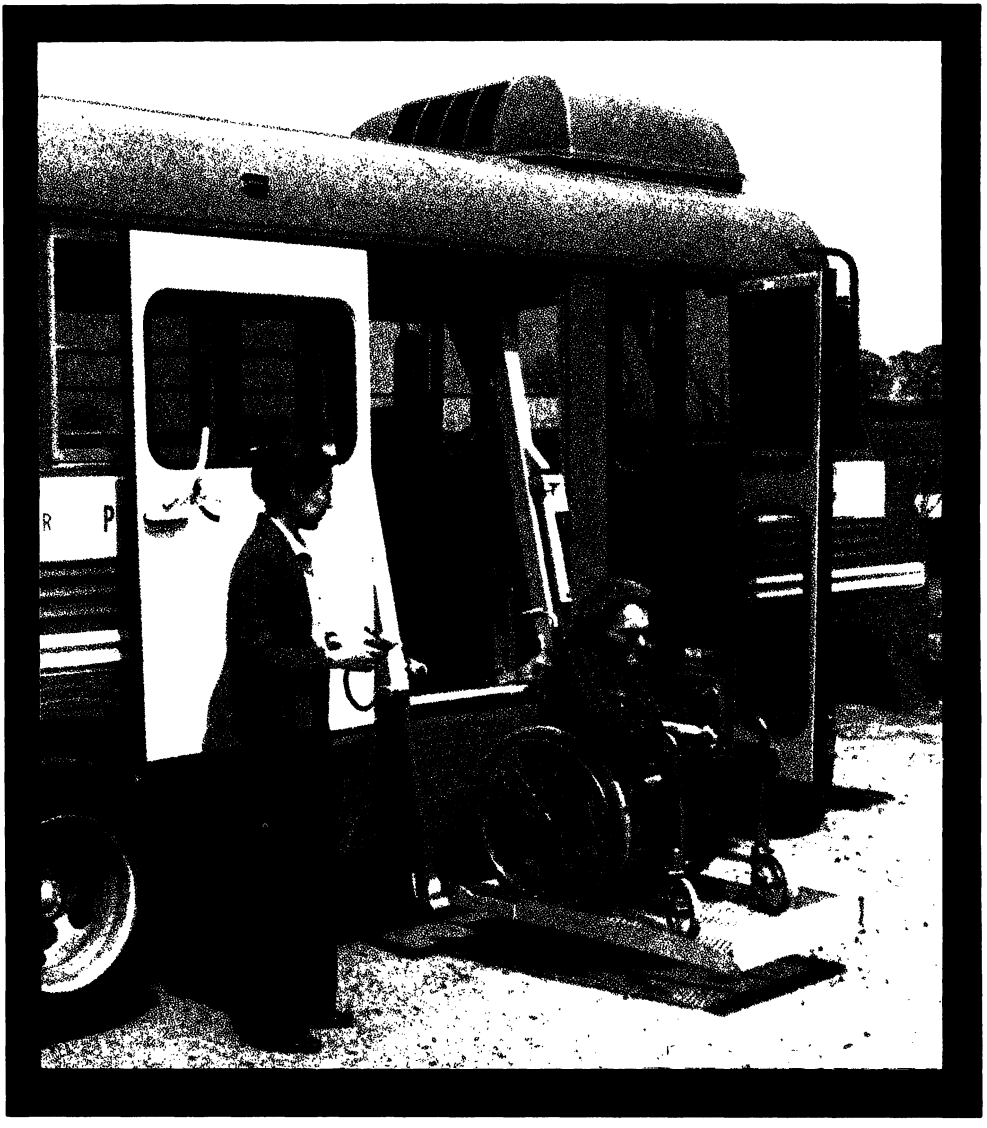
A COMMUNITY DEVELOPMENT GUIDE FOR A TRANSPORTATION SYSTEM FOR THE ELDERLY



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ABSTRACT

A budget analysis was developed which would aid in the evaluation of a proposed transportation systems for the elderly. The analysis used average capital and operating computed from data obtained from 28 existing transportation projects in Oklahoma. Easy to use forms were derived which permit community leaders to conduct their example system for a community in Northwest Oklahoma is included. Four alternative systems, were presented with yearly capital and operating costs ranging from 15,770.80 to 19,414.20. Proposed revenue from the system and from federal programs are also discussed.

ACKNOWLEDGMENTS

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A Community Development Guide for A Transportation System for the Elderly

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Introduction

Rural areas often lack the population density to support public transportation services. Rural people are forced to depend almost exclusively on the private auto for commuting to work and/or gaining access to essential goods and services in nearby towns. In addition, the rural transportation problem is aggravated by the fact that rural America is marked by a large number of low income families with insufficient income to purchase and maintain one automobile. In general, the family car is used to commute to work by the principal wage earner, leaving other family members with no means of mobility. As a result, a large proportion of rural people do not have normal access to private transportation. This may be due to old age, low-income, disability or a combination of these conditions.

In Oklahoma, for example, the Subcommittee on Rural Development in 1972, concluded that 17.7 percent of the households in Rural Counties were transportation deprived and 73.9 percent were transportation handicapped [4 p. 3]. Transportation deprived is defined as a household without an automobile, whereas transportation handicapped is defined as a household with one vehicle primarily used by the breadwinner to commute to and from work. A more detailed analysis of conditions in Oklahoma is reflected in Figure 1. Of the 77 counties in Oklahoma, 22 of them did not have transportation service (taxi or special service project) and 40 of them did not have a special transportation project.

Inadequate mobility of rural people is a critical problem in many rural areas. With the increasing costs of vehicles, gasoline and maintenance, this problem becomes more acute each year. Given all of these conditions in rural areas, it appears that a public transportation system (auto, van, mini-bus, or bus) may be a feasible solution for the rural transportation problems of some areas.

Objectives and Information Needs

The basic objective of this guide is to develop a self-applied manual for local decisionmakers to evaluate the potential usage and cost of transportation services in their area. By doing this, a general procedure can also be developed for designing an economically feasible transportation system (auto, van, mini-bus, or bus). Specific information needed to satisfy this objective include: (1) an estimate of the potential usage of a transportation service for a proposed service area; (2) an estimate of costs of establishing alternative transportation systems for a proposed service area; and (3) an estimate of potential income from passengers and other sources of assistance.

The study area and data collected will be discussed first, followed by a method to estimate the usage of transportation service in rural areas. A discussion of the costs of alternative transportation systems will also be included. Next, federal programs available to local decisionmakers will be discussed. Finally, a self-applied feasibility analysis with do it yourself forms is presented as an example, and the application of the forms developed is shown.

Data and Study Area

Two major problems face decisionmakers when evaluating the feasibility of a project. The first problem that faces local decisionmakers in providing transportation services, is that of estimating usage and income for the service. Estimating the usage for public transportation in a rural area is essential to the effectiveness of the implementation of a rural transportation program.

