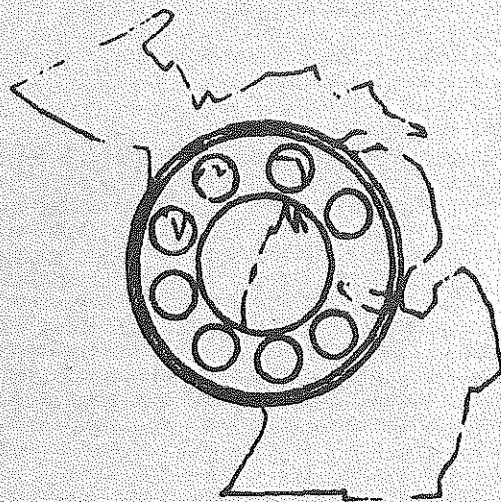


**Dial  
A**

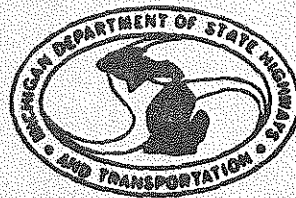
**Ride**

**Transportation**



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**MICHIGAN DEPARTMENT OF STATE HIGHWAYS  
AND TRANSPORTATION**



**BUREAU OF URBAN AND PUBLIC TRANSPORTATION**

**———— Dial-A-Ride Transportation ————**

October, 1975

MICHIGAN DEPARTMENT  
OF  
STATE HIGHWAYS AND TRANSPORTATION

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MICHIGAN DART PROGRAM

STATUS REPORT

Revised October, 1975

By

Bureau of Urban and Public Transportation

STATE HIGHWAY COMMISSION

Peter B. Fletcher  
Chairman

Hannes Meyers, Jr.

Charles H. Hewitt  
Vice Chairman

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## Index

	<u>Page</u>
I. Introduction	1
II. Background	2
A. Legislation and Financing	2
B. Population Characteristics	4
C. System Characteristics	4
D. Flow Chart	5
III. Ridership Data	7
IV. Cost/Revenue Data	8
V. Vehicle Operating Data	9
VI. Community Impact	10
VII. Summary	15
VIII. Supplement - Michigan Urban DART Systems	16

Appendix A - General Guidelines

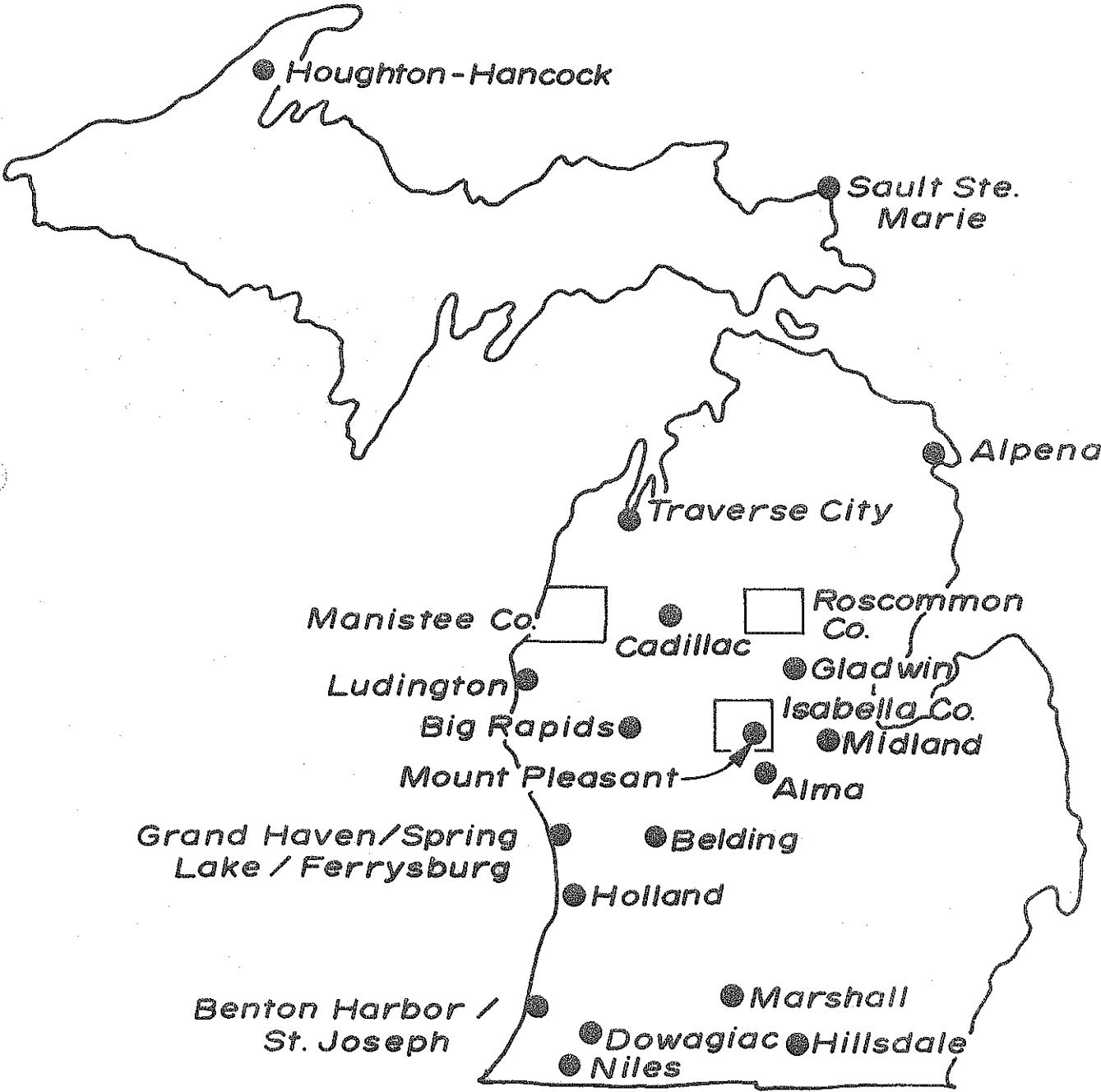
## I. Introduction

The Michigan Department of State Highways and Transportation has actively been exploring the feasibility of improving public transportation in Michigan's small/medium-sized communities and rural areas. Michigan DART or Dial-A-Ride Transportation is the program concept designed to provide basic transportation service throughout the State.

