

A TRANSIT SYSTEM OPERATIONS ANALYSIS FOR THE CITY OF WAUKESHA TRANSIT SYSTEM

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COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 83

A TRANSIT SYSTEM OPERATIONS ANALYSIS
FOR THE CITY OF WAUKESHA TRANSIT SYSTEM

City of Waukesha, Wisconsin

Prepared by the

Southeastern Wisconsin Regional Planning Commission
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May 30, 1983

Mr. Rodney W. VandenNoven, Chairman
Waukesha Transit System Utility Board
Waukesha City Hall
201 Delafield Street
Waukesha, Wisconsin 53186

Dear Mr. VandenNoven :

In January 1982 the City of Waukesha requested the assistance of the Southeastern Wisconsin Regional Planning Commission in the conduct of a study of the operations of the City's new transit system. The study was to be conducted under the guidance of an advisory committee composed of elected and appointed public officials, businessmen, and concerned citizens, and was to identify and recommend measures which might improve the overall efficiency and effectiveness of the City transit system.

The Regional Planning Commission staff, working with the Committee, has now completed the requested study, the findings and recommendations of which are presented in the report hereby transmitted. More specifically, the report presents a set of transit service objectives and related performance measures formulated under the study; the findings of the travel surveys conducted as a part of the study, including a household travel and public opinion survey and an on-board bus survey of current transit system riders; the results of an assessment of both systemwide and route-by-route transit system performance considering operating characteristics, ridership, and financial return; and recommended operational changes that would improve the performance of the system, together with estimates of the associated costs.

The study indicated that, while the current route configuration and schedules meet the majority of the transit service objectives, certain operational changes could be made to further improve the level and extent of service provided and to increase ridership and improve financial performance. Changes recommended for immediate implementation include realignment of five bus routes; the elimination of one bus route; the addition of two special school-oriented bus routes; and certain systemwide schedule changes. Additional improvements, including the reduction of mid-day headways, the provision of evening and Saturday service, and the expansion of service to accommodate in-city secondary school students presently provided with yellow school bus service were also considered, as was a proposal to increase fares. The Advisory Committee, however, made no recommendations regarding these latter proposals.

The Regional Planning Commission is appreciative of the assistance and support given to the study by the Waukesha Transit System Utility Board, the Waukesha Department of Public Works, and the City Transit Coordinator, as well as by the Advisory Committee. The Commission staff stands ready to assist the City in presenting the findings and recommendations of the study to the public for review and evaluation, and in implementing the recommended service improvements.

Sincerely,



Kurt W. Bauer
Executive Director

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Chapter I

INTRODUCTION

BACKGROUND

In July 1979, at the request of the Common Council of the City of Waukesha, former Mayor Joseph C. LaPorte reactivated the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee and charged that Committee with the task of determining if increased motor fuel costs and the likelihood for future fuel shortages had had any impact on the need and support for the provision of public transportation in the Waukesha area. The Advisory Committee had originally been created in January 1975, and worked with the Southeastern Wisconsin Regional Planning Commission during 1975 and 1976 in the preparation of a report setting forth a transit development program for the Waukesha area, which report recommended the development of a demand-responsive transit service for the City of Waukesha and environs.¹ The recommendations set forth in that report were rejected by a two-to-one margin by the Waukesha electorate in a city-wide referendum in April 1977, the vote being 2,236 in favor to 4,053 opposed.

Upon its reactivation by the Mayor in 1979, the Advisory Committee again requested the assistance of the Regional Planning Commission in the review and revision of the transit development program initially prepared by the Advisory Committee. Working with the Commission staff, the Committee completed work in February 1980 on a new report setting forth a revised transit development program for the City of Waukesha. The report, SEWRPC Community Assistance Planning Report No. 31, Waukesha Area Transit Development Program: 1981-1985, documented the Committee's revised recommendations for the reestablishment of public transit service in the City of Waukesha.

The revised plan recommended by the Committee was selected from among six alternative transit service options, including a "do nothing" alternative; three fixed route, cycle scheduled alternatives differing from one another only with respect to the number of routes to be provided; a fixed route, noncycle scheduled alternative featuring loop routing; and a demand-responsive "dial-a-ride" alternative. This last alternative was similar in nature to the recommended transit development plan set forth in 1976 in the initial report noted above and rejected by the city residents. The transit system recommended by the Committee under the new plan consisted of nine radial fixed routes originating at the outer limits of the City of Waukesha and terminating at a common bus transfer point located in the Waukesha central business district. Put to a citywide referendum on April 1, 1980, the Committee's recommendations were approved by 69 percent of the City of Waukesha electorate--a 9,208 to 4,095 vote--and adopted on May 6, 1980, by the Waukesha Common Council.

Following the formation of a Transit System Utility Board in October 1980 to guide in the institution and operation of the proposed transit system, the City of Waukesha retained a transit coordinator in January 1981 to oversee

¹See SEWRPC Community Assistance Planning Report No. 12, Waukesha Area Transit Development Program: 1977-1981, January 1977.

and coordinate all activities necessary for the operation of the recommended transit service. During the ensuing months, these activities included the preparation and submission of applications for federal grants-in-aid of capital and operating costs; the selection of the management firm of ATE Management and Service Company, Inc., to assume responsibility for the day-to-day operation of the transit system; and the search for and lease of operating equipment for the transit system. On August 31, 1981, using 11 45-passenger surplus buses leased from another public transit system, the City began public operation of a new fixed route bus service.

During the first eight months of system operation, utilization of the transit service exceeded the ridership forecasts made under the transit development program. Average weekday ridership during the eight-month period from September 1981 through April 1982 was about 770 revenue passengers per day. This was somewhat higher than the 650 revenue passengers per average weekday during the first year of transit system operation forecast.

During the same period of time, several operating and policy questions arose concerning the transit system. For the most part, these questions dealt with the fares, service hours, and scheduling techniques of the transit system, as well as whether transit service could be improved to major traffic generators or expanded into unserved areas of the City, and if the transit service being provided actually satisfied the origin-destination travel patterns of the residents of the City and environs. Related to at least one of the questions was the need to identify an appropriate location for a central transfer area for the transit system. This issue was raised by local officials after complaints were voiced by some downtown businesses over the use of a location on W. Main Street and W. Broadway for this purpose. Concern was also expressed by local public officials over the economic performance of the transit system which, as forecast in the adopted transit development program, was experiencing a relatively low farebox recovery rate and, consequently, required a high public subsidy. The City of Waukesha subsequently requested assistance from the Wisconsin Department of Transportation and the Southeastern Wisconsin Regional Planning Commission for the conduct of a technical study which would address the overall efficiency and effectiveness of the new transit system.

Accordingly, this planning report sets forth the findings and recommendations of an analysis of the operation of the new transit system serving the City of Waukesha. An analysis of locations and designs for a central transfer terminal for the transit system is the subject of a companion technical study, the findings and recommendations of which are set forth in a separate community assistance planning report.²

STUDY PURPOSE

This transit operations analysis study has four interrelated purposes:

1. To establish design and performance measures through which existing deficiencies in transit system operations can be identified and alternative solutions evaluated;

²See SEWRPC Community Assistance Planning Report No. 82, A Central Transfer Site Location and Design Analysis for the City of Waukesha Metro Transit.

2. To analyze the overall performance of the transit system and identify areas of efficient and inefficient operation;
3. To determine the causes of operational problems resulting in inefficient operation;
4. To develop a plan of recommended operational improvements which could be made to the existing transit system to improve overall system efficiency and effectiveness.

STUDY AREA

The study area considered in the report includes all of the City of Waukesha, all of the Town of Waukesha, and the southern one-half of the Town of Pewaukee. This area represents one of 60 planning analysis areas identified by the Commission within the Southeastern Wisconsin Region. The location of the study area within the Region is shown on Map 1. Where deemed appropriate, the inventories and analyses conducted under this study included certain major traffic generators and transportation terminal facilities located just outside the study area boundaries, including the Waukesha County Technical Institute located in the Village of Pewaukee and the Goerkes Corners Public Transit Station located in the Town of Brookfield.

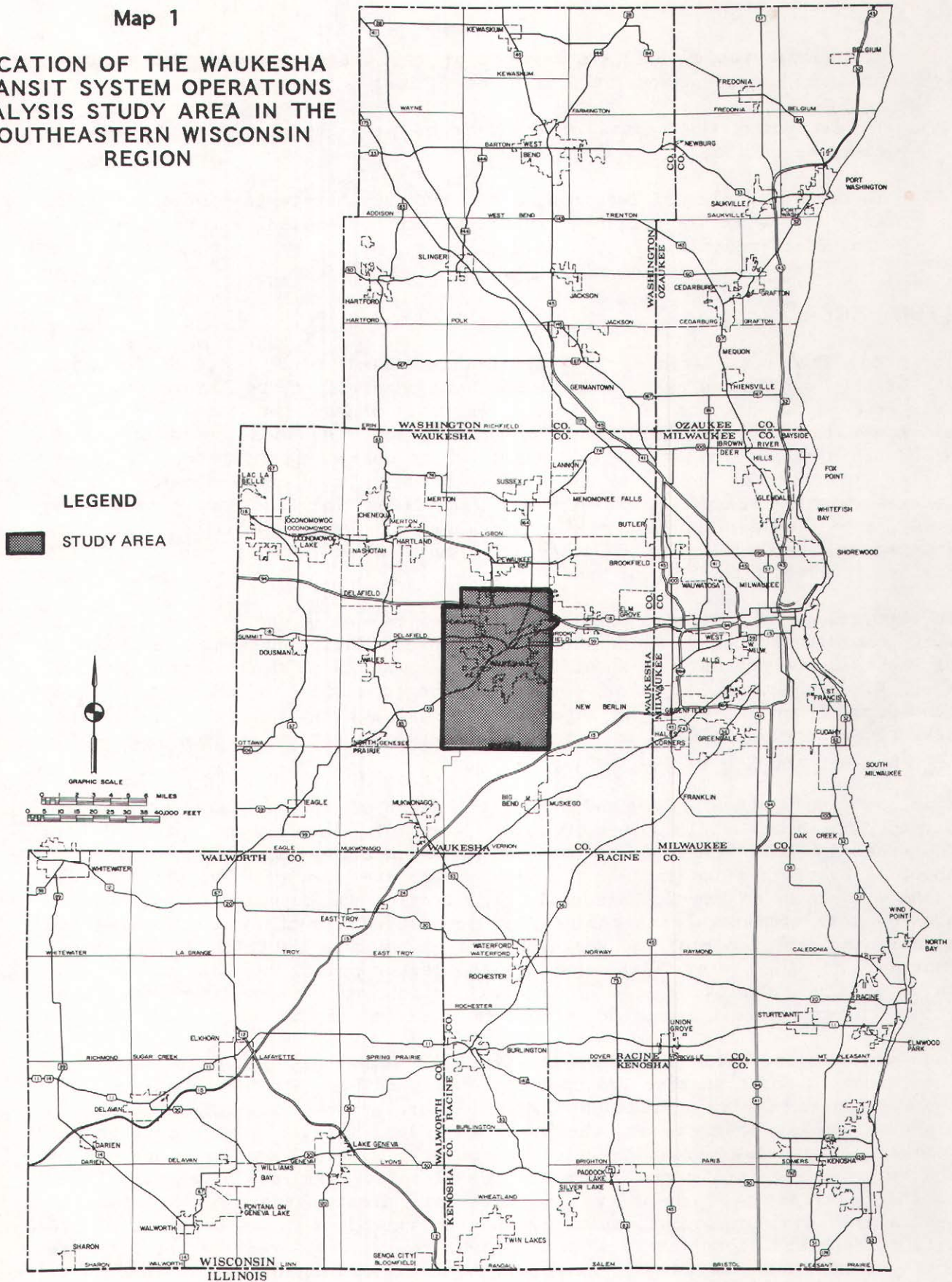
In 1980 the total resident population of the study area was about 60,000 persons according to the U. S. Bureau of the Census. This represents an increase of about 13,500 persons, or about 29 percent, over the 1970 population level of about 47,100 persons. Rates of population change within the study area have tended to fluctuate with the level of economic activity. Table 1 sets forth historical population data for the civil divisions within the study area for the decades between 1950 and 1980.

Since 1960 population growth and urbanization within the study area have intensified. The area within the corporate limits of the City of Waukesha was increased by more than 140 percent, from about 6.1 square miles in 1960 to about 14.8 square miles in 1982. The 1982 corporate limits of the City of Waukesha are shown on Map 2. This rapid urbanization has been marked by a diffusion of both commercial and residential development in the planning area and a declining importance of the Waukesha central business district as an employment and shopping center. With regard to the latter point, the City of Waukesha is currently undertaking a major revitalization of its downtown area in an effort to reverse this trend and attract new business to the area.

Four private railroad companies--the Chicago, Milwaukee, St. Paul & Pacific, the Chicago & North Western Transportation Company, the Soo Line Railroad, and the Wisconsin Central Railroad Company--operate over rights-of-way which traverse the study area, and the passage of long freight trains through the community may cause street traffic "backups" at arterial street crossings of the railroad rights-of-way. Because of the historic influence of the Fox River on the development of the City, the arterial street pattern is complex and partially radial in layout, focusing on the central business district of the City of Waukesha. Local streets in the newer residential areas of the City are mostly curvilinear in layout, with only a small section of the south side of

Map 1

LOCATION OF THE WAUKESHA
TRANSIT SYSTEM OPERATIONS
ANALYSIS STUDY AREA IN THE
SOUTHEASTERN WISCONSIN
REGION



Source: SEWRPC.

CITY OF WAUKESHA CORPORATE LIMITS: 1982



Table 1

DISTRIBUTION OF POPULATION IN THE WAUKESHA TRANSIT SYSTEM OPERATIONS ANALYSIS STUDY AREA: 1950-1980

Civil Division	Population Change				Percent Change		
	1950	1960	1970	1980	1950- 1960	1960- 1970	1970- 1980
City of Waukesha...	21,233	30,004	39,695	50,319	41.3	32.3	26.8
Town of Waukesha...	2,108	3,540	4,408	6,714	67.9	24.5	52.3
Town of Pewaukee ^a ..	2,193	2,315	3,018	3,566	5.6	30.4	18.2
Total	25,534	35,859	47,121	60,599	40.4	31.4	28.6

^a Includes only that portion of the Town of Pewaukee within the study area.

Source: U. S. Bureau of the Census and SEWRPC.

the City exhibiting a grid pattern. This complex street pattern creates problems in the provision of transit service to residential portions of the study area by making direct transit routing difficult.

STUDY ORGANIZATION

The conduct of the transit system operations analysis was a joint effort by the staffs of the City of Waukesha and the Southeastern Wisconsin Regional Planning Commission. Additional staff assistance was obtained, as necessary, from certain other agencies concerned with transit development in the Waukesha area, including the Wisconsin Department of Transportation.

To provide guidance to the technical staff in the conduct of the transit system operations analysis, and to actively involve concerned and affected public officials and agency leaders in the development of transit service improvement proposals, Mayor Paul J. Keenan of the City of Waukesha reactivated, in July 1982, the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee. The purpose of the Committee, which had not met since completing its work on the revised transit development program in 1980, was to assist in the conduct of the study by critically reviewing staff efforts. A complete list of the Committee membership is set forth in Appendix A of this report.

FORMAT OF REPORT PRESENTATION

This planning report consists of seven chapters. Chapter I, "Introduction," briefly discusses the actions that led to the study of transit system operations for the City of Waukesha, the intended purpose of the study, the geographic area covered by the study, and the organization of the study. Chapter II, "Transit System Overview," presents a description of the public transit system as it is currently operated in the City of Waukesha, including descriptions

of system administrative structure, bus routes and schedules, facilities and equipment, fares, ridership, and the financial situation. Chapter III, "Waukesha Transit User and General Household Surveys," provides summaries of two major surveys conducted by the Regional Planning Commission in May 1982 for the purposes of this study. A summary of the relevant findings of an on-board bus survey of transit users describes the socioeconomic and trip characteristics of the current transit riders. Similar information is also included for the general population, based upon the results of a special survey of households conducted within the Waukesha area. Chapter IV, "Transit System Design and Performance Criteria," sets forth a set of criteria to be used to identify existing problems in transit system operation and to evaluate alternative and recommended actions to alleviate such problems. Chapter V, "Transit System Evaluation," presents an evaluation of the existing transit system operation. This chapter also includes a comparison of certain characteristics of the Waukesha transit system with those of other transit systems similar in size to the Waukesha transit system. Chapter VI, "Recommended Transit System Improvement Strategies," presents a description and an evaluation of a series of transit system operational strategies which could be taken to improve the overall performance of the transit system. Finally, Chapter VII, "Summary and Conclusions," provides a summary of the significant findings and recommendations of the transit system operations analysis.

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Chapter II

TRANSIT SYSTEM OVERVIEW

INTRODUCTION

An understanding of existing transit system operations within the study area is basic to the preparation of any sound transit system development plan and program. This understanding should be based upon a thorough inventory of current transit system operating characteristics and appropriate survey data describing the travel habits and patterns of the existing system riders. This chapter documents the transit system operating characteristics of Waukesha Metro Transit. The results of a survey to determine the travel habits and patterns of both the transit users and the general public within the study area are the subject of the following chapter.

WAUKESHA METRO TRANSIT

The major supplier of public travel service in the study area is the City of Waukesha which, as noted in the previous chapter, has operated local bus service within the City and environs since August 31, 1981. The following sections describe the existing operations of the transit system in terms of administration and management, routes and schedules, fare structure, facilities and equipment, ridership levels, and financial status.

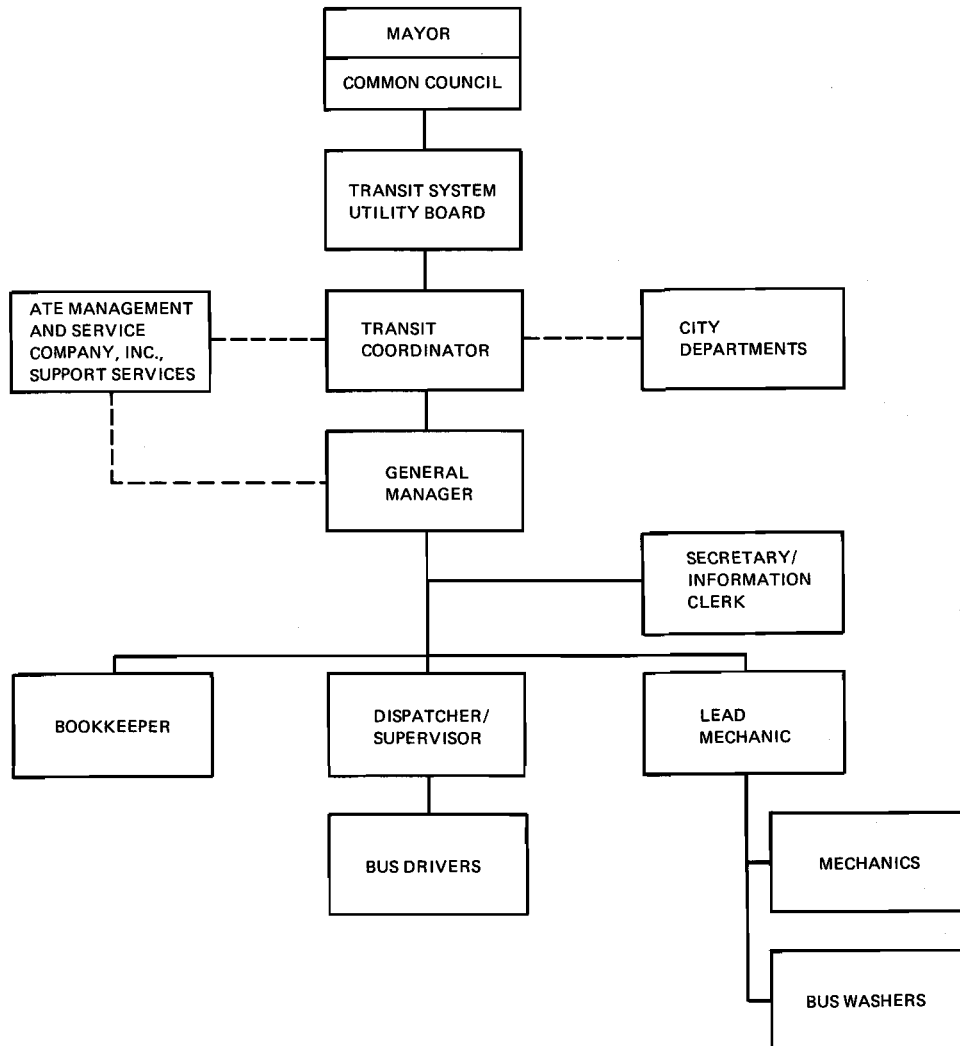
System Administration

The management and policy-making structure for Waukesha Metro Transit is summarized in the organization chart shown in Figure 1. The policy-making body for the local transit system operation is the Waukesha Transit System Utility Board, which also serves as the Waukesha Board of Public Works. The Board is composed of five members--one citizen, one alderman, the Director of Public Works, the City Attorney, and the City Comptroller. The powers of the Transit System Utility Board include the acquisition, management, and operation of the transit system. However, the City of Waukesha Common Council has the ultimate responsibility for the review and approval of certain important matters, including the management contract agreement and the budget and annual public transportation system development program.

Responsible to the Waukesha Transit System Utility Board for the management and administration of the transit system are the transit coordinator in the City Department of Public Works and the general manager, an employee of the private management firm of ATE Management and Service Company, Inc. The transit coordinator is specifically responsible for the supervision of the activities and performance of the management firm, as well as the administrative affairs associated with transit planning and programming, federal and state grants administration, and marketing and policy implementation. The general manager is responsible for, and devotes full time to, management of the day-to-day operations of the transit system.

Figure 1

WAUKESHA METRO TRANSIT ORGANIZATION CHART



Source: Waukesha Metro Transit and SEWRPC.

Routes and Schedules

Regularly scheduled local bus service is currently provided by Waukesha Metro Transit over 10 fixed bus routes within the study area, as shown on Map 3. Of these 10 fixed routes, nine routes are primarily radial in design. Seven of the nine radial routes--Routes 2, 3, 4, 5, 6, 7, and 8--provide service primarily within the City of Waukesha, with only minor portions of Routes 2, 5, 6, and 8 operated outside the City's corporate limits. The remaining two radial routes--Routes 1 and 9--service important traffic generators located outside the Waukesha corporate limits. Route 1 extends approximately 0.6 mile outside the City's corporate limits to serve the Goerke's Corners public transit station in the Town of Brookfield, and Route 9 extends approximately 0.8 mile outside the City's corporate limits to serve the Waukesha County Technical Institute in the Village of Pewaukee. The tenth fixed route--Route 10--is operated as a one-way loop route entirely within the City corporate limits.

Bus service is provided by the transit system for approximately 12.5 hours per day between 5:45 a.m. and 6:15 p.m., Mondays through Fridays. There is no bus service provided on Saturdays, Sundays, or holidays. Eight of the 10 transit routes operate throughout the service day. Transit service over Route 5 and Route 10 is provided only during a part of the service day with service over Route 5 provided only during the morning and afternoon peak periods, and service over Route 10 provided only during the midday period between 9:30 a.m. and 3:00 p.m. The service characteristics of each route of the transit system are summarized in Table 2.

All bus routes terminate at a common transfer location in the Waukesha central business district. Cycle, or "pulse," scheduling is utilized by the transit system so that all buses meet at the common transfer area at approximately the same time. This allows bus passengers the opportunity to conveniently transfer between bus routes and complete a trip with a minimum of delay. In addition,

Table 2

OPERATING AND SERVICE CHARACTERISTICS BY ROUTE FOR WAUKESHA METRO TRANSIT: SEPTEMBER 1982

Route Number	Route Name	Round Trip Route Length (miles)	Service Availability			Service Frequency (minutes)			Buses ^a Required	
			Start Time First Trip (a.m.)	Start Time Last Trip (p.m.)	Total Scheduled Bus Hours	A.M. Peak	Off-Peak	P.M. Peak	Peak	Off-Peak
1	Westbrook/Target...	13.3	5:50	6:15	18.5	30	60	30	2.0	1.0
2	Arcadian/Racine....	8.5	5:50	5:50	8.3	30	60	60	0.5	0.5
3	Hartwell.....	6.5	5:53	5:50	9.4	30	60	30	1.0	0.5
4	Grand.....	6.1	5:55	5:50	8.7	30	60	30	1.0	0.5
5	Prairie.....	6.2	7:45	8:10 ^b	0.6	30	--	--	0.5	--
6	Fox Run.....	16.1	6:12	5:50	11.8	60	60	60	0.5	1.0
7	Madison.....	8.1	5:48	5:50	9.3	30	60	30	1.0	0.5
8	Summit.....	7.2	5:47	5:50	7.8	30	60	60	0.5	0.5
9	Northview.....	13.4	5:55	5:50	14.1	60	60	30	2.0	1.0
10	Courthouse Loop....	4.3	9:24	2:58	3.4	--	60	--	--	0.5
System Total		89.7	5:47	6:15	91.9	30/60	60	30/60	9.0	6.0

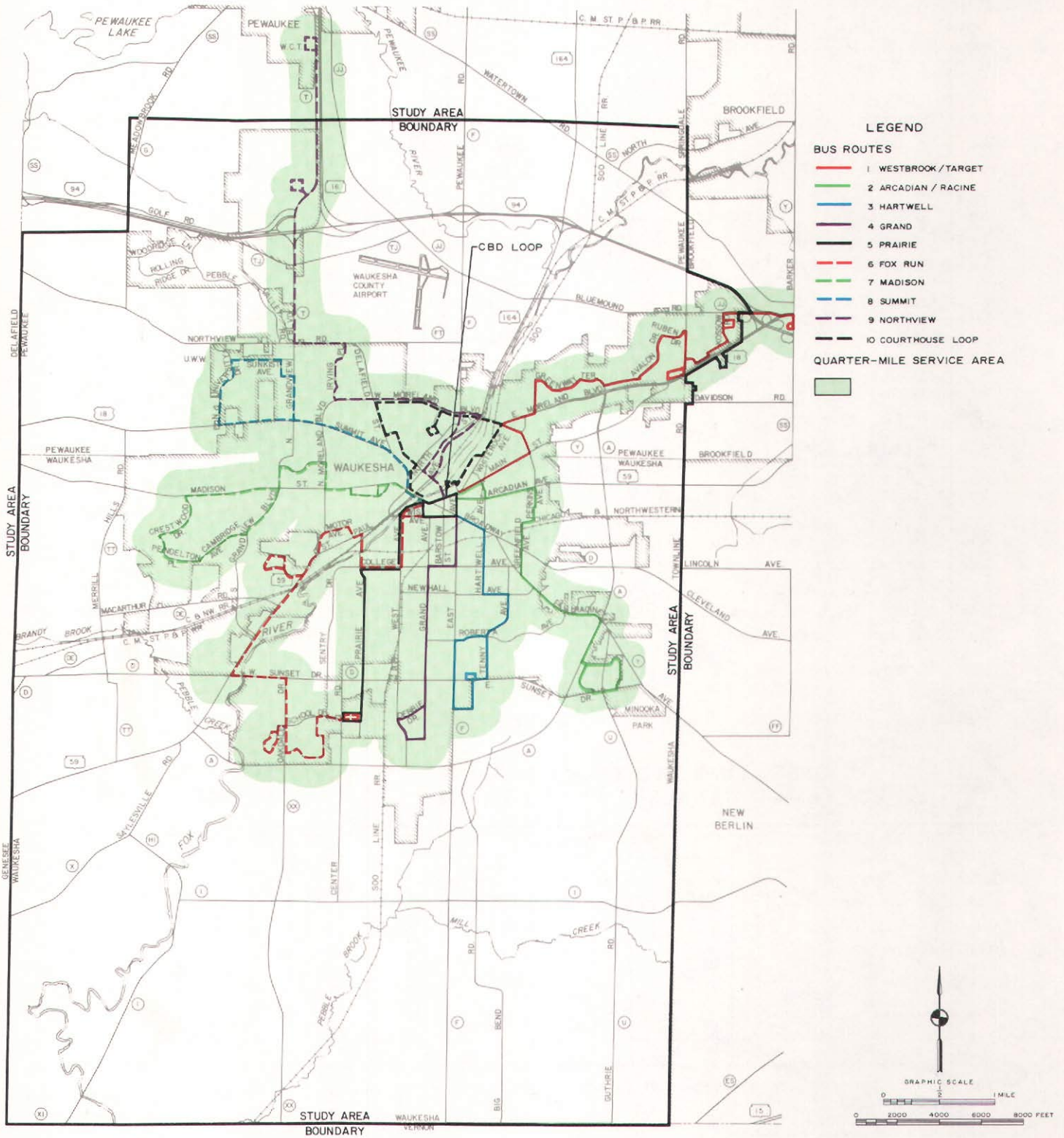
^a Fractions indicate a single vehicle is operated over two routes during a time period.

^b a.m.

Source: Waukesha Metro Transit and SEWRPC.

Map 3

BUS ROUTES OPERATED BY WAUKESHA METRO TRANSIT: SEPTEMBER 1982



six of the 10 routes are paired and operated as through routes--Routes 2 and 8, Routes 3 and 4, and Routes 7 and 10. Buses operating over these route pairs, after meeting at the common transfer area, continue on to another part of the City over a second route. Routes 5 and 6 are also operated as paired routes and share a common outlying route terminus. This enables the route pair to be operated as a loop route at certain times during the peak periods of the day. The idea of pairing routes is designed to eliminate turnaround time and mileage, and reduce the number of transferring passengers. Currently, all buses meet at the "Five Points" intersection in downtown Waukesha on W. Main Street and W. Broadway between Gaspar Street and Clinton Street.

Fares

The current one-way adult fare on the 10 routes of Waukesha Metro Transit is \$0.50 per passenger. Children under four years of age ride free if accompanied by an adult. Children aged 5-11 years are charged \$0.25 per passenger trip, and students age 11 through 18 years ride for \$0.35 per passenger trip. Persons who use the bus system must pay with the exact cash fare, as bus drivers are not allowed to make change. Tickets can be used in lieu of cash fare for individual rides and may be purchased at a cost of \$5.00 for 10 tickets. Monthly passes may be purchased at a cost of \$20.00. The passes are good for unlimited riding during all hours of system operation. Free transfers are issued upon request at the time the fare is paid and may be used to transfer to a different bus route at any downtown bus stop for two hours from the time the transfer was issued.

A special fare program is in effect between 9:00 a.m. and 3:00 p.m. for senior citizens and disabled persons. During this period, individuals belonging to these groups may ride for \$0.25 with a Medicaid card or Metro reduced-fare identification card. To qualify for the special identification card, a person must be at least 65 years of age or be certified as disabled by a physician or agency. Identification cards are issued to qualified individuals by the transit coordinator's office of the Waukesha Department of Public Works.

A special fare program for unemployed persons has also been approved by the transit system and will be in effect on a trial basis between September 7, 1982 and December 31, 1982. Under this program, persons who show a special unemployed discount identification card will be given a \$0.15 per ride discount on the regular adult cash fare or the ticket fare for the transit system. The special identification cards will be issued by the People for Unemployed People Unemployed Discount Program, a special program created to give unemployed persons special discounts on goods and services in the Waukesha area.

Equipment and Facilities

Buses: The current bus fleet operated by Waukesha Metro Transit consists of 14 buses, all leased from other public transit operators. Table 3 presents a categorical listing of the buses in the bus fleet by type of bus, including bus make and model, number of seats per bus, and year of manufacture. As shown in this table, the active bus fleet consists of 14 General Motors Corporation (GMC) 45-passenger buses manufactured between 1960 and 1967, and has

Table 3

WAUKESHA METRO TRANSIT BUS ROSTER: JULY 1982

Fleet Number	Make	Model and Identification Number	Engine Type	Year of Manufacture	Seating Capacity
703	GMC	TDH 4517-548	Diesel	1960	45
705	GMC	TDH 4517-550	Diesel	1960	45
706	GMC	TDH 4517-551	Diesel	1960	45
712	GMC	TDH 4519-1580	Diesel	1967	45
713	GMC	TDH 4519-1581	Diesel	1967	45
714	GMC	TDH 4519-1582	Diesel	1967	45
715	GMC	TDH 4519-1583	Diesel	1967	45
717	GMC	TDH 4519-1585	Diesel	1967	45
718	GMC	TDH 4519-1586	Diesel	1967	45
719	GMC	TDH 4519-1587	Diesel	1967	45
720	GMC	TDH 4519-1588	Diesel	1967	45
812	GMC	TDH 4517-883	Diesel	1960	45
824	GMC	TDH 4517-1302	Diesel	1961	45
826	GMC	TDH 4517-1304	Diesel	1961	45

Source: Waukesha Metro Transit and SEWRPC.

an average age of about 18 years per vehicle. Nine of the 14 buses in the active fleet are in service during the peak periods of system operation (see Table 2). The remaining buses are vehicles that are being serviced or are maintained as spares.

Office and Maintenance Facilities: Activities related to the operation of Waukesha Metro Transit are conducted in the Waukesha City Hall and the Waukesha municipal garage.

The Waukesha City Hall is located on the northern edge of the Waukesha central business district at 201 Delafield Street. Certain important program functions are conducted in the offices and public meeting rooms of the City Hall, including the transit-related executive work of the Mayor of the City of Waukesha; transit-related policy formulation and approval meetings of the Waukesha Common Council and concerned committees of the Council; and policy formulation and approval meetings of the Waukesha Transit System Utility Board. Certain additional transit program-related functions conducted within this building are carried out in the offices of the City Department of Public Works. The transit coordinator and shared support personnel are quartered in this office. Certain transit system services are also provided to the public in this building and include the sale of monthly passes and the distribution of transit system information.

The Waukesha municipal garage is located at 300 Sentry Drive in the southern portion of the City. The garage complex consists of a single building and a surrounding yard area used by the City for storage and maintenance of municipal vehicles. Transit program functions carried out within the garage complex include the storage, cleaning and servicing, and major maintenance of the buses in the transit fleet. All buses are stored outside in the yard area of the garage complex. In addition to providing for storage and maintenance of municipal vehicles, the garage building also houses the general management offices of the transit system, including facilities for bus operators and mechanics and offices for the general manager and support personnel.

Ridership

Ridership forecasts set forth in the currently adopted transit development program indicated that the transit system was expected to carry about 650 revenue passengers per average weekday during the first year of operation.¹ During the first full year of system operation, utilization of the transit system exceeded this ridership forecast. Ridership on the transit system has grown steadily, starting from a low of about 570 revenue passengers per average weekday during the first month of operation, September 1981, and reaching a high of about 990 revenue passengers per average weekday during February 1982. Average weekday ridership during the first year of system operation, from September 1981 through August 1982, was about 720 revenue passengers per day. Average weekday ridership for the first four months of 1982 was about 880 revenue passengers per day. The average weekday ridership for the first full year of system operation is summarized in Table 4. Detailed data concerning the socioeconomic and travel characteristics of the transit riders are presented in the following chapter.

Financial Situation

It is a generally accepted tenet that it is presently neither desirable nor possible to recover the total cost of transit service from farebox revenue alone. To charge fares which would completely recover the cost of operation would result in a diversion of choice riders to other modes of transportation, leaving the captive riders to bear alone the high cost of the service provided. Such raising of fares was common practice in the private transit industry over the past three decades, and eventually led to the collapse of almost all private transit operations, including the local transit service formerly provided by a private transit operator--Wisconsin Coach Lines, Inc.--within the City of Waukesha. If public transportation is to provide a reasonable level of service at a reasonable price to the user, it has generally been accepted that such transportation must be publicly subsidized. The regular riding of the captive user alone cannot sustain the cost of supplying the community with a public transportation system.

The financial situation for Waukesha Metro Transit reflects general agreement with this tenet. A summary of the operating expenses, revenues, and deficits for the transit system during the first full year of actual system operation--August 31, 1981 through August 31, 1982--is presented in Table 5. As shown in this table, total operating expenses for the transit system during this 12-month period averaged about \$3.72 per revenue passenger. Operating revenues for the transit system averaged about \$0.41 per revenue passenger, representing this 11 percent percent of the total system operating expenses and leaving a deficit of about \$3.31 per revenue passenger. The City's share of this total deficit was estimated at about \$0.79 per revenue passenger.

It should be noted that the above figures do not include many one-time expenses associated with the start-up of system operation which were incurred during the period of transit system formation between January 1, 1981 and

¹See SEWRPC Community Assistance Planning Report No. 31, Waukesha Area Transit Development Program: 1981-1985, February 1980.

Table 4

**RIDERSHIP AND PRODUCTIVITY CHARACTERISTICS FOR
WAUKESHA METRO TRANSIT: SEPTEMBER 1981 - AUGUST 1982**

Year	Month	Revenue Passengers		Revenue Vehicle Miles	Passengers per Vehicle Mile	Revenue Vehicle Hours	Passengers per Vehicle Hour
		Total Monthly	Average Weekday				
1981	September ^a	12,637	574	22,696	0.56	1,995	6.33
	October.....	15,182	690	22,888	0.66	1,997	7.60
	November.....	14,597	729	20,736	0.70	1,812	8.05
	December.....	14,793	672	21,995	0.67	1,993	7.42
	Average	14,302	666	22,079	0.65	1,949	7.34
1982	January.....	16,473	867	20,405	0.81	1,717	9.59
	February.....	19,723	986	22,171	0.89	1,807	10.91
	March.....	20,883	908	25,553	0.82	2,083	10.03
	April.....	16,848	766	24,309	0.69	1,989	8.47
	May.....	14,512	726	22,199	0.65	1,813	8.00
	June.....	13,126	597	24,434	0.54	1,989	6.60
	July.....	11,239	535	23,320	0.48	1,905	5.90
	August.....	13,002	591	26,174	0.50	1,996	6.51
	Average	15,725	747	23,571	0.67	1,912	8.22
	12-Month Average	15,251	720	23,074	0.66	1,924	7.93

^a Includes figures for August 31, 1981.

Source: Waukesha Metro Transit and SEWRPC.

Table 5

**OPERATING EXPENSES, REVENUE, AND DEFICITS FOR WAUKESHA
METRO TRANSIT: AUGUST 31, 1981 THROUGH AUGUST 31, 1982**

Characteristic	August 31 Through December 31, 1981	January 1 Through August 31, 1982	Total
Revenue Passengers	57,209	125,806	183,015
Total Vehicle Miles.....	93,780	199,535	293,315
Operating Expenses ^a	\$227,036	\$454,298	\$681,334
Total Per Mile.....	\$2.42	\$2.28	\$2.32
Total Per Passenger.....	\$3.97	\$3.61	\$3.72
Operating Revenue.....	\$ 23,373	\$ 52,331	\$ 75,704
Per Passenger.....	\$0.41	\$0.42	\$0.41
Percent of Operating Expenses....	10.3	11.5	11.1
Operating Deficit.....	\$203,663	\$401,967	\$605,630
Local Share.....	50,029 ^b	94,865 ^b	144,894
Per Passenger.....	\$3.56	\$3.20	\$3.31
City Share Per Passenger.....	\$0.87 ^b	\$0.75 ^b	\$0.79

^a Excluding depreciation expense.

^b Estimated, based on actual or projected local share of total operating deficit for the calendar year.

Source: Waukesha Metro Transit and SEWRPC.

August 30, 1981, prior to the actual initiation of transit system operations. Start-up expenses incurred by the transit system during this pre-operation period totaled \$75,244. The City's share of these expenses was estimated to be about \$18,500.

The total operating budget for the City's public transit program for calendar year 1982 is approximately \$698,900. Revenue from bus passenger fares and advertising for this period is expected to amount to about \$74,500, leaving an operating deficit of about \$624,400. To cover the shortfall in operating revenues in 1982, it is anticipated that the U. S. Department of Transportation, Urban Mass Transportation Administration, will provide about \$267,100; the Wisconsin Department of Transportation will provide about \$209,700; and the City of Waukesha will provide about \$147,600.

SUMMARY

On August 31, 1981, the City of Waukesha began operation of Waukesha Metro Transit to provide local bus service in the City of Waukesha and environs. The local bus system is managed by the private firm of ATE Management and Services Company, Inc., under the direct supervision of the transit coordinator in the City of Waukesha Department of Public Works. The policy-making body of the transit system is the Transit System Utility Board. However, the Waukesha Common Council has the ultimate responsibility for review and approval of certain important matters including the annual budget and transit system development program.

In July 1982, the local bus system consisted of 10 regular city routes, totaling about 90 round-trip route miles. Nine of the bus routes are primarily radial in design and one route is operated as a one-way loop. Two bus routes extend outside the City's corporate limits to serve the Goerke's Corners public transit station in the Town of Brookfield, and the Waukesha County Technical Institute in the Village of Pewaukee. All bus routes are operated on a "pulse" schedule basis, with buses meeting at a common point in the Waukesha central business district at approximately the same time to allow for ease of rider transfer.

Ridership on the transit system during the first year of system operation has averaged about 720 revenue passengers per day and has exceeded the forecast ridership of 650 revenue passengers per day for the first year of system operation. Operating expenses during the first 12 months of system operation have averaged about \$3.72 per revenue passenger and the total operating deficit has averaged about \$3.31 per revenue passenger. The City's share of this total deficit was estimated at \$0.79 per revenue passenger. Operating revenues for the transit system represented about 11 percent of system operating expenses during this period.

This chapter has set forth a description of the operating characteristics of Waukesha Metro Transit during its brief period of existence. This information, together with the trip-making data to be presented in the following chapter, will be used to evaluate the performances of the transit system. The results of this evaluation will be reported in Chapter V.

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Chapter III

WAUKESHA HOUSEHOLD AND TRANSIT USER SURVEYS

INTRODUCTION

An inventory of existing travel habits and patterns within the study area is necessary in order to determine the effectiveness of the transit system in serving the existing travel demand. Accordingly, two major travel surveys were conducted by the Commission in May 1982 to gather pertinent travel information. These surveys included a survey of Waukesha households to collect travel information for the general population, and a survey of bus users to collect travel information for the current transit riders. In addition, a household opinion survey was conducted in conjunction with the household travel survey to collect information on the general public's knowledge of, and attitudes toward, the existing transit service. This chapter documents the findings of these three surveys.

WAUKESHA HOUSEHOLD TRAVEL SURVEY

Survey Procedure

In May 1982, the Commission conducted a survey of households located within the City of Waukesha to collect information on the existing travel habits and patterns of the general population. A two-part mail-back survey was distributed to 1,002 households, or to 5.5 percent of the 18,200 households within the City. The household survey form used is reproduced in Appendix B of this report. Each sample household was requested to supply detailed data on each trip made by household members five years of age or older for a predetermined weekday and information on the socioeconomic characteristics of the household. An attempt was made to contact each sample household by telephone on the day prior to the designated travel day for the household to inform the household of the survey purpose and content. Approximately one week subsequent to the designated survey day, an attempt was again made to contact by telephone sample households which had not responded to the survey to obtain completed survey information.

Of the 1,002 households sampled, 481, or about 48 percent, provided completed trip and socioeconomic information. The data received from these sample households were then expanded to represent the approximately 18,200 households located within the City of Waukesha, using household data obtained from the 1980 U. S. Census for the City of Waukesha. Inasmuch as the travel characteristics obtained from the expanded survey data were meant to be representative of average weekday travel in 1982, the survey was conducted during the month of May when travel is no longer affected by winter weather and driving conditions and before travel is affected by recreational trips made during school vacation periods. Traffic count data collected throughout the year has also indicated that May is a month during which average weekday travel is representative of average annual weekday travel. The following sections summarize the travel and socioeconomic data collected under the Waukesha general household survey.

Quantity of Total Person Travel

An analysis of the data collected by the Waukesha household survey indicates that about 148,000 person trips¹ were made by residents of the City of Waukesha on an average weekday in May 1982. This represents an increase of about 16,100 person trips per day, or about 30 percent, over the 114,300 person trips made by residents of the City of Waukesha and environs in 1972, and an increase of about 60,100 trips per day, or about 68 percent over the 87,900 person trips made in 1963. The years 1963 and 1972 represent previous years in which the Commission conducted major household surveys of travel in the Southeastern Wisconsin Region, including the City of Waukesha.

The total person trip data collected by the household surveys were grouped into five categories of travel purpose: home-based work, home-based shopping, home-based other, nonhome-based, and school-based trips. Home-based work trips are defined as those trips made between the place of residence of the trip-maker and a place of work. Home-based shopping trips are defined as trips made between the place of residence of the tripmaker and a place for shopping. Home-based other trips are defined as those trips made between the place of residence of the tripmaker and a place other than work, shopping, or school. This category of travel would include trips made for medical, personal business, or social-recreational purposes. Nonhome-based trips are defined as those trips that neither originate nor end at home or school. School-based trips are defined as those trips having at least one end at school.

A breakdown by trip purpose of 1963, 1972, and 1982 total person trip data is presented in Table 6. Of the 148,000 person trips made by City of Waukesha residents on an average weekday in May 1982, home-based work trips accounted for about 35,600 trips, or 24 percent; home-based shopping trips for about 22,300 trips, or 15 percent; home-based other trips for about 46,800 trips, or 32 percent; nonhome-based trips for about 32,000 trips, or 22 percent; and school-based trips for about 11,300 trips, or 8 percent. As can be seen from the table, the distribution of total person trips by trip purpose has not changed appreciably from the distribution found in 1963 and 1972.

External Person Travel: Trips made to or from areas external to the study area comprised a significant portion of the total number of person trips made by city residents on an average weekday in May 1982. Of the 148,000 person trips made by city residents, about 48,900 trips, or about 33 percent, were made to or from areas external to the study area. This represents a significant portion of all trips made by City of Waukesha residents in 1982 which cannot be fully served by the city's public transit system. By comparison, about 22 percent of person trips made by city residents in 1963 were external and about 25 percent of person trips made by city residents in 1972 were external. The 48,900 external person trips made in 1982 represent an increase of about 20,000

¹A person trip is defined herein as a one-way journey between a point of origin and a point of destination by a person five years of age or over traveling as an auto driver or as a passenger in an auto, taxi, truck, motorcycle, school bus, or other mass transit carrier. To be considered, the trip must have been at least the equivalent of one full city block in length.

Table 6

**DISTRIBUTION OF TRIP PURPOSE OF AVERAGE WEEKDAY
TOTAL PERSON TRIPS MADE BY RESIDENTS OF THE CITY OF
WAUKESHA AND ENVIRONS: 1963, 1972, AND 1982**

Year	Trip Purpose	Internal		External		Total	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1963	Home-based work.....	14,500	21.1	5,400	28.3	19,900	22.6
	Home-based shopping...	9,900	14.4	1,300	6.8	11,200	12.8
	Home-based other.....	25,200	36.6	6,300	33.0	31,500	35.8
	Nonhome-based.....	13,300	19.3	5,800	30.4	19,100	21.7
	School.....	5,900	8.6	300	1.5	6,200	7.1
	Total	68,800	100.0	19,100	100.0	87,900	100.0
1972	Home-based work.....	18,400	21.5	9,000	31.1	27,400	24.0
	Home-based shopping...	13,300	15.6	3,300	11.4	16,600	14.5
	Home-based other.....	32,600	38.2	7,600	26.3	40,200	35.2
	Nonhome-based.....	14,200	16.6	8,000	27.7	22,200	19.4
	School.....	6,900	8.1	1,000	3.5	7,900	6.9
	Total	85,400	100.0	28,900	100.0	114,300	100.0
1982	Home-based work.....	18,400	18.6	17,200	35.2	35,600	24.1
	Home-based shopping...	17,700	17.9	4,600	9.4	22,300	15.1
	Home-based other.....	36,900	37.2	9,900	20.2	46,800	31.6
	Nonhome-based.....	16,900	17.0	15,100	30.9	32,000	21.6
	School.....	9,200	9.3	2,100	4.3	11,300	7.6
	Total	99,100	100.0	48,900	100.0	148,000	100.0

Source: SEWRPC.

trips, or about 69 percent, over the 28,900 external person trips made by city residents in 1972 and an increase of about 29,800 trips, or about 156 percent over the 19,100 external person trips made by city residents in 1963.

Of the 48,900 external person trips made per average weekday in May 1982, about 17,200 trips, or 35 percent, were home-based work trips; about 4,600 trips, or 9 percent, were home-based shopping trips; about 9,900 trips, or 20 percent, were home-based other trips; about 15,100 trips, or 31 percent, were nonhome-based trips; and about 2,100 trips, or 4 percent, were school-based trips. The most significant change in the distribution of external person trips by trip purpose was in the percentage of external person trips made as home-based work trips. External home-based work trips increased from about 28 percent of external person trips in 1963 to about 35 percent of external person trips in 1982.

A breakdown of 1963, 1972, and 1982 total person trip data indicating the distribution of internal and external person trips by trip purpose is presented in Table 7. It is important to note that in 1963, about 27 percent of all home-based work trips and 30 percent of all nonhome-based trips made by city residents were made as external trips. By 1982, about 48 percent of all home-based work trips and about 47 percent of all nonhome-based trips made by city residents on an average weekday were made as external trips. The majority of these trips were made to or from other municipalities within the Milwaukee urbanized area. This indicates that the current travel habits of city residents are not related solely to characteristics of the Waukesha study area, but are strongly related to characteristics of the entire Milwaukee urbanized area.

Table 7

**DISTRIBUTION OF INTERNAL AND EXTERNAL TOTAL
PERSON TRIPS MADE BY RESIDENTS OF THE CITY OF
WAUKESHA AND ENVIRONS: 1963, 1972, AND 1982**

Year	Trips by Trip Purpose					
	Home-Based Work		Home-Based Shopping		Home-Based Other	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1963						
Internal..	14,500	72.9	9,900	88.4	25,200	80.0
External..	5,400	27.1	1,300	11.6	6,300	20.0
Total	19,900	100.0	11,200	100.0	31,500	100.0
1972						
Internal..	18,400	67.2	13,300	80.1	32,600	81.1
External..	9,000	32.8	3,300	19.9	7,600	18.9
Total	27,400	100.0	16,600	100.0	40,200	100.0
1982						
Internal..	18,400	51.7	17,700	79.4	36,900	78.8
External..	17,200	48.3	4,600	20.6	9,900	21.2
Total	35,600	100.0	22,300	100.0	46,800	100.0

Year	Trips by Trip Purpose					
	Nonhome-Based		School		Total	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
1963						
Internal..	13,300	69.6	5,900	95.2	68,800	78.3
External..	5,800	30.4	300	4.8	19,100	21.7
Total	19,100	100.0	6,200	100.0	87,900	100.0
1972						
Internal..	14,200	64.0	6,900	87.3	85,400	74.7
External..	8,000	36.0	1,000	12.7	28,900	25.3
Total	22,200	100.0	7,900	100.0	114,300	100.0
1982						
Internal..	16,900	52.8	9,200	81.4	99,100	67.0
External..	15,100	47.2	2,100	18.6	48,900	33.0
Total	32,000	100.0	11,300	100.0	148,000	100.0

Source: SEWRPC.

Approximately 80 percent of the 48,900 external person trips, or about 39,200 person trips, were made between the study area and other areas within the seven-county Southeastern Wisconsin Region. An additional 2,200 person trips, or about 5 percent of external person trips, were made between the study area and areas external to the Southeastern Wisconsin Region. About 7,500 person trips, or about 15 percent of external person trips were made with both trip ends external to the study area.

The distribution of the 39,200 external person trips made in 1982 between the study area and other areas within the Southeastern Wisconsin Region is shown on Map 4. As shown on this map, the largest trip movements occurred between the study area and the Brookfield/Elm Grove area, with about 10,600 trips; the area comprising the City of Milwaukee, with about 9,600 trips; and the west-central portion of Milwaukee County, with about 5,300 trips. Of the 10,600 trips made between the study area and the Brookfield/Elm Grove area, about 3,700 trips, or 35 percent, were made to or from the Brookfield Square Shopping Center. Of the 9,600 trips made between the study area and the City of Milwaukee, about 2,900 trips, or 30 percent, were made to or from the Milwaukee central business district. Trips made by Waukesha residents between the study area and other municipalities within the Milwaukee urbanized area accounted for about 33,600 person trips, or about 67 percent of all external person trips.

Internal Person Travel: Approximately 99,100 person trips were made on an average weekday in May 1982 to or from areas internal to the study area. This represents an increase of about 13,700 trips, or about 16 percent over the 85,400 internal person trips made by city residents in 1972, and an increase of about 30,300 trips, or about 44 percent over the 68,800 internal person trips made by city residents in 1963. While the absolute number of internal person trips made by city residents has increased since 1963, the percent of the total number of person trips made by city residents as internal trips has actually decreased over this period. About 78 percent of the total number of person trips made by city residents in 1963, and about 75 percent of the total number of person trips made by city residents in 1972 were made as internal trips. In 1982, about 67 percent of the total number of person trips made by city residents were made as internal trips.

Of the 99,100 internal person trips made on an average weekday in May 1982, about 18,400 trips, or about 19 percent, were home-based work trips; about 17,700 trips, or about 18 percent, were home-based shopping trips; about 36,900 trips, or about 37 percent, were home-based other trips; about 16,900 trips, or about 17 percent, were nonhome-based trips; and about 9,200 trips, or about 9 percent, were school-based trips.

To facilitate further analysis of internal person trip characteristics, it is convenient to express travel in terms of trip ends, one end of the trip being the "production" end while the other end is termed the "attraction" end. For trips beginning or ending at home, termed "home-based trips," the production end is always considered as the home end of the trip while the attraction end is always considered as the nonhome end, regardless of the actual direction of the trip. The number of work trips "produced" within a specified area, for example, would be the number of trips from homes in that area to places of

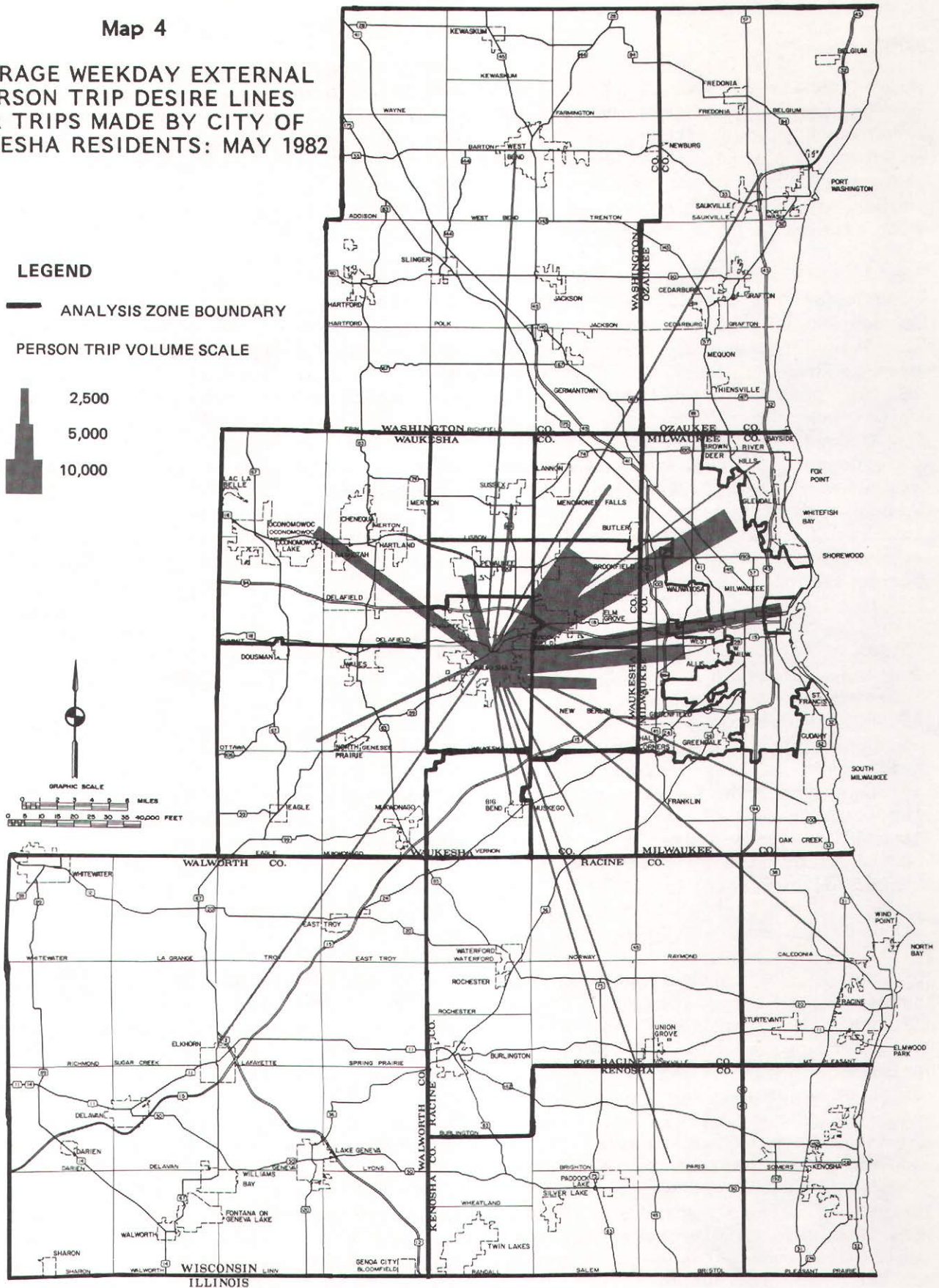
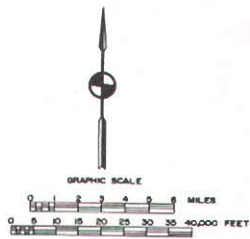
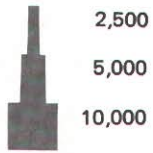
Map 4

AVERAGE WEEKDAY EXTERNAL
PERSON TRIP DESIRE LINES
FOR TRIPS MADE BY CITY OF
WAUKESHA RESIDENTS: MAY 1982

LEGEND

— ANALYSIS ZONE BOUNDARY

PERSON TRIP VOLUME SCALE



Source: SEWRPC.

employment in all other areas plus the number of trips from places of employment in all other areas to homes in the specified area. Conversely, the number of work trips "attracted" to a specified area would be the number of trips from homes in all other areas to a place of employment within that specified area plus the number of trips from places of employment in the specified area to homes in all other areas. Such a designation is helpful in defining the residential distribution of tripmakers and also the concentrations of work, shopping, and school facilities. For trips having neither end at home, termed "nonhome-based trips," the origin of the trip is defined as the production end, while the destination is defined as the attraction end.

