing industry in the area is due to the predominance of such forests. Pasture occupies the next largest land area, 131,511 acres, or 23.1% of the county. Cropland takes up 18.2% (103,953 acres) of the county and is largely located in the northern portion of the county south of the Red River. The major crops are soybeans, grain sorghum, and corn. (6)

Bowie County has 40,516 acres of urbanized land (7.1%). Urban land has increased in the county at varying rates. In 1958 there was approximately 25,321 urban acres. Between 1958 and 1967 an increase of 2.5% occurred. However, since 1966 a 56% increase in urbanized land has been experienced.

Of the three main catagories of land use, cropland exhibited the greatest change, with a 95.5% (50,809 acres) increase over 1967. Forest land added 42,903 acres by 1977. There was a loss of 41,287 acres or 23.9%, of the pasture land, which was converted to another land use by 1977, probably to either forest or crop land. (6)

Agriculture represents a $33 million annual business, mostly from beef, dairy cattle, poultry, and swine. Crops include grain, soybeans, hay, and timber. Business activity centers around manufacturing, agribusiness, government employment, and tourism.

MILLER COUNTY

Miller County, as shown in Fig I-8 is located in southwest Arkansas and has Texas bordering on the west (Bowie County) and Louisiana on the south. Miller consists of 623 square miles. It was formed April 1, 1820, of territory taken from Hempstead County (northeast of Miller County) and was named for James Miller, the first territorial governor of Arkansas.

The county seat, as well as the largest urban area, is Texarkana. Texarkana, Ar., as previously noted, had 21,459 residents in 1980. Fouke, 15 miles southeast of Texarkana, increased 21.3% over its 1970 population of 506, to 614 persons in 1980. Garland experienced a phenomenal 105.6% increase in population. Located 22 miles due east of Texarkana, Garland's population grew from 321 in 1970 to 660 in 1980.

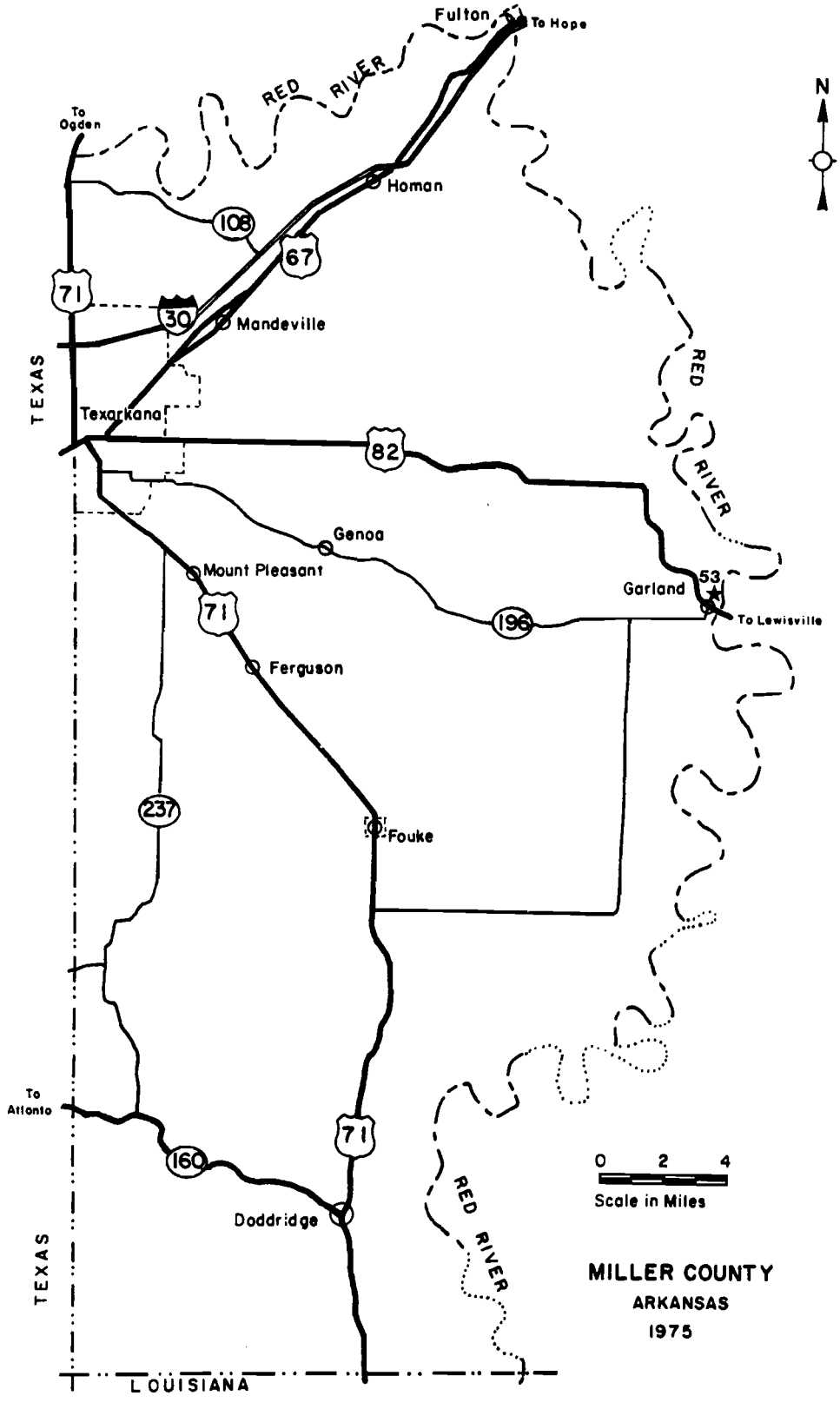

Fig I-8. Miller County, Arkansas, with major employment locations.

Miller County experienced moderate growth over the past decade, increasing 13.1%, from 33,385 persons in 1970 to 37,766 in 1980 (60.6 persons per square mile). While the overall county population increased during the 1970's, the Texarkana urban area did not share in this growth, actually experiencing a slight decrease in total population. The 1980 county population is 5.5% ahead of projections for the county based on 50 years of growth patterns.

Seventy-five percent of the county's population or 28,322 persons were classified as white in 1980, and 24.2% or 9,136, as black. Sixty-five point three percent or 21,800 residents of the county were considered "urban"; 35% or 11,703, resided in rural areas. Twelve point one percent of the population, or 4,030 individuals, were 65 or older in 1970; 34.6% or 11,536 were under 18. Total 1970 employment was 12,537. The median county income was $6,846. Nineteen percent of all families, or 1,670, were below the poverty level.

Miller County contains approximately 416,865 acres (623 square miles). About 43% of this acreage is forest land. Another 40% of the land is devoted to agriculture, found mainly in areas adjacent to and below the Red River, which forms the southern boundary of the county. Wetlands and water, respectively, cover 7% and 5%. About 97% of the acreage within the county is in private ownership. (7)

Urban centers acount for 25,299 acres, or 6.4% of the county. The county showed a significant change between 1958 and 1965, when urban land increased by 94.9% to a total of 23,003 acres. The change was less drastic than that from 1967 to 1977, when urban land increased by 9.7%. Before 1967 no mining took place in Miller county, but since then 2,440 acres have been mined for sand and gravel, predominantly in the southern part of the county. The mineral resources found in the area include petroleum, natural gas, sand and gravel, clay, lignite, gypsum, and bromine. The southern part of the county consists of gulf coastal plain.

Important land uses include: forest, cropland, cattle and dairy industry. There are various mineral extractions and diversified manufacturing, located predominantly in Texarkana.

LITTLE RIVER COUNTY

Little River County, as illustrated in Fig. I-9, is located in the southwestern part of Arkansas, sharing borders with Oklahoma on the west and Texas on the south. It is north of both Miller and Bowie Counties. The county has 544 square miles. The county seat is Ashdown, also the largest city in the county. Little River was formed from Sevier County on March 5, 1867.

Little River County has experienced moderate growth during the past decade. The total population increased 21.5% between 1960 and 1970 and 24.6% between 1970 and 1980, from 11,194 persons to 13,952. Much of the population gain was due to natural increase. Between 1960 and 1970, the immigration rate for Little River was 10.9%. Little River is the least populated county within the study area having 13,952 inhabitants (28.7 persons per square miles).

Fig. I-10 shows population trends and projections for the county. The figure indicates that, while the county population has steadily increased since 1960, the 1980 population still represents only 88% of the 1940 population. Based on the past 30 years, the population is projected to increase 4.6%, to over 14,600, by the year 2000.

The county is predominantly white with 74.3%, or 10,370 persons; 24.9%, or 3,470, are classified as black. Thirty-one point two percent, or 3,493 persons, were classified as "urban" and 7,702 as rural. Eleven point six percent, or 1,299, were listed as sixty-five or older, and 37.2% were under 18 years of age. Total employment was 3,703. The median income was $6,587. Twenty-three point nine percent, or 703 of all families in Little River, were categorized as having incomes below poverty level. This is the largest poverty percentage in the four-county study area.

The largest city in Little River is Ashdown. Ashdown has increased 12.5% since 1970. The largest increase occurred for Foreman at 17.4%, or from 1,173 in 1970 to 1,377 in 1980. Foreman is followed by Ogden (16.8%), Wilton (15.9%), and Ashdown. Winthrop experienced a slight decrease of .8%, from 1970's population of 240 to 1980's 238.

Little River is comprised of approximately 377,579 acres of land. About 52% of this total acreage is in forest land. Thirty-five percent of the

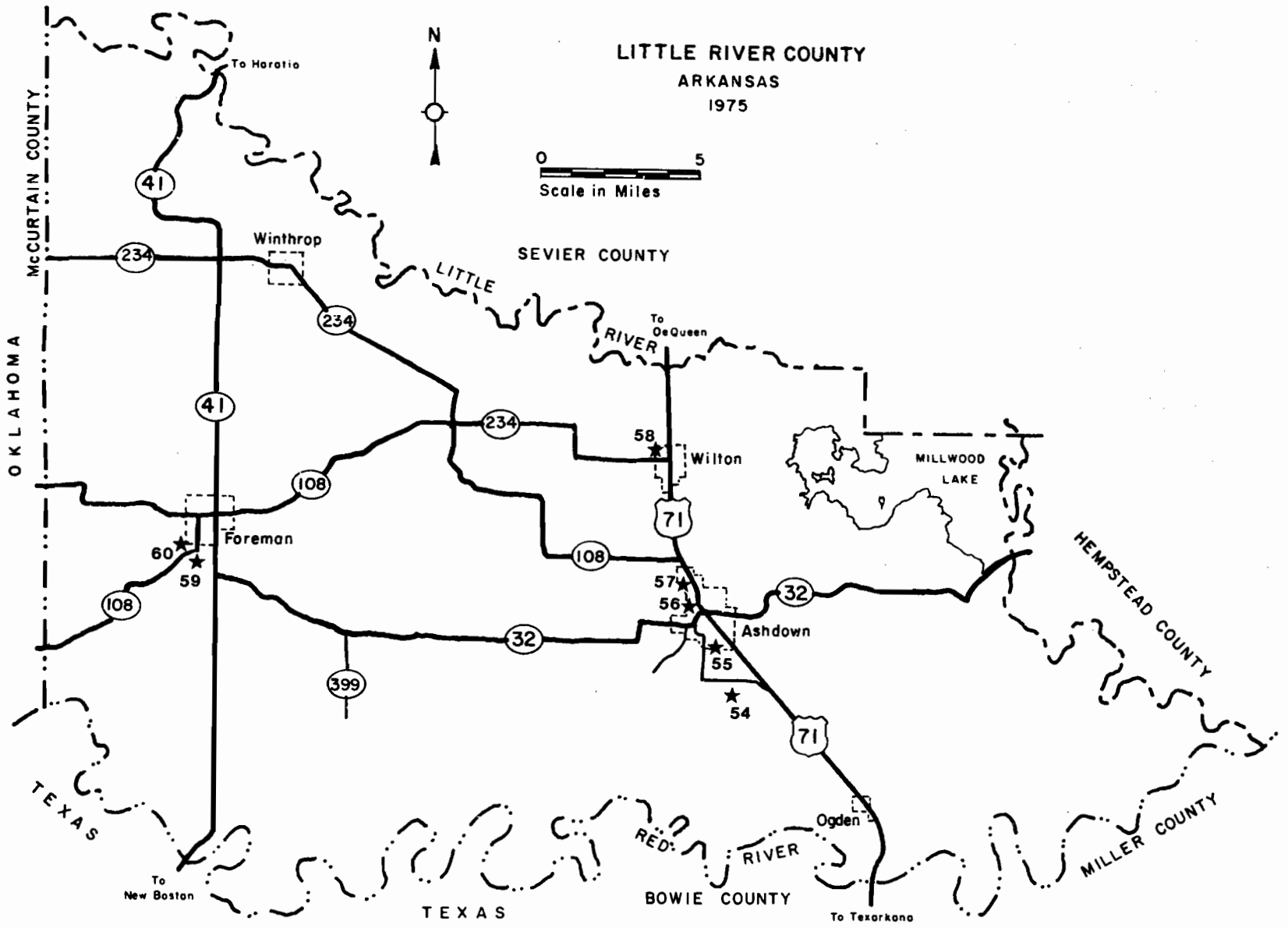

Fig I-9. Little River County, Arkansas, with major employment locations (see Appendix for numbered list of employers).

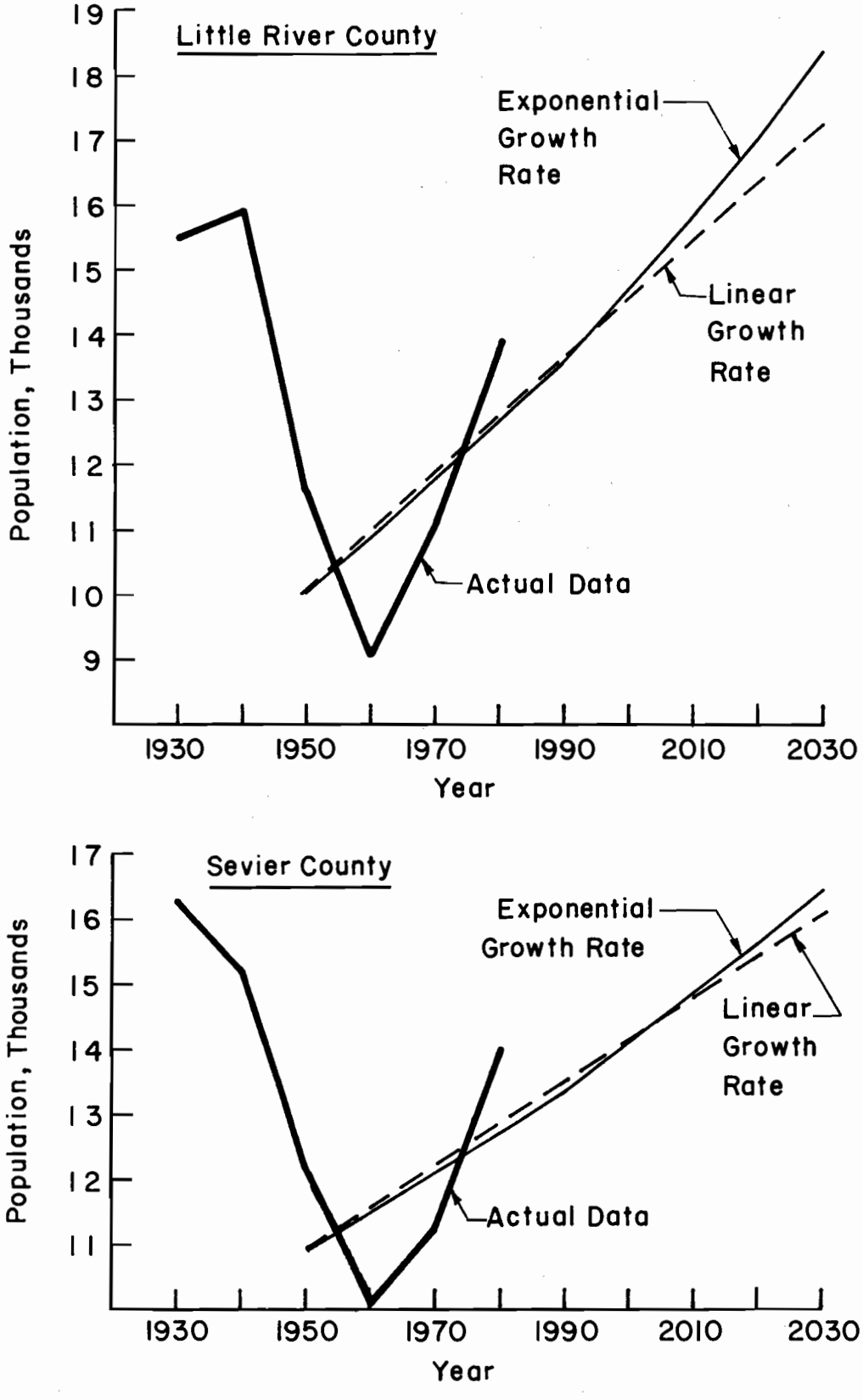

Fig I-10. Population trends, 1930-1980, and projections, 1980-2030, for Little River County, Arkansas, and Sevier County, Arkansas.

land is devoted to agricultural production in two farming areas. The northern-most area has fruits, berries, livestock, poultry, and feed. The southern area has cotton, soybeans, corn, alfalfa, rice, hay and livestock (2). Urban and built-up lands account for only 2% of the acreage. About 90% of the county is in private ownership (9).

SEVIER COUNTY

Sevier County, Arkansas, as shown in Fig. I-11, is located in the southwestern part of Arkansas, with Oklahoma bordering on the west. Sevier, which has 585 sq. miles, is north of both Miller and Little River counties. The county seat is DeQueen (originally called Calamity), which is the largest city in the county. The county was formed October 17, 1828, from parts of Miller and Hempstead counties. (2)

Sevier county has experienced moderate growth during the past decade. The total population increased 11% between 1960 and 1970, and 24.7% between 1970 and 1980 from 11,272 inhabitants in 1970 to 14,060. The population gain was due in part to natural increase, but additionally to in-migration. The in-migration rate was 8.8% between 1970 and 1975. (10)

Fig. I-10 shows that, while Sevier has experienced 20 years of growth since the 1960's, this growth is recent, following a 30 year decline in population from 1930 to 1960. The 1980 census count represents only 86% of the total 1930 population of the county! Population projections for the county indicate that the 1980 population total is 8.9% larger than would be expected, based on growth patterns for 30 years.

The county has the smallest percentage of black residents for the study area, showing only 5.6%, or 783 persons, in 1980. White residents totaled 93.2%, or 13,097 persons, in 1980.

Sevier is predominantly rural with only 33.9%, or 3,821 persons being considered "urban". Fifteen percent, or 1,105 persons, were sixty-five or older in 1970; 32.4%, or 3,653, were under 18. Total 1970 employment was 4,015. The median income was $6,552. Almost 20% of all families in Sevier have incomes lower than poverty level. This represents approximately 2,227 individuals, or 617 families.

DeQueen is the largest city, as well as being the county seat. The city

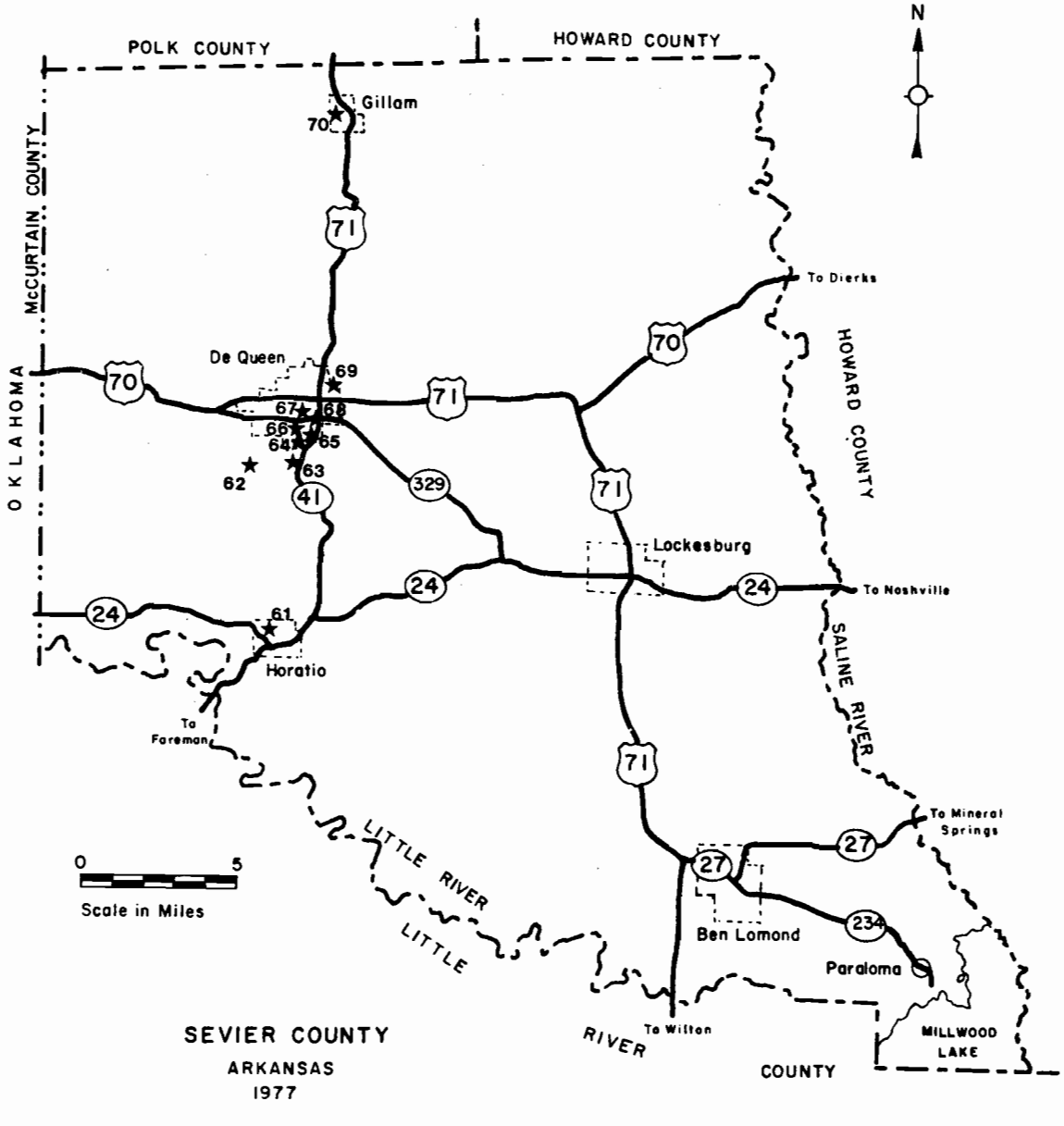

Fig I-11. Sevier County, Arkansas, with major employment locations (numbered employers are listed in the appendix).

experienced a 25.1% increase in population, from 3,863 persons in 1970 to 4,594 in 1980. The largest increase occurred in Gillham, with a 26% increase, from 200 in 1970 to 252 in 1980. Horatio increased 16.1%, while Ben Lomond remained constant. Lockesburg was the only city in Sevier to actually have decreased in population, .6% from 620 residents to 1970 to 616 in 1980.

The county is comprised of approximately 362,749 acres of land. About 70% of this total acreage is forest land. Twenty-five percent is devoted to agricultural production. Water covers 3% of the county. Urban and built-up lands account for 1% of the acreage. About 86% of the county is in private ownership. (10)

SUMMARY OF REGIONAL TRENDS

An analysis of the regional characteristics of the study areas indicates that rural areas, particularly the county units of Little River and Sevier, are growing at a faster overall rate than the Texarkana urban area itself. Population changes recorded from 1970 to 1980 indicate that growth rates for both Little River and Sevier were double that of Miller County and triple the growth rate for Bowie.

Due to the overriding influence of the Texarkana urban area, the study region population generally fits into an urban classification.

The region as a whole is predominantly white, although 22.1% of the 1980 population of 141,079 were non-white. The Texarkana area contributed slightly more than half of the 1980 non-white regional population. Approximately 18.4% of the families in the region had incomes below the poverty level. More than half of these people lived in the Texarkana urban area.

The young and the elderly represented 46% of the 1970 regional population. The Texarkana urban area generated 42% of the under 18 population and 47% of those 65 and over.

The Arkansas counties can clearly be distinguished from both the Texarkana urban area and Bowie County. Although the Arkansas counties are experiencing a faster overall growth rate than either the urban area or their Texas counterpart, they also led in the percentage of 65 and over

population and in the percentage of households below the poverty level. Little River led all four counties in the percentage of households below the poverty level, 23.9%. The Arkansas counties share similiar economic and income characteristics, which are at a level below that found in Bowie County.

ECONOMIC DEVELOPMENT PATTERNS AND EMPLOYMENT TRENDS

UNDERSTANDING THE REGIONAL ECONOMY

The economic growth and character of an area or region directly impact travel in that region. The pattern of work trips within an area is the result of the location and distribution of major industries and employment centers. The pattern of non-work trips is significantly affected by the location and distribution of commercial and business activity within the region, as well as the distribution of hospitals, service facilities, and recreational areas.

A detailed and comprehensive examination of the economic and employment patterns of the four-county Texarkana region and of each of the four individual counties was undertaken to give guidance to the Study Team. First, an effort was made to analyze the basic economy of the region, identifying the areas and services in which the region excelled or showed unusual strength. Second an effort was made to analyze those industrial or commercial activities that had shown significant changes (either increasing or decreasing) from 1960 to 1970. These analyses allow one to identify employment centers that are likely to grow, those that are likely to remain stable, and those that might be expected to present decreased employment opportunities. These insights are coupled with other employment analyses and studies in later sections of this report to suggest growing or stable worktrip routes which might be well served by a rural public transit system.

The four-county region as a whole and each of the individual counties were subjected to several types of economic analyses to indicate the areas of possible industrial growth or decline. The sections that follow first present an economic profile for the entire region and then describe the economic base of each of the four counties.

REGIONAL TRENDS AND PATTERNS

Texarkana is the center of a vast, regional market area which extends over both county and state boundaries. It is the principal hub of economic and cultural activities for nearby areas in Arkansas, Texas, Oklahoma, and Lousisiana.

The four counties within the study region, Miller, Bowie, Little River and Sevier, are integrally tied to one another and to the dominant Texarkana urban area. The counties have similiar climate and geographic characteristics which influence the overall economic base of the region. Various mineral and other resources prevail throughout the area, and the forested terrain of the entire region bears significantly on the level of economic activity.

Along with regional similiarities there are intra-regional differences. The Arkansas counties of Little River and Sevier differ markedly from the two Texarkana-urban counties of Miller and Bowie. Both Arkansas counties are much more rural in nature than either of the Texarkana counties. The economic base of Sevier, in particular, relies heavily upon the county's natural resources, predominantly forest and related industries. Sevier is also the most distant from the Texarkana urban area and was not part of the 1980 SMSA; this represents the Bureau of the Census's judgement that Sevier is not fully dependent upon the Texarkana economy.

Bowie County has the greatest economic influence upon the other counties. The difference between Bowie and Miller County, OK its Arkansas counterpart, is apparent in terms of total employment and the number of industries.

The 1970 census indicated 36,361 workers within the SMSA which in 1970 included only Miller and Bowie Counties. A majority of the workers, 32,321, or 88%, worked inside the SMSA with only 4.1%, or 1,503 working outside the SMSA. Fifty seven percent of those employed worked inside the Texarkana urban area. The majority of these, 39%, or 14,129, worked on the Texas side. An additional 10,329 workers were employed in the rest of Bowie County. Twenty-two percent, or 7,840 were employed in Miller County, including 6,589 in the Texarkana, Arkansas area.

Total employment in the Texarkana region has been increasing slowly but

steadily. Table I-4 shows 1981 average employment figures compiled by the Texas Employment Commission and the Arkansas Employment Security Division for the Texarkana region. The 1981 estimated non-military employment represents a 14.2% increase since the 1970 Census; the 1970 Census figure was a 19.8% increase over the 1960 Census employment figure.

Table I-5 presents employment data for the Texarkana region, the individual counties, and the urbanized area in 1960 Table I-6 presents comparable employment figures for 1970, the last year for which detailed Census data are available. Employment data are repesented for each of the 31 major sectors, or types of industry, which the Census Bureau commonly employs to describe regional economies. All of the industries which fall into each of these various sectors are listed in the Appendix.

Tables I-5 and I-6 also show employment figures for each of the 31 sectors for Texas and Arkansas, as well as combined employment totals for the two States (the last column on the two tables.) The bi-state combined employment figures can be used as a way to compare changes by sector in the Texarkana region to those occuring in the bi-state region. This kind of analysis suggests which changes in the Texarkana region are tied to changes in the larger bi-state region of which it is a part, and which changes have occurred because of factors indigenous to the Texarkana area.

An analysis of changes in employment by industry sector allows an evaluation of the economic health and direction of the regional economy. The analysis also provides insight into the types of industries that bear significantly on Texarkana's economic development.

Employment Changes by Industry Sector

From 1960 to 1970 eight sectors of employment decreased in overall number of employees. The largest decrease occurred for the agricultural, forestry and fisheries industries. Although representing 3.48% of the total regional employment, the sector has not kept pace with other employment growth in the region, or in relation to the bi-state reference area. An additional decrease can be seen in the sector involving furniture, lumber, and wood products, which represents another 3.16% of regional employment. However, although these "linked" industries are decreasing in size, the sec-

TABLE I-4. AVERAGE ANNUAL EMPLOYMENT IN THE TEXARKANA SMSA AND BOWIE, MILLER, LITTLE RIVER, AND SEVIER COUNTIES

	Bowie	Miller	Little River	Sevier	SMSA	Region
Labor force	28,828	15,209	5,654	6,125	49,690	55,815
Employment	25,999	13,708	5,064	5,600	44,771	50,371
Unemployment	2,829	1,500	590	525	4,919	5,444
% Unemployment	9.8	9.9	10.4	8.6	9.9	9.8

*Covered employment only (employees under Federal Social Security; does not include armed forces).

Source: Texarkana State Employment Office, Texas Employment Commission, Labor Force Estimates: 1981.

Arkansas Employment Security Division, Research and Analysis Section, Covered Employment and Earnings, April 1982.

TABLE I-5. 1960 EMPLOYMENT BY INDUSTRY SECTOR IN THE TEXARKANA REGION AND IN ARKANSAS AND TEXAS

#	SECTOR NAME	L.RIV.	SEVIER	MILLER	BOWIE	REGION	ARK.	TEXAS	ARK-TEX
1	AGRICULTURE-FORESTRY-&-FISHERIES	555	462	719	1271	3007	100200	291899	392099
2	MINING	53	8	81	71	213	4848	100162	105010
3	CONSTRUCTION	129	208	770	1263	2370	36464	251938	288402
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	334	661	359	479	1833	36246	32985	69231
5	METAL-INDUSTRIES	73	10	423	2732	3238	5777	58229	64006
6	MACHINERY-EXCEPT-ELECTRICAL	0	8	20	8	36	2850	46861	49711
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	4	5	13	33	55	4453	22049	26502
8	TRANSPORTATION-EQUIPMENT	5	0	63	174	242	2196	55849	58045
9	OTHER-DURABLE-GOODS	131	8	138	271	548	8285	34241	42526
10	FOOD-&-KINDRED-PRODUCTS	37	205	345	425	1012	17637	79798	97435
11	TEXTILES-&-FABRICATED-TEX-PRODS	0	12	19	12	43	10455	41056	51511
12	PRINTING-PUBL-&-ALLIED-INDS.	8	13	123	146	290	5340	40308	45648
13	CHEMICALS-&-ALLIED-PRODUCTS	0	14	116	29	159	5244	46970	52214
14	OTHER-NON-DURABLE-GOODS	0	4	17	17	38	15030	81815	96845
15	TRANSPORTATION	135	198	622	1108	2063	21597	146451	168048
16	COMMUNICATIONS	20	21	95	191	327	4920	39467	44387
17	UTILITIES-&-SANITARY-SERVICES	27	57	220	195	499	8363	60031	68394
18	WHOLESALE-TRADE	72	51	474	531	1128	15918	141509	157427
19	EATING-&-DRINKING-PLACES	59	90	373	562	1084	15101	98295	113396
20	OTHER-RETAIL-TRADE	318	364	1471	3348	5501	72801	464165	536966
21	FINANCE-INSURANCE-REAL-ESTATE	35	73	381	677	1166	15266	138230	153496
22	BUSINESS-&-REPAIR-SERVICES	33	32	264	467	796	11309	88614	99923
23	PRIVATE-HOUSEHOLDS	180	98	708	1112	2098	27929	139729	167658
24	OTHER-PERSONAL-SERVICES	86	74	426	789	1375	20077	124199	144276
25	ENTERTAINMENT-&-RECREATION-SERVS	15	8	69	104	196	3338	23971	27309
26	HOSPITALS	11	88	235	362	696	12606	73438	86044
27	EDUCATIONAL-SERVICES	118	150	394	1086	1748	29409	182456	211865
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	27	22	153	295	497	7187	44139	51326
29	OTHER-PROFESSIONAL-&-REL.-SERVS	17	43	222	353	635	10080	72744	82824
30	PUBLIC-ADMINISTRATION	154	114	627	1720	2615	19622	162918	182540
31	ARMED-FORCES	4	0	140	74	218	5215	162355	167570
32	NOT-REPORTED	61	68	287	687	1103	14903	133987	148890
	TOTALS	2701	3169	10367	20592	36829	570666	3480858	4051524

TABLE I-6. 1970 EMPLOYMENT BY INDUSTRY SECTOR IN THE TEXARKANA REGION AND IN ARKANSAS AND TEXAS

#	SECTOR NAME	L.RIV.	SEVIER	MILLER	BOWIE	REGION	ARK.	TEXAS	ARK-TEX
1	AGRICULTURE-FORESTRY-&-FISHERIES	281	245	394	615	1535	54588	194635	249223
2	MINING	50	9	60	47	166	5164	103075	108239
3	CONSTRUCTION	210	283	831	1408	2732	44129	317758	361887
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	241	536	241	377	1395	30114	35682	65796
5	METAL-INDUSTRIES	346	132	1040	3430	4948	15291	94591	109882
6	MACHINERY-EXCEPT-ELECTRICAL	11	0	15	27	53	6504	68962	75466
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	0	14	6	4	24	15593	61852	77445
8	TRANSPORTATION-EQUIPMENT	19	0	152	255	426	5307	98959	104266
9	OTHER-DURABLE-GOODS	198	138	203	510	1049	16423	68762	85185
10	FOOD-&-KINDRED-PRODUCTS	86	303	270	374	1033	21410	66258	87668
11	TEXTILES-&-FABRICATED-TEX-PRODS	177	31	5	35	248	18587	59118	77705
12	PRINTING-PUBL-&-ALLIED-INDS.	10	31	88	165	294	7107	48456	55563
13	CHEMICALS-&-ALLIED-PRODUCTS	0	3	59	117	179	5514	60364	65878
14	OTHER-NON-DURABLE-GOODS	488	311	669	745	2213	27841	102115	129956
15	TRANSPORTATION	112	139	383	824	1458	22579	154742	177321
16	COMMUNICATIONS	17	34	191	254	496	6700	51955	58655
17	UTILITIES-&-SANITARY-SERVICES	12	97	269	315	693	12165	79498	91663
18	WHOLESALE-TRADE	62	105	453	848	1468	22911	198467	221378
19	EATING-&-DRINKING-PLACES	89	122	473	668	1352	16335	121174	137509
20	OTHER-RETAIL-TRADE	382	381	1156	3349	5268	86727	599052	685779
21	FINANCE-INSURANCE-REAL-ESTATE	43	87	400	871	1401	22418	213261	235679
22	BUSINESS-&-REPAIR-SERVICES	39	43	305	702	1089	15108	143381	158489
23	PRIVATE-HOUSEHOLDS	112	32	339	685	1168	16005	88877	104882
24	OTHER-PERSONAL-SERVICES	61	135	442	811	1449	22243	156320	178563
25	ENTERTAINMENT-&-RECREATION-SERVS	5	13	102	88	208	3993	30977	34970
26	HOSPITALS	121	118	356	515	1110	21301	126878	148179
27	EDUCATIONAL-SERVICES	219	187	718	1553	2677	48729	329799	378528
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	35	66	160	352	613	9349	58242	67591
29	OTHER-PROFESSIONAL-&-REL.-SERVS	44	148	504	918	1614	24722	182519	207241
30	PUBLIC-ADMINISTRATION	179	119	995	4318	5611	24840	225800	250640
31	ARMED-FORCES	0	15	16	118	149	9387	166831	176218
	TOTALS	3649	3877	11295	25298	44119	659084	4308360	4967444

tor remains an important income generating industry.

Additional decreases can be noted for mining, electrical machinery equipment and supplies, transportation, other retail trade, private households and the armed forces. Together they comprise 16.4% of regional employment, with "other retail trade" equalling 11.94% of that figure.

The largest source of employment for the region in 1970 was in public administration, which held 12.72% of all employment. This represented a 114.6% increase since 1960. "Other retail trade" was second, but decreasing in total employment. Metal industries represented 11.22% of the regional employment, and was the largest-single income producer or exporter for the overall region. The metal industry increased 52.8% over 1960 employment, and is increasing more than other sectors within the region.

Additionally, important industries include other durable goods; food and kindred products; and other non-durable goods; eating and drinking places; private households; and welfare, religious, and non-profit organizations. Hospital and educational employment increased 59.5% and 53.2% respectively. Educational services represent 6.07% of the total regional employment.

Much of the employment increase occurred because of diversification of the economic base. The creation of new and additional industries since 1960 reflects much of this increase. Textiles and fabricated textile products increased by 476.7% over 1960, while other non-durable goods showed phenomenal growth at an increase of over 5000%. Growth in public administration is due in part to the significant geographic location of Texarkana, which serves as a center for numerous government agency operations at federal, state, county, and local levels.

Understanding the Basic Employment Sectors in the Region

Detailed employment data by sector are also used by planners and economists to divide a region's economy into 1) basic, or income producing, industries and 2) service industries, which support but do not directly aid in regional growth. Most economists view an area's strength as derived from those industries which sell goods and services 3) outside the region, since this brings income into the region from external sources. Thus the basic sectors of the economy are the ones that promote regional growth.

The remainder of the region's economy consists of those firms and businesses that supply goods and service to local area customers. These service sectors, while important, do not bring additional income into the region; they merely redistribute income already in the region.

A "multiplier effect" is created by the level of basic activity within an area. That is, for a given change in the level of basic activity a predictable and usually larger change in the level of service activity often will result. The amount of interdependence or "linkage" between the basic and service sectors creates the multiplier effect. As a basic sector expands it often requires more than proportional inputs from the local area in the form of labor and supplies. Thus, demand for basic products often determines an area's overall level of economic activity.

By comparing various sectors in the Texarkana region, and in the individual counties, either to national figures or to the bi-state regional figures, we can determine which of the region's industries are basic ones and which are service ones. Because the economy of Texarkana is more directly linked to that of the bi-state region that to national trends, the following analyses use the bi-state sectoral data first shown in Tables I-5 and I-6 as the basis of comparison.

A major way to categorize the industries within a region is by the use of "location quotients". This approach takes the regional percentage of industry activity, which can be measured by sales or production figures or more commonly by employment within the industry, and compares that industry percentage in the region to the comparable industry percentage in a larger region. If a Texarkana industry accounts for a larger percentage of total Texarkana employment than that industry accounts for in total bi-state employment, that sector is assumed to be a basic or export sector, contributing to regional growth. If the Texarkana industry accounts for a smaller percentage of total employment than that industry accounts for in the bi-state region, it is assumed to be a service or non-basic industry.

Location quotients are derived by dividing regional employment percentages by bi-state employment percentages by sector. The resulting number is a guide to whether the sector or industry is a service or basic one; most authorities feel that if the number is above unity, that industry is a basic

one. For the number to be above one, the percentage employment in that sector in Texarkana has to be higher than the comparable figure in the bi-state region. This classification is based on the assumption that if an industry is producing only as much (or employing only as many) as the same industry in the larger region, it is producing only enough for its own use and cannot be exporting.

The export base theory of economic growth is not without critics; the location quotient approach to differentiating sectors within a region ignores important issues. However, the approach is a relatively simple way to understand the economic patterns within a region and to predict how various sectors will respond to internal and external economic forces.

Location quotients can also be used to calculate the percentage of employment within each sector that is devoted to export and the proportion of employment devoted to service. It is assumed that even an export or basic industry will have to supply internal regional needs. Therefore, it is assumed that the percentage of the sectoral labor force equal to the larger region's percentage is employed in local production; only that percentage of the sectoral employment which is above the larger region's employment percentage is assumed to be involved in export activities.

Table I-7 shows a location quotient for each of the 31 sectors in the four-county Texarkana region and calculates the number involved in service activities. Only six of the 31 sectors in Texarkana are export industries: furniture, lumber and wood products, metal industries, food and kindred products, other durable goods, private households, and public administration. Of these the three most important to the region are furniture, metal industries and public administration. It is largely on these three industries that Texarkana depends for economic growth.

Changes in the Economic Base of the Region

Having identified those sectors or industries which are the most important in Texarkana's overall economic development, it is necessary to look at changes in those and other sectors over time. A useful economic tool for analyzing the development of individual sectors over time, and thus for predicting future patterns, is shift-share analysis. Shift-share is an analy-

TABLE I-7. LOCATION QUOTIENTS FOR THE TEXARKANA STUDY REGION, 1970

#	SECTOR NAME	TOTAL EMPLOYMENT		% EMP.	LOCATION	DIVISION OF EMPLOYMENT	
		REGION	ARK-TEX	REGION	QUOTIENT	BASIC	SERVICE
1	AGRICULTURE-FORESTRY-&-FISHERIES	1535	249223	3.48	0.69	0	1535
2	MINING	166	108239	0.38	0.17	0	166
3	CONSTRUCTION	2732	361887	6.19	0.85	0	2732
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	1395	65796	3.16	2.39	811	584
5	METAL-INDUSTRIES	4948	109882	11.22	5.07	3972	976
6	MACHINERY-EXCEPT-ELECTRICAL	53	75466	0.12	0.08	0	53
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	24	77445	0.05	0.03	0	24
8	TRANSPORTATION-EQUIPMENT	426	104266	0.97	0.46	0	426
9	OTHER-DURABLE-GOODS	1049	85185	2.38	1.39	292	757
10	FOOD-&-KINDRED-PRODUCTS	1033	87668	2.34	1.33	254	779
11	TEXTILES-&-FABRICATED-TEX-PRODS	248	77705	0.56	0.36	0	248
12	PRINTING-PUBL-&-ALLIED-INDS.	294	55563	0.67	0.60	0	294
13	CHEMICALS-&-ALLIED-PRODUCTS	179	65878	0.41	0.31	0	179
14	OTHER-NON-DURABLE-GOODS	2213	129956	5.02	1.92	1059	1154
15	TRANSPORTATION	1458	177321	3.30	0.93	0	1458
16	COMMUNICATIONS	496	58655	1.12	0.95	0	496
17	UTILITIES-&-SANITARY-SERVICES	693	91663	1.57	0.85	0	693
18	WHOLESALE-TRADE	1468	221378	3.33	0.75	0	1468
19	EATING-&-DRINKING-PLACES	1352	137509	3.06	1.11	131	1221
20	OTHER-RETAIL-TRADE	5268	685779	11.94	0.86	0	5268
21	FINANCE-INSURANCE-REAL-ESTATE	1401	235679	3.18	0.67	0	1401
22	BUSINESS-&-REPAIR-SERVICES	1089	158489	2.47	0.77	0	1089
23	PRIVATE-HOUSEHOLDS	1168	104882	2.65	1.25	236	932
24	OTHER-PERSONAL-SERVICES	1449	178563	3.28	0.91	0	1449
25	ENTERTAINMENT-&-RECREATION-SERVS	208	34970	0.47	0.67	0	208
26	HOSPITALS	1110	148179	2.52	0.84	0	1110
27	EDUCATIONAL-SERVICES	2677	378528	6.07	0.80	0	2677
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	613	67591	1.39	1.02	13	600
29	OTHER-PROFESSIONAL-&-REL.-SERVS	1614	207241	3.66	0.88	0	1614
30	PUBLIC-ADMINISTRATION	5611	250640	12.72	2.52	3385	2226
31	ARMED-FORCES	149	176218	0.34	0.10	0	149
	TOTALS	44119	4967444	100.00		10153	33966

tical tool which allows the planner to understand the underlying causes of the growth or decline in various sectors of the economy. Understanding the underlying causes of change in the crucial basic sectors is critical to predicting future economic development of the region.

Shift-share analysis assumes that the growth of an industry over time is the result of three major factors: 1) total overall growth in the major region of which the study area is a part 2) growth in the particular industry itself in the major region of which the study area is a part, (i.e.: proportional shift), and 3) something unique or competitive about the study region itself (i.e.: differential shift).

First, for example, the U.S. economy overall has been growing; the economy of the bi-state region has been growing at an even faster rate. We could expect that in Texarkana every industry would show some growth because of the somewhat favorable economic climate of the bi-state area (and should the bi-state region be doing badly we would expect some of the decline in growth to be felt by all industries.

Second, some industries, such as the heavy metal industry (for defense) are growing fairly rapidly right now; we could expect that employment in that sector in Texarkana would reflect some of the increase in overall activity in the industry.

The third element creating changes in an industry's employment patterns is the differential impact of special local factors, such as access to important markets or raw materials. This factor is often called "the competitive advantage." Texarkana may well have special features, perhaps because of its location or natural resources, which allow it to caputure a greater share of the market for some sectors. It is important to isolate and understand this competitive advantage because it is the feature which allows the Texarkana region to grow at a different rate than either the overall bi-state region or the particular industry in question.

Unfortunately a shift-share analysis of Texarkana's 31 sectors, including the five most important, shows that most of the growth in those sectors was due to bi-state regional growth and individual industry strength and not to any competitive advantage that the Texarkana region displayed. Although Texarkana was displaying growth in key sectors, this growth was not

even as fast as bi-state regional or industrial sector growth. In short, key sectors in Texarkana, while growing, are not growing as fast as would be expected given industrial and regional trends. Texarkana has been losing employment to other regions relative to the growth in the economy and in the key sectors.

Table I-8 displays the shift-share analysis undertaken for the entire Texarkana region. The column labelled "Due to Bi-Sate growth" shows the change in employment that was expected between 1960 and 1970 given overall growth in the region. In nine sectors, the Texarkana region lost employment where it should have gained employment. The column labelled "Total Shift" shows the difference between predicted employment and actual employment; if the sector lost employment where it should have gained, the loss of expected employment is added to the actual losses. Then this number is analyzed in the subsequent two columns; each of those columns examines the reasons for gains or losses in employment.

The column labelled "proportional shift" indicates what happened when changes between 1960 and 1970 in the percentage of total bi-state employment in each sector were compared to changes in the percentage of total Texarkana regional employment in each sector. This analysis identifies those industries for which the growth is different from the bi-state regional average for all industries. For example the bi-state region may be growing but a particular sector or industry might be losing employment. If this were so, it would explain losses in employment in that same sector in Texarkana.

A negative number in the "proportional shift" column indicates that the Texarkana industry was not growing in employment as fast as that industry grew as a percentage of total bi-state regional employment. In short that sector was losing employment to the other 30 sectors. A positive number indicates that the Texarkana sector grew faster than that sector grew as a percentage of total bi-state regional employment, thus gaining employment at the expense of other regional sectors.