The Special Unit on Aging (SUOA) in the State of Oklahoma is the primary source of funds for most rural transportation projects (auto, van, mini-bus, or bus). For this study, data were obtained from the monthly reports of each of the fifty-nine projects administered by SUOA. Data were obtained from the beginning of each project. Many were started in April, 1977.

The data include information on the number of passenger trips, type of trips, operating expenses, miles driven, and sources of revenue. These projects include both metropolitan and rural areas. In metropolitan areas, people have much easier access to transportation systems than people in rural areas. Hence, the usage and effect of the transportation program on the rural areas should be different from that in metropolitan areas. Since this study emphasizes the implementation of a transportation program in rural areas, it excludes the projects in metropolitan areas and the projects with limited data. After the exclusions, twenty-six observations remained. The study also obtained data from the Oklahoma Department of Transportation (OKDOT) for two projects funded by the Federal-Aid Highway Act and administered by Urban Mass Transit Administration. One of these programs had three vehicles and served a county whereas the other project had one vehicle and served a city. The 28 projects used in the study were designed to serve the elderly and handicapped in rural areas. Locations of these projects are shown in Figure 2. Because the handicapped generate only a small proportion of the

usage, the study focuses on the usage of the transportation program by the elderly.

A second problem is that of estimating capital and operating expenses. The operating expenses can be estimated from monthly reports which provide information on salaries, fuel and oil, maintenance and repairs. Capital costs of vehicles were obtained from bids made to the SUOA and from dealers. In addition, dealers were contacted for cost data for lifts, ramps and communication equipment.

Estimating the Usage of a Transportation System

This section analyzes usage data gathered from the 28 rural transportation projects in Oklahoma and develops a procedure to predict the number of passengers for a community or county considering initiating such a system. The procedure for predicting ridership or usage was designed to be appropriate for any rural area.

Estimation of Yearly Number of Trips and Mileage

To estimate transportation usage by the elderly, some of the terms used in the monthly reports to the SUOA have to be defined. The target population for SUOA projects includes the elderly and handicapped. For eligibility, elderly is defined as a person whose age is 55 or above. If the person is both handicapped and elderly, he is indicated as elderly in the monthly reports. As to the number of passenger trips, an individual is counted as making two trips if he is taken to the doctor, or some other place, left, and later picked up to make the return trip home.

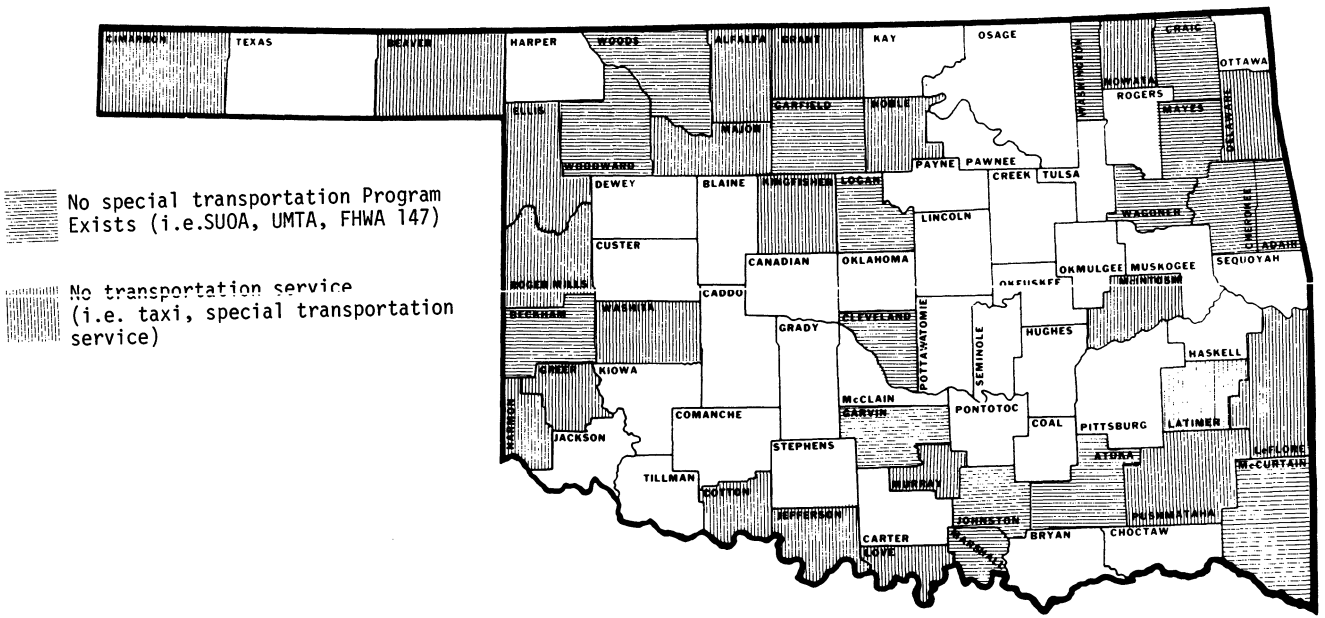
The monthly reports to the SUOA indicate numbers of passenger trips and mileage per month. These monthly figures were used and calculated into yearly figures for this study. In order to determine the average number of trips per person made per year and miles per person trip, each rural system was called to determine its service area. More than half of the rural systems serve rural communities whereas others serve part of a county, an entire county or a multi-county area.

Next, a demographic model was used to estimate the number of elderly in each service area during the year for which ridership information was available. The average number of trips made per year, per elderly person for each of the 28 study areas was derived. The expected value or mean of the number of trips per person, per year was calculated at 3.01. Thus, for each elderly person in a service area, 3.01 rides were generated per year.

An estimate of miles traveled per trip is needed to prepare a budget for the system. For sparsely populated rural communities a demand-responsive system is most often used. For a system serving part of a county, a county or a multi-county area, a demand-responsive system and a fixed-route system is often used.

For a demand-responsive system serving a community, the expected miles per trip was calculated by selecting the communities within the 28 projects which operate in this manner. The expected value or mean was 2.24 miles traveled per person per trip.[2] Most of these trips were to transport elderly to nutri-

FIGURE 1. COUNTIES WITHOUT SPECIAL TRANSPORTATION SERVICE



SOURCES: (1) Public Transportation: Directory of Oklahoma's Public Transportation Service, Oklahoma DOT, ODOT - PT Report # 8002.03, May 1, 1978.

(2) 1978 Map of Oklahoma's State Intercity Bus and Urban Public Transportation Service, Oklahoma Department of Transportation.

(3) Correspondence with Special Unit on Aging, State Department of Institutions, Social and Rehabilitative Services.

tion programs, doctor's offices, grocery stores, and so forth within the community.

For a system which serves an area larger than a community and is demand-responsive with fixed routes in addition, the demand-responsive mileage can be calculated as above and the fixed-route mileage can be calculated by determining the route and frequency of the fixed route.