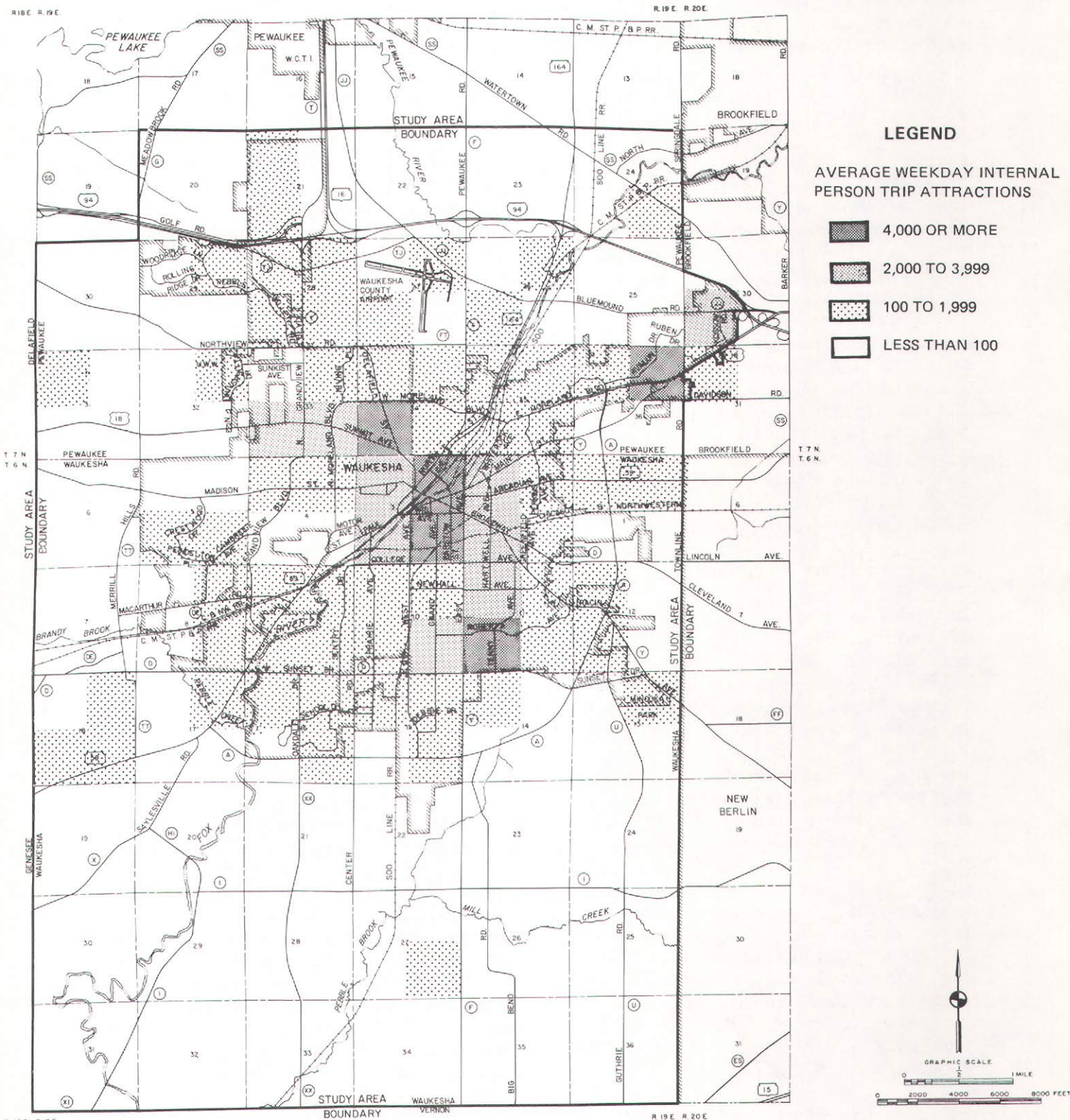
Based upon this distinction, Map 5 graphically illustrates the distribution of internal person trip attractions by quarter section within the study area. The heaviest concentrations of trip attractions were located in the quarter section containing the Waukesha central business district, which attracted about 15,900 internal person trips. The majority of the internal person trips attracted to this quarter section were for home-based shopping and home-based other trip purposes, indicating the concentration of business establishments located within the downtown area. Other quarter sections attracting large numbers of internal person trips include: the quarter section immediately south of the central business district which attracted about 5,000 internal person trips and contains the Waukesha Public Library, Central Middle School, and several medical offices and business establishments; the quarter section immediately northwest of the central business district, which attracted about 4,900 internal person trips and contains the Moreland Plaza Shopping Center, the Moreland Medical Center, and the Willow Park senior citizen housing complex; the quarter section containing the K-Mart/Pick'N Save shopping area and South Campus High School, which attracted about 7,400 internal person trips; and the quarter section containing the Westbrook Shopping Center, which attracted about 4,200 internal person trips.

In terms of trip productions, Map 6 graphically illustrates the distribution of internal person trip productions by quarter section in the study area. In general, the map illustrates the residential concentrations of Waukesha tripmakers. An exception to this generalization would be the quarter section containing the Waukesha central business district, which produced about 5,400 internal person trips, the majority of which were nonhome-based.

The hourly distribution of average weekday internal person trips is shown in Figure 2. The pattern formed by the hourly distribution of person trips shows the relative inactivity of tripmaking during early morning hours between 12:00 and 5:00 a.m., followed by a steady increase in tripmaking until a peaking of trips occurs between 7:00 and 8:30 a.m. The majority of trips made during this morning peak period are destined to either work or school. Trips for shopping, personal business, and social-recreational purposes are the major components of midday travel, beginning during the later morning hours and continuing fairly evenly until mid-afternoon. The afternoon peak period beginning at 3:00 p.m. and extending until about 5:30 p.m. was larger and more sustained than the morning peak and was characterized predominantly by trips returning to home. Total person trip activity declined sharply from the afternoon peak after about 5:30 p.m. This decline was broken occasionally as trips were made for shopping and social-recreational purposes during the evening.

Map 5

DISTRIBUTION OF WAUKESHA RESIDENT INTERNAL PERSON TRIP ATTRactions IN THE STUDY AREA: MAY 1982

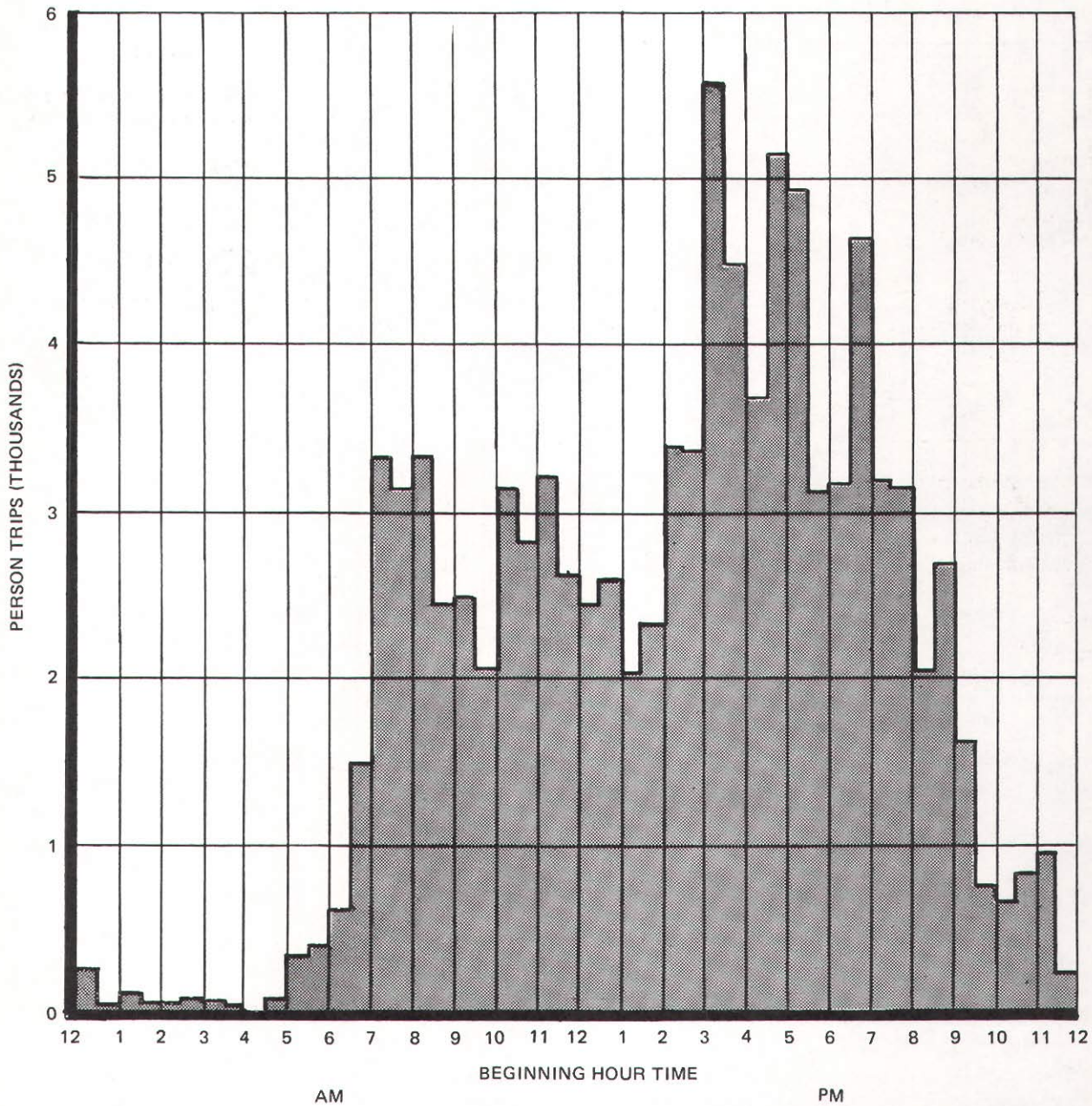


DISTRIBUTION OF WAUKESHA RESIDENT INTERNAL PERSON TRIP PRODUCTIONS IN THE STUDY AREA: MAY 1982



Figure 2

HOURLY DISTRIBUTION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS
MADE BY CITY OF WAUKESHA RESIDENTS: MAY 1982



Source: SEWRPC.

Socioeconomic Characteristics

In addition to information concerning the quantity and nature of trips made by City of Waukesha residents, certain information on the socioeconomic characteristics of Waukesha tripmakers over five years of age was collected by the general household survey. The characteristics collected included the sex, age, mode of travel, household vehicle availability, household size, household income, and driver license status for the resident tripmakers.

The survey determined that about 54 percent of the tripmakers residing in the City of Waukesha were female, as compared with about 51 percent of the total population. The predominant age of tripmakers, as shown in Table 8, was from 25 to 54 years of age. This age bracket also represents the age group into which the preponderance of the total population and labor force falls.

Table 8
PERCENTAGE DISTRIBUTION
OF PERSON TRIPS MADE
ON AN AVERAGE WEEKDAY BY
WAUKESHA RESIDENTS BY
AGE GROUP: MAY 1982

Age Group	Percent of Total Trips
5-11.....	4.3
12-18.....	8.5
19-24.....	10.5
25-54.....	60.4
55-64.....	7.7
65 and Over....	8.6
Total	100.0

Source: SEWRPC.

The primary mode of travel for Waukesha residents was the automobile. About 97 percent of all person trips were made as either an automobile driver or automobile passenger. Forms of public transportation, including local bus, yellow school bus, charter bus, and taxicab service, represented only about 3 percent of all person trips. About 3 percent of person trips were made by households in which no member possessed a valid driver's license.

A strong correlation exists between person trip production and the number of automobiles available to households. The 1982 household survey indicated that about 28,700 automobiles were available to the approximately 18,200 households within the City of Waukesha, an average of about 1.6 automobiles per household. This represents an increase over the average of 1.2 automobiles per household

in 1963 and 1.4 automobiles per household in 1972 for the same geographic area. The correlation of automobile availability to internal person trip production of City of Waukesha residents--trips made by City of Waukesha residents entirely within the study area--is shown in Table 9 for 1963, 1972, and 1982. As shown, trip production per household increased sharply in relation to increased automobile availability for all years shown. Thus, while zero-auto households averaged one trip per weekday in 1982, one-auto households averaged four person trips per weekday, and two-or-more auto households averaged seven person trips per weekday. The data within the table also indicate that in 1963 about 62 percent of the internal person trips were made by households with zero or one automobile available. By 1982, only 27 percent of the internal person trips were made by households with zero or one automobile available. Inasmuch as zero- and one-automobile households have been considered as having good potential for use of public transportation, a decline in the number of

Table 9

**DISTRIBUTION OF AVERAGE WEEKDAY INTERNAL^a PERSON TRIPS
PER HOUSEHOLD MADE BY CITY OF WAUKESHA RESIDENTS
BY VEHICLE AVAILABILITY: 1963, 1972, AND 1982**

Year	Vehicles Available	Households		Internal Person Trips		Internal Person Trips per Household
		Number	Percent of Total	Number	Percent of Total	
1963	Zero.....	1,200	12.6	1,200	1.7	1.0
	One.....	5,800	61.1	41,700	60.6	7.2
	Two or more...	2,500	26.3	25,900	37.7	10.4
	Total	9,500	100.0	68,800	100.0	7.2
1972	Zero.....	1,300	10.2	1,400	1.7	1.1
	One.....	5,200	40.6	26,600	31.1	5.1
	Two or more...	6,300	49.2	57,400	67.2	9.1
	Total	12,800	100.0	85,400	100.0	6.7
1982	Zero.....	1,000	5.5	1,000	1.0	1.0
	One.....	6,000	33.0	25,800	26.0	4.3
	Two or more...	11,200	61.5	72,300	73.0	6.5
	Total	18,200	100.0	99,100	100.0	5.4

^aIncludes only trips with both trip ends within the Waukesha study area.

Source: SEWRPC.

trips made by these households could have a negative impact on the viability of public transit service in the area.

Person trip production is also related to the number of persons comprising the household. Table 10 indicates that while one-person households averaged about two person trips per weekday in 1982, two-person households averaged about four person trips per weekday. The average number of person trips per household increased in each successively higher household size category for the years shown. Also as shown in the table, between 1963 and 1982, the proportion of internal person trips made by one- and two-person households increased.

A third factor related to person trip production is household annual income. Table 11 indicates that the average number of person trips per household in 1982 increased in relation to higher household annual income. Households having a yearly income of less than \$5,000 averaged only about two person trips per weekday, while those households in the highest income group averaged almost eight person trips per weekday. In each successively higher income level, trip production averages showed corresponding increases. Table 11 also indicates that households in the City of Waukesha reporting a yearly income of less than \$20,000 equaled 36 percent of total households, but accounted for only 22 percent of total person trips, while households reporting a yearly income of \$30,000 or more equaled 35 percent of total households but accounted for nearly 47 percent of total person trips.

Table 10

**DISTRIBUTION OF AVERAGE WEEKDAY INTERNAL^a PERSON
TRIPS PER HOUSEHOLD MADE BY CITY OF WAUKESHA
RESIDENTS BY HOUSEHOLD SIZE: 1963, 1972, AND 1982**

Year	Household Size	Households		Internal Person Trips		Internal Person Trips per Household
		Number	Percent of Total	Number	Percent of Total	
1963	One person.....	1,000	10.5	1,400	2.0	1.4
	Two persons.....	2,300	24.2	11,900	17.3	5.2
	Three and four persons...	3,400	35.8	27,900	40.6	8.2
	Five or more persons...	2,800	29.5	27,600	40.1	9.9
	Total	9,500	100.0	68,800	100.0	7.2
1972	One person.....	2,100	16.4	4,900	5.7	2.3
	Two persons.....	3,600	28.1	12,700	14.9	3.5
	Three and four persons...	4,000	31.3	32,300	37.8	8.1
	Five or more persons...	3,100	24.2	35,500	41.6	11.5
	Total.....	12,800	100.0	85,400	100.0	6.7
1982	One person.....	4,100	22.5	9,200	9.3	2.2
	Two persons.....	5,300	29.1	21,900	22.1	4.1
	Three and four persons...	6,400	35.2	46,800	47.2	7.3
	Five or more persons...	2,400	13.2	21,200	21.4	8.8
	Total.....	18,200	100.0	99,100	100.0	5.4

^a Includes only trips with both trip ends within the Waukesha study area.

Source: SEWRPC.

Table 11

**AVERAGE WEEKDAY INTERNAL^a PERSON TRIPS BY CITY
OF WAUKESHA RESIDENTS BY INCOME GROUP: MAY 1982**

Income Group	Households ^b		Internal Person Trips		Internal Person Trips per Household
	Number	Percent of Total	Number	Percent of Total	
\$ 0- 4,999....	700	4.7	1,500	1.7	2.1
\$ 5,000- 9,999....	1,500	10.0	3,400	4.1	2.3
\$10,000-14,999....	1,400	9.4	5,800	6.9	4.1
\$15,000-19,999....	1,800	12.1	8,100	9.7	4.5
\$20,000-24,999....	2,100	14.1	9,800	11.7	4.7
\$25,000-29,999....	2,200	14.8	15,900	19.0	7.2
\$30,000-39,000....	2,900	19.5	21,900	26.1	7.6
\$40,000 or More....	2,300	15.4	17,400	20.8	7.6
Total Reporting Households	14,900	100.0	83,800	100.0	5.6

^a Includes only trips with both trip ends within the Waukesha study area.

^b Approximately 18 percent of the total households surveyed did not provide annual income data.

Source: SEWRPC.

WAUKESHA METRO TRANSIT USER SURVEY

Survey Procedure

An on-board bus survey was conducted by the Southeastern Wisconsin Regional Planning Commission on May 12, 1982, to ascertain the socioeconomic and travel characteristics of the users of Waukesha Metro Transit. Survey forms were distributed to and collected from revenue passengers on all bus runs on each of the 10 local bus routes of the transit system. The on-bus survey form used is reproduced in Appendix C of this report. Provision was also made for return by mail of survey forms which could not be completed and collected on the bus.

Actual ridership by route on the survey day is shown in Table 12. Of the 767 revenue passengers using the transit system on the survey day 512, or about 67 percent, returned usable survey questionnaires. Information gathered included socioeconomic characteristics of the transit users; characteristics of the trips made by transit users; and transfer movements. The following sections summarize the results of this survey.

Socioeconomic Characteristics

Socioeconomic characteristics considered most relevant to the transit planning process were sex, age, income, vehicle driver license status, and automobile availability.

Table 12

RIDERSHIP BY ROUTE ON WAUKESHA METRO TRANSIT: MAY 12, 1982

Route Number	Route Name	Revenue Passengers		Total Passengers ^a	
		Number	Percent of Total	Number	Percent of Total
1	Westbrook/Target...	140	18.3	179	18.6
2	Arcadian/Racine...	29	3.8	42	4.4
3	Hartwell.....	125	16.3	148	15.3
4	Grand.....	121	15.8	144	14.9
5	Prairie.....	14 ^b	1.8 ^b	18 ^b	1.9 ^b
6	Fox Run.....	68	8.9	90	9.3
7	Madison.....	86	11.2	103	10.7
8	Summit.....	60	7.8	72	7.5
9	Northview.....	100	13.0	139	14.4
10	Courthouse Loop....	24	3.1	29	3.0
System Total		767	100.0	964	100.0

^a Includes transfer passengers and free passengers.

^b Low ridership figures for Route 5 reflect the limited bus service provided over the route at the time of the survey, which consisted of four and one-half daily round trips.

Source: Waukesha Metro Transit and SEWRPC.

As indicated in Table 13, the vast majority--about 64 percent--of riders using the routes of Waukesha Metro Transit are female. This is consistent with national figures, which indicate that women have traditionally comprised the majority of transit ridership. Data from the 1980 U. S. Census indicate that approximately 51 percent of the population of the City of Waukesha is female.

By age group, use of the transit system by school-age children and college-age students is prominent. The school-age group, including secondary school-age riders of 12 through 18 years of age, accounted for about 34 percent of system ridership. An additional 21 percent of riders were aged 19 through 24. By comparison, school-age children 10 through 18 years of age account for only about 15 percent of the total population of the City of Waukesha, and persons aged 19 through 24 account for another 13 percent of the total city population. Elderly persons 65 years of age or older accounted for about 10 percent of system ridership. Elderly persons account for about 8 percent of the total city population. Riders aged 25 through 54, the age bracket that represents the bulk of the labor force and about 39 percent of the total city population, accounted for about 28 percent of system ridership. A complete breakdown of ridership by age group is presented in Table 14.

Of those surveyed transit revenue passengers responding to questions on family income, about 18 percent reported a family income of less than \$5,000 per year. Another 32 percent reported a family income of between \$5,000 and \$15,000 per year. About 27 percent of the transit riders responding to this question reported a family income of over \$25,000 per year. The median family income of those responding to this question was between \$12,500 and \$15,000 per year. By comparison, the median household income for the Waukesha area has been estimated at about \$21,400 for 1981.² It is important to note that about 26 percent of the surveyed transit riders did not respond to this question. This may be attributed in part to the large percentage of ridership composed of school-age children, and the poor knowledge of family income by this large ridership group. This large percentage of respondents not reporting family income makes it difficult to accurately describe the income characteristics of the transit users. A complete tabulation of ridership by income group is presented in Table 15.

Automobile availability is generally considered an important factor influencing transit usage. Those households which do not own an automobile are dependent upon other persons or other transportation modes for the provision of essential transportation services. In those households where a single automobile is available and it is preempted for use by some member or members of the household, the remaining household members become dependent upon others or upon other modes of tripmaking. Of those responding to the survey, about 23 percent indicated that they resided in households with no automobile available. An additional 35 percent of surveyed transit riders indicated that they resided in households with only one automobile available. By comparison, about 6 percent of all households within the city indicated that they did not have an automobile available under the general household survey conducted by the Commission in May 1982, and an additional 33 percent indicated that they had

²Median income estimate for the area within a three-mile radius of downtown Waukesha, as presented in the Downtown Market Feasibility Study: Waukesha, Wisconsin, The Rooney Group, Inc., December 1981.

Table 13

**PERCENTAGE DISTRIBUTION OF RIDERSHIP ON WAUKESHA
METRO TRANSIT BY SEX BY ROUTE: MAY 12, 1982**

Route Number	Route Name	Percent of Riders ^a by Sex		
		Male	Female	Total
1	Westbrook/Target.....	39.1	60.9	100.0
2	Arcadian/Racine.....	35.1	64.9	100.0
3	Hartwell.....	31.0	69.0	100.0
4	Grand.....	24.5	75.5	100.0
5	Prairie.....	80.0	20.0	100.0
6	Fox Run.....	52.3	47.7	100.0
7	Madison.....	36.8	63.2	100.0
8	Summit.....	45.3	54.7	100.0
9	Northview.....	39.1	60.9	100.0
10	Courthouse Loop.....	14.3	85.7	100.0
System Average		35.5	64.5	100.0

^a Individual route percentages are based upon total route ridership, including transfer and free passengers. The system average percentage is based upon total revenue passengers.

Source: SEWRPC.

Table 14

**PERCENTAGE DISTRIBUTION OF RIDERSHIP ON WAUKESHA
METRO TRANSIT BY AGE GROUP BY ROUTE: MAY 12, 1982**

Route Number	Route Name	Percent of Riders ^a by Age						Total
		5-11	12-18	19-24	25-54	55-64	65 and Over	
1	Westbrook/Target...	1.8	31.4	26.0	27.2	4.7	8.9	100.0
2	Arcadian/Racine....	--	27.0	18.9	35.2	5.4	13.5	100.0
3	Hartwell.....	4.1	65.5	13.1	11.1	4.1	2.1	100.0
4	Grand.....	3.6	38.1	15.8	35.3	3.6	3.6	100.0
5	Prairie.....	--	20.0	20.0	40.0	20.0	--	100.0
6	Fox Run.....	1.1	29.5	14.8	38.6	4.5	11.5	100.0
7	Madison.....	2.1	33.7	7.4	42.1	6.3	8.4	100.0
8	Summit.....	5.3	17.3	32.0	20.1	8.0	17.3	100.0
9	Northview.....	0.7	10.9	44.2	37.0	1.4	5.8	100.0
10	Courthouse Loop....	--	7.1	10.7	35.8	35.7	10.7	100.0
System Average		2.0	33.9	20.9	27.5	6.2	9.5	100.0

^a Individual route percentages are based upon total route ridership, including transfer and free passengers. The system average percentage is based upon total revenue passengers.

Source: SEWRPC.

Table 15

**PERCENTAGE DISTRIBUTION OF RIDERSHIP ON WAUKESHA
METRO TRANSIT BY INCOME GROUP BY ROUTE: MAY 12, 1982**

Route Number	Route Name	Percent of Riders ^a by Income Group ^b							Total
		Under \$5,000	\$5,000- \$9,999	\$10,000- \$14,999	\$15,000- \$19,999	\$20,000- \$24,999	\$25,000- \$29,999	\$30,000 or More	
1	Westbrook/Target...	7.6	21.4	15.3	10.7	12.2	10.7	22.1	100.0
2	Arcadian/Racine....	7.4	22.2	3.7	18.5	14.8	25.9	7.5	100.0
3	Hartwell.....	11.5	15.6	13.5	7.3	11.5	9.4	31.2	100.0
4	Grand.....	12.6	22.1	16.8	11.6	15.8	12.6	8.5	100.0
5	Prairie.....	--	--	33.3	--	66.7	--	--	100.0
6	Fox Run.....	14.5	8.7	13.0	14.5	20.3	8.7	20.3	100.0
7	Madison.....	4.2	27.8	11.1	9.7	22.2	8.3	16.7	100.0
8	Summit.....	29.8	7.0	3.5	3.5	21.1	5.3	29.8	100.0
9	Northview.....	36.7	16.5	15.6	10.1	6.4	8.3	6.4	100.0
10	Courthouse Loop....	45.0	25.0	5.0	10.0	--	10.0	5.0	100.0
System Average		18.3	20.0	11.9	9.9	13.3	9.2	17.4	100.0

^a Individual route percentages are based upon total route ridership, including transfer and free passengers. The system average percentage is based upon total revenue passengers.

^b Approximately 26 percent of surveyed transit riders did not provide annual household income data.

Source: SEWRPC.

only one automobile available. A complete tabulation of ridership by auto availability is presented in Table 16. It is interesting to note the relatively large percentage of riders--about 31 percent--residing in households with two automobiles available. This can probably be attributed to the larger household size--four or more persons--characterizing this category, as shown in Table 17, and the use of the transit system by school-age members of these households. About 58 percent of surveyed riders indicated that they did not possess a driver's license.

Trip Characteristics

In addition to information on the socioeconomic characteristics of the transit riders, survey data was also collected concerning trip characteristics. Specifically, data was collected concerning the home location of each revenue passenger, the locations of trip origins and destinations, the trip purpose of each revenue trip, the time of day for each revenue trip start, and the mode of travel to reach the initial boarding location of each bus passenger. These trip characteristics are summarized in the following sections.

As would be expected, the vast majority of tripmakers using Waukesha Metro Transit reside within the City of Waukesha. Approximately 93 percent of transit system revenue passengers fall into this category. Other civil divisions whose residents comprise a portion of transit system ridership include the City of New Berlin, the Village of Pewaukee, and the Towns of Waukesha, Brookfield, and Pewaukee. Residents of these civil divisions each comprised about 1 percent of total transit system revenue passengers. The distribution of home residences by quarter section for surveyed transit system revenue passengers is shown on Map 7.

Map 8 graphically illustrates the distribution of transit revenue trip attractions by quarter section. The heaviest concentrations of transit trip attractions within the study area were located in the quarter section containing the Waukesha central business district. This quarter section attracted about 170 transit person trips, the majority of which were for home-based shopping and home-based other trip purposes. Other quarter sections within the study area attracting a significant number of transit person trips included the quarter section containing Central Middle School, the Waukesha Public Library, and several business and medical establishments, which attracted about 120 transit revenue trips; and the quarter section containing South High School and the K-Mart/Pick'N Save shopping area, which attracted about 60 transit revenue trips. While located outside the study area, the quarter section containing the Pewaukee campus of the Waukesha County Technical Institute also attracted a large number of transit revenue trips, attracting about 70 transit trips on the survey day.

In terms of transit trip production, Map 9 graphically represents the distribution of transit revenue trip production by quarter section. For the most part, the distribution of produced transit trips closely follows the distribution of the home location of transit revenue passengers since most of the trips were home-based, with one trip end at the home location of the tripmaker.

Table 16

**PERCENTAGE DISTRIBUTION OF RIDERSHIP ON
WAUKESHA METRO TRANSIT BY AUTOMOBILE
AVAILABILITY BY ROUTE: MAY 12, 1982**

Route Number	Route Name	Percent of Riders ^a by Vehicles Available				
		Zero	One	Two	Three or More	Total
1	Westbrook/Target...	25.2	32.7	27.0	15.1	100.0
2	Arcadian/Racine....	12.5	34.4	34.4	18.7	100.0
3	Hartwell.....	9.2	31.0	41.5	18.3	100.0
4	Grand.....	15.7	48.8	31.5	4.0	100.0
5	Prairie.....	--	60.0	--	40.0	100.0
6	Fox Run.....	20.0	37.5	25.0	17.5	100.0
7	Madison.....	24.5	23.4	46.8	5.3	100.0
8	Summit.....	16.7	42.4	24.2	16.7	100.0
9	Northview.....	22.5	48.1	17.8	11.6	100.0
10	Courthouse Loop....	72.0	8.0	16.0	4.0	100.0
System Average		22.8	34.7	30.7	11.8	100.0

^a Individual route percentages are based upon total route ridership, including transfer and free passengers. The system average percentage is based upon total revenue passengers.

Source: SEWRPC.

Table 17

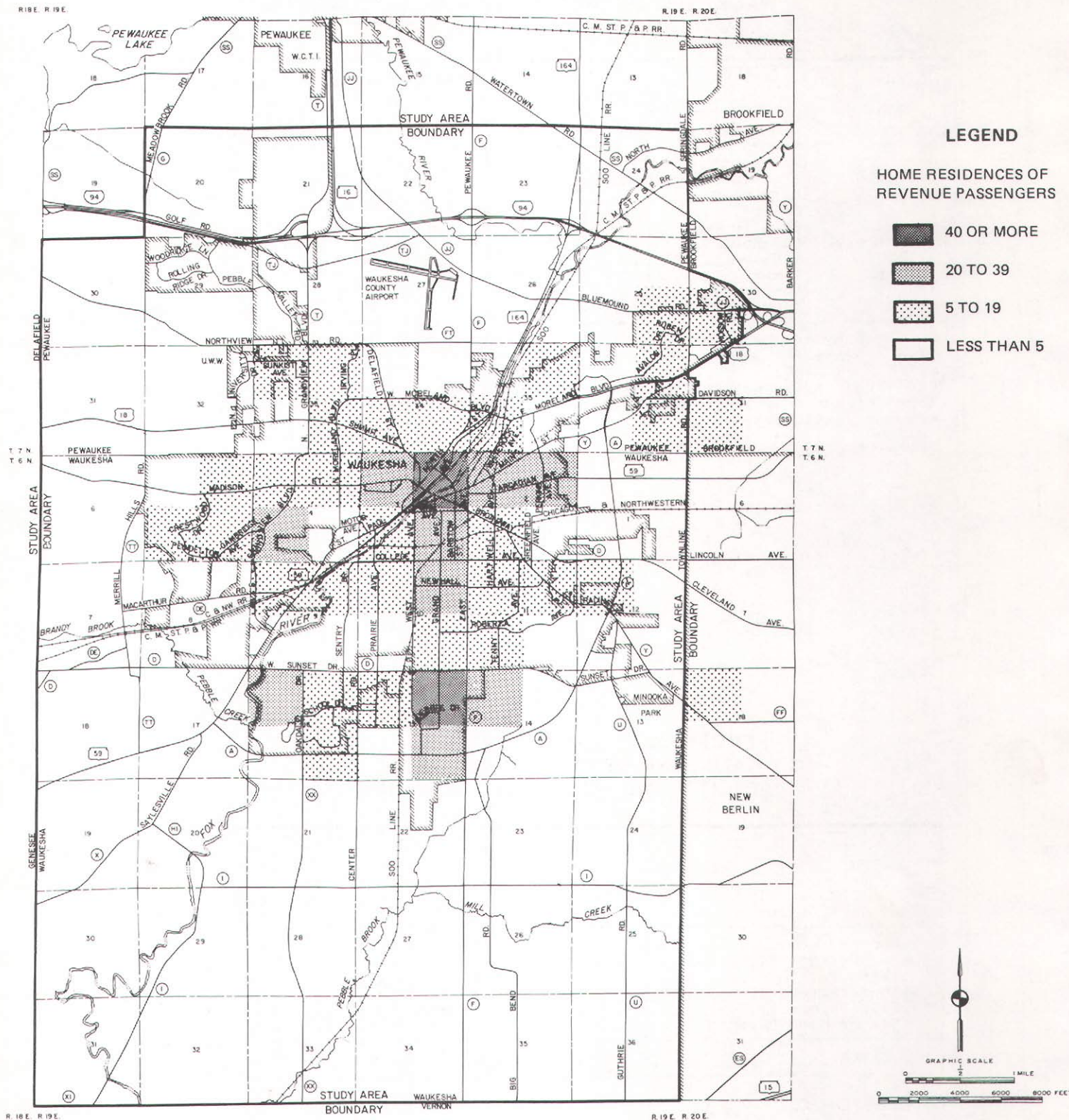
**PERCENTAGE DISTRIBUTION OF RIDERSHIP
ON WAUKESHA METRO TRANSIT BY AUTOMOBILE
AVAILABILITY AND HOUSEHOLD SIZE: MAY 12, 1982**

Household Size	Percent of Revenue Passengers by Number of Automobiles Available				
	None	One	Two	Three or More	Total
One Person.....	13.4	2.0	--	--	15.4
Two Persons.....	2.6	10.8	2.4	0.1	15.9
Three Persons.....	3.5	7.6	5.2	2.3	18.6
Four Persons.....	2.6	8.1	11.0	2.6	24.3
Five Pesons.....	--	3.6	7.9	4.8	16.3
Six or More Persons...	0.7	2.5	4.2	2.1	9.5
Total	22.8	34.6	30.7	11.9	100.0

Source: SEWRPC.

Map 7

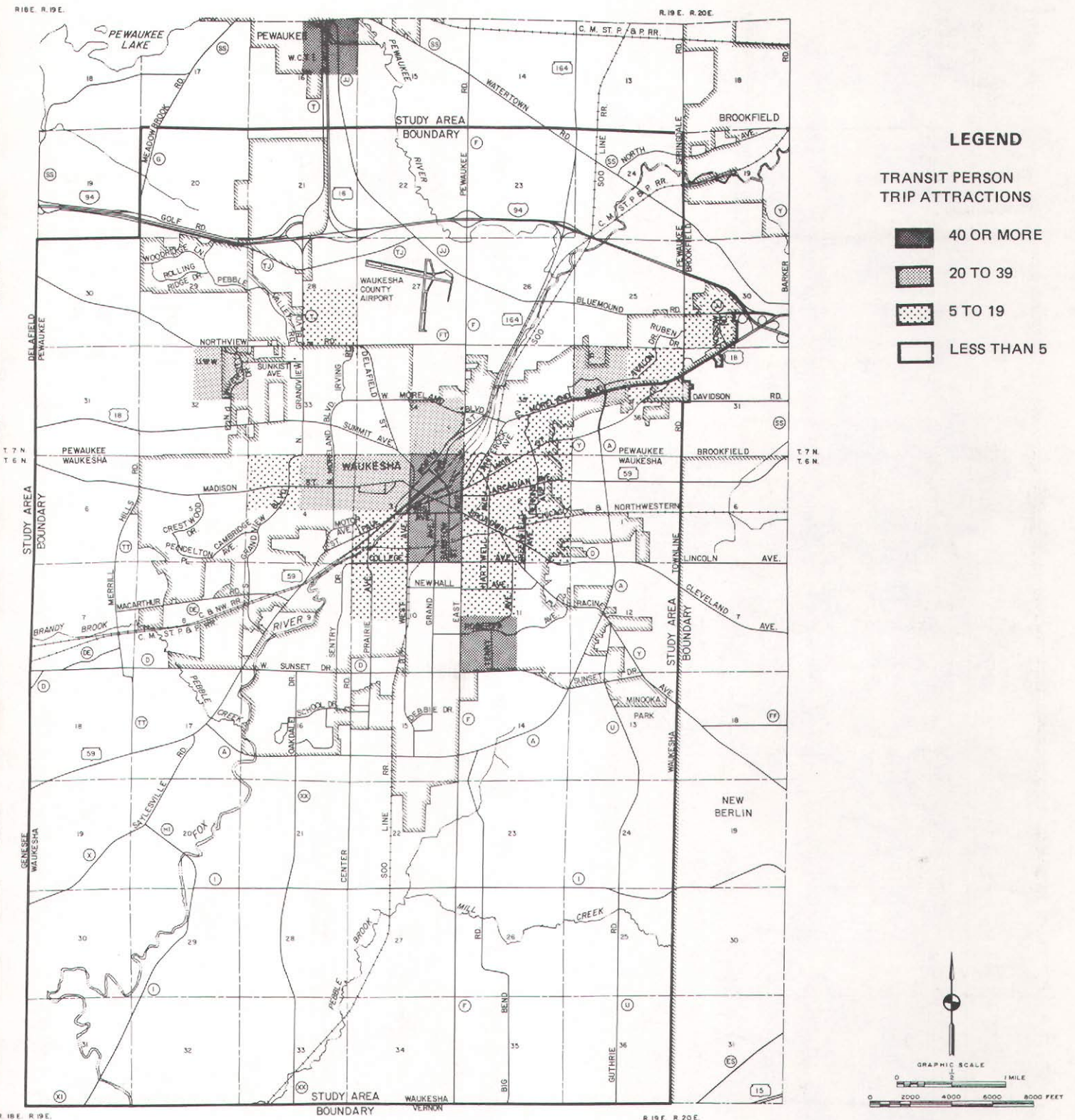
HOME RESIDENCES OF REVENUE PASSENGERS ON WAUKESHA METRO TRANSIT: MAY 12, 1982



Source: SEWRPC.

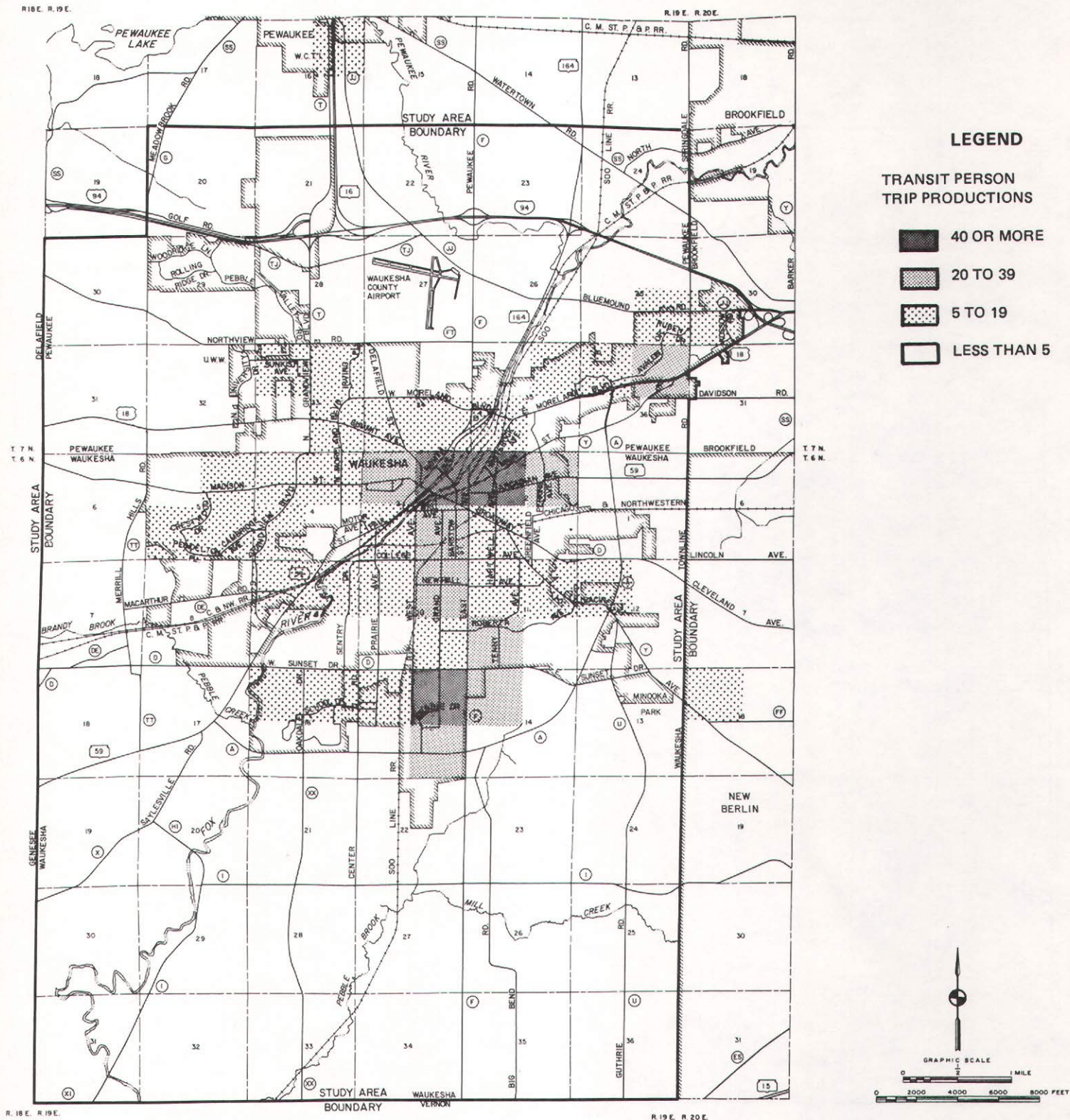
Map 8

TRANSIT PERSON TRIP ATTRactions: MAY 12, 1982



Map 9

TRANSIT PERSON TRIP PRODUCTIONS: MAY 12, 1982



Source: SEWRPC.

The importance of home or school as either a trip origin or a trip destination is shown in Tables 18 and 19. Only about 2 percent of all transit users make trips that do not either start or end at home or school. The plurality of trips on the transit system were school-related, with about 46 percent of the transit trips being school-based. Home-based work trips comprised the second largest category of tripmaking, with about 28 percent of transit trips made for this purpose.

Table 18

PERCENTAGE DISTRIBUTION OF TRIP ORIGINS AND
DESTINATIONS ON WAUKESHA METRO TRANSIT: MAY 12, 1982

Origin of Trip	Percent of Revenue Transit Trips	Destination of Trip	Percent of Revenue Transit Trips
From:.....		To:	
Home.....	49.6	Home.....	41.5
Work.....	11.4	Work.....	20.8
School.....	28.8	School.....	17.7
Shopping.....	4.6	Shopping.....	5.7
Social-Recreational..	1.9	Social-Recreational..	4.9
Personal Business....	3.7	Personal Business....	9.4
Total	100.0	Total	100.0

Source: SEWRPC.

Table 19

PERCENTAGE DISTRIBUTION
OF TRIPS ON WAUKESHA
METRO TRANSIT BY TRIP
PURPOSE: MAY 12, 1982

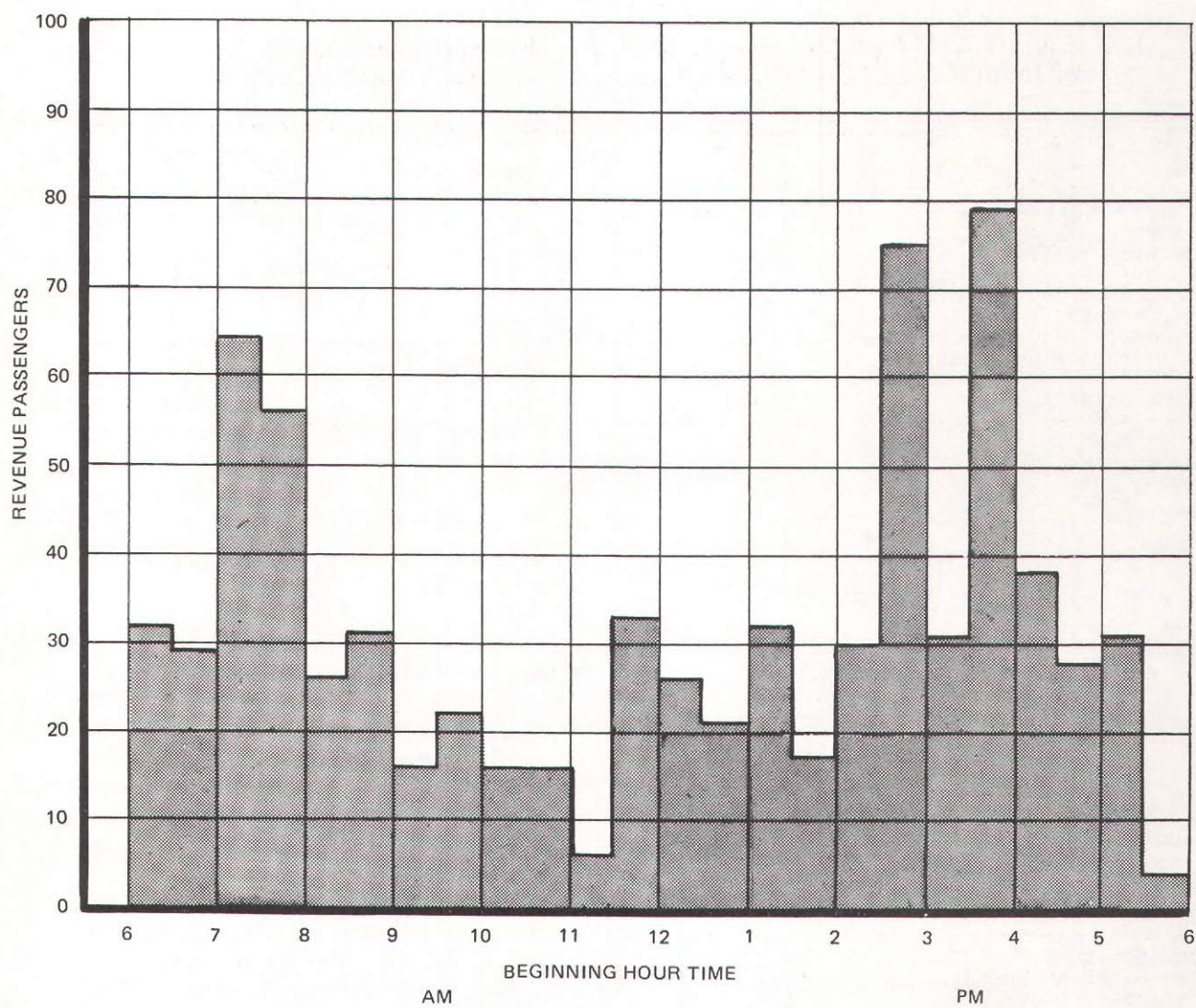
Trip Purpose	Percent of Revenue Transit Trips
Home-Based Work.....	28.3
Home-Based Shopping...	8.7
Home-Based Other.....	15.1
Nonhome-Based.....	1.9
School-Based.....	46.0
Total	100.0

Source: SEWRPC.

The hourly distributional pattern of transit revenue passengers is shown in Figure 3. The pattern shown in this figure indicates that most of the travel on the transit system occurs during two peak periods of transit ridership between the hours of 6:00 a.m. and 9:00 a.m. and 2:00 p.m. and 5:30 p.m., with approximately 72 percent of the total daily revenue ridership occurring during these two periods. The ridership peak occurring between 7:00 a.m. and 8:00 a.m. accounted for about 15 percent of the total daily revenue ridership, with about 97 percent of the trips made during this hour destined to either work or school. Peaking during the afternoon peak period was more sharp than during the morning peak period, and was concentrated between 2:30 p.m. and

Figure 3

HOURLY DISTRIBUTION OF REVENUE PASSENGERS ON
WAUKESHA METRO TRANSIT: MAY 12, 1982



Source: SEWRPC.

3:00 p.m., and between 3:30 p.m. and 4:00 p.m. The ridership peaks occurring during these two half-hour periods accounted for about 20 percent of the total daily revenue ridership. The afternoon peak period was characterized predominantly by trips returning to home.

Overall, about 96 percent of transit system revenue passengers arrived at their initial boarding location by walking, with the median walking distance being about one block. Over 85 percent of the transit revenue passengers who walked to their initial bus boarding location walked three blocks or less. The relatively short walking distance for transit users may be attributed, in part, to the lack of fixed bus stop locations along the routes outside downtown Waukesha at the time of the survey, resulting in the ability of transit users to board the bus at virtually any intersection along the bus route outside of the Waukesha central business district.

Only about 2 percent of the transit system revenue passengers used an automobile to get to their initial bus boarding location. Virtually all of these users were automobile passengers dropped off at the bus stop. About 2 percent of the transit system riders used bus service other than that provided by Waukesha Metro Transit to arrive at their initial location for boarding the city bus.

About 49 percent of the surveyed transit revenue passengers indicated that they regularly used Waukesha Metro Transit five days per week. An additional 25 percent of the surveyed revenue passengers indicated they used Waukesha Metro Transit three or four days per week. Transit revenue passengers using the transit system only one or two days per week accounted for about 13 percent of the surveyed riders, while 11 percent of the surveyed revenue passengers indicated that they used the transit system occasionally, or less than one day per week. About 2 percent of the surveyed revenue passengers indicated they were using the transit system for the first time.

Approximately 59 percent of the revenue passengers indicated that their surveyed trip was part of a round trip on a Waukesha Metro Transit bus on the survey day. Of those who indicated that their trip was not part of a round trip by bus, several reasons were noted: about 17 percent indicated that they would not make a return trip that day; about 21 percent indicated that no bus service was available at the time the return trip would be made; and about 41 percent indicated that they would get a ride with someone for the return trip rather than take the bus.

Transfer Movement

Information was also collected as part of the on-board bus survey concerning the transfer movement of revenue passengers between bus routes. An analysis of survey results indicates that about 23 percent of the revenue passengers on the survey day transferred to a different bus route to complete their trip. Table 20 summarizes the distribution of transferring passengers among bus routes. The largest transfer movement occurred between Route 4 and Route 9, with approximately 11 percent of all transfers systemwide occurring between these two routes. Other significant transfer movements were observed between

Table 20

**DISTRIBUTION OF TRANSFER PASSENGERS BY
ROUTE ON WAUKESHA METRO TRANSIT: MAY 12, 1982**

Number	From Route Name	Passengers Transferring to Route										Total
		1	2	3	4	5	6	7	8	9	10	
1	Westbrook/Target....	--	2	3	3	--	5	1	5	7	--	26
2	Arcadian/Racine.....	2	--	2 ^a	--	--	1	--	3	--	--	8
3	Hartwell.....	13	4 ^a	--	2	--	4	2	3	9	3	40
4	Grand.....	3	1	4	--	--	2	1	2 ^a	11	--	24
5	Prairie.....	1	1	--	--	--	--	--	--	1	--	3
6	Fox Run.....	5	--	3	1	--	--	5	1	4	--	19
7	Madison.....	3	1	2	--	--	2	--	--	4	2 ^a	14
8	Summit.....	5	--	2	--	1	--	1	--	2	--	11
9	Northview.....	3	2	7	9	1	4	2	1	--	1	30
10	Courthouse Loop.....	--	--	--	3	--	2	--	1	--	--	6
Total		35	11	23	18	2	20	12	16	38	6	181

^a Transfer did not require passenger to change buses.

Source: SEWRPC.

Route 1 and Route 3, and between Route 3 and Route 9, each with about 9 percent of all systemwide transfers. Transfer passengers traveling through the downtown on the paired routes operated by the transit system accounted for about 6 percent of all transfer passengers. As noted in the previous chapter, passengers using paired bus routes to travel through downtown do not change buses when transferring between bus routes to complete their trip.

WAUKESHA HOUSEHOLD OPINION SURVEY

In conjunction with the Waukesha household travel survey, a survey of household opinions concerning Waukesha Metro Transit was also conducted. The opinion survey was specifically directed toward gathering information concerning household knowledge of and attitudes toward using Waukesha Metro Transit. Each household was requested to supply information indicating the level of knowledge of household members concerning aspects of the operation of the transit system and whether certain factors would affect or encourage household use of the transit system. Certain socioeconomic data were also collected for use in verifying that the responses received were representative of the total city population. Comments, criticisms, and suggestions on the transit system were also solicited as a part of the survey. The major comments are summarized in Table 21.

Of the 1,002 households sampled within the City of Waukesha, 597, or about 60 percent, provided usable household information. These sample households were expanded to represent the approximately 18,200 estimated households in the City of Waukesha, using data from the 1980 U. S. Census.

Table 21

**SUMMARY OF MAJOR COMMENTS ON WAUKESHA
METRO TRANSIT RECEIVED ON HOUSEHOLD SURVEY**

Subject Area and Generalized Comment	Number of Comments
Routes	
Bus routes do not serve, or bus stops are not close enough to home, work, or school location.....	17
Bus routes are indirect and inconvenient to use.....	8
Extend bus service to unserved areas within or, specifically, outside the City of Waukesha.....	8
Provide new routes which are more direct and do not go downtown.....	6
Schedules	
Scheduled times and service hours are not convenient for travel between home and work or school.....	27
Provide service on time, consistent with scheduled times.....	2
Provide service earlier in the morning or later in the evening.....	7
Provide Saturday or Sunday service.....	13
Fares	
Cost is not a factor in determining use of transit system....	8
Modify special senior citizen fare program.....	5
Marketing	
Advertise routes and schedules; make route and schedule information more available to the public.....	14
General and Service-Related	
Good service; convenient service; bus drivers are helpful and courteous.....	12
Supports city bus system and hopes it continues to operate; bus system is beneficial to City and to those who need it for transportation. Household uses bus system or would use system at some future time.....	46
Supports city bus system, but household does not use it.....	18
Do not use bus system; automobile more convenient to use than bus.....	18
Use bus system only when cannot walk or drive; would use bus system or consider using it if automobile was no longer available.....	7
No use for city bus system at present time; use of bus system not practical for household members.....	22
Handicapped; difficult or unable to use city buses.....	4
Unfamiliar with services offered by Waukesha Metro Transit; do not have enough information to permit use of bus system.....	7
See empty or near empty buses; question need for city bus service.....	17
Bus system is a waste of tax dollars; bus system should pay for itself; city should stop operating bus system.....	18
Question use of large buses; small buses would seem more practical.....	23
Bus transfer site takes up too much valuable parking space or causes traffic problems downtown.....	3
Do not like noise and fumes generated by city buses.....	6

Source: SEWRPC.

Household Knowledge of Transit System

The household opinion survey measured the level of awareness of Waukesha households of the operation and characteristics of the transit system. An analysis of survey results indicates that only about 5 percent of Waukesha households were not aware of the operation of a local bus system in the City of Waukesha, while about 95 percent of Waukesha households were aware of the operation of the local transit system and had some knowledge of transit system operating characteristics. About 21 percent of Waukesha households indicated that some household members used Waukesha Metro Transit.

Transit system operating characteristics relating to the days and hours of operation, frequency of service, bus stop locations, fare structure and transfer privileges, and areal coverage of the transit system were described on the survey form. Each household was then requested to indicate if household members were aware of each characteristic. The level of knowledge of general transit operating characteristics for households using and not using Waukesha Metro Transit is indicated in Table 22. As would be expected, households with members using the transit system exhibited a greater awareness of specific operating characteristics than households in which members did not use the transit system. Nonuser households were most aware of operating characteristics pertaining to the days and hours of system operation and the service provided to certain major travel generators in the area, but were least knowledgeable of characteristics dealing with service frequency, fare structure and transfer privileges, and bus stop locations. The operating characteristic which all households were least aware of was the extent of service area coverage of the city population. Only 28 percent of nonuser households and 32 percent of all households were aware that over 80 percent of the city's residents were located within one-quarter mile of a bus route and, therefore, considered as served by the transit system.

Household Use of Transit System

As noted above, about 21 percent of the households located within the City of Waukesha, or about 3,840 households, have household members who use the transit system. The frequency of use of the transit system reported for members of these user households is shown in Table 23. As indicated in the table, about 640 households, or about 17 percent of user households, indicated that household members used the transit system heavily, making over five trips by bus per week. An additional 960 user households, or about 25 percent of user households, indicated that household members used the transit system often to make from one to four trips by bus per week. About 58 percent of user households, or about 2,240 households, indicated that household members used the transit system only occasionally, making three or fewer trips by bus per month. This large number of user households making only occasional use of the transit system would indicate that a small core of households--about 1,600 households--representing less than half of all user households and about 9 percent of all households within the city are responsible for the majority of the trips made on the transit system. It should be noted that the level of transit system use reported by the household survey, while

Table 22

**PERCENT OF HOUSEHOLDS IN THE CITY OF WAUKESHA
INDICATING KNOWLEDGE OF SPECIFIC TRANSIT
SYSTEM OPERATING CHARACTERISTICS**

Transit System Operating Characteristics	Percent Indicating Knowledge of Transit System Operating Characteristics		
	Households Using Waukesha Metro Transit	Households Not Using Waukesha Metro Transit	Total Households
Operating Hours - 6:00 a.m. to 6:15 p.m.....	86.5	57.3	63.9
Days of Operation - Monday through Friday Except Holidays.....	95.1	71.4	76.8
Service Frequency			
Half-Hour Intervals 6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:15 p.m.....	71.2	36.9	44.7
One-Hour Intervals 9:00 a.m. to 3:00 p.m.....	75.3	36.8	45.6
Common Transfer Point for all Bus Routes Located at the "Five Points" in Downtown Waukesha Where all Buses Meet at the Same Time.....	91.2	64.3	70.5
Transfers Between Bus Routes are Free and are Valid for a Two-Hour Period.....	71.8	39.3	46.8
Buses Stop at any Intersection When Flagged (outside downtown area where bus stop signs are not installed).....	65.5	32.9	40.5
Fares			
Adults - \$0.50 per Ride.....	93.5	55.9	64.3
Students (aged 12 through high school) - \$0.35 per Ride.....	73.6	38.2	46.4
Children (aged 5 through 11 years inclusive) - \$0.25 per Ride.....	63.5	35.5	41.9
Senior Citizens (aged 65 years or older) - \$0.25 per Ride.....	63.4	39.5	45.0
Monthly Pass (good for unlimited riding) - \$20 per Month.....	60.6	32.0	38.6
Exact Fare is Required When Boarding.....	88.5	42.9	53.4
Bus Routes are Located Within One-Quarter Mile of Over 80 Percent of the City's Residents.....	47.3	27.6	32.0
Direct Service Provided to:			
Goerke's Corners Public Transit Station.....	70.8	61.2	63.4
Waukesha County Technical Institute and the University of Wisconsin-Waukesha.....	86.1	69.0	72.9
Waukesha Central Business District.....	98.4	92.1	93.6
Four Major Outlying Shopping Centers (Fox Run, K-Mart, Moreland Plaza, and Westbrook/Target).....	92.7	74.7	78.8

Source: SEWRPC.

Table 23

**FREQUENCY OF BUS TRAVEL BY WAUKESHA HOUSEHOLDS
USING WAUKESHA METRO TRANSIT: MAY 1982**

Frequency of Bus Travel ^a by Household Members	User Households		Total Households	
	Number	Percent	Number	Percent
10 or More Trips per Week.....	140	3.7	140	0.8
5-9 Trips per Week.....	500	13.0	500	2.7
1-4 Trips per Week.....	960	25.0	960	5.3
2 or 3 Trips per Month.....	1,140	29.7	1,140	6.3
Fewer Than 1 Trip per Month....	1,100	28.6	1,100	6.0
No Trips.....	--	--	14,340	78.9
Total	3,840	100.0	18,180	100.0

^a One-way trips.

Source: SEWRPC.

greater than that observed at the time of the on-bus survey, closely approached the level of transit system use experienced during the peak months of transit system use of January, February, and March 1982.

The household opinion survey obtained information on household attitudes toward a series of specific factors that could substantially influence use of the local bus system in the City of Waukesha. Specifically, each sample household was asked to indicate what factors would encourage household members over 12 years of age to begin using or increase the current use of Waukesha Metro Transit. The factors described in the survey and the percent of households responding positively to each factor are listed in Table 24. The factor most frequently indicated as being likely to increase use of the transit system for all households was the loss of the use of an automobile. This factor was indicated by about 65 percent of the households using the transit system and by 54 percent of the households not using the transit system. Among transit user households, other factors indicated as being significant included: the provision of bus service on Saturdays, indicated by about 47 percent of user households; the provision of bus service until 10:00 p.m. on weekdays, indicated by about 40 percent of user households; the rationing of gasoline and substantial increases in the cost of gasoline, indicated by about 39 percent and 38 percent, respectively, of user households; and a change in work or school location, indicated by about 38 percent of user households. Among non-user households, other significant factors included: the rationing of gasoline, indicated by about 35 percent of nonuser households; and a change in work or school location, indicated by about 28 percent of nonuser households.

The survey also obtained a measure of household response, in terms of the frequency of bus travel by household members, to various fare structures for Waukesha Metro Transit. Each sample household was asked to indicate how many round trips household members would make on the transit system under several alternative one-way fares. The responses of Waukesha households to this ques-

Table 24

**PERCENT OF HOUSEHOLDS IN THE CITY OF WAUKESHA
INDICATING SPECIFIC FACTORS WHICH WOULD ENCOURAGE
HOUSEHOLD USE OF WAUKESHA METRO TRANSIT: MAY 1982**

Factors	Percent of Households Indicating Factor Would Encourage Transit Use by Household Members		
	Households Using Waukesha Metro Transit	Households Not Using Waukesha Metro Transit	Total Households
Car No Longer Available.....	65.3	54.4	56.7
Change in Work or School Location...	38.1	27.7	29.9
Change in Work or School Hours.....	23.6	12.8	15.1
Automobile No Longer Needed for Work or Other Activities			
During the Day.....	26.4	19.5	21.0
Rationing of Gasoline.....	39.4	35.3	36.2
Substantial Increase in Cost of Gasoline.....	38.0	24.3	27.2
Getting a Job in the City of Waukesha.....	28.2	22.6	23.7
Bus Service Provided Until 10:00 p.m. Weekdays.....	40.1	10.7	16.9
Bus Service Provided on Saturday....	46.8	12.9	20.0
Bus Service Provided Closer to Home.....	7.3	13.5	12.2
Bus Service Provided Closer to Work or School.....	18.0	15.5	16.0
None--Will Not Use or Increase Current Use of Bus Service.....	12.4	22.1	20.1

Source: SEWRPC.

tion are summarized in Table 25. As would be expected, the general trend indicated in the table is for households to decrease the frequency of use of the transit system as fares for transit service are increased. This trend is exhibited among both user and nonuser households, and is consistent with historic trends within the transit industry. The data presented within the table also indicate that a majority of nonuser households would not use the transit system, no matter what fare structure was established.