The column labelled "differential shift" indicates what happened when changes between 1960 and 1970 in the growth of one sector in the bi-state region were compared to changes in the growth of the same sector in the

TABLE I-8. SHIFT-SHARE ANALYSIS FOR THE TEXARKANA REGION, 1960-1970

#	SECTOR NAME	REGION EMPLOYMENT 1960	1970	CHANGE	DUE TO BI-STATE GROWTH	TOTAL SHIFT	PROPOR-TIONAL SHIFT	DIFFER-ENTIAL SHIFT
1	AGRICULTURE-FORESTRY-&-FISHERIES	3007	1535	-1472	680	-2152	-1775	-376
2	MINING	213	166	-47	48	-95	-42	-54
3	CONSTRUCTION	2370	2732	362	536	-174	68	-242
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	1833	1395	-438	414	-852	-505	-347
5	METAL-INDUSTRIES	3238	4948	1710	732	978	1589	-611
6	MACHINERY-EXCEPT-ELECTRICAL	36	53	17	8	9	11	-2
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	55	24	-31	12	-43	93	-137
8	TRANSPORTATION-EQUIPMENT	242	426	184	55	129	138	-9
9	OTHER-DURABLE-GOODS	548	1049	501	124	377	426	-49
10	FOOD-&-KINDRED-PRODUCTS	1012	1033	21	229	-208	-330	122
11	TEXTILES-&-FABRICATED-TEX-PRODS	43	248	205	10	195	12	183
12	PRINTING-PUBL-&-ALLIED-INDS.	290	294	4	66	-62	-3	-59
13	CHEMICALS-&-ALLIED-PRODUCTS	159	179	20	36	-16	6	-22
14	OTHER-NON-DURABLE-GOODS	38	2213	2175	9	2166	4	2162
15	TRANSPORTATION	2063	1458	-605	466	-1071	-353	-719
16	COMMUNICATIONS	327	496	169	74	95	31	64
17	UTILITIES-&-SANITARY-SERVICES	499	693	194	113	81	57	24
18	WHOLESALE-TRADE	1128	1468	340	255	85	203	-118
19	EATING-&-DRINKING-PLACES	1084	1352	268	245	23	-15	37
20	OTHER-RETAIL-TRADE	5501	5268	-233	1244	-1477	281	-1758
21	FINANCE-INSURANCE-REAL-ESTATE	1166	1401	235	264	-29	361	-389
22	BUSINESS-&-REPAIR-SERVICES	796	1089	293	180	113	287	-174
23	PRIVATE-HOUSEHOLDS	2098	1168	-930	474	-1404	-1260	-144
24	OTHER-PERSONAL-SERVICES	1375	1449	74	311	-237	16	-253
25	ENTERTAINMENT-&-RECREATION-SERVS	196	208	12	44	-32	11	-43
26	HOSPITALS	696	1110	414	157	257	345	-89
27	EDUCATIONAL-SERVICES	1748	2677	929	395	534	980	-446
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	497	613	116	112	4	45	-41
29	OTHER-PROFESSIONAL-&-REL.-SERVS	635	1614	979	144	835	810	25
30	PUBLIC-ADMINISTRATION	2615	5611	2996	591	2405	384	2020
31	ARMED-FORCES	218	149	-69	49	-118	-38	-80
32	NOT-REPORTED	1103	0	-1103	249	-1352	-1352	0
	TOTALS	36829	44119	7290	8326	-1036	485	-1521

Texarkana region. This analysis focuses on changes only within each industry itself. If the number in "differential shift" column is positive, it indicates that Texarkana's industry is growing faster than the industry in the bi-state region, drawing resources away from other regions. Negative numbers indicate that Texarkana's industry is growing more slowly than the industry in the bi-state region, thus losing resources to other regions. Both changes reflect the Texarkana's relative competitive strength in each industry.

The two columns can be used together to give a fairly good idea of the economic strength of each sector in Texarkana. If there are a (+) proportional shift and a (-) differential shift, they indicate that the sector is doing well in relation to other sectors in Texarkana but not within that industry in the bi-state region. Sixteen sectors in Texarkana fall into this category, including sector 20, "other retail," and sector 27, "educatio nal services," two small but significant components of the regional economy.

A (-) proportional shift and a (+) differential shift indicate that the sector is doing well compared to the growth of the sector in the bi-state region but it is not doing well in comparison to other sectors in Texarkana. Only two sectors in the Texarkana region fall into this category: food and kindred products, a fairly important sector in the region, and eating and drinking places, sector 19.

If there are a (+) proportional shift and a (+) differential shift, they indicate that the sector is doing well in comparison to other sectors in the Texarkana region, as well as doing well in reference to that sector in the bi-state region. Five industries in the Texarkana region fall into this highly favorable category, including two very important ones, sector 30, public administration and sector 29, other professional and religious services.

A (-) proportional shift and a (-) differential shift, indicate that the sector is not keeping pace with other sectors in the Texarkana region and that it is doing badly in relation to that industry in the bi-state region. Unfortunately, seven sectors in the Texarkana region are in this worst of all categories including four fairly significant industries: sector 1, agriculture-forestry & fisheries, sector 4, furniture-lumber & wood

products, sector 15, transportation, and sector 23 private households.

In summary, of Texarkana's 10 most important sectors in terms of total employment, only two (sectors 29 and 30) are in a competitive or advantaged position in Texarkana and in the bi-state region. Moreover two of the top ten sectors are in the worst competitive position in relationship to the bi-state region and the industries involved as a whole. One of the two single most important sectors, heavy metal industries has shown growth only because of growth in the industry in the total bi-state region; that sector in Texarkana has affectively "lost" some potential increases in jobs in this sector to other regions.

Shift-share analysis is not without its critics. While shift-share provides insights into regional economic structure, it indicates nothing about the capacity of a region to retain or attract growing industries. Unlike location quotients, this analysis assumes that industries are independent of one another, ignoring secondary multiplier effects on "linkages" with supporting industries.

However the single worst criticism one can make of this analysis is that it had to be based on changes between 1960 and 1970 because 1980 Census data were unavailable. Recent growth in the heavy metal sector may bring additional growth to Texarkana, perhaps in the same way as previous increases did. That is, Texarkana may have gained employment but not as much as the full industry in the bi-state region did.

Texarkana too may have lost some employment in one of its most important sectors, public administration, because of recent State and Federal cutbacks.

In spite of these problems, the shift-share analysis gives a clearer idea of growth patterns in the Texarkana area than could be obtained from looking at changes in employment numbers alone. It is possible to view the raw changes in employment from 1960 to 1970 in a more favorable light than that in which they should be seen. Growth in Texarkana's major industrial sectors was not as much as expected given regional and industrial trends. In short Texarkana captured less of the economic growth in the bi-state region than it could and it has a competitive advantage in only two industries.

This suggests to the transportation planner that there will be no

drastic changes in the employment patterns in the four-county region overall. Major employment centers will hold their current employment, although some may decrease slightly. There is no reason to expect major new industrial centers to develop in the region.

Of course, each of the counties in the Texarkana region is very different in terms of employment by sector and industrial mix. In several counties, total employment in one industrial sector can be attributed to one plant or firm. Since more can be known about such individual employers than can be gleaned from an examination of the aggregate four-county data, the same economic analyses discussed above were performed for each of the four counties. The following sections present a location quotient analysis and a shift share analysis for Miller, Bowie, Little River, and Sevier Counties.

BOWIE COUNTY ECONOMIC PROFILE

Bowie County is both the most populous of the four counties studied, with a 1980 population of 75,301, and the largest county in land area with 891 square miles. Bowie also has the largest employment base, which increased by 22.9%, from 20,592 in 1960 to 25,298 in 1970. However, estimates for 1981 employment indicate a dramatic decrease in employment growth; employment will increase only 2.3%, the lowest increase of the four-county region. The total 1981 available labor force is estimated at 28,828, with 9.8%, or 2,829, being unemployed.

Bowie has the largest portion of the Texarkana urban area. Bowie has many of the federal, state, county, and local social service and governmental agencies available within the region. Table I-9 presents location quotients for Bowie County; the analyses there show that public administration, sector 30, has the highest employment for any sector in Bowie, representing 17.1% of the total employment within the county. Public administration employment increased by 151.1% over 1960.

Table I-10 which displays the shift-share analysis for Bowie County, shows that public administration is well ahead of the bi-state region.

Bowie County led the Texarkana region in all but five employment sectors in 1970: mining; furniture, lumber and wood products; electrical machinery equipment and supplies; textiles and fabricated textile products; and

TABLE I-9. LOCATION QUOTIENTS FOR BOWIE COUNTY, 1970

#	SECTOR NAME	TOTAL EMPLOYMENT BOWIE	TOTAL EMPLOYMENT ARK-TEX	% EMP. BOWIE	LOCATION QUOTIENT	DIVISION OF EMPLOYMENT BASIC	DIVISION OF EMPLOYMENT SERVICE
1	AGRICULTURE-FORESTRY-&-FISHERIES	615	249223	2.43	0.48	0	615
2	MINING	47	108239	0.19	0.09	0	47
3	CONSTRUCTION	1408	361887	5.57	0.76	0	1408
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	377	65796	1.49	1.13	42	335
5	METAL-INDUSTRIES	3430	109882	13.56	6.13	2870	560
6	MACHINERY-EXCEPT-ELECTRICAL	27	75466	0.11	0.07	0	27
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	4	77445	0.02	0.01	0	4
8	TRANSPORTATION-EQUIPMENT	255	104266	1.01	0.48	0	255
9	OTHER-DURABLE-GOODS	510	85185	2.02	1.18	76	434
10	FOOD-&-KINDRED-PRODUCTS	374	87668	1.48	0.84	0	374
11	TEXTILES-&-FABRICATED-TEX-PRODS	35	77705	0.14	0.09	0	35
12	PRINTING-PUBL-&-ALLIED-INDS.	165	55563	0.65	0.58	0	165
13	CHEMICALS-&-ALLIED-PRODUCTS	117	65878	0.46	0.35	0	117
14	OTHER-NON-DURABLE-GOODS	745	129956	2.94	1.13	83	662
15	TRANSPORTATION	824	177321	3.26	0.91	0	824
16	COMMUNICATIONS	254	58655	1.00	0.85	0	254
17	UTILITIES-&-SANITARY-SERVICES	315	91663	1.25	0.67	0	315
18	WHOLESALE-TRADE	848	221378	3.35	0.75	0	848
19	EATING-&-DRINKING-PLACES	668	137509	2.64	0.95	0	668
20	OTHER-RETAIL-TRADE	3349	685779	13.24	0.96	0	3349
21	FINANCE-INSURANCE-REAL-ESTATE	871	235679	3.44	0.73	0	871
22	BUSINESS-&-REPAIR-SERVICES	702	158489	2.77	0.87	0	702
23	PRIVATE-HOUSEHOLDS	685	104882	2.71	1.28	151	534
24	OTHER-PERSONAL-SERVICES	811	178563	3.21	0.89	0	811
25	ENTERTAINMENT-&-RECREATION-SERVS	88	34970	0.35	0.49	0	88
26	HOSPITALS	515	148179	2.04	0.68	0	515
27	EDUCATIONAL-SERVICES	1553	378528	6.14	0.81	0	1553
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	352	67591	1.39	1.02	8	344
29	OTHER-PROFESSIONAL-&-REL.-SERVS	918	207241	3.63	0.87	0	918
30	PUBLIC-ADMINISTRATION	4318	250640	17.07	3.38	3042	1276
31	ARMED-FORCES	118	176218	0.47	0.13	0	118
	TOTALS	25298	4967444	100.00		6272	19026

TABLE I-10. SHIFT-SHARE ANALYSIS FOR BOWIE COUNTY, 1960-1970

#	SECTOR NAME	BOWIE EMPLOYMENT 1960	BOWIE EMPLOYMENT 1970	CHANGE	DUE TO BI-STATE GROWTH	TOTAL SHIFT	PROPOR-TIONAL SHIFT	DIFFER-ENTIAL SHIFT
1	AGRICULTURE-FORESTRY-&-FISHERIES	1271	615	-656	287	-943	-750	-193
2	MINING	71	47	-24	16	-40	-14	-26
3	CONSTRUCTION	1263	1408	145	286	-141	36	-177
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	479	377	-102	108	-210	-132	-78
5	METAL-INDUSTRIES	2732	3430	698	618	80	1341	-1260
6	MACHINERY-EXCEPT-ELECTRICAL	8	27	19	2	17	2	15
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	33	4	-29	7	-36	56	-92
8	TRANSPORTATION-EQUIPMENT	174	255	81	39	42	99	-58
9	OTHER-DURABLE-GOODS	271	510	239	61	178	211	-33
10	FOOD-&-KINDRED-PRODUCTS	425	374	-51	96	-147	-139	-8
11	TEXTILES-&-FABRICATED-TEX-PRODS	12	35	23	3	20	3	17
12	PRINTING-PUBL-&-ALLIED-INDS.	146	165	19	33	-14	-1	-13
13	CHEMICALS-&-ALLIED-PRODUCTS	29	117	88	7	81	1	80
14	OTHER-NON-DURABLE-GOODS	17	745	728	4	724	2	722
15	TRANSPORTATION	1108	824	-284	250	-534	-189	-345
16	COMMUNICATIONS	191	254	63	43	20	18	2
17	UTILITIES-&-SANITARY-SERVICES	195	315	120	44	76	22	54
18	WHOLESALE-TRADE	531	848	317	120	197	96	101
19	EATING-&-DRINKING-PLACES	562	668	106	127	-21	-8	-14
20	OTHER-RETAIL-TRADE	3348	3349	1	757	-756	171	-927
21	FINANCE-INSURANCE-REAL-ESTATE	677	871	194	153	41	209	-168
22	BUSINESS-&-REPAIR-SERVICES	467	702	235	106	129	168	-39
23	PRIVATE-HOUSEHOLDS	1112	685	-427	251	-678	-668	-11
24	OTHER-PERSONAL-SERVICES	789	811	22	178	-156	9	-166
25	ENTERTAINMENT-&-RECREATION-SERVS	104	88	-16	24	-40	6	-45
26	HOSPITALS	362	515	153	82	71	180	-108
27	EDUCATIONAL-SERVICES	1086	1553	467	246	221	609	-387
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	295	352	57	67	-10	27	-36
29	OTHER-PROFESSIONAL-&-REL.-SERVS	353	918	565	80	485	450	35
30	PUBLIC-ADMINISTRATION	1720	4318	2598	389	2209	253	1956
31	ARMED-FORCES	74	118	44	17	27	-13	40
32	NOT-REPORTED	687	0	-687	155	-842	-842	0
	TOTALS	20592	25298	4706	4655	51	1213	-1162

entertainment and recreational services. Surprisingly, one sector that has higher employment in Bowie than in the three Arkansas counties is "agriculture and forestry." However, the total employment for that sector represents only 2.43% of the total employment within Bowie and is in itself a dramatic 51.5% decrease over 1960 employment for that sector.

Besides the decrease in sector 1, agriculture and forestry, employment decreased in seven additional sectors as well: mining; furniture, lumber and wood products; electrical machinery equipment; food and kindred products; transportation and entertainment and recreation. Altogether, these sectors represent only 11.74% of the total county employment.

The metal industries sector has the second largest employment, representing 13.56% of the total county employment. More significant is its position as the county's largest export or "basic" sector as Table I-9 shows. Bowie is the site of the largest single employer within the entire study region, the Red River Army Depot, employing some 6,000 individuals. Red River is a large military manufacturing complex which employs mostly civilians. Additionally, adjacent to Red River is the Lone Star/Day and Zimmerman Ammunition Plant, the fourth largest employer in the region, employing an additional 1,200. The third leading employment sector in Bowie is sector 20 other retail trade, representing 13.24% of the total employment.

Other metal manufacturing industries located in Bowie include: Texana Tank Car, Nash; Tri-State Sheet Metal; Fabsteel, G.S.L. Industries, and Commercial Box Co, all of Texarkana. (All of these employment sites are shown on the county maps in Section I; all major employment sites are also listed in the Appendix)

As Table I-9 shows, sectors that are significant to the export base include: furniture, lumber and wood products; other durable goods; other non-durable goods; private households; welfare, religious and non-profit organizations. Hospital and educational employment increased by 42.3% and 43.0% respectively since 1960.

Bowie has the largest number of individuals in the armed forces, 118, representing only .46% of total employment within the county.

Table I-10 shows that only 3 sectors in Bowie had strong competitive

advantage in the region, and only one, sector 30 public administration showed significant gains.

Bowie leads the other counties studied in total number of employers. Other major employers located in Bowie include: Buchanan Bottling Co.; The Texarkana Newspaper; Dickey Clay Tile; Brown and Miller Pickle Co.; Mayo Manufacturing; and Life Style Homes. One major regional employer located just outside of the study area and Bowie County is International Paper Co., located just over the county line in Cass County.

MILLER COUNTY ECONOMIC PROFILE

Miller County is the eastern portion of the Texarkana urban area, the Arkansas counterpart to Bowie County. Texarkana had a population of 21,459 in 1980, out of a county population of 37,766. Miller is also second of the four counties in estimated employment for 1981 with 13,708 employed out of a total labor force of 15,208. Nine point nine percent (9.9%) or 1,500 individuals were estimated to be unemployed. The 1981 employment is an increase of 21.4% over 1970. This contrasts sharply to the 1960-1970 decade, where employment increased by only 8.95%.

Table I-11 presents location quotients for Miller County. As Table II-8 shows, Miller decreased in 14 out of 31 sectors of employment between 1960 and 1970. Noted significant decreases include: agriculture, forestry and fisheries, which decreased by 45.2% but still represents 3.49% of the total employment; furniture, lumber and wood produts, decreasing 32.9%; other retail trade; and private households. Other retail trade, although decreasing in employment from 1960 to 1970, was still the largest sector of employment, representing 10.23% of all employment. Furniture, lumber and wood products industry, while decreasing in employment and representing only 2.13% of the total employment, is an important economic base exporting industry for the county.

The second largest sector of employment is that of the metal industries, as was noted for Bowie County. This sector represents 9.21% of the county's employment and significantly influences Miller's economic development since, as Table I-11 shows, it is the largest exporter-income producer in the county. This sector increased by 145.9% over 1960 employment.

TABLE I-11. LOCATION QUOTIENTS FOR MILLER COUNTY, 1970

#	SECTOR NAME	TOTAL EMPLOYMENT MILLER	TOTAL EMPLOYMENT ARK-TEX	% EMP. MILLER	LOCATION QUOTIENT	DIVISION OF EMPLOYMENT BASIC	DIVISION OF EMPLOYMENT SERVICE
1	AGRICULTURE-FORESTRY-&-FISHERIES	394	249223	3.49	0.70	0	394
2	MINING	60	108239	0.53	0.24	0	60
3	CONSTRUCTION	831	361887	7.36	1.01	8	823
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	241	65796	2.13	1.61	91	150
5	METAL-INDUSTRIES	1040	109882	9.21	4.16	790	250
6	MACHINERY-EXCEPT-ELECTRICAL	15	75466	0.13	0.09	0	15
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	6	77445	0.05	0.03	0	6
8	TRANSPORTATION-EQUIPMENT	152	104266	1.35	0.64	0	152
9	OTHER-DURABLE-GOODS	203	85185	1.80	1.05	9	194
10	FOOD-&-KINDRED-PRODUCTS	270	87668	2.39	1.35	71	199
11	TEXTILES-&-FABRICATED-TEX-PRODS	5	77705	0.04	0.03	0	5
12	PRINTING-PUBL-&-ALLIED-INDS.	88	55563	0.78	0.70	0	88
13	CHEMICALS-&-ALLIED-PRODUCTS	59	65878	0.52	0.39	0	59
14	OTHER-NON-DURABLE-GOODS	669	129956	5.92	2.26	374	295
15	TRANSPORTATION	383	177321	3.39	0.95	0	383
16	COMMUNICATIONS	191	58655	1.69	1.43	58	133
17	UTILITIES-&-SANITARY-SERVICES	269	91663	2.38	1.29	61	208
18	WHOLESALE-TRADE	453	221378	4.01	0.90	0	453
19	EATING-&-DRINKING-PLACES	473	137509	4.19	1.51	160	313
20	OTHER-RETAIL-TRADE	1156	685779	10.23	0.74	0	1156
21	FINANCE-INSURANCE-REAL-ESTATE	400	235679	3.54	0.75	0	400
22	BUSINESS-&-REPAIR-SERVICES	305	158489	2.70	0.85	0	305
23	PRIVATE-HOUSEHOLDS	339	104882	3.00	1.42	101	238
24	OTHER-PERSONAL-SERVICES	442	178563	3.91	1.09	36	406
25	ENTERTAINMENT-&-RECREATION-SERVS	102	34970	0.90	1.28	22	80
26	HOSPITALS	356	148179	3.15	1.06	19	337
27	EDUCATIONAL-SERVICES	718	378528	6.36	0.83	0	718
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	160	67591	1.42	1.04	6	154
29	OTHER-PROFESSIONAL-&-REL.-SERVS	504	207241	4.46	1.07	33	471
30	PUBLIC-ADMINISTRATION	995	250640	8.81	1.75	425	570
31	ARMED-FORCES	16	176218	0.14	0.04	0	16
	TOTALS	11295	4967444	100.00		2264	9031

Table I-12 presents the shift-share analysis for Miller County. It shows that six sectors in Miller enjoy strong competitive advantage in Texarkana and in the bi-state region. They include metal industries; educational services; and public administration; the three sectors of highest employment in the county.

Miller led the other three counties in total number of export-base sectors, which also include: construction; other durable goods; food and kindred products; other non-durable goods; communications; utilities and sanitary services; eating and drinking places; private households; other personal service; entertainment and recreational service; hospitals; welfare and religious organizations; other professional services; and public administration. Of the employment sectors which grew, notable increases were seen in other non-durable goods increasing over 3,000%; hospitals, increasing by 51.5%; and educational services, increasing by 82.2%.

Texarkana is essentially the only major employment location within Miller County. The only exception is the Mar-Bax shirt manufacturer located in Garland. The addition of the Robert Maxwell Air Industrial Park in Texarkana, Arkansas, has greatly enhanced and diversified employment within the county. Texarkana is also the central location for social and governmental agencies; public administration represents the third largest sector of employment in the county with 8.81% of the total.

Miller led in only one sector of employment among the four counties, entertainment and recreational services, which represents less then 1% of the total county employment. This perhaps reflects differences between Bowie and Miller; Texarkana in Bowie County is "dry" (i.e.: the sale of alcoholic beverages is restricted), whereas Texarkana, Ar., is not.

Other significant manufacturers located in Miller, include Globe Battery; Sta-Fresh Buns, and the largest employer within the entire Texarkana urban area, and the second largest within the entire region, Cooper Tire and Rubber Co., with approximately 1400 employees.

LITTLE RIVER COUNTY ECONOMIC PROFILE

Little River County is part of the 1980 Texarkana SMSA. It is directly

TABLE I-12. SHIFT-SHARE ANALYSIS FOR MILLER COUNTY, 1960-1970

#	SECTOR NAME	MILLER EMPLOYMENT 1960	1970	CHANGE	DUE TO BI-STATE GROWTH	TOTAL SHIFT	PROPOR-TIONAL SHIFT	DIFFER-ENTIAL SHIFT
1	AGRICULTURE-FORESTRY-&-FISHERIES	719	394	-325	163	-488	-425	-63
2	MINING	81	60	-21	18	-39	-16	-23
3	CONSTRUCTION	770	831	61	174	-113	22	-135
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	359	241	-118	81	-199	-99	-100
5	METAL-INDUSTRIES	423	1040	617	96	521	208	314
6	MACHINERY-EXCEPT-ELECTRICAL	20	15	-5	5	-10	6	-15
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	13	6	-7	3	-10	22	-32
8	TRANSPORTATION-EQUIPMENT	63	152	89	14	75	36	39
9	OTHER-DURABLE-GOODS	138	203	65	31	34	107	-73
10	FOOD-&-KINDRED-PRODUCTS	345	270	-75	78	-153	-113	-40
11	TEXTILES-&-FABRICATED-TEX-PRODS	19	5	-14	4	-18	5	-24
12	PRINTING-PUBL-&-ALLIED-INDS.	123	88	-35	28	-63	-1	-62
13	CHEMICALS-&-ALLIED-PRODUCTS	116	59	-57	26	-83	4	-87
14	OTHER-NON-DURABLE-GOODS	17	669	652	4	648	2	646
15	TRANSPORTATION	622	383	-239	141	-380	-106	-273
16	COMMUNICATIONS	95	191	96	21	75	9	65
17	UTILITIES-&-SANITARY-SERVICES	220	269	49	50	-1	25	-26
18	WHOLESALE-TRADE	474	453	-21	107	-128	85	-214
19	EATING-&-DRINKING-PLACES	373	473	100	84	16	-5	21
20	OTHER-RETAIL-TRADE	1471	1156	-315	333	-648	75	-723
21	FINANCE-INSURANCE-REAL-ESTATE	381	400	19	86	-67	118	-185
22	BUSINESS-&-REPAIR-SERVICES	264	305	41	60	-19	95	-114
23	PRIVATE-HOUSEHOLDS	708	339	-369	160	-529	-425	-104
24	OTHER-PERSONAL-SERVICES	426	442	16	96	-80	5	-85
25	ENTERTAINMENT-&-RECREATION-SERVS	69	102	33	16	17	4	14
26	HOSPITALS	235	356	121	53	68	117	-49
27	EDUCATIONAL-SERVICES	394	718	324	89	235	221	14
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	153	160	7	35	-28	14	-41
29	OTHER-PROFESSIONAL-&-REL.-SERVS	222	504	282	50	232	283	-51
30	PUBLIC-ADMINISTRATION	627	995	368	142	226	92	134
31	ARMED-FORCES	140	16	-124	32	-156	-24	-131
32	NOT-REPORTED	287	0	-287	65	-352	-352	0
	TOTALS	10367	11295	928	2344	-1416	-10	-1405

north of Bowie County and is integrally tied both economically and culturally to Texarkana and the rest of the SMSA. Little River is the smallest county in the study area in square miles and in population. The largest city and the county seat is Ashdown, which had a 1980 population of 4,218.

Total employment in the county increased by 35% from 1960 to 1970. The 1981 employment was estimated at 5,064, an increase of 38.8% over 1970. The total labor force was estimated at 5,654. Little River experienced a slightly higher unemployment rate than the rest of the study area, 10.4%.

Table I-13 shows the location quotient analysis of Little River. Little River led all study area counties in 1970 in employment in textile and fabricated textile production, a sector which had no employment in 1960. This sector represented 4.85% of total employment in Little River and is an important "basic" or export industry for the county. Representative of this industry is the Spotlight Company located in Ashdown, a manufacturer of ladies sleepwear.

The largest sector of employment occurred in the other non-durable goods sector, which employed 488 in 1970. This sector represented 13.37% of total employment within the county. The sector showed no employment in 1960. The second largest sector of employment in the county was other retail trade, representing 10.47% of the total employment.

Two economically significant employment sectors are agriculture, forestry and fisheries, and furniture, lumber, and wood products. These sectors represent 7.7% and 6.6%, respectively, of total employment within the county. Both sectors lost employment from 1960, decreasing by 49% and 28% in total employment. The location quotients, in Table I-13, show these sectors represent important exporting industries for the county.

Located within Little River is the third largest employer within the Texarkana study area, Nekoosa Papers, Inc., just south of Ashdown. Nekoosa is a manufacturer of paper and paper products and is an industry in sector 1. Additional industries having employment within this sector are numerous lumber and sawmill operations, including Porter Enterprises of Wilton, the Little River Mill company in Ashdown, maker of wooden moldings, and the Quality Pallet Co. in Foreman, maker of wooden pallets.

TABLE I-13. LOCATION QUOTIENTS FOR LITTLE RIVER COUNTY, 1970

#	SECTOR NAME	TOTAL EMPLOYMENT L.RIV.	ARK-TEX	% EMP. L.RIV.	LOCATION QUOTIENT	DIVISION OF EMPLOYMENT BASIC	SERVICE
1	AGRICULTURE-FORESTRY-&-FISHERIES	281	249223	7.70	1.53	98	183
2	MINING	50	108239	1.37	0.63	0	50
3	CONSTRUCTION	210	361887	5.76	0.79	0	210
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	241	65796	6.60	4.99	193	48
5	METAL-INDUSTRIES	346	109882	9.48	4.29	265	81
6	MACHINERY-EXCEPT-ELECTRICAL	11	75466	0.30	0.20	0	11
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	0	77445	0.00	0.00	0	0
8	TRANSPORTATION-EQUIPMENT	19	104266	0.52	0.25	0	19
9	OTHER-DURABLE-GOODS	198	85185	5.43	3.16	135	63
10	FOOD-&-KINDRED-PRODUCTS	86	87668	2.36	1.34	22	64
11	TEXTILES-&-FABRICATED-TEX-PRODS	177	77705	4.85	3.10	120	57
12	PRINTING-PUBL-&-ALLIED-INDS.	10	55563	0.27	0.25	0	10
13	CHEMICALS-&-ALLIED-PRODUCTS	0	65878	0.00	0.00	0	0
14	OTHER-NON-DURABLE-GOODS	488	129956	13.37	5.11	393	95
15	TRANSPORTATION	112	177321	3.07	0.86	0	112
16	COMMUNICATIONS	17	58655	0.47	0.39	0	17
17	UTILITIES-&-SANITARY-SERVICES	12	91663	0.33	0.18	0	12
18	WHOLESALE-TRADE	62	221378	1.70	0.38	0	62
19	EATING-&-DRINKING-PLACES	89	137509	2.44	0.88	0	89
20	OTHER-RETAIL-TRADE	382	685779	10.47	0.76	0	382
21	FINANCE-INSURANCE-REAL-ESTATE	43	235679	1.18	0.25	0	43
22	BUSINESS-&-REPAIR-SERVICES	39	158489	1.07	0.33	0	39
23	PRIVATE-HOUSEHOLDS	112	104882	3.07	1.45	35	77
24	OTHER-PERSONAL-SERVICES	61	178563	1.67	0.47	0	61
25	ENTERTAINMENT-&-RECREATION-SERVS	5	34970	0.14	0.19	0	5
26	HOSPITALS	121	148179	3.32	1.11	12	109
27	EDUCATIONAL-SERVICES	219	378528	6.00	0.79	0	219
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	35	67591	0.96	0.70	0	35
29	OTHER-PROFESSIONAL-&-REL.-SERVS	44	207241	1.21	0.29	0	44
30	PUBLIC-ADMINISTRATION	179	250640	4.91	0.97	0	179
31	ARMED-FORCES	0	176218	0.00	0.00	0	0
	TOTALS	3649	4967444	100.00		1272	2377

The metal industries sector, as in both Bowie and Miller Counties, again appears significant, with 9.48% of the total employment. This sector also represents an important export industry, one on a par with wood products. Industries such as the Ashdown Manufacturing Co., which manufactures flat-bed and semi-truck trailers, contribute employment to this sector.

Other durable goods, representing only 5.43% of total employment, is an important source of revenue within the county. The Arkansas Cement Co., located in Foreman, is an area-wide supplier of cement and other durable products.

Hospital employment increased by 91% over 1960, and educational services increased 46%.

Table I-14 displays the shift-share analysis for Little River County. Overall employment in Little River decreased in 12 sectors and increased or did not change in 19. Six sectors are not keeping pace with growth within those industries in the bi-state region or with other sectors in the county. Another six sectors are enjoying growth in relation to other sectors in both the county and in bi-state region. However, the majority of the industries in Little River are not keeping pace with their counterparts in bi-state region.

SEVIER COUNTY ECONOMIC PROFILE

Sevier County is located directly north of Little River County and is not part of the Texarkana SMSA. It is the most distant from Texarkana, and hence its economy is only partially influenced by Texarkana.

DeQueen is the largest city and the county seat. DeQueen has 4,594 residents out of a 1980 county population of 14,060. An estimated 5,600 were employed in 1981 out of a work force of 6,125, representing an unemployment rate of 8.6%, or 525, the lowest rate among the four counties.

The 1981 employment figure is a dramatic increase of 44.4% over 1970's employment total for the county. This represents the largest employment increase within the four-county region during the last decade. From 1960 to 1970 employment increased by 22.3% in Sevier, indicating overall excellent employment growth during the last 20 years.

Table I-15 displays the location quotients analysis for Sevier. Sevier

TABLE I-14. SHIFT-SHARE ANALYSIS FOR LITTLE RIVER COUNTY, 1960-1970

#	SECTOR NAME	LITTLE RIVER EMPLOYMENT 1960	1970	CHANGE	DUE TO BI-STATE GROWTH	TOTAL SHIFT	PROPOR-TIONAL SHIFT	DIFFER-ENTIAL SHIFT
1	AGRICULTURE-FORESTRY-&-FISHERIES	555	281	-274	125	-399	-328	-72
2	MINING	53	50	-3	12	-15	-10	-5
3	CONSTRUCTION	129	210	81	29	52	4	48
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	334	241	-93	76	-169	-92	-76
5	METAL-INDUSTRIES	73	346	273	17	256	36	221
6	MACHINERY-EXCEPT-ELECTRICAL	0	11	11	0	11		
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	4	0	-4	1	-5	7	-12
8	TRANSPORTATION-EQUIPMENT	5	19	14	1	13	3	10
9	OTHER-DURABLE-GOODS	131	198	67	30	37	102	-64
10	FOOD-&-KINDRED-PRODUCTS	37	86	49	8	41	-12	53
11	TEXTILES-&-FABRICATED-TEX-PRODS	0	177	177	0	177		
12	PRINTING-PUBL-&-ALLIED-INDS.	8	10	2	2	0	-0	0
13	CHEMICALS-&-ALLIED-PRODUCTS	0	0	0	0	0		
14	OTHER-NON-DURABLE-GOODS	0	488	488	0	488		
15	TRANSPORTATION	135	112	-23	31	-54	-23	-30
16	COMMUNICATIONS	20	17	-3	5	-8	2	-9
17	UTILITIES-&-SANITARY-SERVICES	27	12	-15	6	-21	3	-24
18	WHOLESALE-TRADE	72	62	-10	16	-26	13	-39
19	EATING-&-DRINKING-PLACES	59	89	30	13	17	-1	17
20	OTHER-RETAIL-TRADE	318	382	64	72	-8	16	-24
21	FINANCE-INSURANCE-REAL-ESTATE	35	43	8	8	0	11	-11
22	BUSINESS-&-REPAIR-SERVICES	33	39	6	7	-1	12	-13
23	PRIVATE-HOUSEHOLDS	180	112	-68	41	-109	-108	-1
24	OTHER-PERSONAL-SERVICES	86	61	-25	19	-44	1	-45
25	ENTERTAINMENT-&-RECREATION-SERVS	15	5	-10	3	-13	1	-14
26	HOSPITALS	11	121	110	2	108	5	102
27	EDUCATIONAL-SERVICES	118	219	101	27	74	66	8
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	27	35	8	6	2	2	-1
29	OTHER-PROFESSIONAL-&-REL.-SERVS	17	44	27	4	23	22	1
30	PUBLIC-ADMINISTRATION	154	179	25	35	-10	23	-32
31	ARMED-FORCES	4	0	-4	1	-5	-1	-4
32	NOT-REPORTED	61	0	-61	14	-75	-75	0
	TOTALS	2701	3649	948	611	-339	-322	-17

TABLE I-15. LOCATION QUOTIENTS FOR SEVIER COUNTY, 1970

#	SECTOR NAME	TOTAL EMPLOYMENT SEVIER	TOTAL EMPLOYMENT ARK-TEX	% EMP. SEVIER	LOCATION QUOTIENT	DIVISION OF EMPLOYMENT BASIC	DIVISION OF EMPLOYMENT SERVICE
1	AGRICULTURE-FORESTRY-&-FISHERIES	245	249223	6.32	1.26	50	195
2	MINING	9	108239	0.23	0.11	0	9
3	CONSTRUCTION	283	361887	7.30	1.00	1	282
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	536	65796	13.83	10.44	485	51
5	METAL-INDUSTRIES	132	109882	3.40	1.54	46	86
6	MACHINERY-EXCEPT-ELECTRICAL	0	75466	0.00	0.00	0	0
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	14	77445	0.36	0.23	0	14
8	TRANSPORTATION-EQUIPMENT	0	104266	0.00	0.00	0	0
9	OTHER-DURABLE-GOODS	138	85185	3.56	2.08	72	66
10	FOOD-&-KINDRED-PRODUCTS	303	87668	7.82	4.43	235	68
11	TEXTILES-&-FABRICATED-TEX-PRODS	31	77705	0.80	0.51	0	31
12	PRINTING-PUBL-&-ALLIED-INDS.	31	55563	0.80	0.71	0	31
13	CHEMICALS-&-ALLIED-PRODUCTS	3	65878	0.08	0.06	0	3
14	OTHER-NON-DURABLE-GOODS	311	129956	8.02	3.07	210	101
15	TRANSPORTATION	139	177321	3.59	1.00	1	138
16	COMMUNICATIONS	34	58655	0.88	0.74	0	34
17	UTILITIES-&-SANITARY-SERVICES	97	91663	2.50	1.36	25	72
18	WHOLESALE-TRADE	105	221378	2.71	0.61	0	105
19	EATING-&-DRINKING-PLACES	122	137509	3.15	1.14	15	107
20	OTHER-RETAIL-TRADE	381	685779	9.83	0.71	0	381
21	FINANCE-INSURANCE-REAL-ESTATE	87	235679	2.24	0.47	0	87
22	BUSINESS-&-REPAIR-SERVICES	43	158489	1.11	0.35	0	43
23	PRIVATE-HOUSEHOLDS	32	104882	0.83	0.39	0	32
24	OTHER-PERSONAL-SERVICES	135	178563	3.48	0.97	0	135
25	ENTERTAINMENT-&-RECREATION-SERVS	13	34970	0.34	0.48	0	13
26	HOSPITALS	118	148179	3.04	1.02	2	116
27	EDUCATIONAL-SERVICES	187	378528	4.82	0.63	0	187
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	66	67591	1.70	1.25	13	53
29	OTHER-PROFESSIONAL-&-REL.-SERVS	148	207241	3.82	0.92	0	148
30	PUBLIC-ADMINISTRATION	119	250640	3.07	0.61	0	119
31	ARMED-FORCES	15	176218	0.39	0.11	0	15
	TOTALS	3877	4967444	100.00		1154	2723

leads all other study region counties in the furniture, lumber, and wood products employment sector, which represents 13.83% of total employment in Sevier. It is also the most important export or revenue industry within the county, having a location quotient of 10.44, the largest computed for any sector in any of the four counties. However, in relation to the bi-state region, the sector is not keeping pace.

The related agriculture, forestry, and fisheries sector represents an additional 6.32% of total employment and an additional source of export income. Both sectors, however, decreased from 1960 employment levels.

Throughout Sevier are numerous industries with employment related to sectors 1 and 4 since most of the county is heavily forested. One of the largest employers in Sevier is the Weyerhaeser Co., of DeQueen, manufacturer of lumber, railroad ties and power poles. Additional related industries include the Horatio Lumber Co. of Horatio; Frames, Inc., of DeQueen; and the James T. Wax Sawmill of Gillham.

Sevier is second among the other counties in food and kindred products, the sector representing 7.82% of the total employment. This sector was an important export industry, increasing 32% over 1960. The largest single employer in the county is the Bo-Pilgrim Co. of DeQueen (formerly Mountainaire Poultry, Inc.), producer of processed poultry products.

Other important employment sectors include metal industries, increasing 92% over 1960; other durable goods, increasing 94%; other non-durable goods, increasing by 99%; utilities and sanitary services, 41%; eating and drinking places, 26%; and transportation, decreasing by 42%. DeQueen is the main site of a variety of industries ranging from the Baldwin Piano Co., to Tred II of Arkansas, manufacturer of tennis shoes.

Personal service sectors are important for Sevier. These sectors include other personal services, increasing 45% over 1960; hospitals, increasing by 25%; educational services, by 20%; welfare, religious, and non-profit organizations by 67%, and other professional and related services increasing by 71%.

Table I-16 shows the shift-share analysis for the county. Overall only six employment sectors actually lost in total employment in the decade from 1960 to 1970. Only eight sectors are performing worse in relation to other

TABLE I-16. SHIFT-SHARE ANALYSIS FOR SEVIER COUNTY, 1960-1970

#	SECTOR NAME	SEVIER EMPLOYMENT 1960	SEVIER EMPLOYMENT 1970	CHANGE	DUE TO BI-STATE GROWTH	TOTAL SHIFT	PROPORTIONAL SHIFT	DIFFERENTIAL SHIFT
1	AGRICULTURE-FORESTRY-&-FISHERIES	462	245	-217	104	-321	-273	-49
2	MINING	8	9	1	2	-1	-2	1
3	CONSTRUCTION	208	283	75	47	28	6	22
4	FURNITURE-LUMBER-&-WOOD-PRODUCTS	661	536	-125	149	-274	-182	-92
5	METAL-INDUSTRIES	10	132	122	2	120	5	115
6	MACHINERY-EXCEPT-ELECTRICAL	8	0	-8	2	-10	2	-12
7	ELECTRICAL-MACH-EQUIP-&-SUPPLIES	5	14	9	1	8	8	-1
8	TRANSPORTATION-EQUIPMENT	0	0	0	0	0		
9	OTHER-DURABLE-GOODS	8	138	130	2	128	6	122
10	FOOD-&-KINDRED-PRODUCTS	205	303	98	46	52	-67	119
11	TEXTILES-&-FABRICATED-TEX-PRODS	12	31	19	3	16	3	13
12	PRINTING-PUBL-&-ALLIED-INDS.	13	31	18	3	15	-0	15
13	CHEMICALS-&-ALLIED-PRODUCTS	14	3	-11	3	-14	0	-15
14	OTHER-NON-DURABLE-GOODS	4	311	307	1	306	0	306
15	TRANSPORTATION	198	139	-59	45	-104	-34	-70
16	COMMUNICATIONS	21	34	13	5	8	2	6
17	UTILITIES-&-SANITARY-SERVICES	57	97	40	13	27	7	21
18	WHOLESALE-TRADE	51	105	54	12	42	9	33
19	EATING-&-DRINKING-PLACES	90	122	32	20	12	-1	13
20	OTHER-RETAIL-TRADE	364	381	17	82	-65	19	-84
21	FINANCE-INSURANCE-REAL-ESTATE	73	87	14	17	-3	23	-25
22	BUSINESS-&-REPAIR-SERVICES	32	43	11	7	4	12	-8
23	PRIVATE-HOUSEHOLDS	98	32	-66	22	-88	-59	-29
24	OTHER-PERSONAL-SERVICES	74	135	61	17	44	1	43
25	ENTERTAINMENT-&-RECREATION-SERVS	8	13	5	2	3	0	3
26	HOSPITALS	88	118	30	20	10	44	-34
27	EDUCATIONAL-SERVICES	150	187	37	34	3	84	-81
28	WELFARE-RELIGIOUS-NON-PROF-ORGS	22	66	44	5	39	2	37
29	OTHER-PROFESSIONAL-&-REL.-SERVS	43	148	105	10	95	55	40
30	PUBLIC-ADMINISTRATION	114	119	5	26	-21	17	-38
31	ARMED-FORCES	0	15	15	0	15		
32	NOT-REPORTED	68	0	-68	15	-83	-83	0
	TOTALS	3169	3877	708	716	-23	-396	372

sectors within Sevier. However, in relation to the bi-state region, 13 employment sectors are doing worse than their own industries in the region, and four sectors are being out-performed in both the county by other sectors, and within their own industry in relation to combined Arkansas and Texas economic patterns.

SUMMARY OF ECONOMIC PATTERNS IN THE REGION

Table I-17 summarizes the detailed regional and county-specific analyses discussed in this section. The table makes it clear that Bowie and Miller County are most like the region as a whole, Little River and Sevier Counties are least like the region.

Table I-17 illustrates also that the problems in the regional economy are shared more by Miller and Bowie Counties than by the other two. For the region as a whole, the industries showing the largest employment totals, and generally the largest percentage increases over the ten year period from 1960 to 1970, were not industries which contributed to the economic growth of the region or in which the region maintained a competitive advantage.

As previously described, those industries or sectors which are considered export or basic industries are assumed to be the source of economic growth and development in the region; growth in other industries can only have weak secondary impacts on regional development. For the region as a whole, and for Bowie and Miller counties, the only major employment sources that were also basic industries were public administration and metal industries. But the region as a whole only shows competitive advantage for only one of those two sectors, public administration. In other words, while there may be increased employment in the basic metal industry sector, jobs in that growing industry will be lost to other areas, which enjoy a competitive advantage over the Texarkana region.

On the other hand, Little River and Sevier counties are in slightly better relative positions. All of the five largest employment sectors in Little River are also basic industries contributing to economic growth in the county. However only the metal industries sector is also a competitive one compared to the bi-state region. This means that increased employment in that sector will bring larger percentage growth in employment in metals

TABLE I-17. SUMMARY OF MAJOR ECONOMIC ELEMENTS IN THE TEXARKANA STUDY REGION

	Five Largest Employ--ment Sectors	Strong in Relation to Other Sectors	Strong Competitive Position in Relation to Other Regions	Major Export or Basic Industries
Texarkana Region	(3) Construction (5) Metal Industries (20) Other Retail Trade (27) Educational Services (30) Public Administration	(5) Metal Industries (9) Other Durable Goods (27) Educational Services (30) Public Administration	(11) Textiles (30) Public Administration	(4) Furn., lumber, wood (5) Metal Industries (10) Food Products (9) Other Durables (23) Private Households (30) Public Administration
Bowie County	(3) Construction (5) Metal Industries (20) Other Retail Trade (27) Educational Services (30) Public Administration	(5) Metal Industries (21) Finance, Insurance, Real Estate (27) Educational Services (30) Public Administration	(14) Other Durables (30) Public Administration	(4) Furn., lumber, (5) Metal Industries (9) Other Durables (14) Other Non-durables (23) Private Households (30) Public Administration
Miller County	(3) Construction (5) Metal Industries (20) Other Retail Trade (27) Educational Services (30) Public Administration	(5) Metal Industries (21) Finance, Insurance, Real Estate (26) Hospitals (27) Educational Services (30) Public Administration	(5) Metal Industries (14) Other Non-durables (30) Public Administration	(4) Furn., lumber wood (5) Metal Industries (10) Food Products (14) Other Non-durables (16) Communications (17) Utility (18) Eating Places (23) Private Households (25) Entertainment (30) Public Administration

(continued)

TABLE I-17. (CONTINUED)

	Five Largest Employment Sectors	Strong in Relation to Other Sectors	Strong Competitive Position in Relation to Other Regions	Major Export or Basic Industries
Little River	(1) Agriculture (4) Furn, lumber wood (5) Metal Industries (14) Other Non-durables (20) Other Retail	(9) Other Durables (27) Educational Services	(5) Metal Industries (26) Hospitals	(1) Agriculture (4) Furn, lumber wood (5) Metal Industries (9) Other Durables (10) Food Products (11) Textiles (14) Other Non-durables (23) Private Households (26) Hospitals
Sevier	(3) Construction (4) Furn, lumber wood (10) Food Products (14) Other Non-durables (20) Other Retail Trade	(27) Educational Services	(5) Metal Industries (9) Other Durables (10) Food Products (14) Other Non-durables	(1) Agriculture (4) Furn, lumber wood (5) Metal Industries (9) Other Durables (10) Food Products (14) Other Non-durable (17) Utility (28) Welfare Services

(#) = Sector Number

industries in Little River than it will in the region as a whole or in Miller or Bowie Counties.

