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analyzing transit options for small urban communities

VOL III

summary of management and operations experience

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16. Abstract

This manual provides an analytical framework and supporting analytical techniques to assist in the analysis of transit options for small urban communities. It is intended for use principally by planners and decision-makers in communities with less than 200,000 residents, but many portions would be useful in larger urban areas as well. Sufficient information is provided in the manual to permit the small urban community to conduct its own analysis without resorting to outside assistance.

The information and analytical techniques contained in this manual are presented in three volumes. This volume, Volume Three, Summary of Management and Operations Experience, contains the last two chapters of the manual. These two chapters describe the activities of a transit operation, explore the relations between these activities, identify arguments for and against local control of transit organizations, and provide numerous data and statistics that characterize the financial and operating performance of existing conventional transit and paratransit services in small urban communities.

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ANALYZING TRANSIT OPTIONS FOR SMALL URBAN COMMUNITIES

Volume Three: Summary of Management and Operations Experience

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January 1978

Prepared for

U. S. Department of Transportation
Urban Mass Transportation Administration
Office of Planning Methods and Support

FORWARD

Today's transportation planner must confront ever-changing issues within a variety of working environments. To assist him, UMTA's Planning Methods and Support program researches, develops, and distributes planning tools, including the documentation of novel planning studies, new design and forecasting techniques, and germane research results. This report is one example. Prepared by recognized experts, its content clearly presents usable planning concepts, and thus constitutes a valuable addition to the growing set of computerized and manual techniques comprising the UMTA/FHWA Urban Transportation Planning System (UTPS).

More important than the production and dissemination of a new tool is the experience and opinion of its user. Local issues change. Better methods evolve. Or, realistically, errors may appear in the final product. We depend on you, the transportation planner, to alert us to any of the above. We need your comments and your ideas. Please let us hear them, so we can continually improve our products.

You may obtain additional copies of this report from the National Technical Information Service (NTIS), Springfield, VA, 22101. On your request, please reference IT-06-9020-78-3.

Robert B. Dial, Director
Office of Planning Methods
and Support (UPM-20)
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Washington, D. C. 20590

ABSTRACT

This manual provides an analytical framework and supporting analytical techniques to assist in the analysis of transit options for small urban communities. It is intended for use principally by planners and decision-makers in communities with less than 200,000 residents, but many portions would be useful in larger urban areas as well.

The procedures and techniques presented in the manual are oriented to state and local planners and decisionmakers who are called upon to analyze transit options but who have limited data and time to perform these analyses. Sufficient information is provided in the manual to permit the small urban community to conduct its own analysis without resorting to outside assistance. At the same time, modifications, embellishments, and improvements to the procedures and techniques set forth in this manual are encouraged should local data or past analyses suggest more appropriate methods.

The information and analytical techniques contained in this manual are presented in three volumes. Volume One, Transit Service Objectives and Options, contains the first four chapters:

- Chapter I - Introduction
- Chapter II - A Procedure for Planning Conventional Transit and Paratransit Service in Small Urban Communities
- Chapter III - Identifying Objectives for Local Transit Services
- Chapter IV - Formulating Transit Service Opportunities

In these four chapters the structure, content, and applicability of the manual is set forth, a general approach to analyzing transit options in small urban communities is described, the specification of local transit service objectives is discussed, and information to assist in the formulation of transit service opportunities is presented.

Volume Two, Analysis Methods, contains the fifth chapter of the manual:

- Chapter V - Evaluating Transit Service Alternatives

In this chapter, an evaluation approach is described and detailed techniques are presented with which one can estimate the patronage, cost, and revenue

implications of a transit service operation; these are three key elements in the evaluation of transit service alternatives.

Volume Three, Summary of Management and Operations Experience, contains the last two chapters of the manual:

- Chapter VI - Planning for Transit Management and Operation
- Chapter VII - Transit Experience in Other Urban Communities

These two chapters describe the activities of a transit operation, explore the relations between these activities, identify arguments for and against local control of transit organizations, and provide numerous data and statistics that characterize the financial and operating performance of existing conventional transit and paratransit services in small urban communities.

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CHAPTER VI

PLANNING FOR TRANSIT MANAGEMENT AND OPERATION

A. Introduction

As planners and decisionmakers determine the role and objectives of transit in the community and consider alternative types of service to accomplish these objectives, there is a parallel need to determine the nature and structure of the organization that will implement transit service. One basic issue is the relation of the transit organization to other community organizations. Institutional arrangements influence both the transit organization's degree of control or flexibility for achieving objectives and its responsiveness to the community. A second basic issue is the transit organization's internal structure and staffing and managerial requirements.

This section discusses those issues which should concern the planner and decisionmaker in structuring, managing, and operating a transit organization.[1] Although typically encountered during initiation of transit service (startup), transfer of ownership of the service to the local government (takeover), and significant addition to existing transit service (expansion), these issues are subject to continual scrutiny, debate, and change for any transit organization. The various aspects of transit organization, management, and operation are discussed in the following order:

- the nature of the transit organization and its relation to other organizations.
- the internal structure of the transit organization, including:
    - major functions and activities;

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[1] For a discussion addressed more specifically to the transit manager charged with starting and operating a small fixed-route, fixed schedule bus system, see George M. Smerk et al, Mass Transit Management: A Handbook for Small Cities (Bloomington, Indiana: Indiana University, 1971). A more recent treatment of issues in this area is also contained in Transit Operating Manual, Vukan R. Vuchic, et al, prepared by the University of Pennsylvania for the Bureau of Mass Transit Systems, Pennsylvania Department of Transportation, Harrisburg, Pennsylvania, 1976. For a parallel treatment of dial-a-bus systems, see Ling Suen et al, Dial-a-Bus Manual vol. II (Montreal: Transport Canada Transportation Development Agency, 1974).

- typical organizational arrangements;
- estimated staffing requirements; and
- desirable managerial characteristics.

B. Nature of the Transit Organization and Its Relation to Other Organizations

When a community has decided to initiate transit service, change the ownership of the transit system, or significantly alter the level of quality of service to be provided, a fundamental issue to be addressed is the level of autonomy the transit organization is to have or, conversely, the level of control to be exercised over the transit organization by the community. Two basic factors that influence the independence of a transit organization, particularly in policy matters, are the legal basis for the transit organization and local financing commitments. The independence of the transit organization can also be impacted by the number and type of transit management activities or functions that are performed by other agencies. Each of these factors is discussed briefly below.

1. The Legal Framework

The transit organization may operate within the municipal government or as a separate municipal agency, a quasi-municipal corporation, a licensed private corporation, a private corporation operating under regulatory statutes, or an unregulated private corporation, partnership, or proprietorship. The subtleties of wording in charters and legislation provide a continuous range of degrees of independence for transit organizations.

The degree of control exercised over a transit organization is also influenced by federal and state laws and local ordinances: the Urban Mass Transportation Act, antitrust laws, unfair competition laws, and local limitations on taxing authority all impose constraints on the transit organization. These constraints are either direct (through regulation) or, more frequently, indirect (through restraints on the availability of financial assistance).

2. The Financial Structure

The major sources of funds available to a transit organization are fare box revenues, direct public grants, earmarked tax revenues, and public debt. On one hand, the transit organization may be provided with

limited independent taxing authority, the power to issue revenue bonds, and the ability to set fare levels. In this type of situation, legislative, but not administrative, control is exercised over the transit organization. On the other hand, operating subsidies by local government may be considered annually, public debt may be restricted to general obligation bonds, and fare levels may be subject to public scrutiny and approval. Both legislative and administrative control are exercised over the transit organization in this type of situation.

3. Performance of Transit Functions and Activities by External Organizations

Many of the functions and activities of the transit organization may be performed externally. For example, maintenance may be performed by the vehicle maintenance department of the local government, and planning may be performed by other appropriate offices in the local government. Alternatively, many functions of transit management and operation may be performed by private contractors. The activities most often performed by organizations other than the transit organization itself are:

- maintenance, especially component repair;
- electronic data processing (EDP);
- payroll processing;
- accounting;
- legal counseling;
- insurance and claim litigation;
- planning; and
- general management.

The independence of the transit organization can be affected by the arrangement for performance of these support activities by external organizations. The transit organization may in fact be tied to local government and subject to its control through the community's performance of various transit-related activities, or it may be separated from the local government and contract with the private sector for external performance of one or more of these support activities.

Two factors that influence the decision to assign activities outside the transit organization are economies of scale and the responsiveness of a self-contained organization. The cost savings of having the

community perform some of the transit organization's support functions (e.g., insurance or accounting) are the most direct benefits of such arrangements. Similarly, cost savings may be had by contracting to professional transportation firms for accounting/management services. In addition to direct savings, such firms offer experience in transit management. For very small systems, these considerations may be decisive. However, the cost savings of contracting for services must be weighed against the loss of internal control and responsiveness. The completely self-contained transit organization is often more able to innovate and to adapt quickly to changing circumstances.

4. Considerations in Determining the Transit Organization's Relation with the Community

There are advantages and disadvantages that require consideration in determining the relation between the transit organization and the small urban community. In Table VI-1 these advantages and disadvantages are shown for two extreme situations: the completely autonomous transit organization and the transit organization that is under the direct control of the community. If an autonomous transit organization has a clear statement of objectives and the flexibility necessary to achieve them, the only constraint on efficiency and effectiveness is the talent of the manager and the organization itself. However, if goals are not periodically reviewed by the community, the danger exists that an unencumbered transit organization may revise and change its objectives in a manner that is not appropriate for (or agreeable to) the community.

In general, the reverse is true when a community exercises complete, or even limited, control over a transit organization. The community's ability to change its transit objectives increases, but the transit organization's flexibility for changing them decreases, and it may be constrained in its choice of means to achieve them. A balance between these extremes is most desirable; an organization is most likely to be successful when it has a high degree of flexibility and is led by a manager who is sensitive to the changing attitudes of the people in the community.

Local control of the organization should ideally be defined in a clear, concise, and periodically reviewed statement of transit system objectives as they relate to the community's overall objectives. To the extent that local financial support is required, a ready mechanism for review of transit objectives is the annual budgeting process, which is particularly suitable because it forces the small urban community to consider its expectations for the transit organization in light of its financial resources to support transit services.

TABLE VI-1

ADVANTAGES AND DISADVANTAGES ASSOCIATED WITH VARYING DEGREES OF EXTERNAL ORGANIZATIONAL CONTROL

Degree of Control	Advantages	Disadvantages
Autonomy	Flexibility of organization to achieve transit system objectives in most efficient manner.	Tendency for organization to set its own goals without regard for changing objectives in the community.
Direct Control	Ease of change in the transit organization's priorities and objectives for serving the community.	Constraints to innovation and fragmented decision making tends to create inefficiencies and uneven quality of service. Such constraints also curtail ability to perform long-range planning beyond normal community planning horizon.

In some cases, common sense will dictate the general level of independence the transit organization should have; the size of the system, the community's goals for the system, and the competence of the local government to perform support functions are self-evident criteria for making this decision. In most cases, however, including public takeover of service or significant expansion to existing service, a more careful consideration of the following factors is advisable:

- existing legal, political, and institutional factors;
- desired community control over the transit organization;
- desired community control over the quality of the service provided by the transit organization;
- cost to the public of exercizing control over the transit organization; and
- potential for transit service expansion.

a. Existing Legal, Political, and Institutional Factors

Decisions regarding the degree of local control to be imposed on a transit organization are influenced by federal and state laws and by local ordinances. The Urban Mass Transportation Act, antitrust laws, unfair competiton laws, and local limitations on taxing authority may all affect decisions regarding local control of the transit organization. Political factors can also exert significant influence on the degree of local control over the transit organization. Influential interest groups, such as taxicab companies or real estate investors, may be affected by the degree of public control over the transit organization and may lobby for public control of the transit organization or force transit into unprotected competition. Institutional factors may also constrain the decision regarding local control of the transit organization. If the system crosses several jurisdictional boundaries, the need for an independent transit organization is often greater than the need for local control. Existing transit/government relations may also significantly affect opportunities for local control over the transit organization.

b. Desired Community Control Over the Organization

The noise and unsightliness of maintenance facilities, the potential unattractiveness of vehicles and advertising, and the change in local traffic patterns are among the factors which may lead a community to try to maintain control over a transit organization.

c. Desired Community Control Over the Quality of the Service Provided by the Transit Organization

The most important reason for public control over transit organizations is the need to dictate the quality of transit services. If the community wishes to have decisions about the quality of the service made on grounds other than profitability, it may wish to retain a greater degree of control. Extended service hours, special service for the elderly and handicapped, special service to cultural centers, and low fares are among the factors that would tend to support the need for public control of the transit organization.

d. Cost to the Public of Exercising Control Over the Transit Organization

Control over the environmental impact of transit and the quality of service, which can be enhanced by integrating the transit organization into the local government structure, will generate a real cost to the public. Not only will transit services create direct costs to the public through subsidy payments, but the process of control itself has a cost because it is accompanied by the burden of decisionmaking.

e. Potential for Transit Service Expansion

Transit systems that are too small to warrant their own organization or too large to be contained within the structure of the local government are two cases in which size affects decisions regarding the independence of transit organizations. If rapid growth is foreseen for the system or if it appears likely that the system may expand across jurisdictional boundaries or eventually merge with a neighboring system, a greater degree of independence will probably be advantageous.

C. Internal Structure of the Transit Organization

Understanding (1) the functions and activities of transit management and operation and (2) their functional organization are essential factors for the planner and decisionmaker when considering the implementation or expansion of the transit service. Overall staffing requirements and the desirable characteristics of a transit manager are also key factors in the development of the internal structure of a transit organization. A review of the functions and activities of a transit system, the typical internal structure of these functions and activities in a small urban community context, and management and staffing considerations are discussed below.

1. Activities and Functions of Transit Management and Operation

To aid in the adequate planning for transit management and operation, a summary of the principal activities carried out by a typical transit organization is presented below. These activities are grouped into eight functions:

- transportation;
- mechanical;
- purchasing and stores;
- scheduling;
- planning and marketing;
- fiscal;
- claims; and
- support.

These functions are common to most transit organizations. However, some organizations may emphasize different functions more than others. For example, paratransit systems will normally place less emphasis on the scheduling activity than will conventional transit systems.

In many of the larger transit properties, each of these eight functions is conducted by an individual department. In smaller properties, however, several functions are often conducted by one department. Each function is discussed separately below.

a. The Transportation Function

The transportation function includes the dispatching and operating of vehicles and therefore results in the basic output of a transit organization. Activities in this function bring the transit organization into direct contact with the public (i.e., the transit user and the community). Employees engaged in this function include drivers, supervisors, dispatchers, instructors, superintendents and assistant superintendents, and clerical assistants. The duties of these employees are outlined below.

(1) Drivers

Drivers have the responsibility for transporting people safely from one place to another in a transit vehicle. They are directed by a written schedule or a communication from a dispatcher or passenger. Because of the peaking that is characteristic of the demand for transit service, drivers usually work in shifts. Although special purpose paratransit systems and exceptional properties present some variations, as a rule the drivers' time is scheduled in the following manner. "Runs" (full work days) are usually chosen by the drivers on the basis of seniority at "sign-ups" held three or more times a year. Eight-hour "straight runs" (5:00 AM to 1:00 PM, 11:00 AM to 7:00 PM, 5:00 PM to 1:00 AM) combine with "swing runs" (7:00 AM to 11:00 AM and 3:00 PM to 7:00 PM) and with "open pieces" (runs that do not comprise a full day's work) to determine the hourly profile of drivers' needs.

Drivers who do not have regular assigned runs are termed "extra" drivers and fill in for drivers who are absent (because of termination, illness, vacation, etc.). Extra drivers may work any kind of run. This group, commonly known as "extra board," is usually composed of drivers who have lowest seniority; in some systems, however, the labor agreement allows more senior operators to choose to work "extra" in the hopes of obtaining better work than their seniority would ordinarily permit ("holding down" the runs of more senior drivers who are vacationing or out with an extended illness).

(2) Supervisors

Supervisors are charged with seeing that drivers provide the service that is assigned as their responsibility. In addition, supervisors control the operation of the system in a variety of circumstances. They normally adjust service and schedules in the event of breakdowns, emergency situations, temporary rerouting, or accidents. They also handle on-the-scene passenger relations when required.

(3) Dispatchers

Dispatchers are charged with assigning the driver and vehicle to the proper service and replacing them when they can no longer continue service for one reason or another. In transit systems having the necessary facilities, the dispatcher may also operate the system's radio base station, maintaining contact with supervisors and drivers.

(4) Instructors

The role of instructor is normally filled by a senior supervisor or by another person who is skilled in training drivers. Instruction includes the training of new drivers and the periodic retraining of senior drivers.

(5) Superintendents

The superintendent oversees all the activities in the transportation function and is responsible to the transit system's manager for their efficient and timely performance. In larger systems, there may be one or more assistant superintendents who, together with clerical assistants, handle the recordkeeping that is required to assist the superintendent in conducting his activities.

The superintendent is directly responsible for discipline among the employees and for training and retraining. Accident, discipline, and attendance records for each employee are normally maintained by the superintendent. In smaller operations the supervisory tasks are often combined and performed by only one person.

b. The Mechanical Function

The mechanical function consists of three groups of related activities:

- servicing;
- routine maintenance; and
- repair.

(1) Servicing

Servicing is a daily activity; it includes fueling, checking lubricant and coolant levels, and washing and cleaning vehicles. Servicing employees (hostlers) move vehicles through the service routine and park them after service is completed. Although fare box receipts are often removed from the vehicles during the service cycle by service personnel, this is not normally considered a servicing function. Similarly, although daily safety inspection (e.g., inspection of lights, wipers, horn, brakes) is considered a routine maintenance activity, in smaller transit operations it is often performed by servicing personnel.

(2) Routine Maintenance

Maintaining the vehicles of the operating fleet is the largest and most important activity within the mechanical function. Routine maintenance includes the inspection of vehicles at planned intervals (daily, weekly, etc.), replacement of worn and defective parts, proper lubrication of equipment, adjustment of fixtures to proper tolerances, and careful attention to any warning signals.

(3) Repair

Repair is necessary when a vehicle breaks down or when a defect is noted by a driver, a mechanic, or another observer. When preventive maintenance is not conducted properly, the need for repair activity increases. Regardless of the degree of preventive maintenance activity, however, repair activities will always be needed.

Repair activities can be categorized by three "shops" as follows:

- running repair shop, where minor malfunctions are corrected, usually by replacing parts or units (e.g., engines, transmissions, alternators, starters);

- backshop, where the major units are rebuilt and repaired and where machining and other highly skilled jobs are done; and

- the paint and body shop.

For larger transit operators these shops may be physically separated within the maintenance facility.

Activities performed in the repair functions are overseen by one or more supervisory personnel (i.e., foremen) and by a superintendent. These individuals are responsible for keeping the fleet in a constant state of readiness; for using manpower, material, and supplies efficiently; and foreseeing that vehicles are available both for all scheduled operations and for a reasonable number of unscheduled activities. To fulfill this responsibility, constant supervision of mechanics, service personnel, and hostlers is required. Inventory, costing, and control records are often kept of all the inspections performed on each vehicle and of all fuel, lubricants, and supplies used by it.

c. The Purchasing and Stores Function

The purchasing and stores function includes the purchase of replacement parts, fuel, lubrication, and other supplies necessary for transit management and operation. It also includes controlling the store rooms so that waste and pilferage are minimized and proper inventory levels are maintained. The performance of this function in a small property will typically require one full-time employee.

The activities involved in the purchasing and stores function may be performed within the fiscal department. The major purpose of the function, however, is to support the mechanical department function, and it is often operated and staffed by mechanical function personnel.

d. The Scheduling Function

The scheduling function includes the scheduling (assignment) of both vehicles and personnel. In a fixed-route transit system, vehicle scheduling includes detailing the movement of each vehicle through time and space on a regular recurring (daily) basis. In a demand-scheduled operation, it involves the assignment of a vehicle to a given area or base, and the actual operating schedule becomes the responsibility of the vehicle dispatcher.

Activities within the scheduling function include gathering data on existing operations, compiling these data into meaningful reports, preparing vehicle and driver schedules with full adherence to labor agreement provisions, supervising operator sign-ups, and preparing reports to management (e.g., drivers and vehicles required, miles and hours operated).

Personnel in a separately established schedule department include:

- traffic checkers, who gather data on passengers, schedule adherence, and running times;
- schedule clerks, who process these data;
- schedulers (or writers), who develop vehicle and driver schedules; and
- a superintendent, who oversees the entire process.

In smaller systems, these activities may be performed within the transportation function, and the number of people involved could be quite small.

e. The Planning and Marketing Function

Because they are so closely related, planning and marketing constitute a single function. Marketing can be defined as that phase of business activity which directs the flow of commodities or services from the producer to the consumer or user. For this flow to be "directed" properly, it must be planned. The planning function gathers, assembles, and analyzes information to help direct the marketing effort.

Very few small transit operations have separate planning/marketing departments. Planning is more often performed by a regional or municipal planning organization, although it can be of considerable value to the transit organization in a marketing effort. In small transit operations the planning/marketing function is normally performed by the transit manager.

Planning and marketing typically include the following activities:

- data collection concerning potential operating areas, population trends, new commercial or industrial activities, new or upgraded transportation facilities, etc.;
- data summarization and display;
- interface with local planning groups;
- layout of routes and/or service areas and the development of potential usage;
- distribution of information concerning the services of the transit system;
- maintenance of an information system;
- design and preparation of passenger timetables and transit system maps;
- promotion of specific and overall services; and
- interpretation of planning data in such a way as to enable the provision of marketable transit services.

f. The Fiscal Function

The fiscal function includes all those activities related to the receipt, protection, and disbursement of monies and materials. In very small transit systems, the only persons regularly assigned to this function are bookkeepers, payroll clerks, and, possibly, counting room personnel. The results of their activities are recorded and published in profit and loss statements, balance sheets, annual reports, and supporting documents.

g. The Claims Function

In addition to all the incidental legal problems common to business enterprises, transit operations handle an unusual number of accident claims. Accident compensation to the public may cost a transit organization as much as 10 percent of its revenue. For smaller transit systems, the litigation and negotiation of such claims and payments are usually handled by an insurance company.

h. Support Functions

Support functions include those activities (in particular, those requiring specialized skills) that are indispensable to the transit organization but have little to do with transit operation itself. Examples are legal assistance, which is used in labor and material contract negotiations, and data processing assistance. Such activities are often contracted out. For example, data processing assistance is usually performed by an outside service bureau, a management company, or the transit system's owning entity.

2. Internal Organization of Functions and Activities

The internal organizational structure of the transit organization will be the concern primarily of the manager who is chosen to implement transit decisions. To the extent that the internal structure affects personnel requirements, it is of interest to the planner and decisionmaker as well. A few typical organizational structures are presented below. Different structures are suggested for small (less than 25 vehicles) and for medium-sized (25 to 100 vehicles) transit organizations.

a. Internal Structures for Small Transit Organizations

The internal structure of small transit organizations will be determined primarily by the amount of support activity that is performed outside the organization. Figure VI-1-a suggests a basic organizational

structure in which the manager is also the superintendent of transportation; the only other person at the administrative level is the superintendent of maintenance. All support activities are performed by outside organizations. Figures VI-1-b and VI-1-c suggest internal structures for small transit organizations that perform more of their own support activities.

b. Internal Structures for Medium-Sized Transit Organizations

Figure VI-2-a presents the simplest internal structure for a transit organization that has between 25 and 100 vehicles. Most of the support services are performed outside the organization. Figure VI-2-b shows an internal structure for a medium-sized transit organization that performs more of the support services itself. The different structures reflect the character of the manager and the administrative aids (for example, Figure VI-2-b reflects a strong and competent transportation superintendent).

3. Staffing Requirements

The number of people required to operate a transit organization varies according to the size of the organization, the amount of support activity that is performed outside the organization, and the severity of peaking that occurs during the day. Based on typical levels of external support, estimates of staffing requirements are presented in Table VI-2.

Because the primary functions of labor are to operate and maintain the vehicles, the number of vehicles required to operate the peak schedule is the best measurement for estimating staffing requirements. However, because operators can be assigned to shifts that overlap during the peak period, the number of operators and hostlers per vehicle is lower for more severe peaking patterns. The most convenient measurement of peaking severity is the "peak/base ratio," i.e., the number of buses required to fill the peak period schedule divided by the lowest number of buses required between the morning and evening peaks.

Staffing requirements are estimated for each of three employee groups: administrative, mechanical department, and operators. Administrative personnel requirements vary only with the size of the system; mechanical department employees (hostlers and mechanics) and operators however vary both with the size of the system and with the severity of peaking. Paratransit systems that involve demand responsive dispatching require additional dispatching personnel. Estimates of this requirement are presented in Table V-2 as a number that is to be

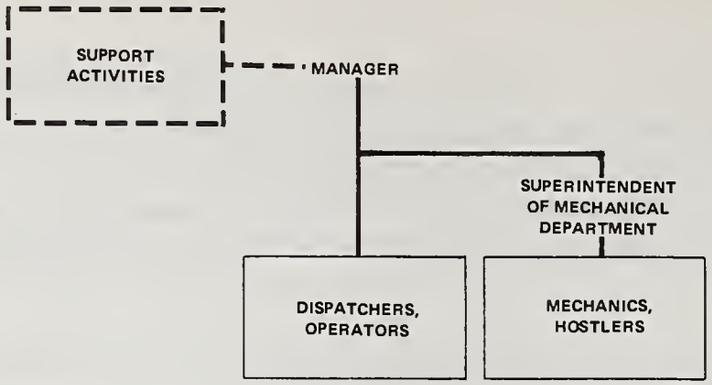


FIGURE VI-1-a: BASIC INTERNAL STRUCTURE FOR SMALL TRANSIT ORGANIZATIONS

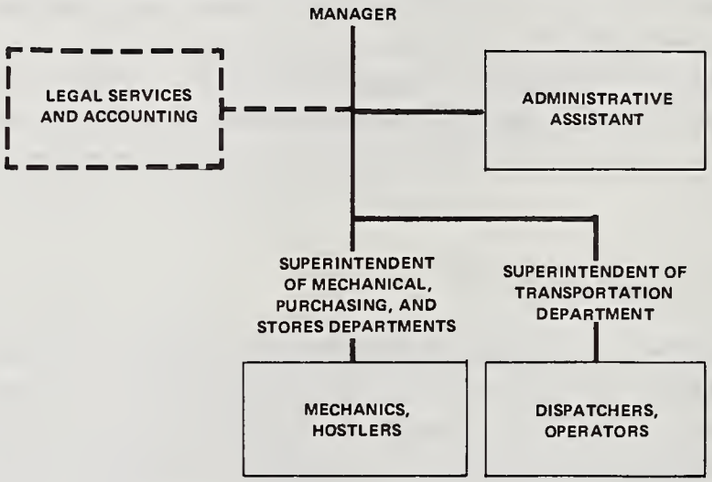


FIGURE VI-1-b: FIRST VARIATION ON INTERNAL STRUCTURE FOR SMALL TRANSIT ORGANIZATIONS

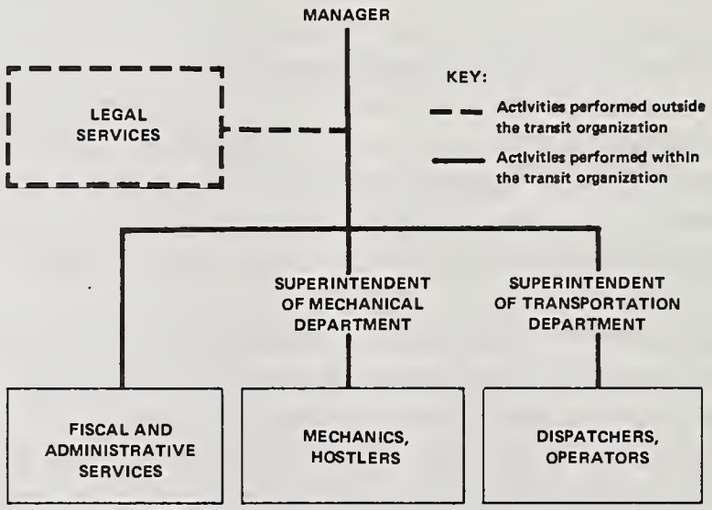


FIGURE VI-1-c: SECOND VARIATION ON INTERNAL STRUCTURE FOR SMALL TRANSIT ORGANIZATIONS

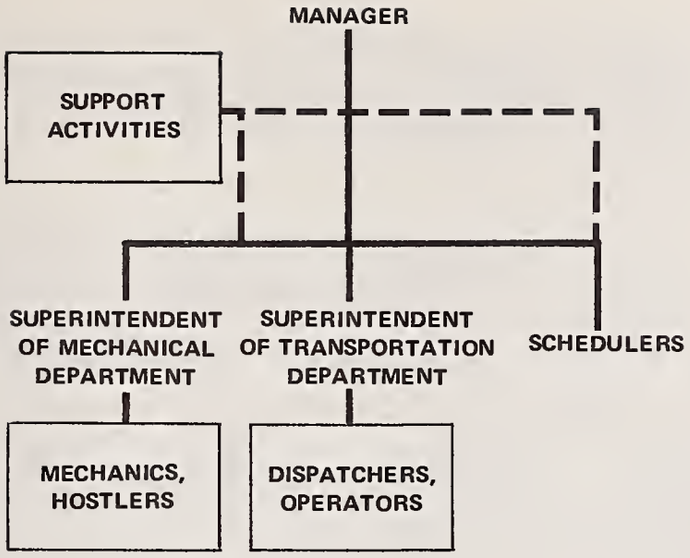


FIGURE VI-2-a: BASIC INTERNAL STRUCTURE FOR MEDIUM-SIZED TRANSIT ORGANIZATION

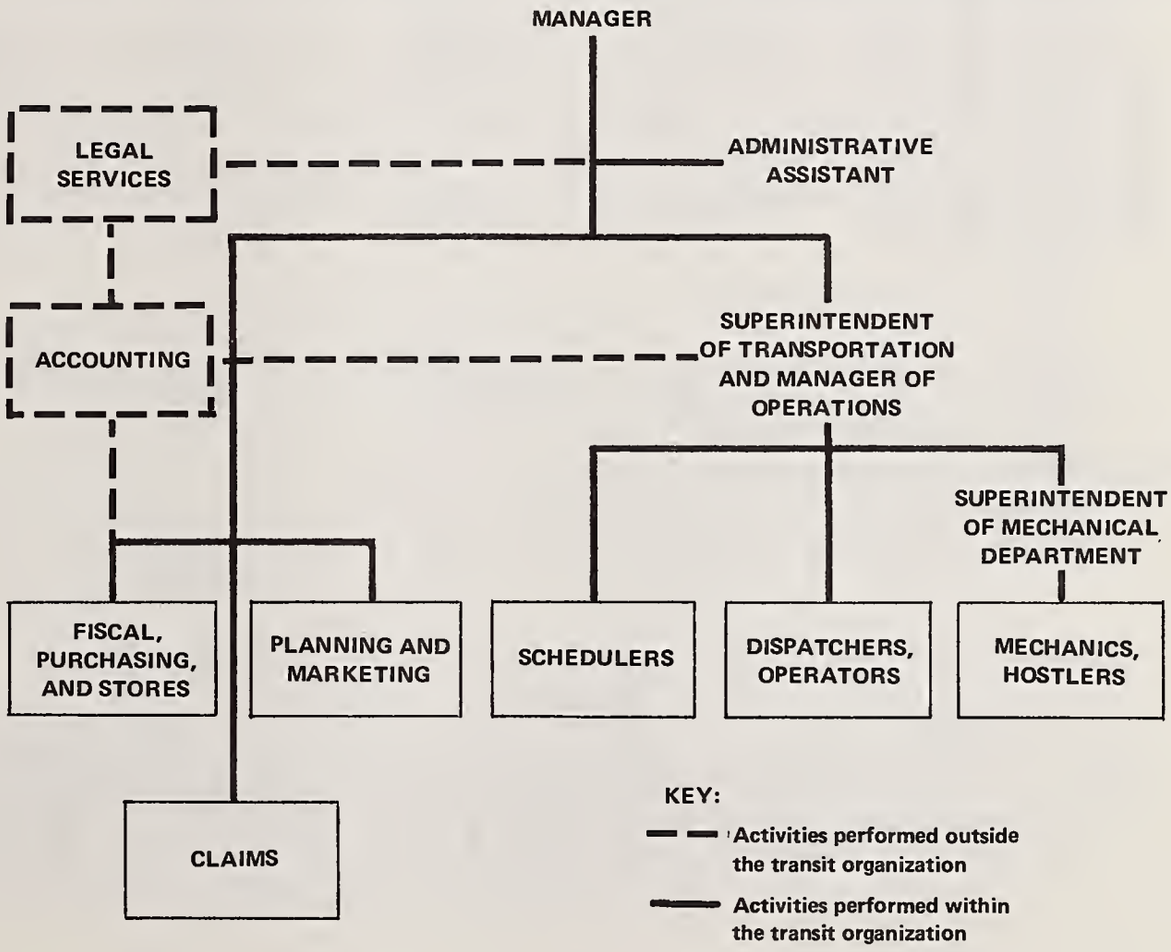


FIGURE VI-2-b: VARIATION ON INTERNAL STRUCTURE FOR MEDIUM-SIZED TRANSIT ORGANIZATIONS

TABLE VI-2

TRANSIT ORGANIZATION STAFFING REQUIREMENTS

Peak/Base Ratio	Employee Group	NUMBER OF BUSES REQUIRED TO FILL PEAK SCHEDULE							
		5-9	10-14	15-19	20-29	30-39	40-59	60-79	80-100
1.0-2.0	Administrative	2	2	3	4	5	6	7	8
	Mechanical	2- 3	4- 5	6- 8	9-11	12- 16	17- 23	24- 31	32- 39
	Operators	11-22	22-35	34-45	44-70	69- 93	92-143	142-149	191-233
	Total	**15-27**	**28-42**	**43-56**	**57-85**	**86-114**	**115-172**	**173-230**	**231-290**
	Paratransit (Additional)	1	2	2	3	4	7	10	13
2.0-2.5	Administrative	2	2	3	4	5	6	7	8
	Mechanical	2	3- 4	5- 6	7- 8	9- 12	13- 17	18- 22	23- 30
	Operators	7-16	16-25	24-33	32-52	51- 59	58-107	106-145	144-182
	Total	**11-20**	**21-31**	**32-42**	**43-64**	**65- 86**	**87-130**	**131-174**	**175-220**
	Paratransit (Additional)	1	2	2	3	4	7	9	12
2.5-3.0	Administrative	2	2	3	4	5	6	6	7
	Mechanical	2	3	4- 5	6- 7	8- 10	11- 15	16- 20	21 - 26
	Operators	6-14	14-23	22-30	29-47	46- 63	62- 97	97-132	131-167
	Total	**10-18**	**19-28**	**29-38**	**39-58**	**59- 78**	**74-118**	**119-158**	**159-200**
	Paratransit (Additional)	1	2	2	3	4	7	9	11
3.0+	Administrative	2	2	3	4	5	6	6	7
	Mechanical	2	3	4	5- 6	7- 8	9- 12	13- 18	19- 24
	Operators	6-12	12-20	19-26	25-41	40- 56	55- 86	86-115	114-144
	Total	**10-16**	**17-25**	**26-33**	**34-51**	**52- 69**	**70-104**	**105-139**	**140-175**
	Paratransit (Additional)	1	2	2	3	3	6	8	10

NOTE: This table is based on the 1970-1974 experience of transit firms in small urban areas (no more than 300,000 service area residents) as reported to the American Public Transit Association and documented annually in Transit Operating Report.

added to the number required for comparable conventional transit systems. For example, a paratransit system with a peak/base ratio of 2.4 and a peak bus requirement of 30 is estimated to have the following staffing requirements:

Administrative personnel	5
Mechanical department employees	9
Operators	51
Additional dispatchers	4
Total	69

These estimates include allowance for extra-board and hold-down operators. They do not, however, take into consideration such factors as peculiarities of local labor agreements and nonconventional bus maintenance requirements.

4. Managerial Requirements

When a decision to implement a transit proposal is reached, the future of the proposal will lie principally in the hands of the person who implements the proposal, the transit manager. This person will usually select equipment, choose personnel, and determine the atmosphere of the organization. He, therefore, more than any other person, will influence the character of the service. Careful evaluation and selection of the transit manager are therefore essential to the success of the transit proposal.

If a new manager is to be selected, the transit organization's objectives and the requisite management capabilities should be considered. In assessing the characteristics of the transit manager, a perspective of the overall direction to be pursued by the transit organization is useful. Table VI-3 presents a set of characteristics that might be used to evaluate managerial candidates in light of the objectives of the transit organization.

A transit manager's success in implementing proposed changes in transit service is measured by the transit organization's success in achieving its objectives within budget. It is therefore incumbent on the transit manager to analyze and understand the capabilities of the transit organization. Careful analysis of the organization's capabilities will lead to reasonable expectations in the development of transit service objectives in conjunction with reasonable budget preparations.

TABLE VI-3

QUALIFICATIONS FOR EVALUATION OF MANAGERIAL CANDIDATES

Transit Organization Objectives	Desirable Managerial Qualifications
INNOVATION	Imagination Experience in Nontransit Fields
GROWTH	Energy Community Relations Ability Motivational Ability Ambition Technical Planning Ability
ECONOMY	Administrative Ability Perceptiveness Business Education and Experience Practicality Experience in Transit Familiarity with the Organization

Chapter VII

TRANSIT EXPERIENCE IN OTHER URBAN AREAS

A. Introduction

This section provides a summary of data and statistics which describe the financial and operating characteristics of existing transit systems. This information is presented to provide local planners and policymakers with a tool for quick evaluation of alternative service opportunities. It is also useful for determining the extent of transit services in other urban communities.

Data and statistics are provided for conventional transit (Section B) and paratransit (Section C) systems. Information is prescribed in four general categories:

- Transit Service Supply, which includes data and statistics describing the level of service provided by existing transit systems. Basic measures of transit supply are presented, together with statistics indicating variations in the level of transit service, for different sizes of urban areas.

- Transit Service Demand, which includes data and statistics describing the level of transit demand experienced by existing transit systems. Basic measures of transit demand are presented, together with statistics indicating variations in the level of demand for different sizes of transit systems.

- Transit Revenue and Expense Characteristics, which includes data and statistics describing the revenue, expense and net income characteristics of transit operations. Basic measures of transit revenue and expense are presented, together with statistics indicating variation in these measures in relation to system size and various transit operating characteristics.

- Transit System Characteristics, which includes data and statistics describing the operating nature of transit systems.

Data and statistics in these categories are presented in tabular, graphic, and descriptive formats. The objectives of this presentation are to:

- identify some of the more important financial and operating characteristics of transit systems;
- describe the values of these variables and illustrate some of their more interesting features (e.g., their ranges and average values);
- indicate the variation in the data among urban areas and transit systems; and,
- provide data and statistics for local planners and policy-makers to use in comparing the financial and operating performance of alternative transit services.

B. Conventional Transit Experience

Conventional transit experience is illustrated by data and statistics from the following sources:

- the American Public Transit Association (APTA);
- transit development studies conducted in several small urban areas; and
- the 1974 National Transportation Study.

Information from each of these sources is presented below.

1. American Public Transit Association Data

The American Public Transit Association (APTA) receives annual reports from its membership which describe the financial and operating characteristics of individual transit systems. APTA reports this information each year in its annual publication, Transit Operating Report. Each year, APTA also publishes an industrywide summary of historical and current data in its periodical Transit Fact Book. These two publications are often used to assess the nature of the transit industry.

One of the problems encountered in analyzing APTA data, however, is that some transit firms fail to report information on all the variables of interest, and, because the reporting is voluntary, not all firms report

data in each of the years of interest. For these reasons, it is not always possible to use the same number of data points for various statistics and different years in a comparative analysis.

The data and statistics presented in the following pages are for those transit systems which had no more than 300,000 persons in their service area over the period 1970 to 1974. To illustrate the characteristics of the conventional bus transit industry in small urban communities, these data are used in two ways. First, data for the period 1970-1973 are used to provide a summary of significant trends in the financial and operating characteristics of U.S. transit firms. Second, data for 1974 are used to provide a summary of the most recent conventional transit operating experience.

a. Bus Transit Profile (1970-1973)

Table VII-1 presents a summary of data and statistics that illustrate the financial and operating performance of conventional bus transit systems between 1970 and 1973. Each of the variables in this table is defined in Table VII-2. The information presented in the table is based on the operations of 20 U.S. bus transit firms reporting to APTA. These firms operated transit systems in communities with service area populations ranging from just under 45,000 residents to just under 300,000 residents (four in areas with less than 100,000; eight between 100,000 and 200,000; and eight between 200,000 and 300,000). The level of transit supply provided by these 20 transit firms remained relatively stable between 1970 and 1973, ranging from slightly less than 500,000 annual bus-miles to slightly more than 3 million annual bus-miles. With few exceptions, the regular line services of each of these transit firms operated at a loss, with operating ratios (operating revenue + operating cost) ranging from .54 to 1.04 in 1970 and from .40 to .99 in 1973.

The data and statistics presented in Table VII-1 are arranged in four categories. In the first category, the nature of transit supply between 1970 and 1973 is illustrated. In the next three categories, the nature of the demand, revenue expense, and system design characteristics of conventional bus transit is explored. Some of the more interesting features exhibited by the data in this table are described below.