Characteristics of Transit User and Nonuser Households

The household opinion survey also collected certain socioeconomic data which permit a general comparison of the characteristics of both transit user and nonuser households within the City of Waukesha. A comparison of selected characteristics of Waukesha households using and not using Waukesha Metro Transit at the time of the survey is presented in Table 26.

Concerning household size, a higher percentage of user households--about 47 percent--than nonuser households--about 26 percent--were comprised of four or more persons. This would indicate that larger households are more likely to have members using the transit system. Table 26 also indicates that, while

Table 25

**HOUSEHOLD RESPONSE CONCERNING THE EFFECTS OF
ALTERNATIVE FARE STRUCTURES FOR WAUKESHA
METRO TRANSIT ON FREQUENCY OF BUS TRAVEL
BY HOUSEHOLD MEMBERS: MAY 1982**

Number of Round Trips by Bus per Week	Percent of Households Indicating Travel Frequency Under Alternative Fare Structures			
	Households Currently Using Waukesha Metro Transit			
	No Cost	\$0.25 Adult Fare ^a	\$0.50 Adult Fare ^b	\$0.75 Adult Fare ^c
More than 10.....	11.7	6.3	2.3	--
6-10.....	33.1	26.9	14.6	2.9
1-5.....	44.0	60.9	72.3	47.1
Fewer than 1.....	11.2	5.9	10.8	50.0
Total	100.0	100.0	100.0	100.0

Number of Round Trips by Bus per Week	Households Not Currently Using Waukesha Metro Transit			
	No Cost	\$0.25 Adult Fare ^a	\$0.50 Adult Fare ^b	\$0.75 Adult Fare ^c
More than 10.....	4.9	4.0	4.6	--
6-10.....	7.1	3.5	4.5	2.7
1-5.....	23.9	26.1	22.7	11.5
Fewer than 1.....	64.1	66.4	68.2	85.8
Total	100.0	100.0	100.0	100.0

Number of Round Trips by Bus per Week	Total Households			
	No Cost	\$0.25 Adult Fare ^a	\$0.50 Adult Fare ^b	\$0.75 Adult Fare ^c
More than 10.....	6.1	4.4	4.0	--
6-10.....	11.7	8.4	6.8	2.8
1-5.....	27.4	33.4	34.1	17.9
Fewer than 1.....	54.8	53.8	55.1	79.3
Total	100.0	100.0	100.0	100.0

^a \$0.15 student fare; \$0.10 children's fare; and \$0.10 elderly fare between 9:00 a.m. and 3:00 p.m.

^b \$0.35 student fare; \$0.25 children's fare; and \$0.25 elderly fare between 9:00 a.m. and 3:00 p.m.

^c \$0.50 student fare; \$0.35 children's fare; and \$0.35 elderly fare between 9:00 a.m. and 3:00 p.m.

Source: SEWRPC.

Table 26

**PERCENTAGE DISTRIBUTION OF SELECTED
CHARACTERISTICS OF WAUKESHA HOUSEHOLDS USING
AND NOT USING WAUKESHA METRO TRANSIT: MAY 1982**

Selected Characteristics	Percent of Households	
	Households Using Waukesha Metro Transit	Households Not Using Waukesha Metro Transit
Household Size		
One-Person.....	23.6	22.6
Two-Persons.....	20.3	31.8
Three Persons.....	9.6	19.4
Four Persons.....	20.5	16.6
Five Persons.....	14.3	6.8
Six or More Persons.....	11.7	2.8
Total	100.0	100.0
Annual Household Income		
Less than \$5,000.....	7.5	4.0
\$ 5,000- 9,999.....	12.9	9.7
\$10,000-14,999.....	7.3	10.1
\$15,000-19,999.....	16.0	10.5
\$20,000-24,999.....	7.8	16.0
\$25,000-29,999.....	15.7	14.1
\$30,000-39,000.....	17.5	20.0
\$40,000 or More.....	15.3	15.6
Total	100.0	100.0
Age of Head of Household		
19-24.....	3.7	6.0
25-34.....	16.0	30.8
35-44.....	25.1	18.7
45-54.....	21.4	16.2
55-64.....	10.9	10.1
65 and Over.....	22.9	18.2
Total	100.0	100.0
Education of Head of Household^a		
Some Grade School.....	0.8	2.4
Grade School Graduate.....	2.6	5.2
Some High School.....	11.1	6.9
High School Graduate.....	27.4	25.7
Technical/Vocational Training....	12.1	13.2
Some College.....	14.9	18.0
College Graduate.....	20.3	16.2
Post-Graduate Study.....	10.8	12.4
Total	100.0	100.0
Household Automobile Availability		
None.....	15.7	3.0
One.....	26.6	37.0
Two.....	45.7	46.4
Three or More.....	12.0	13.6
Total	100.0	100.0
Number of Licensed Drivers in Household		
None.....	14.9	2.1
One.....	13.1	28.0
Two.....	51.0	56.2
Three or More.....	21.0	13.7
Total	100.0	100.0

^a Highest level completed.

Source: SEWRPC.

a significant proportion of both user and nonuser households have an annual income of \$25,000 or more, the percent of households with annual incomes of less than \$10,000 is greater for user households, with about 20 percent, than for nonuser households, with about 14 percent.

In about 47 percent of transit user households, the head of the household is from 35 to 54 years of age. Typically, households with household heads within this age range are involved with raising families and many such households include school-age children. Consequently, a high proportion of user households falling within this category could be considered consistent with the high proportion of school-age children found using the public transit system. No significant differences were found between user and nonuser households concerning the highest educational level completed by the head of the household. The household heads of about 46 percent of user households and about 47 percent of nonuser households had completed some college or higher education level.

Significant differences were noted between user and nonuser households concerning household automobile availability and the number of licensed drivers within the household. About 16 percent of user households, compared with only 3 percent of nonuser households, did not have an automobile available for use by household members. Similarly, about 15 percent of user households, compared with only about 2 percent of nonuser households, had no licensed drivers within the household. This would indicate a significant number of user households depended upon the public transit system as a means of travel. It is interesting to note the high proportion of user households, about 46 percent, with two automobiles available. As previously noted, this can probably be attributed to the use of the transit system by school-age children within these households.

SUMMARY

In May 1982, the Commission undertook two major travel surveys in the City of Waukesha--a household travel survey to ascertain the socioeconomic characteristics and the average weekday travel habits and patterns of the households within the City, and an on-board bus survey to ascertain the socioeconomic characteristics and travel habits and patterns of the users of Waukesha Metro Transit. In addition, a household opinion survey was also conducted in conjunction with the household travel survey to gather information on household knowledge of and attitudes toward use of Waukesha Metro Transit.

A total of 148,000 person trips were made by residents of the City of Waukesha on an average weekday in May 1982. Of this total, about 48,900 person trips, or about 33 percent, were made to or from points external to the study area. About 99,100 person trips were made to or from points internal to the study area.

External to the study area, the greatest number of person trips were made between the study area and other municipalities within the Milwaukee urbanized area. About 33,600 person trips, or about 67 percent of external person trips and 23 percent of total person trips, were made to municipalities within the Milwaukee urbanized area. The largest volumes of external person trips were made between the study area and the Brookfield/Elm Grove area, the City of Milwaukee, and the west-central portion of Milwaukee County.

Internal to the study area, the quarter section containing the Waukesha central business district both attracted and produced the greatest volume of internal person trips. Other areas attracting significant numbers of internal person trips included quarter sections containing the Westbrook Shopping Center, the K-Mart/Pick'N Save shopping area, the Moreland Medical Center, and Central Middle School. With the exception of the quarter section containing the Waukesha central business district, internal person trip productions were generally concentrated within the densely developed residential areas of the City of Waukesha.

Survey data to ascertain the characteristics of transit riders indicate that the typical transit user could be described as a female between the ages of 12 and 24, not possessing a valid driver's license, and residing in a household of four or more persons. Similar survey data concerning the trip characteristics of transit revenue passengers indicate that about 93 percent of transit riders reside within the City of Waukesha. Only about 2 percent of transit revenue passengers make trips that do not start or end at home or school. The plurality of revenue trips made on the transit system were school-based and home-based work trips, with about 46 and 28 percent, respectively, of all transit revenue trips made for these purposes. The quarter section containing the Waukesha central business district both produced and attracted the largest number of transit revenue trips.

The public opinion survey of Waukesha households indicated that only 5 percent of Waukesha households were not aware of the operation of a local bus system in the City of Waukesha. The majority of Waukesha households were most aware of transit system operating characteristics concerning the days and hours of system operation and certain major generators served by the transit system. Waukesha households were least aware of the extent of geographic coverage of the residents of the City. The factor indicated by the majority of households as likely to encourage use of the transit system was the loss of the use of an automobile. Concerning household response to alternative fare structures for the transit system as measured by frequency of bus travel by household members, households indicated that the frequency of use of the transit system by household members would decline as fares for the transit service increased.

About 21 percent of the households located within the City of Waukesha had household members who used the transit system. Transit user households were more likely to be four or more persons in size, and have a household head aged 35 to 54 years, and less likely to have an automobile or a licensed driver available than nonuser households. Transit user households also had a higher percentage of households with an annual income of less than \$10,000, but had almost the same percentage of households with an annual income of \$25,000 or more as the nonuser households.

This chapter has described the socioeconomic characteristics and travel habits and patterns of Waukesha households and users of Waukesha Metro Transit. This chapter has also provided some insight into the attitudes and characteristics of both transit user and nonuser households in the City of Waukesha. This information can be used to provide a sound basis for the evaluation of how well the local transit system serves the travel characteristics of the resident city population. This evaluation will be presented in Chapter V of this report.

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Chapter IV

TRANSIT SERVICE OBJECTIVES AND STANDARDS

INTRODUCTION

Probably the most critical steps in the conduct of any transit system operations analysis is the articulation of the objectives to be attained by the transit service, together with the identification of supporting standards, which can be used to measure the degree of attainment of an objective.

The articulation of objectives and standards is considered to be a critical step in the conduct of the Waukesha Metro Transit system operations analysis because those objectives and standards provide the criteria upon which the performance of the existing transit system can be objectively assessed and any recommendations for improvement soundly made. The objectives should clearly and comprehensively represent the goals of the transit service and the system performance desired by the Waukesha community. The standards should permit direct measurement of the extent to which the objectives are being attained. Only if the objectives and standards clearly reflect community transit-related goals will the evaluation of the existing system be able to identify desirable system improvements.

The following sections of this chapter present the public transit service objectives and standards used in the performance evaluation of the existing transit system, and in the subsequent design and evaluation of the alternative short-range transit improvement plans.

OBJECTIVES

Because the transit objectives formulated in the study must implicitly reflect the underlying value system of the residents of the Waukesha area with respect to local transit service, this task of formulating objectives is not only critical, but also quite complicated and difficult. As a result, efforts were made to actively involve in the articulation of the objectives and supporting standards interested and knowledgeable public officials and private citizens of the Waukesha area representing a broad cross-section of interests in the community. Accordingly, one of the major responsibilities of the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee was to articulate the transit service objectives for the Waukesha transit system. By drawing upon the collective knowledge, experience, views, and values of the members of the Committee, it is believed that a meaningful expression of the public transit system performance desired by the Waukesha community was obtained, and a relevant set of transit service objectives was defined.

The specific objectives adopted for this operations analysis of Waukesha Metro Transit were concerned with providing the Waukesha area with a public transportation system which will effectively serve the City of Waukesha and environs while minimizing the costs incurred in the provision of the desired service. The following specific objectives were adopted by the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee:

1. The public transit system should effectively serve the City of Waukesha and environs.
2. The public transit system should maximize the service provided to the transit-dependent segments of the general population.
3. Transit system ridership should be maximized.
4. The transit system should be efficient and economical, meeting all other objectives at the lowest possible cost.

The objectives are essentially the same as those originally adopted by the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee in the preparation of the adopted transit development program.¹

STANDARDS

Complementing each of the foregoing specific transit service objectives is a set of service standards and performance measures, as set forth in Table 27. Each set of standards is directly related to the transit service objective, and serves to facilitate quantitative application of the objectives in the evaluation of the existing transit system and transit service improvement proposals. The performance measure identifies the specific means to be used in quantifying each service standard. The standards and performance measures are intended to include only the most important criteria relating to the attainment of each objective. This was considered essential so that the entire set of measures could be kept to a level which could be readily worked with and comprehended in the evaluation process.

The performance evaluation utilized in the transit system operations analysis included assessments of transit performance on both a systemwide and on an individual route basis. The service standards set forth within this chapter represent a comprehensive list from which specific performance standards and measures, as deemed appropriate, were drawn in conducting the systemwide and route performance evaluations. A complete description of the evaluation process is presented in the following chapter.

Overriding Considerations

While the objectives and standards set forth in Table 27 were intended to be used to guide the performance evaluation of the transit system and the design and evaluation of public transit system service and facility improvements, several overriding considerations must be recognized in applying the service standards in the conduct of the transit system operations analyses for Waukesha Metro Transit.

First, it must be recognized that the Waukesha transit system has been in operation for one year in an area which had been without local bus service for over five years. Unlike other public transit operations where local

¹See SEWRPC Community Assistance Planning Report No. 31, Waukesha Area Transit Development Program: 1981-1985, February 1980.

Table 27

PUBLIC TRANSIT OBJECTIVES AND STANDARDS ADOPTED FOR USE IN THE TRANSIT SYSTEM OPERATIONS ANALYSIS OF WAUKESHA METRO TRANSIT

Objective	Standards	Performance Measures
1. The public transit system should effectively serve the City of Waukesha and environs	<ul style="list-style-type: none"> ● The population served should be maximized 	<ul style="list-style-type: none"> ● Total population residing within one-quarter mile of a bus route
	<ul style="list-style-type: none"> ● Major land use areas served should be maximized 	<ul style="list-style-type: none"> ● Major land use areas served by the transit system: <ul style="list-style-type: none"> a. Major regional, community and neighborhood retail and service centers^a b. Educational institutions including universities, colleges, vocational schools, secondary schools and parochial schools^b c. Major community and special medical centers^a d. Major employment centers^c e. Major governmental and public institutional centers^a f. Major recreational areas^d
	<ul style="list-style-type: none"> ● The jobs served should be maximized 	<ul style="list-style-type: none"> ● Jobs located within one-eighth mile of a bus route with start and stop times which permit use of scheduled bus service^e
2. The public transit system should maximize the service provided to the transit-dependent segments of the general population	<ul style="list-style-type: none"> ● The residential concentrations of, and the facilities frequently used by, transit-dependent population groups should be served 	<ul style="list-style-type: none"> ● Residential concentrations of transit-dependent population groups served by a bus route: <ul style="list-style-type: none"> a. The elderly^f b. The young (children aged 10-19 inclusive) c. The members of low-income families d. The handicapped^g e. The members of zero-auto households
		<ul style="list-style-type: none"> ● Facilities used by transit-dependent population groups served by a bus route: <ul style="list-style-type: none"> a. Facilities for the elderly^a b. Facilities for the handicapped^a c. Subsidized rental housing^d
3. Transit system ridership should be maximized	<ul style="list-style-type: none"> ● Ridership on the transit system should be maximized 	<ul style="list-style-type: none"> ● Revenue passengers ● Revenue passengers per capita ● Total passengers per route mile
	<ul style="list-style-type: none"> ● Passengers per vehicle hour should be maximized 	<ul style="list-style-type: none"> ● Revenue passengers per revenue vehicle hour ● Total passengers per revenue vehicle hour
	<ul style="list-style-type: none"> ● Transit service should be "on time"^h at least 95 percent of the time 	<ul style="list-style-type: none"> ● Percent "on-time"^h adherence
	<ul style="list-style-type: none"> ● Transit travel times should be comparable to automobile travel times among component parts of the urban area 	<ul style="list-style-type: none"> ● Ratio of transit travel time to automobile travel time
	<ul style="list-style-type: none"> ● Waukesha Metro Transit routes and schedules should be coordinated with each other and with the routes and schedules of the intercity and commuter bus operations within the urban area 	<ul style="list-style-type: none"> ● Bus stop and schedule coordination

Table 27 (continued)

Objective	Standards	Performance Measures
4. The transit system should be efficient and economical, meeting all other objectives at the lowest possible cost	● Operating expenses for the transit system should be minimized and reflect efficient utilization of resources	● Operating expenses per vehicle hour by expense category:
	● The amount of transit system operating expenses recovered through operating revenues should be maximized	● Percent of operating expenses recovered through farebox and total operating revenues
	● The public subsidy for the transit system should be minimized. The local share of the public subsidy requirement should reflect the most effective use of other subsidies	● Total operating deficit ● Total operating deficit per passenger ● Local share of total operating deficit per capita ● Local share of total operating deficit per passenger
	● The productivity of the transit system labor force and revenue vehicles should be maximized	● Scheduled operating speed ● Layover time as a percent of total scheduled time
	● Transit system accidents should be minimized	● Accidents per 100,000 vehicle miles

^a Shall be considered as served when a bus stop is located at or within the center.

^b Shall be considered as served when a bus stop is located within one-eighth mile of the center.

^c A major employment center shall be defined as an existing or planned concentration of industrial, commercial, or institutional establishments providing employment for 100 persons or more. A major employment center shall be considered as served when a bus stop is located within one-eighth mile of the center.

^d Shall be considered as served when located within one-quarter mile of a bus stop.

^e Jobs shall be considered as fully served by scheduled transit service when scheduled transit service allows employees to arrive at their job locations no sooner than 20 minutes, but no later than 5 minutes, before the job's scheduled start time; and allows employees to depart from their job location within 20 minutes of their job's scheduled stop time.

^f The elderly shall be defined as persons 65 years of age or older.

^g The handicapped shall be defined as individuals who, by reason of illness, injury, congenital malfunction, or other permanent or temporary incapacity or disability, are physically or developmentally disabled. Such individuals should be capable of using the buses of the fixed route transit system without the aid of special equipment such as wheelchair lifts on buses.

^h "On time" is defined as adherence to a schedule within the range of zero minutes early and three minutes late.

Source: SEWRPC.

governments have assumed ownership and operation of existing transit operations, the new transit system in the City of Waukesha has had no existing ridership to serve as a base upon which to build and add new ridership. Consequently, maximum ridership on the transit system has probably not been attained during its short period of existence and the potential for significant improvements in ridership levels and in transit system performance over the next few years should still exist.

Second, an overall evaluation of the existing transit system performance and transit service improvement proposals must be made on the basis of cost. Such an analysis may show that attainment of one or more standards is beyond the economic capability of the community and, therefore, that the standards cannot be met practically and must be either modified or eliminated.

Third, it must be recognized that the transit system is unlikely to meet all the standards completely, and that the extent to which each standard is met, exceeded, or violated must serve as a measure of the ability of the transit system to achieve the objective which a given standard complements.

Fourth, and finally, it must be recognized that certain intangible factors, including the perceived value of transit service to the community and potential acceptance by the concerned elected officials, may influence and, therefore, must be considered in making final recommendations for service changes. Inasmuch as transit service may be perceived as providing a valuable service within the community, the community may decide to initiate or retain such services regardless of its performance or cost. With regard to acceptance of recommended service changes, only if a considerable degree of such acceptance exists, will service recommendations be implemented and their anticipated benefits realized.

SUMMARY

This chapter has presented a set of transit service objectives and standards developed and adopted by the study advisory committee as a basis for the Waukesha transit system operations analysis. The four specific objectives have been developed within the context of the transit development objectives and standards previously adopted by the advisory committee during the preparation of the adopted transit development program.

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Chapter V

TRANSIT SYSTEM PERFORMANCE EVALUATION

INTRODUCTION

Previous chapters of this report have described the general operating characteristics of the City of Waukesha transit system, and the travel habits and patterns served by that system. This chapter presents an evaluation of the performance of the transit system based upon the transit service objectives and standards set forth in Chapter IV of this report, together with other specific performance measures, and identifies areas of efficient and inefficient operation.

The performance evaluation was conducted at two levels, utilizing the specific sets of performance measures set forth in Table 28. At the first level, an assessment of performance was made on a systemwide basis to ascertain the degree to which the existing transit system attained certain transit service objectives and standards. This assessment was conducted in two parts, with the first part examining the extent to which the transit system serves the major land uses and transit-dependent population groups within the Waukesha area, and the second part presenting a comparison of the ridership and financial performance of the transit system during its first full year of operation versus the ridership and financial projections set forth in the adopted transit development program. Through this comparison, areas of performance of the Waukesha transit system which differed markedly from the projected performance of the system were identified. Further analyses to determine possible causes of the differences in performance were then conducted.

At the second level of evaluation, the performance of each route in the transit system was evaluated, and the routes rank-ordered on the basis of performance. Transit routes exhibiting the poorest performance were considered as potential candidates for change or elimination.

The following sections of the chapter present the findings of the evaluation process. These findings were used to develop the transit operations improvement strategies described in Chapter VI of this report.

SYSTEMWIDE PERFORMANCE EVALUATION-- TRANSIT SERVICE PROVIDED TO LAND USES

A systemwide evaluation of the transit system was conducted against the transit service objectives and standards set forth in Chapter IV of this report. A determination of the ability of the transit system to achieve agreed-upon objectives was accomplished through the application of performance measures related to the first three transit service objectives. The performance measures indicate the degree to which the transit system serves the total resident population, major land uses, jobs, and transit-dependent population groups within the study area, and the ability of the system to provide service which is reasonably competitive with that provided by the automobile.

Table 28

APPLICATION OF SPECIFIC PERFORMANCE MEASURES IN THE PERFORMANCE EVALUATION PROCESS

Performance Measure by Objective	Application in Evaluation Process		
	Systemwide Performance Evaluation		Route Performance Evaluation
	Service to Land Uses	Ridership and Financial Performance	
<u>Objective 1</u> The public transit system should effectively serve the City of Waukesha and environs: 1. Total population residing within one-quarter mile of a bus route..... 2. Major land use areas served by a bus route..... 3. Jobs served by a bus route.....	 X X X		
<u>Objective 2</u> The public transit system should maximize the service provided to the transit-dependent segments of the general population: 1. Residential concentrations of transit-dependent groups served by a bus route..... 2. Facilities utilized by transit-dependent groups served by a bus route.....	 X X		
<u>Objective 3</u> Transit system ridership should be maximized: 1. Revenue passengers..... 2. Revenue passengers per capita..... 3. Total passengers per route mile..... 4. Revenue passengers per revenue vehicle hour..... 5. Total passengers per revenue vehicle hour... 6. Percent on-time adherence..... 7. Ratio of transit travel time to automobile travel time..... 8. Bus stop and schedule coordination.....	 X X	 X X X X X X	 X X X X
<u>Objective 4</u> The transit system should be efficient and economical, meeting all other objectives at the lowest possible cost: 1. Operating expenses per vehicle hour by expense category..... 2. Percent of operating expenses recovered through total operating revenues..... 3. Total operating deficit..... 4. Total operating deficit per passenger..... 5. Local share of total operating deficit per capita..... 6. Local share of total operating deficit per revenue passenger..... 7. Scheduled operating speed..... 8. Layover time as a percent of total scheduled time by route..... 9. Vehicle and passenger accidents per 100,000 vehicle miles.....		 X X X X X X X	 X X X

Source: SEWRPC.

Population Served

About 49,000 persons are estimated to reside within about one-quarter mile of the bus routes operated by the transit system. This approximately quarter-mile service area is shown on Map 10. Of this total, about 46,600 persons reside within the City of Waukesha proper, representing about 93 percent of the total city population. As of September 1982, the only major residential areas which were not served by the transit system were the Pebble Valley and The Windings subdivisions, located together on the northwest side of the City.

Major Land Use Areas Served

For systemwide transit service evaluation purposes, the major land uses identified included shopping areas, educational institutions, community and special medical centers, governmental and public institutional centers, major employment centers, and major recreational areas. Such land uses often comprise major traffic generators since they tend to attract a large number of total person trips. Such land uses also attract, or have the potential to attract, large numbers of transit person trips.

The major shopping areas identified within the study area are listed in Table 29 and located on Map 11. Of the 11 shopping areas identified, only two are not directly served by a bus stop on a bus route: the Grand Avenue strip development and the Sunset Avenue strip development. These two shopping areas are, however, located within one-eighth mile of a bus stop.

Sixteen major public and private educational institutions were identified within the study area and are listed in Table 30 and located on Map 12. Only four of the educational institutions identified do not lie within one-eighth mile of a bus stop and are, therefore, considered as not served by the transit system. Three of these educational institutions--Central Middle School, North High School, and Mt. Calvary Lutheran School--are located within one-quarter mile of a bus stop.

One community medical center and three special medical centers were identified within the study area. These medical centers are listed in Table 31 and located on Map 13. All medical centers are served by the public transit system.

Governmental and public institutional centers identified within the study area are listed in Table 32 and located on Map 14. Of the 12 centers identified, three centers are not directly served by a stop on a bus route--the Social Security Administration office, the offices of the Wisconsin Department of Transportation, and the Waukesha Town Hall. Of these three centers, the offices of the Social Security Administration are located within one block of a bus stop, and the offices of the Wisconsin Department of Transportation will be served by the transit system after March 1983, when those offices are relocated in the new state office building under construction in the central business district of the City of Waukesha.

Major employment centers in the Waukesha study area with over 100 employees are listed in Table 33 and located on Map 15. As noted within the table, 29 of the 37 major employment centers identified are located within one-eighth mile

QUARTER-MILE SERVICE AREA FOR
WAUKESHA METRO TRANSIT: SEPTEMBER 1982

QUARTER-MILE SERVICE AREA FOR
WAUKESHA METRO TRANSIT: SEPTEMBER 1982

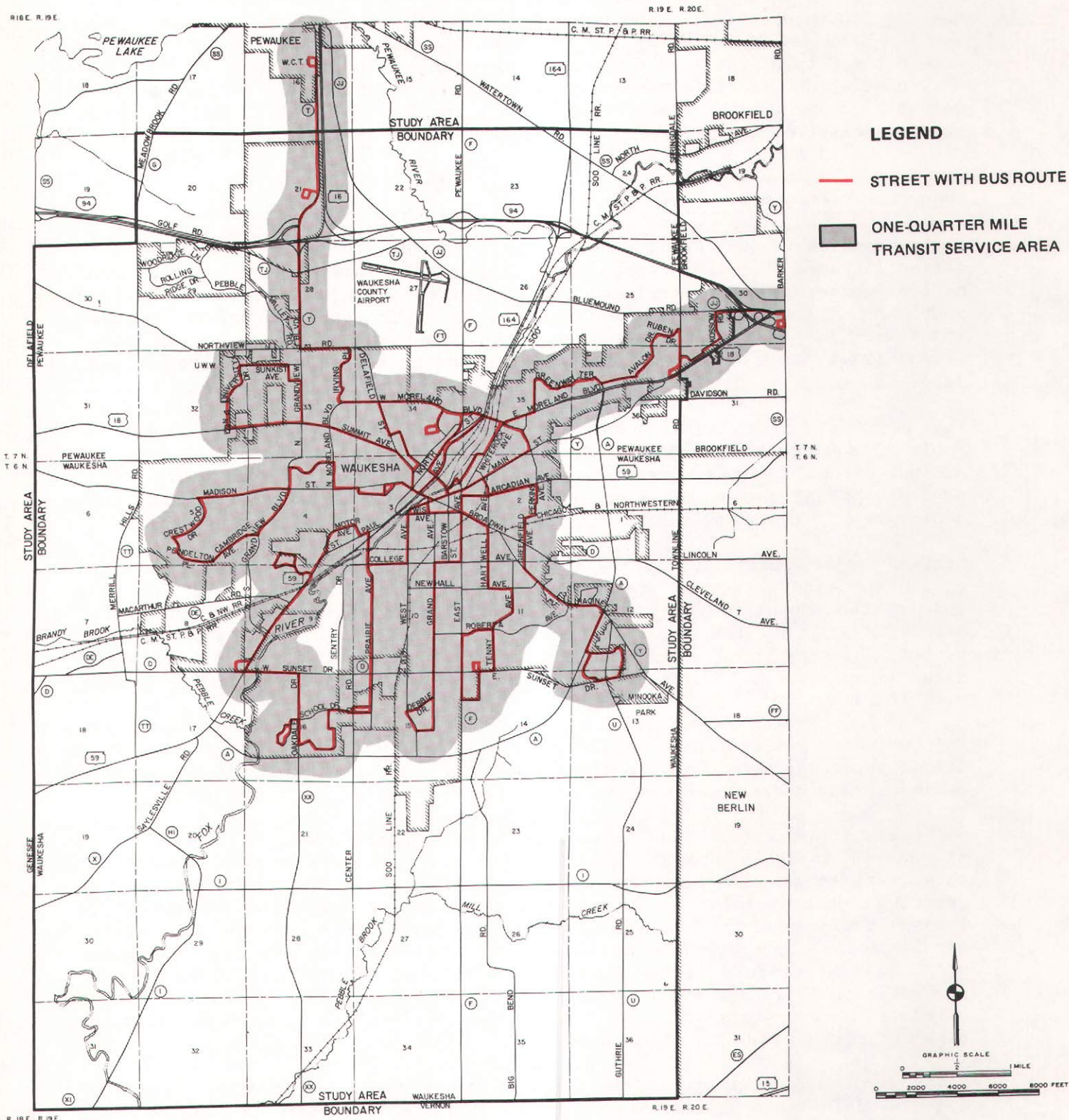


Table 29

SHOPPING CENTERS IN THE WAUKESHA STUDY AREA: 1982

Code Number on Map 11	Shopping Center	Location ^a	Served by Waukesha Metro Transit ^b
1	Community ^c Central business district.....	Area bounded by Wisconsin Avenue, East Avenue, St. Paul Avenue, and West Avenue	Yes
2	K-Mart/Pick'N Save/Brighton Square Shopping Area.....	East Avenue and Sunset Drive	Yes
3	Westbrook-Target strip development...	On Moreland Boulevard between Ramona Road and IH 94	Yes
4	Neighborhood ^d Fox Run Shopping Center.....	St. Paul Avenue and Sunset Drive	Yes
5	Gray Terrace Shopping Center.....	Racine Avenue and Roberta Avenue	Yes
6	Moreland Plaza Shopping Center.....	Moreland Boulevard and Delafield Street	Yes
7	Other ^e Broadway strip development.....	On Broadway between East Avenue and Barney Street	Yes
8	Delafield strip development.....	On Delafield Street between Madison Street and Summit Avenue	Yes
9	Grand Avenue strip development.....	On Grand Avenue between College Avenue and Williams Street	No
10	Grandview strip development.....	Intersection of Grandview Boulevard and Summit Avenue	Yes
11	Sunset Drive strip development.....	On Sunset Drive between West Avenue and Grand Avenue	No

^aAll locations are in the City of Waukesha.

^bBus stop located at or within a shopping center or shopping area.

^cDefined as a concentration of stores, including one major food store, one department store, and six minor stores and support facilities.

^dDefined as a concentration of stores, including one major food store and five minor stores and support facilities.

^eDefined as minor shopping areas, including a food store or five minor stores with support facilities.

Source: City of Waukesha Planning Department and SEWRPC.

LOCATION OF SHOPPING CENTERS IN THE WAUKESHA STUDY AREA: 1982



Table 30

EDUCATIONAL INSTITUTIONS IN THE WAUKESHA STUDY AREA: 1982

Code Number on Map 12	Educational Institution	Approximate Fall 1982 Enrollment	Address ^a	Served by Waukesha Metro Transit ^b
1	Colleges and Universities			
2	Carroll College.....	1,100	100 N. East Avenue	Yes
3	University of Wisconsin-- Waukesha County.....	2,300	1500 University Drive	Yes
	Waukesha County Technical Institute			
	Pewaukee Campus.....	11,180	800 Main Street, Village of Pewaukee	Yes
4	Waukesha Campus.....	660	400 E. Broadway	Yes
5	Middle and Senior High Schools			
6	Butler Middle School.....	1,010	310 N. Hine Avenue	Yes
7	Catholic Memorial High School....	1,020	601 E. College Avenue	Yes
8	Central Middle School.....	1,110	400 N. Grand Avenue	No
9	Horning Middle School.....	930	2000 Wolf Road	Yes
10	North High School.....	1,450	2222 Michigan Avenue	No
	South High School.....	1,690	401 E. Roberta Avenue	Yes
11	Parochial Elementary Schools			
12	Mt. Calvary Lutheran School.....	60	1941 Madison Street	No
13	St. Joseph's School.....	250	841 Martin Street	Yes
14	St. Mary's School.....	550	520 E. Newhall Avenue	Yes
15	St. William's School.....	230	444 N. Moreland Boulevard	Yes
16	Trinity Lutheran School.....	190	1060 White Rock Avenue	Yes
	Waukesha Christian Academy.....	90	W271 S2470 Merrill Hills Road, Town of Waukesha	No

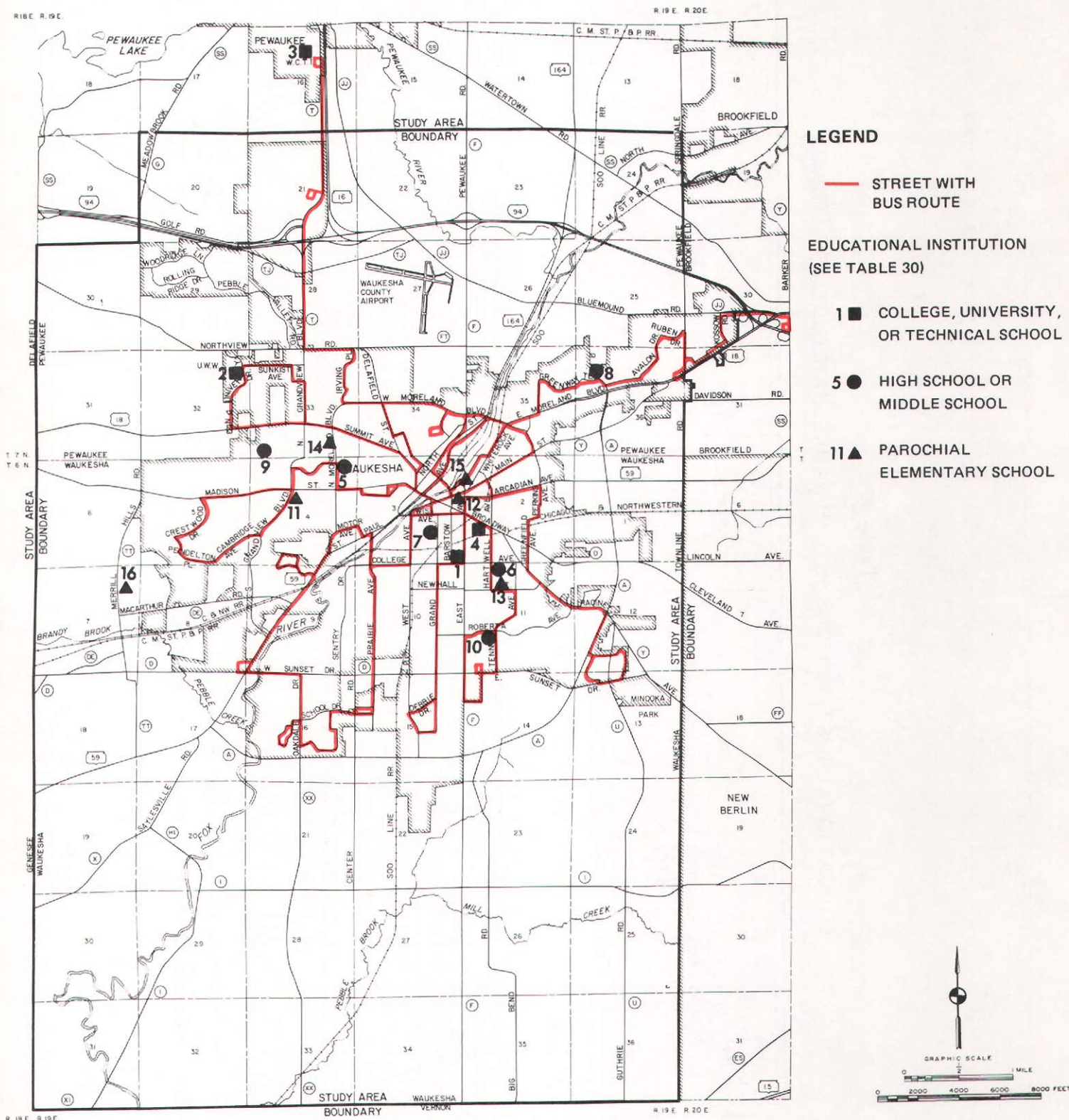
^a Except where otherwise noted, all addresses are in the City of Waukesha.

^b Bus stop located within one-eighth mile of facility.

Source: Waukesha Joint School District No. 1 and SEWRPC.

Map 12

LOCATION OF EDUCATIONAL INSTITUTIONS IN THE WAUKESHA STUDY AREA: 1982



Source: SEWRPC.

LOCATION OF MEDICAL CENTERS IN THE WAUKESHA STUDY AREA: 1982



Table 31

**COMMUNITY AND SPECIAL MEDICAL CENTERS
IN THE WAUKESHA STUDY AREA: 1982**

Code Number on Map 13	Medical Center	Address ^a	Served by Waukesha Metro Transit ^b
1	Community Medical Center ^c Waukesha Memorial Hospital.....	725 American Avenue	Yes
2	Special Medical Centers ^d Moreland Medical Clinic.....	1111 Delafield Street	Yes
3	Northview Home and Hospital....	N1 W25042 Northview Road, Town of Pewaukee	Yes
4	St. Joseph's Medical Clinic....	826 N. East Avenue	Yes

^aExcept where noted, all addresses refer to the City of Waukesha.

^bBus stop located at facility.

^cDefined as a hospital having at least 100 beds, and providing in- and out-patient facilities and laboratory and clinical services.

^dDefined as all other major medical facilities and special clinics offering multispecialty medical services.

Source: SEWRPC.

Table 32

**GOVERNMENTAL AND PUBLIC INSTITUTIONAL CENTERS
IN THE WAUKESHA STUDY AREA: 1982**

Code Number on Map 14	Institutional Center	Address ^a	Served by Waukesha Metro Transit ^b
1	Regional and County		
2	County Courthouse Annex.....	916 N. East Avenue	Yes
3	Social Security Administration.....	716 N. Barstow Street	No
4	State Office Building ^c	N. W. Barstow Street and Bank Street	Yes
5	Waukesha County Courthouse..	515 W. Moreland Boulevard	Yes
6	Waukesha County Office Building.....	500 Riverview Avenue	Yes
7	Waukesha Public Library.....	321 Wisconsin Avenue	Yes
	Wisconsin Department of Transportation ^d	310 S. West Avenue	No
8	Community and Other		
9	U. S. Post Office.....	300 E. Broadway	Yes
10	Waukesha City Hall.....	201 Delafield Street	Yes
11	Waukesha Police Department..	130 Delafield Street	Yes
	Waukesha Town Hall.....	W250 S3567 Center Road, Town of Waukesha	No
12	Waukesha Unified School District.....	222 Maple Avenue	Yes

^aExcept where otherwise noted, all addresses are in the City of Waukesha.

^bBus stop located at facility.

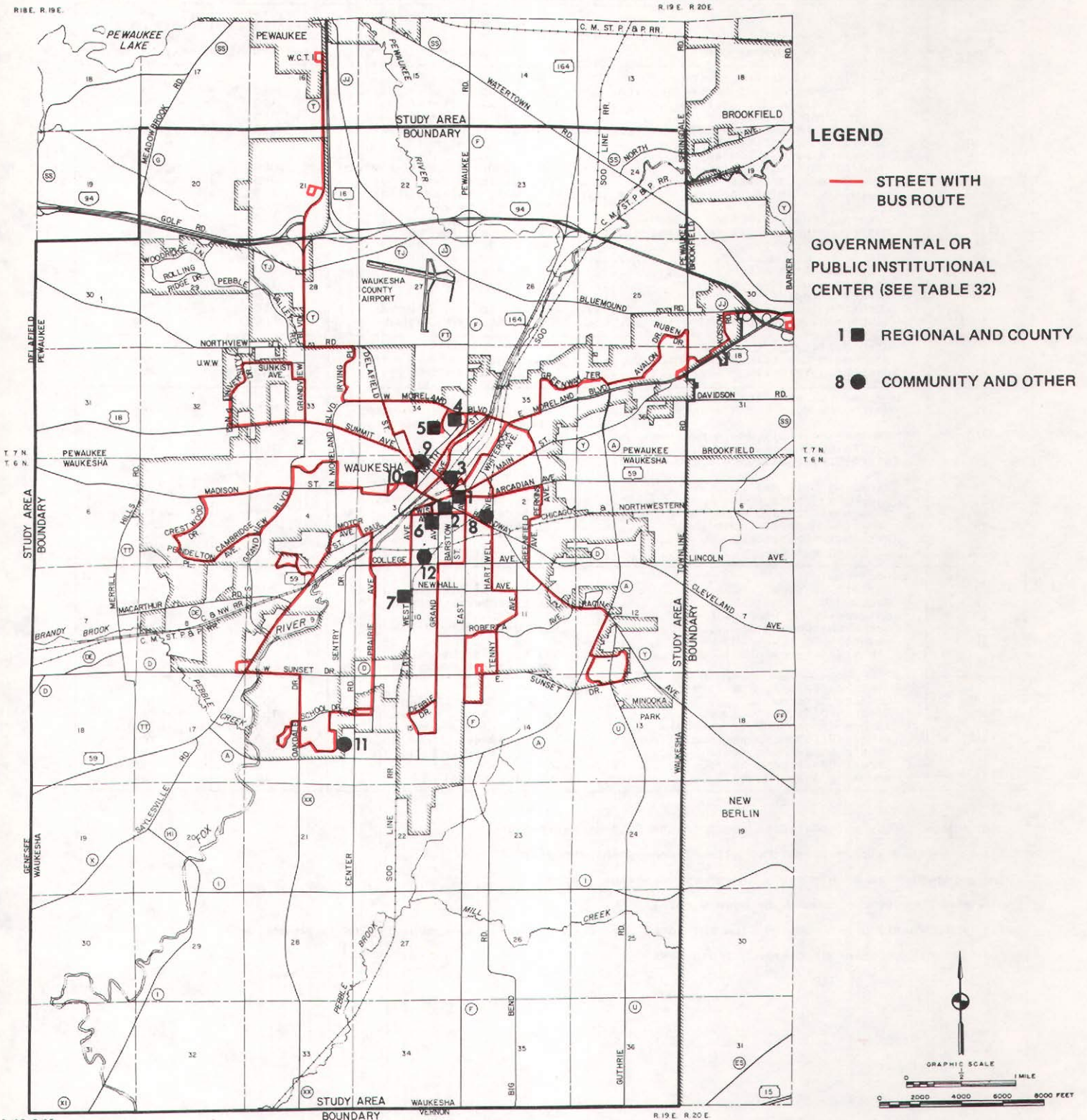
^cUnder construction.

^dThe Wisconsin Department of Transportation offices are scheduled to be moved into the State Office Building in March 1983.

Source: SEWRPC.

Map 14

LOCATION OF GOVERNMENTAL AND PUBLIC INSTITUTIONAL CENTERS IN THE WAUKESHA STUDY AREA: 1982



Source: SEWRPC.

Table 33

MAJOR EMPLOYMENT CENTERS IN THE WAUKESHA STUDY AREA: 1982

Code Number on Map 15	Employment Center	Address ^a	Total Estimated 1982 Employment	Served by Waukesha Metro Transit ^b
1	Industrial and Manufacturing			
2	ABEX Corporation-Waukesha Division...	1300 Lincoln Avenue	430	Yes
3	Alloy Products Corporation.....	1045 Perkins Avenue	190	Yes
4	Amron Corporation.....	525 Progress Avenue	260	Yes
5	Envirex, Inc.-Rexnord Company.....	1901 S. Prairie Avenue	450	Yes
6	General Castings Corporation.....	706 E. Main Street	150	Yes
7	General Electric Company-Medical Systems Division.....	3000 N. Grandview Boulevard	2,000	Yes
8	Hein-Werner Corporation.....	1200 National Avenue	250	No
9	Husco-Division of Koehring Company...	N218 W239 Pewaukee Road, Town of Pewaukee	215	No
10	International Harvester Company.....	1401 Perkins Avenue	450	No
11	Quality Aluminum Casting Company.....	1242 Lincoln Avenue	160	No
12	RTE Corporation.....	1900 E. North Street	1,400 ^c	No
13	RTE Corporation.....	1313 Lincoln Avenue	-- ^d	No
14	RTE-ASEA Corporation.....	400 S. Prairie Avenue	370	Yes
15	Waukesha Cutting Tools, Inc.....	1111 Sentry Drive	120	No
16	Waukesha Engine--Division of Dresser Industries, Inc.....	1000 W. St. Paul Avenue	1,050	Yes
17	Wisconsin Centrifugal, Inc.....	905 E. St. Paul Avenue	560	Yes
18	Public Utility			
19	Wisconsin Electric Power Company.....	2330 Bluemound Road	100	Yes
20	Wisconsin Telephone Company.....	1240 Davidson Road	160	No
21	Governmental and Institutional			
22	Northview Home and Hospital.....	N1 W25042 Northview Road, Town of Pewaukee	420	Yes
23	Southeastern Wisconsin Regional Planning Commission.....	916 N. East Avenue	100	Yes
24	State Office Building.....	N. W. Barstow Street and Bank Street	525 ^e	Yes
25	Waukesha City Hall.....	201 Delafield Street	100	Yes
26	Waukesha County Courthouse.....	515 W. Moreland Boulevard	920 ^c	Yes
27	Waukesha County Office Building.....	500 Riverview Avenue	-- ^d	Yes
28	Waukesha Memorial Hospital.....	725 American Avenue	1,470	Yes
29	Wisconsin Department of Transportation.....	310 S. West Avenue	185	No
30	Educational			
31	Carroll College.....	100 N. East Avenue	200	Yes
32	South High School.....	401 E. Roberta Avenue	140	Yes
33	University of Wisconsin-Waukesha County.....	1500 University Drive	140	Yes
34	Waukesha County Technical Institute--Pewaukee Campus.....	800 Main Street, Village of Pewaukee	440	Yes
35	Wholesale, Retail, and Finance			
36	Godfrey Company.....	1200 W. Sunset Drive	300	Yes
37	Holsum Foods.....	500 S. Prairie Avenue	150	Yes
38	Independence Bank of Waukesha.....	831 N. Grand Avenue	170	Yes
39	K-Mart Discount Department Store.....	120 E. Sunset Drive	150	Yes
40	Kohl's Department Store.....	2130 E. Moreland Boulevard	120	Yes
41	Target Department Store.....	2401 Kossow Road	210	Yes
42	Waukesha State Bank.....	100 Bank Street	110	Yes

^a Except where noted, all addresses refer to the City of Waukesha.

^b Bus stop located within one-eighth mile of employment center.

^c Total employment at both company or agency locations listed.

^d Employment included in company or agency total.

^e Building currently under construction and to be completed in 1983. Employment figure is an estimate.

Source: Waukesha Chamber of Commerce and SEWRPC.

LOCATION OF MAJOR EMPLOYMENT CENTERS IN THE WAUKESHA STUDY AREA: 1982



of a bus stop. Of the eight employment centers not located within one-eighth mile of a bus stop, only three centers--the Husco plant on Pewaukee Road, the RTE plant on North Street, and the Wisconsin Telephone Company offices on Davidson Road--are not located within one-quarter mile of a bus stop.

The 17 recreational sites identified within the study area are listed in Table 34 and located on Map 16. Only three of the recreational areas identified have no recreational facilities within one-quarter mile of a bus stop--Charles Heyer Park in the City of Waukesha and the Waukesha County Exposition Center and the Slocum Golf Club, both located in the Town of Pewaukee.

Jobs Served

In the previous section, the major employment centers located within one-eighth mile of a bus stop and the total number of jobs at each center were identified (see Table 33). While this information was useful in identifying which major employers were located within a reasonable walking distance of a bus stop, further analysis was necessary to determine the number of jobs which were effectively served by the service hours and schedules of the transit system. To facilitate this analysis, the employment by work shift was examined for each of the major employment centers located within one-eighth mile of a bus stop. This information is summarized in Table 35.

As shown within the table, there were approximately 10,900 jobs available in 1982 at the 29 major employment centers located within one-eighth mile of a bus stop. About 6,000 of the 10,900 jobs, or about 55 percent, were available at just six of the 29 major employment centers listed--General Electric Company-Medical Systems Division; Waukesha Engine-Division of Dresser Industries, Inc.; Wisconsin Centrifugal, Inc.; Waukesha Memorial Hospital; the Waukesha County Courthouse; and the Waukesha County Office Building. Of the 10,900 total jobs available, approximately 7,400 jobs, or about 68 percent, had work schedules with start and stop times within the hours of transit system operation of 6:00 a.m. to 6:00 p.m. and, on that basis, could be fully served by the public transit system. An additional 1,100 jobs, or about 10 percent, had work schedules under which only the start or the stop time fell within the hours of transit system operation and, therefore, could be only partially served by the transit system. Approximately 2,400 jobs, or about 22 percent, had work schedules which could not be readily ascertained or fell completely outside the hours of transit system operation.

Objective 1, Standard 3, states that the number of jobs served by the transit system should be maximized. For the purpose of this study, jobs are considered as fully served when scheduled transit service allows employees to arrive at their job locations no sooner than 20 minutes, but no later than five minutes before the job's scheduled start time, and allows employees to depart from their job location within 20 minutes of the job's scheduled stop time. Of the 7,400 jobs at major employment centers with work schedules falling completely within the hours of transit system operation, about 4,900 jobs had work schedules which were fully served by scheduled transit service and an additional 1,300 jobs had work schedules under which either the start or stop times were served by scheduled transit service. Of the 1,100 jobs with work schedules under which only the start or stop time falls within the hours of transit system operation, about 200 jobs had start or stop times which were served

Table 34

RECREATIONAL AREAS IN THE WAUKESHA STUDY AREA: 1982

Code Number on Map 16	Recreational Area	Location or Address ^a	Served by Waukesha Metro Transit ^b
1	Regional ^c Minooka Park.....	Sunset Drive and Racine Avenue	Yes
2	Community ^d Banting Park.....	Empire Drive and Butler Drive	Yes
3	Bethesda Park.....	Bethesda Court and Dunbar Avenue	Yes
4	Buchner Park.....	Oakland Avenue and Broadway	Yes
5	Charles Heyer Park.....	Lynne Drive and Heyer Drive	No
6	Dopp Park.....	Washington Avenue and Dopp Street	Yes
7	Frame Park.....	Baxter Street and Frame Park Drive	Yes
8	Grandview Park.....	Grandview Boulevard and Pine Street	Yes
9	Horeb Springs Park.....	Summit Avenue and Spring Street	Yes
10	Lowell Hill Park.....	Madison Street and Grandview Boulevard	Yes
11	Saratoga Softball Complex....	Prairie Avenue and Phillips Drive	Yes
12	Special ^e Cutler Park.....	Grand Avenue and Wisconsin Avenue	Yes
13	Moor Downs Golf Course.....	Moreland Boulevard and Riverview Avenue	Yes
14	Slocum Golf Club.....	N12 W26506 Golf Road, Town of Pewaukee	No
15	Waukesha County Exposition Center.....	N1 W24848 Northview Road, Town of Pewaukee	No ^f
16	YMCA.....	320 E. Broadway	Yes
17	YWCA.....	306 N. West Avenue	Yes

^aExcept where otherwise noted, all locations and addresses are in the City of Waukesha.

^bBus stop located within one-quarter mile of recreational facilities.

^cDefined as public recreation sites of at least 250 acres in size, offering multiple recreational opportunities.

^dDefined as multiple-use public recreation sites which are community-oriented in service area and which contain community recreation facilities such as baseball or softball diamonds, swimming pools, or tennis courts.

^eComprised of public and private recreational areas used primarily for special purposes.

^fWhile not served at all times by regularly scheduled bus service, the Waukesha County Exposition Center has been served by bus service when special events are scheduled at the center, including during the Waukesha County Fair.

Source: SEWRPC.

LOCATION OF RECREATIONAL AREAS IN THE WAUKESHA STUDY AREA: 1982



by scheduled transit service. In total, about 6,400 jobs at the major employment centers, or about 86 percent of the total number of jobs available, were either fully or partially served by scheduled transit service currently provided by the transit system.

The data presented in Table 35 indicate that scheduled working hours vary significantly among types of employers as well as between individual employers. At several employers, start and stop times are staggered. At other centers, working schedules for employees vary by day of the week. This variation in working times makes the provision of full transit service to all employment centers difficult and costly. Consequently, emphasis should be on serving as completely as practicable the largest employment centers. Of the 6,400 jobs which could be either fully or partially served by scheduled transit service, about 4,300 jobs, or about 67 percent, were located at five of the six largest employment centers. Of the 4,900 jobs which could be fully served by scheduled transit service, approximately 3,700 jobs, or about 76 percent, were located at five of the six largest major employment centers served by the transit system.

Transit-Dependent Population Groups Served

There are certain segments of the population whose dependence on and use of public transit are greater than that of the population as a whole. Five special population groups were considered in this study because, historically, members of these groups have had less access to the automobile as a form of travel than the population in general and, therefore, have had to rely more heavily on alternative transportation modes for mobility. These groups include school-age children, the elderly, low-income families, the handicapped, and those persons living in households with no automobile or one automobile available. Information about these groups in the Waukesha study area was obtained primarily from 1980 U. S. Census data. The census data were supplemented with additional information, including information concerning the location in 1982 of facilities used by the elderly, facilities used by the handicapped, and federally subsidized rental housing for low-income households. Selected population characteristics for the Waukesha study area are set forth in Tables 36 and 37. Inasmuch as over 95 percent of the population served by Waukesha Metro Transit resides within the City of Waukesha, the data presented within these two tables represent only the City of Waukesha component of total census tract population and household figures.

In 1980, school-age children in the 10 through 19 year old age group constituted about 18 percent of the resident population of the City of Waukesha; elderly persons constituted about 8 percent of the resident population; and members of low-income families constituted about 5 percent of the resident city population. About 45 percent of the households within the City of Waukesha had no automobile or only one automobile available for use by household members. As noted in Chapter III of this report, automobile availability is generally considered an important factor influencing transit usage.

There were no significant concentrations of school-age children within the city in any census tract. Rather, a relatively even distribution was found among all census tracts throughout the city, with the exception of Tract 2027--the Waukesha central business district--which contained a much lower-than-average percentage of school-age children. Consequently, only those

Table 35

**EMPLOYMENT BY WORK SCHEDULE AT MAJOR EMPLOYMENT CENTERS WITHIN
ONE-EIGHTH MILE SERVICE AREA OF WAUKESHA METRO TRANSIT: FALL 1982**

Employment Category	Employment Center	Address ^a	Total Employment		Employment Served ^b	
			Scheduled Hours	Employees	Fully ^c	Partially
Industrial and Manufacturing	ABEX Corporation-Waukesha Division	1300 Lincoln Avenue	7:00 a.m.-3:30 p.m. 3:30 p.m.-11:00 p.m. 11:00 p.m.-7:00 a.m. Total	350 40 40 430	-- -- -- --	350 ^d -- -- 350
	Alloy Products Corporation	1045 Perkins Avenue	7:00 a.m.-3:30 p.m. 8:00 a.m.-5:00 p.m. Total	145 45 190	145 45 190	-- -- --
	Amron Corporation	525 Progress Avenue	7:00 a.m.-3:30 p.m. 7:45 a.m.-4:15 p.m. 3:30 p.m.-12:00 a.m. Total	170 80 10 260	-- -- -- --	-- -- -- --
	Envirex, Inc.-Rexnord Company	1901 S. Prairie Avenue	7:00 a.m.-3:30 p.m. 7:30 a.m.-4:15 p.m. Total	80 370 450	-- 370 370	-- -- --
	General Castings Corporation	706 E. Main Street	9:00 p.m.-5:00 a.m. Total	140 140	-- --	-- --
	General Electric Company-Medical Systems Division	3000 N. Grandview Boulevard	6:45 a.m.-3:15 p.m. 7:00 a.m.-3:30 p.m. 8:15 a.m.-4:45 p.m. Total	500 500 1,000 2,000	500 500 1,000 2,000	-- -- -- --
	Quality Aluminum Casting Company	1242 Lincoln Avenue	6:00 a.m.-2:00 p.m. 8:00 a.m.-4:30 p.m. 2:00 p.m.-10:00 p.m. 10:00 p.m.-6:00 a.m. Total	80 40 30 10 160	-- -- -- -- --	80 ^e 40 ^d -- 10 ^e 130
	RTE-ASEA Corporation	400 S. Prairie Avenue	7:00 a.m.-3:00 p.m. 3:00 p.m.-11:00 p.m. 11:00 p.m.-7:00 a.m. Total	270 60 40 370	-- -- -- --	-- -- -- --
	Waukesha Engine-Division of Dresser Industries, Inc.	1000 W. St. Paul Avenue	7:00 a.m.-3:30 p.m. 7:30 a.m.-4:30 p.m. 3:30 p.m.-12:00 p.m. Total	510 500 40 1,050	510 -- -- 520	-- 500 ^e -- 500
	Wisconsin Centrifugal, Inc.	905 E. St. Paul Avenue	6:30 a.m.-2:30 p.m. 6:30 a.m.-4:00 p.m. 7:00 a.m.-3:30 p.m. 8:00 a.m.-4:30 p.m. 8:00 a.m.-5:00 p.m. 2:30 p.m.-10:30 p.m. 9:00 p.m.-6:30 a.m. 10:30 p.m.-6:30 a.m. 10:30 p.m.-7:00 a.m. Other Total	30 20 90 50 110 30 20 20 90 100 560	30 20 90 50 110 -- -- -- -- -- 300	-- -- -- -- -- -- 20 ^e 20 ^e -- -- 40

Table 35 (continued)

Employment Category	Employment Center	Address	Total Employment		Employment Served	
			Scheduled Hours	Employees	Fully	Partially
Industrial and Manufacturing	Wisconsin Electric Power Company	2330 Bluemound Road	7:00 a.m.-3:30 p.m.	50	--	--
			7:30 a.m.-4:30 p.m.	25	--	--
			8:00 a.m.-5:00 p.m.	25	--	--
			Total	100	--	--
Governmental and Institutional	Northview Home and Hospital	N1 W25042 Northview Road, Town of Pewaukee	6:30 a.m.-3:00 p.m.	140	--	140 ^d
			3:00 p.m.-11:00 p.m.	140	--	--
			11:00 p.m.-6:30 a.m.	140	--	--
			Total	420	--	140
	Southeastern Wisconsin Regional Planning Commission	916 N. East Avenue	8:00 a.m.-5:00 p.m.	100	100	--
	Waukesha City Hall	201 Delafield Street	8:00 a.m.-4:30 p.m.	100	100	--
Educational	Carroll College	100 N. East Avenue	5:00 a.m.-2:00 p.m.	15	--	--
			7:30 a.m.-4:00 p.m.	25	25	--
			8:00 a.m.-4:30 p.m.	80	80	--
			Other	80	-- ^f	-- ^f
Total	200	105	--	--		
Educational	South High School	401 E. Roberta Avenue	7:00 a.m.-4:00 p.m.	40	40	--
			7:20 a.m.-3:15 p.m.	90	--	--
			4:00 p.m.-11:00 p.m.	10	--	--
			Total	140	40	--
Educational	University of Wisconsin-Waukesha County	1500 University Drive	7:30 a.m.-3:30 p.m.	5	5	--
			7:45 a.m.-4:30 p.m.	20	20	--
			8:00 a.m.-5:00 p.m.	10	--	--
			4:30 p.m.-11:30 p.m.	10	--	--
Other ^g	95	-- ^f	-- ^f			
Total	140	--	--			
Educational	Waukesha County Technical Institute--Pewaukee Campus	800 Main Street, Village of Pewaukee	7:30 a.m.-4:30 p.m.	180	--	180 ^e
			8:00 a.m.-5:00 p.m.	100	--	--
			Other ^h	160	-- ^f	-- ^f
			Total	440	--	--

Table 35 (continued)

Employment Category	Employment Center	Address	Total Employment		Employment Served	
			Scheduled Hours	Employees	Fully	Partially
Wholesale, Retail, and Finance	Godfrey Company	1200 W. Sunset Avenue	6:00 a.m.-2:30 p.m. 7:00 a.m.-3:30 p.m. 8:00 a.m.-4:30 p.m. 3:00 p.m.-11:30 p.m. Total	90 10 140 60 300	-- -- -- -- --	-- -- -- -- --
	Holsum Foods	500 S. Prairie Avenue	7:00 a.m.-3:30 p.m. 8:30 a.m.-5:00 p.m. 3:30 p.m.-12:00 a.m. 12:00 a.m.-7:00 a.m. Total	60 50 30 10 150	-- -- -- -- --	-- 50 ^d -- -- 50
	Independence Bank of Waukesha	831 N. Grand Avenue	8:00 a.m.-4:30 p.m. 8:30 a.m.-5:00 p.m. Total	85 85 170	85 85 170	-- -- --
	K-Mart Discount Department Store	120 E. Sunset Drive	Varies by day of week between 7:00 a.m.-10:30 p.m.	150	-- ^f	-- ^f
	Kohl's Department Store	2130 E. Moreland Boulevard	9:00 a.m.-5:00 p.m. 5:00 p.m.-9:00 p.m. Total	40 80 120	-- -- --	40 ^e 80 ^d 120
	Target Department Store	2401 Kossow Road	Varies by day of week between 8:00 a.m.-11:00 p.m.	210	-- ^f	-- ^f
Total	Waukesha State Bank	100 Bank Street	8:30 a.m.-5:00 p.m.	110	110	--
				10,890	4,940	1,510

^a Except where noted, all addresses refer to the City of Waukesha.