Three of Sevier County's largest employment sources are also basic industries contributing to economic development in the county. However, only two of those industries are also competitive versus the bi-state region. Again increases in employment may be seen in the largest employment industries but these will not be as large as those found in the same industries in other parts of the bi-state region outside Texarkana.

Overall the Texarkana region is forced to depend for further economic growth on just a few sectors; in only one of those five or six sectors does the region enjoy a competitive position.

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(4) Harland, Bartholomew and Associates, Inc. Transit Development Program Update, Texarkana Urban Area, August 1981, p 4.

(5) Texas Almanac, 1982-83. Dallas Morning News. A. H. Belo Corporation, Publishers, 1981, p 249.

(6) Ark-Tex Council of Governments. Natural Resource Management Plan: Criteria and Standards, Volume I, 1977-78, p 125.

(7) Arkansas Department of Local Services. Miller County, January 1977.

(8) Southwest Arkansas Planning and Development District, Inc. Overall Economic Development Program, 1977, p 20.

(9) Arkansas Department of Local Services. Little River County, January 1977, p 11.

(10) Arkansas Department of Local Services. Sevier County, January 1977, p 13.

PART II. EXISTING TRANSPORTATION SERVICES IN THE RURAL STUDY AREA

INTRODUCTION

It is crucial to identify the existing transportation resources of the regional area. Such identification will avoid duplication, prevent conflict with certificated providers, and allow the developing rural public transit system to more efficiently and effectively coordinate services and resources already available in the region.

In this part of the report four types of transportation services are carefully inventoried and analyzed: certificated motor coach service within and through the region, non-certificated home-to-work services, taxi operations, and human service transportation systems. In each of the following sections, these services are described and their potential involvement, if any, in the development of a rural public transit system is analyzed. In the final part of this report the ways in which these existing systems and operations could be incorporated into a rural public transportation system will be considered and evaluated.

INTRA AND INTER-REGIONAL

The four-county Texarkana study region is integrally united by way of an extensive highway network, the center of which is Texarkana. A major axis of this network is Interstate 30, which enters the region at Fulton in the east, crosses the Arkansas-Texas state line at Texarkana, and extends west to New Boston. The Interstate leaves the region in the southwest corner of Bowie County, sharply turning in that direction just west of the New Boston area.

Texarkana, because of its strategic position along the Interstate system, and as a crossroad for seven U.S. highways, has logically become a major stopover and transfer point for interstate and regional travel. The highway network provides the framework upon which an extensive intercity

motor coach system is founded.

Russell's Official National Motor Coach Guide indicates that 27 interstate routes traverse the region and cross the state line by way of Texarkana. Detailed information on these carriers is presented in the Appendix. Interregional service is provided by 52 scheduled daily routes connecting Texarkana with communities throughout the area. (1)

Table II-1 displays the availability of motor coach services in a variety of cities in the four-county region. With few exceptions, the intercity bus system serves virtually the entire region either directly or through transfers. The Texarkana region is serviced by 17 separate motor coach carriers. Communities located outside the Texarkana urban area are primarily serviced by only 3 companies: Jefferson Lines, Greyhound, and Trailways.

The Arkansas-Texas jurisdictional division of Texarkana creates special circumstances in the utilization of the regional motor coach system. The "twin" cities, straddling the state line, have different taxing and regulatory practices, a not uncommon phenomenon in interstate travel. If travellers on a carrier must cross the state line in order to reach their destination, special excise taxes, such as a gasoline tax, are added onto the fare. Table II-2 illustrates the fares between keypoints on the Arkansas and Texas sides of the region.

The intercity bus carriers have recognized the economic unattractiveness of different state-set fares, and in effect have created twin bus terminals, one on each side of the state line. The Trailways terminal is located on the Arkansas side, and the Greyhound/Jefferson Lines terminal is located on the Texas side. A traveller may avoid increased fares by choosing the correct terminal for departure. Most of the interregional routes include stops at both terminals.

MOTOR COACH SERVICE IN BOWIE COUNTY.

Bowie County highway corridors are served by some 26 different bus schedules to and from Texarkana by either Greyhound or Trailways. Figure II-1 illustrates the major routes and stops in the county. The routes follow

TABLE II-1. MOTOR COACH SERVICE AVAILABILITY IN CITIES IN THE TEXARKANA REGION

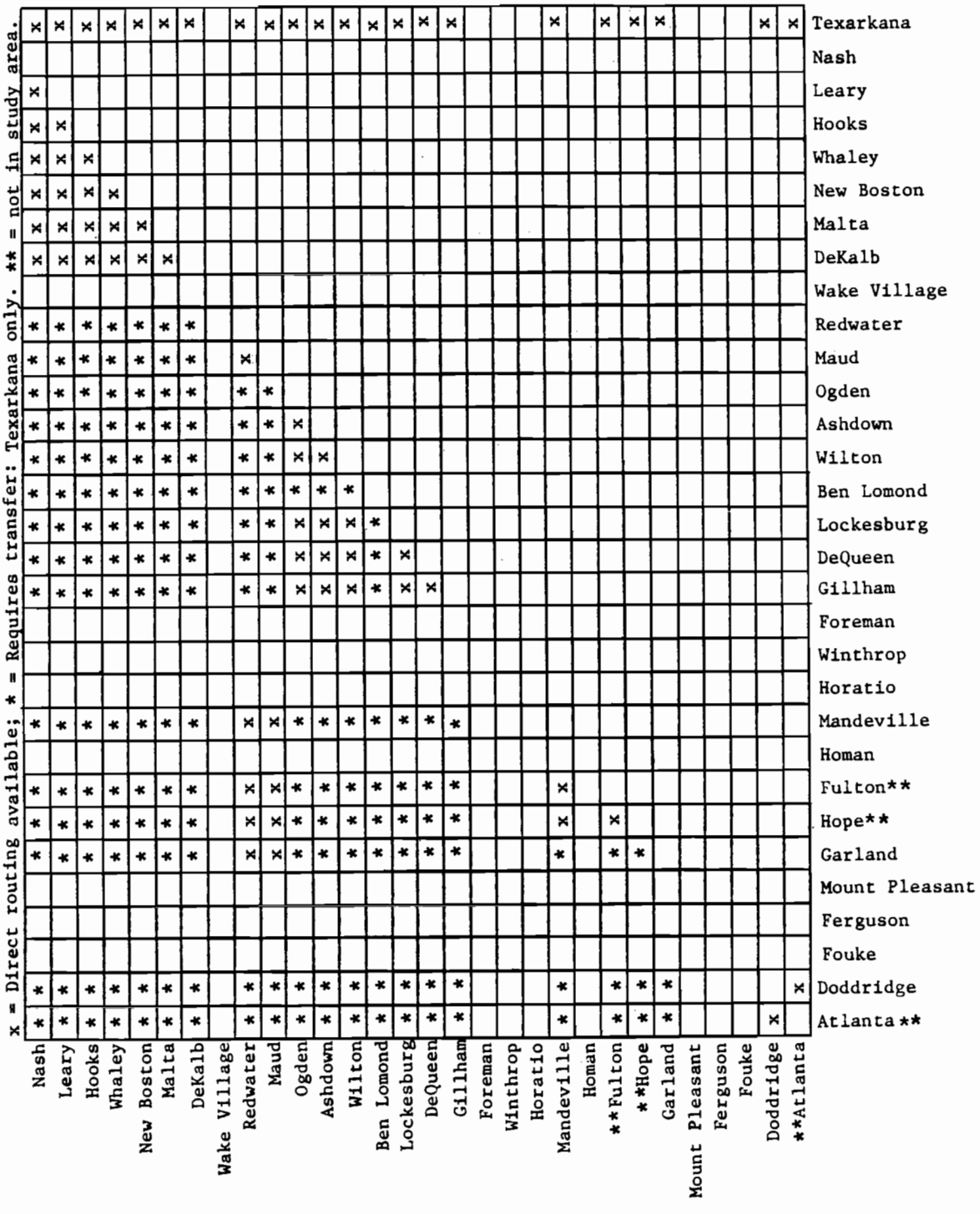

TABLE II-2. INTRAREGIONAL AND SELECTED INTERREGIONAL MOTOR COACH FARES, SPRING 1982 (2)

TEXARKANA, TEXAS		TEXARKANA, AR.	
NASH	$ 1.50	OGDEN	$ 0.80
LEARY	1.50	ASHDOWN	2.20
HOOKS	1.95	WILTON	2.45
WHALEY		BEN LOMOND	2.95
NEW BOSTON	2.35	LOCKESBURG	4.60
DEKALB	4.10	DeQUEEN	4.60
REDWATER	1.85	GILLHAM	6.10
MAUD	2.30	FULTON	2.15
ATLANTA	2.65	GARLAND	2.30
SHREVEPORT	10.35	DODDRIDGE	2.70

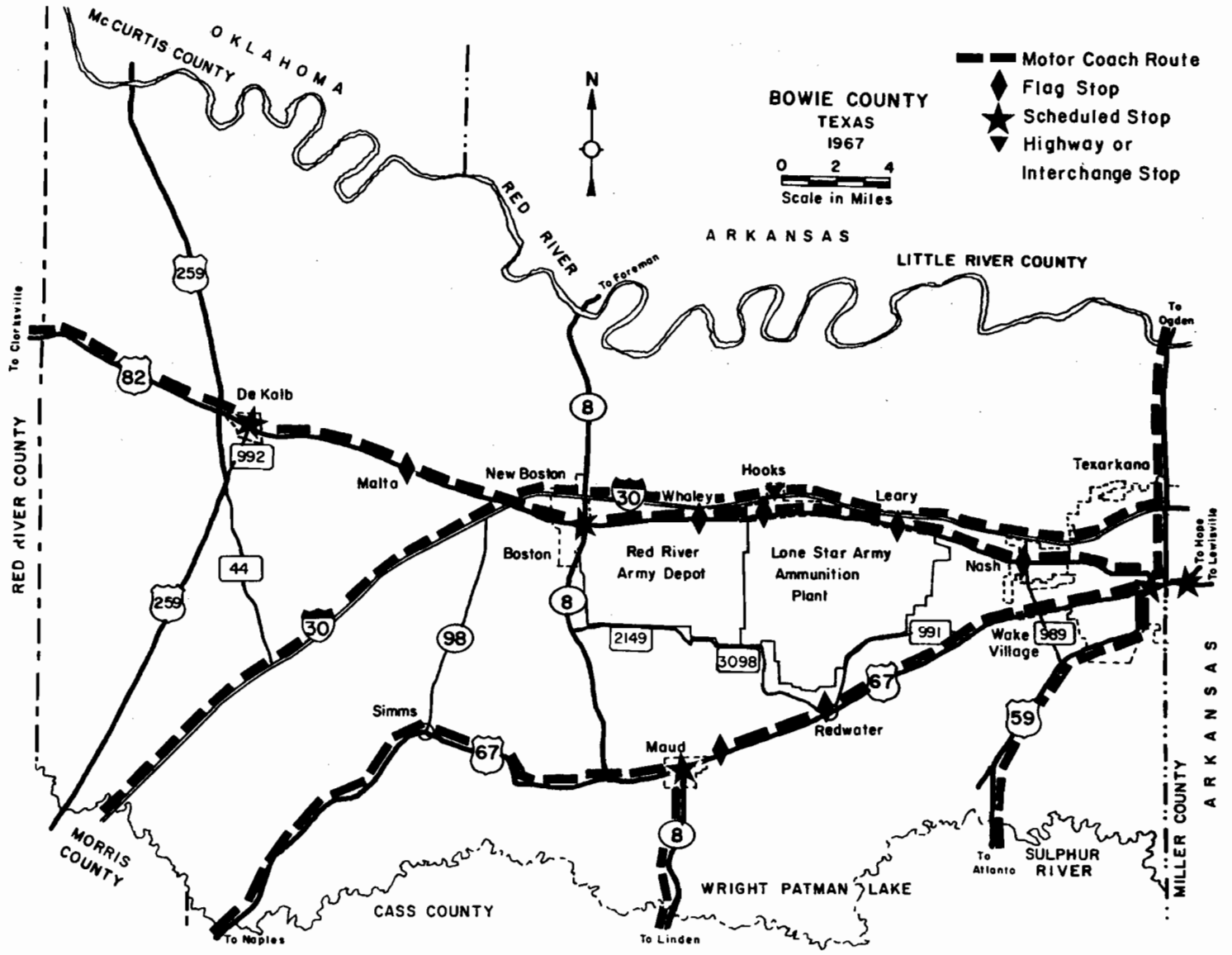

Fig II-1. Motor coach routes and stops in Bowie County.

Interstate 30, U.S. Hwy. 82, and U.S. 67, west and southwest of Texarkana. The main corridors of travel include: DeKalb to Texarkana along U.S. 82; New Boston to Texarkana along Interstate 30; and Maud and Redwater to Texarkana along U.S. 67.

DeKalb to Texarkana

Travelling east along the major east-west axis following Interstate 30 and U.S. 82, four scheduled routes depart daily from DeKalb for Texarkana. The schedules for these services are shown in Table II-3. Each of the routes allows for a flag1 stop in Malta. New Boston is a regularly scheduled stop along the four routes and is additionally served by two direct routes along the Interstate into Texarkana. Travellers from Whaley, Hooks, Leary, and Nash have only two opportunities throughout the day for travel into Texarkana. Two of the four routes departing DeKalb allow for flag stops in these communities.

The bus trip from DeKalb to Texarkana takes 47 minutes. The earliest departure is at 2:38 am. The next departure is four hours and 12 minutes later, at 6:50 am. The first complete route with scheduled or flag stops at all communities enroute leaves DeKalb at 2:15 pm. In addition to stopping at Malta and New Boston, this bus is available to residents of Whaley, Hooks, Leary, and Nash between 2:30 and 3:00 pm. The last bus departing DeKalb and available for intermittant stops along the corridor leaves at 9:15 pm; arriving in Texarkana at 10:05 pm.

Only three routes make the return trip west to DeKalb. Four routes, including one direct, serve New Boston. The first departure from Texarkana is at 7:25 am; the bus is available allowing for a stop at the Interstate interchange for passengers travelling to Hooks. A scheduled stop in New Boston is followed by a flag stop in Malta, with arrival in DeKalb at 8:25 am. Only one route, the last available from Texarkana, at 7:50 pm; allows for flag stops in Nash, Leary, Hooks, and Whaley. Figure II-2 displays this scheduling information in a different format.

The one-way fares to and from Texarkana, Texas along this corridor are: between Texarkana , Texas and Nash, Leary, Hooks, New Boston, and DeKalb, are shown in Table II-2.

TABLE II-3. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN DEKALB AND TEXARKANA

Departures for Texarkana

Route Table	De Kalb	Malta	New Boston	Whaley	Hooks	Leary	Nash	Texarkana
8186	*2:28*	*f*	*2:45*					*3:15*
8186	*6:50*	*f*	*7:05*					*7:45*
8186	2:15	f	2:30	f	f	f	f	3:05
8190			2:30					8:05-3:30
8186	9:15	f	9:30	f	f	f	f	10:05
8190			9:30					10:05-10:30

Departures from Texarkana

Route Table	Texarkana	Nash	Leary	Hooks	Whaley	New Boston	Malta	De Kalb
8186	*7:25*			*X*		*8:05*	*f*	*8:25*
8186	*11:45*			*X*		12:25	f	12:45
8190	*11:10-11:45*					12:25pm		
8186	7:50	f	f	f	f	8:23	f	8:40

X: Interstate Highway, stops at interchange for local passengers
f: Flag stop only
am: *in italics*
pm: in standard type

All routes daily unless otherwise noted.

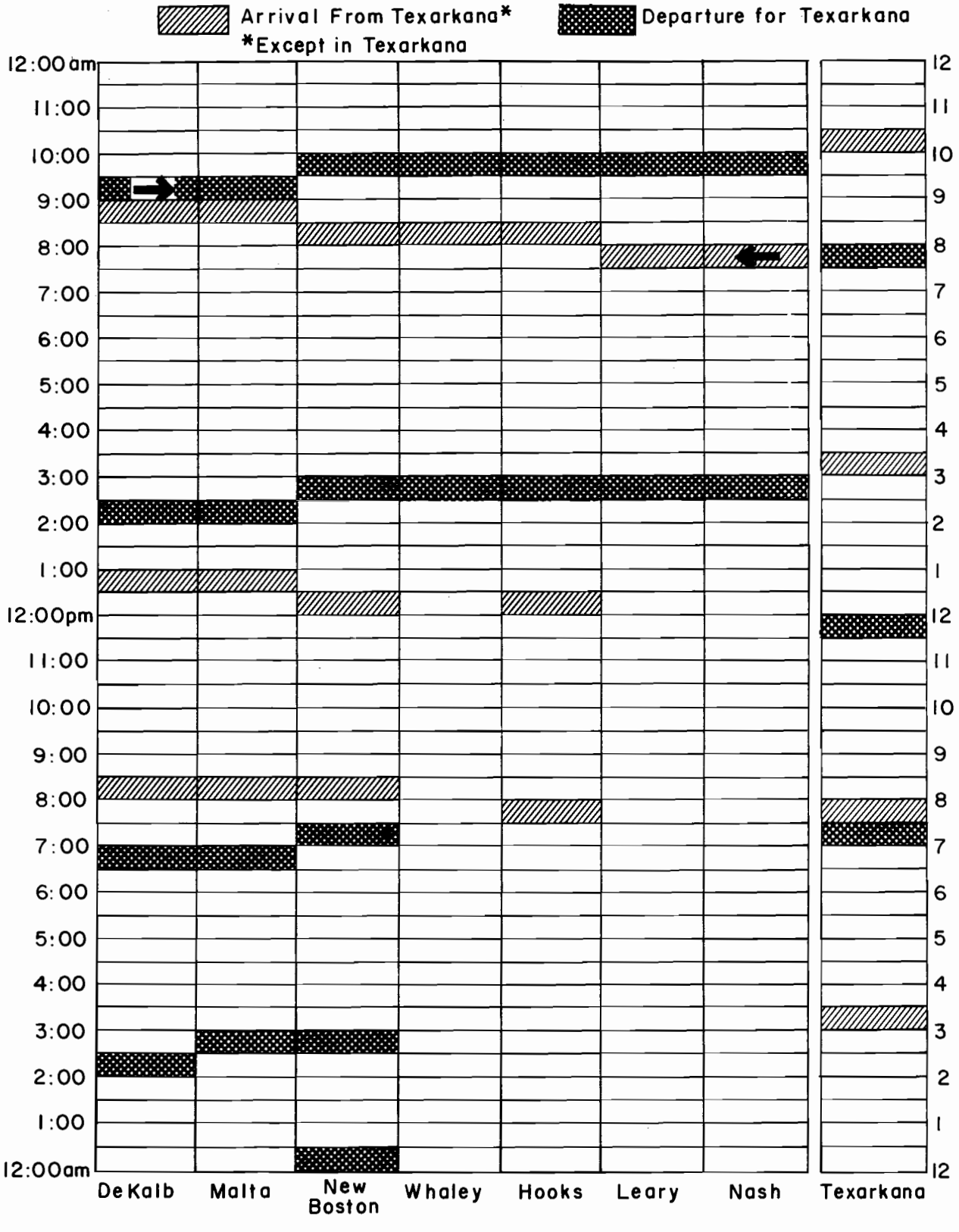

Fig II-2. Daily motor coach service departures from and arrivals at Texarkana through Bowie County.

Maud to Texarkana

The communities of Maud and Redwater are located along U.S. 67 southeast of Texarkana. Maud is the first available stop in Bowie County for carriers travelling eastward into Texarkana. Maud is at a juncture for carriers travelling east from Naples along U.S. 67 and north from Linden along Texas Hwy. 8.

Table II-4 shows four scheduled and three flag stops available daily from Maud to Texarkana. One-half of the routes allow for a flag stop in Redwater. The average time required to complete the trip from Maud is 25 minutes. The first departure is a flag stop at 1:40 am., arriving in Texarkana at 2:05 am. A flag stop is also allowed at Redwater. The last available route with stops in both Maud and Redwater is at 9:35 pm., with service from Maud only leaving at 9:45 pm. Direct routing is possible from Maud and Redwater to both Garland and Fulton along this corridor.

Eight routes make the return trip through Maud, four allowing for flag stops in Redwater. The first departure from Texarkana is at 12:25 am. The first complete route to both Redwater and Maud is at 5:15 am. The last to both cities is at 10:55pm.

Motor coach service is also available along U.S. 71 south of Texarkana. The closest stop to the study area along this route is in Atlanta, loated in Cass County. Atlanta is served with two routes daily into Texarkana.

The only communities in Bowie not provided with motor coach service are located along U.S. 67. Wake Village, which is adjacent to the Texarkana urban area, and Simms, located 30 miles west of Texarkana and 11 miles west of Maud, are by-passed by regularly scheduled service.

The one-way fares between Texarkana, Texas, and Redwater, Maud, Atlanta and Shreveport are shown in Table II-2.

Access to Employment Sites via Motor Coach Service in Bowie County

Work-trip travel on motor carriers along the east-west axis from DeKalb to Texarkana is not easy. Neither Whaley nor Hooks is serviced by a route during the 6:00 am to 9:00 am window or time frame, necessary for most

TABLE II-4. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN MAUD AND TEXARKANA

Departures for Texarkana

Route Table	Maud	Redwater	Texarkana
8353	*1:40 (f)*	*f*	*2:05*
595	*4:20*		*4:25-4:50*
8353	*7:15 (f)*	*f*	*7:40*
595	*11:05*		*11:30-11:40*
8353	3:45	f	4:15
595	4:50		5:15-5:20
8353	9:35 (f)	f	10:00
595	9:45		10:10-10:30

Departures from Texarkana

Route Table	Texarkana	Redwater	Maud
595	*12:25*		*12:40*
8353	*5:15*	*f*	*5:45*
595	*8:30*		*8:55*
8353	*9:15*	*f*	*9:45*
8353	3:15	f	3:45
595	4:35		5:00
595	9:20		9:45
8353	10:55	f	11:20

f: Flag stop only
am: *in italics*
pm: in standard type

employment purposes.

Residents of DeKalb and New Boston who work in Texarkana can utilize a route departing DeKalb at 6:50 am, and arriving in Texarkana at 7:45 am. Additional transportation from the bus terminal in Texarkana would be required in order to reach employment locations. However, the lack of an afternoon return trip to DeKalb limits the usefulness of this schedule. The return trip would have to begin between 2:30 and 3:00 pm.

Both Maud and Redwater are serviced by adequate carrier schedules for employment in Texarkana. A bus departs Maud at 7:15 am, serving Redwater enroute and arriving in Texarkana at 7:40 am. Again, additional transportation in Texarkana would be required. The return trip to both cities is available at 3:15 pm, an additional route leaving only for Maud at 4:35 pm. The round trip fare from Maud is $4.60 and from Redwater is $3.70.

No schedule would facilitate travel from Texarkana to and from the southern entrances of either Lone Star or RRAD without additional transportation being available in Redwater.

MOTOR COACH SERVICE IN MILLER COUNTY

Eighteen motor coach routes connect the local communities of Miller County with the Texarkana urban area. The routes follow the main highway corridors in Miller, forming three main radii of travel into the Texarkana area. The corridors are illustrated in Figure II-3: along U.S. 67 from Fulton to Mandeville to Texarkana, direct from Hope to Texarkana along Interstate 30; Garland to Texarkana along U.S. 82; and Doddridge to Texarkana via U.S. 71.

Fulton to Texarkana

Table II-5, shows that only one route along the northeast corridor provides service to Fulton, which is just over the Miller County line in Hempstead County. Trailways departs for Texarkana from Hope at 7:20 am., and allows for flag stops at both Fulton and Mandeville, 6 miles northeast of Texarkana. No regularly scheduled stops are provided. Arrival time in Texarkana is 50 minutes later at 8:10 am. Additionally, Fulton and

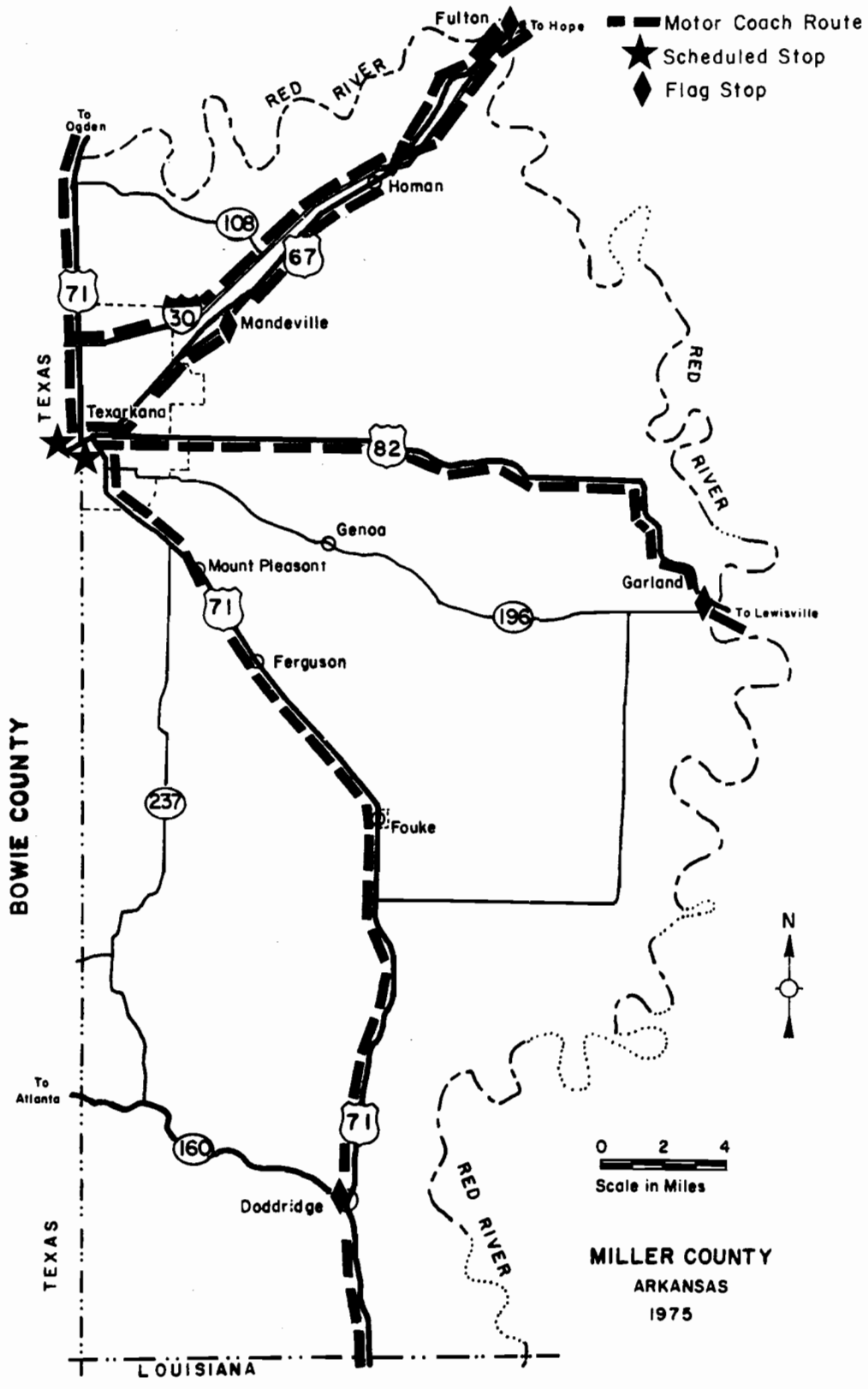

Fig II-3. Motor coach routes and stops in Miller County.

TABLE II-5. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN HOPE AND FULTON AND TEXARKANA

Departures for Texarkana

Route Table	(Hope)*	Fulton	Mandeville	Texarkana
8353	*7:20*	*f*	*f*	*8:10*

Departures from Texarkana

Route Table	Texarkana	Mandeville	Fulton	(Hope)*
8353	4:45	f	f	5:35

*: Not in study area
f: Flag stop only
am: *in italics*
pm: in standard type

Mandeville have direct access by way of Texarkana to both Maud and Redwater, southeast of Texarkana. Four direct routes from Hope to Texarkana travel along the Interstate and do not allow for additional stops enroute.

One route returns along the corridor, departing Texarkana at 4:45 pm., and again allowing for "flag" stops in both Mandeville and Fulton. The one-way fare in either direction from Texarkana, Arkansas, and Mandeville is $1.40. The Fulton fare is $2.15.

Garland to Texarkana

Garland, along the east-west axis in Miller County, is serviced by ten routes daily arriving from or departing to Texarkana. The schedule for these services is shown in Table II-6. On each of these routes, Garland is a flag stop and is not a regularly scheduled stop. Routes to Texarkana originate from Lewisville, in Lafeyette County. The earliest departure from Lewisville is at 7:45 am., arriving 40 minutes later in Texarkana, at 8:25 am. The next scheduled departure occurs 8 hours later, at 3:50 pm.; the last trip is at 11:30 pm. Additionally, Garland has direct access via Texarkana to both Maud and Redwater.

An equal number of routes depart for Garland, the earliest at 4:50 am. An afternoon departure is at 5:20 pm., and the last is at 10:30 pm. Both Greyhound and Trailways serve Garland. The one-way fare between Texarkana and Garland is $2.30.

Doddridge to Texarkana

Trailways provides service along the Shreveport to Doddridge to Texarkana corridor. Doddridge is located 20 miles southeast of Texarkana along U.S. 71. The schedule of service is shown in Table II-7. Three routes allow for a flag stop in Doddridge, while the communities of Fouke, Ferguson, and Mount Pleasant are not provided with service. The earliest departure from Shreveport to Texarkana is at 5:05 am., with arrival at 6:45 am. The bus arrives in Doddridge at approximately 5:55 am for a 50 minute ride to Texarkana. The next bus is at 2:10 pm., the last at 9:25 pm.

Three routes return through Doddridge, the first departing Texarkana at

TABLE II-6. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN LEWISVILLE AND GARLAND AND TEXARKANA

Departures for Texarkana

Route Table	(Lewisville)*	Garland	Texarkana
595	*7:45*	*f*	*8:25*
595	3:50	f	4:30
8169	6:00	f	6:45
595	8:20	f	9:00
595	11:30	f	*12:10*

Departures from Texarkana

Route Table	Texarkana	Garland	(Lewisville)*
595	*4:50*	*f*	*5:30*
8169	*8:00*	*f*	*8:40*
595	*11:40*	f	12:20
595	5:20	f	6:00
595	10:30	f	11:10

*: Not in study area
f: Flag stop only
am: *in italics*
pm: in standard type

TABLE II-7. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN SHREVEPORT AND DODDRIDGE AND TEXARKANA

Departures for Texarkana

Route Table	(Shreveport)*	Doddridge	Texarkana
8171	*5:05*	*5:55 (f)*	*6:45*
8171	1:20	2:10 (f)	3:00
8171	8:35	9:25 (f)	10:15

Departures from Texarkana

Route Table	Texarkana	Doddridge	(Shreveport)*
8171	*12:25*	*f*	*1:55*
8171	11:45	f (pm)	1:15
8171	8:30	f	10:00

*: Not in study area
f: Flag stop only
am: *in italics*
pm: in standard type

12:25 am., the last at 8:30 pm. The one-way fare between Texarkana, Arkansas, and Doddridge is $2.70.

Access to Employment Sites via
Motor Coach Service in Miller County

Both Fulton and Mandeville are provided with motor coach service that may facilitate employment in Texarkana. Although only one bus is scheduled along the route, departure is between 7:30 am. and 8:00 am., arriving in Texarkana at 8:40 am. The return trip departs Texarkana at 4:45 pm. The round trip fare is $2.80 from Mandeville and $4.30 from Fulton. Additional transportation in Texarkana from the bus station would be required.

Garland is also well situated in this respect, with a Texarkana arrival time at 8:25 am. The return trip departs at 5:20 pm. The round-trip fare is $4.60.

Although a departure from Doddridge occurs at 5:55 am., with arrival in Texarkana at 6:45 am, no feasible return trip is provided for. No late afternoon route is scheduled for Doddridge, the only available return departing Texarkana at 8:30 pm. These schedules are displayed in Fig. II-4

MOTOR COACH SERVICE IN SEVIER AND LITTLE RIVER COUNTIES

Sevier and Little River Counties are served primarily by the Jefferson Lines Company, and Trailways which goes only as far north as Ben Lomond. These routes are shown in Figures II-5 and II-6. The counties were also served by the Jordan Bus Company, through 1981, until the Oklahoma-based carrier ceased operations. This eliminated 13 scheduled routes, it primarily affected service from DeQueen to Foreman to Ashdown along Arkansas highways 41 and 32. No motor coach service is now available to either Horatio or Foreman. Schedules for current services are shown in Table II-8.

The Jefferson Lines provides daily scheduled service along U.S. 71, with regular stops in DeQueen, Lockesburg, Wilton, and Ashdown before arriving in Texarkana. Highway Stops are allowed in Gillham and Ogden.2 The earliest departure from DeQueen is at 4:55 am and it provides service to all the communities along U.S. 71 except Ben Lomond. Arrival time in Texarkana is one

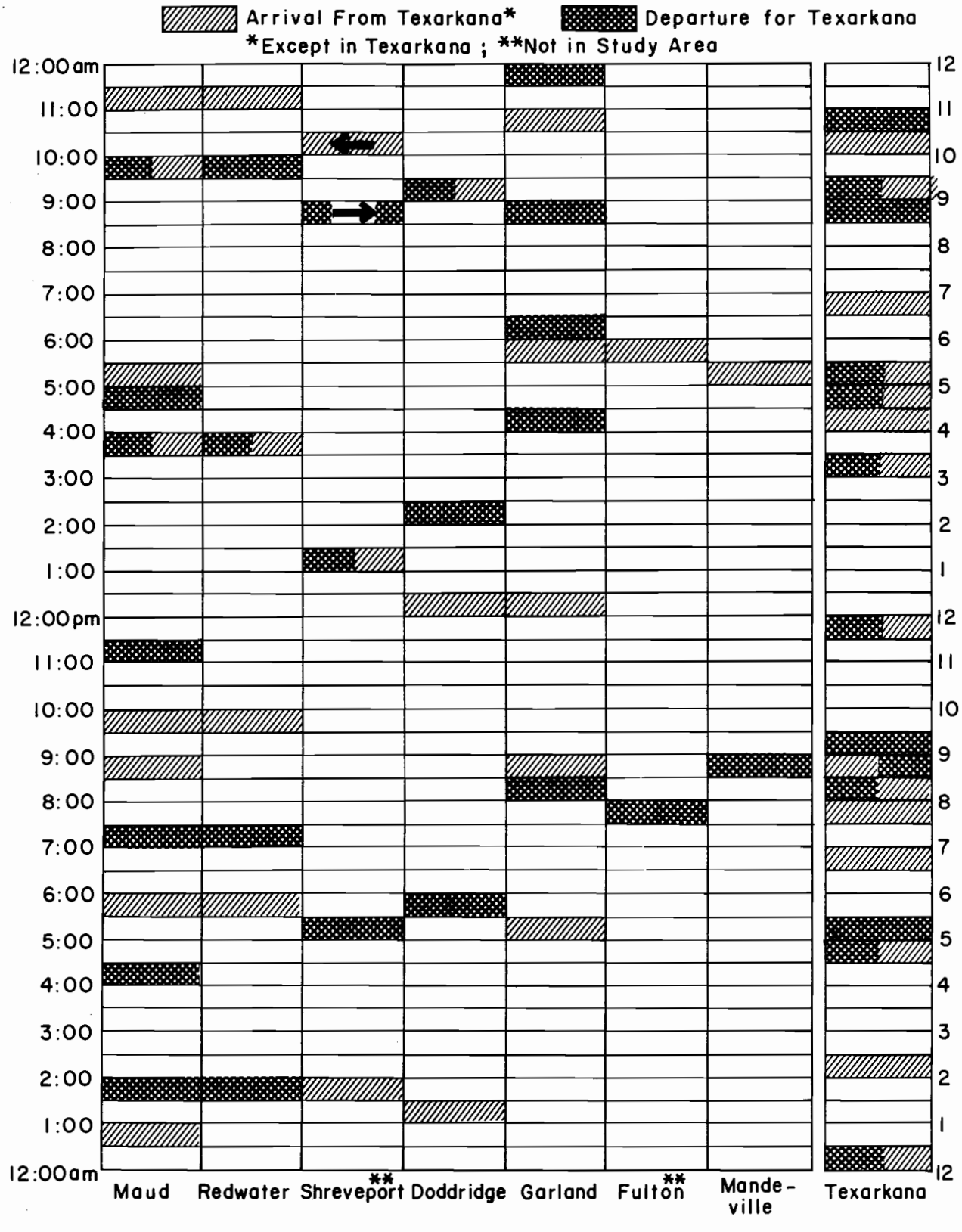

Fig II-4. Daily motor coach service departures and arrivals between Bowie and Miller Counties, Arkansas.

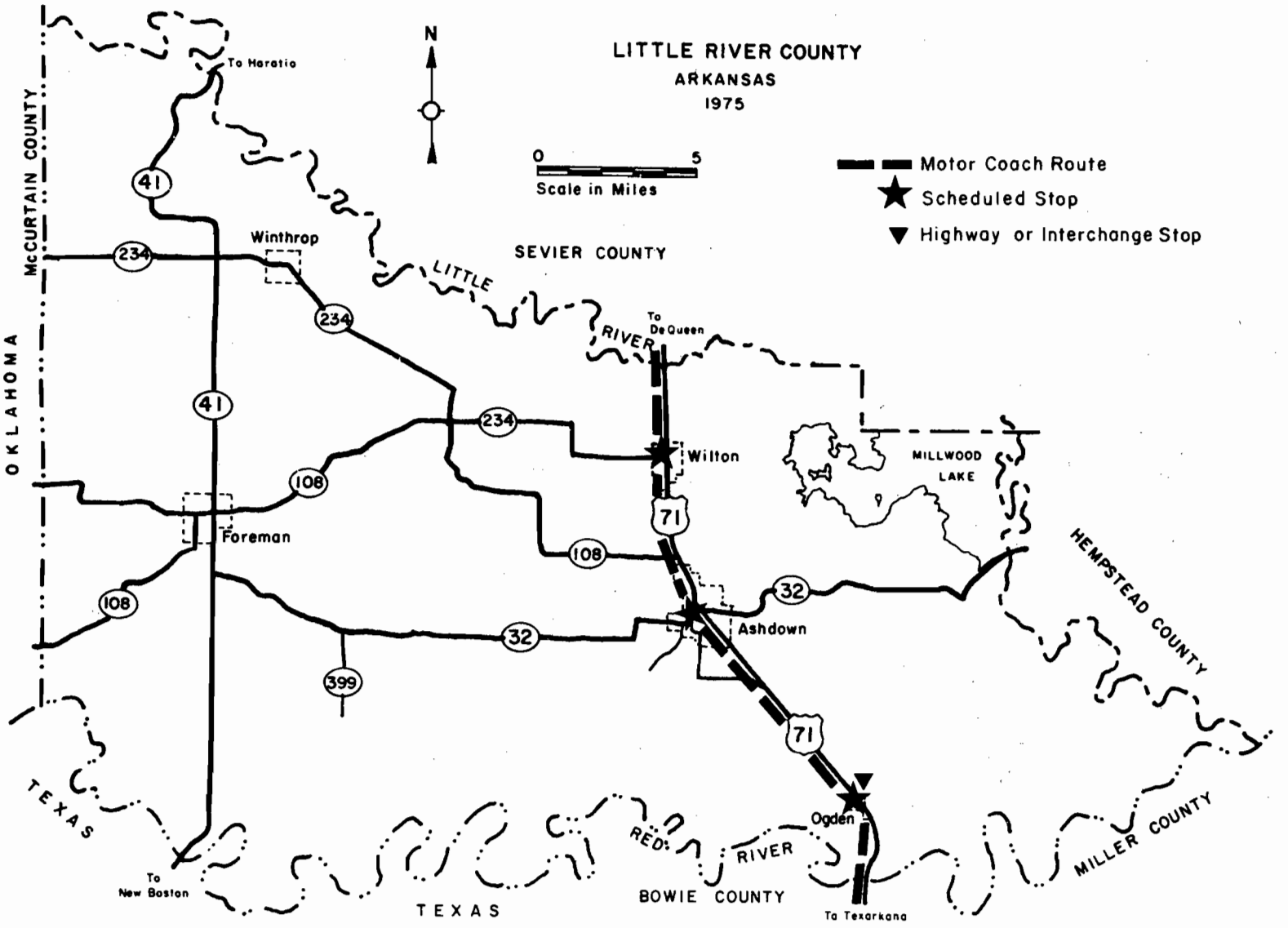

Fig II-5. Motor coach routes and stops in Little River County.

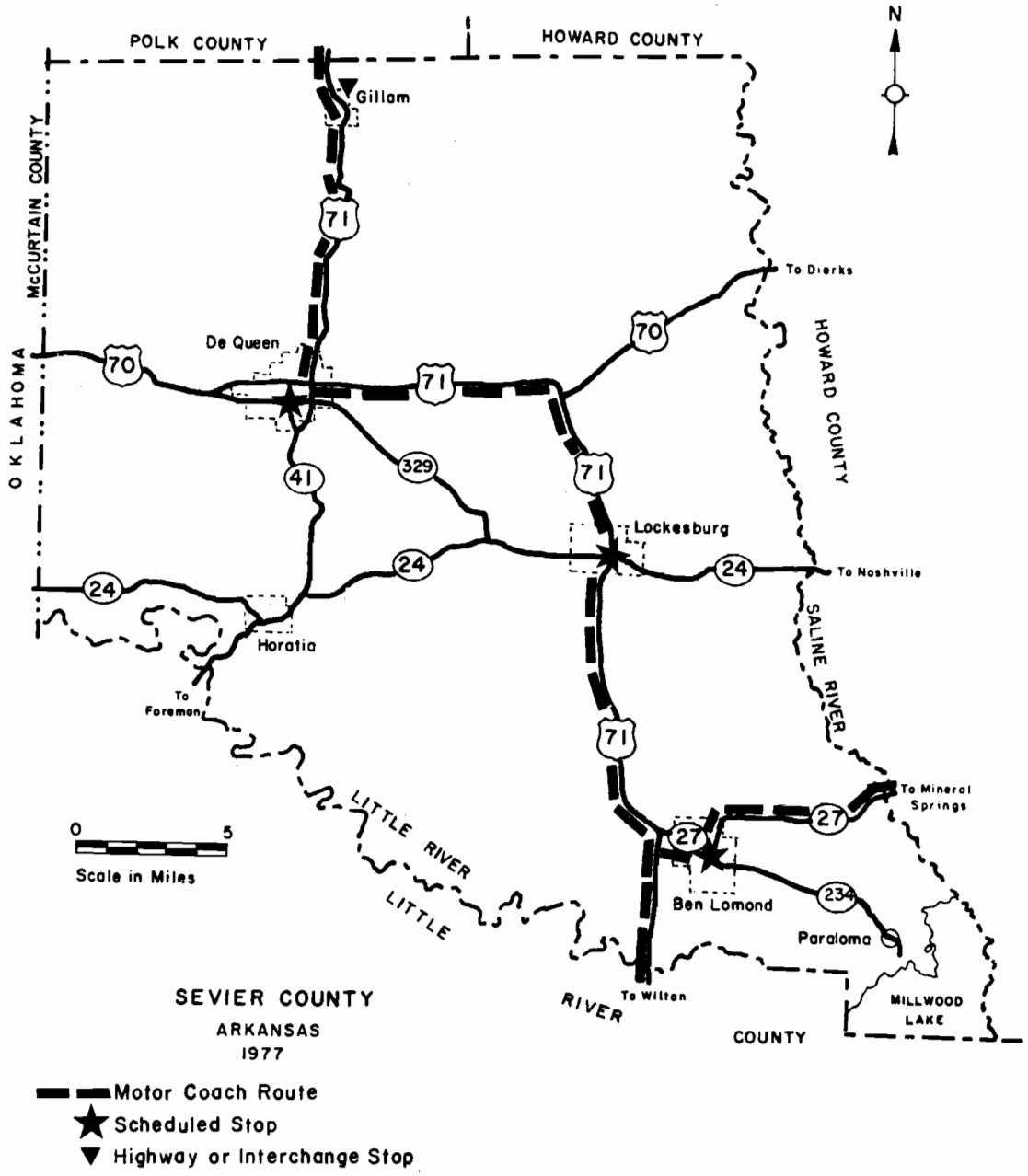

Fig II-6. Motor coach routes and stops in Sevier County.

TABLE II-8. SCHEDULED SERVICES ALONG THE ROUTE BETWEEN GILLHAM AND TEXARKANA

Departures for Texarkana

Route Table	Gillham	DeQueen	Lockesburg	Ben Lomond	Wilton	Ashdown	Ogden	Texarkana
751	*HS*	*4:55*	*5:11*		*5:20*	*5:35*	*HS*	*6:10-6:20*
8186				*6:06*	*6:16 (R)*	*6:27 (R)*	*6:36 (R)*	*6:55 (R)*
751	*HS*	*10:00*	*10:15*		*10:35*	*10:40*	*HS*	*11:25*
8186				6:01	6:11 (R)	6:22 (R)	6:31 (R)	6:50 (R)
751	HS	6:30	6:45		7:00	7:10	HS	7:45-8:00

Departures from Texarkana

Route Table	Texarkana	Ogden	Ashdown	Wilton	Ben Lomond	Lockesburg	DeQueen	Gillham
751	*8:00-8:10*	*HS*	*8:40*	*8:45*		*9:05*	*9:25*	*HS*
8186	*9:00 (R)*	*9:17 (R)*	*9:35 (R)*	*9:48 (R)*	*9:57*			
8186	3:30 (R)	3:47 (R)	4:09 (R)	4:18 (R)	4:27			
751	4:15-4:25	HS	4:54	5:02		5:21	5:39	HS
751	10:50-11:00	HS	11:39	11:45 pm		*12:06*	*12:25*	*HS*

HS: Highway stop, does not go into town
R: No local passengers between these points
am: *in italics*
pm: in standard type

All trips daily unless otherwise noted.

hour and fifteen minutes later, at 6:10-6:20 am. The next scheduled departure is five hours later, at 10:00 am; the last departures is at 6:30 pm. Each route allows for stops at all communities enroute to Texarkana.

Two additional routes begin at Ben Lomond. Trailways serves the two counties with routes originating from Nashville in Howard county. Additional stops are regularly scheduled for Wilton, Ashdown, and Ogden. However, no local passengers may be carried between these communities (i.e., no service is provided from Ben Lomond to Wilton, Wilton to Ashdown, or Ashdown to Ogden). The first route serving Ben Lomond departs at 6:06 am, arriving in Texarkana approximately 50 minutes later, at 6:55 am. The only other route regularly scheduled departs daily at 6:01 pm. Wilton, Ashdown, and Ogden are each served by five regularly scheduled routes into Texarkana.

