COMMUNITY ASSISTANCE
PLANNING REPORT NO. 239

FEASIBILITY STUDY OF COMMUTER RAILWAY PASSENGER TRAIN SERVICE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

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Prepared by the

Southeastern Wisconsin Regional Planning Commission
P. O. Box 1607
Old Courthouse
916 N. East Avenue
Waukesha, Wisconsin 53187-1607

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Chapter I

INTRODUCTION

This report documents the findings and recommendations of a study of the feasibility of instituting commuter rail service in the South Lakeshore Travel Corridor of the Southeastern Wisconsin Region. The service would be provided between the cities of Kenosha, Racine, and Milwaukee over the Union Pacific Railroad (former Chicago & North Western Railway), Kenosha Subdivision, with the potential of extension of such service to Chicago.

Such a feasibility study is an essential step toward implementation of the regional transportation system plan for Southeastern Wisconsin adopted by the Regional Planning Commission on December 7, 1994. The plan recommends significant improvement and expansion of public transit service within the Region, including the development of rapid and express transit service and the improvement and expansion of existing local transit services. The rapid transit component of the regional public transit system is envisioned as connecting the urban centers of the Region to each other and to the Milwaukee Central Business District (CBD). Buses operating over freeways in mixed traffic, buses operating over special busways, and commuter rail trains are identified in the adopted plan as potential modes for providing the recommended rapid transit service.

As shown on Map 1, one of the several corridors identified in the adopted regional transportation system plan for development of rapid transit service extends from the City of Kenosha northward through the City of Racine and the Milwaukee County south-shore suburbs of Oak Creek, South Milwaukee, Cudahy, and St. Francis to the City of Milwaukee CBD. At an intergovernmental meeting held at the request of the Mayor of the City of Racine on June 15, 1995, representatives of the Cities and Counties of Kenosha, Milwaukee, and Racine and of the Wisconsin Department of Transportation jointly requested that the Regional Planning Commission conduct a feasibility study of the extension of commuter rail service in the South Lakeshore Travel Corridor, approved a scope of work for the desired feasibility study, and agreed to fund the study. Commuter rail service currently is provided by Metra, the Commuter Rail Division of the Regional Transportation Authority of Northeastern Illinois, southward from the City of Kenosha through the Chicago north shore suburbs to the City of Chicago CBD.

The feasibility study is intended to examine the potential for providing commuter rail service for trips originating and ending in the Kenosha and Racine areas but oriented to the Milwaukee area, as well as for trips originating and ending in the Kenosha, Racine, and Milwaukee areas but oriented to the Chicago area. The potential commuter rail service to be examined under the study is intended to operate in addition to, not in place of, the existing intercity Amtrak service, operated over the Canadian Pacific Railway (former Chicago, Milwaukee, St. Paul & Pacific Railroad) main line between Chicago and Milwaukee, with a stop within the Region at Sturtevant. Accordingly, in the conduct of the study no replacement or reduction in the Amtrak service was assumed. The feasibility study also recognizes that future improvements to the Amtrak service are being considered and that the Amtrak service and the new commuter rail service to be considered under the study largely, although not exclusively, serve differing passenger trips and markets.

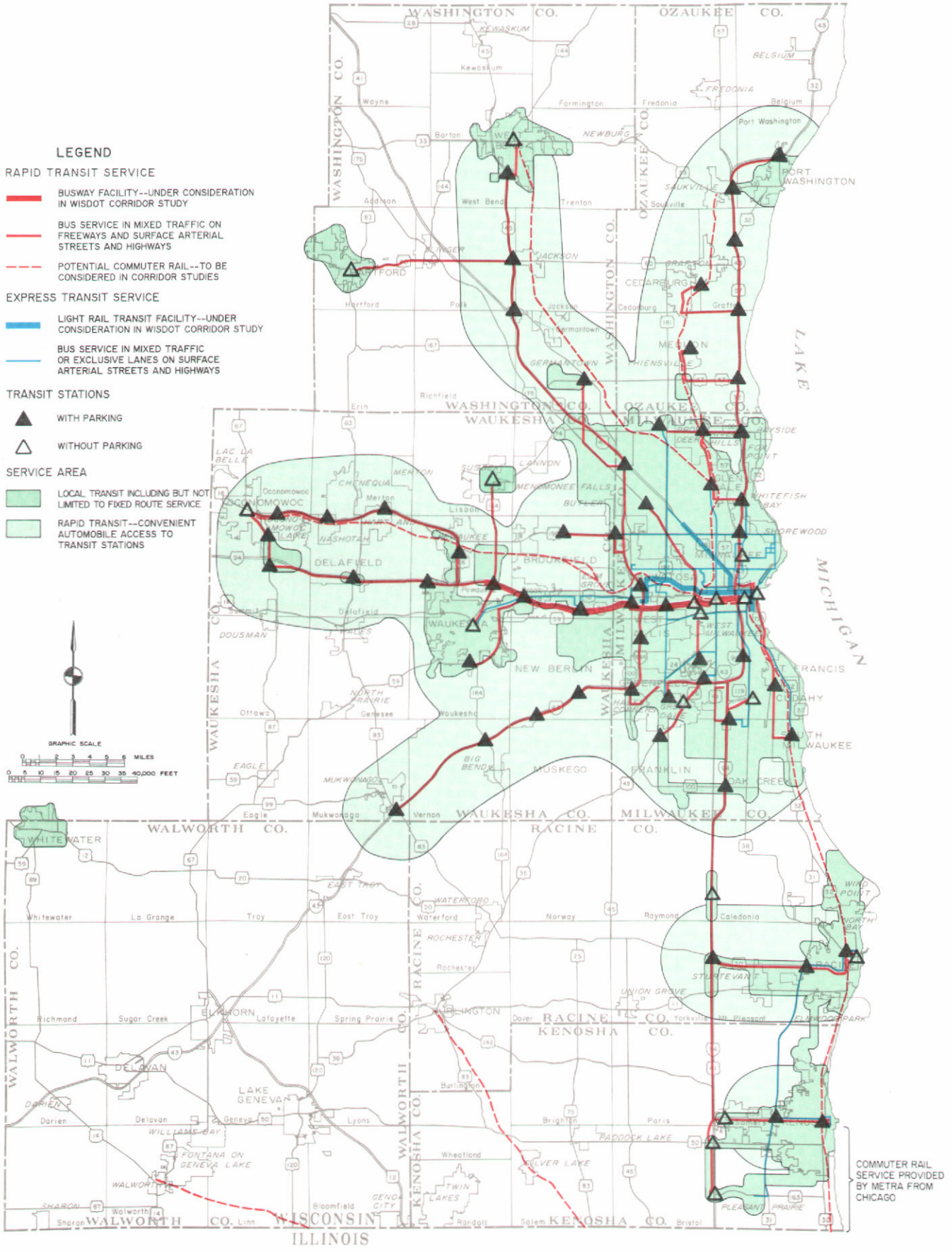
The issue of how best to provide and improve intercity Amtrak rail passenger service between Milwaukee and Chicago was analyzed in a recently completed high speed rail study conducted jointly by the Wisconsin and Illinois Departments of Transportation. The study concluded that high speed intercity rail service, if provided, should be implemented on the Canadian Pacific Railway mainline right-of-way. The study also concluded that if freight traffic on the Canadian Pacific Railway main line should stay on that route, but with increases in the frequency and speed of intercity rail service, separate tracks may need to be provided for freight service and for high speed passenger service. Moving the Canadian Pacific Railway freight traffic to the nearby Union Pacific tracks was analyzed but rejected because of attendant substantial capital costs.

STUDY PURPOSE

The requested feasibility study is intended to be conducted prior to the initiation of a major investment study and preparation of an attendant environmental impact statement. As such, the study is intended to provide the information needed by the public officials concerned to make a decision as to whether or not to proceed with such a

Map 1

PUBLIC TRANSIT ELEMENT OF THE ADOPTED REGIONAL TRANSPORTATION SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN: 2020



Source: SEWRPC.

costly major investment study. Under Federal regulations, a major investment study is a prerequisite to any consideration of Federal funding in support of the implementation of a major transit service improvement project such as the extension of commuter rail service. A major investment study must provide a detailed evaluation of bus and fixed guideway transit alternatives in a travel corridor before final decisions on implementation and specific mode and alignment are made. The necessary environmental impact assessment may be conducted as part of, or subsequent to, the major investment study.

Accordingly, this feasibility study is to provide an estimate of the total capital and operating costs of the commuter rail service in the Corridor, together with an estimate of the potential commuter rail ridership. In addition to providing a sound basis for a decision as to whether or not to proceed with a major investment study, the feasibility study may also be expected to assist in the ultimate conduct of a major investment study should it be decided to proceed with such a study, as well as in the preparation of an environmental impact statement, by identifying key issues and options which must be considered in a more detailed design and evaluation of transit service alternatives in the Corridor.

More specifically, the study of the feasibility of commuter rail passenger service in the South Lakeshore Travel Corridor is intended to serve the following purposes:

1. To identify the physical and operational characteristics of commuter rail service alternatives in the Corridor;

2. To identify the capital costs of the commuter rail service alternatives;

3. To identify the anticipated operating costs of, and necessary operating-cost subsidies for, the commuter rail service alternatives;

4. To identify impacts of the commuter rail service alternatives on freight operations over the railroad concerned;

5. To identify the potential ridership of the commuter rail service alternatives, the attendant farebox revenues, and the impact on highway traffic in the Corridor;

6. To provide the basis for a determination by the public officials concerned as to whether or not to proceed with a major investment study in the Corridor.

DEFINITION OF COMMUTER RAIL SERVICE

Commuter rail service is a type of urban public transit that has been the subject of increasing interest in the United States in recent years, chiefly because it offers the potential for providing attractive, high-quality rapid transit service at reasonable costs, as compared to heavy- and light rail rapid transit service, using existing railroad trackage. This type of urban passenger transportation is normally referred to simply as "commuter rail." In other countries this mode is often referred to as "regional rail" to emphasize the length of the lines involved and to emphasize the high level of service provided throughout the entire day and not only during peak-travel period and in the peak direction, as typically provided by existing commuter rail systems in the United States.

In spite of the current widespread interest in commuter rail, especially in areas of the United States where commuter rail service does not now exist, there is frequently confusion as to what commuter rail is, what passenger markets it is intended to serve, and what important characteristics distinguish commuter rail from such other railroad modes as light rail, heavy rail, and high speed rail. Each of these railroad transit modes has different technological, design, operational, performance, capacity, cost, and economic characteristics. It is, therefore, important to define the term "commuter rail" and to describe how such service differs from other types of railroad passenger transportation services. A comparison of some of the basic characteristics attendant to each of these types of railroad passenger services is provided in Table 1.

Commuter Rail

Commuter rail may be defined as a type of passenger transit service that utilizes diesel-electric or electric locomotives, operating over the same rights-of-way and trackage used by intercity freight and passenger traffic. Common practice in the United States and Canada is to use diesel-electric locomotives, as opposed to electrified multiple-unit equipment. Some commuter rail service is provided by self-propelled diesel-powered coaches. Fare collection is typically on board, by cash or ticket; boarding is normally from low platforms.

Table 1

COMPARISON OF SELECTED CHARACTERISTICS OF DIFFERENT TYPES OF RAIL PASSENGER SERVICES FOLLOWING TYPICAL NORTH AMERICAN PRACTICE

Characteristics	Light Rail	Heavy Rail	Commuter Rail	Conventional Intercity Rail	High Speed Rail
Vehicles (usual type)	Modern articulated streetcars	Modern subway or elevated cars	Locomotive-hauled or self-propelled coaches	Locomotive-hauled coaches	Locomotive-hauled coaches
Train Length	1 to 3 cars	4 to 10 cars	2 to 8 coaches	2 to 14 coaches	8 to 12 coaches
Propulsion System	Electric using *overhead wire*	Electric using *third rail*	Diesel-electric[a]	Diesel-electric	Electricity from overhead wire
Right-of-Way Requirements	New surface alignment	New grade-separated alignment	Existing mainline railroad trackage	Existing mainline railroad trackage	Upgraded existing or new railroad mainline trackage
Route Length (typical, in miles)	5 to 15	5 to 15	20 to 50	50 to 2,000	100 to 500
Station Spacing (average, in miles)	¼ to 1	½ to 2	2 to 5	5 to 50	10 to 50
Boarding Platforms at Stations	*Low or high*	*High*	*Low*	*Low*	*High*
Fare Collection (typical)	Self-service	At stations	On-board	On-board	At stations or on-board
Speed					
Maximum Operating (mph)	50	70	79	79 to 90	125 to 250
Average along Route (mph)	10 to 20[b] 20 to 30[c]	25 to 40	30 to 50	40 to 70	100 to 150
Primary Passenger Market (typical)	Trips within densely developed urbanized areas	Trips within densely developed urbanized areas	Trips within metropolitan areas between suburbs and major urban centers, including central business district	Long distance trips between cities	Long distance trips between major metropolitan areas
Frequency of Service					
Peak Period	5 to 10 minutes	5 to 10 minutes	30 to 60 minutes	1 to 2 hours	30 to 60 minutes
Nonpeak Period	10 to 20 minutes	10 to 20 minutes	1 to 3 hours	Daily	1 to 2 hours

[a] *Self-propelled coaches may be either diesel-electric, diesel-hydraulic, or diesel-mechanical.*

[b] *Extensive use of street rights-of-way.*

[c] *Extensive use of exclusive grade-separated rights-of-way.*

Source: SEWRPC.

Commuter rail normally accommodates only the longest trips made within metropolitan regions during weekday peak-travel periods at high overall average operating speeds, typically between 30 and 50 miles per hour, with relatively few stops. Typical commuter rail routes range from 20 to 50 miles in length. Because the railroad trackage is shared with intercity freight and passenger trains, commuter rail does not normally require the acquisition of new right-of-way nor the construction of new mainline trackage. However, for safety and operational reasons, locomotives and cars must be manufactured to mainline railroad standards with respect to size and strength. These characteristics, together with the relatively long station spacings of two to five miles, characterize commuter rail as having the ability to provide a very high level of riding comfort for passengers.

Commuter rail is the oldest of all railroad passenger-transit modes, but currently exists only in corridors with substantial concentrations of passenger-trip origins in the outlying suburban areas of the corridors with destinations in a CBD. The operating commuter rail system closest to Southeastern Wisconsin is the one centered on the City of Chicago CBD, operated by Metra. As already noted, Metra is the Commuter Rail Division of the Regional Transportation Authority of Northeastern Illinois. Metra operates one of the largest commuter rail systems in North America and is generally regarded as among the best-managed and most cost-effective systems. Metra and some other existing commuter rail systems in the United States and Canada have made efforts to attract off-peak as well as peak-travel period ridership, with its services marketed to attract passengers from the private automobile to the railroad. Extensive park-ride facilities are usually associated with commuter rail services. Some of the existing systems, again including Metra, have begun to give consideration to finding ways of serving trips not oriented to the CBD of metropolitan areas. Typical commuter rail frequency of service on individual routes may be every 30 minutes in the peak-travel direction during weekday peak-

travel periods, with midday, evening, and weekend service varying from one to three hours where such nonpeak service is operated at all.

Commuter rail systems are found only in relatively few of the largest metropolitan areas within the United States and Canada. Large-scale commuter rail operations, which include frequent peak-period service and a base service during nonpeak periods and on weekends, are found in the Boston, Chicago, Montreal, New York, Philadelphia, San Francisco, and Toronto areas. Other commuter rail operations, with service provided principally during weekday peak periods, operate in the Baltimore and Washington, D. C., areas. New commuter rail operations including peak-period service and some limited nonpeak weekday service have begun operations within the last ten years in the Dallas, Los Angeles, Miami, New Haven, and San Diego areas. Specialized commuter rail services that function more as local area shuttles have begun operations in the southern New Jersey and the Syracuse (New York) areas. It should be noted that a small number of long-established commuter rail operations have ceased operation in recent years, including those in the Detroit and Pittsburgh areas. The potential for commuter rail services continues to be considered in a number of other metropolitan areas. New services being considered for initiation within the near future include those serving the Burlington (Vermont), Oakland, and Portland (Maine) areas. Additional services are undergoing either planning or preliminary engineering in the Atlanta, Cleveland, Hartford (Connecticut), New Orleans, St. Louis, Seattle, and Tampa areas.

Light Rail

The commuter rail mode should not be confused with the light rail mode. Light rail may be defined as a type of urban passenger transportation service that utilizes electrically propelled cars, or trains of cars, operating primarily on the surface over either exclusive rights-of-way or over public streets. Light rail is essentially an improved and modernized version of the old streetcar and electric interurban railroad modes that were common in the United States from the 1890s through World War II. Light rail can best be envisioned as trains of one to three articulated rail vehicles operating largely on the surface and receiving electric power from overhead wires. Fare collection is typically self-service, with tickets purchased from vending machines. Boarding may be from either high- or low-level platforms.

The trackage used for light rail operations is not normally shared with other passenger and freight trains. Light rail systems are intended to accommodate all types and lengths of passenger trips within the most densely developed portions of metropolitan areas during weekday peak-travel periods, during midday and evening off-peak-travel periods, and on weekends. Typically, light rail routes range from five to 15 miles in length. Normal station spacing for such systems ranges from one-quarter mile to one mile, providing good access while maintaining reasonable overall operating speeds. Typical average overall speeds for express- transit light rail routes operating primarily over public streets may range from 10 to 20 miles per hour. Such speeds for rapid light rail routes operating extensively over exclusive, grade-separated rights-of-way may range from 20 to 30 miles per hour. Frequency of service on light rail systems typically ranges from five- to 10-minute headways during peak-travel periods and from 10- to 20-minute headways during other times of the day. Extensive park-ride facilities may be provided at outlying stations, but substantial ridership accesses light rail facilities by walking to stations or using feeder bus service. Unlike commuter rail, which utilizes existing trackage, the development of a new light rail system typically requires the acquisition or dedication of new rights-of-way and the construction of new trackage. Thus, the capital cost of implementing a light rail route will normally be significantly greater than the capital cost of a commuter rail route.

Within the United States and Canada, examples of light rail systems include the San Diego Trolley; MetroLink, in St. Louis; C-Train, in Calgary; Metropolitan Area Express, in Portland (Oregon), and the Sacramento Regional Transit District.

Heavy Rail

The commuter rail mode also should not be confused with the heavy rail mode. Heavy rail may be defined as a type of urban passenger transportation service that utilizes electrically propelled trains of cars operating over fully grade-separated rights-of-way. Heavy rail may best be envisioned as high-capacity, semi-automated trains of four to ten cars receiving electric power through a third rail. Because heavy rail systems require an exclusive, completely grade-separated alignment, extensive subways and elevated structures are needed, which are costly and disruptive to construct. Fare collection is typically at stations; boarding is from high-level platforms.

The trackage used for heavy rail operations is not shared with freight and other passenger trains. Like light rail, heavy rail systems are intended to accommodate all types and lengths of passenger trips within the most densely developed portions of their metropolitan areas during weekday peak-travel periods, during midday and evening

off-peak-travel periods, and on weekends. Typically, heavy rail routes range from five to 15 miles in length. Normal station spacing for such systems ranges from one-half mile to two miles. Typical average overall speeds may range from 25 to 30 miles per hour. Frequency of service on heavy rail systems typically ranges from five- to 10-minute headways during peak-travel periods and from 10- to 20-minute headways during other times of the day. Extensive park-ride facilities may be provided at outlying stations, but substantial ridership accesses heavy rail facilities by walking to stations or using feeder bus service. Unlike commuter rail, which utilizes trackage already in place, the development of a heavy rail system typically requires the acquisition or dedication of new rights-of-way and the construction of new trackage. Unlike light rail, which is intended to operate primarily on the surface, heavy rail requires fully grade-separated elevated or subway locations. Thus, the capital cost of implementing a heavy rail route will normally be much greater than the capital cost of either a commuter rail or a light rail route.

Within the United States and Canada, examples of heavy rail systems include the Chicago Transit Authority, the "L"; the New York City subway system; Metro, in Washington, D. C.; MARTA, in Atlanta; the Red Line, in Los Angeles; and BART, in San Francisco and Oakland.

High Speed Rail

The commuter rail mode also should not be confused with the high speed rail mode. "High speed rail" is a technical term which defines a type of long distance, intercity passenger service. While this type of service has also been a subject of increasing interest within the United States, it is intended to serve the same passenger market as Amtrak, that is, passengers traveling between metropolitan areas, not passengers traveling within a metropolitan area, as do the commuter rail, light rail, and heavy rail modes.

High speed rail would require the use of either an improved existing rail alignment or a new alignment with very gentle horizontal and vertical curvatures and few, if any, grade crossings. Whereas commuter rail, light rail and heavy rail trains may be expected to have maximum operating speeds of between 50 and 79 miles per hour, high speed intercity trains maybe envisioned as operating at maximum speeds of anywhere from 125 to 250 miles per hour. Conventional Amtrak trains typically operate at top speeds of 79 to 90 miles per hour. For example, the present maximum operating speed for the Milwaukee to Chicago Amtrak trains is 79 miles per hour. The only true high speed intercity rail service currently operating in North America is in the corridor between New York and Washington, D. C., although high speed rail systems are common in other parts of the world, especially in France, Germany, Great Britain, and Japan.

SCOPE OF WORK

The feasibility study comprised four major elements: 1) conduct of inventories and analyses, 2) definition of alternatives, 3) evaluation of alternatives, and 4) identification of the most feasible alternative.

The conduct of the study required the collection or collation of data on existing and probable future resident population, household, and employment levels in the Travel Corridor; on land use; on travel habits and patterns; and on the characteristics of existing railroad, public transit, and highway facilities in the Corridor and on their utilization. The required data were collected primarily from existing Commission data files. An inventory of the existing condition and use of the potential commuter rail line was also conducted. Analyses were facilitated by the availability of the Commission travel-survey data and travel-simulation models, which were used to identify existing and potential travel within the Corridor by mode.

The study identified a number of alternative service configurations that were to be considered and described the physical and operational characteristics of each of those alternatives. The definition of alternatives included the identification of possible routes and alignments; the identification of potential station locations and attendant automobile parking facilities; the development of operational plans; and identification of needed signal systems, additional tracks, passing sidings, and equipment storage and servicing facilities. Consideration was given to the improvements necessary to accommodate commuter rail traffic along with current and potential freight traffic.

The feasibility of instituting commuter rail service in the Travel Corridor was evaluated on the basis of necessary capital improvements and attendant costs, anticipated ridership, potential operating costs and revenues, and necessary public operating-cost subsidies. On the basis of the evaluations of the alternatives considered, the study identified whether or not each of the alternatives was feasible.

As already noted, this report documents the findings and recommendations of the feasibility study, including the recommendation of the study Advisory Committee with respect to whether or not a full-scale major investment study should be undertaken. With respect to a such major investment study, the report identifies the lead agency

that would conduct such a study, the costs and means of funding, and the scope and content of such a study.

Public involvement in the feasibility study was facilitated through representation of interested citizens on the 20-member Study Advisory Committee as well as through the conduct of public informational meetings and hearings. Initial meetings were conducted early in the study, following a preliminary definition of alternatives, to inform the public about the study; to describe the alternatives to be considered; and to receive public comment on those alternatives. Additional public informational meetings and hearings were conducted, following the evaluation of the alternatives, to describe to the public the findings of the evaluations and the preliminary recommendations of the Study Advisory Committee.

STUDY AREA

The study area consisted of a "primary" study area, and a "secondary" study area, as shown on Map 2. The primary study area consisted of the South Lakeshore Travel Corridor within the Southeastern Wisconsin Region, extending along the Lake Michigan shoreline between Kenosha, Racine, and Milwaukee. The boundaries of the primary study area were delineated so as to be consistent with study areas already developed and used in the planning of local transit system development in the Kenosha, the Racine, and the greater Milwaukee areas and in the conduct of comprehensive travel surveys by the Regional Planning Commission. The primary study area lies entirely within the Southeastern Wisconsin Counties of Kenosha, Racine, and Milwaukee.

The secondary study area consisted of an extension of the Travel Corridor into Northeastern Illinois and to the City of Chicago CBD. The boundaries of the secondary study area were delineated so as to be consistent with areas used in the conduct of comprehensive travel surveys by the Regional Planning Commission and by the Chicago Area Transportation Study. The secondary study area lies entirely within the Northeastern Illinois Counties of Lake and Cook.

STUDY ORGANIZATION

The lead agency for the conduct of the feasibility study was the Southeastern Wisconsin Regional Planning Commission. The study was conducted by the Commission staff with the assistance of a consulting transportation engineering firm and the staffs of the counties and communities within the study area, together with the staffs of the Wisconsin Department of Transportation, the Chicago Area Transportation Study, the various railroads concerned, and Metra.

To provide guidance to the staff in the conduct of the study and to more directly and actively involve concerned and affected public officials in the development of the feasibility study, an Advisory Committee was created. The membership of this Committee is listed on the inside front cover of this report. The Committee reviewed staff-prepared materials and approved this report.

SCHEME OF PRESENTATION

As already noted, the findings and recommendations of the feasibility study are set forth in this report, which consists of six chapters, including this introductory chapter.

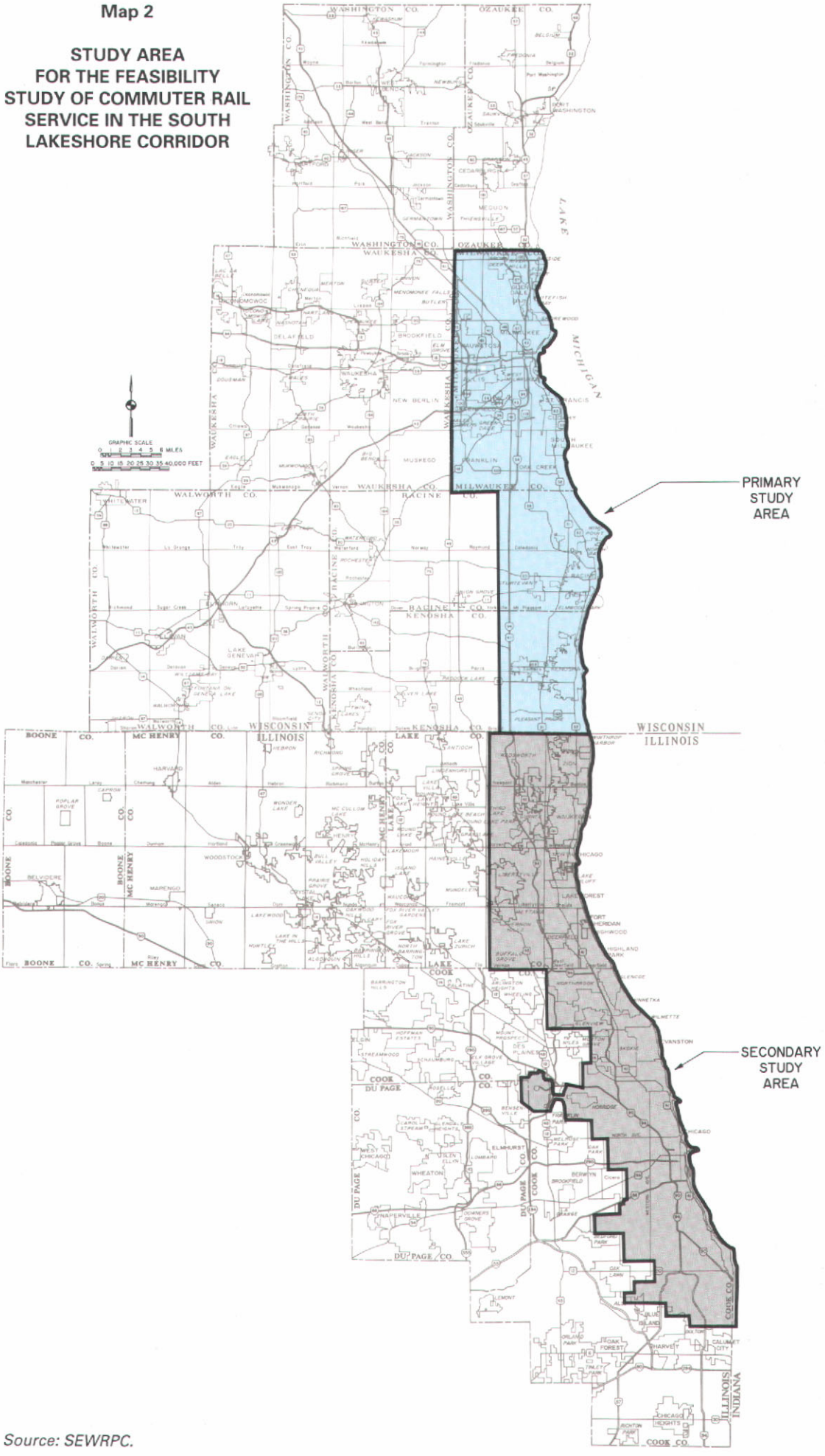
Chapter II describes the land use, demographic, economic, and travel information considered in the study. The information presented includes a description of the resident population levels and distributions in the primary study area, along with an identification of the principal trip generators in that area. The travel habits and patterns within the primary study area and between Southeastern Wisconsin and Northeastern Illinois were identified from data collected in the comprehensive travel survey conducted by the Regional Planning Commission in 1991, supplemented by data collected in a similar study by the Chicago Area Transportation Study, and from simulation modeling.

Chapter III presents a description of the existing transportation facilities and services within the study area. The existing and planned transit systems serving Milwaukee County, the City of Racine, and the City of Kenosha are identified and described, as well as the existing commuter rail service currently operated between Kenosha and Chicago by Metra. Suburban bus services that connect to the existing Metra service are also identified. The existing Amtrak intercity passenger service in the Milwaukee-Chicago Travel Corridor is also described, as are the arterial highway facilities and intercity bus services within the Corridor. This chapter also presents a description of the existing railroad lines and attendant facilities that would be necessary for the operation of commuter rail service in the Corridor. These lines and facilities are described in terms of their existing condition and current use.

Chapter IV identifies the commuter rail equipment and facility requirements as needed for the definition and evaluation of each of the alternative commuter rail services considered. This information is described in terms of

Map 2

STUDY AREA FOR THE FEASIBILITY STUDY OF COMMUTER RAIL SERVICE IN THE SOUTH LAKESHORE CORRIDOR



Source: SEWRPC.

the commuter rail alternative alignments, station locations, track and signal improvements, locomotive and coach requirements, operational plans, and service providers. Chapter V presents a comparison and evaluation of the alternatives considered. The principal evaluation measures include anticipated ridership, capital costs, operating costs and deficits, farebox revenues and deficits, reduction in highway traffic and attendant impacts, travel time improvements within the Corridor, and impact on freight operations. This chapter also sets forth a description of the most promising alternative on the basis of the comparative evaluation of the alternatives considered. It also sets forth the recommendation of the Advisory Committee as to whether or not to proceed with a major investment study.

Chapter VI presents a summary of the findings and recommendations of the feasibility study.

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Chapter II

EXISTING LAND USE AND TRAVEL PATTERNS

INTRODUCTION

This chapter describes the factors which may be expected to influence the potential demand for commuter rail service within the South Lakeshore Travel Corridor. These factors include the extent of existing urban development in the Corridor, including resident population, household, and employment levels, and existing travel patterns. Also presented are planned year 2020 population, household, and employment levels within the Corridor. For the presentation of these data, the primary and secondary study areas within the Corridor were divided into the subareas shown on Map 3.

POPULATION, HOUSEHOLDS AND EMPLOYMENT

The 1990 resident population level in the primary and secondary study area is set forth by subarea in Table 2, along with the planned future year 2020 population level. The resident populations within the Kenosha and Racine County portions of the primary study area are anticipated to increase by about 25,900 and 6,200 residents, or by about 24 and 5 percent, respectively, between 1990 and 2020. However, the resident population level within the Milwaukee County portion of the primary study area is anticipated to increase by about 61,400 residents between 1990 and 2020. Thus, the resident population within the primary study area is anticipated to increase from about 1,171,900 in 1990 to about 1,265,000 in 2020, or by about 8 percent.

The 1990 and 2020 household levels in the study area are set forth by subarea in Table 3. The number of households within each of the three county portions of the primary study area is anticipated to increase between 1990 and 2020 so that the total number of households within the primary study area may be expected to increase from about 462,800 to about 524,000 households, or by about 13 percent.

The 1990 and 2020 employment levels in the study area are set forth in Table 4. Employment within each of the three county portions of the primary study area is anticipated to increase so that the total employment within the primary study area may be expected to increase from about 687,400 jobs in 1990 to about 761,800 jobs in 2020, an increase of about 11 percent.

EXISTING LAND USE

Historic Urban Growth

The historic pattern of urban development in the primary study area is shown on Map 4. Prior to 1880, development within the primary study area was largely confined to settlements in the communities of Kenosha, Milwaukee, and Racine. Between 1880 and 1950 urban development in the primary study area occurred at medium to high urban densities largely around those urban centers and in St. Francis, Cudahy, and South Milwaukee, as well. After 1950, proliferation of scattered low-density urban development away from the historic urban centers began to occur; it has continued to date.

Planned Urban Development

The adopted year 2020 regional land use plan for the seven-county Southeastern Wisconsin Region[1] recommends a relatively compact, centralized regional settlement pattern, with urban development occurring at medium urban densities in concentric rings along the full periphery of, and outward from, existing urban centers. The regional land use plan defines the boundaries within which sanitary sewer service should be provided and thus within which urban development should be encouraged to occur. The extent of planned urban development upon buildout of the planned sanitary sewer service areas within the primary study area is graphically compared to the extent of existing 1990 urban development on Map 5. The sanitary sewer service areas are not expected to be fully developed by the year 2020 since they incorporate some reserve lands to provide flexibility to local communities in determining the spatial distribution of new urban development and to facilitate the operation of the urban land market.

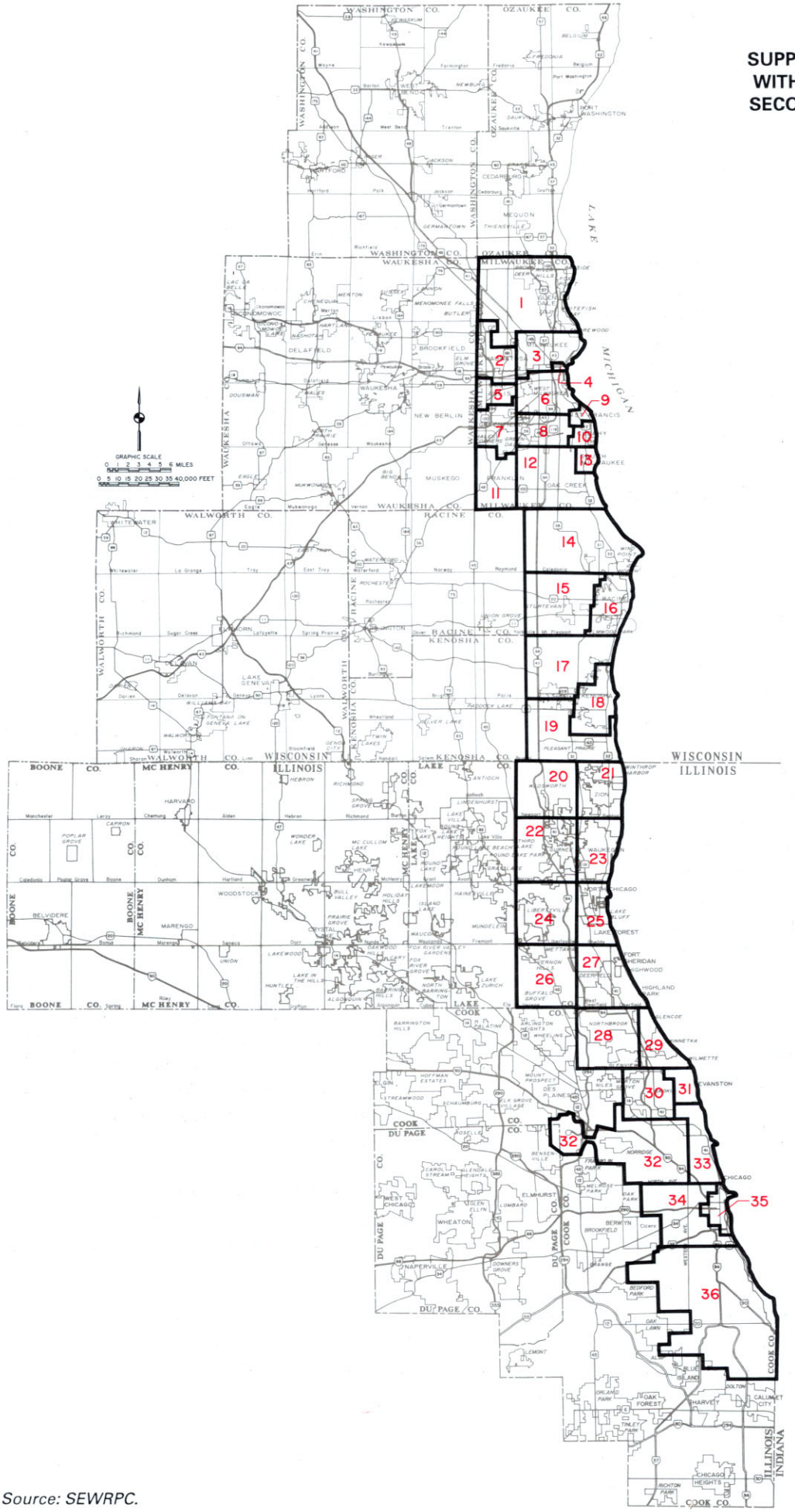
Major Potential Trip Generators

For the purposes of commuter rail planning, the following types of land uses were identified as major

[1] *See SEWRPC Planning Report No. 45,* A Regional Land Use Plan for Southeastern Wisconsin: 2020, *December 1997.*

Map 3

SUPPLEMENTAL SUBAREAS WITHIN THE PRIMARY AND SECONDARY STUDY AREAS



LEGEND

ANALYSIS SUBAREAS

PRIMARY STUDY AREA

1 MILWAUKEE-NORTH
2 WAUWATOSA
3 MILWAUKEE-CENTRAL
4 MILWAUKEE-CBD
5 WEST ALLIS
6 MILWAUKEE-SOUTH
7 GREENFIELD
8 MILWAUKEE-AIRPORT
9 ST. FRANCIS
10 CUDAHY
11 FRANKLIN
12 OAK CREEK
13 SOUTH MILWAUKEE
14 NORTHERN RACINE COUNTY
15 SOUTHERN RACINE COUNTY
16 CITY OF RACINE
17 NORTHERN KENOSHA COUNTY
18 CITY OF KENOSHA
19 SOUTHERN KENOSHA COUNTY

SECONDARY STUDY AREA

20 WADSWORTH
21 ZION
22 GURNEE
23 WAUKEGAN
24 LIBERTYVILLE
25 LAKE FOREST
26 BUFFALO GROVE
27 HIGHLAND PARK
28 NORTHBROOK
29 WINNETKA
30 SKOKIE
31 EVANSTON
32 CHICAGO-NORTHWEST
33 CHICAGO-NORTH
34 CHICAGO-WEST
35 CHICAGO-CBD
36 CHICAGO-SOUTH/SOUTHWEST

Source: SEWRPC.

Table 2

STUDY AREA RESIDENT POPULATION: EXISTING 1990 AND PLANNED 2020

Study Area		Population		Change in Population 1990-2020	
Map Key Number[a]	Name	1990	Forecast Year 2020[b]	Number	Percent
	Primary Study Area				
	Milwaukee County				
1	Milwaukee-North	237,100	255,900	18,800	7.9
2	Wauwatosa	60,400	60,400	0	0.0
3	Milwaukee-Central	231,100	234,200	3,100	1.3
4	Milwaukee-CBD	4,400	5,500	1,100	25.0
5	West Allis	58,200	57,000	(1,200)	-2.1
6	Milwaukee-South	144,900	143,300	(1,600)	-1.1
7	Greenfield	56,900	64,100	7,200	12.7
8	Milwaukee-Airport	49,300	50,400	1,100	2.2
9	St. Francis	10,100	10,700	600	5.9
10	Cudahy	17,900	19,400	1,500	8.4
11	Franklin	14,200	19,700	5,500	38.7
12	Oak Creek	28,200	52,700	24,500	86.9
13	South Milwaukee	20,700	21,500	800	3.9
	Subtotal	933,400	994,800	61,400	6.6
	Racine County				
14	Northern Racine County	34,000	39,500	5,500	16.2
15	Southern Racine County	19,800	21,800	2,000	10.1
16	City of Racine	74,700	73,400	(1,300)	-1.7
	Subtotal	128,500	134,700	6,200	4.8
	Kenosha County				
17	Northern Kenosha County	18,200	26,500	8,300	45.6
18	City of Kenosha	79,200	82,700	3,500	4.4
19	Southern Kenosha County	12,600	26,700	14,100	111.9
	Subtotal	110,000	135,900	25,900	23.5
--	Primary Study Area Total	1,171,900	1,265,400	93,500	8.0
	Secondary Study Area				
	Lake County				
20	Wadsworth	3,600	7,300	3,700	102.8
21	Zion	35,600	48,900	13,300	37.4
22	Gurnee	34,900	66,700	31,800	91.1
23	Waukegan	78,200	86,400	8,200	10.5
24	Libertyville	42,500	59,800	17,300	40.7
25	Lake Forest	43,400	61,500	18,100	41.7
26	Buffalo Grove	51,100	68,800	17,700	34.6
27	Highland Park	64,400	75,300	10,900	16.9
	Subtotal	353,700	474,700	121,000	34.2
	Cook County				
28	Northbrook	79,900	92,800	12,900	16.1
29	Winnetka	59,200	61,700	2,500	4.2
30	Skokie	94,700	101,000	6,300	6.7
31	Evanston	71,900	77,000	5,100	7.1
32	Chicago-Northwest	626,000	639,700	13,700	2.2
33	Chicago-North	372,800	400,700	27,900	7.5
34	Chicago-West	647,400	759,200	111,800	17.3
35	Chicago-CBD	74,300	102,400	28,100	37.8
36	Chicago-South/ Southwest	1,062,200	1,138,300	76,100	7.2
	Subtotal	3,088,400	3,372,800	284,400	9.2
--	Secondary Study Area Total	3,442,100	3,847,500	405,400	11.8
--	Corridor Total	4,614,000	5,112,900	498,900	10.8

[a] *The map key number refers to Map 3, "Analysis Subareas Within the Primary and Secondary Study Areas."*

[b] *Within the primary study area, the forecast year 2020 resident population data set forth in this table are based upon forecast design year 2020 data prepared by the Southeastern Wisconsin Regional Planning Commission. Within the secondary study area, the forecast year 2020 resident population data set forth in this table are based upon existing 1990 and forecast design year 2020 data for Cook and Lake Counties prepared by the Northeastern Illinois Planning Commission.*

Source: SEWRPC.