(1) Transit Service Supply Characteristics

Although transit service between 1970 and 1973 remained relatively stable within each of the 20 urban areas represented in Table VII-1, the level of transit service supplied varied greatly between individual urban areas. For example, one measure of transit supply, bus

TABLE VII-1

CONVENTIONAL BUS TRANSIT PROFILE (1970-1973)

APTA DATA AND STATISTICS	Maximum Value				Minimum Value				Average Value (Number of Systems Reported)			
Service Supply Statistics	1970	1971	1972	1973	1970	1971	1972	1973	1970	1971	1972	1973
Total Annual Bus Miles Operated (million bus miles per year)	3.08	3.16	3.13	3.14	.40	.29	.29	.29	1.41 (20)*	1.35 (19)	1.30 (20)	1.38 (20)
Annuel Bus Miles Operated: Regular Line Service	3.06	3.08	3.03	3.03	.29	.29	.29	.29	1.34 (20)	1.25 (19)	1.24 (20)	1.27 (20)
Annual Regular Service Bus Miles per Person Served	19.55	19.41	NA	NA	4.31	3.08	NA	NA	8.54 (20)	7.72 (18)	NA	NA
One Way System Route Miles per 1,000 Persons Served	1.68	1.68	NA	NA	.23	.20	NA	NA	.54 (16)	.53 (16)	NA	NA
Peak Period Buses per 100,000 Persons Served	66.63	66.24	NA	NA	12.54	10.35	NA	NA	28.83 (15)	25.84 (15)	NA	NA
Service Demand Statistics												
Passengers per Bus Mile: Reguler Line Service	3.04	3.12	3.88	2.71	1.37	1.54	1.21	1.13	2.29 (17)	2.19 (18)	2.11 (19)	1.93 (17)
Weekdey Passengers per One Way System Route Mile	229.77	207.42	182.65	184.44	47.81	41.99	40.20	37.65	124.00 (14)	121.79 (17)	97.94 (18)	94.16 (16)
Revenue and Expense Statistics												
Revenue per Bus Mile: Regular Line Service	.80	.84	.87	.81	.22	.24	.24	.24	.51 (20)	.53 (18)	.52 (20)	.50 (20)
Cost per Bus Mile: Regular Line Service	.85	.89	.94	.97	.33	.41	.43	.45	.67 (20)	.70 (18)	.74 (20)	.76 (20)
Operating Ratio: Regular Line Service	1.04	1.11	1.07	.99	.54	.48	.40	.40	.76 (20)	.75 (19)	.71 (20)	.67 (20)
Revenue per Passenger: Regular Line Service	.31	.34	.47	.46	.16	.15	.15	.14	.22 (17)	.25 (19)	.27 (19)	.27 (17)
Cost per Passenger: Regular Line Service	.46	.53	.70	.59	.19	.23	.26	.25	.30 (18)	.34 (18)	.39 (19)	.40 (17)
Net Income per Passenger: Regular Line Service	.01	.01	.05	.01†	.21	.27	.42	.29	.08 (18)	.10 (18)	.13 (20)	.13 (17)
System Design Characteristics												
Ratio of Peak to Base Buses	3.44	4.18	3.53	3.70	1.00	1.19	1.17	1.10	2.04 (15)	2.09 (17)	1.89 (17)	1.98 (17)
Employees per Peak Bus	3.34	3.76	3.39	3.38	1.00	1.46	1.21	1.33	2.13 (15)	2.33 (17)	2.28 (17)	2.32 (17)
Percent Spare to Total Buses	20.00	56.00	58.00	31.00	0.00	0.00	5.00	8.00	15.00 (15)	21.00 (17)	23.00 (17)	21.00 (17)

*Number in parenthesis indicates number of observations.

†Number in brackets indicates negative value

TABLE VII-2

DEFINITION OF VARIABLES AND STATISTICS

Variable or Statistic	Definition
(1) Total Annual Bus Miles Operated	Sum of all passenger vehicle miles operated in line (regular) service, special (charter) service, and nonrevenue service.[1]
(2) Annual Bus Miles in Charter Service	The ratio of total annual charter revenue to total annual operating revenue (regular service revenue plus charter service revenue) multiplied by total annual bus miles operated.
(3) Annual Bus Miles in Regular Service	Total annual bus miles operated less annual bus miles in charter service.
(4) Service Area Population	The population of the area accessible to transit service. Accessibility to transit service is determined by the reporting system, but is normally a measure of distance, e.g., any person residing within four blocks of a transit route has access to transit service.[2]
(5) Annual Bus Miles Operated (Regular Line Service) per Person Served	(3) ÷ (4)
(6) One-Way System Route Miles	The sum of the actual length (one way) of all streets or highways traversed by motor buses. When several routes pass over portions of the same street or highway, each route is counted separately.[2]
(7) One-Way System Route Miles per 1,000 Persons Served	[(6) ÷ (4)] [1,000]
(8) Peak-Period Buses	The maximum number of motor buses operated during one morning or evening peak service period.[2]
(9) Peak-Period Buses per 100,000 Persons Served	[(8) ÷ (4) [100,000]
(10) Annual Revenue Passengers (Regular Line Service)	Total number of rides taken by originating passengers paying a full adult cash fare, child fare, student fare, senior citizen fare, handicapped person fare, or other reduced fare.[2]
(11) Annual Revenue Passengers (Regular Line Service) per Regular Service Bus Mile	(10) ÷ (3)
(12) Weekday Passengers per One Way Route Mile	$\frac{[(10) \div (6)]}{295.5}$
(13) Passenger Revenue	Fares, including transfer charges and zone charges, paid by transit passengers traveling aboard transit vehicles operating in regular service.[1]
(14) Passenger Revenue per Bus Mile	(13) ÷ (3)
(15) Total Operating Cost	The sum of all transit system operating expenses.
(16) Operating Cost (Regular Line Service)	Total operating cost minus the ratio of total annual charter revenue to total annual operating revenue multiplied by total operating cost.
(17) Operating Cost per Bus Mile	(16) ÷ (3)
(18) Operating Ratio (operating revenue ÷ operating cost)	(13) ÷ (16)
(19) Average Fare (passenger revenue ÷ revenue passengers)	(13) ÷ (10)

[1] APTA. Transit Fact Book: 1975-76.

[2] APTA. Transit Operation Report for Calendar/Fiscal Year 1974.

TABLE VII-2 (Continued)

Variable or Statistic	Definition
(20) Operating Cost per Passenger	(16) ÷ (10)
(21) Net Income per Passenger	[(13) – (16)] ÷ [(10)]
(22) Buses in the Base Service Schedule	The greatest number of buses operated during one-day base service period.[2]
(23) Ratio of Peak to Base Buses	(8) ÷ (22)
(24) Total Buses Active	Number of buses regularly maintained in condition for active service including vehicles temporarily out of service for repairs.
(25) Percent Spare Buses to Total Buses	The ratio of spare buses to total buses active.
(26) All Employees, Average Number	The average number of total transit system employees including bus operators employed by a transit system during the reporting period.[2]
(27) Employees per Peak Bus	(26) ÷ (8)

[1]APTA. Transit Fact Book: 1975-76.

[2]APTA. Transit Operation Report for Calendar/Fiscal Year 1974.

miles per person served, varied from 4.31 to 19.55 in 1970, with an average rate of 8.54 annual bus-miles operated per person served. However, as illustrated in Figure VII-1, variations in the rate of transit service supply, are not necessarily directly related to the size of the population being served. Many other factors, (e.g., availability of supporting financial assistance) influence the level of transit service supplied in an urban area.

Two other service supply statistics are presented in Table VII-1. Each indicates rates of transit service supply in relation to the population of the service area. Like the previous statistics, variations in these rates are not necessarily related to the size of the urban area population.

(2) Transit Service Demand Characteristics

The demand for conventional bus transit service is illustrated by two statistics in Table VII-1. The first, annual passengers per bus-mile, provides an indication of transit ridership in relation to a surrogate measure of the overall level of service provided in an urban area (bus-miles operated). The second, weekday passengers per one-way system-route-mile, provides an indication of transit ridership in relation to a single measure (coverage) of the level of service provided in an urban area

Each of these statistics varies widely between urban areas; many factors other than bus miles operated or the extensiveness of system-route-miles (e.g., fare levels, frequency of service) influence transit ridership. Despite these variations between urban areas, however, a clear trend is indicated in Table VII-1. The rate of transit demand in relation to the level of transit supply declined consistently between 1970 and 1973. The average value of annual passengers per bus-mile dropped, for example, from 2.29 in 1970 to 1.93 in 1973.

This trend is more clearly illustrated in Figure VII-2, which displays the frequency distribution of annual passengers per bus-mile between 1970 and 1973. As indicated in this figure, the number of transit systems reporting a figure of less than 2.0 passengers per bus-mile increased from 24 percent in 1970 to 59 percent in 1973. At the same time, the number of transit systems reporting a figure of greater than 2.5 passengers per bus-mile decreased from 35 percent in 1970 to 12 percent in 1973.

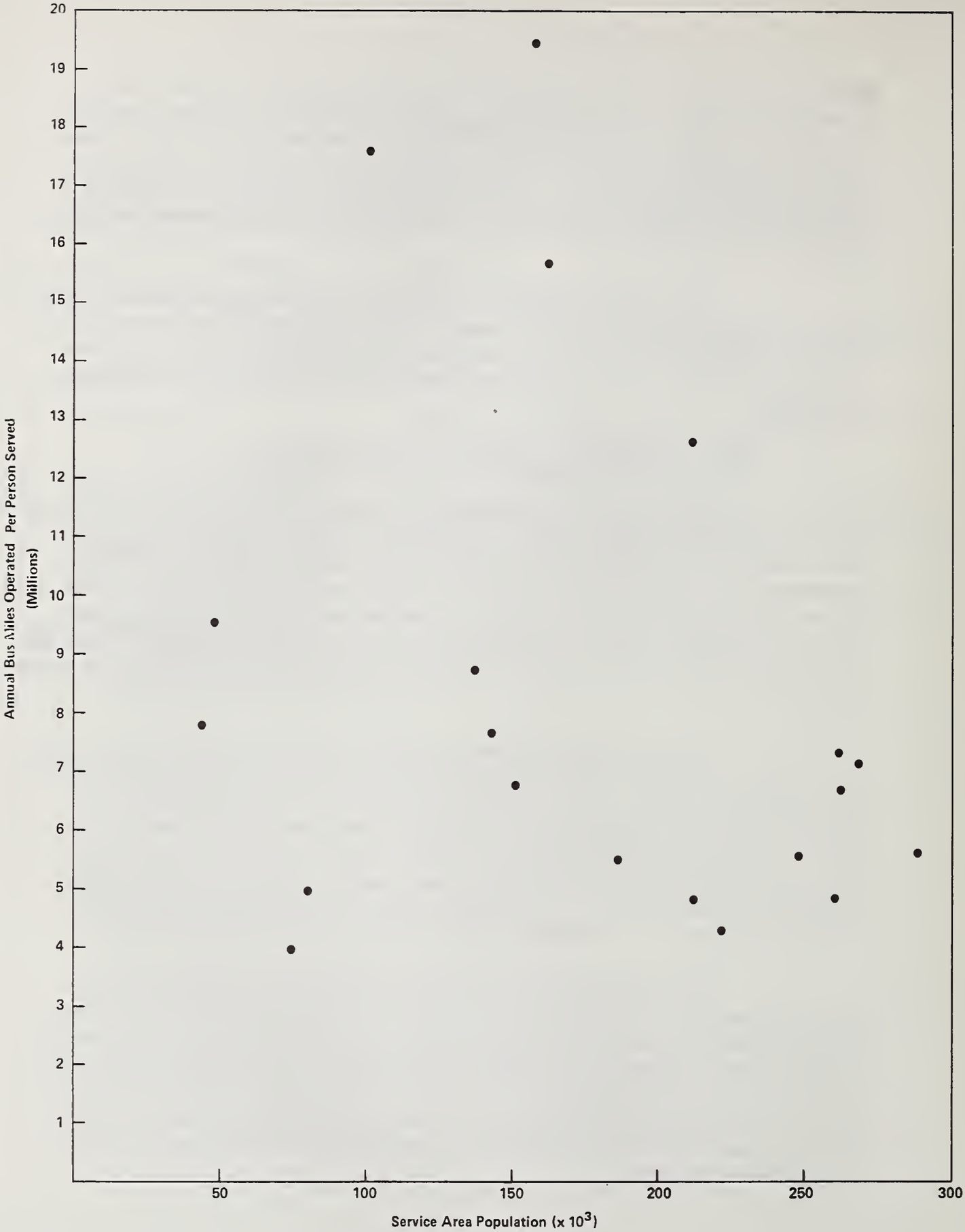


FIGURE VII-1: ANNUAL BUS-MILES OPERATED PER PERSON SERVED VERSUS SERVICE AREA POPULATION (1970)

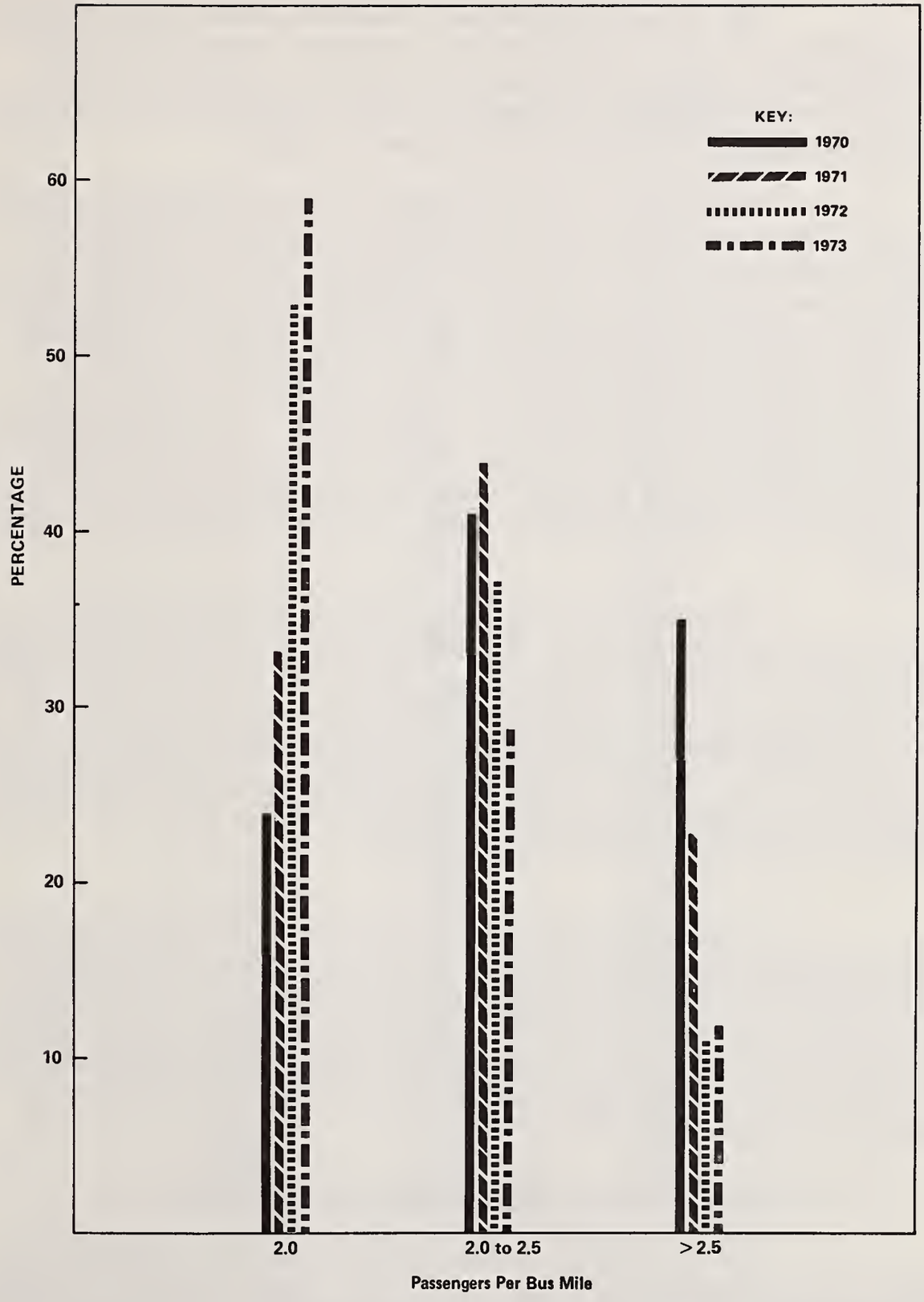


FIGURE VII-2: FREQUENCY DISTRIBUTION OF ANNUAL PASSENGERS PER BUS-MILE FOR 20 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1970-1973)

(3) Bus Transit Revenue and Expense Characteristics

The revenue and expense characteristics of conventional bus transit service are closely related to transit demand and supply characteristics. Table VII-1 presents a summary of statistics that measure transit operating revenue and transit operating cost in relation to the supply of and demand for transit service.

The single most important trend indicated by these statistics is the growing disparity between transit operating revenue and transit operating expense. Between 1970 and 1973, average transit operating revenue per bus-mile remained relatively stable, while the average transit operating cost per bus-mile rose 13 percent. Similarly, while the average operating revenue per passenger (average fare) increased 23 percent over this period, the average operating cost per passenger increased by 33 percent. At the same time, the productivity of conventional bus transit systems was declining, as illustrated by the trend in passengers per bus-mile. As a result of these trends, the disparity between total operating costs and total operating revenues increased.

This disparity is indicated directly by two statistics in Table VII-1. The operating ratio dropped in the average ratio between total operating revenue and total operating expense from .76 in 1970 to .67 in 1973. Net income per passenger indicates that the average loss per passenger resulting from transit operation rose 63 percent, from 8 cents in 1970 to 13 cents in 1973. Of these two statistics, the first is the more significant because its meaning is not changed as a result of the high rates of inflation experienced during this period.

Figure VII-3 illustrates more clearly the declining trend in the operating ratio for the 20 bus transit operators represented in Table VII-1. As shown in this figure, the proportion of transit systems with an operating ratio of less than .50 increased from none in 1970 to 25 percent in 1973. At the same time, the proportion of transit systems with an operating ratio of greater than .75 decreased from 50 percent in 1970 to 35 percent in 1973.

(4) Bus Transit System Design Characteristics

Three statistics presented in Table VII-1 illustrate the nature of conventional bus transit systems in small urban communities. The first, the ratio of peak to base buses, provides an indication of the extent of peak period (AM and PM rush hour) service relative to the

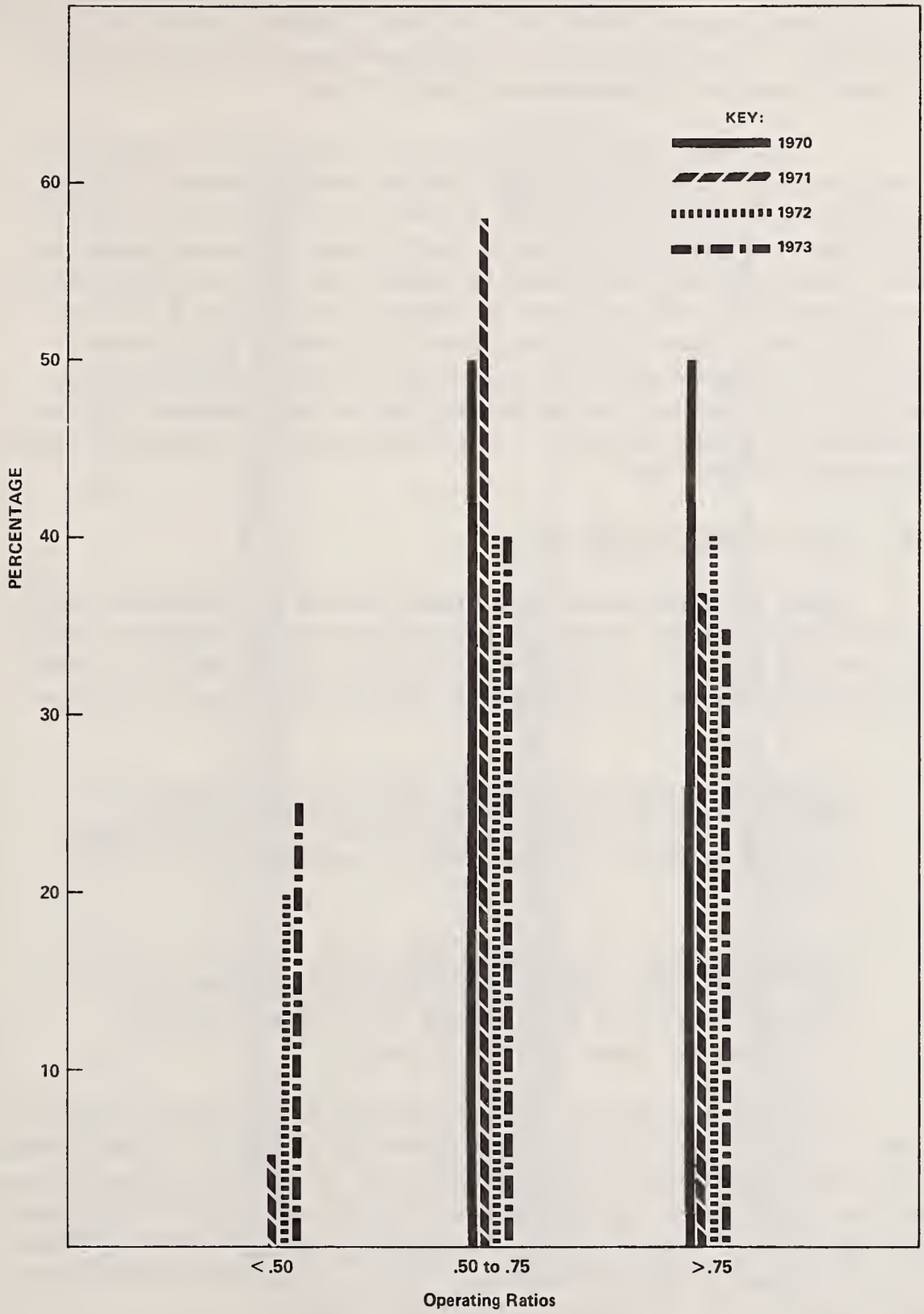


FIGURE VII-3: FREQUENCY DISTRIBUTION OF BUS TRANSIT OPERATING RATIOS FOR 20 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1970-1973)

base (or normal) service supplied in small urban communities. The average ratio of peak to base buses declined only slightly from 2.04 in 1970 to 1.98 in 1973. The distribution of systems operating with different peak to base ratios is illustrated in Figure VII-4.

The remaining two statistics in Table VII-1 indicate the range and average values of (1) total staffing requirements in relation to the number of buses in peak period service and (2) the percentage of spare buses maintained in relation to the total number of buses in the fleet. Total staffing requirements range from one to slightly under four employees per peak bus, with an average of between 2.10 and 2.40. Employee requirements are closely related to the internal structure of the transit firm and the extent to which administrative and support activities are conducted outside the organization. Figure VII-5 displays the distribution of transit firms with various-sized staff complements per peak bus.

b. Bus Transit Profile (1974)

Table VII-3 presents a summary of data and statistics that illustrate the financial and operating performance of conventional bus transit systems in 1974. Each of the variables in this table is defined as described previously in Table VII-2 with the following two exceptions:

- Annual Bus-Miles Operated: Regular Line Service. In 1974, transit operators reported this variable directly. It is not estimated therefore as it was for the 1970-1973 profile.

- Operating Cost: Regular Line Service. [(total operating cost) minus (the ratio of annual bus-miles operated charter service to total annual bus-miles operated) multiplied by (total operating cost)].

The information presented in Table VII-3 is based on the operations of 30 U.S. bus transit firms reporting to APTA. These firms operated transit systems in communities with service area populations ranging from just under 45,000 persons to just under 300,000 persons in 1974. As in Table VII-1, the data and statistics presented in Table VII-3 are arranged in four categories. Some of the more interesting features exhibited by this data are described below.

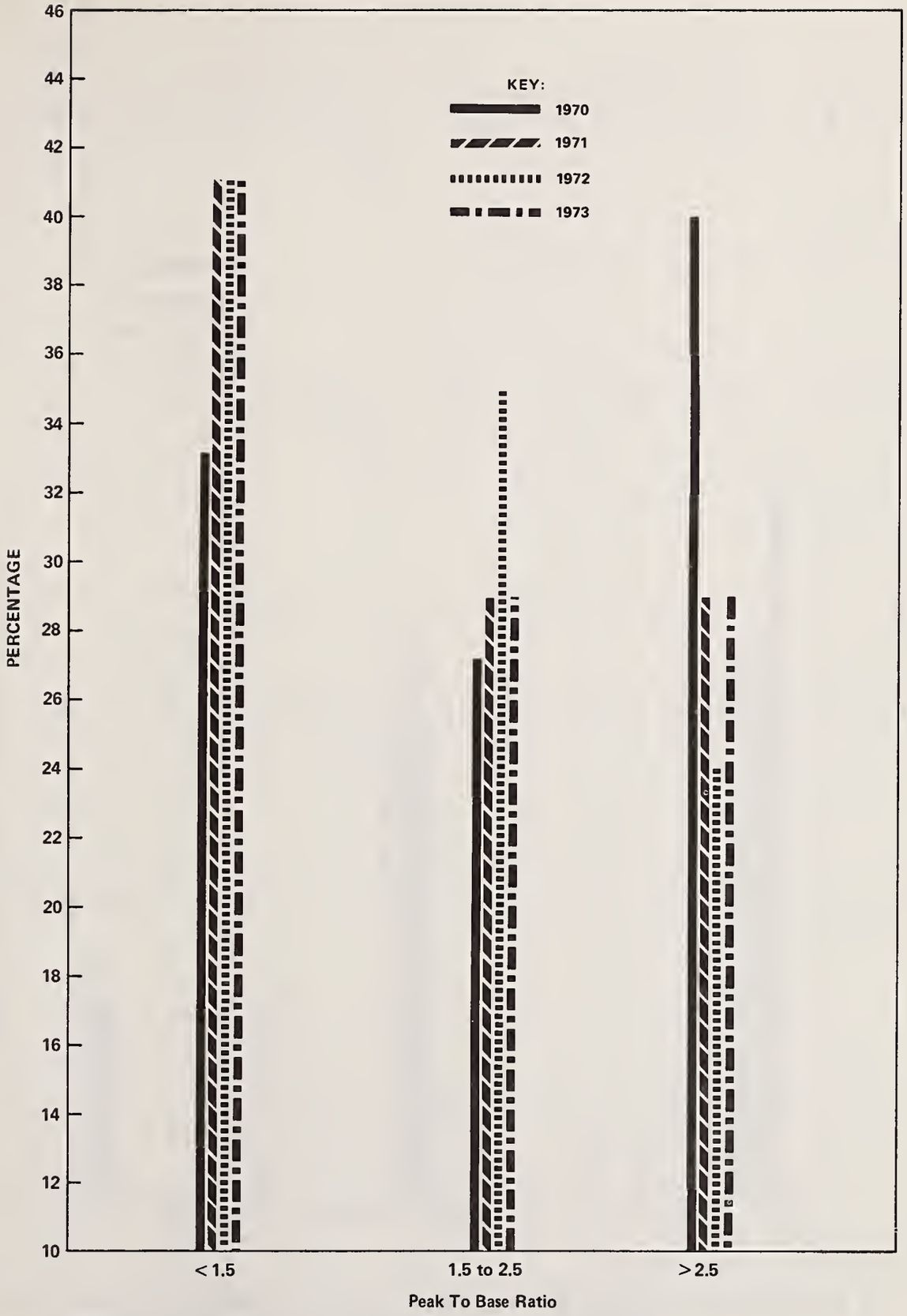


FIGURE VII-4: FREQUENCY DISTRIBUTION OF PEAK TO BASE RATIOS FOR 20 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1970-1973)

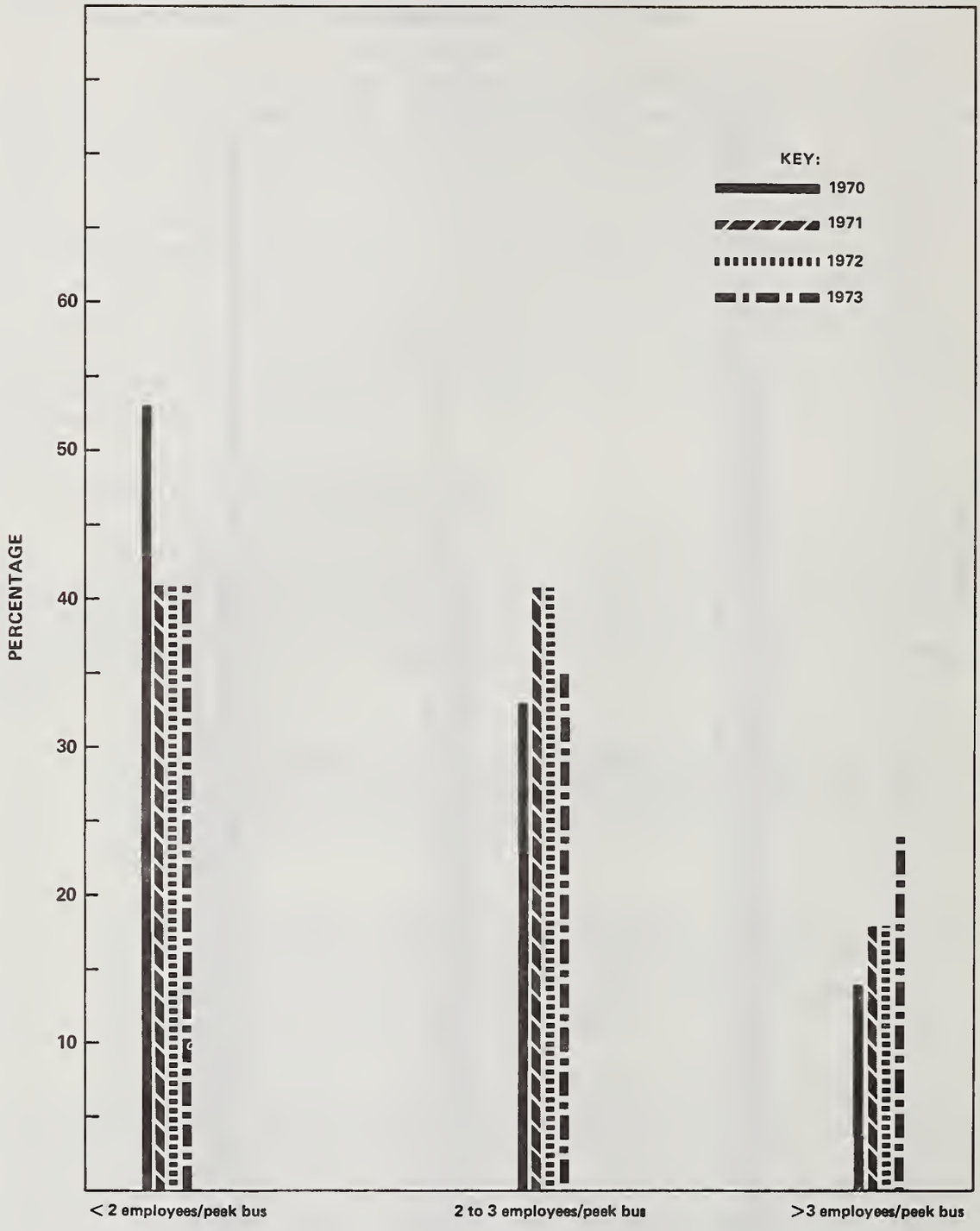


FIGURE VII-5: FREQUENCY DISTRIBUTION OF EMPLOYEES PER PEAK BUS FOR 20 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1970-1973)

TABLE VII-3

CONVENTIONAL BUS TRANSIT PROFILE (1974)

APTA DATA AND STATISTICS	Maximum Value	Minimum Value	Average Value (Number of Systems Reporting)
Service Supply Statistics			
Total Annual Bus Miles Operated (million bus miles per year)	3.23	.18	1.36 (30)*
Annual Bus Miles Operated: Regular Line Service	3.19	.17	1.28 (30)
Annual Regular Service Bus Miles per Person Served	19.49	1.38	7.81 (29)
One Way System Route Miles per 1,000 Persons Served	1.28	.26	. .69 (22)
Peak Period Buses per 100,000 Persons Served	67.09	4.78	23.53 (26)
Service Area Population	281,159.00	45,000.00	164,319.00 (29)
Service Demand Statistics			
Passengers per Bus Mile: Regular Line Service	3.00	.97	1.77 (29)
Weekday Passengers per One Way System Route Mile	197.17	21.00	69.01 (22)
Revenue and Expense Statistics			
Revenue per Bus Mile: Regular Line Service	.72	.07	.45 (30)
Cost per Bus Mile: Regular Line Service	1.33	.48	.87 (30)
Operating Ratio: Regular Line Service	.98	.06	.53 (30)
Revenue per Passenger: Regular Line Service	.41	.10	.26 (29)
Cost per Passenger: Regular Line Service	.84	.28	.51 (29)
Net Income per Passenger: Regular Line Service	<.004>†	<.62>	<.25> (29)
System Design Characteristics			
Ratio of Peak to Base Buses	4.25	1.00	1.80 (27)
Employees per Peak Bus	3.77	.63	2.15 (27)
Percent Spare to Total Buses	47.00	9.00	24.00 (26)

*Number in parenthesis indicates number of observations.
†Number in brackets indicates negative value.

(1) Transit Service Supply Characteristics

Figure VII-6 illustrates the proportion of transit firms providing transit service at various rates in 1974. As indicated in this figure, nearly two-thirds of the transit firms represented in Table VII-3 provided transit service at a rate of 8 or less bus-miles per person served. Approximately 60 percent of the firms provided transit service at a rate of between 2 and 8 bus-miles per person served.

To offer this overall level of service, these 30 transit firms operated systems of between .26 and 1.28 one-way route miles per 1,000 persons served and provided peak period buses at a rate of between 4.78 and 67.09 buses per 100,000 persons served. As indicated in Figure VII-7, however, over two-thirds of these transit systems provided between .30 and .90 one-way route-miles per 1,000 persons served, and over 70 percent provided between 5 and 25 peak period buses per 100,000 persons served.

(2) Transit Service Demand Characteristics

The demand for conventional bus transit service in 1974 ranged between .97 and 3.00, with an average value of 1.77 passengers per bus-mile. Nearly 70 percent of the transit firms represented in Table VII-3, however, reported rates of passengers per bus-mile of between 1.00 and 2.00, as illustrated in Figure VII-8. Of the 10 firms reporting greater than 2.00 passenges per bus-mile, eight provided more than the average level of service (7.81 bus miles per person served), one provided service with the maximum peak-to-base ratio (4.25, indicating a high degree of peak demand), and one provided service at the lowest average fare ($.10 revenue per passenger).

(3) Bus Transit Revenue Expense Characteristics

The growing disparity between transit operating revenue and transit operating expense, indicated in the 1970 and 1973 profile of bus transit operations, continued into 1974. As indicated in Figure VII-9, 60 percent of the transit firms represented in Table VII-3 reported a cost per bus mile of greater than $.80, while the maximum revenue per bus-mile ratio for all firms reporting was $.72. Over 80 percent of the transit firms reporting had operating ratios of less than .70, and 50 percent reported only half as much operating revenue as operating expense.

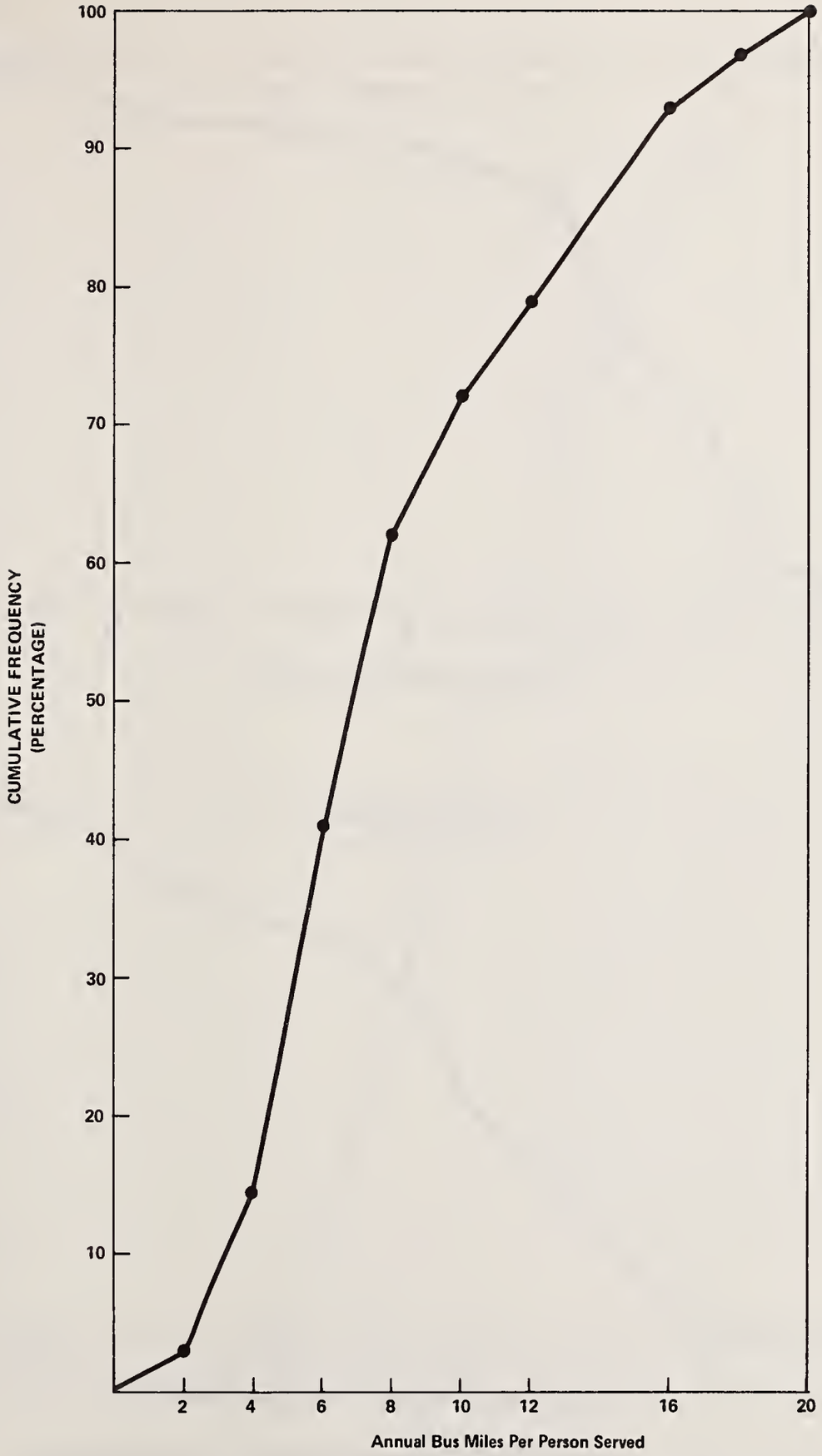


FIGURE VII-6: CUMULATIVE FREQUENCY DISTRIBUTION OF ANNUAL BUS-MILES OPERATED PER PERSON SERVED FOR 30 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1974)

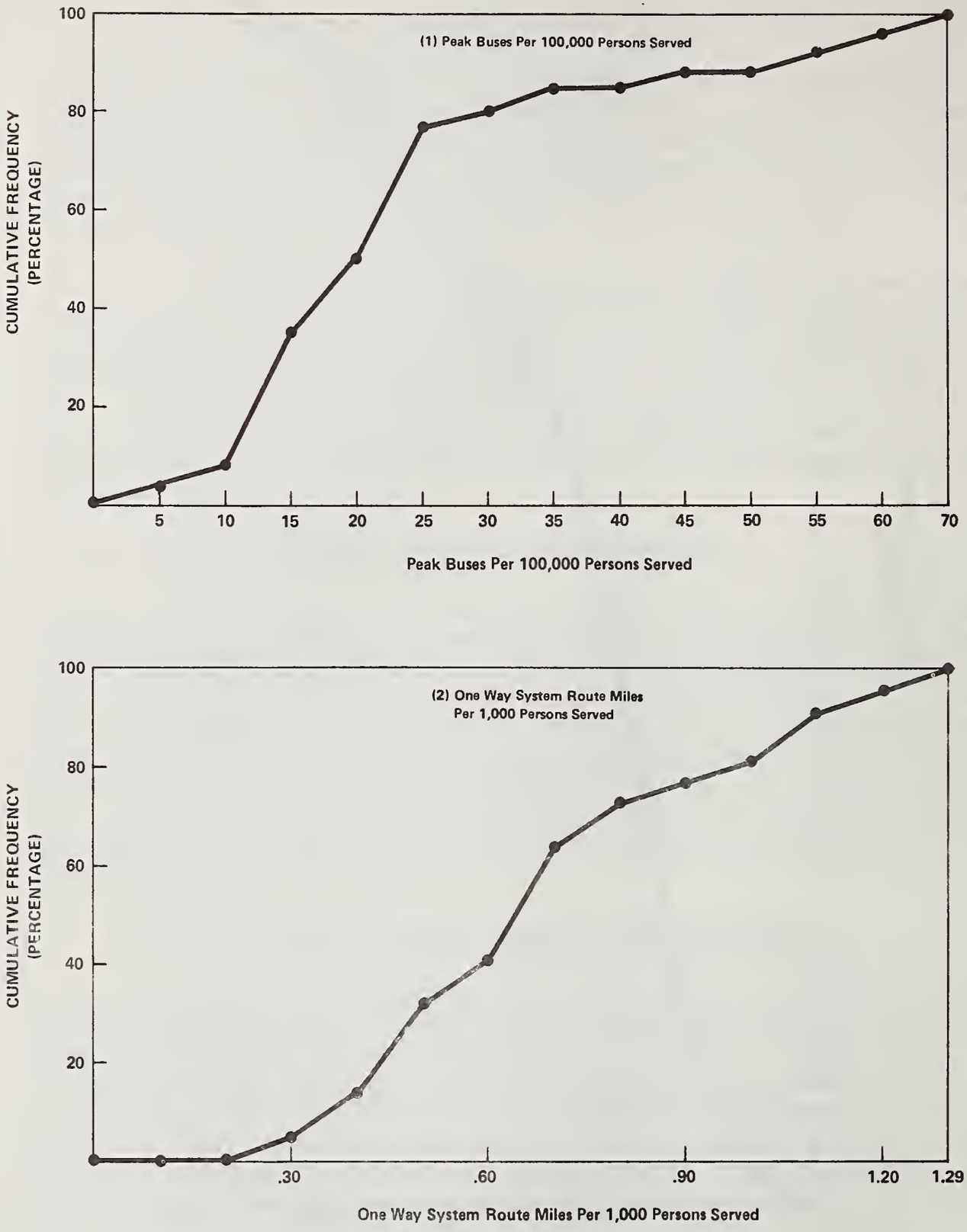


FIGURE VII-7: CUMULATIVE FREQUENCY DISTRIBUTION OF SELECTED SERVICE SUPPLY STATISTICS FOR 30 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1974)