^b Scheduled bus service is available to enable employees to arrive at employment center no sooner than 20 minutes but not later than five minutes before scheduled start time, and to depart from employment center within 20 minutes of scheduled stop time.

^c Both start and stop times are served by scheduled bus service.

^d Start times only served.

^e Stop times only served.

^f Cannot be determined from data available.

^g Includes office and class hours for faculty which vary by day, generally between 7:00 a.m. and 5:00 p.m.

^h Includes office and class hours for faculty which vary by day, generally between 7:30 and 2:30 p.m.

Source: SEWRPC.

Table 36

**SELECTED CHARACTERISTICS OF THE CITY OF WAUKESHA
RESIDENT POPULATION BY CENSUS TRACT: 1980**

Census Tract Number	Total City Population	School-Age Children ^a		Elderly ^b		Low-Income ^c	
		Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
2016	16	-- d	--	-- d	--	-- d	--
2021	1,760	272	15.3	18	1.1	123	6.8
2022	6,041	933	15.4	546	9.1	221	3.6
2023	9,156	1,568	17.1	538	5.9	622	6.8
2024	5,007	1,149	22.7	348	7.0	156	3.2
2025	3,476	563	16.1	416	12.1	181	5.2
2026	3,140	505	15.9	503	15.9	252	8.0
2027	1,232	116	9.8	331	26.8	207	17.1
2028	3,720	558	15.1	557	15.1	210	5.6
2029	3,716	748	20.2	106	3.0	62	1.6
2030	1,706	288	17.0	136	8.2	147	8.8
2031	11,350	2,186	19.3	710	6.3	322	2.8
Total	50,319	8,886	17.7	4,209	8.4	2,503	5.0

^aAges 10 through 19 inclusive.

^bAged 65 years old or older.

^cFamily income below federal poverty threshold. Poverty thresholds for families in 1979 as defined by the U. S. Bureau of the Census are shown in the following table:

Size of Family Unit	Thresholds	Related Children Under 18 Years								
		None	1	2	3	4	5	6	7	8 or More
1 Person (unrelated individual). Under 65 Years..... 65 Years and Over.....	\$ 3,686 3,774 3,479	\$ 3,774 3,479								
2 Persons..... Householder Under 65 Years..... Householder 65 Years and Over.....	4,723 4,876 4,389									
3 Persons.....	5,787	5,674	5,839	\$ 5,844	\$ 7,382					
4 Persons.....	7,412	7,482	7,605	7,356						
5 Persons.....	8,776	9,023	9,154	8,874	8,657	\$ 8,525	\$ 9,512			
6 Persons.....	9,915	10,378	10,419	10,205	9,999	9,693				
7 Persons.....	11,237	11,941	12,016	11,759	11,580	11,246	\$ 10,857	\$10,429	\$11,835	\$14,024
8 Persons.....	12,484	13,356	13,473	13,231	13,018	12,717	12,334	11,936		
9 Persons or More.....	14,812	16,066	16,144	15,929	15,749	15,453	15,046	14,677	14,586	

^dData suppressed by U. S. Bureau of the Census.

Source: SEWRPC.

Table 37

**DISTRIBUTION OF HOUSEHOLDS WITHIN THE CITY OF WAUKESHA
WITH ZERO OR ONE AUTOMOBILE AVAILABLE BY CENSUS TRACT: 1980**

Census Tract Number	Number of Households Within City			Percent of Total Households With Zero or One Automobile Available
	Households With Zero Automobiles Available	Households With One Automobile Available	Total Households	
2016	-- ^a	-- ^a	8	--
2021	5	226	622	37.1
2022	147	679	1,975	41.8
2023	117	1,296	3,231	43.7
2024	17	405	1,454	29.0
2025	74	590	1,338	49.6
2026	311	698	1,342	75.2
2027	264	254	616	84.1
2028	227	567	1,301	61.0
2029	--	379	1,300	29.2
2030	55	253	664	46.4
2931	133	1,245	3,793	36.3
Total	1,350	6,592	17,644	45.0

^a Data suppressed by U. S. Bureau of the Census.

Source: U. S. Bureau of the Census and SEWRPC.

school-age children, as well as the general population residing within the Pebble Valley and The Windings subdivision area of the city located in Tract 2031 were not served by the public transit system.

Significant concentrations--over 10 percent of total tract population--of elderly city residents were found in Tracts 2025, 2026, and 2028. Significant concentrations of both elderly and low-income city residents were found in Tract 2027. Tracts 2026, 2027, and 2028 also contained the heaviest concentrations of households within the City having no automobile or only one automobile available for use by household members. These four census tracts accordingly may be considered as high-priority areas for transit service. These high-priority areas are shown on Map 17. Only small portions of the residential sections of these areas are currently not within one-quarter mile of a bus route and, consequently, are not served by the transit system.

Although census information provided a general indication of residential location, it was considered important, with regard to the elderly, to identify specific locations of concentrations of elderly population groups and facilities used by the elderly. To this purpose, places frequently used by the elderly for care and recreation purposes, along with the location of retirement homes, elderly housing complexes, and nutrition sites were identified in the Waukesha study area in 1982. These facilities are listed in Table 38 and located on Map 18. Of the 11 facilities for the elderly identified in this study, two facilities--the Virginia Nursing Home and Avalon Manor--were not directly served by the public transit system.

The locations of special federally subsidized rental housing for low-income families and individuals were also identified within the study area in 1982. These facilities are listed in Table 39 and located on Map 19. All facilities identified were served by the transit system.

HIGH PRIORITY AREAS FOR TRANSIT SERVICE WITHIN THE CITY OF WAUKESHA: 1980



Table 38

**FACILITIES FOR THE ELDERLY WITHIN
THE WAUKESHA STUDY AREA: 1982**

Code Number on Map 18	Facility	Address ^a	Served by Waukesha Metro Transit ^b
1	Nursing Homes		
	Northview Home and Hospital..	N1 W25042 Northview Road, Town of Pewaukee	Yes
2	Virginia Nursing Home.....	1471 Waukesha Avenue	No
3	Westmoreland Manor.....	1810 Kensington Drive	Yes
	Retirement Homes and Housing Complexes		
4	Avalon Manor.....	222 Park Place	No
5	East Terrace Apartments.....	801 N. East Avenue	Yes
6	Oak Hill Village.....	1800 Kensington Drive	Yes
7	Saratoga Heights ^c	120 Corrina Boulevard	Yes
8	Senior House.....	825 Pleasant Street	Yes
9	Willow Park ^c	1001 Delafield Street	Yes
	Senior Centers		
10	C. F. Schuetze Building.....	1120 Baxter Street	Yes
11	La Casa de Esperanza, Inc. ^c ..	410 Arcadian Avenue	Yes

^aExcept where otherwise noted, all addresses are in the City of Waukesha.

^bBus stop located at facility.

^cFacility also serves as a site for special elderly nutrition program.

Source: SEWRPC.

Table 39

**FEDERALLY SUBSIDIZED RENTAL HOUSING
IN THE WAUKESHA STUDY AREA: 1982**

Code Number on Map 19	Project Name	Number of Units ^a	Address ^b	Served by Waukesha Metro Transit ^c
1	East Terrace Apartments...	130	801 N. East Avenue	Yes
2	Saratoga Heights.....	119	120 Corrina Boulevard	Yes
3	Senior House.....	32	825 Pleasant Street	Yes
4	Sunset Apartments.....	71	1512 Big Bend Road	Yes
5	Westwood Heights.....	40	1705-1709 Elder Street	Yes
6	Willow Park.....	146	1001 Delafield Street	Yes

^aExcludes units known to be used as offices or as resident manager and caretaker units.

^bAll addresses refer to the City of Waukesha.

^cBus stop located at facility for those facilities with primarily elderly residents; otherwise, bus stop located within one-quarter mile of a facility.

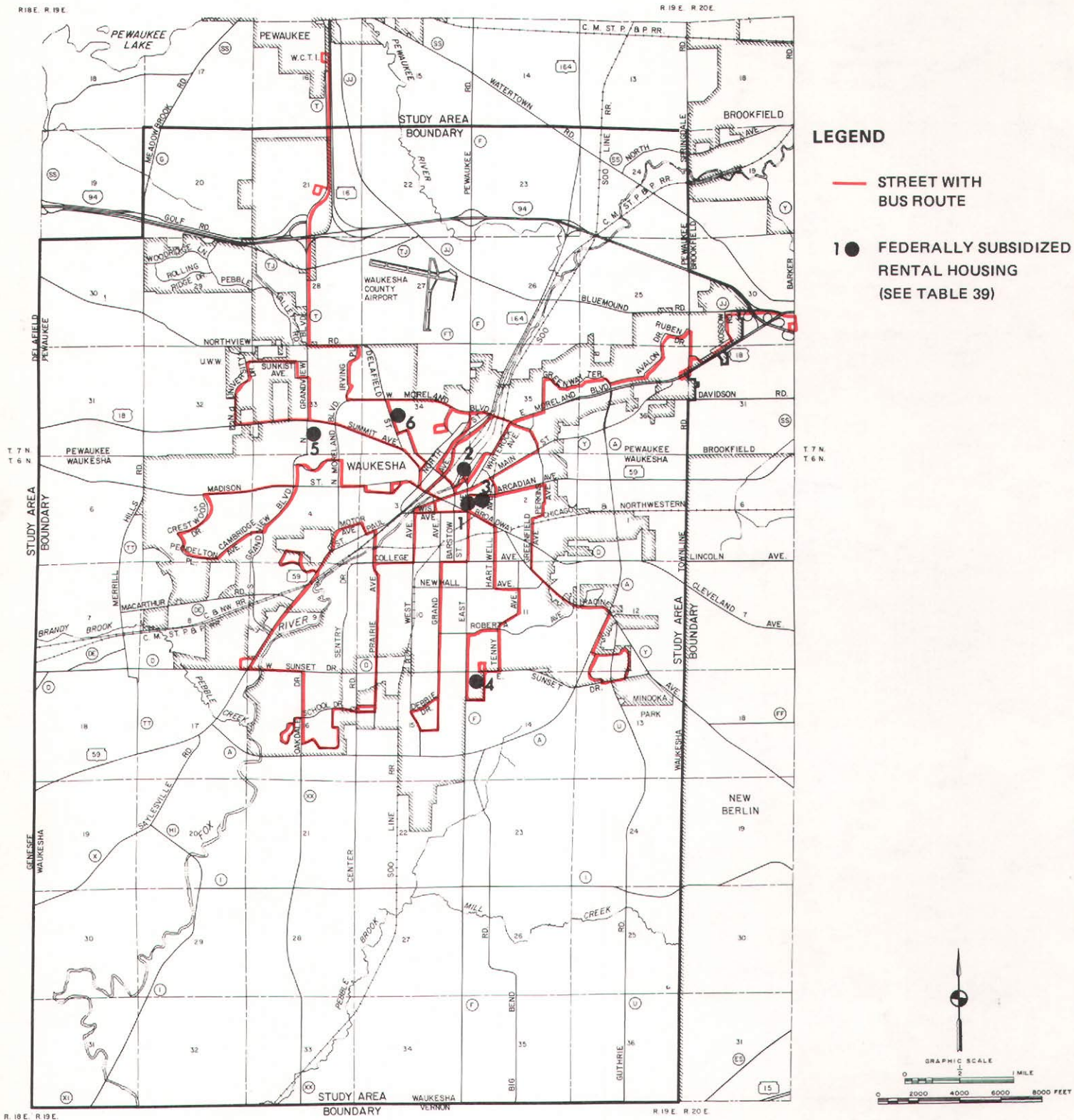
Source: SEWRPC.

LOCATION OF FACILITIES FOR THE ELDERLY
IN THE WAUKESHA STUDY AREA: 1982



Map 19

LOCATION OF FEDERALLY SUBSIDIZED RENTAL HOUSING IN THE WAUKESHA STUDY AREA: 1982



Source: SEWRPC.

The fixed route transit service provided by Waukesha Metro Transit is not currently accessible, or planned to be made accessible, to nonambulatory or wheelchair-bound handicapped individuals. A separate program operated by Waukesha Metro Transit--Metrolift--provides eligible nonambulatory handicapped persons with door-to-door specialized transportation service within the regular quarter-mile service area of the fixed bus routes. Because this study is concerned only with the operation of the fixed bus routes, the analysis of the transit service provided to handicapped individuals was directed toward ambulatory handicapped individuals, including developmentally disabled persons. Section 55.06(18) of the Wisconsin Statutes prohibits the release of names and addresses of handicapped clients of the Wisconsin Department of Health and Social Services, Division of Vocational Rehabilitation. Therefore, the locations of such individuals cannot be readily ascertained. It is possible, however, to identify the locations frequently used by these handicapped individuals for residential care or educational purposes. The locations include housing and residential care facilities, rehabilitation and sheltered employment facilities, and schools with special education programs. Such facilities in the study area in 1982 are listed in Table 40 and located on Map 20. Of the 11 facilities identified in the table, five--the Waukesha Training Center, Northview Home, Westmoreland Manor, West Avenue Home, and the Pewaukee Campus

Table 40

FACILITIES FOR THE HANDICAPPED IN
THE WAUKESHA STUDY AREA: 1982

Code Number on Map 20	Facility	Address ^a	Served by Waukesha Metro Transit ^b
1	Curative Workshops Waukesha Training Center.....	300 S. Prairie Avenue	Yes
2	Nursing Homes Northview Home and Hospital.....	N1 W25042 Northview Road, Town of Pewaukee	Yes
3	Virginia Nursing Home.....	1471 Waukesha Avenue	No
4	Westmoreland Manor.....	1810 Kensington Drive	Yes
5	Group Homes College Avenue Apartments.....	227 W. College Avenue	No
6	Nelson House.....	520 N. Grand Avenue	No
7	Transition Home.....	123 McCall Street	No
8	Volunteers of America Child and Adult Home.....	722 Luke Avenue	No
9	West Avenue Home.....	516 N. West Avenue	Yes
10	Schools Offering Special Education Waukesha County Technical Institute Pewaukee Campus.....	800 Main Street, Village of Pewaukee	Yes
11	Waukesha Campus.....	400 E. Broadway	No

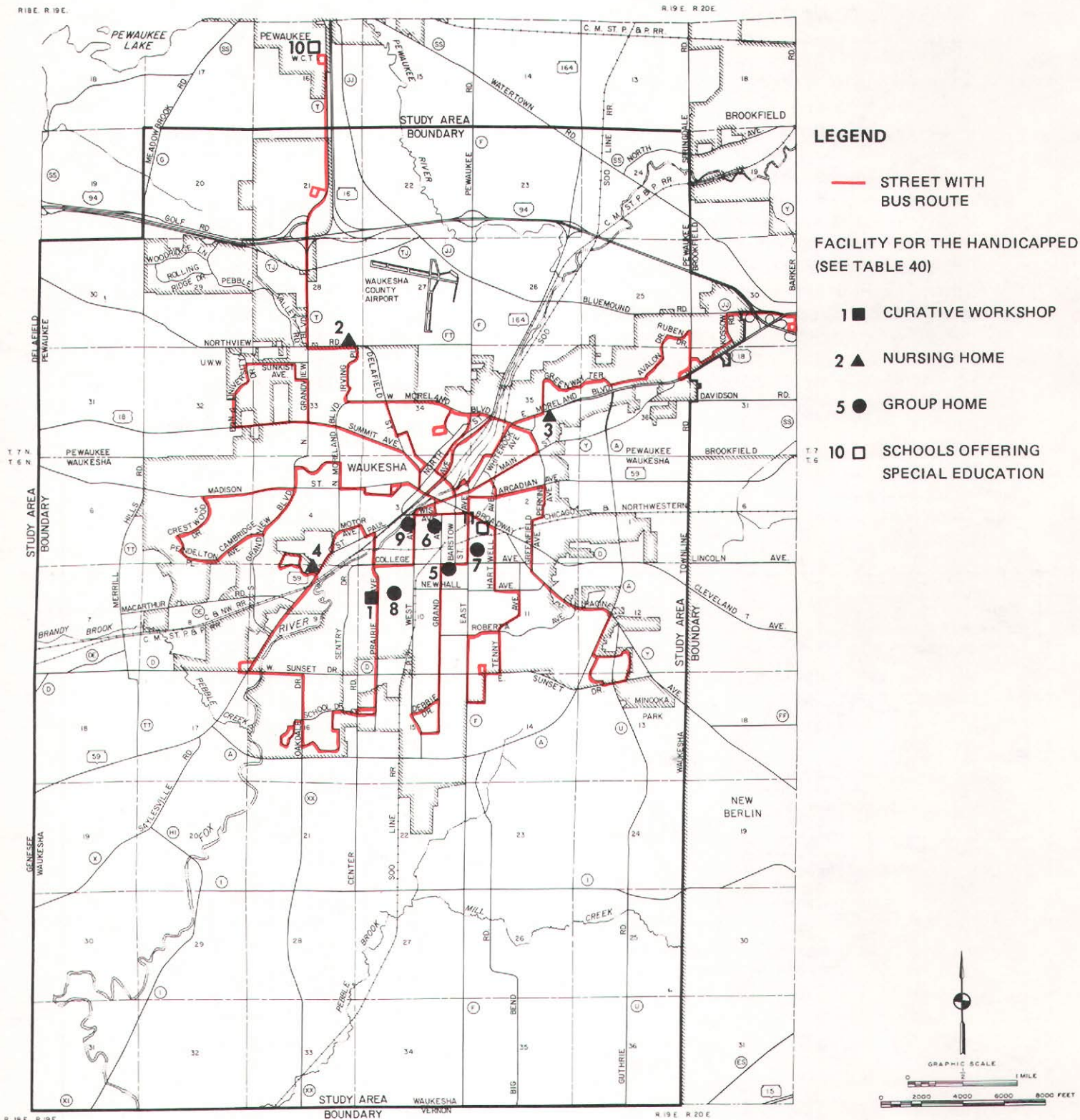
^aExcept where otherwise noted, all addresses are in the City of Waukesha.

^bBus stop located at facility.

Source: Waukesha County Department of Social Services and SEWRPC.

Map 20

LOCATION OF FACILITIES FOR THE HANDICAPPED IN THE WAUKESHA STUDY AREA: 1982



Source: Waukesha County Department of Social Services and SEWRPC.

Northview Home, Westmoreland Manor, West Avenue Home, and the Pewaukee Campus of the Waukesha County Technical Institute--were directly served by the transit system. However, the remaining six facilities were all located within less than one-eighth mile of a bus stop.

Comparison of Transit and Automobile Travel Times

In order to measure the ability of the transit system to compete with the automobile, travel time ratios were developed by dividing average transit travel times by average automobile travel times for travel between selected locations within the transit service area. Automobile travel times were derived by conducting special surveys of automobile running times between the locations along minimum travel time paths. Transit travel times were derived from the average scheduled running times published for each route for fall 1982. Travel time ratios were calculated for both peak and off-peak travel periods for both downtown-oriented trips to and from locations on the nine radial bus routes, and for crosstown-oriented trips to and from major travel generators.

As noted within Chapter III, the Waukesha central business district both produced and attracted the largest volume of total person trips made by residents of the City of Waukesha on an average weekday in 1982. Accordingly, travel time ratios were calculated for travel between the intersection of W. Main Street and W. Broadway in the Waukesha central business district and outlying termini of the nine radial city bus routes. These travel time ratios are presented in Table 41. Travel time ratios greater than two--indicating travel times by transit were over twice as long as travel times by automobile--were found on Routes 1, 6, and 9. These three routes were the longest routes operated by the transit system and serve the residential areas and major travel generators most distant from the central business district. When compared with the minimum time path automobile travel routes, these three transit routes more were indirect and circuitous. This indirection in transit routing is the result of efforts to completely serve the major trip generators and residential areas along the routes while satisfying the operational requirements of pulse scheduling. The pulse scheduling used by the transit system requires a total running time for these routes approaching 30 minutes in order to maximize vehicle and driver productivity.

Travel time ratios were also calculated for some typical crosstown-oriented trips made between residential areas within the City and selected major travel generators, including the University of Wisconsin-Waukesha, the Waukesha County Technical Institute, the Waukesha County Office Building, the K-Mart Discount Department Store, and the Target Department Store. These travel time ratios are also presented in Table 41. Crosstown travel on the transit system requires all passengers to travel through the Waukesha central business district, where buses lay over for a short time at a common location while passengers transfer between bus routes. Consequently, crosstown travel by transit is more indirect and time consuming than crosstown travel by automobile, resulting in travel time ratios generally exceeding two. In addition, because buses from all bus routes do not meet at the common transfer point at the same time during the midday off-peak period, the time required to transfer between these bus routes can be significant, accounting for about 30 minutes of the total travel time required for some crosstown trips made by transit and resulting in travel time ratios exceeding five.

Table 41

**TRANSIT-TO-AUTOMOBILE TRAVEL TIME RATIOS FOR TRAVEL
BETWEEN SELECTED LOCATIONS SERVED BY WAUKESHA METRO TRANSIT**

Bus Route	Termini for Travel Time Measurements	Average Travel Time (minutes)								
		A.M. Peak			Off-Peak			P.M. Peak		
		Auto	Transit	Ratio ^a	Auto	Transit	Ratio ^a	Auto	Transit	Ratio ^a
Downtown-Oriented Travel										
1 Westbrook/Target...	Goerkes Corners Public Transit Station and Waukesha central business district	12	23	1.9	12	26	2.2	12	30	2.5
2 Arcadian/Racine....	Intersection of Sunset Drive/Blackhawk Trail and Waukesha central business district	10	13	1.3	9	13	1.4	10	14	1.4
3 Hartwell.....	K-Mart Discount Department Store and Waukesha central business district	8	13	1.6	8	14	1.7	8	13	1.6
4 Grand.....	Intersection of Madera Street/Sentinel Drive and Waukesha central business district	10	12	1.2	9	12	1.3	10	13	1.3
5 Prairie.....	Intersection of School Drive/Prairie Avenue and Waukesha central business district	8	12	1.5	--	--	--	--	--	--
6 Fox Run.....	Intersection of Waterview Lane/Haymarket Drive and Waukesha central business district	10	22	2.2	10	24	2.4	10	21	2.1
7 Madison.....	Intersection of Commanche Lane/Pendelton Place and Waukesha central business district	10	15	1.5	10	15	1.5	10	12	1.2
8 Summit.....	Intersection of University Drive/Sunkist Avenue and Waukesha central business district	9	15	1.7	9	14	1.6	9	12	1.3
9 Northview.....	Waukesha County Technical Institute and Waukesha central business district	12	25	2.1	13	19	1.5	12	26	2.2
Crosstown-Oriented Travel										
6 Fox Run	Intersection of Waterview Lane/Haymarket Drive and intersection of University Drive/Sunkist Avenue	12	37	3.1	12	68	5.7	12	38	3.2
8 Summit.....										
6 Fox Run	Intersection of Waterview Lane/Haymarket Drive and Target Department Store	--	--	--	14	52	3.7	14	46	3.3
1 Westbrook/Target...										
4 Grand	Intersection of Sentinel Drive/Madera Street and Waukesha County Office Building	10	21	2.1	10	58	5.8	10	23	2.3
9 Northview										
10 Courthouse Loop....	Intersection of College Avenue/Hartwell Avenue and Waukesha County Technical Institute	14	35	2.5	15	28	1.9	14	32	2.3
3 Hartwell										
9 Northview.....	Intersection of Manhattan Drive/Greenway Terrace and K-Mart Discount Department Store	--	--	--	8	26	3.2	8	30	3.7
1 Westbrook/Target										
3 Hartwell.....										

^aRatio of transit travel times to automobile travel times.

Source: SEWRPC.

Transit Service Relative to Existing Travel Habits and Patterns

The previous sections of the chapter have provided an indication of the extent of areal coverage of the transit system with regard to residential areas and major traffic generators in the City of Waukesha and environs. It is also important to determine how well the transit system serves the trips generated by the land use areas served. Accordingly, an analysis was conducted to determine how well the transit system, as currently operated, is capable of serving travel demand, specifically the origin-destination pattern of the total person trips made by residents of the City of Waukesha within the service area of the transit system, and the origin-destination pattern of trips made by transit system passengers.

Total Person Travel: As noted within Chapter III of this report, about 99,100 person trips were made internal to the study area by City of Waukesha residents on an average weekday during 1982. Of this total, about 88,500 person trips, or about 89 percent, were made entirely within the portion of the study area served by the Waukesha transit system. This analysis would indicate that the current service area of the Waukesha transit system accommodates the vast majority of internal origins and destinations of Waukesha tripmakers.

In addition to the 88,500 internal person trips made within the transit service area, about 600 internal-external trips were made between the portion of the transit service area within the study area and the Pewaukee campus of the Waukesha County Technical Institute--the major external trip generator served by the transit system. A total of about 89,100 person trips were consequently made by City of Waukesha residents within the transit service area on an average weekday. Further analysis of the person trips made within the transit service area indicates that about 66,100 person trips, or about 74 percent, were made during the period between 6:00 a.m. and 6:00 p.m.--the approximate hours of transit system operation. This would indicate that the current hours of transit system operation are appropriate for the majority of trips made within the transit service area.

A more detailed analysis of the average weekday origin-destination patterns of trips made within the transit service area was conducted to ascertain how well the trips were served by the current route structure. This analysis indicated that about 44,000 trips, or about 67 percent of the 66,100 person trips made within the transit service area during the approximate hours of transit system operation, could potentially be conveniently served using the routes of the existing transit system. More specifically, about 32,000 of the 44,000 person trips were determined to have origins and destinations within the service area of a single bus route and, therefore, have the potential to be completed without transferring to another bus route. About 12,000 of the 44,000 trips were determined to have the potential to be conveniently completed by transferring to a bus route traveling in the same general direction as the first bus route. Use of the routes of the transit system to complete the remaining 22,100 trips which possibly could be made on the transit system would result in indirect or circuitous travel between origin and destination.

The extent to which the transit system is capable of conveniently serving the trips made on an average weekday within the transit service area is graphically shown on Maps 21 through 23. These maps show the desire lines of travel for

MAJOR TRAVEL DESIRE LINES FOR AVERAGE
WEEKDAY TOTAL PERSON TRIPS WHICH COULD BE
CONVENIENTLY SERVED BY ONE BUS ROUTE: 1982



MAJOR TRAVEL DESIRE LINES FOR AVERAGE WEEKDAY
TOTAL PERSON TRIPS WHICH COULD BE CONVENIENTLY
SERVED BY TWO BUS ROUTES WITH A TRANSFER: 1982



MAJOR TRAVEL DESIRE LINES FOR AVERAGE WEEKDAY
TOTAL PERSON TRIPS WHICH ARE NOT CONVENIENTLY
SERVED BY ROUTES OF THE TRANSIT SYSTEM: 1982



major trip movements--200 trips or more--between quarter sections within the transit service area for the three categories of trips discussed in the preceding paragraph.

It is important to note the most significant volumes of trips which could potentially be directly served by a single route of the transit system, as shown on Map 21, were centered primarily on the Waukesha central business district. This is not totally unexpected because the central business district is both the largest attractor of trips made by city residents within the service area and the focus of all routes of the transit system. By comparison, trips which could potentially be conveniently completed on the transit system with a transfer, as shown on Map 22, are of significantly lower volumes, and are not really concentrated on any particular area.

Map 23 shows the desire lines of travel for person trips made within the transit service area which are not conveniently served by the existing route structure. While the majority of the trip movements depicted are of low volume, a significant concentration of low- and moderate-volume trip movements was found to be centered on the quarter section containing the K-Mart/Pick 'N Save shopping area, South High School, and Whittier public elementary school. This quarter section is the second largest trip attractor within the service area and attracts primarily shopping and school trips from residential areas of the City south of Sunset Drive, as well as from within the southeast quadrant of the City--areas of the City presently served by Routes 2, 4, and 6. Trips made on the transit system between these areas and the traffic generators in this quarter section presently must travel in a northerly direction to the central business district on Routes 2, 4, or 6, transfer to Route 3 in the central business district, and travel south on Route 3 to the traffic generators in the quarter section. The feasibility of restructuring Routes 2, 4, and 6 to serve traffic generators in this quarter section should be reviewed.

Whereas the preceding discussion has focused on the origin-destination pattern of total person trips made within the transit service area during the hours of system operation, nearly one-third of the total person trips made within the transit service area, or about 23,000 trips, are made outside the hours of transit system operation. Of this number, about 19,100 person trips are made between the hours of 6:00 p.m. and 10:00 p.m. Nearly 82 percent of the trips made during this evening period are for home-based shopping or home-based other trip purposes--about 26 percent and 56 percent, respectively. Map 24 shows the major desire lines of travel for trips made within the transit service area during this evening period. As can be seen from the map, the major trip movements still focus on the Waukesha central business district, but are significantly fewer and lower in volume of trips. The pattern of desired travel indicates that if the transit system were to extend service into the evening period, it should still focus on the Waukesha central business district. The pattern of trip movements shown on the map would also indicate a need to operate most, if not all, routes of the transit system during this period.

Transit System Passenger Travel: An analysis of the origin-destination patterns of bus passengers was also conducted, using the results of the on-board bus survey conducted by the Commission in May 1982. The transit system carried 767 revenue passengers on the survey day. Of this number, 586 revenue passengers, or about 76 percent of the total, were able to complete their trip on

MAJOR TRAVEL DESIRE LINES FOR AVERAGE WEEKDAY TOTAL
PERSON TRIPS WITHIN THE TRANSIT SERVICE AREA MADE
BETWEEN THE HOURS OF 6:00 P.M. AND 10:00 P.M.: 1982



the survey day using only one bus route. Map 25 shows the desire lines of travel for the major trip movements in this category. As can be seen from this map, a majority of the trips completed using one bus route were focused on the Waukesha central business district, which is directly served by all routes. A second area on which many trip movements were focused was the quarter section immediately south of the central business district which contains several major trip generators, including Central Middle School. Major trip movements focused on this quarter section can be primarily attributed to the proximity of residential areas and major traffic generators in this quarter section to bus stops for all routes located in the central business district. Bus patrons, consequently, are able to walk between these stops and their origins and destinations in this quarter section.

A transfer to a second bus route to complete a trip on the transit system was needed by 181 revenue passengers, or about 24 percent of the total, on the survey day. The desire lines of travel for major movements of these transfer trips is shown on Map 26. The major trip movements shown on the map were all of low volume and represent crosstown trips which can be conveniently served by the routes of the transit system even with the required transfer. No major trip movements were found for crosstown trips which would be considered as inconveniently served by the routes of the transit system.

The analysis of the origin-destination patterns of bus passengers would indicate that the routes of the transit system are capable of conveniently serving the vast majority of trips made on the transit system.

Conclusions Drawn from Evaluation of Transit Service Provided to Land Uses

Based upon the systemwide performance evaluation, it may be concluded that the transit system provides excellent areal coverage of the residential areas of the City of Waukesha, with only the Pebble Valley and The Windings subdivisions on the northwest side of the City being without service. Extension of transit service into this area should be considered, particularly to provide access to Waukesha schools for the school-age population.

The transit system also provides good coverage of the major traffic generators identified within the study area, serving 60 of the 83 major traffic generators existing in the City and environs in 1982. Only seven of the 23 major traffic generators not considered as served by the transit system are not located within one-quarter mile of a bus stop--a maximum walking distance for transit users based on accepted standards within the transit industry. Consideration should be given to providing improved transit service to North High School, which has an enrollment of about 1,450 students, and also to the industrial plants operated by the RTE Corporation which is the third largest employer in the study area, with about 1,400 employees.

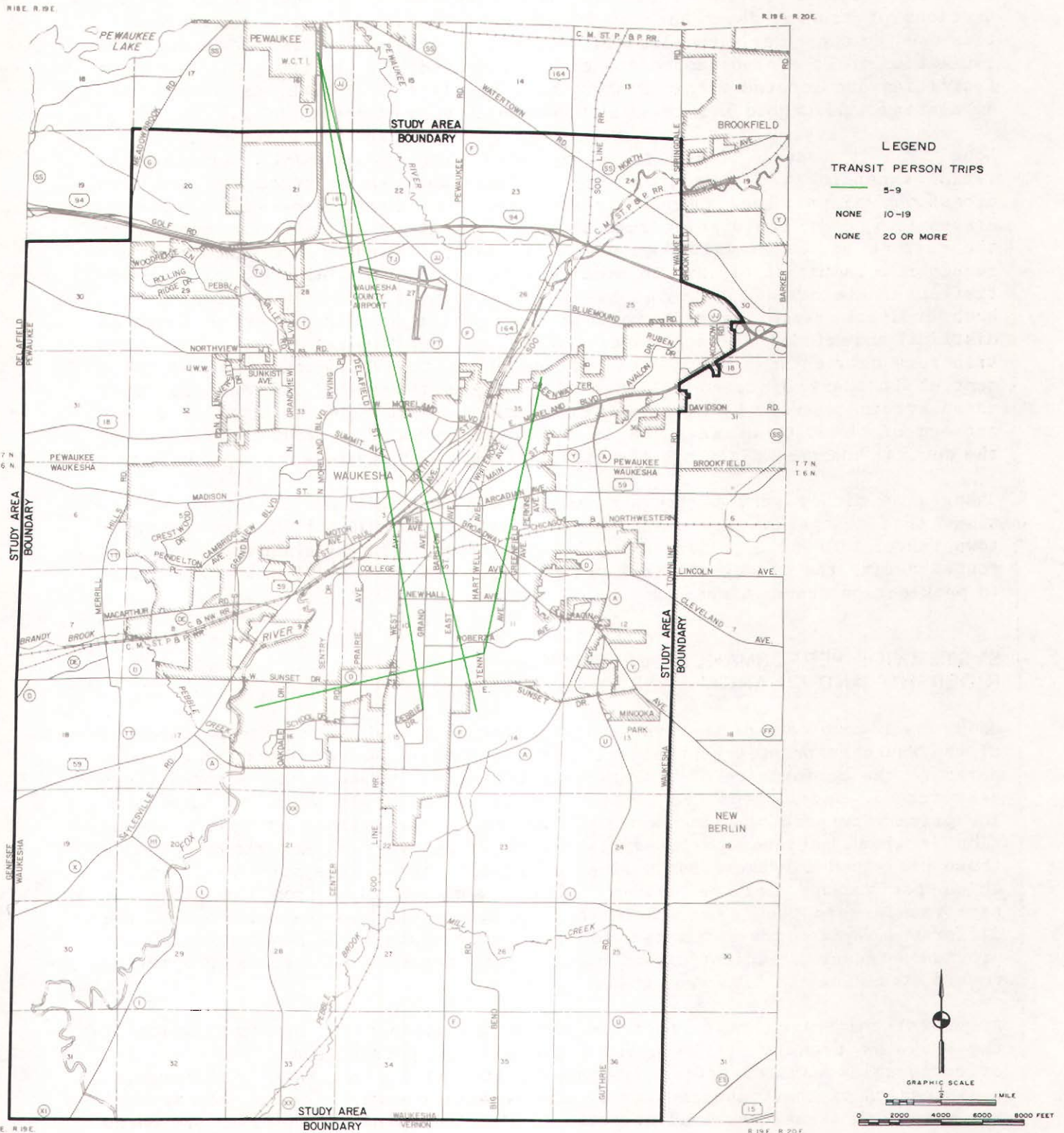
As previously noted, variations in work schedules make serving all of the jobs available at all centers difficult and costly. Only about one-half of the total number of jobs available at the major employment centers were determined to be either fully or partially served by the scheduled transit service currently provided by the transit system. Possible changes in the currently scheduled service should be reviewed with a view to expanding the number of

MAJOR TRAVEL DESIRE LINES FOR REVENUE
PASSENGERS ON WAUKESHA METRO TRANSIT NOT
TRANSFERRING BETWEEN BUS ROUTES: MAY 12, 1982



Map 26

MAJOR TRAVEL DESIRE LINES FOR REVENUE PASSENGERS ON WAUKESHA METRO TRANSIT TRANSFERRING BETWEEN BUS ROUTES: MAY 12, 1982



Source: SEWRPC.

jobs fully served by the transit system. Priority should be given to fully serving a larger proportion of the total employment at the seven largest employment centers identified in Table 34.

The transit system provides excellent areal coverage of the residential concentrations of transit-dependent population groups, and good coverage of facilities used by the elderly and low-income families or individuals. While only two facilities for the handicapped are directly served by a bus stop, the remaining facilities are located within a short walking distance from a bus stop, which ambulatory handicapped individuals should be capable of negotiating.

Long transit travel times, resulting in transit-to-automobile travel time ratios exceeding two were found for certain downtown-oriented, as well as crosstown, trips. Long transit travel times for downtown-oriented trips on Routes 1, 6, and 9 could be reduced through more direct transit routing between the current route termini. However, this appears inappropriate since it would result in a reduction of service area coverage to residential areas or to major traffic generators. Long travel times for crosstown transit trips result from both indirect radial transit routing through the Waukesha central business district and midday service levels of 60 minutes between buses under which transfers between some bus routes require 30 minutes. Inasmuch as the Waukesha central business district attracts the largest volumes of person trips made on an average weekday by city residents, and the fact that the arterial street pattern of the City of Waukesha is partially radial in layout and focuses on the central business district, the radial transit routing appears appropriate.

Changes in midday service frequencies would have a greater impact on travel times than changes in route layout and should be considered to improve crosstown travel time ratios. Decreasing headways from 60 to 30 minutes on some bus routes during the midday off-peak period would provide travel times comparable to peak-period travel times.

SYSTEMWIDE PERFORMANCE EVALUATION-- RIDERSHIP AND FINANCIAL PERFORMANCE

Under the second part of the systemwide performance evaluation, the performance of the Waukesha transit system during its first full year of operation was compared to the performance of a transit system as projected in the adopted five-year transit development program for its first and fifth years of operation. The primary purpose of this comparison was to identify areas of system operation in which achieved performance measure values were either above or below those projected for the first year of operation. Areas of system operation in which performance measure values differed substantially from the projected performance were then examined further to determine possible causes for the difference. A secondary purpose for this comparison with projections is to provide a general indication of how far the transit system has progressed toward attaining its five-year goals.

A general comparison was also conducted of the performance characteristics of the Waukesha transit system against the average performance characteristics of comparable transit systems serving similar-sized urban areas in Wisconsin. A discussion of the comparability of the general operating characteristics of the Wisconsin transit systems selected and Waukesha Metro Transit is presented in Appendix D.

In conducting this comparison of performance characteristics, it was recognized that, while the comparable Wisconsin transit systems are all well-established transit systems that have been in existence throughout at least the previous decade, the Waukesha transit system is a new transit system which has just completed its first year of operation. Furthermore, unlike the comparable transit systems where local governments assumed ownership and operation of existing private transit systems without interruption of transit service, the Waukesha transit system initiated service in an area which had been without local bus service for over five years. Consequently, the Waukesha transit system did not, upon the initiation of service, have the benefit of an existing ridership base and has had to work to establish a new transit riding habit within the community. Because of the differences resulting from the start-up nature of the Waukesha transit system, the average performance of the other transit systems was compared to the performance projected for the Waukesha transit system's fifth year of operation.

Performance Characteristics

The actual and projected performance characteristics of the Waukesha transit system are presented in Table 42. The performance measures included in this table provide a general indication of the overall effectiveness, efficiency, and financial performance of the Waukesha transit system. Specific areas of comparison include measures of ridership, operating expenses, operating revenues, and operating deficits.

A key measure of transit system effectiveness is ridership. During its first full year of operation, the Waukesha transit system carried about 183,000 revenue passengers, or, based upon the estimated 1980 population residing within the quarter-mile service area, about 3.8 rides per capita. This is about 17 percent above the 156,000 revenue passengers and 3.2 rides per capita projected for the first year of transit system operation. Revenue passengers per revenue vehicle hour--a measure of transit system utilization per unit of service--for the Waukesha transit system was also higher than projected for the first year of operation. During its first year, the transit system carried about 7.9 passengers per vehicle hour--about 16 percent above the 6.8 passengers per hour projected in the transit development program.

During its fifth full year of operation, the transit system is projected to carry about 264,000 revenue passengers, or about 5.5 rides per capita and about 11.5 passengers per vehicle hour. These figures represent a ridership increase of about 44 percent over actual first year ridership. To achieve this ridership goal, actual ridership on the transit system will have to increase in each of the next four years by about 10 percent over the preceding year. By comparison, ridership on similar-sized Wisconsin transit systems during 1981 averaged about 881,000 revenue passengers, or about 18 rides per capita and 22 passengers per vehicle hour. These figures are from two to three times the figures projected for the fifth year of operation for the Waukesha system.

A basic measure of system efficiency relating produced output to cost is operating expense per vehicle hour. The operating expense per revenue vehicle hour for Waukesha Metro Transit of \$29.50 for the first full year--12 months--of operation was about 10 percent higher than the rate of \$26.70 (1981 constant

Table 42

**COMPARISON OF ACTUAL AND PROJECTED PERFORMANCE
CHARACTERISTICS OF WAUKESHA METRO TRANSIT**

Performance Characteristics	Transit Development Program Projections ^a		Actual for First Full Year of Operation ^b
	First Year of Operation	Fifth Year of Operation	
Service Area Population.....	48,000	48,000	48,000
Annual Revenue Passengers.....	156,000	264,000	183,000
Rides per Capita.....	3.2	5.5	3.8
Annual Revenue			
Vehicle Hours.....	22,950	22,950	23,100
Revenue Passengers per			
Revenue Vehicle Hour.....	6.8	11.5	7.9
Operating Expense			
Total.....	\$612,900	\$586,200	\$681,300
Per Revenue Vehicle Hour....	\$26.70	\$25.54	\$29.50
Per Passenger.....	\$3.93	\$2.22	\$3.72
Operating Revenue			
Total.....	\$ 72,400	\$122,600	\$ 75,700
Per Passenger.....	\$0.46	\$0.46	\$0.41
Percent of			
Operating Expenses.....	11.8	20.9	11.1
Operating Deficit			
Total.....	\$540,500	\$463,600	\$605,600
Total per Passenger.....	\$3.46	\$1.76	\$3.31
Local Share per Passenger...	\$1.35	\$0.49	\$0.79
Local Share per Capita.....	\$4.37	\$2.70	\$2.88

^a Cost and revenue projections presented in the transit development program were expressed in 1980 dollars. For comparison with actual figures, transit development program projections were adjusted upward based upon the percentage change in operating expense per vehicle hour observed on similar-sized Wisconsin transit systems between 1980 and 1981. Consequently, all projections are expressed in 1981 constant dollars.

^b August 31, 1981 through August 31, 1982.

Source: Waukesha Metro Transit and SEWRPC.

dollars) projected in the transit development program.¹ In order to determine if the current operating expense rate was reasonable, the operating expenses per vehicle hour for Waukesha Metro Transit and similar-sized transit systems in Wisconsin were compared. A breakdown of these operating expenses per vehicle hour by expense category for 1981 is presented in Table 43. Operating expenses for the Waukesha transit system exceeded the average or median of the other systems by significant amounts in only two expense categories: services and leases and rentals.

Higher-than-average operating expenses for services may be attributed primarily to the management structure of the Waukesha transit system. Waukesha Metro Transit, as recommended by the transit development program, is managed by a private management firm under contract with the city. Consequently, a major

¹Cost projections initially presented in the transit development program were expressed in 1980 constant dollars. For comparison with actual figures for the first 12 months of system operation, all projections were adjusted upward based upon the average rate of change in operating expense per revenue vehicle hour observed on similar-sized Wisconsin transit systems between 1980 and 1981.

Table 43

**COMPARISON OF OPERATING EXPENSE PER REVENUE VEHICLE
HOUR BY EXPENSE CATEGORY OF SIMILAR-SIZED WISCONSIN
TRANSIT SYSTEMS AND WAUKESHA METRO TRANSIT: 1981**

Operating Expense Category	Operating Expense per Vehicle Hour ^a (dollars)			
	Comparable Wisconsin Transit Systems			
	Fond du Lac Area Transit System	Janesville Transit System	La Crosse Municipal Transit Utility	Manitowoc Transit System ^b
Labor				
Operator's Wages.....	9.08	9.14	9.30	8.69
Other Wages.....	3.30	5.72	3.07	3.69
Subtotal	12.38	14.86	12.37	12.38
Fringe Benefits.....	3.63	4.84	4.42	4.67
Services.....	1.21	0.43	0.03	0.45
Materials and Supplies Consumed.....	8.18	8.35	4.84	4.61
Utilities.....	0.17	0.58	0.29	0.39
Casualty and Liability Costs.....	0.83	1.59	0.62	1.14
Purchased Transportation Service.....	--	0.30	0.30	--
Miscellaneous Expenses...	1.15	0.47	0.19	0.54
Leases and Rentals				
Revenue Equipment.....	--	--	--	--
Other.....	--	0.14	--	--
Subtotal	--	0.14	--	--
Total Expenses	27.55	31.56	23.06	24.18

Operating Expense Category	Operating Expense per Vehicle Hour ^a (dollars)				
	Comparable Wisconsin Transit Systems				
	Oshkosh Transit System	Sheboygan Transit System	Mean	Median	Waukesha Metro Transit ^b
Labor					
Operator's Wages.....	9.79	7.31	8.89	9.11	6.64
Other Wages.....	2.99	3.20	3.66	3.25	4.72
Subtotal	12.78	10.51	12.55	12.37	11.36
Fringe Benefits.....	3.37	2.58	3.92	4.02	2.56
Services.....	0.07	0.37	0.43	0.40	3.52
Materials and Supplies Consumed.....	5.09	5.28	6.06	5.18	4.97
Utilities.....	0.61	0.41	0.41	0.40	0.29
Casualty and Liability Costs.....	1.44	1.03	1.11	1.08	1.24
Purchased Transportation Service.....	--	0.10	0.12	0.05	--
Miscellaneous Expenses...	0.29	0.41	0.51	0.44	0.66
Leases and Rentals					
Revenue Equipment.....	--	--	--	--	4.50
Other.....	--	--	0.02	--	0.02
Subtotal	--	--	0.02	--	4.52
Total Expenses	23.65	20.69	25.11	23.94	29.12

^a Excludes interest expense, depreciation, and amortization.

^b Actual for four-month period between August 1, 1981 and December 31, 1981. Excludes expenses associated with start-up of system operation.

Source: Wisconsin Department of Transportation, Waukesha Metro Transit, and SEWRPC.

portion of the operating expenses in the services category is due to management service fees paid to the management firm. This is unlike the other transit systems which are operated and managed with city employees and have lower expenses under this category. The management service contract has, however, kept operating expenses for Waukesha Metro Transit lower in other expense categories. This is particularly true with regard to labor expenses, which may be substantially higher if operators and mechanics were city employees subject to city wage scales and fringe benefit packages, and not employees of the management firm as they are at present. For this reason, higher than average operating expenses for Waukesha Metro Transit in this category should not be considered as a significant problem.

Higher-than-average expenditures for the Waukesha transit system for leases and rentals may be attributed to lease costs for buses. Virtually all of the operating expenses in this category for the Waukesha transit system during 1981 were for rental of the buses used in the operation of the transit system. These expenditures for bus rental accounted for about 15 percent of total transit system operating expenses for the Waukesha transit system during 1981. Buses used in the operation of the other transit systems are all owned by the respective transit systems. As a result, the other transit systems have no expenditures for these items. By its fifth year of operation, operating expenditures for the Waukesha transit system are projected to decrease due to the operation of vehicles owned by the City, and the elimination of the lease costs for renting buses. Elimination of the current costs associated with the rental of buses would make the current operating expenses of the Waukesha transit system comparable to both projected operating expenses and the operating expenses of similar transit operations.

Operating expense per passenger, operating revenue per passenger, and operating deficit per passenger are financial performance measures that relate to the level of public financial support required to sustain transit operations. While the actual total operating expenses for the Waukesha transit system were about 11 percent above projected expenses, the operating expense per passenger for Waukesha Metro Transit during its first full year of operation was about \$3.72, or about 5 percent below the projected level of \$3.93 (1981 constant dollars). This was due to the higher than projected ridership experienced on the transit system during its first operating year. The operating revenue per passenger of \$0.41, however, was about 11 percent below projected first year levels of \$0.46 (1981 constant dollars). As a result, total operating revenues for the Waukesha transit system covered about 11.1 percent of total operating expenses during its first full year of operation, or slightly less than the projected recovery rate of 11.8 percent of the operating expenses. The operating deficit per passenger is an overall performance measure, combining both operating revenue per passenger and operating expense per passenger. In spite of the lower than projected revenue per passenger, the operating deficit per passenger for the Waukesha transit system was about \$3.31, or about 5 percent below the \$3.46 (1981 constant dollars) projected for the first year of system operation.

By the end of the fifth year of operation, the operating expense per passenger for the Waukesha transit system is projected to decrease to about \$2.22 (1981 constant dollars), and the operating deficit per passenger is projected to decrease to \$1.76 (1981 constant dollars). At the same time, the percent of operating expenses recovered through operating revenues is projected to

increase to almost 21 percent, although operating revenue per passenger is projected to remain at \$0.46 (1981 constant dollars). Achievement of these objectives will be directly related to whether or not the transit system is successful in attaining ridership goals and in reducing transit system operating expenses through elimination of bus rental costs. By comparison, the average operating expense per passenger and operating deficit per passenger for similar-sized transit systems in Wisconsin during 1981 was \$1.16 and \$0.88, respectively. On the average, similar-sized Wisconsin transit systems recovered about 26 percent of operating expenses through operating revenues during 1981.

The safety record of the Waukesha transit system during its first year of operation has been very good. Accident rates for the transit system were not projected in the transit development program. However, the accident rate for the Waukesha transit system was comparable to the accident rate observed on the similar Wisconsin transit systems.

Conclusions Drawn from Evaluation of Ridership and Financial Performance

From the preceding evaluation, it may be concluded that the ridership and financial performance of the Waukesha transit system during its first year of operation generally exceeded that projected for the system in the transit development program. It also may be concluded that the transit system has made good progress toward achieving the five-year transit development program ridership and financial performance goals.

During its first year of operation, the transit system has performed significantly better than expected with regard to ridership, which was about 17 percent above that projected. To attain the five-year ridership goal, transit ridership must increase by about 10 percent in each of the next four years.

With regard to financial performance, the transit system had a lower operating expense per passenger and an operating deficit per passenger than projected for the first year of operation, although the operating expenses were higher than projected and operating revenues were lower on a per passenger basis than projected. By the end of its fifth year of operation, the transit system is projected to recover about 21 percent of operating expenses through operating revenues. The reduction of operating expenses resulting from elimination of lease costs for buses will help in reaching this goal. However, unless ridership continues to exceed projected levels, an increase in operating revenue per passenger will still be necessary before the end of the five-year period to realize the projected recovery rate.

If the Waukesha transit system attains the ridership and financial performance levels projected for the system after five years of operation, the performance of the transit system will still be somewhat below the performance of other Wisconsin transit systems serving similar-sized urban areas. The important differences between the performance observed on comparable Wisconsin transit systems and the performance of Waukesha Metro Transit are related to the low ridership levels of the Waukesha transit system. Projected fifth year ridership for the Waukesha transit system is about one-third of the average ridership observed on similar-sized Wisconsin transit systems in 1981. There are several factors which account for this ridership difference.

First, some of the differences in ridership levels may be attributed to the start-up nature of the Waukesha transit system versus the well-established nature of comparable Wisconsin transit systems. As already noted, the Waukesha transit system is a new transit system which has just completed its first year of operation in an area that had been without any local bus service for a period of over five years. Consequently, the transit system does not have the benefit of an existing transit ridership base and must work to attract and establish a new transit riding habit within the community. Reaching the ridership levels observed on other comparable Wisconsin transit systems may require a longer time than the five years considered in the transit development program.

Second, a part of the difference in ridership levels may also be due to the nature of the travel habits and patterns of, and the distribution of the transit-dependent population groups within, the service area populations of the other transit systems and the Waukesha transit system. With regard to the travel habits and patterns, the City of Waukesha is a part of a larger urbanized area--the Milwaukee urbanized area--and not the central city of its own urbanized area. The travel patterns of city residents are affected by the location of the city within a larger metropolitan area, as evidenced by the fact that over 33 percent of total person trips, and almost 50 percent of work trips, made by city residents were external trips in 1982. Consequently, a large portion of the trips made by Waukesha residents cannot, as a practical matter, be served by the city transit system. This is not the case with the other comparable Wisconsin transit systems which essentially serve areas that are self-contained with regard to goods and services needed by area residents. Consequently, a larger portion of the trips made by residents of the service areas of these systems are made as internal trips which may be served by the other transit systems.

With regard to transit-dependent population groups which generally compose the captive ridership of the transit system, a comparison of the distribution of these population groups within the service area populations of comparable Wisconsin transit systems and Waukesha Metro Transit is presented in Table 44. As may be seen from the table, the service area populations for other transit systems contain significantly higher proportions of elderly persons and households with limited automobile availability than the service area population for Waukesha Metro Transit. While the concentration of transit-dependent population groups, and the travel habits and patterns of the service area population are factors which influence the level of transit ridership, these are factors which are beyond the control of transit system managers.

Third, differences in ridership levels may also be caused, in part, by differences found in the types and levels of transit service provided by comparable Wisconsin transit systems and the Waukesha transit system. All of the comparable transit systems provide some type of special transit service directed toward serving the student enrollment of the schools within the respective service areas. Ridership generated from the special school service provided by comparable transit systems accounts for between 15 and 40 percent of the annual ridership of those transit systems, or about 190,000 of the 881,000 average annual revenue passengers carried by those transit systems during 1981. No special school service was provided by the Waukesha transit system during its first year of operation or was recommended to be provided in the transit development program. The transit system is, however, currently experimenting

Table 44

**DISTRIBUTION OF TRANSIT-DEPENDENT POPULATION GROUPS
WITHIN SERVICE AREA POPULATION FOR PEER GROUP
TRANSIT SYSTEMS AND WAUKESHA METRO TRANSIT: 1980**

Transit System	Percent of Service Area Population ^a			Percent of Total Households With Zero or One Automobile Available
	School-Age Children	Elderly	Low-Income	
Fond du Lac Area Transit System.....	16.8	14.1	6.1	53.7
Janesville Transit System...	18.4	10.1	5.5	52.6
La Crosse Municipal Transit Utility.....	19.6	15.2	12.8	47.0
Manitowoc Transit System....	16.9	16.5	5.4	60.7
Oshkosh Transit System.....	17.9	13.8	8.4	58.8
Sheboygan Transit System....	16.7	15.6	5.2	57.9
Waukesha Metro Transit.....	17.7	8.4	5.0	45.0

^aBased on 1980 census figures.

Source: U. S. Bureau of the Census and SEWRPC.

with limited special school service by deviating the routing of buses operating over some regular routes at certain times of the day to serve students residing in otherwise unserved areas of the city, or to bring the bus service closer to a school. Further increases in the amount of special school service provided by the transit system should be considered as a possible means to increase ridership and thereby improve system performance.

With regard to the extent of service area coverage and level of transit service, Waukesha Metro Transit, like the other transit systems, provides nearly complete--over 90 percent--coverage of its service area population. However, due primarily to the lack of Saturday service and the provision of service on 60-minute headways on all routes during the midday service period, Waukesha Metro Transit operated about 42 percent fewer revenue vehicle hours of service during its first year of operation than the average value for comparable Wisconsin transit systems during 1981. Because this level of service is projected to remain constant for the Waukesha transit system throughout the five years considered in the transit development program, lower ridership levels could be expected for the Waukesha transit system than observed on the other transit systems.

In summary, it appears that the Waukesha transit system has generally met or exceeded the ridership and financial performance levels projected for its first year of operation. Higher than projected ridership levels experienced by the transit system during its first year of operation are a good indication that the transit system may be able to attain the five-year ridership goal set forth in the adopted transit development program. However, based upon a comparison of the projected five-year ridership level and the average ridership level observed on similar-sized Wisconsin transit systems, it may be advisable for the Waukesha transit system to look beyond the five-year ridership goals and consider actions which may bring the ridership and financial performance of the transit system closer to that observed on other systems. In this

respect, service changes which may result in increased transit ridership and, on that basis, merit further consideration, include the provision of some form of special school service, a reduction of off-peak period headways from 60 to 30 minutes, and the provision of Saturday transit service.

ROUTE PERFORMANCE EVALUATION

The performance evaluation of the individual routes of the Waukesha Metro Transit System was conducted using specific performance measures set forth under the transit service objectives and standards. Performance measures indicating the current level of ridership and financial performance of each bus route were used to identify bus routes with low performance levels. Further analyses of each route were then conducted using expanded survey information indicating the boarding and deboarding activity of bus passengers along route segments. Finally, each bus route was examined for existing operational problems in the areas of labor and vehicle productivity, schedule adherence, and bus stop and schedule coordination.

Ridership and Financial Performance

The performance characteristics of the bus routes operated by Waukesha Metro Transit are shown in Table 45. The data presented within this table are based upon the operating characteristics and average total daily ridership--revenue passengers, transfer passengers, and free passengers--for each route during the week of November 29 through December 3, 1982, and average costs of operation for the first nine months of 1982. The performance measures included in the table provide an indication of the ridership, productivity, and financial performance of each bus route.

Table 45

AVERAGE DAILY PERFORMANCE CHARACTERISTICS OF BUS ROUTES OPERATED BY WAUKESHA METRO TRANSIT WEEK OF NOVEMBER 29 THROUGH DECEMBER 3, 1982

Bus Route and Number	Round-Trip Route Length (miles)	Revenue Vehicle Hours	Performance Characteristics									
			Total Passengers		Total Passengers per Route Mile		Total Passengers per Revenue Vehicle Hour		Operating Deficit per Passenger ^a		Percent of Operating Expenses Recovered Through Farebox Revenues ^a	
			Number	Route Rank	Number	Route Rank	Number	Route Rank	Deficit	Route Rank	Percent	Route Rank
1. Westbrook/Target...	13.3	18.2	183	4	13.8	6	10.1	7	\$2.72	8	10.6	9
2. Arcadian/Racine...	8.5	8.1	79	8	9.3	7	9.8	8	2.87	9	10.8	7
3. Hartwell.....	6.5	9.1	196	2	30.2	1	21.5	1	1.14	1	20.5	2
4. Grand.....	6.1	8.7	151	5	24.8	2	17.4	3	1.41	4	19.2	4
5. Prairie.....	6.2	0.6	10	10	1.6	10	16.7	4	1.32	3	20.3	3
6. Fox Run.....	16.1	11.8	115	6	7.1	8	9.7	9	2.70	7	10.7	8
7. Madison.....	8.1	9.3	189	3	23.3	3	20.3	2	1.18	2	21.0	1
8. Summit.....	7.2	7.8	108	7	15.0	4	13.8	6	1.92	6	15.3	6
9. Northview.....	13.4	14.1	199	1	14.9	5	14.1	5	1.74	5	17.9	5
10. Courthouse Loop....	4.3	3.4	23	9	5.3	9	6.8	10	4.23	10	6.3	10
Total	89.7	91.1	1,253	--	14.0	--	13.8	--	\$1.88	--	14.9	--

^aFigures represent estimates and are based upon systemwide average operating expenses and average passenger revenues. Estimates of average daily operating expenses per route were based upon the systemwide average operating cost for the first nine months of 1982 of \$28.59 per vehicle hour of service, and total daily vehicle hours of service for each route. Estimates of average daily passenger revenues for each route were based upon passenger counts by fare category--full, student, elderly/child, monthly pass, free, and transfer--by route for the week examined and cash fares or revenue per trip attendant to each fare category.

Source: SEWRPC.