In working with community leaders considering a transportation system, it is important to have a current estimate of the population 55 years old and older. A population prediction model[3] is used to update the latest census information to arrive at the best estimate of the number of persons 55 years old and older for a service area. With a current population estimate and the usage and mileage figures, the estimated number of trips and mileage can be calculated for a service area. Easy-to-use forms were designed for this purpose and are illustrated in the application section of his guidebook.

Monthly and Start-Up Information

To assist in planning a system it is useful to know if there is monthly variation in ridership. Also, in starting a system, it is useful to now how long it takes to get ridership up to expected levels. By analyzing the monthly pattern of trip-taking in rural areas, it will help local decisionmakers design a transportation system which has sufficient capacity to satisfy transportation needs at the least cost.

Among the 28 units included in the study, there were 14 units with complete observations in 1978 for analyzing the monthly pattern of making. The results of these 14 units showed that the elderly in Oklahoma rural areas made the least number of trips in January nd February. The peak period was August through October. This monthly pattern of trip-making is summarized in Table 1.

When a decisionmaker designs a transportation system for his area, he should take the peak usage of transportation into account. Given the expected value of 3.01 trips per year, per elderly , the annual average transportation usage for a specified area would be 3.01 trips times the predicted elderly population of that area. However, in order to have a system that will satisfy the peak usage, the capacity of the mini-bus transportation program should be designed to meet the annual usage of 3.01 trips

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1. Within two standard deviations or 95 percent of the time, the expected number of trips per elderly person per year will range from 2.15 to 3.87.
2. Within two standard deviations or 95 percent of the time, the expected mileage per trip per elderly person will range from 1.56 to 2.92.
3. The population projection model used in this study is a demographic model which uses birth rate, death rate and migration rate. In most states, the Cooperative extension service or some other state agency can provide population estimates.

times the index of the peak usage month (which in September equals 1.18) times the elderly population in that area.

Community decisionmakers who are considering the establishment of a transportation system need to know how long it will take to reach the expected level of usage. To attempt to assist them with this question, the projects with information concerning ridership for start-up months were analyzed. Seventeen projects had data on ridership since their beginning. Some of these had only 8 months of data whereas a few had data for longer than a year. With careful evaluation of these data, it is safe to draw the following conclusions: (1) In general, it takes 2 to 3 months for a mini-bus transportation program to be established. Only a few projects will be able to establish stable riderships within one month after the program is implemented. (2) The period of time required to establish a system seems to be related to the publicity given the system. With the larger service areas it takes longer for the target population to recognize that there is a mini-bus transportation program to serve them. However, for smaller service areas, the information proably can be disseminated to the target population much easier. Therefore, it usually takes more time for the systems which serve larger areas to become established. (3) For larger projects with a higher volume of riders, once the projects are established, the volume of riders stays much more stable than for smaller projects which seem to have more erratic patterns of ridership.

Estimating the Costs of a Transportation System

Knowledge of transportation costs, as well as expected system revenue, is necessary to evaluate methods of providing the service within the community's financial capabilities. Bids submitted to the SUOA were studied and dealers of capital equipment were contacted to obtain estimates of capital costs. Operating expenses were obtained from monthly reports of the 28 rural projects.

Capital Expenses

Vehicle Five alternative vehicles were considered as possibilities for a transportation system. The alternatives, a brief description of each and the price as of 1979 are as follows: (1) standard size automobile: a 1980, 4-door sedan with V-8 engine, automatic transmission, power steering and brakes, and air-conditioner can be purchased at an approximate price of $5,718; (2) station wagon: a 1980 model with V-8 engine, automatic transmission, power steering and brakes and air conditioner can be purchased at an approximate price of $6,100; (3) 12 passenger van: a 1980 model with sliding door on right side of vehicle, V-8 engine, automatic transmission, power steering and brakes and air conditioner can be purchased at an approximate price of $8,820; (4) 15 passenger van: a 1980 model with sliding door, V-8 engine, automatic transmission, power steering and brakes and air-conditioner can be purchased at a price of $9,855; and (5) 26 passenger school bus: a 1979 school bus body and chassis with a V-8 engine, four speed manual transmission power steering and air-conditioner can be purchased at an approximate price of $22,333.

These prices represent minimums, rather than averages or maximums. The upper limit of the price range for each type depends on the vehicle and the extras included. In selecting a vehicle, the following three steps should be helpful: (1) Consult several dealers to get the lowest bid. (2) Evaluate all options including renting a vehicle or buying a used one. (3) Check with federal and state regulatory agencies to be sure the vehicle meets specifications.

The life of a vehicle depends primarily on how much it is used and the quality of maintenance it receives. In general, dealers and operators preferred to trade in automobiles, station wagons and vans at 75,000 miles and buses at 65,000 miles.

Lifts, Ramps and Locks, Community leaders of some communities want their transportation system designed to transport wheel chair patients. A hydraulic lift will cost about $2,850. Ramps can be used if a hydraulic system is considered too expensive. A wheel chair ramp will cost about $850. Finally, wheel chair locks are needed and they cost about $150 a set. Each wheel chair accomodation will reduce regular seating by about 2.5 seats.

Communication System The installation of a communication system will greatly improve the efficiency of transporting people in rural areas. The Federal Communications Commission (FCC) was established as regulatory agency with the purpose of protecting life and property through radio communication. Its responsibilities include licensing broadcasters, assigning frequencies and determining station operating powers. In considering basic communication equipment, local decisionmakers should have knowledge of the general specifications to be met in providing quality communications within a certain range and how much the communication equipment will cost. There are two adequate communication system options available to local decisionmakers: using an existing system or constructing a new one.

If the community has a fire or police department with an existing system, it is possible to use it at a cost much lower than establishing a new system. If the system is very high frequency (VHF), a 2-way radio for the vehicle would cost approximately $2,000, plus $60 for installation. If the community does not have an appropriate existing communication system, a new one can be constructed, choosing among very high frequency (VHF), ultra high frequency (UHF) and citizen band (CB) systems. Both VHF and UHF communication systems require antennas.

The general specifications for a new VHF communication component might call for 100-watt base station at an approximate cost of $4,100 having a 2-frequency capability, with one frequency available for paging personnel within a 10-mile radius. A remote console would also be needed at an approximate cost of $710. Installation of the base station and remote console would cost an additional $150. The base station, remote console and mobile radio have an average life of 10 years.

The main advantage of a UHF system over a VHF system is that it can accommodate up to 10 channels. A 100-watt base station with three frequencies costs approximately $5,700. More frequencies can be added at additional cost, but in rural areas, three may be adequate. The mobile radio for the vehicle will cost

approximately $2,980 and the remote console about $710. Installation charges for a mobile unit are approximately $60 and for base station and console, about $150.

