

RECOMMENDED GUIDELINES  
FOR THE  
PLANNING, DESIGN, AND IMPLEMENTATION  
OF  
DEMAND-ACTUATED RURAL TRANSPORTATION SYSTEMS

by

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# TABLE OF CONTENTS

	Page
LIST OF TABLES . . . . .	iv
LIST OF FIGURES . . . . .	v
Chapter	
I. INTRODUCTION. . . . .	1
Notes. . . . .	5
II. EXISTING CONDITIONS	
General Problem Areas. . . . .	6
Specific Geographic Areas of Transportation Need . . . . .	7
Existing Facilities. . . . .	17
Notes. . . . .	28
III. THE DEMAND FOR RURAL PUBLIC TRANSPORTATION	
Introduction . . . . .	29
The Concept of Demand and Need . . . . .	30
Estimating Demand. . . . .	31
Amount of Service Needed to Meet Demand. . . . .	37
System Implications of These Demand Levels . . . . .	40
Notes. . . . .	42
IV. RECOMMENDED RURAL TRANSPORTATION SYSTEM: DARTS	
Recommended System: General Conceptualization . . . . .	44
Organization . . . . .	62
Responsibilities of System Personnel . . . . .	68
Operational Concerns . . . . .	84
Legal Concerns . . . . .	124
Notes. . . . .	131
V. FUNDING	
Introduction . . . . .	135
Federal Funding Sources. . . . .	136
State and Local Funding Sources. . . . .	149
Future Funding Prospects . . . . .	151
Notes. . . . .	155
VI. CONCLUSIONS AND RECOMMENDATIONS	
Introduction . . . . .	156
Conclusions. . . . .	156
Recommendations. . . . .	158
APPENDIX. . . . .	161
BIBLIOGRAPHY. . . . .	175

## LIST OF TABLES

TABLE		Page
II-1	The Percentage of Households Without Autos by County . . . . .	11
II-2	The Percentage of Households With Poverty-Level Incomes . . . . .	12
II-3	The Percentage of the Population 65 Years and Older . . . . .	13
II-4	The Population Density by County . . . . .	14
II-5	Composite Score of All Four Variables for Each County . . . . .	15
II-6	Bus Companies Listed with the Kansas Corporation Commission . . .	18
II-7	Scheduled Bus Service in Kansas . . . . .	19
II-8	Taxicab Service in Cities of 5,000 to 50,000 Population . . . . .	23
III-1	Low Estimate of Potential Annual Transit Trips in Rural and Small Urban Areas . . . . .	35
III-2	High Estimate of Potential Annual Transit Trips in Rural and Small Urban Areas . . . . .	37
IV-1	Typical Total Costs Per Seat-Mile in a Rural Environment . . . . .	94
IV-2	Utilization of Maintenance Forms . . . . .	106
IV-3	Major Travel Barriers Listed by Area of Impact . . . . .	123
V-1	Major Federal Funding Sources Providing Transportation . . . . .	138
V-2	Illustrated Major State Funding Sources . . . . .	150
V-3	Examples of Local and Private Funding Sources . . . . .	152

## LIST OF FIGURES

FIGURE		Page
II-1	Priority Ranking of Counties with a Need for Transportation Services . . . . .	9
II-2	Existing Intercity Bus Routes in Kansas . . . . .	20
II-3	Statewide Bus Service . . . . .	22
II-4	Geographic Distribution of AoA Vehicles in Kansas . . . . .	25
II-5	Geographic Distribution of Section 16(b)(2) Vehicles in Kansas . . . . .	26
II-6	Approximation of School Buses Per County . . . . .	27
IV-1	Transportation System Alternatives on the Basis of Route Flexibility . . . . .	47
IV-2	Conceptual Framework for Demand-Responsive Services . . . . .	51
IV-3	Fixed Route with Deviations . . . . .	53
IV-4	"Pure" Demand-Responsive Service . . . . .	53
IV-5	User Locations Related to Fixed-Route Service . . . . .	54
IV-6	User Locations Related to "Pure" Demand-Responsive Service . . . . .	54
IV-7	Example of Service-by-Sector Routing . . . . .	59
IV-8	Typical Present-Day Small-Scale Transit Organization . . . . .	64
IV-9	Suggested Functional Organization Chart . . . . .	66
IV-10	Sample Organization Chart . . . . .	67
IV-11	Example of a Ride Request Slip . . . . .	76
IV-12	Daily Ride Sheet . . . . .	77
IV-13	Driver Evaluation Form . . . . .	80
IV-14	Sample Vehicle Log . . . . .	81
IV-15	Implementation Flow Chart for DARTS System . . . . .	85
IV-16	Example of Agency Ticket . . . . .	87

FIGURE		Page
IV-17	Example of a Prepaid Ticket . . . . .	87
IV-18	Sample Specification Sheet . . . . .	99
IV-19	Daily Vehicle Defect Card . . . . .	107
IV-20	Weekly Vehicle Report . . . . .	108
IV-21	Monthly Vehicle Summary . . . . .	109
IV-22	6,000 Mile Maintenance Report . . . . .	110

## CHAPTER I

### INTRODUCTION

The lack of adequate, effective transportation is now recognized as one of the major problems hindering the development of rural America today. It was but a few years ago when, except for in the larger metropolitan areas, transit services were receiving little, if any, attention and even less promotion. There was no concern shown for public transportation in rural areas, and it was inconceivable to think that major efforts would be so directed in such a short period of time. However, in 1971, at the White House Conference on Aging, transportation was identified as the most crucial problem for the rural elderly.<sup>1</sup> Since that time, rural transportation demonstration projects have been funded throughout the U.S. with most of the departments in the Federal government becoming involved in research and/or rural transport operations. In 1973, Section 147 of the Federal-Aid Highway Act, authorized the Federal Highway Administration, together with the Urban Mass Transportation Administration, to use the Federal Highway Trust Fund monies to carry out a rural highway public transportation demonstration program. This program, together with the various activities promoted in the transportation area by the Administration on Aging of the Department of Health, Education and Welfare, has stimulated awareness and interest in the public transportation problem in rural America. The need to resolve this problem

is now widely accepted.

In the planning and development of transport systems to resolve the transportation problems in rural Kansas, a basic assumption was made-- that rural areas are different from urban areas. This was done in order to emphasize the fact that even though urban transportation planning techniques are well advanced, and that, in some instances, these techniques can be applied to rural areas, there are some very basic differences that exist which modify the standard planning approach. These differences should be considered.

One such basic difference is in the philosophy behind urban as opposed to rural transportation services. In our automobile-dominated society, the role of public transportation is basically two fold. First, public transportation offers an alternative to the automobile which can be utilized to overcome a number of the negative attributes of the latter transport mode. Some of these negative attributes include inefficient land use allocation, congestion, high energy consumption, and noise and air pollution. Second, public transportation provides mobility for those groups unable to utilize an automobile. These groups include the young, the elderly, the handicapped, and those unable to afford the relatively high costs involved in operating and maintaining automobiles. In urban areas the proponents of public transportation systems argue for both sides. In rural areas similar arguments can be advanced, but they hold less validity. In rural areas the major positive attribute of the automobile, namely its flexibility, is utilized to the fullest. In addition, its negative attributes are largely absent, apart from its consumption of energy. Because of these factors, the public transportation system in rural areas will primarily meet the needs of those persons unable to

utilize automobiles.<sup>3</sup>

This difference in philosophy heightens the problems and difficulties of implementing public transportation services in rural as opposed to urban areas. The rural system is basically oriented toward a subset of the population. Unless this subset represents a major proportion of the population, support from political entities will be difficult to obtain. Unfortunately, the need for this support is heightened because no rural system can hope to be financially self-sustaining. Economic viability in higher density urban areas is seldom achieved. In rural areas, economic viability is even more difficult to achieve when considering that the services provided are oriented toward only a segment of a population which is already sparsely distributed.<sup>4</sup>

Consideration of the spatial structure of rural areas, as opposed to urban areas, presents other differences with respect to factors affecting transportation planning and implementation. Several critical factors, with respect to transportation and the level of service provided, consist of: 1) the spatial distribution of the population, 2) the spatial distribution of facilities with which the population interacts, and 3) the road network linking population and facility locations. In rural areas, the population densities are considerably lower than those found in even the low density suburbs of urban areas. Facilities which are the generators of trips are generally concentrated in a relatively small number of communities within a given region. Finally, the road network may not be a highly linked system. The picture presented is one in which there is many-to-few system in which the origins are more widely dispersed than in urban areas, the destinations are relatively centralized, and the road network is weakly connected. Consequently, that which is implied, is a

system in which vehicle miles, if not travel time, is greatly increased over that of an urban system.<sup>5</sup>

These basic differences between rural and urban areas have negated much of the accepted planning methodology with respect to transportation planning in rural areas. Because the demand for and the implementation of rural transportation services has developed much more rapidly than the appropriate planning and implementation methodology, there has been created a technical information void. The organizers of rural systems do not have the benefit of proven planning, development, and implementation techniques to enable them to establish effective, efficient rural transportation systems. The results of this lack of planning and technical guidance is that the organizers of local transit systems in Kansas are unaware of the many aspects and problems to be encountered when attempting to develop transit services in rural Kansas communities. These individuals are in a state of total confusion, disillusioned with their ability to properly provide such services, and grasping for direction and guidance.

In lieu of this situation, the basic purpose of this report is to provide the planning, development, and implementation methodology in an effort to fill the previously mentioned information void. In so doing, it is hoped that the existing state of disorder, duplication of services, and general confusion prevalent in the development of transit services in Kansas, will be eliminated. Through the development of this common base of knowledge and experience, a more comprehensively planned uniform statewide approach to rural transportation can be realized.

It is within this framework, one of ultimately realizing a statewide approach to rural public transportation, that this report is written.



The chapters which follow will be concerned with:

1. A statement of existing conditions with regard to rural transportation needs in Kansas and the existing facilities available to meet those needs.
2. A simplistic model to help determine the extent of the statewide demand for rural transportation services in Kansas.
3. A recommended concept for a transportation system which includes the planning, design, and implementation methodology necessary for the creation of the local component of a statewide rural transportation system.
4. A review of existing Federal, State, local and private funding sources which are available to assist in the development of local transit operations.
5. A listing of conclusions and recommendations pertinent to the successful, comprehensive, coordinated development of the local component of a statewide rural public transportation system.

#### Notes

1. 1971 White House Conference On Aging, Final Report (Washington: 1971).
2. U.S. Federal Register, Vol. 39, Number 215 (Washington: U.S. Government Printing Office, November 6, 1974).
3. Ronald Briggs, Designing Transportation Systems for Low Density Rural Regions, a report to the 71st Annual Meeting-Association of American Geographers, Milwaukee, April, 1975 (Austin, Texas: University of Texas, 1975), p
4. Ibid., pp. 2-3.
5. Ibid., pp. 3-4.

## CHAPTER II

### EXISTING CONDITIONS

#### General Problem Areas

As stated, the lack of adequate transportation in rural areas is recognized as a major problem. There are few transportation alternatives available for the rural Kansas resident. There are not enough buses, the schedules are seldom publicized, head ways are excessive, and the fares are burdensome for persons with low incomes-or fixed incomes. Therefore, the only form of transportation available for most of the rural residents of Kansas is the automobile. This involves a large capital investment and high operating and maintenance costs. According to the 1970 U.S. Census, in Kansas 1 of every 8 rural residents lives in poverty as compared to 1 of every 13 persons in urban areas and 1 of every 17 persons in suburban areas.<sup>1</sup> Because of this, there are a substantial number of elderly, handicapped, and disadvantaged households which often purchase a car they cannot afford initially or on an on-going basis, or they are paying a disproportionate amount of their income for use of other transportation modes.

Those persons who absolutely cannot afford a car are confronted by numerous restrictions. Health care will often be neglected because these persons have only enough money to pay for transportation costs to the store and the cost of the groceries. Some persons may not even get to go to the store. Someone must pick up their groceries and other necessities for

them. The choice to the consumer of a broad selection of goods is often limited because these persons are confined to a geographically restricted service area. Even the opportunity to take advantage of food stamp programs is eliminated if the family has no means of getting to a distribution center.

As has been shown, many elderly and handicapped live in poverty. In addition to this financial restriction, they must face other obstacles. Their mobility may be limited to the point that it is impossible to walk the several yards or miles, in some cases, to where a bus may be available. If they are able to get to a "bus stop" they may not be capable of boarding the vehicle without assistance. Isolation, dependency, and a lack of social awareness for the rural residents of Kansas are a direct result of these restrictions on mobility.

The nature of rural Kansas itself is an obstacle to transportation. There are numerous rivers and streams which need to be crossed. Bad weather conditions, i.e., snow, excessive periodic rains, often causing floods and muddy conditions, must be considered in the planning of rural transportation systems. Population density in the rural areas is low. This compounds further the economic feasibility of providing extensive networks of rural transportation systems.

#### Specific Geographic Areas of Transportation Need

In beginning to discuss the transportation problems of rural Kansas, it was first necessary to establish some objective criteria for determining problem areas. With this end in mind, one of the initial tasks was to put together some statistical data on variables that were seen to be contributing to transportation difficulties. These four variables included:

1. The percentage of households with no car: The higher this figure, the greater the transportation problems since public transportation service in rural areas is usually minimal or nonexistent and other alternatives are expensive.
2. The percentage of households with poverty-level incomes: Higher values of this statistic indicate greater transportation problems since poverty-level households have little money available for transportation, which severely restricts their mobility.
3. The percentage of the population 65 years and older: The elderly have a significant number of transportation problems. The elderly often cannot drive because of handicaps, financial problems, or lack of knowledge, or cannot use other transportation systems (again because of physical handicaps or limited incomes).
4. The population density: As the number of households per square mile decreases, transportation problems grow because of increased trip lengths and lack of public transportation. Another contributory factor is the lack of nearby friends and neighbors to offer transportation to persons without cars.<sup>2</sup>

Each variable makes its own contribution to a composite picture of the areas with transportation needs in Kansas. Figure II-1 is a map that shows how the counties ranked on a combined assessment of all four variables. The following is an explanation of how this assessment was determined.

Utilizing the 1970 U.S. Census, statistics for each county were collected for each of the above mentioned variables, first eliminating the

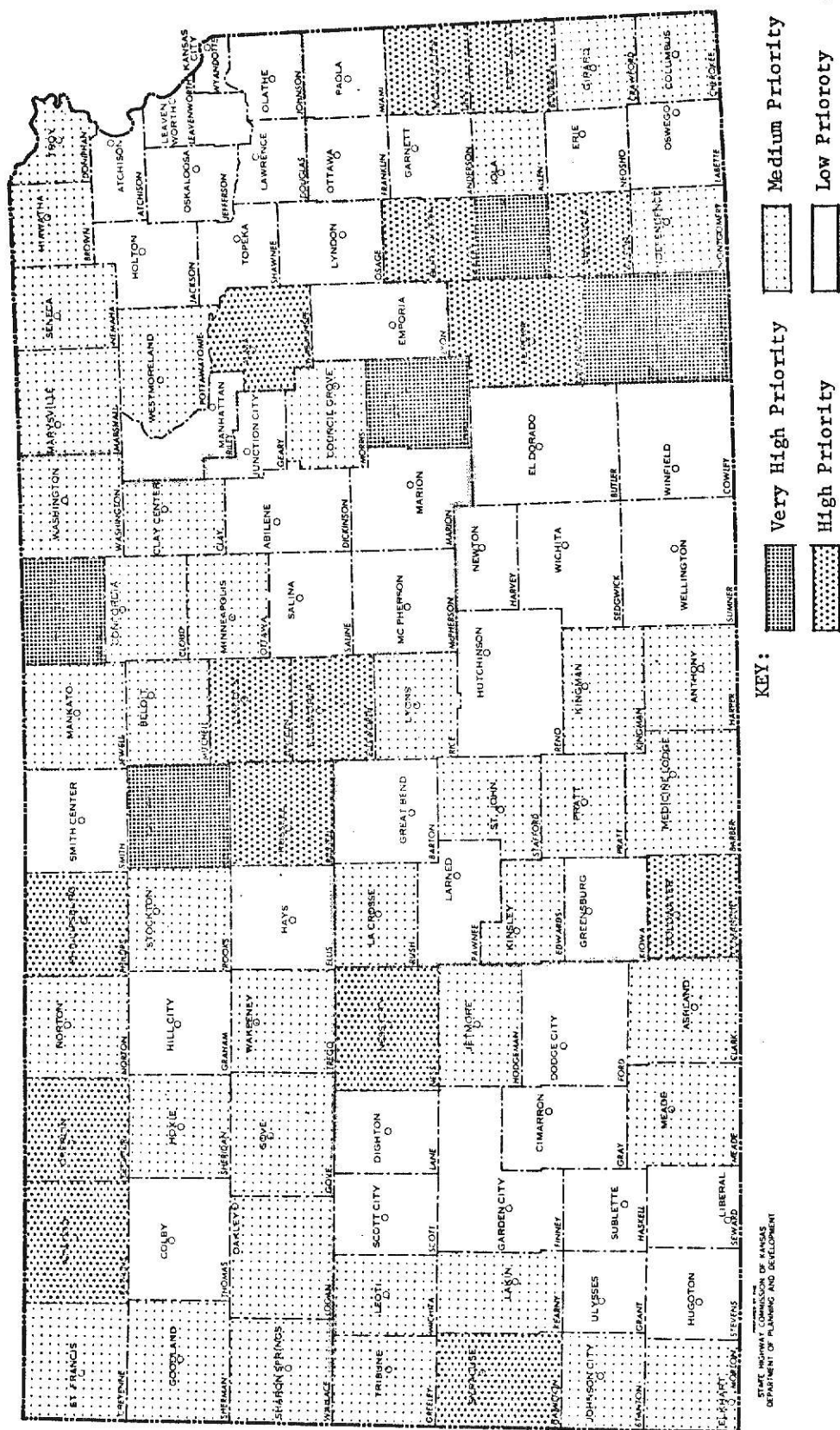
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PRIORITY RANKING OF COUNTIES WITH A NEED FOR TRANSPORTATION SERVICES

## KANSAS

SHOWING COUNTY SEATS



urbanized population (see Tables II-1, II-2, II-3, and II-4). After this the county totals for each variable were added. This figure was divided by the total number of counties producing a state average. The state average, for working purposes, was assumed to be the base level of significance. Any counties falling on, or below, the state average for a particular variable were considered to be of low priority in terms of being a transportation problem area.

Next, the difference between the highest single entry (or, as in the case of population density, the lowest) was calculated and divided by 3. This divided the range above the state average into three equal variables. These intervals constituted what were called the medium, the high and the very high priority range.

Having accomplished this, a composite score was then produced, showing each county's ranking for the combination of all 4 variables. This was done by first assigning a numerical value for the placement of each county with each individual variables. If the county fell into the low range, it was designated by a zero; if the medium range, one; if the high range, two; and if very high, three. The ranking for all four variables gave each county a total score, and once again, as with the individual variables, the county totals were added and the sum was divided by the total number of counties to obtain a state average (see Table II-5). Then, still following the same procedure, all counties falling on or below the state average were considered to be low priority, while the range between the state average and the highest single total was divided by three to produce three equal intervals. Each county then was placed in its proper range, and the result was mapped as shown in Figure II-1.

TABLE II-1

THE PERCENTAGE OF HOUSEHOLDS WITHOUT  
AUTOS BY COUNTY

Allen.....	11.0%	Greeley.....	4.0	Osborne.....	14.0
Anderson.....	8.1	Greenwood.....	9.4	Ottawa.....	12.3
Atchison.....	7.9	Hamilton.....	14.4	Pawnee.....	4.6
Barber.....	9.8	Harper.....	10.0	Phillips.....	10.6
Barton.....	6.0	Harvey.....	7.3	Pottawatomie..	8.7
Bourbon.....	12.8	Haskell.....	9.7	Pratt.....	5.2
Brown.....	11.2	Hodgeman.....	4.1	Rawlins.....	8.7
Butler.....	5.5	Jackson.....	8.1	Reno.....	7.3
Chase.....	14.2	Jefferson.....	10.1	Republic.....	13.9
Chautauqua....	16.5	Jewell.....	9.9	Rice.....	12.2
Cherokee.....	11.5	Johnson.....	5.0	Riley.....	4.3
Cheyenne.....	11.0	Kearny.....	10.1	Rooks.....	7.4
Clark.....	6.4	Kingman.....	6.8	Rush.....	12.4
Clay.....	9.3	Kiowa.....	7.7	Russell.....	11.5
Cloud.....	11.4	Labette.....	10.8	Saline.....	5.0
Coffey.....	12.7	Lane.....	5.0	Scott.....	0.0
Comanche.....	12.8	Leavenworth..	7.4	Sedgwick.....	4.4
Cowley.....	6.1	Lincoln.....	9.8	Seward.....	6.2
Crawford.....	12.8	Linn.....	16.6	Shawnee.....	3.5
Decatur.....	11.4	Logan.....	9.8	Sheridan.....	8.1
Dickinson.....	7.1	Lyon.....	9.0	Sherman.....	6.8
Doniphan.....	16.4	Marion.....	9.8	Smith.....	8.4
Douglas.....	6.2	Marshall.....	10.7	Stafford.....	9.4
Edwards.....	9.3	McPherson.....	6.7	Stanton.....	8.1
Elk.....	13.4	Meade.....	7.1	Stevens.....	6.2
Ellis.....	7.5	Miami.....	7.3	Sumner.....	8.7
Ellsworth.....	11.6	Mitchell.....	8.5	Thomas.....	7.7
Finney.....	5.1	Montgomery....	12.6	Trego.....	8.9
Ford.....	4.1	Morris.....	10.5	Wabaunsee....	8.6
Franklin.....	7.3	Morton.....	8.7	Wallace.....	9.1
Geary.....	5.4	Nemaha.....	10.4	Washington....	11.0
Gove.....	4.6	Neosho.....	9.1	Wichita.....	4.1
Graham.....	6.8	Ness.....	10.2	Wilson.....	12.8
Grant.....	3.2	Norton.....	9.8	Woodson.....	15.6
Gray.....	7.6	Osage.....	9.4	Wyandotte.....	6.1

Source: U.S. Department of Commerce, Bureau of Census, 1970 General Population Characteristics: Kansas (Washington: U.S. Government Printing Office 1972).

CALCULATIONS

State Average: 8.6%

	<u>Priority</u>	<u>Points</u>
0 - 8.6	Low	0
8.7 - 11.2	Medium	1
11.3 - 13.9	High	2
14.0 - 16.6	Very High	3



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TABLE II-2

THE PERCENTAGE OF HOUSEHOLDS WITH  
POVERTY-LEVEL INCOMES

Allen..... 14.2%	Greeley..... 18.2	Osborne..... 11.1
Anderson..... 15.8	Greenwood..... 15.1	Ottawa..... 11.1
Atchison..... 15.1	Hamilton..... 13.2	Pawnee..... 14.5
Barber..... 6.0	Harper..... 11.2	Phillips..... 15.5
Barton..... 9.1	Harvey..... 8.8	Pottawatomie.. 13.6
Bourbon..... 19.2	Haskell..... 9.9	Pratt..... 7.5
Brown..... 18.5	Hodgeman..... 21.4	Rawlins..... 15.3
Butler..... 10.1	Jackson..... 12.0	Reno..... 7.4
Chase..... 18.6	Jefferson..... 11.3	Republic..... 15.7
Chautauqua... 22.4	Jewell..... 11.9	Rice..... 9.1
Cherokee..... 19.1	Johnson..... 6.6	Riley..... 17.4
Cheyenne..... 11.4	Kearny..... 9.8	Rooks..... 16.1
Clark..... 3.9	Kingman..... 18.9	Rush..... 12.6
Clay..... 13.9	Kiowa..... 8.2	Russell..... 18.5
Cloud..... 11.2	Labette..... 14.4	Saline..... 30.5
Coffey..... 16.2	Lane..... 12.3	Scott..... 12.0
Comanche..... 10.2	Leavenworth.. 10.5	Sedgwick..... 7.0
Cowley..... 12.4	Lincoln..... 10.6	Seward..... 11.0
Crawford..... 16.3	Linn..... 15.5	Shawnee..... 5.6
Decatur..... 14.9	Logan..... 10.3	Sheridan..... 22.8
Dickinson..... 11.1	Lyon..... 11.6	Sherman..... 17.9
Doniphan..... 16.0	Marion..... 12.2	Smith..... 13.7
Douglas..... 9.0	Marshall..... 14.5	Stafford..... 7.2
Edwards..... 5.5	McPherson..... 7.8	Stanton..... 20.7
Elk..... 16.2	Meade..... 13.9	Stevens..... 6.0
Ellis..... 15.3	Miami..... 11.9	Summer..... 11.1
Ellsworth..... 15.7	Mitchell..... 13.7	Thomas..... 10.7
Finney..... 11.3	Montgomery.... 15.3	Trego..... 14.6
Ford..... 9.7	Morris..... 11.8	Wabaunsee.... 13.2
Franklin..... 12.8	Morton..... 8.1	Wallace..... 8.6
Geary..... 6.3	Nemaha..... 19.3	Washington.... 17.1
Gove..... 15.9	Neosho..... 14.6	Wichita..... 15.4
Graham..... 10.3	Ness..... 19.5	Wilson..... 22.5
Grant..... 11.4	Norton..... 8.4	Woodson..... 19.7
Gray..... 9.3	Osage..... 12.3	Wyandotte..... 6.6

Source: U.S. Department of Commerce, Bureau of Census, 1970 General Population Characteristics: Kansas (Washington: U.S. Government Printing Office, 1972).

CALCULATIONS

State Average: 13.0%

	<u>Priority</u>	<u>Points</u>
0 - 13.0	Low	0
13.1 - 18.9	Medium	1
19.0 - 24.7	High	2
24.8 - 30.5	Very High	3

TABLE II-3

THE PERCENTAGE OF THE POPULATION  
65 YEARS AND OLDER

Allen.....19.3%	Greeley.....11.2	Osborne.....23.2
Anderson.....15.3	Greenwood.....19.4	Ottawa.....20.4
Atchison.....13.3	Hamilton.....13.0	Pawnee.....11.9
Barber.....16.9	Harper.....18.1	Phillips.....19.0
Barton.....11.2	Harvey.....12.3	Pottawatomie..16.2
Bourbon.....17.1	Haskell.....7.4	Pratt.....16.5
Brown.....20.7	Hodgeman.....13.6	Rawlins.....15.8
Butler.....9.7	Jackson.....14.4	Reno.....11.9
Chase.....20.5	Jefferson.....15.0	Republic.....19.4
Chautauqua...23.2	Jewell.....21.0	Rice.....16.3
Cherokee.....14.3	Johnson.....7.3	Riley.....6.2
Cheyenne.....17.1	Kearny.....9.7	Rooks.....16.9
Clark.....18.3	Kingman.....13.4	Rush.....18.0
Clay.....17.4	Kiowa.....17.4	Russell.....16.0
Cloud.....19.8	Labette.....16.0	Saline.....8.5
Coffey.....22.6	Lane.....13.3	Scott.....5.2
Comanche.....18.7	Leavenworth..11.2	Sedgwick.....7.2
Cowley.....13.5	Lincoln.....22.2	Seward.....8.1
Crawford.....17.5	Linn.....21.6	Shawnee.....7.3
Decatur.....20.1	Logan.....14.3	Sheridan.....13.6
Dickinson.....15.5	Lyon.....13.8	Sherman.....7.9
Doniphan.....16.6	Marion.....18.1	Smith.....22.9
Douglas.....10.8	Marshall.....19.1	Stafford.....19.9
Edwards.....17.5	McPherson....14.8	Stanton.....7.3
Elk.....25.7	Meade.....13.8	Stevens.....6.2
Ellis.....9.6	Miami.....11.8	Summer.....15.4
Ellsworth.....19.2	Mitchell.....19.0	Thomas.....14.2
Finney.....5.0	Montgomery...16.3	Trego.....14.8
Ford.....13.1	Morris.....20.6	Wabaumsee....19.7
Franklin.....15.1	Morton.....8.1	Wallace.....12.1
Geary.....4.2	Nemaha.....18.2	Washington...20.2
Gove.....12.8	Neosho.....17.0	Wichita.....8.1
Graham.....13.3	Ness.....16.9	Wilson.....18.0
Grant.....3.2	Norton.....16.2	Woodson.....23.2
Gray.....13.2	Osage.....15.9	Wyandotte.....7.0

Source: U.S. Department of Commerce, Bureau of Census, 1970 General Population Characteristics: Kansas (Washington: U.S. Government Printing Office 1972).

CALCULATIONS

State Average: 14.9%

	<u>Priority</u>	<u>Points</u>
0 - 14.9	Low	0
15.0 - 18.5	Medium	1
18.6 - 22.1	High	2
22.2 - 25.7	Very High	3

TABLE II-4

THE POPULATION DENSITY BY COUNTY  
(Persons Per Square Mile)

Allen.....17.0	Greeley..... 2.3	Osborne..... 7.1
Anderson..... 9.3	Greenwood..... 4.9	Ottawa..... 8.6
Atchison.....18.0	Hamilton..... 2.8	Pawnee..... 5.2
Barber..... 3.9	Harper..... 6.5	Phillips..... 5.2
Barton.....12.2	Harvey.....22.1	Pottawatomie..11.3
Bourbon..... 9.9	Haskell..... 6.3	Pratt..... 4.6
Brown.....14.4	Hodgeman..... 3.1	Rawlins..... 4.1
Butler.....14.2	Jackson.....11.1	Reno.....19.5
Chase..... 4.4	Jefferson.....21.7	Republic..... 7.6
Chautauqua.... 7.2	Jewell..... 6.7	Rice.....11.0
Cherokee.....17.3	Johnson.....58.5	Riley.....49.5
Cheyenne..... 4.1	Kearny..... 3.6	Rooks..... 5.7
Clark..... 3.0	Kingman..... 6.1	Rush..... 7.1
Clay..... 7.6	Kiowa..... 5.7	Russell..... 4.6
Cloud..... 8.8	Labette.....19.7	Saline.....12.7
Coffey.....11.5	Lane..... 3.8	Scott..... 2.2
Comanche..... 3.4	Leavenworth...56.4	Sedgwick.....61.7
Cowley..... 9.2	Lincoln..... 6.3	Seward..... 3.6
Crawford.....25.7	Linn.....12.8	Shawnee.....62.9
Decatur..... 5.6	Logan..... 3.6	Sheridan..... 4.3
Dickinson.....12.0	Lyon.....10.3	Sherman..... 2.2
Doniphan.....23.5	Marion.....10.8	Smith..... 7.6
Douglas.....21.3	Marshall.....12.5	Stafford..... 7.5
Edwards..... 7.4	McPherson.....11.8	Stanton..... 3.4
Elk..... 6.0	Meade..... 5.0	Stevens..... 2.0
Ellis.....10.4	Miami.....17.6	Summer.....13.1
Ellsworth..... 8.6	Mitchell..... 5.6	Thomas..... 2.7
Finney..... 3.3	Montgomery....18.9	Trego..... 4.9
Ford..... 7.8	Morris..... 9.2	Wabaunsee..... 8.1
Franklin.....15.7	Morton..... 4.9	Wallace..... 2.4
Geary.....32.7	Nemaha.....16.7	Washington....10.4
Gove..... 3.7	Neosho.....14.5	Wichita..... 4.5
Graham..... 5.3	Ness..... 4.4	Wilson..... 8.6
Grant..... 3.8	Norton..... 4.2	Woodson..... 9.5
Gray..... 5.2	Osage.....15.1	Wyandotte....259.0

Source: U.S. Department of Commerce, Bureau of Census, 1970 General Population Characteristics: Kansas (Washington: U.S. Government Printing Office 1972).