Measures of ridership and productivity examined for each bus route included total passengers, total passengers per route mile, and total passengers per revenue vehicle hour. Measures of financial performance included operating deficit per total passenger and percent of operating costs recovered through farebox revenues. The financial performance measures, however, must be considered estimates, as they are based upon passenger counts by type of fare paid and on average cost per hour of the service provided. The performance of each bus route with respect to the ridership, productivity, and financial performance measures was compared with that of the other bus routes and with that of the average of the entire system. This comparison is also presented in Table 45. The intent of this comparison was to identify those bus routes with performance levels which were significantly below systemwide averages. It is important that this comparative information not be misinterpreted or misused. The information is provided to identify those routes which should be concentrated on in developing service improvements. No single performance measure should be used to justify termination of a route which has a performance level below the systemwide average. As an example, Route 1--Westbrook/Target--had an operating deficit per passenger of \$2.72, well above the systemwide average of \$1.88, and eighth in rank among the 10 routes for this measure. However, Route 1 ranks among the highest in terms of total passengers carried. The financial productivity of the route is relatively low because it is a long route, with its traffic generators being relatively widely spaced along the route. It requires two buses during peak periods to provide the half-hour headways necessary to the pulse transit service provided. It would be an error to drop this route because it is below the systemwide average in financial performance. It is proper, however, to examine this route for potential service improvements. It is a good route, carrying a large number of passengers, and attempts should be made to replace its unproductive segments or to eliminate unproductive bus trips to improve its financial performance.

The first performance measure displayed in the table is total passengers. During the week in which ridership was examined, the transit system carried an average of just over 1,250 total passengers per day. Average daily total passengers on just five routes--Routes 1, 3, 4, 7, and 9--together accounted for over 73 percent of total system ridership.

Total passengers per route mile is an indicator of the density of travel demand. Systemwide, an average of about 14 passengers per route mile were carried on the transit system during the week examined. Four routes of the transit system carried significantly fewer passengers per route mile--less than 80 percent of the systemwide average--than the other routes of the transit system. These routes were Routes 2, 5, 6, and 10. These four routes carried a combined average of about seven passengers per route mile, while the other six routes of the transit system carried a combined average of about 19 passengers per route mile. In reviewing these data, it should be recognized that the low values for Route 5 reflect the limited amount of service provided over the route and, consequently, the low ridership on the route. The low values for Route 6 reflect the length of the route which is the longest in the transit system.

Total passengers per revenue vehicle hour is a major measure of route productivity, and relates passengers carried to the volume of service provided. Higher values indicate better vehicle utilization and economy of operation. For the week examined, the transit system averaged about 14 passengers per

vehicle hour. Four routes of the transit system had passenger-per-revenue vehicle hour values which were less than 80 percent of the daily systemwide average--Routes 1, 2, 6, and 10. These four routes carried a combined average of about 10 passengers per revenue vehicle hour, while the other six routes carried a combined average of about 17 passengers per vehicle hour. Routes 1 and 6 are two of the longest routes in the transit system and require more vehicle hours to operate than the shorter routes of the transit system. This results in lower than average performance values. This is particularly true in the case of Route 1, which ranks high in total passengers carried but only seventh in passengers per vehicle hour because of the number of vehicle hours required to operate the route at current service levels.

Measures of financial performance examined for each bus route included operating deficit per total passenger and the percent of operating expenses recovered through farebox revenues. Both measures provide a general indication of how well the level of passenger revenue generated by each route meets the expenses of the route. The passenger revenue is a function of the total passengers carried, as well as the type of fare paid: full or 50¢, student or 35¢, elderly and children or 25¢, and monthly pass--which for November and December of 1982 averaged 39¢ per trip. For the week examined, the systemwide average daily deficit per total passenger was about \$1.88, and about 15 percent of operating expenses were recovered through farebox revenues. Four bus routes--Routes 1, 2, 6, and 10--had an operating deficit which exceeded \$2.50 per total passenger. Route 1, however, carries among the highest number of total passengers of the 10 routes of the Waukesha system. The same four bus routes recovered less than 11 percent of their operating expenses through operating revenues. These four bus routes had an average deficit per total passenger of about \$2.83 and recovered about 10 percent of operating expenses through operating revenues. By comparison, the other six routes of the transit system had an average deficit per total passenger of \$1.44 and recovered about 19 percent of operating expenses through farebox revenues.

Boarding and Deboarding Passengers by Route Segment

An examination of passenger boarding and deboarding activity along each bus route was conducted to identify both productive and nonproductive route segments. Information concerning the number of boarding and deboarding passengers by location for each bus route was obtained from the results of the bus user survey conducted by the Commission on May 12, 1982, and reflects the ridership for the bus routes as they were operated at the time of the survey.² To facilitate analysis of passenger boarding/deboarding information, each bus route was divided into segments based upon distance and land uses served. Table 46 presents boarding and deboarding passengers by route segment for all bus routes except Route 5. Survey data on Route 5 were insufficient to accurately depict passenger boarding and deboarding activity. Map 27 identifies the segments for each route except Route 5.

As would be expected, route segments which included the central transfer point in downtown Waukesha had the highest volumes of boarding and deboarding passengers. With the exception of Routes 2, 6, and 10, all bus routes had at least

²Changes in the routing of Route 1 were made on June 14, 1982; changes in the routing of Routes 2, 5, 6, 7, 8, 9, and 10 were made on August 16, 1982.

Table 46

BOARDING AND DEBOARDING PASSENGERS BY ROUTE SEGMENT ON WAUKESHA METRO TRANSIT: MAY 12, 1982

Bus Route	Route Segment ^a	Total Passengers		Major Boarding/ Deboarding Locations ^b
		Boarding	Deboarding	
1. Westbrook/Target	1	76	54	Intersection of W. Main Street/W. Broadway
	2	24	42	Intersection of E. Main Street/Perkins Avenue
	3	2	2	--
	4	12	11	--
	5	28	23	Horning Middle School
	6	15	14	--
	7	18	22	Westbrook Shopping Center
	8	2	9	--
Total		177	177	
2. Arcadian/Racine	1	24	22	Intersection of W. Main Street/W. Broadway
	2	2	7	--
	3	3	7	--
	4	5	6	--
	5	12	4	--
Total		46	46	
3. Hartwell	1	59	76	Intersection of W. Main Street/W. Broadway
	2	2	3	--
	3	15	21	Intersection of Newhall Avenue/Hartwell Avenue
	4	11	40	South High School, K-Mart
	5	59	6	South High School
Total		146	146	
4. Grand	1	42	59	Intersection of W. Main Street/W. Broadway
	2	5	4	--
	3	26	27	Intersection of W. College Avenue/S. Grand Avenue
	4	16	11	--
	5	49	37	Intersections of Madera Street/Sentinel Drive and S. Grand Avenue/Dodie Drive
Total		138 ^c	138 ^c	
5. Prairie	--	--	--	--
6. Fox Run	1	39	41	Intersection of W. Main Street/W. Broadway
	2	9	17	--
	3	2	5	--
	4	12	12	--
	5	--	1	--
	6	7	4	--
	7	7	2	--
	8	3	2	--
	9	4	2	--
	10	5	2	--
Total		88	88	
7. Madison	1	38	31	Intersection of W. Main Street/W. Broadway
	2	8	21	Waukesha Memorial Hospital
	3	26	12	Intersection of Madison Street/N. Hine Avenue
	4	12	13	--
	5	12	15	--
	6	2	6	--
Total		98	98	
8. Summit	1	41	28	Intersection of W. Main Street/W. Broadway
	2	4	4	--
	3	6	2	--
	4	8	9	--
	5	5	8	--
	6	9	18	University of Wisconsin-Waukesha
	7	2	6	--
Total		75	75	
9. Northview	1	79	52	Intersection of W. Main Street/W. Broadway
	2	3	2	--
	3	7	22	--
	4	5	7	--
	5	5	2	--
	6	1	3	--
	7	1	3	--
	8	42	52	Waukesha County Technical Institute
Total		143	143	
10. Courthouse Loop	1	13	13	Intersection of W. Main Street/W. Broadway
	2	3	7	--
	3	7	4	--
	4	3	2	--
Total		26	26	

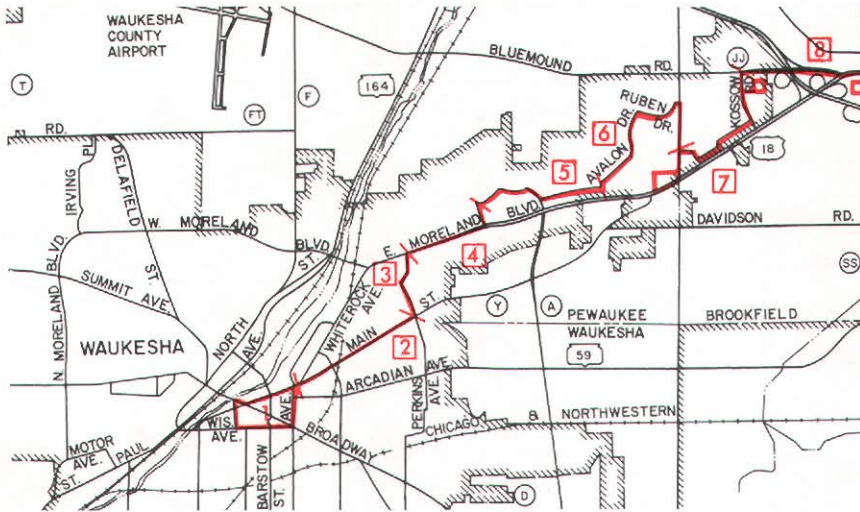
^aSee Map 21.^bLocation with 10 or more boarding or 10 or more deboarding passengers.^cInsufficient survey data to depict boarding/deboarding locations.

Source: SEWRPC.

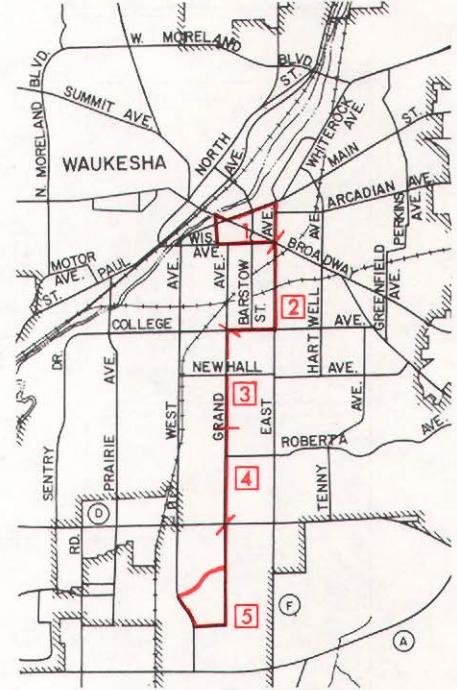
Map 27

MAJOR SEGMENTS OF BUS ROUTES OPERATED BY WAUKESHA METRO TRANSIT: MAY 12, 1982

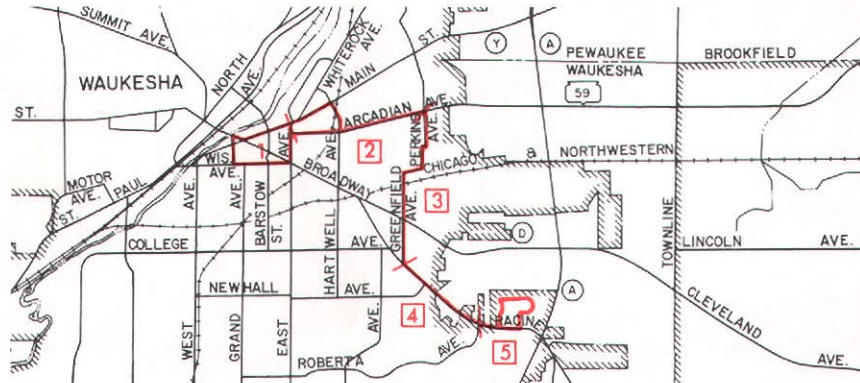
ROUTE 1 - WESTBROOK/TARGET



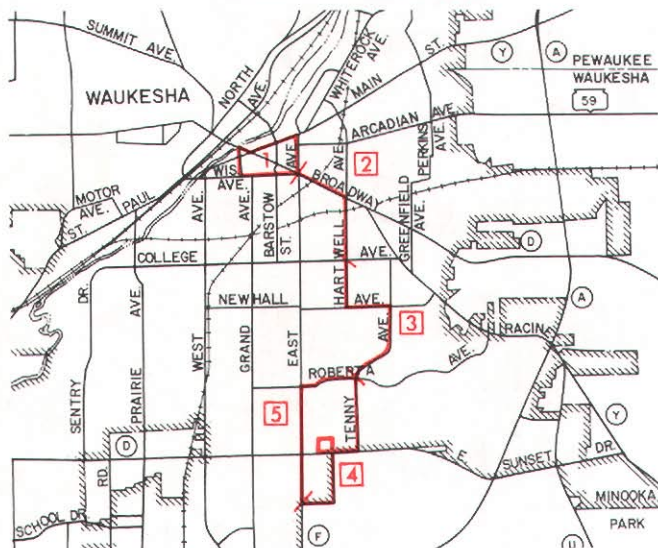
ROUTE 4 - GRAND



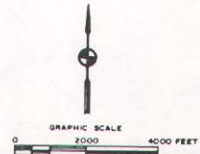
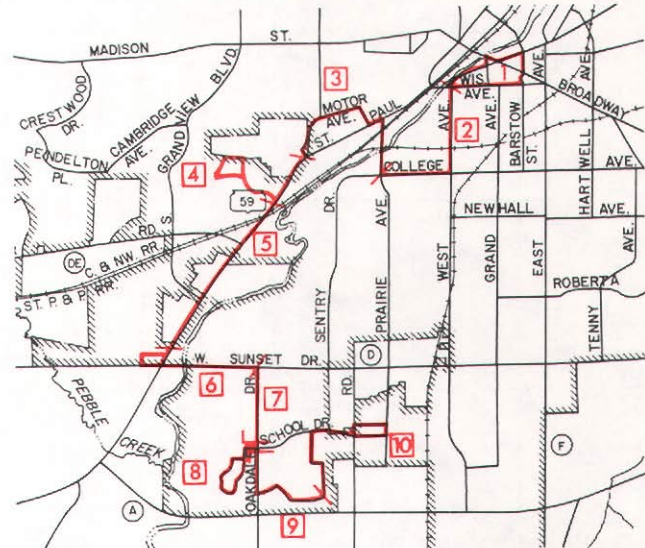
ROUTE 2 - ARCADIAN/RACINE



ROUTE 3 - HARTWELL

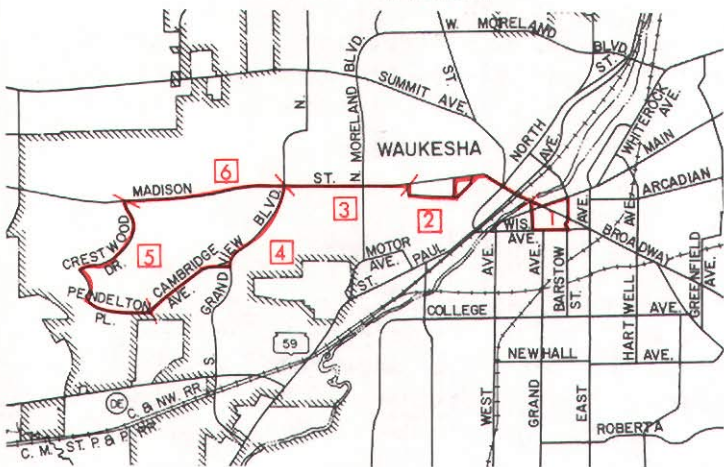


ROUTE 6 - FOX RUN

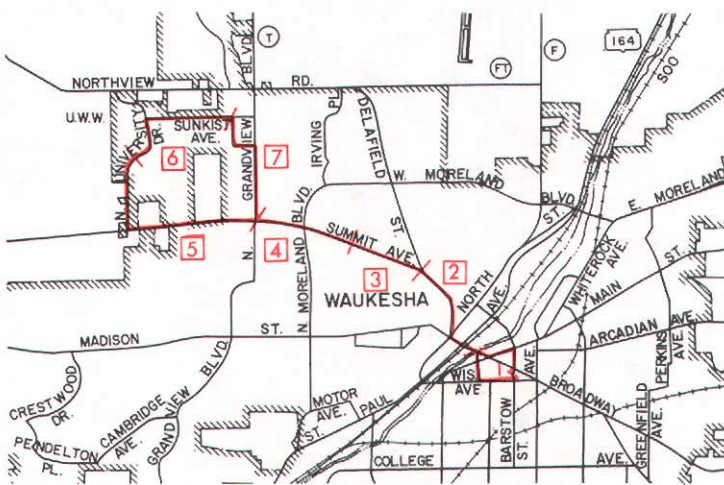


Map 27 (continued)

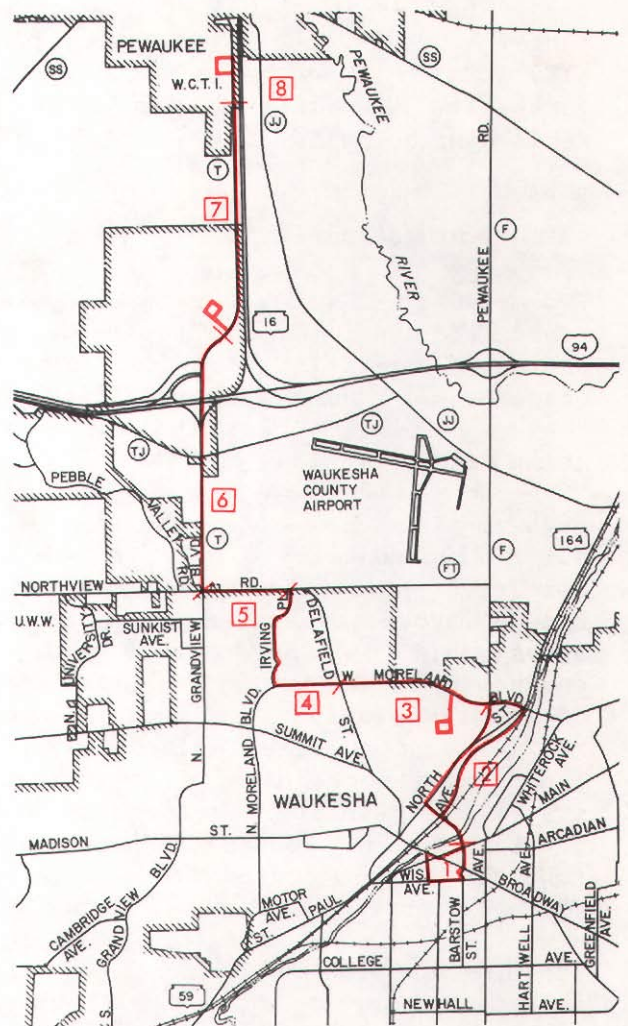
ROUTE 7 - MADISON



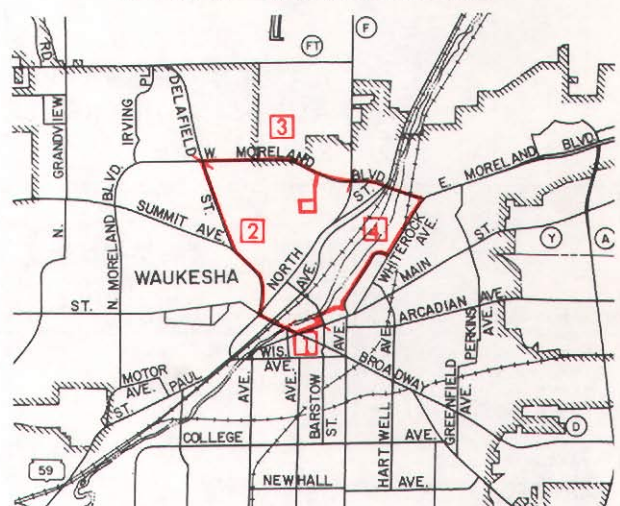
ROUTE 8 - SUMMIT



ROUTE 9 - NORTHVIEW

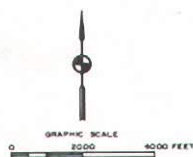


ROUTE 10 - COURTHOUSE LOOP



LEGEND

 ROUTE SEGMENT



one other location with over 10 boarding or 10 deboarding passengers. All bus routes had at least one nonproductive route segment exhibiting very low passenger boarding/deboarding activity. Nonproductive route segments were generally located close to the Waukesha central business district. Route segments located at the outlying ends of the routes generally had the best boarding/deboarding activity.

Labor and Vehicle Productivity

Two measures of productivity were examined for each bus route: layover time per round trip and average scheduled operating speed. The measures provide an indication of the relative productivity of the labor force, in particular the bus operator, and the revenue vehicles associated with each route. Generally, the measures indicate that the routes of the transit system are currently operating without serious problems in productivity.

Layover time consists of the time allowed between bus arrival and departure at a bus stop--usually at the end of a route--for the purpose of providing time for driver relief and for recovery from delays. For the Waukesha transit system, a layover time of about 10 percent of total scheduled time was considered a desirable goal. An analysis of layover times on the Waukesha transit system, conducted in August 1982, indicated that layover times exceeding 10 percent of total scheduled time were present on all bus routes. On August 16, 1982, routing changes were implemented, affecting Routes 2, 5, 6, 7, 8, 9, and 10. The changes were intended to increase the geographic coverage of the transit system by extending service into areas of the City previously unserved by the transit system. Schedule changes were made at the same time to reduce the schedule time allotted to make each round trip on all bus routes based upon the most current measures of actual running times for each bus route.

The layover time per round trip before and after the routing and scheduling changes of August 16, 1982, is presented in Table 47 for each bus route. As a result of these changes, layover time was reduced on eight of the 10 bus

Table 47

COMPARISON OF SYSTEM PRODUCTIVITY ON ROUTES OF WAUKESHA METRO TRANSIT BEFORE AND AFTER SCHEDULE AND ROUTE CHANGES OF AUGUST 16, 1982

Bus Route	Before August 16, 1982				After August 16, 1982			
	Maximum Round-Trip Running Time (minutes)	Scheduled Time Allotted for Round-Trip (minutes)	Nonproductive Time		Maximum Round-Trip Running Time (minutes)	Scheduled Time Allotted for Round-Trip (minutes)	Nonproductive Time	
			Minutes	Percent of Allotted Time			Minutes	Percent of Allotted Time
1. Westbrook/Target...	57	70	13	18.6	56	60	4	6.7
2. Arcadian/Racine....	30	35	5	14.3	27	30	3	10.0
3. Hartwell.....	30	35	5	14.3	27	30	3	10.0
4. Grand.....	26	35	9	25.7	25	30	5	16.7
5. Prairie.....	23	35	12	34.3	23	25	2	8.0
6. Fox Run.....	59	70	11	15.7	55	60	5	8.3
7. Madison.....	31	35	4	11.4	27	30	3	10.0
8. Summit.....	26	35	9	25.7	27	30	4	13.3
9. Northview.....	55	70	15	21.4	45	60	-15	25.0
10. Courthouse Loop....	21	35	9	30.0	21	30	9	30.0

Source: Waukesha Metro Transit and SEWRPC.

routes. Significant amounts of layover time remain on Routes 9 and 10. Extra layover time on Route 9 could be used to expand transit service to unserved areas of the City such as The Windings and Pebble Valley subdivisions.

Scheduled operating speed, as already noted, is an indicator of efficiency in operation. Scheduled operating speed can also be used to give a general indication of labor and vehicle productivity by providing a measure of the amount of service which is being provided within a certain amount of time--in this case, the amount of revenue vehicle miles operated for each revenue vehicle hour of service provided. Average scheduled operating speeds for similar size transit systems range from 12 to 15 miles per hour.

The average scheduled operating speed for each route operated by Waukesha Metro Transit is listed in Table 48. Only one route--Route 10--had an average scheduled operating speed considerably below the systemwide average. This low speed is related to the high percentage of layover time per round trip for this route. The highest average scheduled operating speeds were found on Routes 2, 5, 6, and 7. High scheduled operating speeds on these routes are due to the existence of route segments with low passenger boarding/deboarding activity, or few bus stop locations, thus allowing buses to stop less often and operate at speeds closer to posted vehicle speed limits.

Table 48

**AVERAGE SCHEDULED SPEED FOR
ROUTES OF WAUKESHA METRO
TRANSIT: SEPTEMBER 1982**

Bus Route	Average Scheduled Speed (mpn)
1. Westbrook/Target...	13.3
2. Arcadian/Racine....	16.9
3. Hartwell.....	13.0
4. Grand.....	12.2
5. Prairie.....	17.1
6. Fox Run.....	16.3
7. Madison.....	15.8
8. Summit.....	13.8
9. Northview.....	13.7
10. Courthouse Loop....	8.9
System Average	14.1

Source: Waukesha Metro Transit and SEWRPC.

Schedule Adherence

The provision of transit service that is reliable and on-time is important to attracting and keeping transit riders. For the purpose of this study, on-time has been defined as adherence to published schedules within the range of zero minutes early and three minutes late. The relatively long headways--30 and 60 minutes--operated by the Waukesha transit system can involve considerable waiting times for passengers who miss service connections due to bus departures ahead of schedule. Performance within these guidelines becomes important to minimize passenger inconvenience.

To obtain a measure of schedule adherence on the Waukesha transit system, spot checks were made of departure times at selected bus stop locations along each bus route by the Commission from August 11 through August 13, 1982. The spot checks were made on selected inbound and outbound bus trips during the morning peak, midday off peak, and afternoon peak periods of transit system operation. Actual departure times were then compared with scheduled departure times to note any consistent problems in schedule adherence. The data collected are summarized in Table 49.

Seven of the 10 bus routes operated by the transit system had some early or late departures at bus stops on the bus trips checked. Incidences of early departures were due primarily to the differences in the actual running times

Table 49

**ON-TIME PERFORMANCE OF SCHEDULED TRANSIT SERVICE
PROVIDED BY WAUKESHA METRO TRANSIT: AUGUST 11-13, 1982**

Bus Route	Number of Bus Trips Checked	Number of Bus Stops Checked per Trip	Number of Bus Stops With		
			Early Departures	Late Departures	On-Time Departures
1. Westbrook/Target..	6	2	2	--	10
2. Arcadian/Racine...	6	2	--	--	12
3. Hartwell.....	6	2	--	--	12
4. Grand.....	6	2	--	--	12
5. Prairie.....	2	2	2	--	2
6. Fox Run.....	4	2	--	1	7
7. Madison.....	6	2	1	--	11
8. Summit.....	6	2	--	--	12
9. Northview.....	6	2	3	--	9
10. Courthouse Loop...	1	3	--	1	3

Source: SEWRPC.

and scheduled time per round trip for each bus route at the time the spot checks were made. Because bus drivers could complete a round trip on a route in less time than allotted by the schedule, early departures at bus stops could occur unless drivers constantly compensated for running time and scheduled time differences. This was particularly true on early bus runs on Route 1 and on Route 9. Schedule changes made August 16, 1982, corrected early departure problems in on-time performance resulting from differences in actual versus scheduled running times.

Following the schedule changes of August 16, 1982, and the closing of the E. Moreland Boulevard bridge over the Fox River in August 1982, late departure problems were noted on all bus routes, but in particular on Routes 7 and 9. These problems developed primarily due to increased automobile traffic and congestion in the Waukesha central business district, resulting from the E. Moreland Boulevard bridge closure and the previous closure in May 1982, of the Wisconsin Avenue bridge. Completion of construction projects on these two bridges and their reopening should resolve late departure problems.

Bus Stop and Schedule Coordination

The degree to which the routes and schedules of a transit system are coordinated with each other and with the routes and schedules of other transit operators can have a definite effect upon the convenience of using the transit service. This is particularly true when transfers between bus routes are required to complete a trip. Minimizing the inconvenience of transferring between bus routes helps to promote transit ridership.

A substantial degree of coordination exists for the routes and schedules of the Waukesha transit system. This results primarily from the design of the transit system, which has all bus routes terminating at a common transfer point in the Waukesha central business district. The use of pulse scheduling, which provides

for buses operating on the routes to meet at the common transfer point at approximately the same time has also contributed to service coordination. This scheduling allows passengers the opportunity to transfer between bus routes with a minimum of delay. However, all bus routes do not meet at the common transfer point at the same time throughout the day. This is due primarily to the operation of routes with both 30- and 60-minute headways during the morning and afternoon peak-use periods, and the paired operation of some bus routes during the midday off-peak period. As a result, during the peak periods some bus routes depart from the central transfer point every 30 minutes, and other routes depart every 60 minutes. During the midday off-peak period when all bus routes are operated with 60-minute headways, the bus routes are grouped into two sets with the routes within each set departing from the common transfer point every 60 minutes. However, the two sets of routes depart from the central transfer point 30 minutes apart.

These problems are illustrated in Table 50, which indicates which bus routes have coordinated departure times during the course of the service day. From the information presented in this table, it can be seen that most problems in transferring between bus routes occur during the midday period between 9:00 a.m. and 3:00 p.m. As a result of differences in departure times during this period, passengers arriving on Routes 1, 4, 5, 8, 9, and 10 can immediately transfer only to Routes 1, 2, 3, 6, 7, and 9, while passengers arriving on Routes 2, 3, and 7 can immediately transfer only to Routes 4, 8, and 10. Transfers made between bus routes not immediately departing from the central transfer point during this period generally result in waiting times of about 30 minutes. Transfer problems also occur for students using special afternoon school runs operated on Route 1 from Horning Middle School and on Route 3 from South High School. These school day runs arrive at the common transfer point at about 3:00 p.m.--10 minutes after the 2:50 p.m. departure for the other bus routes. Students using these services who want to transfer to other routes, particularly students on Route 3, must wait at least 20 minutes and possibly 50 minutes until the next scheduled departure time for other bus routes.

A possible solution to the first problem would be the operation of the shorter bus routes with 30 minute headways throughout the service day. This would allow all bus routes to meet on an hourly basis and allow passengers the opportunity to plan their trip to avoid a 30-minute wait for transferring. This action would also require a substantial increase in bus hours and total operating expenses for the transit system. A possible solution to the second problem would be to change the pulsed departure times from the central transfer point for the bus routes to better serve the student ridership, or to operate special school routes which would more directly serve student origins and destinations, thus eliminating the need for students to transfer to other bus routes.

Other transit operators providing intercity and commuter bus service through or from the Waukesha study area include the Peoria-Rockford Bus Company, which stops at the Union Bus Depot in downtown Waukesha; Badger Coaches, Inc., which stops at the Goerkes Corners Public Transit Station; Wisconsin Coach Lines, Inc., which stops at both of the above locations; and Greyhound Lines, Inc., which stops at the PDQ store located on E. Moreland Boulevard. Bus service is provided by Waukesha Metro Transit to these intercity and commuter bus stops.

Table 50

**COORDINATION OF BUS ARRIVAL AND DEPARTURE TIMES
AT THE CENTRAL TRANSFER POINT FOR THE BUS ROUTES
OPERATED BY WAUKESHA METRO TRANSIT: SEPTEMBER 1982**

Route Number ^a										Arrival Times	Departure Times	Route Number ^a									
1	2	3	4	5	6	7	8	9	10			1	2	3	4	5	6	7	8	9	10
X	X	X	X			X	X	X		6:07 a.m.	6:10 a.m.	X	X	X	X			X	X	X	
X	X	X	X		X	X	X	X		6:37 a.m.	6:40 a.m.	X	X	X	X		X	X	X	X	
X	X ^b	X	X			X	X	X		7:07 a.m.	7:10 a.m.	X	X	X	X			X	X	X	
X	X	X	X		X	X	X	X		7:42 a.m.	7:45 a.m.	X	X	X	X	X ^c		X	X	X	
X	X	X	X	X		X	X	X		8:17 a.m.	8:20 a.m.	X	X	X	X	X ^c		X	X	X	
X	X	X	X		X	X	X	X		8:47 a.m.	8:50 a.m.	X	X	X			X	X	X	X	
	X	X				X			X ^e	9:17 a.m.	9:20 a.m.				X						X ^d
X			X		X		X	X		9:47 a.m.	9:50 a.m.	X	X	X			X	X		X	X ^d
	X	X				X			X ^e	10:17 a.m.	10:20 a.m.				X				X	X	X ^d
X		X	X			X		X		10:47 a.m.	10:50 a.m.	X	X	X			X	X		X	X ^d
	X					X		X	X ^e	11:17 a.m.	11:20 a.m.				X				X		X ^d
X	X	X	X		X	X	X	X		11:47 a.m.	11:50 a.m.	X	X	X			X	X		X	X ^d
X	X	X	X		X	X	X	X	X ^e	12:17 p.m.	12:20 p.m.				X				X		X ^d
	X	X				X			X ^e	12:47 p.m.	12:50 p.m.	X	X	X			X	X		X	X ^d
X		X				X		X	X ^e	1:17 p.m.	1:20 p.m.				X				X		X ^d
X	X	X	X		X	X	X	X	X ^e	1:47 p.m.	1:50 p.m.	X	X	X			X	X		X	X ^d
	X	X				X			X ^e	2:17 p.m.	2:20 p.m.				X				X		X ^d
X		X ^f	X	X			X	X	X ^e	2:47 p.m.	2:50 p.m.	X	X	X			X	X		X	X
X		X							X	2:58 p.m.	2:58 p.m.				X						X
	X	X			X	X ^f	X	X		3:17 p.m.	3:20 p.m.	X		X	X			X	X	X	
X	X	X	X		X	X	X	X		3:47 p.m.	3:50 p.m.	X	X	X	X		X	X	X	X	
X		X	X			X	X	X		4:17 p.m.	4:20 p.m.	X		X	X			X	X	X	
X	X	X	X		X	X	X	X		4:47 p.m.	4:50 p.m.	X	X	X	X		X	X	X	X	
X	X	X	X		X	X	X	X		5:17 p.m.	5:20 p.m.	X	X	X	X			X	X	X	
X										5:47 p.m.	5:50 p.m.	X	X	X	X		X	X	X	X	
X										6:17 p.m.											
X										6:37 p.m.											

^aAn "X" indicates bus arrives or departs at times shown unless otherwise noted.

^bBus arrives four minutes earlier than time shown.

^cBus departs 10 minutes earlier than time shown.

^dBus departs four minutes later than time shown.

^eBus arrives two minutes earlier than time shown.

^fBus arrives two minutes later than time shown.

Source: Waukesha Metro Transit and SEWRPC.

Of these three private transit operators, Wisconsin Coach Lines, Inc., represents the major transit operator with which schedules of the Waukesha transit system should be coordinated. Wisconsin Coach Lines, Inc., operates two commuter bus routes between the City of Waukesha and the Milwaukee central business district. Both bus routes originate at the Union Bus Depot located at the intersection of Clinton Street and W. Broadway, about one block from the common transfer point for all bus routes of the Waukesha transit system. Wisconsin Coach Lines, Inc., operates 33 one-way trips--17 eastbound trips and 16 westbound trips--each weekday between the Union Bus Depot in downtown Waukesha and the Greyhound Bus Depot in the Milwaukee central business district. A comparison of the scheduled arrival and departure times of Waukesha Metro Transit bus service at the common transfer point and the scheduled arrival and departure times of Wisconsin Coach Lines, Inc., commuter bus service at the Union Bus Depot is shown in Table 51. Of the 33 one-way bus trips operated by Wisconsin Coach Lines, Inc., each weekday, 28 trips have arrival and departure times which are within the service hours of Waukesha Metro Transit. Of these 28 one-way bus trips, 14 trips have scheduled arrival and departure times which allow for transfers to or from bus service provided by the Waukesha transit system and which result in transfer waiting times of less than 15 minutes.

Conclusions Drawn from Route Performance Evaluation

From the preceding route evaluation, it is apparent that the routes which have succeeded in attracting the most passengers and which perform at higher levels of cost-effectiveness include Routes 3, 4, 7, 8, and 9. In addition, Route 1 has been successful in attracting many passengers, but operates at a lower cost-effectiveness. These six routes--1, 3, 4, 7, 8, and 9--together accounted for over 80 percent of the total systemwide ridership during the week ridership counts were taken and, with the exception of Route 1, have productivity levels well above the systemwide average. Routes which have not been as successful in attracting passengers or which have low productivity levels include Routes 2, 5, 6, and 10. In reviewing the performance of these bus routes, it was noted that the transit system had been in operation for only one year and further improvements in ridership and effectiveness could be expected with the growth of systemwide ridership. Other factors which contributed to differences in ridership and productivity levels were also noted and are described below.

A major reason for the differences observed in performance levels among bus routes can be attributed to the transit service provided to schools and the level of student ridership on each route. Systemwide, about 46 percent of revenue passengers use the transit system to make trips for school purposes. Accordingly, the routes which have been successful in attracting the most passengers also carry large numbers of students as passengers.

Generally, the most successful routes of the transit system directly serve a secondary school or higher educational institution, or can be used for direct travel between an educational institution and a residential area, or both. In this respect, Routes 1, 3, 4, and 7 regularly carry large numbers of secondary school students as passengers. Routes 1, 3, and 7 also directly serve a secondary school. All four routes provide direct transit service between secondary schools and residential areas of the City which are provided with limited or no yellow school bus service, but are located far enough from secondary schools to require substantial walking distances for students.

Table 51

**COORDINATION OF WAUKESHA METRO TRANSIT SCHEDULES
WITH SCHEDULED WAUKESHA-MILWAUKEE COMMUTER BUS SERVICE
PROVIDED BY WISCONSIN COACH LINES, INC.: SEPTEMBER 1982**

Hour Beginning at	Weekday Scheduled Arrival and Departure Times			
	Eastbound-Waukesha to Milwaukee		Westbound-Milwaukee to Waukesha	
	Waukesha Metro Transit Arrival Times ^a	Wisconsin Coach Lines, Inc. Departure Times ^b	Wisconsin Coach Lines, Inc. Arrival Times ^b	Waukesha Metro Transit Departure Times ^a
5:00 a.m.	--	5:35 a.m.	--	--
6:00 a.m.	6:07 a.m. 6:37 a.m.	6:35 a.m. 6:50 a.m. 6:55 a.m.	--	6:10 a.m. 6:40 a.m.
7:00 a.m.	7:07 a.m. 7:42 a.m.	7:25 a.m. 7:50 a.m.	7:19 a.m.	7:10 a.m. 7:45 a.m.
8:00 a.m.	8:17 a.m. 8:47 a.m.	--	8:43 a.m.	8:20 a.m. 8:50 a.m.
9:00 a.m.	9:17 a.m. 9:47 a.m.	9:00 a.m.	9:43 a.m.	9:20 a.m. 9:50 a.m.
10:00 a.m.	10:17 a.m. 10:47 a.m.	10:00 a.m.	--	10:20 a.m. 10:50 a.m.
11:00 a.m.	11:17 a.m. 11:47 a.m.	11:00 a.m.	11:09 a.m.	11:20 a.m. 11:50 a.m.
12:00 p.m.	12:17 p.m. 12:47 p.m.	12:10 p.m.	12:08 p.m.	12:20 p.m. 12:50 p.m.
1:00 p.m.	1:17 p.m. 1:47 p.m.	1:10 p.m.	1:23 p.m.	1:20 p.m. 1:50 p.m.
2:00 p.m.	2:17 p.m. 2:47 p.m.	2:10 p.m.	2:22 p.m.	2:20 p.m. 2:50 p.m.
3:00 p.m.	3:17 p.m. 3:47 p.m.	3:10 p.m. 3:30 p.m.	3:23 p.m.	3:20 p.m. 3:50 p.m.
4:00 p.m.	4:17 p.m. 4:47 p.m.	4:00 p.m.	4:28 p.m.	4:20 p.m. 4:50 p.m.
5:00 p.m.	5:17 p.m. 5:47 p.m.	5:00 p.m.	5:17 p.m. 5:21 p.m. 5:27 p.m. 5:48 p.m.	5:20 p.m. 5:50 p.m.
6:00 p.m. and Later	--	7:30 p.m.	6:09 p.m. 7:05 p.m. 10:03 p.m.	

^aArrival and departure times at common transfer point.

^bArrival and departure times at Union Bus Depot.

Source: Waukesha Metro Transit, Wisconsin Coach Lines, Inc., and SEWRPC.

While Routes 8 and 9 do not attract the large numbers of secondary school students carried by the above four routes, these routes carry significant numbers of college and technical school students attending the University of Wisconsin-Waukesha and the Waukesha County Technical Institute--educational facilities directly served by these routes.

By comparison, Routes 2 and 6 do not carry the large numbers of students carried by the above routes. However, the operating and service area characteristics of these routes are also not as favorable toward attracting students as passengers. Neither route directly serves a major educational institution, although both routes are operated within a reasonable walking distance of Central Middle School. Of more importance, these routes also have major portions of their service areas which are either extensively served by yellow school bus routes or are within reasonable walking distance of secondary schools. Because of their current service area characteristics, these routes will, in all likelihood, continue to carry substantially fewer students as passengers than the other routes. While the feasibility of restructuring these routes to improve student ridership should be examined, such actions appear to be limited for these routes. This is particularly true for Route 6, which operates within one block of Central Middle School but has a substantial portion of its service area in the Fox Hills and South Park Estates subdivision areas which is provided with yellow school bus service to Central Middle School. The current policy of the Waukesha Unified School District is to provide yellow school bus service to students residing two miles or more--measured "over the road"--from the school they are entitled to attend. Modification of this policy to exclude students residing within the service area of the Waukesha transit system would do much toward increasing student ridership on the transit system.

The low performance level observed on Route 6 was also partially attributable to the route's length and vehicle hours of service operated. With a round trip length of over 16 miles, the route is the longest in the transit system. Because of its long length, the route is third highest in vehicle hours of service, even though service is provided on 60-minute headways throughout the day. These figures combined with observed ridership levels result in low values for passengers per route mile and passengers per vehicle mile. While the route has several nonproductive route segments, primarily where it passes through areas with little residential development and few major trip generators, restructuring to eliminate such segments does not appear feasible. This is because the route must pass through less densely developed areas of the City if it is to continue to serve the Fox Point and South Park Estates residential areas located on the southwest side of the City. Because the route is currently operated with what should be considered a maximum headway, a reduction in service is not recommended.

Low performance levels on Route 5 can be directly attributed to the limited amount of scheduled transit service provided over this route. Transit service is currently provided primarily to serve clients of the Waukesha Training Center. Transit service was initially provided over the route to also serve the Prairie Avenue industries, but was reduced from 4.5 round trips per day to its current level of less than two round trips per day in mid-August 1982 because of low ridership from the industries served. The limited amount of service allows the route to operate with passenger-per-vehicle hour values close to the systemwide average, despite extremely low ridership levels, indicating good utilization of the service provided. Low total ridership levels

should, therefore, not be a major concern. It should be noted that poor economic conditions and low employment levels during the past year may have affected ridership from the Prairie Avenue industries. Restoration of transit service to the Prairie Avenue industries should be considered if a significant number of service requests are received from this area.

Route 10 represents an extra route which was not part of the nine-route transit system recommended in the adopted transit development program. The route was implemented primarily to provide a route which could be paired with one of five recommended routes during the midday period in order to make full use of the vehicles operated on these routes without exceeding the 60-minute midday headways recommended for the transit system. During the week ridership counts were taken, the route ranked second to last in total passengers and passengers per route mile, and last in passengers per vehicle hour. The route serves a limited amount of residential area within the City, most of which is also within the service area of other routes. The route does provide direct transit service to the Waukesha County Courthouse and office building, the Willow Park and Saratoga elderly housing complexes, and the senior citizen center at the Schutze Building. However, minor changes to Routes 8 and 9 could replace the transit service provided over the most productive segments of Route 10 to the Waukesha County Courthouse and office building, and to the Willow Park elderly housing complex. Low performance levels and the potential to replace the transit service provided over much of this route with transit service provided by other routes make Route 10 a good candidate for elimination. The vehicle used on Route 10 could then be used to provide transit service on one of the more productive routes of the transit system.

While generally considered as one of the more successful routes in the transit system, the performance characteristics observed for Route 1 were mixed. In terms of total ridership, it is a major route of the transit system, ranking among the highest in total passengers carried. In terms of productivity and financial performance, the route ranked seventh in total passengers per vehicle hour, eighth in operating deficit per passenger, and ninth in percent of operating expenses recovered through farebox revenues. Low performance in these areas is the direct result of the route's long length which, in turn, requires an extensive number of vehicle hours of service to operate under current service levels. Elimination of nonproductive route segments or reductions in vehicle hours of service through elimination of bus trips carrying few passengers could improve performance on this route, as well as on other routes in the transit system.

The route analysis indicated that only minor operational problems exist with regard to vehicle and labor productivity and schedule adherence. Route and schedule changes implemented in August 1982 eliminated most problems which existed in these areas during the first year of transit system operation.

With regard to route and schedule coordination, a significant degree of coordination exists among the routes within the Waukesha transit system and between the Waukesha transit system and the commuter bus service operated from the City by Wisconsin Coach Lines, Inc. Service coordination of the routes within the Waukesha system could be improved through operation of shorter bus routes with 30-minute headways all day to allow for all bus routes to meet at hourly intervals at the common transfer point throughout the service day. While this

service improvement would eliminate most transfer problems noted within the Waukesha transit system, its impact upon the overall financial performance of the transit system must also be considered.

Some potential for improved schedule coordination between the Waukesha transit system and Wisconsin Coach Lines, Inc., commuter bus service exists. However, because the schedules for the Waukesha transit system are based primarily upon providing good service to the major traffic generators within the service area, the flexibility of the schedules for improved coordination with the Wisconsin Coach Lines, Inc., commuter bus service schedules is limited.

In summary, while some routes of the transit system were observed to have low performance levels, the impact of service levels, operating characteristics, and service area characteristics upon individual route performance levels must be recognized. In this respect, if the transit system is to continue to provide extensive areal coverage of the Waukesha area, some bus routes must be expected to perform at somewhat lower levels than other bus routes because of the operating and service area characteristics of each individual route. Conclusions drawn from the route performance evaluation must also recognize the need for the transit system to serve the Waukesha area as a whole. Accordingly, major changes in routing which would significantly reduce the extent of geographic coverage of the transit system would not appear to be sound at this time. Some changes to existing routes may be warranted to improve transit service between residential areas and Waukesha schools or major traffic generators, to expand service to unserved areas of the City, to reduce layover times, and to replace service presently provided on Route 10. Schedule changes should be considered where the potential exists to increase route ridership by better serving major generators such as schools, to increase route productivity by eliminating underutilized bus trips, or to improve transfer coordination.

SUMMARY

This chapter has presented an evaluation of the performance of the Waukesha transit system during its first full year of operation, from August 31, 1981, to August 31, 1982. The performance evaluation was conducted at two levels, using specific sets of performance measures set forth under the transit system objectives and standards.

At the first level, a two-part assessment of performance was made on a system-wide basis. The first part of this assessment examined the extent to which the transit system served the population and major land uses within the Waukesha area. The second part of this assessment presented a comparison of the ridership and financial performance of the transit system during its first full year of operation versus the ridership and financial projections set forth in the adopted transit development program. At the second level of evaluation, the performance of each route in the transit system was evaluated based upon its operating characteristics, ridership, and financial performance. Major conclusions drawn from the analyses conducted include the following:

- The Waukesha transit system provides excellent service area coverage of the residential areas of the City, including the residential concentrations of transit-dependent population groups. Service area coverage could be improved by extending transit service into the Pebble Valley and The Windings subdivision areas on the northwest side of the City.

- The Waukesha transit system also provides good coverage of the major traffic generators identified within the study area, serving 60 of the 83 major traffic generators existing in the City and environs in 1982.
- There were an estimated 13,600 jobs at major employment centers within the study area in 1982. About 10,900 of these jobs were served by the routes of the transit system. Of these 10,900 jobs, about 6,400 jobs, or about 58 percent, were determined to be either fully or partially served by the current schedules of the transit system routes. Adjustment of the currently scheduled service could increase the number of jobs fully served by the transit system by better relating the period of transit service to the starting and quitting times of certain major employers.
- Long travel times of some crosstown transit trips could be reduced through decreases in midday service frequencies on shorter bus routes from 60 to 30 minutes. This action could also serve to better coordinate the scheduled arrival and departure times of all bus routes at the central transfer point on an hourly basis, and provide for more convenient transfers of passengers between bus routes.
- The geographic area currently served by the transit system--containing about 89 percent of the internal person trips made by city residents--can accommodate the vast majority of internal origins and destinations of Waukesha tripmakers. The current hours of transit system operation--during which about 74 percent of the total person trips within the transit service area are made--are appropriate for the majority of trips made within the transit service area. About 67 percent of the total person trips made within the transit service area during the hours of system operation have the potential to be conveniently served by the routes of the existing transit system. The analysis of the origin-destination patterns of bus passengers indicated that the routes of the transit system conveniently serve the vast majority of trips made on the transit system.
- During its first year of operation, the Waukesha transit system has generally exceeded the ridership and financial projections set forth for the system in the adopted transit development program, and has made good progress toward achieving its five-year ridership and financial performance goals.
- Based upon a review of the operating characteristics of similar sized Wisconsin transit systems, actions which would increase total transit system ridership and, on that basis, merit further consideration, include the provision of some form of special school-oriented transit service; a reduction of midday off-peak headways from 60 to 30 minutes; and the provision of Saturday transit service.
- Some routes of the transit system--Routes 1, 3, 4, 7, 8, and 9--were found to have been more successful in attracting ridership or operate with better levels of effectiveness than the other routes of the transit system--Routes 2, 5, 6, and 10. A major reason for these differences was found to be due to the ability of the more successful routes to attract large numbers of students as passengers. Routes 2 and 6 do not have operating or service area characteristics which are as favorable to

attracting the number of students carried on the most successful routes. Low ridership on Route 5 can be accounted for by the limited service operated over this route. The low performance levels and operating characteristics of Route 10 make this route a good candidate for elimination, with transit service on its better route segments to be replaced with service provided over Routes 8 and 9.

- Major changes in routing which would significantly reduce the extent of geographic area served by the transit system are not recommended. Changes to existing routes may be warranted to improve transit service to schools and major generators, to expand service to unserved areas of the City, to reduce layover times, and to replace service presently provided on Route 10. A change in current policy of the Waukesha Unified School District to exclude students residing within the service area of the Waukesha transit system from qualifying for yellow school bus service would significantly increase student ridership on the transit system.

The analyses documented in this chapter indicate that certain changes in transit system operation should be considered to improve transit system performance. In reviewing the feasibility of such service changes, consideration must be given to not only the potential impact upon system ridership, but also to the potential impact upon the total financial requirements for and overall financial performance of the transit system. The following chapter will document the actions recommended to improve the performance of the Waukesha transit system.

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Chapter VI

EVALUATION AND RECOMMENDATION OF TRANSIT SYSTEM IMPROVEMENTS

INTRODUCTION

The preceding chapter of this report presented an extensive evaluation of the operation of, and service provided by, the Waukesha Metro Transit system. The results of this evaluation indicated that, while the transit system has been successfully implemented and has generally exceeded ridership projections for its first year of operation, the potential exists for operational improvements which could further enhance system performance levels. This chapter presents a program of operational improvements which, when implemented, should increase the ridership and upgrade the financial performance of the transit system.

RECOMMENDED OPERATIONAL IMPROVEMENTS

During its first full year of operation, the Waukesha transit system was operated essentially as recommended in the adopted transit development program prepared in 1980. The first-year accomplishments of the transit system, which included meeting and exceeding the ridership and financial forecasts for the first year of operation, were described in the previous chapter. Transit service changes made in mid-August of 1982 further expanded the geographic area served by the transit system, increased ridership on some routes, and corrected most operational problems observed during the first year of operation. Although the evaluation documented in the previous chapter indicates that the current route configuration and schedules meet the majority of the transit service objectives and standards established for the system, there are certain service changes which, if implemented, could further improve upon the level and extent of transit service provided, and which should increase transit system ridership and overall system performance.

In developing the recommended service changes, a change from the existing radial routing and pulse scheduling was considered and was dismissed. However, certain adjustments in the routing and scheduling are recommended to better serve existing travel demand and major traffic generators. Additional routes are also recommended to provide special service to Waukesha area middle and senior high schools. Consideration was also given to the impact of increases in off-peak service frequency, extension of hours of operation into the evening period, and the provision of Saturday transit service on system ridership, revenues, and costs. Finally, the financial requirements of the transit system were estimated based upon the recommended service changes and fare structure. A later section of this chapter includes a discussion of possible changes in the fare structure to improve upon the rate of recovery of operating expenses through operating revenues and a discussion of the sharing of operating deficits for the transit system among funding sources, including the impact of potential reductions in federal transit operating assistance upon the transit system.

Routing and Scheduling Technique

At the present time, the Waukesha transit system is operated using a radial network of routes with pulse scheduling. Questions concerning the appropriateness of this radial pulse system--in particular the need for pulse scheduling--were raised during implementation of the transit system and have continued to be raised from time to time since the start of system operation. These questions can best be addressed by providing some background information regarding routing and scheduling techniques commonly employed in the operation of transit systems and the appropriate conditions for their use.

The two most common routing and scheduling techniques used by fixed-route bus transit systems are the radial route network with pulse scheduling, and the grid route network with nonpulsed scheduling. Under a radial routing system, bus routes originating in outlying areas converge on a central location, usually the central business district of the community served. Some type of radial street system usually exists in cities using radial routing and is a factor contributing to its use. Although some routes may intersect in outlying areas to accommodate transfers outside of the central business district, most transfers occur at a common transfer location in the central business district. While the central business district may not contain most of the jobs, or most of the commercial establishments, in the area, it usually still comprises the most intensively developed area and the most important transit trip generator in the area. Because of the location of the central transfer point within this area, most transit passengers on a radial route system are not required to transfer between bus routes to complete their trip. However, while some crosstown transit trips can be conveniently completed with a transfer, many crosstown trips which require a transfer result in some backtracking along parallel routes and are inconvenient to complete.

Under pulse scheduling, as noted earlier in this report, the headways of each route are timed so that buses from all routes arrive and depart from the central transfer location at the same time. This permits transfers to occur between bus routes with little waiting time for passengers. Routes of the transit system can be operated on any headway, based upon the longest round-trip travel time of the routes in the system. The radial-pulse system is most commonly used in medium- and small-sized cities because it works well with clock headways of 30 and 60 minutes. Such headways are generally the minimum headways which are economically feasible for operation on smaller systems.

Under a grid routing system, bus routes are laid out in a distinct grid pattern rather than focusing on a single geographic location. The grid routing system is most readily applied to cities having a predominantly grid street pattern. Under a grid system, it is generally necessary for passengers to transfer one or more times to reach a final destination unless the passengers live near a bus route which passes near or directly serves their destination. The primary advantage in using the grid system is found in its ability to serve destinations outside of the central business district almost as well as those within the central business district. Because the grid system is a decentralized type of route network, it can effectively serve many trips which originate and terminate away from the central business district. Consequently, passengers do not have to transfer in the downtown area and possibly backtrack on a parallel route to reach their final destination. The grid system is generally used in larger cities and urban areas where development and travel patterns are not highly centralized.

The success of a grid system is dependent upon the ability to transfer conveniently at route intersections. Because of the large number of route intersections in a grid network, it is virtually impossible to schedule the routes so that buses will meet at all intersecting routes. Inasmuch as waiting time for passengers at route intersections must be kept to a minimum, the grid system requires a very high level of service, with short headways on all routes. Cities using the grid system usually operate with peak-period headways of five to 15 minutes. Operation with longer headways may result in substantial waiting times for transfers. For a grid system to be effective, it must generally serve an area with a high population density, capable of generating the ridership levels necessary to make the high level of service required economically feasible.

Based upon the foregoing considerations, it is recommended that the Waukesha transit system continue to operate as a radial-pulse system, centered on the Waukesha central business district. Because of the historic influence of the Fox River on the development of the City, the arterial street pattern is complex and partially radial in layout, focusing on the central business district. The Fox River effectively divides the City and the river crossings which interconnect the various parts of the City exist primarily within the downtown area. The central business district is also the singularly largest transit trip generator in the area. Pulse scheduling enables the transit system to provide for convenient passenger transfers between bus routes while operating with headways of 30 and 60 minutes. The elimination of pulse scheduling with the existing headways would greatly inconvenience passengers transferring between bus routes. Operation of the transit system with headways of 15 minutes or less to permit more convenient transfers under a grid system would require a substantial and costly increase in the level of transit service currently provided. This level of service would not be economically feasible since transit system ridership cannot be expected to increase in proportion to the required increase in service.

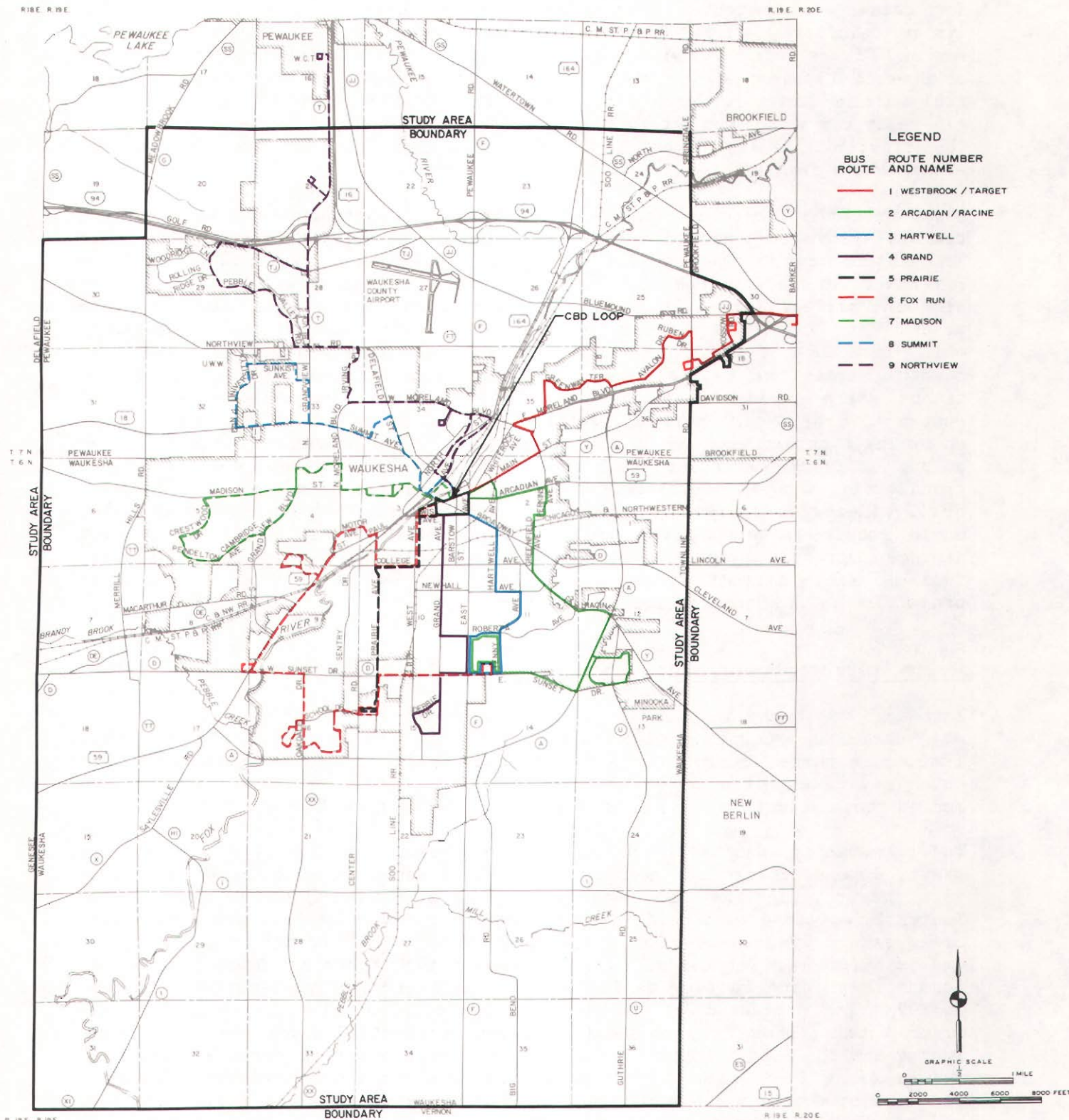
Route Adjustments and Scheduling Changes

Although the Waukesha transit system has been in operation for just over one year, and experience with operation of the system has, therefore, been limited, a number of route adjustments and scheduling changes were identified which may be expected to be beneficial to the system operation. The recommended route structure for the transit system is shown on Map 28.

The recommended adjustments in routing are intended to better serve existing travel demand, to replace nonproductive route segments, and to increase service area coverage. In this respect, routing adjustments are recommended for Routes 2, 4, and 6 to provide direct, no-transfer service from the residential areas served by these routes to the K-Mart/South High School area. This area was identified in Chapter III of this report as attracting about 7,400 total person trips made by city residents on an average weekday--second only to the 15,900 trips attracted by the Waukesha central business district. Existing major total person trip movements between residential areas served by these routes and the K-Mart/South High School area were noted in the previous chapter as being inconveniently served by the existing route structure. The proposed adjustments to these routes would better serve existing travel patterns and would also create a secondary focus point for the transit system where transfers between routes could be made.