The antenna tower required for both VHF and UHF systems should have a height of 100 to 150 feet, depending on the area to be served. The cost of a 100-foot tower is approximately $1,000 and the cost of a 150 foot antenna, about $270. In addition, transmission lines will cost about $2.84 per foot, and installation of the 100-foot tower, approximately $525. The life expectancy of the tower is 20 years.

Use of CB radios for communications is another alternative [8]. In this analysis, considerations of citizens band will be limited to the class D stations operating on the frequencies between 26.96 MHz and 27.23 MHz with input power limited to 5 watts. Base station costs are about $350 and mobile unit costs are about $250.

Operating Expenses

Vehicle Included in vehicle operating expenses are costs of gasoline, tires, oil, oil filters, lubrication, tune-ups, insurance and miscellaneous repairs. 1979 costs of these items are based on records of the 28 projects in the study area and on opinions of experts in the field of rural transportation systems. The vehicle operating costs are presented in Table 2. Decision-makers in rural areas who are planning within limited budgets need to understand their options in providing a transportation system. Since payroll is probably the biggest operating expense, it must be carefully included in the budget. Some systems operate with volunteer drivers and therefore the operating budget is kept low. Most of the volunteeer systems are used in communities or counties with a small number of riders. For larger systems where service is provided five days a week, from 8 am to 5 pm, paid personnel are hired at the local wage rate. The range of driver wage rates for the study area was from $3.00 to $4.00 per hour. When estimating a budget, 15 percent overhead needs to be included to cover Social Security, health benefits, leave, etc. Thus, one person hired at $3.50 per hour and working 40 hours per week would be paid $7,280. By adding the 15 percent, he budget cost is $8,372.

Financial Programs Available to Assist Local Communities

The federal government has become increasingly concerned with transportation problems of non-urbanized areas. "The National Mass Transportation Act of 1974 provides up to $500 million for exclusive use of non-urbanized areas during the period from 1975 through 1980" [5 p.148]. Under this act the Urban Mass Transit Administration (UMTA) set up a number of funding programs for transit in small urban and rural areas with populations less than 50,000.

Overview of Programs

Planning Assistance of UMTA Section 9 One million dollars of a total $4.2 million for planning for fiscal year 1976 was apportioned on the basis of non-urbanized areas' population. These funds are intended to be used for planning- related expenses to provide background information and to support activities needed to preserve, improve or provide transit services.

Capital Assistance to Elderly and Handicapped of UMTA Section 16 (b)(2) This section of the act provides funds by a formula to state agencies designated by the governor to help private nonprofit organizations provide for the special needs of elderly and handicapped persons where existing or proposed services of public and private transit operators are inadequate, insufficient, or unavailable.

Capital Assistance of UMTA Section 3 for Public Agency Funding is available through this act to provide capital assistance capital funds under section 3 would not be set aside by formula as funds are under section 16 (b) (2). It encourages the state transportation agency or county organizations to develop and submit a joint application on behalf of several communities for grant applications.

UMTA Service and Methods Demonstration Program Funds under this program are used to develop, test and promote nationally-relevant, innovative public transportation services for non-urbanized areas. These funds can cover capital investment and 1-3 years of operation, administration and evaluation costs.

FHWA/UMTA Rural Highway Public Transportation Demonstration Program of UMTA Section 147 Authorized by the Federal-Aid Highway Act of 1973, this program sponsors innovative transit services and management arrangements for rural and small urban area transit. Funds can cover both capital and operating expenses for a multi-year period.

In addition to these UMTA funds there are many projects which receive grants from Older American Act, Office of Economic Opportunity.

Oklahoma Experiences

In Oklahoma, numerous projects are being undertaken and supported by the above federal assistance programs designed to serve the elderly and handicapped in rural areas. According to the Directory of Oklahoma's Public Transportation Services 1978, the transportation projects funded for elderly and handicapped persons in rural areas come from the following programs.

(1) Older American Act Title III It provides financing for senior citizen centers, including funds for the purchase and operation of mini-buses or vans (75-90 percent federal) to transport their clientele. There are 13 existing projects with 23 vehicles funded under this program which is administered by the Special Unit on Aging (SUOA), State Department of Institutions, Social and Rehabilitative Services (DISRS).

(2) Urban Mass Transportation Act of 1964, as amended The federal government provides under section 16 (b) (1) and 16 (b) (2), for 80 percent of the capital expenses for the purchase of transit or paratransit[4] vehicles. As of spring 1978, there were 32 projects with 53 vehicles funded under the 16 (b) (2) program. There were at least another 33 projects and 52 vehicles being planned since that time. Additional funding is also anticipated under this program which is also administered by SUOA, DISRS.

(3) FHWA/UMTA Rural Highway Public Transportation Demonstration Program The federal government provides 100 percent of the capital and operating expenses under this program. Currently, there are 2 projects and 3 vehicles operating under this program which is administered by the Oklahoma Department of Transportation.

If community leaders are searching for financial assistance, they should contact their multi-county or sub-state development district or the state agency which has been assigned these responsibilities. Personnel from these agencies can provide the appropriate application form and assistance in its completion.

Planning a Rural Transportation System

In 1979, leaders in a community in Northwestern Oklahoma were evaluating their needs for a transportation system. The community had an estimated elderly population of 1,240 for 1980. Estimates of revenue and costs for alternative systems were derived.

This section of the study will utilize the information presented in previous sections in the planning of a rural transportation system for a community in Northwestern Oklahoma. Forms are presented for the estimation of system usage (ridership and mileage), estimation of annual capital and operating costs, and comparison of annual revenue and costs for determination of the subsidy amount, if necessary, from a federal or state source.

The Northwestern Oklahoma community has estimated a 1980 population of 4,200, 1,240 of which will be elderly. Residents are concerned about the transportation needs of this group and wish to determine the costs of a transportation system set up to meet those needs.

Form I is used to estimate the number of expected riders per year. For this community, the expected number of riders is 3,732, with a low estimate of 2,666 and a high estimate of 4,799. Yearly mileage estimates are calculated for both demand-responsive and fixed routes. Estimated mileage for the system is

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4. Para-transit services are surface passenger transportation services existing in between exclusive-ride taxi service and fixed- schedule, fixed rate transit service, including services such as shared-ride taxi, (Public Transportation, Work Shop No. 1, Para-Transit and the Taxi operator, Planning Division, OKDOT).

19,020. During an average day, the number of demand-responsive trips is 16, whereas during the busiest month the number of trips per day is estimated at 19.