Table 3

STUDY AREA HOUSEHOLDS: EXISTING 1990 AND PLANNED 2020

Study Area		Households		Change in Households 1990-2020	
Map Key Number[a]	Name	1990	Forecast Year 2020[b]	Number	Percent
	Primary Study Area				
	Milwaukee County				
1	Milwaukee-North	94,600	105,700	11,100	11.7
2	Wauwatosa	25,900	26,900	1,000	3.9
3	Milwaukee-Central	88,600	94,600	6,000	6.8
4	Milwaukee-CBD	3,300	3,900	600	18.2
5	West Allis	25,100	25,600	500	2.0
6	Milwaukee-South	57,300	59,300	2,000	3.5
7	Greenfield	23,100	26,900	3,800	16.5
8	Milwaukee-Airport	20,000	21,300	1,300	6.5
9	St. Francis	4,300	4,700	400	9.3
10	Cudahy	7,200	8,000	800	11.1
11	Franklin	5,200	7,800	2,600	50.0
12	Oak Creek	10,300	20,100	9,800	95.1
13	South Milwaukee	8,200	8,700	500	6.1
	Subtotal	373,100	413,500	40,400	10.8
	Racine County				
14	Northern Racine County	12,200	15,700	3,500	28.7
15	Southern Racine County	7,100	8,700	1,600	22.5
16	City of Racine	28,500	30,900	2,400	8.4
	Subtotal	47,800	55,300	7,500	15.7
	Kenosha County				
17	Northern Kenosha County	7,500	11,700	4,200	56.0
18	City of Kenosha	30,000	33,300	3,300	11.0
19	Southern Kenosha County	4,400	10,200	5,800	131.8
	Subtotal	41,900	55,200	13,300	22.5
--	Primary Study Area Total	462,800	524,000	61,200	13.2
	Secondary Study Area				
	Lake County				
20	Wadsworth	1,200	2,600	1,400	116.7
21	Zion	11,900	17,400	5,500	46.2
22	Gurnee	13,000	27,000	14,000	107.7
23	Waukegan	27,600	32,200	4,600	16.7
24	Libertyville	15,000	22,700	7,700	51.3
25	Lake Forest	10,000	13,100	3,100	31.0
26	Buffalo Grove	17,600	25,500	7,900	44.9
27	Highland Park	22,300	28,200	5,900	26.5
	Subtotal	118,600	168,700	50,100	42.2
	Cook County				
28	Northbrook	29,200	35,900	6,700	22.9
29	Winnetka	21,600	23,300	1,700	7.9
30	Skokie	35,600	39,600	4,000	11.2
31	Evanston	27,100	29,000	1,900	7.0
32	Chicago-Northwest	232,900	248,900	16,000	6.9
33	Chicago-North	185,000	204,900	19,900	10.8
34	Chicago-West	201,900	249,200	47,300	23.4
35	Chicago-CBD	39,600	55,400	15,800	39.9
36	Chicago-South/ Southwest	365,800	409,300	43,500	11.9
	Subtotal	1,138,700	1,295,500	156,800	13.8
--	Secondary Study Area Total	1,257,300	1,464,200	206,900	16.5
--	Corridor Total	1,720,100	1,988,200	268,100	15.6

[a] *The map key number refers to Map 3, "Analysis Subareas within the Primary and Secondary Study Areas."*

[b] *Within the primary study area, the forecast year 2020 resident household data set forth in this table are based upon forecast design year 2020 data prepared by the Southeastern Wisconsin Regional Planning Commission. Within the secondary study area, the forecast year 2020 resident household data set forth in this table are based upon existing 1990 and forecast design year 2020 data for Cook and Lake Counties prepared by the Northeastern Illinois Planning Commission.*

Source: SEWRPC.

Table 4

STUDY AREA EMPLOYMENT: EXISTING 1990 AND PLANNED 2020

Study Area		Employment		Change in Employment 1990-2020	
Map Key Number[a]	Name	1990	Forecast Year 2020[b]	Number	Percent
	Primary Study Area				
	Milwaukee County				
1	Milwaukee-North	126,800	137,800	11,000	8.7
2	Wauwatosa	64,300	65,000	700	1.1
3	Milwaukee-Central	102,600	110,100	7,500	7.3
4	Milwaukee-CBD	87,100	96,000	8,900	10.2
5	West Allis	34,600	34,000	(600)	-1.7
6	Milwaukee-South	74,900	76,700	1,800	2.4
7	Greenfield	19,800	22,200	2,400	12.1
8	Milwaukee-Airport	21,000	22,000	1,000	4.8
9	St. Francis	3,800	4,500	700	18.4
10	Cudahy	10,300	10,600	300	2.9
11	Franklin	3,300	4,200	900	27.3
12	Oak Creek	23,200	31,600	8,400	36.2
13	South Milwaukee	6,500	6,600	100	1.5
	Subtotal	578,200	621,300	43,100	7.5
	Racine County				
14	Northern Racine County	10,100	12,900	2,800	27.7
15	Southern Racine County	11,900	18,300	6,400	53.8
16	City of Racine	41,900	47,000	5,100	12.2
	Subtotal	63,900	78,200	14,300	22.4
	Kenosha County				
17	Northern Kenosha County	9,200	14,000	4,800	52.2
18	City of Kenosha	29,700	32,100	2,400	8.1
19	Southern Kenosha County	6,400	16,200	9,800	153.1
	Subtotal	45,300	62,300	17,000	37.5
--	Primary Study Area Total	687,400	761,800	74,400	10.8
	Secondary Study Area				
	Lake County				
20	Wadsworth	1,000	2,800	1,800	180.0
21	Zion	6,500	10,700	4,200	64.6
22	Gurnee	17,500	43,500	26,000	148.6
23	Waukegan	32,000	37,800	5,800	18.1
24	Libertyville	38,000	55,800	17,800	46.8
25	Lake Forest	20,400	24,200	3,800	18.6
26	Buffalo Grove	28,100	62,500	34,400	122.4
27	Highland Park	34,600	49,000	14,400	41.6
	Subtotal	178,100	286,300	108,200	60.8
	Cook County				
28	Northbrook	77,500	92,900	15,400	19.9
29	Winnetka	24,600	29,300	4,700	19.1
30	Skokie	95,300	103,100	7,800	8.2
31	Evanston	40,400	44,600	4,200	10.4
32	Chicago-Northwest	237,100	318,400	81,300	34.3
33	Chicago-North	95,200	98,300	3,100	3.3
34	Chicago-West	323,300	365,000	41,700	12.9
35	Chicago-CBD	569,800	670,300	100,500	17.6
36	Chicago-South/ Southwest	249,100	285,600	36,500	14.7
	Subtotal	1,712,300	2,007,500	295,200	17.2
--	Secondary Study Area Total	1,890,400	2,293,800	403,400	21.3
--	Corridor Total	2,577,800	3,055,600	477,800	18.5

[a]The map key number refers to Map 3, "Analysis Subareas within the Primary and Secondary Study Areas."

[b]Within the primary study area, the forecast year 2020 resident employment data set forth in this table are based upon forecast design year 2020 data prepared by the Southeastern Wisconsin Regional Planning Commission. Within the secondary study area, the forecast year 2020 resident employment data set forth in this table are based upon existing 1990 and forecast design year 2020 data for Cook and Lake Counties prepared by the Northeastern Illinois Planning Commission.

Source: SEWRPC.

potential commuter rail trip generators within the primary study area: 1) major commercial centers, 2) educational institutions, 3) major industrial centers, 4) governmental and institutional centers, and 5) major passenger transportation terminals.

Major Commercial Centers

Commercial centers, as defined by the Commission, include retail centers and office centers. Major retail centers are defined as concentrations of employment with at least 2,000 jobs in the retail trade sector. Major office centers are defined as concentrations of employment with at least 3,500 jobs in the office and service sectors. Existing and planned major commercial centers within the primary study area are shown on Map 6.

Educational Institutions

Major educational facilities within the primary study area include colleges and universities, identified not only because they have significant student enrollments, but because they represent employment centers as well. The major educational facilities within the primary study area are shown on Map 7.

Governmental and Public Institutional Centers

Major governmental and public institutional centers provide services to which citizens should have ready access and which are also potentially significant employment centers. The types of government and public institutional centers identified were major regional, county, and special centers. The governmental and public institutional centers located within the primary study area are shown on Map 8.

Major Industrial Centers

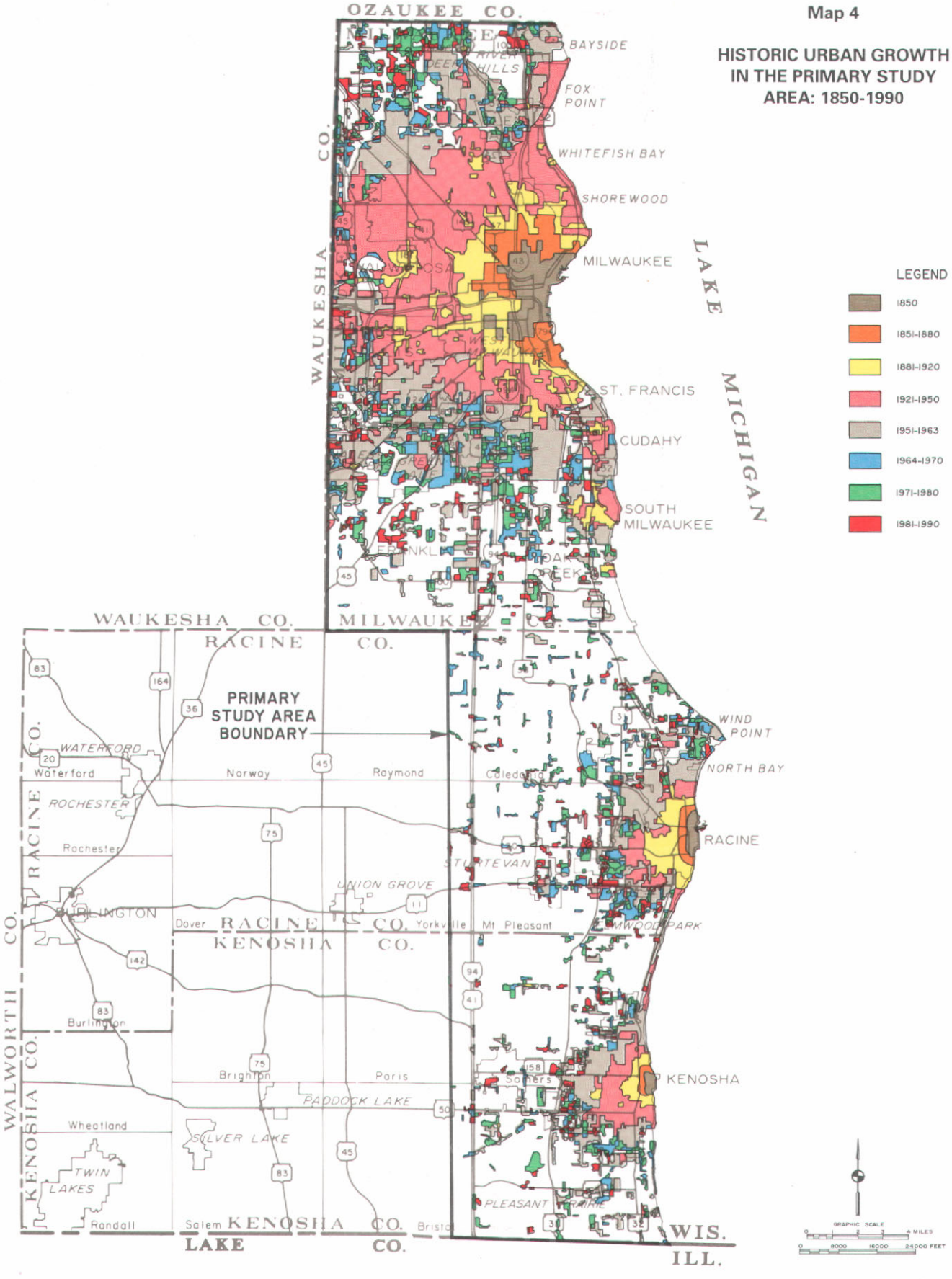
Major industrial centers are identified as concentrations of industrial land with manufacturing and other industry-related employment of at least 3,500 jobs. The major industrial centers range in character from older industrial complexes in central cities, which have traditionally emphasized heavy manufacturing activity, to industrial parks, characterized by a mix of uses, including service operations, research facilities, and office facilities in addition to manufacturing and wholesaling uses. The 1990 existing and planned 2010 industrial centers in the primary study area are shown on Map 9.

Major Passenger-Transportation Terminals

Major passenger-transportation terminals within the primary study area include rail-passenger terminals, bus terminals, and airports. These facilities within the primary study area are shown on Map 10.

Map 4

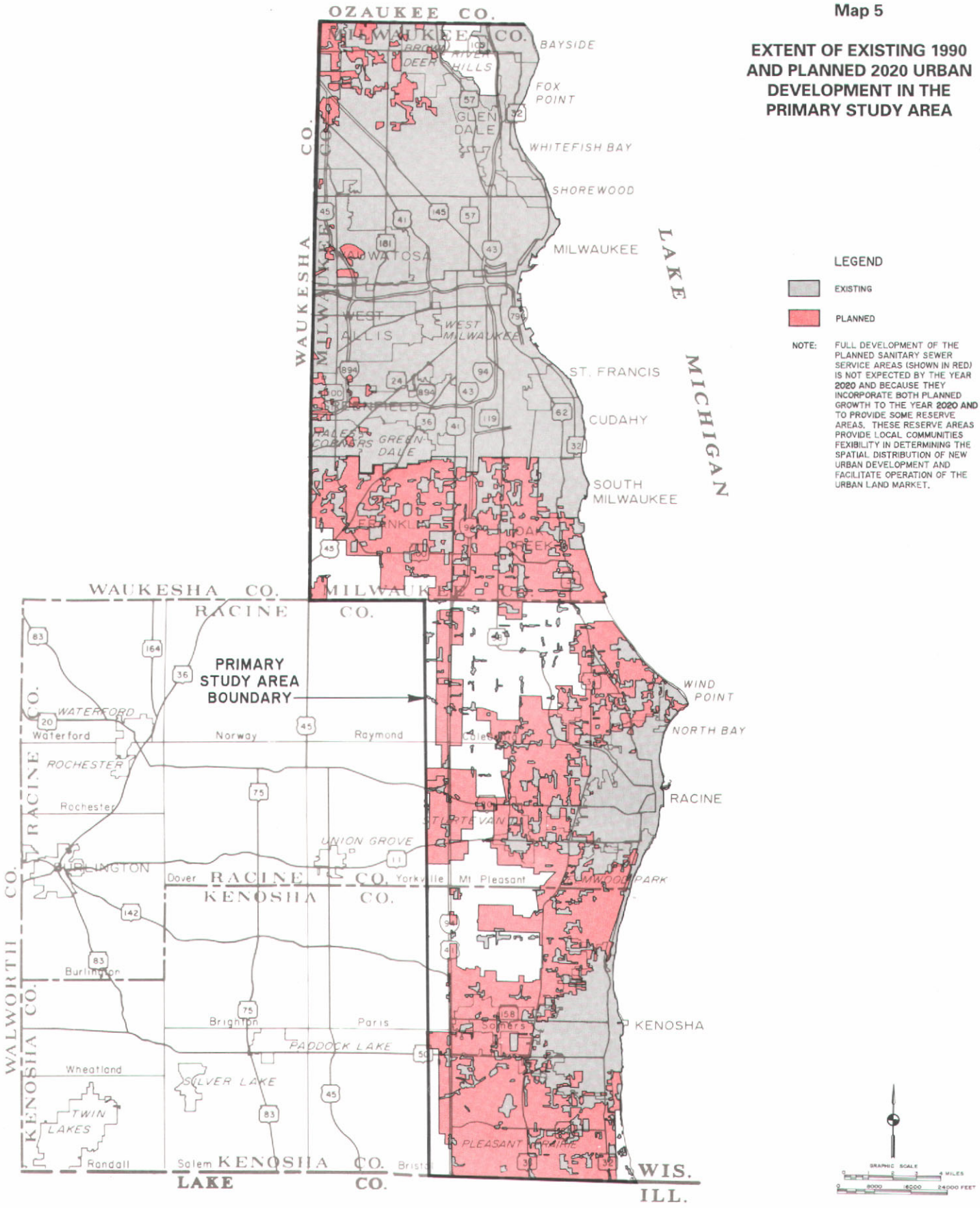
HISTORIC URBAN GROWTH IN THE PRIMARY STUDY AREA: 1850-1990



Source: SEWRPC.

Map 5

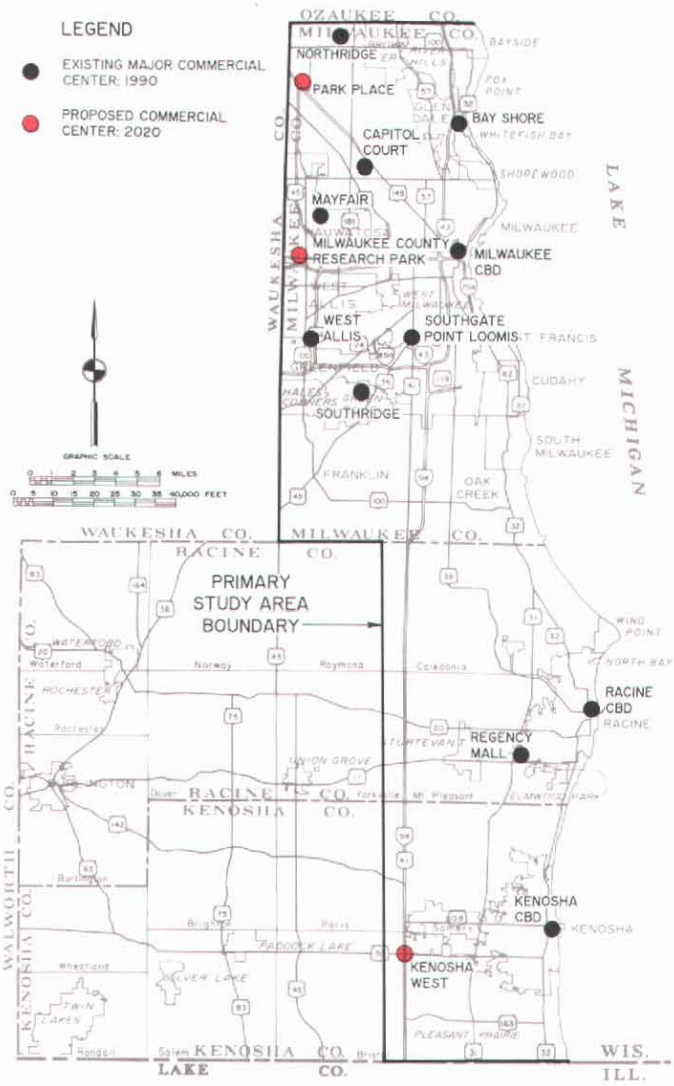
EXTENT OF EXISTING 1990 AND PLANNED 2020 URBAN DEVELOPMENT IN THE PRIMARY STUDY AREA



Source: SEWRPC.

Map 6

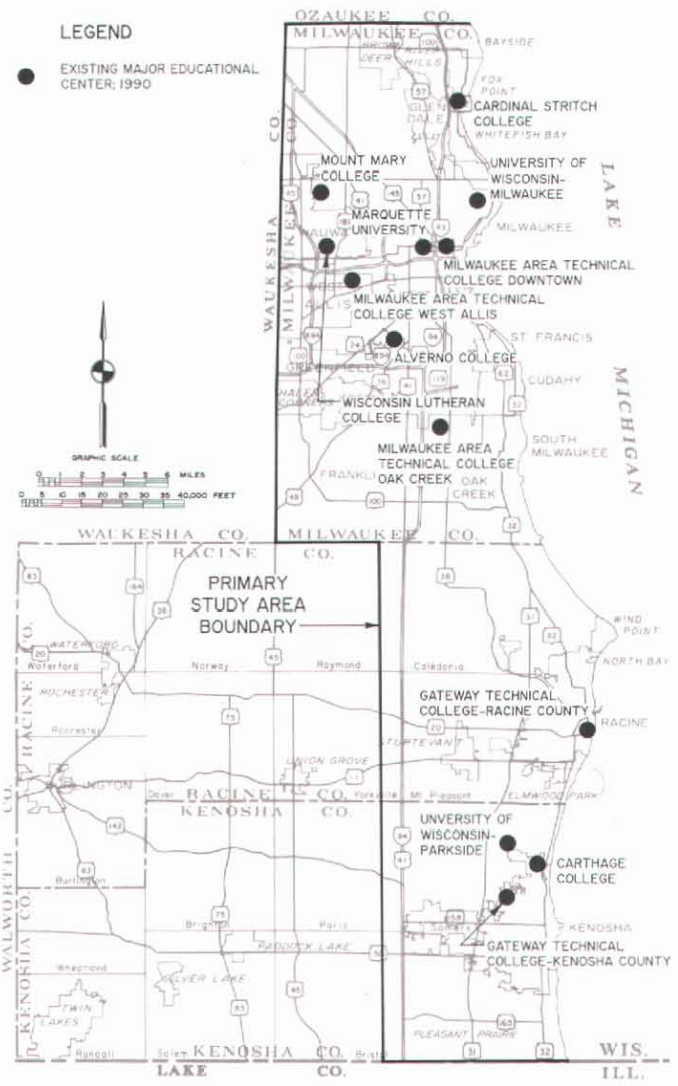
EXISTING AND PLANNED MAJOR COMMERCIAL CENTERS IN THE PRIMARY STUDY AREA



Source: SEWRPC.

Map 7

MAJOR EDUCATIONAL CENTERS IN THE PRIMARY STUDY AREA



Source: SEWRPC.

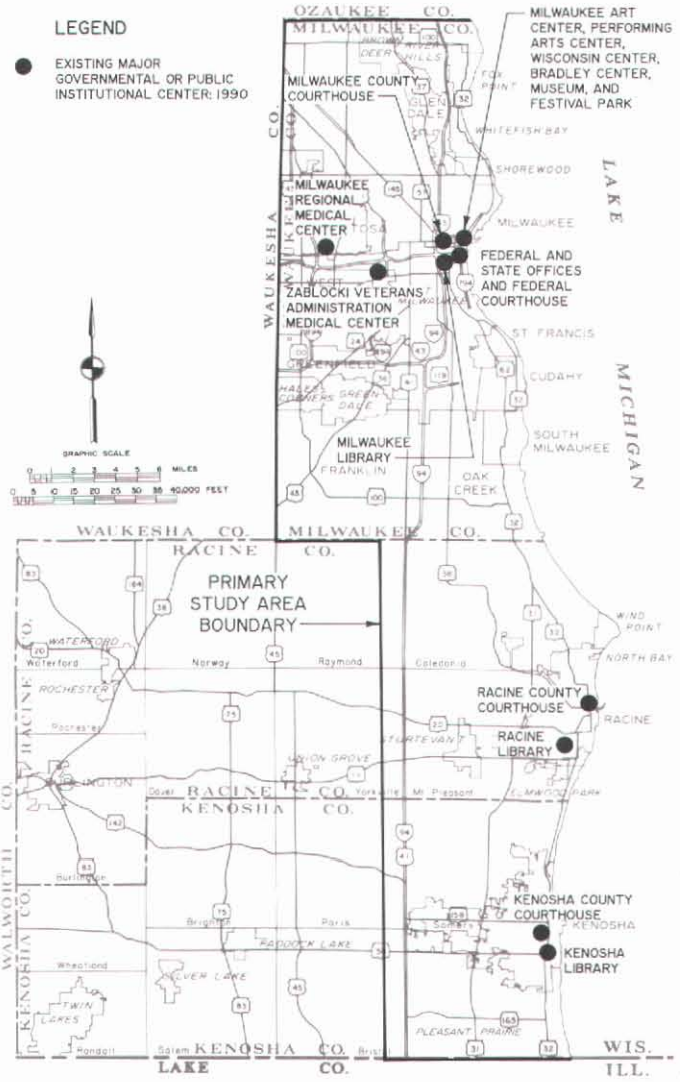
EXISTING TRAVEL PATTERNS

This section presents data on the amount of travel occurring on an average weekday within the primary study area of the Corridor and data on travel between the primary and secondary study areas of the Corridor. The travel data are based on the findings of a regional resident household travel survey and an external cordon survey conducted by the Regional Planning Commission in the fall of 1991. These surveys were a part of a comprehensive inventory of travel which included, in addition to the household travel and the external cordon surveys, a public transit user survey, and a truck and taxi survey. The 1991 household travel survey is the source of the data on person trips made on an average weekday in 1991 within the primary study area.[2] The 1991 external cordon survey is the source of the data on person trips made between the primary and secondary study areas. The travel surveys

[2] *A person trip was defined as a one-way journey between a point of origin and a point of destination by a person five years of age or older traveling as an auto driver or as a passenger in an auto, taxi, truck, school bus, on a motorcycle, or via another mass transit carrier. To be considered, the trip must have been at least the equivalent of one full city block in length.*

Map 8

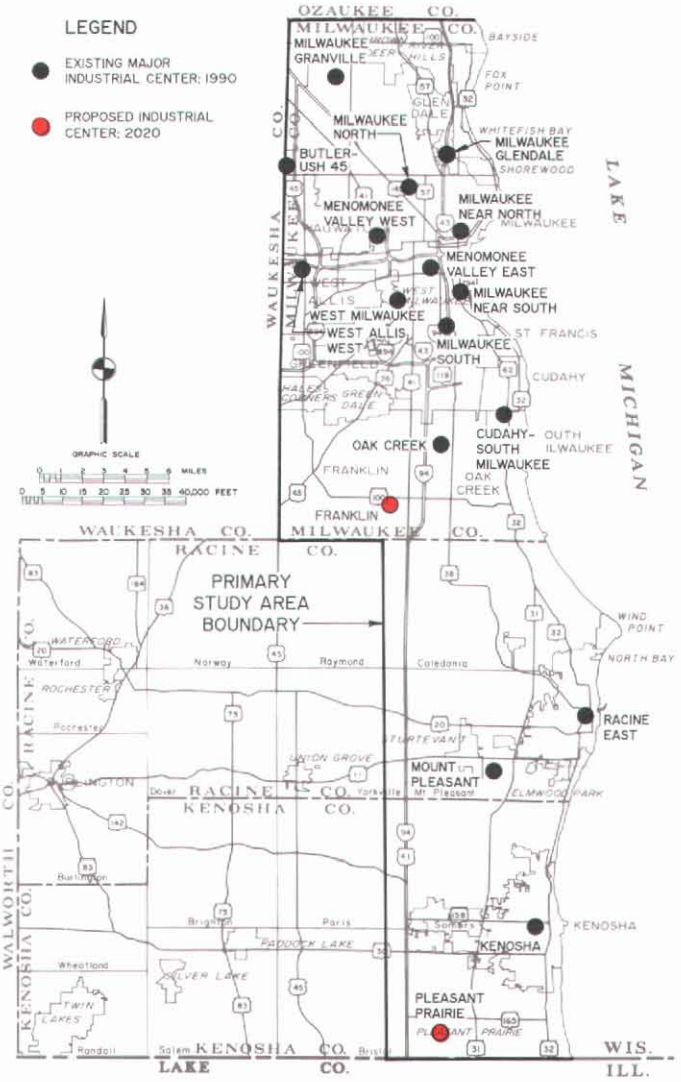
MAJOR GOVERNMENTAL AND PUBLIC INSTITUTIONAL CENTERS IN THE PRIMARY STUDY AREA



Source: SEWRPC.

Map 9

EXISTING AND PLANNED MAJOR INDUSTRIAL CENTERS IN THE PRIMARY STUDY AREA



Source: SEWRPC.

show that approximately 3.35 million person trips are made on an average weekday within the primary study area and between the primary and secondary study areas.

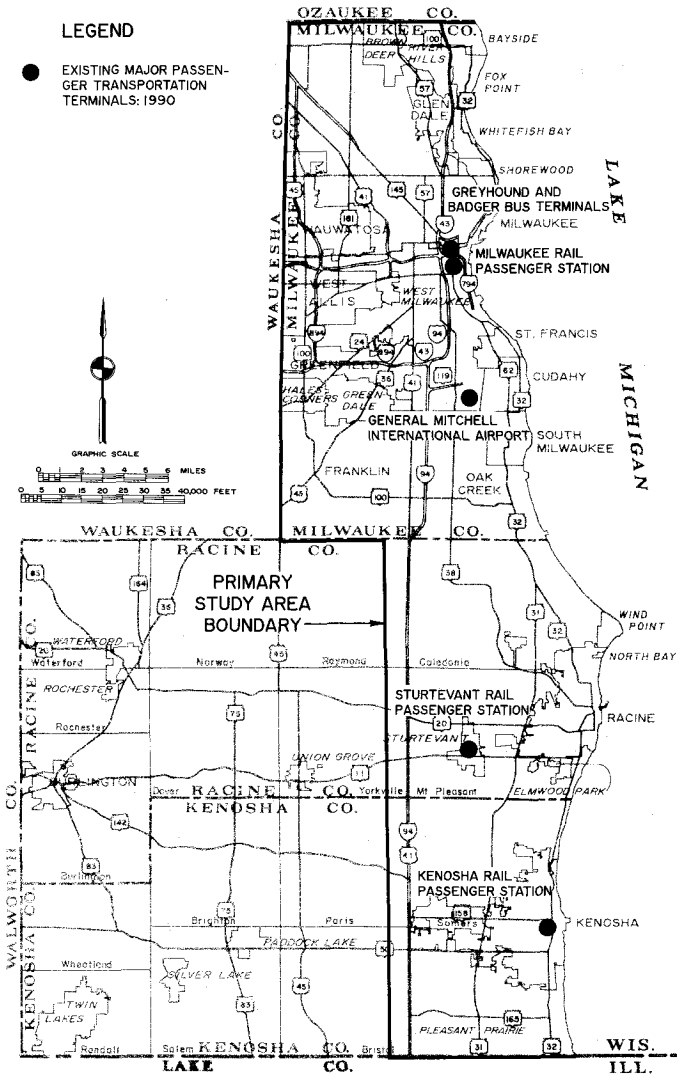
A trip is herein defined and presented as travel by a person from a place of trip production to a place of trip attraction. For trips with one end at home, the place of trip production is always defined as the home and the place of trip attraction is always defined as the other end of the trip which may be a place of work, shopping, personal business, social activity, recreation, or other activity. For a trip which neither begins or ends at home, the place of trip production is the place of origin of the trip, and the place of trip attraction is defined as the place of destination of the trip.

Travel within the Primary Study Area

On an average weekday in 1991, about 3.30 million trips were made between origins and destinations entirely within the primary study area. Of these trips, about 1.84

Map 10

MAJOR PASSENGER TRANSPORTATION TERMINALS IN THE PRIMARY STUDY AREA



Source: SEWRPC.

million, or about 56 percent, were made between analysis areas within the primary study area and about 1.46 million trips, or 44 percent, were made totally within such analysis areas. Of the 1.84 million person trips made between analysis areas, about 1.74 million person trips, or about 95 percent, were intracounty trips, or trips made entirely within one of the three counties within the primary study area. The remaining 96,100 person trips, or about 5 percent, were trips which crossed one or more county boundaries. The pattern of person trips within the primary study area is presented in Table 5 and displayed graphically on Maps 11 and 12.

The largest proportion of the person trips made within the primary study area in 1991 were "home-based other" trips, which would include trips made for medical, personal business, or social and recreational purposes. About 31 percent of all person trips in the primary study area were made for these purposes on an average weekday. The remaining person trips within the primary study area were relatively evenly distributed, among the other trip purposes, with about 22 percent made for work, about 14 percent made for shopping, about 20 percent were nonhome-based, and about 13 percent were school trips.

The pattern of person trips between the primary study area and the remainder of the Southeastern Wisconsin Region is also important to consider. These trips are presented in Table 6 and graphically displayed on Map 13. The overall pattern of person trips among the seven counties of Southeastern Wisconsin is graphically displayed on Map 14.

Interregional Travel

About 56,900 interregional person trips, or trips crossing the Illinois-Wisconsin State line between the primary and secondary study areas, were made on an average weekday in 1991. This represents approximately 38 percent of the total 150,200 person trips found to be crossing the Illinois-Wisconsin State line in Kenosha and Walworth Counties on an average weekday in 1991.

Most of the 56,900 person trips made on an average weekday between the primary study area and the secondary study area, about 53 percent, were "home-based work" trips. Of the remaining person trips, about 11 percent were home-based shopping trips, about 25 percent were home-based other trips, about 9 percent were nonhome-based trips, and about 2 percent were school trips.

The generalized pattern of person trips made on an average weekday between the primary and secondary study areas is shown in Table 5 and illustrated graphically on Maps 15 and 16.

SUMMARY

This chapter has presented information on pertinent existing and probable future characteristics of the primary study area which may affect, or may be affected by, the provision and use of commuter-rail service, including population, employment, land use, and travel habits and patterns. The most important findings concerning these characteristics may be summarized as follows:

Table 5

DISTRIBUTION OF AVERAGE WEEKDAY PERSON TRIPS WITHIN THE PRIMARY STUDY AREA AND BETWEEN THE PRIMARY AND THE SECONDARY STUDY AREAS: 1991

Area of Trip Production	Area of Trip Attraction																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Primary Study Area Total
Primary Study Area																				
1 Milwaukee-North	433,100	58,050	84,760	43,290	12,850	23,390	6,130	5,540	480	1,280	510	2,460	310	170	150	880	40	230	320	673,940
2 Wauwatosa	27,790	91,200	19,160	10,640	16,790	8,300	4,840	2,730	270	490	120	640	--	150	80	80	180	--	240	183,700
3 Milwaukee-Central	105,530	37,510	208,000	56,740	10,190	36,400	9,610	8,320	980	1,870	620	2,400	730	50	140	590	--	120	100	479,900
4 Milwaukee-CBD	7,510	4,080	13,680	14,540	2,060	6,250	1,830	2,020	340	240	250	700	70	390	140	80	--	--	--	54,180
5 West Allis	8,220	16,000	8,210	5,540	91,340	15,550	21,690	2,130	220	330	1,330	1,480	210	40	60	240	--	230	--	172,820
6 Milwaukee-South	15,510	11,780	29,760	23,400	25,520	151,970	23,860	29,380	4,860	4,830	1,530	6,180	1,760	480	220	750	--	180	60	332,030
7 Greenfield	5,060	9,880	9,520	7,190	24,030	20,120	83,930	14,360	950	1,630	4,580	4,130	840	410	200	580	150	220	90	187,870
8 Milwaukee-Airport	4,780	5,100	6,360	9,720	7,080	35,820	28,500	50,230	4,390	5,600	1,860	11,780	660	550	240	700	70	330	60	173,830
9 St. Francis	750	1,250	1,130	730	340	4,330	980	2,560	6,510	4,350	70	1,040	960	--	--	110	--	--	--	25,110
10 Cudahy	1,450	1,070	1,760	2,380	800	5,900	2,960	5,270	5,150	26,150	360	5,140	5,300	490	--	50	60	70	60	64,420
11 Franklin	810	1,400	1,580	1,760	2,230	3,450	12,120	3,410	80	220	9,840	3,640	340	390	140	220	70	--	40	41,740
12 Oak Creek	1,940	1,840	3,170	3,800	1,530	7,690	6,790	8,630	880	4,220	3,320	35,840	5,540	1,160	610	1,160	230	120	250	88,720
13 South Milwaukee	730	960	1,790	2,710	710	4,070	1,650	4,220	780	7,840	720	6,640	26,710	320	60	340	90	60	70	60,470
14 Northern Racine County	660	390	870	1,210	120	2,060	270	2,440	--	690	120	4,560	740	39,640	9,060	50,550	1,080	2,020	140	116,620
15 Southern Racine County	140	--	220	500	280	410	460	250	30	70	--	670	20	4,370	14,110	27,960	1,520	1,790	210	53,010
16 City of Racine	1,120	860	1,060	1,950	550	700	510	1,460	40	130	160	1,920	260	23,620	29,280	200,050	5,160	7,750	1,620	278,200
17 Northern Kenosha County	--	--	120	110	--	120	--	--	--	60	--	70	--	650	1,000	4,760	3,010	12,940	1,230	24,070
18 City of Kenosha	460	330	630	950	230	590	170	710	80	--	--	280	--	400	1,870	14,280	15,850	203,130	14,090	254,050
19 Southern Kenosha County	70	220	70	260	50	--	--	140	--	--	--	20	--	--	470	1,590	1,150	22,230	6,160	32,430
Primary Study Area Total	615,630	241,920	391,850	187,420	196,700	327,120	206,300	143,800	26,040	60,000	25,390	89,590	44,450	73,280	57,830	304,970	28,660	251,420	24,740	3,297,110
Secondary Study Area																				
20 Wadswaorth	--	--	--	--	--	--	--	--	--	--	--	--	--	10	90	130	10	100	110	--
21 Zion	40	30	--	70	--	230	60	30	--	--	--	120	--	--	120	530	350	3,170	670	--
22 Gurnee	30	--	60	60	--	10	--	10	--	--	--	10	--	--	110	170	80	380	320	--
23 Waukegan	70	--	90	--	10	20	--	--	--	--	--	--	20	50	60	330	180	1,270	250	--
24 Libertyville	40	70	70	170	20	50	--	50	--	10	--	10	--	--	10	140	50	190	150	--
25 Lake Forest	1,040	--	10	30	--	--	--	20	--	--	--	20	--	--	--	90	60	280	40	--
26 Buffalo Grove	40	0	10	10	10	20	--	--	--	10	--	--	--	20	60	70	10	70	60	--
27 Highland Park	10	--	20	60	--	10	--	50	--	--	--	--	--	10	20	20	--	80	40	--
28 Northbrook	20	--	40	150	--	50	--	10	--	--	--	10	--	20	10	50	30	120	100	--
29 Winnetka	--	20	10	30	--	--	--	--	--	--	--	--	10	--	20	20	--	--	30	--
30 Skokie	10	60	20	30	--	--	--	10	--	--	--	--	--	--	--	10	--	50	30	--
31 Evanston	20	0	30	180	--	--	--	10	--	--	--	10	--	10	10	--	--	10	10	--
32 Chicago-NW	110	--	40	50	30	50	50	50	--	--	--	--	--	30	--	50	--	60	100	--
33 Chicago-North	30	0	50	40	10	--	10	10	--	--	--	10	--	--	80	40	20	20	40	--
34 Chicago-West	--	--	10	20	--	--	--	20	--	--	--	--	--	--	--	80	10	--	30	--
35 Chicago-CBD	20	--	10	70	10	70	--	20	--	--	--	--	--	--	--	10	--	20	30	--
36 Chicago-SO/SW	30	--	20	40	--	10	--	--	--	--	--	--	--	10	--	10	10	10	80	--
Secondary Study Area Total	1,510	180	490	1,010	90	520	120	290	0	20	0	190	30	160	590	1,750	810	5,830	2,090	--
Corridor Total	617,140	242,100	392,340	188,430	196,790	327,640	206,420	144,090	26,040	60,020	25,390	89,780	44,480	73,440	58,420	306,720	29,470	257,250	26,830	3,297,110

NOTE: Trips are shown in produced-attracted format; that is, from the area of production to the area of attraction. Shaded cells indicate trips made entirely within an individual subarea analysis area.

Table 5 (continued)

Area of Trip Production	Area of Trip Attraction																	Primary Study Area Total	Corridor Total
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		
Primary Study Area																			
1 Milwaukee-North	280	--	210	410	180	140	70	30	80	60	60	40	190	220	30	110	30	2,140	676,080
2 Wauwatosa	--	70	80	40	70	--	--	80	170	160	10	40	90	80	--	--	0	890	184,590
3 Milwaukee-Central	80	90	40	--	10	20	--	50	70	20	--	30	20	70	0	30	10	540	480,440
4 Milwaukee-CBD	20	30	--	--	60	10	--	--	20	--	20	--	40	140	20	20	--	380	54,560
5 West Allis	10	30	90	--	50	90	10	--	30	30	--	--	40	--	--	20	--	400	173,220
6 Milwaukee-South	--	20	150	--	110	70	20	--	20	10	20	--	240	40	30	--	20	750	332,780
7 Greenfield	30	--	90	--	10	10	30	60	100	80	10	10	50	60	40	--	10	590	188,460
8 Milwaukee-Airport	--	180	--	--	--	60	--	--	20	20	10	--	10	--	10	30	10	350	174,180
9 St. Francis	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25,110
10 Cudahy	--	--	20	--	30	10	--	--	10	10	--	--	10	--	--	10	--	100	64,520
11 Franklin	--	--	60	--	20	60	--	--	10	10	10	--	20	--	--	--	--	190	41,930
12 Oak Creek	30	--	80	30	20	160	--	30	20	10	--	--	50	--	20	--	--	450	89,170
13 South Milwaukee	20	--	10	--	--	--	--	--	10	10	--	--	--	--	--	--	40	90	60,560
14 Northern Racine County	10	90	120	90	210	10	40	--	70	50	20	10	50	--	20	110	120	1,020	117,640
15 Southern Racine County	10	100	50	140	40	150	10	70	60	70	--	--	10	--	--	20	20	750	53,760
16 City of Racine	10	480	290	440	210	460	180	240	40	50	10	30	190	10	--	70	20	2,730	280,930
17 Northern Kenosha County	140	290	260	540	290	360	110	140	50	120	50	--	90	--	10	--	--	2,450	26,520
18 City of Kenosha	230	4,450	2,220	4,690	2,740	3,870	680	710	620	350	140	80	460	50	0	90	320	21,700	275,750
19 Southern Kenosha County	70	1,470	510	1,050	760	800	270	160	310	80	10	50	150	--	20	--	20	5,730	38,160
Primary Study Area Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41,250	--
Secondary Study Area																			
20 Wadsworth	Not surveyed by Commission staff																	450	450
21 Zion																		5,420	5,420
22 Gurnee																		1,240	1,240
23 Waukegan																		2,350	2,350
24 Libertyville																		1,030	1,030
25 Lake Forest																		1,590	1,590
26 Buffalo Grove																		390	390
27 Highland Park																		320	320
28 Northbrook																		610	610
29 Winnetka																		140	140
30 Skokie																		220	220
31 Evanston																		290	290
32 Chicago-NW																		620	620
33 Chicago-North																		360	360
34 Chicago-West																		170	170
35 Chicago-CBD																		260	260
36 Chicago-SO/SW																		220	220
Secondary Study Area Total	940	7,300	4,280	7,430	4,810	6,280	1,420	1,570	1,710	1,140	370	290	1,710	670	200	510	620	15,680	--
Corridor Total	940	7,300	4,280	7,430	4,810	6,280	1,420	1,570	1,710	1,140	370	290	1,710	670	200	510	620	--	3,354,040

NOTE: Trips are shown in produced-attracted format, that is, from the area of production to the area of attraction.