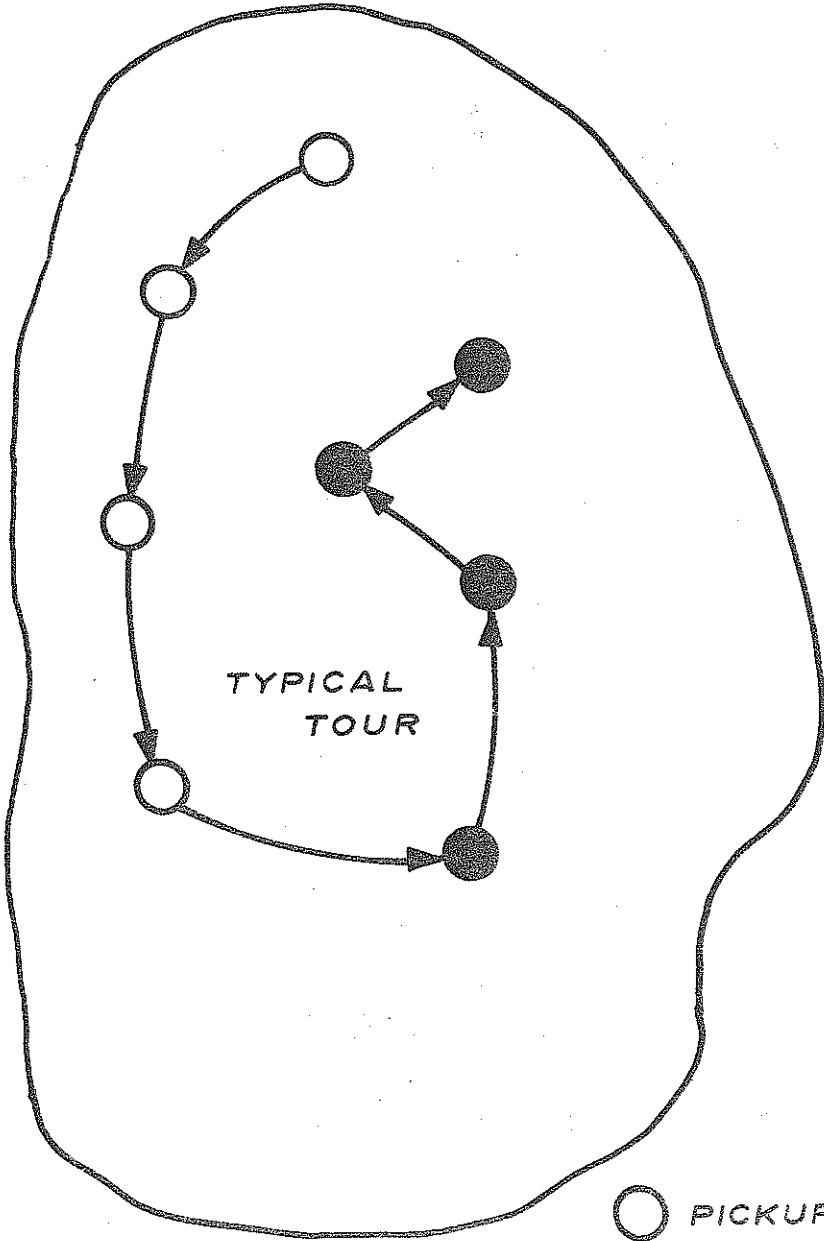
DART service has now been implemented in nineteen locations statewide (Exhibit A), providing total public transportation services to one-quarter of a million Michigan residents. By August of 1975, we expect to have twenty-two systems operating.

Basically, a dial-a-ride transportation system in cities involves the potential customer contacting the transit service by telephone to make arrangements for pickup and delivery to a destination. DART is a flexible system which operates on a demand-response basis (Exhibit B). DART does not operate like a taxi, picking up and delivering fares one at a time, but on tours. A tour consists of the bus picking up passengers at five or six locations and delivering them to different destinations throughout the city. All of the DART vehicles are radio dispatched. When a tour is finished, the dispatcher uses the radio system to relay a new list of pickups. Pickups after call-in are generally within 20 minutes and trip time averages 15 minutes.

# OPERATING SYSTEMS



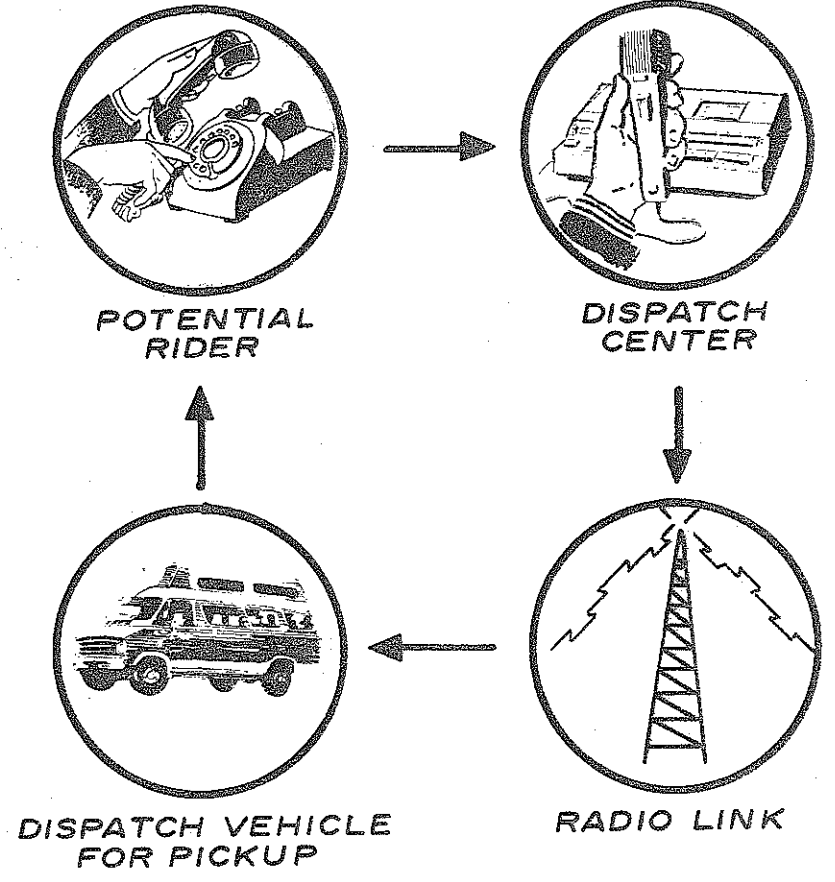
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**SERVICE AREA**

**TYPICAL TOUR**

- PICKUPS
- DROP OFF



# DEMAND-RESPONSIVE SERVICE

In rural areas, DART takes on many different forms. The towns over 3,000 are served with Dial-A-Ride; however, it is operationally impossible to provide this quality of service to all residents in a typical county covering 500 square miles and keep the actual cost per passenger under \$2.50.