The return trip to DeQueen is again provided by three scheduled routes. The earliest departure for DeQueen and all local stops is at 8:00 am, with arrival at 9:25 am. The next bus leaving for DeQueen is at 4:15 pm., the last is at 10:50 pm. Departures for Ben Lomond are at 9:00 am and 3:30 pm. Wilton, Ogden and Ashdown are again served by five scheduled routes.

One-way fares to and from Texarkana, Arkansas, are Ogden $.80, Ashdown $2.20, Ben Lomond $2.45, Lockesburg $4.60, DeQueen $4.60, and Gillham $6.10.

Communities within the two counties which are not currently being served by any intercity motor coach service include Foreman, Arkinda, Alleene, and Horatio.

Access to Employment Sites via Motor Coach Service in Little River and Sevier

Figure II-7 shows all the possible motor-coach connections between Texarkana and cities in Little River and Sevier Counties. Access to Texarkana employment from DeQueen is facilitated by an early departure at 4:55 am with arrival at 6:10-6:20 am. This route stops at Gillham, Lockesburg, Wilton, Ashdown, and Ogden. Additional transportation would be required form the bus station in Texarkana. A return trip from Texarkana departs at 4:15-4:25 pm., and provides service to all communities enroute. The round trip fare between Texarkana and Gillham $12.20; DeQueen $9.20; Lockesburg $9.20; Ashdown $4.40; and Ogden $1.60.

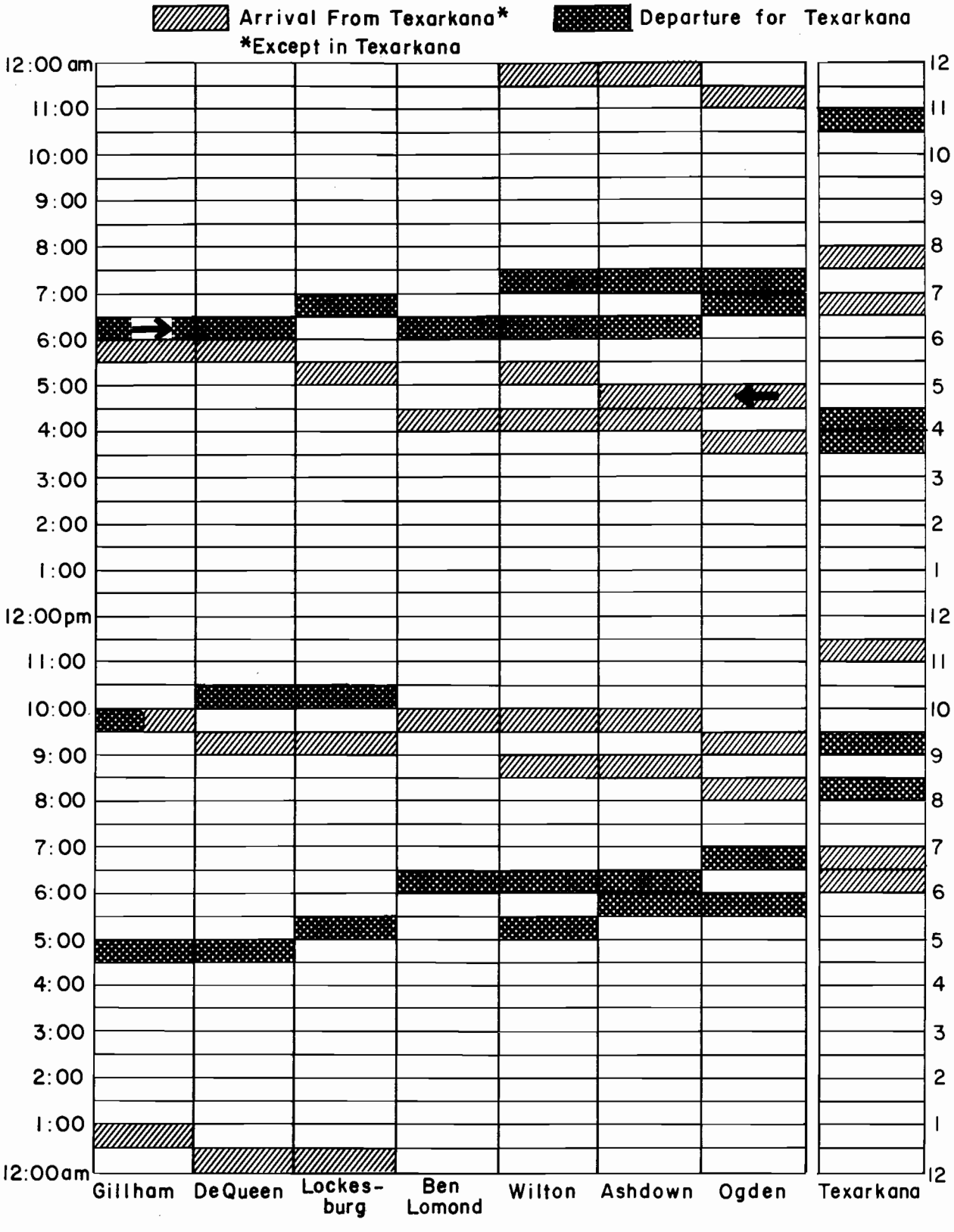

Fig II-7. Daily motor coach service departures and arrivals between Texarkana and Little River and Sevier Counties.

For residents of Texarkana who are employed in Ashdown, a bus departs at 8:10 am and arrives by 8:40 am. The earliest return trip, however, is at 6:22 pm which would inhibit utilization of the system for employment in Ashdown. Travel times to DeQueen would also not be conducive for employment.

The schedule to Ben Lomond would facilitate work-trip travel to Texarkana, with a departure at 6:06 am, and arrival at 6:55 am in Texarkana. The return trip departs Texarkana at 3:30 pm. The round trip fare from Ben Lomond would be $4.90.

TEXARKANA ARRIVALS AND DEPARTURES

Texarkana, being the focal point of intercity motor coach service throughout the region, has several concurrent arrivals and departures throughout the day. Intercity movement may be facilitated by coordinating this activity with movement into and within Texarkana.

Concurrent Motor Coach Arrivals in Texarkana

TIME	CITIES SERVED
6:30 - 7:00 AM	Ben Lomond, Wilton, Ashdown, Ogden, Doddridge
7:30 - 8:00 AM	DeKalb, Malta, New Boston, Maud, Redwater
3:00 - 3:30 PM	DeKalb, Malta, New Boston, Whaley, Hooks, Leary, Nash, Doddridge
6:30 - 7:00 PM	Ben Lomond, Wilton, Ashdown, Ogden, Garland
10:00 - 10:30 PM	DeKalb, Malta, New Boston, Whaley, Hooks, Leary, Nash, Doddridge

Concurrent Daily Motor Coach Departures From Texarkana

TIME	CITIES SERVED
8:00 - 8:30 AM	Gillham, DeQueen, Lockesburg, Wilton, Ashdown, Ogden, Garland, Maud
9:00 - 9:30 AM	Ogden, Ashdown, Wilton, Ben Lomond, Redwater, Maud
11:30AM-12:00 PM	Hooks, New Boston, Malta, DeKalb, Garland, Doddridge

10:30 - 11:00 PM	Ogden, Ashdown, Wilton, Lockesburg, DeQueen, Gillham, Garland, Redwater, Maud

Concurrent Daily Motor Coach Arrivals (A) at and Departures (D) from Texarkana

TIME	CITIES SERVED
12:00AM-12:30 AM	(D) Doddridge (D) Maud (A) Garland
4:30 AM-5:00 AM	(A) Maud (D) Garland
8:00 AM-8:30 AM	(A) Fulton, Hope (A) Maud, Tedwater (D) Garland (D) Odgen, Ashdown, Wilton, Lockesburg, DeQueen, Gillham
8:30 AM-9:00 AM	(A) Garland (D) Maud
11:30AM-12:00 PM	(A) Maud (D) Garland (D) Doddridge (D) Hooks, New Boston, Malta, DeKalb
3:00 PM-3:30 PM	(A) DeKalb, Malta, New Boston, Whaley, Hooks, Leary, Nash (A) Doddridge (D) Maud, Redwater
4:00 PM-4:30 PM	(A) Maud, Redwater (D) Ogden, Ashdown, Wilton, Lockesburg, DeQueen, Gillham
4:30 PM-5:00 PM	(A) Garland (D) Mandeville, Fulton
5:00 PM-5:30 PM	(A) Maud (D) Garland
7:30 PM-8:00 PM	(A) Gillham, DeQueen, Lockesburg, Wilton, Ashdown, Ogden (D) Nash, Leary, Hooks, Whaley, New Boston, Malta, DeKalb
9:00 PM-9:30 PM	(A) Garland (D) Maud

NON-CERTIFICATED COMMUTER BUS SERVICE

Harland and Bartholomew, and Associates (HBA), in Transit Development Update: Texarkana Urban Area, August 1981, noted the availability of commuter (work) bus service between Texarkana and the Red River Army Depot (RRAD) and the Lone Star Ammunition Plant. The commuter bus company has been operational since March of 1980. (3)

The company, providing this service (Industry Bus Lines) filed for a Certificate of Public Convenience and Necessity with the Texas Railroad Commission on June 18, 1979. The application was withdrawn and dismissed as of February 14, 1980, because the company could not obtain adequate liability insurance. In withdrawing their application the company noted, "All quotes for insurance on this type (of) service were in excess of the total expected revenue". Hence, the company is not officially recognized nor regulated. While the Industrial Bus Lines application was pending before the commission, no formal protest was made by either taxi or motor coach carriers. (4)

The proposal submitted to the Railroad Commission indicated interest in serving three corridors of work-trip travel:

1. The corridor along U.S. 82 from Texarkana to both Lone Star in Hooks, and RRAD in Whaley. The round trip to Lone Star is 44 miles; to RRAD the round trip is 50 miles.

2. South along U.S. 67 and Texas FM 991 to the southern entrance of the Lone Star Plant, just northeast of Redwater. The round trip is 42 miles.

3. A proposed route to International Paper along U.S. Highway 59 south, then east along Texas FM 3129. The round trip is 50 miles.

It is believed that service is now being provided along U.S. 82 west to both Lone Star or RRAD.

All Industrial Bus Line buses depart from the terminal located at 224 South Lake Drive, Texarkana, Texas. Service is provided to intermediate points along all routes. HBA estimated that 50,000 one-way passenger trips are made annually. Tickets are sold on a daily, $2.00 per day, basis or for longer periods (an estimated $20.00 per month). Drivers received free trips plus an hourly wage.

Industrial Bus Lines utilizes three buses: one 1976 International 44

passenger bus; one 1973 Ford 36 passenger bus; and one 1967 Bluebird 48 passenger bus. These are the service hours

Service to Lone Star:

	Texarkana		Lone Star
Depart:	6:10 am	Arrive:	7:00 pm
Arrive:	4:15 pm	Depart:	3:12 pm

Service to RRAD:

	Texarkana		RRAD
Depart:	6:45 am	Arrive:	7:20 am
	7:15 am		7:50 am
Arrive:	4:35 pm	Depart:	4:00 pm
	3:05 pm		2:30 pm

Proposed Service to International Paper:

	Texarkana		Int. Paper
Depart:	6:50 am	Arrive:	7:20 am
Arrive:	4:05 pm	Depart:	4:35 pm

At an estimated 50,000 round trips per year, this service represents less than 1.4% of the combined work force of both RRAD and Lone Star.

TAXI SERVICE

Texarkana has the only taxi service in the four-county region. Harland and Bartholomew Associates (HBA) in their 1981 Report described the type of service available as of August 1981. Two affiliated companies, the Yellow Cab Company and the Black and White Cab company provide service primarily in Bowie and Miller Counties. The rate structure, is $0.85 for the initial trip segment, and 50 cents for each additional half mile. The cab companies operate 15 vehicles and have 25 drivers. HBA estimated that between 20-40,000 passenger trips are made by taxi annually in Texarkana. The annual gross revenue for the companies nears $170,000.

SOCIAL SERVICE AGENCY TRANSPORTATION

Most of the Texarkana study region has some form of limited social service transportation. Six non-profit human service agencies provide transportation in the region, including the Texarkana Human Development Center (THDC); Senior Citizens Services Centers in Foreman, Ashdown, and DeQueen; the Adult Activity Center in DeQueen; the Howard County Childrens Center in Nashville; and the School of Hope. These agencies transport elderly, mentally and physically handicapped children and adults, and other transportation disadvantaged persons who are eligible for available federal and state programs. Funding is provided by numerous federal programs, including Title III of the Older Americans Act and Title XX of the Social Security Act.

The type and level of service provided within the region by these social service agencies is described below. Although each service provider is described separately all the human service transportation in each of the four counties is shown on an individual county map. Fig. II-8 shows the services available in Bowie County.

TEXARKANA HUMAN DEVELOPMENT CENTER

The Texarkana Human Development Center (THDC) was incorporated in September 1971. THDC provides coordinated transportation to clients of social service agencies in three counties and two states, in both rural and low density urban areas. Transportation is provided on a contractual basis to several agencies of the States of Texas and Arkansas and to additional regional and local agencies. Services are provided only to agency clients as specified in the contracts, on both a subscription and a demand-responsive 24-hour advance notice basis.

THDC currently provides approximately 10,000 one-way client trips per month, averaging 5.3 miles per trip. The average cost per trip has been $3.60. THDC operates 25 vans, six of which are equipped with wheelchair lifts. Eighteen drivers are employed, with 3 back-up or relief drivers and 4 administrative and operational personnel. Service hours are 8:00 am to 5:00 pm; services are generally provided on a fixed route basis during peak agency periods, which are 7:30am to 8:30 am and 11:00am to 1:30pm. (5)

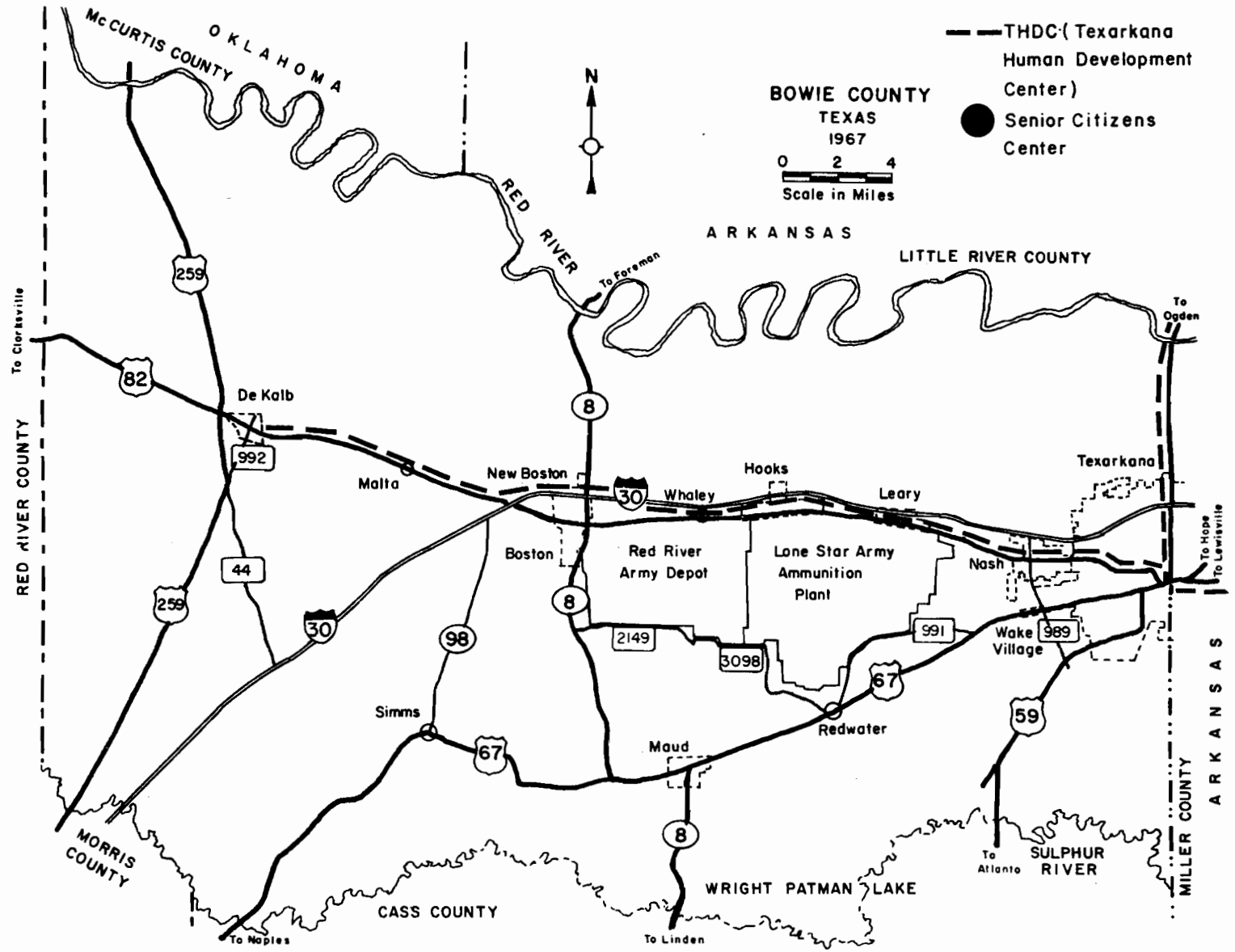

Fig II-8. Human service transportation in Bowie County.

The service which THDC provides includes the transporting of mentally retarded children from both Texas and Arkansas to daily special education classes. Under a contract with the state of Arkansas, THDC carries both individual and group eligible clients under Medicaid and Title XX. These trips tend to be non-recurring, demand-responsive trips. THDC also provides congregate meal services under contract to an Arkansas AAA in seven sites. The system also contracts to carry hot food to Arkansas nutrition centers and to shut-ins. In addition, THDC often contracts with local senior citizens groups for day-long shopping and recreation trips.

Although service is provided primarily within the Texarkana city limits, the agency also transports clients from as far west as DeKalb and New Boston in Bowie County, as far east as to Garland, Fouke, and Mandeville in Miller County, and as far north as Wilton and Ashdown in Little River County.

Most of THDC's service is funded by Federal social service programs. Vehicles were purchased through the UMTA 16(b)2 program, which provides 75% of the cost of the vehicles for private, non-profit organizations that provide transportation to elderly and handicapped persons. A 25% local share is required, which at this time is provided by the Arkansas State Agency on Aging, the city of Garland, Arkansas, and the United Way.

Although THDC has some support in the form of local matching grants, the system operates largely from the contract charges it assesses. THDC's charges are based on both time and distance factors, although not directly. The unit trip fare charged each participating agency reflects the average cost of serving a passenger within the city limits of Texarkana. Agencies with clients living beyond the city limits are charged an additional or marginal cost which represents both the time and distance consumed in providing service.

The costs of trips within Texarkana are estimated using the average cost per one-way passenger trip computed on average vehicle miles. The city limits are the boundaries of Zone 1. As mentioned earlier, average costs per one-way trip are currently $3.60. Zone 1 charges to participating agencies are then generally $3.60, although there are some differences which recognize vehicle or local match contributions.

The area within 25 miles of Zone 1 was designated Zone 2. Zone 2 charges

are 1.4 times that average figure or $4.81. Zone 3 is the area from 25 miles to 50 miles from the city limits of Texarkana. Charges for Zone 3 are computed by multiplying the basic Zone 1 average costs by 2.7, which gives $8.71. THDC requires a minimum of 5 passengers for trips to either Zone 2 or 3.

Zone 1 charges are slightly overstated since they represent an average cost figure based on the full costs of service, which include the higher cost services provided in Zones 2 and 3. Conversely, the charges for Zones 2 and 3 are slightly underestimated. However, the magnitude of this understatement is probably small.

Most social service agencies are billed in proportion to the percentage of total THDC trips that their clients' trips represent. For example, in August of 1981, the Texarkana Special Education Center provided 36.4% of THDC total monthly income from billings accounting for 38.1% of all client trips. Almost every other agency showed a similiar match between the percentage of monthly income contributed and the percent of total trips carried.

SENIOR CITIZENS SERVICES, INC.

Senior Citizen Services programs are available to persons who are sixty years old or older. Activities sponsored by the bi-state agency include nutrition programs, group and recreational services, and transportation. The transportation programs include transportation of elderly persons between their homes and neighborhood centers to participate in the agency's nutrition program and delivery of meals to the homes of those elderly who cannot physically be transported to the nutrition centers.

Senior Citizen Centers providing transportation in the region include those located in Foreman, Ashdown and DeQueen. Figure II-9 shows the human service transportation provided by all agencies in Little River County. The Ashdown Senior Citizens Center is operated by a staff of 6 and averages 64 clients per day. One 15-passenger van transports 12 to 15 Ashdown residents daily Monday through Friday. Twice a week, on Mondays and Thursdays, the van provides service to Ogden, located 8 miles south of Ashdown. On Tuesdays and Fridays, both Richmond, to the east of Ashdown, and Wilton, located 5 miles north of Ashdown, are provided service. The center operates Monday

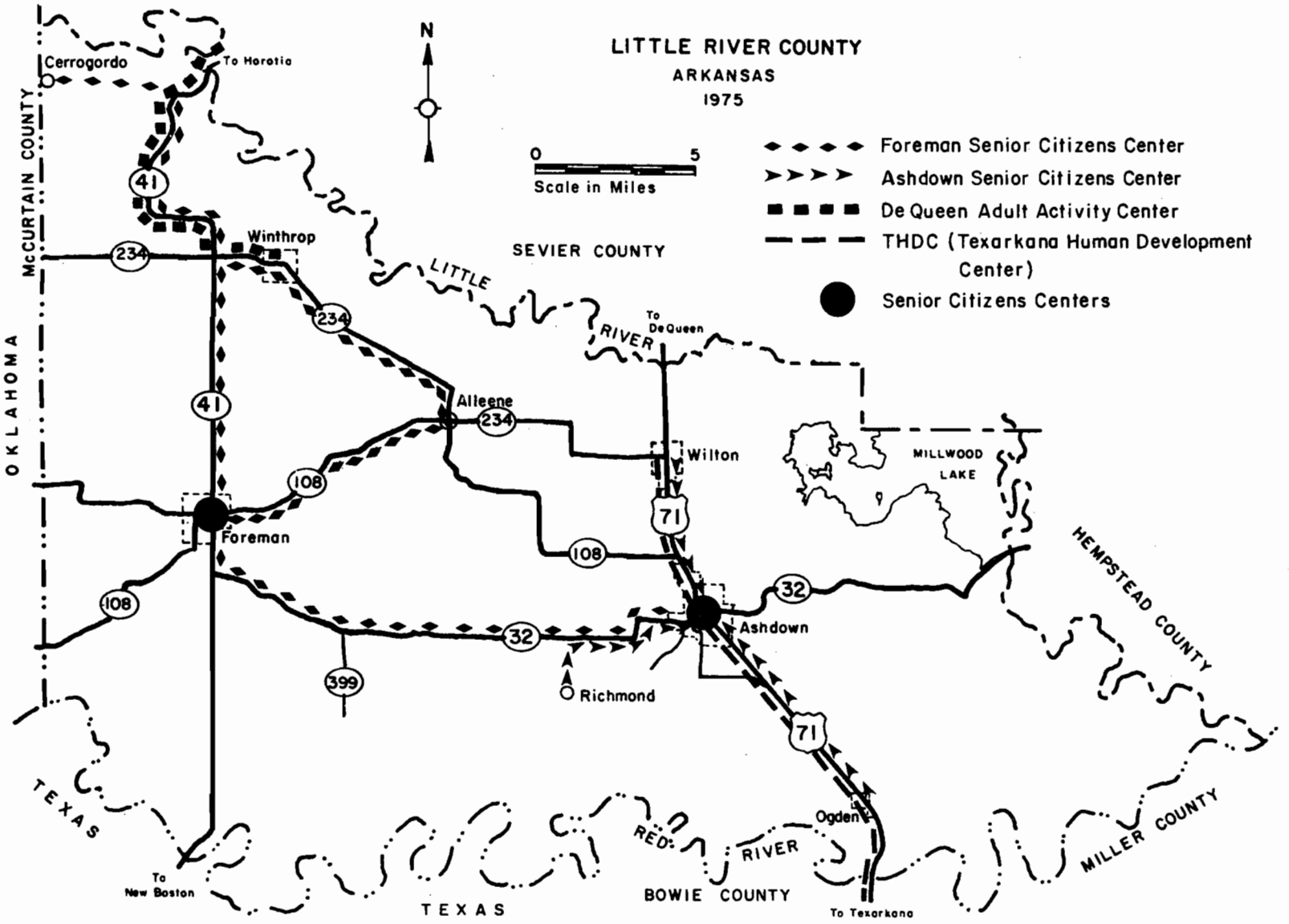

Fig II-9. Human service transportation in Little River County.

through Friday, 7:00am to 3:00pm. All meals served in the center are prepared and transported by the Foreman Senior Citizens Center. (6)

The Foreman Senior Citizens Center averages 60 clients per day. The center owns one 15-passenger van, which provides service to residents of Foreman, Monday through Friday. Additionally, on Mondays, Wednesdays, Thursdays, and Fridays, seniors located in the communities of Winthrop and Alleene are also provided with transportation to Foreman. On Tuesdays the Foreman van travels to Cerrogordo, located on the Oklahoma-Arkansas state line, near the Sevier County boundary. As noted, the Foreman center prepares and transports meals for the Ashdown center five days a week. (7)

Three centers are located in Sevier County, at DeQueen, Horatio, and Lockesburg. The DeQueen center is the only center providing transportation; it has two 15-passenger vans available. The DeQueen center averages 65 clients per day and provides transportation service Monday through Friday in DeQueen, where an average of 20 clients utilize the transport service. The other DeQueen van serves nine additional communities and begins all routes from Lockesburg. On Mondays the van travels to Paraloma, located southeast of Ben Lomond. On Tuesdays the communities of Cowlingsville, White Cliffs, Ben Lomond, and Falls Chapel are served. On Wednesdays an average of 14 residents of Horatio are provided with transportation to the DeQueen center. Gillham and King, located north of DeQueen, are serviced on Thursdays, and on Fridays the communities of Lockesburg, Provo, Greens Chapel, and New Bethel are served. (8)

The centers at Horatio and Lockesburg provide no transportion for area clients. Both the Horatio and Lockesburg centers average 38 clients per day. Additional centers not providing transportation are located at New Boston and DeKalb in Bowie County. The New Boston Senior Citizens Center averages 60 clients per day. The center prepares meals for both the New Boston and DeKalb centers. A staff of six operates from 7:00 am to 4:00 pm Monday through Friday. The DeKalb center averages 34 clients per day. The staff of five operates from 10:00am to 4:00pm. The center delivers meals prepared in New Boston. (9)

OTHER SOCIAL SERVICE PROVIDERS

The School of Hope, located at Hope in Hempstead County, transports physically and mentally handicapped children and adults. Monday through Friday the School provides services to 10 residents of the Fulton area, just over the Miller County line in Hempstead County. The School of Hope has one bus and two vans, one equpped with a wheelchair lift. The school averages 71 clients per day. Lewisville east of Garland is also serviced by the School of Hope. (10)

The Adult Activity Center of DeQueen primarily serves handicapped residents of Sevier County. The center averages 19 clients per day and operates two vans, one of which serves only the DeQueen area. The other van provides service to Gillham, north of DeQueen; Grani's and Wickes, located in Polk county, north of Sevier County; and occasionally to Winthrop in Little River County. (11)

Sevier County is also served by the Howard County Children's Center located in Nashville. Transportation is provided to mentally and physically handicapped children and adults. The center averages 60 clients per day and operates five vans. One van provides service to residents of Lockesburg Monday through Friday, as shown in Figure II-10. (12)

SUMMARY

On a county basis, social service transportation provided to Sevier County is the most extensive. Virtually every major residential area in the County is provided with some form of social service transportation. The county is serviced by three separate agencies providing transportion for senior citizens and physically and mentally handicapped persons.

Little River County is also extensively serviced by social service agencies. County residents have access to four centers providing transportation, including access to the Texarkana urban area from both Ashdown and Wilton. Both senior and handicapped citizens are served. Only Foreman and Alleene do not have transportation services for the handicapped.

Miller and Bowie Counties are primarily served by THDC. (Figure II-11 shows the services available in Miller County.) This system provides access

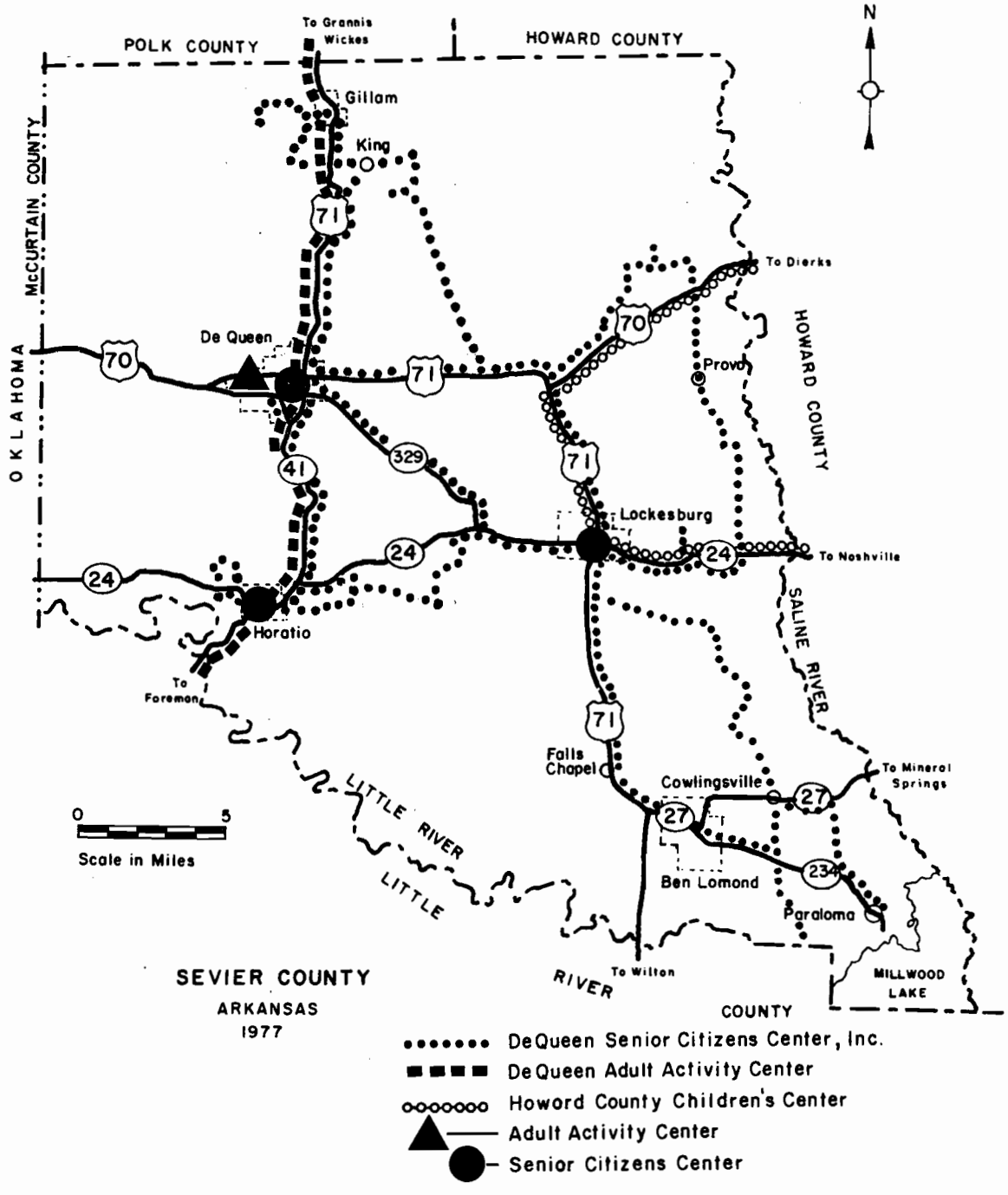

Fig II-10. Human service transportation in Sevier County.

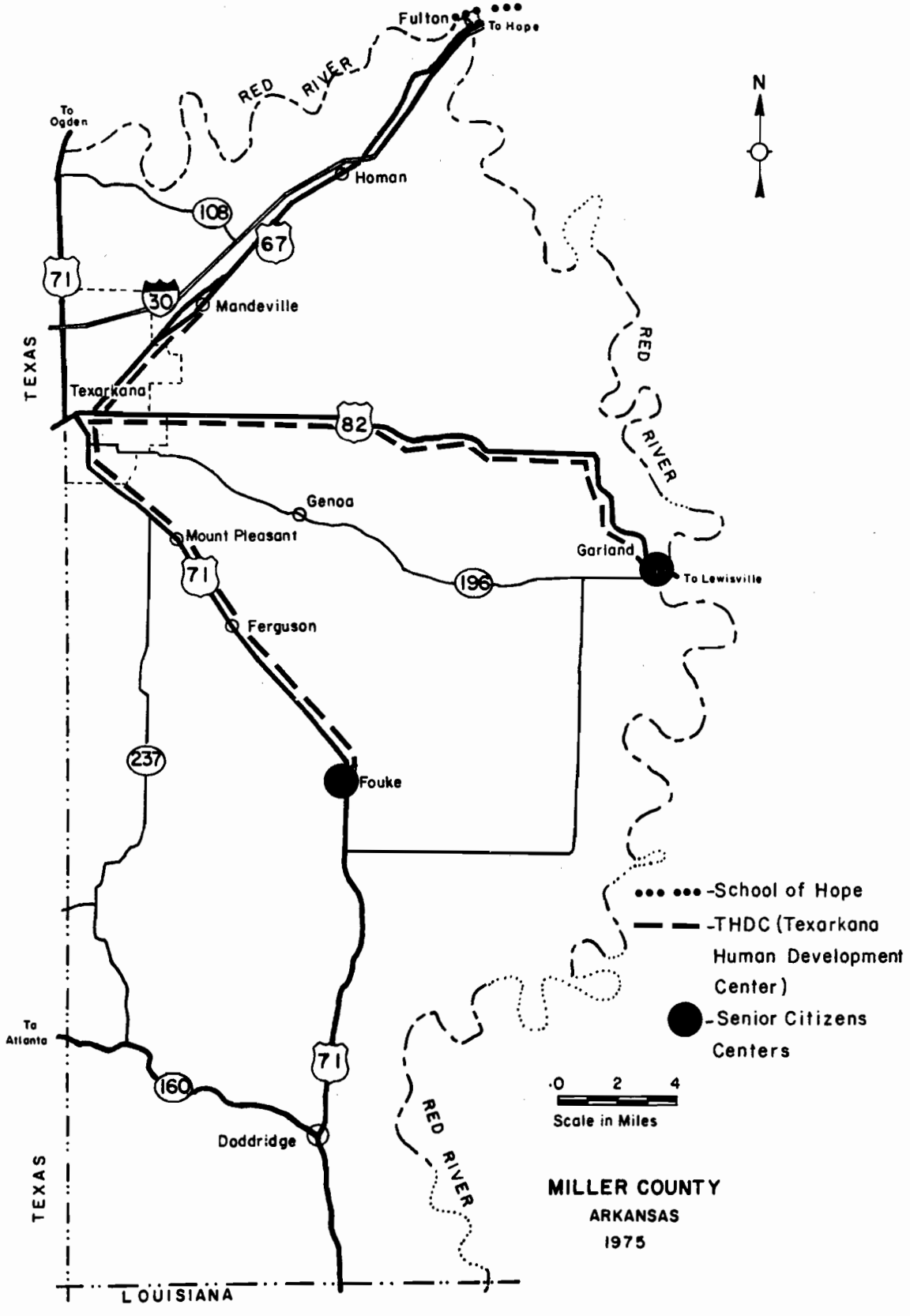

Fig II-11. Human service transportation in Miller County.

to the Texarkana urban area from a variety of locations both within the Texarkana metropolitan area and throughout each county. However, Doddridge, Redwater, Maud and Simms are not currently being provided with social service transportation.

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PART III. RURAL TRAVEL DEMAND

Although there have been a number of rural mobility studies that date back to the late 1960's, difficulties continue in terms of a readily adaptable methodology for forecasting travel demand patterns for rural residents. A review of the literature surfaced a variety of techniques, most of which were designed for a specific locality and were not readily transferable to other areas, including their use in Texarkana. A review of pertinent studies was conducted to identify the range of prior methodological concepts considered and their characteristics.

BACKGROUND

Four methodological concepts were selected for consideration in this study:

(1) Burkhardt's Study,
(2) Nationwide Personal Transportation Study (NPTS),
(3) Conventional Travel Demand Forecasting Models, and
(4) Modified Conventional Travel Demand Forecasting Models.

BURKHARDT'S STUDY

Burkhardt's Study, which is characteristic of a number of studies conducted over the last decade, utilized the following assumptions:

(1) trip generation rates were based on existing systems;
(2) counties were the appropriate geographical unit; and
(3) the characteristics of travelers, the characteristics of the available transportation services, and the spatial distribution of activities in the area affect travel behavior.

Approximately a hundred existing rural transportation systems (fixed route or demand-responsive systems) were used to calibrate eight multiple regression models. In addition, the systems were categorized according to

the scale of operation in which a macromodel was developed to provide county-wide or system-wide estimations and a micromodel was developed for individual routes of a fixed route system or a small sector of the county. Despite the relative ease in using these models, they are not readily transferable since the variables used in the regression models require local verification to ensure accuracy and reliability. Tests performed by others showed that the percentage error by the regression models might be unacceptably high. Nevertheless, these models may serve as a relative comparison for methods used in other areas.

NATIONWIDE PERSONAL TRANSPORTATION STUDY (NPTS)

The NPTS is based on personal interviews which were conducted in several households to collect the required data on travel behavior and travel characteristics. In an effort to utilize the NPTS, a proposed methodology, the formulating of a stratified multistaged cluster sampling technique, was developed; it utilized the 1,030 primary sampling units (PSU) from the U.S. Each PSU, which might include a county, groups of counties, or independent cities, was placed in 376 strata according to homogeneity of selected socioeconomic characteristics. This stratifying resulted in 156 having a single PSU and the remaining 220 having more than one PSU. The entire data base was recorded onto four tapes with six tables developed to describe the data items.

While the NTPS is an extremely useful data file, the sample size for the study area rendered by the technique used to obtain the sample was found to be insufficient for use in the study. To adequately describe travel behavior, attempts were made to increase the sample size by aggregating SMSA's of similar socioeconomic characteristics. Factor analysis and cluster analysis were employed to select the set of SMSA's to augment the data for the Texarkana region. This was ultimately rejected because the identifying computer code utilized for each of the selected SMSA's could not be obtained from the Bureau of Census.

CONVENTIONAL TRAVEL DEMAND FORECASTING MODELS

To utilize the conventional travel forecasting procedures, the availability of default trip generation rates as well as similar data was required. Since trip generation rates vary substantially throughout the study area and since the default generation rates were primarily available for the urbanized area, this restriction rendered the direct application of traditional models useless. An effort was made to utilize local linear regression models to estimate district by district generation rates for major trip generators. The results were not satisfactory and, therefore, were rejected in favor of a modified process.

MODIFIED TRAVEL DEMAND FORECASTING MODELS

The major modifications made to the conventional travel demand models were as follows:

(1) the application of generation rate transferability was assumed feasible given a careful selection of districts with similar socioeconomic characteristics,

(2) factor and cluster analysis were utilized for the selection of default districts,

(3) different procedures were utilized to forecast travel demand in urban and rural districts,

(4) the travel demand forecasting process for rural districts utilized an iterative procedure that provided feedback to the trip generation task,

(5) traffic counts at cordon lines were used as external constraints on rural trip assignments; this linked the prior urban transportation studies with the entire study area,

(6) using the external constraints, the percentage of error for the travel estimates by station could be estimated, and

(7) the trip assignment process preceded estimation of rural public transportation patronage.

Based on these modifications, this process was adopted to characterize the travel behavior for the entire study area.

MODIFIED TRAVEL DEMAND FORECASTING PROCESS

The conventional travel demand models were modified as needed and utilized in this study. As stated previously, these modifications were dictated by data availability and the resources available to the study. The process emphasis was oriented toward methodology rather than data collection.

The modeling process, as presented in Figure III-1, provides for different techniques in determining the trip generation rates for the urban and rural districts. For example, trip generation rates for the rural districts employ a multivariate analysis to identify urban districts of similar socio-economic characteristics from which to borrow trial generation rates. It is noted that these trial trip generation rates were utilized for an initial value and were later calibrated on the basis of the cordon line count information obtained at locations on the urban fringe. Urban districts used trial rates obtained in prior studies.

The trip generation phase included two major activities: obtaining the final trip generation rates for the base period and forecasting the rates for each of the districts. An algorithm for the generation rates was developed for the urban districts and the multivariate analysis was used to initiate the trial trip generation rates for the rural districts. Using the predicted trip rates, household information and employment data (i.e., industrial, commercial, and public), forecasting of vehicle trips for the years 1982 and 1985 was performed.

With respect to trip distribution, assumptions, such as travel time between district pairs, were made. For example, it was assumed that the average highway speed on the rural highways is approximately 38 miles per hour and that the isochronal travel time contours, developed in 1975, were still valid. In addition, travel times in both directions were considered to be identical. Terminal times were obtained from NCHRP 187. The "quick response method" for trip distribution (modified gravity model) was used to reflect the travel distribution pattern. Vehicle occupancy for different origin and distribution (O-D) pairs and default percentages for each trip purpose were developed in order to operate the gravity model.

The trip assignment phase was applied only to the rural districts since the urban area was considered as one large district with few outlets. The objective of this study was to explore the feasibility of a rural public

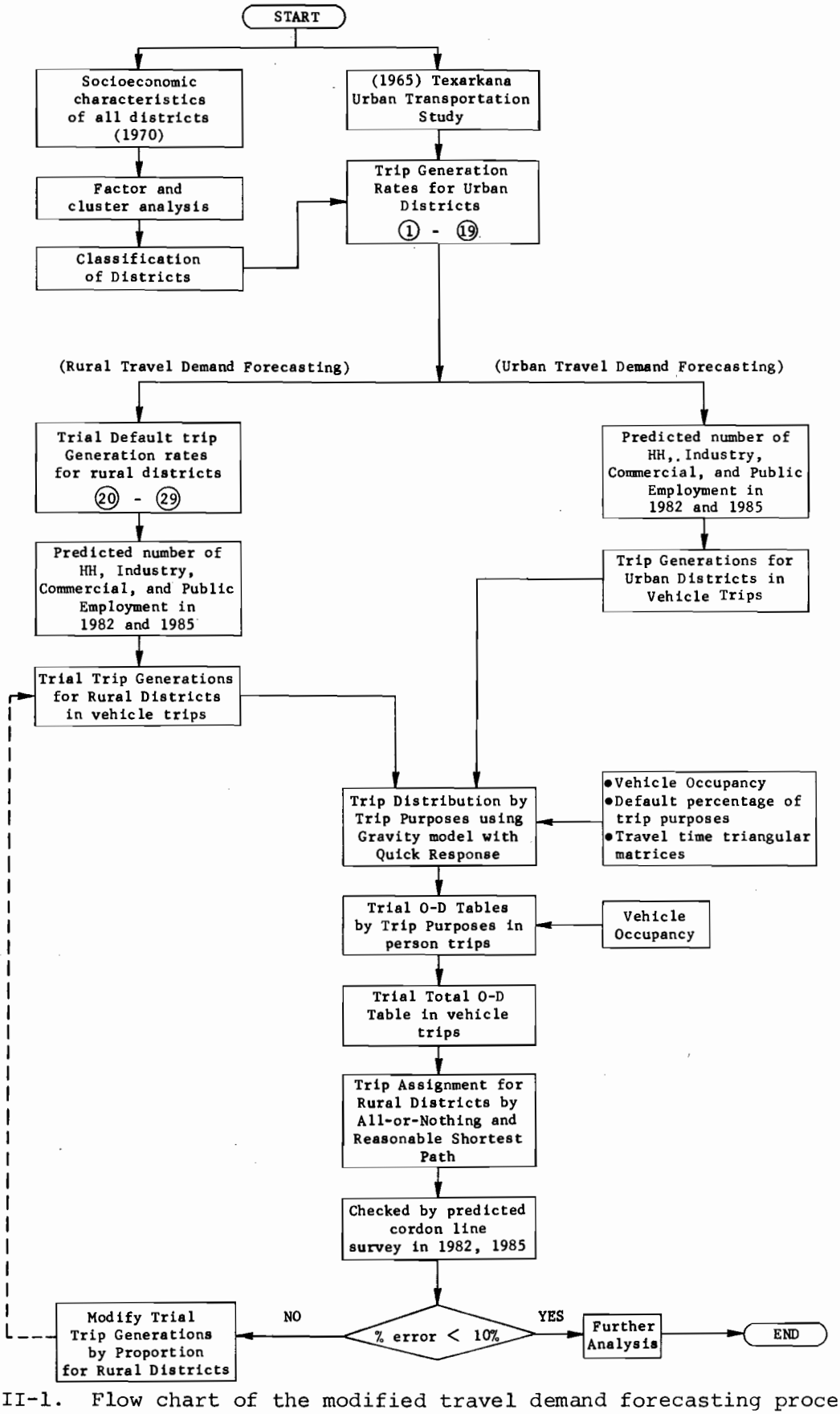

Fig III-1. Flow chart of the modified travel demand forecasting process for Texarkana and the surrounding area.

transportation system for the area. Therefore, the number of destinations within the urban area was limited. For modeling purposes, the formulation of the urban area as a single district in this phase was reasonable. The shortest path and the all-or-nothing assignment technique were assumed since the use of capacity restraint or similar techniques was not conducive given the level and magnitude of congestion on the rural highway facilities. The traffic counts taken at several external stations on the fringe of the urban district were used to calibrate and modify trip generation rates of the rural districts if the percent error was found to be unacceptable. The process was repeated until an acceptable result was obtained.

With respect to the modal share analysis, it was recognized that the share using public transportation is sensitive to the service characteristics of the system. A wide range of default percentage values corresponding to different service levels were used rather than assuming a single default percentage.

DATA COLLECTION AND MANIPULATION

To minimize the data dependency and other requirements, a number of assumptions had to be developed and tested. The nonavailability of data naturally limits the overall confidence in results obtained in travel forecasting, particularly in rural areas. Secondary data sources were used extensively and were updated where spot verification could be performed. Some of the secondary data are listed below:

(1) Daily motor coach carrier arrivals and departures;

(2) Population data (e.g., for Bowie County, population estimates were available for 1960, 1970, 1973, 1974, and 1980 and projections were available for 1990 and 2000. For the remaining counties and cities, descriptions of the population for 1970 and 1980 were used. The number of housing units at the county level was available for 1970 and 1980.);

(3) Census tracts for the years 1960 and 1970 were available for the Texarkana SMSA (Bowie and Miller Counties only). The 1970 census tracts were used in estimating the default values.

(4) The various publications from the ongoing Texarkana Urban Transportation Study were major sources utilized in this study. A variety of travel characteristics presented in those reports was utilized and transferred for use in the study. Cordon line counts, for example, were utilized to constrain the traffic assignment task.