CALCULATIONS

State Average: 11.3 person/square mile

	<u>Priority</u>	<u>Points</u>
0 - 11.3	Low	0
11.2 - 8.2	Medium	1
8.1 - 5.1	High	2
5.0 - 2.0	Very High	3

TABLE II-5

COMPOSITE SCORE OF ALL FOUR  
VARIABLES FOR EACH COUNTY

Allen.....	4	Greeley.....	4	Osborne.....	8
Anderson.....	3	Greenwood.....	7	Ottawa.....	5
Atchison.....	1	Hamilton.....	7	Pawnee.....	3
Barber.....	5	Harper.....	4	Phillips.....	6
Barton.....	0	Harvey.....	0	Pottawatomie..	4
Bourbon.....	6	Haskell.....	3	Pratt.....	4
Brown.....	4	Hodgeman.....	5	Rawlins.....	6
Butler.....	0	Jackson.....	1	Reno.....	0
Chase.....	9	Jefferson.....	2	Republic.....	8
Chautauqua....	10	Jewell.....	5	Rice.....	5
Cherokee.....	4	Johnson.....	0	Riley.....	1
Cheyenne.....	4	Kearny.....	4	Rooks.....	4
Clark.....	4	Kingman.....	4	Rush.....	5
Clay.....	5	Kiowa.....	3	Russell.....	7
Cloud.....	5	Labette.....	3	Saline.....	3
Coffey.....	6	Lane.....	3	Scott.....	3
Comanche.....	7	Leavenworth...	0	Sedgwick.....	0
Cowley.....	1	Lincoln.....	6	Seward.....	3
Crawford.....	4	Linn.....	6	Shawnee.....	0
Decatur.....	7	Logan.....	4	Sheridan.....	5
Dickinson.....	1	Lyon.....	2	Sherman.....	4
Doniphan.....	4	Marion.....	3	Smith.....	6
Douglas.....	0	Marshall.....	4	Stafford.....	5
Edwards.....	4	McPherson.....	0	Stanton.....	5
Elk.....	8	Meade.....	4	Stevens.....	3
Ellis.....	1	Miami.....	0	Summer.....	2
Ellsworth.....	6	Mitchell.....	5	Thomas.....	3
Finney.....	3	Montgomery....	4	Trego.....	5
Ford.....	2	Morris.....	4	Wabaunsee.....	6
Franklin.....	1	Morton.....	4	Wallace.....	4
Geary.....	0	Nemaha.....	4	Washington....	5
Gove.....	4	Neosho.....	3	Wichita.....	4
Graham.....	2	Ness.....	7	Wilson.....	6
Grant.....	3	Norton.....	5	Woodson.....	9
Gray.....	2	Osage.....	2	Wyandotte.....	0

CALCULATIONS

State Average: 3.82

		<u>Priority</u>
0 - 3		Low
4 - 5		Medium
6 - 7		High
8 - 10		Very High

Since the average score for all counties was 3.82, any county scoring three or fewer total points for the four variables would fall into the low priority category. The highest point total for the four variables was ten (10), so the difference between that and the State average was 6.18. Dividing by 3, the range was found to be 2.06 and the breakdown was as follows:

0 - 3.82 low priority  
 3.83 - 5.88 medium  
 5.89 - 7.94 high  
 7.95 - 10.0 very high

Since each county's point total was a whole number, the practical range became:

0 - 3 low priority  
 4 - 5 medium  
 6 - 7 high  
 8 - 10 very high

It can be seen from this that it is possible for a county to be situated in the very high priority category on the composite map while not being in the very high category for any single variable. It would be only necessary that it be in the high category for all four variables. At the same time, it would be possible for a county to be in the very high range for a single variable and still be in the low priority range overall, provided it was in the low range for all other variables. In spite of these possible irregularities, the composite map gives a more accurate picture of areas of transportation priority need than would be given if the four variables were considered separately. The data as it has been presented puts the determination of need on a more comparable statistical foundation.

From Figure II-1 it can be seen that there is a very high priority of need for transportation services, in six (6) counties across Kansas. Sixty-two (62) out of the 105 counties in Kansas have some degree of transportation need. In an effort to see how these transportation needs are being addressed, the following is a discussion concerned with the existing transportation facilities in the state.

### Existing Facilities

#### Intercity Transit Service

Records of the Kansas Corporation Commission were examined and twenty-one scheduled service franchises were determined (see Table II-6). All systems which were authorized to provide passenger services were then either checked by inquiry directly to the operator, or by use of Russell's Official Motor Coach Guide,<sup>3</sup> to determine if the service was actually operating, and if so, the frequency of service. Of these 21 companies, only 8 operate on a daily basis in Kansas. Continental Trailways operated the largest scheduled service, followed by Greyhound Lines. A schedule of bus service is presented in Table II-7.

This information was then plotted on a map which showed the routes of the various major common passenger carriers (see Figure II-2). It immediately became apparent that Kansas has a pretty good basic interurban transportation network, especially with buses connecting the large urban areas. After a more indepth interurban analysis was conducted it was shown that, of the 619 incorporated cities in Kansas, 225 have some type of bus service. Of these 225 cities, 85 are county seats or other cities with a

TABLE II-6

BUS COMPANIES LISTED WITH  
THE KANSAS CORPORATION COMMISSION

- |  |  |
|--|--|
| 1. Anthony Stage Lines<br>Hutchinson, Kansas                 | 12. A. T. Meyers & Sons, Inc.<br>Merriam, Kansas                     |
| 2. Continental Panhandle Lines, Inc.<br>Amarillo, Texas      | 13. Missouri-Kansas-Oklahoma Coach<br>Lines, Inc.<br>Tulsa, Oklahoma |
| 3. Continental Trailways, Inc.<br>Dallas, Texas              | 14. Mid Continent Coaches, Inc.<br>Oklahoma City, Oklahoma           |
| 4. Bickel Bus Lines<br>Norton, Kansas                        | 15. Ottawa Bus Service, Inc.<br>Ottawa, Kansas                       |
| 5. Easton Bus Service<br>Easton, Kansas                      | 16. Republican Valley Lines<br>Hastings, Nebraska                    |
| 6. Greyhound Lines<br>Chicago, Illinois                      | 17. K. G. Lines, Inc.<br>Tulsa, Oklahoma                             |
| 7. Jayhawk Bus Lines<br>Topeka, Kansas                       | 18. Trans State Bus, Inc.<br>Great Bend, Kansas                      |
| 8. Jefferson Lines, Inc.<br>Minneapolis, Minn.               | 19. Vandalia Bus Lines, Inc.<br>Caseyville, Illinois                 |
| 9. B. W. Jones & Sons, Inc.<br>McPherson, Kansas             | 20. Trenton-St. Joseph Coaches<br>St. Joseph, Missouri               |
| 10. Kansas City-Leavenworth Bus Lines<br>Leavenworth, Kansas | 21. Santa Fe Trail Transportation Company<br>Wichita, Kansas         |
| 11. Kraftours Company<br>Tulsa, Oklahoma                     |  |

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Source: Kansas Corporation Commission, July 1975.



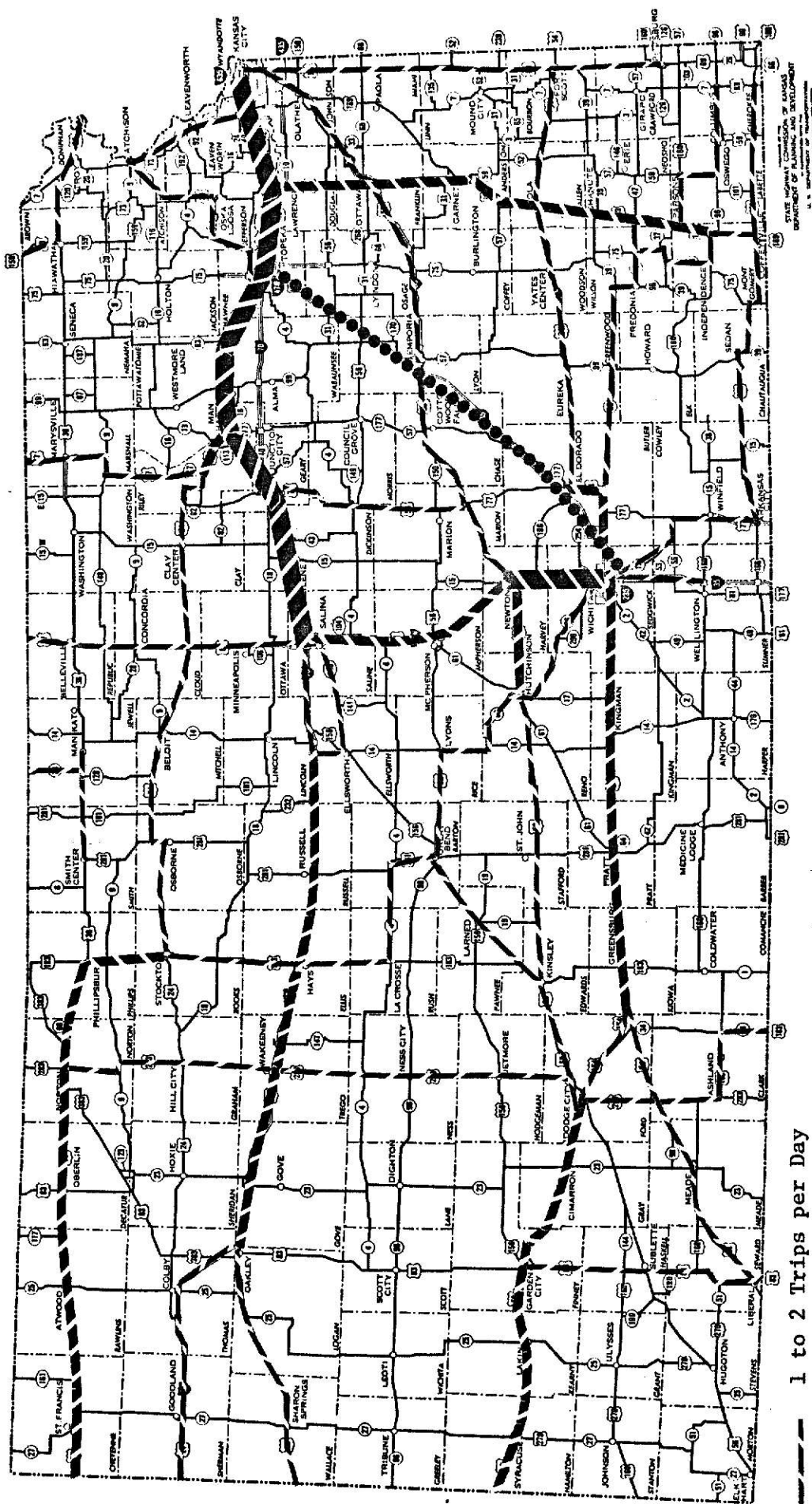
TABLE II-7  
SCHEDULED BUS SERVICE IN KANSAS

<u>LINE NUMBER</u>	<u>ORIGIN</u>	<u>DESTINATION</u>	<u>HEADWAY (hours)</u>
1	Kansas City	Pittsburg	6
2		Wichita	24
3		Independence	12
4		Coffeyville	12
5		Hiawatha	24
6		Atchison	24
7		Liberal	24
8		Wichita	24
9		Wellington	24
10	Wichita	Dodge City	24
11		Syracuse	12
12		Syracuse	24
13	Dodge City	Syracuse	24
14	Kansas City	Goodland	24
15		Goodland	24
16		Sharon Springs	24
17	Wichita	Salina	12
18		Junction City	12
19		St. Francis	24
20		St. Francis	24
21		St. Francis	24
22		St. Francis	24
23		Salina	24
24		Hutchinson	24
25		Marysville	24
26		Marysville	24
27		Salina	24
28		Belleville	24
29		Baxter Springs	24
30		Arkansas City	8
31		Columbus	24
32		Pittsburg	24
33		Wellington	24
34	Salina	Minneapolis	24
35	Dodge City	McPherson	24
36	Garden City	Norton	12
37		Ashland	24
38		Liberal	24
39	Topeka	Atchison	24
40	Smith Center	Mankato	24
41	Kansas City	Wichita	12
42		Wichita	24

---

Source: Planning and Development Division, Kansas Department of Transportation

FIGURE II-2  
EXISTING INTERCITY BUS ROUTES  
IN KANSAS



Source: Russell's Official National Motor Coach Guide, November 1974.

population greater than 10,000. 87 out of the 105 Kansas counties are served by existing bus service somewhere within the county (see Figure II-3).

The primary problem discovered was that interurban service tends to be oriented to and controlled by the service needs of the larger urban areas, not the rural areas and small towns. The bus system in Kansas is geared toward interstate and interregional travel, not intracounty travel. It is most difficult to travel to other cities within the same county or in neighboring counties because of the transfer problems involved and the low frequency of services offered.

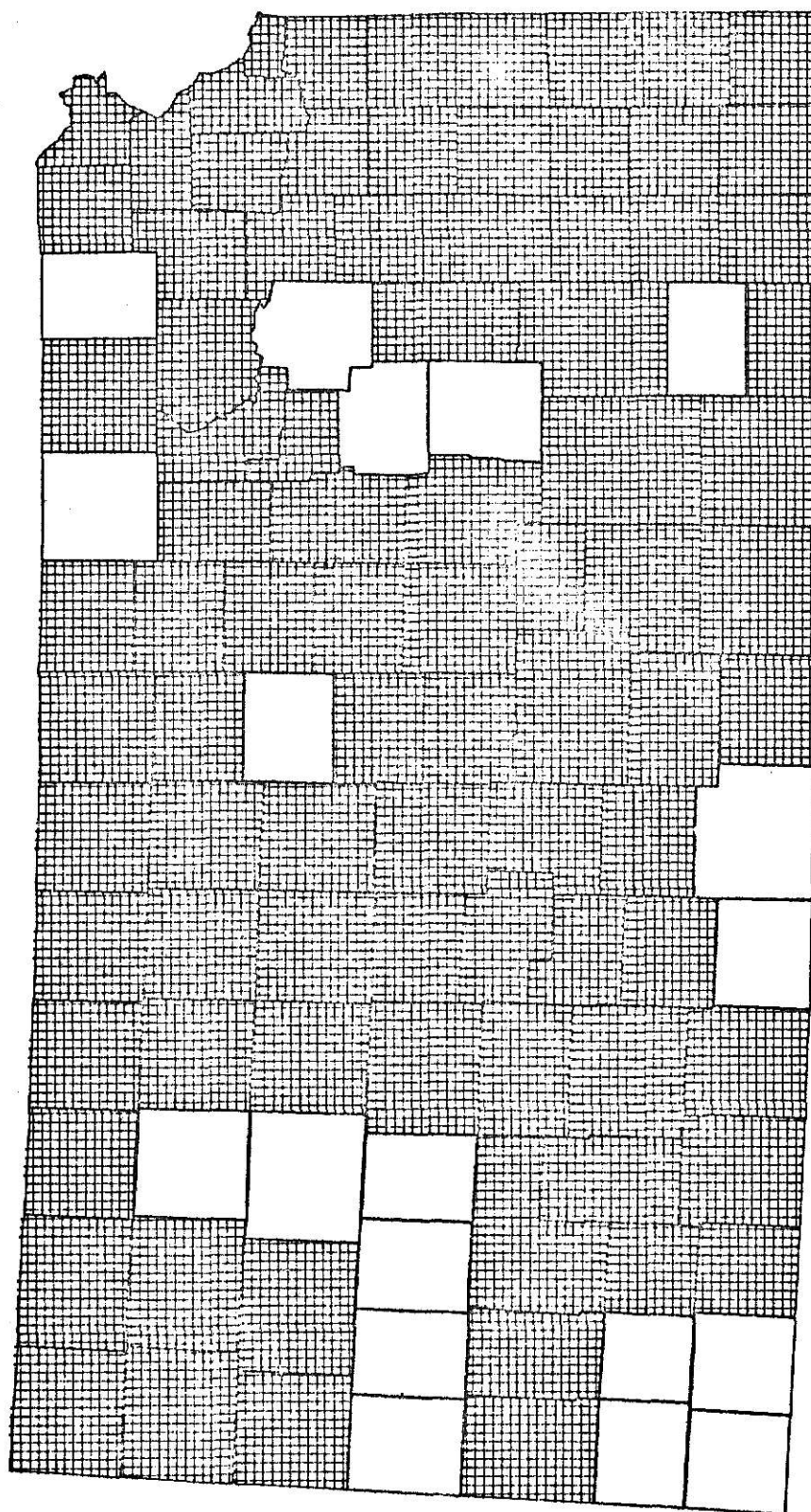
#### Intracity Transit Service

Of primary concern here was an inventory of services in cities under 50,000 population, not of services in the three larger urban areas.

There are 41 cities in Kansas which have a population between 5,000 and 50,000 and which are not a part of the three larger metropolitan areas. Of these cities, Lawrence is the only city with regularly scheduled intracity bus service. The only available intracity public transportation present in those cities other than Lawrence is that provided by private taxicab companies. Currently, there are 52 taxicab companies operating within or near 33 of these cities. For many elderly, handicapped, and poor, they represent the only available public transportation. Table II-8 lists these cities and the number of taxicab companies serving in each. In addition to those cities listed in Table II-8, six cities of less than 5,000 population also have taxi service, they are: Cherryvale, Colby, Galina, Garnett, Herington, and Osawatomie.

FIGURE II-3

**KANSAS STATEWIDE BUS SERVICE**  
**1974**



KEY: BLANK - NOT SERVED

SHADED - SERVED

**Source:** Planning and Development Division, Kansas Department of Transportation

TAXICAB SERVICE  
IN CITIES OF 5,000 TO 50,000 POPULATION

City	Operating Taxicab Companies
Abilene	1
Arkansas City	1
Atchison	1
Augusta	0
Baxter Springs	2
Bonner Springs	1
Chanute	1
Clay Center	1
Coffeyville	1
Concordia	2
Dodge City	3
*Derby	0
El Dorado	1
Emporia	1
Fort Scott	2
Garden City	2
Goodland	0
Great Bend	1
Hays	2
Hutchinson	1
Independence	1

City	Operating Taxicab Companies
Iola	2
Junction City	4
Larned	1
Lawrence	2
Leavenworth	2
Liberal	2
McPherson	1
Manhattan	2
Newton	1
Olathe	2
Ottawa	1
Paola	0
Parsons	1
Pittsburg	1
Pratt	0
Russell	1
Salina	2
Wellington	1
Winfield	1
Total	52

\*Derby could be served by Wichita companies.

### Specialized Transportation Service

Within the Kansas Department of Social and Rehabilitation Services (SRS), Services for the Aging Sections (SAS), has been most active in their efforts to provide transportation services to their clientele. With funds through the Older Americans Act, SAS has made available capital grant funding, administered by their Area Agencies on Aging (AAA), to numerous public and private organizations so that these organizations could purchase vehicles (12 to 15-passenger size minibuses) to transport the elderly. As a result of these efforts, there are now approximately 85 vehicles in 66 communities located in 58 counties throughout Kansas. These buses attempt to operate on a city wide basis, with occasional county wide service being provided (see Figure II-4). No operating subsidies are available under the program.

In addition to those vehicles being provided for by SAS, the Kansas Department of Transportation (KDOT) is purchasing 61 vehicles for private nonprofit organizations with funds provided under Section 16(b)(2) of the Urban Mass Transportation Act of 1964, as amended. These vehicles are directly aimed at providing a means of mobility to elderly and handicapped persons in their respective communities (see Figure II-5).

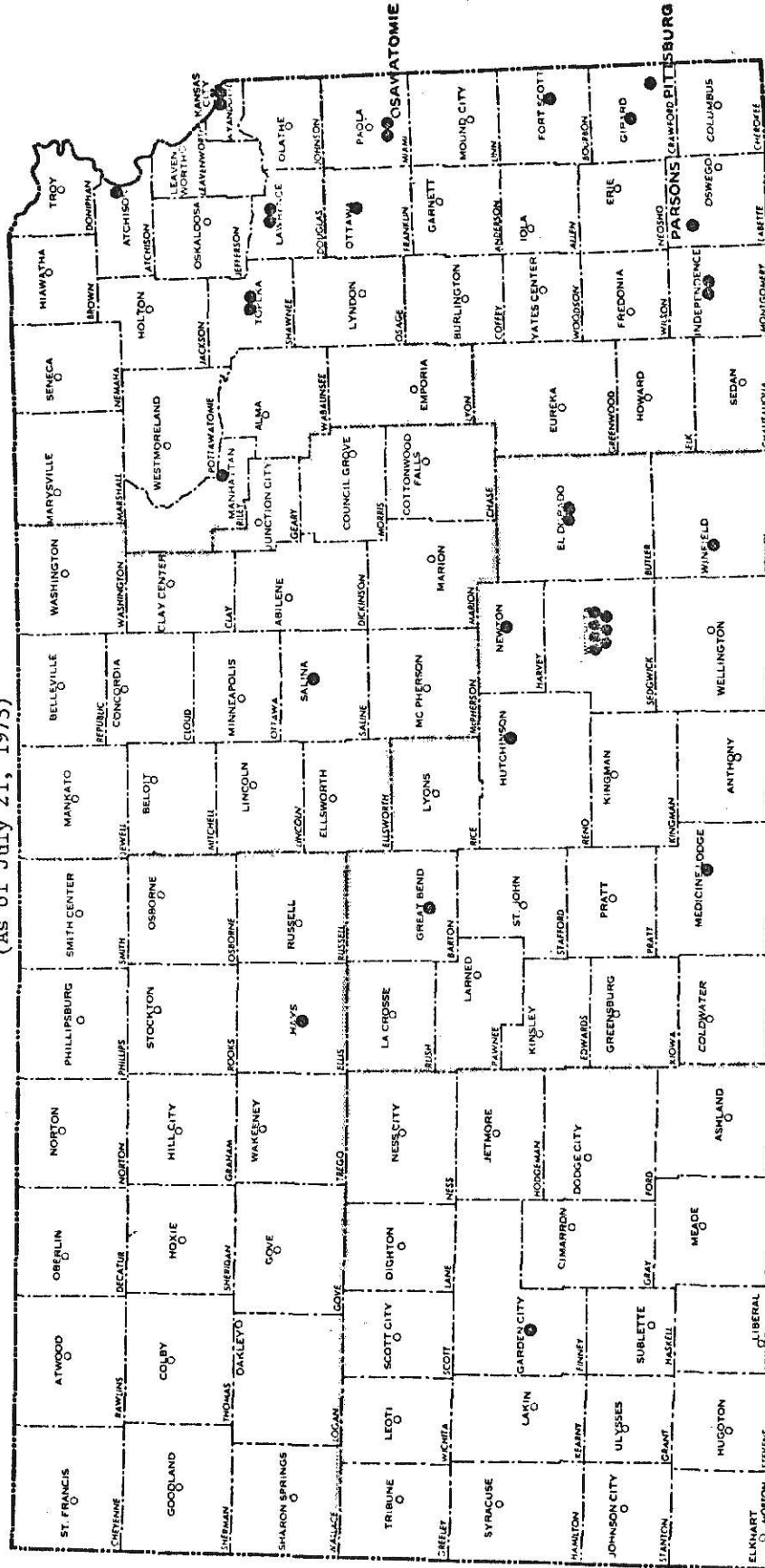
Another example of specialized transportation service is being provided by the Southeast Kansas Community Action Program (SEK-CAP). This system encompasses seven counties. There are two buses available which traverse seventeen routes usually once a month. This service is primarily directed at low income and/or elderly citizens. Because of its infrequent schedule of service, this system falls somewhat short of meeting the day to day transportation needs of the transportation disadvantaged in their area.





FIGURE II-5

GEOGRAPHIC DISTRIBUTION OF  
 APPLICANTS APPROVED FOR FUNDING  
 SECTION 16(b)(2) OF THE  
 URBAN MASS TRANSPORTATION ACT OF 1964, AS AMENDED  
 (As of July 21, 1975)

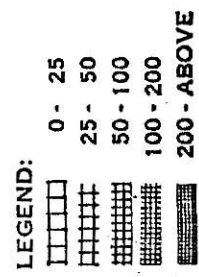
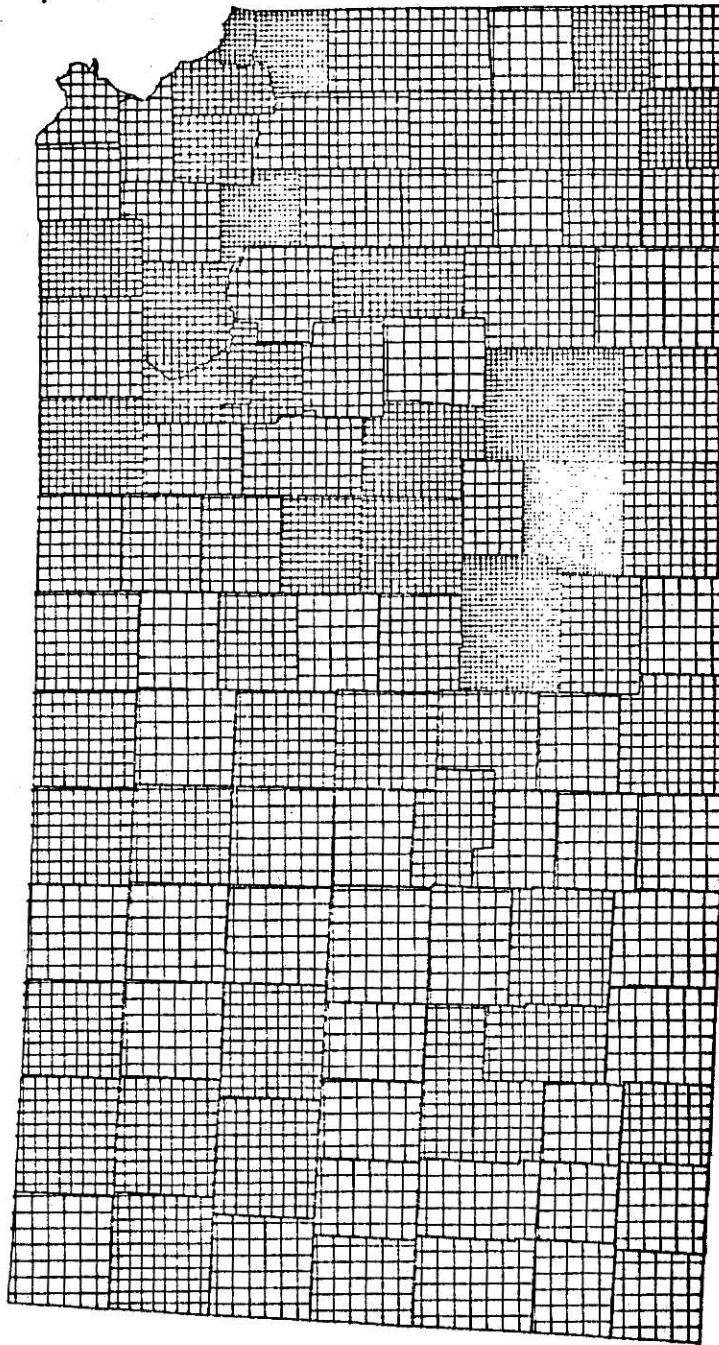


● Indicates location of applicant(s) approved for funding



FIGURE II-6

APPROXIMATION OF SCHOOL BUSES PER COUNTY  
(1974 - 1975 School Year)



Source: Kansas Department of Transportation

When considering specialized transportation, school bus service cannot be excluded. During the 1974-1975 school years, 4,239 school buses were utilized to transport students in the various school districts across the State. The approximate distribution, shown in Figure II-6, begins to reveal the potential role that school buses could play in providing additional public transportation. Due to legal restrictions these vehicles can be used only for the transport of school children. With effective legislation, school buses represent a transportation resource that could effectively provide services to persons needing access to clinics, jobs, shopping areas, and the like, especially if operating subsidies were offered to individual districts.

As has been shown there are, based on the four variables used, geographic areas of transportation needs present in 62 counties in Kansas. The transportation services which are presently available are not geared to address this intracounty transit need. In order to understand better the degree to which this transportation need exists in the various counties of Kansas the number of demands for service should be calculated. Chapter III addresses itself to this endeavor.

#### Notes

1. U.S. Department of Commerce, Bureau of Census, 1970 General Social and Economic Characteristics: Kansas (U.S. Government Printing Office, 1972).
2. Jon Burkhardt et al., Rural Transportation In Pennsylvania: Problems and Prospects, Vol. 1, prepared for the Governor of Pennsylvania (Harrisburg: May, 1974), pp. 4-7.
3. Russell's Guides, Inc., Russell's Official National Motor Coach Guide (Cedar Rapids, Iowa: 1974), pp. 744-755.

## CHAPTER III

### THE DEMAND FOR RURAL PUBLIC TRANSPORTATION

#### Introduction

If we were willing to pay any price for goods or services which were intended to fulfill a need, no investigation into the cost of those goods or services would be necessary. However, in the planning and implementing of public policies and programs, this expensive approach cannot be tolerated. A need should be identified, quantified, and evaluated before any action steps can be taken to effectively meet the need. Public transportation in rural areas is one such need which has received little consideration along these lines.

As stated earlier, over the past few years there have been many small-scale efforts developed to meet the perceived transportation needs of a given geographic area. The typical effort has been one of implementing small demonstration projects with a few vehicles operating in a relatively small area, serving an often ill-defined clientele, and utilizing grant funds from social service programs. Usually, little analytical work preceded the project's implementation. More often than not, any analytic work that was done was directed at identifying funding sources. Quantifying the need for the service was seldom done. A general description of the potential clientele such as the number or percent of elderly, those persons below the poverty level, etc., was all that was included in the

analysis. When sufficient funds were secured to put vehicles on the road, the project would go into operation. When the funds expired the project would end.

Before serious, long-term, large-scale efforts can be successfully undertaken, careful analysis of the demand or need for rural public transportation service should be made. The remainder of this chapter will determine the statewide demand for rural public transportation in Kansas.

### The Concept of Demand and Need

In that transportation is generally considered to be a service that is consumed, not for its own merits but rather to achieve some secondary goal, it is important to understand what the "demand" for and what the "need" for transportation services is. There presently exists considerable ambiguity around the distinction between "demand" and "need". Some clarification of this issue has been provided by K. E. Boulding<sup>1</sup> in the health area and, more recently by J. E. Burkhardt and C. C. Eby<sup>2</sup> in respect to transportation. From the more traditional economic point of view, the amount of transportation supplied should equal the demand for the service at the price at which it is offered.<sup>3</sup> Unlike demand, need is established independently of economic considerations. As Burkhardt puts it, "Need is an ideal determined by experts, whereas demand is what the consumer wants and buys."<sup>4</sup> Following this line of thought, the need for transportation can be inferred to be the quantity of service that "expert opinion" regards as necessary for any individual to be able to achieve the minimum social and economic amenities dictated by contemporary standards. R. Briggs

defines need in slightly different words, "Transportation need can be defined as the minimum amount of transportation required for an individual to access that package of goods and services deemed by contemporary standards to be essential for at least minimum levels of living."<sup>5</sup>

Theoretically, these definitions may suffice, but operationally they fall somewhat short of reality. Well defined contemporary community standards are difficult to defend, most often being a matter of subjective judgement. This is particularly true in the realm of transportation where the opinions of the "experts" vary greatly. Consequently, the approach most often taken in determining demand has been one of assuming that additional transportation is needed if the transportation disadvantaged generate sufficient numbers of person trips to merit a minimum level of public transportation service, i.e., one vehicle per county. The transportation disadvantaged are defined as those who, because of age, physical impairment, or income, cannot utilize automobiles.

#### Estimating Demand

For transportation planning purposes, estimates are required of the number of trips occurring between all pairs of subregions within a proposed transportation service area. The standard methodology for estimating the demand for transportation usually involves conducting an origin and destination (OD) survey. The data collected in this survey is then utilized to accomplish three tasks. First, trip generation rates are estimated for each survey zone in the study region. Secondly, trips from each of these zones are distributed to other zones within the study region by means of some distributional formula usually based upon gravity or potential model concepts.