The options available are planned/demand service (advance sign-up), shuttles connecting population areas, local coordinators to arrange transportation for low population areas, contracts with community action and social service agencies, etc.

The intent of the following discussion will be to provide an overview of the Michigan DART program. Detailed evaluation of each system will be completed at a later date.

## II. Background

### A. Legislation and Financing

Act 327 of the Public Acts of 1972 provides for the implementation of Dial-A-Ride Transportation systems in Michigan's small/medium-sized cities and rural counties. In Fiscal Year 1974, funds from the General Transportation Fund, which are derived from one-half cent of the nine cent State gas tax, were utilized to implement nine systems on a demonstration basis. The program for Fiscal Year 1975 provides funding

for an additional fifteen communities. Equipment costs will be covered by the General Transportation Fund, while operating costs will be from the State General Fund.

The first year operation cost is funded 100 percent from the State, less \$1,000 as the local contribution. The covered costs include:

1. Capital Costs
  - a. Vehicles
  - b. Radio System
  - c. Dispatch Center Renovation
  
2. Monthly Operating Costs
  - a. Management
  - b. Insurance
  - c. Marketing
  - d. Office Supplies
  - e. Rent and Utilities
  - f. Telephone
  - g. Dispatch Labor
  - h. Driver Labor
  - i. Vehicle Operations and Maintenance
  - j. Radio Maintenance

For the first year, the State contracts with the city, county or authority. If a subcontractor is used, such as, a cab company, the local unit of government must execute a contract with the third party to provide operating services.

At the end of the first year, if the system is continued, the equipment is sold to the community for one dollar per vehicle. The State will continue after the first year to provide



operating subsidies up to a maximum of 33 percent of the total operating costs, as well as provide matching funds for capital grant requests to UMTA.

B. Population Characteristics

Exhibit C indicates pertinent demographic data for each system. It is readily apparent that a wide range of Michigan communities now have DART service. Belding is the smallest with a population of 5,121 and Benton Harbor/St. Joseph is the largest with a population of 67,835. Percent of households with no cars, percent of senior citizens, and percent of families below poverty level are indicators of the relative need for public transportation.

C. System Characteristics

Exhibit D describes the basic system characteristics. Of the nineteen systems operating, the Huron River Group implemented Holland, Ludington, Mt. Pleasant, Sault Ste. Marie, Traverse City, Midland, Houghton, and Benton Harbor/St. Joseph. State forces have implemented Alpena, Niles, Marshall, Cadillac, Hillsdale, Manistee County, Big Rapids, Isabella County, Belding, Roscommon County and Gladwin to date. The basic fare structure is 50 cents with senior citizens riding for half fare. It should be noted that a number of the systems are being operated by the local cab company under subcontract to the City.

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Exhibit D

SYSTEM CHARACTERISTICS

	Holland	Ludington	Mount Pleasant	Sault Ste. Marie	Traverse City	Isabella County	Midland	Houghton/Hancock	Alpena	Benton Harbor/St. Joseph	Niles	Marshall
Start of Service	Feb. 1974	Feb. 1974	Mar. 1974	Apr. 1974	May 1974	June 10, 1974	June 1974	July 1974	July 1974	Sept. 1974	Nov. 1974	Nov. 1974
Regular Vehicles	5	3	4	5	5	2	8	5	4	14	4	2
Lift Vehicles	1	1	1		1		1		1	1	1	1
Fare Adult	50-75	50-75	50	50	50-75	1.00	50	50	50-75	50	50-65	50-75
Structure Children	Free 50-75	Free 25-35	Free	Free	Free 50-75	Free-.75	Free 25-50	Free 25	25-40	Free	25-40	25-40
Sen. Cit.	25-25	25-35	25	25	25-25	.50	25	25	25-40	25	25-40	25-40
System Hours	M-Th. 6:00-6:00 Fri. 6:00-6:00 Sat. --- Sun. ---	6:00-6:00 6:00-7:00 8:00-6:00 9:00-1:00	7:00-7:00 7:00-9:00 8:00-7:00 9:00-1:00	7:30-10:00 7:30-11:00 8:00-6:00 8:00-6:00	6:00-6:00 6:00-9:30 9:00-5:00 ---	M.-F. 7:00-5:30	6:15-11:00 6:15-11:00 8:00-6:00 9:00-5:00	6:00-6:00 6:00-10:00 6:00-6:00 ---	6:30-8:30 6:30-10:30 6:00-6:00 9:00-5:00	6:30-6:30 6:30-6:30 9:00-6:00 ---	6:00-6:00 6:00-9:00 9:00-6:00 ---	6:00-6:00 6:00-6:00 8:00-6:00 ---
Number of Employees	Full 3 Part 9	3 7	1 17	8 8	7 1	0 5	16 7	9 1	9 1	26 3	8 6	4 3
Operator	Warm Friend Inc.	City	City	Comm. Action Agency	Number 1 Cab Co.	Isabella Co. Comm. on Aging	City	Portage Lake Trans. Authority	City Cab	Twin City Area Trans. Auth.	Waltman Enter.	City
Total First Year Cost	\$198,980	\$149,110	\$171,950	\$199,465	\$175,000	\$56,131	\$312,333	\$167,820	\$164,290	\$430,646	\$141,932	\$103,546
Special Services & Features	Sen. Cit. Charter	Shutin Tour-Hand. Lift Mental School	Experiment. with 25c reg. fares Charter for mental	Comm. Programs Free	Sen. Cit. Center - Pick up 2 Wed. nights/mo.	Headstart Charter	\$9/hour Charter Loop-line haul service	Painesdale 5 trips/day 75c		Sat. Ser. to Lincoln Twp. & Stevensville 1 trip/hr. M-F to Lake Mich. College	Meets AMTRAK Trains	