After review of the secondary data, the study area and traffic volume components were defined. The study area, shown in Fig III-2, includes four counties——Bowie, Miller, Little River, and Sevier——and the Texarkana urban area. Some of the large cities outside of the study area were utilized as external stations because of the significant traffic between the study area and those cities. The traffic volume was allocated to four components:

(1) interdistrict trips——trips with ends in different districts,

(2) intradistrict trips——trips with both ends in the same district,

(3) external-local trips——trips with one trip end in the study area and the other outside the study area, and

(4) external-through trip ——trips with both trip ends outside the study area.

Throughout the modeling process, consistency of data over time was found to be an issue. For example, the inconsistency in the definition of individual census tracts since 1960 created some difficulty in the modeling effort. After careful examination and corrective transformation, the study area was defined into 29 districts as shown in Fig III-3. There are 19 districts in the urban area and ten districts in the rural area; each of two rural districts is a county, Little River and Sevier. Justification for the two large county districts was based on the unavailability of data for a more detailed analysis.

The 19 districts which comprise the urban area were developed from the 1965 Texarkana Urban Transportation Study and the census tract layout. Ten districts from previous urban transportation studies were utilized to represent the travel characteristics of Texarkana. These ten districts were within the urbanized area and have boundaries comparable to the boundaries of the census tracts defined in the 1970 census. This facilitated the use of the 1970 census data on socioeconomic and employment characteristics and transportation modes within the Texarkana SMSA. Table III-1 provides the travel characteristics of these ten representative urban districts.

From the data sources (1970) assembled, a variety of summary tables were assembled for the 27 districts comprising Bowie and Miller Counties:

Table III-2. Socioeconomic Characteristics for the 27 Districts Comprising Bowie and Miller Counties (1970),

Table III-3: Employment Data for the 27 Districts Comprising Bowie and Miller Counties (1970),

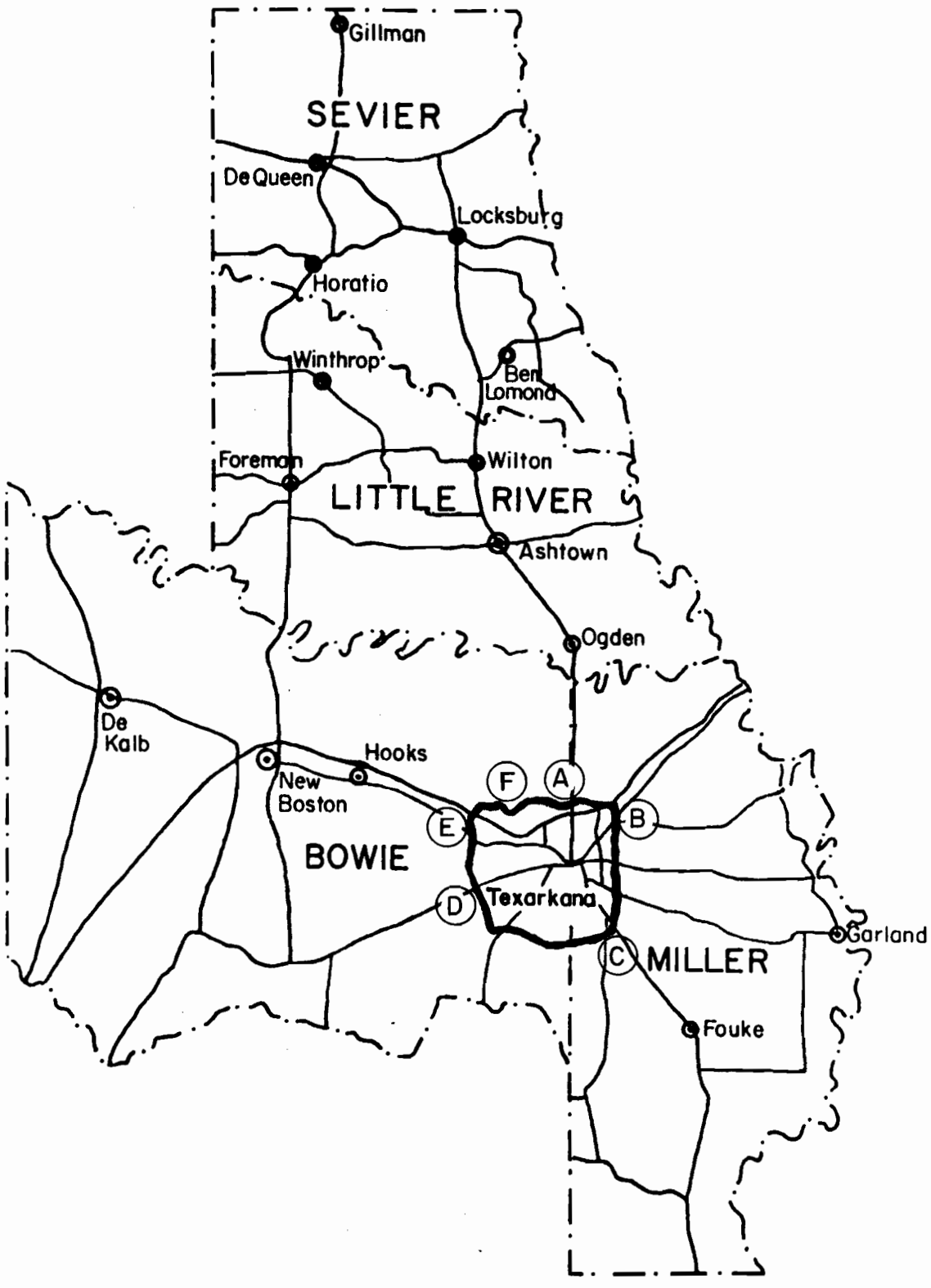

Fig III-2. Texarkana rural transportation study area.

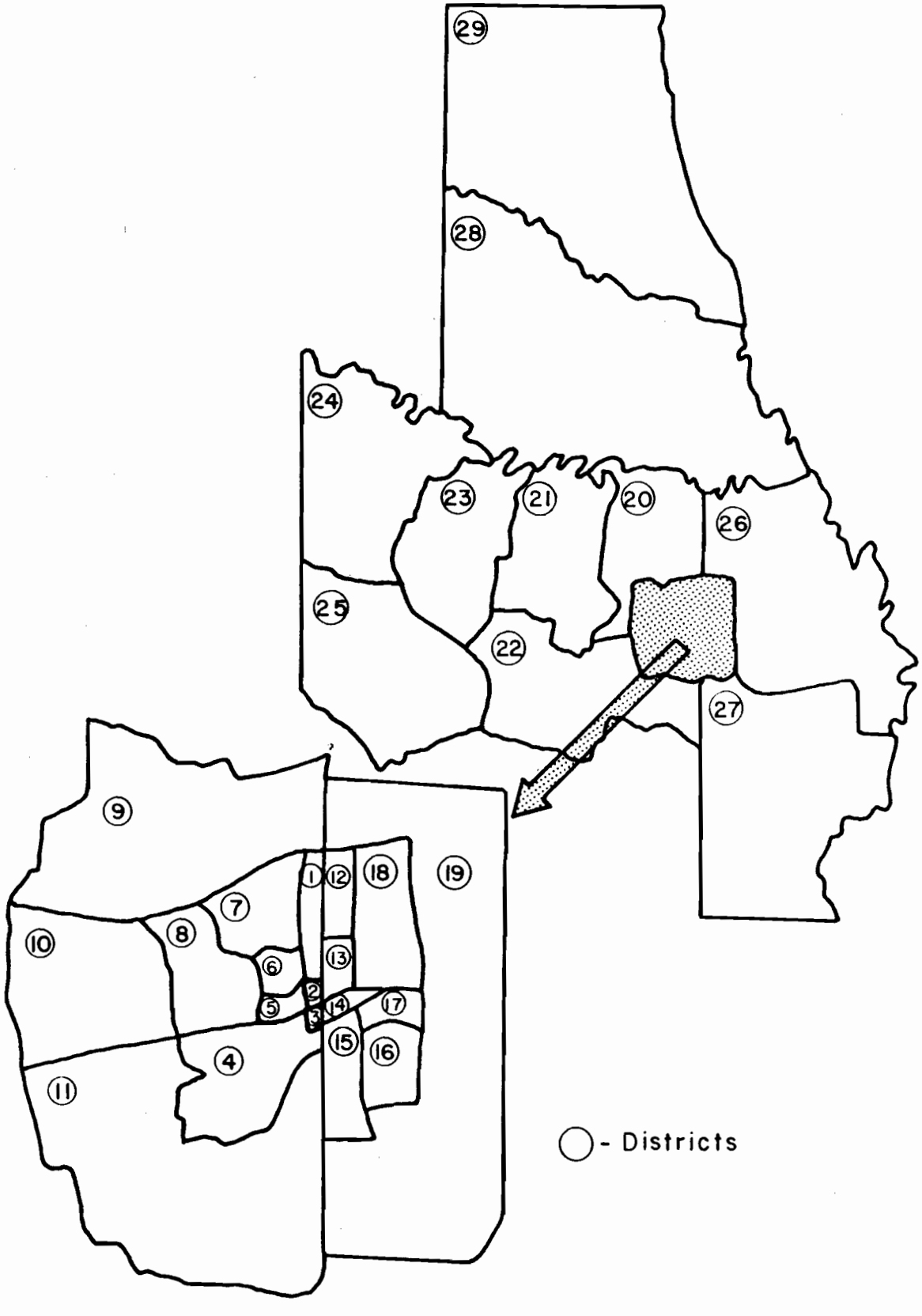

Fig III-3. District boundaries.

TABLE III-1. TRAVEL CHARACTERISTICS OF THE TEN REPRESENTATIVE DISTRICTS

District	ATIN1	ATIN2	ATIN3	ATIN4	ATIN5	ATEX1	ATEX2	PTIN1	PTIN2	PTEX1	PTEX2	HH
1	114	2153	2413	6138	1430	643	689	10954	1440	183	221	1940
2	696	2723	1744	1386	1160	678	225	6614	1154	675	154	899
3	441	5219	1573	1014	2335	1029	390	9501	2314	995	437	436
4	175	2384	724	4543	2500	1063	593	9017	2480	861	627	2253
5	110	897	533	2574	1009	259	91	4207	1009	262	126	1332
6	131	1622	421	3636	1082	385	133	5924	1087	338	83	1456
7	14	697	1355	4831	910	538	134	6950	900	525	151	1411
8	177	5592	1018	4138	1580	1151	341	11061	1602	1073	328	1595
11	148	197	209	1863	703	205	163	2453	728	214	135	989
16	16	206	234	3065	671	217	100	3965	670	194	77	1385

Where

ATIN1 = Internal passenger car attractions of industry
ATIN2 = Internal passenger car attractions of commerce
ATIN3 = Internal passenger car attractions of public
ATIN4 = Internal passenger car attractions of residents
ATIN5 = Internal commercial vehicle attractions
ATEX1 = External passenger car attractions
ATEX2 = External commercial vehicle attractions
PTIN1 = Internal passenger car productions
PTIN2 = Internal commercial vehicle productions
PTEX1 = External passenger car productions
PTEX2 = External commercial vehicle productions
HH = Number of households

TABLE III-2. SOCIOECONOMIC CHARACTERISTICS FOR THE 27 DISTRICTS COMPRISING BOWIE AND MILLER COUNTIES (1970)

District	A	B	C	D	E	F	G	H
1	5255	6.9	16.6	10124	16.3	311	12.6	8.2
2	1513	50.4	21.2	7153	28.0	171	22.1	14.3
3	567	34.0	21.3	8691	30.9	75	38.1	26.3
4	6709	50.2	11.6	7258	29.5	576	26.7	22.4
5	3364	49.0	15.0	6252	38.5	455	34.0	29.0
6	3577	36.0	17.7	7224	27.2	346	23.8	16.6
7	4937	14.5	9.0	13374	10.8	158	8.9	6.4
8	4976	4.1	11.3	9361	16.9	286	12.2	9.0
9	3190	.8	3.6	12727	5.8	48	5.2	5.1
10	5030	14.6	6.6	9267	14.1	177	10.4	9.2
11	4075	24.1	7.5	8604	19.1	163	15.0	13.9
12	3001	2.6	12.7	8824	17.4	171	14.6	11.0
13	4166	21.2	16.9	8738	20.4	332	17.9	12.8
14	778	6.6	21.3	4033	43.3	141	43.6	39.7
15	1750	.5	12.9	5904	30.0	162	28.0	25.5
16	4387	9.9	14.9	6627	31.0	452	24.2	21.0
17	3541	93.3	12.7	5772	39.5	375	36.0	32.0
18	4712	22.1	6.0	10033	14.0	205	11.0	10.0
19	2377	12.5	7.9	8576	11.6	54	9.4	8.4
20	1702	23.9	11.2	9425	20.8	59	14.0	10.5
21	5131	18.7	7.8	9251	18.8	244	13.3	11.7
22	4887	16.3	10.1	8055	23.9	256	18.9	16.3
23	5231	13.5	11.6	8639	20.7	314	17.4	13.7
24	6046	26.0	14.7	7370	31.8	404	26.6	24.2
25	1623	.0	13.2	7097	32.0	73	26.4	23.8
26	4085	24.5	11.2	6361	32.9	216	33.7	29.4
27	4588	10.8	11.4	6636	25.9	1084	23.8	22.0

Where

A = Total population (persons)
B = Percent of Black (%)
C = Percent of old persons 65 years and over (%)
D = Mean income (dollars)
E = Percent of households with incomes below poverty (%)
F = Total number of households with incomes below poverty (%)
G = Percent of population with incomes below poverty (%)
H = Percent of families with incomes below poverty (%)

TABLE III-3. EMPLOYMENT DATA FOR THE 27 DISTRICTS COMPRISING BOWIE AND MILLER COUNTIES (1970)

	IN(I)	CMT(I)	PU(I)	TC(I)	HE(I)	ED(I)	OI(I)
1	540	750	439	148	170	172	22
2	202	219	200	15	38	43	6
3	17	62	47	17	20	9	30
4	981	550	500	119	55	181	71
5	313	333	245	67	84	81	31
6	375	446	348	64	40	76	18
7	472	624	433	102	140	165	19
8	565	677	449	172	74	149	9
9	290	448	326	70	94	58	38
10	623	529	431	180	70	95	14
11	404	349	316	70	79	73	29
12	271	385	286	149	31	72	5
13	358	599	406	97	112	178	51
14	41	63	52	39	41	0	24
15	176	227	91	42	28	21	21
16	535	439	201	91	104	43	53
17	405	244	291	30	108	53	4
18	561	583	373	127	86	229	45
19	271	254	87	70	65	30	39
20	216	100	132	24	0	16	69
21	538	272	669	75	11	102	55
22	617	294	484	132	20	52	44
23	579	316	800	58	75	117	46
24	485	395	671	50	38	143	216
25	230	74	91	30	10	21	33
26	356	274	229	137	42	55	143
27	605	319	127	61	26	37	171

Where

IN(I) = Industrial (including construction and manufacturing)
CMT(I) = Commercial (including wholesale, retail, finance, insurance, real estate, business, and repair services)
PU(I) = Municipal building and facilities (including personal services, other professional and related services, and public administration)
TC(I) = Transportation (transportation, communications, utilities, and sanitary services)
HE(I) = Hospitals (health services)
ED(I) = Education services (schools)
OI(I) = Other industries (e.g., recreation)

Table III-4. 1970 Employment Classification (percentages),

Table III-5. Work Trips by Transportation Mode, and

Table III-6. 1970 Employment Location (percent of employment).

Examination of prior studies facilitated the formulation of initial trip generation rates for some of the major generators in the Texarkana urban area. Trip generation estimates for other major generators were not available from these sources and an alternative approach had to be formulated.

With respect to trip generation in the rural area, a more detailed analysis was made utilizing the latest highway maps for the various counties. A map was made of the lane use characteristics of each of these smaller traffic zones, which included the dwelling unit, camps, lodges, trailer parks, churches, businesses (e.g., saw mills and gravel pits), and industrial plants. From this information, a comprehensive list of major trip attractors in the rural districts was assembled.

With respect to employment and data, three categories were utilized initially: commercial, industrial, and public service. A classification scheme was devised and a correlation matrix used to test the suitability of this classification of employment data. Correlation coefficients were deemed to be satisfactory; therefore, this classification was used throughout. Household information for each district, critical data for any trip generation analysis, was compiled.

The 1965 Texarkana Urban Transportation Study reports were utilized for the compilation of the initial external and intradistrict travel characteristics. Due to the characteristics of the study area, it was necessary to adjust the percentages of the external and internal trips. In general, the percentages of external vehicle trips range from 2 to 9 percent, with percentages for interdistrict vehicle trips ranging from 3 to 20 percent.

For Little River and Sevier Counties, an alternative approach to the data issue was proposed which divided the county into subareas for more detailed assessment. For the required data, the following considerations were made:

TABLE III-4. 1970 EMPLOYMENT CLASSIFICATION (PERCENTAGES)

District	Total Empl	(%) PIND	PCMT	PPU	PTC	PHE	PED	POI
1	2241	20.0	33.4	19.5	6.6	7.5	7.6	.9
2	723	27.9	30.2	27.6	2.0	5.2	5.9	.8
3	202	8.4	30.6	23.2	8.4	9.9	4.4	14.8
4	2457	39.9	22.3	20.3	4.8	2.2	7.3	2.8
5	1154	29.1	28.8	21.2	5.8	7.2	7.0	2.6
6	1367	27.4	32.6	25.4	4.6	2.9	5.5	1.3
7	1955	20.1	31.9	22.1	5.2	7.1	8.4	.9
8	2095	26.9	32.3	21.4	8.2	3.5	7.1	.4
9	1324	21.9	33.8	24.6	5.2	7.0	4.3	2.8
10	1942	35.0	27.2	22.1	9.2	3.6	4.8	.7
11	1320	30.6	26.4	23.9	5.3	5.9	5.5	2.1
12	1199	22.6	32.1	23.8	12.4	2.5	6.0	.4
13	1801	19.8	33.2	22.5	5.3	6.2	9.8	2.8
14	260	19.7	24.2	20.0	15.0	15.7	0.0	9.2
15	606	29.0	37.4	15.0	6.9	4.6	3.4	3.4
16	1466	36.4	29.9	13.7	6.2	7.0	2.9	3.6
17	1135	35.6	21.4	25.6	2.6	9.5	4.6	.3
18	2004	27.9	29.0	18.6	6.3	4.2	11.4	2.2
19	816	33.2	31.1	10.6	8.5	7.9	3.6	4.7
20	557	38.7	17.9	23.6	4.3	0.0	2.8	12.3
21	1722	31.2	15.7	38.8	4.3	.6	5.9	3.1
22	1643	37.5	17.8	29.4	8.0	1.2	3.1	2.6
23	1991	29.0	15.8	40.1	2.9	3.7	5.8	2.3
24	1998	24.2	19.7	33.5	2.5	1.9	7.1	10.8
25	489	47.0	15.1	18.6	6.1	2.0	4.2	6.7
26	1236	28.8	22.1	18.5	11.0	3.3	4.4	11.5
27	1346	40.9	23.6	9.4	4.5	1.9	2.7	12.7

Where

PIND(I) = % Industry
PCMT(I) = % Commercial
PPU(I) = % Municipal building and facilities
PTC(I) = % Transportation
PHE(I) = % Hospitals
PED(I) = % Educational services
POI(I) = % Other industry

TABLE III-5. WORK TRIPS BY TRANSPORTATION MODE

I	WKT	PAD	PPAD	PAP	PPAP	BUS1	PBS1	WALK	PWLK	WOHO	PWOH	OTH	WOTH
1	2255	1769	78.4	335	14.8	0	0.0	29	1.2	40	1.7	82	3.6
2	705	298	42.2	186	26.3	48	6.8	83	11.7	13	1.8	77	10.9
3	182	61	33.5	34	18.6	0	0.0	49	26.9	31	17.0	7	3.8
4	2434	1634	67.1	509	20.9	52	2.1	142	5.8	73	2.9	24	0.9
5	1098	639	58.1	319	29.0	51	4.6	70	6.3	6	0.5	13	1.1
6	1327	831	62.6	302	22.7	65	4.8	80	6.0	18	1.3	31	2.3
7	1943	1483	76.3	304	15.6	22	1.1	15	0.7	27	1.3	92	4.7
8	2081	1608	77.2	308	14.8	16	0.7	17	0.8	31	1.4	101	4.8
9	1297	1086	83.7	158	12.1	0	0.0	6	0.4	7	0.5	40	3.0
10	1884	1282	68.0	388	20.5	0	0.0	0	0.0	27	1.4	187	9.9
11	1280	1041	81.3	132	10.3	0	0.0	33	2.5	53	4.1	21	1.6
12	1183	649	54.8	422	35.6	10	0.8	10	0.8	0	0.0	92	7.7
13	1816	1252	68.9	349	19.2	16	0.8	130	7.1	18	0.9	51	2.8
14	247	127	51.4	32	12.9	0	0.0	60	24.2	13	5.2	15	6.0
15	553	408	73.7	32	5.7	0	0.0	0	0.0	21	3.7	92	16.6
16	1471	910	61.8	306	20.8	24	1.6	77	5.2	12	0.8	142	9.6
17	1081	459	42.4	347	32.0	151	13.9	65	6.0	39	3.6	20	1.8
18	1971	1501	76.1	198	10.0	14	0.7	52	2.6	54	2.7	152	7.7
19	780	551	70.6	88	11.2	0	0.0	17	2.1	0	0.0	124	15.8
20	520	392	75.3	90	17.3	0	0.0	9	1.7	23	4.4	6	1.1
21	1761	1517	86.1	148	8.4	5	0.2	66	3.7	14	0.7	11	0.6
22	1551	1203	77.5	260	16.7	8	0.5	48	3.0	7	0.4	25	1.6
23	2037	1342	65.8	519	25.4	8	0.3	46	2.2	69	3.3	53	2.6
24	1978	1420	71.7	380	19.2	20	1.0	49	2.4	81	4.0	28	1.4
25	482	287	59.5	77	15.9	8	1.6	22	4.5	88	18.2	0	0.0
26	1198	768	64.1	84	7.0	0	0.0	117	9.7	0	0.0	229	19.1
27	1246	880	70.6	67	5.3	0	0.0	6	0.4	37	2.9	256	20.5

Where

I = District code
WKT = Total number of workers
PAD = Number of private automobiles
PPAD = Percentage of drivers of private automobiles
PAP = Number of passengers in private automobiles
PPAP = Percentage of passengers in private automobiles
BUS1 = Number of bus passengers
WALK = Number of workers walking to work
PWLK = Percentage of workers walking to work
WOHO = Number of workers working at home
PWOH = Percentage of workers working at home
OTH = Others
POTH = Percentage of others

TABLE III-6. 1970 EMPLOYMENT LOCATION (% OF EMPLOYMENT)

I	ISMT	PIST	ISM1	PIS1	ISM2	PIS2	ISM3	PIS3	ISM4	PIS4	DSMT	POST	NORE	PNOR
1	2127	94.3	1416	66.5	422	19.8	266	12.5	23	1.0	59	2.6	69	3.0
2	630	89.3	365	57.9	163	25.8	102	16.1	0	0.0	24	3.4	51	7.2
3	182	99.9	150	82.4	10	5.4	22	12.0	0	0.0	0	0.0	0	0.0
4	2247	92.3	1471	65.4	620	27.5	150	6.6	6	0.2	59	2.4	128	5.2
5	1020	92.8	771	75.5	111	10.8	105	10.2	33	3.2	15	1.3	63	5.7
6	1179	88.8	816	69.2	228	19.3	117	9.9	18	1.5	53	3.9	95	7.1
7	1743	89.7	978	56.1	454	26.0	285	16.3	26	1.4	116	5.9	84	4.3
8	1950	93.7	1392	71.3	384	19.6	167	8.5	7	0.3	64	3.0	67	3.2
9	1147	88.4	596	51.9	404	35.2	141	12.2	6	0.5	26	2.0	124	9.5
10	1710	90.7	792	46.3	740	43.2	156	9.1	22	1.2	61	3.2	113	5.9
11	1134	88.5	540	47.6	412	36.3	173	15.2	9	0.7	92	7.1	54	4.2
12	1024	86.5	378	36.9	192	18.7	454	44.3	0	0.0	47	3.9	112	9.4
13	1574	86.6	583	37.0	100	6.3	875	55.5	16	1.0	163	8.9	79	4.3
14	213	86.2	74	34.7	15	7.0	113	53.0	11	5.1	13	5.2	21	8.5
15	449	81.1	169	37.6	27	6.0	229	51.0	24	5.3	30	5.4	74	13.3
16	1318	89.5	360	27.3	193	14.6	631	47.8	134	10.1	46	3.1	107	7.2
17	886	81.9	246	27.7	57	6.4	442	49.8	141	15.9	36	3.3	159	14.7
18	1763	89.4	570	32.3	114	6.4	972	55.1	107	6.0	101	5.1	107	5.4
19	697	89.3	265	38.0	50	7.1	356	51.0	26	3.7	36	4.6	47	6.0
20	479	92.1	200	41.7	240	50.1	32	6.6	7	1.4	18	3.4	23	4.4
21	1660	94.2	635	38.2	975	58.7	40	2.4	10	0.6	27	1.5	74	4.2
22	1257	81.0	272	21.6	901	71.6	64	5.0	20	1.5	41	2.6	253	16.3
23	1804	88.5	400	22.1	1377	76.3	16	0.8	11	0.6	53	2.6	180	8.8
24	1799	90.9	101	5.6	1686	93.7	12	0.6	0	0.0	69	3.4	110	5.5
25	378	78.4	51	13.4	322	85.1	5	1.3	0	0.0	39	8.0	65	13.4
26	1025	85.5	217	21.1	94	9.1	408	39.8	306	29.8	42	3.5	131	10.9
27	926	74.3	321	34.6	61	6.5	256	27.6	288	31.1	173	13.8	147	11.7

Where

ISMT,PIST = Inside SMSA and its percentage
ISM1,PIS1 = Texarkana, Texas and its percentage
ISM2,PIS2 = Remainder of Bowie County, Texas and its percentage
ISM3,PIS3 = Texarkana, Arkansas and its percentage
ISM4,PIS4 = Remainder of Miller County and its percentage
DSMT,POST = Outside SMSA and its percentage
NORE,PNOR = Place of work not reported and its percentage

(1) Little River and Sevier Counties are homogeneous in many characteristics,

(2) the 1970 county and city book was used as a principal data source,

(3) unclassified employment data were allocated in proportion to the available employment distribution, and

(4) the travel characteristics are stable over time and transferable with respect to default values used in the modeling process.

Table III-7 summarizes the data collected and utilized for Little River and Sevier Counties.

Information on the highway network and existing bus routes provided in Parts I and II of this report was assembled for use in the modeling process.

MODELING RESULTS

The prior sections of this part contain a brief description of the modified processes and some of the considerations utilized in the modeling effort. This section contains more information on the modeling results.

TRIP GENERATION FINDINGS

From assembled secondary data, an algorithm was developed for estimating district-specific trip generation rates. These rates for rural and some urban districts were not readily obtainable from prior studies and were developed through the careful selection of default districts. These default districts were selected by a process which included the classification of all districts on the basis of their respective socioeconomic characteristics. An iterative feedback procedure was employed which continued to refine the generation rates until an acceptable percent error was obtained from the comparison of predicted and assigned traffic data. In this study, four iterations were required to complete the entire process with the maximum error limited to 6 percent.

The input data required to operate the algorithm were obtained from the 1965 Texarkana Urban Transportation Study and the 1970 census. Initial trip generation rates for ten representative urban districts selected for the original formulation of the algorithm varied somewhat from the ITE trip generation manual. The rates, shown in Table III-8, were selected over other

TABLE III-7. TRIP ESTIMATION INPUT DATA FOR LITTLE RIVER AND SEVIER COUNTIES (1970)

County	A	B	C	D	E	F	G	H
Little River	6570	24.3	12.2	27.3	4017	2296	776	629
Sevier	6550	18.8	14.8	6.8	4160	2342	1192	481

A = mean family income in 1969
B = % of population in poverty level
C = % of population 65 years and over
D = % of black population
E = total number of housing
F = total number of industrial employees
G = total number of commercial employees
H = total number of public employees

TABLE III-8. TRIP ATTRACTION AND PRODUCTION RATES FOR SELECTED DISTRICTS

	Trip Attraction Rates				Trip Production Rates
	Per Employee			Per	Per
	Industry	Commercial	Public	Household	Household
1	0.2	4.2	4.5	3.5	6.6
2	4.3	17.0	8.5	1.7	9.6
3	32.4	121.3	29.8	2.6	30.4
4	1.8	7.9	1.8	2.3	5.8
5	0.5	4.8	2.3	2.1	4.2
6	0.5	5.9	1.5	2.7	5.1
7	0.0	1.7	2.9	3.7	6.0
8	0.3	11.4	2.1	2.9	8.8
11	0.7	1.4	1.1	2.1	3.6
16	0.1	0.9	1.4	2.4	3.5

typical generation rates since these were obtained from local data. With respect to the formulation of the districts, a factor and cluster analysis technique was used to select the default districts. Accordingly, these ten districts were important in establishing the default districts. The ultimate classification of 27 of the 29 districts comprising the study area was based on the available census tract information for Texarkana. The clustering of tracts into districts was based upon such attributes as percentage of blacks, percentage of older citizens (equal to or greater than 65 years of age), median income per capita, and percentage of households at poverty level. Through examination of the results of this hierarchical clustering analysis, the establishment of default districts was readily obtained.

In summary, the trip productions and attractions for the future years were predicated on input data which includes population, percent of total employment, percentage of industrial-commercial-public sector employment, and trip generation rates for each of the districts. The output was an estimation of the total trip production and attraction for each district. The next step was to separate the total trip productions and attractions by trip purpose and category (e.g., work trips, internal district trips, intra-district and external trips). These data are provided in subsequent sections of this part of the report.

TRIP DISTRIBUTION FINDINGS

A modified version of the gravity model was used as the basis of the trip distribution phase. The modification was required to satisfy the limitation of available data. The input data requirements were

(1) trip attractions and productions by district,
(2) travel time for each O-D pair,
(3) vehicle occupancy, and
(4) default percentages for trip purposes.

With respect to the travel time for each O-D pair, the highway network mileage map was prepared for the study area and an average highway speed of 38 miles per hour in the rural area was assumed. A travel time matrix for each O-D pair was constructed assuming equal bidirectional travel times.

Assumptions with respect to terminal items were made utilizing NCHRP 187. Friction factors were developed for each of the districts for use in the gravity model.

TRAFFIC ASSIGNMENT FINDINGS

Once a trial trip table was prepared, the next process was to perform an assignment procedure which facilitated the comparison of the assigned traffic to projected volume counts. The basis for the initial traffic assignment was the selection of the most reasonable, shortest path as being the most likely path for travel between districts. An all-or-nothing assignment process was utilized throughout. In order to simplify the network, six aggregated external stations were utilized. The Texarkana urban area was considered as a single terminal and is designated as "U" in many of the following tables. Six access locations to and from the Texarkana urban area were used for routing purposes.

Upon completion of the traffic assignment, a comparison between the model output and the traffic volume from the projected 1978 traffic volume was prepared. An iterative process was required to achieve acceptable accuracy through convergence (Table III-9). Table III-10 provides the final trip table for all districts comprising the study area. Table III-11 yields the final trip table for the rural districts. The maximum percent error was determined to be approximately 6 percent, which is within the tolerable percentage error of 10 percent established for this study. Table III-12 provides a summary of the total trip attractions and productions for the rural districts (Districts 20-29). The more urbanized districts, or those districts which have larger communities within them, show a higher percentage of interdistrict trips while the less urbanized districts possess a higher percentage of intradistrict trips.

MODAL SHARE FINDINGS

For the modal share consideration, information was obtained utilizing the 1970 transportation survey of workers in the area, as well as related data. By examining Table III-13, District 24 was selected as the default district to be used in the modeling process. This assumes that bus service in each of the rural districts in 1970 was comparable to that in District 24.

TABLE III-9. COMPARISON BETWEEN ASSIGNED AND PREDICTED VEHICLE TRIPS

	A	B	C	D	E	F
Assigned Volume	6,438	4,888	4,843	3,753	2,4472	2,563
Predicted Volume	6,094	15,391	4,593	3,660	23,644	2,469

TABLE III-10. FINAL TRIP TABLE (PERSON TRIPS)

	1	2	3	4	5	6	7	8	9	10
1	0.	1649.	1430.	739.	318.	1278.	2594.	2492.	738.	983.
2	2095.	0.	1781.	1260.	646.	572.	450.	694.	296.	360.
3	1607.	1576.	0.	1808.	799.	712.	900.	1127.	408.	808.
4	676.	909.	1473.	0.	1214.	1073.	839.	2189.	448.	2299.
5	305.	489.	682.	1274.	0.	659.	603.	974.	288.	687.
6	1228.	433.	608.	1125.	658.	0.	1265.	1548.	503.	949.
7	2330.	318.	719.	823.	564.	1183.	0.	1168.	763.	845.
8	1886.	414.	759.	1810.	767.	1220.	986.	0.	988.	6600.
9	643.	204.	315.	424.	261.	454.	738.	1134.	0.	1181.
10	709.	205.	519.	1808.	516.	712.	678.	6277.	979.	0.
11	174.	125.	315.	793.	215.	115.	272.	440.	168.	330.
12	815.	308.	324.	183.	133.	36.	380.	216.	184.	151.
13	1027.	387.	573.	364.	334.	230.	374.	306.	153.	258.
14	1434.	1250.	1165.	1433.	582.	692.	790.	759.	396.	609.
15	97.	52.	183.	226.	55.	47.	76.	70.	37.	57.
16	254.	183.	649.	557.	157.	165.	183.	241.	98.	200.
17	341.	211.	341.	192.	73.	87.	140.	130.	69.	106.
18	2845.	485.	1099.	674.	340.	494.	578.	697.	529.	606.
19	296.	52.	222.	146.	76.	127.	172.	106.	87.	110.
20	79.	37.	59.	69.	36.	54.	91.	110.	199.	238.
21	582.	278.	538.	784.	259.	284.	499.	1416.	461.	1189.
22	89.	79.	171.	299.	65.	64.	115.	200.	84.	205.
23	117.	57.	123.	152.	55.	63.	109.	220.	84.	207.
24	412.	194.	493.	505.	167.	198.	323.	518.	261.	677.
25	29.	14.	34.	37.	12.	14.	23.	37.	19.	47.
26	30.	120.	261.	209.	80.	105.	147.	198.	101.	181.
27	152.	77.	215.	221.	73.	71.	106.	158.	76.	148.
28	156.	71.	181.	147.	49.	72.	120.	159.	98.	198.
29	138.	66.	166.	169.	56.	67.	107.	174.	87.	254.

	11	12	13	14	15	16	17	18	19	20
1	227.	910.	1158.	1294.	116.	292.	364.	2669.	349.	149.
2	206.	436.	556.	1435.	79.	266.	284.	578.	78.	89.
3	463.	407.	726.	1183.	248.	838.	408.	1159.	297.	127.
4	949.	187.	375.	1185.	248.	586.	188.	580.	159.	122.
5	270.	142.	361.	505.	63.	173.	76.	306.	86.	66.
6	144.	38.	250.	601.	53.	182.	89.	446.	143.	100.
7	319.	381.	379.	641.	81.	189.	134.	487.	183.	156.
8	436.	183.	262.	519.	64.	210.	105.	496.	96.	159.
9	190.	178.	151.	311.	39.	98.	63.	431.	88.	330.
10	311.	121.	211.	397.	49.	167.	82.	410.	95.	327.
11	0.	51.	98.	280.	71.	157.	51.	159.	51.	54.
12	59.	0.	300.	529.	37.	100.	103.	865.	132.	38.
13	113.	297.	0.	1110.	89.	272.	169.	826.	169.	42.
14	405.	654.	1386.	0.	446.	1356.	1100.	1754.	481.	136.
15	78.	34.	83.	334.	0.	278.	66.	135.	37.	13.
16	180.	98.	267.	1067.	291.	0.	455.	477.	156.	33.
17	63.	108.	179.	934.	75.	490.	0.	518.	208.	23.
18	220.	1029.	992.	1688.	172.	582.	586.	0.	952.	110.
19	57.	124.	161.	367.	37.	150.	187.	755.	0.	22.
20	37.	21.	24.	64.	9.	20.	13.	54.	13.	0.
21	484.	108.	195.	586.	156.	252.	111.	485.	114.	363.
22	155.	26.	49.	146.	25.	70.	28.	99.	27.	56.
23	109.	20.	44.	145.	18.	59.	29.	157.	32.	59.
24	397.	87.	144.	556.	69.	234.	114.	414.	133.	165.
25	30.	6.	11.	39.	5.	17.	8.	29.	10.	12.
26	79.	113.	154.	394.	38.	167.	137.	315.	166.	33.
27	107.	42.	77.	285.	72.	181.	67.	138.	50.	35.
28	116.	33.	54.	197.	21.	71.	35.	156.	52.	46.
29	150.	28.	48.	187.	23.	78.	39.	138.	46.	53.

(continued)

TABLE III-10. (CONTINUED)

	21	22	23	24	25	26	27	28	29
1	1094.	131.	185.	612.	48.	40.	224.	253.	230.
2	662.	149.	114.	367.	31.	196.	144.	147.	138.
3	1137.	283.	216.	824.	65.	378.	358.	333.	309.
4	1350.	402.	220.	688.	58.	246.	298.	220.	257.
5	469.	91.	83.	239.	19.	99.	103.	77.	89.
6	512.	90.	95.	283.	23.	130.	101.	114.	106.
7	843.	151.	155.	430.	34.	171.	140.	178.	161.
8	2013.	222.	262.	583.	47.	194.	177.	195.	218.
9	752.	107.	115.	336.	27.	113.	98.	139.	126.
10	1608.	215.	235.	724.	56.	168.	157.	233.	302.
11	695.	173.	130.	451.	36.	78.	120.	145.	190.
12	181.	36.	29.	116.	9.	131.	55.	49.	41.
13	327.	63.	60.	190.	16.	177.	102.	78.	72.
14	1218.	237.	253.	916.	73.	563.	466.	357.	342.
15	244.	30.	23.	86.	6.	40.	88.	29.	32.
16	412.	89.	80.	302.	25.	188.	233.	101.	113.
17	196.	38.	44.	159.	13.	167.	93.	54.	60.
18	971.	156.	263.	656.	52.	432.	217.	271.	246.
19	180.	32.	43.	168.	14.	180.	62.	72.	65.
20	359.	43.	49.	128.	10.	23.	27.	39.	46.
21	0.	570.	3679.	3242.	298.	263.	354.	787.	916.
22	733.	0.	346.	812.	116.	68.	110.	146.	229.
23	4371.	320.	0.	4630.	203.	78.	128.	293.	342.
24	4098.	799.	4925.	0.	852.	306.	506.	1584.	1843.
25	337.	101.	193.	763.	0.	29.	48.	112.	130.
26	384.	77.	94.	351.	37.	0.	142.	156.	176.
27	450.	111.	137.	511.	56.	123.	0.	222.	259.
28	908.	131.	284.	1444.	114.	124.	201.	0.	743.
29	1039.	203.	325.	1652.	130.	137.	229.	731.	0.

*Maximum percent error compared with predicted traffic counts in cordon line is six percent.

**The predicted traffic numbers were provided in the Texarkana Urban Public Transportation Study, 1978.

TABLE III-11. FINAL TRIP TABLE FOR THE RURAL DISTRICTS (PERSON TRIPS)

From	To U	20	21	22	23	24	25	26	27	28	29	
U	---	2,096	14,864	2,695	2,605	8,130	652	3,691	3,236	3,045	3,097	
20	1,227	---	359	43	49	128	10	23	27	39	46	1,951
21	8,781	363	---	570	3,679	3,242	298	263	354	787	916	19,253
22	1,996	56	733	---	346	812	116	68	110	146	229	4,612
23	1,800	58	4,371	320	---	4,630	203	78	128	293	342	12,224
24	5,896	165	4,098	789	4,925	---	852	306	506	1,584	1,843	20,974
25	421	12	337	101	193	763	---	29	48	112	130	2,146
26	2,995	33	384	77	94	351	37	---	142	156	176	4,445
27	2,316	35	450	111	137	511	56	123	---	222	259	4,220
28	1,986	46	908	131	284	1,444	114	124	201	---	743	5,981
29	2,021	53	1,039	203	325	1,652	130	137	229	731	---	6,520
		2,918	27,543	5,050	12,637	21,663	2,468	4,842	4,981	7,115	7,781	

TABLE III-12. TOTAL TRIP ATTRACTIONS AND PRODUCTIONS FOR THE RURAL DISTRICTS IN PERSON TRIPS (PERCENTAGES)

	Interdistrict		Intradistrict		External		Total	
	A	P	A	P	A	P	A	P
20	2,918 (39.7)	1,951 (17.8)	4,192 (56.2)	9,016 (82.2)	239 (3.9)	390 (3.6)	7,349	10,967
21	27,543 (86.1)	19,253 (86.1)	4,134 (12.9)	2,597 (11.6)	332 (1.0)	524 (2.3)	32,009	22,374
22	5,050 (41.4)	4,612 (34.4)	6,810 (55.8)	8,407 (62.6)	338 (2.8)	405 (3.0)	12,198	13,424
23	12,637 (86.7)	12,224 (79.6)	1,569 (10.8)	2,691 (17.5)	378 (2.6)	435 (2.8)	14,584	15,350
24	21,663 (82.2)	20,974 (76.1)	3,842 (14.6)	5,586 (20.3)	865 (3.3)	990 (3.6)	26,370	27,550
25	2,418 (38.3)	2,146 (28.8)	3,364 (53.3)	4,628 (62.1)	530 (8.4)	676 (9.1)	6,312	7,450
26	4,842 (49.2)	4,445 (41.4)	4,645 (47.2)	5,880 (54.7)	353 (3.6)	416 (3.9)	9,840	10,741
27	4,981 (45.8)	4,220 (32.3)	4,324 (39.8)	6,844 (52.3)	1,569 (14.4)	2,016 (15.4)	10,874	13,080
28	7,115 (21.9)	5,981 (15.3)	24,180 (74.7)	31,810 (81.2)	1,075 (3.3)	1,408 (3.6)	32,370	39,199
29	7,781 (22.0)	6,520 (15.2)	26,351 (74.6)	34,834 (81.2)	1,172 (3.3)	1,539 (3.8)	35,304	42,893

TABLE III-13. WORK TRIP DATA BY MODE OF TRANSPORTATION (1970)

Districts	Number of Workers	Transportation Modes					
		Drive	Carpool	Bus	Walk	None*	Other
4	2,434	67.1	20.9	2.1	5.8	2.9	0.9
24	1,978	71.7	19.2	1.0	2.4	4.0	1.4
25	482	59.5	15.9	1.6	4.5	18.2	0.0
26	1,198	64.1	7.0	0.0	9.7	0.0	19.1
27	1,246	70.6	5.3	0.0	0.4	2.9	20.5

*Work performed in the home

Based on this information, Tables III-14, III-15, and III-16 were prepared to provide for the total work trips, total bus trips, and work trips by bus for each rural district, respectively.

SUMMARY

The purpose of this part of the report is to provide an overview of the process used to arrive at estimates of the travel demand characteristics within the study area. The process involved developing trip generation rates, adjusting a standard distribution technique, calibrating a traffic assignment technique, and developing estimates of trip shares which may be captured by a rural public transportation system. In all cases, modified procedures of conventional travel demand forecasting techniques were utilized. These procedures and modifications enabled the prediction of reasonable estimates of the travel characteristics within the study area given the assumptions reported herein. The trip table data provide guidance in the assessment of alternatives in Part IV of this report.

TABLE III-14. TOTAL WORK TRIPS FOR EACH RURAL DISTRICT
(PERSON TRIPS)

From \ To	U	20	21	22	23	24	25	26	27	28	29	
U	---	296	2,051	365	361	1,172	100	503	411	410	429	
20	171	---	51	6	7	19	2	3	4	6	7	276
21	1,183	51	---	80	547	480	42	44	64	129	146	2,766
22	271	8	103	---	51	121	16	11	19	26	37	663
23	246	9	654	47	---	630	29	14	24	48	55	1,756
24	848	25	613	120	673	---	110	52	89	227	257	3,014
25	65	2	48	14	28	99	---	5	9	18	20	308
26	407	4	65	13	17	59	6	---	19	24	27	639
27	288	5	80	19	25	88	10	16	---	35	40	606
28	265	7	149	23	47	205	18	19	33	---	93	859
29	278	8	167	33	52	229	20	21	36	93	---	937
		415	3,930	720	1,808	3,102	353	688	708	1,016	1,111	

TABLE III-15. TOTAL BUS TRIPS BY RURAL DISTRICT
(PERSON TRIPS)

From \ To	U	20	21	22	23	24	25	26	27	28	29	
U	--	23	163	30	29	89	8	40	35	33	34	
20	13	--	4	0	1	1	0	0	0	0	1	20
21	97	4	--	6	40	35	3	3	4	9	10	211
22	22	1	7	--	4	9	1	1	1	2	2	50
23	20	1	48	3	--	51	2	1	1	3	4	134
24	65	2	45	8	54	--	10	3	5	18	20	230
25	5	0	3	1	2	9	--	0	1	1	2	24
26	33	0	4	1	1	4	0	--	2	2	2	49
27	25	0	5	1	1	6	1	1	--	2	4	46
28	22	1	9	1	3	15	1	1	2	--	8	63
29	22	1	11	2	3	19	1	2	3	8	--	72
		33	299	53	137	238	27	52	54	78	87	

TABLE III-16. WORK TRIPS BY BUS FOR EACH RURAL DISTRICT
(PERSON TRIPS)

From \ To	U	20	21	22	23	24	25	26	27	28	29	
U	--	3	23	4	4	13	1	6	4	4	4	66
20	2	--	0	0	0	0	0	0	0	0	0	2
21	13	1	--	1	6	5	0	0	1	1	2	30
22	3	0	1	--	1	1	0	0	0	0	0	6
23	3	0	7	1	--	6	0	0	0	1	1	19
24	9	0	6	1	7	--	1	1	1	2	3	31
25	1	0	1	0	0	1	--	0	0	0	0	3
26	4	0	1	0	0	1	0	--	0	0	0	6
27	3	0	1	0	0	1	0	0	--	0	0	5
28	3	0	2	0	0	2	0	0	0	--	1	8
29	3	0	2	0	1	2	0	0	0	1	--	9
	44	4	44	7	13	32	2	7	6	9	11	

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PART IV. ALTERNATIVE OF RURAL PUBLIC OPTIONS FOR THE TEXARKANA STUDY AREA

EXPANDING TO A PUBLIC TRANSIT SYSTEM

The preceding analyses have evaluated the demographic and economic factors that bear on the need for rural public transit services in the four-county Texarkana region. These analyses have suggested industries and industrial sites that will have stable or growing workforces. In addition these analyses have identified population growth patterns in the region and considered their implications. Both of these major analyses have suggested possible home-to-work corridors that could be served by rural public transit as well as the need for mid-day or non-work trips.

A rural social service system like THDC has a number of options as it expands into a rural public system serving the general population as well as clients of human service agencies. The Federal Highway Administration and the States of Arkansas and Texas have made it clear that systems like THDC may begin adding general public services and may evolve over time into full-fledged public transit systems.

Many rural social service systems have begun evolving into public services by adding work trips to their existing operations. This is often the best way to use existing resources since many human service clients need mid-day, off-peak travel. Although THDC currently has considerable morning and afternoon peaking with its social service clients, it does have some current capacity for peak hour service.