Third, a modal split procedure is utilized to assign trips to appropriate transportation modes.<sup>6</sup> Unfortunately, conducting an extensive statewide OD survey is an expensive and time consuming task, one which was far beyond the financial and manpower resources available to this author. Because of this, a more simplified means of estimating potential demand for a statewide rural transportation system in Kansas was needed. As a result of a review of the literature pertaining to this subject, another approach was formulated based on strategy developed in a paper by Jon E. Burkhardt and William W. Millar.<sup>7</sup>

Before proceeding with the Burkhardt-Millar demand estimating technique, several terms should be defined. The term "rural" includes all areas outside the urbanized areas identified for the 1970 Census, except small urban areas. "Rural public transportation" includes public transportation wholly within rural areas or small urban areas, or between rural areas or small urban areas and the boundary of urbanized areas. The "demand for rural public transportation" is the number and length of trips which would be taken on public transportation by residents of rural and small urban areas at a given level of fare and level of service. Demand can be expressed in terms of passenger miles.

In utilizing this method of estimating demand for rural public transportation in Kansas, it was assumed that any rural public transportation system would operate at reduced or no fare for persons age 65 or older and for low income non-senior citizens, at a fare of 25¢ or at a rate of 5¢ per passenger mile, whichever is greater, for everyone else. Reduced or free fares for the elderly and low income persons would be paid for through modification of existing or proposed social service programs. Any general subsidy

required to keep the overall fare structure at the level outlined above would come from unspecified state revenues.

Since the justification for a rural public transportation service rises primarily from the transportation demand of transit dependent persons (the captive riders), which is not being met, it was assumed that the level of service offered would have only a marginal influence on the demand for the service. Level of service does, however, have a great effect on the cost of providing the service.

#### Low Estimate of Demand

One way to estimate rural public transportation demand is by using ridership experience data developed for existing rural transportation services and applying those measures to the rural Kansas situation. A useful value to use in estimating potential system usage is annual per capita ridership.

A recent report prepared for the Urban Mass Transportation Administration contained statistics which indicated that the annual per capita transit ridership in rural areas of the United States in 1960 was 3.5 revenue transit rides per person. By 1970, this rate had fallen to 2.8 annual revenue transit rides per person. If this downward trend has continued, it is likely that the 1975 rate would be about 2.5 annual revenue rides per person. The same report showed an annual per capita revenue ridership figure in small urban areas of 10.0 in 1960 and 5.0 in 1970. If this trend has continued, the likely value for 1975 would be about 3.8 annual revenue trips per capita.<sup>8</sup>

Another estimate of rural public transportation per capita ridership was derived from data presented on two systems operating in Florida. The

CATS service, operating in rural Brevard County, has a per capita ridership of 0.8 trips per person per year. The Suwannee Valley Transit System, which serves a four county rural area in northern Florida, was experiencing a rate of 0.6 trips per capita in the rural portion of the counties and 1.9 trips per capita in the two major urban communities (Lake City-10,575 and Live Oak-8,630) it serves.<sup>9</sup>

A review of data collected from participating transit companies in the Free Transit Program for Senior Citizens, in Pennsylvania, indicated that per capita ridership in small urban areas ranged from .6 to 4 transit trips per person per year, and .5 to 3 transit trips per capita per year for companies whose service area was strictly rural in character.<sup>10</sup>

An attempt was made to establish similar measures for non-common carrier transportation operations in Kansas such as those operated by Community Action Agencies and those sponsored by Area Agencies on Aging. Unfortunately, most of the operators of these services keep no records of the number of persons they carry. However, one such organization, the Community Senior Service Center, Inc. in Osawatomie, Kansas, did have records indicating that their transit system served approximately 10,400 person trips in the one year period from September, 1974 through August, 1975. This would represent about .5 rides per capita per year based on the Miami County 1975 population of 20,900 persons.<sup>11</sup>

Utilizing these factors generated by other systems, mostly located in other states, it was possible to develop ranges of estimated potential patronage for statewide rural public transportation service in Kansas.

The 1970 U.S. Census reported Kansas' total population as 2,246,500 with 785,900 persons living within the state's 4 urbanized areas. An



additional 698,900 persons lived in other urban places with populations of at least 2,500. The remaining 761,700 person lived in the rural areas of Kansas.<sup>12</sup> Using the above factors and figures, Table III-1 shows estimates of the potential number of annual person trips which could be expected to be made if transportation services were available to the rural and small urban residents of Kansas.

TABLE III-1  
LOW ESTIMATE OF POTENTIAL ANNUAL TRANSIT TRIPS  
IN RURAL AND SMALL URBAN AREAS

Type of Area	Annual Trips Per Capita	Population	Potential Annual Transit Trips
Rural	0.5	761,700	380,900
Rural	0.6	761,700	457,000
Rural	0.8	761,700	609,400
Rural	2.5	761,700	1,904,300
Small Urban	0.6	698,900	419,300
Small Urban	1.9	698,900	1,327,900
Small Urban	3.8	698,900	2,795,600

Averaging the figures derived in Table III-1 yielded an estimated demand of 837,900 rural annual (person) transit trips, and 1,514,300 small urban annual transit trips. Of course, these estimates assume that transit trips will continue to be made at rates consistent with current experience. Obviously, many factors could affect these estimates greatly including type, cost, frequency, and quality of the service provided.

#### High Estimate of Demand

While the above estimates are for the population at large, it is clear

that persons with certain characteristics may use a public transportation service much more than the norm. A study of the transit making habits of poverty households in both rural and small urban areas of West Virginia revealed a transit riding propensity of 19 annual rides per person per year,<sup>13</sup> Pennsylvania's experience with the Free Transit Program for Senior Citizens showed, in many urban areas, an annual per capita ridership ranging from 14 to 26 annual transit trips per senior citizen. Comparable values in rural areas were on the order of 10 to 15 annual transit rides per senior citizen.<sup>14</sup> Obviously, the higher the proportion of elderly and/or low income persons in the population of an area, the higher the potential demand for public transportation services is likely to be.

Using these ridership factors it was possible to determine another estimate of rural transportation demand in Kansas which was based on a high degree of system utilization by elderly and low income persons located in Kansas' rural and small urban areas. An assumption was made, based on prior experience, that these persons would represent approximately 80% of the total system ridership.<sup>15</sup> The estimated total annual person trips for rural and small urban areas, indicated in Table III-2, was equal to the estimated senior citizen ridership plus the estimated low income ridership divided by the captive ridership factor of 0.8.

As is shown in Table III-2, there was an estimated transit demand of 3,511,250 annual rural person trips and 3,793,750 annual small urban person trips. This produced a total estimated transit demand of 7,305,000 annual person trips which could be expected to be made if transportation services were available to the elderly and low income persons in the rural and small urban areas of Kansas.

TABLE III-2

HIGH ESTIMATE OF POTENTIAL ANNUAL TRANSIT  
TRIPS IN RURAL AND SMALL URBAN AREASRural

109,000	senior citizens
<u>12</u>	annual trips per senior citizen
1,308,000	annual senior citizen ridership
79,000	non-elderly low income persons
<u>19</u>	annual trips per person
1,501,000	annual low income ridership
1,308,000	annual senior citizen ridership
1,501,000	annual low income ridership
2,809,000	annual captive ridership
<u>÷ 0.8</u>	annual ridership
3,511,250	annual rural person trips

Small Urban

90,000	senior citizens
<u>20</u>	annual trips per senior citizen
1,800,000	annual senior citizen ridership
65,000	non-elderly low income persons
<u>19</u>	annual trips per person
1,235,000	annual low income ridership
1,800,000	annual senior citizen ridership
1,235,000	annual low income ridership
3,035,000	annual captive ridership
<u>÷ 0.8</u>	captive ridership factor
3,793,750	annual small urban person trips

Amount of Service Needed to Meet Demand

Having estimated the potential demand for rural transportation services, in terms of total person trips, it was possible to determine how much service, in terms of total passenger miles, should be provided to meet the estimated demand. In order to do this, an estimate of the length of trip necessary to satisfy the demand had to be established.

A review of several studies of rural and small urban travel habits has revealed that the most likely trip purposes to be served by rural transportation services are shopping, medical, personal business, and social-recreational trips. Work trips are generally of lesser importance in rural and small urban areas than they are in urbanized areas. In order to determine where these trip purposes might best be satisfied, the location of community service facilities needed to be established. All general hospitals were noted on a map. All counties except Chase, Doniphan, Elk, Gray, Linn, Osage, Stanton, Wabaunsee, Wallace and Woodson, had at least one hospital located within its boundaries. Next, government offices and courthouses were plotted on the same map. Finally, since there were no listings available of the major shopping areas throughout the state, the assumption was made that adequate shopping facilities could be found in every county seat or in every municipality with a population of at least 5,000 persons.

As a result of the above analysis and assumption concerning the location of community service facilities, the county seats and municipalities with a population of at least 5,000 were designated as service centers where it was probable that the majority of rural transit trip purpose demands could be met.

Each service center became the focal point or centroid for the development of a theoretical transportation service area. The boundaries of these service areas were initially defined by bisecting the airline distance between each service center and every other service center adjacent to it. These boundary lines defined the theoretical least distance limits of a transportation area around the service center. Physical features such as rivers and road networks were not considered in determining these

areas. The boundaries which evolved closely approximated existing county boundaries in the majority of cases.

A sampling procedure was then instituted selecting, at random, counties in the state to determine the average distance between a service center and the outer limits of its service area. When this was done, the judgement was made that the average person trip length in a given service area would be equal to one-half the average airline distance calculation (assuming that the population density was reasonably similar throughout the service area) multiplied by an adjustment factor of 1.5 to account for the difference between airline distance and highway distance.

As a result of this procedure, it was determined that the average person trip length ranged from 8 to 12 miles. This resulting value was an estimate of the average one-way person trip length for potential passengers of a rural public transportation system within a given service area, assuming that there were no unusual population dispersement patterns in the service area.

#### Calculation of Total Passenger Miles

Having determined the statewide average person trip length (10 miles), it was possible to estimate the number of passenger miles of service needed in rural areas of the state. As calculated from the data presented in Table III-1, the annual demand for rural public transportation was 837,900 person trips. If these trips averaged 10 miles in length, there would be a need for service to handle 8,379,000 passenger miles of demand annually in rural areas. Based on the calculations in Table III-2, the 3,511,250 person trips converted to 35,112,500 passenger miles. Thus, the demand for transit

services in just the rural areas of Kansas could range from 8.4 to 35.1 million passenger miles per year.

Based on experience found in urban transit operations, it was calculated that the average trip lengths in small urban areas would be approximately 1.5 miles.<sup>16</sup> Thus, if based on the data presented in Tables III-1 and III-2, the low estimate of annual demand for small urban area public transportation would be 2.3 million passenger miles while the high estimate of demand would be 5.7 million passenger miles.

Adding the total for both the rural and the small urban areas, it was determined that there was an estimated need for transit services, statewide, to accommodate 10.7 million passenger miles of demand to handle the low estimate of demand, and 40.8 million passenger miles for the high demand estimate.

#### System Implications of These Demand Levels

This estimated demand can be handled in a number of different ways, in various areas of the state, depending on the density of the demand. There are approximately 79,000 square miles in rural Kansas excluding urban areas, federal lands, and water surface. Thus, the annual rural transportation demand density (assuming the low estimate of demand of 837,900 transit trips was accurate) would be approximately 11 annual demands per square mile, or .92 monthly demands per square mile, or .03 daily demands per square mile. The average rural county (i.e., transportation service area) contains nearly 750 square miles and, thus, could expect approximately 24 demands for service daily.

24 demands for service distributed over 750 square miles is a very low

level of demand which can only be served at very high cost. The cost of serving these demands can be reduced if the demands for service can be structured both in terms of time and geographic location. Also, the 24 daily demands for service was calculated assuming service would be offered every day in the service area. If the service were offered only five days per week, the average daily demand for service would be 31 daily demands, still a low level of demand.

Assuming the high estimate of demand (3,511,250 rural transit trips) is accurate, the density of demand would be 45 annual rural transit demands per square mile, or .13 daily demands per square mile. The average rural county could expect approximate 98 daily demands for service. For a five-day-a-week service, there would be 126 daily demands. This is a more serviceable level of demand than that of the low estimate, but considering the geographic dispersion, we would still be providing service which would be at the high end of the cost scale. Structuring the demands geographically, and at specific times, will significantly reduce the cost of providing the transit service.

Geographically, it is not likely that the demands will be dispersed uniformly across the county. Concentrations will occur in small towns and along the main roads. Thus, with experience, differing amounts of service can be offered to meet the varying demand patterns. That is, some areas might require service several times per day while others might require service only once per week.

Notes

1. K.E. Boulding, "The Concept of Need for Health Services and Comments on the Health Services Research Papers Conference," Milbank Memorial Fund Quarterly, Vol. 44, No. 4, Pt. 2, (October, 1966), pp. 202-233.
2. Jon E. Burkhardt and Charles L. Eby, "Need As a Criterion for Transportation Planning," Highway Research Board No. 435 (Washington, D.C.: Highway Research Board, 1973), pp. 32-41.
3. Ronald Briggs, Designing Transportation Systems for Low Density Rural Regions, a report to the 71st Annual Meeting-Association of American Geographers, Milwaukee, April, 1975 (Austin, Texas: University of Texas, 1975), p. 9.
4. "Need As a Criterion," op. cit., p. 36.
5. "Designing Transportation Systems," op. cit., pp. 9-10.
6. Ibid., p. 11.
7. Jon E. Burkhardt and William W. Millar, "Estimating the Cost of Providing Rural Transportation Services," presented at the 54th Annual Meeting of the Transportation Research Board (Washington: January, 1975).
8. U.S. Department of Transportation, Transportation System Center, The Handicapped and Elderly Market for Urban Mass Transit (Cambridge, Mass.: October, 1973), pp. 6-9.
9. Proceedings, Third Annual Transportation Conference (St. Peterburg Beach, Florida: 1973).
10. "Estimating the Cost," op. cit., p. 6.
11. T.L. Barrett, Annual Report of Bus Operations (Osawatomie, Kansas: Community Senior Service Center, September, 1975), p. 1.



12. U.S. Department of Commerce, Bureau of Census, 1970 General Population Characteristics: Kansas (Washington: U.S. Government Printing Office, 1972).

13. J.E. Burkhardt et al., A Study of the Transportation Problems of the Rural Poor, Vols. 1 and 2, prepared for the U.S. Office of Economic Opportunity (Washington: 1972), Vol. 2, pp. 23-27.

14. "Estimating the Cost," op. cit., pp. 7-8.

15. Ibid., p. 8.

16. Ibid., p. 10.

## CHAPTER IV

### RECOMMENDED RURAL TRANSPORTATION SYSTEM: DARTS

Having discussed the existing conditions and having shown that there is a potential demand for rural transportation service in Kansas, the methodology by which rural transportation services can be planned, developed, and implemented, to address the transport needs of rural Kansans, will be presented.

### Recommended System: General Conceptualization

#### Various System Types

Alternative types of potential transit service can be divided into, basically, two broad categories -- "demand responsive" service and "fixed route and schedule" service. In selecting one category of service over the other, the types of trips to be served must be kept in mind.

There are four basic types of trips:

- 1) Trips by those persons who do not have access to private auto and yet have some need to travel. A primary trip type service would be for persons seeking access to shopping, medical care and social services. Such trips are made infrequently but with considerably advance knowledge. Destinations are small in number and concentrated, while origins are usually more numerous and dispersed.

- 2) Work trips are seldom served by rural transit due to the obvious fact that most employed persons can afford private automobiles or that arrangements (e.g. car pools) can readily be made because of the high regularity of the trips.
- 3) Trips generated by social service programs (e.g. Head Start, adult training programs, Nutrition Meals). The regularity of these trips allows for prescheduling and, unlike work trips, riders are usually not able to drive themselves. These trips can be arranged through the social service agency involved.
- 4) General transit trips, so called because this is a category which comprises a wide range of different trip purposes. Such trips are served when the combination of random individual trips produces a demand great enough to support a transit service. Such conditions normally occur only between fairly large concentrations of populations.

If one or more trip purpose type is to be served it is important to have a reasonably precise perception of trip types by priority and to identify the origins, destinations, frequencies and times that potential riders wish to make each type of trip. If the trip origins are widely scattered and/or if the times of trips are made more or less randomly, "demand responsive service" should be favored. If riders have some means of getting to and from their home to a fixed route and population density is relatively high, then a "fixed route and schedule" system can often be utilized.<sup>1</sup> In an attempt to determine which type of transit service is most suited to the rural condition a brief mention of various systems in both service categories will be helpful.

There are many possible combinations and permutations of the demand responsive and the fixed route categories as indicated in Figure IV-1. The distinction between the two categories of systems is easily discernable. The transportation systems, shown in Figure IV-1, are organized on a scale of decreasing route flexibility. When considering the demand responsive group, the automobile, understandably, has the greatest route flexibility. In rural areas, payment for transportation by automobile to friends, neighbors, family members, or others is a common occurrence. It is usually inexpensive, but also unreliable, and, more often than not, places an imposition on those persons involved in providing the transportation. Car pools are inexpensive but very difficult to arrange on any continuing basis for other than work trip purposes.<sup>2</sup>

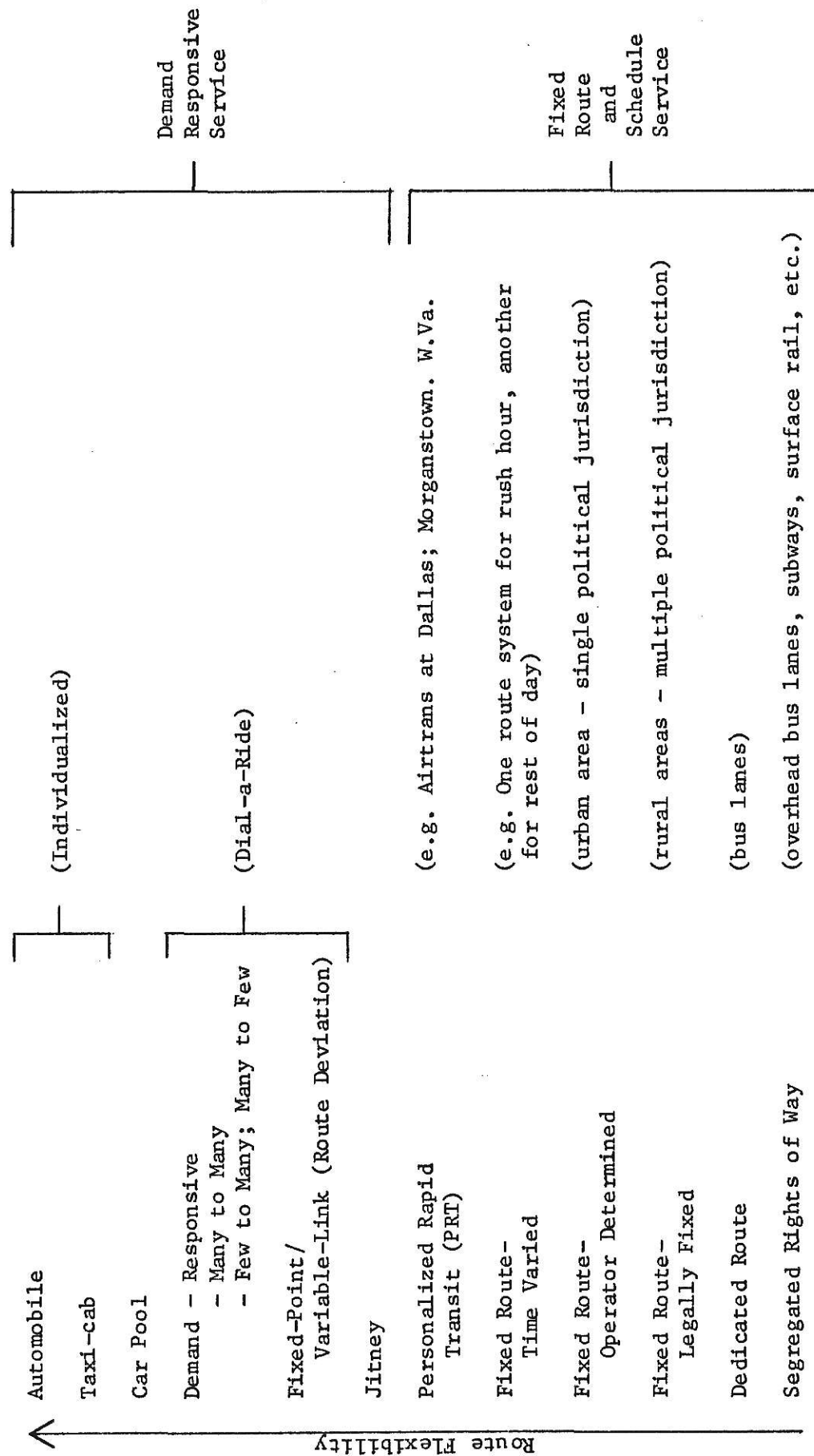
Jitneys and taxicabs offer good flexibility, providing for prescheduled rides through a central dispatcher and on a point-to-point basis. But certain limitations are created specifically related to the use of the smaller 5-8 passenger vehicles which most taxis and jitneys utilize:

- 1) Physically disabled elderly persons, handicapped persons, and persons in wheelchairs frequently experience much difficulty getting in and out of smaller vehicles and experience great discomfort as passengers.
- 2) In terms of cost per seat mile cars, taxis, and station wagons are a more expensive mode of transportation.

Demand responsive "dial-a-ride" systems provide door to door transportation for multiple origin and/or destination passengers. There are two basic variations this type of system can utilize. First, routing may be completely flexible, with routes travelled solely in response to the desired origins and

FIGURE IV-1

TRANSPORTATION SYSTEM ALTERNATIVES ON THE BASIS OF  
ROUTE FLEXIBILITY



Source: Ronald Briggs, Designing Transportation Systems for Low Density Rural Regions, a report to the 71st Annual Meeting-Association of American Geographers, Milwaukee, April, 1975 (Austin, Texas: University of Texas, 1975), p. 34. (A modified version.)

destinations of passengers. Second, routing may be between a series of predetermined points but the link between the points is not fixed allowing for route deviation.

The remaining types of transit systems involve vehicles moving over predetermined routes. These constitute the "fixed route and schedule" group. The most flexible of these systems involves buses running over highway systems. Bus systems operating on dedicated lanes or bus and rail systems utilizing segregated right-of-ways, comprise the most inflexible routing systems, and for obvious reasons are applicable only in heavily populated urban areas.<sup>3</sup>

Fixed routed bus systems, for the most part, are not feasible alternatives for transportation in rural areas. One reason for this is that rural transportation is more oriented toward those unable to utilize automobiles. That is, door-to-door transportation is essential for adapting to the needs of certain subgroups in a population, i.e., the elderly, handicapped, and economically disadvantaged, because of the following reasons:

- 1) The elderly and handicapped segments of the population have critical mobility limitations which preclude their having access to, and/or use of, fixed route bus services; and
- 2) Many economically disadvantaged, isolated rural households neither own an automobile nor have access to existing bus lines as a consequence of distance barriers.

Another reason that fixed routed bus systems are not feasible alternatives is that, given the low density and consequently, the low transit demand that characterizes nonurbanized areas, small rural "fixed route and schedule" bus systems can respond to a low level of demand only at a very high cost. Therefore if a rural fixed route transportation system were developed within the

limits of economic feasibility it would most likely be at the expense of the system's effectiveness in meeting the demands of the target population. And by the same token, if a rural fixed route system were structured to provide access to all residents it would most likely extend far beyond the range of economic feasibility.

Based on the above observations of the systems presented in Figure IV-1, it can easily be seen that the most feasible structure for the local component of a rural transportation system should fit into the demand responsive category, and more specifically into the "dial-a-ride" grouping.

The following discussion presents a detailed description of the basic features of this recommended system type, henceforth to be referred to as a "Demand Actuated Rural Transit System" (DARTS).

#### Overview of DARTS Concept

##### Introduction

The actual implementation of the overall system design of the recommended local rural transportation system incorporates the various advantages and capability put forth through the use of a demand responsive dial-a-ride type small transit system. The basic concept of the system is one of accommodating a person's travel needs through the provision of transportation services on a "demand responsive" basis; a system which will provide flexible personalized point-to-point service in response to individual travel requests.

As suggested, demand responsive transportation systems complement conventional fixed-route and scheduled systems. In low and medium density areas, they can provide a total transportation service where conventional, fixed-

route buses are not economically feasible. In higher-density areas, they can easily provide feeder service to line-haul facilities. Figure IV-2 shows how demand responsive systems fit into the overall spectrum of public transportation systems.

While the demand responsive transit service is basically "taxi-like" in nature, it differs from a taxi service in two distinct respects:

- 1) A passenger shares a vehicle with other riders being picked up and dropped off while the vehicle utilizes flexible routing and scheduling, and
- 2) Because of the "shared occupancy" feature, the cost of operation can be spread over a larger group of persons, providing for substantially lower fares than conventional taxis.

Demand responsive transportation thus represents a hybrid form of the traditional bus and taxi service, combining the economic efficiencies of fixed route and scheduled transportation with the point-to-point flexibility, convenience, and security of private taxis.

#### How it Works

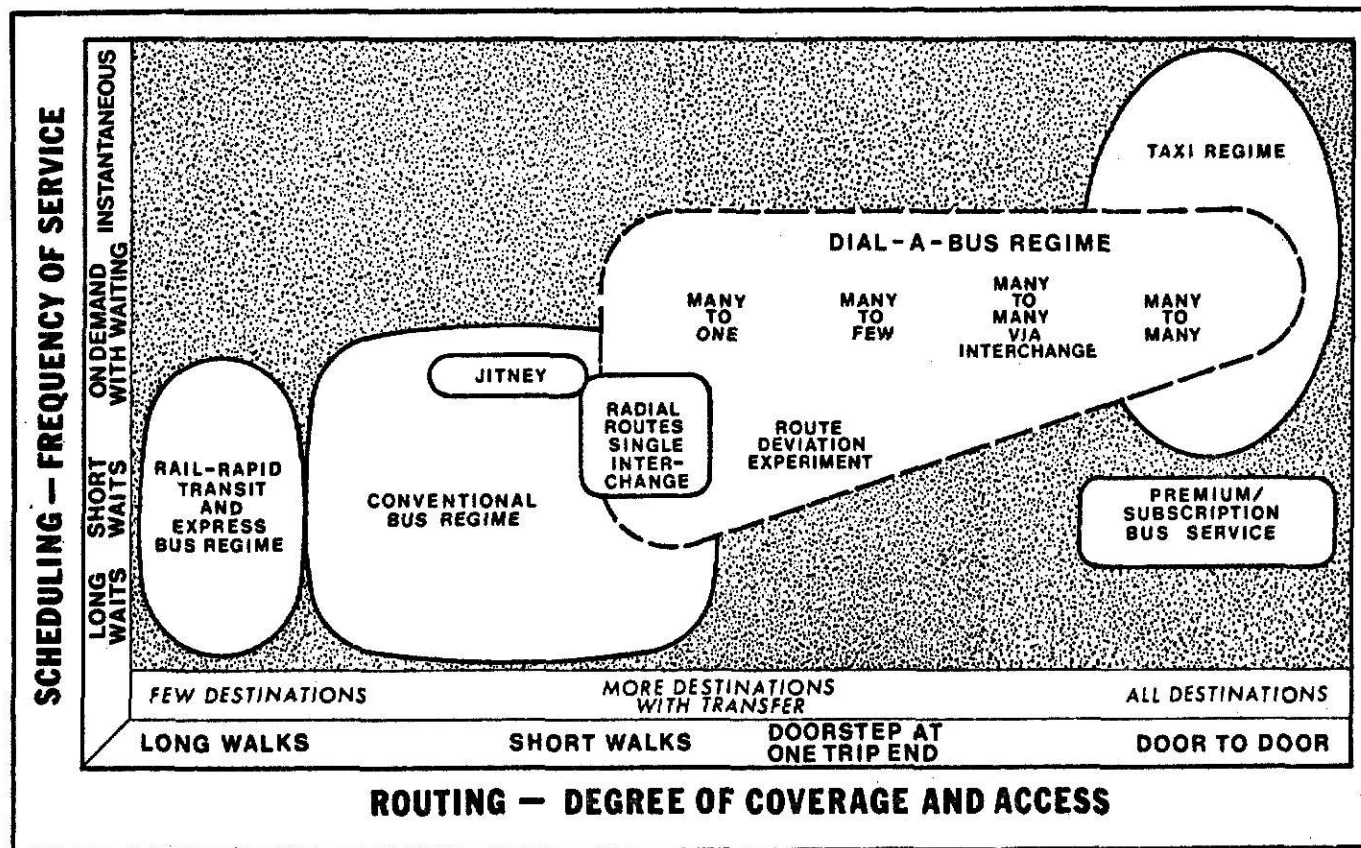
Theoretically, when a person needs or desires to go somewhere he phones the DARTS number of his community or, if it's a countywide system, of the centrally located dispatcher. He gives the dispatcher his address, destination, and time at which he wishes to be picked up. The driver or dispatcher can prepare the route or "tour" from a list of customers' addresses. Then, the driver picks up each passenger at or near his doorstep.<sup>4</sup>

The customer's request for service could be made just before the trip is to be made, or in advance. The amount of notice needed depends on the length of the route. A driver can handle last minute requests radioed to



FIGURE IV-2

## CONCEPTUAL FRAMEWORK FOR DEMAND-RESPONSIVE SERVICES



Source: Transportation Information Center, Demand-Responsive Transportation, State of the Art Overview, prepared for the UMTA, U.S. Department of Transportation (Cambridge, Mass.: 1974), p. 21.

him by the dispatcher, if they do not disrupt the route.

The basic elements of a demand responsive transit service are:

- 1) a fleet of vehicles
- 2) a control center to receive requests for service, and to schedule and dispatch vehicles.
- 3) a means of communication between the customer and the control center, and
- 4) a means of communication between the control center and the vehicle drivers.

Around these basic elements, the concept of demand responsive transit service generates the flexibility which accommodate a variety of configurations.