Data on Form II provide cost estimates for vehicles, communication equipment, labor and other items. Assuming a 15-passenger van with hydraulic lift, yearly depreciation would be $3,298.10. It is assumed that an existing communication system will be used, thus no base communication depreciation is charged. A VHF Vehicle communication system is assumed and yearly depreciation is $206.00. Other equipment in this example include a fire extinguisher priced at $50 with a 10-year life. If money needs to be borrowed, an interest charge is necessary. For this example, if money is borrowed the current interest rate is applied to the vehicle and its associated equipment, the communication system, and fire extinguisher. Vehicle operating expenses, mainly a function of mileage, are estimated to be $3,889.70. If it is assumed that the system operates 8 hours a day, 5 days a week and a driver is paid $3.50 per hour, labor cost will be $7,280 in 1980. By adding the 15 percent for benefits, yearly driver costs are $8,372. Finally, Form II includes an area for miscellaneous costs. Total yearly capital and operating costs are estimated at $15,770.80.

Form III was used to project cost for alternative systems and income for alternative charge rate. Many systems charge a small fee if the person is able to pay. Thus, if the charge rate is $.50 and 60 percent of the riders pay, yearly income will be $1,119.60. The first alternative delivery system shown assumes a 15-passenger van, a demand-responsive system with 2 scheduled fixed-route trips per week and driver payment of $3.50 per hour. Total yearly costs for this system are $15,770.80.

The second alternative assumes that two 12-passenger vans (one equipped with hydraulic lift and two sets of wheel chair locks, the other a standard van without a lift or wheel chair locks) are purchased and both fixed and demand-responsive routes are set up. Labor costs are $3.50 per hour for 1 full-time and 1 part- time drivers. Yearly costs equal $19,414.20. The third alternative assumes the same as the second except a station wagon and 12 passenger van (with lift and wheel chair locks) are purchased and yearly costs are projected at $18,969.30. Finally, the fourth alternative assumes the same as the second except an auto and 15 passenger van (with lift and wheel chair locks) are assumed. Yearly costs equal $18,931.40.

In summary, community decisionmakers can compare costs and income for alternative systems and rate structures from Form III. If $.50 were charged and 60 percent paid the fee, yearly income would be $1,119.60, while if the community provided the service as specified by alternative 1, yearly costs would be $15,770.80. The decisionmakers would then know that this alternative would have to be subsidized by $14,651.20.

Summary

This study has been done to help community planners in the early planning stages of a transportation system for the elderly. The study does not make recommendations, but rather provides cost and income information for various alternatives and a methodology for the estimation of a community's needs for such a system. Planners should integrate local information in their alternatives so that each closely reflects the community's conditions and needs. The forms and data in this guide can be used to develop costs and revenue for a county system with multiple locations and routes.

References

[1] Doeksen, Gerald A., Leonard G. Anderson, Jr. Walter M. Whitlow, A Community Develcpment Guide for Emergency Medical Services. Published by State Highway Office, Oklahoma Dept. of Transportation, 1979.

[2] Hamilton, H.R. et al. System Simulation for Regional Analysis, An Application to River Basin Planning. Cambridge, The MIT Press, 1969.

[3] Levy, Steve, K. William Easter, Harold Jansen and Jerry Fruin. Planning Transportation Systems for Older Rural Americans, University of Minnesota Agricultural Experiment Station Bulletin
1977.

[4] Office of Policy and Planning Development, U.S. Dept. of Transportation, The Transportation of People in Rural Areas, Subcommittee on Rural Development of the Committee on Agriculture Forestry, United States Senate, 93rd Congress, 2nd. Session, Feb. 27, 1974.

[5] Office of University Research and Technology Sharing Programs, U.S. Dept. of Transportation, Proceedings of the First National Conference on Rural Public Transportation, t., 1976.

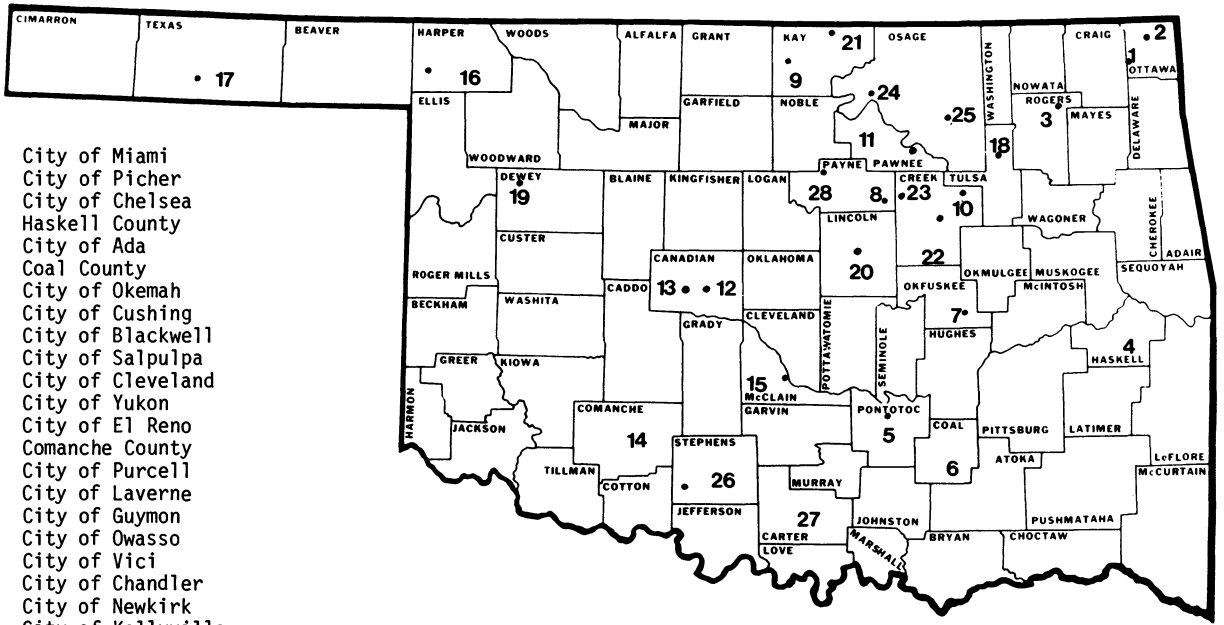
[6] Oklahoma Employment Security Commission, Oklahoma Population Estimates, July, 1977, Data for State SMSA's Counties, Selected Cities, Jan., 1979.

[7] State of Oklahoma, Dept. of Transportation, Planning Division, Public Transportation: Directory of Oklahoma's Public Transportation Services, ODOT-PT Report # 8002:03, May 1, 1978.

[8] State of Texas, State Dept. of Highways and Public Transportation, Transportation Planning Division, ction 16B (2) Grant Program, Administrative Handbook, Oct., 1977.

[9] U.S. Dept. of Commerce, Bureau of the Census, General Population Characteristics, Oklahoma, ¦) - B38 Okla., Aug., 1971.