In addition, as THDC expands to provide work trip services, excess mid-day capacity may be created. Some of this capacity no doubt could be utilized by other social service agency clients. However, it is important to also identify promising non-work services.

The Study Team has identified six classes of services that could be added, in stages if necessary and prudent, to existing THDC service to allow the evolution of a genuine rural public transit service. These services fall

into the two major categories work and non-work trips:

Work trip travel

Feeder service to inter-city motor coach service

Subscription home-to work service, from outlying rural areas to concentrated employment sites

Route-deviation fixed route service, peak periods, into Texarkana

Non-work travel

Subscription non-work or mid-day travel from outlying areas into Texarkana

Route-deviation fixed route service, off-peak periods, within rural counties

Demand-responsive service, off-peak, in Texarkana and in Rural centers

This part of the report analyzes the various options available to THDC to allow its evolution to a public system. The emphasis of the analysis in this section is the identification of complementary "packages" of transportation services that could be added to the existing THDC infrastructure. These services could be complementary in terms of geography, types of clients carried, routes, or times of day.

Table IV-1 lists the kind of information and analyses that are necessary in order to determine if and where each of these six services could be efficiently provided in the four-county rural area. It is obvious that some of the needed information is available from the work presented in previous sections of this report. The public transit service options listed in Table IV-1 will be described in the following sections, using both the data and findings of previous sections of this report, and additional information. It should be noted that many of these services will have to be combined with each other or with existing THDC services to be practical; it is unlikely that any service, by itself, will be immediately feasible.

In the following sections of this part of the report, the two major types of trips to be served are analyzed and "packaged" separately. First, work trips and work-trip routes are analyzed, using both the findings of the

TABLE IV-1. ANALYSES AND DATA NEEDED TO EVALUATE SIX MAJOR CLASSES OF PUBLIC TRANSIT SERVICE OPTIONS

PUBLIC TRANSIT SERVICE OPTION	INFORMATION AND QUANTITATIVE DATA NEEDED
Work-Trip Travel	
Feeder service to intercity buses	• high density demand corridors from outlying cities to central Texarkana • appropriate (morning and evening peak) intercity services matched to demand corridors
Subscription home-to-work services; outlying areas to concentrated employment sites	• concentrated employment generators inside and outside Texarkana • appropriate demand corridors from residential origins matched to those employment generators
Route-deviation fixed route services, peak periods, into Texarkana	• work-trip patterns in and outside Texarkana • moderate volume demand corridors • any conflict with existing intercity service by time of day
Non-Work Travel	
Subscription non-work or mid-day service from outlying areas into Texarkana	• outlying trip generators (nursing homes, etc.) • major trip attractors as possible destinations (e.g., shopping malls, theaters, etc.)
Route-deviation fixed route services, off-peak periods, within rural counties	• outlying trip generators • major trip attractors as possible destinations
Demand responsive service, off-peak, in Texarkana and in rural centers	• existing excess capacity or idle vehicle time in Texarkana • potential capacity if other options are implemented

travel demand modeling described in Part III and the results of a regional employment survey undertaken in 1982. Based on these analyses, various work-trips routes and services are suggested which could be added to THDC's current or expanded operations.

Next, non-work and mid-day trips are analyzed, based on an identification of such flows derived from the demand modeling undertaken in Part III. These travel predictions are augmented by an analysis of the major commercial, business, medical, and service trip attractors in various areas in the four-county region. Various non-work services that could complement either existing THDC service or the potential work-trip services identified above are described.

This two part process will allow THDC to pick combinations of work and non-work-trip services that will effectively utilize existing resources. Additional public services can be added in stages, as primary or expanded service becomes operational. For example, should work-trip service to a rural site be put into operation, the analysis in this section would allow THDC to pick complementary non-work or mid-day services that would allow for greater utilization of the vehicle and driver resources committed to the work-service.

Above all, the analysis considers how existing transportation services and providers can be effectively incorporated into or coordinated with options offered by the rural public system.

The financial implications of each option are also investigated. The fares that could be charged for each service as well as the costs that will be incurred by each service option are discussed.

Travel between and among the nineteen districts within the urbanized area is generally not considered in this evaluation, because such an analysis was undertaken for the Texarkana area in 1981 by Harland Bartholomew and Associates.

UNDERSTANDING HOME-TO-WORK TRAVEL PATTERNS

Two major sources of information assist in the identification of potential corridors of home-to-work service that could be served efficiently by a Texarkana public transit system. One source is the origin-destination matrix developed using the travel demand forecasting techniques described

in Part III. This matrix was based on modifications of urban modeling techniques and it was necessary to rely on 1970 Census data. The second major source of information on work-trip patterns in the four-county region is a regional employment survey undertaken by THDC and analyzed by The University of Texas Study Team.

Each of these information sources is described below and the implication of their findings for serving home-to-work trips is analyzed.

FINDINGS FROM TRADITIONAL PREDICTION METHODS

Part III of this report presents a complete origin-destination matrix (O-D) describing predicted travel behavior from each of the 29 districts in the four-country region to each of the other 28 districts. The prediction techniques discussed in Part III also divides total tripmaking between districts into work and non-work trips. In many cases in the Texarkana region, work trips accounted for less than 25% of all trips made between any two pairs of districts.

Table IV-2 summarizes predicted work-trip travel between and among the 29 districts in the study area, without specifying trips among the 19 districts in the Texarkana urbanized study area. The patterns shown in Table IV-2 are entirely consistent with the employment analyses presented in Part I of this report. The majority of all workers in the four-county region work inside the three-county SMSA.

There are, however, wide variations in the percentage of workers commuting into Texarkana from rural districts. But percentages can be misleading. Of the ten rural districts, none generates more <u>total</u> work trips to the Texarkana urbanized area than to any of the other rural districts. Several of these rural districts generate significant <u>numbers</u> of work trips destined for the Texarkana urbanized area (less Wake Village and Nash). For instance, District 21 (Hooks, Leary, and Whaley) has almost 1200 workers per day travelling into Texarkana. However, District 23 (New Boston) actually generates more work trips destined for other rural districts than to Texarkana. And several rural districts generate a significant number of total work trips to other districts.

In terms of numbers of daily work trips into Texarkana, the highest travel demand corridors are between Districts 21 (Hooks, Leary, Whaley), 24

TABLE IV-2. WORK-TRIP TRAVEL PATTERNS BETWEEN AND AMONG DISTRICTS IN THE STUDY AREA

Living in District	Working in the SMSA	Working Within Texarkana, Tx	Working Within Texarkana, Ar	SMSA	20	21	22	23	24	25	26	27	28	29
20	92.1%	41.7%	6.6%	171	--	51	6	7	19	2	3	4	6	1
21	94.2%	38.2%	2.4%	1183	51	--	80	547	480	42	44	64	129	146
22	81.0%	21.6%	5.0%	271	8	103	--	51	121	16	11	19	26	37
23	88.5%	22.1%	0.8%	246	9	654	47	--	630	29	14	24	48	55
24	90.9%	5.6%	0.6%	848	25	613	120	673	--	110	52	89	227	257
25	78.4%	13.4%	1.3%	65	2	48	14	28	99	--	5	9	18	20
26	85.5%	21.1%	39.8%	407	4	65	13	17	59	6	--	19	24	27
27	74.3%	34.6%	27.6%	288	5	80	19	25	88	10	16	--	35	40
28				265	7	149	23	47	205	18	19	33	--	93
29				278	8	167	33	52	229	20	21	36	93	--

(DeKalb), 26 (northern Miller County and Garland), 27 (southern Miller County and Fouke and Doddridge), and 22 (Maud and Redwater), and the 19 urbanized Texarkana districts.

Table IV-3 describes the highest density demand corridors between and among the ten rural districts. While the total number of work trips between rural districts tends to be lower than the number of work trips destined for Texarkana, both Tables IV-2 and IV-3 make clear that here are several fairly significant travel corridors in the region outside of Texarkana. The highest demand corridors outside the urbanized area are into District 21 (Hooks, Leary, and Whaley) from Districts 23, 24, 28 (Little River County), and 29 (Sevier County); into District 23 (New Boston) from Districts 21 and 24; into District 24 from Districts 21, 23, 28, and 29; into District 28 from Districts 21, 24, and 29; and finally into District 29 from Districts 21, 24, and 28.

When these corridors are matched to some of the employment data first presented in Part I of this report, the actual destination of most trips within each district becomes clear. Probably the only baffling set of demand corridors are those into District 23 (New Boston) from Districts 21 and 24.

Of course all of the O-D patterns described above are based on the total number of work trips. We must estimate what percentage of those work trips could be and would be served by various types of rural public transit options. Certainly the demand for public transit may not be high enough in some of these corridors to justify provision of transit service.

Fairly sophisticated modal split prediction methods exist for urban areas where comprehensive data are available. As Part III of this report discusses, however, most available methodologies require more data than were available for the Texarkana study area. Instead, the Study Team used an estimation technique which bases modal split predictions on "default values" from comparable areas with public transit service. In 1970 more workers in District 24 reported using public transit to work than in any other district; therefore, this percentage figure, a little over 1 percent, was one method used to predict the response to the provision of public transit service in the other rural districts.

However, public response to transit service is a result of a variety of factors, some inherent in the population, others in the nature of the work trip involved, and still others in the kind, cost, and quality of service offered. The method above is a conservative one, assuming that whatever

TABLE IV-3. HIGHEST DENSITY WORK-TRIP DEMAND CORRIDORS IN THE REGION

From			To			
District	Major Cities	Daily Work Trips	District	Major Employers*	Employer Code**	Map Code
23	New Boston	654	21	Day and Zimmerman, Lone Star Division	F	50
24	De Kalb	613				
28	Little River County	149		Red River Army Depot	G	51
29	Sevier County	167				
21	Hooks, Leary, Whaley	480	23			
24	De Kalb	673				
21	Hooks, Leary, Whaley	480	24	Red River Fertilizer	B	52
23	New Boston	630				
28	Little River County	205				
29	Sevier County	229				
21	Hooks, Leary, Whaley	129	28	Ashdown — Ashdown Manufacturing	C	56
24	De Kalb	227		Ashdown — Little River Millwork	B	55
29	Sevier County	93		Ashdown — Nekoosa Paper, Inc.	F	54
				Ashdown — Spotlight Company, Inc.	D	57
				Foreman — Arkansas Cement	D	60
				Foreman — Quality Pallet Company	B	57
				Wilton — Porter Enterprises	B	58
21	Hooks, Leary, Whaley	146	29	De Queen — Baldwin Piano	C	65
24	De Kalb	257		De Queen — Bo-Pilgrim	E	64
28	Little River County	93		De Queen — Trend II of Arkansas	D	69
				De Queen — Weyerhauser	D	62
				Horatio — Horatio Lumber Company	B	61

*Employer codes: B 10-49; C 50-99; D 100-499; E 500-999; F 1000-1499; G 1500+

**Map codes refer to numbers appearing on county maps in Section I and identified in the Appendix.

level of transit service existed in District 24 in 1970 will be similar to that offered in 1982. While that may be justifiable, it is essentially conservative.

More liberal estimates of transit ridership can be made, and defended, if other factors are taken into account. Given the poverty of the area, the likelihood that current services will be better and no more expensive than previous services (in constant dollars), and that work trips are relatively long (a condition conducive to transit use), we can also make the assumption that the mode split found in some other rural areas, averaging 3 percent, would be found there also. For example, the estimated ridership on Industrial Bus Lines from Texarkana to both Lone Star and Red River is far in excess of 3 percent of total work trips between the two points.

Table IV-4 presents the estimated number of work trips that would be made using public transit among various O-D pairs given both sets of modal split assumptions. These numbers must be recognized as based on generalized transit service concepts, which may or may not be present. For example, a worker who would willingly take an express bus from New Boston to his job in Texarkana would be less likely to do so if the route stopped in four or five cities along the way.

Table IV-4 shows a few corridors of high transit demand; from Districts 21 and 24 into the urbanized area, from District 21 to Districts 23 and 24, from District 23 to Districts 21 and 24; and from District 24 to Districts 21, 23, and 29. Such corridors might be served by small buses (15-20 passengers) in express bus service. However, some of the other lighter density corridors might be combined into limited-stop routes or services.

This information is based on aggregate flows between districts, which do not specify exactly where in each district a trip is going. It is necessary to augment this information with more site-specific data. In order to do so, an actual employer survey was undertaken (that survey is discussed in the next section of this report). The complementary findings of the two types of analyses are then combined to suggest which of the six classes of transit options identified in the introduction might be suitable for various corridors within the study area.

TABLE IV-4. TWO ESTIMATES OF POTENTIAL TRANSIT RIDERSHIP FOR WORK TRIPS BETWEEN RURAL DISTRICTS AND TEXARKANA AND AMONG RURAL DISTRICTS

From \ To	1-19	20	21	22	23	24	25	26	27	28	29	
1-19	-	3/9	23/69	4/12	4/12	13/39	1/3	6/18	4/12	4/12	4/12	66/198
20	2/6	-	0/2	0	0	0/1	0	0	0	0	0	2/9
21	13/39	1/3	-	1/3	6/18	5/15	0	0	1/3	1/3	2/6	30/93
22	3/9	0	1/3	-	1/3	1/3	0	0	0/1	0/1	0/1	6/21
23	3/9	0	7/21	1/3	-	6/18	0/1	0	1/1	1/3	1/3	19/59
24	9/27	0/1	6/18	1/3	7/21	-	1/3	1/3	1/3	2/6	3/18	31/103
25	1/3	0/0	1/3	0	0/1	1/3	-	0	0	0	0/1	3/11
26	4/12	0	1/3	0	0	1/3	0	-	0	0/1	0/1	6/20
27	3/9	0	1/3	0/1	0/1	1/3	0	0	-	0/1	0/1	5/19
28	3/9	0	2/6	0/1	0/1	2/6	0	0/1	0/1	-	1/3	8/28
29	3/9	0	2/6	0/1	1/3	2/6	0	0/1	0/1	1/3	-	9/30
	44/132	4/12	44/134	7/24	13/60	32/97	2/7	7/23	6/22	9/30	11/46	

FINDINGS FROM A REGIONAL EMPLOYMENT SURVEY

Survey Background

In order to supplement the origin and destination data developed from 1970 Census data, a regional employment survey was conducted among major employers in the four-county region. The survey was conducted to generate current data to augment the more comprehensive prediction methods described in Section III. The survey was designed, in part, to specifically identify frequently traveled work trip corridors, both outside the urbanized area and from the rural part of the region into Texarkana. In addition, it was felt that the information gathered could be used to suggest those employers or major employment sites which might be willing to work with a rural public transit system in developing subscription or employer-organized work trips.

The Texarkana Human Development Center, THDC, sent a brief questionnaire to all major employers in the study area asking them to respond with total employment figures and employee residential location figures. The actual data obtained through the survey were organized and analyzed by The University of Texas Study Team. These analyses follow.

Over 82 employers were originally contacted; 88 percent responded with at least one of the two pieces of data requested, total employment. Only 42 or 50 percent also supplied the more vital information, employee residential location. It should be noted that this survey, while providing valuable insight into actual home-to-work travel patterns in the region, was not a valid random sample and consequently cannot be used as the basis for statistical prediction methodologies. In addition, data from employers in some counties are far more complete than those from other counties.

Information for a total of 6,406 workers in the region was received. With an estimated 1981 regional employment of 50,371, this response represents 12.7 percent of the total employment in the study area. In all, the analyses include 11 counties and 50 individual communities identified as employee residential locations for seven major areas of employment within the study area. Seventeen of the residential sites are not located within the study region but are included because of their locational proximity or because they are contiguous to routes of travel into or out of the study area. Additionally, an often cited "unspecified Texarkana" location is included, as are six

residential communities combined into an "Oklahoma" category. The "other" category represents an additional 24 communities in the four-state area which were not considered to be contiguous with the study region.

Results for the Texarkana Urban Area

The survey results indicate that a majority of the employee residential locations are in the Texarkana urban area. Fifty-nine percent, or 3,638 of the 6,183 employees of firms surveyed, reside in the urban area, employed at one of seven major employer sites in the region, including Texarkana itself. Of these, 36.4% of the respondents were employed in the Texarkana, Ar., area (1,324). Texarkana, Tx., employed 23%, Hooks 19%, and Whaley 21%. Table IV-5 shows the residential and employment location of all respondents to the survey. There was little traffic flow to either Little River or Sevier County. Five and six residents of Texarkana indicated that they commuted to employment in Foreman and Ashdown, respectively. Only two out of 3,636 Texarkana residents surveyed commuted the 54 miles to work in DeQueen.

Of the 2,929 respondents who are employed in Texarkana, 74% also reside there. Sixty-two percent, or 1,821, of those surveyed are employed in the Arkansas portion, while 38%, or 1,108, work on the Texas side. Of those who work in Texarkana, Ar., 32%, or 578, both work and reside there. Out of 1,108 working-residents of Texarkana, Tx., only 14%, or 155, both work and reside there. Twenty-five percent of the respondents who lived on the Texas side commuted across the state line to work on the Arkansas side. Only 7% crossed from the Arkansas side into Texarkana, Tx., for employment. However, 68% of the "unspecified Texarkana" working-residents who were employed in the Texarkana urban area worked in the Texas portion.

The Arkansas portion of Texarkana has neither the diversity nor the number of employers, but Texarkana, Ar., is the site of the Robert Maxwell Air Industrial Park, which is mainly centered around Rockwell International, Globe Battery, and Sta-Fresh Buns. The single largest employer within the entire Texarkana urban area and the second largest within the region is found on the Arkansas side, Cooper Tire and Rubber Co., with approximately 1,400 employees.

Although it is apparent that the Texarkana, Texas, half of the urban area has a larger employment base from which to attract workers, travel flow

TABLE IV-5. RESIDENTIAL LOCATIONS OF WORKERS OF EMPLOYERS SURVEYED IN 1982 REGIONAL EMPLOYMENT SURVEY

PLACE OF RESIDENCE	TEXAS									
	TXARK.	BOWIE COUNTY	R.RIVER	CASS CO.	TITUS/MO.	ARK.				
PLACE OF WORK						MILLER				
TEXARKANA, AR.	578	74	652	200					852	TEXARKANA, AR.
TEXARKANA, TX.	450	151	601	500				2	1103	TEXARKANA, TX.
TEXARKANA, TOTAL	296	619	915		757	5	6		1683	TXARK, UNSPECIFIED
HOOKS, TX.	20	31	51	28					79	NASH
WHALEY, TX.	15	30	45	51	16				112	WAKE VILLAGE
FOREMAN, AR.		1	1		11				12	LEARY
ASHDOWN, AR.	26	16	42	75	99	1			217	HOOKS
DeQUEEN, AR.										WHALEY
TOTAL	37	16	53	77	259	3			392	NEW BOSTON/BOSTON
					12				12	MALTA
	16	6	22	68	151	1			242	DeKalb
	3	9	12	21	12				45	REDWATER
	17	28	45		16				61	MAUD
	8	7	15	15	34				64	SIMMS
		1	1	15	14				30	AVERY*
					11				11	ANNONA*
					26				26	CLARKSVILLE*
	78	26	104	41	69				214	ATLANTA/QUEEN C.*
	9	2	11	12					23	BLOOMBURG*
	10	9	19						19	DOUGLASSVILLE*
		1	1	12	49				62	LINDEN*
				29	24				53	NAPLES*
					25				25	MT. PLEASANT*
					11				11	PITTSBURG*
					1				1	MANDEVILLE
										HOMAN
										MT. PLEASANT

* not in study area

(continued)

TABLE IV-5. (CONTINUED)

ARKANSAS		TEXARKANA, AR.	TEXARKANA, TX.	TEXARKANA, TOTAL	HOOKS, TX.	WHALEY, TX.	FOREMAN, AR.	ASHDOWN, AR.	DeQUEEN, AR.	TOTAL	PLACE OF RESIDENCE
											FERGUSON
	MILLER	137	26	163	19	2				184	FOUKE
		23	4	27	7					34	DODDRIDGE
		9	2	11						11	GENOA
			7	7	7					14	GARLAND
	LAF/HEMPSTD.	4	1	5	5	2				12	FULTON*
		15	6	21		2				23	HOPE*
		10	1	11						11	LEWISVILLE*
		1		1		1				2	STAMPS*
	LITTLE RIVER	10		10	21	1				32	OGDEN
		34	5	39	16	21	47	41		164	ASHDOWN
		4	5	9						9	WILTON
		1		1		1	1			3	ALLEENE
		3		3			19		3	25	WINTHROP
		2		2		6	167	7		182	FOREMAN
			3	3			7	5	12	27	HORATIO (SEVIER)
		2		2						2	ARKINDA
	SEVIER						3			3	BEN LOMOND
		1	6	7					7	14	LOCKESBURG
			8	8		3	5		50	66	DeQUEEN
			1	1					4	5	GILLHAM
	HOWARD	2	1	3						3	MINERAL SPRINGS*
			5	5					3	8	DIERKS*
		1821	1108	2929	1219	1636	259	59	81	6183	TOTAL
		1	4	5	7	3	19		8	42	OKLAHOMA*
		54	80	134		37			10	181	OTHER*
		1876	1192	3068	1226	1676	278	59	99	6406	TOTAL

PLACE OF WORK

* not in study area

from the Arkansas side into the Texas side of Texarkana was not directly evident from the survey.

In all, there are seven major corridors of travel leaving and entering the Texarkana urban area for both work and residential destinations. These corridors were clearly defined by the employment survey and represent distinct routes of travel involving hundreds of vehicle trips daily.

The East-West Corridor Through Bowie County. Entering the Texarkana urban area from the west along a travel corridor extending into Red River County are residents of Avery, DeKalb, Malta, New Boston, Whaley, Hooks, Leary, and Nash. The travel corridors within Bowie County are illustrated in Fig. IV-1. A total of 170 surveyed workers travel the corridor east into Texarkana along Interstate 30 or U.S. Highway 82, 58% being employed on the Arkansas side and 42% on the Texas side.

This corridor not only represents vehicle trips entering the Texarkana area but also includes the significant levels of employment found in both Hooks and Whaley. Travelling from the Red River-Bowie County line to Texarkana, Ar., the New Boston to Whaley segment showed the highest amount of travel, with 956 workers travelling this segment. This figure was reduced by the employment pull of both the Red River Army Depot (RRAD) and the Lone Star/Day and Zimmerman ammunition plant located in Whaley and Hooks. By the time it reaches the Texarkana, Tx., city boundary, the eastward travel flow is reduced by 82%, and drops even further by the time the state line is reached.

The second most travelled eastward link is the DeKalb-to-Malta-to-New-Boston link, over which 300 respondents travelled. Thirty-nine percent of those surveyed, or 2,388 people, were employed along this corridor outside of the Texarkana area. Sixteen percent of the respondents also lived along the corridor, excluding the Texarkana area.

The busiest link in the highway network for the entire region occurred on this east-west corridor. Travelling west from Texarkana along the same east-west axis, the Nash-Leary-Hooks link experienced the greatest amount of travel flow of any highway segment. Leaving Texarkana, the route gains in traffic until by Hooks it represents the busiest segment for the entire study area, with 1,555 workers, or 25% of the total survey, commuting west. This flow of employee travel is abruptly absorbed by Whaley, indicating that

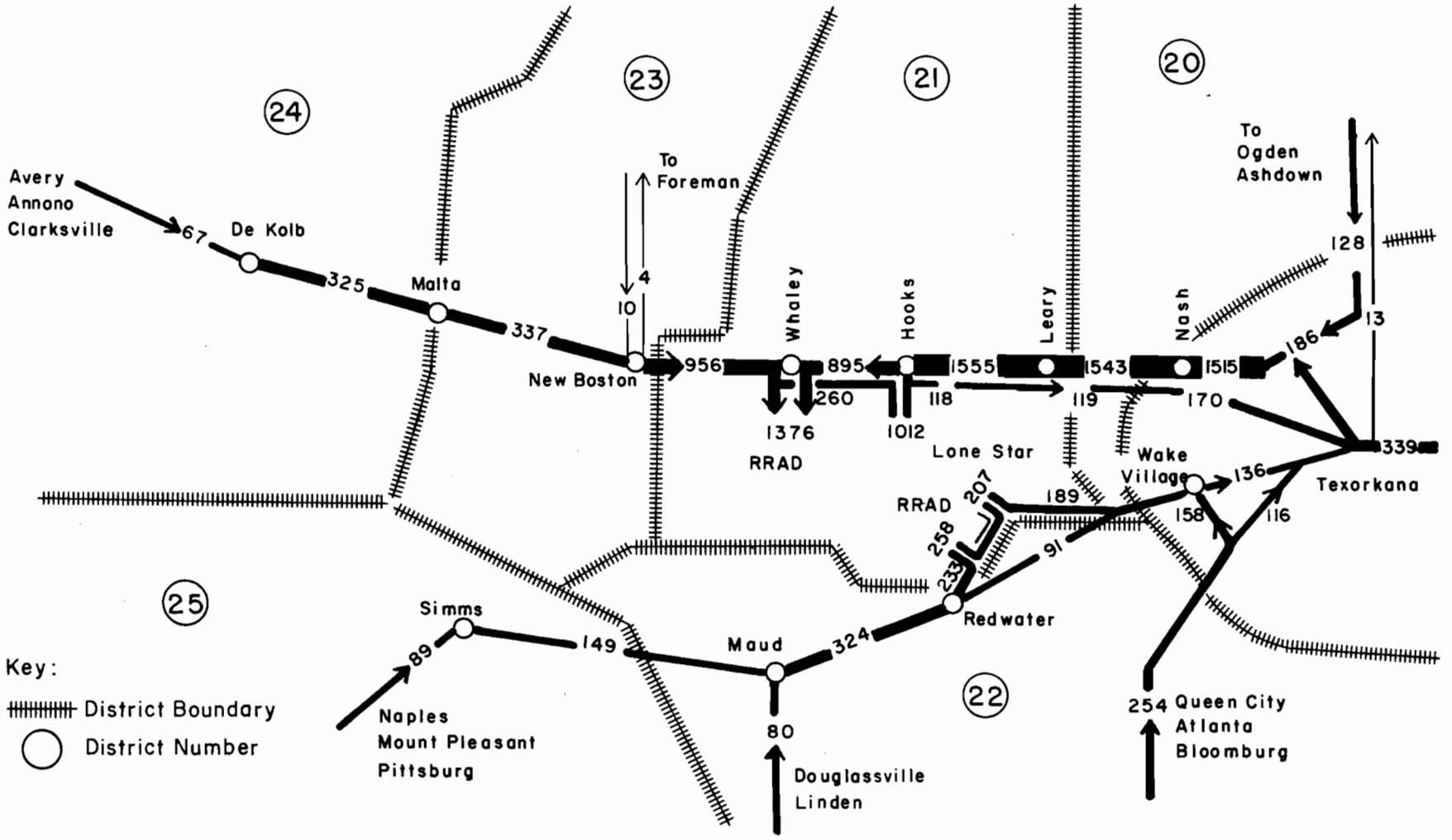

Fig IV-1. Travel flow in Bowie County based on the 1982 regional employment survey.

almost all of the surveyed east-to-west work-trip flow is destined for either Hooks or Whaley. A total of 1,012 vehicle trips, or 83% of the Lone Star work force, enter at Hooks, while 1,376, or 84% of the RRAD work force, enter at Whaley.

The Southern and Southwest Travel Corridors Through Bowie County

Communities southwest of Texarkana along U.S. 67, such as Linden, Douglassville, Simms, Maud, Redwater, and Wake Village, create another important work-trip corridor. One hundred thirty-seven residents of these communities indicated that they travel this route for employment in Texarkana. Sixty-one percent are employed on the Texas side, the rest in Arkansas. Additionally, communities directly south of Texarkana, such as Bloomburg and the Atlanta/DeQueen City area, produce 115 work trips, 76% of which are employed on the Arkansas side. In all, these flows represent 252 workers, or 8.6% of total employment in the Texarkana area, who enter along the southwest corridor.

The southwest corridor is the second most utilized of the seven major route networks. The busiest link for eastward travel is between Maud and Redwater. This corridor is also influenced by both the RRAD and Lone Star plants, which have southern entrances just northeast of Redwater. Flows along this corridor reflect their significance. The combined eastward flow from Maud is reduced by 42% by the time it reaches the Texarkana, Tx., city boundary, and the remaining flow is further reduced by 64% by the time it reaches the state line.

The south corridor along U.S. 59 is the third most travelled. The busiest link occurs between the Atlanta/Queen City area and Wake Village. This flow has decreased by 46% at the Texarkana boundary and is reduced further by the time it reaches the state line. This corridor includes travel across state and county lines from Doddridge. Not demonstrated in this survey is work-trip flow to one of the areas largest employers, the International Paper Co., located just south of the Bowie County line in Cass County. Employing approximately 800, the company did not provide employee residential locations. Significant portions of the employees would each be expected to travel north to homes in Texarkana, south to the Atlanta/Queen City area, and east into Miller County.

Travel Corridors Located in Miller County. Figure IV-2 displays travel corridors in Miller County. Southeast of Texarkana along U.S. 71 lie the communities of Doddridge, Fouke, Ferguson and Mount Pleasant. They combine to create a southeast corridor for residents employed in the Texarkana area. One hundred ninety surveyed residents of these communities travel this corridor, 84% being employed on the Arkansas side. The majority of the commuter trips along this route originates in Fouke. Doddridge residents travel both north into Texarkana and west into Cass and Bowie for employment.

Directly east of Texarkana along U.S. 82 are the communities of Lewisville, Stamps, and Garland, and along Arkansas 196, is Genoa. Residents of these cities form another travel corridor, with 30 residents working in the Texarkana area, 67% on the Arkansas side. Garland is also the site of the Mar-Bax Shirt Co., which employs 500 people, and did not provide employee residential locations.

Also within Miller County is a travel corridor extending northeast of Texarkana and connecting the communities along Interstate 30 and U.S. 67. Thirty-seven commuters travel from as far as Hope; 70% of them work on the Arkansas side. Other communities along this route include Fulton, Homan, and Mandeville. No major industry is located along this corridor, except in the Texarkana urban area.

In all, 4.7% of the survey respondents who worked in or travelled through the Texarkana urban area for employment are Miller County residents.

Travel Corridors Located in Little River and Sevier Counties. North of Texarkana are corridors of travel originating from, and also contained within, the Arkansas counties of Little River and Sevier. Figure IV-3 shows these corridors. Sixty-six residents of Little River County, from the communities of Arkinda, Foreman, Winthrop, Alleene, Wilton, Ashdown, and Ogden, commute to employment in Texarkana. Eighty-five percent of these work in the Arkansas portion of Texarkana. Twenty-one residents of Sevier and Howard Counties, from the communities of Gillham, DeQueen, Dierks, Lockesburg, Ben Lomond, and Horatio, also commute into Texarkana; 95% are employed on the Texas side.

These flows combine at Ashdown along U.S. 59/71 and represent the fourth busiest link for the entire study area, and the busiest found in either Little River or Sevier. Along this segment, just south of Ashdown, is Nekoosa

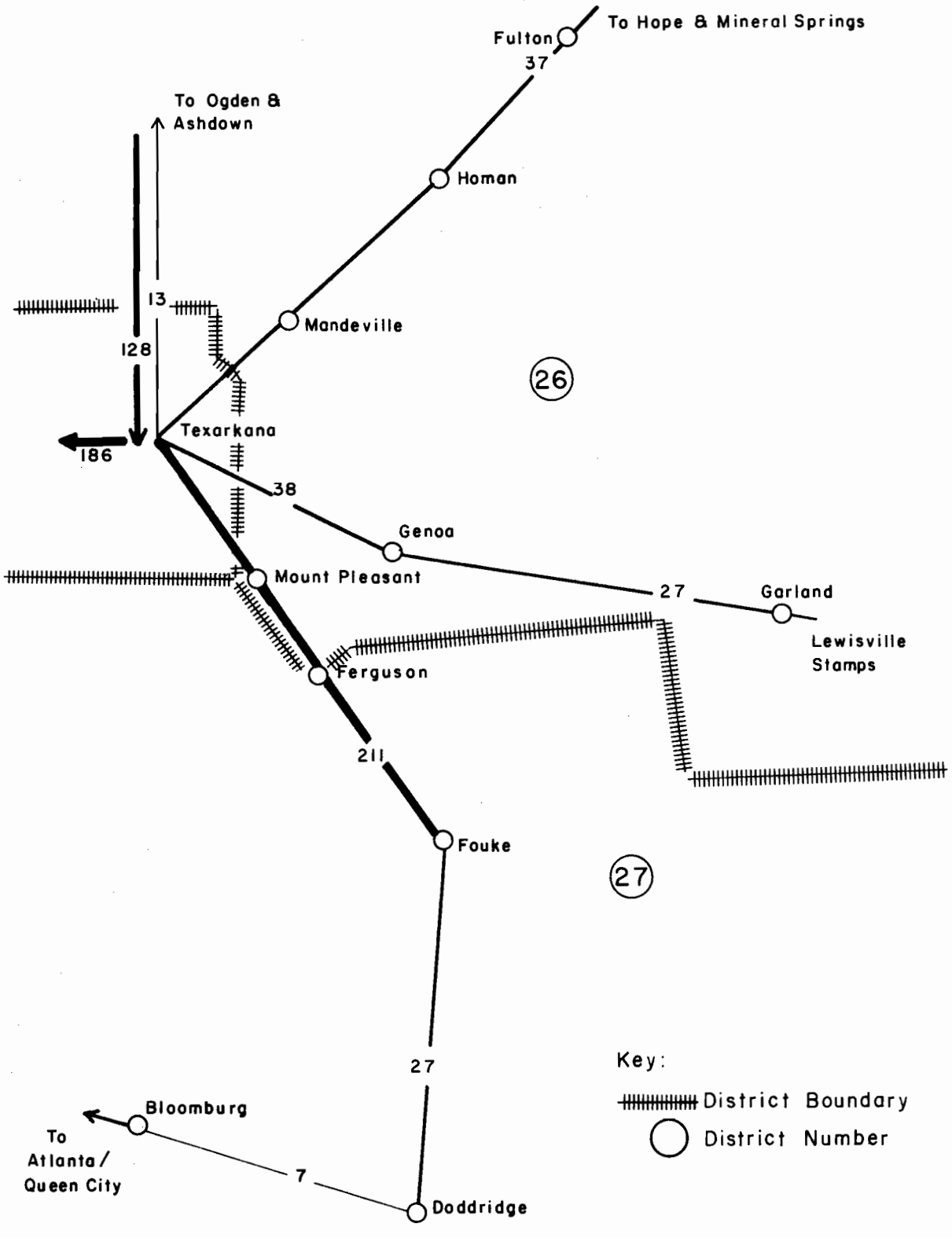

Fig IV-2. Travel flow in Miller County based on the 1982 regional employment survey.

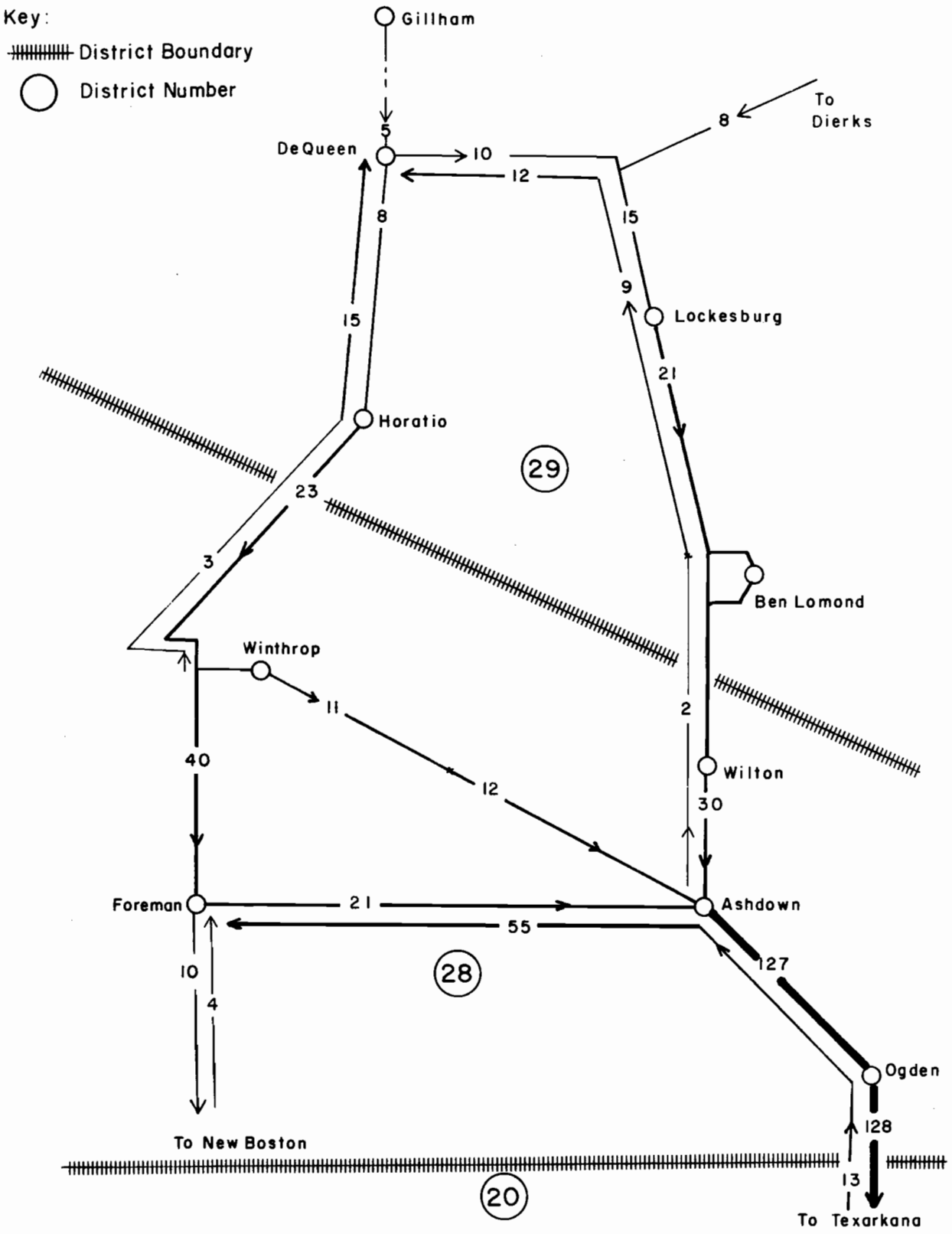

Fig IV-3. Travel flow in Little River and Sevier Counties based on the 1982 regional employment.

Papers, Inc., the third largest employer in the region, employing approximately 1,300. Unfortunately they did not provide employee residential locations. It is assumed that many of their workers live in Texarkana or in communities in Little River and Sevier. Traffic flow data on this major generator would greatly increase the volume along this segment.

Other corridors found within the two counties are not as significant. This is due in part to the fact that so few employers responded to the request for employee residential locations. After the Ashdown-Ogden-Texarkana link, the next busiest segment occurred between Foreman and Ashdown, where travel occurred in both directions, although more work trips were made from Ashdown to Foreman. Foreman and Ashdown are both sites of significant employment.

From Sevier County, work-trip travel flows south along U.S. 71 to Ashdown, and along Arkansas Highway 41 to Foreman. The DeQueen-Horatio-Winthrop-Foreman segment is utilized only slightly more than the DeQueen-to-Lockesburg-to-Ben Lomond-to-Wilton-to-Ashdown segment. Travel flow into DeQueen is not shown as significant, again due in part to missing survey information. There is also some movement in both directions between Foreman and New Boston, but it is not very significant.

Travel Flows to the Red River Army Depot and the Lone Star Ammunition Plant

The Lone Star Plant. Hooks, located 14 miles west of Texarkana, is the site of the Lone Star Ammunition Plant. The main entrance is on the east side of Hooks along rural route 1398, with a second, southern entrance located just northeast of Redwater on rural route 991. Lone Star is adjacent to the large military-industrial complex, the Red River Army Depot (RRAD), the single largest employer in the four-county area. RRAD's main entrance is located in Whaley, 3 miles west of Hooks and 17 miles west of Texarkana. RRAD's southern entrance is located adjacent to and just southwest of the Lone Star entrance at Redwater. Employees enter RRAD after going through the Lone Star complex.

On the previously described east-west axis, which flows out of Texarkana along Interstate 30 and U.S. 82, Lone Star and RRAD are the focal point of much of the work-trip travel occurring along the corridor. Of those who work in Hooks, 700, or 57%, of the respondents reside in Texarkana, the majority

(500) on the Texas side. An additional 28 reside in Nash, 9 miles east of Hooks, and 75 reside in Hooks itself. East and north of Texarkana the communities of Garland, Hope, Fulton, Ashdown, and Ogden add an additional 49 workers travelling west along this corridor to Hooks. A total of 852, or 70%, of the Lone Star work force travel through and west of Texarkana, entering the Lone Star plant at Hooks.

Flowing east into Hooks from as far west as Avery in Red River County and DeKalb, Malta, and New Boston in Bowie, are an additional 160 workers. In all 1,012, or 83%, of the Lone Star work force enter through the main entrance adjacent to Hooks.

The southern entrance east of Redwater is the main point of entry for residents of Fouke, Doddridge, Atlanta, Queen City, Bloomburg, Simms, Linden, and Naples. Twenty-six respondents reside in either Fouke or Doddridge, 12 in Bloomburg, 41 in the Atlanta/Queen City area, and 12 in Linden; together they represent a total flow of 91 workers, or 7.5% of Lone Star's employment, from areas southeast of the plant. An additional 15 reside in Simms, and 29 in Naples, for a total of 44 travelling east to enter at Redwater. Combined, these routes represent a total of 207, or 17% of the total Lone Star work force, entering through the Redwater entrance.

The Red River Army Depot. With entrances both in Whaley and northeast of Redwater, the Red River Depot is accessible on both the north and the south. Travelling west from Texarkana to Whaley along the east-west corridor are 46%, 757, of the RRAD employees. Employees travel from as far east of RRAD as Hope, Stamps, Fulton, and Garland. Leary and Hooks add an additional 110 employees entering RRAD from the east, for a total of 872, or 53% of the surveyed employment travelling to Whaley from that direction.

Travelling east along the same east-west axis from as far west as Clarksville, Annona, Avery, DeKalb, Malta, and New Boston are 473 employees, or 29% of the RRAD work force. Passing through New Boston from Ashdown, Alleene, Winthrop, Foreman, Horatio, Ben Lomond, and DeQueen, an additional 31 employees enter at Whaley from the west. In all, 1,376, or 84% of the surveyed employees, enter the RRAD through the main entrance at Whaley.

Entering RRAD at the Redwater entrance are employees residing in Redwater, Maud, Simms, Linden, Naples, Mt. Pleasant, Pittsburg, Atlanta/Queen City, and Fouke. The largest single grouping was from the Atlanta/Queen City

area, with 69 of the working residents surveyed. A total of 87, or 5.3%, travel to the Redwater entrance from as far southeast of Redwater as Fouke. Travelling directly north from as far south as Linden are 49 surveyed employees, and an additional 122, 7.4% of the employees, travel from the southwest. In all, 258, or 16% of the 1,636 surveyed employees, enter RRAD through the south gate at Redwater. However, for both RRAD and Lone Star, some data for travel from Texarkana to the Redwater entrances may be missing.

Lone Star and RRAD Together. Important and similar employee travel patterns emerge for both RRAD and Lone Star because of the plants' proximity to each other. Combined, they represent the most significant destination of all reported work trips within the entire four-county region. Travelling west from Texarkana through Nash, Leary, and Hooks they represent a combined work-trip flow of 1,670, or 58% of the combined surveyed work force of both RRAD and Lone Star. An additional 54 workers from areas directly east and north of Texarkana slightly increase the westwardly flow into both Hooks and Whaley to 1,724, or 60% of the combined work force.

A combined flow of 633 employees, or 22% of the combined work force, travels from areas west of the plants. An additional 31 employees travel from the two northern counties of the study region, passing through New Boston to both Whaley and Hooks. This represents a total eastward corridor travel flow of 664 employees, or 23% of the combined RRAD and Lone Star work force.

Travelling northeastward from the communities of Fouke, Doddridge, Bloomburg, and the Atlanta/Queen City area are 150 employees, or 5.3% of the combined work force. Travelling from areas south of the two plants, Linden, Maud, and Redwater, and entering through the Redwater gates, are 110, or 3.9% of the employees. An additional 138 employees, or 4.8% of the combined work force, representing part of a total work flow of 248, or 8.7% of the work force, travel from southwest of Redwater, entering at Redwater from the west. In all, 358, or 12.5% of the combined surveyed work force of both RRAD and Lone Star, enter through the southern gates.

Travel Flow Patterns for Locations in Foreman

Foreman is the site of the Arkansas Cement Co., the Quality Pallet Co., and others. Employers in Foreman provided the residential locations for 259

employees, 64.5% of whom both work and reside there. Foreman is also the site of employment for residents of Winthrop (19), Alleene (1), Horatio (7), Ben Lomond (3), and DeQueen (5). Ashdown is located 18 miles east of Foreman, and 47 of its residents commuted to Foreman for employment, representing 18.2% of the Foreman work force. Foreman's proximity to the Oklahoma state line attracted 19 residents, or 7.3% of the surveyed employment from the state.

Travel flow from nearby Bowie County was insignificant, with Hooks, New Boston, and DeKalb contributing a total of 4 employees, while an additional 5 travelled 37 miles from Texarkana. These 9 employees represent only 3.9% of the Foreman work force. Additionally, 10 person-trips either were generated from Foreman or traversed through the city for employment in Bowie County, notably at the RRAD facility in Whaley. No employee residential locations for Miller County were identified by the survey.

Travel Flow Patterns for Ashdown

Ashdown is the site of the Spotlight Co., Ashdown Manufacturing Co., Little River Millwork, and nearby Nekoosa Paper Co. The survey response for the Ashdown area was not at all indicative of the employment occurring there, with responses received providing only 59 residential locations. The responses that were received indicate that 69% both work and reside in Ashdown. Foreman contributed 11.9%, Horatio provided 8.5%, and Texarkana, although 20 miles to the south, provided 10.2% of the local work force surveyed.

The limited response to the survey from Ashdown employers and the residential locations not provided by Nekoosa Paper, the largest employer in Ashdown, prevent an accurate portrayal of the travel flows for the area.

Travel Flow Patterns for DeQueen

DeQueen is the largest city in Sevier County. It is the major source of employment for the entire county area, being the location of the Weyerhaeuser Co., Frames, Inc., Bo-Pilgrim Co., Baldwin Piano Co., Trend II, and others. Of the 81 from whom responses were received, 61.7% both live and work in DeQueen. Nearby Gillham provides 4.9% of the work force, Lockesburg 8.6%, Horatio 14.8%, and Winthrop 3.7%. Texarkana, 54 miles

southeast of DeQueen, provides 2.5% of the surveyed employment in DeQueen. Oklahoma sends an additional 8.7% of the DeQueen work force.

The largest employer in DeQueen, Bo-Pilgrim, employing some 800 individuals, did not provide residential locations for its employees. The limited response to the survey from DeQueen employers may not adequately indicate the full magnitude of travel patterns for the city.