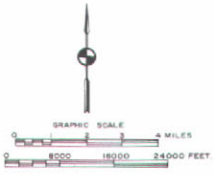
Source: Chicago Area Transportation Study and SEWRPC.

INTRACOUNTY AVERAGE WEEKDAY PERSON TRIPS BETWEEN SUBAREA ANALYSIS AREAS WITHIN THE PRIMARY STUDY AREA: 1991

TRIPS INTERNAL TO ANALYSIS SUBAREAS

AREA	NAME	TRIPS
1	MILWAUKEE-NORTH	433,100
2	WAUWATOSA	91,200
3	MILWAUKEE-CENTRAL	208,000
4	MILWAUKEE-CBD	14,540
5	WEST ALLIS	91,340
6	MILWAUKEE-SOUTH	151,970
7	GREENFIELD	83,930
8	MILWAUKEE-AIRPORT	50,230
9	ST. FRANCIS	6,510
10	CUDAHY	26,150
11	FRANKLIN	9,840
12	OAK CREEK	35,840
13	SOUTH MILWAUKEE	26,170
14	NORTHERN RACINE COUNTY	39,640
15	SOUTHERN RACINE COUNTY	14,110
16	CITY OF RACINE	200,050
17	NORTHERN KENOSHA COUNTY	3,010
18	CITY OF KENOSHA	203,130
19	SOUTHERN KENOSHA COUNTY	6,150

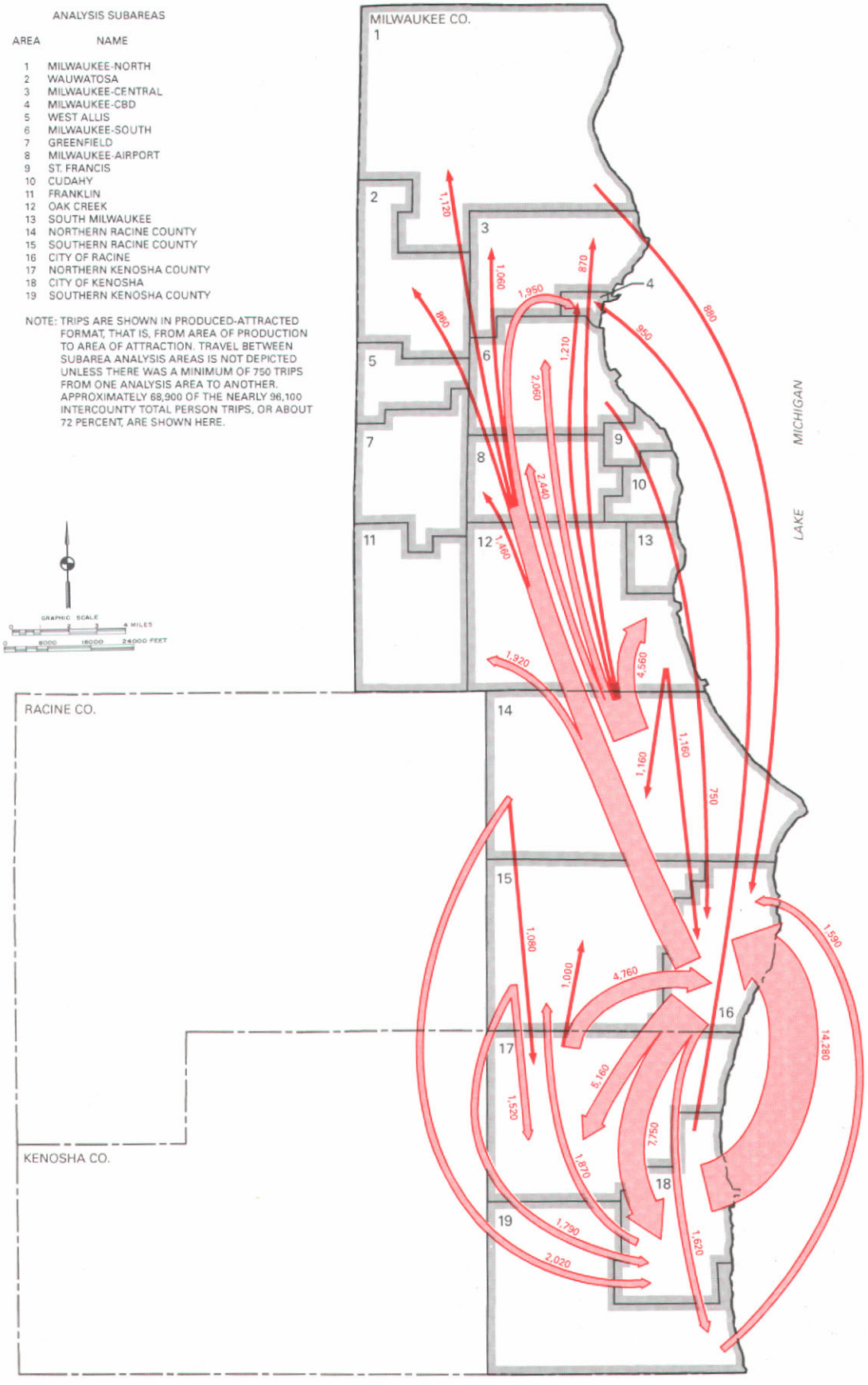
NOTE: TRIPS ARE SHOWN IN PRODUCED-ATTRACTED FORMAT, THAT IS, FROM AREA OF PRODUCTION TO AREA OF ATTRACTION. TRAVEL BETWEEN SUBAREA ANALYSIS AREAS IS NOT DEPICTED UNLESS THERE WAS A MINIMUM OF 10,000 TRIPS FROM ONE ANALYSIS AREA TO ANOTHER. APPROXIMATELY 916,000 OF THE NEARLY 1,834,200 INTRACOUNTY TOTAL PERSON TRIPS, OR ABOUT 50 PERCENT, ARE SHOWN HERE.



Source: SEWRPC.

Map 12

INTERCOUNTY AVERAGE WEEKDAY PERSON TRIPS BETWEEN SUBAREA ANALYSIS AREAS WITHIN THE PRIMARY STUDY AREA: 1991



Source: SEWRPC.

Table 6

DISTRIBUTION OF AVERAGE WEEKDAY PERSON TRIPS BETWEEN THE PRIMARY STUDY AREA AND THE REMAINDER OF THE REGION

Area of Trip Production	Area of Trip Attraction												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Primary Study Area													
1 Milwaukee-North													
2 Wauwatosa													
3 Milwaukee-Central													
4 Milwaukee-CBD													
5 West Allis													
6 Milwaukee-South													
7 Greenfield													
8 Milwaukee-Airport													
9 St. Francis													
10 Cudahy	Reported in Table 5												
11 Franklin													
12 Oak Creek													
13 South Milwaukee													
14 Northern Racine County													
15 Southern Racine County													
16 City of Racine													
17 Northern Kenosha County													
18 City of Kenosha													
19 Southern Kenosha County													
101 Kenosha County West	240	--	110	230	--	--	130	40	--	--	--	170	--
102 Ozaukee County	31,620	3,130	7,880	7,840	1,110	2,780	520	940	150	40	60	190	80
103 Racine County West	640	1,280	1,010	1,360	1,740	1,840	3,180	1,450	220	420	750	1,090	90
104 Walworth County	140	850	260	370	9,610	630	1,250	500	--	100	60	170	--
105 Washington County	17,260	4,520	4,590	2,410	1,420	2,410	540	760	80	40	30	570	--
106 Waukesha County	39,270	47,240	22,170	18,980	33,440	17,090	21,800	7,130	360	1,270	2,410	3,700	1,120
Remainder of Region Total	89,170	57,020	36,020	31,190	47,320	24,750	27,420	10,820	810	1,870	3,310	5,890	1,290

Area of Trip Production	Area of Trip Attraction												
	14	15	16	17	18	19	101	102	103	104	105	106	Remainder of Region Total
Primary Study Area													
1 Milwaukee-North							--	20,270	330	350	7,180	61,490	89,620
2 Wauwatosa							--	1,860	150	30	1,630	36,300	39,970
3 Milwaukee-Central							--	4,490	320	190	910	22,130	28,040
4 Milwaukee-CBD							--	780	--	--	320	4,960	6,060
5 West Allis							30	540	350	270	670	21,050	22,910
6 Milwaukee-South							--	1,130	70	360	350	7,390	9,300
7 Greenfield							--	410	810	830	620	14,510	17,180
8 Milwaukee-Airport							40	650	600	430	340	5,120	7,180
9 St. Francis							--	--	210	--	140	600	950
10 Cudahy	Reported in Table 5						--	60	140	--	90	1,130	1,420
11 Franklin							20	170	170	130	70	2,890	3,450
12 Oak Creek							30	230	240	40	30	2,230	2,800
13 South Milwaukee							--	100	30	--	100	1,270	1,500
14 Northern Racine County							320	140	1,340	240	80	1,180	3,300
15 Southern Racine County							300	--	1,070	--	20	440	1,830
16 City of Racine							610	330	3,410	550	180	970	6,050
17 Northern Kenosha County							890	--	330	--	40	110	1,370
18 City of Kenosha							2,320	80	500	660	--	180	3,740
19 Southern Kenosha County							1,640	40	210	40	--	20	1,950
101 Kenosha County West	--	500	1,660	2,110	6,820	3,830	--	--	--	--	--	--	15,840
102 Ozaukee County	30	--	130	50	--	40	--	--	--	--	--	--	56,590
103 Racine County West	1,490	3,480	6,360	1,290	760	720	--	--	--	--	--	--	29,170
104 Walworth County	200	120	680	200	780	30	--	--	--	--	--	--	15,950
105 Washington County	80	20	90	--	80	50	--	--	--	--	--	--	34,950
106 Waukesha County	770	600	1,070	230	180	430	--	--	--	--	--	--	219,260
Remainder of Region Total	2,570	4,720	9,990	3,880	8,620	5,100	6,200	31,280	10,280	4,120	12,770	183,970	620,380

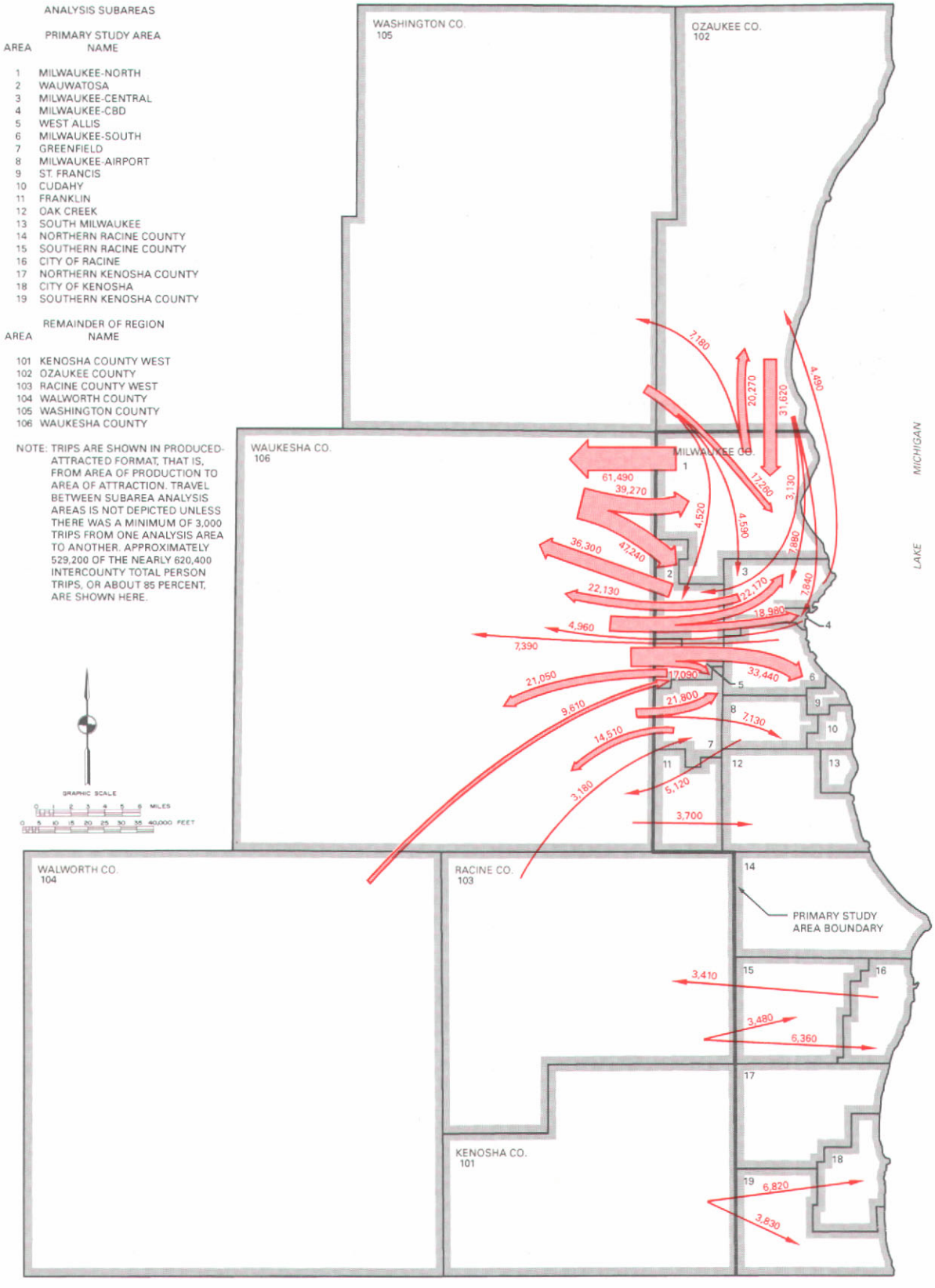
Source: SEWRPC.

1. In 1990, the resident household population of the primary study area totaled about 1,171,900 persons. The population in the primary study area is anticipated to increase to about 1,265,000 persons by the year 2020, an increase of about 8 percent.

2. In 1990, the number of households in the primary study area totaled about 462,800. The number of households in the primary study area is anticipated to increase to about 524,000 households by the year 2020, an increase of about 13 percent.

Map 13

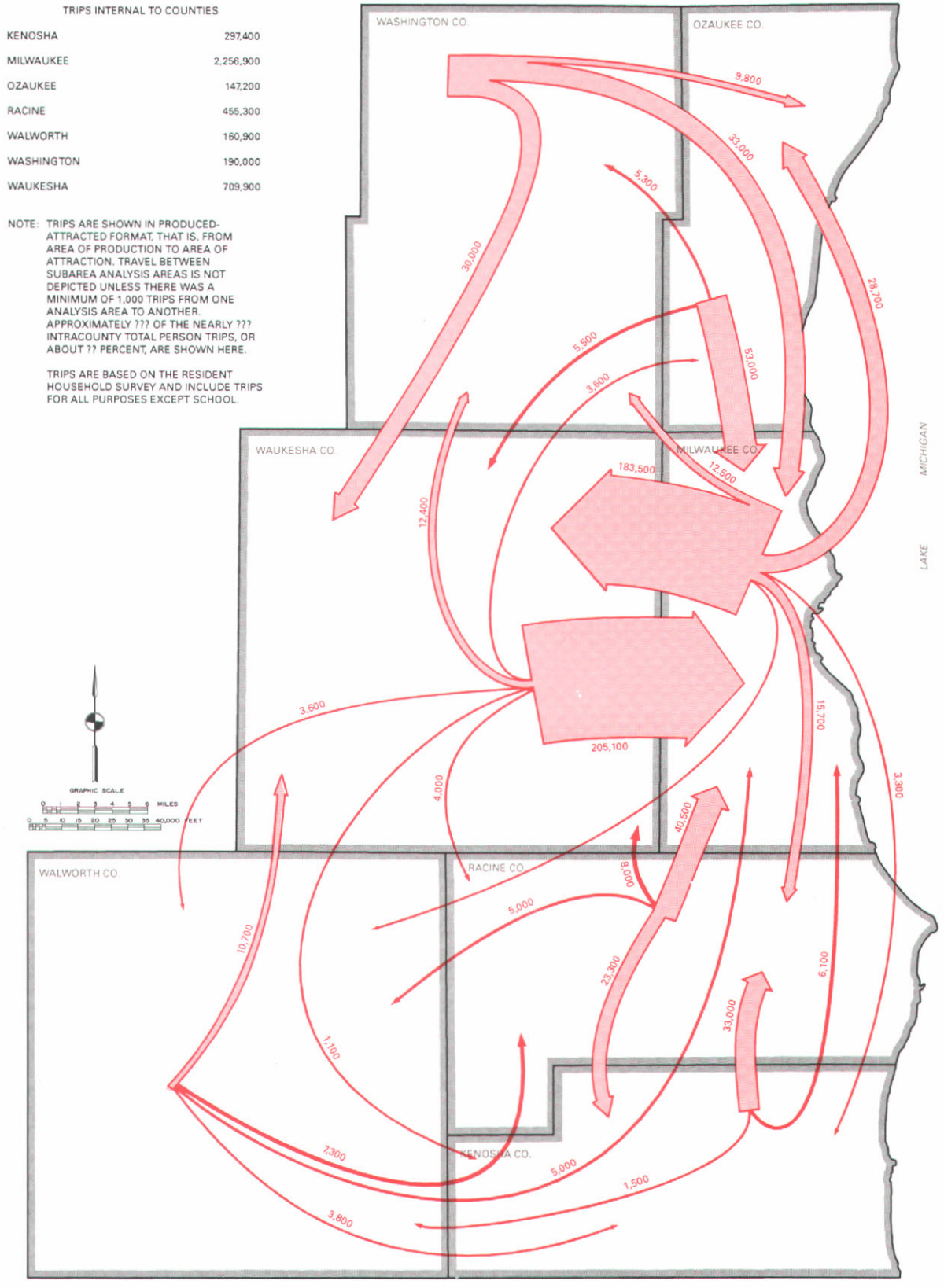
INTERCOUNTY AVERAGE WEEKDAY PERSON TRIPS BETWEEN SUBAREA ANALYSIS AREAS WITHIN THE PRIMARY STUDY AREA AND THE REMAINDER OF THE REGION: 1991



Source: SEWRPC.

Map 14

AVERAGE WEEKDAY PERSON TRIPS BETWEEN COUNTIES IN THE REGION: 1991



Source: SEWRPC.

Map 15

AVERAGE WEEKDAY PERSON TRIPS PRODUCED WITHIN PRIMARY STUDY AREA SUBAREA ANALYSIS AREAS AND ATTRACTED TO SECONDARY STUDY AREA SUBAREA ANALYSIS AREAS: 1991

ANALYSIS SUBAREAS

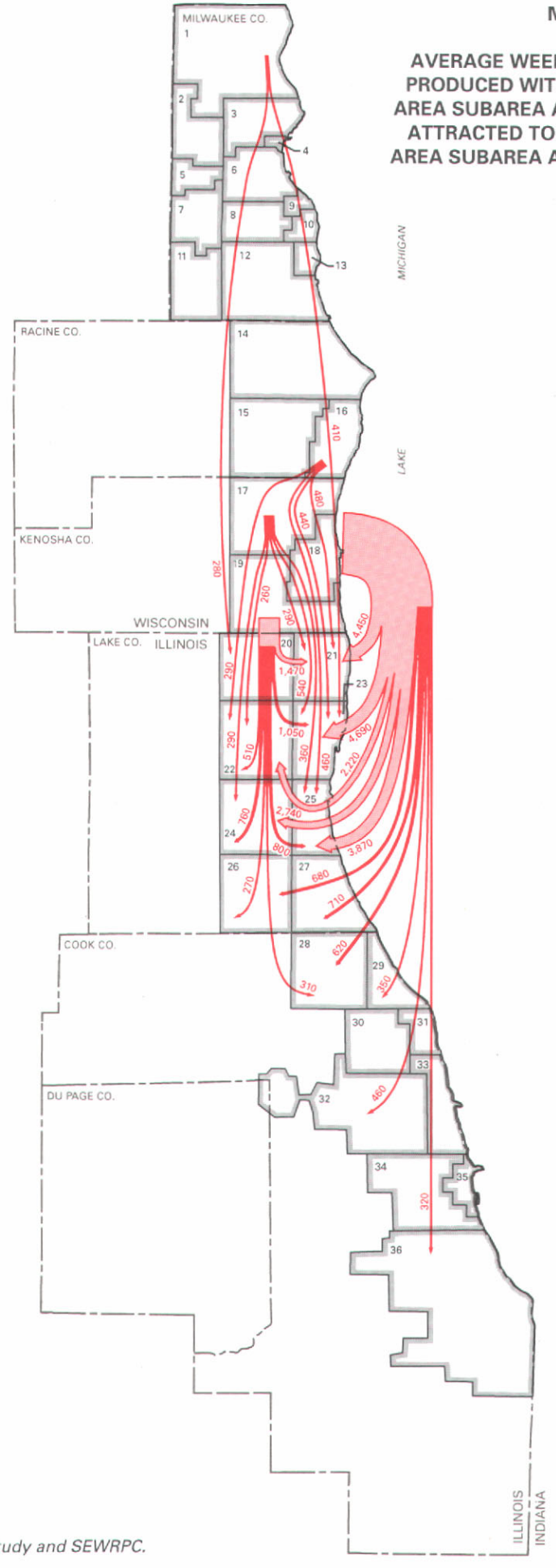
PRIMARY STUDY AREA

AREA	NAME
1	MILWAUKEE-NORTH
2	WAUWATOSA
3	MILWAUKEE-CENTRAL
4	MILWAUKEE-CBD
5	WEST ALLIS
6	MILWAUKEE-SOUTH
7	GREENFIELD
8	MILWAUKEE-AIRPORT
9	ST. FRANCIS
10	CUDAHY
11	FRANKLIN
12	OAK CREEK
13	SOUTH MILWAUKEE
14	NORTHERN RACINE COUNTY
15	SOUTHERN RACINE COUNTY
16	CITY OF RACINE
17	NORTHERN KENOSHA COUNTY
18	CITY OF KENOSHA
19	SOUTHERN KENOSHA COUNTY

SECONDARY STUDY AREA

AREA	NAME
20	WADSWORTH
21	ZION
22	GURNEE
23	WAUKEGAN
24	LIBERTYVILLE
25	LAKE FOREST
26	BUFFALO GROVE
27	HIGHLAND PARK
28	NORTHBROOK
29	WINNETKA
30	SKOKIE
31	EVANSTON
32	CHICAGO-NORTHWEST
33	CHICAGO-NORTH
34	CHICAGO-WEST
35	CHICAGO-CBD
36	CHICAGO-SOUTH/SOUTHWEST

NOTE: TRAVEL BETWEEN SUBAREA ANALYSIS AREAS IS NOT DEPICTED UNLESS THERE WAS A MINIMUM OF 250 TRIPS FROM ONE ANALYSIS AREA TO ANOTHER. APPROXIMATELY 30,400 OF THE NEARLY 41,300 TOTAL PERSON TRIPS FROM THE PRIMARY STUDY AREA TO THE SECONDARY STUDY AREA, OR ABOUT 74 PERCENT, ARE SHOWN HERE.



Source: Chicago Area Transportation Study and SEWRPC.

Map 16

AVERAGE WEEKDAY PERSON TRIPS PRODUCED WITHIN SECONDARY STUDY AREA SUBAREA ANALYSIS AREAS AND ATTRACTED TO SECONDARY STUDY AREA SUBAREA ANALYSIS AREAS: 1991

ANALYSIS SUBAREAS

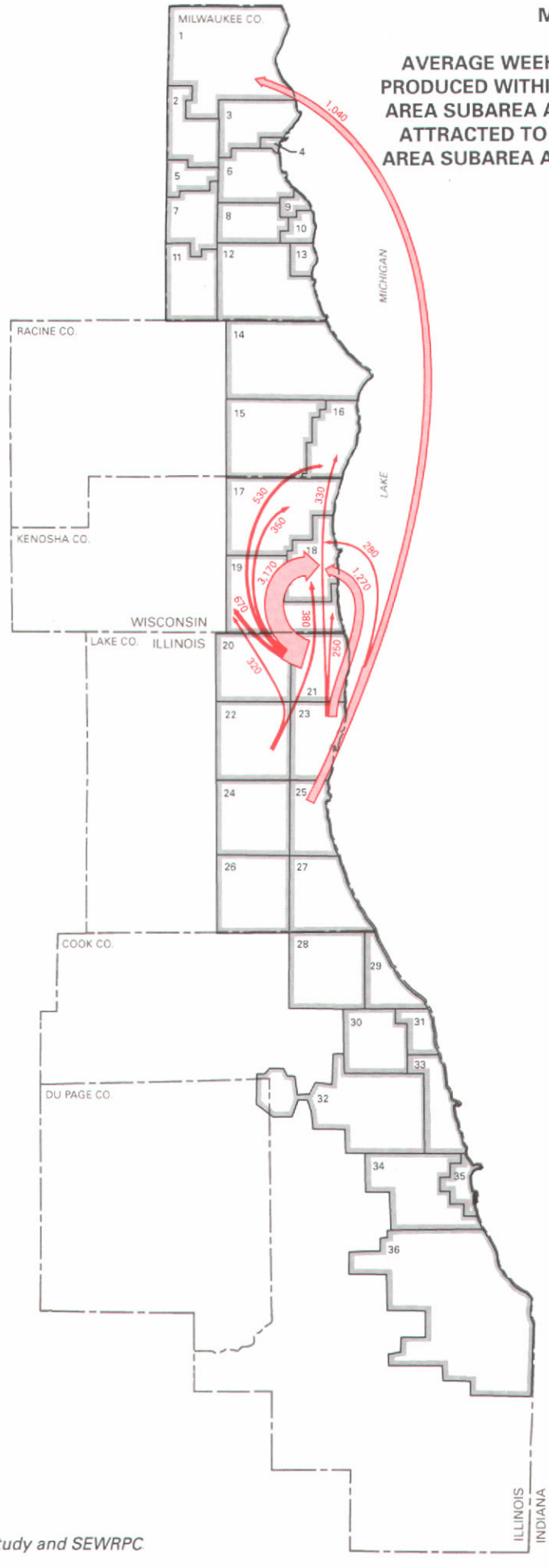
PRIMARY STUDY AREA

AREA	NAME
1	MILWAUKEE-NORTH
2	WAUWATOSA
3	MILWAUKEE-CENTRAL
4	MILWAUKEE-CBD
5	WEST ALLIS
6	MILWAUKEE-SOUTH
7	GREENFIELD
8	MILWAUKEE-AIRPORT
9	ST. FRANCIS
10	CUDAHY
11	FRANKLIN
12	OAK CREEK
13	SOUTH MILWAUKEE
14	NORTHERN RACINE COUNTY
15	SOUTHERN RACINE COUNTY
16	CITY OF RACINE
17	NORTHERN KENOSHA COUNTY
18	CITY OF KENOSHA
19	SOUTHERN KENOSHA COUNTY

SECONDARY STUDY AREA

AREA	NAME
20	WADSWORTH
21	ZION
22	GURNEE
23	WAUKEGAN
24	LIBERTYVILLE
25	LAKE FOREST
26	BUFFALO GROVE
27	HIGHLAND PARK
28	NORTHBROOK
29	WINNETKA
30	SKOKIE
31	EVANSTON
32	CHICAGO-NORTHWEST
33	CHICAGO-NORTH
34	CHICAGO-WEST
35	CHICAGO-CBD
36	CHICAGO-SOUTH/SOUTHWEST

NOTE: TRAVEL BETWEEN SUBAREA ANALYSIS AREAS IS NOT DEPICTED UNLESS THERE WAS A MINIMUM OF 250 TRIPS FROM ONE ANALYSIS AREA TO ANOTHER. APPROXIMATELY 8,600 OF THE NEARLY 15,700 TOTAL PERSON TRIPS FROM THE SECONDARY STUDY AREA TO THE PRIMARY STUDY AREA, OR ABOUT 55 PERCENT, ARE SHOWN HERE.



Source: Chicago Area Transportation Study and SEWRPC

3. In 1990, employment in the primary study area stood at about 687,400 jobs. The number of jobs in the primary study area is anticipated to increase to about 761,800 jobs by the year 2020, an increase of about 11 percent.

4. Certain existing and planned land use concentrations in the primary study area generate a large number of person trips on an average weekday. These include: 14 commercial centers, 13 educational centers, 10 governmental and public institutional centers, 17 industrial centers, and five major passenger transportation terminals. The commercial, educational, governmental, industrial centers, and major passenger transportation terminals are generally located in the eastern portion of the primary study area.

5. According to household travel surveys undertaken by the Commission in 1991, about 3.30 million person trips were made on an average weekday in the primary study area. Of those trips, about 1.46 million trips were made entirely within individual subarea analysis areas of the primary study area; and about 1.84 million trips were made between those subarea analysis areas. Of the 1.84 million trips between subarea analysis areas, only about 96,100 trips crossed one county boundary or more. In addition, the Commission's 1991 external cordon survey found that about 56,900 person trips crossed the Illinois-Wisconsin line on an average weekday between the primary study area and the secondary study area.

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Chapter III

EXISTING TRANSPORTATION SERVICES AND FACILITIES

INTRODUCTION

This chapter describes the existing transportation services and facilities within the primary study area of the South Lakeshore Travel Corridor of the Southeastern Wisconsin Region and as well between the primary and secondary study areas of the Corridor.

The first section of this chapter provides a description of the existing railroad and bus passenger-transportation services in the Corridor. Railroad services include the existing commuter rail service between Kenosha and Chicago and the existing Amtrak intercity service between Milwaukee and Chicago. A description of existing public bus transportation services in the Corridor is also provided. These include local services provided by publicly-owned transit systems serving the Milwaukee, Racine, and Kenosha urbanized areas, as well as suburban and intercity bus services provided by privately owned systems.

The second section of the chapter provides a description of the existing railroad facilities in the Corridor with emphasis on the facilities of the Union Pacific Railroad, Kenosha Subdivision. The description includes information on trackage, bridges, stations, and signals. The existing condition and current utilization of the facilities is also described.

The third section of the chapter describes the existing arterial street and highway system within the Corridor.

EXISTING RAILROAD AND BUS PASSENGER SERVICES IN THE CORRIDOR

Existing Railroad Passenger Services

As of January 1997 there were two existing railroad passenger train services operating within the South Lakeshore Travel Corridor. One was the Metra commuter rail service, operated over the Union Pacific North Line between Kenosha and Chicago. Commuter rail service between Kenosha, Racine, and Milwaukee would probably constitute either an extension of, or a connection to, this existing Metra service. The other existing railroad passenger service within the Corridor was operated by Amtrak between Milwaukee and Chicago, with a stop at Sturtevant. The routes of these services are shown on Map 17. A description of both services is provided after a brief history of passenger train service in the Corridor.

Historic Perspective

Until May 1971, when Amtrak assumed the operation of most remaining intercity passenger service in the United States, private railroad companies, including electric interurban railroad companies, were responsible for operating virtually all commuter and long distance passenger trains. Passenger train service in the South Lakeshore Travel Corridor of the Southeastern Wisconsin Region was historically very competitive among the various private railroads serving the Corridor.

Until 1963, three private railroads competed for passenger traffic between Milwaukee and Chicago. One of these was the Chicago & North Western Railway (C&NW), which was recently acquired by the Union Pacific Railroad and which used the line being examined under this study for the operation of its mainline passenger trains between Chicago and Milwaukee, with intermediate stops at Kenosha and Racine, and thence northward to Green Bay and northwestward to St. Paul-Minneapolis.

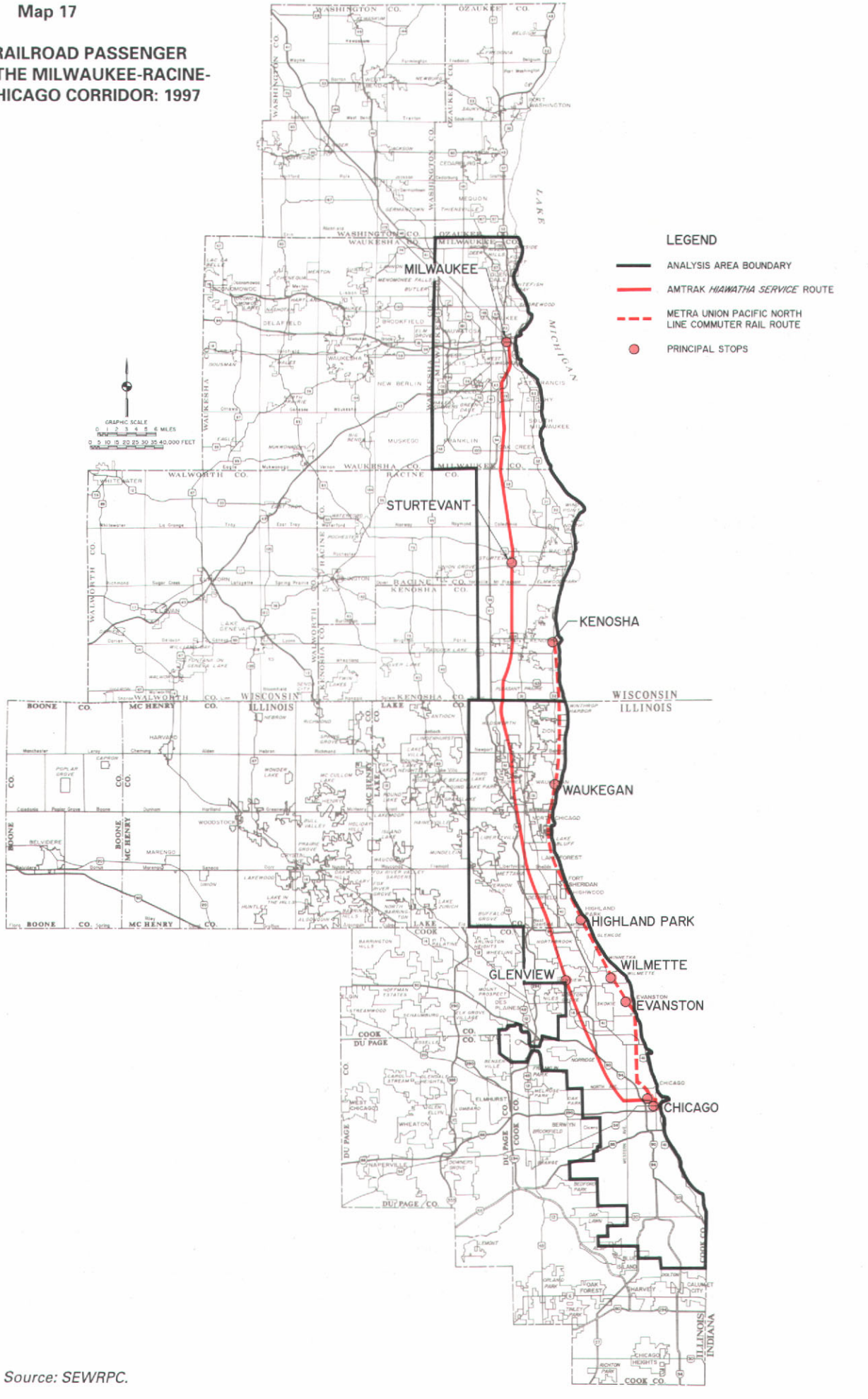
A second private railroad company operating in the Corridor was the Chicago, North Shore & Milwaukee Railroad (North Shore Line), an electric interurban railroad abandoned in 1963. This company operated passenger trains between Milwaukee, Racine, Kenosha, and Chicago.

A third private railroad company operating in the Corridor was the Chicago, Milwaukee, St. Paul & Pacific Railroad (The Milwaukee Road), since acquired by the Canadian Pacific Railway. This company also operated passenger trains between Milwaukee and Chicago. Its trackage, however, lay west of, not through, the Cities of Racine and Kenosha.

As late as January 1963, these three private railroads operated a total of about 35 regularly scheduled passenger trains per day in each direction between Milwaukee and Chicago. In addition, another private company, The Milwaukee Electric Railway & Light Company (The Milwaukee Electric Lines, or TMER&L), operated electric interurban passenger train service between Milwaukee, Racine, and Kenosha until the service was abandoned

Map 17

EXISTING RAILROAD PASSENGER SERVICES IN THE MILWAUKEE-RACINE-KENOSHA-CHICAGO CORRIDOR: 1997



Source: SEWRPC.

in 1947. In 1947, the two electric interurban railroads, together with the C&NW, were operating a total of about 51 regularly scheduled passenger trains per day in each direction between Milwaukee, Racine, and Kenosha.

Before and after World War II, the companies operating in the Corridor invested heavily in extensively upgrading these passenger train services, with new equipment and track and signal improvements to enable faster operations and to attract greater ridership. The C&NW, Milwaukee Road, and North Shore Line trains regularly operated in the Corridor at speeds of 80 to 100 miles per hour from the 1930s into the 1960s. Despite this investment, the railroads in the Milwaukee-Racine-Kenosha-Chicago Corridor steadily lost passengers to the private automobile and to the airplane throughout the 1950s and 1960s. Several factors contributed to this decline, including the convenience of the private automobile; public investment in greatly improved highways, including the construction of the IH 94 freeway through the Corridor in 1960; postwar economic prosperity; and large-scale expansion of, and technological improvements in, air travel. This situation, however, was no different from that experienced by railroads elsewhere in the United States. The services provided by the two mainline railroads and two electric interurban railroads in the Corridor, even though eventually abandoned, were better than such services provided in most other areas of the United States.

During the late 1950s and early 1960s, several railroads operating commuter trains in the Chicago area, including the C&NW, which operated the Kenosha-to-Chicago service, challenged the then commonly prevailing opinion that railroad passenger train service, especially commuter rail service, was unprofitable. Unlike commuter rail operations elsewhere in the United States, these Chicago-based carriers reequipped and marketed the passenger train services in the Corridor and managed to turn a small profit on commuter rail services for several years. By the 1970s, however, virtually all commuter rail operations in the Chicago area and in the rest of the United States had been transferred from private ownership and operation to public ownership and operation with public subsidy. All service was then provided either directly by a public operator or under contract between a public authority and a private operator.

Commuter rail service has been operated by the C&NW between Kenosha, Waukegan, Chicago's north shore suburbs, and the Chicago Central Business District (CBD) almost since the completion of that line in 1855. However, true commuter rail service has never been provided in the Corridor over the former C&NW line north of Kenosha o Milwaukee, although this portion of the line did in the past offer intercity passenger service with stops in Milwaukee, Racine, and Kenosha. For many years, a very small number of the C&NW Chicago-to-Milwaukee intercity trains did make local stops at stations in Cudahy and South Milwaukee. These outlying Milwaukee-area stations, however, were used by only one or two trains per day and these stops were discontinued during the 1950s.

During the 1960s both the C&NW and The Milwaukee Road gradually reduced their passenger train service; on May 1, 1971, the National Railroad Passenger Corporation, a quasi-public corporation also known as Amtrak, assumed operation of the remaining passenger train service in the Chicago to Milwaukee Corridor. At that time the remaining passenger trains operated between Milwaukee and Chicago were transferred to the former Milwaukee Road main line, west of the Cities of Racine and Kenosha, and the remaining intercity passenger trains along what is now known as the Kenosha Subdivision between Milwaukee, Racine, Kenosha, and Chicago were discontinued. Use by Amtrak of the former Milwaukee Road route between Milwaukee and Chicago instead of the former C&NW route was controversial because the Milwaukee Road route bypassed the Cities of Racine and Kenosha. From time to time since 1971, Amtrak has considered relocating its service to the Kenosha Subdivision. Amtrak Milwaukee-Chicago service has, however, always remained on the former Milwaukee Road route.

Recognition that extensive railroad passenger service was once provided in the South Lakeshore Travel Corridor is important. The history of this service has provided one basis on which a number of individuals, public officials, and organized groups have proposed the reinstitution of passenger service over the Union Pacific Railroad, Kenosha Subdivision. In 1980, for example, U. S. Representative Les Aspin led an effort to extend commuter rail service from Kenosha to Racine for a two-year trial period. This effort included the preparation and submission of a proposal for Federal funding in partial support of track rehabilitation, as well as a one-day display of contemporary commuter rail equipment in the City of Racine in October of 1980. Severe Federal funding cutbacks in the early 1980s caused the project to be abandoned. Interest in providing such service, however, continues to the present day.