Demand responsive transit service can be classified into two different types: 1) Fixed-point/variable-link (route deviation) 2) dynamically routed or "pure" demand responsive service. The first, route deviation, is a limited form and a simple technique of demand responsive service. The vehicle follows a regular fixed route, deviating from the route to pick up or discharge a passenger at a requested location (see Figure IV-3).<sup>5</sup>

The second, dynamically routed or "pure" demand responsive service, is the more common type of service employed. There is no fixed route or schedule of service. The routing and scheduling of vehicles depends solely on the particular requests of the customers. There are three variations of the "pure" form which may be developed and implemented as basic service patterns (see Figure IV-4).<sup>6</sup>

- 1) Many-to-one - providing transportation from several origins to a common destination, such as a shopping center or bus terminal.
- 2) Many-to-few - providing transportation from multiple origins to a few destinations, such as major activity centers or points on a

## FIXED ROUTE WITH DEVIATIONS

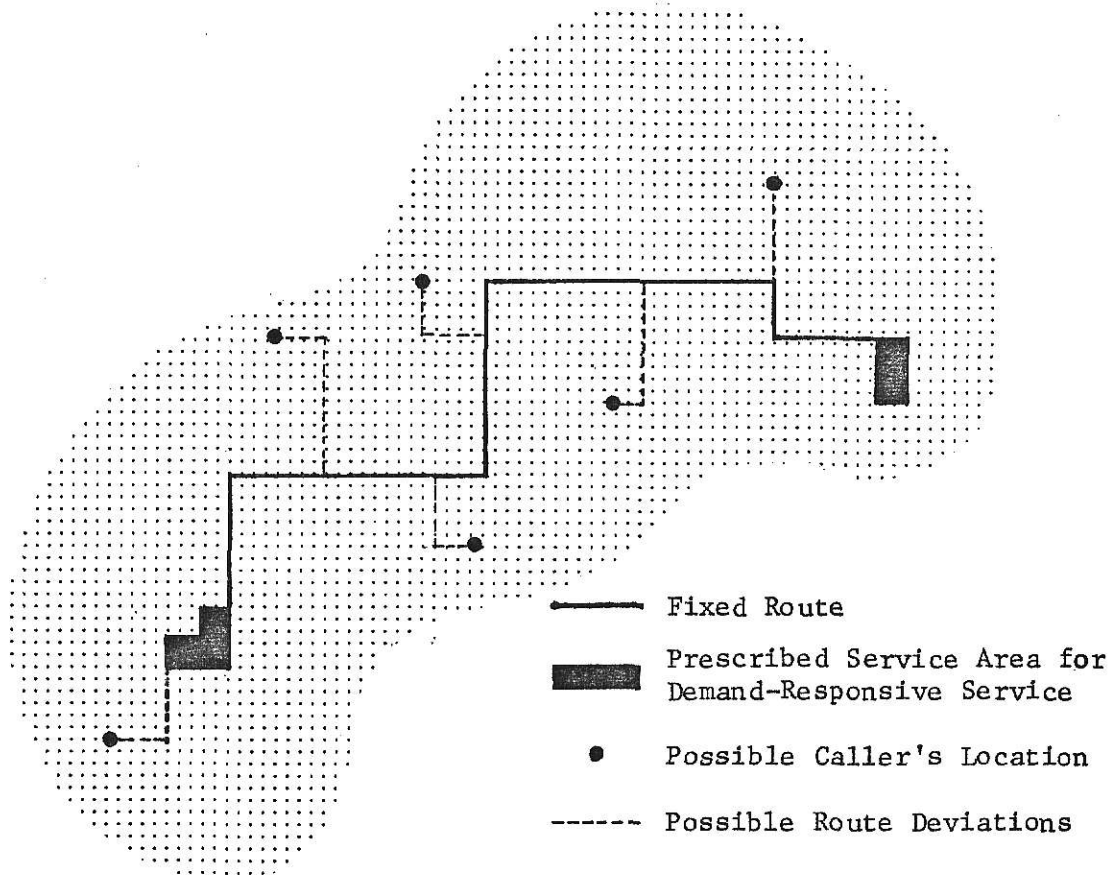


FIGURE IV-4

## "PURE" DEMAND-RESPONSIVE SERVICE

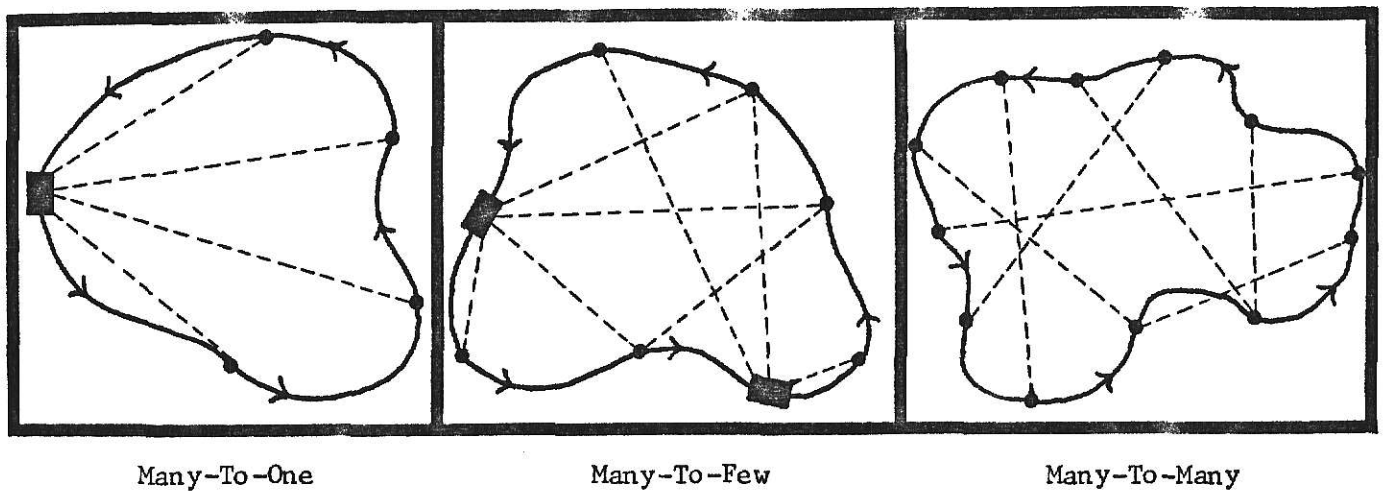


FIGURE IV-5

USER LOCATIONS RELATED TO  
FIXED-ROUTE SERVICE

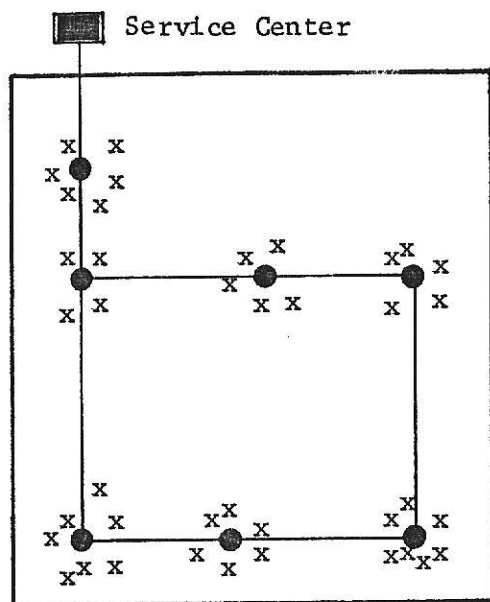
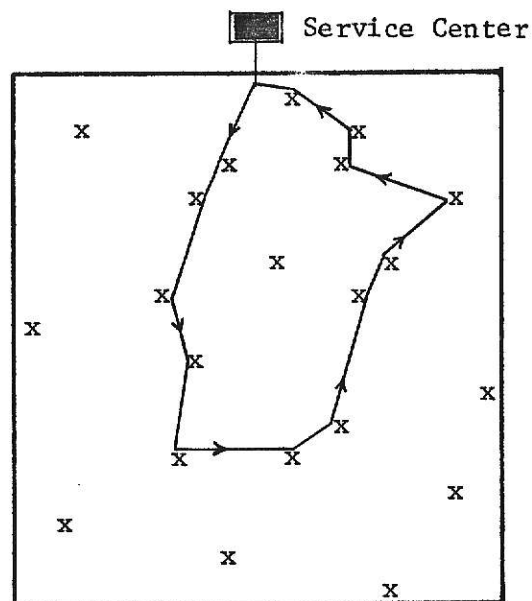


FIGURE IV-6

USER LOCATIONS RELATED TO  
"PURE" DEMAND-RESPONSIVE SERVICE



Source: Highway Research Board, Demand-Responsive Transportation Systems  
(Washington: Highway Research Board, Special Report No. 136, 1973),  
p. 7.

downtown loop.

- 3) Many-to-many providing transportation between any origin-destination pair in the service area without limitation.

These service patterns can be used alone, in combination or in reverse order throughout a service area or on a zonal basis, depending on the characteristics of the service area.<sup>7</sup> Figures IV-5 and IV-6 give an indication of what the user location relationships are to the fixed route and to the "pure" demand responsive service, respectively.

The following is a more specific indication of how these service patterns can be best utilized in the design and implementation of the recommended rural transit system type. Two approaches will be considered.

First, a typical countywide system will be developed. Secondly, a short discussion on the design implications of a citywide system will be conveyed. The system design presented, and the following discussion of its pertinent elements, should not be considered a rigid plan for solution of the mobility needs of rural Kansans, but as a framework which may require some modification once the plan elements are implemented.

#### DARTS: Recommended County and City Systems

##### Recommended County System Design

As determined in Chapter III, most parts of rural Kansas can be delineated into transportation service areas which roughly approximate county boundaries. It seems reasonable to assume at this point, that a rural transportation system might operate on a scale corresponding to those county boundaries. If such were the case, a discussion of the basic elements of a countywide system would be as follows:

Basic System Design. - Since one of the primary objectives of a countywide system would be to provide residents in outlying rural areas with a means of access to shopping facilities, medical clinics, and other personal services, a designated commercial center, such as the county seat, should become the focal point, or the central location, of the countywide system.

The commercial center would function as:

1. The terminal point for all service routes or "tours";
2. The transfer point for access to routes for cross-country destinations;
3. The transfer point for access to intercity (e.g. intercounty, regional) bus lines. (This latter point assumes that the commercial center is a designated stop or pick-up point along an existing bus

route and that the existing system provides intercounty as opposed to local bus service.)

Generally speaking, in an effort to maximize the efficiency of a rural transportation system, the system needs to be structured so as to respond on a day to day basis to as high a level of service demand as possible; a service demand which is distributed throughout a defined geographic area. Therefore, it is recommended that the countywide service area be split into more manageable service zones or sectors. These divisions may be made on the basis of population distribution or may conform to natural, physical or geographic features. The intent is to define functional service area parameters, such that at any given time, the system is geared to respond to as great a concentrated demand as possible, as opposed to transit demands that are randomly dispersed throughout a broadbased service area. In short, the overall design for this service-by-sector countywide system would be analogous to a large pie that is sliced from the center into wedge shaped pieces corresponding to the various sectors.

Scheduling. - The recommended frequency at which transportation services should be scheduled in each service sector should be once or twice weekly for all nonwork trip purposes. The major purpose for providing for alternate day or weekly scheduling, as opposed to daily scheduling, is to significantly reduce the low demand obstacles which create sizeable reductions in vehicle load factors (% of vehicle occupancy) and, consequently, in overall system efficiency.

Earlier in this report, relatively low transit demand estimates were calculated for the rural areas of Kansas. The service-by-sector approach, as stated, is one way of dealing with these low levels of demand. Another

way in which a rural transportation system can manipulate demand is through the scheduling mechanism. If transit services are scheduled in a particular service zone only on certain days of the week, then it can be expected, with some amount of assurance, that certain trip-making patterns will be adjusted to coincide with the transit schedule. Assuming, then, that demand patterns can be significantly altered on the basis of service frequency, an optimum level of demand can be attained over time through incremental adjustments in scheduling. Ultimately, the amount of service will vary from sector to sector, depending on such factors as population density, demand rates and types of transit demands, i.e., trip purposes. Scheduling variations may range from daily service in some rural areas to weekly service in other. While journey-to-work trips would require daily scheduling, alternate day scheduling should, in most cases, be sufficient to meet the demand for all non-work trip purposes such as shopping, medical and health-related trips, social or recreational trips, etc.

System Illustration. - Whether the DARTS system utilizes the previously mentioned "route deviation" service or the "pure" demand responsive service, will best be determined based upon learned experience relative to the specific geographic area of the operation and the demand for the service. In a countywide rural area situation, a combination of the techniques might be most workable. The following is an illustration of how scheduling might be set up to use a fixed point-to-point route, with some deviation, resulting in a demand responsive many origins to one destination service. The City of Clay Center in Clay County will be used as the commercial center in this example.

Every Friday a vehicle will depart Clay Center for a "tour" of Sector 4

(see Figure IV-7 for route delineation). The tour will consist of pickup points at Clifton, Morganville, and Idana and at such places along either side of the fixed route that are no more than two miles distance from the route. In that calls to Clay Center would possibly be long distance, it might be best, initially, to have calls for reservations received at the local collections points along the route. This can be done by having a volunteer dispatcher at each community to take the calls for the transit service at least a day before the scheduled tour. The volunteer could then place one collect long distance call to the Clay Center dispatcher and relay the pick-up information to him. The central dispatcher would then relay this information to the driver of the vehicle in that sector on the morning of the tour. A more detailed discussion concerning the role and the problems of the dispatcher will be undertaken in a later section.

Based on these pre-scheduled reservations, the driver can formulate the "tour" or route he must take. The driver should start the tour at the furthest designated pickup point from Clay Center, i.e., Clifton. If there were no pickups at Clifton that Friday, then the tour would start at a point between Clifton and Morganville or at Morganville.

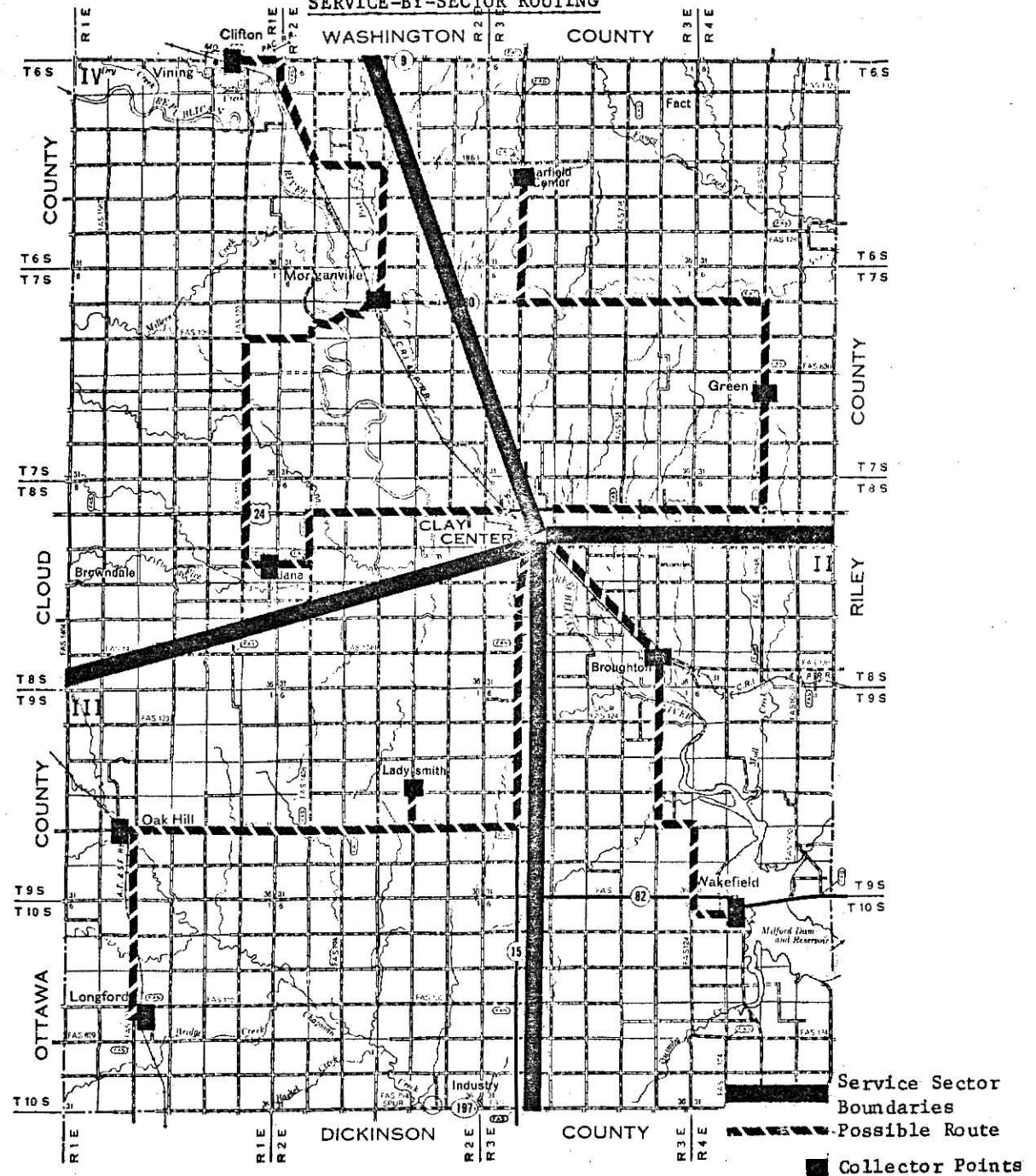
From the standpoint of economy, both in time and money, it might be best, initially, to have those persons who call in to a local volunteer dispatcher picked up at one central location in the community to which they called. This assumes that those persons have a means of getting to this central pickup point. If, in fact, those persons do not have a means to get to the central pickup, the vehicle is mandated to provide the door-to-door service necessary to satisfy their needs.

A typical tour then might be: the vehicle leaves Clay Center and arrives



FIGURE IV-7

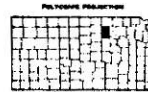
EXAMPLE OF  
SERVICE-BY-SECTOR ROUTING



LEGEND

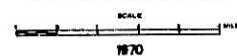
ROADS AND ROADWAY FEATURES	
PRIMITIVE ROAD	-----
UNIMPROVED ROAD	-----
GRADED AND DRAINED ROAD	-----
SOIL SURFACED ROAD	-----
GRAVEL OR STONE ROAD	-----
NOT GRADED OR DRAINED	-----
GRAVEL OR STONE ROAD	-----
GRADED AND DRAINED	-----
GRAVEL OR STONE ROAD WITH	-----
STABILIZED SURFACE	-----
BITUMINOUS ROAD-LOW TYPE	-----
PAVED ROAD	-----
DIVIDED HIGHWAY	-----
HIGHWAY WITH FULL CONTROL OF	-----
ACCESS AND INTERCHANGE	-----

ROAD SYSTEM DESIGNATION	
FEDERAL-AID INTERSTATE HIGHWAY SYSTEM	-----
FEDERAL-AID PRIMARY HIGHWAY SYSTEM	-----
FEDERAL-AID SECONDARY HIGHWAY SYSTEM	-----
POINTS BETWEEN WHICH DISTANCES ARE	-----
MEASURED INDICATED TOUR	-----
INTERSTATE NUMBERED HIGHWAY	-----
U.S. NUMBERED HIGHWAY	-----
STATE HIGHWAY SYSTEM OR	-----
STATE NUMBERED HIGHWAY	-----
END OF DESIGNATED SYSTEM OR	-----
MARKED ROUTE	-----



GENERAL HIGHWAY MAP  
CLAY COUNTY  
KANSAS

PREPARED BY THE  
STATE HIGHWAY COMMISSION OF KANSAS  
DEPARTMENT OF PLANNING AND DEVELOPMENT  
IN COOPERATION WITH THE  
U. S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION



at the Senior Citizens Clubroom in Clifton at 9:30 a.m.; departs Clifton at 9:40 a.m. and arrives at Morganville at 10:00 a.m.; leaves Morganville at 10:10 a.m.; driver deviates from route to pick up a passenger one mile west on US 24; vehicle arrives at Idana at 10:40 a.m.; departs Idana and arrives in Clay Center at 11:00 a.m.

The fare for such a trip will vary according to what the revenue policies of the operation are. Generally speaking, a minimum rate of 5¢ per passenger mile is a standard. This means that for a passenger living ten miles from a service center, the fare might be 50¢ for a oneway trip to that service center. A more detailed discussion of fares and revenue can be found in later sections of this report.

Upon arriving in Clay Center, the driver, having predetermined designations, discharges his passengers at their desired points, i.e., doctors appointment or shopping center. Each passenger should be aware that the return trip will leave from the Clay Center post office at 3:30 p.m. Having discharged his passengers, the driver and vehicle are available for service calls within Clay Center until the 3:30 return trip to Sector 4.

The same procedure is repeated in Sectors 1, 2 and 3 on alternate days or more often, as the demand dictates. One day a week might be left to providing intracounty service, i.e., service between the service sectors of the county. Intercounty service will be provided by a regional system of existing intercity regional bus routes.

As stated earlier, one of the strong points of the DARTS demand responsive service is its flexibility. The above is but one of the many scheduling arrangements which can be implemented. The geographic distribution of the population, the commercial center chosen as the central location, and the basic demand levels experienced, will dictate how frequently vehicles

must be scheduled in a service area or sector. The transit operator must be aware of and allow for this system flexibility in order to meet the needs of those desiring service.

#### Recommended City System Design

A intracity DARTS system works similarly to a intracounty system only at a reduced scale. The components of the system are basically the same. The distance travelled vary considerably and there is usually daily scheduling either in advance or on the same day. The following is an explanation of a typical small urban demand responsive system:

The sample town covers six (6) square miles and has a population of about 7,000 persons. The city operates three mini buses. Two are used on a regular basis, while the third is held on standby to fill in when one of the other units is down for repairs or service. The buses seat twelve (12) passengers each. One bus has a lift for handicapped or disabled passengers.

The buses operate from 6:00 a.m. to 6:00 p.m. Monday through Friday and from 8:00 in the morning until 6:00 at night on Saturday. There is no service on Sunday.

Fares run from 25 cents to 75 cents. A one-way adult fare within the city limits is 50 cents. Children under 12 and all passengers over 65 can ride for a quarter. The buses can pickup and deliver within a radius of up to three miles outside the city limits. The adult fare for riders outside the city limits is 75 cents, 40 cents for persons under 12 and over 65.

Passengers should be asked to allow 10 to 15 minutes for the bus to arrive. Advance reservation can be taken. If a passenger wants to be picked up at the same time every day, he can leave a standing order with the dispatcher. He does not have to phone in every day. The buses can pick up

passengers who flag them down without phoning ahead if there's room on the bus, but the driver is under no obligation to stop for hand-wavers as is done on a regular bus line.

The buses are equipped with two-way radios. Phone calls come in to the dispatcher located at the city hall, police station, fire station, etc. As the call comes in, the dispatcher writes down the caller's name and the pick-up point. This information is related to the bus driver immediately or in the form of a list of pickups conveyed to the driver at the end of a "tour."

The above simplified illustration is used as a way to convey the typical aspects of a small urban demand-responsive transportation system. As with the county system, there can be many scheduling variations with flexibility being the key to the successful, efficient implementation of the operation.

The sections which follow will discuss in more detail the various components of the overall recommended system design which must be considered and dealt with. Through the discussion of the various elements, the planning, design, and implementation methodology will be put forth.

### Organization

#### Objectives

In order to organize and implement a rural transportation service, or any sort of business for that matter, the organizer must have a knowledge of what he intends to do before he can decide how he will go about doing it. Therefore, some sort of objective or goal is essential if a clear definition of direction is to be undertaken.

Several rules which can simplify the setting of objectives are:

1. Objectives should be clear and definite (a precise statement should be made of what is to be achieved.)
2. Objectives should be attainable (achievement should be reasonably possible; one objective should not conflict with another.)
3. Objectives should be measurable (it must be possible to know when the goal has been achieved.)
4. Objective should be set in terms of a target date (a time parameter should be incorporated to allow for effective planning and budgeting.)<sup>8</sup>

An example of an objective which exemplifies these criteria might be: to provide rural transportation services, on at least a daily basis, between each community within a county by January 1, 1979.

When establishing objectives, consider as many reasonable alternatives as possible, and select one or more that appears most feasible. There will be differences between goals or objectives formulated by private nonprofit organizations, private firms, and publicly owned enterprises for a number of reasons. But, regardless of the ownership of a transit operation, some objectives will be common to all three entities. Generally speaking:

1. They will probably wish to serve the public as well as they can.
2. They will probably share a goal of wishing to increase their patronage if doing so will boost profits.
3. They will like to maximize profits or minimize costs.<sup>9</sup>

Goals or objectives, and the means by which they are realized, should be subject to evaluation and change if an operation is to remain a viable cog in satisfying the transportation needs of a county or local community. Changing service patterns and demands will dictate that an operation be

flexible enough to adjust goals as well as the process by which they are implemented and achieved.

### Organization

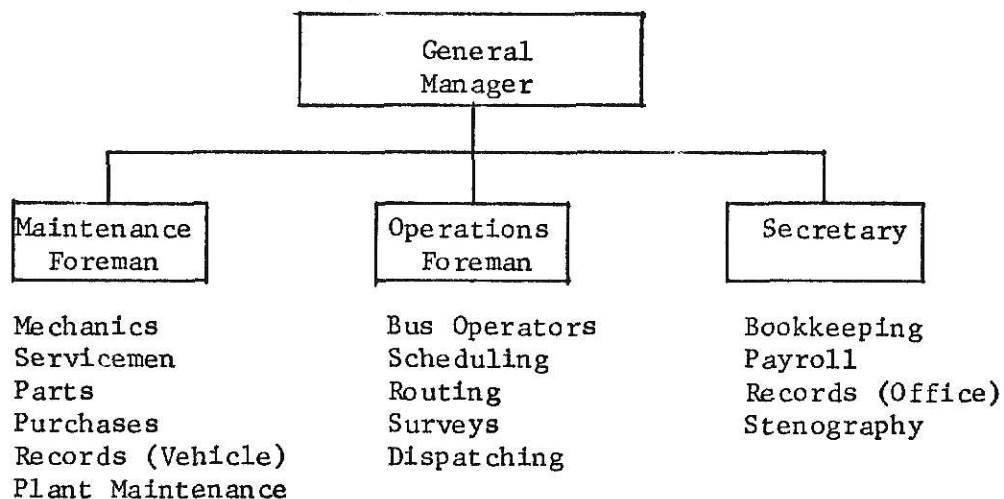
Regardless of the organization's infra-structure, all organization follows at least four basic principles:

1. All the work of the operation must be split up among the employees into specific tasks.
2. Responsibility and authority must be fixed for each employee.
3. The chain of command must be established clearly, specifying the authority to whom each employee will report.
4. The activity of individuals must be coordinated so that desired goals or objectives can be met.<sup>10</sup>

### Recommended Form of Organization

In the past, the basic consideration in the organization of transit operations was in producing a product rather than selling it, as is indicated by the organizational chart presented in Figure IV-8. Today this

FIGURE IV-8  
TYPICAL PRESENT-DAY SMALL-SCALE TRANSIT ORGANIZATION




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Source: George M. Smerk et al., Mass Transit Management: A Handbook for Small Cities, prepared for the UMTA, U.S. DOT (Springfield, Va.: National Technical Information Service, 1971), p. 15.

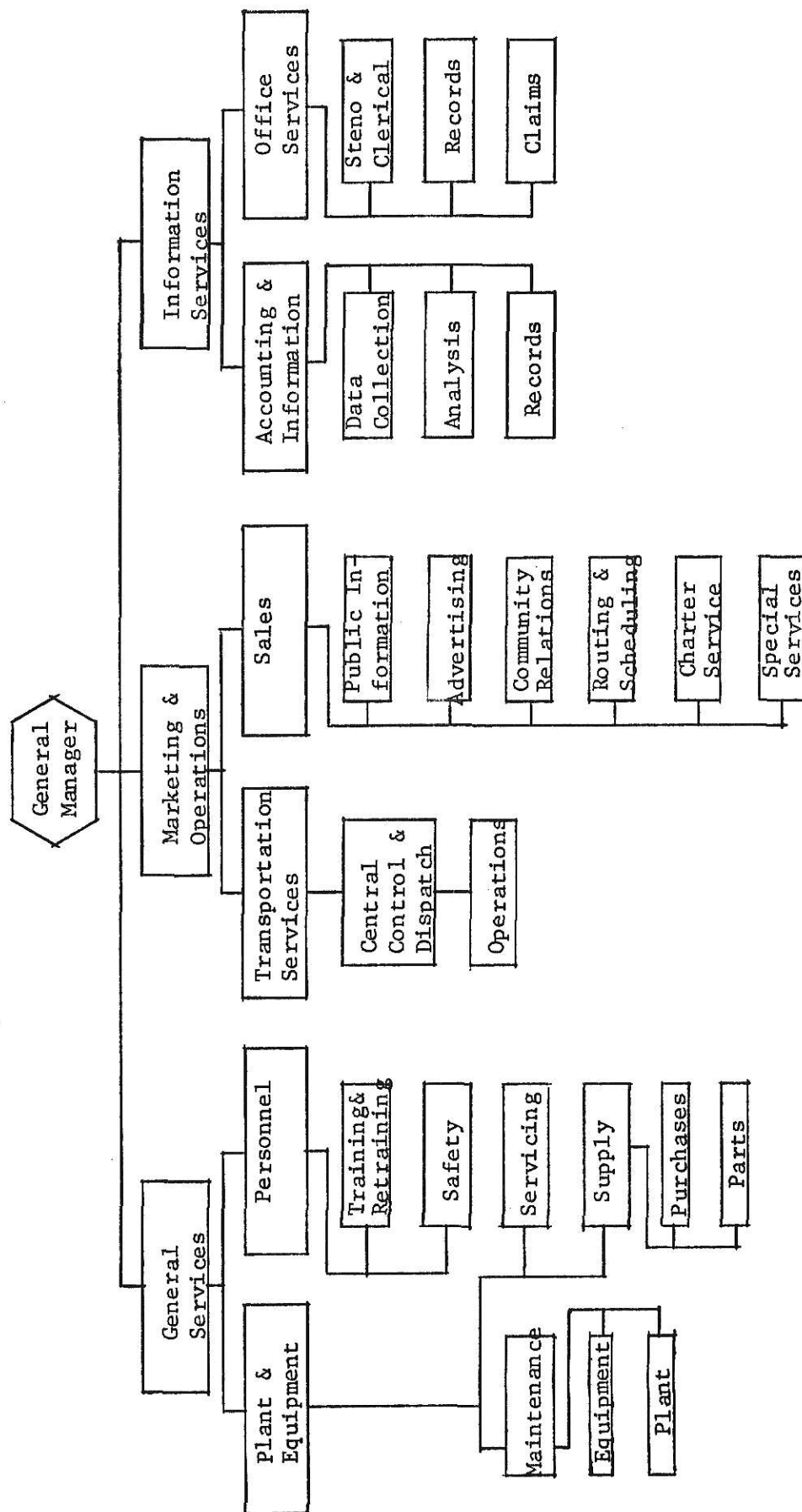
situation has reversed itself. The experience of the past has indicated that the "transit product" can be efficiently produced. The problem now facing transit operations is not how to "make" transit service but rather how to sell it. Utilizing information produced by the Institute of Urban Transportation at Indiana University in devising a functional organization chart (see Figure IV-9), the emphasis is marketing-oriented; marketing and operations are combined as the major central function. This combination of functional elements is made in order to sensitize and coordinate operations, with all other parts of the operation helping to support this main function. For example, the area labeled "General Services" is composed of a number of tasks consolidated for the purpose of providing the manpower and equipment to assist in carrying out the transit marketing effort. The main task of the "Information Services" area would be to collect and analyze the data needed by which a better understanding of the market could be arrived at and to help make decisions affecting service and financial matters.<sup>11</sup>

The purpose of the functional organizational chart depicted in Figure IV-9 is just that, to show organizational structure. It should not be interpreted as a personnel organization chart. The diagram illustrates jobs to be considered and accomplished, and shows their relationship to each other. It does not indicate job slots for individuals. For the size transit operations being considered, there could not possibly be separate individuals provided to perform each function. There will be considerable functional overlapping in job descriptions because of the economics of a small operation.