Comparison Between Origin-Destination Projections and Regional Employment Survey

For travel entirely outside the Texarkana urbanized area (Districts 1-19), the O-D matrix showed the highest work-trip travel between Districts 23 (New Boston) and 21 (Hooks, Leary, Whaley); between 23 and 24 (DeKalb); between 24 and 21; between 21 and 23; and between 24 and 23. The regional employment survey showed similar patterns; the first three pairs listed above were also the highest work-trip pairs in the regional survey. However, the survey did not identify travel between Districts 24 and 23 and between Districts 21 and 23 as significant. There are currently no major employment centers in District 23, which centers around New Boston. It is possible that the 1970 Census, on which the O-D matrix is based, reflected the presence of one or more industries in that district which do not exist in 1982.

There are greater discrepancies between the O-D matrix and the regional survey for travel from the outlying rural districts and the cities of Texarkana. Three districts showed considerable work-trip travel into Texarkana in the O-D matrix: 21 (Hooks, Leary, Whaley), 24 (DeKalb), and 26 (Fouke, Garland). None of these districts is shown as major sites of work-trip origination in the regional survey. The discrepancies here probably result from the bias of the employer survey; by concentrating on larger employers the survey underrepresents the large number of small employers who are located in Texarkana. Thus the bias of the regional survey toward large employers makes it more accurate in the rural districts where a few large employers account for the majority of employment opportunities.

Overall, however, there is a great deal of complementarity between the O-D matrix and the regional employment survey. Used together they give definite guidance on potential corridors of demand for specialized rural transit service.

The following sections will take the information and analysis just

presented and evaluate the feasibility of the three major work-trip services (feeder service, subscription service, and route-deviation fixed routes) with current THDC resources and with an expanded fleet.

EVALUATIONS OF THE APPROPRIATENESS OF THREE MAJOR HOME-TO-WORK OPTIONS

Feeder Service to Motor Coach Lines

There are only three possible motor carrier routes which could be served with feeder service for home-to-work trips from outlying counties. One possibility is service from DeKalb at 6:50 am and New Boston at 7:05 am into Texarkana. However, the usefulness of this service is sharply reduced by two factors; the first is that the return trip must be made in the early afternoon. This means that a worker must have less than a 7 hour workday to be able to use the service; the 7:45 arrival in Texarkana precludes starting work before 8:00 am.

The second problem is that it is unlikely that a worker would be willing to transfer to another conveyance once in Texarkana having transferred once from the rural system to the motor carrier; therefore, the service is only practical for those people working within walking distance of the bus depot. Analyzing the O-D matrix for travel from Districts 23 and 24 into the districts surrounding the depot shows that there would be almost no travellers willing to use the public transit service, even given liberal modal split assumptions. It is, however, possible that this service may be of interest to those travelling into Texarkana for shopping or medical appointments, etc. This type of service is discussed in the next section of this report.

The next possible motor coach route which could be fed by a rural system is the one leaving Mandeville and Fulton between 7:30 and 8:00 am, arriving in Texarkana at 8:40 am. The return trip leaves Texarkana at 4:45 pm; this limits a traveller to a 7 or 7½ hour workday (9:00 to 4:30). More importantly, an analysis of the O-D matrix shows that there are no people travelling from District 26 into the urban districts surrounding the bus depot who would be willing to use public transit, even using liberal modal split assumptions. In fact this route would not have many non-work travellers either.

The last possibility for feeder service is the motor carrier service which leaves DeQueen at 4:55 am, arriving in Texarkana around 6:20 am. The return trip at approximately 4:15 is practical although the early departure seems less so. However, the route which serves DeQueen stops at almost all communities in the county, reducing the need for feeder service. Moreover, an analysis of the O-D matrix reveals that so few people are travelling from District 29 to the urban districts surrounding the bus depot that none would be likely to use the feeder service for either work or non-work trips.

Although the idea of serving as a feeder to motor carrier service seems like a good idea on the surface, it is not possible to put it into practice, given the schedules of the carriers in the area.

Subscription Home-to-Work Services

Table IV-6 shows the 13 routes with the highest potential ridership, based on both the O-D matrix and the regional employment survey. Of the 13 potential routes, THDC could probably provide service only on one to three with existing resources. Routes A, C, and M seem the most promising, given THDC's current routes and service. All other options would require THDC to either expand its fleet or reorient current services.

The 13 routes can, however, be further examined in light of a number of service and cost variables. Table IV-6 shows possible one-way fares for each of the potential routes. These fares are based on comparable motor carrier fares; while it may be possible to charge more over the same or similar routes, or desirable to charge less, the fares listed in the table are a reasonable approximation of an appropriate charge.

Table IV-6 also describes the marginal costs that THDC would incur in providing the service in question. These cost figures must be taken as very gross approximations. They are calculated on an average cost per vehicle mile of $1.20 in 1982 dollars; this is a figure which is suggested by the literature and is close to THDC's current marginal costs. The most serious problem with this cost parameter, however, is that there is no way to ensure that the service can be operated for only the marginal cost. If the vehicle were underutilized any part of the day because it was used in the peak periods to provide the suggested service, real costs would rise sharply. If THDC were required to incur significant dead-heading miles in order to provide the suggested services, costs would again rise sharply. These cost parameters are presented here to suggest break-even points under the most

TABLE IV-6. POTENTIAL SUBSCRIPTION WORK-TRIP ROUTES IN THE FOUR-COUNTY REGION

Route Identification	Estimated Number of Riders Hi/Low	Travel Time Express Service	Approximate Mileage	Possible One-Way Fares	Marginal Cost of Providing Service	Minimum Break-Even Ridership
From Texarkana to						
(A) District 21, RRAD and Lone Star	23/69	27 min.	17 miles	$2.00	$20-24	10
(B) District 24, DeKalb	13/39	33 min.	21 miles	$4.50	$25-27	6
(C) District 26, Shirt Co.	6/18	35 min.	22 miles	$2.50	$27-30	11
From District 21						
(D) to Texarkana	13/39	27 min.	17 miles	$2.00	$20-24	10
(E) to District 23, New Boston	6/18	8 min.	5 miles	$1.00	$ 6-7	6
(F) to District 24, DeKalb	5/15	27 min.	17 miles	$2.00	20-24	10
From District 23						
(G) to District 24, RRAD and Lone Star	7/21	8 min.	5 miles	$1.00	$ 6-7	6
(H) to District 24, DeKalb	6/18	28 min.	13 miles	$2.00	$15-17	8
From District 24						
(I) to Texarkana	9/27	55 min.	35 miles	$4.50	$42-46	10
(J) to District 21	6/18	27 min.	17 miles	$2.00	$20-24	10
(K) to District 23	7/21	20 min.	13 miles	$2.00	$15-17	8
(L) to District 29	3/18	84 min.	53 miles	$4.80	$63-68	14
From District 26						
(M) to Texarkana	4/12	35 min.	22 miles	$2.50	$27-30	11

efficient operational patterns, certainly a goal at which to aim.

Table IV-6 also presents the running time and approximate mileage of each of the suggested services. These are included to give a better idea of the inherent, if subjective, attractiveness of the suggested options. The literature indicates that longer trips attract higher public transit ridership; therefore, it is likely that the longer routes among the 13 suggested in the table will be more attractive. Running time is provided in order to consider the impact of combining one or more of these routes in a fixed route configuration. The longer the deviation required to service more than one site, as a ratio of total travel time, the less likely it is that people will use the service offered.

There are three potential routes from Texarkana into the rural parts of the county. The first and most promising of these is already served by Industrial Bus Lines. While Industrial Bus is an uncertificated carrier and is almost certainly acting in violation of Railroad Commission requirements, the company is apparently providing satisfactory service to well over the estimated number of potential travellers at a reasonable cost. It seems unnecessary to provide competing service.

The other two routes also seem promising. They are both fairly long routes, which is a condition conducive to transit usage, and the fares which probably could be charged would cover the marginal operating costs at well below the maximum predicted ridership. Of course how well these routes would really do depends in part on how productively the vehicles and drivers could be used in the middle of the day. The following section suggests some midday services that could be matched to routes B and C.

Of the ten routes which remain, three are into Texarkana from outlying areas. All three, D, I, and M, seem very likely to have a significant ridership. They are long routes, and the predicted ridership is close to or higher than the break-even point at the suggested one-way fares. The ultimate attractiveness of each of these routes will depend on the actual destinations within the Texarkana urbanized area. If the deviations required within the city consume more than 15 or 20 minutes, ridership will be discouraged. The ultimate financial feasibility of all three services may depend on whether the vehicles will start at THDC headquarters in Texarkana or whether they can be started in the outlying areas (perhaps by hiring drivers who live in those areas). Lastly of course, the costs of the services will be affected

by how productively the drivers and vehicles can be used during the day.

Of the remaining routes, the most attractive are F, J, and L. However, these routes are questionable. It is less likely that THDC can start the vehicles in the outlying district of origin and there may be difficulties in effectively utilizing the vehicles during the day. If daytime services could be provided in Sevier to keep the peak-to-base ratio high, route L would be the most efficient of the three routes.

One additional service option should be discussed. International Paper is located in Cass County, just 2 miles from the regional study southern boundary. The plant employs over 800 people and there are indications of substantial travel from both Texarkana and outlying areas to the plant. One possible service is from Texarkana to the plant. Mid-day service would then be required in Queen City and Atlanta, both outside the study area.

Route Deviation Fixed Route Service

Route deviation service is a variety of subscription or fixed route service; it assumes that a vehicle will follow a fairly fixed schedule and route but will make slight deviations to either pick individual people up or drop them off. The personal element of the service has both advantages and disadvantages. While it encourages ridership by not requiring extensive transferring or waiting at isolated stops, the deviation increases the total amount of time spent by all passengers already on board. This kind of deviation will usually be tolerated only if the time involved is a small percentage of total running time.

In examining the O-D matrices, and the findings of the regional employment study, only two feasible services of this type could be identified. The first is a route beginning in DeKalb and travelling to New Boston, to the Lone Star Armory and RRAD, and then Texarkana. The predicted ridership patterns are as follows:

District	Passengers		Mileage	Marginal/Total Running and Waiting Time
	Get On	Get Off		
24	22/66	--	--	--
23	10/30	7/21	13 mi	20/30 min.
21	13/39	13/39	5/18 mi	28/48 min.
Texarkana	--	13/39	12/30 mi	75 min.

This service would need between 21 and 25 passengers to cover marginal operating costs. However, since passengers travelling from DeKalb and to a lesser extent from New Boston would incur additional riding time because of the pick-ups and stops enroute, the service is less attractive than express service. It seems sensible to assume that the more conservative mode split predictions would hold. However, even with the conservative mode split assumption, this route should more than cover the minimum ridership. Of course, again cost patterns are very sensitive to the initial starting location of the vehicle and to the use to which the vehicle can be put during the day in Texarkana.

A second route would begin in DeQueen, travel through the country to Ashdown, and then travel to Texarkana. The very long distances involved make this route a potentially feasible one. The potential ridership patterns are:

District	Passengers		Mileage	Marginal/Total Running and Waiting Time
	Get On	Get Off		
29	4/12	--	--	--
28	3/9	1/3	34 mi	54 min.
Texarkana	--	6/18	20 mi	42/96 min.

This route would require approximately 14 passengers daily to cover marginal operating costs and that seems problematic here. Still, this route might be a feasible one, given some subsidy, and it might grow to a point where it would not require subsidy.

Summary of Potential Home-to-Work Services

There are a number of attractive and potentially feasible home-to-work routes which could be effectively served by a rural public transit system. This section of the report has described and analyzed these routes, but the cost parameters of the suggested routes are very sensitive to the use to which the vehicles and drivers can be put during the remainder of the day. Every transit system attempts to have as high a peak-to-base ratio as possible in order to keep average costs down. The following, and final, section of this report analyzes potential non-work and mid-day use of the vehicles throughout the service area.

IDENTIFYING NON-WORK TRAVEL PATTERNS IN THE REGION

Table IV-7 presents the non-work origin and destination table for the four-county region based on the travel demand modelling techniques described in Part III of this report. Using the traditional modal split estimation process, several pairs of districts were identified as having a significant number of non-work trips that could be served by a public transit system.

In this section we will stress those non-work, and generally mid-day, services that could complement and support the promising home-to-work options suggested in the previous section. The thirteen subscription services described in the preceeding sections brought vehicles and drivers into certain districts where they must be used during the day to keep productivity high. In particular, the following options "stranded", or left vehicles during non-peak hours in the following districts or locations:

In Texarkana Mid-day

Options D, I, and M

In District 21 (Whaley, Hooks)

Options A, G, and J

In District 23 (New Boston)

Options E and K

In District 24 (DeKalb)

Options B, F, and H

In District 26 (Garland)

Option C

In District 29 (DeQueen)

Option L

These districts can be matched to promising corridors of demand for non-work services. The three major types of non-work services considered are subscription services from outlying areas into Texarkana, route-deviation fixed-route services in rural districts, and demand responsive services in or outside Texarkana. These services must be matched to both complementary work-trip options and natural corridors of non-work travel demand.

Unfortunately, we have far less data with which to work and must depend on general indications of demand for non-work travel. The following origin and destination pairs give promise of supporting a number of mid-day travel activities:

From Texarkana to:	Potential Travellers
21	1486
24	813
26	369
27	323
From District 21 to:	
Texarkana	878
24	73
From District 23 to:	
21	37
24	40
From District 24 to:	
Texarkana	590
23	43
From District 26 to:	
Texarkana	300

TABLE IV-7. NON-WORK ORIGIN AND DESTINATION MATRICES

Living in District	District of Destination									
	20	21	22	23	24	25	26	27	28	29
20	---	308	37	42	109	8	20	23	33	45
21	312	---	510	3132	7262	256	219	290	658	770
22	48	630	---	295	691	100	57	91	120	192
23	50	3717	273	---	4000	174	64	104	245	287
24	140	3485	679	4252	---	742	254	417	1357	1586
25	10	289	87	165	664	---	24	39	94	110
26	29	319	64	77	292	31	---	141	132	149
27	30	370	92	112	423	46	107	---	187	219
28	39	760	108	237	1239	96	105	168	---	650
29	45	872	170	273	1423	110	116	193	638	---

If the proper services could be provided to support these potential non-work transit riders, a majority of the work-trip options could be made more attractive. In particular options A, C, D, G, I, J, and M become more attractive and more likely to show promising cost parameters.

In order to identify exactly where in each district non-work trips were being attracted, an inventory of all major commercial, medical, service, and recreational facilities throughout the four-county region was undertaken. Figures IV-4 through IV-11 indicate the major non-work trip attractors in each of the four counties and in all the districts listed above. Using these maps, it should be possible to actually fix the routes or at least the service parameters of non-work public transit travel for the promising pairs listed above.

SETTING CHARGES AND THE USE OF SECTION 18 OPERATING ASSISTANCE

One of the biggest problems facing a system which serves both contract customers and the general public is how to charge for service. In many such systems contracting agencies are billed for the actual cost of the service delivered to their clients, or at least some average trip cost figure. The general public is usually charged only a nominal fee; 25 to 50¢ is common. However, there is nothing in the regulations which forbids a system from charging the general riding public a "fair" charge representing at least the average cost of service. It is often not done because trip costs above $1.00 are seen as discouraging ridership by the general public.

On the other hand, agencies which contract with a transportation system for actual trip costs are understandably unhappy when they pay $2-8 per trip for trips which their own clients could buy by themselves (if capable) for 50¢. In some areas, such agencies have simply purchased 50¢ tickets or given their clients the 50¢ directly and stopped paying the transportation system the actual or average costs of transporting their clients. Such behavior seriously threatens the operation of a rural system which must depend on continued contract funds to operate efficiently.

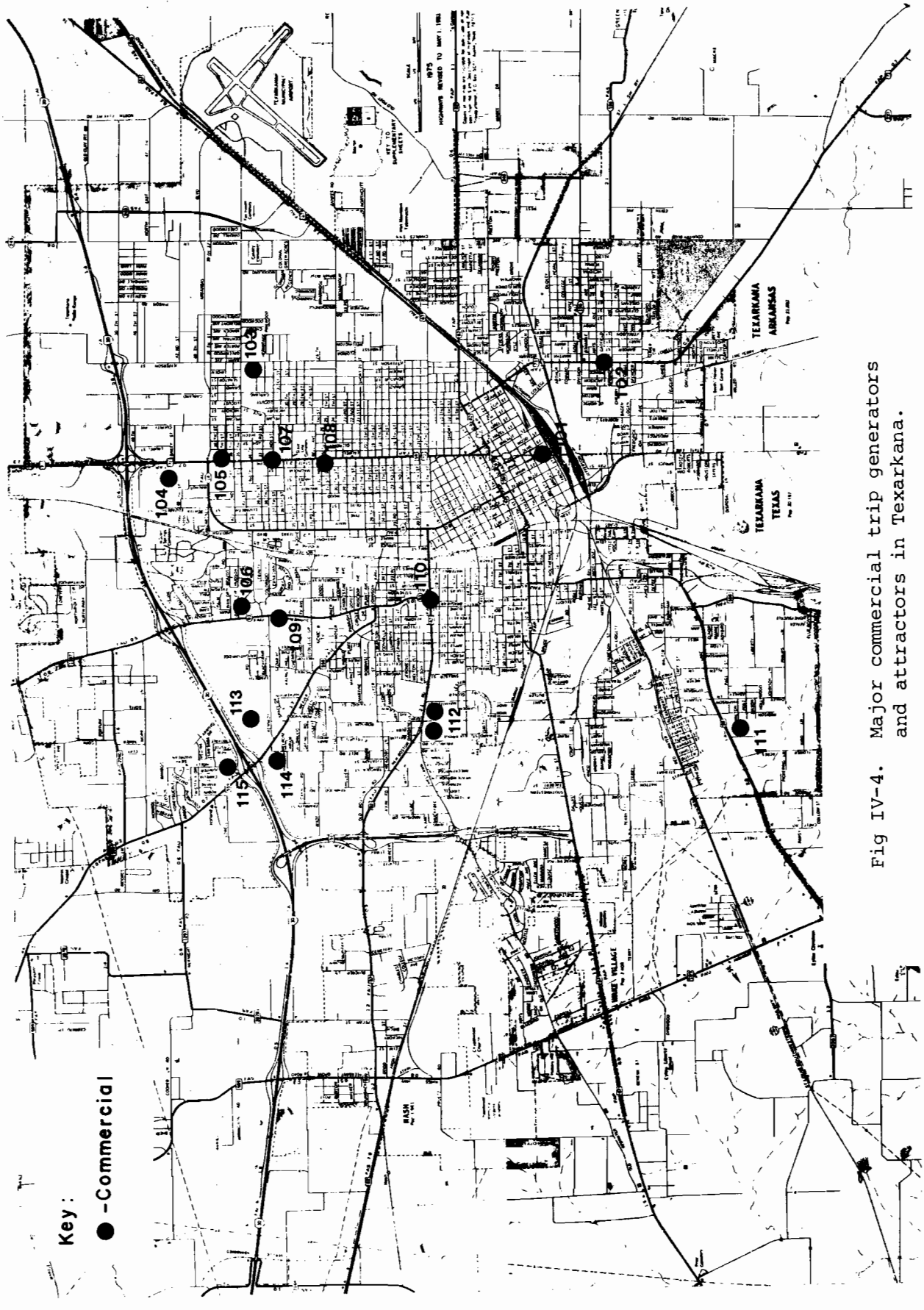

Fig IV-4. Major commercial trip generators and attractors in Texarkana.

MAJOR GENERATORS, AS SHOWN ON FIG IV-4

Number	● Commercial	Location
101	Downtown Texarkana/Broad and Main	Texarkana
102	College Hill Shopping Center	
103	Safeway Supermarket	
104	K-Mart Shopping Center	
105	Skaggs-Alpha-Beta	
106	Summerhill Square Shopping Center	
108	Howard Plaza	
109	Safeway Supermarket	
110	TG&Y Shopping Center/Weingartens	
111	Southwest Shopping Center	
112	Oaklawn Shopping Center/Safeway	
113	Central Mall	
114	Townwest	
115	Richmond Road Shopping Center	

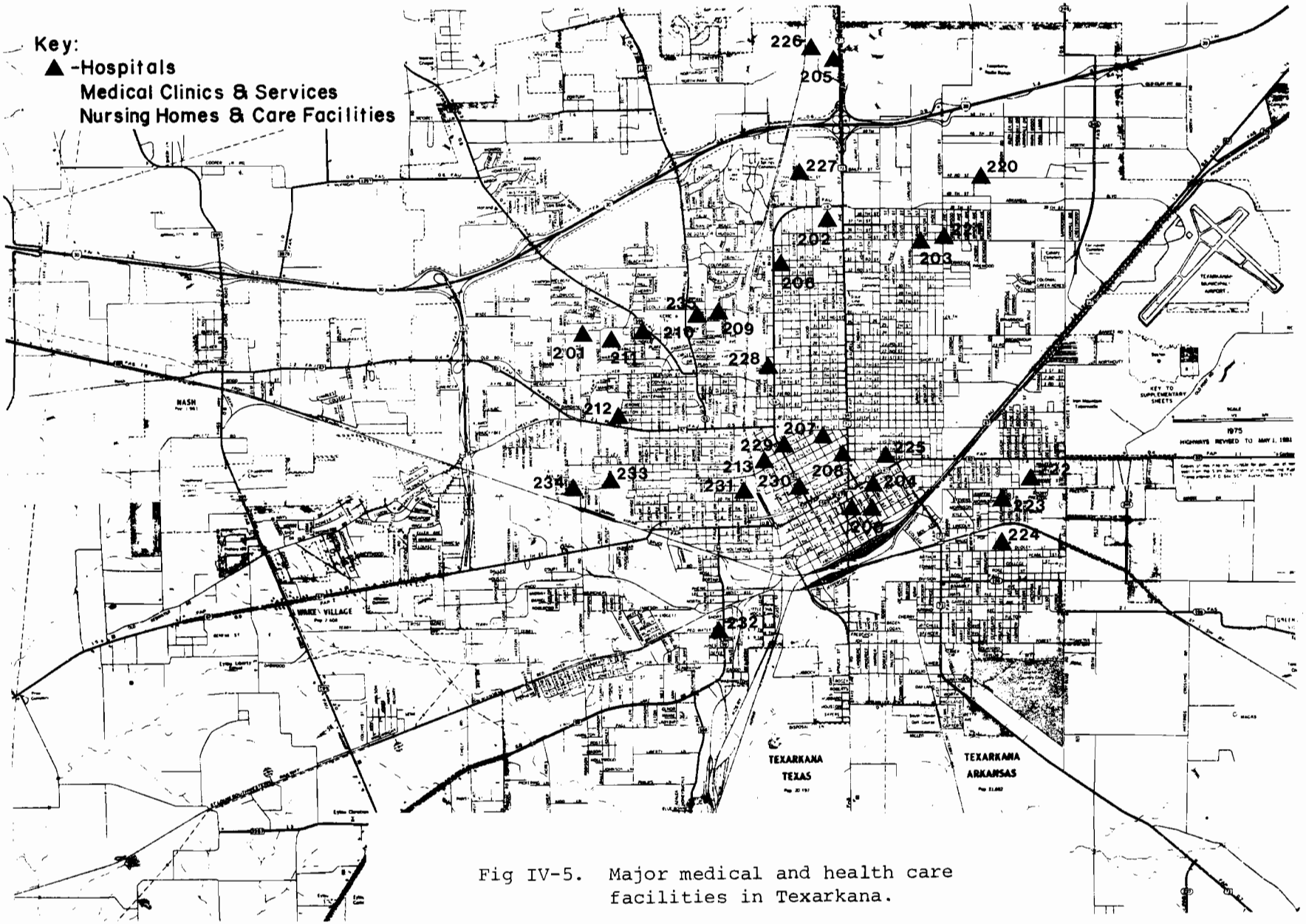

Fig IV-5. Major medical and health care facilities in Texarkana.

MAJOR GENERATORS, AS SHOWN ON FIG IV-5

Number	▲ Hospitals	Location
200	St. Michael's Hospital	Texarkana
201	Texarkana Community Hospital	
202	Wadley Hospital Medical Complex	
	▲ Medical Clinics and Services	
203	Spanish Trace Clinic	Texarkana
204	Southern Clinic	
205	Southwest Arkansas Counseling and Mental Health Center, Inc.	
206	Collum and Carney Medical Center	
207	Temple Memorial Treatment Center: Therapy for Children and Adults	
208	Main St. Medical Center	
209	Four States Blood Service	
210	Glenwood Medical Center	
211	Alcohol Detoxification Unit	
212	Texarkana Plasma Lab	
213	Bowie County Health Clinic	

(continued)

Number	▲ Nursing Homes and Care Facilities	Location
220	Medicalodge Nursing Home (105 beds)	Texarkana
221	Evergreen Place (70 beds)	
222	Leisure Lodge Nursing Home (52 beds)	
223	Pinehurst Nursing Home (42 beds)	
224	Rehabilitation Center	
225	Haven Home	
226	Texarkana Special Education Center	
227	Leisure Lodge Nursing Home (120 beds)	
228	Commission for the Blind	
229	Ben and Jane Collins Home for Women	
230	Texas Rehabilitation Commission Office	
231	Vocational Industrial Center	
232	Child Care Center	
233	Four States Nursing Home (180 beds)	
234	Oak Manor Nursing Home (56 beds)	
235	Tanglewood Nursing Home (118 beds)	

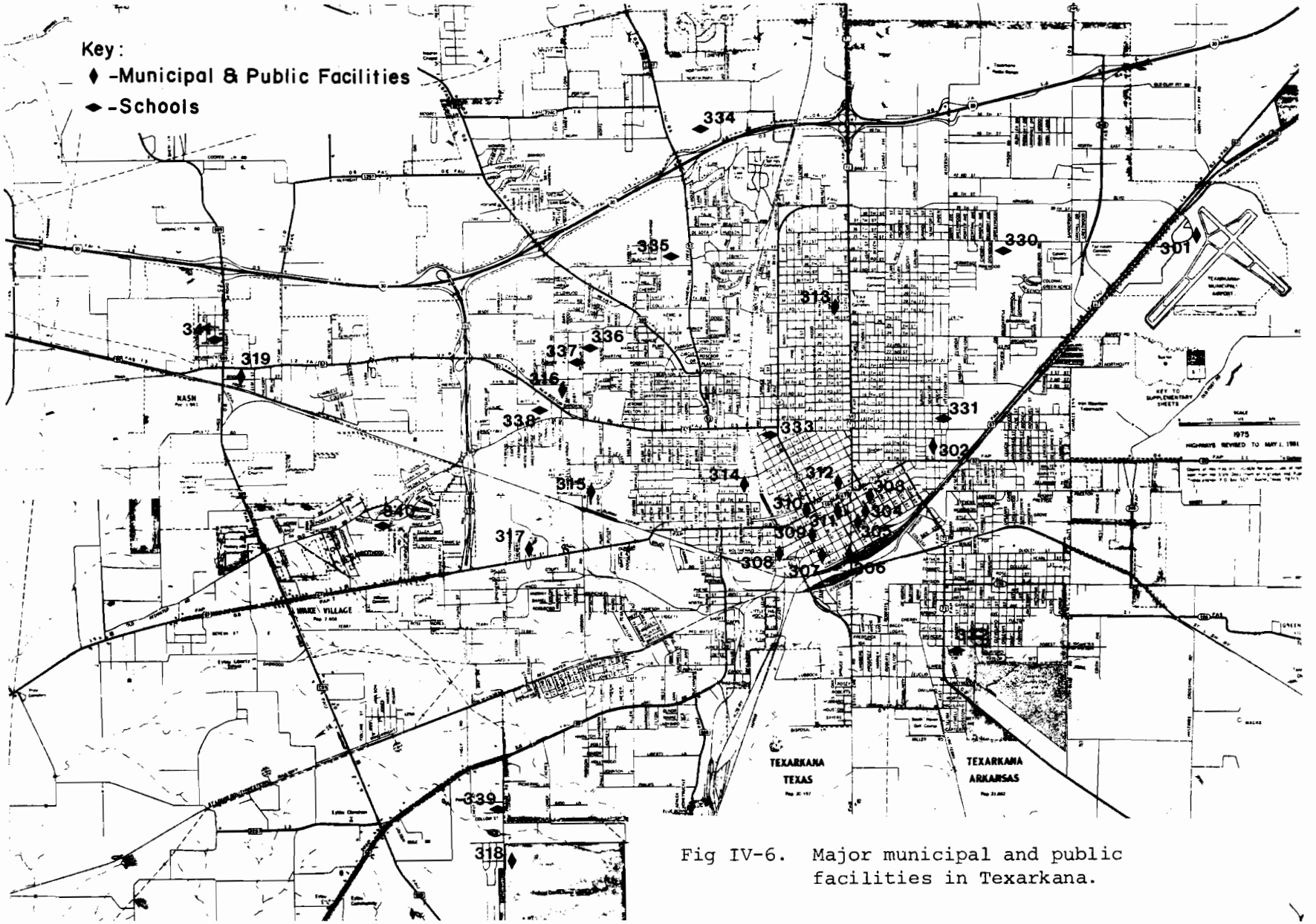

Fig IV-6. Major municipal and public facilities in Texarkana.

MAJOR GENERATORS, AS SHOWN ON FIG IV-6

Number	♦ Municipal and Public Facilities	Location
301	Texarkana Municipal Airport	Texarkana
302	Miller County Health Department	
303	County Courthouse	
304	Arkansas Municipal Building/City Hall——Arkansas	
305	Trailways Bus Terminal	
306	Amtrak Station	
307	City Hall——Texas	
308	Public Library	
309	Bowie County Building	
310	Greyhound/Jefferson Lines Bus Terminal	
311	U.S. Post Office	
312	Chamber of Commerce	
313	Social Security Office	
314	Department of Human Resources	
315	Housing Authority Office	
318	Federal Correctional Institution	
319	Nash City Hall	

(continued)

Number	Schools	Location
330	North Heights Junior High School	Texarkana
331	Arkansas High School	
332	College Hill Junior High School	
333	Pine Street Junior High School	
334/336	East Texas State University	
335	Texas Senior High School	
337	Texarkana Community College	
338	Westlawn Junior High School	
339	Liberty-Eylau Junior High School	
340	Wake Village School	
341	Nash School	

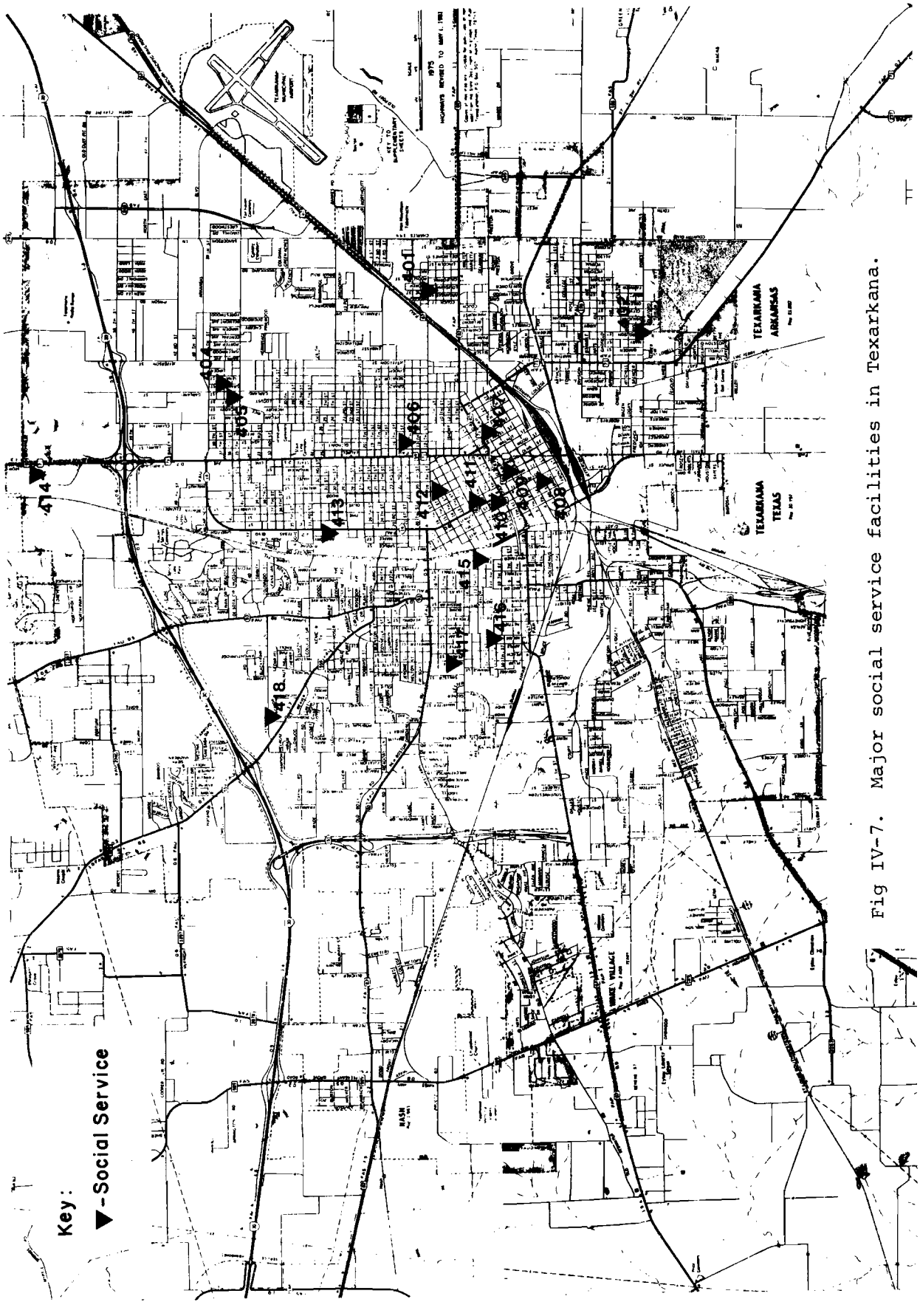

Fig IV-7. Major social service facilities in Texarkana.

MAJOR GENERATORS, AS SHOWN ON FIG IV-7

Number	Social Service Facilities	Location
401	Hacota Homes Nutrition Center	Texarkana
402	College Hill Nutrition Center	
404	Southwest Arkansas Resource Center	
405	North Heights Nutrition Center	
406	Sandflats Nutrition Center	
407	First United Methodist Nutrition Center	
408	United Way of Greater Texarkana, Inc.	
409	Senior Citizens Services of Texarkana, Inc. (Main Office)	
410	American Red Cross	
411	American Cancer Society	
412	Christine Franks Therapy for Children and Adults	
413	Volunteer Services Bureau	
414	Texarkana Human Development Center	
415	Texarkana Sheltered Workshop, Inc.	
416	Adult Learning Center	
417	Community Action Resources Services, Inc. Admin.	
418	Adult Day Activity Center	

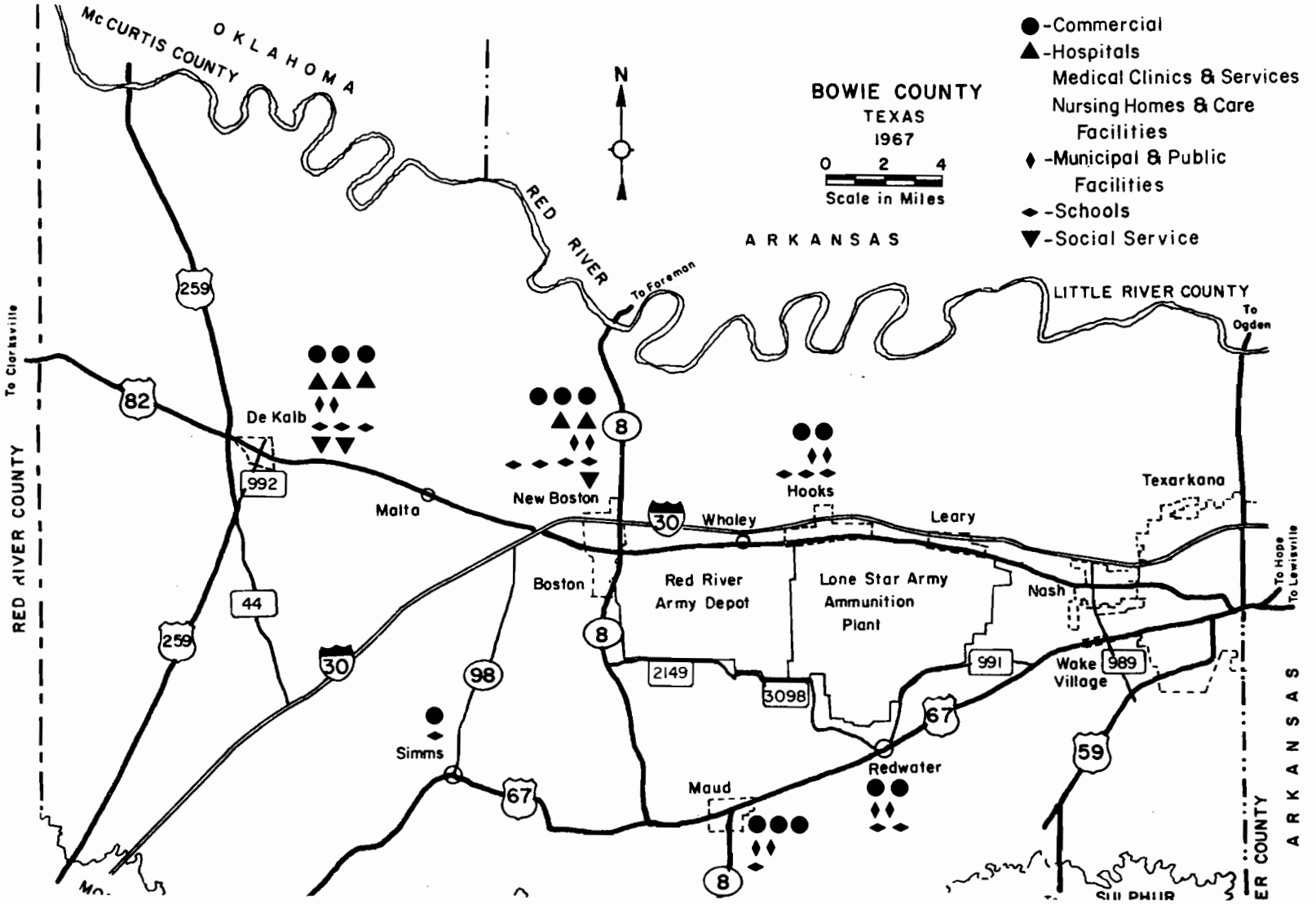

Fig IV-8. Major commercial, public health care, and social service facilities in Bowie County (outside of Texarkana).

MAJOR GENERATORS, AS SHOWN ON FIG IV-8

Number	● Commercial	Location
140	Piggly Wiggly	DeKalb Bowie County
141	Save Mart Grocery	
142	Hawkins Furniture	
	▲ Medical Clinics and Services	
240	Rural Medical Clinic	
241	DeKalb Clinic	
242	DeKalb Electrolysis Clinic	
	♦ Municipal and Public Facilities	
345	Post Office	
346	Texas Department of Human Resources	
	◆ Schools	
347	DeKalb Elementary School	
348	DeKalb High School	
349	DeKalb Junior High School	

(continued)

Number	▼ Social Service Facilities	Location
440	DeKalb Senior Citizens Services Center	DeKalb
441	Industrial Cooperative Training Dept.	Bowie County (continued)
	● Commercial	
143	Piggly Wiggly	New Boston Bowie County
144	Parker and Howell Grocery	
145	Kountry Market	
	Hospitals	
243	New Boston General Hospital	
	▲ Nursing Homes and Care Facilities	
244	New Boston Nursing Center	
	♦ Municipal and Public Facilities	
350	Housing Authority	
351	Post Office	
	◆ Schools	
352	Crestview Elementary School	
353	New Boston High School	
354	New Boston Junior High School	
355	Oakview Elementary School	

(continued)

Number	▼ Social Service Facilities	Location
442	New Boston Senior Citizens Services Center	New Boston Bowie County (continued)
	● Commercial	
146	D & D Grocery	Hooks Bowie County
147	Jackson's Thrifty Food Store	
	♦ Municipal and Public Facilities	
356	Post Office	
357	Community Action Resource Service, Inc.	
	◆ Schools	
358	East Hooks Elementary School	
359	Hooks High School	
360	Hooks Junior High School	
	● Commercial	
148	Bargain Store	Maud Bowie County
149	DeLaughter's Food Center	
150	Piggly Wiggly	
	♦ Municipal and Public Facilities	
361	Post Office	
362	City Hall	

(continued)

Number		Location
	◆ Schools	
363	Maud School	Maud Bowie County (continued)
	● Commercial	
151	Grannies Grocery and Country Kitchen	Redwater Bowie County
152	Spencer Grocery and Market	
	♦ Municipal and Public Facilities	
364	Post Office	
365	Office of Economic Opportunity	
	◆ Schools	
366	Redwater Junior High School	
367	Texarkana College Truck Driving School	
	● Commercial	
151	Powell Grocery	Simms Bowie County
	◆ Schools	
368	James Bowie School	

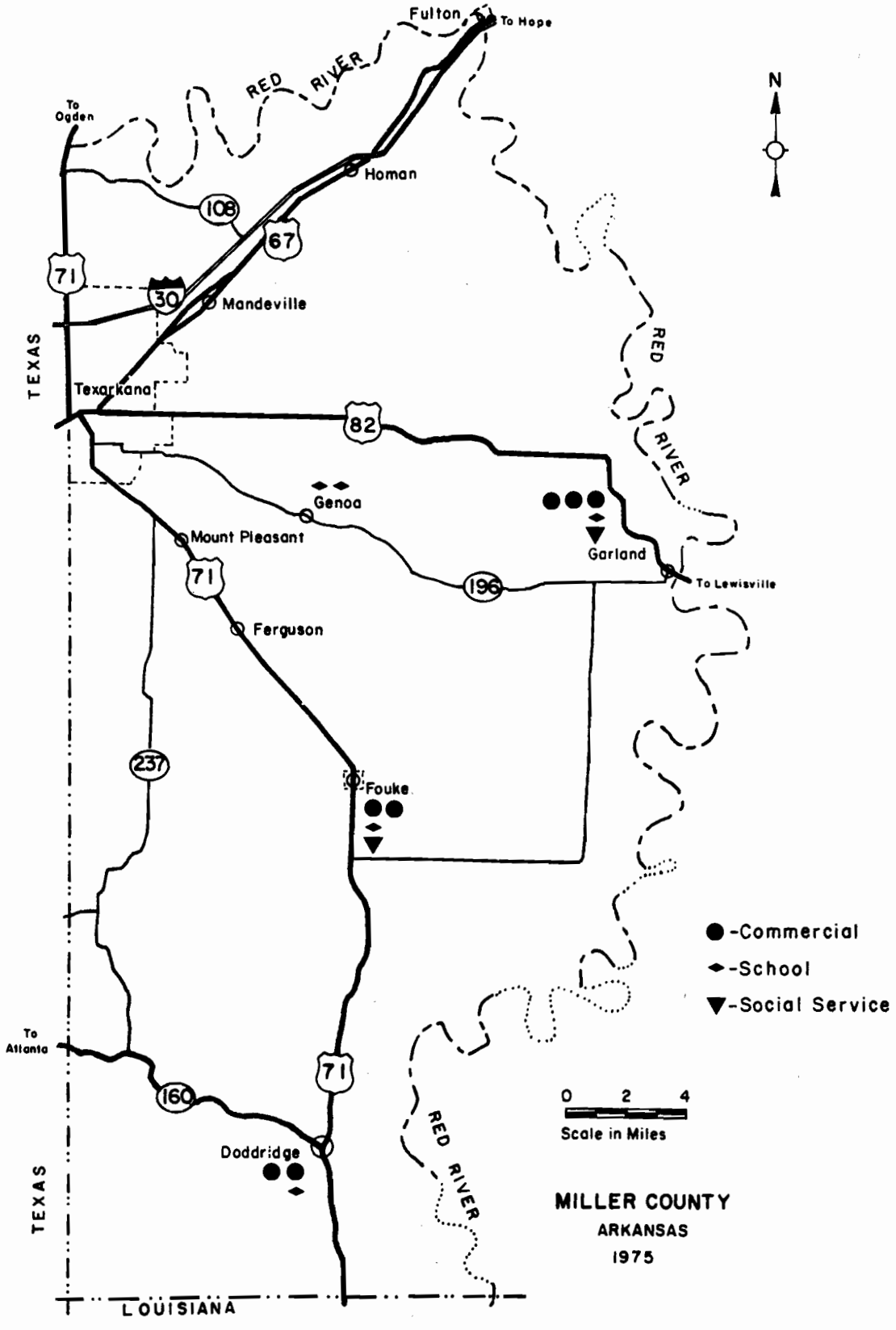

Fig IV-9. Major commercial, public health care, and social service facilities in Bowie County (outside of Texarkana).

MAJOR GENERATORS, AS SHOWN ON FIG IV-9

Number	● Commercial	Location
170	Big Star Grocery	Fouke Miller County
171	Davis Roy Grocery	
	◆ Schools	
370	Fouke High School	
	▼ Social Service Facilities	
470	Senior Citizens Services	
	● Commercial	
172	Dunlop Grocery and Station	Doddridge Miller County
173	Bricker's General Store	
	◆ Schools	
371	Bright Star School	
	● Commercial	
174	E-Z Mart Store	Garland Miller County
175	Greenshaw Grocery	
176	Stevens Grocery	

(continued)

Number	Schools	Location
372	Garland High School	Garland Miller County (continued)
	▼ Social Service Facilities	
471	Senior Citizens Services	
	◆ Schools	
373	Genoa Central Elementary School	Genoa Miller County
374	Genoa Central High School	

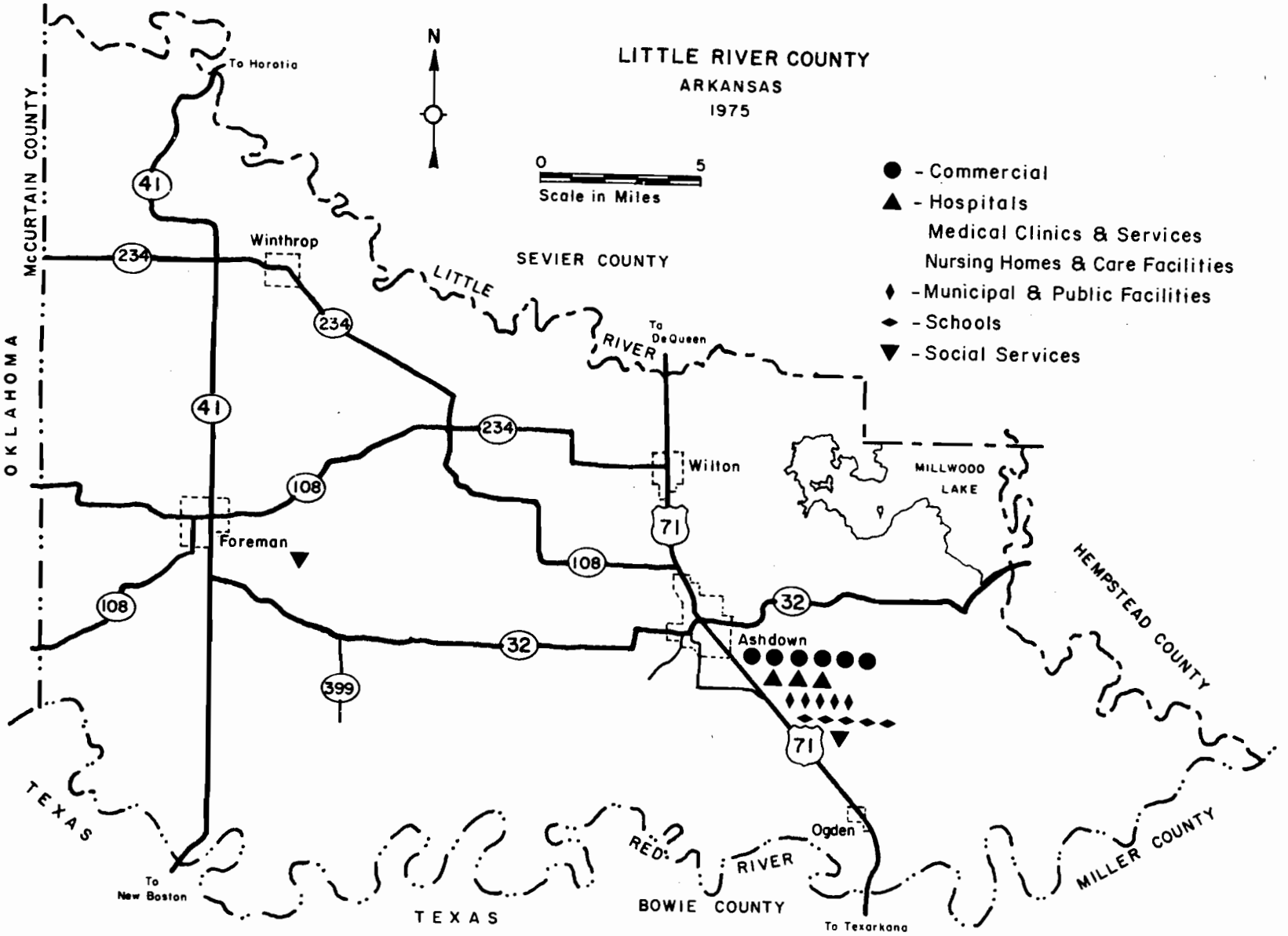

Fig IV-10. Major commercial, public health care, and social service facilities in Little River County (outside of Texarkana.