Existing Metra Commuter Rail Service

In 1997, existing commuter rail service extended into the South Lakeshore Corridor. That service was provided by Metra over the Union Pacific North Line. The Union Pacific North Line, formerly known as the C&NW North

Line, is a 51.6-mile-long commuter rail line from Chicago to Kenosha and is one of 12 commuter rail lines in the Metra system. "Metra" is the marketing name utilized by the commuter rail division of the Regional Transportation Authority of Northeastern Illinois. The 540-mile Metra commuter rail system serves about 245 stations within the Northeastern Illinois Region, which includes the six Illinois counties of Cook, DuPage, Kane, Lake, McHenry, and Will. Actual operation of the trains on the Union Pacific North Line is by the Railroad under a contract with Metra.

Commuter rail service on the Union Pacific North Line is oriented toward serving passengers who reside in the Corridor and work in the City of Chicago CBD. Much of the service on this line originates and terminates at Waukegan, Illinois, which is the primary outlying terminal and overnight storage yard for equipment used on this route. This line is unique in that it is the only Metra route that currently extends outside the six-county Northeastern Illinois Region, to Kenosha, Wisconsin, without receiving any public funding other than funding by Metra. The primary reason for this is that the train storage yard at Waukegan is at capacity and additional needed locomotives and coaches are stored overnight at a second yard, in Kenosha. Thus, the operation of a limited number of trains beyond Waukegan to Kenosha by Metra is an operational convenience.

As of January 1997, nine of the 31 southbound weekday passenger trains on the Union Pacific North Line originated at Kenosha, five of these nine serving the morning inbound rush hour. Of the 22 other southbound trains, three originated at Winnetka, three originated at Highland Park, and the rest originated at Waukegan. Three of the five southbound weekday rush hour passenger trains originating at Kenosha were express trains which "skipped" some station stops on the route into Chicago. Nine of the 31 northbound weekday passenger trains originating in Chicago terminated at Kenosha, five of these nine served the afternoon rush hour. Of the other 22 northbound trains, three terminated at Winnetka, three terminated at Highland Park, and the remainder terminated at Waukegan. Four of the five northbound weekday rush hour trains to Kenosha were express trains which "skipped" some station stops. One weekday peak-period train in each direction was scheduled to provide reverse commutation to and from Kenosha.

On Saturdays, five of the 11 southbound trains and seven of the 11 northbound trains on the route operate between Kenosha and Chicago. On Sundays and major holidays, three of both the eight southbound and the eight northbound trains on the route operate between Kenosha and Chicago. The remaining trains operate only between Waukegan and Chicago. There is no express service on Saturdays, Sundays, or holidays.

The length of trains to and from Kenosha varied, but peak-period, peak-direction trains typically consisted of one locomotive and eight bilevel gallery coaches. Trains operating at other times and on weekends and holidays typically consisted of one locomotive and four bilevel gallery coaches, although not all coaches might be open for use.

In 1997, there were 27 passenger stations along the 51.6-mile commuter rail route. Kenosha was the only station in Wisconsin and in the primary study area. Between Highwood and Evanston, Illinois, many of the stations are close together, resulting in relatively low average overall speeds for trains that serve most, or all, stops. The southbound travel times from Kenosha to Chicago varied during weekday peak periods from 82 minutes, for the fastest express trains, an average overall speed of 37 miles per hour, to 102 minutes, for local trains, an average overall speed of 30 miles per hour, and was typically 96 minutes during nonpeak-travel periods and on weekends. The northbound travel times from Chicago to Kenosha also varied during weekday peak periods from 80 minutes, for the fastest express trains, to 93 minutes, for local trains, and was typically 100 minutes during nonpeak periods and on weekends.

Ridership on the Metra service provided over the Union Pacific North Line was substantial and compared favorably with other heavily used Metra routes. Between 1979 and 1983, average weekday ridership on the line decreased from about 27,010 to about 19,230; but from 1983 to 1991, average weekday ridership increased to about 25,010 weekday passengers, as shown in Table 7 for selected years for which data are available. In 1996, ridership was about 26,050 on an average weekday, about 6,110 on an average Saturday, and about 3,990 on an average Sunday. On an average weekday, about 19,150, or about 74 percent, of all passengers were carried on peak-period, peak-direction trains; about 2,600, or about 10 percent, of all passengers were carried on peak-period, reverse-direction trains; about 2,560, or about 10 percent, of all passengers were handled on midday trains; and 1,740, or about 6 percent, were carried on evening trains. During 1996, about 7,654,800 annual passenger trips were carried on this Metra line, about 140,360 during an average week. The average passenger trip length for all trips was 19.8 miles on the 51.6 mile route.

Table 7

TOTAL WEEKDAY PASSENGER BOARDINGS ON METRA'S UNION PACIFIC NORTH LINE: 1979-1996

Year	Weekday Boardings
1979	27,010
1983	19,233
1985	20,540
1987	23,063
1989	23,649
1991	25,213
1993	25,026
1995	25,007
1996	26,052

Source: Metra.

Table 8

WEEKDAY PASSENGER BOARDINGS AND ALIGHTINGS AT THE KENOSHA STATION ON METRA'S UNION PACIFIC NORTH LINE: 1979-1995

Year	Weekday Boardings	Weekday Alighting
1979	267	267
1983	142	146
1985	169	149
1987	208	208
1989	207	208
1991	296	269
1993	308	313
1995	264	267

Source: Metra.

Ridership information specific to the Kenosha station is also available for selected years from surveys conducted about every two years by Metra. While passenger boardings and alightings at any Metra station will vary from day to day, the counts resulting from the surveys are considered to be representative of weekday passenger activity at individual stations. As shown in Table 8, between 1979 and 1995, weekday boardings and alightings at Kenosha have varied from a low of 142 to a high of 313. In 1995, there were 264 southbound passengers boarding at Kenosha These consisted of 215 boardings of the morning peak-period trains, 18 boardings of the midday trains, 15 boardings of the evening peak-period trains, and 16 boardings of the evening trains. In 1995, there were 267 northbound passengers alighting at Kenosha. These consisted of nine on morning peak-period trains, 19 on midday trains, 224 on the evening peak period trains, and 15 on evening trains. By way of comparison, the 1995 weekday boardings and alightings for all stations on Metra's Union Pacific North Line, including Kenosha, are shown in Table 9.

Surveys conducted by the Southeastern Wisconsin Regional Planning Commission in 1991 of passengers using this service indicate that the travel patterns of such users are indeed fairly typical of passengers who may be expected to use CBD- oriented commuter rail service. For example, almost 75 percent of the passengers boarding or alighting at Kenosha were traveling to and from

Table 9

WEEKDAY PASSENGER BOARDINGS AND ALIGHTINGS AT STATIONS ALONG METRA'S UNION PACIFIC NORTH LINE: 1995

Station	Weekday Boardings	Weekday Alightings
Kenosha	264	267
Winthrop Harbor	57	61
Zion	94	90
Waukegan	841	876
North Chicago	192	187
Great Lakes	110	92
Lake Bluff	379	372
Lake Forest	652	625
Fort Sheridan	296	297
Highwood	246	245
Highland Park	1,118	1,058
Ravinia	416	390
Braeside	275	256
Glencoe	770	759
Hubbard Woods	428	407
Winnetka	721	718
Indian Hill	372	382
Kenilworth	446	437
Wilmette	1,505	1,532
Central Street, Evanston	1,210	1,171
Davis Street, Evanston	1,208	1,251
Main Street, Evanston	773	712
Rogers Park	877	824
Ravenswood	878	789
Clybourn	424	514
Chicago Passenger Terminal	10,455	10,695
Total	25,007	25,007

Source: Metra.

work or for work-related purposes. Also, 73 percent of the passengers boarding or alighting at Kenosha typically used this Metra service every weekday. Another 11 percent of the passengers boarding or alighting at Kenosha use this Metra service on the average at least every second day. The remaining passengers use this service less frequently. About 10 percent of the passengers boarding or alighting at Kenosha used this service less than once a month.

With respect to the origins and destinations of trips that board or alight at the Kenosha station, the 1991 Commission surveys had found that 75 percent of such travelers were going to or from the City of Kenosha and other Kenosha County locations. About 19 percent of the travelers were going to or from the City of Racine and other Racine County locations. The remaining 6 percent of the travelers were distributed among Milwaukee, Walworth, and Waukesha Counties. With respect to the other end of the trips made to and from Kenosha County, 84 percent of the trips were found to be going to and from Cook County, 7 percent were to and from the Waukegan area, and the remaining 9 percent to and from various other north shore communities. With respect to the other end of the travel to and from Racine County, as well as the other Southeastern Wisconsin counties, almost all these trips were to and from Cook County.

Over the years, changes in the commuter rail service between Kenosha and Chicago have been relatively minor. For example, in 1981, three northbound late-evening weekday trains into Kenosha were discontinued north of Waukegan as part of overall cost-reduction measures by the Regional Transportation Authority. In February 1987, the C&NW, which was responsible for operation of commuter rail service into Kenosha, eliminated the ticket agent on duty at the Kenosha station. At the time this resulted in local concerns among City of Kenosha officials and residents over the discontinuance of commuter-train service into Kenosha. While the Kenosha ticket agent was eliminated because of the low volume of ticket-window sales at the depot, commuter rail service was not discontinued; in fact, the C&NW soon afterward made physical improvements to the storage yard at Kenosha.

Existing Amtrak Intercity Passenger Service

Existing intercity passenger service is provided in the South Lakeshore Travel Corridor of the Southeastern Wisconsin Region by the National Railway Passenger Corporation, commonly called Amtrak, over the Canadian Pacific Railway Chicago-Milwaukee-St. Paul main line. While this service traverses the primary study area, it does not directly serve the Cities of Racine and Kenosha.

Amtrak's Milwaukee-Chicago service is referred to as *Hiawatha* Service, and consists of a 85-mile-long route over which six trains in each direction operate Mondays through Saturdays and five trains operate in each direction on Sundays and major holidays. All stop at Sturtevant, in Racine County, and at Glenview, in Cook County, Illinois. This route through the study area is also used by one long distance Amtrak train, the *Empire Builder*, which operates once a day in each direction between Chicago, Milwaukee, St. Paul, and Seattle.

The Amtrak Milwaukee-Chicago service is oriented toward providing connections for Milwaukee-area passengers to other long distance trains at Chicago Union Station, a primary intercity service hub of the national Amtrak system. Certain weekday trains, however, have always been well patronized by residents of the greater Milwaukee area who make occasional business trips, who are regular commuters, or who make occasional trips to Chicago for personal or recreational purposes. The stop at Sturtevant was little used by The Milwaukee Road before 1971, but was instituted as a regular stop for all Milwaukee-Chicago trains by Amtrak specifically to serve Racine-area passengers. The existing *Hiawatha* Service is funded in part by the Wisconsin and Illinois Departments of Transportation.

Milwaukee and Sturtevant are the only Amtrak stations located within the primary study area. The travel time between Milwaukee and Chicago for passenger trains is 92 minutes, except for two peak-period, peak-direction trains, which require 97 minutes. The travel time between Sturtevant and Chicago is 68 minutes, except for two peak-period peak-direction trains, which require 73 minutes. The average overall speed of this service is 55 miles per hour (mph).

Ridership on Amtrak's Milwaukee-Chicago *Hiawatha* Service has fluctuated from year to year as a result of changes in the frequency of service and in the fare structure. Table 10 sets forth the annual ridership on this service in years for which data are available. In 1996, an estimated 330,000 trips were made on the service, resulting in an estimated daily ridership of 900 to 1,000 passengers. Surveys of passengers using this service conducted by the Southeastern Wisconsin Regional Planning Commission in 1991 indicated that from 25 to 35 passengers, or about 7 percent of the trips, boarded or alighted at Sturtevant. About half of the trips boarding at Sturtevant are by passengers who are residents of Racine County. Almost three quarters of the trips boarding at Milwaukee are by passengers who are residents of the Milwaukee metropolitan area, consisting of Milwaukee, Ozaukee, Washington, and Waukesha Counties.

Table 10

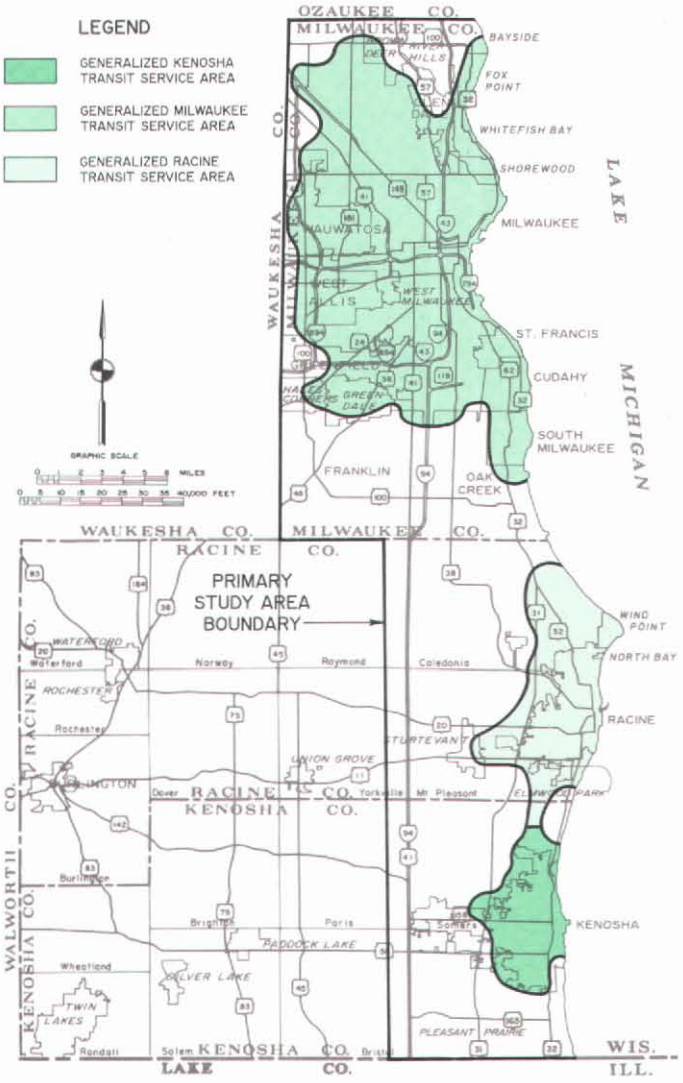
ESTIMATED ANNUAL AND DAILY RIDERSHIP ON AMTRAK'S MILWAUKEE-CHICAGO SERVICE: SELECTED YEARS, 1981-1997

Year	Ridership	
	Annual	Estimated Daily
1981	196,900	500-600
1982	142,300	400-500
1985	193,600	500-600
1988	198,600	500-600
1990	297,600	800-900
1991	315,400	800-900
1992	348,800	900-1,000
1993	411,500	1,100-1,200
1994	453,800	1,200-1,300
1995	328,600	900-1,000
1996	329,000	900-1,000
1997	362,300	1,000-1,100

Source: Amtrak, Wisconsin Department of Transportation, and SEWRPC.

Map 18

SERVICE AREAS FOR URBAN TRANSIT SYSTEMS SERVING THE KENOSHA-RACINE-MILWAUKEE CORRIDOR: 1997



Source: SEWRPC.

Existing Bus Transportation Services

As of January 1997, there were six bus systems operating within the South Lakeshore Travel Corridor within the Southeastern Wisconsin Region. Three of these systems were publicly owned and provided local service within the Milwaukee and Racine urbanized areas. These included: the Kenosha Transit System, owned and operated by the City of Kenosha; the Belle Urban System, owned and operated by the City of Racine; and the Milwaukee County Transit System, owned and operated by Milwaukee County. These transit systems could provide feeder and distributor service to and from potential commuter rail connections in the Corridor. The other three bus systems operating within the Corridor were privately owned systems providing suburban or intercity bus service within the primary study area. These system included the Wisconsin Coach Lines, Inc.; Greyhound Lines, Inc.; and United Limo, Inc.

City of Kenosha Transit System

Fixed-route local transit service in the City of Kenosha and environs was provided by the City of Kenosha Transit Commission. As of January 1997, service was provided over eight fixed routes, radial in design and emanating from the Kenosha CBD. These routes provide direct, nontransfer service from the CBD to all areas of the City and immediate environs, including the University of Wisconsin-Parkside campus. Map 18 shows the transit service area of the Kenosha Transit System. The entire transit service area lies within the primary study area for this commuter rail feasibility study.

On Routes 1 through 6, the Kenosha transit system provided service from 6:00 a.m. to 6:00 p.m. on weekdays and Saturdays, with approximate 30-minute peak-period headways and 60-minute headway during nonpeak periods on most routes. Routes 7 and 8 were two special shuttle routes which provided service to major commercial, recreational, and employment centers that have developed

beyond the historic Kenosha local transit service area. These two routes provided limited service; no service was operated by the system on Sundays or major holidays.

The Kenosha Transit System provided direct service to the Metra commuter rail passenger station, at 5414 13th Avenue, principally via Route 1. Selected buses operating on this route deviate from their regular routes on weekdays and Saturdays to serve the Metra station. The remaining regular runs on Route 1 did not provide direct service to the Metra station. Some buses on Route 4 also deviated from their regular routes to provide direct service to the Metra station. Passengers on the remaining bus routes had to transfer at the central transfer point of the system, located in the CBD, to travel to the Metra station or had to walk from the nearest bus stop on those routes. Thus, the Kenosha Transit System provided limited feeder-bus service to the Metra station. Current service hours of the Metra North Line service, however, begin before, and end after, the current service hours of the Kenosha Transit System.

As already noted, the Kenosha Transit System could provide feeder bus service to potential commuter rail service in the Corridor. The most likely location for passenger transfer would be the existing Metra station. Several Kenosha Transit System bus routes, however, also cross the railroad line concerned north of the Metra station. Some of these locations might be appropriate for connections between local bus routes and proposed commuter rail service if they prove to be good locations for a commuter rail stop and if the local bus routes can be adjusted appropriately.

City of Racine Transit System

Fixed-route local transit service in the City of Racine and environs is provided by the City of Racine. The service is referred to as the Belle Urban System, or "the BUS." As of January 1997, service was provided over 11 fixed routes, 10 of which were radial in design, emanating from the Racine CBD. The 11th route was a local circulation route that connected a portion of the Town of Caledonia to the remainder of the system. These routes provided direct, nontransfer service from the Racine CBD to most areas of the City and immediate environs, including the University of Wisconsin-Parkside campus. Map 18 shows the transit service area for the Belle Urban System. All the Racine transit service area lies within the primary study area for this commuter rail feasibility study.

The Belle Urban System provided service from 5:30 a.m. to 7:00 p.m. on weekdays and from 7:00 a.m. to 6:00 p.m. on Saturdays. Headways during peak periods and nonpeak periods were 30 minutes on all routes except on Routes 3, 4, and 7, where the peak-period headway was 20 minutes during nonsummer months; on Route 10, where the headway was 45 minutes during the entire day; and on the Washington Avenue Express Route, where only limited service was provided on weekdays. No service was operated on Sundays or major holidays. Transit patrons who desire to travel between points served by the Belle Urban System and points served by the Kenosha Transit System could do so by transferring at the University of Wisconsin-Parkside campus. Passengers transferring between the two transit systems were required to pay the appropriate fare for each service.

The Belle Urban System provided direct service to the Sturtevant Amtrak passenger station via Route 7. The service hours of the Belle Urban System enabled connecting service to be provided for all Amtrak trains except the last northbound evening train.

As already noted, the Belle Urban System could provide feeder bus service to potential commuter rail service in the Corridor. Several Racine transit system bus routes cross the railroad line concerned. Some of these locations might be appropriate for connections between local bus routes and proposed commuter rail service if those locations prove to be good locations for commuter rail stops and if the local bus routes can be adjusted appropriately.

Milwaukee County Transit System

Fixed-route local transit service in Milwaukee County is provided by the Milwaukee County Transit System. As of January 1997, service was provided over a total of 70 fixed bus routes, including 14 local radial routes emanating from the Milwaukee CBD, 15 local crosstown routes, three express routes, 11 Freeway Flyer routes, 15 special school routes, three special routes serving industrial parks, and nine local circulator or feeder routes. Specialized routes were also operated for sports events, fairs, and festivals. These routes together formed a system that provided service throughout the developed urban area of Milwaukee County and into some adjacent areas of Waukesha County. The Milwaukee County Transit System provided service seven days a week, typically from 5:00 a.m. to 1:00 a.m. Peak-period headways on most major routes ranged from 10 to 20 minutes and nonpeak-period headways ranged from 15 to 30 minutes. Map 18 shows the area served by the Milwaukee County Transit System in 1997.

The Milwaukee County Transit System provides direct service to the Amtrak passenger station, in downtown Milwaukee, via Routes 13, 57, and 80. The Amtrak station is within three blocks' walking distance of most other bus

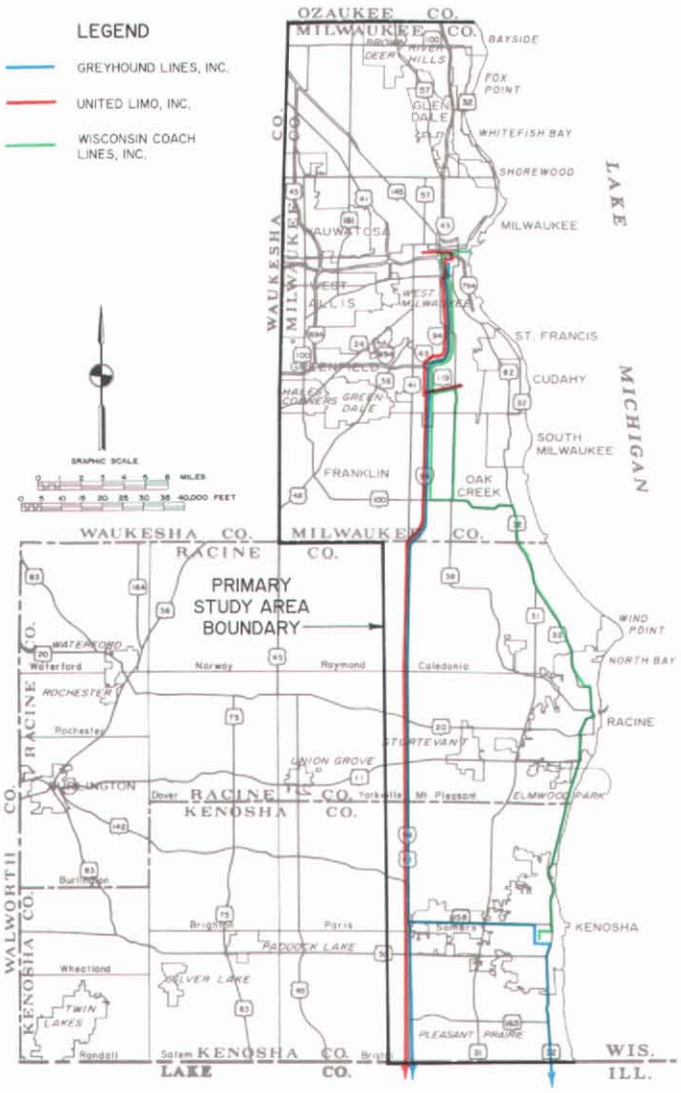
routes serving downtown Milwaukee. The service hours of the transit system enabled connecting service to be provided for all Amtrak trains.

A major portion of the Milwaukee transit service area lies within the primary study area for this commuter rail feasibility study. While several Milwaukee County Transit System bus routes extended into the primary study area, two in particular closely followed the Kenosha Subdivision railroad alignment within Milwaukee County. Route 15, Oakland-Kinnickinnic, is a heavily used local route that extended from the Milwaukee CBD through St. Francis and Cudahy to South Milwaukee and provided frequent all-day service. An extension of this route to the Carrollville area of Oak Creek provided limited service on weekdays. Route 48, the South Shore Flyer, provided weekday peak-period express service between the Milwaukee CBD and the suburban communities of St. Francis, Cudahy, South Milwaukee, and Oak Creek.

Clearly, the Milwaukee County Transit System could provide feeder bus service to any potential Kenosha-Racine-Milwaukee commuter rail service. The most likely location for passengers to transfer between the bus and rail services would be at the existing Amtrak station in the Milwaukee CBD. Several transit system bus routes crossed the South Lakeshore Corridor railroad line within Milwaukee County. Some of these locations might be appropriate for connections between local bus routes and proposed commuter rail service if these locations prove to be good locations for commuter rail stops and if the local bus routes can be adjusted appropriately. Maximizing the potential for these bus routes to provide feeder bus service will probably require: 1) realignment and extensions of some selected existing bus routes to provide direct service to potential new station locations, 2) extension of service hours on selected bus routes, and 3) modification of existing bus route schedules to minimize transfer waiting times.

Map 19

INTERCITY BUS ROUTES SERVING THE KENOSHA-RACINE-MILWAUKEE CORRIDOR: 1997



Source: SEWRPC.

Wisconsin Coach Lines, Inc.

In 1997 Wisconsin Coach Lines, Inc., provided express bus service within the Corridor over a single route between the Milwaukee CBD, the City of Racine, and the City of Kenosha. As of January 1997, a total of eight runs were operated in each direction on weekdays and a total of four runs were operated in each direction on Saturdays, Sundays, and holidays. Intermediate stops were made along the route at major rural and suburban intersections, at local transit system stops within the major cities served, and at additional rural locations upon the request of passengers when deemed safe and practical by drivers. The bus terminal in Kenosha was located at 2105 Roosevelt Road, about one mile southwest of downtown Kenosha. However, all bus runs stopped at the Kenosha Metra station. This bus route is shown on Map 19.

Until 1985, this service was operated without public subsidy; the passenger and freight revenues were sufficient to offset operating costs. Since 1985 the City of Racine, the City of Kenosha, Racine County, and Kenosha County have agreed jointly to provide Wisconsin Coach Lines, Inc., with the financial assistance necessary to operate the bus service. The City of Racine acts as lead agency for the necessary funding. All present subsidy funds are derived entirely from State grants made to the City of Racine.

The Wisconsin Coach Lines route is close to the South Lakeshore Travel Corridor railroad alignment along its entire length. In fact, over much of its length the bus route parallels the railroad line. Ridership on this service approximated 72,900 revenue passengers during 1996, a decrease of about 53 percent from the peak ridership level of about 156,900 in 1980.

Greyhound Lines, Inc.

In 1997, Greyhound Lines, Inc., provided intercity bus service within the Corridor over a single route between the Milwaukee and Chicago CBDs. The location of this bus route within the primary study area is shown on Map 19.

As of January 1997, a total of 16 southbound and 14 northbound runs were operated on this route. The service was oriented toward providing connections for Milwaukee-area passengers with other Greyhound long distance services at the firm's Chicago hub and to accommodate travel between Milwaukee and Chicago. Most of the buses operated nonstop along IH 94 between Milwaukee and Chicago. The only stop within the primary study area was in Kenosha, at 2105 Roosevelt Road. Only two of the 16 southbound and two of the 14 northbound runs deviated from IH 94 and stopped at Kenosha, as well as at Waukegan and Skokie. The schedules of these runs was not conducive to use by commuters living and working in either Milwaukee or Chicago. The scheduled running time for the Greyhound buses between Milwaukee and Chicago varied from two hours 45 minutes to three hours.

Greyhound Lines, Inc., did not receive any public financial assistance for the bus services it provided through the study area.

United Limo, Inc.

In 1997, United Limo, Inc., provided intercity bus service within the Corridor over a single route between Milwaukee and Chicago's O'Hare and Midway Airports. While this service was routed through the primary study area, it did not directly serve the Cities of Racine and Kenosha. The location of this bus route within the primary study area is shown on Map 19.

As of January 1997, a total of 12 southbound and 12 northbound runs were operated on this route. The service was strongly oriented toward providing transportation for Milwaukee-area passengers to and from the two major Chicago airports. Most of the buses operated nonstop along IH 94 between Milwaukee and Chicago. In the Milwaukee area, stops were made at Marquette University, the Amtrak station, United Limo's office and garage at 4960 S. 13th Street, and General Mitchell International Airport. Other stops within the primary study area were at IH 94 and STH 20 for Racine-area passengers and at STH 50 for Kenosha-area passengers. In Illinois, stops were made at Gurnee, O'Hare International Airport, and Midway Airport. Not all bus runs made all stops. A small number of passengers used this service to connect with other airport bus services at O'Hare Airport for nonairport-related trips to and from other Illinois, Indiana, and Michigan cities. The schedules of these runs were not conducive for use by commuters living and working in either Milwaukee or Chicago. The scheduled running time for United Limo buses between the Amtrak station in Milwaukee and O'Hare Airport Chicago was about 2 hours 10 minutes.

United Limo, Inc., did not receive any public financial assistance for the bus services it provides through the study area.

EXISTING KENOSHA-RACINE-MILWAUKEE RAILROAD LINE

A potential new commuter rail route serving the South Lakeshore Travel Corridor of the Southeastern Wisconsin Region would extend from the existing Metra passenger station in Kenosha to the existing Amtrak passenger depot in Milwaukee. The 32.6-mile-long route would utilize trackage owned and operated by the Union Pacific Railroad between Kenosha and Washington Street, in the City of Milwaukee, a distance of 31.4 miles. Washington Street is the point of connection between the Union Pacific Railroad trackage and trackage owned and operated by the Canadian Pacific Railway. The Canadian Pacific Railway trackage would be utilized between Washington Street and the Milwaukee passenger depot, a distance of 1.2 miles.

Within Milwaukee County, the route passes through the Cities of Milwaukee, St. Francis, Cudahy, South Milwaukee, and Oak Creek. Within the City of Milwaukee, the route passes through the neighborhood of Bay View, and, within the City of Oak Creek, the route passes through the community known as Carrollville. Within Racine County, the route passes through the City of Racine and the Towns of Caledonia and Mt. Pleasant. Within Kenosha County, the route passes through the City of Kenosha and the Town of Somers. As of January, 1997, there were a total of 10 stations identified along this route, as shown in Table 11. It should be noted that these stations are specific locations designated on the operating timetables of the railroads and are used in the dispatching and operation

Table 11

EXISTING STATIONS ON THE POTENTIAL KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL ROUTE

Milepost	Station Name[a]	Distance (miles) From Kenosha	Distance (miles) From Milwaukee
	Union Pacific Kenosha Subdivision		
51.6	Kenosha	0.0	32.6
60.5	Racine	8.9	23.7
69.3	Oak Creek	17.7	14.9
78.2	Cudahy	26.6	6.0
79.9	St. Francis	28.3	4.3
	Union Pacific National Avenue Spur		
79.9	St. Francis	28.3	4.3
81.8	Bay View	30.2	2.4
82.5	Kinnickinnic Drawbridge	30.9	1.7
83.0	Washington Street	31.4	1.2
	Canadian Pacific Railway C & M Subdivision		
84.2	Washington Street	31.4	1.2
85.4	Menomonee Drawbridge	32.3	0.3
85.7	Milwaukee (Depot)	32.6	0.0

[a]*Stations are specific locations designated by operating timetables or engineering records but do not necessarily denote the existence of depot buildings or other facilities.*

Source: Union Pacific Railroad and Canadian Pacific Railway.

of trains. Such stations do not necessarily denote the existence of buildings or other facilities and, in fact, are frequently marked only by signs.

For purposes of this feasibility study, the potential Kenosha-Racine-Milwaukee commuter rail route was divided into three segments. The first segment extends from Kenosha to St. Francis, a distance of 28.3 miles, on the Union Pacific Railroad Kenosha Subdivision. This segment is sometimes variously referred to as the "Lakefront Line", the "Passenger Line," or the "Old Line." The second segment extends from St. Francis to Washington Street, a distance of 3.1 miles, on the Union Pacific Railroad National Avenue Spur Track. The third segment extends from Washington Street to the Milwaukee passenger depots on the Canadian Pacific Railway Chicago & Milwaukee (C&M) Subdivision, a distance of 1.2 miles. St. Francis is a junction on the Union Pacific Railroad where the Kenosha Subdivision and the National Avenue Spur Track connect with the Union Pacific Railroad Milwaukee Subdivision. The Milwaukee Subdivision consists of the Union Pacific freight main line between Chicago and Milwaukee and runs about three miles west of, and parallel to, the Kenosha Subdivision. It bypasses the Cities of Waukegan, Kenosha, Racine, South Milwaukee, and Cudahy, and is sometimes referred to as the "New Line." The railroad lines as they existed within are shown by ownership on Map 20 and on Map 21 by operating subdivisions and line segments. The potential Kenosha-Racine-Milwaukee commuter rail route is shown on Map 22.

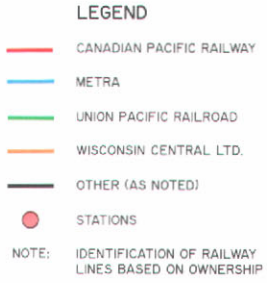
Historic Perspective

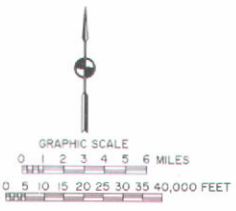
Of the three segments of the Kenosha-Racine-Milwaukee route, the 1.2-mile-long segment along Canadian Pacific Railway's C & M Subdivision has always been part of a major railroad line from Chicago through Milwaukee to St. Paul-Minneapolis. It has always been well maintained and heavily used as a main line. As of January 1997, this segment was used by Canadian Pacific Railway through freight trains and by Amtrak passenger trains. The two segments of the route on the Union Pacific Railroad Kenosha Subdivision and National Avenue Spur Track, however, have undergone extensive changes with respect to their function and facilities in recent years. These two segments were owned and operated by the C&NW prior to its acquisition by Union Pacific Railroad in 1995 and were part of the C&NW's passenger main line between Milwaukee and Chicago. Although extensive intercity passenger train service was operated on what is now the Kenosha Subdivision and the National Avenue Spur Track in past years, the role of this route and its facilities have changed dramatically since that time.

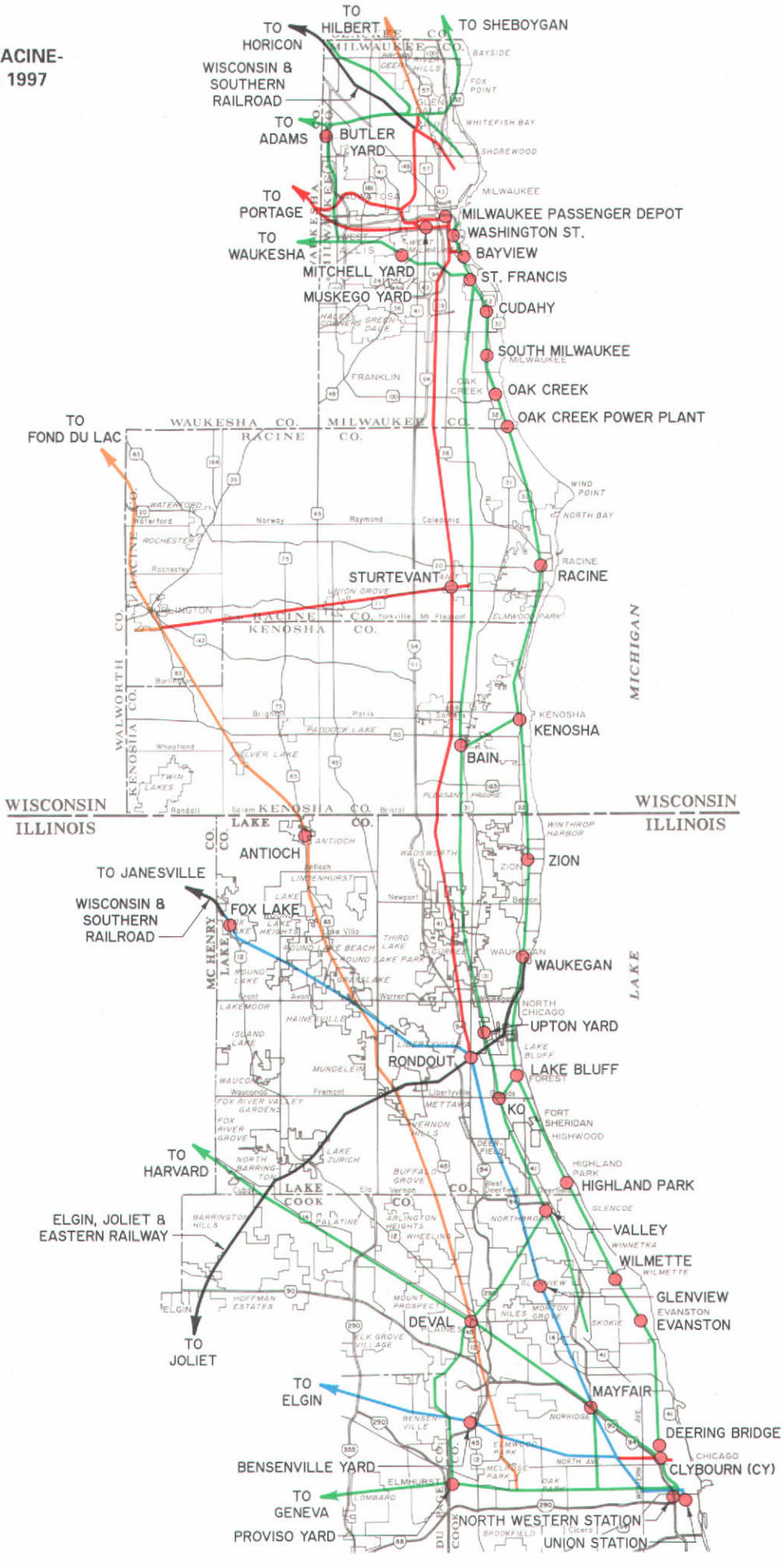
For most of its historic existence, the Kenosha-St. Francis-Washington Street portion of the potential commuter rail route was operated by the C&NW as its passenger main line between Chicago and Milwaukee. At Washington Street the C&NW passenger main line turned northeast and ran about one mile further to the former C&NW lakefront passenger depot at the foot of E. Wisconsin Avenue in the City of Milwaukee. From Milwaukee, numerous passenger trains continued north to Green Bay and Upper Michigan and west to Central Wisconsin and St. Paul-Minneapolis. The intense competition for passenger traffic in the Milwaukee-Chicago Corridor caused this line to be improved and maintained for high speed passenger train operation. Beginning in 1935, selected trains on this route operated at, and sometimes exceeded, 100 miles per hour on a regular basis. This route consisted of a double-track main line over its entire length from Milwaukee to Chicago. In 1952 the Interstate Commerce Commission ordered the installation of an Automatic Train Stop (ATS) system along this line if 100-mph operation were to be continued. ATS is a safety system that applies train brakes if the engineer does not periodically respond to certain trackside or dispatcher signals. During the 1950s, the maximum speed limit for passenger trains along this line was 100 mph on tangent track and 85 mph on curves.

Map 20

RAIL LINES IN THE MILWAUKEE-RACINE-KENOSHA-CHICAGO CORRIDOR: 1997



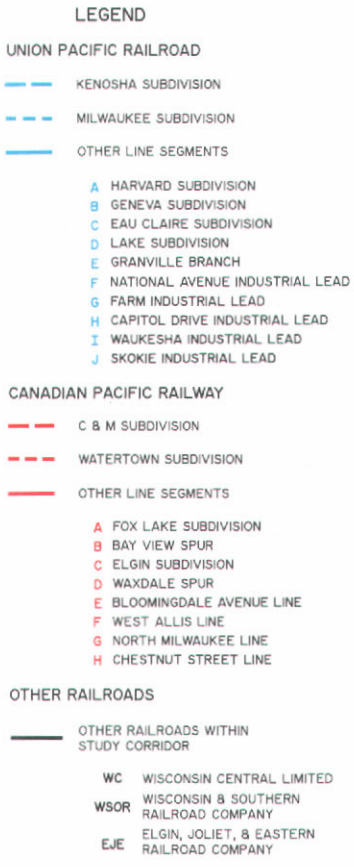


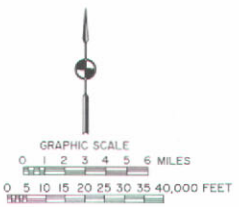


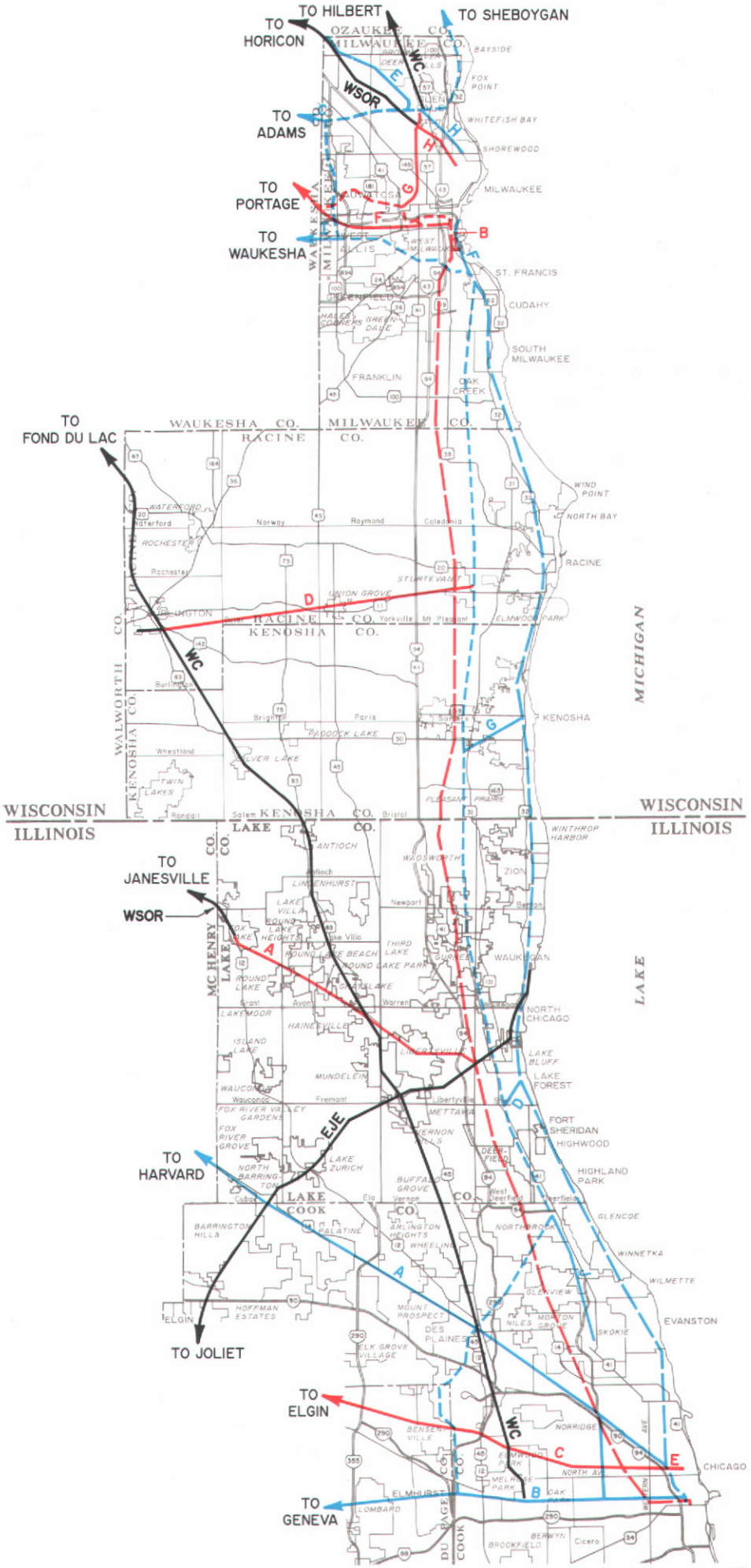
Source: SEWRPC.