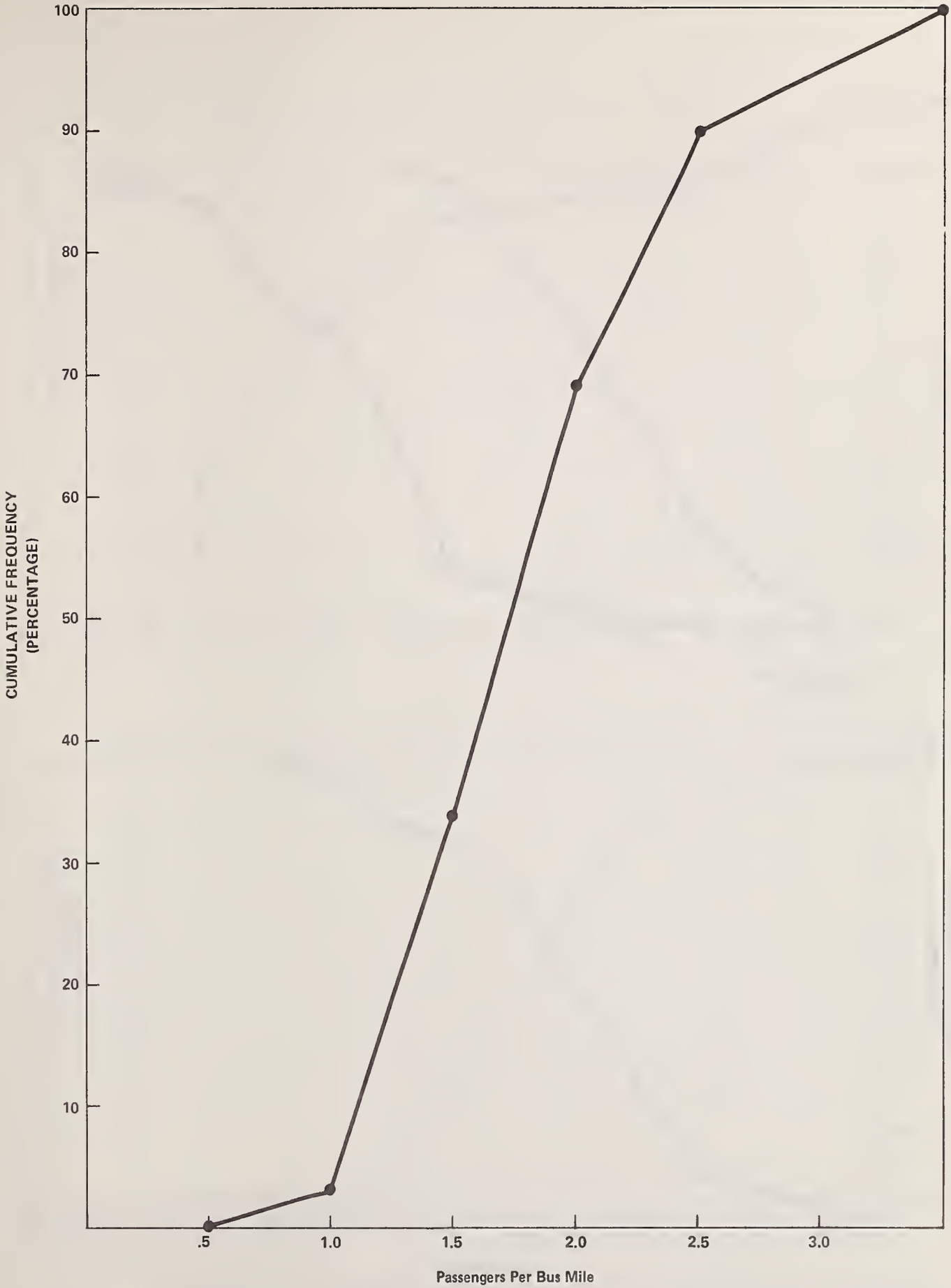
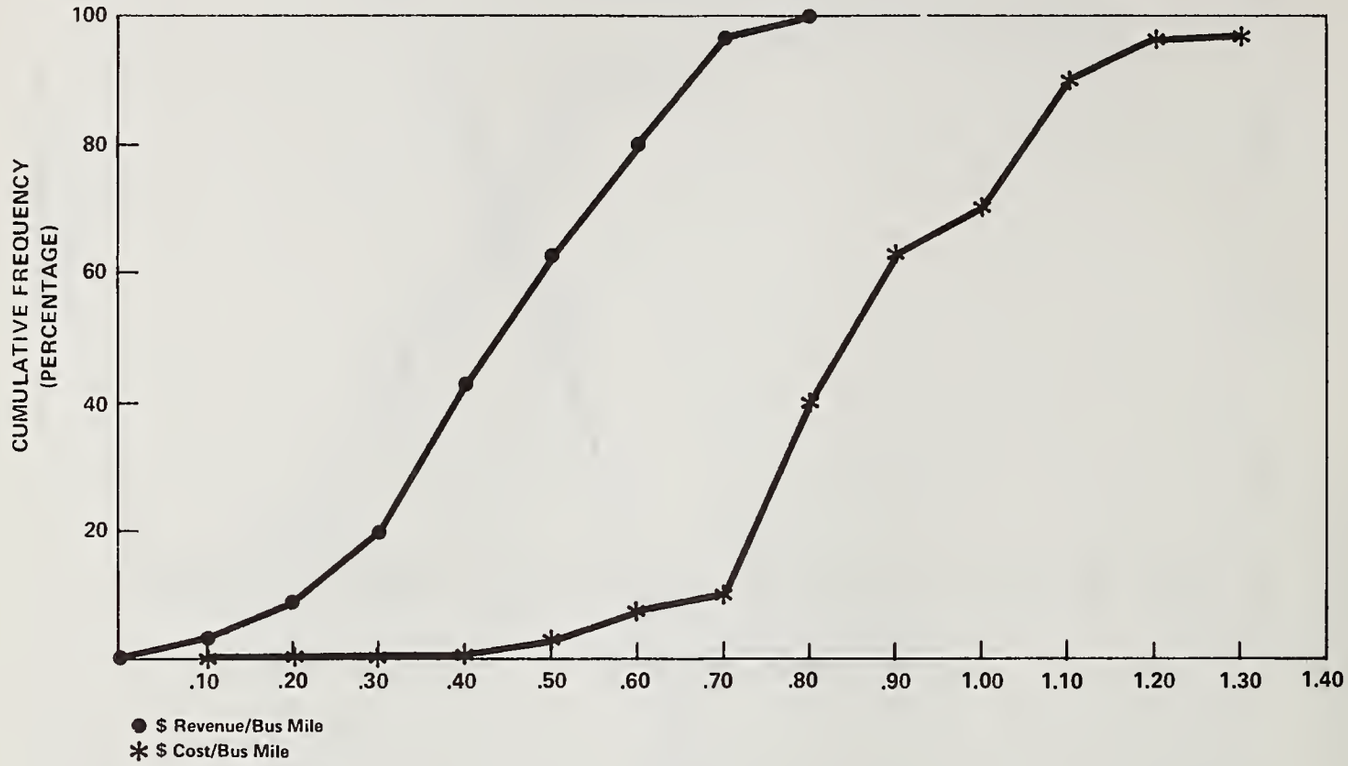


FIGURE VII-8: CUMULATIVE FREQUENCY DISTRIBUTION OF PASSENGERS PER BUS-MILE FOR 30 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1974)



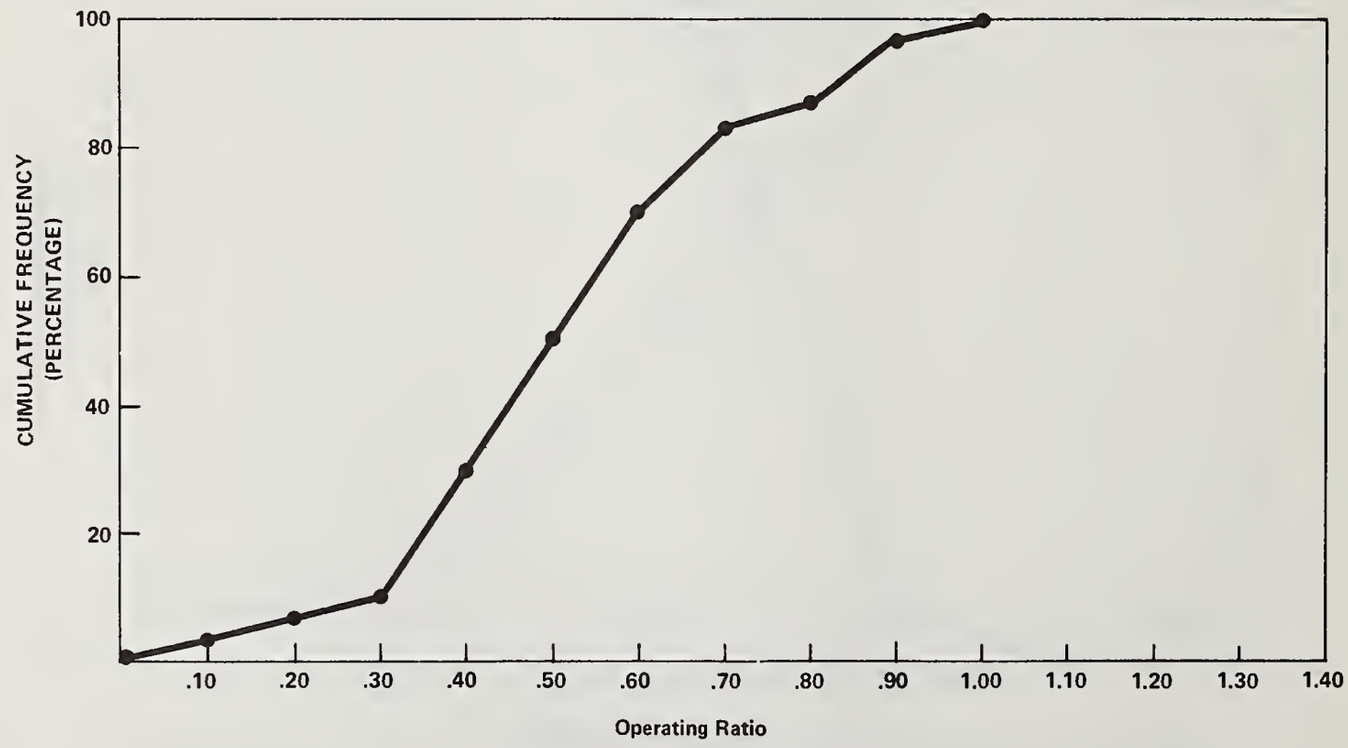
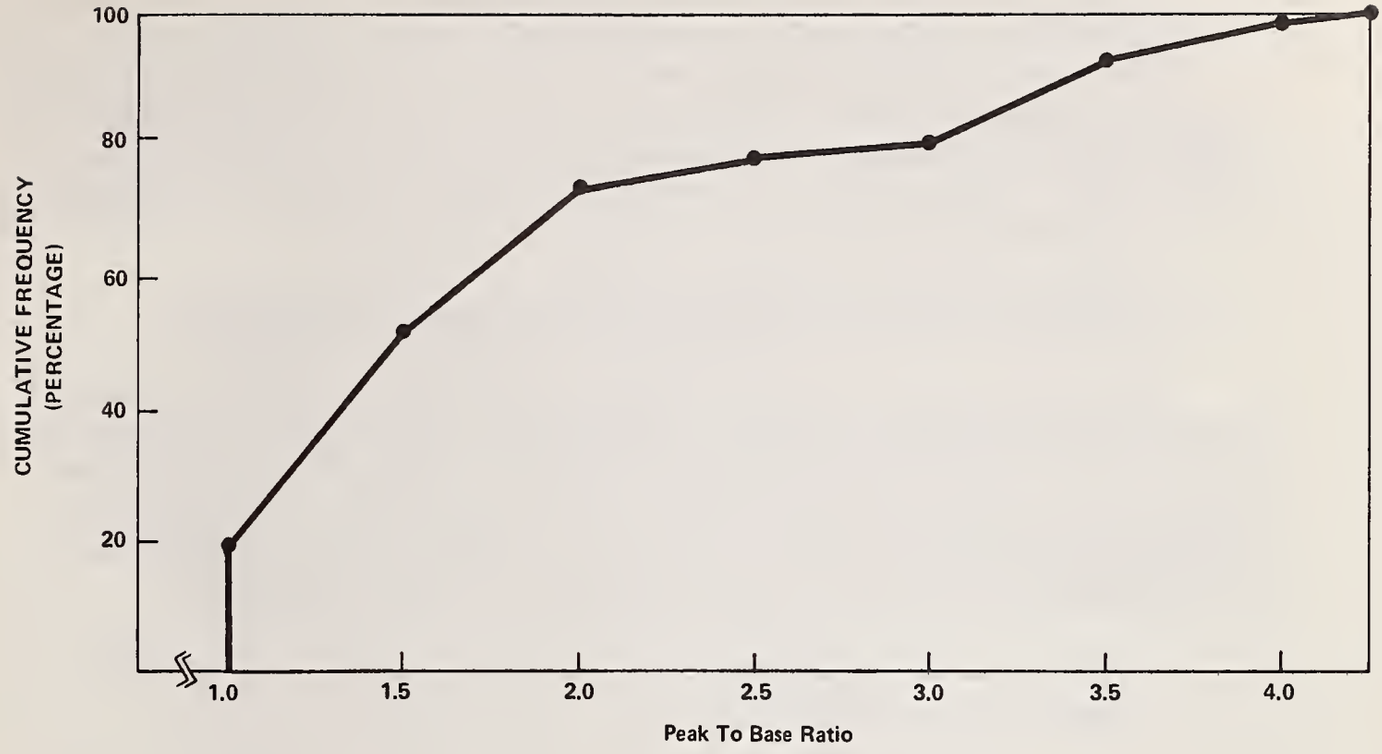


FIGURE VII-9: CUMULATIVE FREQUENCY DISTRIBTUION OF SELECTED REVENUE/EXPENSE CHARACTERISTICS FOR 30 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1974)



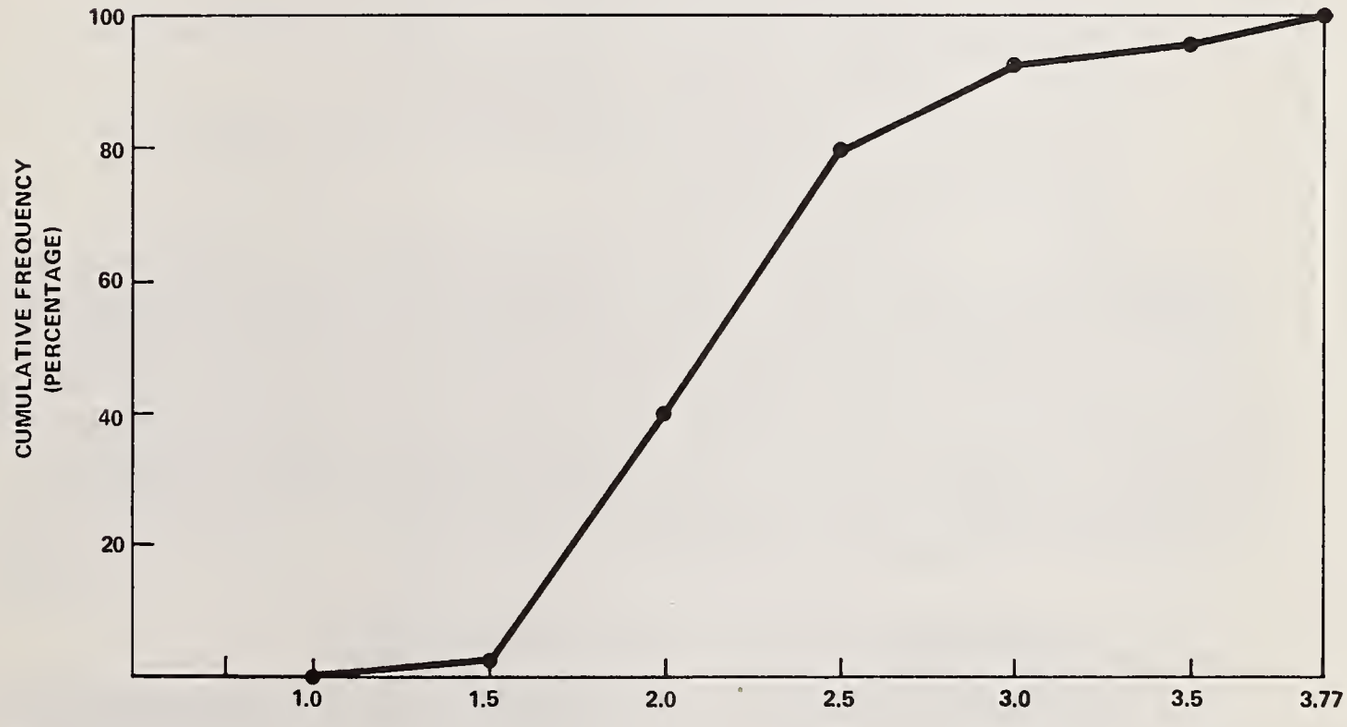


FIGURE VII-10: CUMULATIVE FREQUENCY DISTRIBUTION OF SELECTED SYSTEM DESIGN CHARACTERISTICS FOR 30 CONVENTIONAL BUS TRANSIT FIRMS REPORTING TO APTA (1974)

(4) Bus Transit System Design Characteristics

In 1974 the average ratio of peak to base buses declined slightly from 1.98 in 1973 to 1.80. At the same time, the average number of employees per peak bus decreased from 2.32 in 1973 to 2.15 in 1974. Figure VII-10 details these system design characteristics for the 30 transit firms represented in Table VII-3.

2. Data from Selected Transit Studies in Small Urban Areas

Information from transit studies conducted in small urban areas over the past 6 years is presented below. The objective of this presentation is to provide a more detailed overview of transit operations and transit users in small urban areas than is possible by examining the aggregate statistics presented elsewhere in this chapter. To provide this detailed overview, the following information is presented:

- the nature of existing transit service in small and medium-size urban areas;
- characteristics of small urban area transit riders compared with the characteristics of urban area residents in the community where the transit system operates;
- profiles of transit ridership by trip purpose, frequency of use, and degree of transit captivity; and
- distributions of small urban area transit ridership by day of week and by time of day.

There are two reasons for presenting specific data from individual cities in this format. The first is to provide the small urban area planner with detailed profiles of transit riders on fixed-route, fixed-schedule transit systems and thus enable comparison of local experience with that of cities of similar size and character. The second is to provide a general overview of transit ridership profiles throughout the country to show which ridership characteristics are similar for all systems and which vary widely.

a. Existing Small Urban Area Transit Systems

Transit studies have been conducted in many urbanized areas over the past 10 years. Most have been short-range studies that include an analysis of existing conditions, an analysis of transit alternatives, and

recommendations for transit improvements over a 1- to 5-year period. These studies (transit development programs) have been required with each application for capital or operating grants from the UMTA. Those conducted for small urban areas that had transit service at the time of the study generally presented the following picture of existing transit systems:

- All had steadily declining patronage and revenues over the 10 years preceding the study.
- Every operation had been profitable 1 or more years in the 10 years preceding the study; most, however, were incurring deficits at the time of the study.
- Passengers per bus-mile, revenue per bus-mile, and bus-miles operated were declining in the years preceding the study.
- Most operations were cutting service in an attempt to minimize deficits.
- Most were private operations at the time of the study.
- Virtually all were threatened with certain extinction unless subsidy in some form was forthcoming.
- Every small urban area transit operation had a bus fleet either at the end of or long past its useful service life.

The trend in most cities that have conducted such transit development programs has fortunately reversed. Based on the recommendations contained in these studies, most small urban transit systems have acquired new equipment with the assistance provided by UMTA capital grants, transit service has been extended and improved, and patronage has stabilized or, in some cases, increased. Most systems are not, however, profitable and do not expect to be profitable in the future. The data presented here portray most of the systems before such improvements and are therefore generally representative of small urban area transit systems at or near a crisis state.

Table VII-4 presents a list of 37 cities for which these studies were conducted. Existing fixed-route, fixed-schedule transit systems operated in each of these cities at the time of the study. Of the 37 cities listed, 25 had transit service provided by private operators. Three of these private operators were already receiving public subsidy; all other

TABLE VII-4

DESCRIPTION OF CONVENTIONAL BUS TRANSIT SYSTEMS

CITY	Urbanized Area Population	Transit Systems (Time of Survey)	Date of Ridership Survey
Akron, Ohio	542,775	Public transit authority ownership, management, and operation	'73
Austin, Texas	264,499	Private operator (city subsidy), university shuttle system, model cities bus	12/71
Birmingham, Alabama	558,099	Major system: private operator, 2 small private operators	'71
Boise City, Idaho	85,187	Purchase of service by city; private operator, 2 small private operators	'68
Brownsville, Texas	52,627	2 private operators	9/70
Burlington, Iowa*	32,444	Private operator	2/70
Burlington, Vermont*	38,633	Private operator	11/72
Davenport/Rock Island/Moline	266,119	2 private operators	10/71
Des Moines, Iowa	255,824	Private operator	3/71
Eau Claire, Wisconsin*	44,603	Private operator	5/71
Eugene, Oregon	139,255	Public transit authority ownership, management, and operation	'72
Greenville, South Carolina	157,073	Private operator	10/71
Hattiesburg, Mississippi*	38,274	Private operator	10/71
High Point, North Carolina	93,547	2 private operators	10/71
Iowa City, Iowa*	46,850	Private operator	3/70
Jackson, Mississippi	190,060	Private operator	7/71
Lafayette, Indiana	79,117	Public transit authority ownership, management, and operation	10/73
Lubbock, Texas	150,135	Private operator	'71
Lynchburg, Virginia	70,842	Private operator, city subsidy	5/73
Manchester, New Hampshire	95,140	Private operator	9/72
Parkersburg, West Virginia	44,198	Private operator	3/74
Portland, Maine	106,599	Private operator	'70
Reading, Pennsylvania	167,932	Private operator; state, county, and city subsidy	9/72
Saint Cloud, Minnesota	39,691	Public transit authority ownership; management and operation by private contractor	8/70
Salem, Oregon	93,041	Public transit authority	–
Salt Lake City, Utah	479,342	Public transit authority ownership, management, and operation	5/70
Santa Rosa, California	75,083	City ownership; management and operation by private contractor; 2 private jitneys	8/72
Shreveport, Louisiana	234,564	Private operator	6/70
Sioux Falls, South Dakota	75,146	Private operator	1/70
Spokane, Washington	229,620	City ownership; management and operation by private contractor	10/69
Stockton, California	160,373	Public transit authority ownership, management, and operation	2/73
Syracuse, New York	376,169	Public transit authority ownership, management, and operation; 3 small private operators	11/71
Topeka, Kansas	132,108	Private operator	12/71
Trenton, New Jersey	274,148	County transit authority ownership, management, and operation	5/73
Tulsa, Oklahoma	371,499	Public transit authority ownership, management, and operation	1/70
Tuscaloosa, Alabama	85,875	County transit authority ownership, management, and operation	6/73
Waco, Texas	118,843	Private operator	'70
Wichita Falls, Texas	97,564	Private operator	10/70
Wilmington, North Carolina	57,645	Private operator	6/73
Winston-Salem, North Carolina	142,584	City transit authority ownership, management, and operation	3/71

*Not an Urbanized Area; City Populations Given

private operators were already requesting subsidy payments or planning to cease operations when their current franchise agreement expired. In every such case, the study recommended public ownership of the transit system and immediate replacement of the existing bus fleet.

Of the 12 cities where the transit system was publicly owned, nine had transit authorities which also managed and operated their own systems, two were owned by the cities and managed and operated under a service agreement with a private contractor, and one was owned by a public transit authority and managed and operated by a private contractor.

In three of the cities, supplemental service was provided in addition to the primary transit service. In Austin, for example, as in other cities with major universities, the university had contracted with the transit operator to provide shuttle service between the university and various residential sections of the city. In Birmingham and Syracuse, small private operators have franchises to provide service between the central city and outlying areas.

b. Transit Ridership Profiles

Tables VII-5, VII-6, and VII-7 present a profile of transit riders on the various small and medium-sized urban area transit systems represented in Table VII-4. This profile has been developed from surveys of transit riders conducted as a part of transit studies for each urban area. Table VII-5 presents the distribution of riders by age and sex and compares these with the respective distributions of the general population. Table VII-6 presents statistics traditionally used to measure transit captivity (e.g., auto ownership, auto availability, and possession of a driver's license). Table VII-7 shows the distribution of transit ridership by trip purpose and transit trip frequency, the percentage of transit trips that involve transfers, and the percentage of trips bound to or from the city's CBD.

As indicated in Table VII-5, it is common to find that a highly disproportionate share of transit ridership is female; the percentage of transit ridership which is female is at least 65 percent for each transit system presented here. As shown in Table VII-7, although automobiles are owned by over half of the transit riders' households, an automobile is generally not available for 70 to 90 percent of the transit riders. It is likely, therefore, that the highly disproportionate share of female transit riders may be explained by their captivity to the transit mode; there may be an automobile in their household, but it is generally being used by another family member.

TABLE VII-5

DEMOGRAPHIC CROSS SECTION OF SMALL URBAN AREA TRANSIT RIDERS

	URBANIZED AREA CHARACTERISTICS (1970 CENSUS)						TRANSIT RIDERSHIP CHARACTERISTICS					
	Total Pop.	Percent Male	Percent Female	Percent <18 yrs. old	Percent 18-64 yrs. old	Percent >64 yrs. old	Avg. Weekly Ridership (Revenue Passengers)	Percent Male	Percent Female	Percent <18 yrs. old	Percent 18-64 yrs. old	Percent >64 yrs. old
Akron, Ohio	542,775	48.2	51.8	33.6	57.0	9.4	NR	18	62	NR	NR	NR
Austin, Texas	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Birmingham, Alabama	558,099	46.7	53.3	34.0	55.7	10.3	31,250	23	77	3	89	8
Boise City, Idaho	85,187	48.0	52.0	34.7	56.0	9.3	600	79	21	NR	NR	NR
Brownsville, Texas	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Burlington, Iowa*	32,444	46.4	53.6	33.2	52.5	14.3	1,250	28	72	31	48	21
Burlington, Vermont*	38,633	46.3	53.7	29.8	60.8	9.4	1,319	NR	NR	39	53	8
Davenport/Rock Island/Moline	266,119	48.6	51.4	35.2	54.9	9.9	5,500	NR	NR	11	65	24
Des Moines, Iowa	255,824	47.3	52.7	33.5	56.4	10.1	16,876	33	67	19	68	13
Eau Claire, Wisconsin*	44,603	46.6	53.4	28.7	59.8	11.5	3,600	28	72	NR	NR	12
Eugene, Oregon	139,255	49.2	50.8	32.5	59.5	8.0	NR	NR	NR	NR	NR	NR
Greenville, South Caroline	157,073	47.0	53.0	34.3	58.2	7.5	9,044	32	68	NR	NR	NR
Hattiesburg, Mississippi	38,274	46.8	53.2	30.7	59.8	9.5	1,463	20	80	NR	NR	NR
High Point, North Cerolina	93,547	47.1	52.9	33.9	57.3	8.8	4,040	29	71	NR	NR	NR
Iowa City, Iowa*	46,850	48.5	51.5	25.4	68.0	6.6	970	35	65	16	75	9
Jackson, Mississippi	190,060	46.9	53.1	36.7	56.1	7.2	2,300	15	85	NR	NR	NR
Lafayette, Indiana	79,117	51.2	48.8	27.3	65.6	7.1	2,550	32	68	16	78	6
Lubbock, Texas	150,135	48.9	51.1	34.7	59.1	6.2	NR	21	79	7	78	15
Lynchburg, Virginia	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Manchester, New Hampshire	95,140	47.7	52.3	32.5	55.3	12.2	5,564	24	76	25	64	11
Parkersburg, West Virginia*	44,198	46.8	53.2	31.8	55.9	12.3	869	20	80	7	70	23
Portland, Maine	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Reading, Pennsylvania	167,932	46.9	53.1	28.4	58.2	13.4	10,710	21	79	5	77	18
Saint Cloud, Minnesota*	39,691	48.6	51.4	31.4	58.8	9.8	617	NR	NR	15	67	18
Salem, Oregon	93,041	47.6	52.4	31.8	56.3	11.9	NR	NR	NR	NR	NR	NR
Salt Lake City, Utah	479,342	48.8	51.2	40.0	52.6	7.4	10,200	NR	NR	10	67	23
Santa Rosa, California	75,083	46.8	53.2	32.4	54.7	12.9	920	20	80	12	56	32
Shreveport, Louisiana	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sioux Falls, South Oakota	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Spokane, Washington	229,620	47.1	52.1	33.0	54.8	12.2	13,000	29	71	18	72	10
Stockton, California	160,373	48.9	51.1	33.4	56.0	10.6	6,128	NR	NR	39	53	8
Syracuse, New York	376,169	48.0	52.0	33.7	56.5	9.8	34,675	26	74	11	74	15
Topeka, Kansas	132,108	48.6	51.4	33.2	56.0	10.8	2,834	27	73	8	65	27
Trenton, New Jersey	274,148	48.0	52.0	32.1	58.3	9.6	NR	NR	NR	24	63	13
Tulsa, Oklahoma	371,499	47.8	52.2	34.0	57.2	8.8	6,050	31	69	13	77	10
Tuscaloosa, Alabama	85,875	48.3	51.7	28.9	61.7	9.4	8.650	25	75	NR	NR	NR
Waco, Texas	118,843	48.0	52.0	31.1	57.3	11.6	5,145	30	70	NR	NR	NR
Wichita Falls, Texas	97,564	49.7	50.3	30.5	60.0	9.5	NR	30	70	NR	NR	NR
Wilmington, North Carolina	57,645	46.8	53.2	33.3	57.5	9.2	4,861	NR	NR	12	78	10
Winston-Salem, North Carolina	142,584	46.8	53.2	33.6	57.9	5.8	5,159	NR	NR	32	59	9

* Not an urbenized area, statistics given for city

NR Not reported

TABLE VII-6

SUMMARY OF CONVENTIONAL BUS TRANSIT CAPTIVE RIDERSHIP INDICATORS

CITY	URBANIZED AREA				TRANSIT RIDERS					
	Auto/Housing Unit (%)			% of Pop. in Group Quarters	Autos in Household (%)			No Driver's License (%)	Captives (%) (No Auto Available)	Choice %
	0	1	2+		0	1	2+			
Akron, Ohio	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Austin, Texas	10	47	43	8	35	35	30	NR	78	22
Birmingham, Alabama	20	39	41	1	NR	NR	NR	73	83	17
Boise City, Idaho	9	42	49	2	NR	NR	NR	NR	80	20
Brownsville, Texas	26	48	26	1	56	34	10	NR	NR	NR
Burlington, Iowa	16	50	34	2	NR	NR	NR	NR	68	32
Burlington, Vermont	23	54	23	12	NR	NR	NR	NR	64	36
Davenport/Rock Island/Moline	13	49	38	2	43	38	19	NR	43	57
Des Moines, Iowa	14	46	40	3	NR	NR	NR	NR	76	24
Eau Claire, Wisconsin	14	52	34	9	NR	NR	NR	NR	84	16
Eugene, Oregon	10	47	43	4	NR	NR	NR	NR	81	19
Greenville, South Carolina	17	41	42	2	63	28	9	79	79	21
Hattiesburg, Mississippi	21	45	34	9	69	23	8	NR	83	17
High Point, North Carolina	18	42	40	2	53	35	12	NR	94	6
Iowa City, Iowa	15	55	30	15	28	46	26	34	69	31
Jackson, Mississippi	16	41	44	3	57	32	11	NR	57	43
Lafayette, Indiana	13	56	31	15	NR	NR	NR	NR	71	29
Lubbock, Texas	8	46	46	6	48	41	11	NR	91	9
Lynchburg, Virginia	23	44	33	9	55	NR	NR	68	87	13
Manchester, New Hampshire	24	55	21	4	32	46	22	69	90	10
Parkersburg, West Virginia	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Portland, Maine	24	52	24	2	NR	NR	NR	NR	83	17
Reading, Pennsylvania	23	48	29	2	50	38	12	NR	82	18
Saint Cloud, Minnesota	12	53	35	16	31	40	29	NR	NR	NR
Salem, Oregon	14	46	40	8	NR	NR	NR	NR	86	14
Salt Lake City, Utah	11	43	46	1	44	38	18	81	81	19
Santa Rosa, California	11	46	43	2	NR	NR	NR	77	94	6
Shreveport, Louisiana	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sioux Falls, South Dakota	12	46	42	4	NR	NR	NR	NR	69	31
Spokane, Washington	16	45	39	3	NR	NR	NR	NR	80	20
Stockton, California	18	43	39	3	32	39	29	NR	89	11
Syracuse, New York	19	53	28	4	46	40	14	NR	81	19
Topeka, Kansas	13	46	41	5	52	36	12	71	72	28
Trenton, New Jersey	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Tulsa, Oklahoma	11	45	44	1	22	NR	NR	NR	61	39
Tuscaloosa, Alabama	19	40	41	15	57	NR	NR	82	78	22
Waco, Texas	14	44	42	6	54	37	9	58	88	12
Wichita Falls, Texas	11	50	39	9	NR	NR	NR	NR	72	28
Wilmington, North Carolina	23	43	34	2	NR	NR	NR	NR	85	15
Winston-Salem, North Carolina	20	40	40	4	60	26	14	NR	82	18

TABLE VII-7

TRANSIT RIDERSHIP CHARACTERISTICS

CITY	PURPOSE OF TRANSIT TRIP AVERAGE WEEKDAY (%)					% of Trip Ends in CBD	% of Trips Requiring Transfer	RIDERSHIP FREQUENCY (%)			
	Work	Shopping	School	Other	TOTAL			4-5 Days/Week	1-3 Days/Week	<1 Day/Week	TOTAL
Akron, Ohio	64	12	15	9	100	NR	NR	NR	NR	NR	–
Austin, Texas	54	12	18	16	100	33	27	75	13	12	100
Birmingham, Alabama	79	3	7	11	100	NR	NR	75	18	7	100
Boise City, Idaho	50	19	13	18	100	NR	NR	NR	NR	NR	–
Brownsville, Texas	NR	NR	NR	NR	–	NR	NR	72	21	7	100
Burlington, Iowa	33	17	21	29	100	75	NR	55	27	18	100
Burlington, Vermont	NR	NR	NR	NR	–	33	17	NR	NR	NR	–
Davenport/Rock Island/Moline	45	20	10	25	100	30	NR	NR	NR	NR	–
Des Moines, Iowa	63	4	15	8	100	85	9	NR	NR	NR	–
Eau Claire, Wisconsin	31	NR	41	29	100	NR	NR	NR	NR	NR	–
Eugene, Oregon	34	23	16	27	100	NR	NR	NR	NR	NR	–
Greenville, South Carolina	67	13	3	17	100	21	NR	NR	NR	NR	–
Hattiesburg, Mississippi	56	7	14	23	100	NR	35	69	24	7	100
High Point, North Carolina	56	14	8	22	100	NR	17	NR	NR	NR	–
Iowa City, Iowa	46	9	33	12	100	NR	NR	NR	NR	NR	–
Jackson, Mississippi	NR	NR	NR	NR	–	NR	18	NR	NR	NR	–
Lafayette, Indiana	45	18	21	16	100	NR	NR	49	31	20	100
Lubbock, Texas	61	18	9	15	100	43	NR	NR	NR	NR	–
Lynchburg, Virginia	42	12	13	33	100	34	NR	NR	NR	NR	–
Manchester, New Hampshire	43	13	19	25	100	37	18	NR	NR	NR	–
Parkersburg, West Virginia	53	32	NR	15	100	54	NR	53	33	14	100
Portland, Maine	51	18	18	13	100	NR	NR	53	17	30	100
Reading, Pennsylvania	59	20	1	20	100	43	14	64	29	7	100
Saint Cloud, Minnesota	NR	NR	NR	NR	–	40	26	NR	NR	NR	–
Salem, Oregon	41	33	8	18	100	NR	NR	NR	NR	NR	–
Salt Lake City, Utah	53	12	10	25	100	NR	15	NR	NR	NR	–
Santa Rosa, California	NR	NR	NR	NR	–	18	NR	NR	NR	NR	–
Shreveport, Louisiana	NR	NR	NR	NR	–	NR	24	NR	NR	NR	–
Sioux Falls, South Dakota	64	8	21	7	100	62	3	75	15	10	100
Spokane, Washington	42	13	NR	45	100	NR	9	NR	NR	NR	–
Stockton, California	26	14	46	14	100	24	19	NR	NR	NR	–
Syracuse, New York	55	11	18	16	100	NR	NR	74	20	6	100
Topeka, Kansas	45	29	5	21	100	NR	32	55	37	8	100
Trenton, New Jersey	48	NR	NR	42	100	NR	NR	NR	NR	NR	–
Tulsa, Oklahoma	82	10	5	3	100	59	18	NR	NR	NR	–
Tuscaloosa, Alabama	53	27	NR	20	100	NR	13	NR	NR	NR	–
Waco, Texas	63	11	10	16	100	41	27	71	13	16	100
Wichita Falls, Texas	49	15	15	21	100	NR	11	62	21	17	100
Wilmington, North Carolina	59	21	NR	20	100	NR	9	70	25	5	100
Winston-Salem, North Carolina	55	7	19	19	100	NR	40	NR	NR	NR	–

NR – Not Reported

Table VII-5 also shows that only a slightly disproportionate share of transit riders are elderly. In most cases, the percentage of transit riders aged 65 or over is only slightly greater than the percentage for the general population of the urbanized area. Generally, the reverse is true for persons aged 18 and under except in transit systems that carry a large share of school trips (e.g., in Stockton, California).

The vast majority of riders on small and medium-sized urban area transit systems are captive riders, as shown in Table VII-6. The "percent captive" column in this table shows the response to a survey question which generally asked whether a respondent actually had an automobile available for the trip he or she was making at the time. On some surveys, the respondent was asked whether he could have reasonably made the trip by any mode other than transit. In all but two out of 34 cities, over 60 percent of the riders were classified as "captives" according to this criterion. In 19 of the 34 cities, over 80 percent of the riders were captive; at the time of the study these systems were virtually serving only the transportation disadvantaged persons in their respective urban communities.

Other statistics in Table VII-6 further corroborate this supposition. The distribution of auto ownership for transit riders is compared with that for the general population in each urban community. The percentage of households in the urbanized area which have no automobile varies from 8 to 23, while the corresponding percentage for transit riders is generally over 40 percent. With one exception, in those cities where riders were asked if they possessed valid drivers' licenses, the vast majority indicated that they did not.

The percentage of the population living in group quarters may be an indication of transit dependence. All cities with high percentages (i.e., 12 to 16 percent) in this category have large universities whose students tend to have a high propensity toward transit use if the service is available. The on-board transit survey in Austin, incidentally, was conducted only on the city bus system and not on the university shuttle system, which carries more passengers than the city bus system.

Table VII-7 presents other profiles of small urban area transit riders. The distribution of ridership by trip purpose shows that in most cities approximately half of the trips are made to or from work. The percentage of trips made to or from school varies considerably depending on the provision of special school transit services. Shopping trips are often not mandatory and will not be made by transit unless the service is particularly convenient.

Most small urban area transit systems are focused on the city's CBD. Table VII-7, however, shows considerable variance in the percentage of transit riders bound to or from the CBD, even though in all but the very largest cities listed every transit route serves the CBD. As few as 18 to 25 percent of the transit riders have one trip end in the CBD in Shreveport, Louisiana; Stockton, California; and Greenville, South Carolina. This may be indicative of major traffic generators elsewhere in the city, such as the large Air Force base in Shreveport or the large proportion of school ridership in Stockton. The proportion of CBD-bound transit riders tends to be higher in larger cities such as Birmingham, Alabama; Des Moines, Iowa; and Tulsa, Oklahoma.

The proportion of passengers who must transfer to reach their destinations varies from 3 to 40 percent. This may indicate that the systems do not have routes oriented along major desire lines of travel or that the system has coordinated its routes to meet at a central point to provide residents living on one route access to jobs, schools, and shopping facilities located on other routes. As shown in Table VII-7, 15 to 20 percent of boarding passengers generally transfer to other routes.

The ridership frequency statistics in Table VII-7 indicate that, with one exception, over half the transit riders are regular riders; that is, they generally ride the bus four to five times each week.

c. Transit Ridership Distributions Over Time

Figures VII-11 and VII-12 illustrate typical transit ridership distributions by time of day for small and medium-sized urban areas, respectively. These are presented to illustrate the peaking characteristics which occur on most conventional bus transit systems. Once a planner determines an annual or daily estimate of transit demand, this must be converted into peak period and peak hour estimates to determine the quantity of transit system supply which must be provided to meet estimated demand.

Figure VII-11 illustrates that peaking of passenger demand occurs on some, but not all, small urban area transit systems. The system in Parkersburg, West Virginia, for example, has a relatively uniform demand throughout the day. The peak demands on other systems, with the exception of Burlington, Iowa, are not terribly pronounced; no peak hour accounts for more than 15 percent of the total daily system demand. One notable characteristic of small urban area transit systems is the very early dissipation of demand. Many systems do not provide service after 6 PM and those that do have very low ridership after 6 PM. Afternoon peaks tend to occur between 4 and 5 PM.