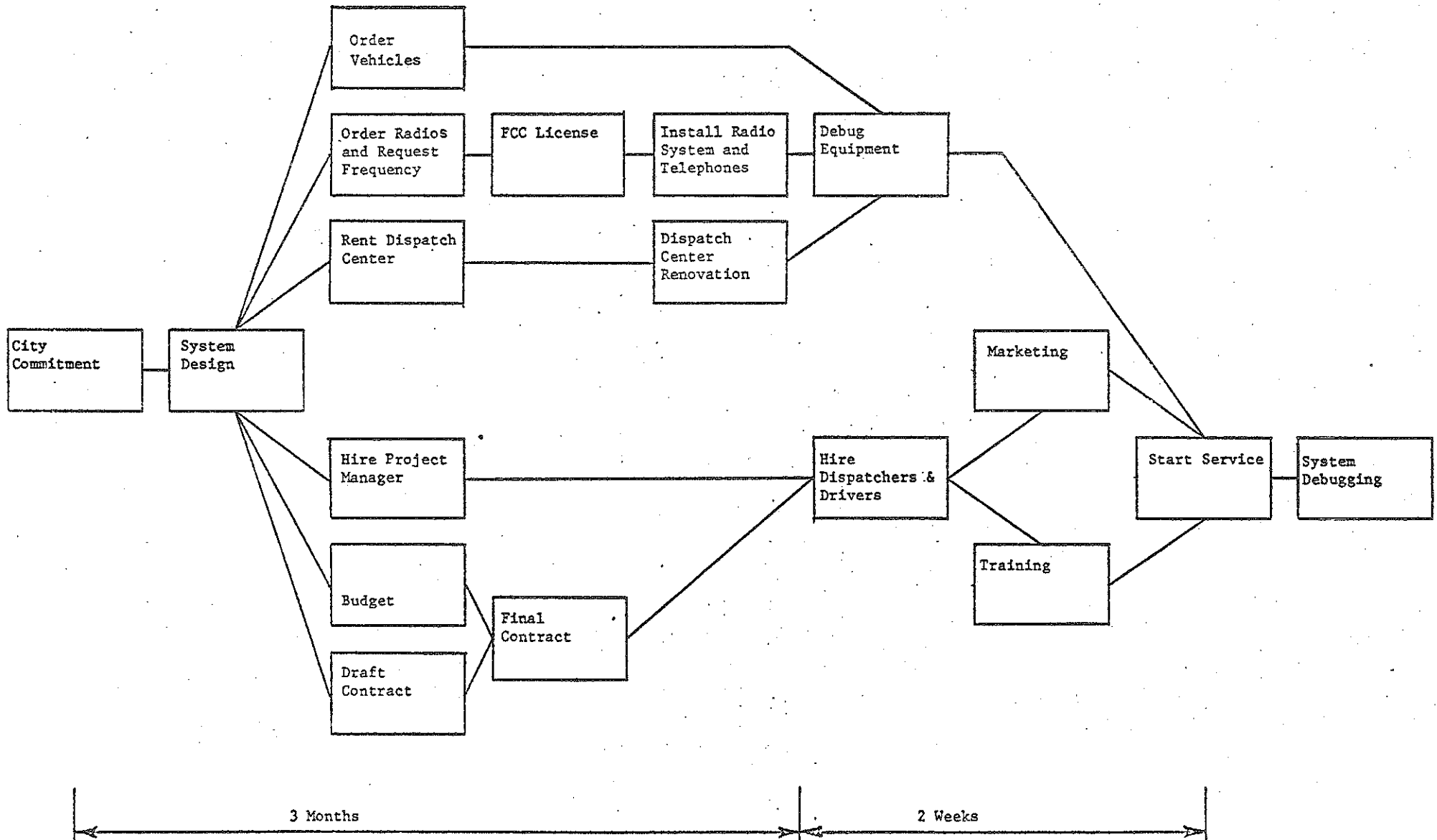


Most of the systems have experimented with special service to both increase ridership and meet community needs. Mt. Pleasant experimented with a 25 cent full fare for a month. Their ridership increased substantially during the month, then dropped back to previous levels. It did serve to introduce many new people to the system. Ludington has provided one-hour tours for shut-ins, with the cost covered by a local merchant or individuals. Twelve of the systems have vehicles equipped with a wheelchair lift. In the near future, all of the DART systems will have this capability. Passengers requiring the use of the lift must call in well in advance. The systems do not have a driver available to operate the lift vehicles at all times during operating hours, since in most cases, the demand for the lift is too low. Service for customers using the lift is limited generally to curb-to-curb service to avoid liability problems. If required, the passengers must provide an attendant.

D. Flow Chart

A number of basic steps must be taken in order to implement a DART system as shown in simplified form in Exhibit E. Obviously, all of these steps must be coordinated to insure that everything is set to go at the projected start-up date.

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All equipment is purchased by the State. Training is also handled by State staff and covers such things as rules of the road, emergency procedures, proper radio procedures, use of the equipment, especially the safe operation of the wheelchair lift, customer relations, dispatcher and driving techniques, etc.

State staff and the local project manager develop a low-key marketing program initially including an information brochure, opening ceremony talks to local groups and as much free radio, TV and newspaper coverage as possible prior to and during the start-up period. An excessively large marketing campaign at the outset could overload the system at the beginning causing long waits and ride times which will in turn drive customers away. The marketing should, therefore, be geared to create a gradual but continual increase in ridership over the first year, allowing the project manager to efficiently adjust the system to meet the increasing demand.



### III. Ridership Data

Of course, the measure of success in any transportation system is found in the ridership statistics. Exhibit F indicates the average ridership for the third quarter of Fiscal Year 1975. As of this writing, over 100,000 passengers per month are riding Dial-A-Ride.