Map 21

RAILROAD SUBDIVISIONS AND OTHER LINE SEGMENTS IN THE MILWAUKEE-RACINE-KENOSHA-CHICAGO CORRIDOR: 1997







Source: SEWRPC.

Beginning in the late 1950s, the C&NW changed its facilities and operations, focusing primarily on freight transportation. The nature and slower operating speeds of freight trains compared with passenger trains requires different facilities and in some cases permits use of less sophisticated track and signal systems and comparatively lower levels of maintenance. These changes were also intended to modernize its commuter rail service in the Chicago area and to reduce the impact of losses in the operation of intercity passenger trains on the rest of its system. This shift away from the historic emphasis on passenger operations was, at the time, shared by most other private railroad companies in the United States.

Also, beginning in the late 1950s, the C&NW began to request, and received, permission to discontinue a large number of intercity passenger trains, many of which operated in the Milwaukee-Chicago Corridor. By the mid 1960s, the maximum passenger train operating speed between Milwaukee and Chicago was reduced to 79 miles per hour. In 1966, the C&NW moved its remaining passenger trains from its Milwaukee depot at the foot of E. Wisconsin Avenue to the passenger station at N. 5th Street and W. St. Paul Avenue, newly constructed in 1965 as a Union Station by The Milwaukee Road. The connecting track between the two railroads at Washington Street was constructed at that time to enable C&NW passenger trains to use the new depot. On May 1, 1971, Amtrak assumed responsibility for all intercity passenger train operations in the Milwaukee to Chicago Corridor; the remaining C&NW passenger trains operating through Racine and Kenosha were discontinued.

While passenger service north of Kenosha was eliminated on the Kenosha Subdivision, the line continued to be operated by the C&NW in freight service throughout the 1970s. The commuter rail service between Kenosha and Chicago continued to be operated on the line south of Kenosha, together with a number of through and local freight trains and unit coal trains. Since the line had been well maintained for passenger operation until the advent of Amtrak, it was used by the C&NW as a supplemental route to the Milwaukee Subdivision, located a few miles to the west. For much of the 1970s, the Kenosha Subdivision regularly handled as much freight traffic as the parallel Milwaukee Subdivision.

As a result of changing freight traffic patterns during the late 1970s and early 1980s, the C&NW undertook further changes in its facilities and began to defer maintenance on certain parts of its system. As a result, most regular freight operations between Milwaukee and Chicago were routed over the Milwaukee Subdivision, making that line essentially the primary freight line for the C&NW in the Corridor and relegating the Kenosha Subdivision north of the commuter rail territory to the status of a secondary freight line. Consequently, freight operating speeds north of Kenosha dropped to 30 mph, with frequent use of 10 mph "slow orders." With the status of the line downgraded, the C&NW also began removing the signal systems along the line. In 1983, the interlocking signal system for the drawbridge over the Kinnickinnic River was dismantled. In December 1985, the interlocking tower and its operator at St. Francis Junction were replaced with remote control operation by the dispatcher in Chicago. In 1987 both the Automatic Block Signal system (ABS) and the ATS between the north side of Kenosha and St. Francis were removed. Following the removal of the ABS and ATS systems from the Kenosha-St. Francis segment, the mainline was reduced from two tracks to one track between the north side of Kenosha and St. Francis. While the physical condition of the remaining track was upgraded to reduce the need for slow orders, the superelevation of curves was reduced to accommodate solely freight train operation and not higher-speed passenger train operation. Also, grade-crossing-signal circuits were modified for slower freight operating speeds.

Current Utilization

As of January 1997, the number and type of train operations varied significantly among the three sections of the Kenosha-Racine-Milwaukee railroad route. As already noted, commuter trains were operated as far north as Kenosha. At Kenosha some commuter trains were stored in the three-track yard adjacent to the main line at the passenger depot. Additional equipment used to be stored overnight in a seven-track lower coachyard west of the depot. The lower coachyard was accessed by backing trains from the main line down the Farm Spur Track. The Farm Spur is a four-mile-long industrial lead track which connects the Kenosha Subdivision main line at the Kenosha depot with the Milwaukee Subdivision freight main line at Bain Station, just west of the City of Kenosha.

A variety of regular through and local freight trains were operated over the Kenosha Subdivision between Kenosha and St. Francis by the Union Pacific Railroad. Through freight trains operated on the Kenosha Subdivision included general freights and unit coal trains. The Union Pacific operated one daily northbound general through freight train over this line on a regular basis. This train operated from Proviso Yard, near Chicago, to Butler Yard, near Milwaukee. This train enters the Kenosha Subdivision at Lake Bluff, picks up and sets out cars at Waukegan, and leaves the Kenosha Subdivision at St. Francis. Unit coal trains are operated to the Wisconsin

Electric Power Company Oak Creek Power Plant, at the Milwaukee-Racine County line. Northbound loaded unit coal trains enter the Kenosha Subdivision at Lake Bluff. After delivering cars at the power plant, the locomotives usually run light, or without a train of cars, from Oak Creek through St. Francis to Butler Yard. The locomotives for southbound empty coal trains usually originate at Butler Yard, pick up empty cars at the power plant, and leave the Kenosha Subdivision at Lake Bluff. The operation of unit coal trains on the Kenosha Subdivision averages one loaded train and one empty train daily.

In addition to these regular through and unit coal freights, traffic congestion or track maintenance on the Milwaukee Subdivision may result in additional trains being operated over the Kenosha Subdivision at the discretion of the dispatcher. When this occurs, as many as 10 to 12 additional through trains a day may be handled on the Kenosha Subdivision between St. Francis, Kenosha, and Lake Bluff. These may include through trains to and from Milwaukee, St. Paul-Minneapolis, and Duluth-Superior, as well as unit grain, potash, and coal trains. In 1997, Union Pacific was making efforts to attract additional freight traffic to and from Canada, which may operate in the Milwaukee-Chicago Corridor. Capacity limitations on the Milwaukee Subdivision between Milwaukee and Chicago may require that some of this new traffic use the Kenosha Subdivision between St. Francis and Lake Bluff.

As of January 1997, the Union Pacific also operated local freights along the Kenosha-Racine-St. Francis portion of the Kenosha Subdivision. A local freight train known as the "Kenosha Road Switcher" served customers in Kenosha and Racine. This train was based at the Kenosha Yard and worked Monday through Friday during first shift. A local freight known as the "Waukegan Road Switcher" was based at the Waukegan Yard and typically worked Monday through Friday during second shift. The Waukegan Road Switcher ran north to Kenosha to drop off cars for the Kenosha Road Switcher, then continue westward on the Farm Spur to serve customers located at, and south of, Bain Station. This train then ran south to Upton Yard and returns to Waukegan via Lake Bluff. A local freight known as the "Cudahy Road Switcher" was based at the Mitchell Yard in Milwaukee and worked Monday through Friday during first shift. The Cudahy Road Switcher entered the Kenosha Subdivision at St. Francis and served customers in the Cudahy and South Milwaukee areas. Three times a week this train continued south to Racine to interchange cars with the Kenosha Road Switcher.

Train operations on the National Avenue Spur Track normally consist of a single train known as the "Marsh Job." The Marsh Job was based at Mitchell Yard in Milwaukee and operated Monday through Friday during the first shift. The Marsh Job enters the Kenosha Subdivision at St. Francis and operates north on the National Avenue Spur. It is responsible for serving customers north of St. Francis, including those in the Jones Island area, the Port of Milwaukee, in and around Marsh Yard, and in the City of Milwaukee Third Ward.

Train operations on the Canadian Pacific Railway C&M Subdivision over the 1.2-mile distance between Washington Street and the Milwaukee passenger depot are heavy because this segment of track forms part of the main line between Chicago and St. Paul- Minneapolis. The trackage between Washington Street and the Milwaukee passenger depot is shared by Chicago-Twin Cities mainline traffic of both the Canadian Pacific Railway and Amtrak Milwaukee-Chicago Corridor trains. As of January 1997, there were seven daily intercity passenger trains operated in each direction, six in each direction on Sundays and major holidays, plus, typically, from eight to 10 daily freight trains in each direction between Milwaukee and Chicago. Most of these freight movements may be expected to use the "passenger main line" between Washington Street and the passenger depot. This is the line that commuter trains from Racine and Kenosha would use to enter Milwaukee. The remaining Canadian Pacific Railway freight train movements between Milwaukee and Chicago operated through Muskego Yard, along the southern perimeter of the Menomonee River valley, necessitating use of the "freight main line" located adjacent to the passenger main line between Washington Street and E. Florida Street. Freight trains routed to Muskego Yard over the freight main line leave the main line of the C&M Subdivision at E. Maple Street, about 0.7 mile south of Washington Street. Therefore, freight train movements to and from Muskego Yard would not conflict with possible commuter-train movements from Kenosha. The decision as to which Canadian Pacific Railway freight trains are routed through Muskego Yard and which trains are routed through the Milwaukee passenger depot is made by train dispatchers and is dependent upon whether or not significant switching work is to be done in Milwaukee and whether a particular train has excess-weight cars or loads in its consist. Through freights routed through the passenger depot must travel slowly because of the sharp curves just east of the depot. They are typically 5,000 feet to 8,000 feet in length, requiring a significant length of time to pass through the depot area.

Local switching activity is normally minimal in and around the Milwaukee passenger depot. Amtrak does not normally set out or add cars to its *Empire Builders* at Milwaukee.

Map 22

EXISTING MILWAUKEE-RACINE-KENOSHA RAIL LINE

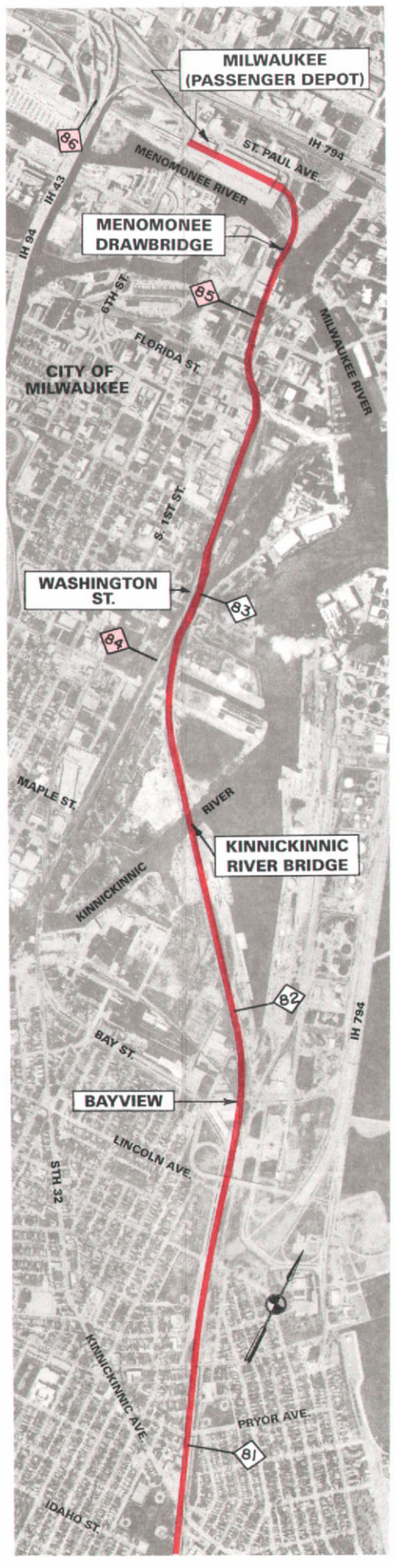
LEGEND

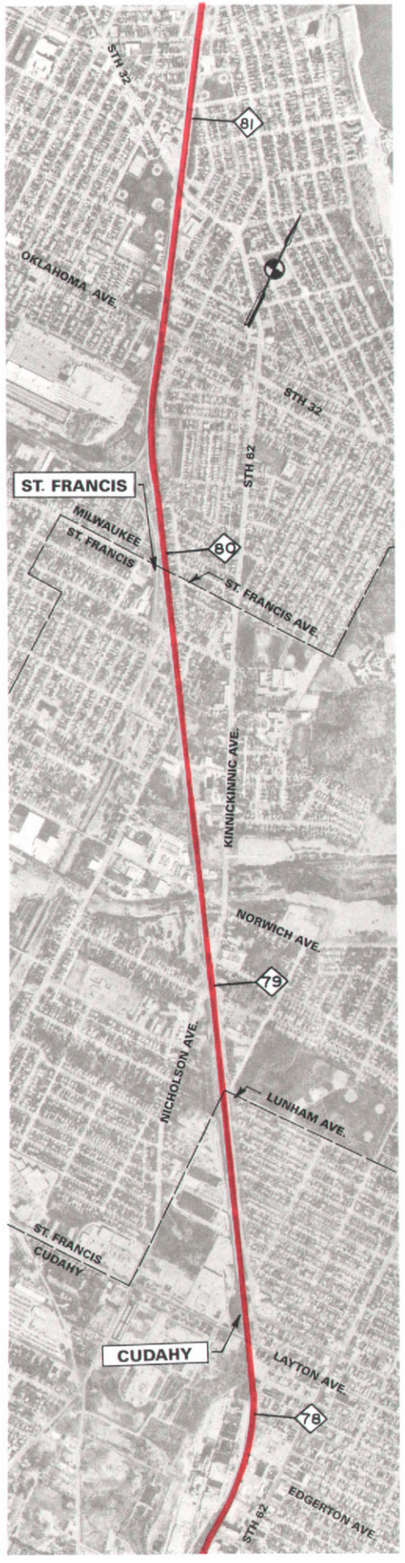
- PROPOSED COMMUTER RAIL ROUTE
- BAYVIEW — EXISTING STATION
- 81 — UNION PACIFIC RAILROAD MILEPOST
- 84 — CANADIAN PACIFIC RAILWAY MILEPOST

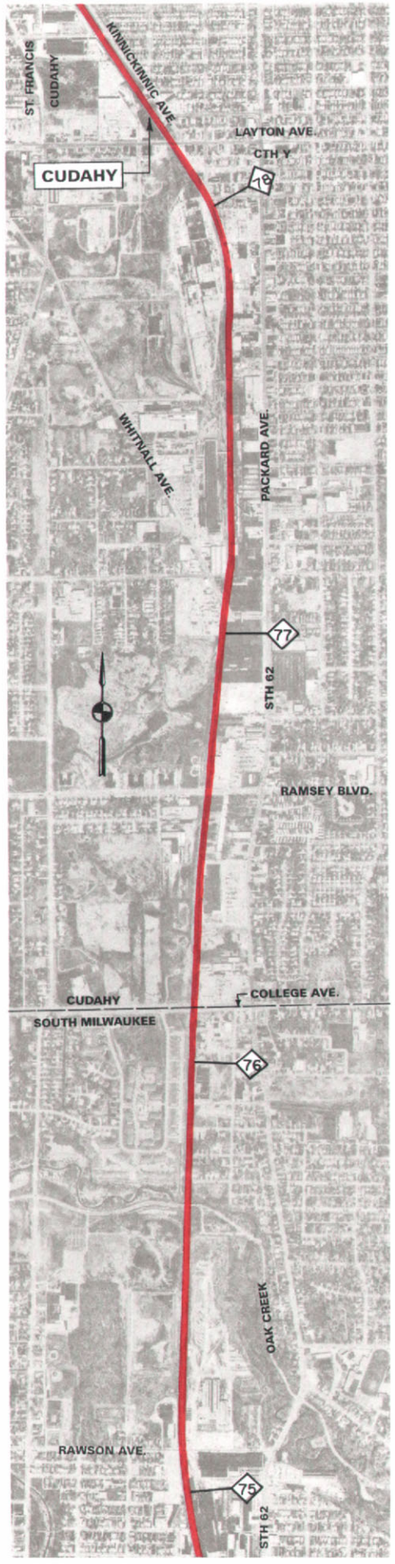
GRAPHIC SCALE
0 1/8 1/4 MILE
0 1000 2000 FEET

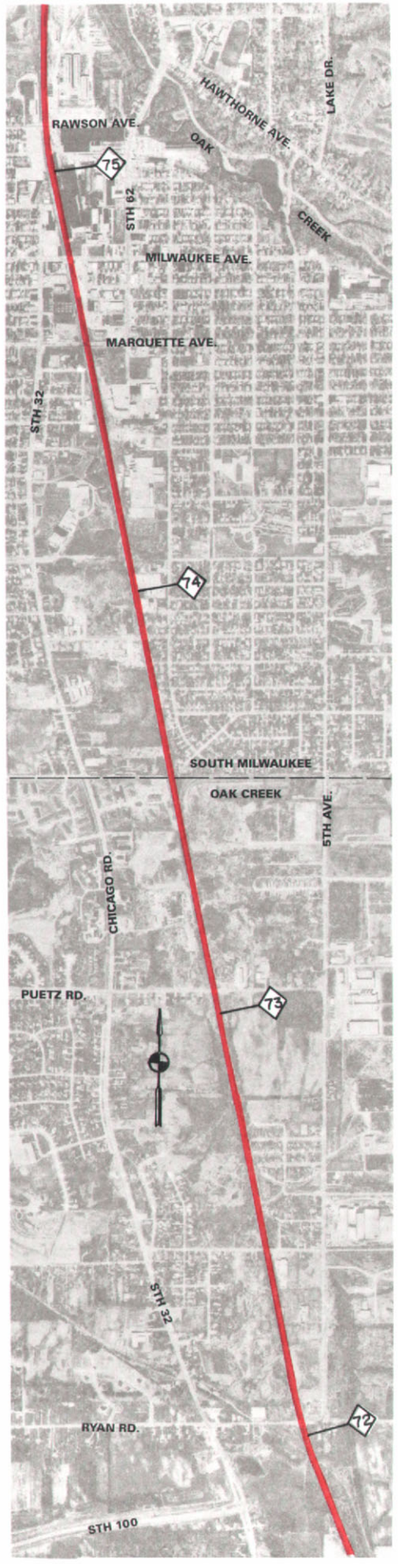
NOTE: Railway stations are specific locations designated by operating timetables or engineering records and do not necessarily denote the existence of depot buildings or other facilities.

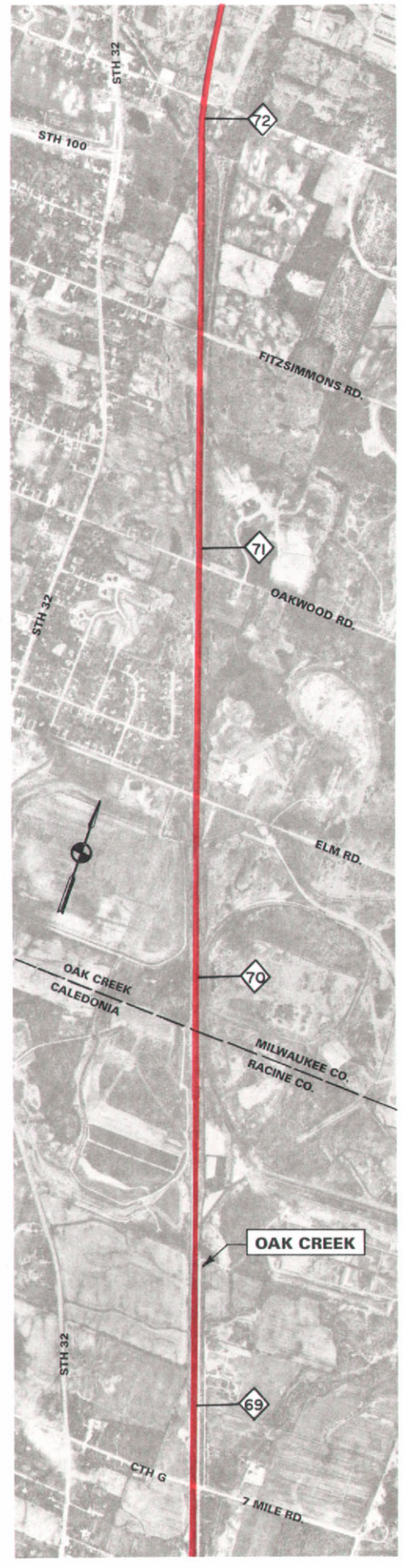
Source: SEWRPC.

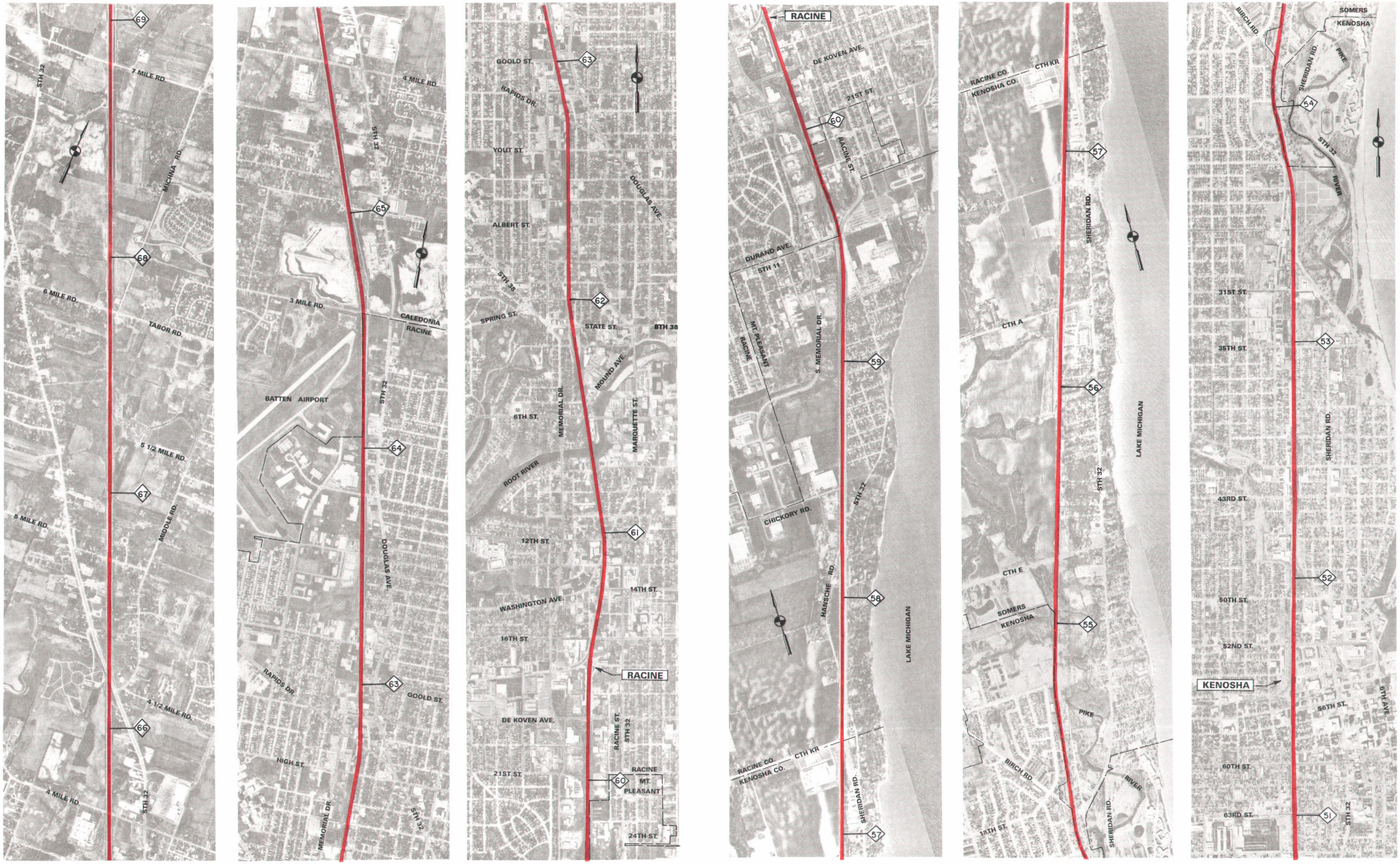











69
7 MILE RD.
STH 32
MICHNA RD.
68
6 MILE RD.
TABOR RD.
5 1/2 MILE RD.
67
5 MILE RD.
MIDDLE RD.
4 1/2 MILE RD.
66
4 MILE RD.
STH 32
4 MILE RD.
STH 32
65
3 MILE RD.
CALEDONIA
RACINE
BATTEN AIRPORT
STH 32
64
DOUGLAS AVE.
63
GOOLD ST.
RAPIDS DR.
HIGH ST.
MEMORIAL DR.
STH 32
GOOLD ST.
63
RAPIDS DR.
YOUT ST.
ALBERT ST.
DOUGLAS AVE.
STH 38
62
SPRING ST.
STATE ST.
STH 38
MOUND AVE.
6TH ST.
MEMORIAL DR.
MARQUETTE ST.
ROOT RIVER
61
12TH ST.
14TH ST.
WASHINGTON AVE.
16TH ST.
RACINE
DE KOVEN AVE.
RACINE ST.
STH 32
21ST ST.
60
RACINE
MT. PLEASANT
24TH ST.
RACINE
DE KOVEN AVE.
21ST ST.
60
RACINE ST.
DURAND AVE.
STH 11
MT. PLEASANT
RACINE
S. MEMORIAL DR.
59
CHICKORY RD.
STH 32
HANSCHE RD.
58
LAKE MICHIGAN
RACINE CO.
KENOSHA CO.
CTH KR
SHERIDAN RD.
57
RACINE CO.
KENOSHA CO.
CTH KR
57
SHERIDAN RD.
CTH A
56
LAKE MICHIGAN
STH 32
CTH E
SOMERS
KENOSHA
55
PIKE
BIRCH RD.
18TH ST.
RIVER
SHERIDAN RD.
BIRCH RD.
SOMERS
KENOSHA
SHERIDAN RD.
PIKE
54
STH 32
RIVER
31ST ST.
35TH ST.
53
SHERIDAN RD.
43RD ST.
52
50TH ST.
52ND ST.
KENOSHA
56TH ST.
6TH AVE.
60TH ST.
63RD ST.
51
STH 32

Also, the train consists for the *Hiawatha* Service operations do not usually require switching. Most switching in the depot area consists of shifting the *Hiawatha* Service equipment from one track to another or occasionally positioning private cars for movement on Amtrak passenger trains. Local Canadian Pacific Railway switching moves, usually consisting of only a locomotive and a few cars, also pass through the depot several times a day.

Traffic Control

Train operation authority along the potential Kenosha-Racine-Milwaukee commuter rail route varies, depending upon the section of line. The main line of the Kenosha Subdivision south of the City of Kenosha is generally equipped for handling the existing Metra commuter operations. South of the City of Kenosha the main line consists of two tracks with the normal direction of traffic utilizing the left-hand track. Commuter passenger trains are operated by timetable authority and train spacing is protected by ABS over the entire route except between Winnetka and Evanston, where Centralized Traffic Control (CTC) is in operation for a distance of 6.4 miles, controlled by the operator at CY Tower in Chicago. Between Chicago and Kenosha, the Subdivision remains equipped with ATS. Any train operating within this territory must be led by a locomotive equipped for ATS. The Kenosha station is located at Milepost 51.6. The double-track main line extends from north of the Kenosha depot to Milepost 53.0, where it converges to a single-track. The ABS and ATS territory extends north of the Kenosha depot to Milepost 52.1. Yard limits on the Kenosha Subdivision in the City of Kenosha area extend from Milepost 51.0 to 53.0.

From Milepost 53.0, near Kenosha, to Milepost 79.9, at St. Francis, train movements are governed by Track Warrant Control (TWC), which is essentially a manual dispatching system whereby train crews obtain permission from the dispatcher by radio for operating trains over certain segments of track. Dispatchers governing train movements along this segment work out of the Union Pacific Railroad Harriman Dispatching Center in Omaha, Nebraska. TWC is typical for operation over unsignaled segments of track and replaces the traditional authority of written train orders used by railroads in the past.

Train operations along the National Avenue Spur Track are governed by rules for operation within yard limits, since this line is operated essentially as an industrial-switching lead track. Signals and turnouts on the main lines for the junction at St. Francis are also controlled by the dispatcher at the Harriman Dispatching Center in Omaha. At Bay View, there is a connection from the National Avenue Spur Track to the Port of Milwaukee trackage on Jones Island and a crossing with Canadian Pacific Railway's Bay View Spur, which also serves the Jones Island area. The crossing at Bay View is protected by automatic signals activated by approaching trains. The signal system is equipped with timed-release push-button controls for use by train crews to clear the signals when they do not operate automatically. At Milepost 82.5, the National Avenue Spur Track crosses the Kinnickinnic River on a drawbridge protected by stop boards and manually operated derails but no longer has signal protection. Thus, opening and closing the span is a relatively cumbersome and time-consuming manual procedure. The bridge machinery can be operated from a control box on either bank of the river or from the bridge-tender cabin on the bridge.

Alignment

The vertical and horizontal alignment of the railroad along the potential commuter rail route is generally well suited for high speed passenger train operation. The Kenosha-Racine-Milwaukee route parallels the Lake Michigan shoreline on relatively flat topography for its entire length. The few grades that exist are generally caused by ravines that stretch inland perpendicular to the lakeshore. Accordingly, most of the route is on the natural grade of the surrounding topography. The railroad is built on a fill between 36th Street and the Metra depot, in the City of Kenosha, a distance of 1.3 miles; between 9th Street and Mound Street, in the City of Racine, a distance of 0.5 mile; and between the Menomonee Drawbridge and Washington Street, in the City of Milwaukee, a distance of 1.2 miles. Grades are expressed in percentages, with a grade of 1 percent rising or falling one foot per 100 feet. Between Kenosha and Racine grades are minor, with a 0.57 percent grade descending northbound at Milepost 52.5 coming off the elevation in Kenosha, and a sag at Milepost 55.2 to bridge the Pike River. Between Milepost 61.5 and Milepost 70.3, beginning in the City of Racine, the line ascends northbound on a 0.20 percent grade. From a crest at Milepost 70.3, the railroad grade descends in northbound on a 0.23 percent grade for a distance of nearly 5.0 miles into South Milwaukee before again ascending on a 0.75 percent grade for a distance of 1.4 miles. Milepost 77.8 in the City of Cudahy marks the highest elevation along the route, 717 feet above mean sea level. North of Cudahy the line descends at an average grade of about 0.70 percent for about 4.0 miles through St. Francis and Bay View to the Kinnickinnic Drawbridge. After crossing the Kinnickinnic River, the northbound line ascends for about 0.9 miles. The steepest grade in this segment is 0.75 percent, between

Milepost 82.6 and Washington Street, where the route becomes generally level and connects Union Pacific and Canadian Pacific Railway trackage. North of Washington Street, the northbound grade descends at an average of 0.70 percent for 0.6 mile, to the east end of the Milwaukee passenger station.

With respect to horizontal alignment, there are 36 horizontal curves along the entire route. Between Kenosha and Washington Street, on the Union Pacific portion of the route, there are 31 horizontal curves. All but six curves on this segment are 2°00' or less. The sharpest curves along the route are between Milwaukee and Washington Street, on the Canadian Pacific Railway portion of the route, where there is a curve of 3°45' and a compound curve of 14°00' and 12°30' at the east end of the passenger station and a reverse curve of 10°00' and 9°30' on the bridges over S. First and E. Florida Streets. On the connection track between the two railroads, at Washington Street, there is a reverse curve of 2°22' and 5°30'.

The right-of-way width generally varies between 80 and 100 feet between Kenosha and Washington Street. Between St. Francis and E. Lincoln Avenue, where the railroad line has been relocated to accommodate construction of the new Lake Parkway, the right-of-way is narrow, ranging from 27 to 50 feet in width. Between Washington Street and the Milwaukee passenger station, the right-of-way width varies from 60 to 140 feet. There are no vertical or horizontal clearance restrictions along the route that would prohibit the use of conventional commuter-train equipment over this route. In fact, bilevel gallery coaches of the type extensively used by Metra have been operated over this entire route on a regular basis in the past by the C&NW.

Track Structure

The Union Pacific Kenosha Subdivision between Kenosha and St. Francis consists of a single-track main line with passing sidings. The double-track main line from Chicago extends from north of the Kenosha Depot to Milepost 53.0, where it converges to the single-track main line to Racine and St. Francis. As already noted, the line between Kenosha and St. Francis was at one time double-tracked. Between Milepost 53.0 and Milepost 70.3, the former southbound, or easterly, track remains in place. Between Milepost 70.3 and Milepost 79.9 at St. Francis, the former northbound, or westerly, track remains in place. At Racine, a 1.7- mile-long passing siding extends from Milepost 58.7 to Milepost 60.4. This siding was formerly a part of the northbound main line. At Oak Creek, a 2.2-mile-long passing siding extends from Milepost 67.0 to Milepost 69.2. This siding was formerly a part of the southbound main line. It is often used to store unit coal trains prior to delivery to the Wisconsin Electric Power Company Oak Creek generating plant. At Cudahy, there is a 1.2-mile-long passing siding, extending from Milepost 75.6 to Milepost 76.8. It is also a part of the former northbound main track.

The main line is generally laid with 112-pound to 115-pound jointed rail rolled and laid between 1936 and 1953, except for the segment between Milepost 70.2 and Milepost 74.0, which is laid with 115-pound continuous welded rail rolled and laid in 1964 and 1966. The passing sidings which utilize one of the former mainline tracks are laid with 110-pound to 112-pound jointed rail rolled and laid between 1929 and 1942. Another passing siding, 1.4 miles in length, is located in Cudahy, from Milepost 77.1 to Milepost 78.5. This siding does not consist of a section of former mainline track, but is used as a lead track for the Cudahy Yard. Small yards used for sorting local freight car traffic are located at Kenosha, Racine, and Cudahy. A variety of other tracks exists along this line and are used for local switching, storage, or providing access to local customers.

St. Francis is the site of a major junction between the Kenosha Subdivision and the National Avenue Spur Track and the Union Pacific Milwaukee Subdivision, which is the primary Union Pacific freight line from Chicago to Milwaukee and on to St. Paul. The Milwaukee Subdivision is considered the main route through the Junction. It curves from a north-south alignment to an east-west alignment at St. Francis. All four lines entering this junction are single track; any train movements through the junction must use a short stretch of common track. During late 1996 and early 1997, trackage at this junction was reconstructed and realigned to provide right-of-way for construction of the Lake Parkway. The track through the junction is laid with 136-pound continuous welded rail rolled in 1994 and laid in 1996.

The Union Pacific National Avenue Spur Track between St. Francis and Washington Street consists of a single mainline track. The section of this line between Milepost 79.9, at St. Francis, and Milepost 81.6, where E. Lincoln Avenue crosses, was reconstructed and realigned to provide adequate space on the railroad right-of-way for construction of the new Lake Parkway. As a result, all other railroad trackage in this segment of the right-of-way has been removed. The remaining single track was relocated to the westerly edge of the railroad right-of-way. The track along this segment is laid with 115-pound continuous

welded rail rolled in 1994 and laid in 1996 resting on concrete crossties. As part of the reconstruction of this segment of line, the six bridges carrying the railroad over local streets were also relocated and rebuilt. As already noted, the line between St. Francis and Washington Street was once a double-track main line. On this segment the former southbound, or easterly, track remains in place and is used as the main running track. North of the Canadian Pacific Railway rail crossing at Bay View, the former northbound, or westerly, track also remains in place but is normally used for local switching and car storage. Between the north end of the reconstructed segment of the National Avenue Spur Track and Washington Street, the main running track is generally laid with 112-pound jointed rail rolled in 1938 and laid in 1939. A variety of other tracks exists along this line, particularly in the area around the Continental grain elevator, near the south approach to the Kinnickinnic Drawbridge, and also near Washington Street. These tracks are used for local switching, storage, and access to local customers.

Washington Street is the site of the connection between the Union Pacific National Avenue Spur Track and the Canadian Pacific Railway C&M Subdivision main line. This connection was constructed in 1966 and is laid with 115-pound jointed rail rolled and laid in 1966. Turnouts leading to this connection from the National Avenue Spur Track are hand-thrown switches, while the turnout leading to the Canadian Pacific Railway main line is controlled by Canadian Pacific Railway dispatchers in Minneapolis. Since C&NW passenger train service was discontinued in 1971, this connection has seen only occasional use, primarily for detours and special movements.

The Canadian Pacific Railway C&M Subdivision between Washington Street and the Milwaukee passenger depot consists of a double-track main line. Crossovers between the two main tracks are located within the depot area and south of the Menomonee Drawbridge. Both main tracks are laid with 132-pound continuous welded rail rolled and laid in 1980. There are no auxiliary tracks diverging from the main line along this segment.

Track Condition

The condition of the track along the Kenosha-Racine-Milwaukee route may be described in terms of the permissible maximum train operating speed. The maximum practical operating speed along any specific section of railroad track is dependent upon four principal factors: alignment, special trackwork, operational considerations, and physical condition. Maximum operational speed limits are determined primarily by the horizontal curvature of the alignment and, to a lesser extent, by the severity of the grades. Maximum operating speed limits over special trackwork, such as turnouts, crossings, and crossovers, are determined by the curvature of the turnouts and by the angle of the crossings. Other factors affecting speeds on special trackwork may include the extent of such work in a single area and the need for train movements to have adequate time to respond to signal indications. Operational speed limits are determined by such factors as station-to-station distances, performance characteristics of locomotives and rolling stock, surrounding development, and safety considerations. In general it is desirable to operate trains at the highest safe speeds, considering the aforementioned factors. As already noted, the operational requirements of passenger trains are generally more demanding of the track and signal system than the operational requirements of freight trains.

Table 12

MAXIMUM TRAIN OPERATING SPEEDS ALLOWED BY FEDERAL RAILROAD ADMINISTRATION TRACK CLASSIFICATION: 1997

Class	Maximum Allowable Operating Speed (miles per hour)	
	Freight Trains	Passenger Trains
1	10	15
2	25	30
3	40	60
4	60	80
5	80	90
6	110	110

NOTE: Actual operating speeds on a specific section of railroad trackage are dependent not only upon the physical condition of the track structure and roadhead, but also on the track alignment, existence of special trackwork and operational considerations.

Source: Federal Railroad Administration.

With respect to the physical condition of railroad tracks, the Federal Railroad Administration (FRA) has prescribed minimum requirements for the safe operation of freight and passenger trains over railroad lines that are a part of the general railroad system of the United States. These minimum requirements are set forth in a detailed set of engineering standards that relate to the condition of the trackwork structure, including the age and condition of rails, the age and condition of crossties, the condition of ballast, the quality of drainage, and the level of vegetation. As shown in Table 12, there are a total of six classes that apply to specific track conditions. On the basis of the

detailed technical requirements of each class, the FRA allows train movements over railroad trackage in the United States up to specified speed limits for each class. These six FRA classes provide a good basis for an initial evaluation of the condition of railroad trackage and for estimation of the costs of improvements needed to meet desired operating speeds in an existing track structure.

The trackage and roadbed on the Union Pacific Kenosha Subdivision between Kenosha and St. Francis is generally in good condition and meets FRA Class 3 track safety standards. The maximum speed for freight operations on the Kenosha Subdivision between Kenosha and St. Francis is 40 mph. There are permanent speed restrictions of 30 mph between Milepost 77.0 and Milepost 79.9, where the line passes through Cudahy and St. Francis, and 25 mph through the junction at St. Francis. The speed limit on sidings is 10 mph. No speed limits for passenger train movements are identified on the Kenosha Subdivision north of the Kenosha station. The National Avenue Spur Track between St. Francis and Washington Street is in very good physical condition between St. Francis and the E. Lincoln Avenue overpass near Bay View and in poor condition from the E. Lincoln Avenue overpass to Washington Street. The entire National Avenue Spur Track is classified as "FRA excepted track." Trackage so classified does not have to meet FRA track safety standards, but is restricted in the type of operations that can be made over it. On track that has been excepted from FRA standards, there are restrictions on the maximum weight of cars that may be handled, restrictions on the number of freight cars containing hazardous materials that may be handled, all train operations are limited to a maximum speed of 10 mph, and no train movements may be handled with revenue passengers on board. Accordingly, all train operations on the National Avenue Spur Track are currently limited to a maximum speed of 10 mph.