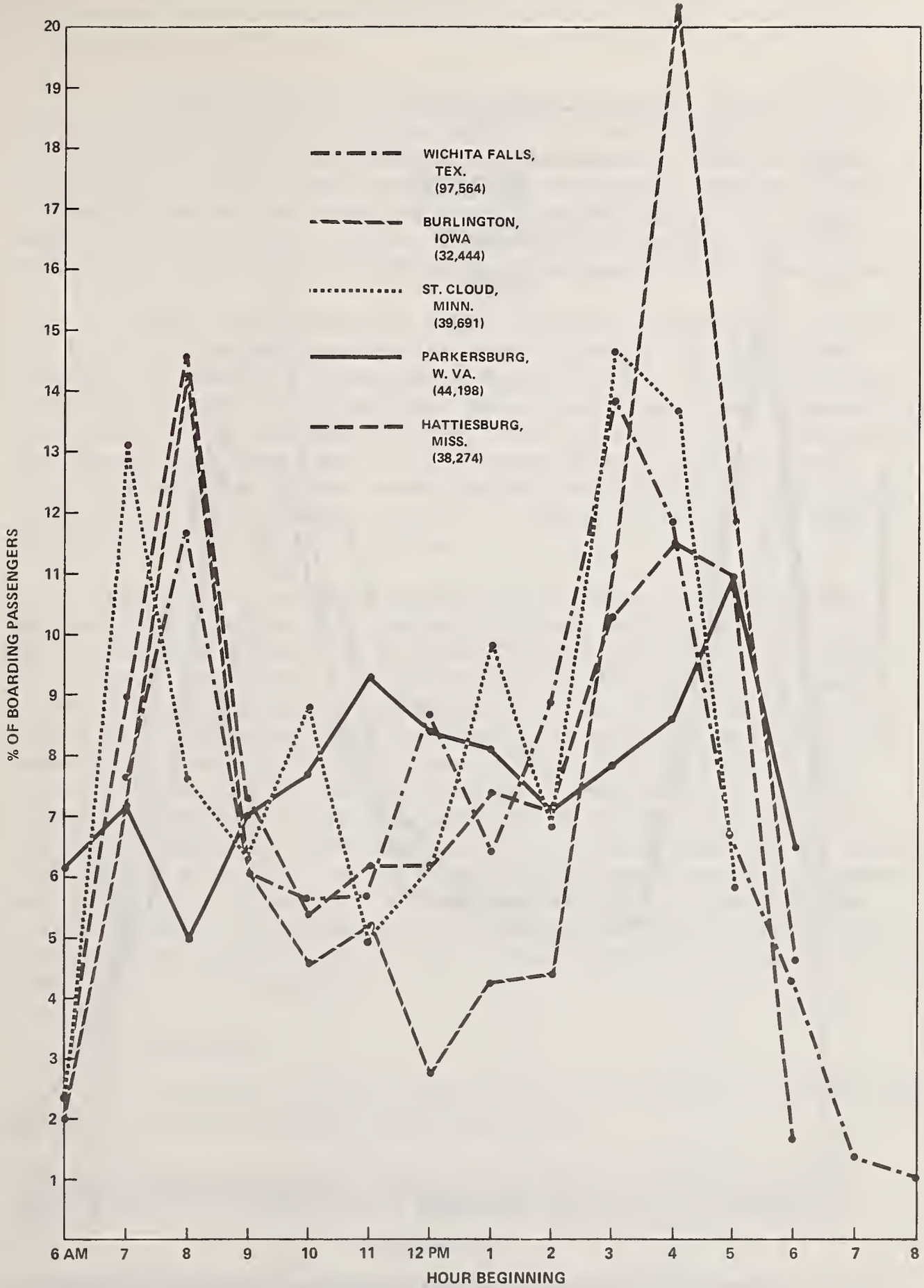


FIGURE VII-11: BUS RIDERSHIP BY TIME OF DAY IN SELECTED SMALL URBAN AREAS (30,000 TO 100,000 POPULATION)

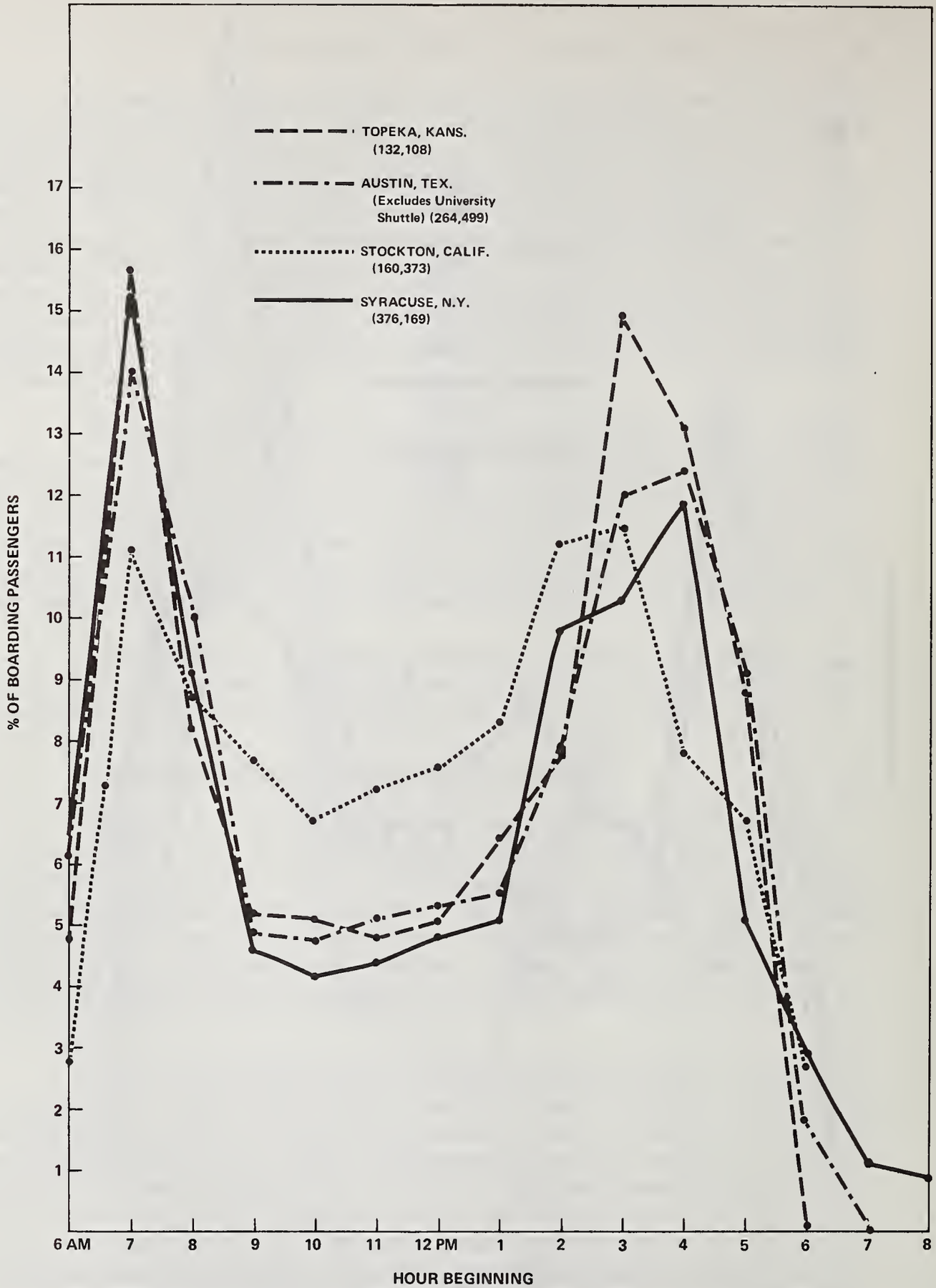


FIGURE VII-12: BUS RIDERSHIP BY TIME OF DAY FOR SELECTED MEDIUM-SIZED URBAN AREAS (100,000 TO 400,000 POPULATION)

The distribution in medium-sized urban areas, shown in Figure VII-12, displays similar characteristics. With the exception of the transit system in Stockton, California, which carries a high percentage of students, the other three systems shown experience pronounced morning peaks between 7 and 8 AM and more dispersed, early PM peak periods between 3 and 5 PM. Again, demand falls off quickly, even well within what would still be considered peak periods in larger urban areas.

Figure VII-13 shows the transit ridership distribution by day of the week for three small urban area transit systems, all of which had weekday and Saturday service, but no Sunday service. Ridership during the week tends to be fairly uniform, although all three systems experienced perceptibly higher ridership on Friday than on any other day. Each weekday generally accounted for 16 to 19 percent of total weekly ridership, while 9 to 13 percent of each week's demand occurred on Saturday. Typically, transit system supply, in terms of routes and revenue bus-miles operated, followed similar patterns.

Figure VII-14 shows the distribution of transit ridership by trip purpose for the various time periods (Portland, Maine). This illustration provides an indication of the type of transit rider using the system in each period of the day. The distributions shown are typically what might be expected in most small urban areas: 51 percent for work trips and 18 percent each for school and shopping trips. As might be expected, work trips account for nearly 70 percent of the AM peak period trips; school trips account for another 27 percent. The distribution is not nearly so pronounced in the afternoon peak, when riders returning from shopping, medical and dental appointments, personal business, and social calls as well as workers use the system. Most transit trips for shopping are typically made during the midday base period. The distribution of transit demand by trip purpose and time of day indicates that transit service could vary by period of the day to meet the demands of the predominate type of rider in each period.

d. References

The following transit studies were used as sources in the preceding discussion (listed in alphabetical order by city):

Akron Transit Development Program for Summit and Portage County Area, Akron City Department of Planning, Akron, Ohio, September 1974.

Transit Action Program (1972-1977), Austin City Department of Traffic and Transportation, Austin, Texas, October 1972.

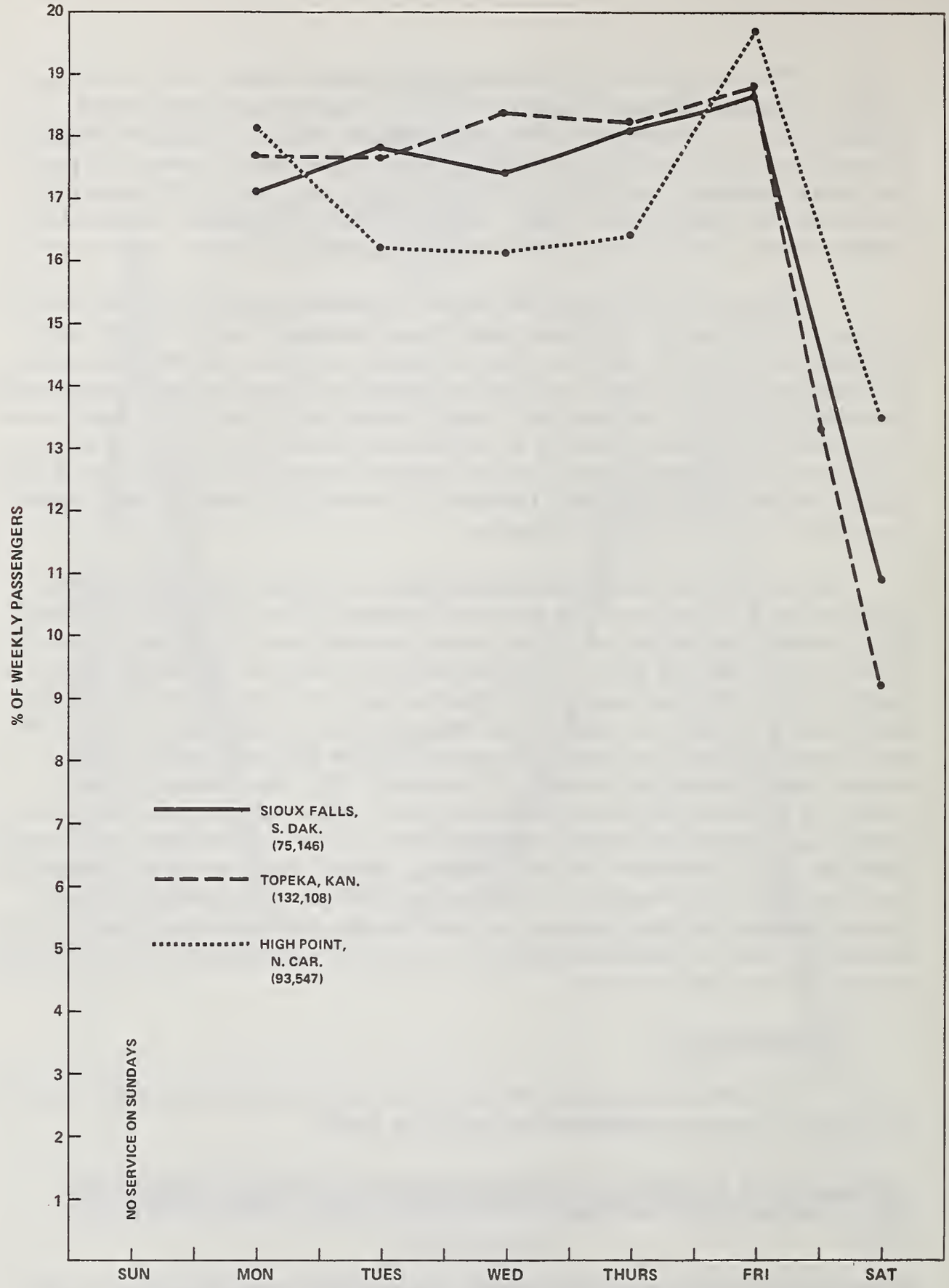


FIGURE VII-13: BUS RIDERSHIP BY DAY OF WEEK

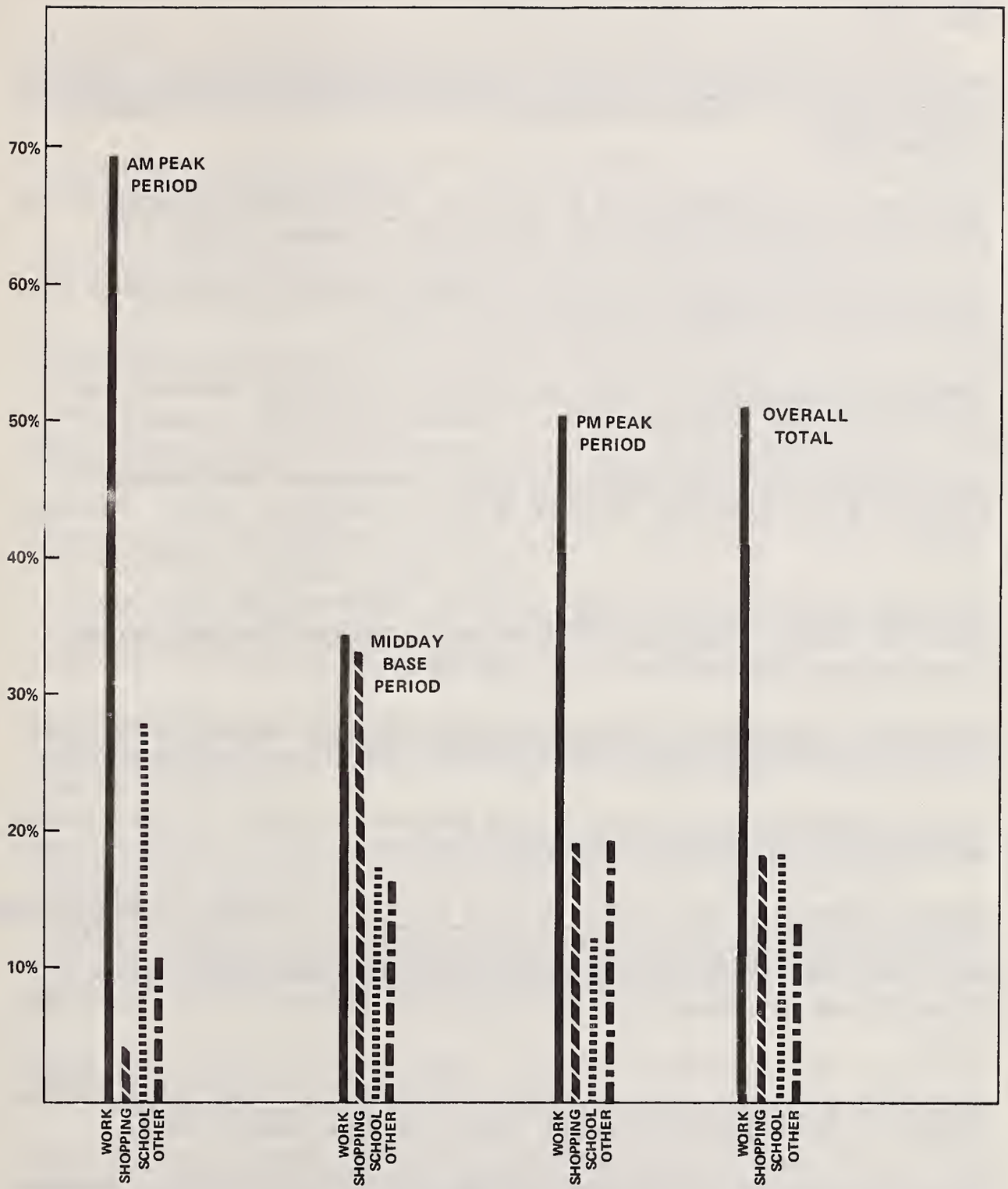


FIGURE VII-14: TRANSIT TRIP PURPOSE BY TIME PERIOD – PORTLAND, MAINE

Birmingham Transit Study for Birmingham Regional Planning Commission, Wilbur Smith and Associates, Inc., Columbia, South Carolina, June 1972.

Boise Metropolitan Area Public Transportation Plan, Phase I, Analysis of Alternatives, DeLeuw Cather and Co., San Francisco, California, January 1973.

An Urban Mass Transit Study for the City of Brownsville, Texas, W. M. Peterson Consulting Engineers, Brownsville, Texas, August 1971.

A Transit Improvement Program for Burlington, Iowa 1971-1975, W.C. Gilman and Co., Chicago, Illinois, June 1971.

Transit Technical Study, Chittenden County, Vermont (Burlington), Barton-Aschman Associates, Inc., Washington, D.C., January 1973.

Quad Cities Public Transportation Study (Davenport, Rock Island, Moline), Peat, Marwick, Mitchell & Co., Washington, D.C., February 1972.

Des Moines Area Transit Study, Alan M. Voorhees and Associates, Inc., St. Louis, Missouri, and City of Des Moines Plan and Zoning Commission, Des Moines, Iowa, July 1973.

Eau Claire Transit Study (Eau Claire, Wisconsin), Dalton Dalton Little Newport and ATE Management and Service Co., Inc., February 1973.

Lane Transit District Transit Survey (Eugene, Oregon), DeLeuw Cather and Co., San Francisco, California, 1972.

Study of Public Transportation Service for the Greenville, South Carolina, Urban Area; Technical Report on the Inventory and Analysis, Kimley-Horn and Associates, Inc., Raleigh, North Carolina and Research Triangle Institute, Research Triangle Park, North Carolina, November 1974.

Hattiesburg Transit Study; The City of Hattiesburg, Mississippi, Wilbur Smith and Associates, Columbia, South Carolina, August 1972.

Transit Improvement Program for High Point, North Carolina, Alan M. Voorhees and Asosciates, Inc., McLean, Virginia, November 1972.

Mass Transit Technical Study; Iowa City, Iowa, Institute of Urban and Regional Research, University of Iowa, Iowa City, Iowa, September 1971.

A Public Transportation System for Jackson, Mississippi, Barton-Aschman Associates, Inc., Chicago, Illinois, August 1973.

The Effect of Improved Service on the Bus Transit Ridership in the Greater Lafayette (Indiana) Area, School of Civil Engineering, Purdue University, West Lafayette, Indiana, December 1973.

Transit for Lubbock's Future, Simpson and Curtin, Inc., Philadelphia, Pennsylvania, March 1972.

A Transit Development Program for the Lynchburg Urban Area, Alan M. Voorhees and Associates, Inc., McLean, Virginia, February 1974.

A Transit Development Program for Manchester, N.H., Alan M. Voorhees and Associates, Inc., McLean, Virginia, March 1973.

Short Range Transit Improvement Program, Parkersburg, W. Va., Vogt, Sage, and Pflum Associates, Cincinnati, Ohio, January 1975.

Public Transit in Greater Portland (Maine), Edward C. Jordan, Co., Inc., Portland, Maine, August 1972.

County of Berks Mass Transit Study (Reading, Penna.), Berks County Planning Commission, Reading, Penna., December 1971.

St. Cloud (Minn.) Metropolitan Transportation Commission Transit Improvement Program, Bather-Ringrose-Wolsfeld, Inc., Roseville, Minnesota, July 1972.

Salem General Neighborhood Renewal Plan, Research and Analyses Technical Memoranda, DeLeuw, Cather and Co., San Francisco, California, 1972.

A Transit Improvement for the Utah Transit Authority (Salt Lake City), Alan M. Voorhees and Associates, Inc., McLean, Virginia, March 1971.

Santa Rosa (Calif.) Transit Study, JHK and Associates, San Francisco, California, December 1972.

Mass Transit Operations Shreveport/Bossier City (Louisiana), DeLeuw, Cather and Co., New York, N.Y. and Forte, Kahl, Tablada, Hock, and Associates, Inc., January 1971.

Comprehensive Transit Study, Sioux Falls, South Dakota, Frederick R. Harris, Inc., Stamford, Connecticut, May 1970.

A Transit Development Program for Spokane, Alan M. Voorhees and Associates, Inc., San Diego, California, May 1970.

On Board Transit Survey (Skockton, Calif.), San Joaquin County Council of Governments, Stockton, California, May 1973.

Syracuse Transit Improvement Study, Wilbur Smith and Associates, Columbia, South Carolina, January 1973.

Short Range Transit Plan, Topeka, Kansas, Johnson, Brickell, and Malcahy Consulting Engineers, Kansas City, Missouri, August 1972.

Trenton Technical Study, The Transportation Program, Princeton University, Princeton, New Jersey, March 1975.

A Transit Improvement Program for the Tulsa Metropolitan Area, 1970-1974, Barton-Aschman Associates, Inc., Chicago, Ill., October 1970.

A Short Range Transit Study (Tuscaloosa, Alabama), Harland Bartholomew and Associates, Memphis, Tennessee, March 1974.

Waco Transit Study, Texas Transportation Institute, Texas A&M University, College Station, Texas, December 1970.

Wichita Falls Transit Study, Pinnell, Anderson, Wilshire and Associates, Dallas, Texas, January 1971.

Wilmington, North Carolina, Bus Transit Study, Sheridan Engineering, Inc., Louisville, Kentucky, and Edwards and Kelcey, Neward, New Jersey, June 1974.

Winston-Salem Transit Study, Winston-Salem, North Carolina, Wilbur Smith and Associates, Winston-Salem, North Carolina, October 1971.

Census data was taken from the following reports:

County and City Data Book, 1972, U.S. Bureau of the Census (population, distribution by age and sex, percent in group quarters).

1970 Census of Housing, U.S. Bureau of the Census, Individual State Reports (household auto ownership).

3. 1974 National Transportation Study Data

The U.S. Department of Transportation conducted a nationwide transportation study in 1972 in which state and local agencies collected transportation inventory data and planning information for all modes of transportation from each urbanized area in the United States. The data provide the most complete, comprehensive, and useful aggregate nationwide inventory. Because of inconsistencies in reporting procedures and the lack of available data pertaining to existing transit operations in smaller areas, aggregate data rather than data for individual urbanized areas are presented.

Table VII-8 presents a list of scattergrams and frequency distributions which provide an overview of conventional bus transit experience. Four categories of transit data are presented: supply data, demand data, supply/demand relationships, and financial operating data.

Summary National Transportation Study (NTS) data are presented for each of two urbanized area population groups: 50,000 to 250,000 and 250,000 to 500,000[1]. The nationwide distribution of several demand and supply rate variables serves as a reference for comparing individual transit operations with national experience. In addition, a series of graphs relates supply, demand, and financial data for all transit operations in the country. These graphs serve as a reference for evaluating of individual system performance and as a crude tool for rough-cut demand, cost, and revenue estimation.

a. NTS Transit Supply Data

The figures in this subsection depict the range and distribution of typical transit supply variables: bus fleet size, revenue bus-miles operated, percentage of population served, and average operating speed. The first three figures relate bus fleet size, revenue bus-miles operated, and the percentage of population served to the urbanized area population.

Figure VII-15 shows that only a slight correlation existed between urbanized area population and bus fleet size. Nearly all urbanized areas with populations from 50,000 to 150,000 operated between five and 25 buses. Larger variations in bus fleet sizes existed in medium-sized urbanized areas (250,000 to 500,000 population).

The plot of annual revenue bus miles versus urbanized area population (Figure VII-16) displays similar characteristics. Generally, bus systems in small urbanized areas operated 100,000 to 1,000,000 revenue bus-miles.

[1] The smaller population group has 149 urbanized areas; the larger, 40 urbanized areas. For a complete list of these urbanized areas, see 1974 National Transportation Study - Manual II: Procedures and Data Forms, Volume 2, Forms and Appendices, Appendix F, U.S. Department of Transportation, Washington, D.C., October 1972.

TABLE VII-8

NTS FIGURES

Figures	Title	Type	Population Group
Supply Data			
VII-15	Bus Fleet Size Versus Urbanized Area Population	Scattergram	50,000 – 500,000
VII-16	Transit Supply Versus Urbanized Area Population	Scattergram	50,000 – 500,000
VII-17	Transit Service Coverage Versus Urbanized Area Population	Scattergram	50,000 – 500,000
VII-18a	Revenue Bus-Miles per Person Served	Frequency distribution	50,000 – 250,000
VII-18b	Revenue Bus-Miles Per Person Served	Frequency distribution	250,000 – 500,000
VII-19a	Average Operating Speed (weekday)	Frequency distribution	50,000 – 250,000
VII-19b	Average Operating Speed	Frequency distribution	250,000 – 500,000
Demand Data			
VII-20	Annual Transit Ridership Versus Urbanized Area Population	Scattergram	50,000 – 500,000
VII-21	Weekday Transit Ridership Versus Urbanized Area Population	Scattergram	50,000 – 500,000
VII-22a	Passengers per Person Served (annual)	Frequency distribution	50,000 – 250,000
VII-22b	Passengers per Person Served (annual)	Frequency distribution	250,000 – 500,000
VII-23	Percent of Passengers Who Transfer	Frequency distribution	50,000 – 500,000
Supply/Demand Relationships			
VII-24a	Passengers per Revenue Bus-Mile (annual)	Frequency distribution	50,000 – 250,000
VII-24b	Passengers per Revenue Bus-Mile (annual)	Frequency distribution	250,000 – 500,000

TABLE VII-8 (Continued)

Figures	Title	Type	Population Group
Supply/Demand Relationships (Continued)			
VII-25	Transit Supply Versus Annual Transit Ridership	Scattergram	50,000 – 250,000
VII-26	Transit Supply Versus Annual Transit Ridership	Scattergram	250,000 – 500,000
VII-27	Transit Supply Rate Versus Transit Demand Rate	Scattergram	50,000 – 500,000
Financial Operating Data			
VII-28a	Operating Revenue per Passenger (average fare)	Frequency distribution	50,000 – 250,000
VII-28b	Operating Revenue per Passenger (average fare)	Frequency distribution	250,000 – 500,000
VII-29	Annual Operating Revenue Versus Annual Transit Ridership	Scattergram	50,000 – 250,000
VII-30	Annual Operating Revenue Versus Annual Transit Ridership	Scattergram	250,000 – 500,000
VII-31a	Operating Expense per Revenue Bus-Mile	Frequency distribution	50,000 – 250,000
VII-31b	Operating Expense per Revenue Bus-Mile	Frequency distribution	250,000 – 500,000
VII-32	Annual Operating Expense Versus Transit Supply	Scattergram	50,000 – 250,000
VII-33	Annual Operating Expense Versus Transit Supply	Scattergram	250,000 – 500,000
VII-34	Annual Operating Revenue Versus Annual Operating Expense	Scattergram	50,000 – 250,000
VII-35	Annual Operating Revenue Versus Annual Operating Expense	Scattergram	250,000 – 500,000

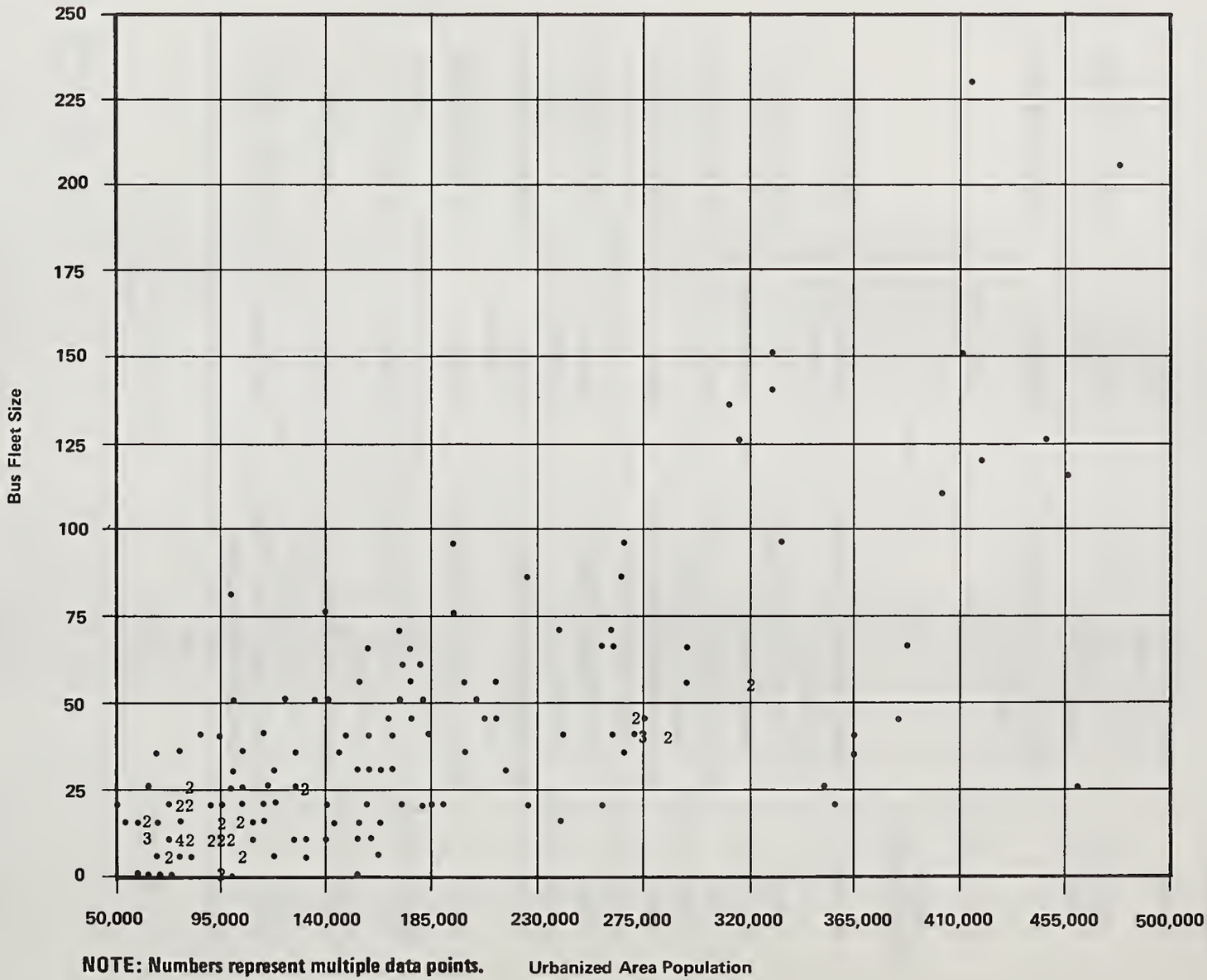


FIGURE VII-15: BUS FLEET SIZE VERSUS URBANIZED AREA POPULATION

Small- and Medium-Sized Urbanized Areas (50,000-500,000 Population)

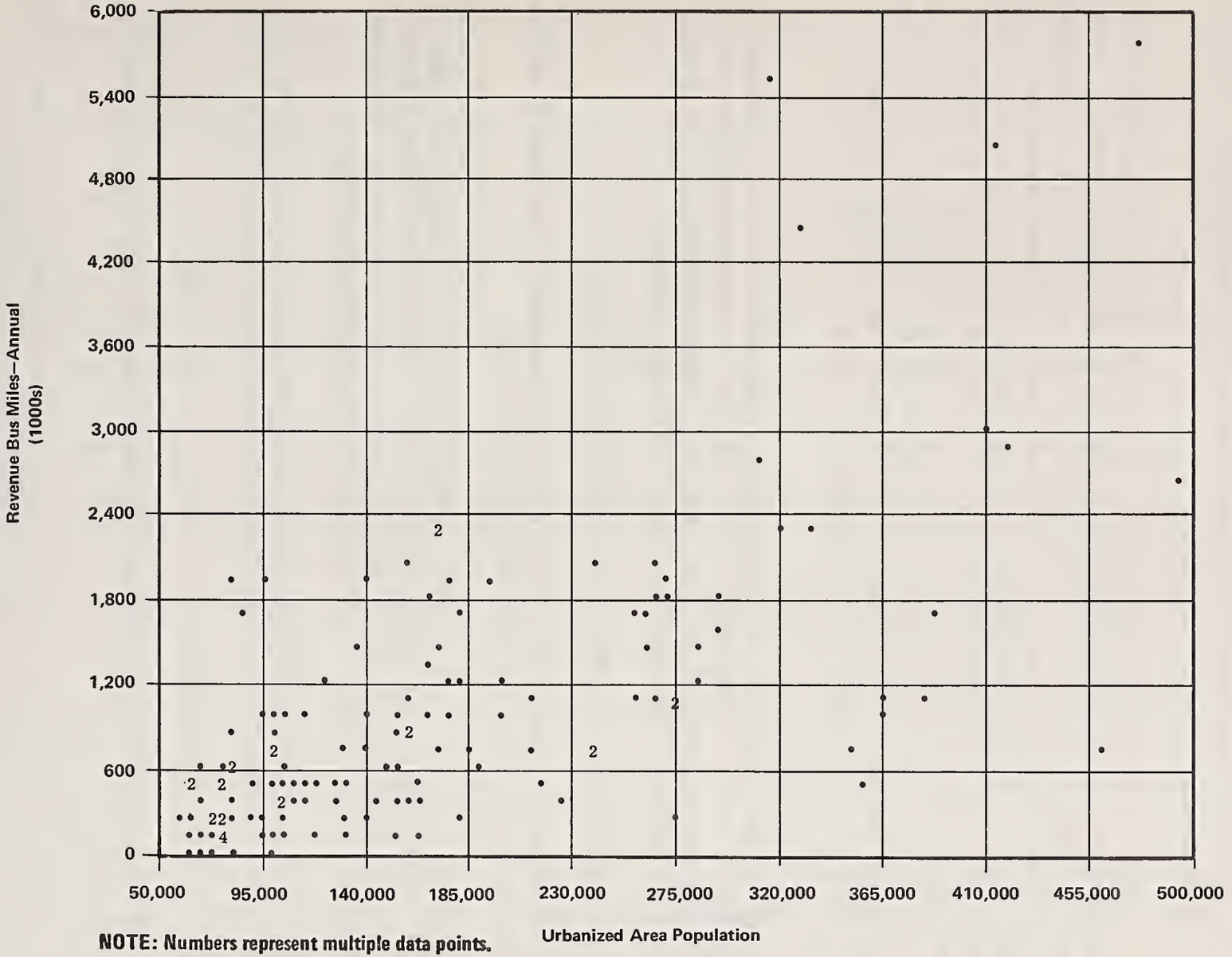


FIGURE VII-16: TRANSIT SUPPLY VERSUS URBANIZED AREA POPULATION

Small- and Medium-Sized Urbanized Areas (50,000-500,000 Population)

The average for small urbanized areas (population 50,000 to 250,000) was 740,000, with a median value of 567,000 revenue bus-miles. Again, a large variation existed for medium-sized urbanized areas, ranging from 295,000 to 5,808,000 annual revenue bus-miles.

Figure VII-17 shows that many small and medium-sized urbanized area bus systems serve a significant proportion of their populations[1]. The service area is defined in the NTS as "the percent of the urbanized area population which is within a band 1/4 mile wide on each side of all bus routes operating on weekdays."[2] The percentage was evenly distributed by 35 and 90 percent for both small and mediumsized cities. Contrary to prior expectations, it was found that large cities did not serve a greater proportion of the population than small cities. Small cities tend to have few or no fringe areas. However, their urbanized population is concentrated in the central city, whereas in larger cities greater proportions of people live outside the central city.

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[1]As defined in the 1970 Census User's Guide, "an urbanized area contains a city (or twin cities) of 50,000 or more population (central city) plus the surrounding closely settled incorporated and unincorporated... areas which constitute the urban fringe and meet the following criteria:

A. Incorporated places with 2,500 inhabitants or more.

B. Incorporated places with less than 2,500 inhabitants, provided each has a closely settled area of 100 dwelling units or more.

C. Enumeration districts in unincorporated areas with a population density of 1,000 inhabitants or more per square mile. (The area of large nonresidential tracts devoted to such urban land uses as railroad yards, factories, and cemeteries is excluded in computing the population density.)

D. Other enumeration districts in unincorporated territory with lower population density provided that it serves one of the following purposes:

1. To eliminate enclaves.

2. To close indentations in the urbanized area of one mile or less across the open end.

3. To link outlying enumeration districts of qualifying density that were no more than 1-1/2 miles from the main body of the urbanized area."

[2]1974 National Transportation Study: Manual II, Procedures and Data Forms, Volume I, Procedures, October 1972, U.S. Department of Transportation.

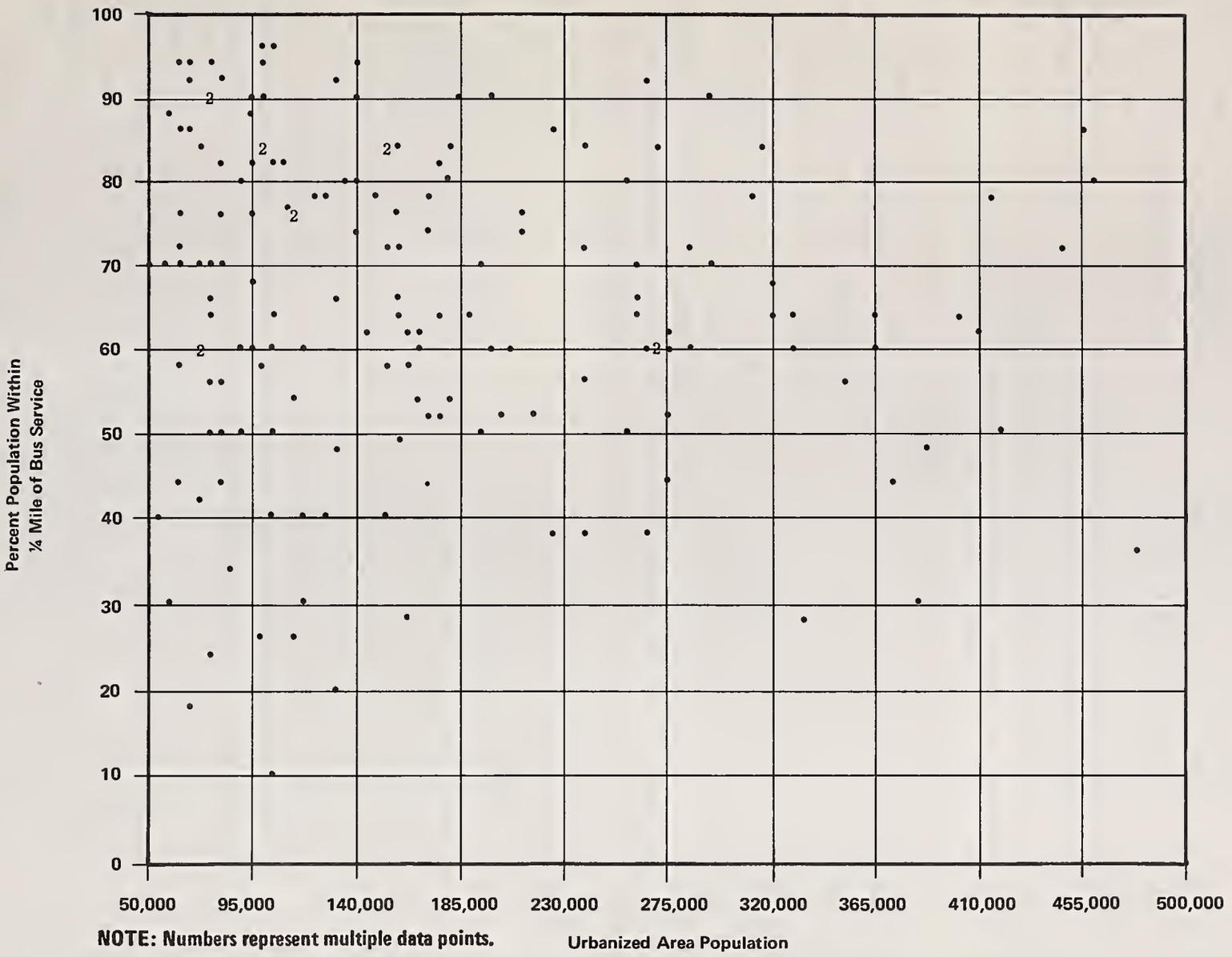


FIGURE VII-17: TRANSIT SERVICE COVERAGE VERSUS URBANIZED AREA POPULATION

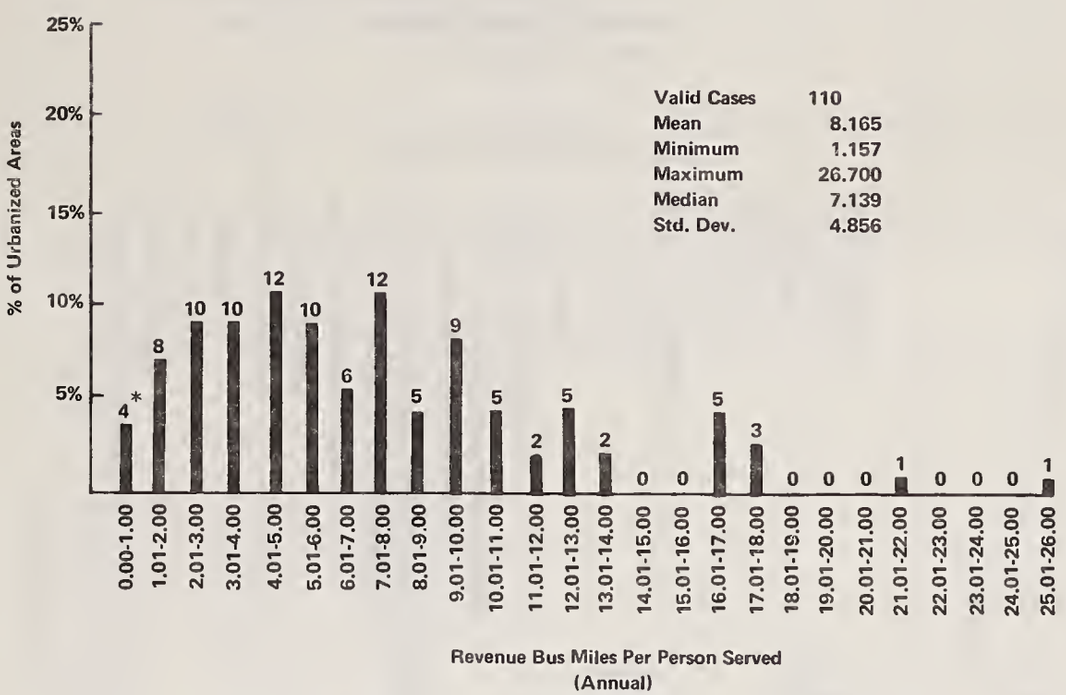
Small- and Medium-Sized Urbanized Areas (50,000-500,000 Population)

A more dependable indicator of transit service offered is the rate of transit supply as measured by revenue bus-miles operated per person served. Distributions of this transit supply rate, known as a "transit service factor", are presented in Figures VII-18a and VII-18b for small and medium-sized areas, respectively. The frequency distribution for small urbanized areas supports the APTA data presented in Figure VII-6. The rate of revenue bus-miles per person served in small urbanized areas ranged from 1.2 to 26.7, with an average of 7.1. Figure VII-18b shows that more (but not significantly more) bus service per person was provided in medium-sized urbanized areas; annual revenue bus-miles per person served ranged from 2.3 to 33.7, with an average of 8.5 for medium-sized urbanized areas.

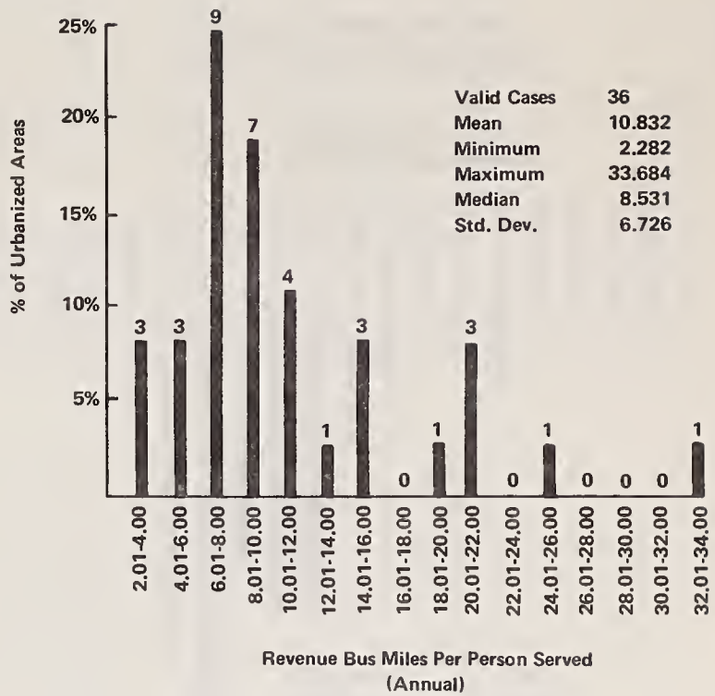
The distribution of average weekday operating speeds presented in Figures VII-19a and VII-19b may be used as very crude indicators of transit service quality. Average transit speeds estimated from these distributions, when compared with speeds of competing modes, may be used as input to transit demand estimation models. Average weekday operating speeds in small urbanized areas varied from 6 to 25 miles per hour, with an average of 13.7. Reported average operating speeds in medium-sized areas ranged from 10 to 20 miles per hour, with a slightly lower average of 13.1. The corresponding ranges for average peak hour operating speeds were 5.0 to 25.0 miles per hour, with an average of 13.0, for small cities and 8.0 to 20.0, with an average of 12.2, for medium-sized cities.

b. NTS Transit Demand Data

Transit demand statistics are presented in Figures VII-20 through VII-23. Demand as measured by both annual and weekday passengers is plotted against urbanized area population in Figures VII-20 and VII-21. Annual ridership statistics are used primarily for revenue estimation; weekday passenger estimates may be used to determine transit system vehicle and labor requirements. Surprisingly, both figures suggest that little correlation existed between city size and transit ridership, which is dependent on transit service supply and quality as well as city density and demographic characteristics. Annual transit ridership in small urbanized areas varied from 200,000 to a single isolated value of 7,826,000, with an average of 1,590,000. The corresponding range for medium-sized cities was 300,000 to one isolated value of 27,105,000, with an average of 5,691,000. All systems typically carried fewer than 10,000,000 passengers. All passenger statistics were reported as unlinked (i.e., transferring passengers counted each time they boarded a bus). Typically, revenue passenger volumes were 5 to 25 percent lower.