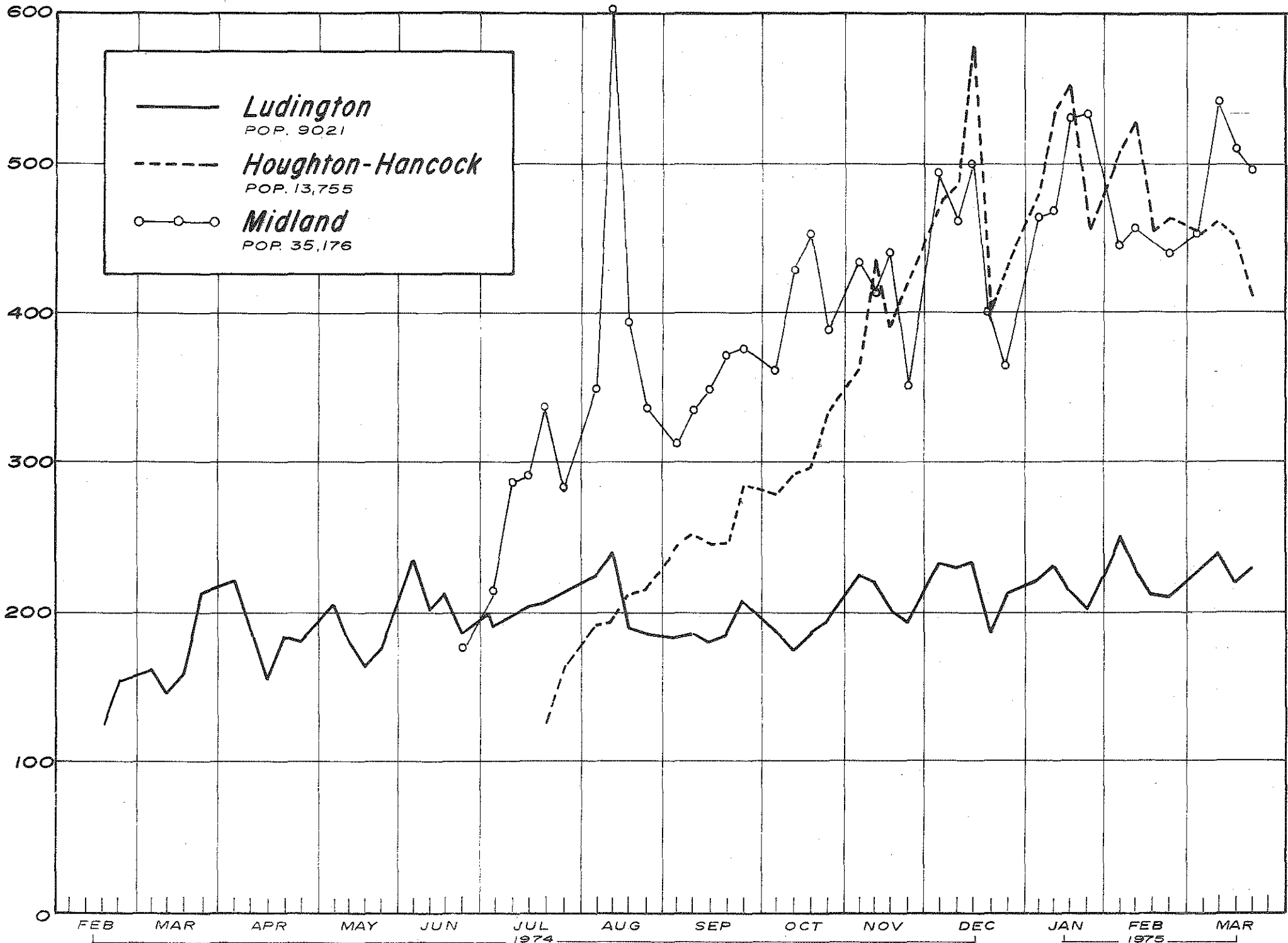
As might be expected, senior citizens have used Dial-A-Ride in large numbers, as shown in the half-fare column.

Passengers/vehicle hour is an indication of system efficiency. We generally feel that DART systems should be averaging six to eight passengers per vehicle hour by the end of the first year. Passengers per 1,000 population are an indicator of system usage and provide a basis for comparing systems. Average waiting times and ratio of riding time to direct driving time are measures of the quality of service being provided to the community. We have limited information on this from Huron River Group. However, the average waiting time of ten minutes and ratio of riding time to direct driving time of 1.47 are within the guidelines set up in the original design.

The average daily ridership trends shown in Exhibit G indicates the trends of the three cities of different populations. There is no clear seasonal pattern to ridership based on our limited

# AVERAGE DAILY RIDERSHIP/WEEK

Exhibit G







data. Each system reacts differently to weather variations, tourist traffic, economic conditions and seasonal variations. Winter weather does bring about some dramatic increase in ridership, especially in the Houghton/Hancock system.

#### IV. Cost/Revenue Data

Another measure of the relative success of the DART program is the actual cost per passenger, as well as the subsidy per passenger (Exhibit H). The average cost per passenger is \$1.37 and average revenue is 36 cents, leaving a required subsidy of \$1.01. By way of comparison, the average cost per passenger for the metropolitan fixed route bus systems was 81 cents for the quarter ending March 31, 1975.

The nature of demand/responsive service, being door-to-door, economical, comfortable and convenient requires a tradeoff in higher operating costs. We do not feel, however, that \$1.37/passenger is excessive in relation to the high quality of service being provided.

COST/REVENUE DATA FOR QUARTER (January, 1975 - March, 1975)

Exhibit H

	Holland	Ludington	Mount Pleasant	Sault Ste. Marie	Traverse City	Isabella County	Midland	Houghton/Hancock	Alpena	Benton Harbor/St. Joseph	Niles	Marshall
Total Operating Cost Per Month	6,245.00	4,933.66	6,258.89	7,772.55	7,387.25	2,561.55	19,486.59	11,063.68	8,561.21	21,523.97	7214.00	5,216.40
% Administration & Fixed Overhead	---	---	---	27	21	22	22	22	13	28	21	15
% Labor	---	---	---	48	65	55	65	62	66	58	59	75
% Vehicle Operation	---	---	---	25	14	23	13	16	21	14	20	10
Cost Per Vehicle Hour	6.91	7.69	6.99	7.10	7.03	5.57	8.48	7.70	6.77	11.56	7.56	9.33
Cost Per Passenger	1.00	1.02	1.05	1.26	1.10	2.38	1.71	.95	1.06	1.89	1.28	2.06
Cost Per Mile	.55	.68	.60	.59	.58	.32	.60	.62	.50	1.09	.75	.99
Revenue Per Month	2,101.85	1,785.50	2,133.56	2,013.73	2,655.42	675.87	3,581.95	3,641.85	3,122.42	3,477.35	2,182.23	937.21
% of Revenue to Total Cost	34	36	34	26	36	26	18	33	36	16	30	18
Revenue Per Vehicle Hour	2.33	2.78	2.38	1.84	2.53	1.47	1.56	2.53	2.47	1.87	2.29	1.68
Revenue Per Passenger	.34	.37	.36	.33	.40	.63	.31	.31	.39	.30	.39	.37
Revenue Per Mile	.18	.25	.21	.15	.21	.08	.11	.21	.18	.18	.23	.18
% of Operating Assistance to Cost	33	17	24	19	22	---	18	14	18	17	16	13



## V. Vehicle Operating Data

The backbone of the DART system is, of course, the passenger vehicle. There are presently many vehicles on the market (approximately 30) which are purported by each company to be the ideal Dial-A-Ride vehicle. Some are van conversions, mobile home conversions, electrics, diesels, school bus conversions, etc.