FIGURE 2. STUDY AREA AND LOCATION OF ANALYZED PROJECTS



1. City of Miami
2. City of Picher
3. City of Chelsea
4. Haskell County
5. City of Ada
6. Coal County
7. City of Okemah
8. City of Cushing
9. City of Blackwell
10. City of Salpulpa
11. City of Cleveland
12. City of Yukon
13. City of El Reno
14. Comanche County
15. City of Purcell
16. City of Laverne
17. City of Guymon
18. City of Owasso
19. City of Vici
20. City of Chandler
21. City of Newkirk
22. City of Kellyville
23. City of Oilton
24. City of Fairfax
25. City of Barnsdall
26. City of Comanche
27. Carter County
28. City of Stillwater

TABLE 1. MONTHLY PATTERN OF TRIP-MAKING

Month	Total Number of Trips	Percentage of Trips	Average Number of Trips	Percentage of Monthly Average
January	4897	5.23%	350.	63%
February	4685	5.00%	335.	60%
March	8547	9.12%	611.	110%
April	8248	8.81%	589.	106%
May	8525	9.10%	609.	109%
June	8224	8.78%	587.	105%
July	8034	8.58%	574.	103%
August	8907	9.51%	636.	114%
September	9209	9.83%	658.	118%
October	9172	9.79%	655.	117%
November	7706	8.23%	550.	99%
December	7521	8.03%	537.	96%
TOTAL	93675	100%	558.	100%

TABLE 2. VEHICLE OPERATING EXPENSES, 1979

Item	Cost and Usage
Gasoline	Standard automobile 15 miles per gallon (MPG) @ 96¢ per gallon Station Wagon 9 MPG @ 96¢ per gallon Van (12 passenger) 9 MPG @ 96¢ per gallon Van (15 passenger) 7 MPG @ 96¢ per gallon Bus (26 passenger) 5 MPG @ 96¢ per gallon
Tires	Standard automobile, station wagon, and van- replaced every 25,000 miles at $70 per tire Bus - replaced every 13,000 miles at $75 per tire
Oil Change, Oil Filter and Lubrication	Standard automobile, station wagon, and van - every 2,500 miles at a cost of $15 Bus - every 2,000 miles at a cost of $60
License	$4.10 per year per vehicle
Tune-Up	Standard automobile, station wagon and van - every 10,000 miles @ $45. Bus - every 6,500 miles @ $70.
Miscellaneous Repairs	$200 every 10,000 miles
Insurance	Standard automobile and station wagon - $300 per year Vans - $400 per year Bus - $500 per year
Communication System	VHF or UHF service contract for $84.

FORM I. PROCEDURE USED TO ESTIMATE THE USAGE OF TRANSPORTATION BY THE RURAL ELDERLY POPULATION

Specify the service area (name of community, county or multi-county areas) for which transportation service is to be provided. The budget analysis is prepared for the year 1980.
A Community in Northwestern Oklahoma

I. Estimated number of riders per year for the service area

A. Expected number of riders per year in the service area
1,240 (Number of persons >55)[1] x 3.01 (expected riders per person per year) = 3,732

B. Low Estimate
1,240 (Number of persons >55) x 2.15 (low estimate of expected riders per person per year) = 2,666

C. High Estimate
1,240 (Number of persons >55) x 3.87 (high estimate of expected riders per person per year) = 4,799

D. Estimated riders per day
3,732 (Expected number of riders per year) ÷ 12 = 311 (average monthly ridership).
311 Average monthly ridership ÷ 20 (average operating days per month) = (average number of riders per day) 16
311 Average monthly ridership ÷ 20 (average operating days per month x 1.18 (Index of the peak usage monthly) = average number of riders per day during busiest month 19

[1] A computerized demographic model is used to project the population 55 years and older for 1980. The model has the usual components of births, deaths, and migration.

II. Estimated mileage for the system

A. Mileage for demand-responsive system

1. Method 1

3,732 (Estimated number of riders per year) x 2.24 (Average miles per rider trip) = 8,360

2. Method 1

Month	No. of Riders Per Year	Monthly % of Trip-making	No. of Riders/Mo.	x Ave. Miles Per Rider Trip	= Miles Per Month
Jan.	3,732	5.23%	195	2.24	437
Feb.	3,732	5.00%	187	2.24	418
March	3,732	9.12%	340	2.24	762
April	3,732	8.81%	329	2.24	737
May	3,732	9.10%	340	2.24	761
June	3,732	8.78%	328	2.24	734
July	3,732	8.58%	320	2.24	717
Aug.	3,732	9.51%	355	2.24	795
Sept.	3,732	9.83%	367	2.24	822
Oct.	3,732	9.79%	365	2.24	818
Nov.	3,732	8.23%	307	2.24	688
Dec.	3,732	8.03%	300	2.24	671
Total		100%			8,360

B. Mileage for fixed-route system

Name of Route	Destination of Route	Origin of Route	Frequency of Service Per Week/Month	x Miles Served Per Round-trip Per Route	x Weeks/Months Per Year	Bus Mil Per Ye
1	City A	The Town	1	(2x57)+10=124	52	6,44
2	City B	The Town	1	(2x38)+5=81	52	4,21

II. Operating Expenses (Type of vehicle 15- Passenger Van)

1. Gasoline
   [1979 price (.96) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #.96 estimated current price] [19,020 (yearly mileage) ÷ 7 (miles per gallon) x $ .96 (Cost per gallon)] = $2,608.50
2. Tires
   [1979 price (#70) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #70. estimated current price] [4 (number of tires per vehicle) x $ 70. (cost per regular tire) x 19,020 (yearly mileage) ÷ 25,000 (expected life of tires in terms of miles)] = $ 213.00
3. Oil Change, Oil Filter and Lubrication
   [1979 price (#15) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #15. estimated current price] [19,020 (yearly mileage) ÷ 2,500 (miles between oil changes) x $ 15. (cost each time)] $ 114.10
4. License
   [1979 price($4.10)x 217.4 (Current CPI) / 217.4 (1979 CPI) = #4.10 estimated current price] $ 4.10
5. Tune-up
   [1979 price (#45) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #45. estimated current price] [19,020 (yearly mileage) ÷ 10,000 (miles between tune-up)] x $ 45. (Cost per tune-up) $ 85.60
6. Miscellaneous repairs
   [1979 price($200) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #200.00 estimated current price] [19,020 (yearly mileage) ÷ 10,000] x $ 200. (cost per 10,000 miles) = $ 380.40
7. Two-way radio service contract (VHF or UHF)
   [1979 price ($84) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #84. estimated current price] $ 84 (yearly service) x 1 (number of radios) or CB service ($10) x (Current CPI) / 217.4 (1979 CPI) x (number of radios) = $ 84.00
8. Insurance
   [1979 price (#400) x 217.4 (Current CPI) / 217.4 (1979 CPI) = #400 estimated current price] $ 400.00
9. Communication system at base station (UHF or VHF)
   [1979 price ($372) x (Current CPI) / 217.4 (1979 CPI) = estimated current price] Maintenance contract for base station remote control and incoder or CB Base maintenance ($10) x (Current CPI) / 217.4 (1979 CPI) = $ 0.00