The trackage and roadbed on the Canadian Pacific Railway C&M Subdivision between Washington Street and the Milwaukee passenger depot is in very good condition and currently meets Class 3 track safety standards. Between Washington Street and the east end of the curve at E. Florida Street, the maximum permissible operating speed for passenger trains is 40 mph. Between the east end of the Florida Street curve and Menomonee Drawbridge, the maximum speed for passenger trains is 30 mph. Between Menomonee Drawbridge and the Milwaukee passenger depot, the maximum operating speed for passenger trains is 15 mph. Operating speed restrictions on this section of the C&M Subdivision are all governed by sharp curvatures of the railroad alignment as it approaches the Milwaukee depot.

Street and Highway Crossings

There are a total of 74 public street and highway crossings along the potential commuter rail route. Some 51 are at-grade and 23 are grade-separated crossings. All 51 at-grade crossings are protected by automatic grade-crossing signals. All but three of those signals have gates in addition to flashing lights and bells. Of the 23 grade-separated crossings, only one crosses over the railroad line and the remaining 22 cross below it. There are also a total of four private at-grade crossings and two pedestrian underpasses along this route. In general, the electrical circuits for activating the automatic grade-crossing signals are timed for freight operations at a maximum speed of 40 mph.

Passenger Depot Buildings

There are six passenger depot buildings remaining along the Kenosha to Milwaukee route. These are located at Kenosha, Racine, South Milwaukee, Cudahy, E. National Avenue in the City of Milwaukee, and downtown Milwaukee. For purposes of this study the term "depot" refers to a building and attendant facilities used for passenger boarding and alighting and is different from the term "station." In railroad terminology, stations are specific locations designated for operating and engineering purposes and do not necessarily denote the existence of a building or other facilities.

The passenger depot at Kenosha is a building at street level, at 5414 13th Avenue, and a 400-foot-long center-island platform between the two main railroad tracks at track level, which is on an embankment. Passenger access to the platform is via a pedestrian tunnel and stairway near the north end of the building. A roof covers the stairway entrance and about 180 feet of the platform at track level. The depot is a brick building owned by the Union Pacific Railroad, constructed in 1948. In 1982, the City of Kenosha initiated a series of improvements to the depot area, including renovation of the building and attendant stairways and rest rooms, and construction of an automobile dropoff and pickup area for passengers, a bus-transfer facility, and a 138 space park-ride lot. The City has invested nearly $1 million in the improvements to the depot facility, which is jointly operated with Metra.

The Racine passenger depot, at 1421 W. State Street, is about 1.3 miles north of the present station at Racine. The facility consists of a brick main building on the east side of the track, a brick baggage building on the west side of the track, and platform canopies on both sides of

the track. The property and structures on the east side of the track are privately owned by Ronald A. and James Haarsma. The structures on the west side of the track are owned by Harold W. Waege. The structures are empty or used for storage and have deteriorated to very poor condition. The passenger platforms have been removed and chain-link fencing has been installed between the depot buildings and the remaining trackage.

The South Milwaukee passenger depot, at 1111 Milwaukee Avenue, of brick construction, is now privately owned and maintained as on office by a building contractor. The early-1900s-vintage building has been restored and appears to be in good condition. The depot platforms have been removed and a chain-link fence separates the depot from the tracks.

The Cudahy passenger depot stands at 4647 S. Kinnickinnic Avenue. The 1892 building is of wood-frame construction, is privately owned, and has been converted into a museum by the Cudahy Historical Society. The depot has been restored and appears to be in good condition. Some sections of the concrete platforms still exist, but have deteriorated. The building is separated from the railroad line by a chain-link fence.

The depot formerly known as the Allis Station is located at 215 E. National Avenue, beneath the Canadian Pacific Railway mainline bridge. The concrete building is owned by Canadian Pacific Railway and is leased to a private model railroad club. It was last used as a passenger depot in the 1930s. Platforms no longer exist.

The Milwaukee passenger depot, at 433 W. St. Paul Avenue, is the facility used by Amtrak for intercity passenger train service. The building was constructed in 1965 and served as the Milwaukee Union Station between 1966 and 1971, when it handled the passenger trains of The Milwaukee Road and the C&NW. The building is privately owned by the Chicago Milwaukee Corporation (CMC), a real estate development firm active in maintaining, and disposing of, real estate formerly owned and operated by The Milwaukee Road. Amtrak leases space for passenger ticketing and the waiting room from the CMC Corporation. These facilities occupy most of the first floor of the building. As of January 1997, most office space on the second and third floors of the depot building was vacant. These areas were formerly occupied by Canadian Pacific Railway offices for dispatching and crew calling. Most of these operations, however, have been moved to other locations. There is one concrete platform 1,140 feet long between the depot building and Track 1 and two concrete island platforms 2,000 feet and 1,400 feet long between Tracks 2 and 3 and 4 and 5, respectively. Access to tracks 2 through 5 by passengers is by a pedestrian tunnel. A 400-foot-long trainshed covers the five depot tracks next to the depot building; a concrete awning covers the island platform area between Tracks 2 and 3 for an additional 400 feet to the west of the 6th Street Viaduct. A limited amount of short-term parking is available adjacent to the depot. Long-term parking is available on privately owned lots across W. St. Paul Avenue from the depot entrance.

Existing Kenosha-Chicago Railroad Line

The Union Pacific North Line between Kenosha and Chicago is 51.6 miles long and consists of a double-track main line throughout its entire length, with four crossovers. The crossovers are not power operated, requiring time-consuming procedures for train crews to throw the turnouts manually for trains to change tracks or reverse direction. As a result, it is difficult to recycle trains efficiently for additional trips during a single peak-traffic period. Also, the existing signal systems and operating rules limit train operation to 40 mph when operating against the current of traffic. A third main track formerly existed between Deering Bridge, in the City of Chicago, and Wilmette, a distance of about 11 miles, which allowed express passenger trains to overtake local passenger trains. By 1984 the third track had been removed. ABS and ATS systems are in use over the entire distance between Kenosha and Chicago.

Metra has proposed a number of physical improvements to the Union Pacific North Line as funding resources become available. Such improvements would permit increased operating speeds, optimize overnight train storage, improve operating efficiency, and increase system flexibility. Major track and operation-related improvements that have been proposed include: installation of CTC and bidirectional signaling north of Winnetka to permit 79 mph operation on either track in either direction; upgrading of track and highway grade-crossing signals for higher train speeds; installation and upgrading of power crossovers at six locations to permit efficient recycling of peak-period trains and to allow express trains to overtake local trains; and replacement of the existing car-storage yard at Waukegan with a new yard in Zion. Construction of a new overnight train storage yard at Zion may end the need for Metra to maintain a train storage yard at and operate to Kenosha. Other proposed improvements include a variety of grade-separation, station, and park-ride-lot improvements.

EXISTING ARTERIAL STREETS AND HIGHWAYS

The total street and highway system within the primary study area is comprised of three types of facilities: land-access, collector, and arterial streets. Land- access facilities function primarily to provide access to abutting property. Collector facilities function primarily to collect and distribute traffic between land-access and arterial facilities. Collector facilities may also provide access to abutting property. Arterial facilities are intended to serve the through movement of traffic. Arterial facilities provide transportation service between major subareas of the primary study area and between the primary and secondary study areas. Arterial facilities may also provide access to abutting property. The existing arterial street and highway system within the primary study area, totaling about 828 miles, is shown on Map 23.

Freeways are arterial highway facilities that provide the highest level of service, carry the heaviest volumes of traffic at the highest speeds, and are fully grade-separated, with no access to or from abutting properties. Freeways currently accommodate significant amounts of travel between the primary and secondary study areas. Of the nearly 72,600 vehicular crossings of the Wisconsin-Illinois border between Lake Michigan and the western boundary of the study area observed on an average weekday in 1990, approximately 50,800 vehicle crossings, or about 70 percent, were made on IH 94. The freeway component of the arterial street and highway system within the primary study area is also shown on Map 23.

SUMMARY

This chapter has presented information on the existing transportation services and facilities within the primary study area of the South Lakeshore Travel Corridor within the Southeastern Wisconsin Region, as well as between the primary and secondary study areas of the Corridor, as pertinent to the possible provision of commuter rail service within the Corridor. The information presented included a description of the existing railroad and bus passenger transportation services in the Corridor; a description of existing railroad facilities within the study area that could be used to provide commuter rail services between Kenosha, Racine, and Milwaukee; and a description of existing arterial street and highway system within the Corridor. The most important findings concerning these services and facilities may be summarized as follows:

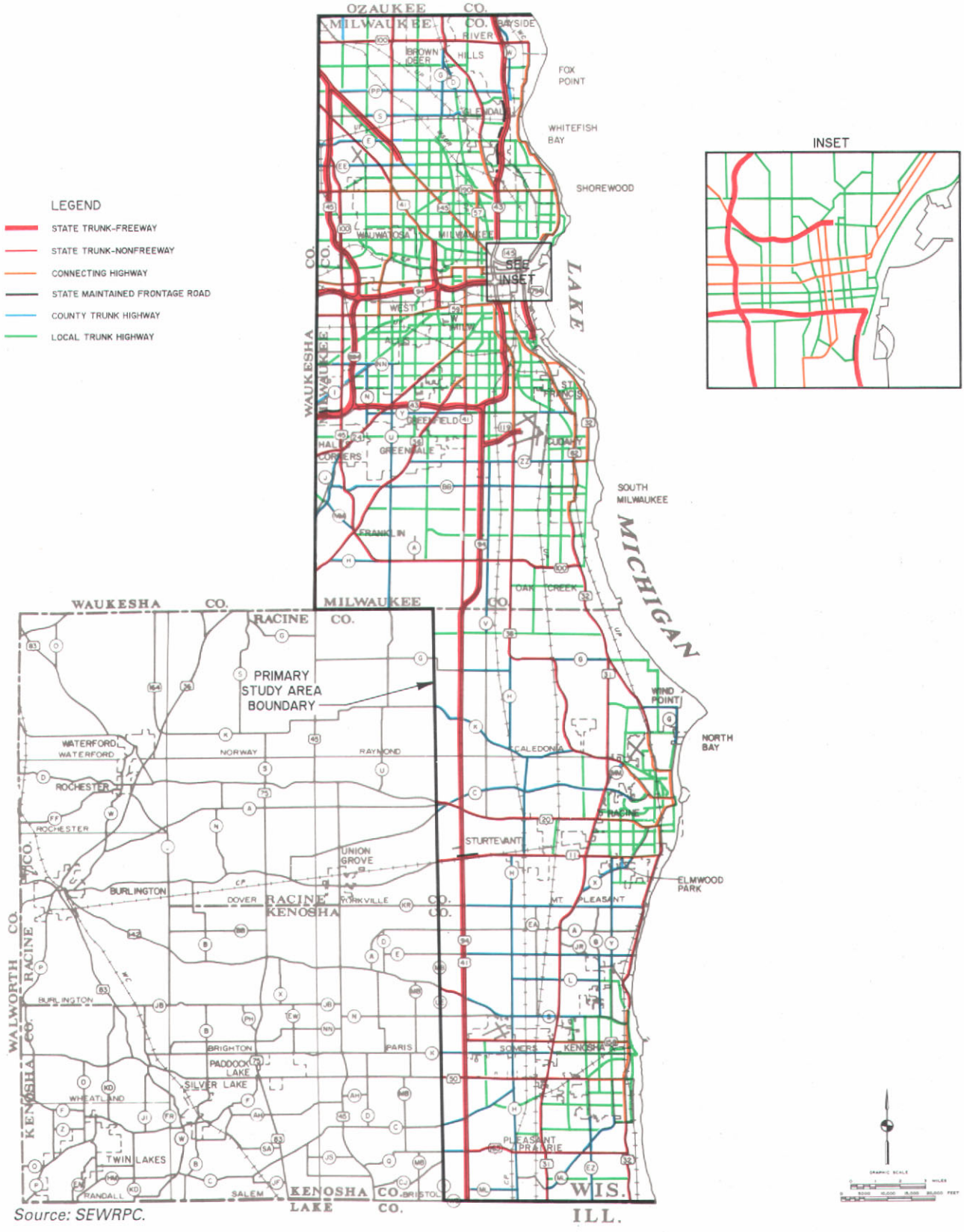
- In 1997, commuter rail service was provided by Metra, the commuter rail division of the Regional Transportation Authority, over a 51.6-mile-long route extending from Kenosha through the north shore suburbs of Chicago to the Chicago CBD over the Union Pacific North Line. This long-established commuter rail service is strongly oriented to serving passengers residing in the Corridor who are employed in the City of Chicago, especially in and around the Chicago CBD. Most of the passenger trains on this route originate or terminate at Waukegan, Illinois, but nine passenger trains in each direction serve Kenosha on weekdays, five trains on Saturdays, and three on Sundays and holidays.

- In 1997, average weekday ridership on the Metra service operated over the Union Pacific North Line totaled about 26,000, with about 265 passengers boarding and alighting at the Kenosha stop on an average weekday. Surveys conducted by the Regional Planning Commission of passengers using this service indicate that the travel patterns of such users are fairly typical of what would be expected on such a CBD-oriented commuter rail service, with the majority of the passengers making work-related trips on a daily, or every-other-day, basis. Most passengers using this service who board or alight at Kenosha are residents of Kenosha or Racine Counties and are traveling to and from the Chicago CBD.

- In 1997, intercity passenger trains between Milwaukee and Chicago, under the name "*Hiawatha* Service," were operated by Amtrak over the Canadian Pacific Railway trackage located about three miles west of the Union Pacific North Line. While this service lies within the primary study area, it did not directly serve the Cities of Racine and Kenosha, but did stop at Sturtevant, just west of the City of Racine. In 1996, it was estimated that this service carried about 330,000 trips, or from 900 to 1,000 passengers on an average weekday. Surveys of passengers using this service conducted by the Regional Planning Commission indicate that about 7 percent of the trips board or alight at Sturtevant. About half the trips using the Sturtevant stop are made by passengers who are residents of Racine County. Almost three-quarters of the trips boarding at Milwaukee were by passengers who were residents of the Milwaukee metropolitan area, consisting of Milwaukee, Ozaukee, Washington, and Waukesha Counties.

Map 23

ARTERIAL STREET AND HIGHWAYS SYSTEM SERVING THE KENOSHA-RACINE-MILWAUKEE CORRIDOR: 1997



Source: SEWRPC.

- In 1997, six bus systems operated within the South Lakeshore Travel Corridor. Three of these systems were publicly owned, providing local transit service within the urbanized areas in the Corridor. These systems could provide feeder bus service to potential commuter rail service in the Corridor. These local systems include the Kenosha Transit System, owned and operated by the City of Kenosha; the Belle Urban System, owned and operated by the City of Racine; and the Milwaukee County Transit System, owned and operated by Milwaukee County. Express bus service is provided within the Corridor over a single route between the Milwaukee CBD, the City of Racine, and the City of Kenosha by Wisconsin Coach Lines, Inc. This service is publicly subsidized by State funding provided through the City of Racine. Intercity bus service in the Corridor is also provided by Greyhound Lines, Inc., and United Limo, Inc. Most Greyhound buses operate nonstop along IH 94 between Milwaukee and Chicago, although two runs in each direction stop in the City of Kenosha. United Limo, Inc., provides intercity bus service within the Corridor from Milwaukee to Chicago's O'Hare and Midway Airports with stops along IH 94 west of Racine and west of Kenosha. Neither Greyhound Lines, Inc., or United Limo, Inc., receives public financial assistance.

- The potential new commuter rail route within the South Lakeshore Travel Corridor would extend from the existing Metra passenger station in Kenosha, through the City of Racine, to the existing Milwaukee passenger depot used by Amtrak in Milwaukee. The 33-mile-long route consists of three major segments.

- The first segment is referred to as the Kenosha Subdivision and is owned and operated by the Union Pacific Railroad for a distance of 28.3 miles between Kenosha and St. Francis Junction. This line is operated primarily as a secondary freight line and is a single-track main line with passing sidings. It has been maintained in good condition and currently permits freight-train operating speeds of 40 mph over most of the line.

- The second segment is referred to as the National Avenue Spur Track and is also owned and operated by the Union Pacific Railroad for a distance of 3.2 miles between St. Francis Junction and the connection to the Canadian Pacific Railway main line at Washington Street. This line is operated as a local switching line consisting of a single track providing access to customers in the Bay View, Port of Milwaukee, and Third Ward areas. The portion of this segment between St. Francis and E. Lincoln Avenue has recently been reconstructed as part of the Lake Parkway project and is in good condition. The section from E. Lincoln Avenue to Washington Street is in poor condition. The entire length of the National Avenue Spur Track is limited to freight train operating speeds of 10 mph.

- The third segment, 1.2 miles, between Washington Street and the Milwaukee passenger depot, is referred to as the C&M Subdivision and is owned and operated by Canadian Pacific Railway. This line is operated as a double-track main line and handles through freight trains operated by the Canadian Pacific Railway and also Amtrak passenger trains. It has been maintained in good condition and currently permits passenger train operating speeds varying between 15 and 30 mph. These speed limits are determined by horizontal curvature restrictions along the alignment.

- For most of its historic existence, the Kenosha-St. Francis-Washington Street portion of the potential commuter rail route, now owned and operated by Union Pacific Railroad, was formerly owned and operated by the C&NW as its passenger main line between Milwaukee and Chicago. When intercity passenger train operation ceased along this route, the physical plant and facilities underwent significant changes, including elimination of trackage and signal systems which were no longer necessary for freight operations. One of the original two mainline tracks along the route was removed, the signal system necessary for efficient passenger train operation was removed, maintenance levels were reduced from those required for high speed passenger train operations, and passenger depots were sold to private interests.

- The street and highway system within the primary study area is comprised of land-access, collector, and arterial facilities. Freeways are those components of the arterial street and highway system which provide the highest level of service and which carry the heaviest and fastest volumes of traffic, including between the primary and secondary study areas. Of the nearly 72,600 vehicular crossings at the Wisconsin-Illinois border between Lake Michigan and the western boundary of the study area on an average day in 1990, approximately 50,800 vehicle crossings, or about 70 percent, were made on IH 94. The existing arterial street and highway system within the primary study area totaled about 828 miles.

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Chapter IV

POTENTIAL COMMUTER RAIL FACILITIES AND SERVICES

INTRODUCTION

The purpose of this chapter is to identify potential alternative commuter rail facility and service options in the South Lakeshore Corridor of Southeastern Wisconsin; to screen those alternatives; and, on the basis of that screening, to recommend the most practical and reasonable commuter rail alternative for further evaluation of benefits and costs. The commuter rail alternative proposed for such evaluation should be that alternative with the greatest potential to provide cost-effective commuter rail service in the South Lakeshore Corridor extending from Kenosha through Racine to Milwaukee.

The principal physical, operational, and service characteristics of any potential commuter rail service in the Corridor concerned include route alignment, station location, operating plan, track and signal improvements, equipment, and a service provider. These characteristics are identified for each alternative considered; the alternatives are screened with respect to the attendant advantages and disadvantages. The most promising alternative is then identified for more detailed evaluation.

ROUTE ALIGNMENT

The purpose of this section is to identify the most promising commuter rail route alignment option in the South Lakeshore Corridor, or the Kenosha-Racine-Milwaukee Corridor, and to eliminate from further consideration route alignment options which are less promising. A prerequisite for the initiation of commuter rail service in the Corridor is the availability of existing railroad lines used for intercity freight or passenger train service. Ideally, such lines would be constructed to main line railroad standards and connect major trip generators and residential areas. Three different aspects of route alignment within the Corridor were considered in the screening of alternatives. These included consideration of available main line route alternatives, consideration of Milwaukee passenger station alternatives, and consideration of connection alternatives between the Union Pacific and Canadian Pacific lines in the Milwaukee area.

Basic Main Line Route Alternatives

Consideration was given to whether or not there were other promising basic main line route alignments within the Kenosha-Racine-Milwaukee Corridor in addition to the Union Pacific Railroad Kenosha Subdivision alignment. The Union Pacific Kenosha Subdivision is the only existing route which connects the central cities of the Kenosha, Racine, and Milwaukee urbanized areas and the long-established suburban communities of Oak Creek, South Milwaukee, Cudahy, and St. Francis. This alignment is well suited to commuter operations. It currently carries only limited freight train traffic. Importantly, service over the Kenosha Subdivision could be operated as an extension of, or as a connection with, the existing Metra commuter service between Kenosha and Chicago.

There are two other railroad lines which extend the length of the Kenosha-Racine-Milwaukee Corridor. These are the Union Pacific Milwaukee Subdivision and the Canadian Pacific Chicago & Milwaukee (C&M) Subdivision. These lines are shown on Maps 20 and 21 in Chapter III.

The Union Pacific Railroad Milwaukee Subdivision is operated as a single-track main line with passing sidings and lies about three miles west of, and generally parallel to, the Kenosha Subdivision. It is the Union Pacific main freight line between Chicago, Milwaukee, and St. Paul, carrying 12 to 16 freight trains per average weekday. The Canadian Pacific C&M Subdivision lies about five miles west of, and generally parallel to, the Union Pacific Kenosha Subdivision. It is a double-track main line carrying 16 to 20 freight trains and 14 passenger trains per average weekday.

Both the Union Pacific Milwaukee Subdivision and the Canadian Pacific C&M Subdivision bypass the cities of Kenosha, Racine, South Milwaukee, and Cudahy. In addition, both of these lines carry a substantial volume of freight traffic. Potential commuter rail service on either line would not connect with the existing Metra Kenosha to Chicago service. A recently completed study of high-speed rail for the Milwaukee-Chicago Corridor, conducted jointly by the Wisconsin and Illinois Departments of Transportation, concluded that the C&M Subdivision was the most appropriate alignment for the continuation of Amtrak intercity passenger train service as well as for potential future high-speed intercity passenger service. The report also recommended that commuter service between

Milwaukee and Chicago, if provided in the future, be provided over the Union Pacific Kenosha Subdivision line.

On the basis of these considerations, it is recommended that the only main line route alignment to be considered further in the Corridor study be the Union Pacific Railroad Kenosha Subdivision route.

Consideration was given to a variation of the basic alignment of the Kenosha Subdivision suggested during 1994 public hearings on the preliminary draft of the Commission's design year 2010 regional transportation system plan. Under this variation, a new connecting rail line would be constructed between the Kenosha Subdivision near E. Ryan Road and the Union Pacific Milwaukee Subdivision near E. Drexel Avenue, a distance of about 3.1 miles, as shown on Map 24. It would be sited on a former electric interurban right-of-way, currently owned by the Wisconsin Electric Power Company and utilized as an electric power transmission trunkline right-of-way. The potential advantages of this alignment variation include the following:

- Potentially faster operating speeds for commuter trains by avoiding the densely developed areas of South Milwaukee and Cudahy.

- An alignment adjacent to General Mitchell International Airport, thus providing a shorter transfer distance for passengers using the commuter service to travel to and from General Mitchell International Airport.

The potential disadvantages of this alignment variation include the following:

- The capital cost attendant to the construction of a new 3.1-mile-long railway alignment.

- The need to construct a new rail line through a developing suburban area of Oak Creek. While this alignment would make use of a former electric interurban right-of-way, there has not been a railroad on this alignment for at least fifty years. Therefore, the connection may be expected to be perceived as disruptive by residents of the area traversed by the connection.

- The potential construction of seven new grade crossings with major arterial streets and highways where no such crossings now exist.

- The possible need to improve the existing main line track, sidings, and signals along the Union Pacific Milwaukee Subdivision between E. Drexel Avenue and the junction at St. Francis because of the already-existing high volume of freight traffic.

- Less convenient station locations, more removed from the densely developed central cores of these long-established suburban communities, for the South Milwaukee and Cudahy areas. The City of Cudahy has proposed a commuter station along the Kenosha Subdivision in a land use plan completed and adopted in 1994.

- Passengers desiring to transfer between the commuter trains and the General Mitchell International Airport terminal area would still require the use of a shuttle service.

It was concluded that the potential disadvantages of this alignment variation significantly outweigh any possible advantages. Accordingly, this alignment variation was dismissed from further consideration under this feasibility study.

Milwaukee Passenger Station Alternatives

The Amtrak station, at the intersection of N. 5th Street and W. St. Paul Avenue, on the southwest side of the Milwaukee central business district (CBD), has a number of advantages as a commuter station. First, the current Amtrak station is a long-established and recognized facility which already has a depot building, platforms, other passenger-handling facilities, and station trackage. Second, there is main line trackage leading directly to the existing passenger station. Third, the existing Amtrak facility would allow passengers to transfer between commuter trains and Amtrak trains. Fourth, the layout of the existing facility would allow commuter services to be through-routed with other potential commuter services westward and northward from Milwaukee. Fifth, because the station facilities already exist, commuter service in the Kenosha-Racine-Milwaukee Corridor could be initiated more quickly than services using a station on a new site.

Only one alternative to the Amtrak station was seriously considered, a site in the area of the City of Milwaukee known as the "Coachyards." This was once the site of a yard for the storage of passenger cars for the Chicago & North Western (C&NW) Railway main Milwaukee passenger depot. This alternative station site would require a route location generally along the historic route the C&NW Railway passenger trains used to the depot at the foot of E. Wisconsin Avenue until 1966. Under this alternative, the potential new commuter service from Kenosha and Racine would continue to operate over the

Map 24

POSSIBLE VARIATIONS TO THE BASIC MAIN LINE COMMUTER RAIL ROUTE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

LEGEND

- BASIC ROUTE ALIGNMENT
- POSSIBLE VARIATION TO BASIC ALIGNMENT

GRAPHIC SCALE

0 1/8 1/4 MILE

0 1000 2000 FEET

Source: SEWRPC.

Union Pacific National Avenue Spur from Washington Street to the end of track at E. Menomonee Street, in the Coachyards, as shown on Map 25.

The Coachyards site is about one-half mile south of the former C&NW passenger station site, southeasterly from the Milwaukee CBD. Extension of the National Avenue Spur to the site of the former C&NW passenger station at the foot of E. Wisconsin Avenue was concluded not to be practical. Since 1966 most of the lands formerly occupied by the station and surrounding coachyard facilities have been converted to other purposes, including William F. O'Donnell Park and the Downtown Transit Center, extension of local streets and highways, construction of the Lake Freeway interchange, and extensive development of festival facilities, businesses, and parklands. To enable the section of the National Avenue Spur north of Washington Street to be utilized for commuter rail service, the main track through this area would have to be upgraded to passenger train operating standards. This would probably require realignment of existing trackage, rehabilitation of the Milwaukee River drawbridge, and construction of passenger station facilities, including a depot building and attendant trackage. Furthermore, a commuter rail passenger depot at this location would be no closer to much of the CBD than the existing Amtrak passenger depot. The station would also be of a stub-end design, allowing for the possible further extension of commuter rail service to the west. Accordingly, it was concluded that this alternative station site offered no advantages over use of the existing Amtrak depot site, especially for new-start service, and, in fact, could be more costly and more complicated to implement.

It has been suggested that a new passenger station for the proposed commuter service be developed in the Milwaukee CBD and connected to the Canadian Pacific Railway C&M Subdivision trackage just east of the present Amtrak passenger station. This new station location has been envisioned as being in proximity to, and parallel to, the Milwaukee River and orientated in a north-south direction to enable a station to be located closer to the center of the Milwaukee CBD. Such an alternative for a Milwaukee passenger station facility was considered, but it was concluded to be impractical because of the lack of an available right-of-way and the need for costly and extensive disruption which would be entailed in constructing such a facility in the extensively developed CBD. In any case, such a new passenger station site would be only marginally closer to the center of the CBD. No other reasonable passenger depot location alternatives were identified.

It should also be noted that the Wisconsin Department of Transportation has begun work on an Intermodal Passenger Facility Study for Milwaukee. Its purpose is to consider alternative intermodal facilities which would facilitate the transfer of passengers between various existing and planned transportation modes and routes, including Amtrak and potential commuter services. The facilities to be considered could range from improvements to current facilities to a new union station. As of May 1997, the study had not reached any conclusions.

On the basis of these considerations, it was concluded under this feasibility study that using the current Amtrak passenger station location and facility was the only practical alternative for a Milwaukee CBD passenger station.

Alternative Connections between Union Pacific and Canadian Pacific

Use of the existing Amtrak passenger depot as the station for the Milwaukee CBD requires a connection between the Union Pacific National Avenue Spur and the Canadian Pacific C&M Subdivision main line. As a practical matter, such a connection would be located somewhere between the City of St. Francis and the Milwaukee CBD.

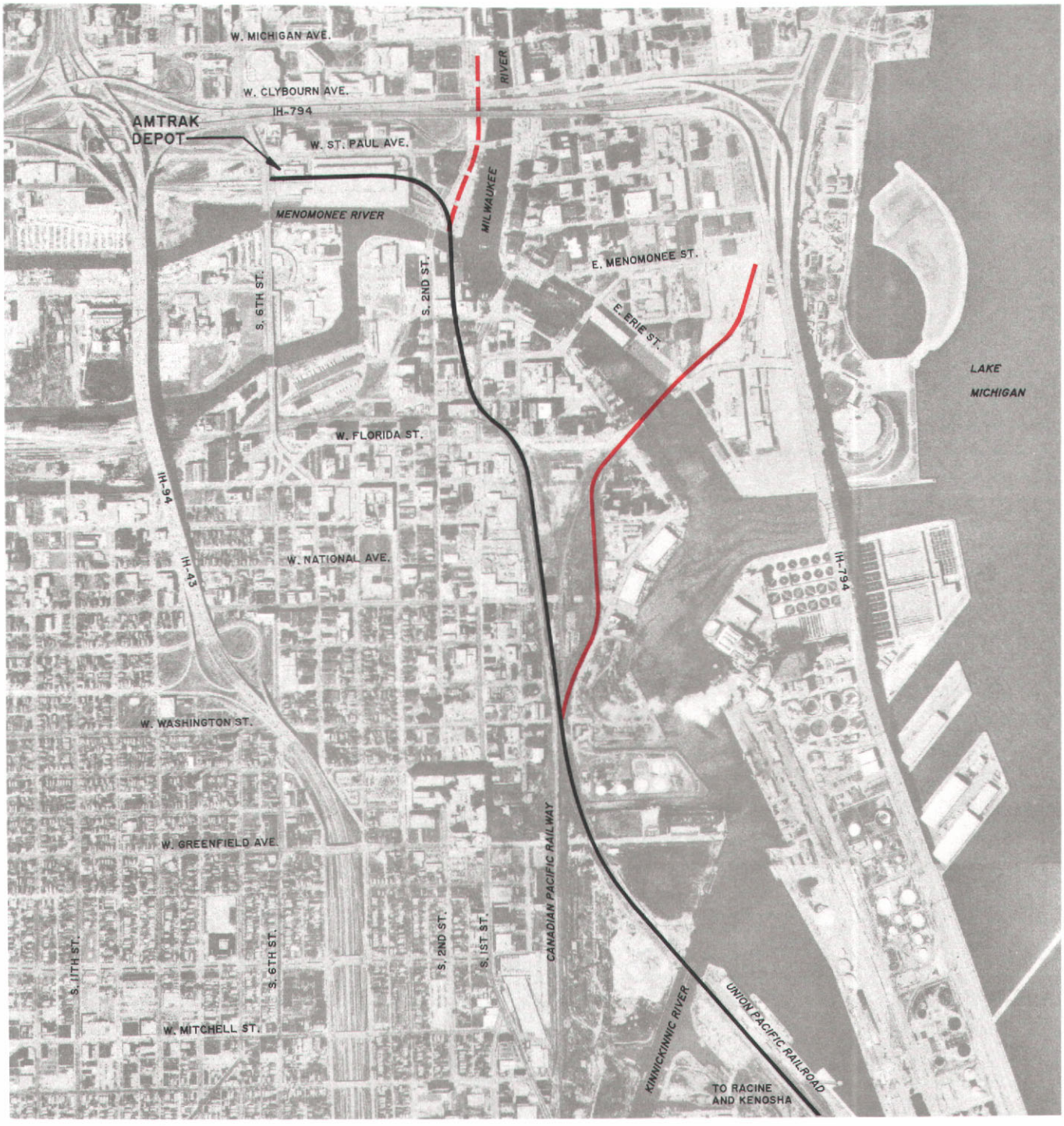
One alternative considered was utilization of the already existing connecting track between the two railroads at Washington Street. This track was constructed in 1966 to enable passenger trains from the then Chicago & North Western Railway to enter the then new Union Station. Under this alternative, the distance from St. Francis to the Milwaukee Passenger station would be 4.3 miles. This alternative is the most direct route available for the connection and would provide the highest average operating speed. It would require rehabilitation or improvement of the entire main line track and rehabilitation of the Kinnickinnic River Bridge, a drawbridge.

Three additional alternative connections were considered on the basis of comments made during the public hearing process on the preliminary draft of the design year 2010 regional transportation system plan. All four of the alternatives are shown on Map 26.

The second alternative would utilize the Canadian Pacific Bay View Spur from its at-grade crossing with the Union Pacific National Avenue Spur south of E. Bay Street to the Canadian Pacific C&M Subdivision main line north of S. Kinnickinnic Avenue. Under this alternative, the distance from St. Francis to the Milwaukee passenger station would be 4.5 miles. The Bay View spur currently consists of a single-track industrial lead with very low operating speeds, three to five miles per hour. The low

Map 25

MILWAUKEE PASSENGER STATION ALTERNATIVES FOR POSSIBLE COMMUTER RAIL SERVICE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR



LEGEND

- BASIC MAINLINE ROUTE TO CURRENT AMTRAK DEPOT
- ALTERNATIVE MAINLINE ROUTE TO COACHYARDS SITE
- ALTERNATIVE MAINLINE ROUTE TO MILWAUKEE RIVER SITE

GRAPHIC SCALE
0 400 800 1600 FEET

Source: SEWRPC.

operating speed is due to sharp horizontal and vertical curvatures and a track on a very narrow right-of-way between existing buildings. The Bay View spur connects with the C&M Subdivision by curving to the south, thus requiring trains from Milwaukee to reverse direction and make a back-up movement to use the spur. Use of the Bay View spur as a commuter train route would require rehabilitation and improvement of the spur trackage, construction of a new connection with the Union Pacific National Avenue spur track, and realignment of the connection between the Bay View spur and the C&M Subdivision main line to enable direct movements of commuter trains. The realigned connection with the C&M Subdivision would probably require acquisition or relocation of portions of one or more manufacturing plants, the Medusa Cement Co., and Lakeside Manufacturing, Inc., as well as Skipper Bud's Marina. It would also require construction of a new bridge over the Kinnickinnic River and installation of a new junction with the C&M Subdivision main line north of the S. Kinnickinnic Avenue overpass. It was concluded that this alternative would be impractical to implement because of high capital costs and attendant industrial disruption. Even after improvement, this alternative would require restrictive operating speeds along the connecting track segment and through the new junctions. Accordingly, this alternative was deemed impractical and dismissed from further consideration.

The third alternative connection considered would continue west from St. Francis along the Union Pacific Milwaukee Subdivision to its grade-separated crossing underneath the Canadian Pacific C&M Subdivision main line north of E. Oklahoma Avenue. A new connecting track would be required. The new connecting track would probably require relocation of a portion of the Nordberg, Inc., manufacturing plant, significant grading, and installation of two new junctions, one with the Canadian Pacific C&M Subdivision and one with the Union Pacific Milwaukee Subdivision. Under this alternative, the distance from St. Francis to the Milwaukee Passenger Depot would be 5.2 miles. The connection would be subject to restricted operating speeds along the connecting track segment and through the new junctions. Also, there would be the potential for traffic congestion along the Union Pacific Milwaukee Subdivision between St. Francis and the new connection since this trackage is used as a freight main line. It was concluded that this alternative would be impractical to implement because of high capital costs and the attendant industrial disruption and would require restrictive operating speeds along the new connecting track segment. Accordingly, this alternative was concluded to be impractical and dismissed from further consideration.

The fourth alternative connection considered would continue west from St. Francis along the Union Pacific Milwaukee Subdivision to about S. 6th Street, where a new connection to the Canadian Pacific C&M Subdivision main line would begin. The new connection would utilize the right-of-way of the former Chicago & North Western Railway Chase spur track to south of E. Lincoln Avenue, where it would connect with the Canadian Pacific's C&M Subdivision. Under this alternative, the distance from St. Francis to the Milwaukee Passenger station would be 5.5 miles. The connection would be subject to restrictive operating speeds along the connecting track segment and through the new junctions. Much of the former Chase spur track right-of-way remains unused. Significant grading would be required for the connection between the Chase spur and the Canadian Pacific main line, as well as the installation of two new junctions. A potential exists for some traffic congestion along the Union Pacific Milwaukee Subdivision between St. Francis and the new connection near S. 6th Street since this trackage is used as a freight main line. It was concluded that while this alternative would be physically feasible to implement, it does not possess any advantages over the National Avenue Spur route. Accordingly, this alternative was dismissed from further consideration.

On the basis of the foregoing, it was concluded that use of the existing connection between the Union Pacific and Canadian Pacific railway lines at Washington Street was the only practical alternative for such a connection.

Design of Route Alignment
Alternative for Feasibility Assessment

Screening of the various route alignment alternatives considered reaffirmed earlier planning conclusions that only a single route alignment was sufficiently promising to be considered further under this feasibility study. This alignment consists of Union Pacific Kenosha Subdivision from Kenosha to St. Francis, the Union Pacific National Avenue Spur from St. Francis to Washington Street, Canadian Pacific's C&M Subdivision from Washington Street to Milwaukee, the existing Washington Street connection between the two railroads, and the existing Amtrak Passenger station in the Milwaukee CBD. This route alignment is the most practical one available for the potential initiation of commuter service in the Kenosha-Racine-Milwaukee Corridor. Other alignment alternatives and options were found to be clearly unacceptable or undesirable, requiring more costly capital improvements without offering any such advantages as higher operating speeds or better service to potential passenger markets.

Map 26

UNION PACIFIC-CANADIAN PACIFIC CONNECTION ALTERNATIVES FOR POSSIBLE COMMUTER RAIL SERVICE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

Source: SEWRPC.

PASSENGER STATION FACILITIES

The purpose of this section is to identify and screen preliminary sites for passenger stations along the potential commuter rail route alignment in the Kenosha-Racine-Milwaukee Corridor. In the context of this section, passenger station facilities are defined as the site, structures, and other equipment necessary to allow passengers to access commuter rail service. This includes platforms, depot buildings, shelters, parking lots, entrance drives, and other passenger amenities. The exact location, specifications, and design of such passenger facilities are considered more properly under subsequent environmental assessment and detailed design planning and engineering phases which must follow completion of a feasibility study; they will depend upon the input and decisions of residents and public officials from the local units of government in which such facilities or stops may ultimately be located. Nevertheless, preliminary assumptions concerning the basic general characteristics of station facilities are necessary to define adequately a commuter rail service alternative for the current feasibility assessment. The purpose of this section is to establish the likely number and spacing of passenger stations along the route, the generalized location of such facilities for purposes of feasibility assessment, and basic facility characteristics which can be used in evaluating the commuter rail service alternatives developed under this study.

Number and Spacing of Passenger Stations

Passenger stations should be located along a potential commuter rail route close enough to each other to properly serve as much of the surrounding existing and planned future urban development as possible, but far enough apart to allow the commuter trains to operate at adequate average speeds. The preliminary number of passenger stations and their spacing along the Kenosha-Racine-Milwaukee commuter rail route was determined on the basis of two criteria. These were the proximity of the proposed commuter rail route to concentrations of existing and planned urban development, and commuter train equipment performance.

With respect to serving passenger demand, the proximity of potential commuter stations to existing and planned concentrations of urban development is crucial because most of the potential ridership on such a commuter service will be generated by nearby residential and employment concentrations. The extent of existing and planned year 2020 urban development within the primary study area of the Corridor was shown on Map 5. It is important to note that much of the area along the potential Kenosha-Racine-Milwaukee commuter line consists of existing and planned medium- or high-density development. The potential commuter line also directly serves the long-developed central cities of Kenosha, Racine, South Milwaukee, Cudahy, St. Francis, and Milwaukee.

It was therefore concluded to be appropriate to consider, at a minimum, potential commuter stations sited in or near the densely developed areas of the Cities of Kenosha, Racine, South Milwaukee, Cudahy, St. Francis, and Milwaukee. For feasibility planning purposes, consideration was given to having a passenger station centrally located in each of these cities at, or near, their CBDs. This would facilitate transfers of passengers to and from local bus routes.

Average spacings for older, established commuter routes range from two to five miles, with three miles being typical. For example, the average station spacings on several of Metra's commuter rail lines serving Lake and McHenry Counties in Northeastern Illinois range from 2.8 miles to 3.2 miles. The average station spacing on Metra's Chicago-Kenosha service is 2.1 miles, a result of the frequent stops in the Chicago North Shore suburbs. During weekday peak periods, peak-direction trains on these routes offer express service, skipping designated stations, resulting in an effective average station spacing of up to 7.9 miles. The average station spacing on Metra's new North Central Service between Chicago and Antioch is 2.9 miles.

Station spacings on some recent new-start commuter rail routes are greater than the above-referenced and such stations have been centrally located only within the most densely developed urban areas. Such areas may be expected to generate the largest volumes of potential passengers. The advantages of longer station spacing include the following: 1) higher possible average operating speeds because of fewer stops, resulting in a higher level of service, which in turn may attract more riders, and 2) lower initial capital costs for passenger station facilities. The primary disadvantage of longer station spacing is the lower level of accessibility provided along the route, possibly resulting in a smaller potential passenger market. In most cases, it is the intent of the newer services to add additional stations in the future, but only as demand increases in areas between the initial stations or as the initial station facilities become too crowded. For example, the average station spacings on the Los Angeles Metrolink Riverside and Santa Clarita lines are 11.8 miles and 9.5 miles, respectively; on the New Haven Shore Line East service, 8.8 miles; on the San Diego Coast Express Rail service, 6.0 miles; on the Miami Tri-Rail service, 4.8 miles; and on the Vancouver West Coast Express, 6.0 miles.