In the Michigan DART program, we have generally settled on the high-roof van conversion as the vehicle best suited for service in medium- to small-sized towns (Exhibit I). It is unobtrusive, comfortable, and very maneuverable on residential streets. We are presently purchasing this type of vehicle for approximately \$10,000 per unit. The major drawback to this vehicle is maintenance and limited vehicle life. The van chassis is a factory production model and is not built for the daily stop and go operations of a bus system. We expect that each vehicle will put on approximately 35,000 miles per year. The vehicle operating cost per passenger averages 25 cents which is only sixteen percent of the total operating cost per passenger, indicating the labor intensiveness of DART service. Exhibit J indicates our operating experience for the last quarter.









As mentioned previously, the Department is providing each DART system with a wheelchair lift equipped vehicle, thus insuring service to 100 percent of the citizens in the service area.

Exhibit K is an example of the type of equipment now in service. Each of these vehicles are equipped with two wheelchair tie-downs leaving seating for six walk-on passengers.

As more and more transit systems get into higher quality, door-to-door service, especially for elderly and handicapped, we expect the demand for small- to medium-sized buses will exceed 100,000 units by 1980. It is hoped that automobile, school bus and transit bus manufacturers will develop a van-size vehicle capable of withstanding the rigors of transit use.

#### VI. Community Impact

To date, the DART systems have had a favorable impact on the community as a whole as reflected in elections in Holland, Mt. Pleasant, Ludington and Traverse City. Holland voters agreed to a one-half mill levy for three years by a 73 percent majority. In an advisory vote, Mt. Pleasant voters voted "yes" to keeping Dial-A-Ride by a 71 percent majority. Ludington and Traverse City voters approved one mill and three-fourths mill, respectively. Midland, Sault Ste. Marie, Alpena and Niles all will be continuing beyond the first year using their general funds or revenue sharing funds.



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The Huron River Group has completed surveys in several of the initial DART cities. Some of the preliminary findings are presented in "Michigan DART: Analysis of Initial Operations" from which the following items are taken:

"Ridership For A Typical Day"

Regular riders	30
New riders	100
Return trips	<u>80</u>
Total	210

"Mobility for the "Transportation Poor"

DART systems in general derive a majority of their ridership from those who are relatively transportation poor. In particular:

- Persons without drivers' licenses comprise 40 percent, 64 percent, and 70 percent of the riders in Mt. Pleasant, Holland and Ludington, respectively.
- Riders from households without automobiles comprised 38 percent, 44 percent and 58 percent of passengers in Mt. Pleasant, Holland, and Ludington, respectively.
- Senior citizens comprise approximately 50 percent of the riders in Holland and Ludington and approximately 24 percent in Mt. Pleasant.
- An average of 6 percent of DART riders in the three cities indicated that in the absence of DART they would not have been able to make their current trip.
- Only five to ten percent of riders in the three cities indicated that their trip on DART replaced a trip in which they would have driven themselves to their destination.

"In conclusion, DART riders in Holland, Ludington, and Mt. Pleasant are dominantly persons with fewer transportation options than the general population. DART has replaced trips which they would have made by walking, having a friend or relative make a special trip to drive them, or taking a taxi; and 15-20 percent of their trips would not have been made at all."

In another Huron River Group report "Ludington DART: First Period Ridership Survey Results," it is interesting to note the distribution of trip purposes by those persons interviewed (see Exhibit L) as well as their alternate mode of travel if DART service was not available.

This survey also yielded the fact that 71 percent of those interviewed did not have a driver's license. In addition, 50 percent of the riders lived in households without automobiles, as compared to 15 percent of all households in Ludington.

#### Economic Impacts

1. Positive benefits from transportation cost savings to riders.
2. Positive benefits from increased employment.
3. Negative benefits from reductions in taxi business.