Yearly Operating Costs $ 3,889.70

FORM II. PROCEDURE USED TO ESTIMATE ANNUAL COSTS

I. Capital Expenditures (type of vehicle (s) 15-Passenger Van)

A. Depreciation

1. Depreciation for the Vehicle and its associated equipment [$ 9,855. (cost of vehicle) + $ 2,850 (cost of hydraulic lift or ramp) + $ 300. (cost of wheel chair locks) - $ 0 (resale value of vehicle and its associated equipment) = $ 13,005 (depreciable balance) x $\frac{217.4 \text{ (Current CPI)}}{217.4 \text{ (1979CPI)}}$ = # 13,005 estimated current price.] # 13,005 (price of vehicle and assorted equipment.) / [75,000 (expected life of vehicle in terms of miles) ÷ 19,020 (estimated yearly mileage)] = $ 3,298.10

2. Base Communication (type of system Existing) [$ _____ (Cost of complete system)] x $\frac{217.4 \text{ (Current CPI)}}{217.4 \text{ (1979CPI)}}$] = _____ estimated current price.] _____ (price of communication) ÷ 10 years = $ 0.00

3. Vehicle Communication (type of system VHF) [$ 2,060 (Cost of radio) x [$\frac{217.4 \text{ (Current CPI)}}{217.4 \text{ (1979CPI)}}$] = # 2,060 estimated current price. # 2,060 (price of vehicle communication) ÷ 10 years = $ 206.00

4. Other Equipment (fire extinguisher) [$ 50 (Cost of equipment) x $\frac{217.4 \text{ (Current CPI)}}{217.4 \text{ (1979CPI)}}$] = # 50 estimated current price # 50 (price of fire extinguisher) ÷ 10 years = $ 5.00

B. Capital Requirements

[$ 13,005. (cost of vehicle and assorted equipment) + $ 0 (cost of base communication) + $ 2,060. (cost of vehicle communication) + $ 50. (cost of other equipment)] = $ 15,115.00

Capital Available $ 15,115.00

Interest = [$ 15,115. (capital requirements) - $ 15,115. (capital available)] x 10 % (interest rate) = $ 0.00

C. Total miles for the system

System	Miles per year
Fixed route	10,660
Demand responsive	8,360
Total	19,020

III. Driver Costs

A. Full-time driver

$ _____(yearly salary) = $_____

_____(yearly salary) x 15% (fringe benefits) = $_____

B. Part-time driver

40X52=2,080 (number of hours per year) x $ 3.50

(hourly wage rate) = $ 7,280.00

#7,280. (yearly wage) x 15% (fringe benefits) $ 1,092.00

C. Volunteer Drivers

$ _____(paid to volunteers per mile) x _____

estimated miles = $_____

Yearly labor costs $ 8,372.00

IV. Miscellaneous Expenses _____ $ 0.00

Total yearly costs = $ 15,770.80

FORM III. PROCEDURE USED TO ESTIMATE ANNUAL RECEIPTS AND COSTS FOR ALTERNATIVE SYSTEMS

I. Estimated annual receipts

	Charge per rider		
	25¢	50¢	75¢
Trip Charge x			
3,732 (number of riders) =			
Total Potential Receipts	# 933.00	# 1,866.00	# 2,799.00
Receipts at 60% payment	559.80	1,119.60	1,679.40
Receipts at 70% payment	653.10	1,306.20	1,959.30
Receipts at 80% payment	746.40	1,492.80	2,239.20

II. Estimated Costs

	Alternatives			
	1st.	2nd.	3rd.	4th.
Specify Vehicle (s)	1 Van 15-Passenger	2 Vans 12-Passenger	12 Passenger Van + Station Wagon	15 Passenger Van + Car
Type of System	DR + FR	DR + FR	DR + FR	DR + FR
Labor System	Hourly Paid	Hourly Paid	Hourly Paid	Hourly Paid
A. Capital Costs				
Vehicle	3,298.10	2,636.20	2,291.30	2,374.00
Communication (Base)	0.00	0.00	0.00	0.00
Communication (Vehicle)	206.00	412.00	412.00	412.00
Other Equip.	5.00	10.00	10.00	10.00
Interest	0.00	0.00	0.00	0.00
B. Vehicle Operating Exp.	3,889.70	3,798.10	3,698.10	3,577.50
C. Labor Expenses	8,372.00	12,557.90	12,557.90	12,557.90
D. Other	0.00	0.00	0.00	0.00
Total	15,770.80	19,414.20	18,969.30	18,931.40

FORM I. PROCEDURE USED TO ESTIMATE THE USAGE OF TRANSPORTATION BY THE RURAL ELDERLY POPULATION

Specify the service area (name of community, county or multi-county areas) for which transportation service is to be provided. The budget analysis is prepared for the year _____.

_____ _____

_____ _____

I. Estimated number of riders per year for the service area

A. Expected number of riders per year in the service area

_____(Number of persons >55) x 3.01 (expected riders per person per year) = _____

B. Low Estimate

_____(Number of persons >55) x 2.15 (low estimate of expected riders per person per year) = _____

C. High Estimate

_____(Number of persons >55) x 3.87 (high estimate of expected riders per person per year) = _____

D. Estimated riders per day

_____(Expected number of riders per year) ÷ 12 = _____ (average monthly ridership).

_____Average monthly ridership ÷ 20 (average operating days per month) = (average number of riders per day) _____

_____Average monthly ridership ÷ 20 (average operating days per month x 1.18 (Index of the peak usage monthly) = average number of riders per day during busiest month _____.

II. Estimated mileage for the system

A. Mileage for demand-responsive system (Two methods of calculation)

1. Method 1

_____(Estimated number of riders per year) x 2.24 (Average miles per rider trip) = _____

2. Method 1

Month	No. of Riders Per Year	Monthly % of Trip-making	No. of Riders/Mo.	x Ave. Miles Per Rider Trip	= Bus Miles Per Month
Jan.	_____	5.23%	_____	_____	_____
Feb.	_____	5.00%	_____	_____	_____
March	_____	9.12%	_____	_____	_____
April	_____	8.81%	_____	_____	_____
May	_____	9.10%	_____	_____	_____
June	_____	8.78%	_____	_____	_____
July	_____	8.58%	_____	_____	_____
Aug.	_____	9.51%	_____	_____	_____
Sept.	_____	9.83%	_____	_____	_____
Oct.	_____	9.79%	_____	_____	_____
Nov.	_____	8.23%	_____	_____	_____
Dec.	_____	8.03%	_____	_____	_____
Total		100%			

B. Mileage for fixed-route system

Name of Route	Destination of Route	Origin of Route	Frequency of Service Per Week or Month	x Miles Served Per Round-trip Per Route	x Week or Months Per Year	= Bus Miles Per Year
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____