With respect to performance requirements for commuter train equipment, the stations should be spaced far enough apart so that the commuter equipment can accelerate away from stations, decelerate for the next station, and still be able to sustain reasonable average speeds. Passenger stations located too close together defeat the purpose of providing a relatively fast and attractive new-start transit service. As already noted, typical commuter station spacings in the United States and Canada generally range from two to five miles to meet these operational needs, yet provide an ample number of stations to meet local demand. It was concluded that station spacing of three to five miles in the South Lakeshore Corridor would provide acceptable commuter train performance and schedules and would adequately serve existing and planned urban development in the Corridor.

On the basis of these considerations, a basic set of commuter stations within the Corridor was identified. It was determined that, at a minimum, the densely developed, long-established urbanized areas within the Corridor should be served by centrally located stations. These areas would include the Cities of Kenosha, Racine, South Milwaukee, Cudahy, St. Francis, and Milwaukee. Except for St. Francis, all these cities have a concentrated CBD or central-city area where the location of a commuter station would be appropriate. The communities of South Milwaukee, Cudahy, and St. Francis are located in close proximity to each other; potential commuter railway stations serving all three of these cities may be too closely spaced for good operation. While most of the urban development in South Milwaukee is fairly evenly distributed around a centrally located business district, the CBD of Cudahy is in that City's northern portion. Much of the urban development in St. Francis is in that City's southern portion. Accordingly, it was concluded that a single station sited in the vicinity of the Kenosha Subdivision crossing of E. Layton Avenue would be preferable to two separate stations in this area. An E. Layton Avenue site for such a station would be well located to serve much of the developed areas of Cudahy and St. Francis and to provide access via E. Layton and S. Howell Avenues to, and from, General Mitchell International Airport. Similarly, a South Milwaukee station could be expected to provide access for passengers going to, and from, the northeastern portion of the City of Oak Creek.

A basic set of commuter stations in the South Lakeshore Corridor would, accordingly, consist of a total of five stations along the route, located to serve urban development in the Kenosha, Racine, South Milwaukee, Cudahy-St. Francis, and Milwaukee areas. The average station spacing would be about 8.2 miles.

Potential additional commuter stations could be provided in the developing areas of the Towns of Somers and Caledonia and of the City of Oak Creek. The development of additional stations on the fringes of the existing urbanized areas would probably be contingent upon the successful start-up of an initial commuter service in the Corridor and the determination that sufficient demand exists for stations in one or more of these areas.

Including these possible stations in the Somers, Caledonia, and Oak Creek areas, there would be a total of eight stations along the route; the average station spacing would be about 4.7 miles. The stations and distances concerned are set forth in Table 13 and shown on Map 27.

Specific Location of Passenger Stations

Once the number and spacing of passenger stations along the commuter route was determined, further consideration was given to the location of each facility. The primary criteria used to identify specific passenger station locations included the following:

- The location, extent, and intensity of existing and planned urban and suburban development in the vicinity of the stations. Commuter stations should be centrally located in concentrations of existing and planned residential development, as well as in CBDs, and as close as possible to other major traffic generators. Concentrations of residential development located up to a distance of three miles from the commuter stations can be adequately served because commuter service generally depends on park-ride lot and feeder-bus access, as well as on direct pedestrian access.

- Availability of adequate land for initial station facility development and future expansion. The initial station facilities may include only platforms and minor passenger amenities with an adequately-sized park-ride facilities and feeder-bus access. Commuter stations can be the least extensive of all types of rail-transit stations. However, significant area may be required for park-ride facilities.

- Appropriate access to the station. Passengers need to have safe, efficient, and direct access to platforms from sidewalks, bus and taxi stops, automobile parking lots, and nearby land uses. To facilitate proper access by private automobile, taxi, and feeder buses, commuter stations should be well located with respect to the arterial street and highway system of the Corridor. The arterial street and highway system in the Corridor is shown on Map 21. Passengers should also be able to inter-

Table 13

POTENTIAL PASSENGER STATIONS TO BE USED FOR FEASIBILITY ASSESSMENT ON THE KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL ROUTE

Milepost Location	Passenger Station Name	Distance (miles)	
		From Kenosha	From Milwaukee
51.6	**Kenosha**	**0.0**	**32.6**
55.4	*Somers*	*3.8*	*28.8*
60.7	**Racine**	**9.1**	**23.5**
65.7	*Caledonia*	*14.1*	*18.5*
72.1	*Oak Creek*	*20.5*	*12.1*
74.9	**South Milwaukee**	**23.3**	**9.3**
78.1	**Cudahy-St. Francis**	**26.5**	**6.1**
85.7	**Milwaukee Passenger Depot**	**32.6**	**0.0**

Note: Names in bold type indicate basic start-up stations. Names in italics indicate additional possible future stations.

Source: SEWRPC.

connect readily with other urban and intercity transportation modes.

- Consistency with local and regional land use plans. The positive relationship between rail-transit modes, such as commuter rail, and urban development and redevelopment, economic development, and land values has been well documented and is generally accepted. Commuter rail service has the potential to shape land use development and redevelopment because such service represents a perceived public commitment to the provision of high-quality transit service and to improved accessibility. It is important to understand, however, that other factors must also be present for desirable forms of transit-related development and redevelopment to occur, including the strength of the economic forces at work throughout an area, which affect the market demand for land development and redevelopment; the attractiveness of the areas surrounding the potential stations; public land use policies which encourage development and redevelopment around transit stations through coordinated tax policies, provision of essential infrastructure facilities, and appropriate land use controls; local neighborhood and community acceptance and approval of such development; and the presence of adequate land near potential stations which may be available or which can be readily assembled.

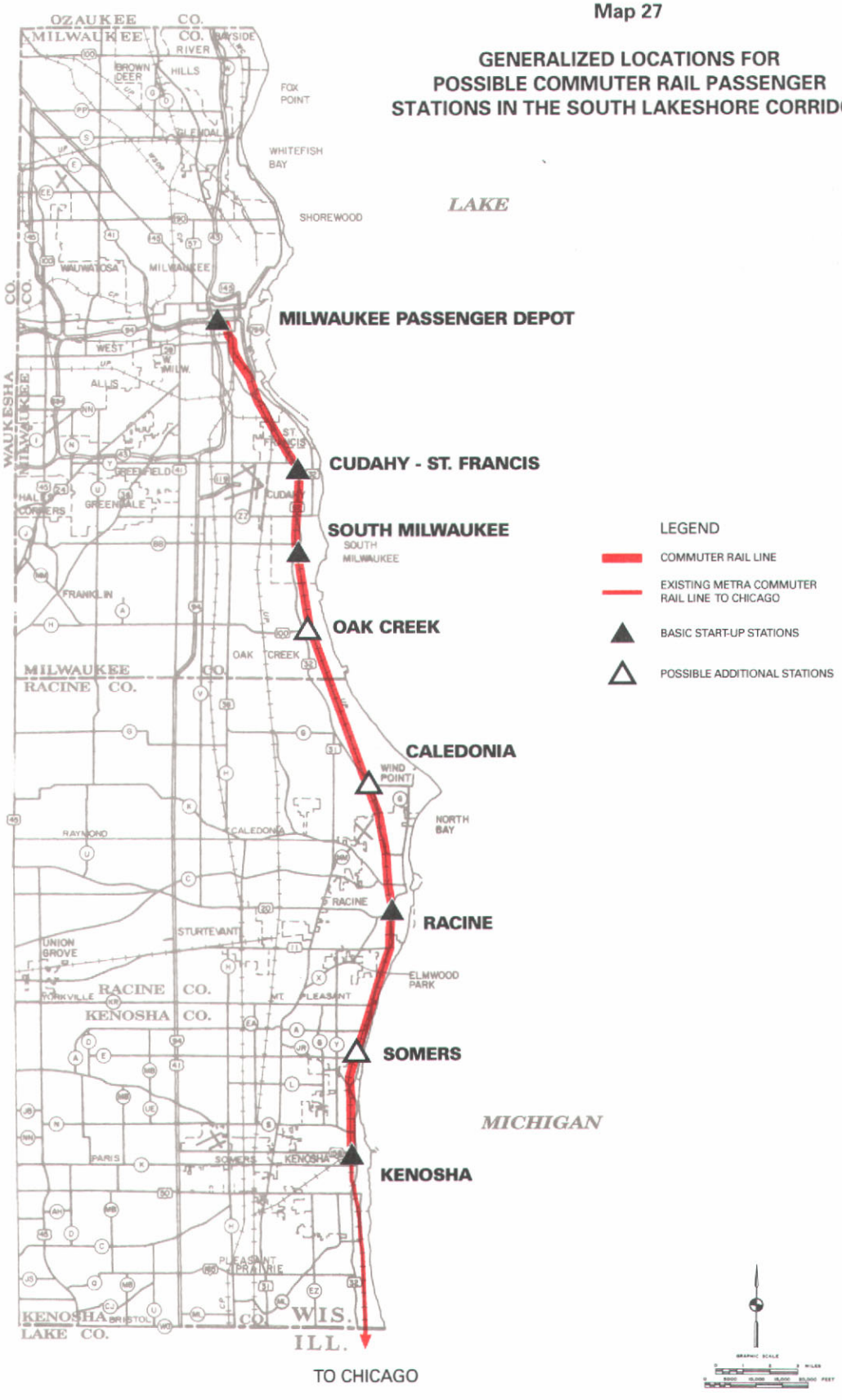
- Historic locations of passenger stations in the Corridor and the present condition and use of such locations. Such historic station locations may provide convenient and readily developable locations for new commuter stations. Such locations, however, should be carefully considered on a case-by-case basis.

On the basis of the application of these criteria, comments and suggestions made by individuals at the public hearings held on the preliminary draft of the regional transportation system plan, and a review of past commuter rail planning efforts by the Regional Planning Commission, the following specific locations were identified for the potential commuter stations in the Kenosha-Racine-Milwaukee Corridor:

- Kenosha: This passenger station would utilize the existing passenger depot facility at 5414 13th Avenue, in the western portion of the City of Kenosha CBD. Because Metra already uses this facility, it is already established as a commuter station and as a transportation center for the Kenosha area. This location is centrally positioned to facilitate direct pedestrian access and to serve trips throughout the Kenosha area arriving by automobile, taxi, and both suburban and local buses or express buses. The depot already has a developed park-ride lot and has good access from the arterial street and highway system. Use of this station would facilitate directly connecting or through service with the existing Metra commuter train service between Kenosha to Chicago. Use of this station would be consistent with the comprehensive plan for the Kenosha Urban Planning District completed in 1995 and subsequently adopted by Kenosha County and by the Village of Pleasant Prairie and the Town of Somers in 1996.

Map 27

GENERALIZED LOCATIONS FOR POSSIBLE COMMUTER RAIL PASSENGER STATIONS IN THE SOUTH LAKESHORE CORRIDOR



Source: SEWRPC.

- Racine: This passenger station would be located where the Union Pacific Kenosha Subdivision line crosses 14th Street, just east of E. Washington Avenue. This site is about 1.3 miles south of the former Racine passenger depot and lies in the western portion of the Racine CBD. This location is centrally positioned to facilitate direct pedestrian and shuttle-bus access to nearby manufacturing employment centers and to serve trips from throughout the Racine area arriving by automobile, taxi, and local or express buses. This site has good access to the arterial street and highway system. This location would also assist in achieving the objectives of a downtown development plan being prepared for the City of Racine.

- South Milwaukee: This station would be located where the Union Pacific Kenosha Subdivision line crosses Milwaukee Avenue, about 0.1 mile north of the former South Milwaukee passenger depot. The location is adjacent to the South Milwaukee CBD and would be centrally positioned to facilitate direct pedestrian and shuttle-bus access to nearby manufacturing employment centers and to serve trips from throughout South Milwaukee and Oak Creek arriving by automobile, taxi, and local or express buses. This location would have good access to the arterial street and highway system.

- Cudahy-St. Francis: This station would be located where the Union Pacific Kenosha Subdivision line crosses E. Layton Avenue, about 0.25 mile south of the former Cudahy passenger depot. It is adjacent to the Cudahy CBD and would be centrally positioned to serve both the Cudahy and the St. Francis areas. This location would facilitate direct pedestrian access, and serve trips from throughout the Cudahy and St. Francis areas arriving by automobile, taxi, and local or express buses. This location would have good access to the arterial street and highway system. E. Layton and S. Howell Avenues would provide good arterial street access for shuttle-bus service between the proposed commuter station and businesses in the vicinity of General Mitchell International Airport, as well as access to the airport terminal. This proposed location is consistent with recommendations in the comprehensive development plan for the City of Cudahy, completed and adopted in 1994.

- Milwaukee: This passenger station would utilize the existing passenger depot facility at 433 W. St. Paul Avenue, on the southwestern fringe of the City of Milwaukee CBD. Because Amtrak already uses this facility, it is already established as a railroad passenger station and as a transportation center for the Milwaukee area. This site is well located to provide direct pedestrian and shuttle-bus access to employment centers in the Milwaukee CBD and to Marquette University and to serve trips from throughout the Milwaukee area arriving by automobile, taxi, and both local and express buses. The depot already has some automobile parking facilities and has good access from the arterial street and highway system. Use of this station would provide direct connections with existing Amtrak intercity passenger trains and with other potential commuter rail services proposed for the Milwaukee area.

As already noted, additional potential commuter stations could be located in the developing urban areas in the Towns of Somers and Caledonia and in the City of Oak Creek. These potential sites could provide additional space for park-ride facilities. Potential locations were identified for these three additional commuter railway stations in the South Lakeshore Corridor as follows:

- Somers: This passenger station would be located at the Union Pacific Kenosha Subdivision crossing of CTH E. This site is about midway between the stations serving the Cities of Kenosha and Racine and would serve planned residential development in the eastern portions of the Towns of Somers and Mount Pleasant and in the northern portion of the City of Kenosha. This proposed site would have good access to the arterial street and highway system.

- Caledonia: This passenger station would be located at the Union Pacific Kenosha Subdivision crossing of Four Mile Road, in the Town of Caledonia. This site would serve planned residential development in the eastern portion of the Town of Caledonia, as well as development in the Villages of Wind Point and North Bay and in the northern portion of the City of Racine. The site would have good access to the arterial street and highway system.

- Oak Creek: This passenger station would be located at the Union Pacific Kenosha Subdivision crossing of E. Ryan Road, just west of the intersection of 5th Avenue. This site would serve planned residential development in the eastern portion of the City of Oak Creek. The site would have good access to the arterial street and highway system.

Basic Passenger Station Facility Requirements

As already noted, determination of the precise configurations and details of individual passenger stations is beyond the scope of this feasibility study. Design guidelines were, however, formulated under the study and in the preparation of estimates of spatial needs and development costs. The following guidelines are generally consistent with the guidelines for station design and standards utilized by Metra, which seek to minimize capital costs while providing adequate station facilities.

The experience of existing commuter rail systems in the United States and Canada indicates that the size and complexity of commuter stations varies widely. Such stations may simply consist of a boarding and alighting platform, a waiting shelter, and pedestrian access, plus small automobile parking facilities. Station sites generating large passenger volumes may have very elaborate facilities, including pedestrian overpasses or tunnels to the platforms and elaborate depot buildings, complete with ticketing facilities. In some cases, the depot buildings and related passenger facilities were originally constructed by the private railroad companies when those companies operated extensive intercity and commuter passenger service. This is especially true of the depots in the CBDs of the larger cities of the United States served by commuter rail.

The design of commuter rail stations must facilitate access by passengers to station facilities and to train cars in compliance with guidelines set forth by the Americans with Disabilities Act (ADA). Provisions for passenger accessibility should be consistent with such provisions on connecting public transit services, including Metra, which provides commuter service between Kenosha and Chicago.

For purposes of this feasibility study, the basic elements of a commuter station were assumed to include the following: boarding and alighting platforms, facilities for passenger access to the platforms, passenger station buildings, parking for automobiles, drop-off and pick-up areas for passengers using connecting taxis and bus services, and certain passenger amenities. Basic guidelines for these basic elements follow.

Platforms

To facilitate movement of passengers in the station area, the design of platforms should consider the existing and future location of depot buildings, shelters, automobile parking, and points of public access. If platforms are located near existing streets or highways with grade crossings, interruption of vehicular traffic at the crossings should be minimized to the extent possible. On lines with two or more tracks, a platform should be provided on the outside of each track. At new stations, island platforms should be used only at stations with three or more tracks. Making passengers board trains across active tracks should be avoided. For a new station site on multiple-track lines, the preferred location for the ancillary facilities, including automobile parking, would be on the side of the tracks expected to have the largest volume of boarding traffic. Normally, on commuter lines, this is the inbound platform for passengers with destinations in the main CBD station, which, on Metra lines, is Chicago. In the South Lakeshore Corridor, the largest volume of boarding traffic could be in the direction of either the Milwaukee or the Chicago CBD. On single-track lines, one platform should be provided on the same side of the track as the public access and parking. Consideration should be given to the need to add a second track at the station in the future.

In general, platforms should be located on tangent track to provide the train crew with a clear view of boarding and alighting passengers. If a station location on a horizontal curve is unavoidable, a limitation of 1°40' in curvature and one inch in elevation of the outer rail on such curves is recommended. Where curvature or elevation of the outside rail exceeds these limits, consideration should be given to platform relocation. Platforms should be of low, level design. Such design will, however, require the provision of wheelchair lifts on at least one car of every train. Platform width should be a minimum of 10 feet for side platforms and a minimum of 15 feet for island platforms. Platform length should be based on projected peak passenger boarding volumes and train operational requirements, as shown in Table 14.

Platform Access

Sidewalks, stairways, and ramps should be located so as to provide a clear and direct path for passengers going to and from the station platforms. Where public access and platforms are at different elevations, ramps or stairs, or both, should be provided. Where there is a significant change in elevation, elevators or ramps shall be provided. Ramps are more desirable than stairways because of safety and ease of use by elderly and disabled individuals.

Elevators should be provided for access to platforms, as required by Federal, State, or local governing agencies, when a building ramp is not feasible. Elevators should be adjacent to the main access point of the platform. Elevators should conform to the applicable requirements for accessibility for individuals with disabilities.

Passenger stations should be designed to minimize the need for passengers to cross active railway tracks at grade.

Table 14

MINIMUM PLATFORM LENGTHS FOR COMMUTER RAIL PASSENGER STATIONS

Projected Peak Train Passenger Boardings	Platform Length
1-105	210 Linear Feet (3 cars)
106-140	295 Linear Feet (4 cars)
141-175	380 Linear Feet (5 cars)
176-210	465 Linear Feet (6 cars)
211-245	550 Linear Feet (7 cars)

Source: Metra and SEWRPC.

Table 15

GUIDELINES FOR PLATFORM STRUCTURES AT COMMUTER RAIL PASSENGER STATIONS

Projected Peak Train Passenger Boardings	Number and Type of Structures
1-24	1 shelter
25-49	2 shelters
50-74	1 or 2 warming houses
75-99	1 depot waiting room
100-399	1 depot waiting room with small canopy
400 and above	1 depot waiting room with large canopy

Source: Metra and SEWRPC.

Crossings that are necessary must be planned to provide direct, but safe, access between platforms, depot buildings, parking areas, pickup points, and connecting taxi and bus service. If pedestrians must cross two or more tracks, traffic controls, such as flashing lights and bells, should be provided.

Site conditions and passenger station design may indicate whether grade-separated pedestrian crossings are needed or desirable. Overpasses are preferred to underpasses. Grade-separated crossings should be located central to the depot building and platforms, parking areas, streets, and other access points. New grade-separated pedestrian crossings should be accessible to individuals with disabilities and may require the provision of ramps or elevators. Wherever possible, existing street overpasses and underpasses should be utilized.

Passenger Station Buildings

Waiting areas at passenger stations can be provided by various types of structures, including depot buildings, warming houses, shelters, and canopies. The required waiting area for each station should be based on the peak boardings in the plan design year. Specific passenger station design will depend on forecast ridership and revenue and local community desires. Forecast passenger demand will help to identify the type of structure—depot, warming house, or shelter—to be used as a waiting area at a given station on the basis of the general guidelines provided in Table 15.

A passenger depot is an enclosed, heated structure which includes a passenger waiting area and possibly other areas for ticket agents, vendors, public rest rooms, storage, crew facilities, janitor and maintenance operations, and miscellaneous passenger furnishings and amenities. A small depot has a daily ridership of 500 to 999 boardings. A large depot has a daily ridership of 1,000 or more boardings. The complexity of an individual depot will depend on whether it is designed to accommodate a ticket office, which in turn is based on the forecast ridership, guidelines for which are provided in Table 16. A warming house is defined as a fully enclosed and heated structure providing accommodations for waiting passengers only. A shelter is an open structure with three or four side walls and a roof providing a protected waiting area for passengers. A shelter may contain a demand activated heater. A canopy is a column-supported roof structure which provides a covered connection between station buildings and boarding trains.

Table 16

GUIDELINES FOR TICKET OFFICES IN COMMUTER RAIL PASSENGER DEPOTS

Projected Daily Peak Period Passenger Boardings	Number of Ticket Windows and Office Space
1-499	None
500-999	Need for ticket windows to be determined on an individual basis
1000 and above	1 ticket window and 200 square foot minimum office area

Source: Metra and SEWRPC.

Parking and Drop-Off Areas

Passenger station sites should be designed to accommodate a variety of modes of access, including pedestrian, bicycle, bus, taxi, automobile drop-off and pick-up, and park-ride modes. Circulation patterns on the station site should be designed to provide good transition and eliminate conflicts between different modes of transportation.

Adequate public parking and passenger drop-off areas are important in the overall design and sizing of commuter stations. Such areas will encompass most of the land required for each station facility. For purposes of this feasibility study, the overall land requirements for parking and drop-off areas at each station were determined. This was done by estimating the forecast volume of boarding passengers who would arrive by an automobile intended to be parked at the station. These forecast volumes were then converted to the number of all-day parking stalls, using an appropriate factor for automobile occupancy. The additional area required for passenger drop-off and pick-up was determined by adding the area equivalent to 20 additional stalls for lots with less than 100 all-day stalls, the area equivalent to 40 additional stalls for lots with 100 to 399 all-day stalls, the area equivalent to 60 additional stalls for lots with 400 to 799 all-day stalls, and the area equivalent to 80 additional stalls for lots with 800 or more all-day stalls. The total area was calculated on the basis of an average area of 350 square feet per stall, including the required area for aisles, access lanes, entrances, and exits. Additional areas for the provision of feeder-bus loading areas were added to each station on a case-by-case basis.

Other Passenger Amenities

Attention should be given to the provision of other passenger amenities necessary to provide an attractive, safe, cost-effective, and otherwise useable environment. These consist of those fixtures, furnishings, and equipment providing conveniences to passengers. These may include, but not be limited to the following: lighting; service information displays; appropriate passenger and vehicle signing; telephones; seating and windbreaks; fencing and guardrails; communication, security, and emergency equipment; landscaping; trash disposal containers; newspaper and other vending machines; and advertising displays. The locations of these items in the passenger station area should provide utility and convenience without interfering with normal passenger and pedestrian flow. The specific types and number of amenities will vary with the particular needs of each station.

OPERATING PLAN

This section provides a description and screening of the alternative commuter rail service operating plans considered under this study. Two basic general operating plans were considered: 1) an operating plan based on service provided as an extension of the existing Metra Union Pacific North Line service operating between Kenosha and Chicago and 2) an operating plan based on a new stand-alone service between Kenosha, Racine, and Milwaukee connecting with the existing Metra Union Pacific North Line between Kenosha and Chicago. Under each of these two operating plans, different operating schedules were considered to provide differing overall levels of service.

The general methodology used to develop the operating plans was to identify first each alternative in terms of the basic service characteristics. Then, other operating alternatives were considered as variations of each basic alternative. Differences in ridership, capital costs, and operating costs attendant to each of the alternative levels of service could then be determined. The characteristics of service levels which are critical in forecasting potential ridership included average operating speeds, days and hours of service, frequency of service, and headways. Developing detailed schedules, or timetables, for individual trains was not essential to the feasibility planning effort. Operating plan scenarios were designed to be representative of new-start commuter rail service.

Operating Plan Assumptions

Certain assumptions were necessary in the design of the various operating plan alternatives. The intent of these assumptions was to enable the alternatives to be designed in a realistic and implementable manner with respect to possible development of a new commuter service in a corridor where no such service has existed previously. The following assumptions were based on a review of the characteristics and recent experience of other new-start commuter railway services in North America, such as those operating in the metropolitan areas of Los Angeles, Miami, Vancouver, and Washington D.C., as well as the new commuter railway services being developed by Metra in the Chicago area.

- The overall experience with contemporary new-start commuter routes in the United States and Canada indicates that only a very basic service is operated initially, with a small number of trains operating only in the peak direction and only during weekday peak periods.

- On new-start commuter routes, initial peak-period service has normally consisted of two or three trains in the peak direction during the peak period. A smaller number of reverse-direction peak-period trains have been instituted on some routes where sufficient demand has been forecast in the non-peak direction.

- A small number of midday and early-evening trains have been operated on new-start commuter railway routes to provide more schedule choices for passengers. Such service has been initiated in some

cases as part of the beginning of service; in other cases it was only when the initial peak-period service has been in operation for some time.

- Service in late weekday evenings and on Saturdays, Sundays, and holidays is rare on contemporary new-start commuter lines. Institution of service during these periods has been viewed as a potential improvement over the long term. In the interim, some new-start services provide shuttle buses to the commuter stations during periods when trains do not operate. The shuttle buses may operate along the entire length of the route or may provide service from another rail transit terminal which does operate during those periods.

- Improvements and enhancements to contemporary new-start commuter routes have normally been undertaken on an incremental basis only after the initial service offering or last service improvement has been successfully tested in terms of ridership, market acceptance, and cost-effectiveness. In some cases, several years separate such incremental improvements.

- Incremental improvements and enhancements have depended on the availability of sufficient resources and the ability to integrate the added services with existing passenger and freight traffic.

In the design of the operating plan alternatives, an important consideration was the unique character of the Kenosha-Racine-Milwaukee Corridor. In most other metropolitan areas of the United States and Canada, the service offered by new commuter rail systems has been strongly oriented towards serving a single major destination for most of the potential passengers, usually the CBD of the major central city concerned. In the Kenosha-Racine-Milwaukee Corridor, the potential exists for substantial numbers of potential passengers to be traveling in one or the other of two directions: toward Milwaukee or toward Chicago. The design of the operating plans reflects this unique characteristic of the Corridor.

Alternative No. 1: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee as an Extension of Metra's Existing Union Pacific North Line with a Basic Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated along the entire length of the Corridor north of Kenosha to Racine and Milwaukee. Trains would continue to make all existing stops between Kenosha and Chicago and would make all intermediate stops between Kenosha and Milwaukee. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

The initial frequency of service would be two trains in each direction between Milwaukee and Chicago during both the morning and afternoon peak periods. The service headway would be about 45 minutes. The trains would be operated as through trains along the entire Corridor. All trains would initially operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 1A: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee as an Extension of Metra's Existing Union Pacific North Line with a Moderate Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated along the entire length of the Corridor north of Kenosha to Racine and Milwaukee. These trains would continue to make all existing stops between Kenosha and Chicago. In addition, because of their early departure time, a small number of trains would originate or terminate at Kenosha. Trains would make all intermediate stops between Kenosha and Milwaukee. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

Frequency of service would be three trains in each direction between Kenosha and Milwaukee during both the morning and afternoon peak periods. The service headway would be about 30 minutes. There would also be one midday train in each direction along the entire Corridor departing in the early afternoon. All trains would operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 1B: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee as an Extension of Metra's Existing Union Pacific North Line with a High Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated along the entire length of the Corridor north of Kenosha to Racine and Milwaukee. These trains would continue to make all existing stops between Kenosha and Chicago. In addition, because of their early departure time, a small

number of trains would originate or terminate at Kenosha. Trains would make all intermediate stops between Kenosha and Milwaukee. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

On weekdays, frequency of service would be four trains from Milwaukee to Kenosha and on to Chicago during the morning peak period and from Chicago to Milwaukee during the afternoon peak period. In the opposite direction, there would be three trains from Kenosha to Milwaukee during the morning peak period and from Milwaukee to Kenosha during the afternoon peak period. The service headway would be about 30 minutes during peak periods. There would also be nonpeak-period trains in each direction along the entire Corridor during the late morning, early afternoon, and evening periods. Weekend service would also be provided. On Saturdays, four trains in each direction would be provided throughout the day along the entire Milwaukee-Racine-Kenosha-Chicago Corridor. On Sundays and holidays, three trains in each direction would be provided throughout the day along the entire Milwaukee-Racine-Kenosha-Chicago Corridor.

Alternative No. 2: Operation of Commuter Rail Passenger Trains between Kenosha and Racine as an Extension of Metra's Existing Union Pacific North Line with a Minimum Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated only to Racine. Trains would continue to make all existing stops between Kenosha and Chicago, and would make all stops north of Kenosha. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

Frequency of service would be two trains in each direction between Racine and Chicago during both the morning and afternoon peak periods. The service headway would be about 45 minutes. The trains would be operated as through trains along the entire Corridor. All trains would operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 2A: Operation of Commuter Rail Passenger Trains between Kenosha and Racine as an Extension of Metra's Existing Union Pacific North Line with a Moderate Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated only to Racine. Trains would continue to make all existing stops between Kenosha and Chicago and would make all stops north of Kenosha. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

Frequency of service would be three trains in each direction between Racine and Chicago during both the morning and afternoon peak periods. The service headway would be about 30 minutes. There would also be one midday train in each direction along the entire Corridor, departing in the early afternoon. All trains would operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 2B: Operation of Commuter Rail Passenger Trains between Kenosha and Racine as an Extension of Metra's Existing Union Pacific North Line with a High Level of Service

Under this alternative, selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated only to Racine. These trains would continue to make all existing stops between Kenosha and Chicago and would make all stops north of Kenosha. To the extent possible, the Kenosha-Chicago trains utilized would be those which already provide skip-stop service during peak periods.

On weekdays, frequency of service would be four trains from Racine to Kenosha and on to Chicago during the morning peak period and from Chicago to Racine during the afternoon peak period. In the opposite direction, there would be three trains from Kenosha to Racine during the morning peak period and from Racine to Kenosha during the afternoon peak period. The service headway would be about 30 minutes during peak periods. There would also be nonpeak-period trains operated in each direction along the entire Corridor during the late morning, early afternoon, and evening periods. Weekend service would also be provided. On Saturdays, four trains in each direction would be provided throughout the day along the entire Racine-Kenosha-Chicago Corridor. On Sundays and holidays, three trains in each direction would be provided throughout the day along the entire Racine-Kenosha-Chicago Corridor.

Alternative No. 3: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee Independently with a Basic Level of Service

Under this alternative, separate commuter trains would operate between Kenosha, Racine, and Milwaukee. The new service would provide for the convenient transfer of

passengers to and from Metra Chicago trains, as well for convenient travel to and from Racine and Milwaukee. Trains would make all intermediate stops between Kenosha and Milwaukee.

Frequency of service would be two trains in each direction between Kenosha and Milwaukee during both the morning and afternoon peak periods. The service headway would be about 45 minutes. All trains would operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 3A: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee Independently with a Moderate Level of Service

Under this alternative, separate commuter trains would operate between Kenosha, Racine, and Milwaukee. The new service would provide for convenient transfer of passengers to and from Metra Chicago trains, as well for convenient travel to and from Racine and Milwaukee. Trains would make all intermediate stops between Kenosha and Milwaukee.

Frequency of service would be three trains in each direction between Kenosha and Milwaukee during both the morning and afternoon peak periods. The service headway would be about 30 minutes. There would also be one midday train in each direction along the entire Corridor, departing in the early afternoon. All trains would operate on weekdays only, with no operation assumed for Saturdays, Sundays, and holidays.

Alternative No. 3B: Operation of Commuter Rail Passenger Trains between Kenosha, Racine, and Milwaukee Independently with a High Level of Service

Under this alternative, separate commuter trains would operate between Kenosha, Racine, and Milwaukee. The new service would provide for convenient transfer to and from Metra Chicago trains, as well as for convenient travel to and from Racine and Milwaukee. Trains would make all intermediate stops between Kenosha and Milwaukee.

On weekdays, frequency of service would be four trains from Milwaukee to Kenosha during the morning peak period and from Kenosha to Milwaukee during the afternoon peak period. In the opposite direction, there would be three trains from Kenosha to Milwaukee during the morning peak period and from Milwaukee to Kenosha during the afternoon peak period. The service headway would be about 30 minutes during peak periods. There would also be nonpeak-period trains in each direction along the entire Corridor during the late morning, early afternoon, and evening periods. Weekend service would also be provided. On Saturdays, four trains in each direction would be provided throughout the day between Kenosha and Milwaukee. On Sundays and holidays, three trains in each direction would be provided throughout the day between Kenosha and Milwaukee.

A summary of the preliminary operating plan alternatives for commuter rail service in the Kenosha-Racine-Milwaukee Corridor is presented in Table 17.

Operating Plan for Feasibility Assessment

Given the range of options for alignment, station, operating plan, track and signal improvement, equipment, and service provider and the possible myriad of combinations available from these characteristics, it was concluded to be desirable to continue focusing on the most practical and flexible operating plan alternative. For purposes of this feasibility assessment, a single basic operating plan alternative was initially identified as a starting point to enable work of the entire study to be completed in the least complicated manner and as soon as possible. Also, it was recognized that as the ridership forecasts and cost estimates for this work are undertaken, it will become obvious that certain refinements may be desirable with respect the station, operating plan, equipment, track, and signal assumptions in order for one or more of the best alternatives to be identified.

For the purposes of this study, an operating plan which retains the inherent flexibility to generate the highest ridership over the entire plan design period was identified for further consideration under this feasibility study. Operation of commuter rail trains between Kenosha, Racine, and Milwaukee would enable the examination of ridership potential over the entire length of the Corridor. Operation of commuter rail trains as an extension of Metra's existing Union Pacific North Line service would provide the benefit of a no-transfer ride for potential passengers. Inclusion of nonpeak service in the feasibility assessment, at least initially, would be expected to enable the largest market of passengers in the Corridor to be attracted to the service. Therefore, Alternative No. 1B, Operation of Commuter Rail Trains between Kenosha, Racine, and Milwaukee as an Extension of Metra's Existing Union Pacific North Line with a High Level of Service, was singled out for further consideration under this feasibility study, recognizing that the characteristics of this operating plan will probably undergo refinement as ridership projections are developed; as equipment, track, signal, and institutional requirements are identified; and as necessary and appropriate capital and operating cost estimates are prepared.

Table 17

SUMMARY OF PRELIMINARY COMMUTER RAIL OPERATING PLAN ALTERNATIVES IN THE SOUTH LAKESHORE CORRIDOR

Service Characteristic	Alternative								
	1, Extension of Kenosha-Chicago Trains to Milwaukee			2, Extension of Kenosha-Chicago Trains to Racine			3, Independent Service between Kenosha and Milwaukee[a]		
Start-Up Level of Service	1, Basic	1A, Moderate	1B, High	2, Basic	2A, Moderate	2B, High	3, Basic	3A, Moderate	3B, High
Extent of Service in Primary Corridor	Kenosha-Racine-Milwaukee	Kenosha-Racine-Milwaukee	Kenosha-Racine-Milwaukee	Kenosha-Racine	Kenosha-Racine	Kenosha-Racine	Kenosha-Racine-Milwaukee	Kenosha-Racine-Milwaukee	Kenosha-Racine-Milwaukee
Operated as through Service with Metra Kenosha-Chicago Trains	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Number of Northbound Weekday Trains									
A.M. Peak	2	3	3	2	3	3	2	3	3
Midday	--	1	2	--	1	2	--	1	2
P.M. Peak	2	3	4	2	3	4	2	3	4
Evening	--	--	1	--	--	1	--	--	1
Number of Southbound Weekday Trains									
A.M. Peak	2	3	4	2	3	4	2	3	4
Midday	--	1	2	--	1	2	--	1	2
P.M. Peak	2	3	3	2	3	3	2	3	3
Evening	--	--	1	--	--	1	--	--	1
Number of Weekend and Holiday Trains[b]									
Saturdays	--	--	4	--	--	4	--	--	4
Sundays	--	--	3	--	--	3	--	--	3
Holidays	--	--	3	--	--	3	--	--	3

[a] *Would require change of trains to and from Metra at Kenosha.*

[b] *Throughout entire day in each direction.*

Source: SEWRPC.

TRACK AND SIGNAL IMPROVEMENTS

This section provides a description of the track and signal improvements necessary for the initiation of commuter rail service along the "Lake Shore Line," the original C&NW designation for this route, of the Union Pacific in the Kenosha-Racine-Milwaukee Corridor. The track and signal improvements are described by the segments of the proposed commuter rail route requiring differing levels of improvements. The necessary track and signal improvements were identified for each segment of the route with respect to main line trackage, terminal area trackage, and crossings and junctions. The need for providing such additional trackage as passing tracks or sidings was also established for each segment.

The necessary track and signal improvements were identified for the most promising route alignment and passenger station locations and for the most practical operating plan, as these were identified in this study.

Track and Signal Planning Assumptions

In order to operate commuter rail service in an efficient, safe, and cost-effective manner and to attract an adequate level of patronage, the trackage and such attendant facilities as signal systems must be maintained in an appropriate condition. This may require that existing facilities be rehabilitated, upgraded, or replaced. To attract sufficient patronage, the proposed commuter rail service must be able to offer high-speed, comfortable, and dependable train operations at all times. In general it is desirable to operate trains at the highest practical speeds, consistent with safety. Because of the higher operating speeds and the need for strict adherence to schedules, the operational requirements of passenger trains are generally more demanding of the track and signal systems than those of freight trains.

The following factors were considered in identifying needed track and signal system improvements:

- The commuter passenger trains were to be operated at the highest practical speeds between stations, consistent with safety, and with minimal delays. Accordingly, en route speed restrictions were to be minimized, routine stops other than at passenger stations eliminated, and interference among the various types of train traffic avoided.

- The maximum practical operating speed along any specific section of track was assumed to depend on the following four principal factors: horizontal and vertical alignment, physical condition, special trackwork, and operational considerations. Any one of these may be the limiting factor along a specific segment of track.

- With respect to the physical alignment of the potential route, maximum train speeds were assumed to be determined primarily by horizontal curvature and, to a lesser extent, by the severity of grades. Since the potential commuter service was to be operated largely over existing main lines, and since it is unlikely that the existing horizontal and vertical alignment of the right-of-way concerned could be easily modified in a practical, nondisruptive, and cost-effective manner, the existing route alignment was assumed to remain unchanged.

- The track safety standards promulgated by the Federal Railroad Administration (FRA) prescribe minimum requirements for the physical condition of railroad tracks to provide for the safe operation of freight and passenger trains. The standards specify maximum allowable speeds on the basis of the condition of the track structure, including the age and condition of rails and other track material, such as tie plates and rail anchors, ties, and ballast, as well as drainage and vegetation. These standards were used in the evaluation of the condition of the trackage concerned. It is important to note, however, that the standards represent minimums for safe operation and may represent a lower condition than desirable for providing passengers with a smooth and comfortable ride.

- Maximum train speeds over special trackwork at junctions, crossings, and at movable bridges were assumed to be determined by the complexity of the trackwork, the size of the junction or crossing, and the curvature of the turnouts and the angles of the crossings involved. Another factor affecting speeds at junctions, crossings, and movable bridges is the type and sophistication of the signal system used to control train movements through the special trackwork and the need to provide adequate response time to signal indications.

- Various operational considerations unique to a specific segment of railroad line may also govern train operating speeds. Such considerations may include, but not be limited to, station-to-station distances; operation through yards, junctions, and sidings; performance characteristics of locomotives and rolling stock; density of train traffic; the proximity of surrounding development; and such safety considerations as frequency of at-grade street and highway crossings.

- The extent of some necessary track and signal improvements will depend on the intended level of service to be offered. That is, a greater number of commuter trains on a daily basis, or at higher operating speeds, may require a more sophisticated level of improvements, particularly with respect to necessary signal systems. However, a certain minimum level of track and signal improvements may be expected to be necessary for the initiation of any commuter rail service, regardless of the intended number of trains or the level of service intended to be offered.

The relationship between track condition and signal requirements is important because both track and signals have a significant cost associated with their installation and maintenance; the facilities with the most restrictive conditions will govern maximum allowable train speeds and operation. Train operations are governed by an extensive set of rules and regulations prescribed by railroads and regulatory bodies. The rules and regulations have been developed over the years using a "fail-safe" philosophy; they are designed to permit only the most restrictive and cautious operations unless superseded by procedures and signal systems which safely permit faster and more heavily trafficked train operations. Thus, railroad signal systems perform the following two basic functions: 1) allowing faster and more efficient operation of trains along main lines through control of train spacing and the meeting or passing of trains and 2) protecting trains from, and providing priority over, conflicting movements at junctions, crossings, and movable bridges.

Federal regulations require certain types of signals to be in operation if certain speeds are to be attained in main line operation. For example, an automatic block signal system (ABS) must be used if passenger trains are operated at

speeds of 60 miles per hour (mph) or more or freight trains are operated at speeds of 50 mph or more. Either an automatic cab signal (ACS), automatic train stop (ATS), or automatic train control (ATC) system must be used where any train is operated at speeds of 80 mph or more. Accordingly, passenger and freight trains are limited to maximum speeds of 59 and 49 miles per hour, respectively, over nonsignaled trackage.

To facilitate the design of preliminary operating schedules under this feasibility assessment, the existing and alternative desirable operating speeds were identified by zones on each of the principal line segments along the potential Kenosha-Racine-Milwaukee commuter rail route. Existing speeds were identified from the current operating timetables of the railroads involved. Alternative desirable operating speeds were based on possible operational considerations, possible signal system improvements, operating speeds of other existing commuter rail systems, and historical operating speeds of passenger trains along the same route. Following a review of possible operating speed options, it was concluded that, for purposes of the study, two alternative commuter rail operating speed scenarios would be considered. Alternative A assumed a maximum attainable main line operating speed of 59 mph. Alternative B assumed a maximum attainable main line operating speed of 79 mph. In some zones, the maximum operating speeds are proportionally lower because of alignment, operational, or safety constraints. The operating speeds for each zone under each scenario are set forth in Table 18.