Figure 2: DART Riders Distributed By Trip Purpose

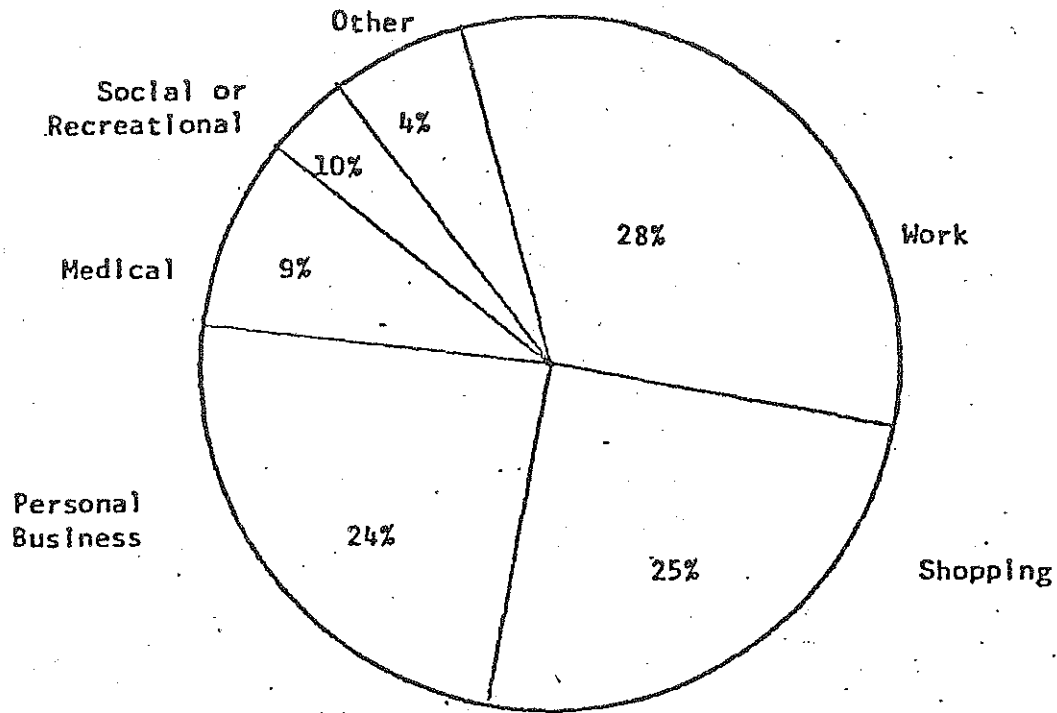
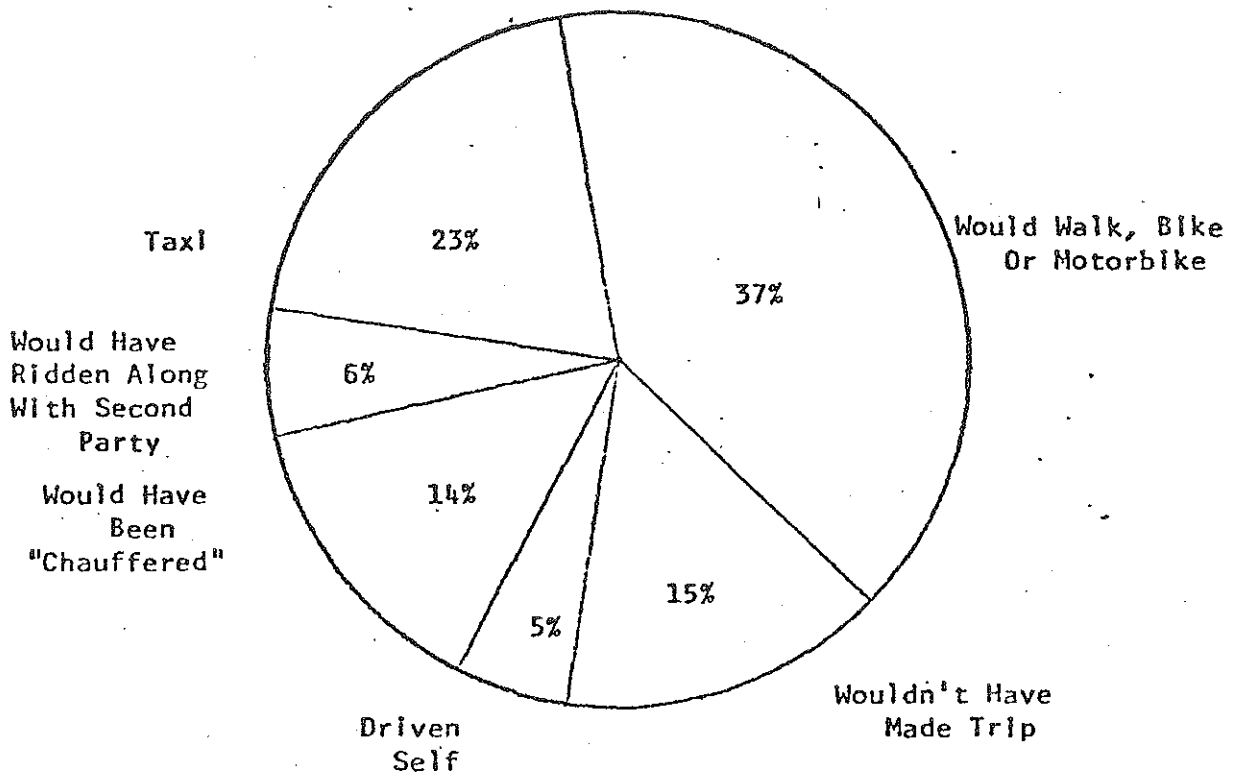


Figure 3: Alternative Mode of Trip-Making





"Estimates of the savings in transportation cost for a regular DART rider, as compared with taxi and automobile use, indicate that a regular rider can save \$1,500-\$2,000 per year.

"Traverse City, where total taxi ridership has been historically much greater, shows a taxi ridership loss of approximately 100 trips per day out of 300. In general, taxi ridership appears to drop approximately 30 percent to 50 percent from historical levels in DART cities. For each taxi ride thus lost, three to five DART riders are generated.

"There is evidence in other areas which have had Dial-A-Ride service that taxi ridership ultimately rebounds and may in fact reach higher levels than before Dial-A-Ride introduction. Such a process has not been observed to date in DART cities. A detailed examination of taxi statistics in Holland reveals that total ridership is down approximately 45 percent on a base of 80-100 riders per day--in agreement with survey results and implications above--but that taxi package deliveries are up approximately 15 percent.

"Neglecting the increase in package deliveries, the introduction of DART in Holland has apparently caused a loss of about \$15,000 per year in gross taxi revenues and a loss of about one and a half

full-time job equivalents in the taxi business. Because Holland DART is operated under a subcontract with the taxi operator, it is unlikely that an actual loss has been registered. Traverse City and Alpena have similarly subcontracted DART operators to local taxi firms, effectively insuring them against actual business losses. Taxi operators in other cities have apparently suffered revenue losses, but exact statistics are not available.

"The net employment impact of DART operations in Holland has thus been the creation of approximately eight new full-time equivalent jobs with a cash value of approximately \$65,000. Transportation savings to riders appear to amount to approximately \$40,000 yearly, with a potential for substantially more if DART use becomes a form of substitution for marginal automobile ownership."

#### Parking, Conjestion, Energy and Pollution

"Current operations then, in which DART services are primarily increasing access for those with limited transportation means, appear to have little net effect on traffic and associated problems. However, future gorwth of DART ridership is likely to begin to impact in this area, since current operations appear to satisfy most of the travel requirements of the transportation poor."

VII. Summary

The Michigan DART program is off and running. In February, 1974, the first system started. There are now 19 systems operating, carrying the equivalent of one million passengers per year.

Three new systems are due to start in the near future. None of these citizens have previously had the availability of public transportation which is low cost, convenient, comfortable, safe, and most of all, provides the freedom of movement when the need arises, not when it is convenient for someone else to provide the transportation.

## SUPPLEMENT

### URBAN DART SYSTEMS

In addition to the outstate DART program discussed in the body of this report, a number of urban DART systems have been implemented as indicated on Exhibit 1.