Map 28

RECOMMENDED ROUTE STRUCTURE FOR WAUKESHA METRO TRANSIT



Routing changes are also recommended for Routes 8 and 9 to replace transit service currently provided over the most productive segments of Route 10. As noted in the previous chapter, Route 10 was not included in the nine-route transit system initially recommended for implementation in the adopted transit development program. Because of low performance levels observed on the route, it is recommended to be eliminated. The recommended routing adjustments are summarized on Map 29.

Changes to existing transit system schedules are recommended to adjust the pulsed arrival and departure times at the downtown central transfer point and to adjust service levels on individual routes. The proposed pulsed arrival and departure times from the central transfer point are shown in Table 52. Changes in existing pulse times are recommended for both the morning and afternoon peak periods. In the morning, it is recommended that the first two pulse times for the transit system be moved back five minutes--from 6:10 a.m. and 6:40 a.m. to 6:05 a.m. and 6:35 a.m. This action would increase headways from 30 to 35 minutes between the second and third pulse times for the system. This extra time could be used on some routes to maintain schedule adherence. No changes are recommended in the pulse times occurring between 7:10 a.m. and 2:20 p.m. Afternoon schedule changes are more extensive than morning schedule

changes. It is recommended that the 2:50 p.m. pulse time be moved to 3:00 p.m. This change would allow dismissal times at Horning Middle School to be served by regular route service rather than by a special bus trip, as at present. As was recommended for the morning period, 35-minute headways are recommended between 3:30 p.m. and 4:05 p.m. and 4:05 p.m. and 4:40 p.m. to allow extra cycle time on some routes which currently have tight schedules during this period. These adjustments will result in moving back by 10 minutes the final two pulse times for the transit system from the current times of 5:20 p.m. and 5:50 p.m. to 5:10 p.m. and 5:40 p.m. The 5:10 p.m. and 5:40 p.m. pulse times will provide better late afternoon service to major traffic generators in the downtown area.

Adjustment of current service levels on individual routes is recommended to eliminate nonproductive bus trips and to add service which could be used by secondary school students. A review of passenger counts by route by bus trip was conducted to identify bus trips carrying few or no passengers. To the extent practicable, the nonproductive bus trips have been recommended for elimination. This has generally resulted in a reduction of the number

Table 52

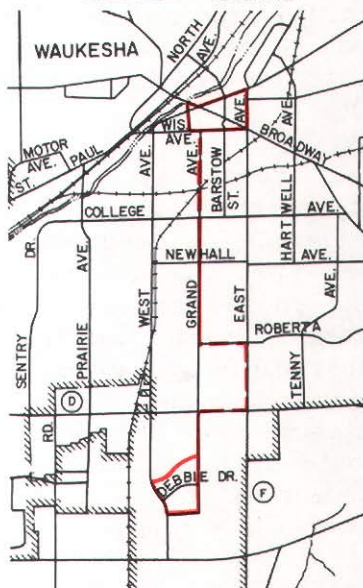
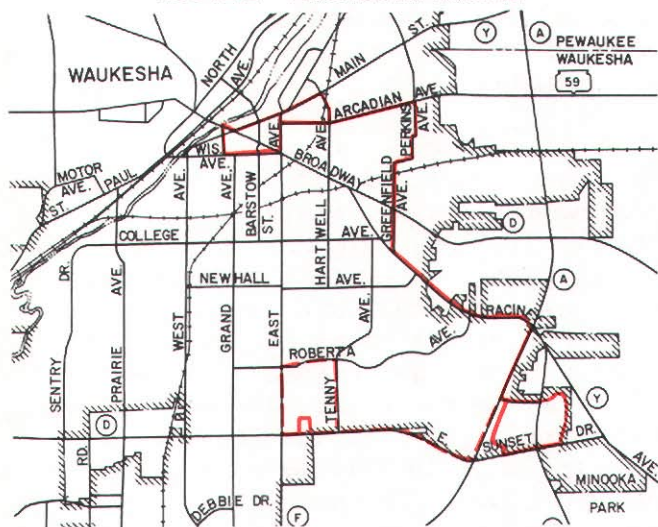
PROPOSED WEEKDAY ARRIVAL AND DEPARTURE TIMES AT THE COMMON TRANSFER LOCATION FOR BUS ROUTES

Proposed Arrival Times	Proposed Departure Times
6:02 a.m.	6:05 a.m.
6:32 a.m.	6:35 a.m.
7:07 a.m.	7:10 a.m.
7:42 a.m.	7:45 a.m.
8:17 a.m.	8:20 a.m.
8:47 a.m.	8:50 a.m.
9:17 a.m.	9:20 a.m.
9:47 a.m.	9:50 a.m.
10:17 a.m.	10:20 a.m.
10:47 a.m.	10:50 a.m.
11:17 a.m.	11:20 a.m.
11:47 a.m.	11:50 a.m.
12:17 p.m.	12:20 p.m.
12:47 p.m.	12:50 p.m.
1:17 p.m.	1:20 p.m.
1:47 p.m.	1:50 p.m.
2:17 p.m.	2:20 p.m.
2:47 p.m.	3:00 p.m.
3:27 p.m.	3:30 p.m.
4:02 p.m.	4:05 p.m.
4:37 p.m.	4:40 p.m.
5:07 p.m.	5:10 p.m.
5:37 p.m.	5:40 p.m.
5:48 p.m.	5:50 p.m.

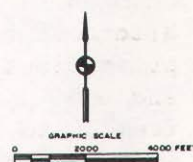
Source: Waukesha Metro Transit and SEWRPC.

RECOMMENDED CHANGES TO BUS ROUTES OF WAUKESHA METRO TRANSIT

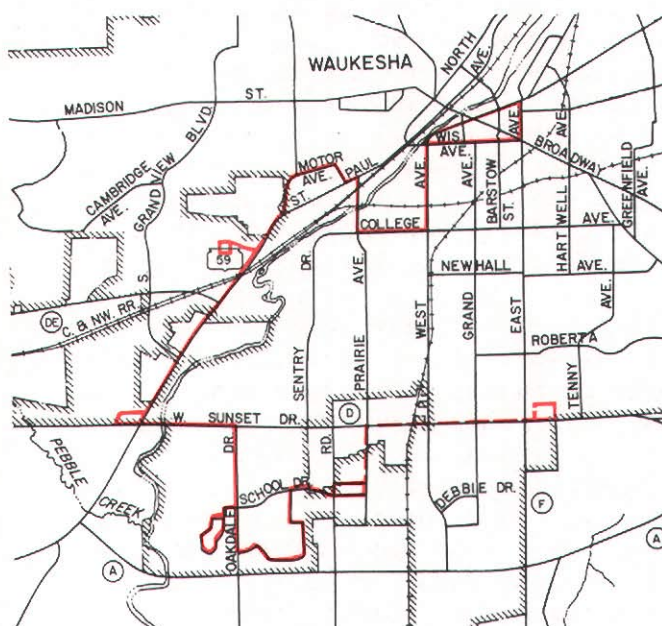
ROUTE 4 - GRAND



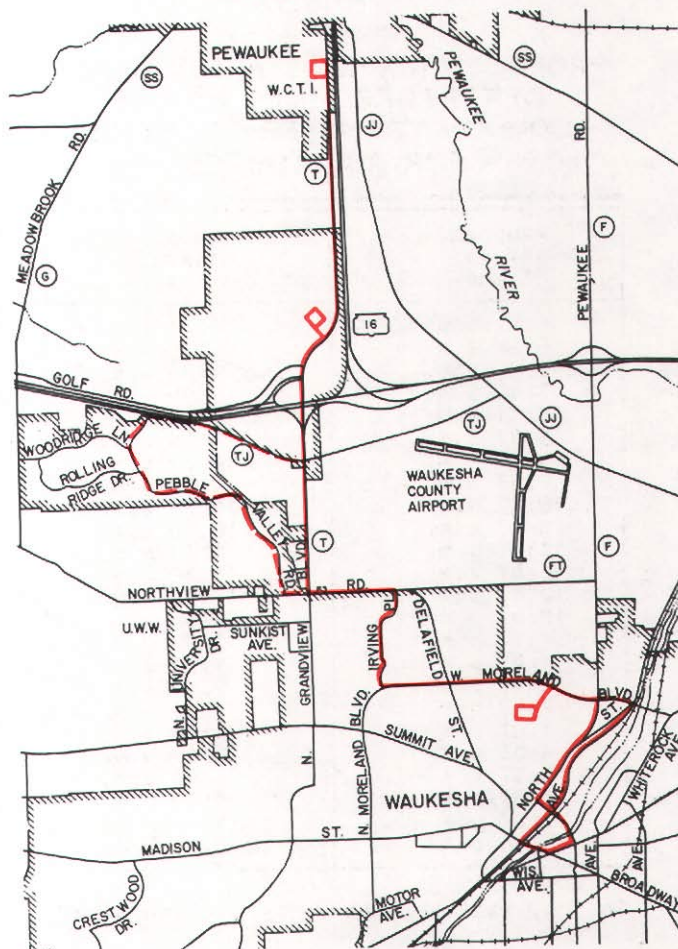
— EXISTING ROUTE SEGMENT
- - PROPOSED ROUTE SEGMENT



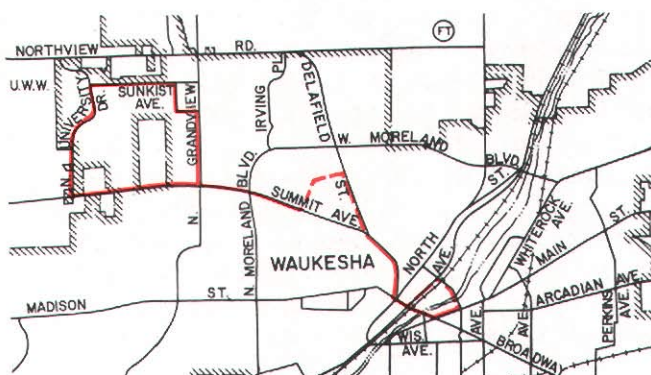
ROUTE 6 - FOX RUN



ROUTE 9 - NORTHVIEW



ROUTE 8 - SUMMIT



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of vehicle hours currently operated on some routes. The following sections provide a more detailed description of the routing adjustments and scheduling changes proposed for each route.

Route 1--Westbrook/Target: No routing adjustments are recommended for this route. However, some reductions in bus trips are indicated. It is recommended that the following bus trips be eliminated: the first inbound bus trip in the morning, originating at Heritage Drive and Springdale Road; the outbound bus trip departing the central transfer point at 8:20 a.m.; and the last two inbound trips of the day, arriving at the central transfer point at 6:17 p.m. and 6:37 p.m. All of the above bus trips recommended for elimination exhibited very low ridership on the basis of the passenger counts made. The recommended change from the 2:50 p.m. to 3:00 p.m. pulse time will enable an additional special bus trip serving Horning Middle School to be eliminated, since dismissal times at the school could then be served with a bus trip which is part of the regular schedule. These service changes should reduce school day vehicle hours on the route from about 18.5 revenue hours to about 16.4 revenue hours, or by about 11 percent.

Route 2--Arcadian/Racine: It is recommended that Route 2 be extended to directly serve the K-Mart/South High School area during the midday period between 9:00 a.m. and 3:00 p.m. The recommended route extension for Route 2 from the present route terminus at Blackhawk Trail and Fleetfoot Drive is over CTH A and E. Sunset Drive to the K-Mart store, and from the K-Mart store over E. Sunset Drive, S. East Avenue, Tenney Avenue, E. Sunset Drive, and CTH A to Blackhawk Trail and Fleetfoot Drive. The one-way loop at the existing route terminus would be retained and operated on both inbound and outbound runs. The recommended route extension would increase round-trip route miles for the route from 8.5 miles to 12.1 miles.

During the midday period when Route 2 is extended to serve the K-Mart/South High School area, the route would be paired with Route 6, which would also be extended to serve the K-Mart store, as discussed below. The extension of these routes will require that a total of two vehicles be assigned for operation on this route pair. Currently, one vehicle is assigned to Route 6 at all times and Route 2 shares a vehicle with a second route throughout the service day. The elimination of Route 10 and the re-pairing of routes will allow the necessary vehicles to be assigned to Routes 2 and 6 to enable extension of the routes.

Some schedule changes are also recommended for Route 2. It is recommended that the 5:54 a.m. inbound trip, the 8:20 a.m. outbound trip, and the 8:34 a.m. inbound trip all be eliminated from the schedule, based upon observed low ridership levels. It is also recommended that one additional round trip be added to the schedule, departing downtown Waukesha at 3:30 p.m. and arriving back downtown at 4:02 p.m. This bus trip would replace a bus trip eliminated in the morning and would serve students attending Central Middle School residing within the service area of this route. The recommended extension of the route and the pairing of the route with Route 6 will result in buses operated on the route both arriving at and departing from the downtown central transfer location at the same pulse time as the longer routes of the transit system, including Routes 1 and 9. This will result in improved coordination for

transfer purposes among these routes. In total, the service changes and recommended route extension would increase vehicle hours operated on the route by about 22 percent, from about 8.3 revenue hours per day to about 10.1 revenue hours per day.

Route 3--Hartwell: No adjustments in routing are recommended for Route 3. Schedule changes recommended for this route are limited to changes in downtown pulse times, as previously discussed for the entire system.

Route 4--Grand: Routing changes are proposed for both the upper and lower segments of Route 4. It is recommended that the segment of the route currently operated over N. East Avenue and W. College Avenue between E. Broadway and N. Grand Avenue be rerouted to operate over N. Grand Avenue between W. Wisconsin Avenue and W. College Avenue. The existing route segment was observed to have low boarding and debording activity, as noted in Chapter V. The replacement route segment would provide direct transit service to the Central Middle School. A significant portion of the existing route ridership consists of students attending Central Middle School who currently board or deboard the bus at the intersection of N. Grand Avenue and W. College Avenue.

It is also recommended that the segment of the route currently operated over S. Grand Avenue between W. Roberta Avenue and W. Sunset Drive be rerouted to operate over W. Roberta Avenue, S. East Avenue, and W. Sunset Drive. This routing change would provide transit service to the K-Mart/South High School area from residential areas served by the route, including residential areas south of Sunset Drive, which produce significant numbers of transit trips. No changes in round-trip route miles would result from these routing adjustments. Service changes proposed for this route would be limited to the addition of one round trip to the afternoon schedule, departing downtown Waukesha at 3:00 p.m. and arriving back downtown at 3:27 p.m.

Route 5--Prairie Avenue: No routing adjustments are proposed for Route 5. Service changes for this route include the addition of one inbound trip arriving in downtown Waukesha at 5:48 p.m. This trip is recommended to be added primarily to return the vehicle serving Route 6 to the central business district to make its final outbound trip at 5:50 p.m. No other additional service is presently recommended for this route.

Route 6--Fox Run: As noted in the discussion of changes proposed for Route 2, it is recommended that Route 6 be extended to directly serve the K-Mart/South High School area during the midday period between 9:00 a.m. and 3:00 p.m. The recommended route extension for Route 6 from the present route terminus at School Drive and Prairie Avenue is over Prairie Avenue and E. and W. Sunset Drive to the K-Mart store and back over the same streets. During the midday period, when this route and Route 2 are extended to serve the K-Mart/South High School area, Routes 2 and 6 would be operated as paired routes, with the outbound vehicle operated over each route to the K-Mart/South High School area being used as the inbound vehicle on the opposite route to the central business district. The extension of this route would add about 2.7 round-trip route miles to the route.

Changes in scheduling proposed for this route include adding one additional outbound trip from the downtown central transfer point after 5:00 p.m. Currently only one outbound departure--at 5:50 p.m.--is scheduled for this route. The proposed schedule calls for two outbound departures after 5:00 p.m., one at 5:10 p.m. and one at 5:50 p.m. Service changes and the extension of this route will increase vehicle hours operated on the route from about 12.0 revenue vehicle hours to about 12.8 revenue vehicle hours.

Route 7--Madison: No routing adjustments are recommended for Route 7. Schedule changes recommended for the route are limited to changes in downtown pulse times, as previously discussed for the entire system.

Route 8--Summit: The recommended changes in Route 8 apply to the middle and the downtown loop portions of the route. It is recommended that the route operate over Delafield Street and W. Washington Avenue, rather than over Summit Avenue between Delafield Street and W. Washington Avenue. This routing change would provide service to the Willow Park elderly housing complex, presently served by Route 10. It is also recommended that the downtown circulation loop for Route 8 be changed to coincide with that operated by Route 7--St. Paul Avenue, N. Barstow Street, E. Main Street, E. Broadway, and Madison Street. This routing change should shorten the time required for downtown circulation and provide the additional time required to operate the first routing change. These routing changes would increase round-trip route miles for the route from about 7.2 miles to about 7.5 miles. No changes in scheduled transit service are proposed for this route other than the changes to pulse times at the downtown central transfer point previously discussed for the entire transit system.

Route 9--Northview: It is recommended that Route 9 be modified to provide service to the Waukesha County Office Building during the midday period as is currently provided by Route 10. No additional route miles would be required for this service change since the route already serves the office building during the peak service period. It is also recommended that Route 9 be extended to provide regular transit service to the Pebble Valley and The Windings residential areas located on the northwest side of the City. The recommended route extension could be over Silvernail Road, University Drive, and Pebble Valley Road between N. Grandview Boulevard and Northview Road. Transit service over this route extension would be provided in the inbound direction only--from the Waukesha County Technical Institute toward the central business district--between about 7:00 a.m. and 12:00 p.m., and in the outbound direction only--away from the central business district to the Waukesha County Technical Institute--between about 12:00 p.m. and 5:00 p.m. Extension of the route would expand regular transit service into the only major residential areas of the City not presently served by the transit system.

Extension of the route to this area and to the Waukesha County Office Building is possible due to the large amount of layover time currently provided on this route. Operation of the route with one-way service through the Pebble Valley and The Windings subdivision areas should not significantly affect the travel times for Waukesha County Technical Institute students who constitute the majority of passengers currently using the route.

It is recommended that the 5:55 a.m. inbound trip--the first inbound trip in the morning--be eliminated due to low ridership levels. It is also recommended that the afternoon schedules on the route be adjusted to eliminate the round trip which currently departs from the central transfer point at 3:20 p.m., and which would depart at 3:30 p.m. under the proposed new pulse times. The proposed 3:00 p.m. and 4:05 p.m. departure times should provide adequate service to WCTI class times and shift times at the General Electric Medical Systems Division plant. Schedule changes proposed for the route would reduce vehicle hours operated on the route from about 14.1 revenue vehicle hours to about 12.3 revenue vehicle hours, or by about 13 percent.

Route 10--Courthouse Loop: As noted in Chapter V, Route 10 was not one of the routes initially recommended for implementation in the adopted transit development program and was implemented, in part, to provide a route which could be paired with one of five recommended routes during the midday period. Because of the low performance levels observed on the route, it is recommended that the route be eliminated. It is also recommended that changes be made in Routes 8 and 9 to replace the service provided on the most productive segments of Route 10. Route 7, the route currently paired with Route 10, would be paired with a different route during the midday period. This action would allow the required number of vehicles to be assigned to Routes 2 and 6 and would facilitate operation of the recommended route extensions.

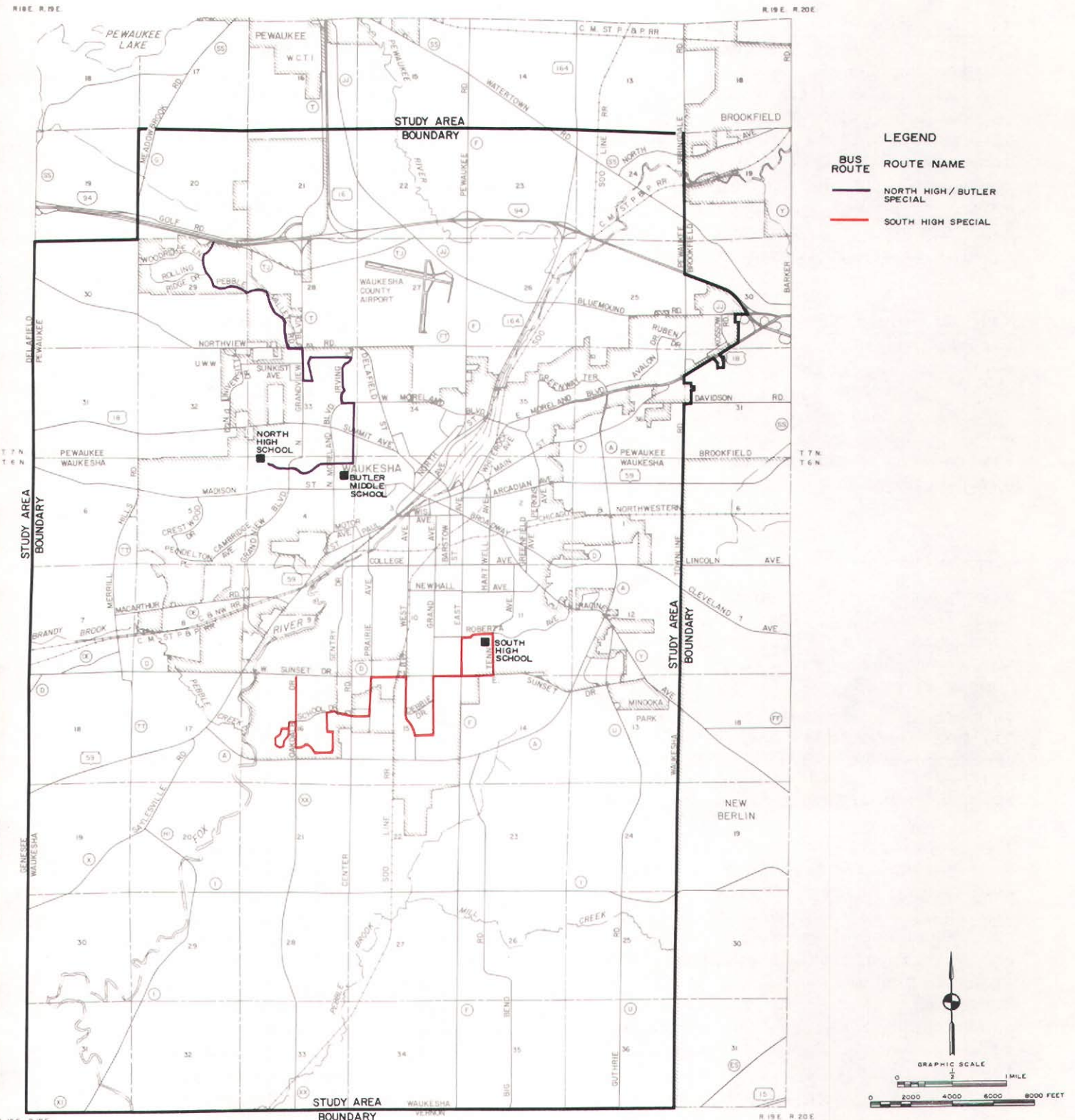
Additional Routes

One of the major issues requiring attention in this study is the means for improving transit service to Waukesha public and parochial schools. Currently, several routes of the Waukesha transit system directly serve Waukesha secondary schools and carry large numbers of students as passengers. Secondary school students who are passengers on these routes generally reside within the service area of the route. For secondary school students who do not reside within the service area of the route serving their school, use of the transit system can be inconvenient due to the need to transfer in the central business district. Improving transit service for these students requires the design and implementation of special routes which would provide direct transit service between residential areas and Waukesha schools. Such routes would be open for anyone to use but would be operated only on school days, with one or two bus trips in the morning and evening periods to serve the start and dismissal times of schools served. Two such "tripper" routes are shown on Map 30 and are described below.

The recommended routes are primarily designed to serve secondary school students residing in areas located between one and two miles from the secondary school attended. Students residing this distance from school are considered to constitute a good market for additional special school service. Students residing less than one mile from the secondary school attended are considered as being within a reasonable walking distance of school and are not likely to regularly use local bus service. Students who reside more than two miles--measured "over the road"--from the school attended are currently eligible for and provided with yellow bus service by the Waukesha Unified School District. Such students are also not likely at the present time to use special city bus

Map 30

RECOMMENDED SCHOOL TRIPPER ROUTES FOR WAUKESHA METRO TRANSIT



service if provided. The impact of eliminating yellow school bus service in the City and providing alternative service by way of the Waukesha transit system is discussed in a later section of this chapter.

Tripper Route No. 1--North High/Butler Special: The first school tripper route recommended for implementation would provide direct transit service between residential areas on the north and northwest sides of the City including the Pebble Valley and The Windings subdivision areas, and both North High School and Butler Middle School. Two bus trips in the morning and two in the afternoon would be operated over the route--one trip during each period to serve the different start or dismissal times of the two schools served. The route would be operated in one direction only during each time period, originating at University Drive and Silvernail Road and terminating at either North High School or Butler Middle School in the morning, and operating in the reverse of the morning direction in the afternoon.

Tripper Route No. 2--South High School Special: The second recommended school tripper route would provide direct transit service between residential areas south of W. Sunset Drive and South High School. Travel by transit between these areas and South High School using these routes would be highly inconvenient. The area to be served by this tripper route is presently served by Routes 4 and 6. The transit service to be provided over this route would consist of one eastbound trip in the morning to South High School and one westbound trip in the afternoon from South High School.

Operating Profile

A comparison of the existing and proposed service and operating characteristics for the Waukesha transit system is presented in Table 53. As can be seen from this table, adjustments to the regular routes of the transit system would add about seven round-trip route miles to the system, increasing the current number from about 90 miles to about 97 miles, or by about 8 percent. The addition of the two recommended school routes would increase the figure by an additional 20 round-trip route miles. The new total for the transit system, incorporating both recommended route adjustments and route additions, would be about 117 round-trip route miles, a total increase over existing levels of about 27 round-trip route miles, or about 30 percent.

The service adjustments proposed for the transit system would result in a reduction of daily revenue vehicle hours operated by the regular routes of the transit system from the existing level of about 92 hours on school days and about 91 hours on nonschool days to about 88 hours on both school days and nonschool days--a reduction of between 3 and 4 percent. The recommended school tripper routes would add almost three revenue hours of service to the transit system on school days. However, recommended reductions in revenue hours for the regular routes of the transit system would enable the recommended school service to be added without exceeding the existing total daily revenue vehicle hours for the transit system. Actually, total revenue hours for the transit system would decline slightly with the recommended service improvements--including special school routes--from about 92 hours on school days and about 91 hours on nonschool days to about 90 hours on school days and about 88 hours on nonschool days.

Table 53

**EXISTING AND PROPOSED WEEKDAY OPERATING
AND SERVICE CHARACTERISTICS BY ROUTE
FOR WAUKESHA METRO TRANSIT**

Bus Route	Round-Trip Route Miles		Hours of Service				Revenue Vehicle Hours			
			Existing		Proposed		Existing		Proposed	
	Existing	Proposed	Start Time First Trip (a.m.)	Start Time Last Trip (p.m.)	Start Time First Trip (a.m.)	Start Time Last Trip (p.m.)	School Days	Nonschool Days	School Days	Nonschool Days
Regular Routes										
1. Westbrook/Target...	13.3	13.3	5:50	6:15	6:05	5:40	18.5	18.2	16.4	16.4
2. Arcadian/Racine...	8.5	12.1	5:50	5:50	6:05	5:40	8.3	8.3	10.1	10.1
3. Hartwell.....	6.5	6.5	5:53	5:50	5:48	5:40	9.4	9.1	9.3	9.0
4. Grand.....	6.1	6.1	5:55	5:50	5:48	5:40	8.7	8.7	9.1	9.1
5. Prairie.....	6.2	6.2	7:45	3:09	7:45	5:36	0.4	0.4	0.6	0.6
6. Fox Run.....	16.1	18.8	6:12	5:50	6:07	5:50	12.0	12.0	12.8	12.9
7. Madison.....	8.1	8.1	5:48	5:50	5:43	5:40	9.3	9.3	9.1	9.1
8. Summit.....	7.2	7.5	5:47	5:50	5:42	5:40	7.8	7.8	8.1	8.0
9. Northview.....	13.4	18.4	5:55	5:50	6:05	5:40	14.1	14.1	12.3	12.3
10. Courthouse Loop...	4.3	--	9:24	2:58	--	--	3.4	3.4	--	--
Subtotal	89.7	97.0	--	--	--	--	91.9	91.3	87.8	87.5
School Routes										
North High/	--	9.3	--	--	7:00	3:25	--	--	1.8	--
Butler Special.....	--	11.1	--	--	6:55	2:50	--	--	0.8	--
South High Special....	--	--	--	--	--	--	--	--	--	--
Subtotal	--	20.4	--	--	6:55	2:47	--	--	2.6	--
Total	89.7	117.4	--	--	--	--	91.9	91.3	90.4	87.5

Bus Route	Service Frequency (minutes)						Number of Buses Required ^a					
	Existing			Proposed			Existing			Proposed		
	A.M. Peak	Off-Peak	P.M. Peak	A.M. Peak	Off-Peak	P.M. Peak	A.M. Peak	Off-Peak	P.M. Peak	A.M. Peak	Off-Peak	P.M. Peak
Regular Routes												
1. Westbrook/Target...	30	60	30	30	60	30	2.0	1.0	2.0	2.0	1.0	2.0
2. Arcadian/Racine...	30	60	60	30	60	30	1.0	0.5	0.5	1.0	1.0	1.0
3. Hartwell.....	30	60	30	30	60	30	1.0	0.5	1.0	1.0	0.5	1.0
4. Grand.....	30	60	30	30	60	30	1.0	0.5	1.0	1.0	0.5	1.0
5. Prairie.....	1 trip	--	1 trip	1 trip	--	2 trips	0.5	--	--	0.5	--	0.5
6. Fox Run.....	60	60	60	60	60	60	0.5	1.0	1.0	0.5	1.0	0.5
7. Madison.....	30	60	30	30	60	30	1.0	0.5	1.0	1.0	0.5	1.0
8. Summit.....	30	60	60	30	60	30	1.0	0.5	0.5	1.0	0.5	1.0
9. Northview.....	60	60	30	60	60	60	1.0	1.0	2.0	1.0	1.0	1.0
10. Courthouse Loop...	--	60	--	--	--	--	--	0.5	--	--	--	--
Subtotal	--	--	--	--	--	--	9.0	6.0	9.0	9.0	6.0	9.0
School Routes												
North High/	--	--	--	2 trips	1 trip	1 trip	--	--	--	1.0	1.0	1.0
Butler Special.....	--	--	--	1 trip	1 trip	--	--	--	--	1.0	1.0	--
South High Special....	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--	--	--	2.0	2.0	1.0
Total	--	--	--	--	--	--	9.0	6.0	9.0	11.0	8.0	10.0

^aFractions indicate a single vehicle is operated over two routes during a time period.

Source: Waukesha Metro Transit and SEWRPC.

No additional vehicles would be required to operate the nine regular routes of the transit system with the recommended route adjustments and extensions. The transit system would continue to operate nine vehicles in the morning and afternoon peak periods and six vehicles in the midday off-peak periods on the regular routes. The routing adjustments and extensions recommended for the regular routes are, therefore, immediately implementable. Operation of the two recommended school tripper routes would require the use of two vehicles in addition to the nine currently operated on the regular routes.

Implementation of the recommended adjustments and extensions to the regular routes and the additional school tripper routes would increase the current transit system vehicle requirements from nine to 11 vehicles. At present, the transit system has a total vehicle fleet of 14 leased buses, of which a maximum of 10 vehicles are available for operation each day. The number of vehicles available for operation is not expected to change following the delivery of the new vehicle fleet of 11 buses for the transit system sometime in late 1983. Consequently, one additional vehicle would be required in order for all recommended service improvements--in particular the two additional school tripper routes--to be implemented. One more vehicle is also recommended to maintain at least two spare buses for the bus fleet. These vehicles would increase the total planned bus fleet from 11 buses to 13 buses. It is recommended that the adjustments to the regular routes and one of the two tripper routes--the North High/Butler Special--be implemented immediately. It is also recommended that, following the delivery of new vehicles in late 1983, the transit system retain one or more of its leased vehicles and use these vehicles to implement and operate the second recommended school tripper route until one or more additional new vehicles can be acquired by the transit system and placed into operation.

Ridership and Financial Projections

Ridership and financial projections for the Waukesha transit system with the recommended weekday transit service are presented in Table 54. Projections presented in this table assume implementation of all recommended service changes, except one tripper route, by May 1, 1983, and implementation of the final tripper route by January 1, 1984. As can be seen from the table, ridership is projected to increase significantly between 1982 and 1986. By 1986, ridership is projected to increase by about 53 percent over 1982 levels, from about 202,700 revenue passengers to about 311,000 revenue passengers. A major portion of this projected increase may be attributed to additional revenue passengers generated by the school tripper routes, which routes are anticipated to generate about 7 percent of total revenue passengers between 1984 and 1986. Some of the ridership increase projected for this period may also be attributed to the continued growth of the ridership base for the transit system as a whole. Passengers per revenue vehicle hour during this period are also projected to increase between 1982 and 1986, from about nine passengers per hour in 1982 to about 14 passengers per hour in 1986.

Projected operating expenses, revenues, and deficits are also presented in Table 54. All financial projections are presented in terms of 1983 constant dollars. Operating expenses for the transit system are expected to decline, in constant dollars, between 1982 and 1986 due primarily to the elimination

Table 54

**RIDERSHIP, OPERATING EXPENSES, OPERATING REVENUES, AND
OPERATING DEFICITS FOR WAUKESHA METRO TRANSIT WITH AND
WITHOUT RECOMMENDED WEEKDAY SERVICE IMPROVEMENTS: 1982-1986**

Operating Characteristics	1982 Estimated	1983 Budget	Projected with Existing System ^a			Projected with Recommended System Improvements ^a			
			1984	1985	1986	1983	1984	1985	1986
Annual Revenue									
Passengers.....	202,700	234,000	257,000	270,000	285,000	245,000	282,000	296,000	311,000
Annual Vehicle Hours									
Revenue.....	23,300	23,600	23,600	23,600	23,600	22,800	22,800	22,800	22,800
Total.....	24,200	24,900	24,900	24,900	24,900	24,100	24,000	24,000	24,000
Revenue Passengers per Revenue Vehicle Hour....	8.7	9.9	10.9	11.4	12.0	10.7	12.4	13.0	13.6
Operating Expenses									
Per Hour.....	\$24.44	\$32.00	\$28.50	\$28.50	\$28.50	\$32.00	\$28.50	\$28.50	\$28.50
Annual.....	688,200	797,200	709,700	709,700	709,700	771,200	684,000	684,000	684,000
Per Revenue Passenger..	3.40	3.41	2.76	2.63	2.51	3.15	2.43	2.31	2.20
Operating Revenue ^b									
Per Revenue Passenger..	\$ 0.43	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41
Annual.....	86,800	95,600	105,400	110,700	116,000	100,000	114,400	120,100	126,200
Percent of									
Operating Expenses....	12.6	12.0	14.9	15.6	16.3	13.0	16.7	17.6	18.4
Operating Deficit									
Annual.....	\$601,400	\$701,600	\$604,300	\$599,000	\$593,700	\$671,200	\$569,600	\$563,900	\$557,800
Per Revenue Passenger..	2.97	3.00	2.35	2.22	2.10	2.74	2.02	1.91	1.79

^a All dollar figures are expressed in terms of constant 1983 dollars.

^b Assumes no change in the existing fare structure.

Source: SEWRPC.

of virtually all lease costs for buses in 1984 after the delivery and placement into operation of all new buses. At that time, operating expenses should decline by about 11 percent. Operating revenues for the transit system should increase with the growth of system ridership over the period from 1982 levels of about \$87,000, to about \$126,000 by 1986--an increase of about 45 percent. Similarly, operating deficits should decline in constant dollars due to decreases in operating expenses and increases in passenger revenues. Operating deficits should decline from 1982 levels of about \$2.97 per revenue passenger to about \$1.79 per revenue passenger in 1986. This analysis assumes no change in the current fare structure for the Waukesha transit system. Changes to the fare structure which could improve the financial performance of the system are discussed separately in a later section of this chapter.

Capital Projects

As previously noted, implementation of the preceding recommended transit system improvements would require the acquisition of two vehicles--one additional vehicle to operate the route and one additional vehicle to maintain an adequate number of spare buses for the fleet. These vehicles would enable the transit system to operate the regular and school tripper routes as recommended. It is recommended that the transit system acquire 35-foot-long buses similar to those currently being purchased by the City. This would increase the total planned city-owned bus fleet from 11 to 13 buses. Also required would be two fareboxes for the buses, and additional bus stop signs for the route extensions and tripper routes. The estimated costs in 1983 constant dollars of the equipment required to implement the preceding service changes are shown in Table 55. The total capital investment required for the preceding

Table 55

**CAPITAL PROJECTS AND EXPENDITURES REQUIRED TO
IMPLEMENT REGULAR ROUTE CHANGES AND SPECIAL
SCHOOL ROUTES RECOMMENDED FOR WAUKESHA
METRO TRANSIT DURING 1983 AND 1984**

Quantity	Capital Equipment	Unit Cost ^a	Total Cost ^a
2	35-Foot-Long, Heavy Duty Urban Transit Coaches.....	\$130,000	\$260,000
2	Nonregistering, Locked, Double-Vault Fareboxes.....	800	1,600
2	Mobile Radio Units.....	1,500	3,000
30	Bus Stop Signs.....	45 ^b	1,350
Total Equipment Costs.....			\$265,950
Contingency Fund ^c			26,595
Project Administration ^d			5,319
Total			\$297,864
Federal Share (80 percent).....			\$238,291
Local Share (20 percent).....			59,573

^a 1983 constant dollars.

^b Installed.

^c Estimated at 10 percent of total equipment costs.

^d Estimated at 2 percent of total equipment costs.

Source: SEWRPC.

service improvements would be about \$297,900. It is recommended that an UMTA capital grant application be prepared in 1984 by the City for purchase of recommended equipment. The federal share of the total costs could be about \$238,300, or 80 percent, under the UMTA Section 9 program. This would leave a local share of about \$59,600, or 20 percent, to be funded by the City.

Additional Service Improvements

The recommended service improvements described in the previous sections represent service changes which can be made within the existing daily revenue vehicle hours of service and the existing level of financial commitment by the City to the transit system. Certain additional service improvements could be considered to increase total transit system ridership. Specifically, these service improvements include increased off-peak service to improve transfer coordination, and expanded hours of service or days of operation. These potential service improvements were considered separately from those previously recommended because of the potential to increase the daily revenue vehicle hours of service and level of financial commitment required to operate the transit system. Inasmuch as provision for such increases have not been included in the 1983 budget, the earliest that such service changes could be implemented would be 1984. The following sections address these potential service improvements and provide estimates of the incremental ridership and financial requirements attendant to these service improvements over those of the weekday transit service previously recommended.

Increased Off-Peak Frequency of Service: As noted in Chapter V of this report, most problems in transferring between bus routes occur during the midday period between 9:00 a.m. and 3:00 p.m., and result from differences in route departure times during this period. Transfers made between bus routes not immediately departing from the central transfer point during this period generally result in waiting times for passengers of about 30 minutes. A possible solution to this problem would be the operation of the shorter bus routes--Routes 3, 4, 7, and 8--with 30-minute headways during this period. This would allow these bus routes to meet on an hourly basis with the longer bus routes--Routes 1, 2, 6, and 9--and allow passengers the opportunity to plan their trip to avoid a 30-minute delay for transferring. This action could also help to reduce long travel times for some crosstown transit trips.

Under this potential service change, Routes 3, 4, 7, and 8 would be operated with 30-minute headways during the midday period. This would involve extending peak-period service frequencies throughout the service day on these routes. It is estimated that this service improvement would add about 3,200 annual revenue vehicle hours to the total vehicle hours projected previously for the transit system with the recommended service changes. It is also estimated that this service change would add from about 23,000 to 25,000 annual revenue passengers to the transit system between 1984 and 1986, or between seven and eight passengers per revenue vehicle hour of service added. This compares with between 12 and 14 passengers per revenue vehicle hour previously projected for the recommended transit system, and about nine passengers per revenue vehicle hour on the existing transit system.

The service change would add about \$88,000, in constant 1983 dollars, to the annual operating budget for the transit system. Passenger revenues generated by the service change would cover about 10 percent of the additional operating expenses. This compares with the recovery rate of from 17 to 18 percent previously projected for the entire transit system, and 13 percent for the existing transit system during 1982. The service change would increase the annual operating deficit for the transit system by between \$78,000 and \$79,000 in constant 1983 dollars. The operating deficit per passenger for the service change would decrease, expressed in constant 1983 dollars, from about \$3.43 in 1984 to about \$3.13 in 1986. This compares with the previously projected operating deficit per passenger for the entire transit system with the recommended service changes of about \$2.02 in 1984 and \$1.79 in 1986. The incremental ridership and incremental operating expenses, revenues, and deficits for these increases in off-peak period frequency of service are presented in Table 56.

Extended Hours of Operation: Another issue addressed by this study was the appropriateness of the current hours of operation for the transit system. The evaluation of transit service relative to existing travel habits and patterns indicated that the current hours of transit system operation are appropriate for the majority of trips made within the transit service area, serving about 74 percent of the total person trips made by city residents within the transit service area on an average weekday. The evaluation also indicated that about 21 percent of the trips were made in the evening hours between 6:00 p.m. and 10:00 p.m. Accordingly, this period represents the most reasonable period into which service hours of the transit system could be extended and an examination of the incremental ridership and costs of such service extension was undertaken.

Because of the pattern of trip movements for the evening period, transit service would be required to be provided on all bus routes. The transit system would be operated essentially as previously recommended during the midday off-peak period. That is, transit service would be provided on all routes on 60-minute headways, and Routes 2 and 6 would be extended to serve the K-Mart/South High School area. In addition, Route 9 would continue to serve Waukesha County Technical Institute until about 9:45 p.m. Four additional downtown departure times--6:40 p.m., 7:40 p.m., 8:40 p.m., and 9:40 p.m.--would be added to the schedules of Routes 3 and 8, and five additional downtown departure times--6:10 p.m., 7:10 p.m., 8:10 p.m., 9:10 p.m., and 10:10 p.m.--would be added to the schedules of Routes 1, 2, 4, 6, 7, and 9. The extended service was assumed to be available on the transit system five days per week.

It is estimated that the extension of service hours in this manner would add about 7,000 annual revenue vehicle hours of service to the projected vehicle hours for the transit system with the previously recommended service improvements. It is also estimated that the extended hours of service would add from 38,000 to 42,000 annual revenue passengers to the transit system between 1984 and 1986, or between five and six passengers per revenue vehicle hour of service added. This compares with 12 and 14 passengers per vehicle hour projected for the transit system with the current hours of operation.

The extension of service hours would add about \$199,500, as measured in constant 1983 dollars, to the annual operating budget of the transit system. Passenger revenues generated by the extended hours would cover between 8 and 9 percent of the additional operating costs, compared to a projected recovery rate of from about 17 to 18 percent for the transit system with the current operating hours. The extension of service hours would increase the annual operating deficit for the transit system by between about \$182,000 and \$184,000, in constant 1983 dollars. The operating deficit per passenger for extended service hours would be about \$4.83 in 1984, and decrease, in constant 1983 dollars, to about \$4.34 in 1986. This compares with the projected operating deficit per passenger for the transit system with the current hours of operation of about \$2.02 in 1984 and about \$1.79 in 1986. The incremental ridership and incremental operating expenses, revenues, and deficits for operation of the transit system with extended evening hours are presented in Table 57.

Extended Days of Operation: One of the major differences noted between the Waukesha transit system and other similar size transit systems in Wisconsin was that the Waukesha transit system did not operate on Saturdays, while the other similar size systems did. It was also noted that the provision of Saturday transit service was an action which should be considered to increase total transit system ridership. Accordingly, an examination of the incremental ridership and costs associated with providing Saturday transit service was undertaken.

Saturday transit service would be provided over all nine regular routes of the transit system. The route structure would be essentially the same as the route structure for the weekday, off-peak period between 9:00 a.m. and 3:00 p.m. except for Route 9. Route 9 on Saturday would be cut back and would operate only between downtown Waukesha and Northview Road and Glenwall Drive. No transit service would be provided to the Waukesha County Technical Institute.

Table 56

**INCREMENTAL RIDERSHIP, OPERATING EXPENSES, OPERATING
REVENUES, AND OPERATING DEFICITS FOR INCREASED OFF-PEAK
SERVICE FREQUENCY ON WAUKESHA METRO TRANSIT: 1984-1986**

Operating Characteristics	1982 Estimated	Projections ^a									
		Recommended System				Increment for Proposed Service Change			Recommended System with Proposed Service Change		
		1983	1984	1985	1986	1984	1985	1986	1984	1985	1986
Annual Revenue											
Passengers.....	202,700	245,000	282,000	296,000	311,000	23,000	24,000	25,000	305,000	320,000	336,000
Annual Vehicle Hours											
Revenue.....	23,300	22,800	22,800	22,800	22,800	3,200	3,200	3,200	26,100	26,100	26,100
Total.....	24,200	24,100	24,000	24,000	24,000	3,100	3,100	3,100	27,100	27,100	27,100
Revenue Passengers per Revenue Vehicle Hour...	8.7	10.7	12.4	13.0	13.6	7.5	7.5	7.8	11.7	12.3	12.9
Operating Expenses											
Per Hour.....	\$24.44	\$32.00	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50
Annual.....	688,200	771,200	684,000	684,000	684,000	88,400	88,400	88,400	772,400	772,400	772,400
Per Revenue											
Passenger.....	3.40	3.15	2.43	2.31	2.20	3.84	3.68	3.54	2.53	2.41	2.30
Operating Revenue ^b											
Per Passenger.....	\$ 0.43	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41
Annual.....	86,800	100,000	114,400	120,100	126,200	9,400	9,800	10,200	123,800	129,900	136,400
Percent of											
Operating Expenses...	12.6	13.0	16.7	17.6	18.4	10.6	11.1	11.5	16.0	16.8	17.7
Operating Deficit											
Annual.....	\$601,400	\$671,200	\$569,600	\$563,900	\$557,800	\$79,000	\$78,600	\$78,200	\$648,600	\$642,500	\$636,000
Per Revenue											
Passenger.....	2.97	2.74	2.02	1.91	1.79	3.43	3.28	3.13	2.13	2.01	1.89

^a All dollar figures are expressed in terms of constant 1983 dollars.

^b Assumes no change in the existing fare structure.

Source: SEWRPC.

Table 57

**INCREMENTAL RIDERSHIP, OPERATING EXPENSES, OPERATING
REVENUES AND OPERATING DEFICITS FOR EXTENDED EVENING
HOURS OF OPERATION ON WAUKESHA METRO TRANSIT: 1984-1986**

Operating Characteristics	1982 Estimated	Projections ^a									
		Recommended System				Increment for Proposed Service Change			Recommended System with Proposed Service Change		
		1983	1984	1985	1986	1984	1985	1986	1984	1985	1986
Annual Revenue											
Passengers.....	202,700	245,000	282,000	296,000	311,000	38,000	40,000	42,000	320,000	336,000	353,000
Annual Vehicle Hours											
Revenue.....	23,300	22,800	22,800	22,800	22,800	7,000	7,000	7,000	29,800	29,800	29,800
Total.....	24,200	24,100	24,000	24,000	24,000	7,000	7,000	7,000	31,000	31,000	31,000
Revenue Passengers per											
Revenue Vehicle Hour....	8.7	10.7	12.4	13.0	13.6	5.4	5.7	6.0	10.7	11.3	11.8
Operating Expenses											
Per Hour.....	\$24.44	\$32.00	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50
Annual.....	688,200	771,200	684,000	684,000	684,000	199,500	199,500	199,500	883,500	883,500	883,500
Per Revenue Passenger...	3.40	3.15	2.43	2.31	2.20	5.25	4.98	4.75	2.76	2.63	2.50
Operating Revenue ^b											
Per Passenger.....	\$ 0.43	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41
Annual.....	86,800	100,000	114,400	120,100	126,200	15,600	16,400	17,200	130,000	136,500	143,400
Percent of											
Operating Expenses.....	12.6	13.0	16.7	17.6	18.4	7.8	8.2	8.6	14.7	15.4	16.2
Operating Deficit											
Annual.....	\$601,400	\$671,200	\$569,600	\$563,900	\$557,800	\$183,900	\$183,100	\$182,300	\$753,500	\$747,000	\$740,100
Per Revenue Passenger...	2.97	2.74	2.02	1.91	1.79	4.83	4.57	4.34	2.35	2.22	2.10

^a All dollar figures are expressed in terms of constant 1983 dollars.

^b Assumes no change in the existing fare structure.

Source: SEWRPC.

The proposed operating profile for Saturday transit service is presented in Table 58. In general terms, transit service would be provided on the transit system between the hours of 8:15 a.m. and 5:15 p.m., with the first pulsed arrival/departure time at the downtown central transfer location scheduled for 8:50 a.m. and the last pulsed arrival/departure time scheduled for 4:50 p.m. Transit service would be provided at 60-minute headways on all routes except Routes 1 and 9. Transit service on Route 1 would be provided on 30- and 60-minute headways and transit service on Route 9 would be provided on 30- and 90-minute headways. Headways for these two routes result from the shared operation of one vehicle, and should provide better transfer coordination of all routes with Route 1, which is anticipated to be the major transfer route on Saturdays. A total of six vehicles would be required for Saturday transit service with the proposed route structure and service frequency.

It is estimated that the provision of Saturday transit service, as proposed, would add about 2,700 revenue vehicle hours of service to the annual vehicle hour totals previously projected for the transit system. It is also estimated that provision of Saturday transit service would add from 26,000 to 29,000 annual revenue passengers to the transit system between 1984 and 1986. The productivity of Saturday transit service would range from about 10 passengers per revenue vehicle hour in 1984 to about 11 passengers per vehicle hour in 1986. This compares with the projected productivity for recommended weekday transit service of about 12 passengers per vehicle hour in 1984 and about 14 passengers per vehicle hour in 1986.

The provision of Saturday transit service would add about \$80,000, in constant 1983 dollars, to the annual operating budget of the transit system. Passenger revenues generated by Saturday transit service would cover from about 13 to 15 percent of the operating expenses for Saturday transit service, compared with the projected recovery rate of about 17 to 18 percent for the recommended weekday transit service. The provision of Saturday transit service would

Table 58

**PROPOSED SATURDAY OPERATING AND SERVICE
CHARACTERISTICS BY ROUTE FOR WAUKESHA METRO TRANSIT**

Bus Route	Round-Trip Route Miles	Hours of Service		Revenue Vehicle Hours	Service Frequency (minutes)	Number of Buses Required ^a
		Start Time First Trip (a.m.)	Start Time Last Trip (p.m.)			
1. Westbrook/Target...	13.3	8:29	4:50	12.8	30/60	1.5
2. Arcadian/Racine...	12.1	8:30	4:50	7.3	60	1.0
3. Hartwell.....	6.5	8:50	4:50	4.3	60	0.5
4. Grand.....	6.1	8:33	4:33	4.3	60	0.5
5. Prairie.....	--	--	--	--	--	--
6. Fox Run.....	18.8	8:18	4:50	10.3	60	1.0
7. Madison.....	8.1	8:50	4:50	4.3	60	0.5
8. Summit.....	7.5	8:28	4:33	4.4	60	0.5
9. Northview.....	6.3	9:05	4:50	4.0	30/90	0.5
Total	78.7	8:18	4:50	51.7	--	6.0

^aFractions indicate a single vehicle is operated over two routes during a time period.

Source: SEWRPC.

Table 59

**INCREMENTAL RIDERSHIP, OPERATING EXPENSES, OPERATING
REVENUES, AND OPERATING DEFICITS FOR SATURDAY
TRANSIT SERVICE ON WAUKESHA METRO TRANSIT: 1984-1986**

Operating Characteristics	1982 Estimated	Projections ^a									
		Recommended System				Increment for Proposed Service Change			Recommended System with Proposed Service Change		
		1983	1984	1985	1986	1984	1985	1986	1984	1985	1986
Annual Revenue											
Passengers.....	202,700	245,000	282,000	296,000	311,000	26,000	27,000	29,000	308,000	323,000	340,000
Annual Vehicle Hours											
Revenue.....	23,300	22,800	22,800	22,800	22,800	2,700	2,700	2,700	25,500	25,500	25,500
Total.....	24,200	24,100	24,000	24,000	24,000	2,800	2,800	2,800	26,800	26,800	26,800
Revenue Passengers per Revenue Vehicle Hour....	8.7	10.7	12.4	13.0	13.6	9.6	10.0	10.7	12.1	12.7	13.3
Operating Expenses											
Per Hour.....	\$24.44	\$32.00	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50	\$28.50
Annual.....	688,200	771,200	684,000	684,000	684,000	79,800	79,800	79,800	763,800	763,800	763,800
Per Revenue Passenger...	3.40	3.15	2.43	2.31	2.20	3.07	2.96	2.75	2.46	2.34	2.23
Operating Revenue ^b											
Per Passenger.....	\$ 0.43	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41
Annual.....	86,000	100,000	114,400	120,100	126,200	10,700	11,100	11,900	125,100	131,200	138,100
Percent of											
Operating Expenses.....	12.6	13.0	16.7	17.6	18.4	13.4	13.9	14.9	16.4	17.2	18.1
Operating Deficit											
Annual.....	\$601,400	\$671,400	\$569,900	\$563,900	\$557,800	\$69,100	\$68,700	\$67,900	\$638,700	\$632,600	\$625,700
Per Revenue Passenger...	2.97	2.74	2.02	1.91	1.79	2.66	2.54	2.34	2.07	1.96	1.83

^a All dollar figures are expressed in terms of constant 1983 dollars.

^b Assumes no change in the existing fare structure.

Source: SEWRPC.

increase the projected operating deficit for the transit system between 1984 and 1986 by between \$68,000 and \$69,000, expressed in constant 1983 dollars. The operating deficit per revenue passenger for Saturday transit service would be about \$2.67 in 1984 and decrease, in constant dollar terms, to about \$2.35 by 1986. This compares with the operating deficit per revenue passenger projected for the recommended weekday transit service of about \$2.02 in 1984 and about \$1.79 in 1986. The incremental ridership and incremental operating expenses, revenues, and deficits for provision of Saturday transit service are presented in Table 59.

Recommendations: A review of the projected incremental ridership and costs of the proposed service changes indicates that none of the service changes would be as productive or operate at financial performance levels equivalent to the recommended weekday transit service. Of the three proposed service changes, Saturday transit service has the best potential productivity and financial performance levels. Productivity levels for Saturday transit service are estimated to be about 77 to 89 percent of those projected for the recommended weekday transit service. The operating deficit per passenger for Saturday transit service is estimated to be about 32 to 34 percent above that projected for the recommended weekday transit service. Saturday transit service would also increase the total transit system operating deficit by the lowest amount of the three service changes considered. Productivity and financial performance levels for the other two service changes examined are considerably lower than those projected for Saturday transit service, as well as those projected for the recommended weekday transit service.

Simultaneous implementation of the three service changes discussed above would add an additional 87,000 to 96,000 revenue passengers to the revenue passenger projections made previously for the recommended weekday transit service. This action would also increase projections of the total annual transit system operating deficit by between \$328,000 and \$332,000, in constant 1983 dollars. Because of the large increase in transit system operating deficits, the implementation of all three proposed service changes is not recommended. However, the implementation of one of the three proposed service changes could be considered desirable to increase total transit system ridership, despite an increase in the operating deficit. Such a decision, which would require an increase in the current level of local financial commitment for the transit system, must ultimately be made by the Waukesha Transit System Utility Board and the Waukesha Common Council.

Elimination of In-City Yellow School Bus Service

At the present time, the major provider of special school transportation service within the study area is the Waukesha Unified School District. The Waukesha Unified School District, during the 1982-1983 school year, provided yellow school bus service to approximately 6,000 students within the school district who reside over two miles from the school they are entitled to attend. Of the 6,000 students receiving yellow school bus service within the school district, about 1,100, or 18 percent, are secondary school students who reside within the corporate limits of the City of Waukesha. An examination of the yellow school bus routes within the City and the routes of Waukesha Metro Transit indicates that a substantial amount of duplication exists between the two route systems, and that many of the secondary school students currently

served by yellow school bus routes could be served by the routes of the Waukesha transit system. This analysis raises the question of whether the City should be providing financial assistance for yellow school bus service if secondary school students using these services could be served by the publicly operated bus system.

A change in the current student transportation policy of the Waukesha School Board to exclude secondary school students residing within the service area of Waukesha Metro Transit from receiving yellow school bus service was suggested in the previous chapter. Such a policy change could significantly improve the ridership and financial performance of Waukesha Metro Transit.

The required change in student transportation policy would essentially constitute a return to the student transportation policies within the City of Waukesha which existed prior to November 1977. In November 1977, the school board was forced to begin providing yellow school bus service to in-city students residing over two miles from their school after special school tripper service operated in the City by a private transit operator--Wisconsin Coach Lines, Inc.--was discontinued, leaving no bus service available for in-city students. Prior to November 1977, yellow school bus service was not provided to students within the City's corporate limits. Instead, students were required to use other forms of transportation, including the privately operated school tripper and local bus service. Prior to 1971, the school board provided financial assistance to in-city students residing over two miles from their school who used the local or special school tripper bus service. In 1971, as a part of a total budget reduction requested by the Waukesha Common Council, the school board discontinued this financial assistance--an action which was a contributing factor to the demise of the local transit system.

To provide some background information on student transportation policies in other areas with local transit systems, a review was conducted of the student transportation policies within six other similar size Wisconsin communities served by publicly operated, fixed route, transit systems--Fond du Lac, Janesville, La Crosse, Manitowoc, Oshkosh, and Sheboygan (see Appendix D). This review indicated that the City of Waukesha is unique among the communities examined in the amount of yellow school bus service provided to in-city students. Within the six similarly sized Wisconsin communities examined, no yellow school bus service is provided for in-city, secondary school students, although some communities do provide yellow school bus service for in-city elementary school students. Students not provided with yellow school bus service must rely on other forms of transportation, including regular route or tripper services provided by the local, publicly operated, fixed route transit systems. The La Crosse school board reimburses in-city students residing over two miles from their school for the cost of using the local bus system--a policy similar to the policy within the City of Waukesha prior to 1971. The school boards operating in the other five communities--Fond du Lac, Janesville, Manitowoc, Oshkosh, and Sheboygan--provide no financial assistance to in-city students for transportation--a policy similar to the policy within the City of Waukesha between 1971 and November 1977.

Service Characteristics, Ridership, and Costs: Regardless of the student transportation policies of other similar size Wisconsin communities, a decision to return to the former student transportation policy for in-city students

should be a local decision in which the costs of such a policy change to the City are weighed against the advantages and disadvantages of the policy change. The costs for Waukesha Metro Transit of returning to such a student transportation policy within the City of Waukesha can be clearly identified. A change in the student transportation policy for the City of Waukesha should consider only the elimination of yellow school bus service for public and parochial secondary school-age children, as this represents the largest student market and the student market which could be best served by the transit system. Because most public elementary school students reside within two miles of the school they attend, yellow school bus service for elementary school students is limited mainly to the intact busing of entire classes to avoid overcrowding of a particular elementary school. Yellow school bus service is better suited to the needs of these students, as well as students participating in the exceptional education program offered by the school district. Because the current contract for the yellow school bus service within the school district runs through the 1984-1985 school year, and because additional equipment would be needed by the City in order to serve students presently served by yellow school bus service, the earliest that the City could assume responsibility for providing transportation to in-city students would be the fall of 1985, at the beginning of the 1985-86 school year.

It is anticipated that the City could serve in-city secondary school students with the system of regular and special school routes previously recommended in this chapter. It is anticipated that some of the additional revenue trips generated by students could be accommodated with the level of service proposed for the recommended system. However, it is also anticipated that extra bus trips would have to be added in the morning and afternoon on some routes of the transit system--in particular, Routes 1, 3, 5, 7, and 9, and one of the special school tripper routes. All bus trips added to schedules to serve student demand would be open for use by the public to conform to current federal regulations.

It is estimated that the additional service required to serve the student trips would add about 1,000 annual revenue vehicle hours in 1985 and about 2,200 annual revenue vehicle hours in 1986 to the total revenue vehicle hours previously projected for the recommended transit system. It is also estimated that about 550 students per school day--about one-half of the in-city secondary school students eligible for yellow school bus service, or about three-quarters of the 700 eligible students currently estimated to use the yellow school bus service daily--would use the transit service provided by Waukesha Metro Transit to make two one-way trips per day. Consequently, the policy change would add about 88,000 revenue passengers in 1985 and about 198,000 revenue passengers in 1986 to the transit system, or between 80 and 90 passengers per revenue vehicle hour of service added. These additional revenue passengers would increase the projected productivity of the recommended system in 1985 and 1986 from about 13 and 14 passengers per vehicle hour to about 16 and 20 passengers per vehicle hour.