FORM II. PROCEDURE USED TO ESTIMATE ANNUAL COSTS

I. Capital Expenditures (type of vehicle (s) _____)

A. Depreciation

1. Depreciation for the Vehicle and its associated equipment
[$_____(cost of vehicle) + $_____(cost of hydraulic lift or ramp) + $_____(cost of wheel chair locks) - $_____(resale value of vehicle and its associated equipment) = $_____(depreciable balance) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979CPI)}}$ = _____estimated current price.] _____(price of vehicle and assorted equipment.) / [_____(expected life of vehicle in terms of miles) ÷ _____(estimated yearly mileage)] = $_____

2. Base Communication
(type of system _____) [$_____(Cost of complete system)] x $\frac{\text{(Current CPI)}}{\text{217.4 (1979CPI)}}$] = _____estimated current price.] _____(price of communication) ÷ 10 years = $_____

3. Vehicle Communication
(type of system _____) [$_____(Cost of radio) x [$\frac{\text{(Current CPI)}}{\text{217.4 (1979CPI)}}$] = _____estimated current price. _____(price of vehicle communication) ÷ 10 years = $_____

4. Other Equipment (fire extinguisher)
[$_____(Cost of equipment) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979CPI)}}$] = _____estimated current price _____(price of fire extinguisher) ÷ 10 years = $_____

B. Capital Requirements
[$_____(cost of vehicle and assorted equipment) + $_____ (cost of base communication) + $_____(cost of vehicle communication) + $_____ (cost of other equipment)] = $_____
Capital Available $_____
Interest = [$_____(capital requirements) - $_____(capital available)] x _____% (interest rate) = $_____

C. Total miles for the system

System	Miles per year
Fixed route	_____
Demand responsive	_____
Total	_____

II. Operating Expenses (Type of vehicle _____)

1. Gasoline
   [1979 price (.96) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] [_____(yearly mileage) ÷
   _____(miles per gallon) x $_____(Cost per gallon)] = $_____

2. Tires
   [1979 price ( ) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] [____(number of tires per vehicle) x
   $_____(cost per regular tire) x _____(yearly mileage)
   ÷ _____(expected life of tires in terms of miles)] = $_____

3. Oil Change, Oil Filter and Lubrication
   [1979 price ( ) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] [_____(yearly mileage) ÷
   _____(miles between oil changes) x $_____(cost each time)] $_____

4. License
   [1979 price($4.10)x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] $_____

5. Tune-up
   [1979 price ( ) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] [_____(yearly mileage) ÷
   _____(miles between tune-up)] x $_____(Cost per
   tune-up) $_____

6. Miscellaneous repairs
   [1979 price($200) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] [_____(yearly mileage) ÷
   10,000] x $_____(cost per 10,000 miles) = $_____

7. Two-way radio service contract (VHF or UHF)
   [1979 price ($84) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] $ _____(yearly service) x ____ (number of radios)
   or CB service ($10) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ x (number of radios) = $_____

8. Insurance
   [1979 price ( ) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] $_____

9. Communication system at base station (UHF or VHF)
   [1979 price ($372) x $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ = _____
   estimated current price] Maintenance contract for base station
   remote control and incoder or CB Base maintenance ($10) x $_____
   $\frac{\text{(Current CPI)}}{\text{217.4 (1979 CPI)}}$ =

Yearly Operating Costs $_____

III. Driver Costs

A. Full-time driver

$ _____(yearly salary) = $_____

_____(yearly salary) x 15% (fringe benefits) = $_____

B. Part-time driver

_____(number of hours per year) x $_____

(hourly wage rate) = $_____

_____(yearly wage) x 15% (fringe benefits) $_____

C. Volunteer Drivers

$ _____(paid to volunteers per mile) x _____

estimated miles = $_____

Yearly labor costs $_____

IV. Miscellaneous Expenses _____ $_____

Total yearly costs $_____

FORM III. Procedure Used to Estimate Annual Receipts and Costs for Alternative Systems

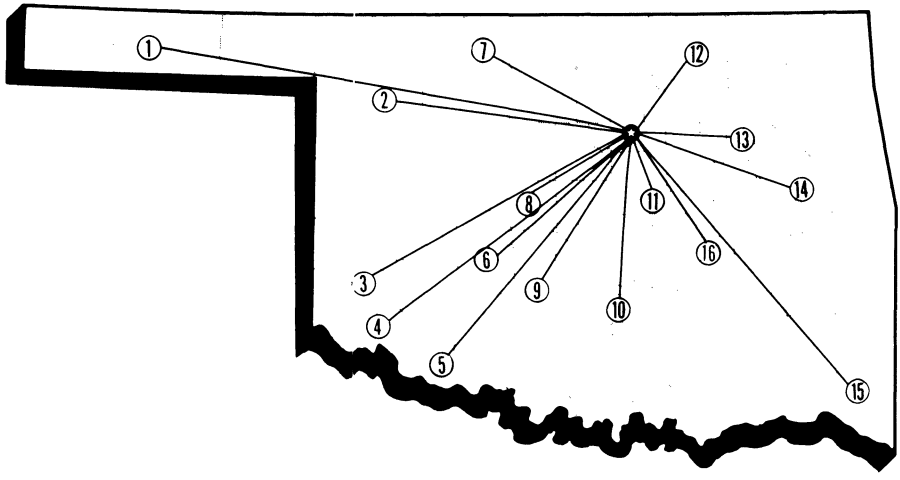
I. Estimated annual receipts

	Charge per rider		
	25¢	50¢	75¢
Trip Charge x _____(number of riders) =			
Total Potential Receipts			
Receipts at 60% payment			
Receipts at 70% payment			
Receipts at 80% payment			

II. Estimated Costs

	Alternatives			
	1st.	2nd.	3rd.	4th.
Specify Vehicle (s)				
Type of System				
Labor System				
A. Capital Costs				
Vehicle				
Communication (Base)				
Communication (Vehicle)				
Other Equip.				
Interest				
B. Vehicle Operating Exp.				
C. Labor Expenses				
D. Other				
Total				

OKLAHOMA
Agricultural Experiment Station
System Covers the State



Main Station — *Stillwater, Perkins and Lake Carl Blackwell*

1. Panhandle Research Station — *Goodwell*
2. Southern Great Plains Field Station — *Woodward*
3. Sandyland Research Station — *Mangum*
4. Irrigation Research Station — *Altus*
5. Southwest Agronomy Research Station — *Tipton*
6. Caddo Research Station — *Ft. Cobb*
7. North Central Research Station — *Lahoma*
8. Southwestern Livestock and Forage Research Station — *El Reno*
9. South Central Research Station — *Chickasha*
10. Agronomy Research Station — *Stratford*
11. Pecan Research Station — *Sparks*
12. Veterinary Research Station — *Pawhuska*
13. Vegetable Research Station — *Bixby*
14. Eastern Research Station — *Haskell*
15. Kiamichi Field Station — *Idabel*
16. Sarkeys Research and Demonstration Project — *Lamar*