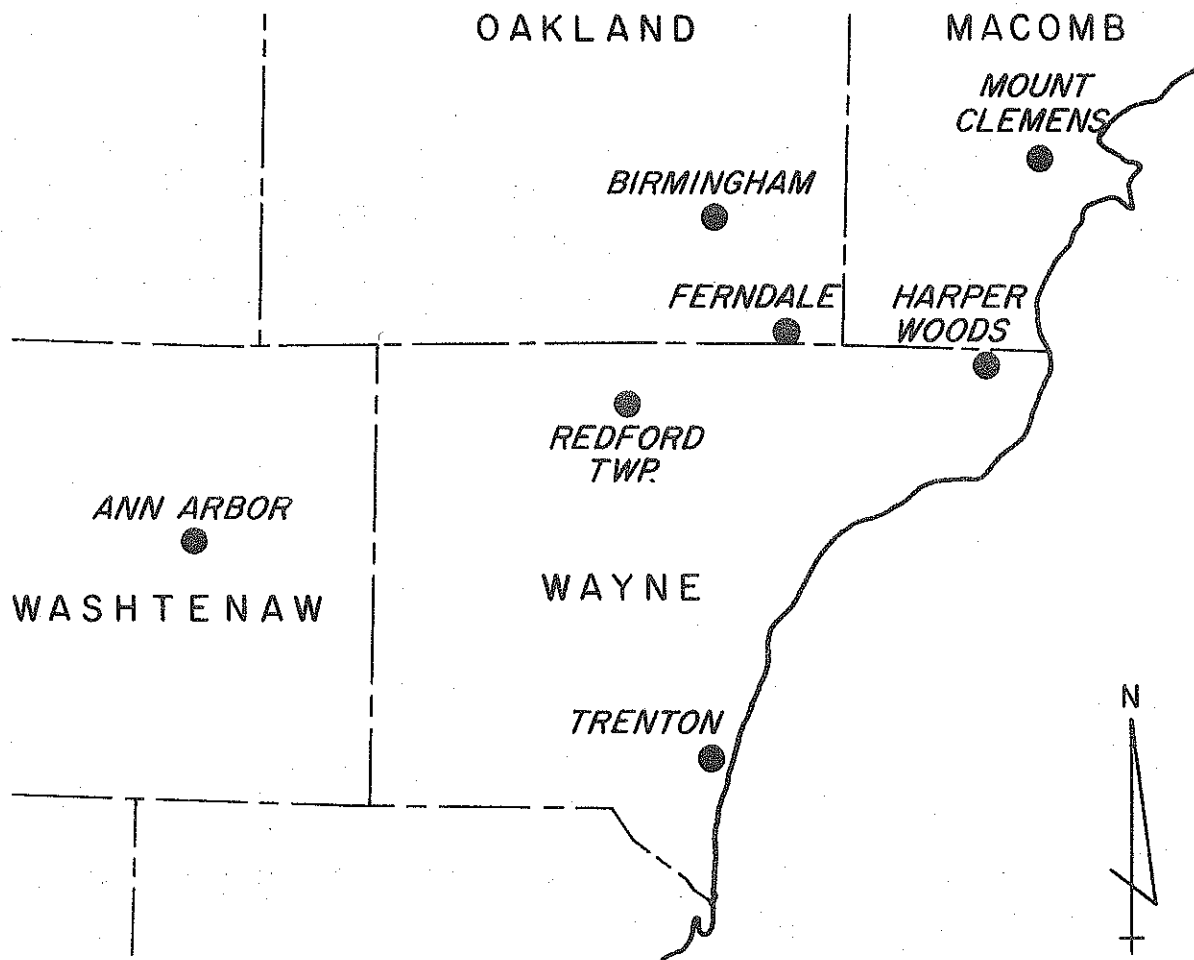
The Ann Arbor Dial-A-Ride system is the forerunner and pioneer for the Michigan DART program. Since its inception several years ago, the Ann Arbor system has first of all demonstrated the need for higher quality portal-to-portal type services, and secondly, the feasibility of providing this service by gradually phasing in the system in logical geographical areas. This insures good integration of DART with existing line-haul service and limited description to the overall system by gradually increasing ridership. The people of Ann Arbor also voted 2.5 mills to support the service. Seven outstate communities have now followed the lead of Ann Arbor by voting millage to support the DART systems.

In the past year, a number of DART systems have been funded by the State within the Detroit area. These systems are operated by the Southeastern Michigan Transportation Authority (SEMTA). These systems are all located within the confines of individual suburbs surrounding

the City of Detroit. The day-to-day operation is similar to the outstate systems in that door-to-door service is provided. Major differences result from service to line-haul buses and commuter rail transfer points, as well as trips outside the city limits to major shopping centers. The potential is great for high productivity in these systems in light of the high densities and rather short trip lengths.

The following exhibits indicate information presently available for these systems. UPTRAN is in the process of revising this report which will include a more complete picture of the urban systems.

# OPERATING SYSTEMS















The following general guidelines are only for the purpose of pointing out some immediate problems in getting the DART system underway. The DART staff will work closely with each community to design and implement the system.

System Operator - Should be a person, company, or agency desirably with some experience in operating a transportation system such as a taxi company, bus company, truck fleet, etc. Specific experience in vehicle dispatch operations, maintenance, communications, and customer service is an important asset. As the DART program will be a highly visible public operation, it is imperative that the project manager have a pleasing personality and a high degree of willingness to work with the public. The system can be operated directly by the city or county or by a private company under a 3rd party contract.

Vehicle Maintenance and Storage - All vehicles should be stored in a heated or unheated building. A preventive maintenance program should be instituted at the beginning of the project. It is important to note that routine service is recommended twice as often as the factory recommends.

Training - Well trained dispatcher and drivers are essential to the initial and continued success of the system. If the staff makes mistakes too often, the public will quickly lose confidence in the operation and stop riding. One of the first goals of the project manager should be to develop a training program including "dry runs" in the field.

Marketing - As the DART system is an innovative program, the public must be made aware of how the system operates, when service is available, and farestructure, etc.

Dispatch Operation - Of immediate concern to the project manager will be the location of the dispatch operation. This will be based on several factors:

1. The physical requirements in the dispatch center, such as; the location of displays, radio and telephone equipment, office furniture, etc.
2. Transmitter location.
3. Location close to the center of town is desirable.

Radio System - Installation of an adequate system is one of the major problems encountered during the design period. If the system operates with a separate radio system a considerable amount of technical design time is required. A small DART system could "piggy back" on an existing radio operation such as public works or cab company systems. In addition, a large amount of paper work is required to get frequency assignments and FCC licenses.