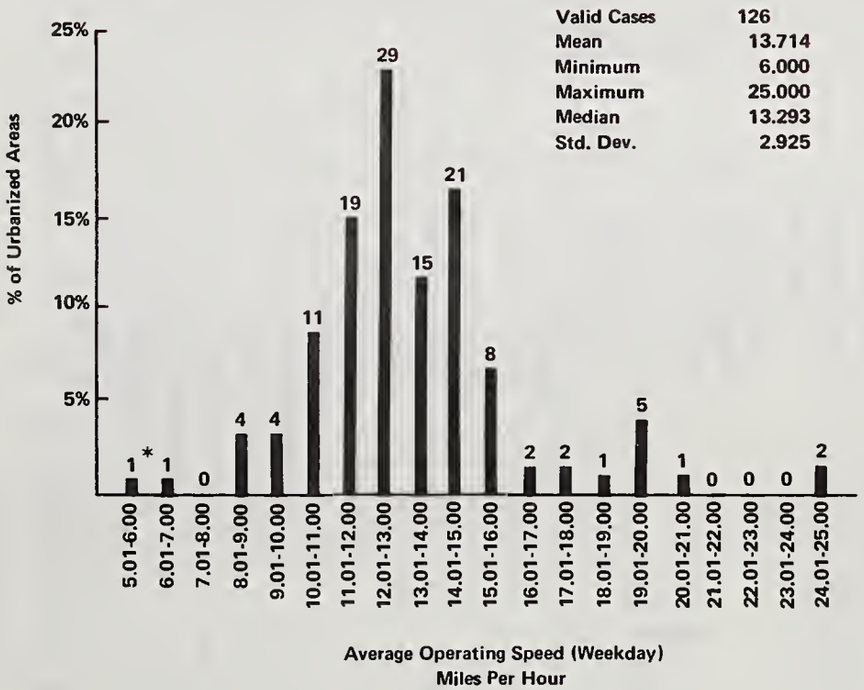
a. Small Urbanized Areas
(50,000-250,000 Population)



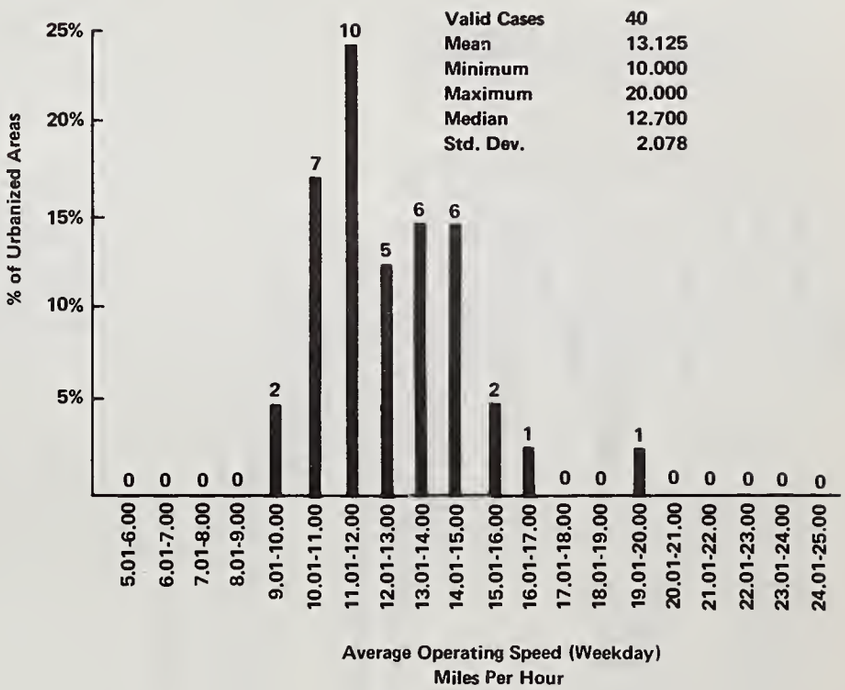
b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-18: FREQUENCY DISTRIBUTION OF REVENUE BUS-MILES PER PERSON SERVED



a. Small Urbanized Areas
(50,000-250,000 Population)



b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-19: FREQUENCY DISTRIBUTION OF AVERAGE OPERATING SPEED (WEEKDAY)

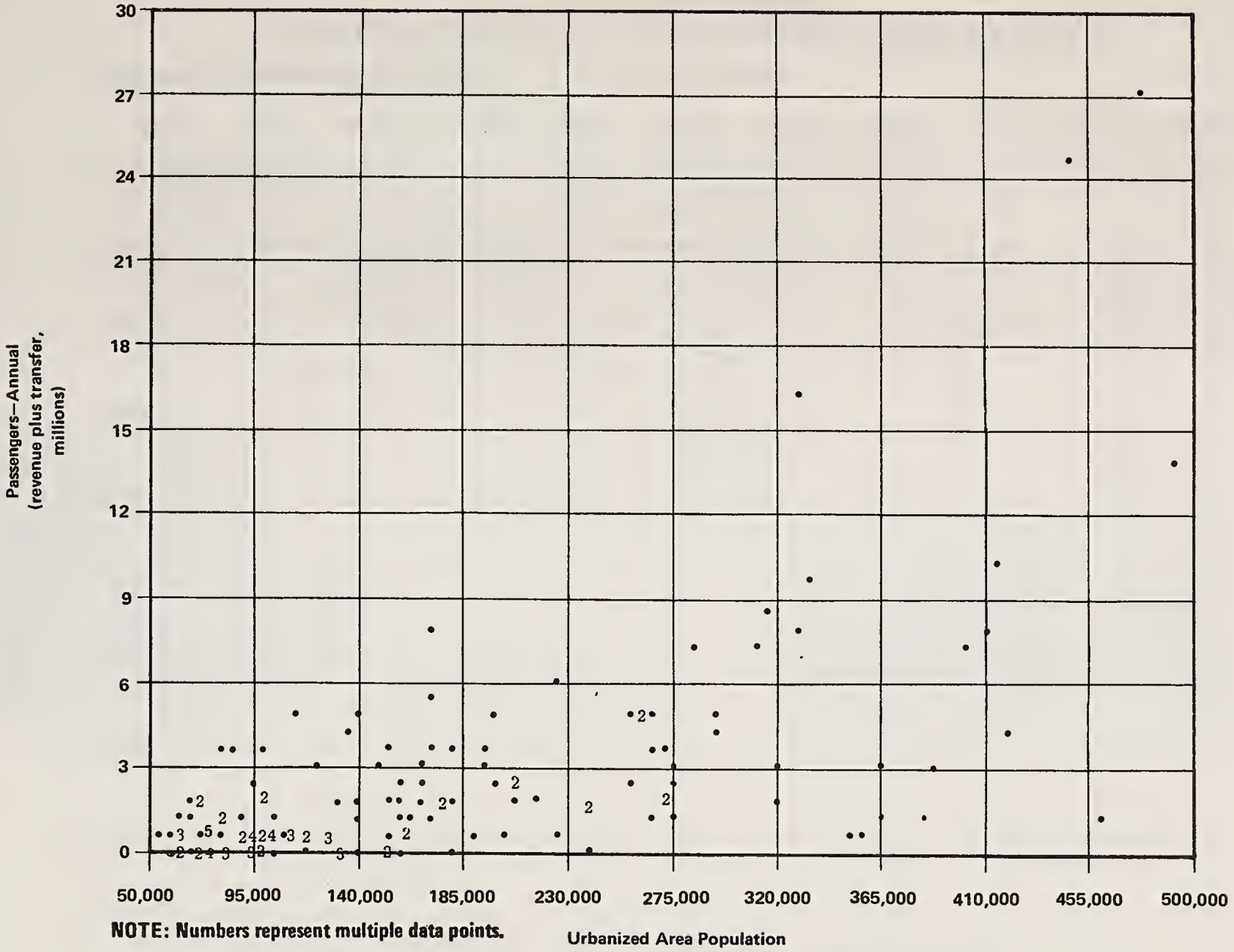
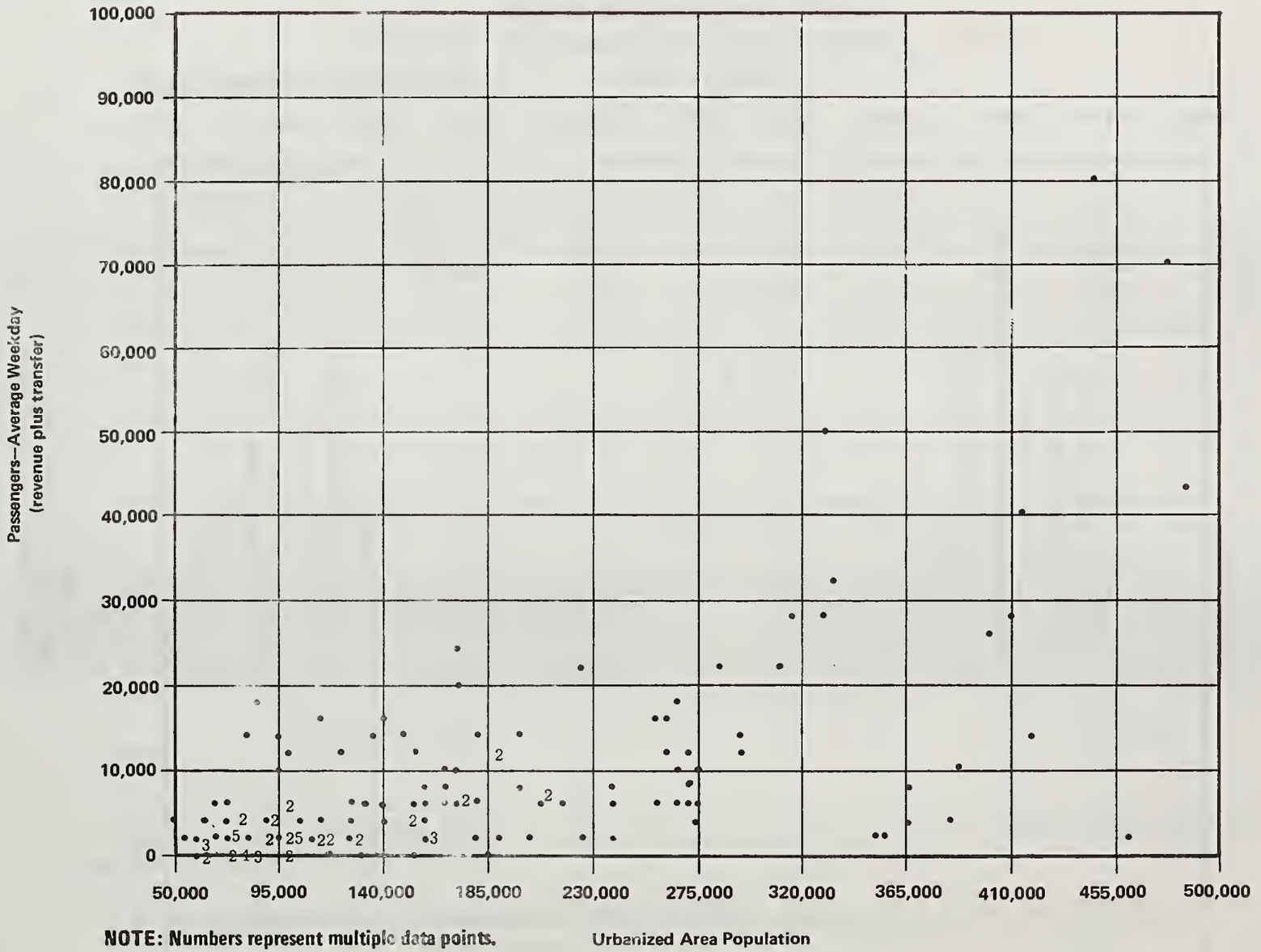


FIGURE VII-20: ANNUAL TRANSIT RIDERSHIP VERSUS URBANIZED AREA POPULATION

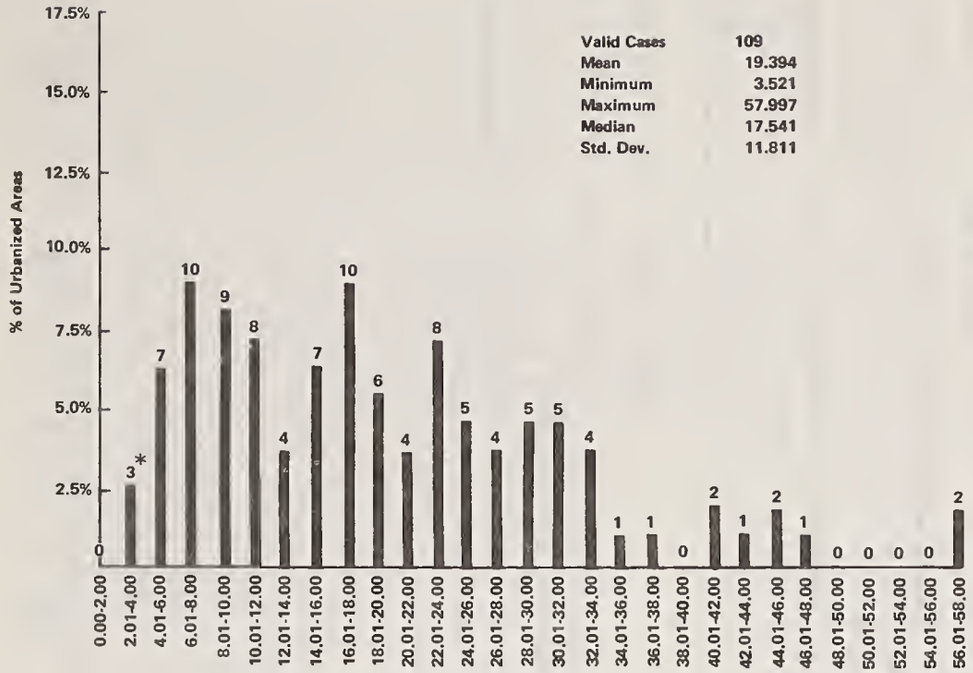
Small- and Medium-Sized Urbanized Areas (50,000-500,000 Population)



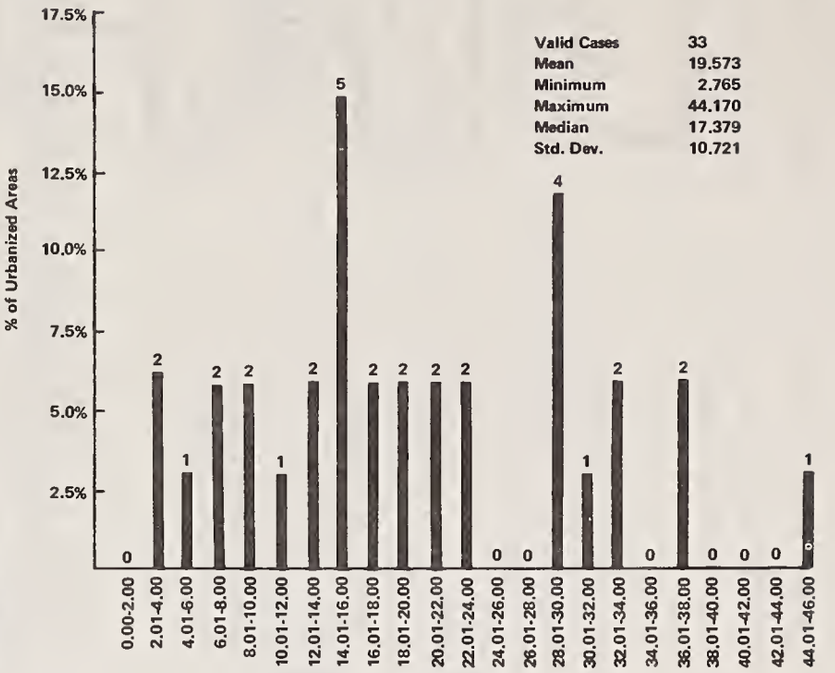
NOTE: Numbers represent multiple data points.

FIGURE VII-21: WEEKDAY TRANSIT RIDERSHIP VERSUS URBANIZED AREA POPULATION

Small- and Medium-Sized Urbanized Areas (50,000-500,000 population)



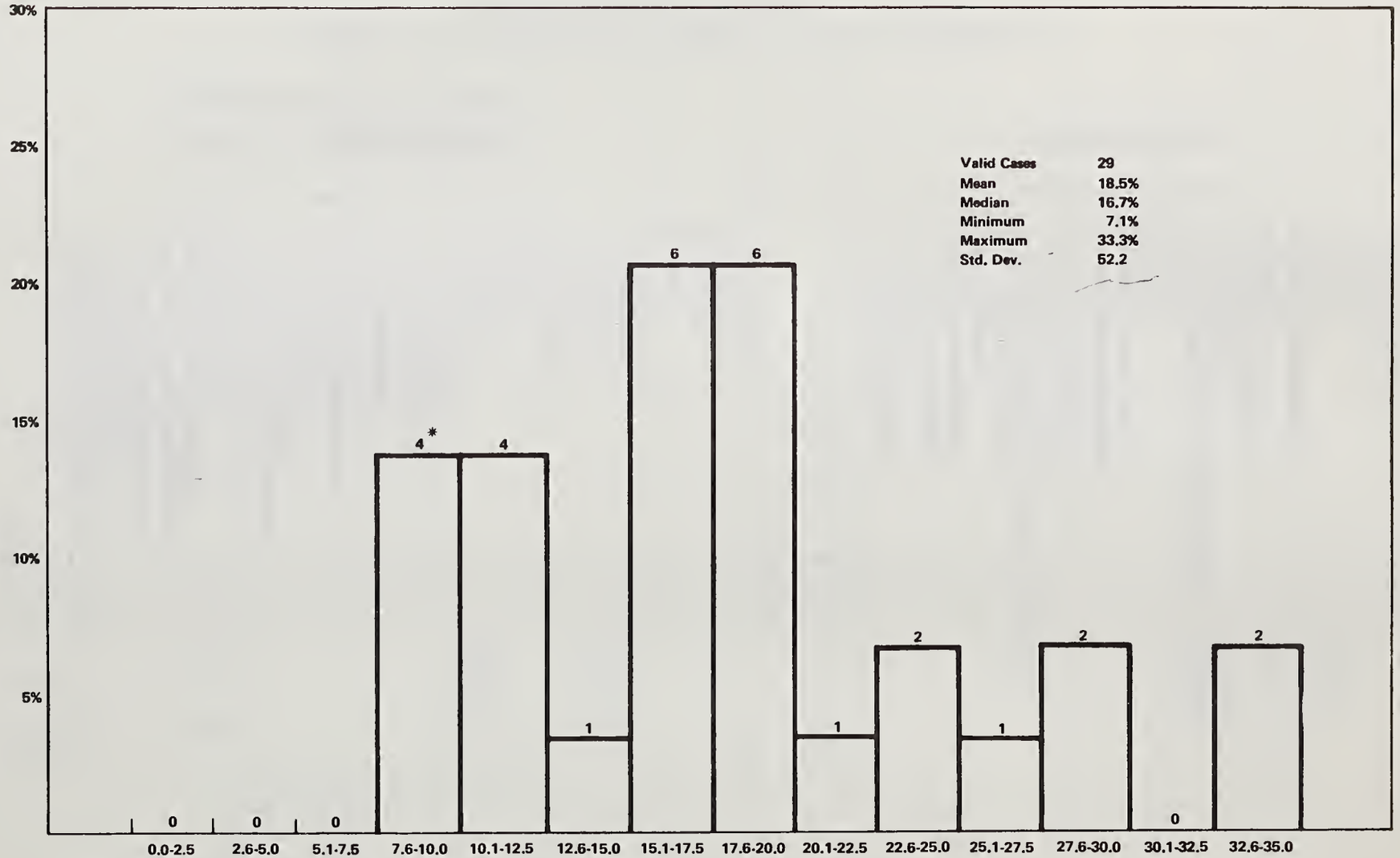
a. Small Urbanized Areas
(50,000-250,000 Population)



b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-22: FREQUENCY DISTRIBUTION OF PASSENGERS PER PERSON SERVED (ANNUAL)



*Numbers indicate the number of observations.

FIGURE VII-23: FREQUENCY DISTRIBUTION OF PERCENT OF PASSENGERS WHO TRANSFER

Urbanized Area Populations 50,000-500,000

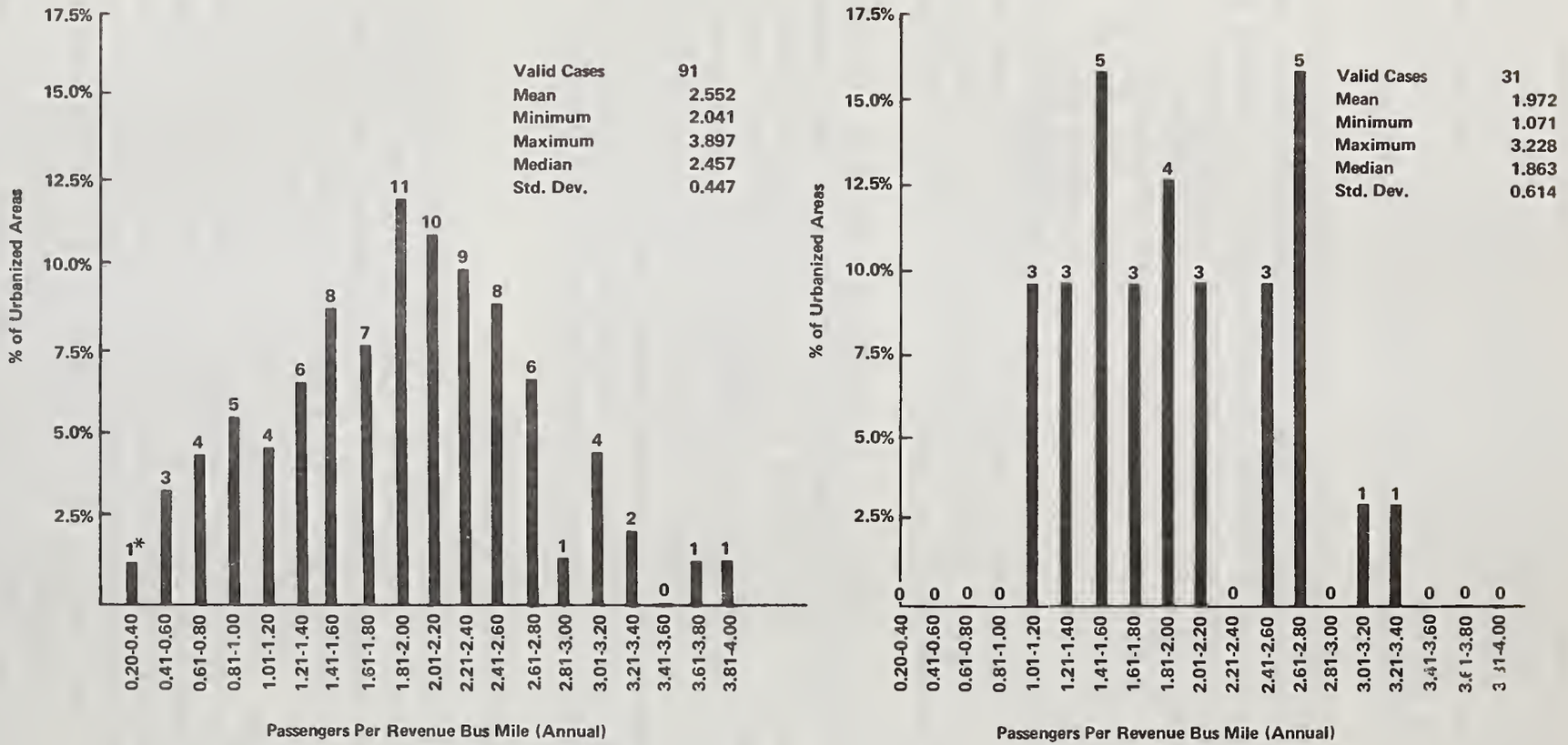
Average weekday ridership for small urbanized areas varied from 550 to 25,650, with an average of 5,600. The vast majority of values spanned 1,000 and 6,000, as shown in Figure VII-21. Again, medium-sized cities showed great variation: 1,000 to 80,000 weekday passengers, with an average of 18,300. More than 90 percent of the reporting systems carried between 3,000 and 30,000 passengers on an average weekday.

Figure VII-22a and VII-22b present frequency distributions of demand rates for small- and medium-sized urbanized areas, respectively. The demand rate is expressed as the number of annual passengers divided by the population within the transit system service area. Figure VII-22a shows that this variable is evenly distributed for small urbanized areas, ranging from 2.0 to 57.0, with an average value of 17.7. More than 80 percent of the transit systems carry between 4.0 and 30.00 passengers annually for each person residing within a service area. A value of 17.0 can be used for very rough-cut demand estimation for fixed-route, fixed-schedule transit service into new areas as a function of service area coverage. Transit systems in medium-sized cities boarded from 2.8 to 44.2 passengers per person served, with an average of 19.6.

Figure VII-23 shows the proportion of boarding revenue passengers that can be expected to transfer on small and medium-sized urbanized area transit systems. The transit systems reporting this statistic had a percentage range of 7.1 to 33.3, averaging 16.7 percent of revenue passengers. This percentage varies according to the coordination of transit routes and the location of major employment centers, schools, universities, and shopping centers, but transfer percentages greater than 30 percent indicate that existing transit routes are not serving major origin-destination pairs that may have potential latent transit demand.

c. Supply/Demand Relationships

The graphs in this section relate the supply and demand variables from the preceding sections to small and medium-sized urbanized areas on separate graphs. Figure VII-24 illustrates the frequency distributions of the variable "passengers per revenue bus-mile for small urbanized areas." This plot illustrates the variations in utilizing available transit supply across the country. Passengers per revenue bus-mile varied from as low as 0.40 to a maximum of 3.90, with an average of 2.1. The distribution for transit systems in medium-sized urbanized areas shown in Figure VII-25 displayed similar tendencies, with values of passengers per revenue bus-mile ranging from 1.1 to 3.2, with an average of 2.0. The average values indicated in the NTS statistics are lower than the corresponding 1971 APTA statistics shown in Table VII-1 primarily because the APTA passenger counts were revenue passengers as opposed to unlinked (revenue plus transfer) passengers reported in the NTS data.



a. Small Urbanized Areas
(50,000-250,000 Population)

b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-24: FREQUENCY DISTRIBUTION OF PASSENGERS PER REVENUE BUS-MILE (ANNUAL)

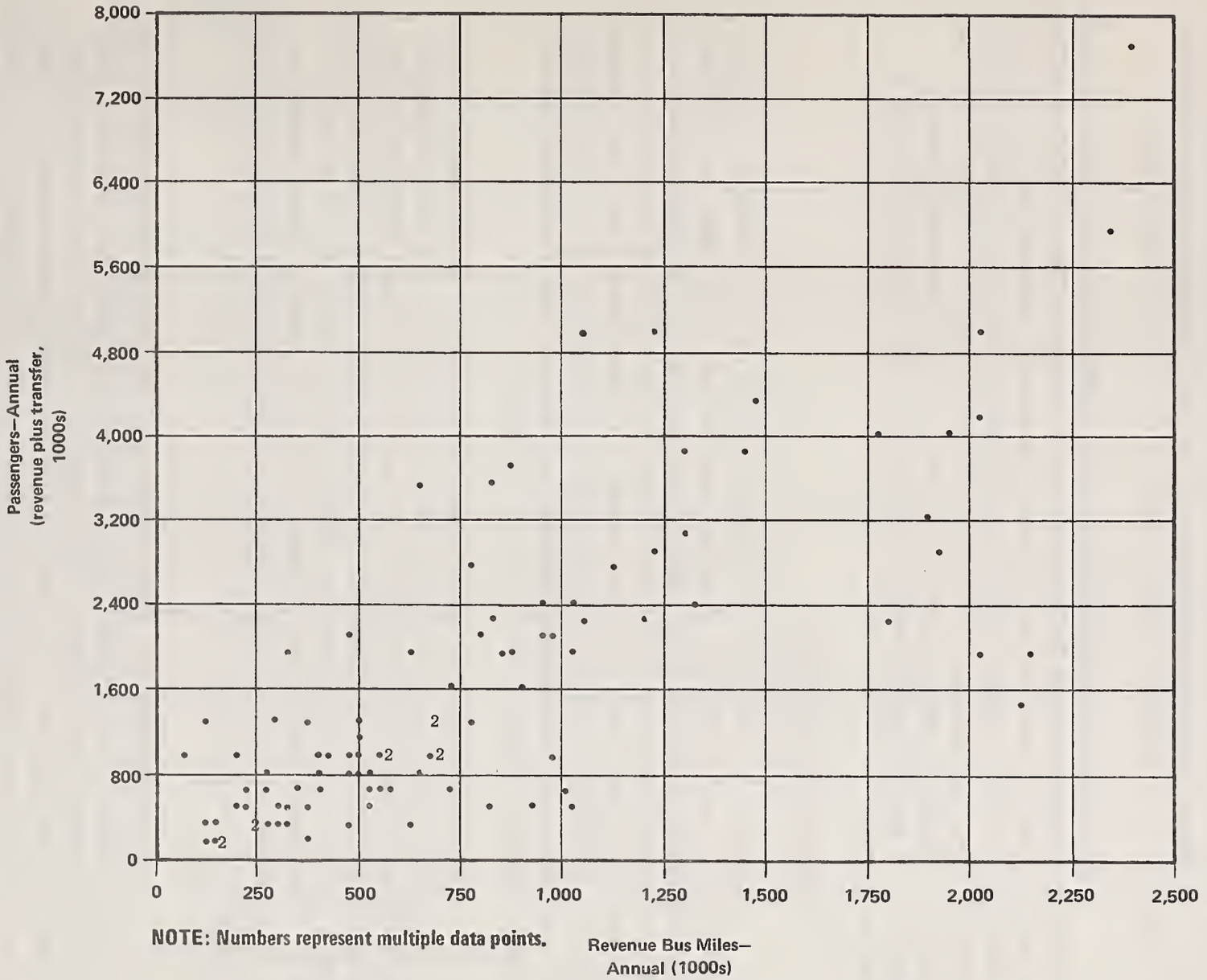


FIGURE VII-25: TRANSIT SUPPLY VERSUS ANNUAL TRANSIT RIDERSHIP

Small- and Medium-Sized Urbanized Areas (50,000-250,000 Population)

Figures VII-25 and VII-26 present plots of annual transit ridership with respect to annual revenue bus-miles (i.e., passenger demand as a function of bus transit supply. Figure VII-25 indicates a strong relationship for small bus systems operating fewer than 750,000 revenue bus-miles, but significant variations in ridership for systems operating between 750,000 and 2,500,000 revenue bus-miles annually exist. A similar tendency is shown in Figure VII-26 for medium-sized urbanized areas with a cut-off point of about 2,000,000 revenue bus-miles.

Figure VII-27 illustrates the relationship between bus transit demand and supply rates for both small and medium-sized urbanized areas. The supply rate (transit service factor) is annual revenue bus miles per person served. The supply rate plotted against the demand rate (annual passengers per person served) can be used as a gross demand estimation method for small urbanized area fixed-route, fixed-schedule transit systems. A strong relationship between demand and supply rates is shown in Figure VII-27.

c. NTS Financial Data

Operating revenue and expense statistics are presented in Figures VII-28 through VII-35. Comparisons between revenue and expense statistics should be used with reservation because of inconsistencies in NTS reporting procedures. Revenue figures include only revenue from fares received from regular operations, excluding subsidies and charter revenue. Expenses include all operation and maintenance costs, taxes, and bond interest, including expenses for charter and school services. Capital costs and depreciation are not included.

The two figures for each statistic represent small and medium-sized urbanized areas. Figures VII-28a and VII-28b present frequency distributions of operating revenue per passenger (representative of the average fare for all passengers). Average fares ranged from 11.5 cents to 50.0 cents for small urbanized areas, with an average value of 26.1 cents. More than half of the systems reported average fares between 18 cents and 30 cents. Average fares in medium-sized cities were somewhat higher, ranging from 11.3 cents to 59.7 cents, with an average value of 27.2 cents.

Figures VII-29 and VII-30 show the relationship between annual operating revenue and the number of passengers carried annually. Figure VII-29 shows a definitive relationship for small urban area transit systems which boarded 2,000,000 or fewer passengers annually. Significant variance in operating revenue as a function of ridership was reported by systems carrying more than 2,000,000 passengers. Figure VII-30

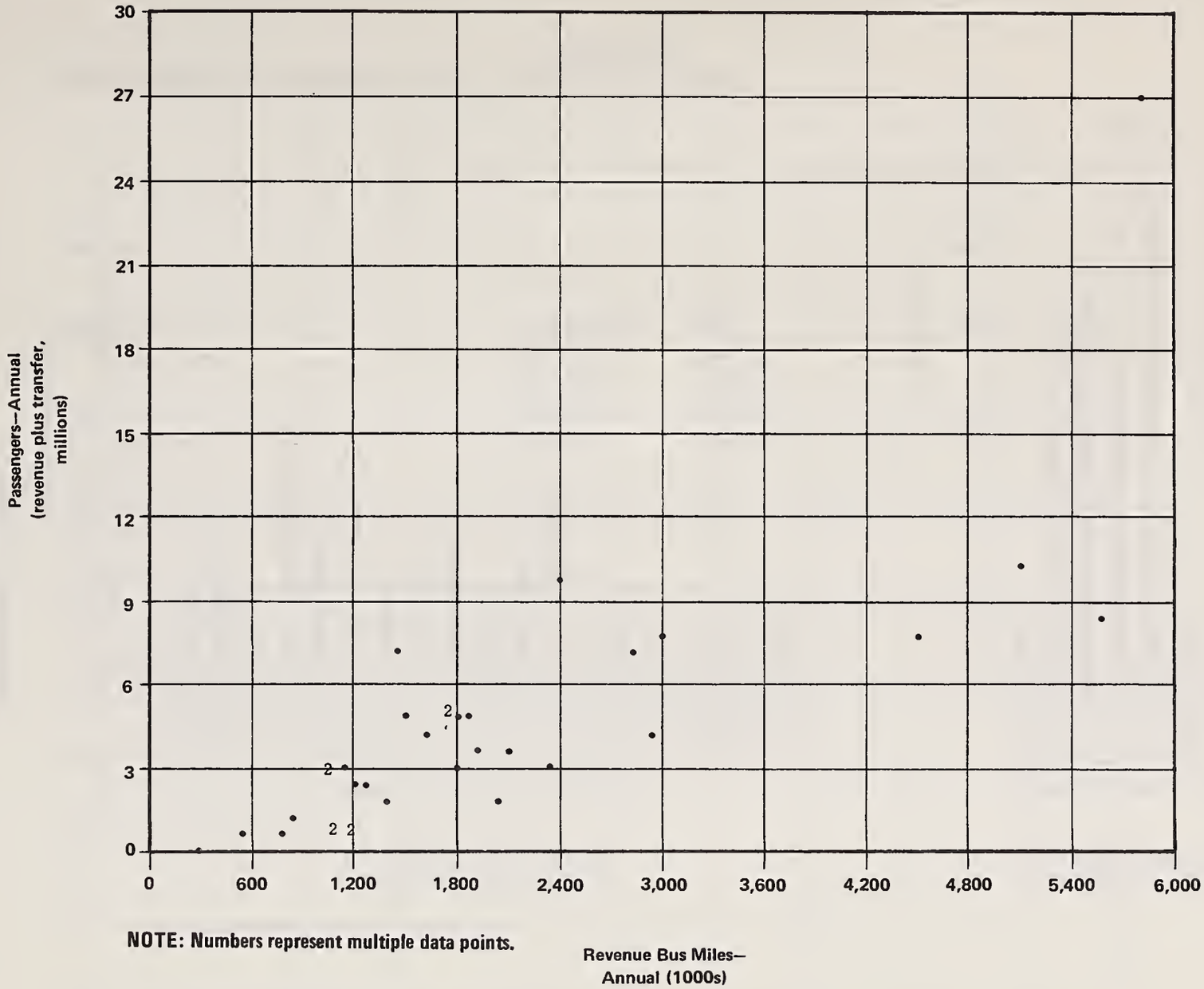


FIGURE VII-26: TRANSIT SUPPLY VERSUS ANNUAL TRANSIT RIDERSHIP

Medium-Sized Urbanized Areas (250,00-500,000 Population)

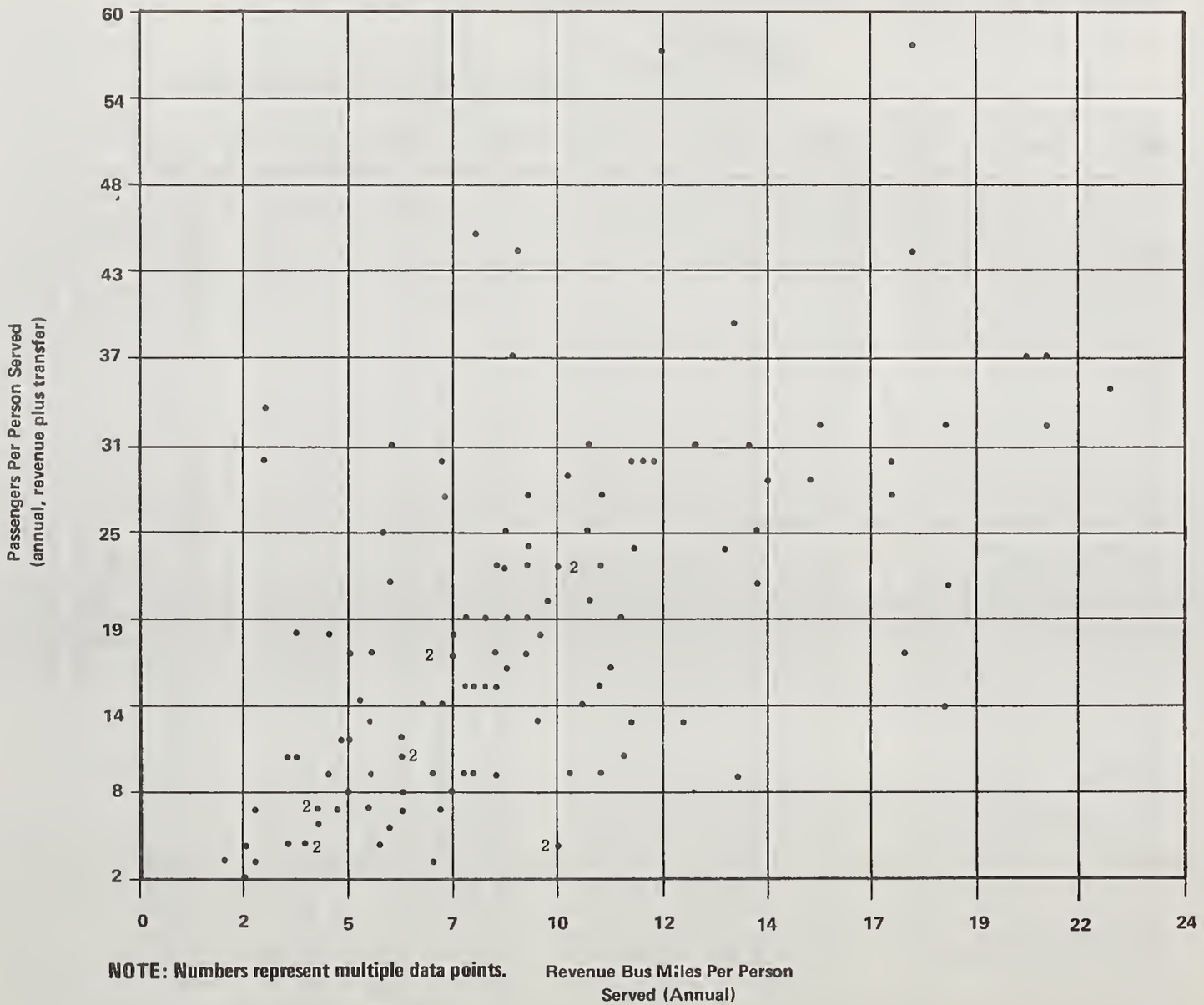
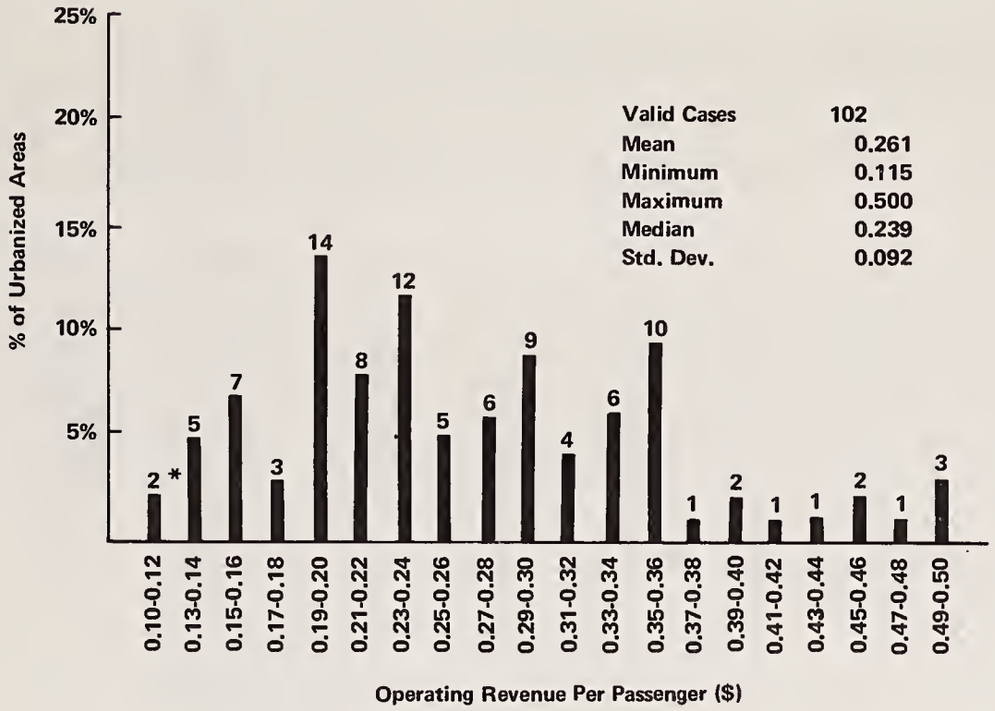
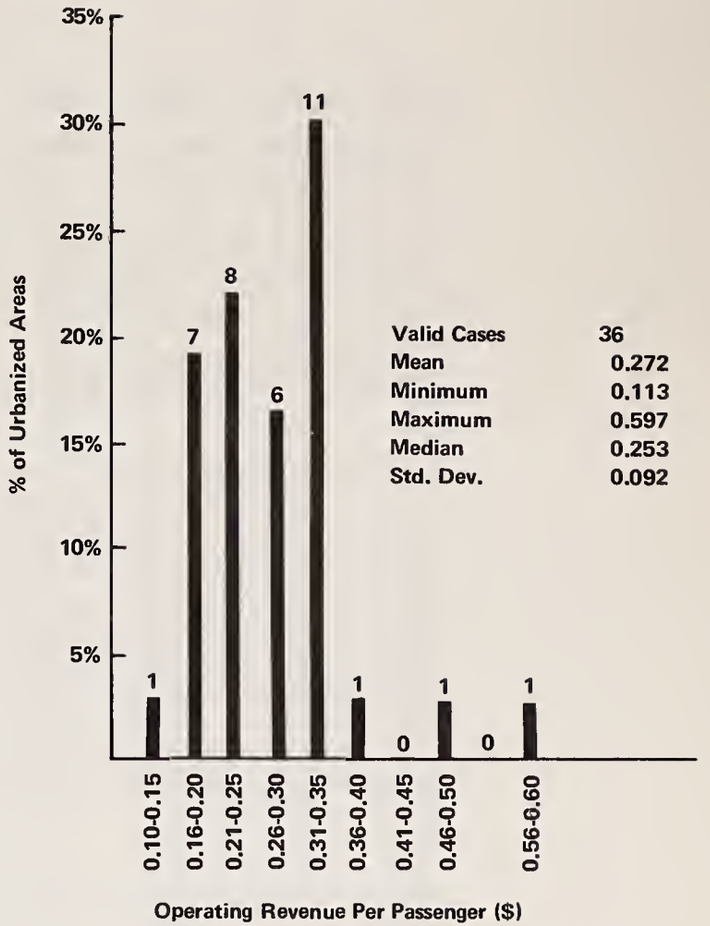