In addition, Figure IV-9 is intended to be used as a guideline, and nothing more, in the drawing up of an individual organization chart for a specific transit operation. Because of variances in local conditions it is

FIGURE IV-9

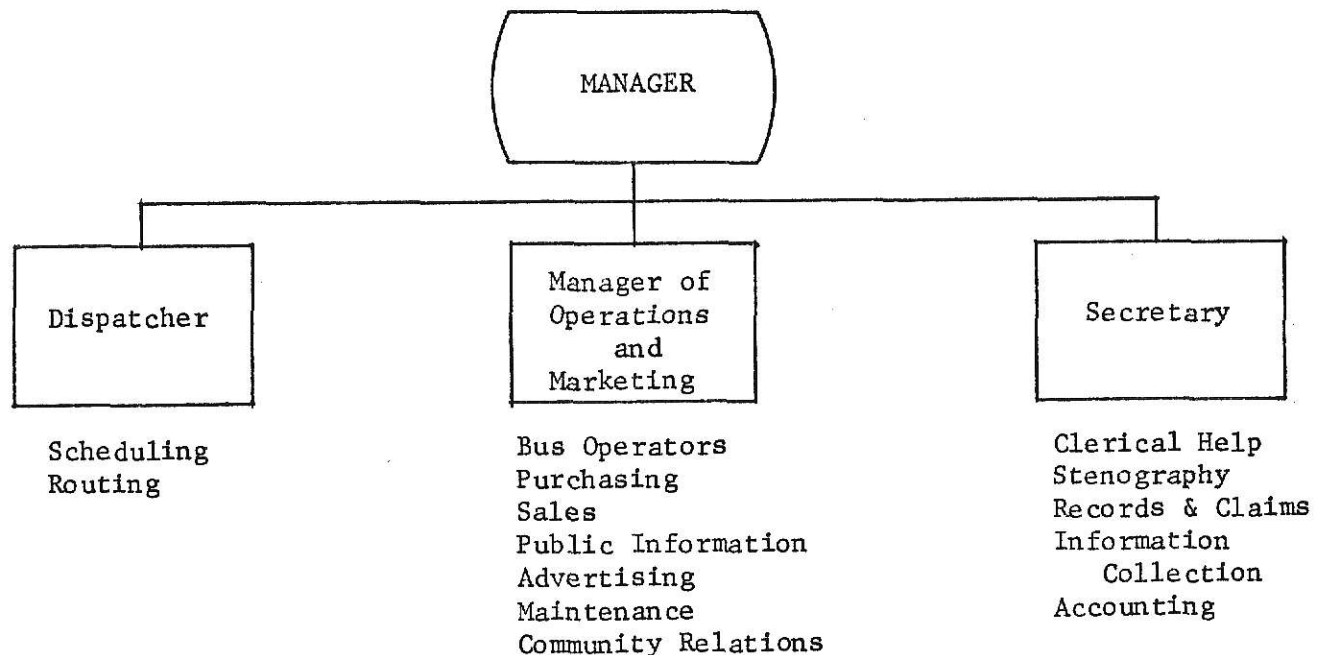
## SUGGESTED FUNCTIONAL ORGANIZATION CHART



Source: George M. Smerk et al., Mass Transit Management: A Handbook for Small Cities, prepared for the UMTA, U.S. DOT (Springfield, Va.: National Technical Information Service, 1971), p. 17.



FIGURE IV-10  
SAMPLE ORGANIZATION CHART  
FOR DARTS




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Source: George M. Smerk et al., Mass Transit Management: A Handbook for Small Cities, prepared for the UMTA, U.S. DOT (Springfield, Va.: National Technical Information Service, 1971), p. 19.

not possible to provide one definitive organization chart which would meet the specific situations of each transit operation. In an effort to help in organization, Figure IV-10 reflects a sample "skeleton" organization chart for a transit operation of one to ten buses. A general manager, a dispatcher, and a secretary could handle all matters, if operations are not very complex.

The operation and marketing function is under the direct supervision of the general manager. The dispatcher oversees scheduling and routing, and a secretary oversees the information and records work in the office and could handle some of the dispatching function. The determination of the actual

number of dispatchers, drivers, and secretaries to be employed would be based on the degree need.

### Responsibilities of System Personnel

#### Introduction

Having developed an organization framework for the recommended DARTS system, some attention should be given to the duties and responsibilities of the "key" figures which make up the nucleus of the organizational structure. The bulk of the following discussion will deal with the responsibilities of the system's management-coordinator. However, shorter discussions concerning the duties of the dispatcher and the driver are also presented.

#### Management Coordinator

##### Management Duties

Management can be thought of as the process by which a cooperative group directs action toward common goals.<sup>12</sup> Once goals have been established, one of the primary responsibilities of the management is to translate these formulated goals into operating policies and guidelines which will enable the transit operation to fulfill or accomplish the stated goals or objectives.

To achieve this end, the managerial duties can be broken down into four broad categories:

- 1) planning,
- 2) organization of resources,
- 3) employee supervision, and
- 4) coordination of activities.

1. Planning--Planning is a continuous activity which enables an operation to successfully cope with an ever changing situation. Briefly, there are several steps which should be followed in the process of planning. First a statement of the goals and objectives must be formulated. This provides the framework for planning to work in and provides general guidance for decision making. Next in the process is the collection of pertinent information and data. After the data have been gathered, the process of analysis and plan development takes place. Analysis should provide the basis upon which a decision can be made to determine what to do and how to do it. Next is the stage of decision or plan implementation. Lastly, there is follow-up and evaluation of the plan which is helpful in determining future choices and revising plans which have already been implemented.

The gathering of information is of considerable importance in this planning process. Various sources of information are available. Data may be obtained from internal as well as external sources. Internal sources include data collected through the day-to-day operation of the transit system. This data may include passenger count, total vehicle miles, revenues, and many other items that come from the transit operations performed. Drivers, riders, questionnaires, etc., are other sources from which information can be gotten. External data sources includes such data as census materials, government reports, consultant reports, and profession contracts.

2. Organization of resources--Simply stated, the manager has the responsibility of seeing to it that all of the ingredients which make up the transit operation are procured and utilized in an optimum fashion. This intensive utilization of resources is one positive step in assuring success of a transit operation.

3. Employee supervision--A responsibility of any manager is that of supervising those persons for whom he is responsible in an effort to obtain maximum productivity from them. The proper handling of employees is very important in transit operations because of the effect that personnel can have on customers. The manner and image put forth by a driver or dispatcher can make the difference between whether a customer will ride the bus or go by some other means of transportation.

4. Coordination--A transit operation is composed of various elements, i.e., dispatching, accounting, and record keeping. These elements do not operate independently, but as a total entity. The manager has the responsibility of coordinating these different segments into an effective, efficient, smooth running operation.

The four aforementioned general areas of responsibility do not cover all aspects of a manager's duties. However, they do represent the areas in which the majority of his time and energy will be spent.

#### Basis Managerial Principles

In management, as in other areas, there are basic principles which, if complied with, will provide guidance to enable the management coordinator to perform his duties and responsibilities in a more effective fashion. One such principle is unity of command. Unity of command, in essence, suggests that no member of the operation should report to more than one superior for any given function. This is done so as to avoid receiving conflicting orders from different persons on the same subject.

Another principle is that of flexibility. Flexibility is a common phase whose use is professed in many fields. In practice, however, it is

often a difficult principle to implement. The need for flexibility is the reality that few operations or systems remain unaltered over a long period of time. As the potential or "latent" demand for transit service is realized, it will require that changes be instituted in the transit operation to compensate for or meet this new demand.

Flexibility can be accomplished through the preparation of "contingency" plans in an effort to anticipate uncertain future developments. It may also be achieved through the structure of the operation itself, i.e., through the capacity to grow or contract, according to demand, without loss of efficiency.

Span of control is another principle. Simply stated, span of control relates to the number of personnel a manager is capable of supervising. Too small a span of control tends to create a "top-heavy" organization, while too large a span of control leads to a loss of control. What the right number in any particular situation is depends on many factors and is usually tied to the number of levels which make up the hierarchy of the whole organization.

The scalar principle states that authority and responsibility should flow clearly from the top to the bottom of the hierarchy. This should not be mistaken to mean that "information" should only flow from the top down. Care must be taken to ensure that the flow of information is a two-way process encouraging a free exchange of information between management and employees.<sup>13</sup>

#### Managerial Qualities

When looking for managerial personnel the following considerations suggested in a publication prepared for the Urban Mass Transportation Administration (UMTA) should be observed:

- (1) The transit manager should be well versed in operations. Preferably, he should be capable of driving a bus, and he should have some mechanical knowledge. When the

occasion presents itself, he should be able to go to work beside his employees without having to stop to find out what is going on. Such knowledge can be very useful because the manager of a small operation never knows when he will be required to pinch hit for one of his men. It helps the manager to keep his finger on the pulse of the organization. A knowledge of operations will also help to establish rapport with the personnel. They are bound to have more respect for a manager who is able to do their jobs and--a critical factor in an intimate operation--to understand their problems. The manager who is cold, aloof and distant is an anachronism.

The manager must, however, be able to keep enough distance between himself and his men so that they will respect him and so that he can maintain discipline. In this respect, the manager's job is like walking a tight-rope. He has to be very careful to maintain a middle ground without going too far one way or another.

- (2) A good manager of a small transit property must possess certain social abilities. Since he will have to carry on much of the public relations effort, he should be an extrovert rather than an introvert. He must be able to associate with local businessmen and government officials on equal terms. Preferably, he should have a buoyant, optimistic and cheerful nature. To a large extent, he will represent the transit property in the eyes of the public.

The manager must, by all means, have an appreciation for public relations, especially since management must attempt to keep public interest at a fairly high level. A visible man in highly visible enterprise, such as transit, cannot perform effectively if his light is hidden under a basket. On the other hand, the manager should avoid a reputation as a flamboyant wheeler-dealer who seeks publicity for the sake of publicity and personal advancement. An honest, sincere person will inspire more confidence.

- (3) The manager should be a forward-looking man who can grasp opportunities when they arise. If possible, he should be a college graduate, preferably one with a business degree or a considerable amount of work in business subjects. However, the desire for a college-trained man should not preclude consideration of a well-qualified man without a college degree. The big requirement is that the prospective manager, whether or not he has a college degree, realizes the need for continuing his education and takes steps to do so. He will often deal with well-educated men in business, government, engineering and planning.

He must be their peer in professionalism, or he will have difficulty in finding the right buttons to push outside the transit enterprise in order to meet the goals of the firm.<sup>14</sup>

#### Sources of Management Personnel

In an attempt to find managerial talent the following sources of information should be explored:

- 1) Contact with others in the transit field.
- 2) College and university placement centers.
- 3) Advertising in local and area-wide papers and trade journals.
- 4) Employment agencies.
- 5) Employees within the organization.

If a transit operation is going to be successful in its attempts to address the transport needs of a community, it must have good, sound, stable management. The previous discussion has been presented so that a better understanding of the managerial position might be obtained. The guidelines conveyed are not hard and fast rules, but elements which will have different applicability in different situations. They do give a general overview of what managerial requirements are necessary to meet the problems of a transit organization.

#### Dispatcher

The duties and responsibility of the dispatcher are relatively specific with regards to the implementation of the recommended system (DARTS). The basic component of the DARTS system revolves around the "tour." As referred to earlier, a tour might consist of picking up passengers at six or seven locations in a rural county area and transporting them to common and to different destinations in the same area, i.e., to the county seat for medical

appointments or for shopping. It is the dispatcher's responsibility to coordinate the tours. It is his responsibility to bring the passengers and the buses together as effectively and efficiently as possible. The dispatcher operates the central control function of the DARTS system.

In a small urban DARTS system, the call to the central dispatcher requesting a ride is usually free to the user of the service. In the rural setting, however, the distances from the rider to the dispatchers are longer and will often involve a toll charge on the telephone call. This problem can be solved, as mentioned earlier, by having local volunteer dispatchers, in communities which are pickup points, refer the calls on to the central dispatcher in the service center. It is also possible to solve this problem by either providing a toll-free number or by accepting collect calls from prospective riders.

There are four (4) basic methods of allowing the customers to call the system toll-free:

1. Accept collect calls from all callers
2. Have a Wide-Area Transfer Service (WATS) line
3. Have an enterprise number
4. Have a foreign exchange system

The first method will yield high but unpredictable monthly costs. The WATS line is very expensive but is most effective when distances are long. For example, if the DARTS county system wished to accept calls from anywhere in the state, a WATS line would be worthwhile. An enterprise number is one in which the caller would be automatically connected to the system and the toll charge is automatically recorded and billed to the system monthly. Again, the monthly charge could be rather unpredictable. The last method listed is a foreign exchange line. A foreign exchange line is a telephone line which



is a toll-free number to another area. For example, given two (2) adjoining telephone exchanges, A and B, the foreign exchange line would allow those in exchange A to call an exchange A number which would ring in exchange B.

Selecting which method to use would be a policy decision. Initially, the use of local volunteer dispatchers may suffice, but ultimately, as the system becomes more stable, some form of direct toll-free call-in service should be made available to all sections of the service area. This direct link capability to the central dispatcher will enhance the overall performance of the DARTS system, providing for more effective, efficient, and reliable service.

The dispatcher will receive calls for service and determine the exact location where the passenger desires to be picked up. Where possible, the caller should identify the particular entrance or an easily located landmark so that the dispatcher can assist the drivers in locating the customer. Having received the request for pick-up the dispatcher should record the information on an appropriate ride request slip (see Figure IV-11). For each day, there should be a daily ride sheet as shown in Figure IV-12. As the ride request slip is completed, the information on the ride should be entered in the appropriate daily ride sheet. Depending on the type of system scheduling, i.e., whether a customer has to call in 24 hours in advance or can have same day service, an estimated time of pick-up should be given to the caller whenever possible. Riders should be encouraged to make their requests known as far in advance as possible.

When sufficient requests have been made to compile a tour, the dispatcher will plan the approximate order of pick-up. This information is then clearly and distinctly relayed to the driver. For systems in small

FIGURE IV-11

## EXAMPLE OF A RIDE REQUEST SLIP

NAME	_____	DAY	_____	DATE	_____
ORIGIN ADDRESS	_____				
DESTINATION ADDRESS	_____				
SECTOR #	_____	FEE	_____		
HANDICAPPED?	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>	
PICK-UP TIME	_____	RETURN TIME	_____		

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Source: RRC International, Inc., An Innovative Rural Public Transportation System Design for Chautauqua County, New York, prepared for the New York Department of Transportation (Albany, N.Y.: January, 1975), p. 140.

DAILY RIDE SHEET

[illegible]

Source: RRC International, Inc., An Innovative Rural Public Transportation System Design for Chautauqua County, New York, prepared for the New York Department of Transportation (Albany, N.Y.: January, 1975), p. 141.

urban areas, requests for pickups may drift in slowly. At other times they may be more frequent. During such "peak hours" (the times when demand is the greatest), the job of the dispatcher can be very demanding. After the system has been in operation for a short time, the peak hours will begin to follow a regular pattern and the dispatcher will be prepared for it. In rural areas, this problem of "peak" hour demand will not be as troublesome.

The dispatcher will have primary responsibility for serving the ride requests. However, it is expected that the system secretary should be able to assist the dispatcher during the busy periods.

In a number of discussions with various social-service providing agencies, it has been found that there is a substantial information void on behalf of the agencies. That is, with the many types of services provided, there is no one central referral source from which consumers can learn about these services. To assist in filling this information void, it is suggested that some consideration be given to utilizing the transportation dispatcher as a social-service referral person. Each participating agency could develop a sheet or booklet on the services they provide. The dispatcher could have these information sources available as well as timetables of other transit carriers in the county. It could be expected that as persons desire certain social services, they will be enabled to find out about them and to arrange transportation to them at the same time.

### Driver

The driver has the responsibility of carrying out the "tours." More importantly, the driver has the greatest responsibility for the safety and well-being of the riders. In addition, the initial success of any rural transit operation will depend on favorable first impressions. These first

impressions will be formulated on the driver's ability to efficiently transport the passengers in a helpful, courteous and polite manner.

Appropriate attention and care should be taken in the hiring of drivers. Any prospective drivers should have a medical examination, and have taken a driver's test to get a chauffeur's license. A thorough check into the background of the driver, i.e. police record and traffic accident reports, is highly advised. Figure IV-13 is an example of a driver evaluation form which can be used in the selection of a driver.

When a driver is out on the road, he should keep in reasonable contact with the dispatcher via two-way radio or telephone. When the dispatcher gives the driver a new list of pick-ups, comprising a new tour, the driver should understand and record every address on the appropriate form. Figure IV-14 is an example of a vehicle log form that might be used. The order in which the addresses are given to the driver should be the sequence for pick-up as determined by the dispatcher. In smaller more rural systems the driver may have the responsibility for determining a logical sequence of pick-up. Planning the drop-off route should be the responsibility of the driver, and should be done in an effort to minimize the "tour" time.

As a rule the driver should check in with the dispatcher and acknowledge the vehicle location twice during the tour. The driver should call in at the conclusion of the pick-ups so that the dispatcher can inform the driver of any additional pick-ups convenient to the "tour" route. The driver should again acknowledge the vehicle location and situation enroute to dropping off the last passenger.

Once the driver has completed the tour, and unless he has received other instructions, he should remain where he is until he hears from the dispatcher. The dispatcher may likely have a list of pick-ups originating from the area

## DRIVER EVALUATION FORM

Name \_\_\_\_\_

Date \_\_\_\_\_

## INSTRUCTIONS:

1. This is a primary step but not the only step (driving tests, medical, prior employment check, etc.) in the initial evaluation of a prospective driver employee.
2. Use point evaluations on all driver applicants.
3. If prospective driver has a driver evaluation score in excess of 6, serious consideration should be given to his qualifications prior to hiring.
4. Points assignable:

A. AGE	POINTS
Under 25	2
25 - 30	1
30 - 45	0
Over 45	1
B. TURNOVER	
0 to 1 year	2
1 yr. to 5 yrs.	1
Over 5 yrs.	0
C. NUMBER of ACCIDENTS (within last 5 years)	
None	0
1 or 2	1 per occurrence
3 and over	2 per occurrence
D. MAJOR MOVING VIOLATIONS (within last 5 years)	
Driving while intoxicated	2 each
Driving under the influence of drugs	2 each
Driving while under suspension	2 each
Reckless driving	2 each
Racing or excessive speeds (20 mph over limits)	2 each
Hit and run	2 each
License suspended or revoked	2 each
E. OTHER MOVING VIOLATIONS (within last 5 years)	
3 and over	1 per occurrence
1 or 2	1
None	0

## GRADING:

Best	0 - 2	Questionable	5 - 6
Average	3 - 4	Poor 1.	Over 6



## FIGURE IV-14 (Continued)

SAMPLE VEHICLE LOG  
INDEX FOR PASSENGER TRIP PURPOSE CODES

## CODE

M - Medical - Visits to Doctors, Dentists, Clinics, Eye Examinations, etc.

A - Agency - Social service, Social Security, Food Stamps, etc.

E - Economic - Trips to banks, shopping, eating out with 1 or 2 others.

V - Visit to a friend or relative, nursing home or hospital visit.

R - Ride

G - Group - Senior Citizen Groups, clubs, eating out with a group.

CH- Church

CM- Congregate Meals

O - Other - These include all not otherwise coded.

Examples: Tours, gardening, hair appointments, fishing trips, etc.

CE- Cultural, Educational - concerts, plays, classes, movies, libraries.

NS- No show

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Source: SEATS Transportation System, Iowa.



in which the driver has just completed the drop-offs. When the driver gets a list of new pick-ups the process is repeated.

A driver should use discretion when determining the length of time to wait at a pick-up location for a passenger. The driver should always give the passenger the benefit of the doubt. If after a minute or so no one has appeared, the driver should call the dispatcher and check on the address or the status of the caller. If there is no reason to expect the passenger to take such a long time to appear, the dispatcher should clear the driver to proceed with the tour. If such is the case, a "No-show" should be recorded in the vehicle log. If the passenger is handicapped or just physically slow, assistance and patience on the part of the driver may be necessary to ensure the safe and easy boarding of the vehicle by the passenger.

As stated, the driver has basic responsibility for the operation of the vehicle. This is to include appropriate preventative maintenance inspections. See page 105 for a discussion of preventative maintenance and the role of the driver. Other helpful suggestions concerning vehicle operation relate to safety procedures. First of all, the driver should be familiar with what the vehicle is capable of and what it is incapable of. Proper adjustment of mirrors and seats should be checked. Stopping at railroad crossings, opening the door, looking both ways, and then proceeding across the tracks if safe to do so, is advisable. When in an urban area situation, back into a driveway or dead-end alley, if possible, so that when leaving the vehicle will be headed into traffic. Never back into traffic.<sup>16</sup>

In conclusion, as with the manager and the dispatcher, the driver must show patience and a willingness to help others. An atmosphere of politeness and personableness should radiate from all personnel in the operation. It's

not enough to be an efficient dispatcher or a safe driver. The role of being a public relations specialist is of great significance.

### Operational Concerns

#### Introduction

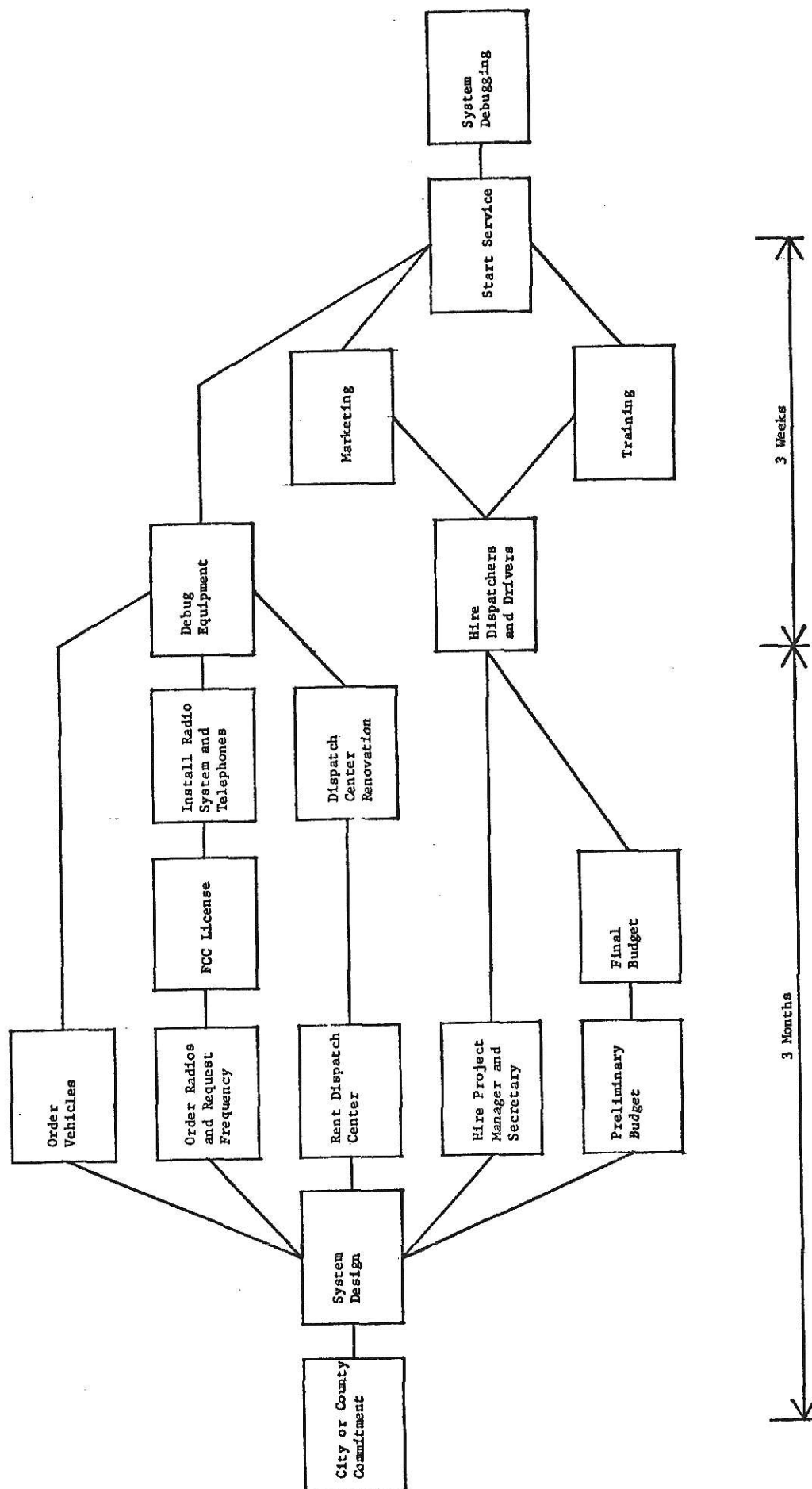
Having discussed the basic concept of the recommended system type and having indicated some of the basic responsibilities of the system's personnel, the following discussion will convey some of the basic operational concerns that must be considered if an effective implementation of a rural transportation system is to be achieved.

#### Implementation Flow Chart

There are a number of very basic steps which must be taken in order to properly implement an effective, efficient DARTS system. Figure IV-15 represents a flow chart which indicates these basic steps and the progression of sequence in which they should be dealt with. Obviously, all of these steps must be coordinated to insure that everything is set to go at the projected start-up date. To neglect or omit any one step could ultimately detract from overall system performance.

The period of time which it takes to go from the step of city or county commitment to actual system operations will vary according to the persons involved and the degree of professionalism to be instilled into the system. The time periods indicated on the Flow Chart are only estimates and should not be interpreted as being fixed. The more prior experience one has in setting up a system of this type the quicker system operations will be realized.

IMPLEMENTATION FLOW CHART  
FOR DARTS SYSTEM



## Marketing

Marketing or publicity, on behalf of the proposed transit service, should be performed both prior to and after the start of the service. Additionally, the marketing campaign should be directed both at agencies and at consumers.

Before the service is to begin, there should be a vigorous campaign to introduce the transit operation. It is helpful if a color scheme and identifying logo are established and that all vehicles, brochures, advertising and stationery should have this logo and color scheme on it. A slide presentation showing, not only the project history but what services will be performed, might be prepared. Such a presentation should last about 15 minutes and be accompanied by a taped vocal presentation. Some of the key items necessary in such a presentation would be:

1. The system is a public system, not just for certain users,
2. The system is not a demonstration or pilot project but a lasting service,
3. Services are available to wheelchair-confined persons (if appropriate), and
4. The system is a demand-responsive operation with door-to-door service.<sup>17</sup>

This slide show could be used for presentation to groups such as senior citizen clubs, and at places where crowds congregate such as at shopping centers. The presentation can also be the foundation for a more detailed presentation to health and social service agencies. In addition to the points previously mentioned, the presentation to agencies should introduce the concepts of tickets and resource coordination in the provision of the transit services. Figures IV-16 and IV-17 give examples of tickets which can be used to facilitate this end.

FIGURE IV-16

## EXAMPLE OF AGENCY TICKET

Rider's Name _____  This ticket good for one round trip between _____ and _____ <div style="display: flex; justify-content: space-around; width: 100%;"> <span>City</span> <span>City</span> </div> on _____ <div style="display: flex; justify-content: center; width: 100%;"> <span>Date</span> </div> Agency's Name _____
--

FIGURE IV-17

## EXAMPLE OF A PREPAID TICKET

.25	.25	.25	.25	.25	.25
.25	Name _____ Good for any transit service in Clay County.				.25
.25					.25
.25	.25	.25	.25	.25	.25

A brochure introducing the service should also be prepared and distributed. The brochure should accompany all slide presentations and might also be distributed through direct mail to target groups. For example, a brochure might accompany monthly public assistance mailings and other bulletins such as information for the aging. Agencies should be given supplies for their clients.

When delivered, the vehicles should be displayed throughout the county.

The news media should be kept informed of all progress throughout the period of implementation so that the public will be made aware of when the system will start operation. During the last few weeks before operation, advertising in newspapers might be in order.

A public transportation map for the entire service area can be prepared. This map can be developed during the implementation stage and should be distributed a few weeks before actual operations start. The map should show all transit routes in the county, both public and private, of all operators.

On an agency level, a booklet describing the services offered by the system to agencies should be prepared and distributed. Additionally, meetings with agency directors should be part of the on-going publicity program both during the planning and actual operation stages.

After the start of operations, the publicity program should not stop. Changes in service, schedules, or fares should be announced far in advance of their occurrence through signs on the vehicles and notices in the newspapers. Progress reports such as the 10,000th rider should be announced as well. On each vehicle and at each waiting area there should be an ample supply of schedules and timetables.

Caution should be taken to ensure that the marketing effort is so geared as to allow for a gradual but continual increase in ridership over

the first year. This will allow for the project manager to efficiently adjust the system to meet the increasing demand.

### System Costs

#### Introduction

Costs can, in many situations, be divided into fixed costs (e.g., those costs which generally do not vary with the amount of service provided) and variable costs (e.g., those costs which vary directly in proportion to how much service is provided). When considering small rural transit operations, however, this distinction in costs has less relevance. In these situations, ultimately all costs will vary with the demand for and the amount of transit service provided. Therefore, no cost should be considered as unalterably fixed.

#### Fixed Costs

The most unvariable cost in a rural transit operation is overhead--primarily the salaries of managers, secretaries, bookkeepers, dispatchers, etc., and, to a lesser degree, office rent and supplies. In a fairly large transit system, overhead will constitute a rather small percentage of the total system costs. Even if such a system is not entirely self-supporting, overhead can usually be covered by revenues. But in smaller systems where revenues are low and where variable operating costs are also low, these fixed costs become very important.

Given the time and difficulty usually encountered in planning and initiating a rural transit service, it is unrealistic to expect that the initial overhead will be covered by the operating revenues. Once a system is in operation, and it becomes clear that these overhead costs cannot be

covered over the long run, the importance of keeping these fixed costs to a minimum will become apparent. There are a number of ways to accomplish this. "Operational" management can be turned over to a lower paid person or possibly to a volunteer community group. One person can serve in a multi-functional role. This is to say that one person can serve in two or more of the following activities: management, bookkeeping, secretarial work, dispatching, and part-time driving. It is probably best that distinctions among employees' functions be rather loose. Specialization can result in efficiency in large organizations but in small transit operations it can prove to be most costly.

Next to overhead, vehicles constitute the most unvariable cost. The number and type of vehicles acquired will vary, of course, with the amount and type of operation provided. But once the vehicles are purchased, the financial commitment is more or less irreversible. While the degree of financial commitment can be limited by leasing vehicles, it is seldom that a very wide range of vehicle types, if any, will be available for leasing in a given rural area.<sup>18</sup>

While the purchase of vehicles is not normally a large element of the total expenses of a rural transit operation, premature and overly ambitious vehicle purchase can lead to serious financial difficulties. Unless each vehicle purchased can reasonably be expected to generate significant additional revenues within a short period of time, its purchase should not be favorably considered. A more complete discussion of vehicles, their cost and maintenance problems, will follow shortly.

There are certain costs associated with vehicle purchases which are more or less fixed -- taxes (including license tags and registration), liability



insurance (see page 128 for a more detailed discussion on insurance), and in the case of used vehicles, initial repairs to make them operable and/or to pass state safety inspections.

According to a publication by the U.S. Department of Transportation, insurance tended to be relatively expensive where there were regular transit operations carrying numerous passengers and having fares and paid drivers. Insurance costs of the systems observed by the U.S. DOT varied enormously, running as high as \$5,000 and as low as \$500 per year per vehicle.<sup>19</sup> Why such wide variations should occur was hard to ascertain, only that the insurance companies did not have much experience in dealing with rural transit operations. The operator of a rural transit service should shop aggressively for his insurance and discuss in detail, with several companies, those factors which might raise or lower his rates. On the other hand, insurance for vehicles using volunteer or nonprofessional drivers and with no fares involved may fall into a different insurance rate classification. These rates may be only marginally higher than those for a private automobile.

#### Variable Costs

According to the previously mentioned U.S. DOT publication, drivers' wages, while actually more or less fixed, are normally considered a variable cost in conventional transit operations and are the single most important cost element. Among those rural transit projects investigated in the report, those which employed professional drivers usually bore out this fact. Drivers may be on an annual or monthly salary base, or on an hourly basis. The minimum wage must be paid, but this salary may not be sufficient to attract professional drivers. It appeared that from \$2.00 to \$3.50 was the prevailing hourly wage range and from \$4,000 to \$8,000 the prevailing yearly salary

range for full-time professional drivers.<sup>20</sup> Nonprofessional drivers, (e.g., housewives, retired persons, etc.) will often work for much less. In some cases, the take-home pay for drivers who work only a few hours a day will be as little as a few hundred dollars a year. In other cases, part-time nonprofessional drivers might net somewhat more depending on the number of hours worked. In other cases, the drivers might be nonpaid volunteers.