MAJOR GENERATORS, AS SHOWN ON FIG IV-10

Number	● Commercial	Location
170	Sears	Ashdown Little River County
171	Shur-way Grocery	
172	Urrey's Department Store	
173	Wal-Mart Discount Cities	
174	E-Z Mart Stores	
175	Brookshire Food Store	
	▲ Hospitals	
280	Memorial Hospital	
	▲ Medical Clinics and Services	
281	Ashdown Clinic	
	▲ Nursing Homes and Care Facilities	
282	Little River Nursing Home	

(continued)

Number	Municipal and Public Facilities	Location
380	City Hall/Chamber of Commerce	Ashdown Little River County (continued)
381	Post Office	
382	Southwest Arkansas Development Council, Inc.	
383	Welfare Department, Health Building	
384	Little River Rural Development Authority	
	Schools	
385	Ashdown School ESEA	
386	Burke Street Elementary School	
387	C. D. Franks Elementary School	
388	Ashdown Junior High School	
389	Ashdown Senior High School	
	Social Service Facilities	
480	Ashdown Senior Citizens Center	
	Social Service Facilities	
481	Foreman Senior Citizens Center	Foreman Little River County

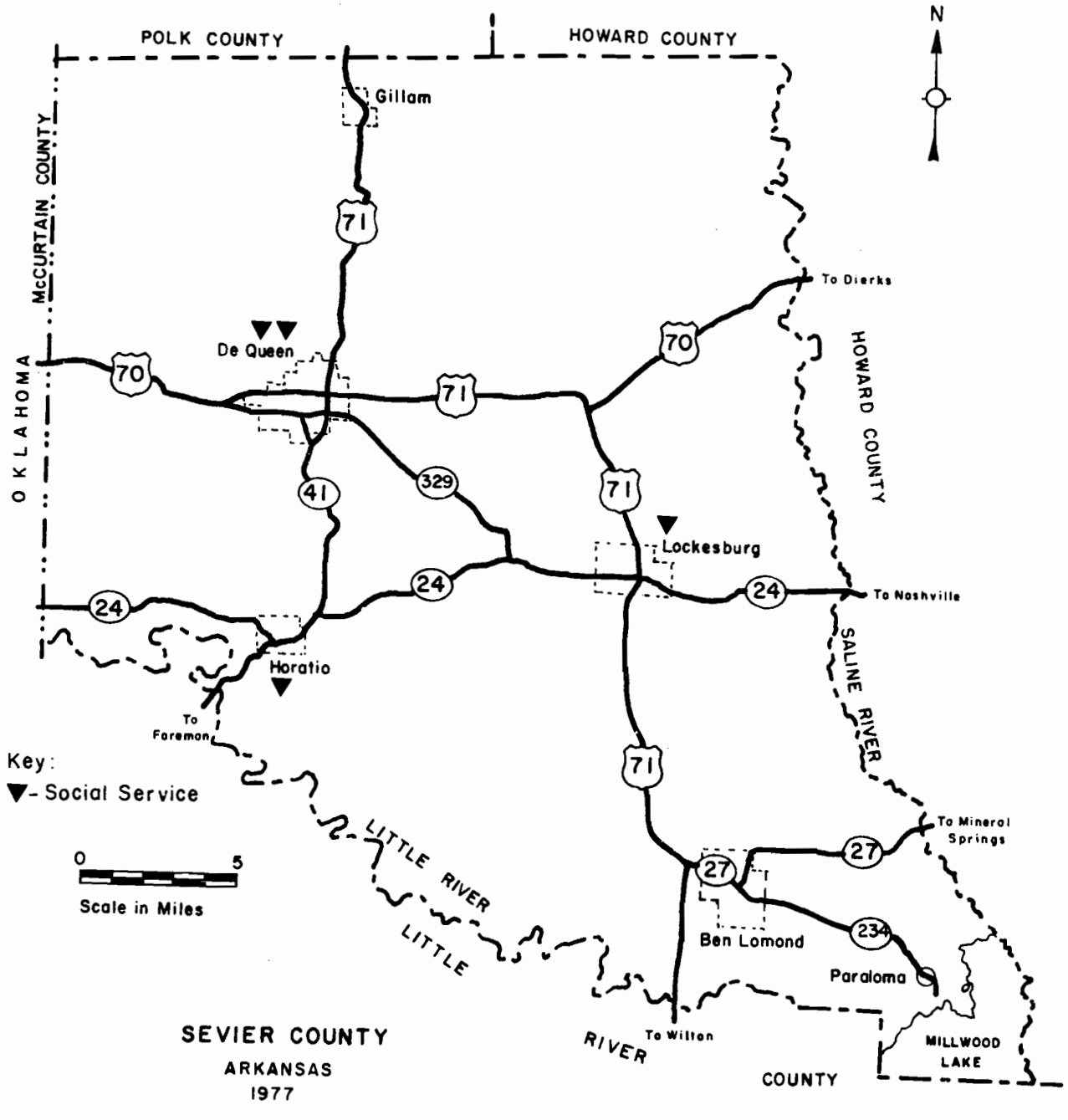

Fig IV-11. Major commercial, public health care, and social service facilities in Sevier County.

MAJOR GENERATORS, AS SHOWN ON FIG IV-11

Number	▼ Social Service Facilities	Location
482	DeQueen Senior Citizens Center	DeQueen Sevier County
483	DeQueen Adult Activity Center	
484	Senior Citizens Center	Horatio Sevier County
485	Senior Citizens Center	Lockesburg Sevier County

While THDC probably cannot devise a system which will charge each passenger, or the agency paying for each passenger, the actual and full cost of each particular trip, it can devise an equitable system which charges an average trip cost which can be varied by (1) type of service provided, (2) extra mileage, and (3) extra hourly charges.

It is strongly recommended that THDC use a large portion of Section 18 operating assistance to lower the total cost figure which is in turn used to calculate average trip costs. Then THDC could charge all passengers or the agencies paying for those passengers the same fare for comparable services, based on this average cost figure.

It is also suggested that THDC's bill for service should list the full, unsubsidized average cost of service and then list the portion which will be covered by Section 18 operating assistance. Finally, the third figure, the average subsidized trip cost should be listed. Such a procedure will constantly remind agencies that they are not paying the full cost of providing transportation to their clients.

The remainder of the available operating assistance could be used to subsidize a small number of public clients who cannot afford the average fare and who are not associated with an agency willing or able to cover all or part of their fare. A fairly stringent screening system should be used to establish a person's eligibility for this service.

Fares may be differentiated by type of service. Subscription services for individuals or groups may be priced differently than demand-responsive services, particularly if the former are both guaranteed capacity and guaranteed time. Services which require extra driver assistance or extra driver time could have an additional charge added to the base trip rate.

Trips which involve lengthy or complicated routes could have an additional mileage charge added to the base trip rate. Trips, however, in which pre-formed groups travel together could be granted discounts.

Trips offered to the general public would then be charged at the same rate as comparable trips delivered to clients of social service agencies under contract to the system. While the same client might pay different amounts for the same trip because a part or all of one trip was being financed by a special agency, fares for the trip would always be comparable.

This pricing policy would be easiest to implement for long, subscription trips, particularly home-to-work trips, and for demand-responsive trips. Pricing of other types of trips might create some resentment among the general travelling public.

THE POSSIBLE NEED FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY

In order to operate a public transportation system over the highways of either Texas or Arkansas, a Certificate of Public Convenience and Necessity must be obtained. The Texas Railroad Commission and the Arkansas Transportation Commission are the respective state regulatory agencies requiring such a certificate:

> No common carrier by motor vehicle . . . shall engage in any operation on any public highway in this State unless there is in force with respect to such carrier a certificate of public convenience and necessity . . . authorizing such operations. (1)

The agencies ascertain the need for such service and review applications in order to avoid duplication of service with existing providers. Both state agencies have the power to regulate fares, routes, schedules, and services.

The applicant must provide the agencies with proposed routes, time schedules and rates, vehicle description and capacity, and information regarding existing transportation service operating along the same corridors. In addition, the applicant must provide a disclosure of financial status.

In determining whether or not a certificate should be issued, the Commission considers the following: (1) the probable permanency of the system, (2) the character and quality of service to be offered, (3) the location of terminals and routes, (4) the condition and limitations of the equipment, (5) the financial ability of the applicant, (6) the experience of the applicant in the transportation of passengers, and (7) liability insurance coverage. (2)

Some Section 18 recipients in Texas have applied for and obtained Certificates from the Railroad Commission. Others have apparently been informally advised by Commission staff that such an application is not necessary. Still others have decided for themselves that they are not required to seek a certificate. It does appear that the Texas Railroad Commission will <u>not</u> actively seek out operation systems with no certificates if there are no protests. On the other hand, a non-certificated Section 18 operator was stopped and

protests. On the other hand, a non-certificated Section 18 operator was stopped and ticketed in Texas recently and the case has not been settled. Overall, it seems likely that, if no other carriers protest the stablishment of the THDC rural public transit system or any of its proposed routes or services, no certificate will be required.

CONCLUSIONS

THDC is a special service for social service agencies and disadvantaged individuals. Evolution to a rural system open to the general public is not only possible but extremely feasible. The evolution to a public system serving members of the general riding public unaffiliated with social service agencies can be accomplished (1) in a limited way with existing resources using excess capacity and (2) in a more acceptable manner with an expansion of capacity.

The FHWA has generally allowed Section 18 recipients who are basically social service transportation systems to evolve into public transit systems while continuing as major social service providers. For THDC a combination of services would promote efficiency and allow it to offer public service at the lowest possible cost. This report has identified complementary work and non-work demand patterns that will allow THDC to continue in its traditional role in the social service community and expand into a public service eligible for Section 18 operating funds.

It is recognized that THDC must grow and expand without providing effective competition to existing public or common carriers in Texas or Arkansas. All of the analyses in this report were conducted with the non-competitive objective firmly in mind. No public services are offered or considered that would compete with existing carriers.

It is clear that THDC could offer some services to the general public with existing resources. Services offered to the public would have to be tailored to filling excess capacity in a way that does not interfere with THDC's contractual obligations to the many service agencies with which it contracts. In general this would limit services to one or two subscription trips, which could be most easily accomodated. Demand-responsive trips could be accomodated only in those periods with significant excess capacity.

Similarly, some services during certain time periods would have to be limited to individual trips because of limited capacity or limited time for lengthy vehicle tours (which might interfere with contractual oblications). Group trips, such as outings from nursing homes, could probably be accomodated only during periods of very high excess capacity. However, as THDC begins expanding its vehicle fleet, it will gain the ability to serve the complementary packages of work and non-work services suggested in this section.

With an expanded vehicle fleet and additional staff resources, THDC could begin to provide a number of additional services to the public. Among the possibilities which the data analysis in this report shows as possible are:

(1) subscription home-to-work trips for concentrated employment generators in Little River, Sevier, and Miller Counties, as well as Texarkana;

(2) subscription group services from senior centers, nursing homes, and other facilities in outlying Miller and Bowie Counties into Texarkana; and

(3) flexible routes from outlying areas into Texarkana at times and along routes not in conflict with existing motor carriers.

REFERENCES

(1) Arkansas Transportation Commission. Arkansas Motor Carrier Act, June 30, 1981.

(2) Texas Railroad Commission, Transportation Division. The Texas Bus Act, November 1978.

APPENDIX A

POPULATION PROJECTION ESTIMATION TECHNIQUES

POPULATION PROJECTION ESTIMATION TECHNIQUES

Population projections covering 50 years from 1980 to 2030 are provided for both Texarkana's and each of the four counties. The projections were calculated utilizing linear regression and non-linear, or exponential, analysis. The projections are based upon known population data for 1930 to 1950, given in Table I-3. Little River and Sevier Counties, however, data are based upon 1950 to 1980, as earlier population levels are inconsistent with current trends. The 1980 populations of both counties were found to be at levels below those in 1930.

Linear regression is based upon a constant incremental increase in population for each successive year. The projections represent a linear average extrapolated from available historical data.

Exponential projections differ in that they represent a constant percentage increase for each successive year, also based upon historical population data. That is, the population is projected to increase by a constant percentage for each successive year. Exponential values tend to be greater than those derived by linear regression.

Examples of both linear and exponential computational methods are given below. The Summary Data Tables include projections as determined by both methods, as well as the base data utilized for each.

Population Trends

1. Linear Regression: 1930-2030

$$b = \frac{n\Sigma xy - (\Sigma x)(\Sigma y)}{n\Sigma x^2 - (\Sigma x)^2} \qquad \text{(slope on the line)}$$

$$a = \frac{\Sigma y}{n} - b\left(\frac{\Sigma x}{n}\right) \qquad \text{(y intercept)}$$

$$y = a + bx \qquad \text{(equation for a line)}$$

1. Example (Bowie County)

Year	x	x^2	y	xy
1930	0	0	48,563	0
1940	2	4	50,208	100,416
1950	4	16	61,966	247,864
1960	6	36	59,971	359,826
1970	8	64	68,909	551,272
1980	10	100	75,301	753,010
	30	220	364,918	2,012,388

$$b = \frac{6(2,012,388) - (30)(364,918)}{6(220) - (30)^2}$$

$$= 2,683$$

$$a = \frac{364,918}{6} - 2,683\ (\frac{30}{6})$$

$$= 47,405$$

$$y = a + bx$$

$y = 47,405 + (2,683)(0) = 47,405$ (1930)
$y = 47,405 + (2,683)(2) = 52,771$ (1940)
$y = 47,405 + (2,683)(4) = 58,137$ (1950)
$y = 47,405 + (2,683)(6) = 63,502$ (1960)
$y = 47,405 + (2,683)(8) = 68,868$ (1970)
$y = 47,405 + (2,683)(10) = 74,234$ (1980)
$y = 47,405 + (2,683)(11) = 79,599$ (1990)
$y = 47,405 + (2,683)(12) = 84,965$ (2000)
$y = 47,405 + (2,683)(13) = 90,331$ (2010)
$y = 47,405 + (2,683)(14) = 95,696$ (2020)
$y = 47,405 + (2,683)(15) = 101,062$ (2030)

2. Nonlinear Regression Analysis——Exponential Curve: 1930-2030

$$b = \frac{n\Sigma x(\ln Y) - (\Sigma x)(\Sigma \ln Y)}{n\Sigma x^2 - (\Sigma x)^2}$$

$$a = \frac{\Sigma \ln Y}{n} - b\left(\frac{\Sigma x}{n}\right)$$

$$\ln Y = \log_e Y$$

2a. Example (Bowie County)

Year	x	x^2	Y	$\ln Y (\log_e Y)$	$x(\ln Y)$
1930	0	0	48,563	10.79	0.00
1940	2	4	50,208	10.82	21.64
1950	4	16	61,966	11.03	44.12
1960	6	36	59,971	11.00	66.00
1970	8	64	68,909	11.14	89.12
1980	10	100	75,301	11.23	112.30
	30	220	364,918	66.02	333.00

$$b = \frac{6(333) - (30)(66.02)}{6(220) - (30)^2}$$

$$= .044$$

$$a = \frac{66.02}{6} - .044\left(\frac{30}{6}\right)$$

$$= 10.78$$

Y = a + bx		$\log_e$	Anti-log	Year
Y = 10.78 + (.044)(0)	=	10.78	48,109	1930
Y = 10.78 + (.044)(2)	=	10.87	52,580	1940
Y = 10.78 + (.044)(4)	=	10.96	57,466	1950
Y = 10.78 + (.044)(6)	=	11.05	62,807	1960
Y = 10.78 + (.044)(8)	=	11.14	68,643	1970
Y = 10.78 + (.044)(10)	=	11.22	74,608	1980

Population Projections:

Y = 10.78 + (.044)(12)	=	11.31	81,995	1990
Y = 10.78 + (.044)(14)	=	11.40	89,615	2000
Y = 10.78 + (.044)(16)	=	11.49	97,443	2010
Y = 10.78 + (.044)(18)	=	11.58	106,937	2020
Y = 10.78 + (.044)(20)	=	11.67	116,993	2030

3. Summary Data Tables

a. Bowie County

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	%Δ	Number	Δ	%Δ	Number	Δ	%Δ
1930	48,563			47,405			48,109		
1940	50,208	1,645	3.4	52,771	5,366	11.3	52,580	4,471	9.3
1950	61,966	11,758	23.4	58,137	5,366	10.2	57,466	4,886	9.3
1960	59,971	-1,995	-3.2	63,502	5,366	9.2	62,807	5,341	9.3
1970	68,909	8,938	14.9	68,868	5,365	8.5	68,643	5,836	9.3
1980	75,301	6,392	9.3	74,234	5,365	7.8	74,608	5,965	8.7
1990				79,599	5,366	7.2	81,995	7,387	9.9
2000				84,965	5,366	6.7	89,615	7,620	9.3
2010				90,331	5,366	6.3	97,943	8,328	9.3
2020				95,696	5,366	5.9	106,937	8,994	9.3
2030				101,062	5,366	5.6	116,993	10,056	9.3

b. Miller County

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	%Δ	Number	Δ	%Δ	Number	Δ	%Δ
1930	30,586			30,163			30,283		
1940	31,874	1,288	4.2	31,292	1,129	3.7	31,307	1,024	3.4
1950	32,614	740	2.3	32,421	1,129	3.6	32,366	1,059	3.4
1960	31,686	-928	-2.8	33,550	1,129	3.5	33,461	1,095	3.4
1970	33,385	1,699	5.4	34,678	1,128	3.4	34,593	1,132	3.4
1980	37,766	4,381	13.1	35,807	1,129	3.3	35,763	1,170	3.4
1990				36,936	1,129	3.1	36,973	1,210	3.4
2000				38,064	1,128	3.1	38,224	1,251	3.4
2010				39,193	1,129	2.9	39,517	1,293	3.4
2020				40,322	1,129	2.9	40,853	1,336	3.4
2030				41,450	1,128	2.8	42,236	1,383	3.4

c. Little River County

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	Δ%	Number	Δ	Δ%	Number	Δ	Δ%
1930	15,515								
1940	15,932	417	2.7						
1950	11,610	-4,322	-27.1	10,140			10,164		
1960	9,211	-2,399	-20.7	11,041	901	8.9	10,952	788	7.7
1970	11,194	1,983	21.5	11,942	901	8.2	11,800	848	7.7
1980	13,952	2,758	24.6	12,843	901	7.5	12,715	915	7.7
1990				13,744	901	7.0	13,700	985	7.7
2000				14,645	901	6.6	14,761	1,061	7.7
2010				15,546	901	6.2	15,905	1,144	7.7
2020				16,447	901	5.8	17,137	1,232	7.7
2030				17,348	901	5.5	18,465	1,328	7.7

d. Sevier County

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	%Δ	Number	Δ	%Δ	Number	Δ	%Δ
1930	16,364								
1940	14,248	-1,116	-6.8						
1950	12,293	-2,955	-19.4	10,983			10,991		
1960	10,156	-2,137	-17.4	11,624	642	5.8	11,563	572	5.2
1970	11,272	1,116	10.9	12,266	642	5.5	12,165	602	5.2
1980	14,060	2,788	24.7	12,908	641	5.2	12,798	633	5.2
1990				13,550	642	5.0	13,463	665	5.2
2000				14,191	642	4.7	14,164	701	5.2
2010				14,833	641	4.5	14,901	737	5.2
2020				15,475	642	4.3	15,676	775	5.2
2030				16,116	642	4.1	16,492	816	5.2

e. Texarkana, Texas

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	%Δ	Number	Δ	%Δ	Number	Δ	%Δ
1930	16,602			16,543			16,803		
1940	17,019	417	2.5	19,950	3,407	20.6	19,447	2,644	15.7
1950	24,753	7,734	45.4	23,357	3,407	17.1	22,508	3,061	15.7
1960	30,218	5,465	22.1	26,763	3,407	14.6	26,050	3,542	15.7
1970	30,497	279	0.9	30,170	3,407	12.7	30,179	4,099	15.7
1980	31,271	774	2.5	33,577	3,407	11.3	34,893	4,744	15.7
1990				36,984	3,407	10.1	40,385	5,492	15.7
2000				40,391	3,407	9.2	46,740	6,355	15.7
2010				43,798	3,407	8.4	54,095	7,355	15.7
2020				47,205	3,407	7.8	62,608	8,513	15.7
2030				50,612	3,407	7.2	72,461	9,853	15.7

f. Texarkana, Arkansas

	Actual			Projections					
				Linear			Exponential		
Year	Number	Δ	%Δ	Number	Δ	%Δ	Number	Δ	%Δ
1930	10,764			10,686			10,997		
1940	11,821	1,057	9.8	13,171	2,485	23.2	12,865	1,868	17.0
1950	15,875	4,054	34.3	15,656	2,485	18.9	15,049	2,184	17.0
1960	19,788	3,913	24.6	18,141	2,485	15.9	17,605	2,556	17.0
1970	21,682	1,894	9.6	20,625	2,485	13.7	20,595	2,990	17.0
1980	21,459	-223	-1.0	23,110	2,485	12.1	24,092	3,497	17.0
1990				25,595	2,485	10.7	28,184	4,092	17.0
2000				28,080	2,485	9.7	32,970	4,786	17.0
2010				30,565	2,485	8.8	38,569	5,599	17.0
2020				33,050	2,485	8.1	45,119	6,350	17.0
2030				35,535	2,485	7.5	52,781	7,662	17.0

APPENDIX B

INDEX TO REGIONAL EMPLOYMENT GENERATORS

EMPLOYMENT GENERATORS

SYMBOL: ★

EMPLOYMENT CODE: A = 1-9; B = 10-49; C = 50-99; D = 100-499;
E = 500-999; F = 1000-1499; G = 1500+

#	Code	Company	Location City/County/State
1	D	Rockwell International 30 Globe Avenue 75501 501/774-3561 Pipe fittings	Texarkana Miller County Arkansas
2	D	Johnson Controls, Globe Battery 35 Globe Avenue., Rt. 12 Box 644 501/774-2251	
3	C	Sta-Fresh Buns of Arkansas, Inc. Robert Maxwell Industrial Park Box 2427 75501 (Wendy's Buns) 501/794-9771	
4	D	North American Car Corporation P. O. Box 580 North Oats and Northcutt Street 501/773-5641 Railroad tank and hopper cars	
5	F	Cooper Tire and Rubber Company 3500 Washington Road Rt. 12 Box 252 75501 501/773-4502 Pneumatic rubber tires	
6	B	Precision Metal Industries 801 Roberts 501/774-5107 Chrome plating	
7	B	Junkin Lumber Company 201 Harrison, Box 59 501/772-2781 Lumber	
8	B	Wright Brothers, Inc. 203 E. Broad 501/773-6502	
9	B	Southwest Printers and Publ., Inc. 308 E. Broad 501/773-2196 Printing	

#	Code	Company	City/County/State
10	-	Coors Distributor 700 E. Broad 501/774-6191 Warehousing	Texarkana Miller County Arkansas (cont.)
11	B	Tennison Brothers of Texarkana 921 E. Broad 501/772-2733 Sheet metal products	
12	B	Hartshorn's, Inc. 333 E. 9th 75502 501/772-3769 Man-made marble	
13	C	Borden, Inc. 3123 Stateline, P.O. Box 581 501/793-4676 Milk, chocolate, fruit drinks	
14	D	Buchanan Bottling Company Buchanan Enterprises, Inc. Dr. Pepper Bottling Company Seven Up Bottling Company 3001 Stateline, Box 89 214/794-3883	Texarkana Bowie County Texas
15	B	Firmin Printing Company 2219 Stateline 214/793-5566 Printing	
16	C	Larkotex Company 1002 Olive, Box 449 75501 214/793-4647 Surgical supplies, crutches	
17	D	Texarkana Newspaper P. O. Box 621 315 Pine 75501 214/794-3311 Newspapers	
18	B	Ragland Office Equipment Company 311 Main 214/794-6135 Printing	
19	A	City Bakery 220 Main 214/794-6811 Bakery products	

#	Code	Company	City/County/State
20	C	D and W Packing Company 200 S. Stateline, Box 1097 214/794-9771 Meat packers	Texarkana Bowie County Texas (cont.)
21	C	Kerr-McGee Forest Products Buchanan Road, Box 690 75501 214/794-5169 Creosoted timbers	
22	B	Pioneer Foods, Div. Pillsbury Company 801 Willis 214/792-3718 Grain storage and mixing feeds	
23	B	Cameron Wholesale 207 South Lake Drive, Box 1080 214/792-6941 Window and door units	
24	D	Dickey Clay Tile 100 South Lelia, Box 1958 75501 214/794-6167 Clay pipe, glue lining, drain tile	
25	D	Brown and Miller Pickle Company 112 South Lelia, Box 1958 75501 214/792-2747 Pickles	
26	B	Humco Laboratory, Inc. 1008 Whitaker, Box 2550 214/793-3174 Chemical mixing and packaging	
27	B	Alto Mills, Inc., Div. of Dyke Ind. 1220 West 13th 75501 214/794-6178 Cabinets and wood products	
28	B	Midwest Farms Division of Southland Corporation 1516 Texas Blvd. 214/792-3761 Milk	
29	B	Smith Tire Company 918 New Boston Road 214/794-4782 Tire recapping	
30	-	Royal Crown Bottling Company 1013 South Robinson Road 214/838-7605 Carbonated beverages	

#	Code	Company	City/County/State
31	C	Commercial Box Company 432 Richmond Road, Box 5698 214/794-2207 Ammo boxes	Texarkana Bowie County Texas (cont.)
32	D	Texarkana Coca-Cola Bottling Company 1930 New Boston Road 214/794-5135 Carbonated beverages	
33	A	Hinshaw's 1920 Milam Street 214/794-5421 Mattresses and upholstering	
34	C	Bruce Kennedy Sand and Gravel Company 2515 West 7th, Box 5457 75501 214/794-3195 Sand, gravel, and ready-mix	
35	B	Gifford Hill and Company 2723 West 7th, Box 6068 214/793-5628 Sand, gravel, and ready-mix	
36	B	Tri-state Sheet Metal Works 2525 Maple 214/832-6281 Metal fabrication	
37	C	Ledwell and Sons Enterprises, Inc. 3300 Waco, Box 1106 75501 214/838-6531 Truck bodies and equipment	
38	B	Verafab (Rosewell) 3500 Waco 214/832-6281 Closed	
39	C	Fabsteel of Texarkana 3802 Waco, Box 5667 214/838-9541 Steel fabrication	
40	B	Arkansas Paper Company 3717 Waco 75501 214/838-7591	
41	B	G.S.L. Industries, Inc. 303 Faluey 214/832-1581 Aluminum containers	

#	Code	Company	City/County/State
42	D	Mayo Manufacturing 1 Terry Street, Box 5338 75501 214/838-0518 Furniture	Texarkana Bowie County Texas (cont.)
43	C	Tele-Service Company 215 Faluey, Box 5946 75501 214/838-9558 Repair of communication equipment	
44	D	Majestic Industries 714 Faluey, Box 5527 75501 214/838-7585 Mobile homes	
45	B	Star Paper Tube, Gulf Division 4201 Waco 214/832-4543 Paper tubes and cores	
46	D	Life Style Homes (Bendix M.H.) P. O. Box 5517 75501 214/838-4551 Mobile homes	
47	B	J.C.M. Industries 2000 Old Boston Road 214/832-2581 Pipe fittings and coupling	Nash Bowie County Texas
48	D	Texana Tank Car and Mfg. Company Hwy 82 West, Box 550 214/838-5564 Railroad tank cars	
49	E	International Paper Company P. O. Box 870 75501 214/796-7107 Bleached board and hardwood pulp	(S. of Texarkana) Cass County Texas
50	F	Day and Zimmerman, Inc. Lone Star Division Hwy 82 West 75507 214/838-1210 Ammunition	Hooks/Redwater Bowie County Texas
51	G	Red River Army Depot Hwy 82 West 75507 214/838-2185 Ordinance	Whaley/Redwater Bowie County Texas
52	B	Red River Fertilizer Company 460 S.E. South Front 75559 214/667-3266 Blended fertilizer	DeKalb Bowie County Texas

#	Code	Company	City/County/State
53	D	Mar-Bax Shirt Company P. O. Box 67 72635 501/435-6211 Men's shirts	Garland Miller County Arkansas
54	F	Nekoosa Papers, Inc. P. O. Box 496, Rt. 71 South 501/878-2711 Paper and wood pulp	Ashdown Little River Co. Arkansas
55	B	Little River Millwork, Inc. P. O. Box 522 71822 501/898-5924 Wooden molding	
56	C	Ashdown Manufacturing Company P. O. Box 338, Hwy 71 501/898-2741 Flat bed and semi-truck trailers	
57	D	Spotlight Company, Inc. Hwy 71 North 71822 501/898-3314 Ladies sleepwear	
58	B	Porter Enterprises, Inc. 71865 501/898-3800 Yellow pine lumber	Wilton Little River Arkansas
59	B	Quality Pallet Company P. O. Box 208 71836 501/542-7206 Wooden pallets	Foreman Little River Co. Arkansas
60	D	Arkansas Cement Corporation P. O. Box 130 71836 501/542-6217 Portland cement, etc.	
61	B	Horatio Lumber Company P. O. Box 218 Horeshoe Bend 501/832-2471 Lumber	Horatio Sevier County Arkansas
62	D	Weyerhaeser Company, Inc. P. O. Box 387 71832 214/584-2311 Power poles, lumber, ties	DeQueen Sevier County Arkansas
63	A	Frames, Inc. P. O. Box 499 71832 501/642-2411 Furniture dimension parts	

#	Code	Company	City/County/State
64	E	Bo-Pilgrim Company (Mountainaire Poultry, Inc.) P. O. Box 389 71832 214/642-2511 Processed poultry	Dequeen Sevier County Arkansas (cont.)
65	C	Baldwin Piano and Organ Company P. O. Box 700 71832 501/642-2412 Electronic organs	
66	B	Willis Brothers Lumber 202 West Stilwell 71832 501/584-7431 Railroad ties, lumber	
67	B	Poage Lumber Tie Company Rt. 1 Box 714 71832 501/584-7022 Railroad ties and lumber	
68	-	DeQueen and Eastern Railroad Rail yards/maintenance	
69	D	Tred II of Arkansas P. O. Box 440 71832 501/642-2243 Tennis shoes	
70	B	James T. Wax Sawmill P. O. Box 104 71841 501/386-2641 Cross-ties, carts, pipeline	Gillham Sevier County Arkansas

APPENDIX C

DEFINING EMPLOYMENT SECTORS AND METHODOLOGY UTILIZED IN LOCATION QUOTIENT AND SHIFT-SHARE ANALYSIS

DEFINING EMPLOYMENT SECTORS AND METHODOLOGY UTILIZED IN LOCATION QUOTIENT AND SHIFT-SHARE ANALYSIS

Many of the employment sectors discussed and illustrated in location quotient and shift-share analysis are broad categories difficult for the casual observer to define. This is due in part to the method of documentation used for the census in an attempt to be as concise and comprehensive as possible. The following sectors are ones that possibly require further explanation.

Number	Sector
10	Food and Kindred Products: Meat; dairy; canned and preserved fruits and vegetables; bakery, sugar, and confectionary items.
15	Transportation: Trucking and warehousing; bus, taxi, and urban transit services; water, air, and pipeline transportation.
20	Other Retail Trade: Drug stores; liquor stores; book, jewelry, and florist shops.
24	Other Personal Services: Hotel and motel service, laundry cleaning and garmet services, beauty shops, barber shops, and funeral services.
4	Furniture, Lumber, and Wood Products: Logging, sawmills, mobile homes, furniture, and fixtures.
9	Other Durable Goods: Stone, clay, glass, and concrete products; other items such as toys, amusement, and sporting goods.
14	Other Non-Durable Goods: Petroleum and coal products, rubber and miscellaneous plastic products, leather and leather products.
23	Private Households: Individuals that perform domestic and general housework, odd jobs, launderers and ironers, cooks, housekeepers and butlers, childcare workers, waitresses, and waiters.
29	Other Professional and Related Services: Health practitioners, nursing and personal care personnel, health and legal services, and child daycare. Also, job training and vocational rehabilitation services.
5	Metal Industries: Aluminum industries, hardware, fabricated structural metal products, ordinance (ammunition, grenades, and armament), steelworks and finishing mills.

Number	Sector
18	Wholesale Trade: Durable goods: motor vehicles and equipment, furniture and home furnishings, lumber and construction materials, sporting goods, metals and minerals, hardware, and machinery. Non-durable goods: paper and paper products, drugs, chemicals and allied products, apparel fabrics and notions, groceries, petroleum products, and alcoholic beverages.

1. Sectors used in the analysis.

Thirty-one employment sectors were used as references for both location and shift-share analysis (32 for shift-share including "not reported", a sector not given in 1970 census data.) These 31 sectors were created from 39 original sectors used in the 1970 census. The sectors which were combined into one comprehensive sector include:

Number	Sector
15	Transportation (created from three 1970 census sectors) (1) Railroads and railway express service (2) Trucking service and warehousing (3) Other transportation
20	Other Retail Trade (1) Food, baker, and dairy stores (2) General merchandise retailing (3) Motor vehicle retailing and service stations (4) Other retail trade
21	Finance, Insurance and Real Estate (1) Banking and credit agencies (2) Insurance, real estate, and other finance
27	Educational Services (1) Elementary, secondary schools and colleges; government (2) Elementary, secondary schools and colleges; private
29	Other Professional and Related Services (1) Legal, engineering, and miscellaneous professional services (2) Health services, except hospitals

Number	Sector
31	Armed Forces

The census does not delineate this category as an employment sector. It was derived from other census data, and is used to indicate governmental influence upon the local economy.

2. 1960 employment sectors.

For 1960, shift-share analysis included the sector "Industry not reported" to reflect its inclusion in the 1960 census. In order to match 1960 and 1970 employment sectors, the 1960 sectors needed reclassification. The changes that were required include the following:

Number	Sector
1	Agriculture, Forestry, and Fisheries

Combined the independent sector of Agriculture with the Forestry and Fisheries sector (combined in 1970).

5	Metal Industries

Combined Primary Metal Industries with Fabricated Metal Industries.

8	Transportation Equipment

Combined Motor Vehicles and Motor Vehicle Equipment with Transportation Equipment, except motor vehicle.

11	Textiles and Fabricated Textile Products

Combined Textile Mill Products with Apparel and Other Fabricated Textile Products.

20	Other Retail Trade

Combined Food and Dairy Products Stores with Other Retail Trade.

22	Business and Repair Services

Combined Business Services with Repair Services.

32	Industry Not Reported

For 1970 data this value was zero as this category was empirically eliminated (unassigned employment was equally divided among all sectors).

3. Location quotients.

Location quotients assign employment to basic and non-basic categories by comparing the proportion of the region's employment in a given industry (sector) with that observed for some reference region, in this case, the Arkansas-Texas combined base. Location quotients are useful in that they indicate the relative specialization of the Texarkana study area in each industry. If the calculated value exceeds unity, (one), then the industry is presumed to be an "exporter" while, if it is less than one, imports are implied.

The location quotient formula is as follows:

$$LQi = \frac{Eir}{Ein} / \frac{Er}{En}$$

where LQi = Location quotient for sector i.
Eir = Employment in sector i in the region.
Ein = Employment in industry i in the nation.

Er = Total employment in the region.
En = Total employment in the nation. (Murdock, p. 30)

4. Shift-share analysis.

Shift-share analysis compares over time the changes in employment rates in a given economy to a larger reference economy, in this case the combined employment data for both Arkansas and Texas. This Ark-Tex base was chosen as the reference due to the regional comparison it will provide. That is, how well the Texarkana study area is doing in relation to its immediate geographical area. The analysis identifies three basic components:

(1) Growth attributable to the regional economy (the state share).
(2) The industrial or proportionality shift.
(3) The competitive position or differential shift.

change in employment = state share + proportionality shift + differential shift, 1960-1970.

The sum of the three components will always add up to the change in employment over the 1960-1970 decade. It is the size and the magnitude of the change that are important.

While shift-share provides insights into the county economic structure, it indicates nothing about the capacity of a region to retain or attract growing industries. Unlike location quotients, it assumes that industries are independent of one another, ignoring secondary multiplier effects of "linkages" with supporting industries.

Shift-share is calculated as follows:

(1) $\Delta Ei^* = Ei^* - Ei$

where Ei^* is the county employment in industry i for 1970.
Ei is the county employment in industry i for 1960.
ΔEi^* represents the change in employment from 1960 to 1970.

(2) $\Delta Ei^* = Ei\ [(\text{Ark-Tex}^*/\text{Ark-Tex}) - 1) + Ei\ (\text{Ark-Tex } i^*/\text{Ark-Tex } i) -$

$(\text{Ark-Tex}^*/\text{Ark-Tex})] + Ei\ [(Ei^*/Ei) - (\text{Ark-Tex } i^*/\text{Ark-Tex } i)]$

where
Ark-Tex* = the total combined Arkansas-Texas employment for 1970.
Ark-Tex = the total combined Arkansas-Texas employment for 1960.
Ark-Tex i* = Arkansas-Texas employment for sector i in 1970.
Ark-Tex i = Arkansas-Texas employment for sector i in 1960.

APPENDIX D

MOTOR COACH CARRIER INDEX AND INTERCITY TRAVEL TIME AND DISTANCE MATRICES

MOTOR COACH CARRIER INDEX AND INTERCITY
TRAVEL TIME AND DISTANCE MATRICES

CARRIER	ROUTE	CITIES SERVED
Jefferson Lines	751	DeQueen, Lockesburg, Wilton, Ashdown, Ogden, Texarkana
Greyhound	12	Texarkana
	576	Texarkana
	595	Maud, Texarkana, Garland
Trailways	8190	Texarkana, New Boston
	8186	Ben Lomond, Wilton, Ashdown, Ogden, Texarkana, Nash, Leary Hooks, Whaley, New Boston, Malta, DeKalb, Hope, Fulton, Mandeville, Texarkana
	8171	Atlanta, Texarkana Doddridge, Texarkana
	8169	Garland, Texarkana
	8353	Hope, Fulton, Mandeville, Texarkana, Redwater, Maud
	8252	Texarkana
	8215	
	8196	
	8258	
	8150	
	7075	
	7073	
	7007	
	7040	
	7053	
Arrow Trailways	7865	Texarkana
Central Texas Trailways	7810	Texarkana
Brooks Bus Lines	3300	Texarkana
Marianna Trlwys.	7740	Texarkana
Crown Transit	1155b	Texarkana
Great Southern Coaches, Inc	3965	Texarkana
	3966	

Wells Bus Lines	3712	Texarkana
Lone Star Bus Lines	4088	Texarkana
Trans Texas Coaches	4090	Texarkana
Oklahoma Transp. Co.	776	Texarkana
Jacksonville Bus Ln.	1145	Texarkana
Gulf Transport	3690	Texarkana
I.N.M.& O. Coaches	744	Texarkana

INTERCITY TRAVEL TIME MATRIX

Time is in minutes, based on 38 mph.

	Atlanta*	Doddridge	Fouke	Ferguson	Mount Pleasant	Garland	Hope*	Fulton*	Homan	Mandeville	Horatio	Winthrop	Foreman	Gillham	DeQueen	Lockesburg	Ben Lomond	Wilton	Ashdown	Ogden	Maud	Redwater	Wake Village	DeKalb	Malta	New Boston	Whaley	Hooks	Leary	Nash	Texarkana
Nash	39	36	32	22	16	44	66	47	38	17	85	69	55	109	93	73	58	46	38	25	25	16	3	46	35	25	17	14	6		8
Leary	46	60	38	28	24	50	74	55	44	25	79	63	49	106	90	79	66	54	46	33	33	24	9	38	28	19	11	6			16
Hooks	54	66	46	35	30	57	80	61	52	32	73	57	43	99	84	85	74	62	54	39	36	30	17	32	20	11	5				22
Whaley	57	71	49	39	35	62	73	54	58	39	68	52	38	99	84	88	77	65	57	44	32	35	20	27	17	8					27
New Boston	63	79	57	47	41	69	92	73	63	43	60	44	30	92	76	79	85	73	65	52	24	33	28	20	9						33
Malta	73	88	66	57	50	79	101	82	73	52	69	54	39	101	85	88	95	82	74	62	33	43	38	11							43
DeKalb	84	99	79	69	63	90	114	95	85	65	80	65	50	112	96	99	106	95	87	74	44	54	50								55
Wake Village	33	52	32	20	16	43	66	47	36	17	98	82	66	107	93	71	58	46	39	25	22	13									8
Redwater	46	65	44	35	28	55	79	60	50	30	93	77	63	125	93	84	71	58	52	38	9										20
Maud	39	68	54	44	38	65	88	69	60	39	84	68	54	115	84	95	80	69	62	49											30
Ogden	58	63	43	32	27	54	77	58	47	28	73	46	41	74	58	38	25	20	13												19
Ashdown	71	76	55	44	39	66	63	47	58	41	55	33	28	69	54	33	20	8													32
Wilton	79	84	63	52	47	74	71	55	66	49	68	25	35	62	46	25	13														39
Ben Lomond	92	96	74	65	60	87	73	57	68	62	36	39	47	52	38	16															52
Lockesburg	103	109	87	77	71	99	73	66	77	73	19	41	49	36	22																63
DeQueen	125	129	109	98	93	120	93	87	96	95	14	36	46	16																	85
Gillham	139	145	123	114	107	136	109	103	112	109	28	50	60																		99
Foreman	93	104	82	73	66	95	92	76	85	68	35	16																			58
Winthrop	107	109	88	79	73	99	88	73	84	74	22																				65
Horatio	123	131	110	99	95	122	92	85	96	96																					87
Mandeville	49	54	33	24	17	44	49	30	20																						9
Homan	69	74	54	43	38	65	28	9																							30
*Fulton	79	84	63	54	47	76	19																								39
*Hope	98	96	82	73	66	49																									58
Garland	74	47	36	46	44																										35
Mount Pleasant	54	36	16	6																											8
Ferguson	54	32	10																												14
Fouke	49	21																													24
Doddridge	28																														44
*Atlanta																															39

MILEAGE CHART

Mileage shown is the distance via paved state highways between highway junctions nearest the center of each city. Mileage does not always represent the shortest route.

* = Not in study area.

	Atlanta*	Doddridge	Fouke	Ferguson	Mount Pleasant	Garland	Hope*	Fulton*	Homan	Mandeville	Horatio	Winthrop	Foreman	Gillham	DeQueen	Lockesburg	Ben Lomond	Wilton	Ashdown	Ogden	Maud	Redwater	Wake Village	DeKalb	Malta	New Boston	Whaley	Hooks	Leary	Nash	Texarkana
Nash	25	23	20	14	10	28	42	30	24	11	54	44	35	69	59	46	37	29	24	16	16	10	2	29	22	16	11	9	4		5
Leary	29	38	24	18	15	32	47	35	28	16	50	40	31	67	57	50	42	34	29	21	21	15	6	24	18	12	7	4			10
Hooks	34	42	29	22	19	36	51	39	33	20	46	36	27	63	53	54	47	39	34	25	23	19	11	20	13	7	3				14
Whaley	36	45	31	25	22	39	46	34	37	25	43	33	24	63	53	56	49	41	36	28	20	22	13	17	11	5					17
New Boston	40	50	36	30	26	44	58	46	40	27	38	28	19	58	48	50	54	46	41	33	15	21	18	13	6						21
Malta	46	56	42	36	32	50	64	52	46	33	44	34	25	64	54	56	60	52	47	39	21	27	24	7							27
DeKalb	53	63	50	44	40	57	72	60	54	41	51	41	32	71	61	63	67	60	55	47	28	34	32								35
Wake Village	21	33	20	13	10	27	42	30	23	11	62	52	42	68	59	45	37	29	25	16	14	8									5
Redwater	29	41	28	22	18	35	50	38	32	19	59	49	40	79	59	53	45	37	33	24	6										13
Maud	25	43	34	28	24	41	56	44	38	25	53	43	34	73	53	60	51	44	39	31											19
Ogden	37	40	27	20	17	34	49	37	30	18	46	29	26	47	37	24	16	13	8												12
Ashdown	45	48	35	28	25	42	40	30	37	26	35	21	18	44	34	21	13	5													20
Wilton	50	53	40	33	30	47	45	35	42	31	43	16	22	39	29	16	8														25
Ben Lomond	58	61	47	41	38	55	46	36	43	39	23	25	30	33	24	10															33
Lockesburg	65	69	55	49	45	63	46	42	49	46	12	26	31	23	14																40
DeQueen	79	82	69	62	59	76	59	55	61	60	9	23	29	10																	54
Gillham	88	92	78	72	68	86	69	65	71	69	18	32	38																		63
Foreman	59	66	52	46	42	60	58	48	54	43	22	10																			37
Winthrop	68	69	56	50	46	63	56	46	53	47	14																				41
Horatio	78	83	70	63	60	77	58	54	61	61																					55
Mandeville	31	34	21	15	11	28	31	19	13																						6
Homan	44	47	34	27	24	41	18	6																							19
*Fulton	50	53	40	34	30	48	12																								25
*Hope	62	61	52	46	42	31																									37
Garland	47	30	23	29	28																										22
Mount Pleasant	34	23	10	4																											5
Ferguson	34	20	6																												9
Fouke	31	13																													15
Doddridge	18																														28
*Atlanta																															25