FIGURE VII-27: TRANSIT SUPPLY RATE VERSUS TRANSIT DEMAND RATE

Small- and Medium-Sized Urbanized Areas (50,000-500,000 Population)



a. Small Urbanized Areas
(50,000-250,000 Population)



b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-28: FREQUENCY DISTRIBUTION OF OPERATING REVENUE PER PASSENGER (AVERAGE FARE)

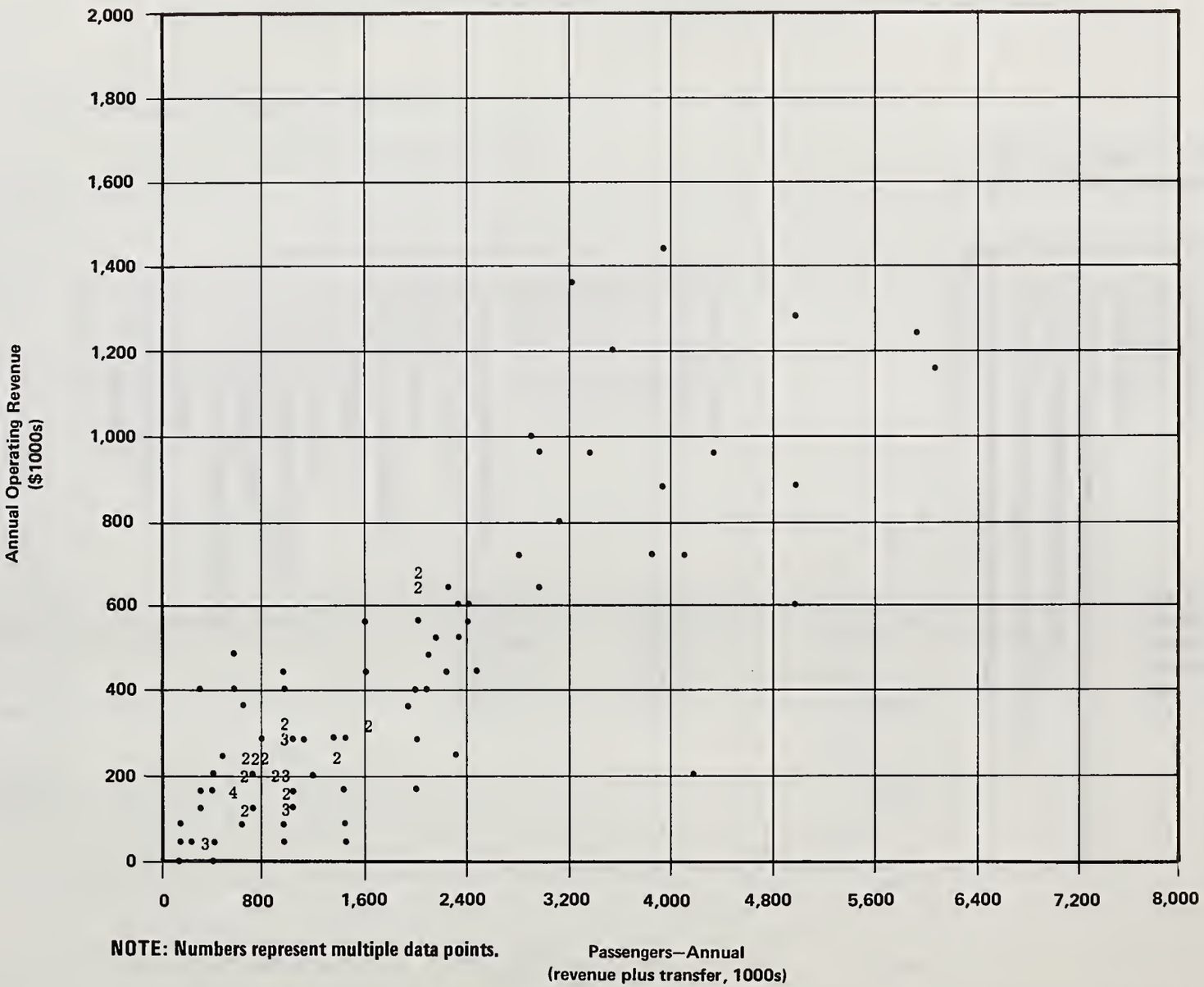


FIGURE VII-29: ANNUAL OPERATING REVENUE VERSUS ANNUAL TRANSIT RIDERSHIP

Small Urbanized Areas (50,000-250,000 Population)

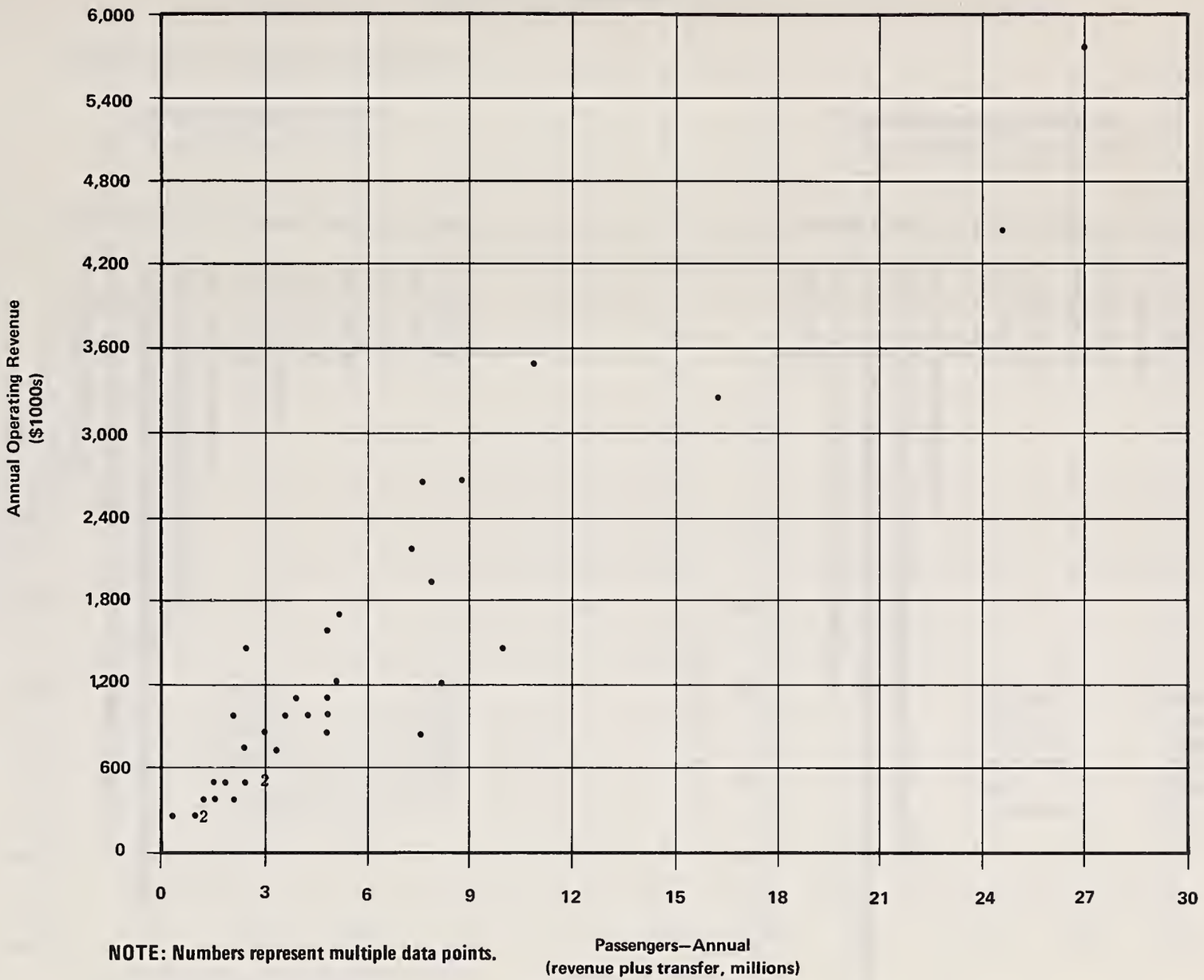
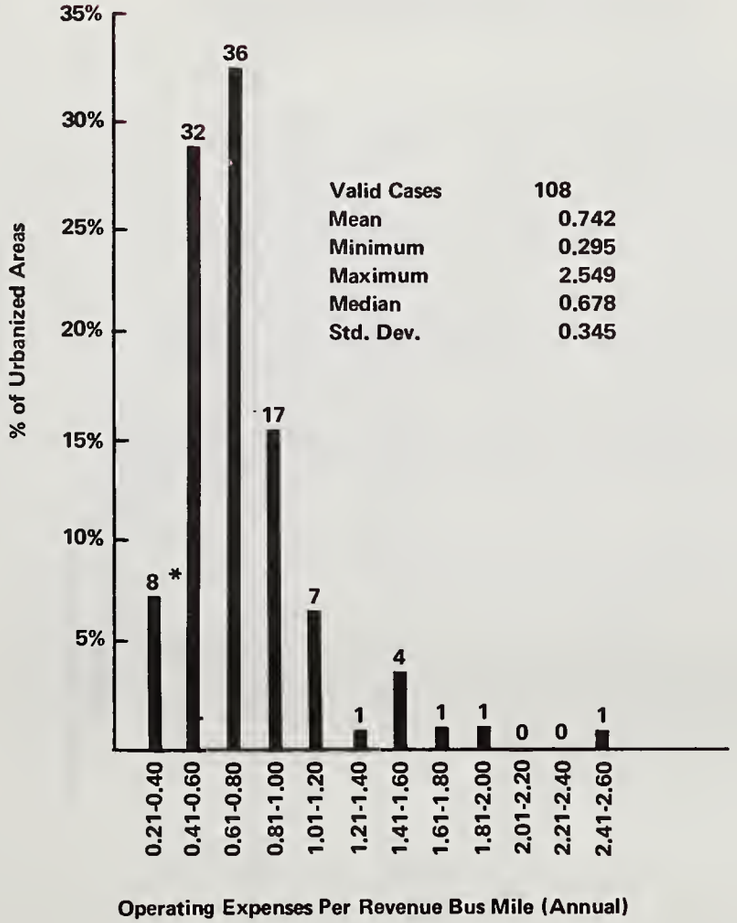
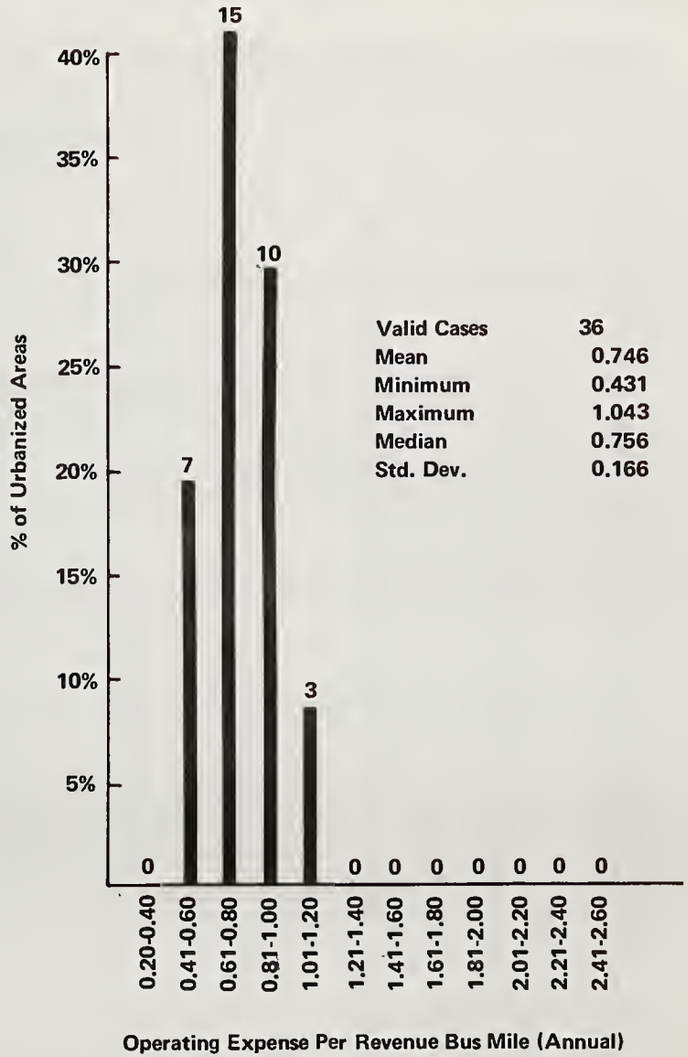


FIGURE VII-30: ANNUAL OPERATING REVENUE VERSUS ANNUAL TRANSIT RIDERSHIP

Medium-Sized Urbanized Areas (250,00-500,000 Population)



a. Small Urbanized Areas
(50,000-250,000 Population)



b. Medium-Sized Urbanized Areas
(250,000-500,000 Population)

*Numbers indicate the number of observations.

FIGURE VII-31: FREQUENCY DISTRIBUTION OF OPERATING EXPENSE PER REVENUE BUS-MILE

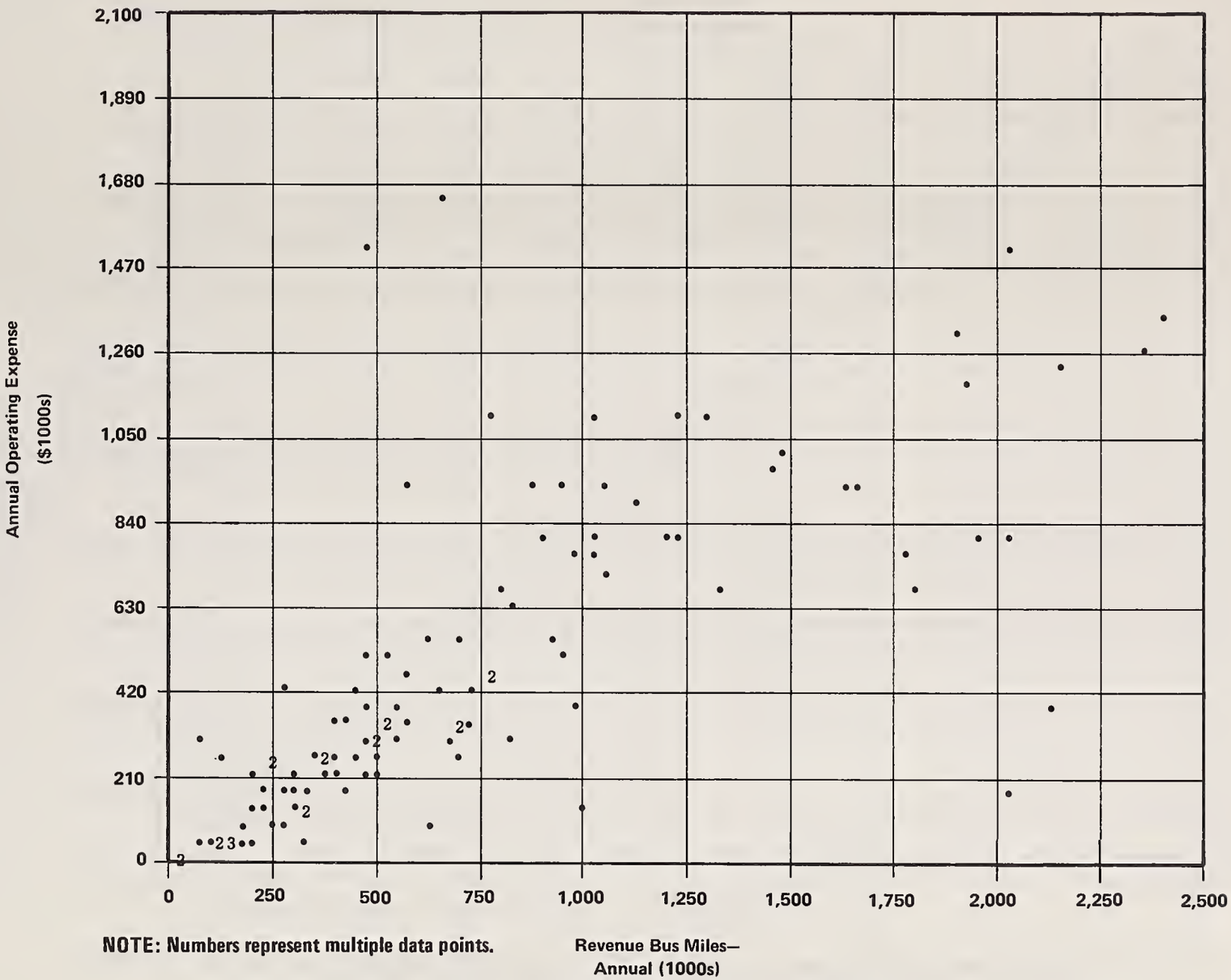


FIGURE VII-32: ANNUAL OPERATING EXPENSE VERSUS TRANSIT SUPPLY

Small Urbanized Areas (50,000-250,000 Population)

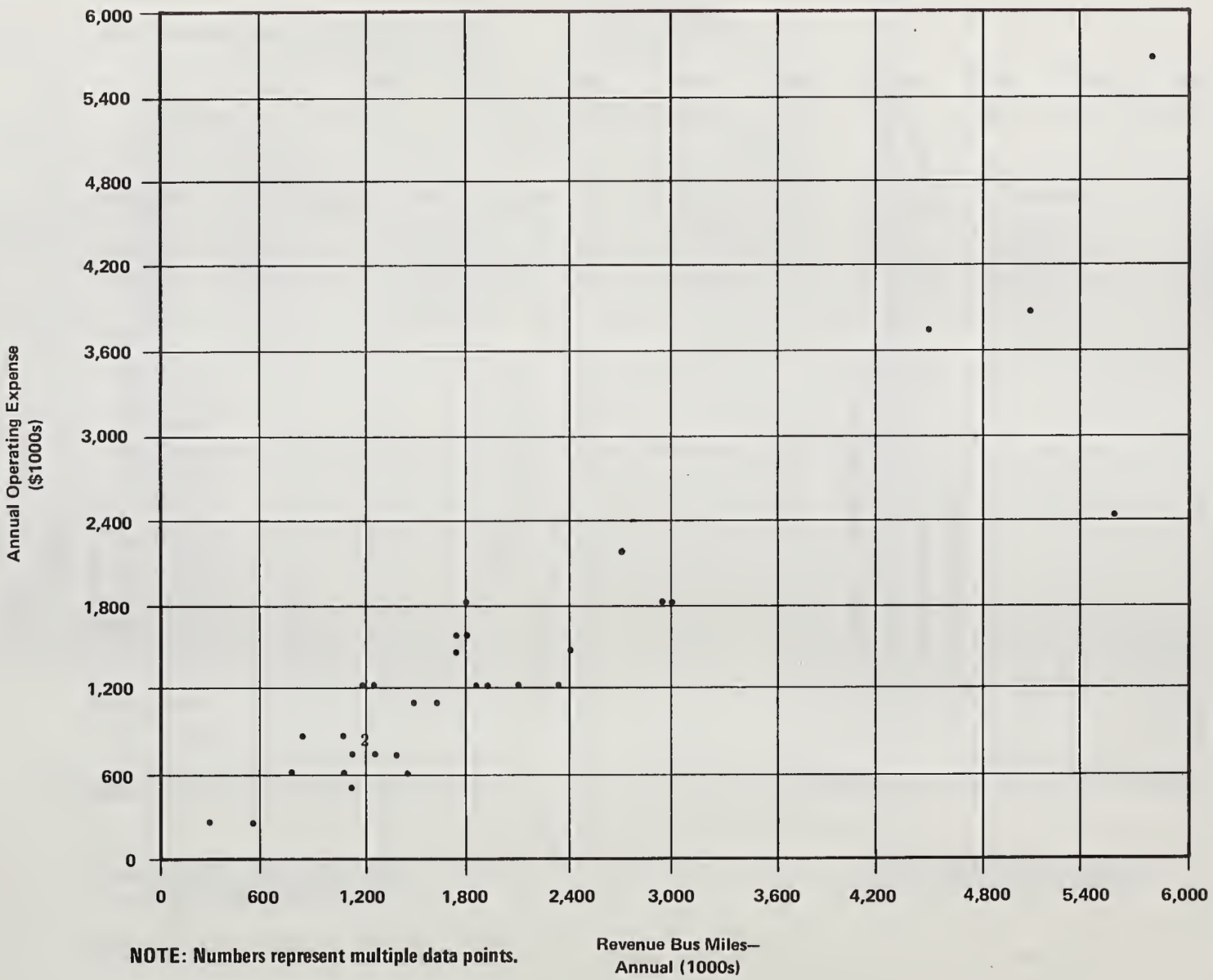


FIGURE VII-33: ANNUAL OPERATING EXPENSE VERSUS TRANSIT SUPPLY

Medium-Sized Urbanized Areas (250,00-500,000 Population)

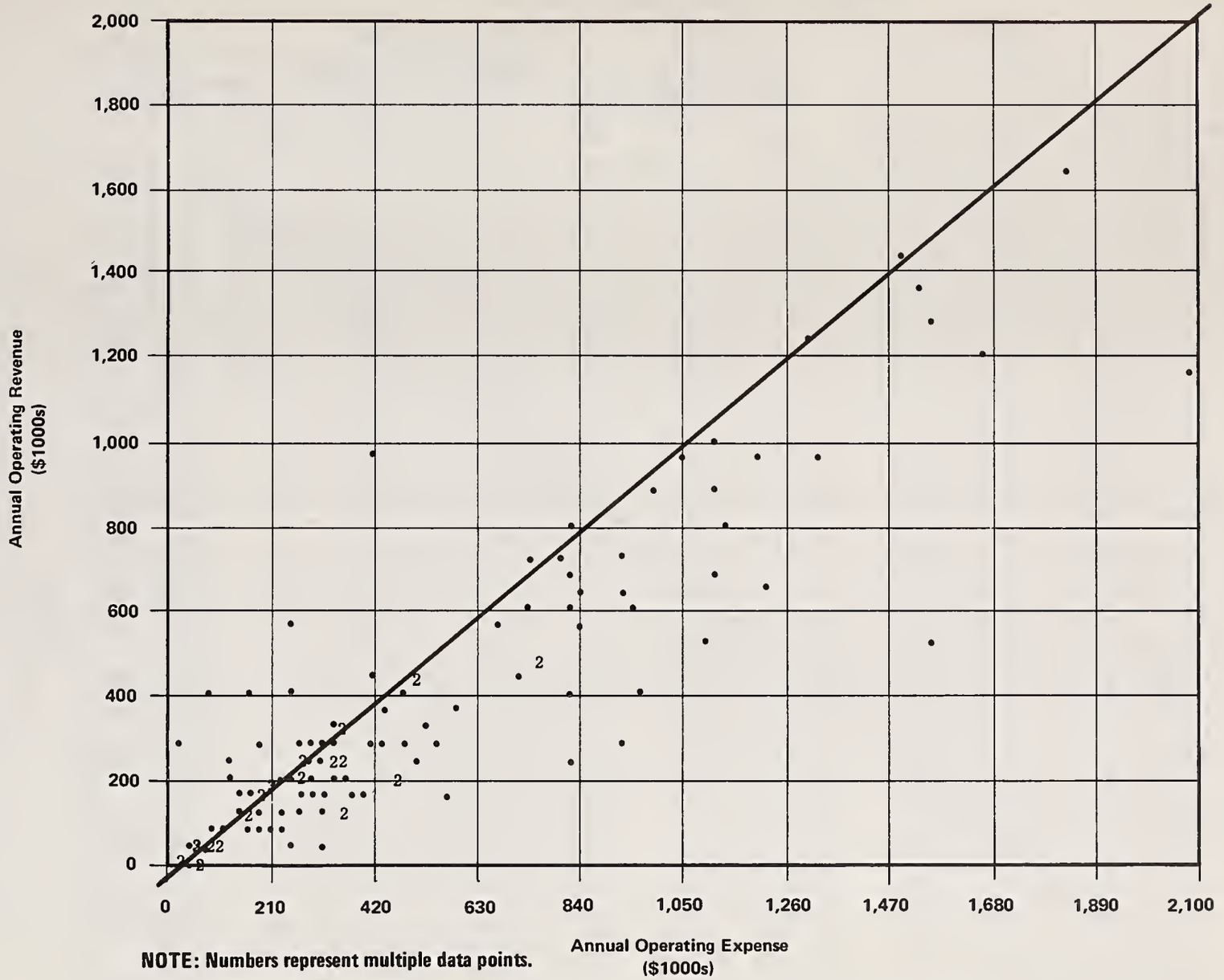


FIGURE VII-34: ANNUAL OPERATING REVENUE VERSUS ANNUAL OPERATING EXPENSE

Small Urbanized Areas (50,000-250,000 Population)

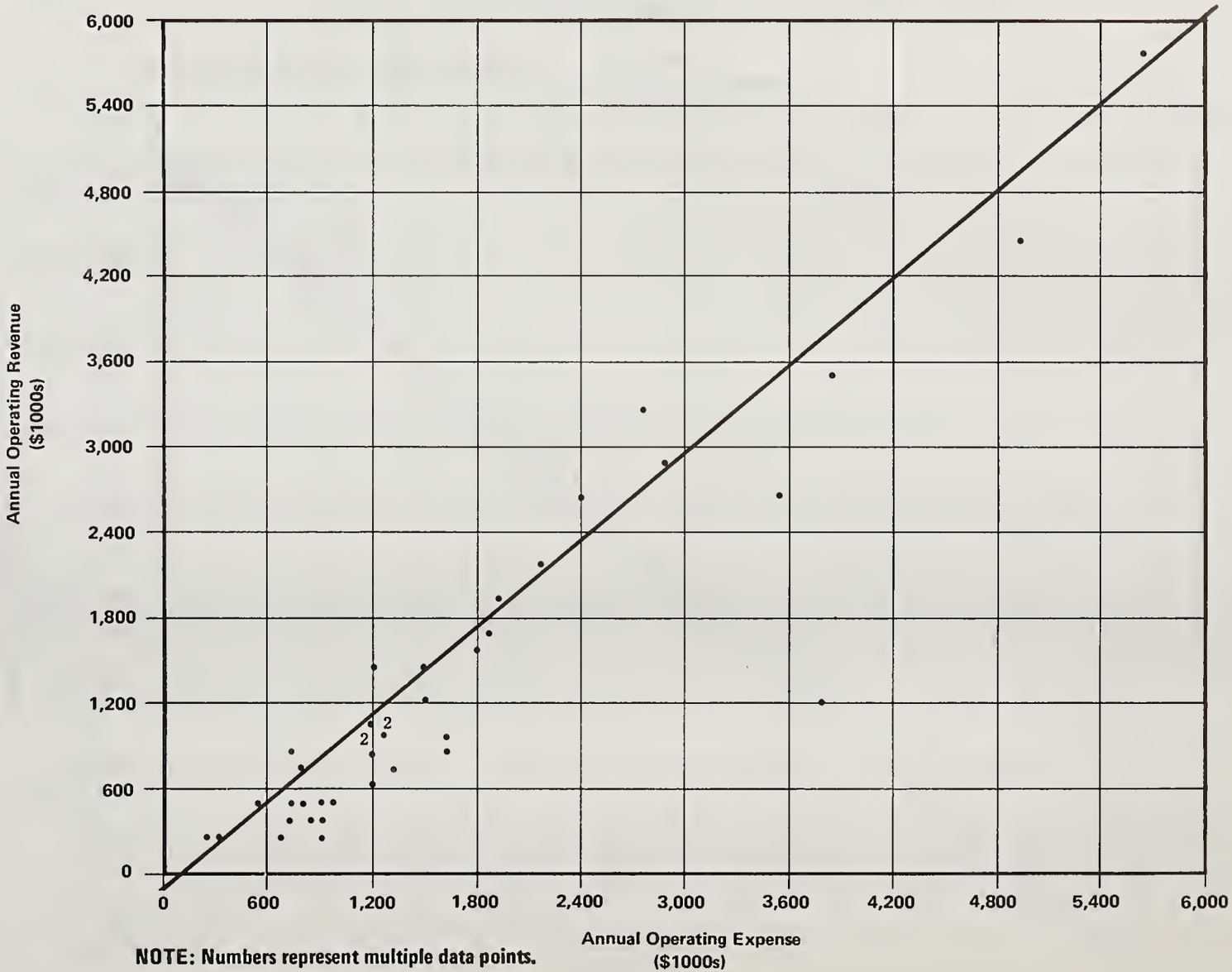


FIGURE VII-35: ANNUAL OPERATING REVENUE VERSUS ANNUAL OPERATING EXPENSE

Medium-Sized Urbanized Areas (250,000-500,000 Population)

shows a strong linear relationship between operating revenue and ridership over the entire range of passenger volumes for medium-sized cities.

Figures VII-31 through VII-33 are useful for estimating projected operating expenses. Figures VII-31a and VII-31b are frequency distributions of operating expenses per revenue bus mile. The first figure shows a very wide range of unit operating costs for small urbanized areas: $0.29 to $2.55 per revenue bus-mile, with a $0.74 average. More than 60 percent of the cities, however, reported expenses from 40 cents to $1.00 per bus-mile. Approximately 22 percent of the cities are included in the $0.80 to $1.20 range. Although most of the medium-sized cities reported operating expenses per bus mile in the lower $0.60 to $1.00 range, the overall average was $0.74. These data support and expand upon the comparable APTA data reported in Table VII-1.

Figures VII-32 and VII-33 provide graphs depicting operating expense versus revenue bus-miles, a measure of bus transit supply. Once again, a strong correlation existed for small urbanized areas up to approximately 750,000 annual revenue bus-miles, beyond which no relationship existed. A similar tendency is shown for medium-sized urbanized areas, with a break point at about 2,000,000 revenue bus-miles.

Figures VII-34 and VII-35 present scattergrams showing operating revenue plotted against operating expense. If total revenues and expenses consistently treated charter and school service revenues and expenses, a 45-degree line from the origin would define an operating ratio of 1.0. However, these graphs provide a useful indication of the cost/revenue relation for fixed-route, fixed-schedule transit service. That most points are located below the 45-degree line for both small and medium-sized urbanized areas indicates the trend toward unprofitable operation of conventional transit service. Both plots show that the operating ratio tends to decrease as the size of the operation increases.

C. Paratransit Experience

Paratransit services are "those forms of intraurban passenger transportation which are available to the public, are distinct from conventional transit (scheduled bus and rail), and can operate over the highway and street system."[1] They include conventional taxi services, shared-ride

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[1] Ronald F. Kirby, Kiran U. Bhatt, Michael A. Kemp, Robert G. McGillivray, and Martin Wohl, Para-Transit: Neglected Options for Urban Mobility (Washington, D.C.: The Urban Institute, 1974), p. 9.

taxi services, dynamically routed and scheduled bus and van services, jitneys, car pools, van pools, and bus pools but exclude Personal Rapid Transit (PRT) and similar systems with small, automated vehicles that travel on fixed, exclusive guideways and are activated by individual users. Compared to an urban freeway and to a rail transit system, paratransit services usually require little capital investment and can be implemented quickly, often immediately. They fill the gap between the private automobile driven alone and conventional fixed-route, fixed-schedule bus and rail services.

Because of the great diversity of paratransit services, this subsection deals with five generic types of paratransit separately: shared-ride DRT services, jitneys, car pools, van pools, and bus pools. Although particular services within each of these groupings differ in many important ways, these five forms of paratransit represent distinct concepts of transit service. This broad classification of paratransit services also conforms with the classification of service options outlined in Section IV.C.

The following statistics on actual paratransit services were compiled from numerous published technical reports and articles.[1]

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[1]The principal sources were:

(1) Lea Transit Compendium: Para-Transit, Vol. 1, No. 8. Huntsville, Alabama: N.D. Lea Transportation Research Corporation, 1974.
(2) Dial-a-Ride Transportation: Michigan DART Program Status Report. Lansing, Michigan: Michigan Department of State Highways and Transportation, Bureau of Urban and Public Transportation, 1976.
(3) Demand-Responsive Transportation: State-of-the-Art Overview. Cambridge, Massachusetts: U.S. Department of Transportation, Transportation Systems Center, 1974.
(4) Para-Transit: Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(5) Demand-Responsive Transportation System Planning Guidelines. McLean, Virginia: The MITRE Corporation, 1974.
(6) Transportation for Older Americans: A State-of-the-Art Report. Prepared for the Administration on Aging. Washington, D.C.: Institute of Public Administration, 1975.
(7) Transportation Pooling. McLean, Virginia: Alan M. Voorhees and Associates, Inc., 1974.

(8) Door-to-Door Buspools: Recommendations for Public Policy. Washington, D.C.: Consortium of Universities, 1973.
(9) The 3M Company Commute-A-Van Program Status Report. St. Paul, Minnesota: 3M Company, 1974.
(10) Ridesharing and the Knoxville Commuter. Knoxville, Tennessee: Transportation Center, The University of Tennessee, 1975.
(11) 1974 National Transportation Study.

Most of the statistics in this subsection were taken directly from these and other sources, while a few were derived from information in these reports.

The available statistics on present paratransit services have several limitations which make any rigorous statistical analysis inadvisable. The accuracy of these statistics varies considerably not only among different systems of the some generic type but also for any particular system. Some of the statistics in the various sources were based on carefully gathered data, while others were simply estimated. For many of the currently operating systems, much of the information on ridership, costs, revenues, and measures of productivity is missing. Many of the present paratransit systems are still expanding and undergoing improvement, and the statistics on ridership, costs, revenues, and productivity for them are only preliminary. Some of the statistics in this subsection are fairly recent, while others are several years old. Despite these shortcomings, however, the following statistics on actual paratransit services are useful as a guide to the planner and the policymaker in assessing the costs and capabilities of various paratransit services.

1. Shared-Ride DRT Services

DRT services are those forms of paratransit which continually change their routes or their schedules or both in response to individual requests for service. Many variations of DRT service exist, but all provide door-to-door service with passenger cars, vans, small buses, or other small vehicles, and passengers normally request such service by telephone. In the literature, DRT services are known by a variety of names, including dial-a-ride, dial-a-bus, demand-actuated bus, demand-jitney, and call-a-ride.

Conventional taxi service is the most common form of DRT but is excluded from this discussion, which is concerned only with DRT services that carry more than one passenger at a time in a vehicle. Several taxicab companies, however, do provide shared-ride service, often at lower fares, and these shared-ride taxi systems are included in this subsection. Table VII-9 shows that some of the oldest DRT services are privately owned and operated shared-ride taxi services.

Tables VII-9 through VII-12 contain information on size, demand, costs, revenues, and productivity for 70 selected shared-ride DRT systems in the United States and Canada. These systems constitute only a small fraction of the shared-ride DRT services now being provided by local governments, transit authorities, private carriers, and social service agencies. Shared-ride DRT services operated by taxicab companies and social service organizations are particularly underrepresented in these tables because of the paucity of data on them. The Institute of Public Administration has identified at least 112 DRT projects that serve only older Americans or only older Americans and the handicapped.[1] The actual number of shared-ride taxi systems is unknown but appears to be increasing as the taxicab industry takes a greater interest in providing this type of service. There is therefore no basis for assuming that the 70 systems included in the tables are representative of all shared-ride DRT services.

In Tables VII-10 through VII-12, the shared-ride DRT systems are arranged into two categories: dial-a-ride and shared-ride taxi. These two groups of services differ primarily in the types of vehicles used and in the form of ownership. Dial-a-ride services use vans or small buses and historically have been owned and operated by the public sector. Shared-ride taxi services use regular passenger cars adapted for taxi service and have always been in the domain of private enterprise. In several Michigan communities, however, taxi operators are providing dial-a-ride service under a city contract, using modified vans provided by the state, while in California and elsewhere, several taxi operators are using their own taxicabs to provide shared-ride taxi service at reduced fares under city contract. Dial-a-ride and shared-ride taxi services were separated in these tables so that their ridership, costs, revenues, productivity, fleet size, and other characteristics could be compared more easily.

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[1] Institute of Public Administration, Transportation for Older Americans: A State of the Art Report, prepared for the Administration on Aging (Washington, D.C.: Institute of Public Administration, 1975), p. 73.