In choosing between professional and nonprofessional drivers, there are a number of determining factors. The most important is the length and difficulty of the daily work -- long, difficult, daily driving almost will always involve professional drivers even if only on a part-time basis. Another important factor is the social affinity of the drivers and the riders. Normally, paid nonprofessional and volunteer drivers are in a position of providing service to friends or of feeling that they are providing some socially valuable service. This phenomenon can easily be associated with a reasonably small and close knit community.

In cases where professional drivers are employed, their wages will usually account for between one-third and two-thirds of the total operating costs. In cases where nonprofessional or volunteer drivers used, drivers' compensation will usually be a smaller percentage of the total operating costs, especially when compared to other more fixed costs.

The most variable costs associated with a rural transit operation are those associated directly with vehicle operation (i.e., fuel, maintenance, and repairs). Fuel in some cases might be obtained at commercial rates. In other cases, where the operator is of a nonprofit status, Federal fuel taxes need not be paid. Discounts from a single dealer, because of volume

purchases, may be possible. In addition, it might be possible to purchase from local public bodies at substantial discounts, e.g., 30¢ per gallon for regular gasoline. There is little to no documentation concerning the costs of maintenance and repair at the time of this writing, so no conclusions about them will be put forth. Table IV-1 does give some indication of maintenance and repair costs while giving a representative picture of the itemized typical costs per seat mile of various vehicle types operating in a rural setting.

The aforementioned U.S. DOT report indicated that for systems utilizing professional drivers and providing full time transit service, the average total cost per vehicle varied from 33¢ to 60¢ per vehicle-mile, clustering in the neighborhood of 36¢ to 40¢ per vehicle-mile. In some instances, in the initial stages of an operation, the cost per vehicle-mile could possibly reach \$1.00. With the increase in gasoline prices, this figure is more realistic than not. The costs described above are typical of a rather substantial transit operation employing professional drivers. Smaller operations, employing basically volunteer drivers, can experience somewhat lower vehicle-mile costs in the neighborhood of 20¢ to 38¢ per vehicle-mile, with overhead included, depending on the level and frequency of service.<sup>21</sup>

#### Revenues

Revenues can be derived from fares, contracts, charters, and from a number of public and private contributions. For those operations charging a fare, the rate (charge per passenger-mile or per trip) might range from 2¢ to 5¢ per passenger-mile (probably closer to 5¢), and 50¢ plus for a round trip depending on the trip length. The rate of 2¢ to 5¢ per passenger-mile parallels the rate level of intercity bus firms operating in rural areas.<sup>22</sup>

TABLE IV-1  
TYPICAL TOTAL COSTS  
PER SEAT-MILE IN A RURAL ENVIRONMENT

	<u>Car</u>	<u>Van</u>	<u>Small Transit Bus</u>	<u>Medium Transit Bus</u>	<u>Large Transit Bus</u>	<u>School Bus</u>
Capacity (Seats)	5	10	20	30	50	44*
Speed (MPH)	30	25	18	18	15	15
Fuel Consumption (mi./gal.)	13	10	7	6	5	7
Fuel Type Cost	Gas \$.50/g	Gas .50/g	Gas .50/g	Diesel .38/g	Diesel .38/g	Gas .50/g
Fuel	.039	.050	.072	.064	.076	.072
Maintenance Rolling Stock	.045	.090	.125	.125	.150	.140
Injury & Damages	.025	.030	.042	.042	.050	.050
General & Misc.	.050	.060	.083	.083	.100	.100
Admin.	.035	.042	.058	.058	.070	.070
Wages @ \$3/hr.	.100	.120	.167	.167	.200	.200
Total Operating Cost/Veh. Mile	.294	.392	.547	.539	.646	.632
Capital Cost/ Veh. Mile	.037	.069	.125	.115	.167	.054
Total Cost/ Veh. Mile	.331	.461	.672	.654	.761	.686
Total Cost/ Seat Mile	.066	.046	.034	.022	.015	.016

\*Adult Seating Configuration

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Source: U.S. Department of Health, Education, and Welfare, Transportation for the Elderly: The State of the Art (Washington: U.S. Government Printing Office, January, 1975), p. 86.

In setting fares for rural transit, an assessment should first be made of the cost of potential alternatives, whether they be existing commercial taxi or bus service, or informal arrangements with neighbors. A comparison of service quality is also desirable. To compete with a higher quality service (e.g., attempting with fixed route bus service to compete with door-to-door car pools) the lower quality service must be priced lower. However, if one is providing superior service (e.g., demand-responsive service in competition with infrequently scheduled buses) it may be possible to charge higher fares.

Another thought here is that it is usually better to initiate service with higher fares and then reduce them rather than to discover, when operations are underway, that fares are too low and must be increased.

With regard to contract service, there is great potential here for the contracting of transportation services with social service agencies. As stated in the chapter on funding sources to be found later in this report, there is a significant amount of money available for the purchase of transportation services. A contractual rate of 10¢ per passenger-mile is an observed average rate. The appropriate rate can be reached through negotiations with the agencies involved.

While it often involves insurance problems, providing charter service to local groups is a lucrative type of business. Charter rates may be set in different ways; two examples are as follows:

1. Ten-passenger van at a rate of 20¢ per mile plus \$2.25 per hour for the driver;
2. A 12-passenger van at 35¢ per mile and a 54-passenger bus at 55¢ per mile. (Both rates include drivers' wages.)

Continuing financial viability of the rural transit service can only be assured by local commitment to the operation. Grassroots support on the part of the "city fathers", the local businessmen, and/or the county commissioners is a must if the system is to succeed over a period of time. A system should not be started on the assumption that continuing federal and state subsidies will be forthcoming. Local commitment and community acceptance must be obtained to insure that adequate revenues will be available to cover capital and, more importantly, operating expenses.

### Vehicle Selection

#### Introduction

The vehicle equipment is the most dominant visible outward image of a transit operation. Proper vehicle acquisition is important for it will, in large part, set the initial image of the transit operation in the mind of the public. The outer appearance of the vehicle is important for this initial impact and impression, but the inner appearance is just as vital, possibly more so. In riding in the confines of the vehicle itself, the passengers will experience the direct impact of the vehicle's qualities. The lasting impression, the one that helps to satisfy and hold customers, is the passenger's perception as a passenger. The equipment can make the ride a relative pleasure or it can make it a cross which the rider must bear until he chooses another means of transportation.

#### Service Requirements

In lieu of the fact that there are varying service requirements which arise out of different clientele needs, the project equipment should be so geared as to address those needs. For regular service, equipment should

provide for easy boarding and exiting. The vehicle should provide for reasonable seat comfort. For service in smaller cities, distances traveled will not be great. Therefore, there may be no need to have extraordinary comfort in either the seating or the suspension of the vehicle. On the other hand, for transit service in rural areas where distances are greater or on streets that are rough and poorly cared for, it may be wise to acquire equipment which affords the smoothest, most comfortable ride.

For specialized services, i.e., services for the elderly and handicapped, the vehicles should be equipped with the necessary equipment which enables them to meet the particular needs of these and other transportation disadvantaged persons. For instance, in gearing service to make travel easier for the handicapped, special wheelchair lifts and restraint systems may be necessary. For those who have difficulty moving up and down steps, a minimum number of steps with a minimum riser height may be needed. An additional "assist step" may be required if the first step onto the bus is at too great a height, i.e., over 18 inches off the ground. Additional handrails and an appropriate ceiling height, i.e., minimum 62 inches, may be necessary so that the easy accommodation of the elderly is possible. A directory of sources for vehicles and equipment capable of transporting persons with impaired mobility is available from the Urban Mass Transportation Administration (UMTA).<sup>23</sup>

#### Promotion Symbolism

The transit vehicle can be used as a promotional device in that it can become the basic symbol of a transit operation. Transit equipment is easily utilized as a news source. The delivery of new transit equipment will be a ready source for free newspaper promotion. The equipment can be placed on display at strategic locations, with an attendant to answer questions, as a

sort of follow-up to the newspaper publicity.

Symbolism is a very important aspect of promotional work. This fact is illustrated by the pains taken by large business organizations to develop a distinctive logo or trademark, one that is instantly recognizable. When the symbol creates an indelible imprint in the public's mind, reminding them of a quality product, the symbol becomes a complete advertising message each time it is observed.<sup>24</sup>

#### Equipment Selection Guidelines

The following list (see Figure IV-18) is intended to ensure that the transit operator considers all possibilities related to equipment. This list contains the elements which compose the initial issues and ideas from which both broad and precise specifications for transit equipment may be developed.

In determining specifications, specific attention should be paid to the physical, topographic, and environmental conditions of the areas in which the transit service is to operate. Road conditions must be taken into account. The width, clearance, and sharpness of curves and corners may severely limit the equipment that may be used. Local topography should be considered. If the terrain is of a hill and valley nature, sufficient engine power and braking power must be provided. A combination of steep hills, narrow roads, and tight corners dictates the use of a vehicle that has a high degree of maneuverability as well as power.

Other elements to be considered revolve around proper specifications which allow for at least the minimum in comfort and quality. An example of assuring overall vehicle riding comfort would be to properly select a vehicle suspension system which is geared to the road conditions of the area in which service is to be provided. In addition, air conditioning, heating, and



## FIGURE IV-18

## SAMPLE SPECIFICATION SHEET

## 1. BODY STRUCTURE:

- a. \_\_\_\_\_ Chassis body or \_\_\_\_\_ Integral
- b. \_\_\_\_\_ Riveted or \_\_\_\_\_ Welded
- c. \_\_\_\_\_ Length
- d. \_\_\_\_\_ Width
- e. \_\_\_\_\_ Standard number of seats (and seat configurations available)
- f. \_\_\_\_\_ Height, ground to first step
- g. \_\_\_\_\_ Number of steps
- h. \_\_\_\_\_ Flat floor
- i. \_\_\_\_\_ Headroom
- j. \_\_\_\_\_ Approximate unloaded weight
- k. \_\_\_\_\_ Weight on front axle
- l. \_\_\_\_\_ Weight on rear axle

## 2. SUSPENSION:

- a. \_\_\_\_\_ Wheelbase
- b. \_\_\_\_\_ Track - front
- c. \_\_\_\_\_ Track - rear
- d. \_\_\_\_\_ Turning radius over outside
- e. \_\_\_\_\_ Turning radius of body (front corner)
- f. \_\_\_\_\_ Type (air, leaf-spring, etc.)
- g. Steering manufacturer and model \_\_\_\_\_
- h. Rear axle manufacturer and model \_\_\_\_\_

## 3. ENGINE:

- a. Location \_\_\_\_\_
- b. \_\_\_\_\_ Inline or \_\_\_\_\_ Transverse
- c. Manufacturer \_\_\_\_\_
- d. \_\_\_\_\_ Gas or \_\_\_\_\_ Diesel
- e. Configuration (6, V-6, V-8, etc.) \_\_\_\_\_
- f. Displacement \_\_\_\_\_
- g. Peak hp/rpm \_\_\_\_\_
- h. Peak torque/rpm \_\_\_\_\_
- i. Estimated engine life before major overhaul \_\_\_\_\_

## 4. BRAKES:

- a. Type \_\_\_\_\_
- b. Total area \_\_\_\_\_
- c. Estimated life \_\_\_\_\_

## 5. TRANSMISSION:

- a. Manufacturer \_\_\_\_\_
- b. Model \_\_\_\_\_
- c. Type (torque, conv., 3-speed, etc.) \_\_\_\_\_

## FIGURE IV-18 (Continued)

## SAMPLE SPECIFICATION SHEET

## 6. PERFORMANCE:

- a. Acceleration \_\_\_\_\_  
     0-20 mph \_\_\_\_\_  
     0-30 mph \_\_\_\_\_  
     0-40 mph \_\_\_\_\_
- b. Maximum grade \_\_\_\_\_
- c. Braking \_\_\_\_\_

## 7. VENTILATION and LIGHTING:

- a. Heat type (recirculating or fresh air) \_\_\_\_\_
- b. Air conditioning capacity \_\_\_\_\_
- c. Air conditioning type (integral w/ heat or other) \_\_\_\_\_
- d. Candle-power at reading plane \_\_\_\_\_

## 8. OTHER SPECIFICATIONS:

- a. Seating capacity \_\_\_\_\_
- b. Aisle width \_\_\_\_\_
- c. Fuel tank capacity \_\_\_\_\_
- d. Standard tire size \_\_\_\_\_
- e. Front axle capacity \_\_\_\_\_
- f. Rear axle capacity \_\_\_\_\_
- g. Estimated fuel mileage \_\_\_\_\_

9. TYPICAL PRICE for the VEHICLE (rounded to the nearest \$1,000.00) \_\_\_\_\_

10. ITEMS NORMALLY CONSIDERED OPTIONAL EQUIPMENT: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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Source: George M. Smerk et al., Mass Transit Management: A Handbook for Small Cities, prepared for the UMTA, U.S. DOT (Springfield, Va.: National Technical Information Service, 1971), pp. 202-203.

ventilating needs should be given serious thought. In the environs of Kansas, air conditioning is a must during the summer months. During winter months an auxiliary heating system most likely will be needed.

Another consideration is the sense of spaciousness in the vehicle. A feeling of crampedness can be avoided by the proper treatment of the interior space in terms of window size and location, decor and the colors used on seating and floors. Some thought should be given to the spacing of seats in the vehicle. To comfortably accommodate an adult, seat centers should be spaced a minimum of 29 to 30 inches apart. Unfortunately, most vehicles come with maximum seating capacity which in turn maximizes seating discomfort. Thought should be given to having the vehicle fitted with fewer than the maximum number of seats usually installed to insure adequate comfort.

Some consideration, especially for a transit operation starting from scratch, should be given to pacing the replacement of equipment by purchasing a mixture of new and used equipment. If, at the start, similar equipment is acquired all at one time, it will tend to wear out at about the same time. Unless a transit service foresees a steady enlargement of service over its first four or five years of operation, so that several new buses will be added each year, both new and used equipment might be included in the initial fleet where possible. Some of the older vehicles might be kept for a year or two and then be replaced by new equipment.<sup>25</sup>

#### Passenger Facilities

Where passengers are picked up in outlying rural communities and brought to a county seat or some other service center, thought should be given to providing a downtown focal point -- a terminal or collection point for the riders. In waiting for the return trip to their home the passenger should

be provided with a place of shelter in the service center. In addition to space and shelter for passengers, this facility should contain restroom accommodations and should be heated and, where possible, air conditioned. After the passenger has completed his or her business in the service center, be it shopping, medical, or recreational, he or she can return to the terminal facility and wait in comfort for the vehicle and their return trip home. This central downtown facility will have much advertising and promotional value with regard to establishing a positive image for the transit operation.

### Vehicle Maintenance

#### Introduction

The primary function of maintenance is to ensure uninterrupted dependable service at low cost. Maintenance is not only the periodic servicing of vehicles by a maintenance staff but also includes daily monitoring of vehicle performance by drivers. The safety of passengers dictates a concerted effort toward a proper maintenance program. In addition, the unpredictability of breakdowns and the high cost of idle equipment dictate a unified conscientious approach to vehicle up-keep.

In any discussion on the maintenance of transit vehicles, one conclusion always reached is that greater emphasis should be placed on preventive maintenance rather than on breakdown maintenance. Preventive maintenance means reducing the number of breakdowns by scheduling certain types of routine maintenance. Breakdown maintenance, on the other hand, is considered to be maintenance performed upon failure of the vehicle to function or operate properly.

### Why Use Preventive Maintenance?

Preventive maintenance simply costs less than breakdown maintenance. To put it another way, when a vehicle breaks down while in service some of the following problems are likely to be caused:

1. Delayed and missed pickups which in turn make for poor customer appeal.
2. Extra maintenance costs.
3. Extra driver costs.
4. Disruption of maintenance program routine.
5. Lost of revenue.
6. Need for investment in extra equipment, which may be underutilized.
7. Claims, if breakdown causes an accident resulting in personal injury or property damage.

These problems result in loss of revenue, dissatisfied customers, and disruption of services, all of which can be avoided or significantly reduced if only properly scheduled maintenance is performed.

### What Is Preventive Maintenance?

A misconception here is that preventive maintenance is only the replacement of parts at a predetermined time, assuming that a particular part has reached its maximum efficiency and should be replaced at a given point in time. Beyond this replacement process, however, preventive maintenance is even more concerned with regular inspections. A sample inspection might include the following items:

1. Checking steering gear for excessive play.
2. Checking fuel pump pressure to idle at so many rpms.
3. Checking seats and seat frames.

4. Checking exterior and interior lights.
5. Checking oil level.
6. Cleaning battery terminals and taking cell readings.
7. Washing batteries with water.
8. Checking exhaust system and mufflers for leaks.
9. Checking for loose bolts and nuts.
10. Checking for unexplained dents.
11. Checking for tears in flooring.
12. Checking for correct shifting speeds.<sup>26</sup>

Generally speaking then, preventive maintenance can be said to be any type of maintenance other than that required simply to keep vehicles operating.

#### Objectives of Preventive Maintenance

What should be the objectives of a maintenance program? The ideal preventive maintenance program would "prevent" any breakdowns whatsoever. However, the expense involved in this type of program would be prohibitive. The optimal number of breakdowns cannot be specified precisely. Depending on the size of the transit operation, a range in breakdowns-per-time period, resulting in a minimization of cost, in terms of ridership, investment in additional equipment, or excessive operator expense, should be strived for.

Safety is the most important objective of any maintenance program. As a minimum, the preventive maintenance program should ensure that all vehicles can pass a rigid safety inspection at any time, by any agency--management or regulatory. This goal should be made a part of the management program in that surprise inspections should be held as a quality check.

Other preventive maintenance objectives should be set so that, as a minimum, the passenger can expect to ride in a clean vehicle, with a clean interior, with seats in good repair, and with no cracked windows. If the passengers have grown accustomed to expecting heat in the winter and air conditioning in the summer, no vehicles should be dispatched or continue to operate beyond the end of any tour if these components are not operating in

a satisfactory manner.

#### The Components of a Maintenance Program

The best way to illustrate the components of a maintenance program is through the forms and paper flow required for the proper execution of the program. Table IV-2 lists the various maintenance forms which should be utilized to ensure proper implementation of the preventive maintenance function. The following discussion describes some of these forms and the need for them.

Daily Vehicle Defect Card (Figure IV-19).— Possibly the most important preventive maintenance is the Daily Vehicle Defect Card. In any preventive maintenance program the driver is the primary element in assuring success of the program. It is his responsibility to report any and all defects in writing on the Daily Vehicle Defect Card. A thorough vehicle inspection should be performed--tire pressure, lights, brakes, doors, windshield wipers, windows, seats, oil levels, etc. can be checked and the defects properly noted. The most convenient time to perform this daily inspection is during the time it takes to fuel the vehicle for that day's initial operations. Prompt attention to listed defects should be given to prevent further complications. These checks are the key to achieving dependable, uninterrupted service.

Other Forms. - The other inspection forms, such as the Weekly Vehicle Report, 6000 Mile Maintenance Report, and the Monthly Vehicle Summary, should be completed individually on a predetermined scheduled basis. Figures IV-20 through IV-22 give examples of the forms and the nature of the items to be checked.

TABLE IV-2  
UTILIZATION OF MAINTENANCE FORMS

Document Name	Completed By	Intervals	Received By
Defect Card	Driver	Daily	Maintenance Supervisor
Daily Fuel Island Inspection Form	Service Crew or Service Foreman	Daily	Maintenance Supervisor
Mileage Inspection Forms	Inspecting Mechanic	At given mileage	Maintenance Supervisor
Air Conditioner Form	Inspecting Mechanic	Every 100 hours of operation	Maintenance Supervisor
Foreman's Inspection Form	Maintenance Foreman	Every 30,000 miles, after regular inspection	Maintenance Supervisor
Battery Report Form	Service Crew or Service Foreman	When battery is charged	Maintenance Supervisor
Tire Form	Bookkeeper	Monthly	Maintenance Supervisor: to be fwd'd to the tire company
Vehicle History Form	Parts or Maintenance Clerk	Fuel and oil, bi-weekly; other entries when needed	Maintenance Supervisor for coach record file
Inventory Control Form	Parts Clerk	When parts are requisitioned	Bookkeeper Vehicle History Form Inventory Records
Repair Order	Maintenance Supervisor	When each vehicle is inspected or repaired	Vehicle History Form Bookkeeper Parts Clerk

Source: George M. Smerk et al., Mass Transit Management: A Handbook for Small Cities, prepared for the UMTA, U.S. DOT (Springfield, Va.: National Technical Information Service, 1971), p. 161.



FIGURE IV-19

## DAILY VEHICLE DEFECT CARD

VEHICLE DEFECT CARD			
Vehicle No.		Date	
		19	
BODY		CHASSIS (cont'd)	
1	Damaged Body	Wheels	22
2	Broken Glass	Tires	23
3	Doors	Steering	24
4	Seats	Horn	25
5	Heaters	Transmission	26
6	Defroster	Misc. Chassis	27
7	Signs	ENGINE	
8	Windshield Wiper	Exhaust leaks	28
9	Misc. Body	Air Leaks	29
ELECTRICAL		Water Leaks	30
10	Wiring	Oil Leaks	31
11	Switches	Fuel Leaks	32
12	Fuses	Air Pressure	33
13	Buzzers	Oil Pressure	34
14	Lights	Noise in Engine	35
15	Battery	Belts	36
16	Starter	Stalling	37
17	Misc. Elect	Overheating	38
CHASSIS		Fuel Trouble	39
18	Springs	Clutch	40
19	Accellerator	Shifting Trouble	41
20	Brakes--Foot	Dirty Bus	42
21	Brakes--Hand	O. K.	X
Punch "X" Against Defect Number			
REMARKS:			

Source: RRC International, Inc., An Innovative Rural Public Transportation System Design for Chautauqua County, New York, prepared for the New York Department of Transportation (Albany, N.Y.: January, 1975), p. 130.

FIGURE IV-20  
WEEKLY VEHICLE REPORT

WEEKLY VEHICLE REPORT		Clay County	TRANSPORTATION SYSTEM
VEHICLE NUMBER _____	DATE _____	MILEAGE _____	
FLUID LEVELS			
___ OIL	___ WINDSHIELD WASHER FLUID		
___ TRANSMISSION FLUID	___ POWER STEERING FLUID		
___ BATTERY WATER	___ WATER	___ BRAKE FLUID	
LIGHTS AND ELECTRICAL			
___ EXTERIOR LIGHTS	___ HORN		
___ INTERIOR LIGHTS	___ WINDSHIELD WIPERS		
OPERATING			
___ BRAKES	___ IDLING	___ HEATER	
___ SHIFTING	___ TIRES	___ MIRRORS	
___ STEERING	___ PARKING BRAKE	___ FLUID LEAKS	
___ DEFROSTER	___ SUSPENSION	___ ENGINE BELTS	
BODY CONDITION			
___ NEW DENTS AND SCRATCHES	___ GLASS INTACT		
CLEANING			
___ EXTERIOR	___ WAXED	___ INTERIOR	
OIL CHANGE (at 3,000 mile intervals)			
EQUIPMENT			
___ FLARES	___ JACK	___ SPARE TIRE	
___ FIRST AID KIT	___ REGISTRATION		

Source: RRC International, Inc., An Innovative Rural Public Transportation System Design for Chautauqua County, N.Y., prepared for the New York Department of Transportation (Albany, N.Y.: January, 1975), p. 131.



FIGURE IV-22

## 6,000 MILE MAINTENANCE REPORT

6000 MILE MAINTENANCE REPORT	<u>Clay County</u>	TRANSPORTATION SYSTEM
VEHICLE _____	DATE _____	MILEAGE _____
CHASSIS LUBRICATION _____		
AIR CONDITIONING SYSTEM _____		
TIRE ROTATION _____		
OIL CHANGE-FILTER _____		
CHECK BRAKES _____		
CHECK POWER STEERING _____		
TUNE-UP ENGINE _____		
POLLUTION CONTROL EQUIPMENT _____		

Source: RRC International, Inc., An Innovative Rural Public Transportation System Design for Chautauqua County, N.Y., prepared for the New York Department of Transportation (Albany, N.Y.: January, 1975), p. 132.

### Other Possible Maintenance Program Alternatives

The cost of developing maintenance facilities is often too great for a small rural transit operation to undertake. Therefore, alternatives to total in-house maintenance should be given much consideration.

Outside Maintenance Contract. - An alternative to establishing a self-owned, self-controlled in-home repair facility is the possibility of negotiating a contract with an outside party for vehicle maintenance and repair. This alternative would enable the small transit operation to avoid the substantial fixed investment of equipping a repair facility. In general, this would involve negotiating a contract for performance of vehicle inspections and repairs with an automobile dealer, truck dealer, independent garage, or user of related equipment. This would possibly be a contract similar to the initial vehicle warranty. Some disadvantages should be noted:

1. Control over the quality of the inspections is lost.
2. Work scheduling is more difficult because of priority considerations.
3. The expenses incurred, while variable (rather than fixed and variable), may be higher.
4. Because much bus work is specialized, more than one contract may have to be negotiated with subsequent loss of quality control and increased scheduling difficulty.
5. The party performing the maintenance might be unwilling to stock the necessary parts, leading to lengthy vehicle out of service periods.<sup>28</sup>

Partial Outside Maintenance Contract. - Another option is to do all the preventive maintenance in-house and contract out all repairs to a local garage. The advantage of this arrangement is that preventive maintenance does not require very extensive physical facilities. The transit operation has the fixed investment of a facility, but it does not have the large fixed investment required in specialized repair equipment and tools. The disadvantages previously listed all pertain to this arrangement, but they are lessened

somewhat because the transit operation has some in-house maintenance capability.

It should be realized that even the modest investment required for this situation should not be considered unless the transit service operates with reliability and with substantial revenues. In most cases, the rural transit systems of which we are concerned, will be initially introduced on a small scale. With this in mind, maintenance facility development should seldom be considered until substantial experience has been gained.

Lease Agreement. - One final option would be to lease vehicles with the maintenance and repairs carried out by the leasing company. Under this agreement, they would furnish the vehicles plus a guaranteed maintenance program. In outlying areas, they might equip a repair facility that could serve the transit system's operation exclusively, if there was a great enough demand for a large number of vehicles. In the more rural areas, however, the option of leasing vehicles of a suitable type is frequently not available. For any transit operation that is starting up a service, a quotation by a leasing company could serve as a ceiling on expenses. That is, since the leasing expense is a firm, contractual price, the new transit operator could use these prices as maximum expenses.<sup>29</sup>

#### Maintenance Facilities and Suggested Equipment

The extent of a particular repair facility that a transit operation might require depends on the following:

1. The type of maintenance program that is operated
2. The number of vehicles in the system
3. The section of the country
4. The topography of the land

## 5. The cost constraints

With these constraints in mind, the following are thirteen basic needs that are required of a complete, all-around maintenance facility.

1. Fueling and service area
2. Wash area
3. Grease pit or hoist, or combination of both
4. Body shop
5. Paint shop (The body shop and paint shop may be combined.)
6. Machine shop
7. Stock room
8. Store room (The stock room and the store room may also be combined.)
9. Maintenance Superintendent's Office
10. Indoor or outdoor storage of vehicles
11. Fuel and lube oil storage tanks
12. Cleaning and repair area
13. Battery room<sup>30</sup>

These facilities cover the typical maintenance functions of a transit operation. There are obvious financial limitations on small transit services which precludes them from obtaining this degree of maintenance capability. As previously stated, undertaking the development of maintenance facilities should not be attempted until the operation is well along in experience and financial stability. This list is intended only to give an idea of the needs involved when attempting to establish a maintenance facility.

## Communication and Control Systems

### Introduction

The importance of good communication cannot be overlooked. Communication is a means by which control can be established over the day-to-day operations of the transit operations. It enables the creation of a link with those vehicles in operation, unifying the total system, and providing the flexibility and the reliability necessary to sustain a viable transit service in less dense geographic areas. For example, perhaps a bus breaks down, causing

considerable inconvenience to the passengers on board. A communication and control system could be used to alert supervisory personnel quickly. If the bus is equipped with a two-way radio, the driver can alert the control center personnel and in a matter of minutes a replacement vehicle and repair crew could be dispatched to the location. Without instant radio or other communication, the driver must find a telephone, which could be a very time consuming problem in rural areas.

#### Methods of Communication

For the type of transit operations that are being proposed (demand-responsive), and considering the geographic nature of the areas in which these services will be operating (primarily rural), the communications and control techniques available are restrictive as compared to method available for use in more urban areas. In urban areas where fixed routes and schedules are predominately used, street supervisors, located at fixed stations or in automobiles, provide for a means of control and supervision of the system. In less dense rural areas the limitations of this method are obvious.

A more feasible method for use in rural, as well as in urban areas, might be to have drivers call in at the end of a "tour" or route and at certain places along the route, by use of a telephone. This would, in a limited way, enable a driver to get a new list of persons to be picked up and delivered and provide for possible emergency pick-ups while in route. This method is better than no communication but its effectiveness is obviously limited to the accessibility of the driver to a telephone. Moreover, it may involve considerable delay and inconvenience for the passengers as well as the driver.

Other methods of control, such as electronic vehicle-monitoring systems and closed circuit television cameras, are only feasible in larger urban



areas, and, at the present time, have no application possibilities in rural areas.

For a small-scale demand responsive transit operation such as DARTS, the best bet in communication devices is the two-way radio. This method offers the most flexibility, reliability, and control. With the improved mobile type radio units that have been developed in recent years, the feasibility of two-way radio communication, without undue expense, has become a most viable and realistic alternative to no communication whatever. With two-way radios, information can be transmitted instantly between vehicles and the control center base station. Communication delays can be practically eliminated.

Some guidelines to be used in the selection of two-way radio communications equipment are as follows:

1. Constant and immediate contact with all buses in route and in special service operation should be possible in order to:
  - a. Meet supervisory and dispatching needs.
  - b. Meet data-collection needs.
  - c. Meet information and emergency needs.
2. The quality of the system should provide a high standard of:
  - a. Range and coverage.
  - b. Clarity and precision in transmission and reception.
  - c. Reliability in operation.
  - d. Lack of interference with driver and customer comfort, and with community radio, television, and telephone systems.
3. Mounting the equipment in the vehicle should require little space.<sup>31</sup>

#### Central Control Center

A two-way radio communication system is more than a device for reporting

emergencies, making checks on drivers, or data collection. Utilizing this type of system, a central dispatcher at a control point in the transit system, probably the county seat, can act as a monitor and control agent for the entire operation. His basic functions, as stated earlier, would be to take trip requests, make scheduling and routing decisions, dispatch vehicles, and ensure the dependable operation of the system.<sup>32</sup>

An example of a typical dispatching system operating a demand-responsive many-to-one service, i.e., countywide pickups with the county seat as their common destination, would be as follows: The central dispatcher answers all incoming telephone calls and records the necessary information: time of call, pickup address or point, and delivery address or point. The tour would begin when the dispatcher radios a driver and gives the driver a list of pickups in the county-wide service area. The dispatcher or the driver can determine the order of pickup. The driver then proceeds with the pickups in the service area.

Having arrived back at the service center after having made all of the designated pickups, the driver calls the dispatcher. The point of entering the town would be determined by the driver unless he has received previous instruction from the dispatcher. The driver circulates on the downtown route simultaneously dropping off inbound passengers and picking up outbound passengers according to the list of stops transmitted by the dispatcher. The driver radios the dispatcher when he leaves the town.