The additional service for students would add about \$37,000 in 1985 and about \$82,700 in 1986 to the annual operating budget projected for the recommended system, in constant 1983 dollars. Revenues generated by the additional student trips would cover between 83 and 84 percent of the additional operating expenses. The additional student revenues generated by the policy change would increase the recovery rate previously projected for the recommended system from

about 18 and 19 percent to about 21 and 25 percent in 1985 and 1986. The additional service would increase the operating deficit for the recommended transit system by about \$6,300 in 1985 and by about \$13,400 in 1986, in constant 1983 dollars. The operating deficit per revenue passenger for the additional service would be about \$0.07. The additional student revenue passengers and revenue would decrease the operating deficit per passenger previously projected for the recommended transit system in 1985 and 1986 from \$1.91 and \$1.79 to about \$1.48 and \$1.12. The incremental ridership and incremental operating expenses, revenues, and deficits for the additional service are presented in Table 60.

The additional service required to serve the student ridership would require six additional vehicles for operation, and one more vehicle to maintain an adequate number of spare buses for the bus fleet. This would increase the number of vehicles required to operate the recommended transit system from 11 vehicles to 17 vehicles, and increase the total vehicle fleet size for the transit system from the 13 vehicles required for the recommended system to 20 vehicles required for the recommended system with the additional transit service for in-city secondary school students. Also required would be seven mobile radio units and seven nonregistering, double-locked vault fareboxes. In addition, because the planned city bus garage and maintenance facility will be constructed to accommodate a bus fleet of 15 vehicles, improvements would be required at this facility. These improvements would include additional storage space for five buses and one additional maintenance bay. The total capital cost, including contingencies and administrative costs, of acquiring the additional seven vehicles and related operating equipment, and expanding the city bus garage and maintenance facility is estimated at about \$1,164,900. The federal share of this total capital cost under the UMTA Section 9 transit assistance program would be about \$931,900, or 80 percent. This would leave a local share of about \$233,000, or 20 percent, to be funded by the City. Assuming a 12-year life for the buses and bus-related operating equipment and a 25-year life for garage improvements, the total average annual capital expenditures would amount to about \$91,500, of which about \$73,200 would be the federal share and about \$18,300 would be the City share. These costs would be in addition to the capital project costs previously described for the transit system.

Advantages and Disadvantages: The major advantages and disadvantages associated with the proposed change in student transportation policy are summarized in Table 61. The major advantages of the proposed policy change include substantially improving the operating performance of the Waukesha transit system, and the possibility of reducing city expenditures. The major disadvantages associated with the proposed policy change include a need to negotiate with the Waukesha School Board for city resident property tax reductions, charging students for transportation service which they now receive at no direct charge, possible adverse effects on the private yellow school bus operator, and the lower cost-effectiveness of the proposed transit service.

The potential improvement in the operating performance of the transit system resulting from the policy change may be seen by comparing the projections made for the transit system with and without the proposed additional student transit service, both as set forth in Table 60. The proposed policy change and additional school service would result in a ridership increase of about 64 percent over previously projected ridership levels for 1986, and a decrease in the operating deficit per revenue passenger of about 37 percent.

Table 60

**INCREMENTAL RIDERSHIP, OPERATING EXPENSES, OPERATING
REVENUES, AND OPERATING DEFICITS FOR ADDITIONAL
SERVICE REQUIRED TO SERVE IN-CITY STUDENTS
ON WAUKESHA METRO TRANSIT: 1983-1986**

Characteristics	1982 Estimated	Projections ^a										
		Recommended System				Increment for Proposed School Services			Recommended System with Proposed School Services			
		1983	1984	1985	1986	1984	1985	1986	1983	1984	1985	1986
Annual Revenue												
Passengers.....	202,700	245,000	282,000	296,000	311,000	--	88,000	198,000	245,000	282,000	384,000	509,000
Annual Vehicle Hours												
Revenue.....	\$ 23,300	\$ 22,800	\$ 22,800	\$ 22,800	\$ 22,800	--	\$ 1,000	\$ 2,200	\$ 22,800	\$ 22,800	\$ 23,800	\$ 25,000
Total.....	24,200	24,100	24,000	24,000	24,000	--	1,300	2,900	24,100	24,000	25,300	26,900
Revenue Passengers per												
Revenue Vehicle Hour...	8.7	1.07	12.4	13.0	13.6	--	88.6	90.0	10.7	12.4	16.1	20.4
Operating Expenses												
Per Hour.....	\$24.44	\$32.00	\$28.50	\$28.50	\$28.50	--	\$28.50	\$28.50	\$32.00	\$28.50	\$28.50	\$28.50
Annual.....	688,200	771,200	684,000	684,000	684,000	--	37,100	82,700	771,200	684,000	721,100	766,700
Per Revenue Passenger.	3.40	3.15	2.43	2.31	2.20	--	0.42	0.42	3.15	2.43	1.88	1.50
Operating Revenue ^b												
Per Passenger.....	\$ 0.43	\$ 0.41	\$ 0.41	\$ 0.41	\$ 0.41	--	\$ 0.35	\$ 0.35	\$ 0.41	\$ 0.41	\$ 0.39	\$ 0.38
Annual.....	86,800	100,000	114,400	120,100	126,200	--	30,800	69,300	100,000	114,400	150,900	195,500
Percent of												
Operating Expense....	12.6	13.0	16.7	17.6	18.4	--	83.0	83.8	13.0	16.7	20.9	25.5
Operating Deficit												
Annual.....	\$601,400	\$671,200	\$569,600	\$563,900	\$557,800	--	\$ 6,300	\$ 13,400	\$671,200	\$569,600	\$570,200	\$571,200
Per Revenue Passenger.	2.97	2.74	2.02	1.91	1.79	--	0.07	0.07	2.74	2.02	1.48	1.12

^a All dollar figures are expressed in terms of constant 1983 dollars.

^b Assumes no change in the existing fare structure.

Source: SEWRPC.

The possibility of reductions in city property taxes is related to the current manner in which school district costs for yellow school bus service are shared among municipalities within the District. Because the City would assume responsibility for providing transportation service to secondary school students within the City under this proposal, an argument could be made that the City residents should not provide financial support to the school district in the form of property taxes for yellow school bus service. The total 1982-1983 budget for the Waukesha School Board includes about \$550,000 for all contract yellow school bus service within the school district, and about \$175,000 in state aids for transportation, leaving about \$375,000 to be supported through taxes within the school district. The school district budget is supported in part by property taxes. These taxes are allocated on the basis of the assessed valuation of the municipalities within the school district. Based upon an estimated equalized assessed valuation within the school district in 1982 of about \$1.840 billion, and an equalized assessed valuation within the City of Waukesha in 1982 of about \$1.325 billion, property taxes from the City of Waukesha support about \$270,000, or about 72 percent, of the \$375,000 in local taxes required for all contract yellow school bus service provided within the school district. By comparison, the average annual cost to the City of Waukesha to provide transportation to in-city students on Waukesha Metro Transit is estimated to be about \$16,900, as noted in Table 61. It should be noted that, while the above figures reflect the city share of costs for all yellow school bus service, only yellow school bus service to in-city secondary school students is proposed to be considered for elimination. However, these figures would indicate that it would be reasonable for the City to request a significant dollar reduction in the City share of the school district tax levy if the City were to assume responsibility for providing transportation to in-city secondary school students.

The major disadvantage associated with the proposed policy change includes the need to negotiate with the School Board for any such reductions in the school district tax levy for the City of Waukesha. If the City would provide in-city students with bus service on Waukesha Metro Transit, the costs for all remaining yellow school bus service would have to be assumed solely by the towns within the school district if the City is to achieve any reduction in its share of the school district tax levy. This may not be possible under current state statutes, in which case the City would still be responsible for 72 percent of the cost of providing yellow school bus service to the towns within the school district. The annual cost to the city for school-related transit service would then be more than the City share of the costs for yellow school bus service under the present arrangement.

A second disadvantage associated with the proposed policy change involves charging fares to students who currently are provided with yellow school bus service at no direct charge. Under the service proposal, city students who reside over two miles from school who now receive free yellow school bus service would be required to pay \$0.70 per day for school transit service on Waukesha Metro Transit. Such a policy is likely to be viewed unfavorably by the affected families. While the school district could provide financial assistance to support the fares on Waukesha Metro Transit for affected students, the costs of such financial assistance would, in all likelihood, be passed back to the City by the school district.

Table 61

ADVANTAGES AND DISADVANTAGES OF REPLACING YELLOW SCHOOL BUS SERVICE PROVIDED TO IN-CITY STUDENTS WITH TRANSIT SERVICE PROVIDED BY WAUKESHA METRO TRANSIT

Advantage	DISADVANTAGE
<ul style="list-style-type: none"> ● WOULD RESULT IN A SUBSTANTIAL IMPROVEMENT IN THE OPERATING PERFORMANCE OF WAUKESHA METRO TRANSIT <ul style="list-style-type: none"> ● A ridership increase of about 198,000 rides per year, or about 64 percent over the projected levels for 1986. ● A decrease in the operating deficit per ride of about \$0.67, or about 37 percent, from 1986 projected levels. ● MAY ALLOW THE CITY TO REDUCE EXPENDITURES <ul style="list-style-type: none"> ● It is estimated that the City paid \$270,000 for city yellow school bus service for the 1982-1983 school year. (The 1982-1983 school district yellow school bus contract for the City and towns is \$550,000, of which \$175,000 is offset by state aids. The City has 72 percent of the equalized assessed property value of the school district, and thus pays 72 percent of all local costs, or 72 percent of \$375,000, or \$270,000.) The cost to the City per student ride on the current yellow school bus service is estimated to be \$1.07 per student ride.^a ● The City would pay \$16,900 per year for Waukesha Metro Transit to provide the city student bus service. (The total cost of the service per year would be \$184,200, of which \$101,500 would be capital costs and interest expenditures, and \$82,700 would be operating and maintenance costs. Student fare revenues per year of \$69,300, and state and federal aids per year of \$98,000 would reduce the annual cost to the City to \$16,900 per year.) The cost to the City per student ride would be \$0.09 per student ride.^b 	<ul style="list-style-type: none"> ● WOULD REQUIRE THE CITY TO NEGOTIATE WITH THE SCHOOL BOARD FOR REDUCTIONS IN THE SCHOOL DISTRICT TAX LEVY TO THE CITY <ul style="list-style-type: none"> ● If the City is to achieve reduction in its share of the school district tax levy, it must be agreed that if the City would provide in-city student bus service on Waukesha Metro Transit, the remaining yellow school bus costs in the school district budget would be assumed solely by the towns. This may not be possible. The City taxpayers may still be required by State law to pay 72 percent of the cost of yellow school bus service to the towns. If this is true, the annual cost to the City of school-related transit service would be more than under the present arrangement. ● WOULD REQUIRE STUDENTS WITHIN THE CITY RESIDING OVER TWO MILES FROM SCHOOL TO PAY \$0.70 PER DAY FOR SCHOOL TRANSIT SERVICE <ul style="list-style-type: none"> ● This service is now free to such students. ● MAY ADVERSELY AFFECT A PRIVATE BUSINESS, THE PRESENT SCHOOL BUS OPERATOR ● THE TOTAL COST OF SERVING IN-CITY STUDENTS WITH YELLOW SCHOOL BUS SERVICE MAY BE LESS THAN THE COST ASSOCIATED WITH CARRYING SUCH STUDENTS ON WAUKESHA METRO TRANSIT <ul style="list-style-type: none"> ● It is estimated that on a cost-per-student basis, it cost the school district \$100,800 to provide yellow school bus service to the City. This \$100,800 estimate is about 18 percent of the total school district cost of \$550,000. About 18 percent of the students eligible for school bus service in the District, or 1,100 of 6,000 students, reside within the City. Based on these figures, it is estimated to cost the yellow school bus operator about \$0.40 per ride to provide in-city school bus service.^c (Because of the way the school district costs are shared, the estimated cost to the City is \$270,000, or \$1.07 per ride.) ● It is estimated that the total annual cost of Waukesha Metro Transit student bus service will be \$184,200, or \$0.93 per student ride.^d (Because fares will be charged and available state and federal aids will be used, the cost to the City will be only \$16,900, or \$0.09 per ride.)

^a Cost to the City for Existing Yellow School Bus Service

= \$1.07 per student ride

$$\left[\$550,000 \text{ total district cost} - \$175,000 \text{ state transportation aids} \right] \times$$

$$\frac{\left[\$1.32 \text{ billion city assessed property value} - \$1.84 \text{ billion school district assessed property value} \right]}{}$$

$$\left[700 \text{ city students riding per day} \times 2 \text{ rides per day} \times 180 \text{ school days per year} \right]$$

^b Cost to the City of Waukesha for Waukesha Metro Transit In-City Student Bus Service

= \$0.09 per student ride

$$\left[\$184,200 \text{ total annual cost} - \$98,800 \text{ state and federal aids} - \$69,300 \text{ student fares} \right]$$

$$\left[550 \text{ city students riding per day} \times 2 \text{ rides per day} \times 180 \text{ school days per year} \right]$$

Table 61 (continued)

c Total Cost of Existing Yellow School Bus Service for In-City Students	= \$0.40 per student ride	$= \frac{\left[\$550,000 \text{ total district cost} \times \frac{1,100 \text{ city-eligible students}}{6,000 \text{ district-eligible students}} \right]}{\left[700 \text{ city students riding per day} \times 2 \text{ rides per day} \times 180 \text{ school days per year} \right]}$
d Total Cost of Waukesha Metro Transit Bus Service for In-City Students	= \$0.93 per student ride	$= \frac{\left[\$101,500 \text{ annual capital costs} + \$82,700 \text{ annual operating costs} \right]}{\left[550 \text{ city students riding per day} \times 2 \text{ rides per day} \times 180 \text{ school days per year} \right]}$

Source: SEWRPC.

The proposed policy change may also have adverse affects on the present private yellow school bus operator. A reduction in the number of students provided with yellow school bus service within the school district could result in fewer bus routes being operated and less equipment being required for operation. This may, in turn, result in driver layoffs, and could leave the school bus operator with a surplus of operating equipment.

Finally, it may be more cost-effective to provide in-city students with yellow school bus service than with regular transit service on Waukesha Metro Transit. While the annual cost to the City of the proposed transit service on Waukesha Metro Transit is estimated to be less than the annual cost to the City for yellow school bus service, this is principally because of the manner in which total school district costs are shared between the City and the towns within the school district, as well as the use of student fares and the availability of federal and state urban transit aids which would reduce the total cost to the City of the transit service provided by Waukesha Metro Transit. On a total cost basis, the existing school bus service may be less expensive than the service proposed to be provided by Waukesha Metro Transit. It is estimated that it costs the yellow school bus operator \$100,800, or about \$0.40 per one-way student trip, to provide yellow bus service to in-city students. This compares with a total annual cost of about \$184,200, or about \$0.93 per one-way student trip, for the service proposed to be provided on Waukesha Metro Transit. This analysis indicates that if only total costs are considered, the existing yellow school bus service may be a more cost-effective way of providing in-city student transportation.

Recommendation: The preceding discussion has indicated that the elimination of yellow school bus service could substantially improve the operating performance of the Waukesha transit system. However, it is not clear at present if the City would be able to obtain any reduction in the school district tax levy if it were to implement the proposed service on Waukesha Metro Transit. Such a reduction would be used to offset the additional operating and capital costs which would be required to operate the proposed service. Uncertainties also remain concerning public reaction to the proposed student fare policy, and the effects of the service proposal on the private yellow school bus operator. In recognition of these concerns, the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee, after reviewing the service proposal, chose not to recommend in favor or against the proposed student service on Waukesha Metro Transit. Rather, the Advisory Committee unanimously recommended

that the City Transit Coordinator and the Waukesha Transit System Utility Board continue to examine the service proposal and initiate discussions with the Waukesha School Board to further clarify some of the issues raised in the above discussion. A final decision on whether or not the proposed service would be financially beneficial to the City and should, therefore, be considered for implementation would then be the responsibility of the Waukesha Transit System Utility Board and the Waukesha Common Council.

Extension of Service to Areas Outside the City

The local share of the operating deficit of the transit system is contributed by City of Waukesha taxpayers. Accordingly, in the interests of equity, transit service should not be extended to residential areas or major trip generators located outside the City at the expense of City of Waukesha taxpayers if such extensions would primarily benefit noncity residents. Such service extensions should be made only if all costs, including a pro rata share of fixed costs, are covered by fares and/or subsidies from other than the City of Waukesha. In addition, such extensions should not be made if they would be in direct competition with other existing transit services.

At the present time, only two routes of the transit system serve major traffic generators located outside the City of Waukesha's corporate limits. Route 1 serves the Goerkes Corners Public Transit Station located in the Town of Brookfield, and Route 9 serves the Waukesha County Technical Institute located just inside the southern corporate limits of the Village of Pewaukee. Extension of transit service to these major generators directly benefits City of Waukesha residents and should be considered as warranted on that basis.

Only one other major external traffic generator located in proximity to the study area--the Brookfield Square Shopping Center--attracts enough total person trips made by city residents to warrant consideration for extension of city transit service. However, transit service is currently provided between the City of Waukesha and the Brookfield Square Shopping Center by Wisconsin Coach Lines, Inc., and is publicly subsidized by federal, state, and county funds. To ensure efficient use of all public funds involved, competition with this public transit service is not recommended.

The extension of Route 9 into the Village of Pewaukee has been considered by the transit system in the recent past. The potential demand for transit service on such a route extension, and the operating deficit which would be incurred by the route extension, could best be determined by extending the route on a trial or demonstration basis. It should be recognized, however, that the household travel survey of City of Waukesha residents conducted under this study indicated that, aside from the Waukesha County Technical Institute, the Village of Pewaukee did not attract a sufficient number of total person trips by city residents to indicate that more than a small number of additional transit trips each weekday by city residents would be generated by the route extension. Consequently, it is anticipated that the route extension would primarily benefit residents of the Village of Pewaukee. Therefore, should such a route extension be implemented on a trial or demonstration basis, it is recommended that the costs of such an extension be shared by the Village of Pewaukee or by Waukesha County.

FINANCIAL ANALYSIS

The previous sections of this chapter discussed the recommended program of improvements for the Waukesha transit system and presented a brief description of the financial requirements for operation of the recommended level of transit service. The purpose of this section is to expand upon the previous discussion of financial requirements by recommending possible actions which would improve the fiscal integrity of the transit system, reduce total transit system operating deficits, and reduce the local public funding requirement. In this respect, this section includes an analysis of the reasonableness and equity of the present fare structure. The section also includes proposed changes to the fare structure which, in conjunction with the previously recommended service changes, would, by the end of the planning period, bring the current rate of recovery of operating expenses through farebox revenues for the Waukesha transit system more in line with that observed on the similar Wisconsin transit systems. Finally, this section includes a discussion of the sharing of projected operating deficits for the transit system among the appropriate federal, state, and local funding sources.

Fare Structure Analysis

Fares are perhaps the most sensitive and visible element of transit services. Motorists, although aware of the costs incurred for motor fuel, can travel from interstate highways to county roads to city streets without ever being fully cognizant of the financial outlays required to construct and maintain the street and highway system they are using. In contrast, the transit user is constantly reminded of the cost of his journey each time he boards a bus and pays the fare for his trip. Perhaps for this reason, questions often arise concerning the reasonableness and equity of transit fares.

The fare structure for the Waukesha transit system was implemented exactly as recommended in the transit development program prepared in 1980. To address the issue of the reasonableness of this fare structure, a comparison was made with the fare structures of the six comparable Wisconsin transit systems. This comparison is presented in Table 62 and indicates that the current fare structure of the Waukesha transit system is reasonable for the size of the transit system, being comparable to fare structures for similar size Wisconsin transit systems.

Cash fares for the Waukesha transit system are more easily compared to those of the other systems than are noncash fares--tickets, tokens, and passes. The base adult cash fare for the Waukesha transit system of \$0.50 during 1982 was consistent with that of a majority of the comparable transit systems. This adult cash fare was, however, among the highest charged within the State during 1982, exceeded only by the \$0.75 adult cash base fare charged by the Milwaukee County Transit System, and the \$0.55 adult cash base fare charged by the Madison Metro system. While the Waukesha transit system has separate fare categories for children five to 11 years of age and children aged 12 through high school, most of the comparable transit systems combine these fare categories into one category. A fare lower than the adult cash base fare is still charged on four of the six transit systems for secondary school-age children. Only Janesville and Oshkosh charge secondary school-age children the

Table 62

**COMPARISON OF FARE STRUCTURES FOR SIMILAR SIZE
WISCONSIN TRANSIT SYSTEMS AND WAUKESHA METRO TRANSIT: 1982**

Comparable Wisconsin Transit System	Fare Structure				
	Adult/Regular	Student	Child/Youth	Elderly and Handicapped	Transfer
Fond du Lac Area Transit System.....	\$0.50 ^a	N/A	\$0.40 ^b	\$0.25 ^c	Free
Janesville Transit System...	0.50 ^d	N/A	N/A	0.25 ^c	Free
La Crosse Municipal Transit Utility.....	0.50 ^e	N/A	0.30 ^f	0.25 ^c	Free
Manitowoc Transit System....	0.50 ^g	N/A	0.35 ^h	0.25 ^c	Free
Oshkosh Transit System.....	0.35 ⁱ	N/A	0.15 ^j	0.15 ^c	Free
Sheboygan Transit System....	\$0.40-\$0.50 ^e	\$0.35-\$0.40 ^l	\$0.30-\$0.40 ^m	\$0.20-\$0.25 ^c	Free
Waukesha Metro Transit.....	0.50 ⁿ	0.35 ^o	0.25 ^p	0.25 ^c	Free

Comparable Wisconsin Transit System	Fare Structure							
	Ticket/Token				Monthly Pass			
	Adult	Student	Child/Youth	Elderly and Handicapped	Adult	Student	Child/Youth	Elderly and Handicapped
Fond du Lac Area Transit System.....	\$0.45	N/A	\$0.35	\$0.25	\$18.00	N/A	\$14.00	\$14.00
Janesville Transit System...	10/\$4.50	N/A	N/A	10/\$2.50	N/A	N/A	N/A	N/A
La Crosse Municipal Transit Utility.....	5/\$2.00	N/A	4/\$1.00	N/A	N/A	N/A	N/A	N/A
Manitowoc Transit System....	10/\$3.50	N/A	10/\$2.50	N/A	12.00	N/A	8.00	8.00
Oshkosh Transit System.....	20/\$5.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sheboygan Transit System ...	5/\$1.75	5/\$1.50	N/A	N/A	N/A	N/A	N/A	N/A
Waukesha Metro Transit.....	10/\$5.00	10/\$3.50	10/\$2.50	10/\$2.50	20.00	N/A	N/A	N/A

NOTE: N/A denotes not available.

^a Ages 16-64.

^b Ages 6-15; children under six ride free.

^c Elderly 65 years of age and older.

^d Ages 5-64; children under five ride free.

^e Ages 18-64.

^f Ages 4-17; children under four ride free.

^g Ages 19-64.

^h Ages 7-18; children under seven ride free.

Source: Wisconsin Department of Transportation and SEWRPC.

ⁱ Ages 11-64.

^j Ages 5-10; children under five ride free.

^k Lower fares for trips and in city; higher fares for trips made to Kohler or Sheboygan Falls.

^l Ages 12 through high school.

^m Ages 3-11; children under three ride free.

ⁿ Ages 12-64.

^o Ages 12 through high school with valid school I.D.

^p Ages 5-12; children under five ride free.

same fare as adult passengers. However, the low adult base fare for the Oshkosh transit system of \$0.35 is comparable to the student fare charged by Waukesha Metro Transit. All transit systems have half-fare programs for elderly and handicapped transit users, as required by federal and state law.

Differences between the noncash fares available for the Waukesha transit system and the comparable transit systems were found primarily in the fare categories available and in the discounts allowed from full cash fares. All of the comparable transit systems make tickets or tokens available for the adult fare category. Four of the six transit systems also make tickets or tokens available for the student or child/youth fare category. Discounts of between 10 and 30 percent from the cash fare are allowed on the purchase of blocks of tickets or tokens. At present, the Waukesha transit system offers tickets in blocks of 10 for all four categories at a cost of 10 times the comparable single cash fare, or at no discount.

Only two of the comparable transit systems offered monthly passes during 1982. A third transit system--the Janesville Transit System--is currently considering a pass program. The monthly pass programs for the comparable transit systems shown in the table included provisions for all fare categories. The Janesville program is proposed to provide a monthly pass good for unlimited riding on all days of operation, and a special weekday pass good on weekdays only, directed toward students. All pass programs discount the normal cash fare and are designed so that the user breaks even after making a certain number of trips which, for the adult fare category, ranged from 24 to 36 trips. This number compares with a possible 42 trips if the user uses the transit system for a round trip every weekday during a typical month having 21 weekdays. The Waukesha transit system offers only one monthly pass at a cost of \$20 per month. At this cost, the user would break even after making 40 trips on the transit system. This comparison would indicate that passes for other than the adult category should be considered for the Waukesha transit system, along with a discount from the comparable single-ride cash fare.

Questions have been raised over the equity of the current fares, particularly with regard to the distance traveled. Based upon survey data, the average trip on the Waukesha transit system is approximately three miles in length. This corresponds favorably with the one-way mileage of the shorter bus routes, which at the time of the survey ranged between three and four miles, and which generally limits trip length on these routes. Longer trips are made on Routes 1, 6, and 9 because these routes are considerably longer than the other routes of the transit system. Fares for these longer trips could be made more equitable by establishing zone boundaries and zone fares to collect distance premiums.

There are several problems inherent in zone fare systems. First, they are often difficult for the public to comprehend. Second, zone fares are administratively cumbersome to collect because enforcement requires changes in fare collection technique. Third, the public acceptance of zone fares is uncertain within a small community such as Waukesha where the cost of operating the transit system is shared equally by all residents through property taxes. Primarily for these reasons, the establishment of a zone fare system is not recommended at the present time for the Waukesha transit system.

Farebox Recovery Rates

The late 1970's and the early 1980's have witnessed significant changes in both the economic and political environment surrounding the provision of public transportation services. Increased operating expenses brought about by increased fuel prices and operator wage increases have accelerated the rate of increase in transit deficits. Policy changes have been proposed by the current federal administration which may result in reductions in federal financial aid for operation of transit systems. The conjunction of these political and economic forces has created the need for changes in the approach to the pricing of public transit services to ensure the continued financial viability and integrity of the transit systems. For most transit systems, this approach has meant an increased emphasis on the amount of transit system operating expenses which are paid for directly by the transit passenger through farebox revenues. Such increases in farebox recovery rates are being viewed by many transit systems as one way to reduce the impact of increases in operating expenses and reductions in federal transit operating assistance on the local public funding requirement.

A policy issue which has been raised with regard to the Waukesha transit system relates to the proportion of operating expenses that should ultimately be borne by transit system passengers: that is, what goal should be established for the farebox recovery rate. To help address this issue, the farebox recovery rates of comparable Wisconsin transit systems are presented in Table 63. Based upon the mean and median values for these transit systems for 1981 and 1982, a farebox recovery rate of between 25 and 30 percent should be considered as a desirable goal for the Waukesha transit system. It should be noted that this farebox recovery rate is significantly lower than the farebox recovery rate of 50 percent of operating expenses recommended for public

Table 63

FAREBOX RECOVERY RATES FOR COMPARABLE WISCONSIN TRANSIT SYSTEMS: 1981 AND 1982

Transit System	Percent of Operating Expenses Recovered Through Passenger Fares	
	1981 Actual	1982 Estimated
Fond du Lac Area Transit System.....	20.2	22.2
Janesville Transit System.....	18.6	30.7
La Crosse Municipal Transit Utility.....	32.3	32.8
Manitowoc Transit System.....	24.1	27.4
Oshkosh Transit System.....	21.4	27.2
Sheboygan Transit System.....	29.4	32.0
Mean	24.3	28.7
Median	22.8	29.7

Source: Wisconsin Department of Transportation and SEWRPC.

transit service under the adopted regional transportation system plan. However, it was not considered practicable for the Waukesha transit system to attain this rate of recovery of expenses from passenger revenues during its early years of operation due primarily to projected ridership levels for the transit system which take into consideration the recent start-up of system operation. In addition, no urban bus system operating within the Region or within the State at present recovers this proportion of expenses from farebox revenues. Consequently, a farebox recovery rate which was more representative of actual farebox recovery rates observed on similar size transit systems was considered a more reasonable goal for the Waukesha transit system.

The farebox recovery rate for the Waukesha transit system has been low during the initial period of system operations due primarily to low ridership levels associated with the start-up nature of the transit system. However, significant increases in the farebox recovery rate have been projected for the transit system over the planning period. With the recommended service improvements the farebox recovery rate is projected to increase from the 1982 level of about 13 percent to about 19 percent by 1986, under the existing fare structure. The expansion of service to accommodate students presently served by yellow school bus service would further increase the farebox recovery rate to about 25 percent by 1986. Increases in passenger fares could be considered over the planning period to further increase the projected farebox recovery rate. The impact of such increases in passenger fares on ridership and financial performance projections is discussed in the following sections.

Proposed Fare Structure

A proposed fare structure for the Waukesha transit system is presented in Table 64. As can be seen from the table, changes are proposed for the existing 1983 fare structure in both the cash and noncash fare categories.

Table 64

EXISTING AND PROPOSED FARE STRUCTURE FOR WAUKESHA METRO TRANSIT

Fare Category	Fare	
	Existing	Proposed
Cash Fares^a		
Adult.....	\$ 0.50	\$ 0.60
Student.....	0.35	0.40
Child.....	0.25	0.30
Elderly and Handicapped....	0.25	0.30
Noncash Fares^a		
Tickets		
Adult.....	10/\$5.00	10/\$5.50
Student.....	10/\$3.50	10/\$3.75
Child/Elderly and Handicapped.....	10/\$2.50	10/\$2.75
Monthly Pass		
Adult.....	\$20.00	\$22.00
Student.....	--	\$15.00
Transfers.....	Free	Free

^a All fares are expressed in constant 1983 dollars.

Source: SEWRPC.

Under the proposed fare structure, adult cash fares would increase from \$0.50 to \$0.60, a 20 percent increase; student cash fares would increase from \$0.35 to \$0.40, a 14 percent increase; and child and elderly and handicapped fares would increase from \$0.25 to \$0.30, a 20 percent increase. Only one fare increase would be proposed through 1986 in order to attract as many passengers as possible, and to continue to build up the ridership base of the transit system.

Changes proposed for noncash fares for the transit system would reflect the above increases in base cash fares, and also include new fare categories and discounts from comparable cash fares. Consequently, adult tickets would be sold at a cost of 10 for \$5.50, or \$0.55 per ride, versus \$0.60 per ride

for the adult cash fare. Student tickets would be sold at a cost of 10 for \$3.75, or \$0.375 per ride, versus \$0.40 per ride for the student cash fare. Child and elderly and handicapped tickets would be sold at a cost of 10 for \$2.75, or \$0.275 per ride, versus \$0.30 per ride for the cash fare.

It is also proposed that the transit system increase the discount from comparable cash fares allowed in the cost of a monthly pass. A recommended guideline for pricing monthly passes is to establish their price so that transit passengers break even after using the pass 36 times during the month. Based on this break-even point, adult monthly passes would be priced at \$22. With the possibility of substantial numbers of in-city students using the city bus system in 1985, a second monthly pass category for students would be implemented by the transit system with student passes priced at \$15 per month.

Impact of Proposed Fare Increases

If the proposed fare increase were implemented in 1984, it would be expected to have significant impacts on previous projections of ridership, revenues, and operating deficits for the Waukesha transit system. These impacts are summarized in Table 65. All figures presented in this table assume the elimination of yellow school bus service to in-city students and the proposed expansion of service on Waukesha Metro Transit to accommodate such students.

Table 65

IMPACT OF PROPOSED FARE INCREASE ON PROJECTED RIDERSHIP, REVENUES, AND OPERATING DEFICITS FOR TRANSIT SERVICE ON WAUKESHA METRO TRANSIT

Characteristic	1982 Estimated	Projected with Existing Fare Structure ^a				Projected with Proposed Fare Structure ^a			
		1983	1984	1985 ^b	1986 ^b	1983	1984	1985 ^b	1986 ^b
Annual Revenue									
Passengers.....	202,700	245,000	282,000	384,000	509,000	245,000	266,000	363,000	481,000
Vehicle Hours									
Revenue.....	23,300	22,800	22,800	23,800	25,000	22,800	22,800	23,800	25,000
Total.....	24,200	24,000	24,000	25,300	26,900	24,000	24,000	25,300	26,900
Revenue Passengers per									
Revenue Vehicle Hour....	8.7	10.7	12.4	16.1	20.4	10.7	11.7	15.3	19.2
Operating Expenses									
Per Hour.....	\$28.44	\$32.00	\$28.50	\$28.50	\$28.50	\$32.00	\$28.50	\$28.50	\$28.50
Annual.....	688,200	771,200	684,000	721,100	766,700	771,200	684,000	721,100	766,700
Per Revenue Passenger..	3.40	3.15	2.43	1.88	1.50	3.15	2.57	1.99	1.59
Operating Revenue									
Per Passenger.....	\$ 0.43	\$ 0.41	\$ 0.40	\$ 0.39	\$ 0.38	\$ 0.41	\$ 0.49	\$ 0.46	\$ 0.44
Annual.....	86,800	100,000	114,400	150,900	195,500	99,800	130,300	167,000	211,600
Percent of									
Operating Expenses...	12.6	13.0	16.7	20.9	25.5	12.9	19.1	23.2	27.6
Operating Deficit									
Annual.....	\$601,400	\$671,200	\$569,600	\$570,600	\$570,200	\$671,400	\$553,700	\$554,100	\$555,100
Per Revenue Passenger..	2.97	2.74	2.02	1.48	1.12	2.74	2.08	1.53	1.15

^a All costs are expressed in terms of constant 1983 dollars.

^b All projected operating characteristics assume that yellow school bus service in the City of Waukesha will be discontinued and replaced with service provided by the Waukesha Metro Transit.

Source: SEWRPC.

It is generally accepted throughout the transit industry that an increase in transit fares will cause a decrease in ridership. Accordingly, the proposed fare increase would be expected to slow the growth of projected ridership. However, it is anticipated that the introduction of new equipment and new special school routes in 1983 and 1984, would offset some of this negative impact on ridership. Annual ridership on the transit system under the proposed fare structure would be expected to be from 5 to 6 percent lower than ridership projected with the existing fare structure. Ridership with the proposed fare increases over the four-year period from 1983 to 1986 may be expected to increase by about 137 percent over 1982 ridership levels; while ridership may be expected to increase by about 151 percent if the existing fare structure were to be retained.

A greater impact would be expected on system revenues. Annual revenues would be expected to increase from 8 to 14 percent between 1984 and 1986. Total revenue over the three-year period would be expected to increase by an average of about 10 percent. The additional revenues would improve the rate of recovery of operating expenses out of the farebox revenues from about 17 to about 19 percent in 1984, and from about 25 to about 28 percent by 1986. Annual operating deficits for the transit system would be expected to decline, in constant dollar terms, by about 3 percent. With the proposed fare increase, it is estimated that the operating deficit for the transit system would decrease, in constant 1983 dollars, from about \$671,000 in 1983 to about \$555,000 in 1986.

Advisory Committee Reaction to Proposed Fare Increases

Members of the Waukesha Mass Transit Citizen and Technical Coordinating and Advisory Committee were divided in their opinions concerning the need for and potential impacts of the proposed fare increase. Some members of the Committee expressed agreement with the proposed increases in fares, noting that it was important to increase the proportion of operating expenses being recovered through passenger fares, and that the proposed increase in fares was small enough to be readily accepted by the existing transit system riders. Other committee members disagreed, stating that ridership would be lost through any proposed fare increase and that this would be contrary to the goal of the transit system to attract as many riders as possible during its early years of operation. These committee members suggested that further increases in ridership and system passenger revenues may be expected to occur with the introduction of new buses, and decreases in operating expenses could also be expected to occur at that time, with the termination of the lease agreement for the currently operated buses. The combination of these two events could result in improvements in the farebox recovery rate similar to those projected with the proposed fare increases without any loss of transit system ridership. Because of this division of opinion, no recommendation in favor or against the proposed fare increase was made by the Advisory Committee.

Recommended Policy for Fare Increases

The previous analyses were conducted with all costs and revenues expressed in terms of 1983 constant dollars, and do not take into consideration the possible effects of general price inflation on projected operating expenses and farebox recovery rates. It is recommended that fares for the Waukesha

transit system keep pace with increases in operating expenses which result from the effects of general price inflation. Consequently, while no specific fare increases have been recommended through 1986, a fare increase may be necessary due to general price inflation to attain the recommended farebox recovery rate for the Waukesha transit system. In order to determine when such additional fare increases are warranted, it is recommended that the transit system establish a policy of monitoring increases in annual operating expenses per unit of service provided in the years since the current fare structure was established and following any subsequent fare increases. Under this policy, increases in fares should be considered as warranted when operating expenses per unit of service provided have escalated by between 15 and 20 percent since the current fare structure was established or after any subsequent fare increase. At that time, fares should be increased by a comparable percentage. It is anticipated that this policy would result in implementation of fare increases every two or three years in amounts equivalent to \$0.10 for the adult cash fare. This policy would also relate increases in fares directly to increases in the costs of providing transit service.

Financial Commitment

The previous sections of this chapter have set forth the operating and capital requirements for implementation of the herein recommended level of transit service on the Waukesha transit system. A commitment of funds to subsidize the annual operation of the transit system and to acquire the necessary operating equipment will be required for implementation. Federal and state funds are recommended to be drawn upon to reduce the City's financial commitment required for the implementation and subsequent annual operation.

Federal funding for a portion of the annual operating deficit would be obtained through the transit operating assistance program administered by the U. S. Department of Transportation, Urban Mass Transportation Administration (UMTA). For 1983, the source of these funds will be the existing UMTA Section 5 formula grant program. For 1984 through 1986, the source of these funds will be the new UMTA Section 9 formula grant program, which was created by the passage of the Surface Transportation Assistance Act of 1982. This program will replace the existing Section 5 transit assistance program in 1984. Funds for these programs are distributed to the nation's urbanized areas on a formula basis.¹

The Federal Surface Transportation Assistance Act of 1982 made several significant changes in the federal transit operating assistance program. In keeping with the policy of the current federal administration of reducing federal aid for transit operating assistance, the Surface Transportation Assistance Act of 1982 placed limits on the amounts of Section 5 and Section 9 funds allocated annually to each urbanized area which can be used for operating assistance, based upon the total population of the urbanized area. Specifically for urbanized areas with a total 1980 population of 1,000,000 or more persons, which includes the Milwaukee urbanized area, the funds available from 1983 through

¹The national formula for distributing funds under the Section 5 formula grant program takes into consideration both the population and population density of each urbanized area. The national formula for distributing funds under the Section 9 formula grant program also takes into consideration the population and the population density of each urbanized area, along with the total annual revenue vehicle miles of service provided within each urbanized area.

1986 for use as operating assistance within the urbanized area are limited to 80 percent of the Section 5 operating assistance funds allocated by formula to the urbanized area in 1982. For 1983 and 1984, formula capital assistance funds, which are also allocated to urbanized areas under these programs, can be transferred for use as operating assistance to bring the urbanized area operating assistance level for these years back up to 100 percent of the 1982 urbanized area allocation level. A penalty is, however, involved for such transfers.² No provision is made for transfer of capital formula funds to operating assistance for 1985 or 1986.

Within the Milwaukee urbanized area, federal funding for operating assistance is complicated by the need to divide federal operating assistance funds allocated to the Milwaukee area among the designated recipients of such funds within the urbanized area.³ Beginning in 1981, the operating deficits of the three public transit agencies in the Milwaukee urbanized area--Milwaukee County, Waukesha County, and the City of Waukesha--were, in total, of such a magnitude that the Section 5 operating assistance funds allocated for use in the Milwaukee urbanized area were insufficient to enable all three units of government in the aggregate to cover 50 percent of their operating deficits--the maximum amount allowed under the program. Accordingly, it has become necessary in 1982 and 1983 to utilize a procedure for equitably allocating the total urbanized area funds among the designated recipients. Under the agreed-upon allocation procedure, available UMTA operating assistance funds are divided among the two designated recipients within the urbanized area with publicly supported transit systems--Milwaukee County and Waukesha County--using the formula for distributing national funds among the nation's urbanized areas, and a debit-credit procedure to account for the extent to which residents of each county use another county's transit system or systems.

The amount of federal operating assistance available for the City of Waukesha's transit system is further complicated by the fact that the City is not a designated recipient of transit operating assistance within the Milwaukee urbanized area. The City must therefore negotiate with Waukesha County, as the designated recipient for the portion of the Milwaukee urbanized area in which the City is located, for a share of the County's annual allocation of total urbanized area funds. In the past, this has not presented a major problem for the City. For 1983, Waukesha County has agreed to share equally with the City of Waukesha the County's 1983 allocation of UMTA Section 5 operating assistance funds. However, this arrangement is made on a year-by-year basis and could change in the future, depending upon the future transit operating assistance needs of Waukesha County.

²As a penalty for transferring formula capital assistance funds for use as operating assistance, UMTA requires that one-third of the amount transferred be paid back to the Secretary of Transportation for use in the discretionary capital grant program nationwide.

³At the present time in the Milwaukee urbanized area, the county boards of supervisors of four of the five counties containing parts of the Milwaukee urbanized area--Milwaukee, Ozaukee, Washington, and Waukesha--have been designated as recipient agencies for available Section 5 monies. The fifth county--Racine County--has not yet been designated as such a recipient because of the very small area and population of the Milwaukee urbanized area contained within that County.

State funding for the annual transit operating deficit would be obtained from the State's urban public transit operating assistance program administered by the Wisconsin Department of Transportation. The state urban public transit operating assistance program, authorized under Section 85.20 of the Wisconsin Statutes, provides operating assistance to communities of 5,000 persons or more with publicly supported transit systems. Eligible communities participating in this program receive state transit operating assistance funds equal to 30 percent of the total operating expenses of the transit system.

The distribution of the projected annual operating deficit for the Waukesha transit system is shown in Table 66. The operating deficits presented within this table are based upon the 1983 fare structure and assume that yellow school bus service in the City of Waukesha will be eliminated and replaced with service provided by Waukesha Metro Transit. The amount of federal funds for all years shown in the table assumes an equal sharing between Waukesha County and the City of Waukesha of the annual Waukesha County allocation of total urbanized area operating assistance funds, as was done in calendar year 1983. The federal funds shown for 1983 and 1984 also assume the transfer of formula capital assistance funds to operating assistance to bring 1983 and 1984 urbanized area operating assistance levels back up to 100 percent of the 1982 urbanized area level. The transfer of such funds has been agreed upon for 1983, and has been assumed to again be acceptable in 1984. Because no such transfer is allowed for 1985 and 1986, federal funds shown for these years are assumed to be at 80 percent of the 1983 levels. Sufficient state funds are assumed to be available for all years to provide state transit operating assistance in an amount equal to 30 percent of projected transit system operating costs as provided under the current state urban public transportation operating assistance program. The City of Waukesha will be responsible for the portion of the annual operating deficit not covered by federal or state operating assistance. The table indicates that a significant reduction in the 1983 city share of the projected operating deficit could be expected for 1984 due primarily to the lower overall operating deficit for the entire system.

Table 66

**DISTRIBUTION OF ANNUAL OPERATING DEFICITS FOR
WAUKESHA METRO TRANSIT SYSTEM AMONG FEDERAL,
STATE, AND LOCAL FUNDING SOURCES: 1983-1986**

Funding Source	Operating Deficit by Year ^a			
	1983	1984	1985 ^b	1986 ^b
Federal.....	\$275,200	\$275,200	\$220,100	\$220,100
State.....	231,400	205,200	216,300	230,000
City of Waukesha...	164,600	89,200	134,200	120,100
Total	\$671,200	\$569,600	\$570,600	\$570,200

^a Assumes existing 1983 fare structure and constant 1983 dollars.

^b Assumes that yellow school bus service in the City of Waukesha will be discontinued and replaced with service provided by Waukesha Metro Transit.

Source: SEWRPC.

The local share of the annual operating deficit is projected to increase over 1984 levels in 1985 and 1986 due primarily to reductions in available federal operating assistance funds. The City's share of the annual operating deficits in 1985 and 1986 should still, however, be significantly lower than the City's share projected for 1983.

It should be noted that there are several factors which could affect the level of federal or state transit operating assistance assumed to be available in future years to the City of Waukesha. First, while the Federal Surface Transportation Assistance Act of 1983 has authorized national funding levels for transit operating assistance through 1986, no appropriation of funds has been made for any year except 1983. The preceding analysis assumed a level of transit operating assistance for the Milwaukee urbanized area through 1986 based upon the level of operating assistance allocated to the urbanized area in 1982 and 1983. A reduction from this level of total operating assistance funds available to the urbanized area would, consequently, reduce the amount available to the City of Waukesha.

Second, a change in the procedure for allocating federal transit operating assistance funds to designated recipients within the Milwaukee urbanized area could change the amount of funds available to Waukesha County and, consequently, to the City of Waukesha. Inasmuch as the current procedure is based, in part, on the national formula for distributing transit assistance among the nation's urbanized areas, and this formula will change in 1984 with implementation of the new UMTA Section 9 program, a change in the urbanized area allocation procedure may be requested. It is estimated that a change in the procedure which would apply the national formula used for distributing UMTA Section 9 monies would reduce the amount of transit operating assistance allocated to Waukesha County in 1985 and 1986.

Third, as previously noted, the sharing of Waukesha County's allocation of total urbanized area funds with the City of Waukesha is agreed upon on a year-by-year basis. The preceding analysis has assumed the same sharing of the County allocation as agreed upon for 1983. A change from this arrangement in future years would affect the level of federal funds available to the City of Waukesha.

These three factors could result in lower amounts of federal transit operating assistance being available for use by the City of Waukesha in 1984 through 1986. Consequently, such an occurrence could require an increase in the City's share of the annual operating deficit for the transit system during these years. It should also be noted that it has been proposed by the current state administration that the State assume part of the anticipated shortfall in federal transit operating assistance for transit systems which pay for 50 percent of their operating expenses through a combination of passenger fares and local financial support during 1984. However, because of the uncertainties associated with the implementation of this proposal, as well as with the factors affecting the level of federal transit operating assistance which will be available for use by the City of Waukesha, the original assumptions made for the preceding analysis appear to be the best that can be made at this time. Should the actual combined amounts of federal and state transit operating assistance require an increase in the City's share of the transit operating deficit in 1984 through 1986, the City may wish to consider actions to reduce the total operating budget or operating deficit, in order to reduce

the level of local funding commitment required. In this respect, it is recommended that actions to be considered include reductions in daily hours of operation, increases in peak-period headways, increases in fares, or elimination of routes, in that order.

It is also recommended that the City seek federal funds in 1984 for a portion of the costs incurred in purchasing the necessary capital equipment for implementation of the recommended service improvements. The source of these federal funds is further recommended to be the new UMTA Section 9 formula grant program. Under the UMTA Section 9 program, grants are provided for up to 80 percent of eligible capital expenditures, including the purchase of buses and bus-related equipment, and the expansion of the city bus garage and maintenance facility. The total capital expenditures required to implement all recommended and proposed service improvements, including the expansion of regular transit service to accommodate in-city secondary school students now provided with yellow school bus service, are presented in Table 67. The total capital investment required for the transit service improvements, including contingency and project administration costs, is estimated at about \$1.46 million, of which about \$1.17 million, or 80 percent, could be the federal share under the UMTA Section 9 formula grant program. The remaining amount of about \$293,000, or 20 percent, would then represent the financial commitment required from the City of Waukesha.

SUMMARY

Although the Waukesha transit system has been in operation for just over one year, and experience with operation of the transit system has, therefore, been limited to this short time, certain transit service improvements can be identified which would improve the ridership and financial performance of the transit system. This chapter has presented such transit service improvements.

The recommended program of transit service improvements envisions continued use of the radial routing and pulse scheduling technique utilized by the transit system. Changes in routing are recommended for individual routes, as are changes in route schedules. The most significant routing change recommended is the elimination of Route 10. Other recommended changes in routing include the extension of Route 2 and Route 6 from their present route termini to the K-Mart/South High School area; modification of Route 8 to serve the Willow Park elderly complex formerly served by Route 10; and the extension of regular route service over Route 9 to The Windings and Pebble Valley residential areas of the City. No routing changes are recommended for Routes 1, 3, 5, and 7. Schedule changes recommended include changes in the early morning and late afternoon pulsed arrival and departure times for buses at the central transfer location to provide extra cycle time for some routes, and to provide departure times which better serve important transit trip generators in the downtown area. Changes are also recommended in individual route schedules to eliminate nonproductive bus trips on some routes and to add needed additional service on other routes.

The recommended program of transit service improvements also includes additional transit service directed at improving the level of transit service provided to Waukesha secondary schools. Two new bus routes--one serving North High School and Butler Middle School, and one serving South High School--are

Table 67

**CAPITAL PROJECT EXPENDITURES REQUIRED TO FULLY IMPLEMENT
ALL REGULAR ROUTE CHANGES, SPECIAL SCHOOL ROUTES, AND
ADDITIONAL TRANSIT SERVICE FOR IN-CITY SECONDARY SCHOOL
STUDENTS PROPOSED FOR WAUKESHA METRO TRANSIT**

Quantity	Capital Equipment or Project	Unit Cost ^a	Total Cost ^a
9	Operating Equipment		
9	35-Foot-Long Urban Motor Coaches...	\$130,000	\$1,170,000
9	Nonregistering, Locked, Double-Vault Fareboxes.....	800	7,200
9	Mobile Radio Units.....	1,500	13,500
30	Bus Stop Signs.....	45 ^b	1,350
	Total Operating Equipment Costs	--	\$1,192,050
5	Expansion of Bus Garage and Maintenance Facility Bus Storage Berths (2,800 square feet).....	\$22 per square foot	\$ 61,600
1	Bus Maintenance Bay (600 square feet).....	\$70 per square foot	42,000
--	Preliminary Engineering ^c	10,360	10,360
	Total Design and Construction Costs	--	\$ 113,960
Total Capital Project Costs.....			\$1,306,010
Contingency Fund ^d			130,601
Project Administration ^e			26,120
Total Grant Amount Requested.....			\$1,462,731
Federal Share (80 percent).....			1,170,185
Local Share (20 percent).....			292,546

^a Expressed in terms of constant 1983 dollars.

^b Installed.

^c Estimated at 10 percent of total construction costs.

^d Estimated at 10 percent of total capital project costs.

^e Estimated at 2 percent of total capital project costs.

Source: SEWRPC.

recommended to be implemented by the transit system. It was also proposed that the City take appropriate action to discontinue the provision of yellow school bus service for secondary school students residing within the City by the fall of 1985 and expand service on the city bus system to accommodate these students. This action could have a significant, positive impact on the operating performance of the Waukesha transit system. However, because of several uncertainties including whether or not the City would be able to obtain any reduction in the school district tax levy by providing this service, the Advisory Committee unanimously recommended that the City's Transit Coordinator and the Waukesha Transit System Utility Board continue to examine this service proposal and initiate discussions with the Waukesha School Board to clarify unsettled issues before making a final decision on whether the proposed service would be financially beneficial to the City and should be recommended for implementation.

Other service improvements which were considered because of their potential to increase total system ridership included a reduction of the midday service frequency from 60 minutes to 30 minutes on the four shorter routes of the transit system; the provision of transit service in the evening; and the provision of Saturday transit service. Of these three transit service improvements, Saturday transit service was found to have the best potential ridership and financial performance characteristics. However, because of the potential for significant increases in the level of local financial commitment required to implement these transit service improvements, no recommendations were made concerning implementation of these services. Rather, a decision on implementation of any of these services was left open for future consideration by the City of Waukesha.

A fare increase, to be implemented in 1984, was also proposed for the Waukesha transit system. This increase was intended to raise the proportion of operating expenses recovered from farebox revenues. The fare increase would raise adult cash fares from \$0.50 to \$0.60, student cash fares from \$0.35 to \$0.40, and child and elderly-handicapped cash fares from \$0.25 to \$0.30. It was also proposed that the price of tickets and passes sold by the transit system provide a discount from comparable single-ride cash fares. Because members of the Advisory Committee were divided in their opinions concerning the need for and potential impacts of the proposed fare increase, no recommendation was made in favor or against the proposed fare increase.

The effect of implementing the recommended program of transit service improvements would be to significantly increase transit system ridership and performance. If the recommended service improvements are implemented, and action is taken to eliminate yellow school bus service to in-city secondary school students and expand regular transit service on Waukesha Metro Transit, transit system ridership may be expected to increase from about 202,700 revenue passengers in 1982 to about 509,000 revenue passengers by 1986. This ridership level includes ridership by in-city secondary school students formerly provided with yellow school bus service. The productivity of the transit system may also be expected to increase over 1982 levels, from about 9 passengers per vehicle hour in 1982 to about 20 passengers per vehicle hour by 1986. Operating expenses would increase over the estimated 1982 level of about \$688,000 to about \$767,000 by 1986, expressed in constant 1983 dollars, due primarily to increases in service to accommodate in-city students formerly served by yellow school bus routes. Operating revenues, however, may also be expected to increase substantially as a result of additional student passengers, from the estimated 1982 level of about \$87,000 to about \$196,000 by 1986, also expressed in constant 1983 dollars. The proportion of operating expenses recovered through operating revenues may also be expected to increase over the planning period from about 13 percent in 1982, to about 26 percent in 1986. The operating deficit for the transit system may be expected to decrease from the estimated 1982 level of \$601,000 to about \$570,000 in 1986, also expressed in constant 1983 dollars. The local share of the annual operating deficit is projected to decrease from about \$165,000 in 1983 to about \$89,000 in 1984, but may be expected to increase to about \$134,000 in 1985 and to decline slightly to about \$120,000 in 1986 if proposed reductions in available federal transit operating assistance take place.

Implementation of the recommended program of transit service improvements will require the acquisition of additional operating equipment for the transit

system and expansion of the bus garage and maintenance facility. Implementation of the recommended school service routes would require one additional vehicle in 1984. Implementation of the additional transit service for in-city students formerly provided with yellow school bus service will require another six buses in 1985. A total of nine additional vehicles and other related operating equipment would be required to implement the recommended and proposed transit service improvements, including two additional vehicles needed to maintain an adequate number of spare buses. The total capital investment for acquiring the required operating equipment is estimated at about \$1.46 million, of which about \$1.17 million, or 80 percent, could be funded under the UMTA Section 9 formula grant program. The remaining \$293,500, or 20 percent, would represent the financial commitment required from the City of Waukesha for capital expenditures.

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Chapter VII

SUMMARY AND CONCLUSIONS

INTRODUCTION

In July 1979, at the request of the Common Council of the City of Waukesha, Mayor Joseph C. LaPorte reactivated the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee and charged that Committee with the task of determining if increased motor fuel costs and the likelihood of future fuel shortages had had any significant impacts upon the need and support for the provision of public transportation in the Waukesha area. Upon its reactivation, the Advisory Committee requested the assistance of the Regional Planning Commission in the review and revision of the transit development program initially prepared by the Advisory Committee in 1976. With the assistance of the Commission staff, the Committee completed its work in February 1980 and issued a report setting forth a revised transit development program for the City of Waukesha. The report, SEWRPC Community Assistance Planning Report No. 31, Waukesha Area Transit Development Program: 1981-1985, documented the Committee's revised recommendations for the re-establishment of public transit service in the City of Waukesha. The transit system recommended by the Committee under the new plan consisted of nine radial fixed routes originating at the outer limits of the City of Waukesha and terminating at a common bus transfer point located in the Waukesha central business district. On August 31, 1981, using 11 leased, 45-passenger buses, the City began operation of the new fixed route bus system.

During its first year of operation, several operating and policy questions arose concerning the transit system. These questions dealt primarily with fares, service hours, and scheduling techniques, and with the improvement of transit service to certain major traffic generators, and the expansion of service into other areas of the City. Concern was expressed as to whether or not the transit service being provided satisfied the travel patterns of the residents of the City and environs. Local public officials also expressed concern over the economic performance of the transit system which, as forecast in the adopted transit development program, was experiencing a relatively low farebox recovery rate and, consequently, a high public subsidy requirement. The City of Waukesha subsequently requested assistance from the Wisconsin Department of Transportation and the Southeastern Wisconsin Regional Planning Commission in the conduct of a technical study which would address these questions and concerns and, in general, the overall efficiency and effectiveness of the new transit system. This planning report sets forth the findings and recommendations of an analysis of the operation of the new transit system serving the City of Waukesha, an analysis conducted in response to the City's request.

Study Purpose

The transit operations analysis had four interrelated purposes:

1. To establish design and performance measures through which existing deficiencies in transit system operations could be identified and alternatives evaluated.
2. To analyze the overall performance of transit system and identify areas of efficient and inefficient operation.
3. To determine the causes of inefficient operations.
4. To develop a plan of recommended operational improvements which could be made to the existing transit system to improve overall system efficiency and effectiveness.

Study Area

The geographic area considered in the analysis consisted of all of the City of Waukesha, all of the Town of Waukesha, and the southern one-half of the Town of Pewaukee.

This area represents one of 60 planning analysis areas--planning analysis areas being defined as rational areas for public infrastructure and related land use development planning--identified by the Commission within the Southeastern Wisconsin Region. As deemed appropriate, the inventories and analyses conducted under this study included certain major traffic generators and transportation terminal facilities located just outside the study area boundaries, including the Waukesha County Technical Institute located in the Village of Pewaukee and the Goerkes Corners Public Transit Station located in the Town of Brookfield.

Study Organization

The conduct of the transit system operations analysis was a joint effort of the staffs of the City of Waukesha and the Southeastern Wisconsin Regional Planning Commission. Additional staff assistance was obtained as necessary from certain other agencies concerned with transit development in the Waukesha area, including the Wisconsin Department of Transportation.

To provide guidance to the technical staff in the conduct of the transit system operations analysis, and to actively involve concerned and affected public officials and citizens in the development of transit service improvement proposals, Mayor Paul J. Keenan of the City of Waukesha reactivated, in July 1982, the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee. The primary function of the Committee, which had not met since completing its work on the formulation of the revised transit development program in 1980, was to assist in the conduct of the study by critically reviewing staff efforts, thereby bringing the knowledge and experience of the committee members to bear on the analysis, and to help shape the findings and recommendations thereof.

TRANSIT SYSTEM OVERVIEW

Management

As already noted, on August 31, 1981, the City of Waukesha began operation of Waukesha Metro Transit to provide local bus service in the City of Waukesha and environs. The local bus system is managed by the private firm of ATE Management and Services Company, Inc., under the direct supervision of the transit coordinator, a staff member of the City of Waukesha Department of Public Works. The policy-making body of the transit system is the Transit System Utility Board. However, the Waukesha Common Council has the ultimate responsibility for review and approval of certain important matters relating to the operation of the system including the annual budget and the transit system development program.

Routes and Schedules

In September 1982, the base period of the analysis, the local bus system consisted of 10 regular transit routes, totaling about 90 round-trip route miles. Nine of the bus routes are primarily radial in pattern, while one route is operated as a one-way loop. Two bus routes extend outside of the corporate limits of the City, one serves the Goerke's Corners Public Transit Station in the Town of Brookfield; and the second serves Waukesha County Technical Institute in the Village of Pewaukee. All bus routes are operated on a pulse schedule basis, with buses meeting at a common point in the Waukesha central business district at approximately the same time to allow for ease of passenger transfers. Bus service is provided by the transit system for approximately 12½ hours per day between 5:45 a.m. and 6:15 p.m. Mondays through Fridays. No bus service is provided on Saturdays, Sundays, or holidays.

Fares

The single-ride adult cash fare on the 10 routes of the Waukesha transit system is \$0.50 per passenger trip. Children under five years of age ride free if accompanied by an adult. Children aged five through 11 years of age are charged a \$0.25 cash fare per passenger trip, and students aged 12 through 18 years of age with proper identification are charged \$0.35 per passenger trip. A special fare program is in effect between 9:00 a.m. and 3:00 p.m. for senior citizens and disabled persons who, with proper identification, can ride for \$0.25 per passenger trip during this period. A special fare program is also in effect for unemployed persons who, with proper identification, are given a \$0.15 discount from the regular adult cash fare.

In lieu of cash fares, passengers can use tickets which are good for individual rides, or a monthly pass which is good for unlimited riding. Tickets can be purchased for all fare categories in blocks of 10 at a cost of 10 times the comparable single-ride cash fare. The transit system offers only one monthly pass at a cost of \$20 per month, or 40 times the adult cash fare of \$0.50 per trip. At this cost, the adult pass user would break even after making 40 trips

on the transit system during a given month. This number compared with a possible 42 trips if the pass user made a round trip on the transit system every weekday during an average month having 21 weekdays.