Grand Rapids, Michigan (3)	197,530	Dial-a-ride: many-few; subscription service		Anyone	17,000	20.0	850	uly 73
Haddonfield, New Jersey (1)	88,680	Dial-a-ride: many-many; many-one commuter rail feeder	State Dept. of Transportation	Anyone	44,000	11.0	4,000	Feb. 72
Harper Woods, Michigan (7)	21,460	Dial-a-ride	City	Anyone	21,460	2.6	8,250	May 75
Hartford, Connecticut (3)	158,020	Dial-a-ride: many-many	N.A.	Elderly	25,000	20.0	1,250	Dec. 73
Helena, Montana (3)	27,000	Dial-a-ride: many-many	N.A.	Elderly	4,000	12.0	330	June 73
Hemet, California (3)	17,200	Dial-a-ride: many-many	N.A.	Anyone	17,200	6.5	2,650	Jan. 74
Hicksville, New York (4)	48,100	Shared-ride taxi: many-many	Cab company	Anyone	48,100	6.8	7,070	1961
Hillsdale, Michigan (7)	7,730	Dial-a-ride	City	Anyone	7,730	4.3	1,800	Feb. 75
Holland, Michigan (7)	26,340	Dial-a-ride: many-many	Warm Friend, Inc.	Anyone	27,140	14.2	1,910	Feb. 74
Houghton, Michigan (7)	6,070	Dial-a-ride: many-many	Transportation authority	Anyone	12,290	4.1	2,760	July 74
Huntington Park, California(1)	33,000	Shared-ride taxi: many-many	Cab company under city contract	Anyone	33,000	3.0	11,000	Jan. 74
Kingston, Ontario (1)	59,200	Dial-a-ride: many-one bus feeder; many-many within zones	City-owned transit property	Anyone	36,100	12.0	3,010	Oct. 72
Kitchener, Ontario (1)	N.A.	Dial-a-ride: many-one bus feeder; many-many within zones	City-owned transit property	Anyone	11,000	4.2	2,630	Oct. 74
La Habra, California (1,6)	44,200	Dial-a-ride: many-many	Orange County Transit District	Anyone	47,000	7.0	6,710	Feb. 73
La Mesa, California (1,3)	45,000	Shared-ride taxi: many-many	Cab company under city contract	Anyone	45,000	7.0	6,430	April 74
La Mirada, California (1)	39,000	Dial-a-ride: many-many	City	Anyone	39,000	7.0	5,570	May 73
Lincoln, Nebraska (3)	149,520	Dial-a-ride: many-many	City-County Commisaion on the Aged	Handicapped Elderly	3,500	51.0	70	June 72

TABLE VII-9
DESCRIPTION OF SELECTED SHARED-RIDE DEMAND-RESPONSIVE TRANSPORTATION SERVICES

LOCATION *	POPULATION	TYPE OF SERVICE	OPERATOR	ELIGIBLE USERS	POPULATION SERVED	AREA SERVED (SQUARE MILES)	NO OF PERSONS SERVED PER SQUARE MILE	DATE INITIATED
Alma, Michigan (7)	9,790	Dial-a-ride	City	Anyone	9,790	4.6	2,130	June 73
Alpena, Michigan (7)	13,810	Dial-a-ride: many-many	Cab company under city contract	Anyone	13,810	10.4	1,900	July 74
Ann Arbor, Michigan (7)	100,040	Dial-a-ride: day - many-few bus feeder; nights & weekends - many-many	Transportation authority	Anyone	100,040	21.8	4,590	Sept. 71
Batavia, New York (1)	18,000	Dial-a-ride: off-peak - many-many, peak - subscription for work & school	Subsidiary of regional transportation authority	Anyone	18,000	5.5	3,270	Dec. 71
Bay Ridges, Ontario (1)	25,000	Dial-a-ride. off-peak - many-few; peak - many-one commuter rail feeder	Town of Pickering	Anyone	25,000	12.0	2,080	July 70
Belding, Michigan (7)	5,120	Dial-a-ride	City	Anyone	5,320	4.7	1,130	April 73
Benicia, California (1)	6,800	Shared-ride taxi: many-many	Cab company under city contract	Anyone	8,800	9.0	980	March 73
Bensenville, Illinois (3)	14,000	Dial-a-ride many-many	N.A.	Anyone	14,000	7.0	2,000	Nov. 73
Benton Harbor - St. Joseph, Michigan (7)	36,830	Dial-a-ride; many-many	Transportation authority	Anyone	56,830	51.6	1,100	Sept. 74
Big Rapids, Michigan (7)	12,000	Dial-a-ride	City	Anyone	12,000	5.1	2,350	March 75
Birmingham, Michigan (7)	26,170	Dial-a-ride	Cab company under city contract	Anyone	26,170	4.6	5,690	July 75
Brampton, Ontario (1)	32,000	Dial-a-ride: many-one bus & commuter rail feeder	City	Anyone	32,000	6.5	4,920	Aug 73
Buffalo, New York (1)	462,780	Dial-a-ride many-many	Model city agency	Persons over 60; handicapped	7,000	3.0	2,330	Dec. 70
Burlington, Ontario (1)	N.A.	Dial-a-ride: many-one bus & commuter rail feeder, many-many within zones	Bus company under city contract	Anyone	7,100-7,700	N.A.	N.A.	May 74
Cadillac, Michigan (7)	9,990	Dial-a-ride	Cab company under city contract	Anyone	10,490	6.1	1,720	Dec. 74
Cambridge, Ontario (1)	24,300	Dial-a-ride many-one bus feeder	City	Anyone	24,300	8.0	3,040	May 74
Chattanooga, Tennessee (8)	119,900	Dial-a-ride: many-few (social service facilities only)	City Human Services Dept.	Persons qualifying for public aid social services	N.A.	52.5	N.A.	N.A.
Chicago, Illinois (8)	3,362,830	Dial-a-ride: many-many within area served	YMCA	Elderly	N.A.	N.A.	N.A.	1966
Cleveland, Ohio (3)	751,050	Dial-a-ride: many-many	N.A.	Elderly	14,000	9.0	1,560	Nov. 73
Columbus, Ohio (1)	539,380	Point-deviation: many-many within model city area	Dial-a-ride Transit Corp., Model City & City Demonstration Agencies	Anyone in area served	37,000	2.5	14,800	Oct. 71
Cranston, Rhode Island (3,9)	73,030	Dial-a-ride: many-many	City & transit authority	Persons over 62; handicapped	12,000	28.6	420	June 72
Davenport, Iowa (4)	98,500	Shared-ride taxi: many-many	Cab company	Anyone	98,500	19.7	5,000	1967
Detroit, Michigan (2)	1,511,340	Dial-a-ride: many-many	Alpha Communications Development Corp. & Model City agency	Anyone in Model City	102,711	9.5	10,812	Feb. 72
Dover, Delaware (3)	27,000	Dial-a-ride: many-many	N.A.	Elderly	1,700	21.0	81	June 74
Dowagiac, Michigan (7)	6,580	Dial-a-ride	City	Anyone	7,850	4.1	1,920	June 75
El Cajon, California (1)	60,000	Shared-ride taxi: many-many	Cab company under city contract	Anyone	60,000	17.0	3,530	Dec. 73
Ferndale, Michigan (7)	30,850	Dial-a-ride	City	Anyone	30,850	3.9	7,910	April 75
Fort Leonard Wood, Missouri(3)	40,000	Shared-ride taxi: many-many	Cab companies	Anyone	40,000	12.0	3,330	1958
Gladwin, Michigan (7)	2,070	Dial-a-ride	City Housing Commission	Anyone	3,025	2.4	1,260	May 75
Grand Haven, Michigan (7)	17,070	Dial-a-ride	Transportation authority	Anyone	17,070	7.5	2,280	Aug 75
Grand Rapids, Michigan (3)	197,530	Dial-a-ride: many-few; subscription service		Anyone	17,000	20.0	850	uly 73
Haddonfield, New Jersey (1)	88,680	Dial-a-ride; many-many; many-one commuter rail feeder	State Dept. of Transportation	Anyone	44,000	11.0	4,000	Feb. 72
Harper Woods, Michigan (7)	21,460	Dial-a-ride	City	Anyone	21,460	2.6	8,250	Dly 75
Hartford, Connecticut (3)	158,020	Dial-a-ride. many-many	N.A.	Elderly	25,000	20.0	1,250	Dec. 73
Helena, Montana (3)	27,000	Dial-a-ride: many-many	N.A.	Elderly	4,000	12.0	330	June 73
Hemet, California (3)	17,200	Dial-a-ride: many-many	N.A.	Anyone	17,200	6.5	2,650	Jan. 74
Hicksville, New York (4)	48,100	Shared-ride taxi: many-many	Cab company	Anyone	48,100	6.8	7,070	1961
Hillsdale, Michigan (7)	7,730	Dial-a-ride	City	Anyone	7,730	4.3	1,800	Feb. 75
Holland, Michigan (7)	26,340	Dial-a-ride: many-many	Waste Friend, Inc.	Anyone	27,140	14.2	1,910	Feb. 74
Houghton, Michigan (7)	6,070	Dial-a-ride: many-many	Transportation authority	Anyone	12,290	4.1	2,760	July 74
Huntington Park, California(1)	33,000	Shared-ride taxi: many-many	Cab company under city contract	Anyone	33,000	3.0	11,000	Jan. 74
Kingston, Ontario (1)	59,200	Dial-a-ride: many-one bus feeder; many-many within zones	City-owned transit property	Anyone	36,100	12.0	3,010	Oct. 72
Kitchener, Ontario (1)	N.A.	Dial-a-ride. many-one bus feeder; many-many within zones	City-owned transit property	Anyone	11,000	4.2	2,630	Dec. 74
La Habra, California (1,6)	44,200	Dial-a-ride many-many	Orange County Transit District	Anyone	47,000	7.0	6,710	Feb. 73
La Mesa, California (1,3)	45,000	Shared-ride taxi: many-many	Cab company under city contract	Anyone	45,000	7.0	6,430	April 74
La Mirada, California (1)	39,000	Dial-a-ride. many-many	City	Anyone	39,000	7.0	5,570	May 73
Lincoln, Nebraska (5)	149,320	Dial-a-ride: many-many	City-County Commission on the Aged	Handicapped Elderly	3,500	51.0	70	June 72

*
Numbers in parentheses refer to sources.
N.A. = Not Available
Sources: (1) Lea Transit Compendium: Para-Transit. Vol. 1, No. 8. Huntsville, Alabama: N.D. Lea Transportation Research Corporation, 1974.
(2) Arrillaga, Bert, and Mouchahoir, George E. Demand-Responsive Transportation System Planning Guidelines. McLean, Virginia: the MITRE Corporation, 1974.
(3) Transportation Systems Center. Demand-Responsive Transportation: State-of-the-Art Overview. Cambridge, Massachusetts: U.S. Department of Transportation, 1975.
(4) Davis, Frank W., Jr.; Heathington, Kenneth W.; Symons, Richard T.; Griese, Stephen C.; Alford, Roger W.; and Middendorf, David P. Economic Characteristics of Privately Owned Shared-Ride Taxi Systems. Knoxville, Tennessee: Transportation Center, the University of Tennessee, 1974.
(5) Kirby, Ronald F.; Bhatt, Kiran V.; Kemp, Michael A.; McGillivray, Robert G.; and Wohl, Martin. Para-Transit: Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(6) Shilling, David R., and Fielding, G.J. "La Habra Dial-a-Ride Project," New Transportation Systems. Transportation Research Record 522. Washington, D.C.: Transportation Research Board, 1974, pp. 56-64.
(7) Michigan Department of State Highways and Transportation. Dial-a-Ride Transportation: Michigan DART Program Status Report. Lansing, Michigan: Michigan Department of State Highways and Transportation, Bureau of Urban and Public Transportation, 1976.
(8) Institute of Public Administration. Transportation for Older Americans: A State-of-the-Art Report. Prepared for the Administration on Aging. Washington, D.C.: Institute of Public Administration, 1975.
(9) Cranston Transvan. Providence, Rhode Island: Duffy and Shanley, Inc., 1975.
(10) Florida State Department of Transportation. Transportation of the Elderly (TOTE): Interim Report. Springfield, Virginia: National Technical Information Service, 1974.

TABLE VII-9 (Cont.)

LOCATION [a]	POPULATION	TYPE OF SERVICE	OPERATOR	ELIGIBLE USERS	POPULATION SERVED	AREA SERVED (SQUARE MILES)	NO. OF PERSONS SERVED PER SQUARE MILE	DATE INITIATED
Little Rock, Arkansas (3)	140,000	Shared-ride taxi: many-many	Cab company	Anyone	140,000	53.0	3,380	1946
Los Angeles, California (3)	2,816,110	Dial-a-ride: many-many	Model City agency	Anyone in Model City area	110,000	8.6	12,790	Sept. 73
Ludington, Michigan (7)	9,020	Dial-a-ride: many-many	City	Anyone	9,520	4.3	2,210	Feb. 74
Madison, Wisconsin (7)	173,800	Shared-ride taxi: many-many	Cab company	Anyone	173,000	48.5	3,570	1934
Marshall, Michigan (7)	7,250	Dial-a-ride	City	Anyone	7,250	4.6	1,580	Nov. 74
Merced, California (3)	25,000	Shared-ride taxi: many-many	Cab company	Anyone	25,000	16.0	1,560	Aug 70
Midland, Michigan (7)	35,180	Dial-a-ride: many-many	City	Anyone	35,180	24.9	1,410	June 74
Milwaukee, Wisconsin (1)	717,120	Dial-a-ride: many-many	Handicab-International of Milwaukee, Inc. (private)	Handicapped	37,900	1,489.0	26	1958
Mt. Clemens, Michigan (7)	20,480	Dial-a-ride	City	Anyone	20,480	3.8	5,390	March 75
Mt. Pleasant, Michigan (7)	20,500	Dial-a-ride, many-many	City	Anyone	20,500	5.1	4,020	March 74
Naugatuck Valley, Connecticut (3)	75,000	Dial-a-ride: many-many	Valley Transit District	Anyone	75,000	56.0	1,340	Jan. 73
Niles, Michigan (7)	12,990	Dial-a-ride	Waltman Enterprises under city contract	Anyone	12,990	5.2	2,500	Nov. 74
Ottawa-Carleton, Ontario (1)	43,500	Dial-a-ride many-few bus feeder	Regional Transit Commission	Anyone	43,500	6.1	7,130	Aug. 73
Peterborough, Ontario (1)	N.A.	Shared-ride taxi: many-few bus feeder	Cab company under city contract	Anyone	2,000	3.9	512	May 74
Regina, Saskatchewan (1)	N.A.	Dial-a-ride: many-few bus feeder	City	Anyone	Peak: 32,000 Off-peak 65,000	Peak: 5.0 Off-peak 10.0	Peak: 6,400 Off-peak, 6,500	Sept. 71
Rochester, New York (1)	296,230	Dial-a-ride: many-many; bus feeder	Transportation authority	Anyone	30,000	10.0	3,000	Aug. 73
Sault Sainte Marie, Michigan (7)	15,140	Dial-a-ride many-many	Community Action Agency	Anyone	15,140	15.7	964	April 74
St. Petersburg, Florida (10)	264,000	Dial-a-ride: many-many	City (Transportation of The Elderly demonstration project)	Persons over 60; handicapped	30,000	10.0	3,000	Sept. 73
Streetford, Ontario (1)	24,000	Dial-a-ride: many-many	Public Utility Commission	Anyone	24,000	5.7	4,200	Sept. 72
Toledo, Ohio (2)	384,000	Point-deviation: many-many	Transportation authority & Model City agency	Anyone in City Neighborhood	26,700	3.5	7,650	Feb. 72
Traverse City, Michigan (7)	18,050	Dial-a-ride: many-many	Cab company under city contract	Anyone	26,320	17.8	1,480	May 74
Trenton, Michigan (7)	24,130	Dial-a-ride	City	Anyone	24,130	7.2	3,350	Aug. 75
York Mills, Ontario (1)	N.A.	Dial-a-ride: many-few; subway feeder	Toronto Transit Commission	Anyone	20,800	N.A.	N.A.	Oct. 73

[a] Numbers in parentheses refer to sources.
N.A. = Not Available

Sources: (1) Low Transit Compendium: Para-Transit. Vol. 1, No. 8. Huntsville, Alabama: M.O. Lee Transportation Research Corporation, 1974.
(2) Arvillage, Bart, and Mouchahoir, George E. Demand-Responsive Transportation Systems Planning Guidelines. McLean, Virginia: the MITRE Corporation, 1974.
(3) Transportation Systems Center. Demand-Responsive Transportation: State-of-the-Art Overview. Cambridge, Massachusetts: U.S. Department of Transportation, 1975.
(4) Davis, Frank W., Jr.; Heathington, Kenneth W.; Symons, Richard T.; Griese, Stephen C.; Alford, Roger W.; and Middendorf, David P. Economic Characteristics of Privately Owned Shared-Ride Taxi Systems. Knoxville, Tennessee: Transportation Center, the University of Tennessee, 1974.
(5) Kirby, Ronald F.; Bhatt, Kiran V.; Kemp, Michael A.; McGillivray, Robert G.; and Wohl, Martin. Para-Transit; Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(6) Shilling, David R., and Fielding, G.J. "Los Watts Dial-a-Ride Project," New Transportation Systems. Transportation Research Record 522. Washington, D.C.: Transportation Research Board, 1974, pp. 58-64.
(7) Michigan Department of State Highways and Transportation. Dial-a-Ride Transportation: Michigan DART Program Status Report. Lansing, Michigan: Michigan Department of State Highways and Transportation, Bureau of Urban and Public Transportation, 1976.
(8) Institute of Public Administration. Transportation for Older Americans: A State-of-the-Art Report. Prepared for the Administration on Aging. Washington, D.C.: Institute of Public Administration, 1975.
(9) Stanton Transvan. Providence, Rhode Island: Duffy and Shanley, Inc., 1975.
(10) Florida State Department of Transportation. Transportation of the Elderly (TOTE), Interim Report. Springfield, Virginia: National Technical Information Service, 1974.

Ferndale, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 12 Sat.: 6	N.A.	8 (part)	2 vans	0.5	0.1	32	367
Gladwin, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 8	N.A.	1 (full)	2 vans (1 with wheelchair lift)	0.8	0.7	8	112
Grand Haven, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 9	N.A.	11 {3 full, 8 part}	4 vans	0.5	0.2	36	475
Grand Rapids, Michigan (3)	N.A.	N.A.	N.A.	N.A.	5	0.3	0.3	N.A.	N.A.
Haddonfield, New Jersey (1)	1974	Mon. - Sun.: 24	14/Shift	N.A.	19 {12 17-psgr. buses, 1 with wheelchair lift; 7 10-pagr. buses}	1.7	0.4	190	N.A.
Harper Woods, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 8	N.A.	6 (part)	4 vans	1.5	0.2	12	169
Hartford, Connecticut (3)	N.A.	N.A.	N.A.	N.A.	6	0.3	0.2	N.A.	N.A.
Helena, Montana (3)	N.A.	N.A.	N.A.	N.A.	5	0.4	1.3	N.A.	N.A.
Hemet, California (3)	N.A.	N.A.	N.A.	N.A.	2	0.3	0.1	N.A.	N.A.
Hillsdale, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 10	N.A.	8 {4 full, 4 part}	3 vans (1 with wheelchair lift)	0.7	0.4	23	251
Holland, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 12	N.A.	12 {3 full, 9 part}	6 vans (1 with wheelchair lift)	0.4	0.2	41	489
Houghton, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 16 Sat.: 12	N.A.	10 {9 full, 1 part}	4 vans	1.0	0.3	36	393
Kingston, Ontario (1)	1974	Mon. - Sat.: 17	4-6	5-8	6 31-pagr. buses	0.5	0.2	22	242
Kitchener, Ontario (1)	1974	Mon. - Sat.: 17 1/2	7	11	3 {2 small buses, 1 transit coach}	0.7	0.3	46	510

TABLE VII-10
SUPPLY STATISTICS FOR SELECTED SHARED-RIDE DEMAND-RESPONSIVE TRANSPORTATIDN SERVICES

LOCATION *	DATE OF INFORMATION	NO. OF HOURS IN OPERATION	NO. OF DRIVERS	TOTAL NO. OF EMPLOYEES	NO. AND TYPES OF VEHICLES	NO. OF VEHICLES PER SQUARE MILE SERVED	NO. OF VEHICLES PER 1000 POPULATION SERVED	AVERAGE VEHICLE-HOURS PER DAY	AVERAGE VEHICLE-MILES PER DAY
Dial-a-ride services									
Alma, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 15 1/2 Sat.: 10	N.A.	9 (8 full, 1 part)	3 vans	0.7	0.3	37	304
Alpena, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 14 Fri.: 16 Sat.: 10 Sun.: 8	N.A.	10 (9 full, 1 part)	5 vans (1 with wheelchair lift)	0.5	0.3	51	707
Ann Arbor, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 18 1/2 Sat.; Sun.: 10	N.A.	N.A.	22 vans (2 with wheelchair lift)	1.6	0.2	485	N.A.
Batavia, New York (1)	N.A.	Mon. - Fri.: 12	N.A.	4 + drivers	7, mixture of 23-pass. buses & 14-pass. vans	1.3	0.4	37	N.A.
Bay Ridges, Ontario (1)	N.A.	Mon. - Sat.: 20 Sun.: 15	N.A.	N.A.	14 (1 19-pass. bus, 13 11-pass. vans)	1.2	0.6	86	N.A.
Belding, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 15	N.A.	6 (2 full, 4 part)	2 vans	0.4	0.4	16	134
Bensenville, Illinois (3)	N.A.	N.A.	N.A.	N.A.	2	0.3	0.1	N.A.	N.A.
Benton Harbor - St. Joseph, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 12 Sat.: 9	N.A.	29 (26 full, 3 part)	15 vans (1 with wheelchair lift)	0.3	0.3	103	1979
Big Rapids, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 13 1/2 Sat.: 9 1/2	N.A.	10 (part)	4 vans	0.8	0.3	32	364
Birmingham, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 8 Sun.: 4	N.A.	5 (full)	4 vans (1 with wheelchair lift)	0.9	0.2	28	374
Bramalea, Ontario (1)	1974	Mon. - Fri.: 16 Sat.: 10	24	39	14 (3 12-pass. vans, 3 17-pass. buses, 4 school buses, 4 convert. motor homes)	2.2	0.4	N.A.	660
Buffalo, New York (1)	1974	Mon. - Sun.: 17	17(Part)	24	10 (2 18-pass. buses, 6 11-pass. vans, 2 14-pass. vans)	3.3	1.4	34	70
Burlington, Ontario (1)	1974	Mon. - Sat.: 17	8	11	4 (2 17-pass. buses, 2 school buses)	N.A.	0.5-0.6	51	N.A.
Cadillac, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 10	N.A.	8 (6 full, 2 part)	4 vans (1 with wheelchair lift)	0.7	0.4	40	456
Cambridge, Ontario (1)	1974	11	10	17	6 vans	0.8	0.3	11	110
Chattanooga, Tennessee (8)	FY 1974	Mon. - Fri.: 8	N.A.	N.A.	17 (14 vans, 3 station wagons)	0.3	N.A.	N.A.	895
Chicago, Illinois (8)	1973	Mon. - Fri.: 12	N.A.	N.A.	3 (1 7-pass. van, 2 15-pass. vans)	N.A.	N.A.	N.A.	65
Cleveland, Ohio (3)	N.A.	N.A.	N.A.	N.A.	1	0.1	0.1	N.A.	N.A.
Columbus, Ohio (1)	1972	Mon. - Fri.: 14 1/2 Sat.: 8 1/2 Sun.: 8	N.A.	5 + drivers	5 (4 19-pass. buses, 1 15-pass. bus)	2.0	0.1	45	150
Cranston, Rhode Island (3,9)	1974	Mon. - Fri.: 8	N.A.	N.A.	3 (2 19-pass. buses, 1 GMC coach with wheelchair lift)	0.1	0.3	N.A.	N.A.
Detroit, Michigan (2)	N.A.	Mon. - Sat.: 16	4	11	11 (9 9-pass. station wagons, 2 12-pass. vans)	1.2	0.1	64	N.A.
Dover, Delaware (3)	1974	N.A.	N.A.	N.A.	4	0.2	0.2	N.A.	N.A.
Dowagiac, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 10	N.A.	3 (2 full, 1 part)	2 vans	0.5	0.3	12	72
Escanaba, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 12 Sat.: 6	N.A.	8 (part)	2 vans	0.5	0.1	32	367
Gladwin, Michigan (2)	Oct. - Dec. 75	Mon. - Fri.: 8	N.A.	1 (full)	2 vans (1 with wheelchair lift)	0.8	0.7	8	112
Grand Haven, Michigan (2)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 9	N.A.	11 (3 full, 8 part)	4 vans	0.5	0.2	36	475
Grand Rapids, Michigan (3)	N.A.	N.A.	N.A.	N.A.	5	0.3	0.3	N.A.	N.A.
Haddonfield, New Jersey (1)	1974	Mon. - Sun.: 24	14/Shift	N.A.	14 (2 17-pass. buses, 1 with wheelchair lift; 7 10-pass. buses)	1.7	0.4	190	N.A.
Harbor Woods, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 8	N.A.	6 (part)	4 vans	1.5	0.2	12	169
Hartford, Connecticut (3)	N.A.	N.A.	N.A.	N.A.	6	0.3	0.2	N.A.	N.A.
Helena, Montana (3)	N.A.	N.A.	N.A.	N.A.	5	0.4	1.3	N.A.	N.A.
Hemet, California (3)	N.A.	N.A.	N.A.	N.A.	2	0.3	0.1	N.A.	N.A.
Hillsdale, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 15 Sat.: 10	N.A.	8 (4 full, 4 part)	3 vans (1 with wheelchair lift)	0.7	0.4	23	251
Holland, Michigan (7)	Oct. - Dec. 75	Mon. - Fri.: 12	N.A.	12 (3 full, 9 part)	6 vans (1 with wheelchair lift)	0.4	0.2	41	459
Houghton, Michigan (7)	Oct. - Dec. 75	Mon. - Thurs.: 12 Fri.: 16 Sat.: 12	N.A.	10 (9 full, 1 part)	4 vans	1.0	0.3	36	393
Kingston, Ontario (1)	1974	Mon. - Sat.: 17	4-6	5-8	6 31-pass. buses	0.5	0.2	22	242
Kitchener, Ontario (1)	1974	Mon. - Sat.: 17 1/2	7	11	3 (2 small buses, 1 transit coach)	0.7	0.3	46	510

		Sat.: 9								
Shared-ride taxi services										
Benicia, California (1)	1973	Mon. - Sat.:	13	N.A.	N.A.	2 taxicabs	0.2	0.2	26 (Max)	N.A.
Davenport, Iowa (4)	1973	Mon. - Sun.:	24	45	N.A.	23 taxicabs	1.2	0.2	265	3,309
El Cajon, California (1)	1974	Mon. - Sun.:	24	N.A.	N.A.	14 taxicabs	0.8	0.2	N.A.	N.A.
Fort Leonard Wood, Missouri (3)	N.A.	N.A.		N.A.	N.A.	80 taxicabs	6.7	2.0	N.A.	N.A.
Hicksville, New York (4)	1973	Mon. - Sun.:	24	100 full and part-time	N.A.	30 taxicabs	4.4	0.6	242	3,399
Huntington Park, California (1)	1974	Mon. - Sat.:	9	N.A.	N.A.	3 14-psgr. vans	1.0	0.1	27	N.A.
La Mesa, California (1,3)	1974	Mon. - Fri.: Sat.: Sun.:	14 10 5 1/2	N.A.	N.A.	5 taxicabs	0.7	0.1	N.A.	N.A.
Little Rock, Arkansas (3)	N.A.	Mon. - Sun.:	24	N.A.	N.A.	75 taxicabs	1.4	0.4	N.A.	N.A.
Madison, Wisconsin (1)	N.A.	Mon. - Sun.:	24	N.A.	N.A.	25 taxicabs	0.5	0.1	N.A.	N.A.
Merced, California (3)	N.A.	N.A.		N.A.	N.A.	18 taxicabs	1.1	0.7	N.A.	N.A.
Petersborough, Ontario (1)	1974	Mon. - Sat.:	18	N.A.	N.A.	Varies; part of regular taxi fleet	N.A.	N.A.	N.A.	N.A.

*Numbers in parentheses refer to sources.

N.A. = Not Available

Sources: See Table VI.C.1

TABLE VII-10 (Cont.)

LOCATION *	DATE OF INFORMATION	NO. OF HOURS IN OPERATION	NO. OF DRIVERS	TOTAL NO OF EMPLOYEES	NO. AND TYPES OF VEHICLES	NO. OF VEHICLES PER SQUARE MILE SERVED	NO. OF VEHICLES PER 1000 POPULATION SERVED	AVERAGE VEHICLE-HOURS PER DAY	AVERAGE VEHICLE MILES PER DAY
Dial-a-ride services (continued)									
La Habra, California (1,6)	1974	Mon. - Sat.: 12	11	16	7 { 6 19-psgr. buses; 1 8-psgr. van	1.0	0.2	33	700
La Mirada, California (1)	1974	Mon. - Fri.: 12 Sat.: 8	7	11	6 { 3 16-psgr. buses; 3 10-psgr. vans	0.9	0.2	48	636
Lincoln, Nebraska (3)	N.A.	N.A.	N.A.	N.A.	6	0.1	1.7	N.A.	N.A.
Los Angeles, California (3)	N.A.	N.A.	N.A.	N.A.	7	0.8	0.1	N.A.	N.A.
Ludington, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 12 Fri.: 13 Sat.: 10 Sun.: 4	N.A.	10 { 3 full; 7 part	4 vans (1 with wheelchair lift)	0.9	0.4	30	341
Marshall, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 12 Fri.: 12 Sat.: 10	N.A.	7 { 4 full; 3 part	3 vans (1 with wheelchair lift)	0.7	0.4	24	282
Midland, Michigan (7)	Oct. - Dec. 73	Mon. - Fri.: 16 3/4 Sat.: 10 Sun.: 8	N.A.	23 { 16 full; 7 part	10 vans (1 with wheelchair lift)	0.4	0.3	86	1,314
Milwaukee, Wisconsin (1)	1974	Mon. - Sun.: 16	30	46	30 { 5 sedans & space for 2-3 wheelchairs	0.02	0.8	240	3,250
Mt. Clemens, Michigan (7)	Oct. - Dec. 73	Mon. - Fri.: 11	N.A.	11 { 1 full; 10 part	4 vans	1.4	0.2	34	436
Mt. Pleasant, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 12 Fri.: 14 Sat.: 11 Sun.: 4	N.A.	18 { 1 full; 17 part	3 vans (1 with wheelchair lift)	1.0	0.2	38	389
Naugatuck Valley, Connecticut (3)	June - Nov. 73	Mon. - Fri.: 12	N.A.	N.A.	9 { 5 21-psgr. buses; 1 14-psgr. bus with wheelchair lift; 3 vans	0.2	0.1	N.A.	N.A.
Niles, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 12 Fri.: 13 Sat.: 9	N.A.	14 { 8 full; 6 part	3 vans (1 with wheelchair lift)	1.0	0.4	44	440
Ottawa-Carleton, Ontario (1)	1974	Mon. - Sat.: 17 1/4	N.A.	N.A.	27 small buses & vans	4.4	0.6	230	2,940
Regina, Saskatchewan (1)	1974	Mon. - Fri.: 18 1/2 Sat.: 17 1/3 Sun.: 7 1/3	23	30	27 (buses & vans seating 14-23 pegrs.)	Peak: 5.4 Off-peak 2.7 Night: 2.7	Peak: 0.8 Off-peak: 0.4 Night: 0.4	200	N.A.
Rochester, New York (1)	1974	Mon. - Fri.: 16 1/4 Sat.: 11	N.A.	N.A.	8 25-psgr. buses	0.8	0.3	N.A.	N.A.
Sault Sainte Marie, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 14 1/2 Fri.: 15 1/2 Sat.: 10 Sun.: 10	N.A.	16 { 8 full; 8 part	6 vans (1 with wheelchair lift)	0.4	0.4	55	659
St. Petersburg, Florida (10)	Sept. 73 - Mar. 74	Mon. - Fri.: 11 1/2 Sun.: 5	14	23	13 { 11 13-psgr. vans; 2 10-psgr. vans with wheelchair lift	1.3	0.4	N.A.	637
Stratford, Ontario (1)	N.A.	Mon. - Sat.: 8	4	6	5 { GMC buses 31-35 psgrs.	0.9	0.2	24	190
Toledo, Ohio (2)	N.A.	Mon. - Fri.: 15	4	9	7 (13-psgr. vans)	2.0	0.3	60	N.A.
Traverse City, Michigan (7)	Oct. - Dec. 73	Mon. - Thurs.: 12 Fri.: 15 1/2 Sat.: 8	N.A.	8 { 7 full; 1 part	6 vans (1 with wheelchair lift)	0.3	0.2	35	387
Trenton, Michigan (7)	Oct. - Dec. 73	Mon. - Fri.: 12	N.A.	27 (part)	6 vans	0.8	0.3	N.A.	N.A.
York Mills, Ontario (1)	Jan. 74	Mon. - Fri.: 16 Sat.: 9	2	4	10 small buses	N.A.	0.5	119	N.A.
Shared-ride taxi services									
Benicia, California (1)	1973	Mon. - Sat.: 13	N.A.	N.A.	2 taxicabs	0.2	0.2	26 (Mon)	N.A.
Davenport, Iowa (4)	1973	Mon. - Sun.: 24	45	N.A.	23 taxicabs	1.2	0.2	265	3,309
El Cajon, California (1)	1974	Mon. - Sun.: 24	N.A.	N.A.	14 taxicabs	0.8	0.2	N.A.	N.A.
Fort Leonard Wood, Missouri (3)	N.A.	N.A.	N.A.	N.A.	80 taxicabs	6.7	2.0	N.A.	N.A.
Hicksville, New York (4)	1973	Mon. - Sun.: 24	100 (full and part-time)	N.A.	30 taxicabs	4.6	0.6	242	3,389
Huntington Park, California (1)	1974	Mon. - Sat.: 9	N.A.	N.A.	3 14-psgr. vans	1.0	0.1	27	N.A.
La Mesa, California (1,3)	1974	Mon. - Fri.: 14 Sat.: 10 Sun.: 5 1/2	N.A.	N.A.	5 taxicabs	0.7	0.1	N.A.	N.A.
Little Rock, Arkansas (3)	N.A.	Mon. - Sun.: 24	N.A.	N.A.	75 taxicabs	1.4	0.4	N.A.	N.A.
Madison, Wisconsin (1)	N.A.	Mon. - Sun.: 24	N.A.	N.A.	25 taxicabs	0.5	0.1	N.A.	N.A.
Merced, California (3)	N.A.	N.A.	N.A.	N.A.	18 taxicabs	1.1	0.7	N.A.	N.A.
Peterborough, Ontario (1)	1974	Mon. - Sat.: 18	N.A.	N.A.	Varies, part of regular taxi fleet	N.A.	N.A.	N.A.	N.A.

*Numbers in parentheses refer to sources.

N.A. - Not Available

Sources: See Table VI.C.1

La Mirada, California (3)							
Lincoln, Nebraska (3)	N.A.	100	28.6	2.0	N.A.	N.A.	N.A.
Los Angeles, California (3)	N.A.	250	2.3	29.1	N.A.	N.A.	N.A.
Ludington, Michigan (7)	Oct. - Dec. 75	236	36.2	54.9	4.6	7.8	0.7
Marshall, Michigan (7)	Oct. - Dec. 75	150	20.7	32.6	2.7	6.3	0.5
Midland, Michigan (7)	Oct. - Dec. 75	464	13.2	18.6	1.1	5.4	0.4
Milwaukee, Wisconsin (1)	1974	1,550-1,600 (Including 1,400 children)	40.9-42.2	1.0	0.1	6.5-6.7	0.3
Mt. Clemens, Michigan (7)	Oct. - Dec. 75	307	15.0	80.8	7.4	9.1	0.7
Mt. Pleasant, Michigan (7)	Oct. - Dec. 75	227	11.1	44.5	3.7	5.9	0.6
Naugatuck Valley, Connecticut(3)	June - Nov. 73	200	2.7	3.6	0.3	N.A.	N.A.
Niles, Michigan (7)	Oct. - Dec. 75	260	20.0	50.0	4.2	5.9	0.6
Ottawa-Carleton, Ontario (1)	1974	2,400	55.2	393.4	22.8	9.6	0.8
Regina Saskatchewan (1)	1974	3,800	62.0	444.0	24.0	19.0	N.A.
Rocheater, New York (1)	1974	450	15.0	45.0	2.8	N.A.	N.A.
Sault Sainte Maria, Michigan(7)	Oct. - Dec. 75	341	22.5	21.7	1.5	6.2	0.5
St. Petersburg, Florida (10)	Sept. 73 - Mar. 74	358	11.9	35.8	3.1	N.A.	0.6
Stratford, Ontario (1)	N.A.	219	9.1	38.3	6.4	9.1	1.2
Toledo, Ohio (2)	N.A.	275	10.3	78.6	5.2	4.6	N.A.
Traverse City, Michigan (7)	Oct. - Dec. 75	222	8.4	12.5	1.0	6.4	0.6
Trenton, Michigan (7)	Oct. - Dec. 75	183	7.6	25.4	2.1	N.A.	N.A.

TABLE VII-11

DEMAND STATISTICS FOR SELECTED SHARED-RIDE DEMAND-RESPONSIVE TRANSPORTATION SERVICES

LOCATION*	DATE OF INFORMATION	AVG. PASSENGER TRIPS/ WEEKDAY	AVG. PASSENGER TRIPS/ 1000 POPULATION SERVED/WEEKDAY	AVG. PASSENGER TRIPS/ SQUARE MILE/ WEEKDAY	AVG. PASSENGER TRIPS/ SQUARE MILE/ HOUR	AVG. PASSENGER TRIPS/ VEHICLE/HOUR	AVG. PASSENGER TRIPS/ VEHICLE/MILE
Dial-a-ride services							
Alma, Michigan (7)	Oct. - Dec. 75	201	20.5	43.7	2.8	5.4	0.7
Alpena, Michigan (7)	Oct. - Dec. 75	314	15.9	30.2	2.2	6.2	0.5
Ann Arbor, Michigan (7)	Oct. - Dec. 75	2,718	27.2	199.9	10.8	5.6	N.A.
Batavia, New York (1)	N.A.	455	25.2	82.7	6.9	12.3	N.A.
Bay Ridges, Ontario (1)	N.A.	950	38.0	79.1	4.0	11.0	N.A.
Belding, Michigan (7)	Oct. - Dec. 75	95	17.9	20.2	1.4	5.9	0.6
Bensenville, Illinois (3)	N.A.	150	10.7	21.4	N.A.	N.A.	N.A.
Bencon Nashoa - St. Joseph, Michigan (7)	Dec. - Dec. 75	679	12.0	13.2	1.1	6.6	0.3
Big Rapids, Michigan (7	Oct. - Dec. 75	224	18.7	43.9	3.7	6.9	0.6
Birmingham, Michigan (7)	Oct. - Dec. 75	186	7.1	40.4	3.4	6.6	0.5
Bramalea, Ontario (1)	1974	1,570	49.1	241.5	13.1	N.A.	2.4
Buffalo, New York (1)	1974	300	42.9	100.0	5.9	8.9	4.3
Burlington, Ontario (1)	1974	325	44.0	N.A.	N.A.	8.4	N.A.
Cadillac, Michigan (7)	Oct. - Dec. 75	277	26.4	45.4	3.8	6.9	0.6
Cambridge, Ontario (1)	1974	548	22.6	68.5	6.2	11.0	5.0
Chattanooga, Tennessee (8)	FY 1974	392	N.A.	7.5	0.9	N.A.	0.4
Chicago, Illinois (8)	1973	44	N.A.	N.A.	N.A.	N.A.	0.7
Cleveland, Ohio (3)	N.A.	35	2.5	3.9	N.A.	N.A.	N.A.
Columbus, Ohio (1)	1972	485	13.1	194.0	13.4	10.7	3.2
Cranston, Rhode Island (3,9)	1974	160	14.5-16.0	5.7	0.7	N.A.	N.A.
Detroit, Michigan (2)	N.A.	400	3.9	42.1	2.6	6.3	N.A.
Dover, Delaware (3)	1974	102	6.1	4.9	N.A.	N.A.	N.A.
Dowagiac, Michigan (7)	Oct. - Dec. 75	67	8.5	16.3	1.6	5.7	1.0
Escanaba, Michigan (7)	Dec. - Dec. 75	249	8.1	63.9	5.3	7.7	0.7
Gladwin, Michigan (7)	Dec. - Dec. 75	83	27.4	34.6	4.3	9.8	0.7
Grand Haven, Michigan (7)	Dec. - Dec. 75	243	14.4	32.7	2.7	6.8	0.5
Grand Rapids, Michigan (3)	N.A.	300	17.6	15.0	N.A.	N.A.	N.A.
Haddonfield, New Jersey (1)	1974	1,200	27.3	109.1	4.5	6.3	N.A.
Harper Woods, Michigan (7)	Oct. - Dec. 75	117	5.5	45.0	5.6	9.6	0.7
Hartford, Connecticut (3)	N.A.	100	4.0	5.0	N.A.	N.A.	N.A.
Helena, Montana (3)	N.A.	60	15.0	5.0	N.A.	N.A.	N.A.
Hemet, California (3)	N.A.	90	5.2	13.8	N.A.	N.A.	N.A.
Hilladale, Michigan (7)	Dec. - Dec. 75	148	19.2	34.4	2.9	6.5	0.6
Holland, Michigan (7)	Oct. - Dec. 75	266	9.8	18.7	1.6	6.5	0.6
Houghton, Michigan (7)	Dec. - Dec. 75	270	22.0	65.9	5.5	7.4	0.7
Kingston, Ontario (1)	1974	375	10.4	31.3	6.3	16.8	1.6
Kitchener, Ontario (1)	1974	350	31.8	83.7	4.8	7.6	0.7
La Habra, California (1,6)	1974	475	10.1	67.9	5.7	8.6	0.7
La Mirada, California (1)	1974	435	11.2	62.1	5.2	9.1	0.7
Lincoln, Nebraska (3)	N.A.	100	28.6	2.0	N.A.	N.A.	N.A.
Los Angeles, California (3)	N.A.	250	2.3	29.1	N.A.	N.A.	N.A.
Ludington, Michigan (7)	Oct. - Dec. 75	234	36.2	54.9	4.6	7.8	0.7
Marshall, Michigan (7)	Dec. - Dec. 75	150	20.7	32.6	2.7	6.3	0.5
Midland, Michigan (7)	Oct. - Dec. 75	464	13.2	18.6	1.1	5.4	0.4
Milwaukee, Wisconsin (1)	1974	1,550-1,600 (including 1,400 children)	40.9-42.2	1.0	0.1	6.5-6.7	0.3
Mt. Clemens, Michigan (7)	Oct. - Dec. 75	307	15.0	80.6	7.4	9.1	0.7
Mt. Pleasant, Michigan (7)	Dec. - Dec. 75	227	11.1	44.5	3.7	5.9	0.6
Naugatuck Valley, Connecticut(3)	June - Nov. 73	200	2.7	3.6	0.3	N.A.	N.A.
Niles, Michigan (7)	Oct. - Dec. 75	260	20.0	50.0	4.2	5.9	0.6
Nepean-Carleton, Ontario (1)	1974	2,400	55.2	393.4	32.8	9.6	0.8
Regina Saskatchewan (1)	1974	3,600	62.0	444.0	24.0	19.0	N.A.
Rochester, New York (1)	1974	450	15.0	45.0	2.8	N.A.	N.A.
Sault Sainte Marie, Michigan(7)	Dec. - Dec. 75	341	22.5	21.7	1.5	6.2	0.5
St. Petersburg, Florida (10)	Sept. 73 - Mar. 74	358	11.9	35.8	3.1	N.A.	0.6
Scarsfood, Ontario (1)	N.A.	219	9.1	38.3	6.4	9.1	1.2
Toledo, Ohio (2)	N.A.	275	10.3	78.6	5.2	4.6	N.A.
Traverse City, Michigan (7)	Oct. - Dec. 75	227	8.4	12.5	1.0	6.4	0.6
Trenton, Michigan (3)	Oct. - Dec. 75	163	7.6	25.4	2.1	N.A.	N.A.

TABLE VII-11 (Cont.)

*Numbers in Parentheses Refer to Sources.

N.A. = Not Avsilable

Sources: See Table VI.C.1

TABLE VII-11 (Cont.)

LOCATION *	DATE OF INFORMATION	AVG. PASSENGER TRIPS/ WEEKDAY	AVG. PASSENGER TRIPS/ 1000 POPULATION SERVED/WEEKDAY	AVG. PASSENGER TRIPS/ SQUARE MILE/ WEEKDAY	AVG PASSENGER TRIPS/ SQUARE MILE/ HOUR	AVG PASSENGER TRIPS/ VEHICLE/HOUR	AVG PASSENGER TRIPS/ VEHICLE/MILE
Dial-a-ride services (continued)							
York Mills, Ontario (1)	Jan. 74	740	35 6	N.A.	N.A.	6.2	N.A.
Shared-ride taxi services							
Benicia, California (1)	1973	80.0	9.1	8.9	0.7	3.1	N.A.
Davenport, Iowa (4)	1973	1,032	10.5	52.4	2.2	3.9	0.3
El Cajon, California (1)	1974	600	10.0	35.3	1.5	N.A.	N.A.
Fort Leonard Wood, Missouri (3)	N.A.	1,000	25.0	83.3	N.A.	N.A.	N.A.
Hicksville, New York (4)	1973	675	14.0	99.3	4.1	2.8	0.2
Huntington Park, California (1)	1974	100	3.0	33.3	3.7	3.7	N.A.
La Mesa, California (1,3)	1974	275	6.1	39.3	2.8	N.A.	N.A.
Little Rock, Arkansas (3)	N.A.	3,000	15.8	56.6	N.A.	N.A.	N.A.
Madison, Wisconsin (1)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Merced, California (3)	N.A.	130	5.2	8.1	N.A.	N.A.	N.A.
Peterborough, Ontario (1)	1974	121	60.5	30.9	1.7	N.A.	N.A.

*Numbers in Parentheses Refer to Sources.