All outbound distributions are performed in sequence so that the outbound tour is completed at the farthest point in the service area from the county service center. No passengers are picked up until all passengers are dropped off. The driver radios the dispatcher after all passengers are

dropped off. If there is insufficient demand to dispatch another tour, the driver would be instructed to park either in the service area or downtown depending on the anticipated demand.<sup>33</sup>

### System Acquisition

The initial step in obtaining a two-way mobile radio system (mobile units, antenna, and base station) is to contact sales representatives or distributors dealing in mobile communications. General Electric, Motorola, and RCA are among the leading manufacturers of equipment, but others are available, both domestic and foreign. Equipment prices vary widely with the type of equipment obtained. The company representative should first attempt to find out what the user wants his radio system to do. Therefore, the user should have a fairly definite idea of what he desires in range, how much communication is going to take place, opinions as to what equipment would best fit his needs, and other relevant information. The representative should investigate the physical characteristics of the area, the other radio systems operating in the area, and other items. Putting all of this data together, he should recommend a system for use by the transit operation that he feels would best suit its needs. This should include the possibility of utilizing and expanding existing communication systems (e.g., those systems used by fire station personnel, taxis, or police). Since systems designed by different representatives tend to vary, it will be necessary for the transit operator to pick the system which would appear to be superior in both suitability and estimated price. Obtaining a radio system is a custom design procedure.

After deciding on a system design, specifications can be drawn up for the needed radio equipment so that all companies can bid on them. See Appendix 'A' for sample specifications for high band mobile radio units and base stations.

# **ILLEGIBLE DOCUMENT**

**THE FOLLOWING  
DOCUMENT(S) IS OF  
POOR LEGIBILITY IN  
THE ORIGINAL**

**THIS IS THE BEST  
COPY AVAILABLE**

It is suggested that installation and maintenance agreements should be spelled out in the bid specifications. After accepting the low bid, plans can be made for getting the equipment, installing it, and training the employees to use it correctly.

All radio operations in the United States are under the supervision of the Federal Communications Commission (FCC). To operate a radio system, an operating license must be secured from the FCC in Washington D.C. The representative of the equipment supplier will usually be very willing to help the buyer deal with the FCC. While regulations and procedures sometimes change, application should be made about two month in advance of the proposed start-up date of the operation. This is a reasonable allowance, as it will take the manufacturer a large portion of this time to produce the order after the sale. After the equipment has been installed, notification from the FCC must be given before testing and regular operation can begin. Forms and assistance may be obtained from the FCC in Washington D.C. or any of its field offices.

Licenses usually have to be renewed every five years. The license covers a specific base station and a specific number of mobile units. To move the location, exceed the number of units, change power output, or make other changes requires modification of the license. The original application can be written, however, to include more mobile units than actual needed for current operation to provide for expansion in the future. The manufacturer can also assist the applicant in choosing a specific frequency, as frequencies are not arbitrarily assigned by the FCC. Several frequencies in each band have been allocated to Motor Carrier Radio Service. These will probably yield the most likely frequency for transit use. In picking a frequency, the applicant

should try to obtain one not already authorized for other use so that he will enjoy exclusive operation. Since the lower bands fill up first, the applicant may have to use a UHF frequency to find one not already in use. In rural areas, however, over crowding of frequencies is not likely to be a problem.

In addition to regulating the establishment of a system, The FCC has rules which govern its operation. The license, for instance, must be prominently displayed. When using the system, proper identification must be made during the transmission. Facilities must be open to inspection by the FCC at any time during regular operating hours. These and many other rules can be found in the FCC Rules and Regulations Manual or can be explained by the manufacturer.<sup>34</sup>

#### Radio Equipment

Voice radio systems are currently allowed by the Federal Communications Commission (FCC) for commercial use in three bands--low (25-50  $\text{MHz}$ ), high (150-173  $\text{MHz}$ ), and UHF (450-470  $\text{MHz}$ ). In general, for similar powered equipment, as the megahertz rise, the range diminishes but the voice quality improves and less interference is received. Since only limited numbers of frequencies are available, selection becomes a problem. In large cities, it may be necessary to use UHF equipment (whose prices are slightly higher than the other two bands) to get a clear channel and avoid sharing with someone else. In smaller cities and rural areas it may be possible to obtain a low or high range frequency which is not in use. Ranges on this type of equipment usually run from 15-25 miles in radius from the antenna.

The mobile radio units will be the largest portion of the initial purchase expense. This piece of equipment goes into the vehicle, usually

mounted under or in back of the seat with the microphone within reach of the driver. Various modifications, such as a light weight head set, a telephone handset, or footswitch, are available to fit the needs of the operator.

Various ranges of power output and solid state arrangements are available.

The antenna is important to the performance of the system. The height of the antenna is significant and will be determined by the range desired, the power of the units used, and the topography of the area. The more centrally located the antenna relative to the transit service area, the smaller the antenna required. The antenna can often be located on an existing tower or tall building, thus cutting installation costs. In some cases, the most central location might be in a valley, and thus, a nearby hill would be superior. If the antenna is not at the control center site, it will be necessary to locate the base station at the antenna site and remotecontrol it to the dispatch control center via a leased phone line. Antennas are relatively inexpensive items, but mounting towers can become very expensive if great height is required.

The base station is the control point of the system. Small models may be of desk-top size, while large and more sophisticated ones may take up space similar to a filing cabinet in addition to a desk control panel. A desk or boom microphone can be used by the dispatcher. As noted before, the base station may be located at the antenna site with only a control panel at the operating location.<sup>35</sup>

The preceding three elements are essential to all systems. A basic rule in radio work is that the more simple the system is, the better it is. Increased complexity will increase initial cost, maintenance costs, and down time. However, additional items are available where needed, such as squelch

controls, which weed out others on the same frequency, and various means of selectivity whereby the dispatcher can call a particular bus or group of buses. These items will usually increase the price of each mobile unit 10-40 percent.

Most radio operations currently in use are covered by a maintenance contract with the manufacturers' authorized service agent. This way of operating is usually the cheapest and most effective. The contract will usually be set up so as to provide continuous coverage on the base station at the users' premises and pickup service on mobile units. The service agent will usually pick up nonworking units that have been pulled from buses, fix them in his own shop, and drop them off again. With proper maintenance, good line equipment can be expected to last ten years or more.<sup>36</sup>

### Travel Barriers

#### Introduction

When considering the development and implementation of a transit system, there should be a firm understanding of barriers which impede easy accessibility of the transit operation by its users. These travel barriers fall into two categories:

1. those barriers which are contiguous to those individuals which use the system, and
2. those barriers which are part of the system used by the individuals.

The first group is concerned with problems associated with: age, physical handicaps, low income, and psychological or emotional constraints. These have been discussed to some degree in earlier chapters of this report. In the second group fall the difficulties associated with the vehicle, terminal



facilities, the facilities for interchange between one mode and another, inadequate weather protection, transfer of needed information, and inadequate personal and support facilities.<sup>37</sup>

Table IV-3 summarizes travel barriers by the area of impact on the elderly and handicapped. As can be seen from this table, architectural barriers are not the only cause of special public transportation problems for the elderly and handicapped, "operational" problems are also present.

#### Physical and Psychological Constraints

In a study of the problems of the elderly and handicapped conducted by the Urban Mass Transportation Administration (UMTA), the following physical and psychological constraints were found to be of major concern.

##### Physical Limitations to the Use of Mass Transit by the Elderly:

- o Approximately one-third of the elderly have vision or movement problems which make riding the bus difficult for them.
- o It is difficult for more than one-third of the elderly to move quickly enough to get on and off buses without problems.
- o Over one-third of the elderly are unable to maintain balance if required to stand while riding.

##### Physical Limitations to the Use of Mass Transit by the Handicapped:

- o Sixty-two percent of the handicapped experience some form of functional difficulty related to riding the bus. Slightly more than one-half are unable to move quickly enough to get on and off the without experiencing problems.
- o Approximately one-half have difficulty carrying packages while riding the bus and therefore have difficulty using buses for shopping.

TABLE IV-3

MAJOR TRAVEL BARRIERS  
LISTED BY AREA OF IMPACT

Travel Barriers

Physical Barriers

VEHICLES

High step required to enter  
Difficult to get into or out of  
seats  
Seats not available/forced to  
stand  
Cannot see out for landmarks  
No place to put packages  
Cannot see or hear location  
information

TERMINALS

Long stairs  
Long walks  
Poor fare collection facilities  
Poor posting of information  
Insufficient seating  
Little interface with other  
modes

TRANSIT STOPS

Insufficient shelter  
Platform incompatible with  
vehicle  
Inadequate posting of  
information

Operational Barriers

VEHICLES

Frequency of service  
Driver assistance/attitude  
Acceleration/deceleration  
Information presentation  
Schedules maintenance  
Inadequate or inappropriate  
route  
Too many transfers

TERMINALS

Employee assistance/attitude  
poor  
Information clarity and  
dissemination  
Length of stops too short  
Crowd flow non-directed  
Little or no interface with  
other modes

TRANSIT STOPS

Poor location: for safety, for  
convenience  
Not enough stops  
Information displayed insuf-  
ficient or confusing

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Source: U.S. Department of Transportation, Urban Mass Transportation on  
Administration, Transportation System Center, The Handicapped and  
Elderly Market for Urban Mass Transit, October 1973, page 13.

#### Psychological Barriers to the Use of Mass Transit by the elderly:

- o Of the total elderly sample, more than one-fifth dislike functioning in crowded conditions.
- o Fear of being physically attacked while riding the bus was a concern of sixteen percent of the sample.

#### Psychological Barriers to the Use of Mass Transit by the Handicapped:

- o Fear of physical assault was the leading psychological barrier to mass transit usage for handicapped persons.
- o More than one-fourth of the handicapped find impatience of other riders and fear of embarrassment a concern.
- o One-fourth of the handicapped dislike having to function in crowds while using the bus.<sup>38</sup>

While these constraints are not all inclusive, they do give some indication of the problem areas which should be given considerable attention in order to reduce their impact on the mobility of the elderly and handicapped.

### Legal Concerns

#### Introduction

The following questions and answers relate to the implementation, operation, and administration of a small transit system composed of "mini-buses" operating over a one county area, as is typical of the DARTS system. Four issues of concern will be addressed. They are:

1. What statutes or regulations govern the actual operation of a system by a private nonprofit, a private profit, or a public nonprofit organization?

2. What are the legal ramifications in the procurement of insurance?
3. What are the employment requirements which must be met?
4. What are the qualifications that drivers must meet?

As a preface to addressing these four areas of concern, let it be understood that the answers presented here are the results of a survey, research, an analysis effort carried out by representatives of the Washburn University School of Law, Topeka, Kansas. Quoting from their report, "Suggestions as to answers and possible alternates are offered with the caveat that specific legal counsel must be obtained to determine specific resolution of a specific factual situation."<sup>39</sup>

#### First Issue

What statutes or regulations govern the actual operation of a system by a private nonprofit, a private profit, or a public nonprofit organization?

Under Article 1 of Chapter 66 in the Kansas Statutes Annotated (K.S.A.), the Kansas Corporation Commission (KCC) has full power and jurisdiction to supervise and control all common carriers doing business in the State of Kansas. The term "common carriers" as defined in K.S.A. 66-105 shall include ". . . all persons and associations of persons, whether incorporated or not, operating such agencies for public use in the conveyance of persons or property within the state."<sup>40</sup>

K.S.A. 66-104 provides that for up to a radius of three (3) miles outside a city's limits, power and authority to control and regulate all public utilities and common carriers situated and operated, wholly or principally within any city or principally operated for the benefit of such city

or its people, shall be vested exclusively in such city. The problem arises when the transit service extends itself beyond the three mile limit and charges a fare or receives a "contribution".

As stated, KCC has no control over public intracity transit services as long as they operate within the three (3) mile incorporated limits of a city. If the public motor carrier of passengers should operate outside that three (3) mile limit they fall within K.S.A. 66-1,115 which requires that the common carrier must obtain, from the KCC, a license or permit to operate.

As far as the KCC is concerned, there is no such thing as a "private motor carrier of passengers". To the KCC any person who holds himself out to the public as willing to undertake for hire to transport by motor vehicle, from place to place, persons who choose to employ him, is considered a "public motor carrier of passengers", regardless of whether it is a private nonprofit, private profit, or public organization. If they transport passengers for hire they are considered "public or contract motor carriers of passengers" and are, therefore, subject to KCC control under K.S.A. 66-1,111, 66-1,112, and 66-1,112a.

The key words here, which implicate whether a service is exempt from KCC control, are "for hire". Any carrier which charges any fare or takes any contribution for rides outside the three (3) mile limit is considered to be a carrier for profit and therefore subject to KCC control and franchising. The size of the fare is not relevant. Calling the fare a "contribution" apparently does not avoid the status of a carrier for hire. Simply stated, any common carrier operating outside its respective city limits and receiving money for the service being provided is considered by the KCC to be operating for profit.

Every "public motor carrier of passengers" must obtain, from the KCC, a certificate of convenience and necessity in order to serve the regulated area. The procedure for obtaining such certification is outlined in K.S.A. 66-1,114. The certificate entitles an operator to provide a regulated intrastate business in Kansas. To obtain such a certificate, public need must be shown in terms of inadequacy of existing service being provided by certified carriers already in the geographic area of concern. Quoting from K.S.A. 66-1,114:

"Except as hereinafter provided, it shall be unlawful for any public motor carrier to operate as a carrier of intrastate commerce within this state without first having obtained from the Corporation Commission a certificate of convenience and necessity. The Corporation Commission, upon the filing of application for such certificate, shall fix a time and place for hearing thereon, which shall not be less than twenty nor more than thirty days after such filing. The Corporation Commission shall cause a copy of such application and notice of hearing thereon to be served at least ten (10) days before the hearing upon an officer or owner of every common carrier that is operating or has applied for a certificate to operate in the territory proposed to be served by the applicant, and on the city clerk of every city into or through which said motor carrier may desire to operate; and any such common carrier or city is hereby declared to be an interested party to said proceedings and may offer testimony for or against the granting of such certificate, and any other interested person may offer testimony at such hearing.

If the commission finds from the evidence that the proposed service or any part thereof will promote the public convenience and necessity, the commission shall issue the certificate; otherwise such certificate shall be denied. Before granting a certificate to a public motor carrier, the commission shall take into consideration other existing transportation facilities in the territory for which a certificate is sought, and in case it appears from the evidence that the service furnished by existing transportation facilities is reasonably adequate, the commission shall not grant such certificate. . . .<sup>141</sup>

In addition to the above requirement, no certificate will be issued by the KCC until the applicant has filed with the commission a liability insurance policy with an insurance company authorized to transact business in the

state. The minimum limits of such a policy, as stated in K.S.A. 66-1,118, are five thousand dollars (\$5,000) for loss to property of others in any one accident, twenty-five thousand dollars (\$25,000) for personal injury or death to any one person in any one accident, and fifty thousand dollars (\$50,000) for injury or death to two or more persons in any one accident.

As can be seen, to be in compliance with the KCC, there is a multitude of statutes and regulations which must be dealt with. A thorough reading and understanding of Article 1 of Chapter 66 is strongly advised.

### Second Issue

What are the legal ramifications in the procurement of insurance?

As stated previously, the KCC regulated carriers are required to have at least a minimum amount of liability insurance. For those carriers not regulated by the KCC, there are still insurance requirements which must be met to obtain license tags, etc. When considering rural transit insurability, insurance companies have had little experience. Transit insurance is specialized with little past experience upon which to base rates. Local insurance companies may not wish to provide coverage for what they consider an unknown risk. In lieu of this, the initial policy obtained may be one of high rates prior to the establishment of a "experience of loss" base. With an "experience of loss" base created, near accident free records and rigid driver selection normally will reduce premium costs considerably. Operations choosing a system based on voluntary drivers will normally experience higher rates when compared with those operations which utilize trained drivers and require testing and physical examinations of their drivers.<sup>42</sup>

The major legal issue concerning insurance revolves around the Kansas

No-Fault insurance law, K.S.A. 1974 Supp. 40-3101 through 3121. Government agencies and political sub-divisions are exempt from the no-fault provisions per K.S.A. 1974 Supp. 40-3105. The legal question becomes "at what point does an organization become a political sub-division of the State?" Is a private nonprofit organization, which receives Federal or State grants or other funds from public agencies going to be considered such a sub-division and, therefore, be exempt from the no-fault law?

The answer to the above question appears to be "No". By examining the "sub-division" identification for federal tax exemption purposes as qualified by the IRS in Rev. Ru. 20-214, the ruling states that it must be established "that the organization is either (a) controlled, directly or indirectly, by an agency of a state or local government, or, (b) is performing a traditional governmental function on a nonprofit basis."<sup>43</sup> The organization in question received 90 percent of its funds from the federal government and the remaining 10 percent from local sources. The organization was operated by a board which was independent of city or state officials and was not performing a traditional purely governmental function.<sup>44</sup>

In that transportation is not considered purely a "traditional governmental function" and while the IRS ruling is not a Kansas no-fault ruling, the point is well taken that nonprofit organizations which receive public funds may not be considered political sub-divisions and, hence, will be subjected to the no-fault provisions.

K.S.A. 1974 Supp. 40-3117 states the "no-fault" requisite factors for tort liability and set the minimum medical value expended prior to being able to filing suit against the wrongdoer, for pain and suffering, at \$500. One can imagine the financial impact of dealing with 10 to 20 law suits all relating



to one bus accident, not only for passenger medical reimbursement but also the possibility of tort liability in each. Smaller operations with budget restraints should find the no-fault law compatible with their needs. While procurement of insurance may be costly initially, it is important for an organization to have adequate insurance, in terms commensurate with the scope of its activities and possible liabilities, both for its own protection and for the protection of its riders.

### Third Issue

What are the employment requirements which must be met?

If employees are paid wages, the organization must comply with state and federal tax withholding laws. The number of employees is irrelevant. If any will make over \$1700 in the calendar year, the withholding tax provisions apply. Provisions for the withholding of social security must also be complied with. Non-government operators may also be concerned with the unemployment tax and workman's compensation.

### Fourth Issue

What are the qualifications that drivers must meet?

The qualifications of drivers is set out in K.S.A. 8-238 which provides: "no person who is under the age of 21 shall drive... any motor vehicle when in use for the transportation of persons or property for compensation."<sup>45</sup> It appears that if the transit operation is receiving any sort of compensation, the drivers must be over 21 years of age and have a valid chauffeurs' license, regardless of whether the driver is a volunteer or a paid employee. Certain operations who utilize volunteer help should be aware of this provision. It

is advisable for all transit operations to maintain rigid driver qualification requirements to promote the maximum safety of passengers.

One must keep in mind that the four issues discussed here are but a few of the legal questions that could possibly arise when establishing a rural transit operation. As an example, one important issue not discussed here is that of public and private operators wanting to receive a "public franchise right" from a local city to conduct a transit operation. A local attorney in the city should be available to advise the operator on this and other legal issues. In a transit operation such as DARTS, as well as in any other business, good legal counsel is a must and should be sought out.

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43. Ibid., p. 6.
44. Ibid., p. 6.
45. Kansas Statutes Annotated, Vol. No. 1, ed. Franklin Corrick (Topeka, Kansas: State Printer, 1964), p. 212.

## CHAPTER V

### FUNDING

#### Introduction

Although all of the steps in setting up and operating a rural transit system outline so far are important, there are two very basic steps that will essentially determine the viability of the operation: The first step is planning, already discussed, which determines whether a system is needed or not. The second step is financing, which determines whether a system can be set up and operated over time. It takes money to operate a system, therefore, financing must be of a primary concern from the beginning.

There is no evidence to suggest that an adequate rural transportation system can support itself solely through the farebox. If it could, it is reasonable to assume that the private market would already be supplying such service in rural areas. As was discussed elsewhere in this report, there are sizeable areas of Kansas which have little or no local public transportation service. This would indicate that, generally speaking, private profit oriented carriers do not feel that such operations would be financially self-supporting.

In an analysis of various rural transportation demonstration projects by the U.S. Department of Transportation, the following list of sources of

funding for small scale operations was compiled:

- grants from local AoA and OEO agencies, as well as from other agencies,
- cooperative membership fees,
- contract and charter services for social agencies and other groups,
- fares and contributions in lieu of fares,
- contributed services (especially, volunteer driver),
- funds, services, and equipment from local service and religious groups, and in some instances,
- operating subsidies from a State or local government.<sup>1</sup>

Even with these funding sources, few of the projects analyzed in this federal report had proved to be successful over a period time. Therefore, this chapter will focus on some current and potential sources of funding which could be used to supplement those sources listed above.

### Federal Funding Sources

#### Introduction

There are a variety of federal sources through which funds may be obtained for the development and implementation of a transportation system in a rural area. However, in utilizing these sources it must be kept in mind that most of the federal government programs which fund transit are of short term duration in two respects. First, the grants are usually made on a yearly basis. Therefore, a new grant proposal must be submitted each year. A previous grant does not automatically imply that future grants

will be awarded. Secondly, most federal programs are often set up for only a two to five year period. Unless they are extended or replaced by Congress, they terminate abruptly. These interrelated factors have lead to the downfall of many transportation systems. It is therefore readily apparent that much thought must be given to the use of federal funding sources and their interrelationship with future projections of financial needs to insure the continued implementation of the transportation system.

There are eight Federal departments or agencies which provide funds for transportation and related services. These sources are summarized in Table V-1. Brief explanations of the most important federal programs are given below.

Department of Health, Education & Welfare (H.E.W.)

1. Older American Act of 1965, as amended, administered through the Administration on Aging (AoA), has as its purpose-

"...to encourage and assist state and local agencies to...foster the development of comprehensive and coordinated service systems to serve older persons...in order to secure and maintain maximum independence and dignity in a home environment for older persons capable of self-care; and remove individual and social barriers to economic and personal independence for older persons."

Titles III and VII of this Act are the primary authorizations for funds. Under Title III, grants are available for "transportation services where necessary to facilitate access to social service" (Section 302) and for model projects that provide transportation for physically and mentally impaired older persons (Section 308). Title VII, the Nutrition Program for the Elderly, provides money for transportation to meet the basic objectives of the nutrition projects.

Title IV, Section 412 of the Older Americans Comprehensive Services



TABLE V-1

MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

Department Statute Title & Section	Description	Provides Transport For	User Eligibility Restrictions		Area Coverage	Capital Purchase
			Age	Income Work Status <sup>2</sup> Educ./ Other		
A. DEPARTMENT OF HEALTH, EDUCATION & WELFARE						
1. Older Americans Act of 1965 as Amended Title III, All Sections except 308	State & Community Programs on Aging	Broad Soc. Services Model	None	Priority:DOC	Planning & Service Areas	Prohibited
Title III, Section 308	Model Projects	Projects	None	None	Varies <sup>3</sup>	Prohibited
Title IV, Section 412	Transportation Study & Demon- stration Projects	Demonstra- tions & Studies	None	None	Rural Emphasis <sup>5</sup>	Possible <sup>6</sup>
Title VII	Elderly Nutrition	Nutrition Sites	60+ <sup>1</sup>	One criterion DOC <sup>4</sup>	Urban <sup>7</sup> Rural	Possible
Title IX	Elderly Community Services	Project Activities	55+	OMB/Unemployed	Community	Possible
2. Public Health Service Act of 1944 as Amended Title III, Section 314(d)	Comprehensive Health Services Community Health Centers	Broad Health Services Health Sites	None	None	Community	Allowable with
Title III, Section 314(e)			None	None <sup>8</sup>	Community <sup>8</sup>	
Title XII	Emergency Medical Services	Emergencies	None	Critical Condition	Established Service Area	Approval

TABLE V-1 (Continued)  
MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

Department Statute Title & Section	Description	Provides Transport For	User Eligibility Restrictions		Area Coverage	Capital Purchase
			Age	Income Work Status <sup>2</sup>		
3. <u>Social Security Act of 1935 as Amended</u> Title VI	Services for aged blind and disabled	Approved <sup>9</sup> Services	at least 60+	SSI Recipient or Applicant <sup>15</sup>	State	Prohibited
Title XIX	Medicaid	Medical		SSI eligibility criteria or more restric- tive criteria at State op- tion <sup>14</sup>	State	Prohibited
4. <u>Mental Retardation Facilities &amp; Commu- nity Mental Health Center Construction</u> Act of 1963 as Amended - Title II	Mental Health Centers	Mental Health Services	None	None	Areas of 75,000 - 200,000	Allowable
5. <u>Vocational Rehabilitation Act of 1973</u>	Vocational Rehabilitation	Any voca- tion rehab. services (incl. med)	None	Unemployed handicapped who is employable	State	Allowable
6. <u>Higher Education Act of 1965 as Amended</u> Title I, Sections 101-102	Community Services	Continuing Education	Adult	Some College Education	Within reach of College	Prohibited
7. <u>Library Services and Construction Act</u> of 1965 as Amended Title I	Library Services	Library Services	None	Priority: handicapped disadvan- taged	Priority: poverty areas	Possible
8. <u>Appalachian Regional Development Act</u> of 1965 as Amended Title II, Section 202	Health Demonstra- tions	Comprehen- sive Health Services	None	None	Counties of 13 States in	Allowable
Title III, Section 302(a)	Research, Demo's	Demo. only	None	None	Appalachia	Allowable

TABLE V-1 (Continued)

MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

Department Statute Title & Section	Description	Provides Transport For	User Eligibility Restrictions		Area Coverage	Capital Purchase
			Age	Income Work Status <sup>2</sup> Educ./ Other		
B. DEPARTMENT OF TRANSPORTATION*						
1. <u>Urban Mass Transportation Act of 1964 as Amended Section 3</u>	Capital Grants				Urban 16	Allowable
Section 6	Research & Demo's				Urban 16	Allowable
Section 9	Technical Studies				Urban	Allowable
Section 16(b) (2)	Grants to private non-profit bodies	Elderly & Handicap			Urban 16	Allowable
2. <u>Federal-Aid Highway Act of 1973 Section 147</u>	Rural Highway Demonstrations				Rural	Allowable except rail
* National Mass Transportation Assistance Act of 1974						
C. DEPARTMENT OF AGRICULTURE						
1. <u>Consolidated Farm and Rural Develop- ment Act of 1972 Title III, Section 360(a)</u>	Loans for essen- tial community Facilities				Rural up to 10,000	Allowable

TABLE V-1 (Continued)  
MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

Department Statute Title & Section	Description	Provides Transport For	User Eligibility Restrictions		Area Coverage	Capital Purchase
			Age	Income Work Status <sup>2</sup> Educ./ Other		
<b>D. DEPARTMENT OF LABOR</b>						
1. <u>Comprehensive Employment and Training Act of 1973: Title III</u>	National Older Workers Program	Work Duties	55+	OEO/"Chron- ically unemployed"	Varies: pri- marily city or county wide	Prohibited
<b>E. 1. <u>Economic Opportunity Act of 1964 as Amended Title II, Sections 212 and 221</u></b>	Community Action Programs (CAP)	Broad Social Services	None	OEO, but broad	urban or rural	Allowable with approval <sup>11</sup>
Title II, Section 222(a)(5)	Emergency Food & Medical Services	Broad nutri- tion & med- ical ser- vices	None	Suffering from hunger	Most are run by CAPs	Allowable <sup>12</sup>
Title II, Section 222(a)(7)	Senior Opportum- ities & services	Broad Soci- al services	61+ <sup>13</sup>	OEO, but flexible	urban or rural	Possible; use 221 monies
Title II, Section 232(a) & (e)	Research & Pilot Programs	Special needs	61+	OEO	Rural focus	Allowable with approval
<b>F. <u>VETERANS ADMINISTRATION</u></b>						
1. <u>Veteran Health Care and Expansion Act of 1973: Title I, Section 101(b)</u>	Expanded Medical Care	VA medical facilities	None	Veteran	Nearest appropriate medical facility	Leased vehicles allowed

TABLE V-1 (Continued)  
MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

Department Statute Title & Section	Description	Provides Transport For	User Eligibility Restrictions		Area Coverage	Capital Purchase
			Age	Income Work Status <sup>2</sup>		
G. ACTION						
1. <u>Domestic Volunteer Service Act of 1973</u> Title II, Section 201	Retired Senior Volunteer Program	Volunteer Stations	60+	Retired Able to work	Community	Allowable with prior
Title II, Section 211(a)	Foster grand- parents programs	Program duties	60+	OEO/retired Able to help children	One or more communities	approval
H. REVENUE SHARING						
1. <u>State and Local Fiscal Assistance Act</u> of 1972	Revenue Sharing	Funds can be used for any <sup>14</sup> purpose			States & local juris- dictions	Allowable

Source: U.S. Department of Health, Education, and Welfare, Transportation for the Elderly: The State of the Art (Washington: U.S. Government Printing Office, January, 1975), pp. 114-118.

TABLE V-1 (Continued)

MAJOR FEDERAL FUNDING SOURCES PROVIDING TRANSPORTATION  
AS OF OCTOBER 1974

- 
1. Plus spouse of any age.
  2. The following symbols are used:
    - "DOC" - Department of Commerce poverty guidelines, based on Census Bureau Statistics
    - "OMB" - Office of Management and Budget poverty guidelines
    - "OEO" - Office of Economic Opportunity poverty guidelines
    - "SSI" - Supplemental Security Income levels
  3. May be statewide or community-wide. Regulations specify that project area must have "large number" of elderly.
  4. Regulations allow the elderly to qualify on any or all of four grounds:
    - (1) cannot afford to eat "adequately"
    - (2) lacks skills to prepare well-balanced meals
    - (3) has "limited mobility"
    - (4) feels lonely and rejected
  5. At least 50% of projects must be in States predominantly rural.
  6. AoA policy is to encourage capital purchase for demonstrations through joint DOT participation.
  7. Both must have high proportion of elderly poor.
  8. Since these projects originated in the Office of Economic Opportunity, most are located in areas of low-income population.
  9. State services vary, and transportation is optional.
  10. Emphasis on urban and suburban areas.
  11. Survey of existing resources must first be taken. Equipment costing \$500 or more must have regional approval.
  12. But only if vehicles extend the coverage of existing service programs. Emphasis is on better use of existing vehicles.
  13. For general services. For employment and volunteer services, the age requirement drops to 55+.
  14. Categorically needy; no upper income limit when deducting incurred medical expenses (medically needy).
  15. Includes potentials, and formers at State option, and those having State supplemental payments. Aged potential recipients are eligible at age 60 or older.
  16. Flexibly interpreted on a project basis but when below 2500, not generally considered.

Amendments of 1973 directs the Commissioner on Aging to "conduct a comprehensive study and survey of the transportation problems of older Americans, with emphasis on solutions that are practicable and can be implemented in a timely fashion..(and to) conduct research and demonstration projects, either directly or by grants or contracts with public or private nonprofit agencies and organizations," for the purpose of:

"developing solutions to the economic and service problems involved in furnishing adequate transportation to older persons,

"experimenting with new methods of providing transportation, such as demand-actuated services or direct payment to individuals to enable them to buy the transportation services they need,

"developing means of improving coordination between transportation systems and social service delivery systems, and,

"developing innovative solutions for other special transportation problems confronting older Americans."

Older American Act funds are usually granted to private or public non-profit agencies or organizations through the Area Agencies on Aging (AAA)/ State Services for the Aging Section, SRS. They are on a seventy-five (75) percent federal, twenty-five (25) percent local matching ratio.

2. Social Security Act of 1935, as amended, administered by the Social Security Administration, under Titles I, IV A, VI, X, XIV, which covers Purchase of Service agreements, funds are available to nonprofit state and local organizations serving low-income populations to insure transportation to "eligible" individuals of social service programs under this Act. Titles IV-A and XVI are the main sources of funds and are available on a matching basis of seventy-five (75) percent federal and twenty-five (25) percent state or local funds. The money cannot be used as grant funds to develop or subsidize a transportation system.

Funds are also available, on a formula basis, for transportation

to health facilities for those who are recipients of the Medicaid Program (Title XIX). Under this formula, the federal share of funds distributed to the states may range from fifty (50) to eighty-three (83) percent. These funds, also, cannot be used for project grants. As with Title IV A and XVI, they can only be used to reimburse recipients for actual travel expenses.

Title XX of the Social Security Act is another funding source. Through these funds, there will be made available \$1.2 million in Kansas for the purchase of transportation related services. The utilization of these funds has not been finalized at this time. It appears that a number of State and local public and private agencies will be able to obtain these funds from SRS District Offices to provide a variety of services of which purchase of transportation will be one. These funds can be used to purchase transportation for any qualified client directly from a vendor.