Bus Fleet

In September 1982, the bus fleet operated by Waukesha Metro Transit consisted of 14 buses, all leased from other public transit operators. The fleet had an average age of about 18 years per vehicle. Nine of the 14 buses were used to provide service during the peak periods of system operation. The transit system currently has on order 11 new transit buses which should be available for operation on the system sometime in late 1983 or early 1984. The 11 new buses will replace the 14 leased buses.

Ridership and Financial Performance

Ridership on the transit system during the first full year of system operation--August 31, 1981 through August 31, 1982--averaged about 720 revenue passengers per day, substantially in excess of the ridership of 650 revenue passengers per day forecast for the first year of system operation in the transit development program. Operating expenses during the first full year of system operation averaged about \$3.72 per revenue passenger. Operating revenues for the transit system averaged about \$0.41 per revenue passenger, representing about 11 percent of system operating expenses during this period, and leaving a total operating deficit for the transit system of about \$3.31 per revenue passenger. The total operating deficit was shared among federal, state, and local funding sources, with the federal share estimated at about \$1.81 per revenue passenger, the state share estimated at about \$1.12 per revenue passenger, and the City share estimated at about \$0.79 per revenue passenger.

WAUKESHA TRAVEL SURVEYS

In May 1982, the Commission undertook two major travel surveys in the City of Waukesha--a household travel survey to ascertain the socioeconomic characteristics and the average weekday travel habits and patterns of the households within the City, and an on-board bus survey to ascertain the socioeconomic characteristics and travel habits and patterns of the users of Waukesha Metro Transit. In addition, a household opinion survey was also conducted in conjunction with the household travel survey to gather information on household knowledge of and attitudes toward use of Waukesha Metro Transit.

Total Person Travel

The travel surveys indicated that a total of 148,000 person trips were made by residents of the City of Waukesha on an average weekday in May 1982. Of this total, about 48,900 person trips, or about 33 percent, were made to or from locations external to the study area. About 99,100 person trips were made to or from locations internal to the study area.

External to the study area, about 33,600 person trips, or about 69 percent of the total external person trips and 23 percent of the total person trips, were made to other municipalities within the Milwaukee urbanized area. The largest volumes of external person trips were made between the study area and the Brookfield/Elm Grove area, the City of Milwaukee, and the west-central portion of Milwaukee County.

Internal to the study area, the U. S. Public Land Survey quarter section containing the Waukesha central business district both attracted and produced the greatest number of internal person trips. Other areas attracting significant numbers of internal person trips included quarter sections containing the Westbrook shopping center, the K-Mart/South High School area, the Moreland Medical Center, and the Central Middle School. With the exception of these major trip generation areas, internal person trip productions were generally concentrated within the more intensely developed residential areas of the City of Waukesha.

Transit Person Travel

The travel surveys indicated that the typical transit user could be described as a female between the ages of 12 and 24, not possessing a valid driver's license, and residing in a household of four or more persons. The travel surveys also indicated that about 94 percent of all transit system riders reside within the City of Waukesha and about 91 percent of the transit trips began or ended at home.

The plurality of revenue trips made on the transit system were home-based school and home-based work trips, with about 39 and 28 percent, respectively, of all transit revenue trips being made for these purposes. The quarter section containing the Waukesha central business district both produced and attracted the largest number of transit revenue trips--about 200 trips per average weekday.

Household Public Opinion Survey

The public opinion survey of Waukesha households indicated that only 5 percent of Waukesha households were not aware of the operation of a local bus system in the City of Waukesha. The majority of Waukesha households were most aware of such transit system operating characteristics as the days and hours of system operation and the major trip generators served by the transit system. Waukesha households were least aware of the extent of the geographic coverage of the system. The factor indicated by the majority of households as likely to encourage use of the transit system was the loss of the use of an automobile. Concerning household response to alternative fare structures for the transit system as measured by frequency of bus travel by household members, households indicated that the frequency of use of the transit system by household members would decline as fares for the transit service increased. This trend is consistent with historic trends observed within the transit industry and was not considered as unique to the Waukesha transit system.

About 21 percent of the households located within the City of Waukesha had members who used the transit system. Transit user households were more likely to be four or more persons in size, and have a household head aged 35 to 54 years. Such households were less likely to have an automobile or a licensed driver available than nonuser households. Transit user households also had a higher percentage of households with an annual income of less than \$10,000, but had almost the same percentage of households with an annual income of \$25,000 or more as the nonuser households.

TRANSIT SERVICE OBJECTIVES AND STANDARDS

The articulation of objectives and standards was considered to be a critical step in the conduct of the operations analysis for the City of Waukesha transit system. Such objectives and standards were to provide the criteria upon which the performance of the existing transit system could be objectively assessed and any recommendations for improvement soundly made. Therefore, it was considered essential that the objectives should clearly state the transit service goals and system performance desired by the Waukesha community. The standards supporting the objectives permit direct measurement of the extent to which the objectives were being attained. Only if the objectives and standards clearly reflected community transit-related goals would the evaluation of the existing system be able to identify desirable system improvements.

Because the transit service objectives were intended to reflect the underlying value system of the residents of the Waukesha area, it was important to actively involve interested and knowledgeable public officials and private citizens representing a broad cross-section of interests in the community in the articulation of those objectives and supporting standards. Accordingly, one of the major responsibilities of the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee was to articulate the transit service objectives for the Waukesha transit system. By drawing upon the collective knowledge, experience, views, and values of the members of the Committee, it was believed that a meaningful expression of the public transit system performance desired by the Waukesha community was obtained, and a relevant set of transit service objectives was defined.

The specific objectives adopted for the transit system operations analysis were concerned with providing the Waukesha area with a public transportation system which would effectively serve the City of Waukesha and environs while minimizing the costs incurred in providing the desired service. The following specific objectives were adopted by the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee:

1. The public transit system should effectively serve the City of Waukesha and environs.
2. The public transit system should maximize the service provided to the transit-dependent segments of the general population.
3. Transit system ridership should be maximized.

4. The transit system should be efficient and economical, meeting all other objectives at the lowest possible cost.

Complementing each of the foregoing specific transit service objectives was a set of service standards and performance measures. Each set of standards was directly related to the transit service objective, and served to facilitate quantitative application of the objectives in the evaluation of the existing transit system and of transit service improvement proposals. The performance measure identified the specific means to be used in quantifying each service standard. The standards and performance measures were intended to include only the most important criteria relating to the attainment of each objective. This was considered essential so that the entire set of measures could be kept to a level which could be readily worked with and comprehended in the evaluation process.

TRANSIT SYSTEM PERFORMANCE EVALUATION

The performance evaluation of the Waukesha transit system was conducted, using information which reflected the performance of the transit system during its first full year of operation, with some additional information reflecting the performance of the transit system at the start of its second full year of operation. The performance evaluation was conducted at two levels, using specific sets of performance measures set forth under the transit service objectives and standards.

At the first level, a two-part assessment of performance was made on a system-wide basis. The first part of this assessment examined the extent to which the transit system served the resident population, major land uses, and major travel patterns within the Waukesha area. The second part of this assessment presented a comparison of the ridership and financial performance of the transit system during its first full year of operation versus the ridership and financial projections set forth in the adopted transit development program, and the ridership and financial performance of transit systems serving similar size urban areas in Wisconsin. At the second level of evaluation, the performance of each route in the transit system was evaluated based upon its operating characteristics, ridership, and financial performance at the beginning of the second year of transit system operation.

The major salient findings of the performance evaluation of the Waukesha transit system indicated the following:

- The system provided excellent service area coverage of the residential areas of the City including the residential concentrations of transit-dependent population groups, serving about 93 percent of the total City population. Service area coverage could be improved by extending transit service into the Pebble Valley and The Windings residential areas on the northwest side of the City.
- The system also provided good coverage of the major traffic generators identified within the study area, serving 72 percent, or 60 of the 83 major traffic generators existing in the City and environs in 1982.

- There were an estimated 13,600 jobs provided at major employment centers within the study area in fall of 1982. About 10,900, or 80 percent, of these jobs were located within areas served by routes of the transit system. Of these 10,900 jobs, about 6,400 jobs, or about 59 percent, were determined to be either fully or partially served by the current schedules of the transit system routes. Adjustment of the currently scheduled service could increase the number of jobs fully served by the transit system by better relating the period of transit service to the starting and quitting times of certain major employers.
- Long transit travel times, resulting in transit-to-automobile travel time ratios exceeding two were found for certain downtown-oriented and cross-town trips by transit. The long travel times of some crosstown transit trips could be decreased by reducing the headways of the midday service on the shorter bus routes from 60 to 30 minutes. This action could also serve to better coordinate the scheduled arrival and departure times of all bus routes at the central transfer point on an hourly basis, and provide for more convenient transfers of passengers between bus routes.
- The geographic area served by the transit system in September 1982 encompassed about 89,000 total person trips, or about 89 percent of the origins and destinations of all person trips made by City residents. The hours of transit system operation accommodated about 66,000 person trips, or about 74 percent of the 89,000 total person trips made within the transit service area, and were considered as appropriate for the majority of trips made within the transit service area. About 44,000 person trips, or about 67 percent of the 66,000 total person trips made within the transit service area during the hours of system operation, had the potential to be conveniently served by the routes of the existing transit system. Such trips were considered as conveniently served because they had the potential to be completed either without transferring to a second bus route or by transferring to a second bus route traveling in the same general direction as the first bus route. The majority of trip movements which were identified as inconveniently served by the existing route structure were of low volume. However, a significant concentration of low- and moderate-volume trip movements were found to be centered on the K-Mart/South High School area. Analysis of the travel patterns of the transit passengers indicated that the routes of the transit system conveniently served the vast majority of trips made on the transit system.
- During its first year of operation, the Waukesha transit system generally exceeded the ridership and financial projections made for the system under the adopted transit development program, and made good progress toward achieving the five-year ridership and financial performance goals set forth in that program.
- Even if the Waukesha transit system attained the ridership and financial performance levels projected for the transit system after five years of operation, the performance of the transit system would still be somewhat below the performance of other Wisconsin transit systems serving similar size urban areas. The most important difference between the performance observed on comparable Wisconsin transit systems and the projected performance of the Waukesha transit system was related to the low ridership

levels of the Waukesha transit system. Factors which accounted for the ridership level differences between the Waukesha transit system and the comparable Wisconsin transit systems included the start-up nature of the new Waukesha transit system, lower student ridership on the Waukesha transit system, travel habits of City of Waukesha residents, the distribution of transit-dependent population groups within the Waukesha transit service area, and the level of transit service provided by the Waukesha transit system. Based upon a review of the operating characteristics of similar size Wisconsin transit systems, actions which could be expected to increase total transit system ridership and, on that basis, merited further consideration, included increasing student ridership levels through the provision of some form of special school-oriented transit service; a reduction of midday off-peak headways from 60 to 30 minutes; and the provision of evening and Saturday transit service.

- Some routes of the transit system--Routes 1, 3, 4, 7, 8, and 9--were found to have been more successful in attracting ridership, and therefore operated at higher levels of effectiveness than the other routes of the transit system--Routes 2, 5, 6, and 10. An important reason for these differences was found to be the ability of the more successful routes to attract larger numbers of students as passengers. Routes 2 and 6 were found to have operating or service area characteristics which were not as favorable to attracting students as passengers as were those of the more successful routes. Low ridership on Route 5 was attributed to the limited service operated over this route. The low performance levels and operating characteristics of Route 10 made this route a candidate for elimination, as transit service on its more effective segments could be replaced with service provided over Routes 8 and 9.
- While some routes of the transit system were observed to have low performance levels, the impact of service levels, operating characteristics, and service area characteristics upon individual route performance must be recognized. In this respect, if the transit system is to continue to provide extensive areal coverage of the Waukesha area, some bus routes must be expected to perform at somewhat lower levels of effectiveness than other bus routes because of the operating and service area characteristics of each route. Thus, if the system is to serve the Waukesha area as a whole, major changes in routing which would significantly reduce the extent of geographic area served cannot be recommended. Some changes to existing routes were considered to be warranted to improve transit service to schools and major trip generators, to expand service to unserved areas of the City, to reduce layover times, and to replace service presently provided on Route 10. Schedule changes were also recommended for consideration where the potential existed to increase route ridership by better serving major trip generators such as schools, to increase route productivity by eliminating under-utilized bus trips, or to improve transfer coordination. A change in the student transportation policy of the Waukesha Unified School District to basically eliminate yellow school bus service within the service area of the Waukesha transit system was also recommended for consideration because such an action would significantly increase student ridership on the Waukesha transit system.

RECOMMENDED TRANSIT SERVICE IMPROVEMENTS

During its first full year of operation, the Waukesha transit system was operated essentially as recommended in the adopted transit development program prepared in 1980. The accomplishments of the transit system included meeting and exceeding the ridership and financial forecasts for the first year of operation. Transit service changes made in mid-August of 1982 further expanded the geographic area of service, increased ridership on some routes, and corrected most operational problems observed during the first year of operation. Although the performance evaluation indicated that the current route configuration and schedules meet the majority of the transit service objectives and standards established for the system, certain service changes were identified which, if implemented, would further improve upon the level and extent of transit service provided, and which would increase transit system ridership and overall system performance.

Routing and Scheduling Technique

In developing the recommended service changes, a change from the existing radial routing and pulse scheduling to grid routing and nonpulsed scheduling was considered. Such a change was, however, dismissed as inappropriate and it was recommended that the Waukesha transit system continue to operate as a radial-pulse system, centered on the Waukesha central business district for several reasons. Because of the historic influence of the Fox River on the development of the City, the arterial street pattern is complex and partially radial in layout, focusing on the central business district, and therefore poorly suited to the operation of a grid routing system. The Fox River effectively divides the City and the river crossings which interconnect the various parts of the City exist primarily within the downtown area, therefore being poorly suited to the operation of a grid routing system. The central business district comprises the singularly largest transit trip generator in the area, making the district a logical focal point for a radial system. Pulse scheduling enables the transit system to provide for convenient passenger transfers between bus routes while operating with headways of 30 and 60 minutes. The elimination of pulse scheduling with the existing headways would greatly inconvenience passengers transferring between bus routes. Operation of the transit system with headways of 15 minutes or less to permit more convenient transfers under a grid system would require a substantial and costly increase in the level of transit service currently provided. This level of service was not considered to be economically feasible, as transit system ridership could not be expected to increase in proportion to the required increase in service.

Route Adjustments and Scheduling Changes

Although the Waukesha transit system had, at the time of the analysis, been in operation for just over one year, and experience with operation of the system had therefore been limited, a number of route adjustments and scheduling changes were identified which were expected to be beneficial to the system operation. The recommended adjustments in routing were intended to better serve existing travel demand, to replace nonproductive route segments, and to increase service area coverage. In this respect, routing adjustments were

recommended for Routes 2, 4, and 6 to provide direct, no-transfer service from the residential areas served by these routes to the K-Mart/South High School area. This area had been identified as attracting about 7,400 total person trips made by City residents on an average weekday--second only to the 15,900 trips attracted by the Waukesha central business district. Existing major total person trip movements between residential areas served by these routes and the K-Mart/South High School area were inconveniently served by the existing route structure. The proposed adjustments to these routes would better serve existing travel patterns and would also create a secondary focal point for the transit system where transfers between routes could be made.

Routing changes were also recommended for Routes 8 and 9 to replace transit service currently provided over the most productive segments of Route 10. Route 10 was not included in the nine-route transit system initially recommended for implementation in the adopted transit development program. Because of low performance levels observed on the route, it was recommended that this route be eliminated.

Changes to existing transit system schedules were recommended to adjust the pulsed arrival and departure times at the downtown central transfer point and to adjust service levels on individual routes. Changes in existing pulse times were recommended for both the morning and afternoon peak periods. In the morning, it was recommended that the first two pulse times for the transit system be moved back five minutes--from 6:10 a.m. and 6:40 a.m. to 6:05 a.m. and 6:35 a.m. This action would increase headways from 30 to 35 minutes between the second and third pulse times for the system. This extra time could be used on some routes as extra cycle time to maintain schedule adherence. No changes were recommended in the pulse times occurring from 7:10 a.m. to 2:20 p.m. Afternoon schedule changes were more extensive than morning schedule changes. It was recommended that the 2:50 p.m. pulse time be moved to 3:00 p.m. This change would allow dismissal times at Horning Middle School to be served by regular route service rather than by a special bus trip, as at present. As was recommended for the morning period, 35-minute headways were recommended between 3:30 p.m. and 4:05 p.m. and 4:05 p.m. and 4:40 p.m. to allow extra cycle time on some routes which currently have tight schedules during this period. These adjustments would result in moving back by 10 minutes the final two pulse times for the transit system from the current times of 5:20 p.m. and 5:50 p.m. to 5:10 p.m. and 5:40 p.m. The 5:10 p.m. and 5:40 p.m. pulse times would provide better late afternoon service to major traffic generators in the downtown area.

Adjustment of current service levels on individual routes was recommended to eliminate nonproductive bus trips and to add service which could be used by secondary school students. A review of passenger counts by route by bus trip was conducted to identify bus trips carrying few passengers. To the extent practicable, the nonproductive bus trips were recommended for elimination. This generally resulted in a reduction of the number of vehicle hours currently operated on some routes.

Additional Routes

One of the major issues which required attention in this study was the means for improving transit service to Waukesha public and parochial schools.

Improving transit service for students required the design of special routes which would provide direct transit service between residential areas and Waukesha schools. Such routes would be open for anyone to use but would be operated only on school days, with operating periods designed to serve the start and dismissal times of the schools served. Two such "tripper" routes--one serving North High School and Butler Middle School, and one serving South High School--are recommended to be implemented.

Operating Profile

Adjustments to the regular routes of the transit system would add about seven round-trip route miles to the system. The addition of the two recommended school routes would increase total system round-trip route miles by an additional 20 round-trip route miles. The new total for the transit system, incorporating both recommended route adjustments and route additions, would be about 117 round-trip route miles, a total increase over existing levels of about 27 round-trip route miles, or about 30 percent.

The service adjustments proposed for the transit system would reduce daily revenue vehicle hours operated by the regular routes of the transit system from the existing level by about four hours on school days, and by about three hours on nonschool days. The recommended school tripper routes would add about three revenue hours of service to the transit system on school days. Recommended reductions in revenue hours for the regular routes of the transit system would, however, enable the recommended school service to be added without exceeding the existing total daily revenue vehicle hours for the transit system. As a result, total revenue hours for the transit system would decline slightly with the recommended service improvements--including institution of special school routes--from about 92 hours on school days and about 91 hours on nonschool days to about 90 hours on school days and about 88 hours on nonschool days.

Implementation of the recommended adjustments and extensions to the regular routes and the additional school tripper routes would increase the current transit system vehicle requirements from nine to 11 vehicles. Because the transit system currently has a maximum of 10 vehicles available for operation each day, and because this number is not expected to change following the delivery of the new vehicle fleet of 11 buses for the transit system sometime in late 1983, one additional vehicle would be required in order for all recommended service improvements--in particular the additional school tripper routes--to be implemented. The acquisition of one more vehicle was also recommended to maintain at least two spare buses for the bus fleet. These vehicles would increase the total bus fleet from the 11 buses currently on order to 13 buses. It was recommended that the adjustments to the regular routes and one of the two tripper routes--the North High/Butler Special--be implemented immediately. It was also recommended that following the delivery of the new vehicle fleet in late 1983, the transit system retain one or more of its leased vehicles and use these vehicles to implement and operate the second recommended school tripper route until the required additional new vehicles can be acquired by the transit system and placed into operation.

Ridership and Financial Projections

Ridership and financial projections for the four-year period 1983 through 1986 were developed for the transit system based upon the recommended service changes. The projections assumed implementation of all recommended service changes, except one school tripper route, by May 1, 1983, and implementation of the final tripper route by January 1, 1984.

By 1986, annual ridership was projected to increase by about 53 percent over 1982 levels, from about 202,700 revenue passengers to about 311,000 revenue passengers. The productivity of the transit system was also projected to increase over this period from about nine revenue passengers per hour in 1982 to about 14 revenue passengers per hour by 1986. Operating expenses for the transit system were projected to decline slightly from about \$688,000 in 1982, to about \$684,000 in 1986, as measured in constant 1983 dollars. Based upon the existing fare structure, operating revenues for the transit system were projected to increase with the growth of system ridership over the period from 1982 levels of about \$87,000, to about \$126,000 by 1986--an increase of about 45 percent. Similarly, operating deficits were projected to decline, as measured in constant 1983 dollars, as a result of the expected decreases in operating expenses and increases in passenger revenues. Operating deficits were projected to decline from 1982 levels of about \$601,000, or about \$2.97 per revenue passenger, to about \$558,000, or about \$1.79 per revenue passenger in 1986.

Additional Service Improvements

The recommended service improvements described in the previous sections represented service changes which could be made within the existing daily revenue vehicle hours of service and the existing level of financial commitment by the City to the transit system. Certain additional service improvements were considered because of their potential to further increase total transit system ridership. These other service improvements included a reduction of the mid-day headway from 60 to 30 minutes on Routes 3, 4, 7, and 8 to improve transfer coordination; the provision of transit service in the evening between 6:00 p.m. and 10:00 p.m.; and the provision of Saturday transit service. Estimates were prepared of the incremental ridership and financial requirements attendant to each of these service improvements over the projected ridership and financial requirements for the weekday transit service previously recommended.

It was estimated that off-peak headway reductions on the above four routes could be expected to add from 23,000 to 25,000 annual revenue passengers to the transit system between 1984 and 1986. It was also estimated that this service change could be expected to add about \$88,000, as measured in constant 1983 dollars, to the annual operating budget for the transit system. Passenger revenues generated by this service change could be expected to range from about \$9,400 to \$10,200, thus recovering from 11 to 12 percent of the additional operating expenses. The service change would increase the annual operating deficit for the transit system between 1984 and 1986 by between \$78,000 and \$79,000, as measured in constant 1983 dollars.

It was estimated that the provision of evening transit service between 6:00 p.m. and 10:00 p.m. could be expected to add from 38,000 to 42,000 annual revenue passengers to the transit system between 1984 and 1986. This extension of service hours was also estimated to add about \$200,000 to the annual operating budget of the transit system. Passenger revenues generated by this service change could be expected to range from about \$15,600 to about \$17,200 and would cover from 8 to 9 percent of the additional operating expenses. The provision of evening service was estimated to increase the annual operating deficit for the transit system between 1984 and 1986 by between \$182,000 and \$184,000, as measured in constant 1983 dollars.

It was estimated that the provision of Saturday transit service could be expected to add about 26,000 to 29,000 annual revenue passengers to the transit system between 1984 and 1986. It was also estimated that the provision of Saturday transit service would add about \$80,000, as measured in constant 1983 dollars, to the annual operating budget of the transit system. Passenger revenues generated by Saturday transit service could be expected to range from about \$10,700 to \$11,900 and to recover from 13 to 15 percent of the additional operating expenses. Saturday transit service was estimated to increase the annual operating deficit for the transit system between 1984 and 1986 by between \$68,000 and \$69,000, as measured in constant 1983 dollars.

Evaluation of the projected incremental ridership and operating expenses for these additional service changes indicated that none of these service changes would be as productive as, or operate at financial performance levels equivalent to, the recommended weekday transit service. Of the three transit service improvements, Saturday ridership was found to have the best potential ridership and financial performance characteristics. Because of the potential for significant increases in the level of local financial commitment required to implement these transit service improvements, no recommendations were made concerning implementation of these services. Rather, a decision on implementation of any of these services was left open for future consideration by the City of Waukesha.

Elimination of In-City Yellow School Bus Service

During the 1982-1983 school year the Waukesha Unified School District provided yellow school bus service to approximately 6,000 students within the school district. Most of these students resided over two miles from the school they were entitled to attend. Of this total, about 1,100, or 18 percent, were secondary school students who resided within the corporate limits of the City of Waukesha. An examination of the yellow school bus routes within the City and the routes of Waukesha Metro Transit indicated that a substantial amount of duplication existed between the two route systems, and that many of the secondary school students currently served by yellow school bus routes could be served by the routes of the Waukesha transit system. This analysis raised the question of whether the City should be providing financial assistance for yellow school bus service if secondary school students using these services could be served by the publicly operated bus system, and whether a change in the current student transportation policy of the Waukesha School Board to exclude secondary school students residing within the service area of Waukesha Metro Transit from receiving yellow school bus service was merited.

The required change in student transportation policy would essentially constitute a return to the student transportation policies within the City of Waukesha which existed prior to November 1977. This policy would also be consistent with the student transportation policies within other similar size Wisconsin communities served by publicly operated, fixed route, transit systems.

The change in the student transportation policy for the City of Waukesha would require the elimination of yellow school bus service for public and parochial secondary school students only, as this represents the largest student market and the student market which could be best served by the transit system. Because the current contract for the yellow school bus service within the school district runs through the 1984-1985 school year, and because additional equipment would be needed by the City in order to serve in-city secondary school students presently served by yellow school bus service, the earliest that the City could assume responsibility for providing transportation to in-city students would be the fall of 1985, at the beginning of the 1985-86 school year.

It was anticipated that the City could serve in-city secondary school students with the recommended system of regular and special school routes. It was also anticipated, however, that extra bus trips would have to be added in the morning and afternoon on some routes of the transit system--in particular, Routes 1, 3, 5, 7, and 9, and one of the special school tripper routes. All bus trips added to schedules to serve student demand would be open for use by the public to conform to current federal regulations.

It was estimated that the student transportation policy change would add about 88,000 revenue passengers to the public transit system in 1985, and about 198,000 revenue passengers in 1986. The additional service for students would add about \$37,000 in 1985, and about \$82,700 in 1986 to the annual operating budget projected for the recommended system, as measured in constant 1983 dollars. Revenues generated by the additional students carried would range between about \$31,000 in 1985 to about \$69,000 in 1986, and would recover between 83 and 84 percent of the additional operating expenses. The additional student revenues generated by the policy change would increase the recovery rate previously projected for the recommended system in 1985 and 1986 from about 18 and 19 percent to about 21 and 26 percent respectively. The additional service would increase the operating deficit for the recommended transit system by about \$6,300 in 1985 and by about \$13,400 in 1986, as measured in constant 1983 dollars. The operating deficit per revenue passenger for the additional service would be about \$0.07. The additional service necessary to serve the student ridership would require six additional vehicles to operate, plus one additional vehicle to maintain an adequate number of spare buses for the vehicle fleet--a total of seven buses--and would increase the total required bus fleet from 13 buses to 20 buses. Because the planned city bus garage and maintenance facility is proposed to be constructed to accommodate a bus fleet of 15 buses, an expansion of the facility would also be required.

Several advantages and disadvantages associated with the proposed change in the student transportation policy were identified. The major advantage of the proposed policy change consisted of substantially improving the operating performance of the Waukesha transit system. The proposed policy change and

additional school service would result in a ridership increase of about 64 percent over previously projected ridership levels for 1986, and a decrease in the operating deficit per revenue passenger of about 37 percent.

A second advantage of the policy change consisted of the possibility of reducing city expenditures. This advantage is related to the current way school district costs for yellow school bus service are shared among municipalities within the district. Because the City would assume responsibility for providing transportation service to secondary school students within the City under this proposal, the argument could be presented that the City should request a reduction in the school board tax levy to eliminate a portion of the tax levy used to support yellow school bus service in the school district. The total 1982-1983 budget for the Waukesha School Board included about \$550,000 for all contract yellow school bus service within the school district, and about \$175,000 in state aids for transportation, leaving about \$375,000 to be supported through taxes within the school district. The school board budget is supported in part by property taxes levied by the school district based upon the total assessed valuation of all municipalities within the school district. Based upon the estimated full assessed value of the school district in 1982 of about \$1.840 billion, and the full assessed value of the City of Waukesha in 1982 of about \$1.325 billion, property taxes from the City of Waukesha could be responsible for up to \$270,000, or about 72 percent of the \$375,000 in taxes required for all contract yellow school bus service provided within the school district. By comparison, the average annual cost to the City of Waukesha to provide transportation to in-city students on Waukesha Metro Transit is estimated to be about \$16,900. It should be noted that, while the above figures reflect the possible city share of costs for all yellow school bus service, only yellow school bus service to in-city secondary school students is proposed to be considered for elimination.

Disadvantages associated with the proposed policy change include a need to negotiate with the Waukesha School Board for city property tax reductions, charging students for transportation service which they now receive at no direct charge, possible adverse effects on the private yellow school bus operator, and the lower cost-effectiveness of the proposed transit service.

The major disadvantage associated with the proposed policy change consisted of the need to negotiate with the School Board for any such reductions in the school district tax levy for the City of Waukesha. If the City would provide in-city students with bus service on Waukesha Metro Transit, the costs for all remaining yellow school bus service would have to be assumed solely by the towns within the school district if the City is to achieve any reduction in its share of the school district tax levy. This may not be possible under current state statutes, in which case the City would still be responsible for 72 percent of the cost of providing yellow school bus service to the towns within the school district.

A second disadvantage associated with the proposed policy change involves charging fares to students who currently are provided with yellow school bus service at no direct charge. Under the service proposal, students who reside over two miles from school who now receive free yellow school bus service would be required to pay \$0.70 per day for school transit service on Waukesha Metro Transit. Such a policy is likely to be viewed unfavorably by the affected families.

The proposed policy change may also have adverse affects on the present private yellow school bus operator. A reduction in the number of students provided with yellow school bus service within the school district could result in fewer bus routes being operated and less equipment being required for operation. This may, in turn, result in driver layoffs, and could leave the school bus operator with a surplus of operating equipment.

Finally, if only total costs are considered, the existing yellow school bus service may be a more cost-effective way of serving in-city student transportation. It was estimated that, on a cost-per-student basis, it cost the yellow school bus operator \$100,800, or about \$0.40 per one-way student trip, to provide yellow school bus service to in-city students. This compares with a total estimated annual cost of about \$184,200, or about \$0.93 per one-way student trip, for the service proposed to be provided on Waukesha Metro Transit. While the annual cost to the City of the proposed transit service on Waukesha Metro Transit was estimated to be about \$16,900, or about \$0.09 per one-way student trip, and was substantially less than the current annual cost to the City for yellow school bus service, this was principally because of the way total school district costs are shared between the City and the towns within the school district, as well as the use of student fares and the availability of federal and state urban transit aids which would reduce the total cost to the City of the transit service provided by Waukesha Metro Transit.

The analysis thus indicated that the elimination of yellow school bus service could substantially improve the operating performance of the Waukesha transit system. However, it was not clear if the City would be able to obtain any reduction in the school district tax levy if it were to implement the proposed service on Waukesha Metro Transit. Such a reduction would be used to offset the additional operating and capital costs which would be required to operate the proposed service. Uncertainties also remained concerning public reaction to the proposed student fare policy, the effects of the service proposal on the private yellow school bus operator, and the overall cost-effectiveness of both services. In recognition of these concerns, the Waukesha Mass Transit Citizens and Technical Coordinating and Advisory Committee, after reviewing the service proposal, chose not to recommend in favor or against the proposed student service on Waukesha Metro Transit. Rather, the Advisory Committee unanimously recommended that the City's Transit Coordinator and the Waukesha Transit System Utility Board continue to examine the service proposal and begin discussions with the Waukesha School Board to further clarify some of the issues raised in the above analysis. A final discussion on whether or not the proposed service would be financially beneficial to the City and should, therefore, be considered for implementation was considered to be the responsibility of the Waukesha Transit System Utility Board and the Waukesha Common Council.

FINANCIAL ANALYSIS

A financial analysis of the recommended program of transit service improvements was conducted to review the financial requirements of the transit system, and recommend possible actions which could be taken to improve the fiscal integrity of the transit system, reduce total transit system operating deficits, and reduce the local public funding requirements.

Fare Structure

The fare structure for the Waukesha transit system was implemented exactly as recommended in the transit development program prepared in 1980. To address the issue of the continued viability of this fare structure, a comparison was made with the fare structures of six transit systems serving similar size urban areas. This comparison indicated that the current fare structure of the Waukesha transit system was reasonable for the size of the transit system.

An additional policy issue raised with regard to the Waukesha transit system related to the proportion of operating expenses that should ultimately be borne by transit system passengers: that is, what goal should be established for the farebox recovery rate. The farebox recovery rates of comparable Wisconsin transit systems were reviewed to help address this issue. Based upon the mean and median values for these transit systems for 1981 and 1982, a farebox recovery rate of between 25 and 30 percent was considered as a desirable goal for the Waukesha transit system. It should be noted that this farebox recovery rate is significantly lower than the farebox recovery rate of 50 percent of operating expenses recommended for public transit service under the adopted regional transportation system plan. However, it was not considered practicable for the Waukesha transit system to attain this rate of recovery of expenses from passenger revenues during its early years of operation due primarily to projected ridership levels for the transit system which take into consideration the recent start-up of system operation. In addition, no urban bus system operating within the Region or within the State presently recovers this proportion of expenses from farebox revenues. Consequently, a farebox recovery rate which was more representative of actual farebox recovery rates observed on similar size transit systems was considered a more reasonable goal for the Waukesha transit system.

A fare increase to be implemented in 1984, was proposed for the Waukesha transit system. This increase was intended to enhance the proportion of operating expenses recovered from farebox revenues. The fare increase would have raised adult cash fares from \$0.50 to \$0.60, student cash fares from \$0.35 to \$0.40, and child and elderly-handicapped cash fares from \$0.25 to \$0.30. It was also proposed that the price of tickets and passes sold by the transit system should provide a discount from comparable single-ride cash fares. Because members of the Advisory Committee were divided in their opinions concerning the need for and potential impact of the proposed fare increase, the Committee did not make any recommendation concerning the specific amount or timing of fare increases. Rather, the Committee suggested that a policy directly relating increases in fares to increases in the costs of providing transit service be established as a guide to the timing and amount of fare increases.

Operating Deficits

The effect of implementing the transit service improvements, including the elimination of yellow school bus service to in-city secondary school students, would be to significantly increase transit system ridership and improve system financial performance. Transit system ridership would be expected to increase from about 202,700 revenue passengers in 1982 to about 509,000 revenue passengers by 1986. This ridership level would include ridership by in-city secondary

school students formerly provided with yellow school bus service. The productivity of the transit system would also be expected to increase over 1982 levels, from about nine passengers per vehicle hour in 1982 to about 20 passengers per vehicle hour by 1986. Operating expenses would increase over the estimated 1982 level of about \$688,000 to about \$767,000 by 1986, expressed in constant 1983 dollars, due primarily to increases in service to accommodate in-city secondary school students formerly served by yellow school bus routes. Operating revenues, however, may also be expected to increase substantially as a result of the additional student passengers, from the estimated 1982 level of \$87,000 to about \$196,000 by 1986, also expressed in constant 1983 dollars. The proportion of operating expenses recovered through operating revenues may also be expected to increase over the planning period from about 13 percent in 1982, to about 26 percent in 1986. The operating deficit for the transit system may be expected to decrease from the estimated 1982 level of \$601,000 to about \$570,000 in 1986, also expressed in constant 1983 dollars. The local share of the annual operating deficit is projected to decrease to about \$89,000 in 1984 from about \$165,000 in 1983, due primarily to reductions in total system operating expenses resulting from the elimination of lease costs for buses. The local share of the operating deficit may be expected to increase to about \$134,000 in 1985 and to decline slightly to about \$120,000 in 1986 if proposed reductions in available federal transit operating assistance take place.

Capital Projects

Implementation of the transit service improvements would require the acquisition of additional operating equipment for the transit system and the expansion of the city bus garage and maintenance facility. Implementation of the recommended school service routes would require one additional vehicle for operation in 1984. Implementation in 1985 of the additional transit service for in-city students formerly provided with yellow school bus service would require another six buses for operation. Including two additional vehicles to maintain an adequate number of spare buses, a total of nine additional vehicles would be required to implement all transit service improvements. It was recommended that the transit system acquire 35-foot-long buses similar to those currently being purchased by the City. The acquisition of these vehicles would increase the total planned city-owned bus fleet from the 11 buses currently on order to 20 buses. Other operating equipment required would include nine fareboxes, nine mobile radio units, and 30 additional bus stop signs for the route extensions and tripper routes. Required improvements at the planned city bus garage and maintenance facility would include expansion of the facility to accommodate five additional bus storage berths and one additional maintenance bay. The total capital investment for the required capital projects is estimated at about \$1.46 million, of which about \$1.17 million, or 80 percent, could be funded under the UMTA Section 9 formula grant program. The remaining amount of about \$293,000, or 20 percent, would represent the financial commitment required from the City of Waukesha.

CONCLUSION

Through the initiation of the operation of a fixed route bus system serving the Waukesha area, the City of Waukesha has made important progress toward accomplishing the primary goal of the adopted transit development program

prepared in 1980, namely, the re-establishment of a local public transit system which would provide Waukesha residents with the maximum practical level of public transit service. The first year accomplishments of the transit system, which included meeting or exceeding ridership and financial forecasts, were a good indication that the existing transit system should be able to attain the five-year ridership and financial performance goals set forth in the adopted transit development program. In this respect, the program of operational improvements recommended in this report includes actions which, if implemented, would be immediately beneficial to accomplishing the ridership and financial performance goals of the adopted transit development program. The analyses conducted during the course of the study also indicated that it would be desirable for the Waukesha transit system to consider actions which would quickly bring the ridership and financial performance of the transit system closer to that observed on other Wisconsin systems of similar size. Accordingly, the study proposes actions directed at capturing a major potential ridership market presently uncaptured in the Waukesha area, but which has been successfully captured by similar size transit systems. This market consists of in-city public and parochial secondary school students presently served by yellow school bus routes. Proposed actions related to capturing this student market for the Waukesha transit system would have the most significant impact of all of the operational improvement actions considered on ridership levels and, when combined with proposed fare increases, on the financial integrity and viability of the transit system. Implementation of the recommended program of operational improvements would concentrate available resources and capabilities on areas which would have the most significant positive impact on transit system performance, particularly financial performance levels, thus assuring the most effective use of limited public financial resources.

APPENDICES

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Appendix A

WAUKESHA MASS TRANSIT CITIZENS AND TECHNICAL COORDINATING AND ADVISORY COMMITTEE

Edward J. Stoltz.....Citizen Member
Chairman
David R. Markiewicz.....Citizen Member
Vice-Chairman
Paul Dybvad.....Administrator, Waukesha Unified
School District
Robert J. Foley, Sr.Alderman, City of Waukesha
Armand C. Garcia.....Citizen Member
John A. Inzeo.....Member, Waukesha Unified
School District Board
Paul J. Keenan.....Mayor, City of Waukesha
Mildred Kipp.....Citizen Member
Richard S. Nettum.....Executive Vice-President,
Waukesha Chamber of Commerce
Michael L. Thaller.....Citizen Member
Karen White.....President, Little Swiss Clock Shop, Inc.
Geraldine H. Wuerslin.....Alderman, City of Waukesha

Nonvoting Technical Staff Members

Kurt W. Bauer.....Executive Director, Southeastern
Wisconsin Regional Planning Commission
James A. Beckwith.....Chief, Public Transit Section,
Bureau of Transit, Wisconsin
Department of Transportation
Vencil F. Demshar.....Highway Commissioner, Waukesha County
Paul A. Feller, P.E.City Engineer, City of Waukesha
Robert C. Johnson.....Transit Coordinator, City of Waukesha
Paul J. Larrouse.....General Manager, Transit
Management of Waukesha, Inc.
Eugene T. Sheedy.....Executive Vice-President and General
Manager, Wisconsin Coach Lines, Inc.
Thomas A. Winkel.....District Chief Planning Engineer,
Wisconsin Department of Transportation

Mr. Albert A. Beck, Principal Planner, SEWRPC, although not a member of the Committee, served as its Secretary.

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Appendix B

WAUKESHA HOUSEHOLD SURVEY TRANSMITTAL LETTER AND FORM

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

916 NO. EAST AVENUE



P.O. BOX 769



WAUKESHA, WISCONSIN 53187



TELEPHONE (414) 547-6721

Serving the Counties of:

KENOSHA
MILWAUKEE
OSHAUKEE
RACINE
WALWORTH
WASHINGTON
WAUKESHA



May 14, 1982

Dear Householder:

Officials responsible for planning and developing transit services in the City of Waukesha are concerned about the effect of transit on the travel habits and patterns of city residents. Therefore, at the request of the Wisconsin Department of Transportation and the City of Waukesha, the Southeastern Wisconsin Regional Planning Commission is conducting a survey of travel habits and attitudes of selected households. The results of this survey will aid the City of Waukesha in evaluating its current transit system and in planning future transit system improvements. By completing the enclosed questionnaires, you will be making an important contribution to the planning of transit service for the City of Waukesha.

The Household Questionnaire should be completed by the head of the household or spouse. Please answer all of the questions to the best of your ability.

The "Trip Report" enclosed with the questionnaire is designed to collect information on the travel patterns of household members 5 years of age and older. Instructions for completing the Trip Report are on the reverse side of this letter.

A high rate of response from both households who do use transit and those households who do not currently use transit is essential in order to properly evaluate the existing transit service and identify any needed improvements. Therefore, a follow-up telephone call will likely be made to all households that have not returned questionnaires after approximately one week.

If your household find it difficult to answer any of the questions, please call Mr. John L. Zastrow of the Regional Planning Commission staff at 547-6721. After answering all applicable questions, you may place the questionnaire in the self-addressed return envelope provided and drop it in any U. S. mailbox.

Your answers will be kept entirely confidential and will be compiled with answers from other households for planning purposes only.

Sincerely,

Kurt W. Bauer
Executive Director

KWB/bg
Enclosures

TRIP REPORT INSTRUCTIONS

You are asked to report on all trips made by each member of the household 5 years of age and older on _____. For purposes of this study a "day" begins at 4:00 a.m. and ends at 4:00 a.m. the following day. "Trips" are defined as one-way travel between an origin (starting place) and a destination (stopping place). For example, a "Round Trip," such as from home to the grocery store and back should be considered two trips. On the form entitled "Trip Report" enter age and sex for each person in the household who makes trips on the travel day. Record all trips for the day (see example). Please call Mr. John L. Zastrow at 547-6721 if you need additional forms or if you find it difficult to answer any questions. Six forms are provided. Use one form for each tripmaker. Code numbers for trip purpose and mode of travel are at the bottom of the form. If you are unsure of a code, please feel free to write a short note in the margin.

TRIP REPORT

AGE: 46 SEX: ☒ MALE ☐ FEMALE SAMPLE NUMBER 1 2 3 4 SHEET _____ OF _____ SHEETS

PERSON NUMBER	TRIP NUMBER	C		D		E		F		G
		WHERE DID THIS TRIP BEGIN? (Origin)		WHERE DID THIS TRIP END? (Destination)		TRIP PURPOSE		TIME OF		
		Street Address	City, Village or Town County	Street Address	City, Village or Town County	TO	FROM	START	ARRIVAL	MODE OF TRAVEL
		101 W. DELL ST. WAUKESHA	WAUKESHA	PARK & LAKE LOT E-94 R 12 WAUKESHA	WAUKESHA	0	6	7:21 AM	7:30 AM	1
		701 E. WISCONSIN MILWAUKEE	MILWAUKEE	701 E. WISCONSIN MILWAUKEE	MILWAUKEE	6	1	7:35 AM	8:10 AM	4
		1427 BURR ST. MILWAUKEE	MILWAUKEE	1427 BURR ST. MILWAUKEE	MILWAUKEE	1	5	12:10 AM	12:20 AM	6
		701 E. WISCONSIN MILWAUKEE	MILWAUKEE	701 E. WISCONSIN MILWAUKEE	MILWAUKEE	5	1	1:17 AM	1:28 AM	6
		101 W. DELL ST. WAUKESHA	WAUKESHA	101 W. DELL ST. WAUKESHA	WAUKESHA	1	0	5:18 AM	5:53 AM	2
		1100 S. ISLAND WAUKESHA	WAUKESHA	1100 S. ISLAND WAUKESHA	WAUKESHA	0	5	7:18 AM	7:33 AM	1
		101 W. DELL ST. WAUKESHA	WAUKESHA	101 W. DELL ST. WAUKESHA	WAUKESHA	5	0	10:05 AM	10:20 AM	1

COLUMN E TRIP PURPOSE

1. Place of Work 6. Change Travel Mode
2. Work-Connected Business 7. Serve Passenger
3. Personal Business 8. Shopping
4. School 9. Recreation
5. Social-Eat Meal 0. Home

COLUMN G MODE OF TRAVEL

1. Auto/Truck Driver 7. Walked to Work (Bicycle)
2. Auto Passenger 8. Worked At Home
3. Railroad Passenger 9. Motorcycle
4. Bus Passenger 0. Air Travel
5. School Bus
6. Taxi Passenger

**HOUSEHOLD SURVEY
WAUKESHA METRO TRANSIT**

TO BE COMPLETED BY
THE HEAD OF HOUSE-
HOLD OR SPOUSE

I. Have you or anyone in your household heard of Waukesha Metro Transit?
(The public transit system operated by the City of Waukesha)

_____ Yes _____ No (Go to Section II)

1. If yes, did you know that Waukesha Metro Transit:

Yes No

- | | | |
|-------|-------|---|
| _____ | _____ | 1. Operates from 6:00 a.m. to 6:15 p.m.? |
| _____ | _____ | 2. Operates Monday through Friday except holidays? |
| _____ | _____ | 3. Provides service to Goerkes Corners (Park and Ride Lot at U. S. Highway 18 and I-94)? |
| _____ | _____ | 4. Provides service to Waukesha County Technical Institute and the University of Wisconsin-Waukesha? |
| _____ | _____ | 5. Provides service to the downtown business district? |
| _____ | _____ | 6. Provides service to the four outlying major shopping centers (Fox Run, K-Mart, Moreland Plaza, and Westbrook--Target). |
| _____ | _____ | 7. Provides half-hour service during mornings 6:00-9:00) and afternoons (3:00-6:00)? |
| _____ | _____ | 8. Provides one-hour service during the midday (9:00 a.m.-3:00 p.m.)? |
| _____ | _____ | 9. Has a downtown transfer point at Broadway and Main Street where all buses meet at the same time to make transferring from route to route easier? |
| _____ | _____ | 10. Can currently be flagged at any intersection along the route (outside of the downtown area, where bus stop signs have not yet been installed)? |
| _____ | _____ | 11. Has an adult fare of 50¢? |
| _____ | _____ | 12. Has a student fare of 35¢ (ages 12 through high school)? |
| _____ | _____ | 13. Has a childrens fare of 25¢ (ages 5 through 11)? |
| _____ | _____ | 14. Has a senior citizens' fare of 25¢ (between 9:00 a.m. and 3:00 p.m.)? |
| _____ | _____ | 15. Has a monthly pass for \$20 which permits unlimited riding? |
| _____ | _____ | 16. Provides free transfers in the downtown business district which are good for a two-hour period? |
| _____ | _____ | 17. Requires exact fare when boarding? |
| _____ | _____ | 18. Has bus routes located within one-quarter mile of over 80 percent of the City residents. |

II. 1. Do you or any household member use Waukesha Metro Transit?

_____ Yes _____ No (Go to Section III)

2. If yes, how often do members of your household make trips by bus?

- | | |
|-------|------------------------------|
| _____ | 1. 10 or more times per week |
| _____ | 2. 5-9 times per week |
| _____ | 3. 1-4 times per week |
| _____ | 4. 2 or 3 trips per month |
| _____ | 5. Less than once per month |

3. What are the purposes of these trips? (check any that apply)

- | | |
|-------|------------------------------|
| _____ | 1. Work |
| _____ | 2. School |
| _____ | 3. Shopping |
| _____ | 4. Personal business/medical |
| _____ | 5. Social-recreational |

	Age	Sex		Currently Use Bus	
		Male	Female	Yes	No
Person 1	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person 2	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person 3	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person 4	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Person 5	_____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

01. Car no longer available.....
02. Change in work or school location.....
03. Change in work or school hours.....
04. No longer need auto for work or other activities during the day...
05. Rationing of gasoline.....
06. Substantial increase in cost of gasoline.....
07. Getting a job in City of Waukesha.....
08. Bus service extended until 10 P.M. on weekdays.....
09. Bus service provided on Saturdays.....
10. Bus service provided closer to home.....
11. Bus service provided closer to work or school.....
12. None--will not use service.....

[illegible]

1. What is the age of the head of the household? _____
2. The total number of persons residing in the household is _____
3. The total number of licensed drivers residing in the household is _____
4. How many vehicles (autos, trucks, and vans) are available for use in your household? _____
5. Please enter the number for the approximate gross family income (before taxes) in your household: _____

01. Under \$ 5,000	05. \$12,500-\$14,999	09. \$30,000-\$39,999
02. \$ 5,000-\$ 7,499	06. \$15,000-\$19,999	10. \$40,000-\$49,999
03. \$ 7,500-\$ 9,999	07. \$20,000-\$24,999	11. Over \$50,000
04. \$10,000-\$12,499	08. \$25,000-\$29,999	

1. Some grade school
2. Grade school graduate
3. Some high school
4. High school graduate
5. Technical/Vocational Training
6. Some college
7. College graduate
8. Post-graduate studies

1. No cost.

2. 25¢ for adults, 10¢ for senior citizens between 9 a.m. and 3 p.m., 15¢ for students, and 10¢ for children.

3. 50¢ for adults, 25¢ for senior citizens between 9:00 a.m., and 3:00 p.m., 35¢ for students, and 25¢ for children.

4. 75¢ for adults, 35¢ for senior citizens between 9:00 a.m. and 3:00 p.m., 50¢ for students, and 35¢ for children.

TRIP REPORT

AGE: _____

SEX: ☐ MALE ☐ FEMALE

SAMPLE NUMBER

1	2	3	4

SHEET _____ OF _____ SHEETS

A PERSON NUMBER	B TRIP NUMBER	C WHERE DID THIS TRIP BEGIN? (Origin)	D WHERE DID THIS TRIP END? (Destination)	E TRIP PURPOSE		F TIME OF		G MODE OF TRAVEL
				TO	FROM	START	ARRIVAL	
		101	201					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		102	202					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		103	203					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		104	204					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		105	205					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		106	206					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		107	207					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		108	208					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					
		109	209					
		Street Address	Street Address					
		City, Village or Town County	City, Village or Town County					

COLUMN E TRIP PURPOSE

- | | |
|----------------------------|-----------------------|
| 1. Place of Work | 6. Change Travel Mode |
| 2. Work-Connected Business | 7. Serve Passenger |
| 3. Personal Business | 8. Shopping |
| 4. School | 9. Recreation |
| 5. Social-Eat Meal | 0. Home |

COLUMN G MODE OF TRAVEL

- | | |
|-----------------------|-----------------------------|
| 1. Auto/Truck Driver | 7. Walked to Work (Bicycle) |
| 2. Auto Passenger | 8. Worked At Home |
| 3. Railroad Passenger | 9. Motorcycle |
| 4. Bus Passenger | 0. Air Travel |
| 5. School Bus | |
| 6. Taxi Passenger | |

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Appendix C

WAUKESHA METRO TRANSIT USER SURVEY FORM

PLEASE COMPLETE AND RETURN ON BUS, OR DEPOSIT IN ANY U. S. MAILBOX

PUBLIC TRANSPORTATION SURVEY

This study of transit riding is being conducted in order to plan better public transportation in your area. Your cooperation in filling out this card is essential to the study. Your replies will be kept entirely confidential and will be used for statistical purposes only. When you have completed the card, please return it to the survey officer on the bus or deposit it in any U. S. Mailbox. This survey is being conducted by the SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION in cooperation with the UNITED STATES DEPARTMENT OF TRANSPORTATION, the WISCONSIN DEPARTMENT OF TRANSPORTATION and the LOCAL TRANSIT OPERATOR.

(Please Print Information)

1. MY HOME ADDRESS IS:

(Street Address) (City, Village, or Town) County
 Office Use Only

2. I GOT ON THIS BUS AT THE INTERSECTION OF:

_____ and _____
 (Record Time and Circle AM or PM)

3. THE TIME OF DAY WAS:

: AM PM
 (Record Time and Circle AM or PM)

4. I GOT TO THIS BUS BY:

☐ Enter Number 1. Walking 2. Auto-Parked 5. Other _____
 3. Auto-Not Parked 4. Bus (please specify)

5. If you have just completed one of these forms on another bus before transferring to this bus on this particular trip, please give route number or name of the bus transferred from and COMPLETE the balance of this form.

(Route Number or Name)

6. MY FARE WAS PAID:

☐ Enter Number 1. In Cash (give amount) _____ cents
 2. By Pass
 3. By Ticket/Token
 4. By Free Transfer (If yes, answer 6a)

6a. IS THIS PART OF A ROUND TRIP ON THE SAME ROUTE?

☐ Yes ☐ No

7. I CAME FROM: If other than "Home", complete Item 8 and continue

☐ Enter Number 1. Home 4. Social Activity 7. Conducting Personal Business
 2. Work 5. Shopping 8. Other
 3. School 6. Recreational Activity

If you came from "Home" go to Item 9

8. THE PLACE I CAME FROM IS LOCATED AT:

(Street Address or Building Name) (City, Village, or Town) (County)
 Office Use Only

9. I WILL GET OFF THIS BUS AT THE INTERSECTION OF:

_____ and _____

10. AFTER LEAVING THIS BUS, I WILL: (Check One)

☐ Not Transfer
☐ Transfer to _____ and get off at _____
 (Bus Route Name and/or Number) (Name of Stop or Intersection)
☐ And Transfer Again to: _____ and get off at _____
 (Bus Route Name and/or Number) (Name of Stop or Intersection)

11. I AM GOING TO: If other than "Home" complete Item 12 and continue

☐ Enter Number 1. Home 4. Social Activity 7. Conducting Personal Business
 2. Work 5. Shopping 8. Other _____
 3. School 6. Recreational Activity Please Specify

If you are going to "Home" go to Item 13

12. THE PLACE I AM GOING TO IS LOCATED AT:

(Street Address or Building Name) (City, Village, or Town) (County)
 Office Use Only

13. I AM A LICENSED DRIVER?

☐ Yes ☐ No

14. I AM OF SPANISH/HISPANIC ORIGIN OR DESCENT

☐ Yes ☐ No

15. IS THIS TRIP PART OF A ROUND TRIP BY BUS TODAY (Check Yes or No)

☐ Yes If "yes", record the actual or expected starting time of your bus trip in the Opposite direction
☐ No : AM PM (Record time and circle AM or PM)

16. I HAVE A HANDICAP OR DISABILITY WHICH MAKES BUS USE DIFFICULT?

☐ Yes If "yes" please describe _____
☐ No ☐ Office Use Only

17. I AM: (Check one)

☐ Male
☐ Female

18. MY AGE IS:

☐ Enter Number 1. 5 or under 6. 25-34
 2. 6-12 7. 35-44
 3. 13-15 8. 45-54
 4. 16-18 9. 55-64
 5. 19-24 10. 65 and over

19. MY RACE IS:

☐ Enter Number 1. Black 4. Asian/Pacific Islander
 2. White 5. Other
 3. American Indian/Alaskan

20. OUR HOUSEHOLD INCOME IS:

☐ Enter Number 1. Under \$5,000 4. \$10,000 - \$12,499 7. \$20,000 - \$24,999
 2. \$ 5,000 - \$ 7,499 5. \$12,500 - \$14,999 8. \$25,000 - \$29,999
 3. \$ 7,500 - \$ 9,999 6. \$15,000 - \$19,999 9. \$30,000 or Over

21. OUR HOUSEHOLD HAS _____ AUTOS AND TRUCKS AVAILABLE FOR PERSONAL USE.

22. THE NUMBER OF PERSONS LIVING IN OUR HOUSEHOLD IS _____

THANK YOU

(continued)

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Appendix D

WISCONSIN TRANSIT SYSTEMS SERVING AREAS SIMILAR TO THOSE SERVED BY WAUKESHA METRO TRANSIT

Comparable transit systems operating in Wisconsin were defined to include those fixed-route systems with service area populations within 10,000 persons of the service area population of Waukesha Metro Transit. Six transit systems with service area populations ranging from about 40,000 to 55,000 persons were selected for the comparative evaluation. Data concerning the operating and performance characteristics of each transit system were collected from the transit operators and the Wisconsin Department of Transportation, Bureau of Transit. The performance of the Waukesha system was compared to the average or median performance of the six comparable systems, thus minimizing the effects of the site-specific idiosyncrasies of the individual transit systems.

Operating Characteristics

A comparison of the operating characteristics in 1982 of the similar sized transit systems in Wisconsin and Waukesha Metro Transit is presented in Table D-1. Generally, the Waukesha transit system is very similar to the other transit systems with regard to most operating characteristics, including route structure, number of routes, route mileage, peak period headways, week-day service hours, and fares. It differs primarily with respect to off-peak period headways, which are generally 30 minutes on the other systems and not 60 minutes, and with respect to provision of Saturday service, which is operated by all the other transit systems.

All transit systems are publicly owned and operated with municipal employees using radial routing and pulse scheduling. The Waukesha transit system is also similar in these characteristics except that it is operated by employees of a private management firm.

The Waukesha transit system, with nine peak-period routes totaling about 90 round-trip route miles, operates slightly more routes and round-trip route miles than the other systems' average of seven peak-period routes and 72 total daily route miles.

In terms of service frequencies, headways of 30 minutes or less are provided on 36 of the 43 routes operated by the other systems during the peak periods, and on about 28 of the 40 routes operated during nonpeak periods. Waukesha Metro Transit provides 30 minute headways on eight of nine routes operated during the peak period, but provides only 60 minute headways on all nine routes operating during the off-peak period.

The weekday service hours for Waukesha Metro Transit are similar to those of the other Wisconsin transit systems, with only two of the six other systems providing evening transit service. However, all the other Wisconsin transit systems provide Saturday transit service and one other system provides Sunday and holiday service. No Saturday, Sunday, or holiday service is provided by Waukesha Metro Transit.

The average base adult fare for the other Wisconsin transit systems in 1982 was \$0.46, with four of the six transit systems having base adult fares of \$0.50. The base adult fare of \$0.50 for Waukesha Metro Transit is thus consistent with that of the majority of the comparable transit systems.

Table D-1

**COMPARISON OF OPERATING CHARACTERISTICS FOR SIMILAR SIZED
WISCONSIN TRANSIT SYSTEMS AND WAUKESHA METRO TRANSIT: 1982**

Operating Characteristic	Wisconsin Transit Systems						
	Fond du Lac Area Transit System	Janesville Transit System	La Crosse Municipal Transit Utility	Manitowoc Transit System	Oshkosh Transit System	Sheboygan Transit System	Waukesha Metro Transit
First Year of Public Operation.....	1973	1952	1975	1978	1978	1972	1981
Transit System Management...	City employees	City employees	City employees	City employees	City employees	City employees	Private management firm
Routing/Scheduling.....	Radial/pulse	Radial/pulse	Radial/pulse	Radial/pulse	Radial/pulse	Radial/pulse	Radial/pulse
Number of Base Routes							
Peak Period.....	7	7	4	5	11	8	9
Off-Peak Period.....	7	7	4	4	10	8	9
Round Trip Miles of Route...	41.6	75.4	69.9	54.3	68.4	123.8	89.4
Service Frequency (minutes) ^a							
Peak Period.....	30	30-60 ^b	30-60 ^c	30-60 ^d	30	15	30-60 ^e
Off-Peak Period.....	30-60 ^f	30-60 ^g	30-60 ^c	30-60 ^d	30	30	60
Service Hours ^h							
Weekdays.....	6:10 a.m.- 5:15 p.m.	6:15 a.m.- 5:45 p.m.	5:10 a.m.- 9:40 p.m.	6:15 a.m.- 5:15 p.m.	6:15 a.m.- 5:45 p.m.	5:15 a.m.- 9:45 p.m.	5:50 a.m.- 5:50 p.m.
Saturday.....	8:10 a.m.- 5:15 p.m.	8:45 a.m.- 5:45 p.m.	5:10 a.m.- 7:40 p.m.	9:15 a.m.- 1:45 p.m.	6:15 a.m.- 5:45 p.m.	6:15 a.m.- 5:45 p.m.	-- --
Sunday and Holidays.....	--	--	7:40 a.m.- 5:40 p.m.	--	--	--	--
Base Adult Fare.....	\$0.50	\$0.50	\$0.50	\$0.50	\$0.35	\$0.40	\$0.50

^aService frequency for all routes unless otherwise noted.

^b30 minute headways on four routes; 60 minute headways on three routes.

^c30 minute headways on three routes; 60 minute headways on one route.

^d30 minute headways on three routes; 60 minute headways on two routes.

^e30 minute headways on eight routes; 60 minute headways on one route.

^f30 minute headways on one route; 60 minute headways on six routes.

^g30 minute headways on three routes; 60 minute headways on four routes.

^hStart time of first trip in the morning and the last trip in the afternoon or evening.

Source: Wisconsin Department of Transportation, Waukesha Metro Transit, and SEWRPC.