N.A. = Not Available

Sources See Table VI.C.1

								free					
Harper Woods, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	7.73	0.55	0.86	50¢; elderly: 25¢; children: free	2.89	0.20	0.32	-0.54@	Yes
Hartford, Connecticut (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Donations	N.A.	N.A.	N.A.	N.A.	Yes
Helena, Montana (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40¢	N.A.	N.A.	N.A.	N.A.	Yes
Hemet, California (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50¢	N.A.	N.A.	N.A.	N.A.	Yes
Hillsdale, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	10.49	0.96	1.62	50¢; children & elderly: 25¢	1.98	0.18	0.31	-1.31@	Yes
Holland, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.77	0.82	1.51	50¢, 75¢; elderly: 25¢	2.17	0.18	0.33	-1.18@	Yes
Houghton, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.41	0.77	1.13	50¢, 70¢; elderly: 25¢, 35¢	2.72	0.25	0.37	-0.76@	Yes
Kingston, Ontario (1)	1974	N.A.	N.A.	N.A.	9.73	0.88	0.60	35¢; students & elderly: 25¢	3.87	0.36	0.23	-0.37@	Yes
Kitchener, Ontario (1)	1974	14.37	1.30	1.89	10.33	0.93	1.36	35¢; elderly & children: 20¢	1.90	0.17	0.25	-1.64	Yes
La Habra, California (1,6)	1974	12.81	1.01	1.48	12.25	0.96	1.42	50¢ cash; 35¢ coupon	2.16	0.17	0.25	-1.23	Yes
La Mirada, California (1)	1974	10.51	0.79	1.16	N.A.	N.A.	N.A.	25¢	1.90	0.14	0.21	-0.95	Yes
Lincoln, Nebraska (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40¢	N.A.	N.A.	N.A.	N.A.	Yes
Los Angeles, California (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	15¢	N.A.	N.A.	N.A.	N.A.	Yes
Ludington, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.56	0.84	1.22	50¢, 75¢; elderly: 25¢, 35¢	2.92	0.26	0.37	-0.85@	Yes
Marshall, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.76	0.83	1.55	50¢, 75¢; children & elderly: 25¢, 35¢	2.12	0.18	0.34	-1.21@	Yes

TABLE VII-12

COST AND REVENUE STATISTICS FOR SELECTED SHARED-RIDE DEMAND-RESPONSIVE TRANSPORTATION SERVICES

LOCATION*	DATE OF INFORMATION	TOTAL COST ($)			OPERATING COST ($)			FARE	AVERAGE REVENUE ($)			SURPLUS OR DEFICIT/ PASSENGER TRIP ($)	SUBSIDIZED
		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP	PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP		
Dial-a-ride services													
Alma, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.78	1.07	1.82	50c; elderly: 25c	1.57	0.19	0.29	-1.33@	Yes
Alpena, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.15	0.66	1.48	50c, 75c; children & elderly: 25c, 40c	2.52	0.18	0.41	-1.07@	Yes
Ann Arbor, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	25c; elderly: 10c	N.A.	N.A.	N.A.	N.A.	Yes
Batavia, New York (1)	N.A.	7.50	N.A.	0.61	N.A.	N.A.	N.A.	60c; subscription: 40c	6.15	N.A.	0.50	-0.11	Yes
Bay Ridges, Ontario (1)	N.A.	7.75	N.A.	0.70	N.A.	N.A.	N.A.	30c cash; 20c ticket	2.34	N.A.	0.23	-0.47	Yes
Belding, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	3.86	0.40	0.66	50c; elderly: 25c	1.34	0.14	0.14	-0.52@	Yes
Benarnville, Illinois (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c; children & elderly: 25c	N.A.	N.A.	N.A.	N.A.	Yes
Benton Harbor - St. Joseph, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	12.49	0.65	1.89	60c; elderly: 30c	2.73	0.14	0.41	-1.48@	Yes
Big Rapids, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	7.96	0.70	1.16	50c; elderly: 25c	2.36	0.21	0.34	-0.82@	Yes
Birmingham, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	10.03	0.75	1.51	50c; children & elderly: 25c	2.20	0.17	0.33	-1.18@	Yes
Brampton, Ontario (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	35c; children 5-12yrs 15c; elderly: free	N.A.	N.A.	N.A.	N.A.	Yes
Buffalo, New York (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Free	0.00	0.00	0.00	N.A.	Yes
Burlington, Ontario (1)	1974	11.87	N.A.	1.86	11.47	N.A.	1.80	35c; students; elderly, children: 25c	1.59	N.A.	0.25	-1.61	Yes
Cadillac, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.32	0.73	1.20	50c; elderly: 25c	2.17	0.19	0.31	-0.89@	Yes
Cambridge, Ontario (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40c; children: 20c elderly: 10c	N.A.	N.A.	N.A.	N.A.	Yes
Chattanooga, Tennessee (8)	FY 1974	N.A.	0.54	1.23	N.A.	0.44	1.01	Free	0.00	0.00	0.00	-1.23	Yes
Chicago, Illinois (8)	1973	N.A.	2.13	9.46	N.A.	N.A.	N.A.	Free	0.00	0.00	0.00	-9.46	Yes
Cleveland, Ohio (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Free; donations accepted	N.A.	N.A.	N.A.	N.A.	Yes
Columbus, Ohio (1)	N.A.	15.98	4.79	1.49	15.24	4.57	1.41	25c; children: 10c; 25c transfer to bus	1.83	0.55	0.17	-1.32	Yes
Cranston, Rhode Island (3,8)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	$1.25 monthly pass	N.A.	N.A.	N.A.	N.A.	Yes
Detroit, Michigan (2)	N.A.	10.88	N.A.	1.74	10.22	N.A.	1.64	Free	0.00	0.00	0.00	-1.74	Yes
Dover, Delaware (3)	1974	N.A.	N.A.	N.A.	2.10	N.A.	1.20	Free	0.00	0.00	0.00	-1.20@	Yes
Dowagiac, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	6.42	1.07	1.14	50c; elderly: 25c	1.83	0.31	0.32	-0.82@	Yes
Ferndale, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	6.65	0.58	0.87	50c, children & elderly: 25c	2.37	0.21	0.31	-0.56@	Yes
Gladwin, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.53	0.61	0.87	50c; elderly: 25c	1.41	0.10	0.14	-0.73@	Yes
Grand Haven, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	6.07	0.46	0.89	50c; elderly: 25c	2.36	0.18	0.35	-0.54@	Yes
Grand Rapids, Michigan (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c	N.A.	N.A.	N.A.	N.A.	Yes
Haddonfield, New Jersey (1)	1974	15.40	N.A.	2.44	13.81	N.A.	2.19	30c; elderly: 15c; children under 12: free	1.71	N.A.	0.27	-2.17	Yes
Harper Woods, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	7.73	0.55	0.86	50c; elderly: 25c; children: free	2.89	0.20	0.32	-0.54@	Yes
Hartford, Connecticut (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Donations	N.A.	N.A.	N.A.	N.A.	Yes
Helena, Montana (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40c	N.A.	N.A.	N.A.	N.A.	Yes
Hemet, California (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c	N.A.	N.A.	N.A.	N.A.	Yes
Hillsdale, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	10.49	0.96	1.62	50c; children & elderly: 25c	1.98	0.18	0.31	-1.31@	Yes
Holland, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.77	0.82	1.51	50c, 75c; elderly: 25c	2.17	0.18	0.33	-1.18@	Yes
Houghton, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.41	0.77	1.13	50c, 70c; elderly: 25c, 35c	2.72	0.25	0.37	-0.76@	Yes
Kingston, Ontario (1)	1974	N.A.	N.A.	N.A.	9.73	0.88	0.60	35c, students & elderly: 25c	3.67	0.34	0.23	-0.37@	Yes
Kitchener, Ontario (1)	1974	14.37	1.30	1.89	10.33	0.93	1.36	35c; elderly & children: 20c	1.90	0.17	0.25	-1.64	Yes
La Habra, California (1,6)	1974	12.81	1.01	1.48	12.25	0.96	1.42	50c cash; 35c coupon	2.16	0.17	0.25	-1.23	Yes
La Mirada, California (1)	1974	10.51	0.79	1.16	N.A.	N.A.	N.A.	25c	1.90	0.14	0.21	-0.95	Yes
Lincoln, Nebraska (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40c	N.A.	N.A.	N.A.	N.A.	Yes
Los Angeles, California (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	15c	N.A.	N.A.	N.A.	N.A.	Yes
Ludington, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.36	0.84	1.22	50c, 75c, elderly: 25c, 35c	2.92	0.26	0.37	-0.85@	Yes
Marshall, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.76	0.83	1.55	50c, 75c; children & elderly: 25c, 35c	2.12	0.18	0.34	-1.21@	Yes

TABLE VII-12 (Cont.)

LOCATION *	DATE OF INFORMATION	TOTAL COST ($)			OPERATING COST ($)			FARE	AVERAGE REVENUE ($)			SURPLUS OR DEFICIT/ PASSENGER	SUBSIDIZED
		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER	PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER		

*Numbers in Parentheses Refer to Sources.

Sources: See Table VI.C.1

(d Amortized Capital Cost not Included.

N.A. = Not Available

TABLE VII-12 (Cont.)

LOCATION*	DATE OF INFORMATION	TOTAL COST ($)			OPERATING COST ($)			FARE	AVERAGE REVENUE ($)			SURPLUS OR DEFICIT/ PASSENGER TRIP ($)	SUBSIDIZED
		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP	PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP		PER VEHICLE PER HOUR	PER VEHICLE PER MILE	PER PASSENGER TRIP		
Dial-a-ride services (Cont'd)													
Midland, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.17	0.60	1.70	50c; elderly: 25c	1.97	0.13	0.36	+1.34@	Yes
Milwaukee, Wisconsin (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	$4 for up to 30 blocks, 55c each additional 10	N.A.	N.A.	N.A.	N.A.	No
Mt. Clemens, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	8.85	0.69	0.98	50c; children & elderly: 25c	3.25	0.25	0.36	-0.62@	Yes
Mt. Pleasant, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	11.37	1.11	1.91	50c; elderly: 25c; children: free	1.80	0.18	0.30	-1.61@	Yes
Naugatuck Valley, Connecticut (3)	June - November 73	N.A.	1.00	2.95	N.A.	N.A.	N.A.	Variable: 25c to $2.50	N.A.	0.42	1.24	-1.71	Yes
Niles, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	9.40	0.94	1.60	50c, 75c; children & elderly: 25c, 35c	2.22	0.22	0.38	-1.22@	Yes
Orleans-Cardelcon, Ontario (1)	1974	N.A.	N.A.	N.A.	9.93	0.84	1.03	Peak - 55c cash, 50c ticket; elderly: 50c cash, 45c ticket; Off-peak - 40c cash, 35c ticket; elderly: 35c cash, 30c ticket	2.98	0.25	0.31	+0.72@	Yes
Regina, Saskatchewan (1)	1974	14.48	N.A.	0.76	13.13	N.A.	0.69	35c; $16 monthly pass	5.89	N.A.	0.31	-0.45	Yes
Rochester, New York (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Many-many: $1.00; subscription: 80c or $7/week; feeder bus: $7.50/week	N.A.	N.A.	N.A.	N.A.	Yes
Sault Sainte Marie, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	4.67	0.39	0.75	50c; elderly: 25c; children: free	1.96	0.16	0.32	-0.43@	Yes
St. Petersburg, Florida (10)	September 73 - March 74	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	60c; 35c if 24-hr. notice is given	N.A.	N.A.	N.A.	N.A.	Yes
Streetsford, Ontario (1)	N.A.	N.A.	N.A.	N.A.	8.03	1.01	0.87	35c; student & elderly: 25c	2.10	0.27	0.23	-0.64@	Yes
Toledo, Ohio (2)	N.A.	9.60	N.A.	2.09	8.75	N.A.	1.91	Free	0.00	0.00	0.00	-2.09	Yes
Traverse City, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	7.62	0.69	1.51	50c, $1.00; children & elderly: 25c, 50c	1.90	0.17	0.38	-1.13@	Yes
Trenton, Michigan (7)	October - December 75	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	60c; children & elderly: 30c	N.A.	N.A.	N.A.	N.A.	Yes
York Hills, Ontario (1)	Jan. 74	N.A.	N.A.	N.A.	8.47	N.A.	1.04	50c, students: 30c; children: 20c	2.05	N.A.	0.33	-0.71@	Yes
Shared-ride taxi services													
Benicia, California (1)	1973	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	35c, 50c	N.A.	N.A.	N.A.	N.A.	Yes
Davenport, Iowa (4)	1973	2.90	0.23	0.74	N.A.	N.A.	N.A.	75c base fare plus 25c/zone	4.27	0.34	1.10	+0.36	No
El Cajon, California (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c	N.A.	N.A.	N.A.	N.A.	Yes
Fort Leonard Wood, Missouri (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	40c	N.A.	N.A.	N.A.	N.A.	No
Hicksville, New York (4)	1973	2.78	0.20	1.00	N.A.	N.A.	N.A.	$1.00 base fare plus 30c/mile	5.70	0.41	2.04	+1.04	No
Huntington Park, California (1)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c; elderly & children: 25c	N.A.	N.A.	N.A.	N.A.	Yes
La Mesa, California (1,3)	1974	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	50c	N.A.	N.A.	N.A.	N.A.	Yes
Little Rock, Arkansas (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	No
Madison, Wisconsin (1)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	55c	N.A.	N.A.	N.A.	N.A.	No
Merced, California (3)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	25c	N.A.	N.A.	N.A.	N.A.	Yes
Peterborough, Ontario (1)	1974	N.A.	N.A.	0.96	N.A.	N.A.	N.A.	35c; children & elderly: 25c	N.A.	N.A.	0.29	-0.67	Yes

*Numbers in Parentheses Refer to Sources.

@ Amortized Capital Cost not Included.

N.A. = Not Available

Sources: See Table VI.C.1

Except for Handicabs, Inc., which serves the five-county Milwaukee metropolitan area covering 1,489 square miles, the range in the size of the DRT service area is from 2.4 to 56.0 square miles. Of the 67 systems for which the size of the service area was reported, one-half or 33 serve an area of 7.5 square miles or less, 42 serve areas of 10 square miles or less, and only 13 serve areas of 20 square miles or more. Service areas larger than 5 square miles are often divided into zones of only a few square miles, with vehicles assigned to each zone. Trips between zones therefore require a transfer.

The DRT systems serve a wide range of sizes of population, from 1,700 elderly in Dover, Delaware, to the 190,000 residents of Little Rock, Arkansas. Of the 68 systems for which the number of people served was reported, one-half serve populations of 24,200 or more, and five, including two shared-ride taxi systems, serve populations of more than 100,000.

DRT service has been considered appropriate for areas with a population density between 3,000 and 7,000 persons per square mile. Only 22 of the systems listed in the tables operate in areas with a population density within this range, however, while 35 serve less than 3,000 persons per square mile and nine serve more than 7,000 persons per square mile. In Dover, Delaware; Lincoln, Nebraska; and Milwaukee the number of potential users per square mile is less than 100. The DRT systems in these cities, however, transport only the elderly or the handicapped and cover more than 20 square miles. At the other extreme, the systems in Columbus, Ohio; Detroit; and Los Angeles operate in Model City Neighborhoods close to the CBD where the population density in each case exceeds 10,000 persons per square mile. This implies that not all of the transportation needs of residents of densely populated areas near the center of large central cities can be met by conventional bus systems which normally serve these areas well, and that DRT systems can play an important role in these areas.

Among the dial-a-ride systems, the number of vehicles in the fleet ranges from one in Cleveland to 30 in Milwaukee. The largest fleets are maintained by three shared-ride taxi systems: two in Fort Leonard Wood, Missouri, which together operate 80 cabs, and the third in Little Rock, Arkansas, which operates 75 cabs. The average fleet size for all of the dial-a-ride and shared-ride taxi systems combined is 10 vehicles. Many of these systems, however, do not utilize an entire fleet during the day, reserving one or more vehicles for use when other vehicles require maintenance.

The number of vehicles owned per square mile served varies from 0.02 in Milwaukee where Handicabs, Inc., covers a five-county area of 1,489 square miles with only 30 vans to 6.7 in Fort Leonard Wood, Missouri, where 80 taxicabs serve an area of only 12 square miles. Forty-six systems own between one vehicle for every 10 square miles served and one vehicle for every square mile covered. The median fleet size is one vehicle for every 1.25 square miles of service area. Of the nine systems which have two or more vehicles per square mile, three operate primarily as a feeder to bus or commuter rail systems, and two are shared-ride taxi systems.

The number of vehicles owned per 1,000 persons served varies much less widely. An overwhelming majority of the DRT systems use less than one vehicle for every 1,000 eligible users. The median is 0.3 vehicles per 1,000 population or one vehicle for every 3,300 persons served.

Average weekday ridership differs considerably among the 70 shared-ride DRT systems. The number of riders carried on an average weekday for every 1,000 possible users varies between 2.3 in the Greater Watts Model City Neighborhood in Los Angeles and 62.0 in Regina, Saskatchewan, and averages 18.7. The number of riders carried on an average weekday for every square mile covered ranges from 1.0 for Handicabs, Inc., which serves only the handicapped in the five-county Milwaukee metropolitan area, and 444.0 for the system in Regina; the average is 58.4 passengers per weekday per square mile served. The systems which carry the most riders per capita or per square mile served are those which operate as a feeder to conventional bus or rail transit systems. These include the systems in Regina, Saskatchewan; Carleton, Ontario, near Ottawa; Bramalea, Ontario; Ann Arbor, Michigan; and Hicksville, New York, on Long Island.

Productivity ranges from 2.8 passengers per hour per vehicle for the shared-ride taxi system in Hicksville to 19.0 for the dial-a-ride feeder service in Regina. The average number of passengers per mile per vehicle varies between 0.2 in Hicksville to 5.0 in Cambridge, Ontario. Of those systems for which data on productivity was available in the literature, one-half carried 6.6 passengers or less per hour and 0.7 passengers or less per mile in a vehicle. The shared-ride taxi systems tend to have lower levels of productivity due to a number of factors including larger fleets, more hours of service, and lower seating capacity. In addition, shared-ride taxi systems usually strive to provide immediate service, while many dial-a-ride systems require a user to notify the dispatcher well in advance of the intended time of the trip, enabling the dispatcher to pool more passengers in a vehicle more easily. At

least six dial-a-ride systems have achieved an average productivity greater than 10 passengers per hour per vehicle. Four of these systems function primarily as a feeder to regular fixed-route bus or rail transit systems.

The total cost of providing DRT service ranges from 61 cents per passenger in Batavia, New York, to $9.46 per passenger for the service run for the elderly in an area on the South Side of Chicago by a YMCA. At least 30 of the 45 systems for which some financial data was available have total costs exceeding $1.00 per passenger. With fares typically below 50 cents a ride, an overwhelming majority of the 70 DRT systems are being subsidized. In several communities, however, private operators are providing service below cost under contract with the local government or a social service agency. This constitutes subsidization of the user rather than subsidization of the system.

2. Jitneys

Jitneys are unscheduled passenger cars, station wagons, limousines, vans, or small buses that carry passengers over a fixed route and, in some places, deviate from the route near its terminus or along a certain section to deliver passengers to their final destinations. Between 1914 and 1917 jitneys were prevalent in many American cities, but by the early 1920s their numbers were substantially reduced by anti-jitney ordinances in most communities. There are currently only a few jitney services left in the United States, and detailed information about them only exists for the jitneys in Atlantic City, New Jersey, and San Francisco.[1]

In Atlantic City, a resort community with a summer population of 110,000, each jitney operator is an entrepreneur who drives his own 10-passenger van or bus and belongs to the Jitneymen's Association, which represents the interests of the jitney operators and establishes work rules and operating procedures. A local ordinance limits the number of jitney licenses to 190, but not all of the licenses are actively used. The jitneys transport an estimated 51,800 riders a day, and the average jitney carries 45 passengers an hour and two to three passengers per mile. The total cost per jitney is about $3.77 per hour, 20

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[1]Lea Transit Compendium: Para-Transit, Vol. 1, No. 8 (Huntsville, Alabama: The N. D. Lea Transportation Research Corporation, 1974), pp. 38, 43.

cents per mile, or 8.6 cents per passenger. With a fare of 30 cents, the average jitney operator makes a profit of roughly 21 cents per passenger.

In San Francisco 120 jitney operators transport an estimated average of 15,656 passengers a day in 12-passenger vans. The average jitney carries 29 passengers per hour and one to two passengers per mile at an estimated total cost of 8.7 cents per passenger. The average fare is 29 cents, leaving the jitney operator with a profit of approximately 20 cents per passenger.

3. Car Pools

More Americans travel to work by car pool than by all other forms of public transportation combined. According to the 1970 Census, 11.7 percent of all workers travel to work as passengers in a private automobile and not as a driver, while 8.9 percent use either a bus or streetcar, subway or elevated train, railroad, or taxicab. The 1970 National Personal Transportation Study found that 9.2 percent of all work trips in all areas and places are made by car pool, while only 8.4 percent of all work trips are made by some form of public transportation.

Most car pools are formed through the initiative of the car pool members themselves without any outside assistance or externally applied incentives. In recent years, however, employers in the public and private sectors; Chambers of Commerce, television and radio stations, newspapers, auto clubs, and other private groups and organizations; and local governmental units in increasing numbers are sponsoring car pool programs to assist commuters in the formation of car pools and to provide incentives for car pooling. Because most of these programs are fairly recent, the preliminary results of only a few are reported below.

The Burroughs Corporation in Los Angeles, assisted by Operation Oxygen, a volunteer, nonprofit organization, began sponsoring a car pool program for its employees in 1971. To facilitate the formation of car pools, the company used a locator board consisting of a large map of the metropolitan area divided into grids. Employees simply noted the grid corresponding to their residence and the names of fellow employees living in the same grid. As a further inducement, the company also provided preferred parking spaces for car poolers. By the end of 1971, 260 employees were participating in the program. The number of occupants per automobile increased by a factor of 1.5 as a result of the program.[1]

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[1]Kirby et al., op. cit., p. 225.

The McDonnell-Douglas Corporation in St. Louis also used a locator board and provided reserved, preferred parking spaces for car poolers to encourage car pooling among its employees. These incentives resulted in an increase in automobile occupancy to approximately 2.8 persons per car.[1]

Using the same incentives, the National Aeronautics and Space Administration (NASA) in Washington, D.C., has maintained an automobile occupancy of 3.3 persons per car among its employees.[2] Approximately 800 NASA employees were riding to work in car pools. The average size of these car pools was 3.85 persons.[3]

Normally charging a parking fee of $2.50 a day, the Prudential Insurance Company in Boston provided free parking in the company-owned garage for employees in car pools with three or more members. As a result, 44 percent of the employees now travel to work in car pools.[4]

In Little Rock, Arkansas, the state government reserved 500 convenient parking spaces for employees who traveled to work in a car pool. The number of car poolers increased from 400 to 1,100.[5]

The Government Employees Insurance Company, faced with a shortage of parking spaces at its offices in Gaithersburg, Maryland, instituted a program of car and bus pooling. Car pools were given the highest priority for the limited parking spaces, and 230 car pool parking permits were ultimately issued.[6]

In Knoxville, Tennessee, the Tennessee Valley Authority (TVA) along with 19 other employers, the City of Knoxville, the Knoxville Transit

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[1]Ibid.

[2]Ibid, p. 234.

[3]Alan M. Voorhees and Associates, Inc., Transportation Pooling (McLean, Virginia: Alan M. Voorhees and Associates, Inc., 1974), p. 10.

[4]Ibid., p. 14.

[5]Ibid, p. 18.

[6]Ibid., p. 21

Authority, the University of Tennessee, and several homeowners associations, participated in the Knoxville Car-Bus Pool Project, an areawide commuter ride-sharing program involving car pools, van pools, and express buses. TVA employees were surveyed to determine their home addresses, working hours, desire for new commuter ride-sharing services, and attitudes toward pooling. This information was analyzed to develop a list of groups of employees with similar spatial and temporal commuting patterns. Before the project began in early 1973, 65 percent of TVA's employees drove alone to work, 30 percent commuted by car pool, and only 3.5 percent rode a bus. By June 1975, only 23 percent of the employees drove alone, while 43 percent commuted by car pool, 29 percent by either regular or express bus, and 6 percent by van pool.[1]

In Portland, Oregon Project CARPOOL, begun in January 1974, was a joint effort of the Oregon Department of Transportation, local government agencies, radio and television stations, and several universities. The project consisted of three phrases. The first phase was a program of providing car pool matching services to commuters through their employers. The CARPOOL staff conducted workshops with large numbers of public and private employers to provide information on car pooling and its benefits. Employers could either use the project's central computerized matching system or develop their own system. In the second phase, encompassing a massive promotional compaign using the various forms of mass media, car pool matching services were provided to persons whose employers did not have a satisfactory program. The third phase involved a program of incentives in which 73 parking lots, including many owned by churches, were designated as park-and-ride lots.

At a cost of $215,000 during the first year, car pool programs were started by 215 employers. Following a survey of 34,000 employees in 49 companies, the CARPOOL staff estimated that 22,007 persons had begun car pooling since February 1974, resulting in the formation of 8,838 new car pools and the removal of 13,169 automobiles from the streets and highways during rush hours.

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[1] Lew W. Pratsch, "Knoxville and Portland: Two Successful Commuter Pooling Programs," Prepared for presentation at the Conference on paratransit in Williamsburg, Virginia, November 9-12, 1975, pp. 2-4.

4. Van Pools

The five van pool projects described in Table VII-13 comprise only a small sample of the many projects now being implemented. They nevertheless depict several forms of van pooling arrangements and cover a wide range of fleet sizes. The cost of these vanpools per mile per passenger has been considerably less than that of driving alone, and the fares, usually set to cover all costs, have been equivalent to those for regular bus service, even though most van pools are arranged for persons who commute over long distances.

The growth of the 3M Company's Commute-a-Van program has spurred the formation of van pool programs by other employers, by individual employees themselves, and by third-party organizations. By early 1976, at least 50 to 60 companies were either buying or leasing vans for their employees. In Knoxville, four individuals have purchased their own vans to transport some of their fellow employees to work. Many rental agencies and other third-party organizations are offering a complete package of services to employers and individual employees interested in van pooling. They not only furnish the vans but also handle van pool matching, maintenance, management, and insurance matters. Clearly, opportunities for innovative arrangements in van pooling are numerous, and the potential of this form of commuter ride-sharing has only begun to be realized.

5. Bus Pools, Commuter Bus Clubs, and Subscription Bus Service

The details of the 12 bus pool projects in Table VII-14 vary considerably. These services have been managed by the commuters themselves and by employers, community associations, authorities, private operators, and third-party organizations, with input from the commuters. They range in size from one to 47 buses, from one to 26 routes, and from 40 to 850 daily riders.

Most of these bus pools were arranged for people who commute long distances to work. The bus pool routes range from one to 65 miles, but most are over 20 miles. The buses usually travel express over a major portion of these routes to make the service more competitive with the private automobile. Bus pools and commuter clubs are therefore particularly appropriate for persons and areas that cannot be reached by conventional bus services.

The cost of bus pool has ranged from 1 cent to 10 cents per mile per seat. Where the buses and drivers were supplied by private charter bus companies, the cost has been below 6 cents per mile per seat. Included in this cost is the operator's profit.

				. Average fare: $23.72 per month or approx.: . 54¢ per psgr. per trip or . 2.2¢ per mile per psgr. for an average round trip of 49 miles	. 20 miles: . $27 per month . 61¢ per ride . 3.1¢ per mile . 40 miles: . $31 per month . 70¢ per ride . 1.8¢ per mile

* Based on the average occupancy of 11.36 passengers per van.
@ Used by TVA Credit Union to calculate fares.
\# Based on the average occupancy of 11.2 passengers per van.

SOURCES: (1) Kirby, Ronald F., et. al. Para-Transit: Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(2) Transportation Pooling. McLean, Virginia: Alan M. Voorhees and Associates, Inc., 1974.
(3) The 3M Company Commute-A-Van Program Status Report. St. Paul, Minnesota: The 3M Company, 1974.
(4) TVA Credit Union

TABLE VII-13

CHARACTERISTICS OF SELECTED VAN POOL PROGRAMS

	B&B MINIBUS COMPANY (1)	"LITTLE HOUSE" SENIOR CITIZENS CENTER (1)	MONARCH ASSOCIATES (1,2)	3M COMPANY (3)	TENNESSEE VALLEY AUTHORITY (4)
Location	Suffolk & Nassau Counties - Long Island, New York	Menlo Park, California	Northern New Jersey	St. Paul, Minnesota	Knoxville, Tennessee
Sponsor	Grumman Aircraft Corp.	"Little House" Senior Citizens Center	Monarch Associates - a private enterprise which: . Leases limousines to groups of northern New Jersey residents . Takes care of gasoline, maintenance, garaging, insurance, tolls, and other operating expenses	3M Company	TVA through TVA Credit Union, a private agency
Operator	B&B Minibus Co. - a minority-owned enterprise, under contract with Grumman Aircraft	"Little House" Senior Citizens Center	Groups of commuters	3M Company	TVA through TVA Credit Union
Date Initiated	Not reported	Not reported	Not reported, eventually discontinued	April 1973	April 1974
Date of Information	1973	1971	1971	May 1974, unless noted otherwise	March 1973, unless noted otherwise
Eligible Users	Work trips of Grumman Aircraft	Members of senior citizens center	Any group of commuters	3M employees	TVA employees
Eligible Trips	Work trips	Trips to and from senior citizens center	Work trips	Work trips	Work trips
Drivers	Employees of B&B Minibus Co.	10 members of senior citizens center	Van pool members	Van pool members: . Ride free . Granted personal use of vans at night and on weekends at 8¢ a mile . Receive the force of any passengers in excess of 9 in a van	Van pool members: . Ride free . Granted personal use of vans at night and on weekends at 10¢ a mile
Vehicles	70 to 25 12-pass. vans owned by B&B Minibus Co.	1 12-pass. van owned by "Little House"	8-pass. limousines owned by Monarch Associates	12-pass. vans owned by 3M Company: . April 73 - 8 . May 74 - 37 . March 75 - 77	Vans seating either 12 or 15 passengers, formerly leased from rental agency, now are owned by TVA Credit Union: . April 74 - 4 . June 75 - 12 . March 76 - 16 Vans are leased to nonprofit agencies during the day on weekdays
Number of Riders Per Day	300	25	No information	July 73 - 35 May 74 - 450 March 76 - Over 800	November 74 - 68 March 76 - 202
Costs	. $3.05 per ride . 3.3¢ per mile per pass.	Approximately 40¢ per ride	No information	September 73: . Fixed costs per van - $1,597 annually or approx. $6.10 per working day (including capital, insurance, and license costs) . Operating costs per van - 5.5¢ per mile . Total cost per pass. for one-way trips of different lengths * . 5 mi. - 7¢ . 10 mi. - 37¢ . 20 mi. - 37¢ . 30 mi. - 41¢ . 40 mi. - 45¢ . 50 mi. - 51¢ . Total cost per mile per pass. for one-way trips of different lengths: . 5 mi. - 5.9¢ . 10 mi - 3.2¢ . 20 mi. - 1.8¢ . 30 mi. - 1.4¢ . 40 mi. - 1.7¢ . 50 mi. - 1.0¢	. Fixed cost per van - $304 per month or approx. $13.87 per working day (capital, insurance, and license costs) . Operating costs per van - 4¢ a mile* . Total cost per pass. for one-way trips of different lengths * . 7.5 mi. - 43¢ . 10 mi. - 58¢ . 20 mi. - 78¢ . 30 mi. - 81¢ 40 mi. - 90¢ . 50 mi. - 97¢ . Total cost per mile per pass. for one-way trips of different lengths * . 5 mi. - 8.2¢ . 10 mi - 6.1¢ . 20 mi. - 3.8¢ . 30 mi. - 2.8¢ . 40 mi. - 2.3¢ . 50 mi. - 1.9¢
Fare	None - cost covered by U.S. Dept. of Labor Manpower Administration training grant	None - cost covered by philanthropic organization	Weekly fees $5.50 - $10.50 per pass.	. Paid monthly . Varies by length of trip . Set so that a van pool is self-supporting with 8 paying pass., fares paid by additional riders are retained by driver . Average fare: $23.77 per month or approx.: . 54¢ per pass. per rdtp or . 7.2¢ per mile per pass. for an average round trip of 49 miles	Fare for one-way trips of different lengths: . 7.5 miles . $7.4 per month . 55¢ per ride . 7.3¢ per mile . 20 miles . $17 per month . 81¢ per ride . 3.1¢ per mile . 40 miles . $23 per month . 70¢ per ride . 1.8¢ per mile

* Based on the average occupancy of 11.36 passengers per van.
& Used by TVA Credit Union to calculate fares.
# Based on the average occupancy of 13.2 passengers per van.

SOURCES: (1) Ecksy, Ronald F., et. al. Fare Strategy, Marketing Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(2) "Transportation Pooling. McLean, Virginia: Allen M. Voorhees and Associates, Inc., 1974.
(3) The 3M Company's Commuter Van Program Status Report. St. Paul, Minnesota: The 3M Company, 1974.
(4) TVA Credit Union

STAIAR (2)	Rochester, New York	1965	1974	Stepa Toward Automated Transportation Around Rochester - nonprofit, unincorporated organization of commuters	Reston Community Association . 1971: Reston Commuter Bus, Inc. - nonprofit corporation consisting of volunteer Board of Directors & 11 volunteer officers	Co. of Va. - a private carrier . Washington Metropolitan Area Transit Authority	Rochester - Genesee Regional Transportation Authority	Persons commuting from vicinity of Pennfield to downtown Rochester	Work	1 route; trip lengths of 20 - 25 miles	1 bus seating 45 - 53 pegrs.	No information	No information	. Approx. $1.82/mile/bus . Approx. 3.6¢/mile/seat	. Approx. 5¢/mile/pegr. . Cash: . $1.50/ride . Approx. 6.25¢/mile/pegr. . Elderly: . 25¢/ride . Approx. 1¢/mile/pegr. . Annual fee: $215 or approx. . 88¢/work-day . 44¢/ride . 1.8 - 2.2¢/mile . Semi-annual fee: $125 or approx.: . $1.02/work-day . 51¢/ride . 2.0 - 2.6¢/mile . Cash fare: . $1.00/ride . 4 - 5¢/mile . Book of 10 tickets: $8 . 80¢/ride . 3.2 - 4.0¢/mile	No

TABLE VII-14

CHARACTERISTICS OF SELECTED BUS POOLS, COMMUTER BUS CLUBS, AND SUBSCRIPTION BUS SERVICES

NAME OF SERVICE	LOCATION	DATE INITIATED	DATE OF INFORMATION	MANAGEMENT	OPERATOR	ELIGIBLE USERS	ELIGIBLE TRIPS	NUMBER AND LENGTH OF ROUTES	NUMBER AND SIZE OF BUSES	RIDERS/DAY	COST	FARE	SUBSIDIZED
Columbia-Baltimore Bus Pool Service (3)	Columbia, Maryland	Dec. 72	As noted	. Columbia Parks and Recreation Association . Committee of riders	Private Charles bus company	Residents of Columbia commuting to Baltimore	Work	1 route 40 miles	2 initially, later reduced to 1 bus	Max 75; 65	June 73: . 80 $/bus/day, . $5.05/mile/bus . 4.3 - 3.2¢/mile/seat	June 73: . $1.00/ride . 3¢/mile/pass.	Yes
Columbia-Washington Bus Pool Service (3,3)	Columbia, Maryland	Nov. 70	As noted	. Columbia Parks and Recreation Association . Committee of riders	Private Charles bus company	Residents of Columbia commuting to Wash., D.C.	Work	1 route 50 miles	8 seating 38 to 48 pages (Mon. 33)	May 73: 385	Feb. 73: . 180 $/bus/day, . $4.80/mile/bus . 3.3 - 4.4¢/mile/seat	$15.00 for 10-trip tickets . $1.50/ride . 3¢/mile/page.	No
Pilot, Maxibus (1,3)	Niles, Michigan	Sept. 68; discontinued Jan. 31	June 31, unless noted otherwise	. SMTA demonstration monitored by American Academy of Transportation . Pilot Transportation Authority	City Coach Lines	Employees at 8 General Motors factories	Work	38 between 1 and 8 mi., avg length of 3 mi.	38 45-pass.	Oct. 68: 330	. $3.80 - $4.30/mile/bus . 8 - 10¢/mile/seat	. Varied with distance & no. of subscribers supporting on a route . Example: $15/mo. for round trip of 6 miles; approx 30¢/ride . 9 ¢/mile/pass . Avg. fare 9 - 10¢/mile/pass.	Yes - intended to be self-supporting
National Geographic Society Bus Pools (4)	Gaithersburg, Maryland	1969	Dec. 71	National Geographic Society	Private chartered bus company	Employees at National Geographic Society	Work	10 between 20 and 24 mi.	10 50-pass.	340 - 380	. $1.30/pass./day . 4¢/mile . 2.8 - 3.2¢/mile/pass.	. 30¢/ride . 1.3 - 1.5¢/mile/pass	Yes
COM-BUS (1,5)	Long Beach, California	1968	1855	Southern California Commuter Bus Service, Inc., a private concern engaged in organizing, coordinating, and providing commuter bus service	Several private charter bus companies	Any large group of commuters working in vicinity of L.A. airport	Work	5, trip lengths range from 30 to 65 miles	47 buses	No information	No information	. $8.35 - $11.30/week . $0.075 - $1.10/ride . $1.8 - 4.4¢/mile/pass.	No
Peoria Premium Special (1,3)	Peoria, Illinois	Dec. 64; discontinued in 1970	Feb. 68	. Dec. 64 - Feb. 68: UMTA demonstration planned & monitored by Univ. of Illinois . Since Feb. 68: City Transit Co., a private carrier	City Transit Co.	Employees of Caterpillar Tractor Co.	Work	31 between 5.3 to 13.3 miles: avg length = 8 miles	21 seating 39 to 45 pages.	Max: 300 (Jan. 69); 400 max. since Feb. 69	. 1.8¢/mile/seat . 6.0 - 8.3¢/mile/pass.	. $8.35 - $15.23/mo. or approx. 31 - 53¢/ride Avg. fare: 39.50/mo. . approx. 55¢/ride approx. 3¢/mile/page for avg. trip length of 8 miles Avg revenue 0.9 - 1.1¢/mile/seat	Yes - intended to be self-supporting
Pittsburg Commuter Club (3)	Pittsburg, Pa	Jan. 74	1874	Club members in cooperation with Port Authority of Allegheny County	Port Authority of Allegheny County	Anyone commuting from Russellville area to downtown Pittsburgh	Work	30-mile route	1 bus	Over 40	No information	$40/mo. or approx.: . 91¢/ride . 3¢/mile/page	No
Reston Express (1,2)	Reston, Virginia	Mar. 68	June 73	. 1968 - 71: Committee of the Reston Community Association . 1971 Reston Commuter Bus, Inc. - nonprofit corporation consisting of volunteer Board of Directors & 11 volunteer officers	. Initially, Vivian Transit Co. of Va. . private carrier . Washington Metropolitan Area Transit Authority	Residents of Reston commuting to downtown Washington, D.C., Rosslyn in Arlington Co., or the Pentagon	Work	33-mile route	33 50-pass.	850	Charter, 340/bus/day: . Approx. $1.85/mile/bus . Approx. 5.8¢/mile/seat	. Tickets: . $1.30/ride with 10-ride ticket . Approx. 4¢/mile/page. . Cash: . $1.50/ride . Approx. 5.3¢/mile/page . Elderly: . 55¢/ride . Approx 1¢/mile/page.	No
STOTAB (5)	Rochester, New York	1885	1914	Steps Toward Automated Transportation Around Rochester - nonprofit, volunteer organization of commuters	Rochester - Genesee Regional Transportation Authority	Persons commuting from vicinity of Pittsford to downtown Rochester	Work	1 route, trip length of 30 - 35 miles	1 bus seating 45 - 53 pages.	No information	No information	. Annual fee: $315 or approx. 6¢/weekday . 44¢/ride . 1.8 - 2.5¢/mile . Semi-annual fee, $155 or approx. $1.03/week day . 51¢/ride . 3.0 - 3.8¢/mile . Cash fare: . $1.00/ride . 4 - 5¢/mile . Book of 10 tickets: $8 . 80¢/ride . 3.3 - 4.8¢/mile	No

SOURCES: (1) Kirby, Ronald F., et. al. Para-Transit: Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(2) Transportation Pooling. McLean, Virginia: Alan M. Voorhees and Associates, Inc., 1974.
(3) Truby, T. James. Door-to-Door Buspools: Recommendations for Public Policy. Washington, D.C.: Consortium of Universities, 1973.

TABLE VII-14 (Cont.)

NAME OF SERVICE	LOCATION	DATE INITIATED	DATE OF INFORMATION	MANAGEMENT	OPERATOR	ELIGIBLE USERS	ELIGIBLE TRIPS	NUMBER AND LENGTH OF ROUTES	NUMBER AND SIZE OF BUSES	RIDERS/DAY	COST	FARE	SUBSIDIZED
GGRNTD Commuter Clubs (1,2)	San Francisco (Marin & Sonoma Counties), Ca	Feb. 71	Dec. 73	. Golden Gate Bridge, Highway, & Transportation District - provides buses & drivers long private sightseeing & charter bus companies . Each club determines its own route & schedule, solicits its members, & owns buses & makes monthly payments to GGRNTD	Several private sightseeing & charter bus companies	Any group of 30 or more people commuting to San Francisco	Work	11 routes (some commuting to San Francisco 14 Marin & Sonoma Counties to San Francisco, 70 -75 miles	5 segments (clubs, 470 subscribers)	2.0 - 4.0¢/mile/seat	. $30 - 50/mo. . Approx. 30 ¢ - $1.52/ride . approx 2.8 - 4 ¢/mile/pass.	Yes--GGRNTD will subsidize bus part, if necessary (no more than $5300/mo)
Wayward Bus (1)	San Francisco, Ca.	No information	Unspecified	2 commuter clubs	2 private charter bus companies	Employees of Standard Register	Work	2 routes, (1) San Pedro to Palo Alto-Menlo Park area, 35 mi. (2) Berkeley to Palo Alto-Sunnyvale area, 50 mi.	2 buses seating 40 to 50 pass.	Not Information	. San Pedro to Palo Alto-Menlo Park route: $1500/month charter, equivalent to 1.9 - 2.4¢/mile/seat Berkeley to Palo Alto-Sunnyvale route: 55¢/day, equivalent to 1.1 - 1.4¢/mile/seat	. San Pedro to Palo Alto - Menlo Park: 550 - 55/mo depending on no. of rides. . 80 - 80¢/ride . 1.9 - 2.3¢/mile/pass. . Berkeley to Palo Alto - Sunnyvale. (1) $11/wk, $1.10/ride 2.2¢/mile/pass. (2) Cash: $1.55/ride . 3.3¢/mile/pass.	No
Specialty Transit III	St. Louis, Mo.	1b58	Dec 72	Specialty Transit Co. - private co.	Specialty Transit Co. - bikes employees of McDonnell-Douglas Corp on part-time basis as drive buses	Employees of McDonnell-Douglas Corp.	Work	21 routes from 17 to 32 miles long	. 21 41-pass. used school buses . 1 50-pass. transit coach	. Summer 450 . Winter: 800	Estimated 1¢/mile/seat	. Shortest route (17 mi.): . $3.00/wk . 30¢/ride . 1.8¢/mile/pass. . Longest route 152 mi.): . $6.50/wk . 65¢/ride . 1.3¢/mile/pass. . avg. less 1.2 - 1.7¢/mile/pass.	No

* Numbers in parentheses denote sources.

SOURCES: (1) Kirby, Ronald F., et. al. Para-Transit, Neglected Options for Urban Mobility. Washington, D.C.: The Urban Institute, 1974.
(2) Transportation Pooling. McLean, Virginia: Alan M. Voorhees and Associates, Inc., 1b74.
(3) Tachy, T. James. Ride-by-Post Proposals, Recommendations for Public Policy. Washington, D.C.: Consortium of Universities, 1973.

In most cases the fares were set to cover all costs. These fares varied between 20 cents and $2.00 a ride, depending on the distance traveled. Most of the bus pools, particularly those managed by a committee of users, an employer, or a third-party organization, have been financially successful.

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