#### Department of Transportation

1. Urban Mass Transportation Act of 1964, as amended, administered by the Urban Mass Transportation Administration (UMTA), has two sections that are directed specifically toward rural areas. The first is Section 4(c) which states:

"Of the total amount available to finance activities under this Act (other than under Section 5) on and after the date of the enactment of the National Mass Transportation Assistance Act of 1974, not to exceed \$500,000,000 shall be available exclusively for assistance in areas other than urbanized areas..."

Urbanized areas, as defined by the U.S. Census Bureau, are essentially incorporated areas of 50,000 population or more. There is a possibility



that fifty (50) percent, or \$250,000,000, will be made available to provide for operating expenses, but as Section 4(c) presently reads all \$500,000,000 must be used for capital expenditures.

The second is Section 16(a) and (b) which states that:

"it is hereby declared to be the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services... that all Federal programs offering assistance in the field of mass transportation (including the programs under the Act) should contain provisions implementing this policy...The Secretary of Transportation...(is authorized) to make grants or loans for the specific purpose of assisting states and local public bodies and agencies thereof in providing mass transportation services which are planned, designed, and carried out so as to meet the special needs of elderly and handicapped persons."

On a nationwide basis, appropriations of over \$21,000,000 were approved in fiscal year 1975. Kansas received over \$435,000. These funds were made available only to private non-profit organizations located primarily in communities of 5,000 population. Nationwide allocations of a similar amount are expected to be made in the next fiscal year.

For both programs, the Federal share of the funding is eighty (80) percent. These funds are for capital improvement costs and can be used to acquire vehicles, build fixed facilities, make improvements to existing facilities and equipment, and buy new equipment. These programs are administered at the State level by the Kansas Department of Transportation.

2. Federal-Aid Highway Act of 1973, as amended, administered by the Federal Highway Administration (FHWA), provides for Rural Public Transportation Demonstration Programs. Prior to the Federal-Aid Highway Act of 1973, federal concern for public transportation was limited mostly to urban areas. Through Section 147, this Act specifically recognizes rural transportation as an area worthy of consideration and research,

The initial authorization of expenditures under this Act was for \$30,000,000 for the two fiscal year period ending June 30, 1976. However, the signing of the Federal Aid Highway Amendments of 1974, Section 147 now states:

"...for transportation of passengers within rural areas and small urban areas...to enhance access of rural populations to employment, health care, retail centers, education and public services, there are authorized to be appropriated \$15,000,000 for the fiscal year ending June 30, 1975, and \$60,000,000 for the fiscal year ending June 30, 1976, of which \$50,000,000 shall be out of the Highway Trust Fund, to the Secretary of Transportation to carry out demonstration projects for public mass transportation on highways in rural areas and small urban areas."

These funds may be used to provide for capital improvements and for some operating expenditures. This is basically a 100 percent grant program, with no specific allocation of funds to individual states. Information about the status of Section 147 can be obtained from the Kansas Department of Transportation.

#### Department of Agriculture

1. Consolidated Farm and Rural Development Act of 1972, administered by the Department of Agriculture, provides for three possible sources of funds for public transportation under Title I of this Act. These possible sources are:

- 1) Section 104 - community facilities loans at five (5) percent interest and forty (40) years to areas with towns of 10,000 population or less,
- 2) Section 118(a) - business loans to facilitate development of private business enterprises in rural areas, and,
- 3) Section 121 - business enterprise grants for improving, developing, or financing business and employment as well as improving the economic and environmental climate in

rural areas.

The Act authorizes the Secretary of Agriculture to coordinate and utilize the programs, personnel, and facilities of all other Federal departments and agencies in the furtherance of rural development goals. The basic key to loan or grant eligibility is that the transportation projects must be tied to the development of private business in the rural sector.

#### Office of Economic Opportunity (OEO)

Economic Opportunity Act of 1964, as amended, has, in the past, been one of the largest sources of funds for rural transportation. Several Community Action Agencies in Kansas have included transportation as part of their general budgets under Sections 212, 221, 111 (a)(7), 232(a) and 232(e) of Title II. Generally speaking, this aid is used on transportation projects which assist low income and/or elderly persons of families. Information concerning this Act can be obtained from the State Office of Economic Opportunity or from any local Community Action Program Agency.

#### Revenue Sharing

State and Local Fiscal Assistance Act of 1972, commonly called revenue sharing, has under Title I provided for \$30.2 billion of federal aid to be formula shared between 38,000 units of state and local governments over a five-year period. Kansas' share for fiscal year 1975 is about \$60 million. The use of these funds is left to the discretion of the state and/or local government. One of the authorized categories of use is for capital, maintenance, and operating expenditures for public transportation. Unless Congress renews the Act before the program expires,

the five year revenue sharing Act will end December 31, 1976.

### State And Local Funding Sources

Many of the Federal funding sources listed in Table V-1 are distributed through the states and their associated local agencies. In addition to these federal sources, there are a variety of additional funding possibilities at the state and local level. Table V-2 lists some of the major financing devices being used by a number of states and gives a brief description of the tax. For Kansas to utilize any one of these devices, at this time, would involve legislative effort.

Other potential areas in which the state might be able to help finance transportation programs are:

- 1) Purchase vehicles, and possibly other equipment, through the State. Because of a large number of vehicles purchased at one time, a fleet price can be gotten which results in a cheaper price.
- 2) Insurance can be a substantial expense. If the State had the vehicles registered in its name, or on a dual title, insurance may be cheap.
- 3) The State could provide needed technical assistance, planning expertise and other non-gratuitous services.
- 4) The State could promote the policy of exempting transit operations from certain taxes.
- 5) The State could promote the development of a central coordinating agency to efficiently coordinate, allocate and distribute funds so as to provide a more comprehensive type of transportation.

TABLE V-2

ILLUSTRATED MAJOR STATE FUNDING SOURCES  
AS OF OCTOBER 1974

<u>Type of Funding</u>	<u>State Providing Funding Source</u>	<u>Description</u>
1. Direct Budget Allocation	All States	Funds for social service as part of general funding - state and local levels.
2. Special Funds	Illinois	In 1972 state authorized grants for mass transit facilities. One of three designated purposes: to aid movement of persons unable to drive.
3. Bond Issues	Massachusetts	State pays 90% of yearly debt service on bonds authorized to finance mass transit equipment.
4. Special Taxation	Michigan	In 1972 state made available part of a motor fuel increase for public transit as advances or loans for a period of 2-1/2 years. (Referendum will decide further use of the funds.)
	Massachusetts	4¢ of tax on cigarettes pays for extra-revenue expenses of the Massachusetts Bay Transportation Authority, and other authorities.
5. Sales Tax	Florida	2¢ of the 8¢ state gasoline tax may go for the establishment and operation of a transportation system.
	California	In 1972, gasoline added to sales tax base. 0.25% of sales tax revenues (est. at \$142-150 million annually) are set aside in a Local Transportation Fund. Monies can be used for development and operation of a public transportation system, but amounts for operating expenses are limited.
6. Utility Taxes	N.A.	
7. Tax Relief	16 States	Motor fuel exemptions or refunds
	27 States	Property, Income and/or Bond Exemptions.
8. Lottery	Pennsylvania New Jersey	Free statewide transit provided elderly under statutory guidelines to aid elderly and individuals. 25% of net revenue goes to program to aid the elderly.

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Source: U.S. DHEW, Transportation for the Elderly: The State of the Art  
(Washington: U.S. Government Printing Office, January, 1975), p. 127.

Table V-3 indicates examples of local and private funding sources authorized for use in the States listed. These local level funding sources have great potential, but few have been made use of as yet, particularly in Kansas. With the exception of a small amount of revenue sharing money and of the fourteen counties which have made use of the property tax to get special mill levies, providing for elderly services, of which transportation is one (see Figure V-1), the most common local sources available for utilization in Kansas are funds from local agencies and donations or contributions from the local businesses and the private sector. Along this line, important private and volunteer support can be obtained from groups such as Muscular Dystrophy, the American Red Cross, the Cerebral Palsy, the American Cancer Society, the Easter Seal Society, as well as local community and religious groups. A coordination of these groups' efforts can provide substantial levels of service to the transportation disadvantaged, i.e., the young, the elderly, the poor, and the handicapped.<sup>2</sup>

#### Future Funding Prospects

The review of Federal, State, local and private sources described above suggests that there are a great number of available sources of funds which can be utilized to provide public transportation services. Considering the many Federal sources available, there exists too many problems which restrict those who attempt to take advantage of them. There are often age, income, health, or geographic restrictions which create barriers if the funds are to be viewed as potential sources for rural

TABLE V-3

EXAMPLES OF LOCAL AND PRIVATE FUNDING SOURCES  
AS OF OCTOBER 1974  
(Tax Sources Expressly Authorized for Transit Support)

<u>Type of Tax</u>	<u>States Authorizing the Tax</u>
1. Property Tax (Including special mil tax levy for elderly services)*	Arizona, Colorado, Illinois, Indiana, Iowa, Kansas, Massachuset Michigan, Nebraska, North Dakota, Ohio, Oregon, Utah, Washington
2. Motor Vehicle Tax	California, Hawaii, Washington
3. Tax on Gross Receipts of Parking Lots	California
4. Gasoline Sales Tax	California, Hawaii, Illinois
5. Transaction (Sales) and Use Tax	California, Washington, Oregon
6. Highway Fund Allocation	Indiana
7. Cigarette Tax Fund	Indiana
8. Ad valorem Tax	Oregon
9. Business License Tax	Oregon, Washington
10. New Income Tax	Oregon
11. Public Utilities Tax	Washington
12. Payroll or Wage Tax	Oregon, Pennsylvania
13. Special Transit District	California, Florida (Pinellas County)
14. Income Tax, Deductible Contribution	Pennsylvania

\*See Figure IV-1 for copy of special mil levy legislation

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Source: U.S. DHEW, Transportation for the Elderly: The State of the Art  
(Washington: U.S. Government Printing Office, January, 1975), p. 128.

## FIGURE V-1

## SPECIAL MILL LEVY LEGISLATION

An Act concerning service programs for the elderly in cities and counties; authorizing tax levies under certain circumstances.

Be it enacted by the Legislature of the State of Kansas:

Section 1. Whenever a petition containing the signatures of not less than five percent (5%) of the registered voters of any city or county is filed with the appropriate election officer requesting an election on the question of whether a specified tax levy of not more than one (1) mill shall be made on all of the taxable tangible property in the city or county for the purpose of creating or continuing a service program for the elderly operated by municipalities as defined in K.S.A. 10-101 or non-profit organizations, such proposition shall be submitted to the voters of the city or county at a question submitted election held in accordance with the provisions of K.S.A. 10-120. The proposition submitted shall be in the following form: "Shall an annual tax of \_\_\_\_\_ mill be levied in \_\_\_\_\_ (city or county) to fund a service program for the elderly." If a majority of the qualified electors voting on the position vote "yes" such tax levy shall be made annually on all of the taxable tangible property within the city or county approving the proposition. No city which has approved a service program for the elderly at an election held pursuant to the authority granted herein shall be included in a county service program for the elderly so long as such city service program is in operation.

Sec. 2. This act shall take effect and be in force from and after its publication in the statute book.

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SOURCE: House Bill No. 1873, State of Kansas, 1974.



public transportation. They are barriers, for they prevent the coordination of transportation resources, which if pooled, could provide a better more efficient approach to public transportation service in rural as well as urban areas.

Because of these restrictions imposed by the Federal agencies who are providing these funding programs, and the very nature of the funding mechanism, there is much concern expressed over the assurance of the continuation of existing programs, as well as new programs, that are forced to operate from year-to-year not knowing whether they will be able to continue service in the future or not. It is essential to design a broadly based Federal funding program which will promote and develop rural public transportation.

At the State and local level the prospects for future funding for transportation programs are going to depend upon the willingness of the State and local communities to commit resources to this activity. As was seen in Tables V-2 and V-3, the major limits to State and local support can be overcome by the ingenuity of State and local governments in identifying potential revenue sources and utilizing them effectively. Given the wide range of possible tax sources, it is not the lack of ingenuity that prevents the creation of a solid financial base, but the lack of commitment to earmark these resources to provide public transportation that is at the crux of the problem.

Notes

1. U.S. Department of Transportation, Rural Transit Operations and Management (Washington: 1973), pp. 33-97.
2. U.S. Department of Health, Education, and Welfare, Transportation for the Elderly: The State of the Art (Washington: U.S. Government Printing Office, DHEW Publication No. (OHD) 75-20081, January, 1975), pp. 125-130.

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

In the previous chapters of this report information has been presented which has dealt with the transportation needs of rural Kansas -- the existing conditions, the demand for transportation services, the planning, development, and implementation methodology, and the potential funding sources by which a recommended system can be realized to address the mobility needs of rural Kansans. Through the research and analysis of the data from which these chapters were formulated, a number of conclusions and recommendations have evolved.

#### Conclusions

Through the analysis of transportation in rural Kansas, the following conclusions have been reached:

1. There is a lack of adequate transportation in many parts of rural Kansas and a lack of information about existing transportation services.
2. There is a major problem of getting persons from outlying areas to service centers. Transportation between towns is available to some degree, but this service is more interregionally oriented rather than intercounty oriented. The frequency of service is low, making intracounty and intercounty

service on a day-to-day basis, for all practical purposes, non-existent.

3. It has been shown that in many parts of rural Kansas, "transportation service areas" can be developed which are indigenous to county boundaries. Therefore, the foundation for the establishment of a rural public transportation system can be structured on a county-by-county basis.

4. There is a need for a coordinated statewide rural transportation system which will provide appropriate levels of service to address the real and potential demands for transportation in rural Kansas.

5. There are certain statutes in Kansas law relating to the regulatory control of the Kansas Corporation Commission with regard to distinctions between types of transportation carriers and the services they provide. Legislative changes are mandated which would provide transit operations with the ability to coordinate services and to provide new and innovative programs.

6. There are numerous restrictions placed on potential funding sources which dictate how these monies can be used to promote and develop transportation services. Because of these restrictions there has developed considerable duplication of services and, consequently, inefficient utilization of funding resources. Many of the restrictions are inherent to Federal programs.

7. There is a need for greater coordination and programmatic direction between those state agencies that currently have rural transportation programs. Coordination of these programs could lead to substantial cost saving as well as increased efficiency of each individual service providing program.

8. It would be possible to significantly reduce the transportation problems present in rural Kansas if the responsibility and leadership could be generated with the state government to coordinate these services.

9. There is a need for the state to provide a portion of the necessary operating subsidies to county and local entities so that a more stable

funding base can be achieved.

10. There would be numerous benefits derived from having adequate transportation services available to the rural residents of Kansas. A few of these benefits would be:

- Increased accessibility to social services, such as health care, welfare services, and other social service programs.
- The intangible benefits of a decrease in isolation -- an increased sense of independence, social awareness, and security, etc.
- A saving in transportation expense to users by providing a viable response to the energy crisis.

#### Recommendations

In an effort to realize the creation of a statewide rural public transportation system, of which the local component, i.e., the county-wide DARTS, is an integral part, the following recommendations have been formulated.

1. The state of Kansas should take on the responsibility of addressing the transportation needs of its rural residents.

2. There should be established a proven organizational hierarchy for the continued planning, coordination, and implementation of a rural public transportation system as follows:

At the state level: The Kansas Department of Transportation (KDOT) should be established as the lead agency for the state in providing transportation coordination, and should receive advisory assistance from a state interagency Task Force.

At the regional level: Under the guidance of the KDOT, operationally

oriented Regional Transportation Authorities (RTAs) should be established. Regional Transportation Advisory Councils (TACs) should be created to assist the RTAs.

At the local level: Under the coordinating guidance of the regional transportation authorities, local system operators, with assistance from possible local TACs, will provide effective, efficient transportation services to all Kansans by utilizing the recommended system guidelines put forth in this report.

3. With the aforementioned organizational hierarchy established, there should be developed a transportation system initiated on a demand-responsive, service-by-sector basis patterned after the recommended system suggested in this report. This service should be coordinated with other existing and potential services -- local, regional, and interstate -- to form a multi-modal, integrated transportation network, with local systems interfacing with regional systems and regional systems interfacing with interstate carriers.

4. The state should give strong consideration to developing a means of providing a state subsidy to assist local systems in meeting their operational expenses. These monies could be distributed through the Regional Transportation Authorities and would ensure continued, reliable service.

5. There should be developed a coordination of financial resources which provide transportation services. The state should establish an agency that would compile all of the resources for transportation. This agency would work with resource providing agencies to direct their funding to the Regional Transportation Authority in the providing agency's geographic area. This would enable the RTA (the regional coordinating body) to make available to the people the transportation services that meet their social, economic, and personal needs. The continued uncoordinated, inefficient use of funding

will continue to duplicate and fragment the transportation services that are offered.

6. Appropriate alterations should be made in Kansas law, with regard to the KCC, in an effort to allow greater coordination and interaction between public carriers and private operators. There should be special emphasis placed on the elderly and handicapped transportation services provided.

## APPENDIX A

### SAMPLE RADIO SPECIFICATIONS

161

#### INSTRUCTIONS

#### High Band Mobile Radio Units

1. Applicant must fill in transmit and receive frequencies.
2. Applicant must answer yes or no on every option.
3. Options must be approved by Radio Technical Subcommittee. Applicant must show that he has need for any option asked for.
4. Applicant must insert in the specification the power output most suited to his needs. 25-35 watt power is recommended for small cities simplex type systems, and all size cities for mobile relay type systems. 50-65 watt power is recommended for medium size cities for simplex type operation. 90-110 watt power is recommended for county-wide systems. (A simplex system is one in which the radio uses the same frequency for transmit and for receive).

For 25-35 watt radio, insert 25-35 in blank space in no. 1 under "General," and 25 in blank space in no. 3 under "TRANSMITTER."

For 50-65 watt radio, insert 50-65 in blank space in no. 1 under "General," and 50 in blank space in no. 3 under "TRANSMITTER."

For 90-110 watt radio, insert 90-110 in blank space in no. 1 under "General," and 90 in blank space in no. 3 under "TRANSMITTER."

5. Any frequencies for which the applicant is not licensed must be coordinated with the Frequency Advisory Chairman of Kansas Chapter of APCO.

Source: Leonard V. Montgomery, Radio Specifications, prepared for the Governor's Committee on Criminal Administration (Topeka, Kansas: March, 1975), pp. 30-43.



## High Band Mobile 2-Way Radio

## General

1. \_\_\_\_\_ watt mobile radio transmitter and receiver unit.  
Single frequency transmit and single frequency receive unless otherwise specified under options.
2. Signal frequency:
 

transmit _____	mHz	receive _____	mHz
transmit _____	mHz	receive _____	mHz
transmit _____	mHz	receive _____	mHz
transmit _____	mHz	receive _____	mHz
3. Frequency stability: .0005% or better from minus 30-degrees to plus 60-degrees C.
4. Shall be designed for 30 KHz separation (split channel operation).
5. Provide all accessories for trunk mounting in passenger automobiles.
6. All new systems or equipment purchased as a part of programmed system replacement must include C.T.C.S.S.

TRANSMITTER

1. Modulation set for plus/minus 5 KHz.
2. Palm type microphone, either reluctance or dynamic, shall be supplied with plug attached to coiled cord.
3. RF Power output: minimum \_\_\_\_\_ watts with normal loading.
4. Spurious and harmonic radiation at least 60 db below rated power output.

RECEIVER

1. Minimum sensitivity shall be 0.5 microvolt for 20 db quieting.
2. Minimum selectivity shall be 90 db down at plus/minus 30 KHz (EIA 2-sig. method).
3. Minimum spurious and image rejection: 90 db down.
4. Intermodulation: 80 db down (EIA method).
5. Modulation acceptance: plus/minus 6 KHz.

6. Audio output: at least 5 watts with not over 10% distortion. 163

7. Control head shall be equipped with a device to adjust pilot light brilliance or with light emitting diode.

### OPTIONS

Check yes or no on each option.

A. Radio shall have 4-channel capability with following frequencies:

F1	transmit	_____	receive	_____
F2	transmit	_____	receive	_____
F3	transmit	_____	receive	_____
F4	transmit	_____	receive	_____

There shall be no degradation of performance up to a maximum frequency spread of 0.4%.

B. Radio shall be equipped with C.T.C.S.S. ☐ Yes ☐ No

C. Radio shall be supplied with a 3 db gain antenna in lieu of standard antenna. ☐ Yes ☐ No

D. Wide space transmit. ☐ Yes ☐ No

E. Wide space receive. ☐ Yes ☐ No

## INSTRUCTIONS

## High Band Base Stations

1. Applicant must fill in transmit and receive frequencies.
2. Applicant must check yes or no on every option.
3. Options must be approved by Radio Technical Subcommittee. Applicant must show that he has need for any option asked for.
4. Subgrantee will be provided with specifications suited to his needs.  
  
25-watt power desk top cabinet is recommended for small cities base station and for control stations in mobile relay systems.  
  
50-watt power is recommended for medium size cities.  
  
90-watt power is recommended for large cities and for county-wide systems.
5. Any frequencies for which the applicant is not licensed must be coordinated with the Frequency Advisory Chairman of Kansas Chapter of APCO.
6. All new systems or equipment purchased as a part of programmed system replacement must include C.T.C.S.S.

Base Station Type

1. Shall mount in desk top cabinet.
2. Channel spacing: 30 KHz.
3. Selectivity: 85 db @ plus/minus 30 KHz (EIA-SINAD)
4. Sensitivity: 0.5 microvolt for 20 db quieting.
5. Local speaker output: 2 watts at less than 5% distortion.
6. Frequency stability: .0005% or better.
7. Intermodulation: 80 db.
8. Spurious and image rejection: 100 db.
9. Frequency: \_\_\_\_\_
10. Receiver shall be single frequency Base Station type.

## 25-watt desk top Base Station (Local Control)

1. Shall be housed in desk top cabinet.

2. Signal frequency:

transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz

3. First receiver to be mounted in desk top cabinet. Second and third receivers to be in desk top cabinets or in separate cabinets suitable for them. All receivers shall be single frequency Base Station type.

4. Operate from 120-volt AC power source.

5. Transmitter to be local controlled.

6. Desk type microphone with PTT switch in base to be supplied.

7. Receiver to be provided with local speaker with volume control.

TRANSMITTER

1. Frequency stability: .0005% or better.

2. Spurious and harmonics: -70 db.

3. Modulation: 5 KHz.

4. FM noise: 55 db below 2/3 deviation.

5. Output power: minimum 25 watts.

RECEIVERS

1. Channel spacing: 30 KHz.

2. Selectivity: 85 db @ plus/minus 30 KHz (EIJ-SINAD).

3. Sensitivity: 0.5 microvolt for 20 db quieting.

4. Speaker output: 2 watts at less than 5% distortion.

5. Frequency stability: .0005% or better.

6. Intermodulation: 80 db.

7. Spurious and image rejection: 100 db.

## OPTIONS

Check yes or no on each option.

A. Radio shall be equipped with C.T.C.S.S.

☐ Yes ☐ No

B. Telephone Handset.

☐ Yes ☐ No

**50-watt Base Station in suitable cabinet (Remote Control)**

1. Shall be housed in compact suitable cabinet.
2. Signal frequency:

transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz

3. First receiver to be mounted in desk top cabinet. Second and third receivers to be in desk top cabinets or in separate cabinets suitable for them. All receivers shall be single frequency Base Station type.
4. Operate from 120-volt AC power source.
5. Transmitter to be remote controlled over 2-wire circuit.
6. Output from receiver to be bridged into transmit line.
7. Main receiver to be provided with local speaker with volume control.
8. Transmitter shall be equipped with intercom circuitry.

**TRANSMITTER**

1. Frequency stability: .0005% or better.
2. Spurious and harmonics: -85 db.
3. Modulation: 5 KHz.
4. FM noise: 55 db below 2/3 deviation.
5. Output power: minimum 50 watts.

**RECEIVER**

1. Channel spacing: 30 KHz.
2. Selectivity: 85 db @ plus/minus 30 KHz (EIA-SINAD).
3. Sensitivity: 0.5 microvolt for 20 db quieting.
4. Telephone line output: 2 watts at less than 5% distortion.
5. Local speaker output: Plus 18 dbm @ 600 ohm at less than 5% distortion.
6. Frequency stability: .0005% or better.
7. Intermodulation: 80 db.
8. Spurious and image rejection: 100 db.

## OPTIONS

Check yes or no on every option.

A. Radio shall be equipped with C.T.C.S.S.

☐

Yes

☐

No

B. Shall be equipped for Mobile Relay Operation.

☐

Yes

☐

No



## 90-watt Base Station (Remote Control)

1. Shall be housed in suitable cabinet.
2. Signal frequency:

transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz
transmit	_____	mHz	receive	_____	mHz

3. First receiver to be mounted in desk top cabinet. Second and third receivers to be in desk top cabinets or in separate cabinets suitable for them. All receivers shall be single frequency Base Station type.
4. Operate from 120-volt AC power source.
5. Transmitter to be remote controlled over 2-wire circuit.
6. Receiver to be provided with local speaker with volume control.
7. Transmitter shall be equipped with local mike and intercom circuit. Local control mike shall be supplied.

TRANSMITTER

1. Frequency stability: .0005% or better.
2. Spurious and harmonics: -85 db.
3. Modulation: 5 KHz.
4. FM noise: 55 db below 2/3 deviation.
5. Output power: minimum 90 watts.

RECEIVER

1. Channel spacing: 30 KHz.
2. Selectivity: 85 db @ plus/minus 30 KHz (EIA-SINAD).
3. Sensitivity: 0.5 microvolt for 20 db quieting.
4. Telephone line output: plus 18 dbm @ 600 ohm at less than 5% distortion.
5. Local speaker output: 2 watts at less than 5% distortion.
6. Frequency stability: .0005% or better.
7. Intermodulation: 80 db.
8. Spurious and image rejection: 100 db.

## OPTIONS

Check yes or no on every option.

A. Radio shall be equipped with C.T.C.S.S.

☐

Yes

☐

No

B. Radio shall be equipped for Mobile Relay Operations.

☐

Yes

☐

No

INVITATION FOR BIDS

\_\_\_\_\_, KANSAS \_\_\_\_\_, 19\_\_

172

\_\_\_\_\_ will accept sealed bids for radio communications as specified in the enclosed specification. Bids will be received in the office of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ until \_\_\_\_\_ m. o'clock, \_\_\_\_\_, 19\_\_.

All bids should be sealed and clearly marked Radio Equipment Bid on the envelope containing the bid proposal.

Instruction to Bidders:

1. Quotations are requested for furnishing, F.O.B. destination, installing and making operational, including all FCC measurements, the equipment listed below and specified in detail in the attached specifications which are hereby made a part of this quotation.
2. All bids are subject to the scrutiny and examination by the subgrantee and by the Governor's Committee on Criminal Administration. The Subgrantee shall recommend to the GCCA, the bid proposal which is the most responsible to the invitation for bids; and most advantageous based on the evaluation of prices, delivery dates, quality and other pertinent factors.
3. Any portion of any bid may be rejected when it is in the purchaser's interest to do so.
4. All specifications shall accompany the bids so that they be forwarded to the Governor's Committee.
5. A performance bond will be furnished in the amount of the bid within ten (10) days after the award is made.
6. Attached to the bid shall be an itemized equipment list by name and model number identification. Include latest published specifications for all items bid.

# BID SHEET

173

List Equipment as in Grant

Amount of Bid

[illegible]

Show Name and Model Numbers and itemize all equipment on a separate sheet.

Estimate Date of Final Installation \_\_\_\_\_.

Bidders Name

By Title

Address

City, State and Zip Code

Date \_\_\_\_\_

RADIO COMMUNICATIONS VENDORS

174

General Electric Company

Mr. Harold Reichardt, District Sales Manager  
Mobile Radio Department  
5700 Broadmoor  
Mission, Kansas 66202

Tel.: 913-384-3121

Motorola Communications and Electronics, Inc.

Mr. Richard Harlee, District Sales Manager  
2831 Bennett Drive, R.R. #4  
Topeka, Kansas 6605

Tel.: 913-235-1694

RCA/Mobile Communications

Mr. Dwight Cox, District Manager  
5750 West 95th Street, Suite 111  
Overland Park, Kansas 66207

Tel.: 913-642-5115

Conrad Company Inc.

Conrad Company Inc.  
1401 Fairfax Trafficway  
Kansas City, Kansas 66115

Tel.: 913-621-3021

NOTE:

We strongly urge that you send Invitations for Bids to at least three of the state representatives of the major vendors listed above. And if you so desire, you may send the bid forms to any other vendors who can meet equipment specifications.

Vance W. Collins  
GCCA--Law Enforcement

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RECOMMENDED GUIDELINES  
FOR THE  
PLANNING, DESIGN, AND IMPLEMENTATION  
OF  
DEMAND-ACTUATED RURAL TRANSPORTATION SYSTEMS

by

HUGH THOMAS McCORMICK

B. of Arch., Texas Tech University, 1971

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AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF REGIONAL AND COMMUNITY PLANNING

Department of Regional and Community Planning

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

1975

## ABSTRACT

The lack of adequate, effective transportation is now recognized as one of the major problems hindering the development of rural American today. In 1971, at the White House Conference on Aging, transportation was identified as the most crucial problem for the rural elderly. In an attempt to alleviate this immobility problem, over the past five years several federal inter-agency agreements and a number of federally funded demonstration and capital grant programs have been designed to increase the mobility of the elderly and other transportation disadvantaged living in urban and rural areas.

With the evolution of these federal programs, providing funding for transportation services, there have been many rural transportation demonstration projects implemented across the country. The results of these projects have been documented in much detail. And although a great amount of material has been written concerning the implementation, success, or failure of these individual transit demonstration projects, there exists little documentation which relates how to plan, design, and implement an effective, efficient rural transportation system.

Because the demand for and the implementation of rural transportation services has developed much more rapidly than the appropriate planning and implementation methodology for rural transport systems, a technical information void has been created. The results of this lack of planning and technical guidance is that the organizers of the many local transit systems in Kansas are unaware of the various aspects and problems to be encountered

when attempting to develop and implement transportation services in rural Kansas counties and communities. These individuals are left in a state of confusion, grasping for direction and guidance.

This report develops recommended guidelines for the planning, design, and implementation of a rural public transportation system which provides service on a countywide and citywide scale and on a demand-actuated basis. The DARTS (Demand-Actuated Rural Transportation Systems) countywide system enables a rider to be picked up at a pre-determined collection point in a county (e.g., an outlying community), and to be taken to the major service center in that county in order to satisfy the social, economic, and personal needs of the individual. In a citywide service, DARTS would provide for the rider to be picked up at his door at a pre-arranged time, and taken to his specified destination within the city's corporate limits. The organization of DARTS, the responsibilities of system personnel, legal concerns, and operation concerns (i.e., marketing, maintenance, vehicle selection, and communication), are addressed in some detail.

Based on four variables relating to transportation needs, this report illustrates which counties have the highest priority of need for transportation services. A review of existing transportation facilities in Kansas indicates a definite lack of intercounty and intracounty transit services.

A simplistic demand model is used to determine the extent of statewide demand for rural transportation services in Kansas. The demand levels generated indicate a definite need for service, but a need which can be met only at a substantial cost.

A review of the existing Federal, State, local, and private funding sources, which are available to assist in the development of local transit operations, is presented. There are many sources of funding available,

but unless there is local support and commitment to the transit operation there is little hope of establishing a reliable, stable system.

The conclusions and recommendations of this report suggest that the state government of Kansas should take an active role in the planning, coordination, implementation, and financing of a statewide rural transportation system. It is further suggested that one state agency should be responsible for the coordination of all transportation services in the state in order to eliminate the duplication of transport services prevalent among those programs implemented by state social-service providing agencies. It is recommended that the Kansas Department of Transportation undertake this coordinating function.