Once the permissible operating speeds for each segment were identified, commuter train travel times over the entire proposed route were developed. Under Alternative A, which has a maximum permissible main line operating speed of 59 mph, the installation of block signals would not be required. Under this alternative, a one-way trip in either direction along the entire Kenosha-Racine-Milwaukee route would take a total of 56 minutes, including stops at the Racine, South Milwaukee, and Cudahy-St. Francis stations. If the stops at Somers, Caledonia, and Oak Creek were included, a one-way trip would then take a total of 65 minutes. Under Alternative B, which has a maximum permissible main line operating speed of 79 mph, the installation and operation of some type of block signal system would be required. Under this alternative, a one-way trip in either direction along the entire Kenosha-Racine-Milwaukee route would take a total of 49 minutes, including stops at the Racine, South Milwaukee, and Cudahy-St. Francis stations. If the stops at Somers, Caledonia, and Oak Creek were included, a one-way trip would then take a total of 58 minutes.

The travel times between stations to be used under this feasibility assessment, as well as station dwell times and total travel time along the route for trains under each alternative, are presented in Table 19. Since the operating plans to be examined under this study were assumed to have commuter trains traveling in both directions during the same periods of the day, meets between trains operating in opposing directions will need to be accommodated. Meets between commuter rail trains and freight trains may also have to be assumed. The times presented in Table 19 do not include any time increments for such meets between trains; it is rather assumed that any needed passing tracks will be long enough to permit meets without reductions in running speeds.

With respect to average speeds for the proposed service, including intermediate stops at Racine, South Milwaukee, and Cudahy-St. Francis, Alternative A would have an average speed of 35 mph over the 33-mile-long route. Alternative B would have an average speed of 40 mph over the 33-mile-long route. If the stops at Somers, Caledonia, and Oak Creek were included, Alternative A would then have an average speed of 30 mph, and Alternative B would then have an average speed of 34 mph. As noted earlier, commuter rail service, in general, operates at relatively high overall average operating speeds, ranging from 30 to 50 mph. By comparison, typical average speeds on Metra's Union Pacific North Line between Kenosha and Chicago are 32 mph for local trains and 36 mph for express trains. Average speeds on Metra's North Central Service between Chicago and Antioch are 37 mph.

Assessment of Track and Signal Conditions and Needs

An assessment of the existing track and signal conditions of the rail line in the Kenosha-Racine-Milwaukee Corridor was made in order to determine the improvements which may be expected to be necessary to permit the operation of commuter rail service. The assessment was conducted by a consulting transportation engineering firm working with the Commission staff. The assessment was completed through a review of Union Pacific's and Canadian Pacific's engineering data and records, field inspection of the entire Kenosha-Racine-Milwaukee line, and discussions with the railroad companies' operating and engineering staffs. This work was undertaken with the cooperation of the companies involved.

Necessary improvements to the Kenosha-Racine-Milwaukee line may be divided into two basic types. The first type includes upgrading or rehabilitation of the existing main tracks and selected auxiliary tracks in order to provide a safe, smooth, and comfortable ride for passengers at the speeds identified in Table 18. The second type

Table 18

ALTERNATIVE MAXIMUM OPERATING SPEEDS FOR POSSIBLE COMMUTER RAIL SERVICE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

Segment	Zone	Description	Milepost Locations	Measured Distance	Maximum Operating Speed		
					Existing	Alternative A	Alternative B
1		Union Pacific Railroad Kenosha Subdivision					
	A	Kenosha Depot to North Yard Limits	51.6-53.0	1.4	40	59	79
	B	Kenosha North Yard Limits to Racine	53.0-60.0	7.0	40	59	79
	C	Racine South Side to North Side	60.0-63.2	3.2	40	40	40
	D	Racine to Cudahy	63.2-77.0	13.8	40	59	79
	E	Cudahy to St. Francis Junction	77.0-79.8	2.8	30	35	50
2		Union Pacific Railroad National Avenue Spur					
	A	St. Francis Junction	79.8-80.2	0.4	25	25	25
	B	Bay View Area	80.2-81.7	1.5	10	35	40
	C	Bay View Crossing	81.7-81.9	0.2	10	20	30
	D	Kinnickinnic Elevator Area	81.9-82.3	0.4	10	30	30
	E	Kinnickinnic River Bridge	82.3-82.5	0.2	Stop	30	30
	F	Greenfield Avenue Area	82.5-83.0	0.5	10	30	30
	G	Washington Street Junction[a]	83.0-83.2	0.2	10	20	25
3		Canadian Pacific Railway C&M Subdivision					
	A	Washington Street to Florida Street	84.2-84.5	0.3	40	40	40
	B	Florida Street to Menomonee Drawbridge	84.5-85.4	0.4[b]	30	30	30
	C	Menomonee Drawbridge to Milwaukee Depot	85.4-85.7	0.3	15	15	15
--	--	Total	--	32.6	--	--	--

[a]*The point at which the connecting track from the Union Pacific Railroad National Avenue Spur Track joins the Canadian Pacific C&M Subdivision main line is at Milepost 83.2 on the Union Pacific Railroad and Milepost 84.2 on the Canadian Pacific Railway.*

[b]*The actual measured distance between mileposts may be less than one mile because of changes in track and right-of-way alignments over the years.*

Source: SEWRPC.

Table 19

ASSUMED OPERATING TIMES TO BE USED FOR POSSIBLE COMMUTER SERVICE ASSESSMENT IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

Measured Distance	Passenger Stations and Route Segments	Travel and Dwell Times in Minutes[a]	
		Alternative A[b]	Alternative B[c]
--	*Kenosha*	--	--
9.1	**Kenosha-Racine**	**12**	**10**
--	*Racine*	*2*	*2*
14.2	**Racine-South Milwaukee**	**18**	**15**
--	*South Milwaukee*	*1*	*1*
3.2	**South Milwaukee-Cudahy**	**6**	**6**
--	*Cudahy-St. Francis*	*1*	*1*
4.9	**Cudahy-Washington St.**	**12**	**10**
1.2	**Washington St.-Milwaukee**	**4**	**4**
--	*Milwaukee Passenger Depot*	--	--
32.6	Totals	56	49

[a]*Times shown for stations are in italics and indicate dwell times. Times shown for route segments are in bold and indicate running times.*

[b]*Based upon a maximum main line operating speed of 59 m.p.h.*

[c]*Based upon a maximum main line operating speed of 79 m.p.h.*

Source: SEWRPC.

includes the relocation or realignment of selected track segments and the possible construction of new trackage to accommodate commuter operations and the joint operation of commuter passenger trains with freight trains and Amtrak trains.

In general, the Union Pacific Kenosha Subdivision between Kenosha and St. Francis was determined to be in acceptable condition for existing freight operations; it would require overall upgrading and the installation of some new trackage to accommodate commuter operations in a safe, efficient, and reliable manner. The National Avenue Spur between St. Francis and Washington Street was determined to be in generally poor condition for accommodating commuter train operations, except for that portion recently relocated and rebuilt as part of the Lake Parkway construction project. The National Avenue Spur would require significant upgrading and some new track improvements for it to be used as a commuter train route. The Canadian Pacific C&M Subdivision was determined to be in very good condition for accommodating commuter operations and would require the installation of only one track improvement.

As already noted, two alternative operating speed scenarios were considered under this feasibility study. Alternative A assumed a maximum main line operating speed of 59 mph; Alternative B assumed a maximum main line operating speed of 79 mph. The assessment of the track and signal system considered both of these alternatives as appropriate, since each alternative may be expected to require different levels of improvement. Much of the required upgrading and many of the improvements, however, were found to be necessary regardless of the maximum assumed main line operating speed or of the assumed frequency of operation. Necessary upgrading and improvements which varied according to the desired maximum main line operating speed were noted. The identification of track and signal system needs is described below by major components.

Track Structure

Track structure refers to the various components comprising railroad track, including the rails, ties, and other track materials. Other track materials include tie plates, spikes, joint bars, joint bolts, and rail anchors. Ballast, while important, is considered part of the roadbed.

The existing rail condition along the Kenosha-Racine-Milwaukee commuter rail route ranges from poor to good. Along the Kenosha Subdivision from Milepost 51.6 to Milepost 70.3 and from Milepost 74.0 to Milepost 80.0, the rail is a combination of jointed 112-pound and 115-pound rail, most of which was rolled and laid in the 1930s. From Milepost 70.3 to Milepost 74.0, the rail is 115-pound continuous welded rail, rolled and laid in 1964 and 1966. Along the National Avenue Spur, the rail has recently been replaced between St. Francis and Bay View. From approximately Milepost 80.0 to Milepost 81.0, the Union Pacific has recently installed new 136-pound continuous welded rail, rolled in 1994 and laid in 1996; from approximately Milepost 81.0 to Milepost 81.8, the company has installed new 115-pound continuous welded rail, also rolled in 1994 and laid in 1996. From Milepost 81.8 to the end of the main track at Washington Street, 112-pound jointed rail, rolled and laid in the 1930s, is in place. Along the Canadian Pacific C&M Subdivision, the rail is 132-pound continuous welded rail on both main tracks, rolled and laid in 1980, and is in good condition.

Thus, the rail on about 25.9 miles of the 32.6 mile main line route consists of older jointed rail which has experienced extensive use and shows signs of wear. There are sections of the existing rail which show such defects and damage as soft spots or engine wheel burns, that is, places where the slippage of the driving wheels has deformed or flattened the rail surface. Many of the defects are too deep to grind out or are in sections of rail with a reduced thickness of railhead. Because the rail is jointed, much of the wear and many of the defects are at the ends of the rail. In these areas, there are frequent indications of rail-end wear, sunken joints, and possibly permanently deformed or bent rails. While these conditions allow the safe operation of freight trains at moderate speeds, they should not be expected to provide a smooth, comfortable ride for passengers and passenger train equipment at high speeds. Because of the age of the rail and because of the reduction in the level of track maintenance by the C&NW after the 1971 discontinuance of regular passenger train service north of Kenosha, the condition of the rail may be expected to continue to decline.

To enable commuter train operation under the maximum main line operating speed alternative of 59 mph, it was concluded that rail replacement would have to be undertaken along several segments of the Union Pacific Kenosha Subdivision and the National Avenue Spur. Such rail replacement is recommended to include the following:

- Replacement of the existing 112-pound jointed rail on the westbound main track from Milepost 52.5 to Milepost 53.0 with new 115-pound continuous welded rail.

- Replacement of the existing 112-pound jointed rail from Milepost 53.0 to Milepost 60.5 with new 115-pound continuous welded rail.

- Replacement of approximately 1,440 track feet of 115-pound jointed rail through the curve between Milepost 61.8 and Milepost 62.05 with new 115-pound premium continuous welded rail.

- Replacement of the existing 115-pound jointed rail through the four curves at Milepost 60.8, Milepost 61.5, Milepost 62.7, and Milepost 64.6 with new 115-pound continuous welded rail for a total distance of 1.0 track mile.

- Replacement of the existing 115-pound jointed rail from Milepost 69.2 to Milepost 69.5 with new 115-pound continuous welded rail. This segment of track includes the Oak Creek Power Plant turnouts.

- Replacement of the existing 112-pound jointed rail from Milepost 78.0 to Milepost 80.0 with new 115-pound continuous welded rail.

- Acquisition of 100 tons each of 112-pound and 115-pound relay rail to make spot replacements of badly worn rails along the line. Used rail is preferred to new rail for such use so that its head wear will match the existing railhead wear.

To enable commuter train operation under a higher maximum main line operating speed of 79 mph, it was concluded that rail replacement in addition to that required for 59 mph commuter rail operation would be required. Such additional rail replacement along Union Pacific Kenosha Subdivision and the National Avenue Spur is recommended to include the following:

- Installation of new 115-pound continuous welded rail for the remainder of the line, a total of approximately additional 14.05 miles.

- The existing continuous welded rail from Milepost 70.3 to Milepost 74.0 can remain in place. However, field welding should be performed to weld all existing rail joints which remain, predominantly in the vicinity of grade crossings.

The existing tie condition along the Kenosha-Racine-Milwaukee commuter rail route ranges from fair to poor. No significant tie replacement work has been done along this line in the last 15 years, resulting in mechanical failure and failure due to aging of the ties. As part of this study, sample tie counts were conducted in 1997 along the main line and along existing passing sidings which could be used for commuter service. The counts indicated that many ties need replacement because of aging. From Milepost 53.0 to Milepost 80.0, it was estimated that about 30 percent of the ties were in need of replacement. From Milepost 52.1 to Milepost 53.0, along the south end of the eastbound main, it was estimated that about 50 percent of the ties were in need of replacement. Ties, together with the roadbed, form the foundation of the track. The ties support the load of the trains and distribute that load through the ballast and subgrade. If the foundation is not sound, unequal or poor distribution of train loads may be expected to lead to failure of the roadbed, ties, and rail. It is therefore recommended that all the bad ties along the entire line be replaced, regardless of the intended maximum main line operating speed for commuter trains.

Other track material consists primarily of tie plates, spikes, joint bars, joint bolts, and rail anchors. Some of each of these items may be expected to require replacement during track rehabilitation efforts. Tie plates exist along the entire length of the track, but inspection indicates that some have cracked. All the tie plates are only rail-spiked. Joint bars and bolts will require replacement where appropriate. The rail line is anchored with drive-on anchors. Inspection of the track does not indicate any set pattern for anchoring the line; however, the rail is fully anchored through curves and turnouts and appears to be adequately anchored along the length of the line.

Ballast and Roadway

Ballast is the material placed under and around a track to hold its position, distribute weight, dissipate loads, and provide drainage. The roadway is that part of the right-of-way which includes the roadbed, or subgrade, which, in turn, supports the track, and, in addition, includes the slopes of cuts, ditches, other drainage structures, and access roads.

The subgrade and roadway along the Union Pacific Kenosha Subdivision and the National Avenue Spur was found to be generally in fair to good condition; along the Canadian Pacific C&M Subdivision they were in good condition. However, at various places along the Kenosha Subdivision and National Avenue Spur, the ditch line is nonexistent or has partially or completely filled in with sediment, impeding proper drainage of the area. There are a number of spots where the drainage ditch line should be recut and cleaned out. Drainage ditches should also be cut through those locations where such ditches are currently nonexistent.

A variety of types of ballast are in place along the existing track, including steel-mill slag, limestone, trap-rock, quartzite, dolomite, and granite. The inspection indicated that there were places where track pumping is occurring because of poor localized roadbed conditions; mud is contaminating the ballast. In this situation, the track

moves excessively in the vertical direction under the wheel loads, and causes subgrade particles and mud to travel, or pump, up into the ballast. This condition was found primarily at grade crossings and turnouts.

Most of the problems with the existing ballast and roadway could be alleviated by undercutting the ballast and adding new ballast where necessary. Undercutting is the process of removing the sediment and small rock particles from the old, fouled ballast and replacing it with new or cleaned ballast and then bringing the track to the intended surface and line. It is recommended that ballast undercutting be performed from Milepost 60.4 to Milepost 63.2, Milepost 68.5 to Milepost 69.5, and Milepost 77.8 to Milepost 79.9, a total of 5.9 miles. Ballast undercutting should also be performed along segments of the main line recommended for rail replacement. This would require an additional 9.45 miles of ballast undercutting. In addition, the entire main track from Kenosha to St. Francis along the Union Pacific Kenosha Subdivision and on the National Avenue Spur beyond, or north of, St. Francis should be surfaced. At Milepost 54.0, there is a 1°56' curve, with 1.25 inches of superelevation, permitting a maximum speed of 55 mph through the curve, according to FRA track safety standards. By raising the superelevation to 2.00 inches, the maximum operating speed can be increased to the recommended 59 mph. Therefore, ballast undercutting and surfacing should also be done through this curve to provide the required superelevation.

To enable commuter train operation under a higher maximum main line operating speed of 79 mph, additional undercutting and surfacing would be necessary in addition to that required for 59 mph operation. The following curves along Union Pacific's Kenosha Subdivision and the National Avenue Spur would require such undercutting and surfacing to provide the recommended superelevation:

- At Milepost 53.6, the existing 0.50 inch of superelevation of the 1°00' curve would be increased to 1.50 inches.
- At Milepost 54.0, the existing 1.25 inches of superelevation of the 1°56' curve would be increased to 4.50 inches.
- At Milepost 54.8, the existing 0.50 inch of superelevation of the 1°00' curve would be increased to 1.50 inches.
- At Milepost 59.5, the existing 0.50 inch superelevation of the 1°00' would be increased to 1.50 inches.
- At Milepost 64.6, the existing 0.50 inch superelevation of the 1°01' curve would be increased to 1.50 inches.
- At Milepost 72.0, the existing 0.50 inch superelevation of the 1°00' curve would be increased to 1.50 inches.
- At Milepost 75.0, the existing 0.50 inch superelevation of the 1°00' curve would be increased to 1.50 inches.
- At Milepost 76.4, the existing 0.50 inch superelevation of the 1°00' curve would be increased to 1.50 inches.

All the recommended superelevations are at, or below, levels which would provide problems for the operation of freight trains.

New and Reconfigured Track and Sidings

The assessment of track condition conducted under this study concluded that some new sidings will be required and certain segments of existing track would need to be relocated or reconfigured to provide for the safe and efficient operation of commuter trains along the Kenosha-Racine-Milwaukee Corridor. The sidings would be required to allow commuter trains traveling in opposite directions to meet and pass each other. The track reconfiguration would also be required to allow the continued operation and coordination of existing and future freight train operations with the introduction of commuter trains.

With respect to the need for new sidings along the Union Pacific Kenosha Subdivision and the National Avenue Spur, which are single-track lines, analyses of possible train movements were conducted and conceptual schedules developed by the engineering consultant and the Commission staff using the desired level of service and headways identified in operating plan Alternative No. 1B in order to determine the number, approximate locations, and length of any necessary sidings. Also, an assessment of possible future freight operations along the single-track Union Pacific Kenosha Subdivision and the National Avenue Spur was made.

Freight train traffic is light along the Union Pacific line concerned. In 1997, normal freight train traffic on the Kenosha Subdivision consisted of one local, one through freight, and two coal trains per day. On the National Avenue Spur, traffic consisted of one weekday local "switching" run which worked primarily north of the Kinnickinnic River Bridge. These trains together typically operated between 7:00 a.m. and 4:00 p.m. daily, with the

time of operations varying from day to day. The maximum freight train length permitted was 1.5 miles (7,920 feet) because of the grades and the spacing of street and highway crossings. Unit coal trains operated in a maximum of 126-car sets.

Existing sidings on the Union Pacific line were used mostly for storage, such as to store hopper cars moving to, and from, the Oak Creek Power Plant. All sidings were remnant segments of the former second main line track, except for the Vulcan Materials siding, near Ives Station, near Three Mile Road, which was a new track, but constructed on the alignment of the former westbound main track. The Union Pacific has indicated that it may be possible for freight operations to be adjusted to accommodate passenger service, but that the company would need to explore this further when a firm proposal for commuter service is actually made.

Regular traffic levels along these Union Pacific lines are projected to remain about the same or, possibly, to increase modestly. The Oak Creek Power Plant may add two coal trains per day to the line. Any other increase in traffic would be due to expansion of existing, or the location of new, customers along the line, a situation not currently foreseen. As noted earlier, traffic congestion and track maintenance work on the Milwaukee Subdivision may result in additional trains being operated over the Kenosha Subdivision on a day-to-day, temporary basis at the discretion of the dispatcher in charge. Traffic increases which are a result of future trackage rights being granted to other railroads include a possible switching agreement with the Canadian Pacific; however, no such arrangement is currently under actual consideration. Most of the freight traffic on the Union Pacific between Milwaukee and Chicago is expected to continue to be accommodated on the Milwaukee Subdivision, which lies west of the lines under consideration for commuter service.

As part of these analyses, the following assumptions were used in considering specific siding-related improvements:

- To the extent possible, the total number of sidings required, as well as the length of each siding, should be minimized in order to reduce the required capital investment.

- To the extent possible, existing sidings, passing tracks, and double-track segments of the line should be considered for possible extension.

- To the extent possible, the installation of new sidings should take advantage of existing roadbeds remaining from former double track.

- The capacity available on existing sidings should be assumed to be required for existing and future freight switching and car storage.

- To the extent possible, new at-grade sidings should be located away from developed urban areas.

- Train scheduling and determination of siding locations should include consideration of, and coordination with, the schedules of Amtrak passenger trains serving Milwaukee, Metra commuter trains serving Kenosha, and freights trains operating in the Corridor.

- Minimum siding lengths should allow commuter trains to operate at, or at least near, the allowable speed for the particular segment of line, allowing trains to meet without significant delays. For safety reasons and to allow operational flexibility, siding lengths should allow a two-minute window on either side of a train meet.

- Turnouts at each end of sidings and crossovers, as well as at locations where main lines transition from single to double track, should be controlled remotely by dispatchers. If such remote operation were not provided, controlling turnouts would remain the responsibility of train crews, requiring trains to stop while a crew member disembarks to throw and reset each turnout, a time-consuming procedure. All remotely controlled turnouts must be interconnected with appropriate signals, most of which will require new installations.

On the basis of the analyses of possible train movements resulting from the conceptual schedules developed for the desired level of service and headways, and the assumed locations for the basic set of five passenger stations, the following recommended improvements would be needed. It was concluded that a minimum of four locations for train meets are likely to be required. These would consist of a northward extension of the existing double track in Kenosha; use of the existing double-track Canadian Pacific main line in Milwaukee; and the installation of at least two new sidings along the Union Pacific Kenosha Subdivision. To provide for a maximum main line operating speed of 59 mph, the new sidings may need to be as much as 3.5 miles in length. To provide for a maximum main line operating speed of 79 mph, the new sidings may need to be as much as 5.0 miles in length. It is important to note that the required number of sidings, as well as the precise location and length of each siding, will ultimately depend upon many factors including: development of an actual schedule for the commuter travel, the final number of

passenger stations and their locations, operating speeds, and negotiation and agreement with the freight railroad companies involved. Unless specifically noted, the following recommended improvements would be needed to enable maximum main line operating speeds of 59 mph and 79 mph, respectively.

Extension of the existing double track in Kenosha would be from Milepost 53.0 to Milepost 54.0 under the 59 mph main line speed alternative. Under the 79 mph main line speed alternative, extension of the double track would be from Milepost 53.0 to Milepost 56.5. These extensions would use the remaining roadbed where the second main line track has been removed. Thus, no major grading or earthwork would be nor any significant extension or widening of bridges, culverts, or other structures would be required. These extensions would, however, require the following work:

- Installation of 1.0 mile of new 115-pound continuous welded rail, ties, and other track material under the 59 mph operating speed alternative and installation of 3.5 miles of new 115-pound continuous welded rail, ties, and other track material under the 79 mph operating speed alternative.

- Installation of a No. 20 turnout at the north end of the extended siding and on the northbound track at Milepost 53.0, where the double track currently ends, to provide for a crossover.

- Removal of the existing No. 10 industrial turnout at Milepost 53.6 and replacement with a new No. 10 turnout off of the extended siding. Replacement of this turnout is necessary, because it has rigid switch braces, which are unsafe for commuter operations.

- Addition of a second track through the grade crossings at 35th, 31st, and 24th Streets for 59 mile per hour operating speed alternative. Under the 79 mph operating speed alternative, the second track would have to be extended through the grade crossings at Birch Road (CTH EE) and 12th Street (CTH E). The street crossings at each of these locations should be rebuilt as part of the additional track construction.

The new sidings would be somewhat evenly spaced along the route between the north end of the extended double track in Kenosha and the south end of the Canadian Pacific double track at Washington Street in Milwaukee, both in the Racine and South Milwaukee areas. It was concluded to be too costly to install a siding along that section of the National Avenue Spur between St. Francis and the Canadian Pacific crossing at Bay View because of the limited right-of-way available. The proposed sidings in the South Milwaukee and Racine areas would utilize the roadbed remaining from a second main line track, now removed. Thus, neither major grading or earthwork would be required nor any significant extension or widening of bridges, culverts, or other structures be necessary.

The new siding required along the Kenosha Subdivision in the Racine area would extend from Milepost 61.1 to Milepost 64.6 under the 59 mph operating speed alternative. Under the 79 mph operating speed alternative, this siding would extend from Milepost 60.4 to Milepost 65.4. These new sidings would require the following work:

- Installation of 3.5 miles of new 115-pound continuous welded rail, ties, and other track material under the 59 mph operating speed alternative and installation of 5.0 miles of new 115-pound continuous welded rail, ties, and other track material under the 79 mph operating alternative.

- Installation of a No. 20 turnout at each end of the new sidings.

- For the 79 mph operating speed alternative, installation of a universal crossover at Milepost 62.9 to allow transfers between the main line and the siding. The universal crossover should consist of two pairs of No. 20 turnouts, allowing trains to enter or exit a long siding at a midway point. This would permit dispatchers some flexibility in accommodating high-speed commuter trains, local switching movements, and assembly of weekday coal trains.

- Removal of the existing, but currently unused, scrapyard turnout at Milepost 62.0.

- For the 79 mph operating speed alternative, new track and track relocation work would be required for a distance of about 0.5 mile, from Milepost 64.9 to Milepost 65.4. The former westbound main-track roadbed along this segment is now owned by Vulcan Materials. This segment of roadbed carries a new siding, constructed there by Vulcan, regularly used to load crushed rock from quarries on both sides of the Union Pacific main line track. The necessary track relocation work would include the placement of about 0.5 mile of fill along the easterly side of the existing roadbed to enable the existing main line to be relocated and to provide sufficient room for the required new siding. Two culverts will need to be extended in this area.

- For the 59 mph operating speed alternative, a second, additional, track would be needed through a total of 12 street or highway crossings, including 11th Street, State Street (STH 38), West Street, Prospect Street, Hamilton Street, Albert Street, High Street, Rapids Drive, Yout Street, Goold Street, Layard Avenue, and South Street. For the 79 mph operating speed alternative, a second track would need to be added through a total of 18 crossings, including the 12 required for the 59 mph operating speed alternative, plus track at 16th Street, 14th Street, 13th Street, Washington Avenue (STH 20), 12th Street, and Three Mile Road. Each of the street crossings should be rebuilt as part of the additional track construction.

Installation of a new siding along the Kenosha Subdivision in the South Milwaukee area would be required from Milepost 73.2 to Milepost 76.7 under the 59 mph operating speed alternative. Under the 79 mph operating speed alternative, the siding would extend from Milepost 72.3 to Milepost 77.3. It would incorporate the existing Cudahy siding located between Milepost 75.7 and 76.7 under both alternatives. Under the 79 mph operating speed alternative, the existing Carrollville industrial siding lead from Milepost 72.3 to Milepost 72.9 would also be incorporated into the new siding. This would require the following work:

- Installation of 2.5 miles of new 115-pound continuous welded rail, ties, and other track material under the 59 mph operating speed alternative and installation of 3.4 miles of new 115-pound continuous welded rail, ties, and other track material under the 79 mph operating alternative.

- For the 59 mph operating speed alternative, replacement of the existing No. 10 turnout at the north end of the existing Cudahy siding with a new No. 20 turnout.

- Installation of a No. 20 turnout at the south end of the new siding under the 59 mph operating speed alternative. Under the 79 mph operating speed alternative, the existing No. 10 turnout at the south end of the Carrollville industrial lead would be replaced with a No. 20 turnout.

- Installation of a universal crossover, consisting of a pair of facing crossovers, each including a pair of No. 20 turnouts, at Milepost 74.8 to allow midpoint movements between the main line and the siding;

- Relocation of the existing turnout at Milepost 74.7 from the existing main line track to the new siding;

- Removal of the existing turnout at Milepost 73.8 because this spur is no longer in service.

- Removal of the existing turnout at Milepost 76.5 on the west side of the existing main track because this spur is no longer in service.

- Removal of the turnouts at Milepost 75.7 for both operating speed alternatives and at Milepost 76.7 for the 79 mph operating speed alternative on the existing Cudahy siding.

- For the 59 mph operating speed alternative, a second track would need to be added through a total of three street crossings, including Columbia Avenue, Milwaukee Avenue, and Rawson Avenue. For the 79 mph operating speed alternative, the second track must be extended through a total of six at-grade street crossings, including the three required for the 59 mph operating speed alternative plus E. Puetz Road, E. Ramsey Avenue, and E. Ladish Avenue. The street crossings at each of these locations should be rebuilt as part of the additional track construction.

With respect to the need for specific track reconfiguration, two track segments require attention. The first segment is located at the north end of the Union Pacific National Avenue Spur. In order to separate freight switching movements and commuter traffic along this industrial lead, as well as to permit an increase in the operating speed for the commuter trains, it is recommended that the former westbound main line between the Bay View crossing of the Canadian Pacific Spur to Jones Island, at Milepost 81.8, and the Washington Street connection at Milepost 83.0 be utilized. This would establish a separate track for commuter trains through the existing yard limits. Although the former westbound main track remains in place for the length of this segment, its reconstruction is required to permit commuter passenger train operation at 30 mph. This will involve the following work:

- Relocation of the Fifth Ward Yard lead switch from its present location at Milepost 83.0 on the Canadian Pacific connection track to the Third Ward Yard lead at Milepost 82.8. This relocation would permit freight trains going to the Fifth Ward Yard lead to switch directly from the former eastbound main line to the Fifth Ward Yard lead, rather than crossing to the westbound main line and then switching to the

Fifth Ward Yard lead, as is currently done. The relocation of this turnout will also require construction of approximately 300 linear feet of new track.

- Replacement of the existing 112-pound No. 15 turnout at Milepost 82.9, on the former westbound main, with a new 115-pound No. 15 turnout;

- Removal of the crossover at Milepost 82.6, just north of the Kinnickinnic River Bridge.

- Replacement of the existing square bridge joints on the Kinnickinnic River Bridge with such appropriate expansion joints as Conley Safety Joints.

- Removal of the West Yard lead turnout at Milepost 82.45, just south of the Kinnickinnic River Bridge, since this lead has been taken out of service.

- Replacement of the existing industry turnout at Milepost 82.0 with a new 115-pound No. 10 turnout. This is necessary because of the poor condition of the switch points, stock rail, and frog.

- Replacement of the existing No. 10 turnout at Milepost 81.8 with a new 115-pound No. 15 turnout. This would allow for higher speeds by commuter trains through the turnout.

- Relocation of the existing No. 10 turnout on the east side of the former eastbound main line leading to the Continental Grain Co. elevator at Milepost 81.8. This would allow sufficient room to install the required new No. 15 turnout at Milepost 81.8, the installation of which would otherwise be constrained by the crossing with the Canadian Pacific's Jones Island Spur.

- Rehabilitation of the Canadian Pacific crossing at Milepost 81.8 by welding the existing frogs, installing new ties, and replacing the fouled ballast with new ballast. This crossing can be surfaced and lined to allow commuter trains to be operated at 25 mph.

- Replacement of all existing rail from Milepost 81.8 to the Washington Street connection with the Canadian Pacific main line at Milepost 83.0 with 115-pound continuous welded rail, new ties, and other track material.

The second track segment requiring attention is the segment of the Canadian Pacific C&M Subdivision main line between Washington Street and the Milwaukee Passenger Station. This segment of the existing double-track Canadian Pacific main line in Milwaukee itself would require no improvements or upgrading except for the installation of a crossover between the two main line tracks just north of the Washington Street connection between the two railroads. This crossover would allow southbound commuter trains to use the southbound main line instead of the northbound main line between the Milwaukee Passenger Station and Washington Street and allow commuter trains to meet on this section of Canadian Pacific double-track line.

However, the Canadian Pacific C&M Subdivision between Washington Street and the Milwaukee Passenger Station experiences a significant volume of both freight and passenger traffic. This segment is the Canadian Pacific main freight line from Chicago through Milwaukee and Minneapolis-St. Paul to Western Canada. In 1997, approximately 20 to 25 freight trains used this segment daily. Currently, the majority of these trains are routed through the Passenger Station rather than through the Muskego Yard. In addition, Amtrak operates seven passenger trains in each direction daily between Washington Street and the Milwaukee Passenger Station.

Canadian Pacific officials have indicated that they have no objection to Kenosha-Racine-Milwaukee commuter operations on this section of track. However, they believe the resulting volume of traffic and the combination of freight and passenger trains may cause congestion problems for all train traffic. Canadian Pacific officials have indicated further that initiation of commuter operations and/or expanded Amtrak service, into the Milwaukee Passenger Station will necessitate routing all freight trains around, rather than through, the Passenger Station. This will require the existing freight trackage through the Muskego Yard on the south side of the City of Milwaukee's Menomonee River Valley to be upgraded to main line standards.

This freight bypass would be a main line route through Muskego Yard to permit freight train operation at 25 mph while maintaining available lead tracks for switching and also maintaining proper connections between the main line trackage and the Yard. Some of the necessary improvements to provide this freight bypass have already been made by Canadian Pacific during 1996 and 1997 as part of its major capital improvement program. The improvements completed to date include major upgrading of Muskego Yard trackage, consisting of the installation of new rail, ties, and ballast; replacing and relocating old and worn turnouts; reconfiguring the track arrangement at the west entrance to the yard; and redesigning and upgrading appropriate signals attendant to these improvements. To date, this work has been funded entirely by the Canadian

Pacific Railway. Canadian Pacific officials have indicated that the following additional work remains to be completed to provide a main line freight bypass:

- Construction of 1.2 miles of a new second main track, with 132-pound continuous welded rail, from the existing end of the double track at S. 3rd Street to the junction of the freight main line with the passenger main at Maple Street, just north of the Canadian Pacific's Kinnickinnic River Bridge.

- Rehabilitation and upgrading of 0.6 mile of both the eastbound and westbound main line between the east end of the Muskego Yard at approximately S. 11th Street to S. 3rd Street, including removal of the sharp "dip" in the existing track profile below the 6th Street Viaduct.

- Construction of a new yard lead for approximately 0.5 mile in an easterly direction from the east end of the Muskego Yard.

- Replacement of the existing Burnham Bridge movable structure with a fixed substructure designed to accommodate the new yard lead at the east end of the Muskego Yard in addition to the two tracks for the main freight line and also to upgrade and modernize the existing bridge.

- Rehabilitation and improvement of 10 turnouts along the new main tracks through the Muskego Yard to provide connections various switching leads.

- Installation of a new power crossover at the west end of the Muskego Yard, together with appropriate machinery and equipment.

- Installation and upgrading of signals at both ends of the Muskego Yard, together with appropriate connections to existing signal systems on the main lines leading to the Muskego Yard.

- Construction of a private pedestrian overpass over the main tracks at the Muskego Yard office.

- Miscellaneous removal and/or rearrangement of selected yard trackage and improvements to private railroad access roads along the new freight main line.

Three specific items in the above list of improvements for the Muskego Yard area deserve additional discussion. First, removal of the "dip" in the track profile underneath the 6th Street Viaduct as part of rehabilitation of the main tracks at the east end of the Muskego Yard would provide a safe and proper grade for the freight main line. During 1997, the City of Milwaukee was conducting preliminary engineering and developing plans for the replacement of the 6th Street Viaduct. To provide for a uniform track profile and a minimum clearance of 23 feet above the final track elevation, the new bridge structure would need to be designed to provide sufficient clearance below the Viaduct. The railroad has indicated that to meet these requirements, a new bridge structure at this site would need to be about four feet higher than the existing structure.

Second, replacement of the double-track Burnham Bridge, a movable structure, with a three-track fixed span would require the decommissioning of Burnham Canal as a navigable channel for large ships. In recent years, only a single occasional commercial user has made use of the Burnham Canal west of the Burnham Bridge. At the start of the 1997 shipping season, this last shipper started using unloading facilities on Jones Island instead of on the Burnham Canal, eliminating the need for Burnham Bridge to be a movable structure. It has been estimated the cost of providing a fixed bridge at this location would be about $3 million, compared to the an estimated cost of $20 million for a new movable bridge. It should be noted that an old movable public street bridge over the Burnham Canal at S. 11th Street, just west of the Canadian Pacific Railway Burnham Bridge, was recently replaced with a fixed-span bridge. Replacement of the bridge with a fixed span will require a cooperative agreement between the City of Milwaukee, the U. S. Army Corps of Engineers, and the Canadian Pacific Railway.

Third, the proposed main line freight route through the Muskego Yard and the Menomonee Valley is now, and would desirably be in the future, free of any at-grade public street, highway, or pedestrian crossings. A rail route free of grade crossings is desirable both for safety and for practical operating reasons, that is, to allow for the holding and switching of lengthy freight trains without interference from street and highway traffic.

Turnouts

The standard turnout along the Kenosha Subdivision and the National Avenue Spur in 1997 was the old Chicago & North Western Railway standard, a No. 10 turnout with 19°-6' curved switch points and rail-bound manganese steel frogs. This turnout design permits a maximum speed of 10 mph through the turnout for freight trains and 15 mph for passenger trains. This speed restriction is due to the presence of jointed rail in the turnout, which rail may cause trains to have unsafe lateral motions at critical speeds, with a potential for derailment. Variations to

this standard type of turnout along the route include the No. 16 turnout at Milepost 83.0, and the No. 20 north main line turnout Milepost 53.0 in Kenosha.

In addition to the need to add and to replace turnouts as part of the needed passing siding and track reconfiguration, it is recommended that certain additional replacement or rehabilitation of turnouts be undertaken, as follows:

- Replacement of the switch points and stock rails on all turnouts currently showing wear on the stock rail. There are a total of eight of these requiring replacement along the line.

- Replacement of the existing No. 10 turnout at Milepost 58.5 with a new No. 10 turnout. Replacement of this turnout is necessary because it has rigid switch braces, which are unsafe for commuter operations.

- Replacement of the old-style "C" clamp guardrails with bolted rail safety guardrails. Nine of these require replacement along the line.

- Replacement of worn-out rail-bound manganese frogs. Seven of these require replacement along the line.

Grade Crossings

There are 55 public and private at-grade street crossings of the Kenosha Subdivision and the National Avenue Spur Track. Of these, 18, or about 33 percent, are in poor condition and should be rebuilt. A number of factors contribute to the poor condition of these crossings, including failure of the railway and/or roadway subgrade and failure of crossing materials. Under the 59 mph operating speed alternative, seven of these crossings would be rebuilt as part of needed addition of a second track for the new passing sidings. Under the 79 mph operating speed alternative, 12 of these crossings would be rebuilt as part of the needed addition of a second track for the new passing sidings. It is recommended that all remaining crossings in poor condition also be rebuilt under each alternative.

Public grade crossings along the route are protected by automatic crossing signals, activated either by motion sensors or by electrical track circuits. It is recommended that all automatic grade crossing signals be activated by constant warning time devices. Use of these devices will provide a consistent length of time for crossing gates to be lowered, regardless of the approach speed for trains.

In 1997 there were three public grade crossings along the proposed commuter rail route which did not have full protection, that is crossbucks, bells, flashing lights, and gates; they would, therefore, require upgrading. These crossings are Hansche Road (Milepost 58.21), Chickory Road (Milepost 58.43), and E. Barnard Avenue (Milepost 78.0). A complete listing of all street and highway crossings, including those at grade, is provided in Appendix A.

The automatic signals are currently set for 40 mph train operation. Where commuter train operating speeds will exceed 40 mph, the crossing signals will need to be retimed to lengthen the trains' approach distance to the crossing.

Bridges and Other Structures

Bridges and other structures along the proposed Kenosha-Racine-Milwaukee commuter route were also examined. Bridges allow the railroad line to cross over streets, highways, and major rivers. Some 25 bridges exist along the line. Of this total, 21, or about 84 percent, serve street and highway crossings; the remainder are river crossings. All bridges are included in Appendix A to this report.

The bridges are generally steel structures on concrete abutments and range from one to four tracks in width. A few of these bridges are of concrete arch, concrete deck, or wood pile designs. Inspection indicated that the condition of the bridges is generally good, with most requiring only minor repairs and repainting.

Other structures consist mainly of culverts allowing the line to cross minor watercourses, drainage features, and pedestrian subways. These structures are of a variety of types. Most of the culverts consist of cast-iron pipe, but there are a few stone-arch, stone-box, and concrete-pipe crossings. Inspection indicated that the condition of these culverts is generally good, with most requiring little or no repair work. In addition, the existing culverts generally extend under the entire double-track width of the roadbed, even though much of the route along the Kenosha Subdivision and the National Avenue Spur has been converted to single-track operation.

There are also two movable bridges, one on the Union Pacific National Avenue Spur crossing of the Kinnickinnic River, at Milepost 82.9, and the other on the Canadian Pacific main line crossing of the Menomonee River, at Milepost 85.4. Both of these rivers are designated and maintained as navigable waterways, requiring that both bridges be able at all times to open for waterborne traffic. Both bridges are of a single-span, through-truss, swing-bridge design.

The Union Pacific swing bridge over the Kinnickinnic River was built in 1898; in 1997 it could be operated via a control box on either side of the bridge or from a bridgetender house atop the bridge. This bridge normally remains in the open position: it is closed and reopened as needed to accommodate railroad traffic. The bridge is opened and closed either by a yard clerk who drives to the bridge from a local switching yard office and meets the train or by a member of the train crew. Inspection of this bridge indicated it to be in good condition, with no apparent significant structural, mechanical, or electrical problems. When the level of Lake Michigan reached its peak in 1986, this bridge experienced operating problems in opening and closing. This situation was due to flooding of the operating mechanism and to the age and wear of certain mechanical parts and of the age of the electrical control system. The resulting problems have since been abated through maintenance.

Some improvements to this bridge needed before commuter service begins were identified. These include replacement of the rail on the bridge and its approaches; upgrading of the rail expansion joints between the bridge and approaches; and provision of appropriate control of, and signal protection for, the movable bridge so that commuter trains would not be required to stop before using the bridge. This will require an operator to be stationed at the bridge during the navigation season for those periods of the day when commuter trains are scheduled. Also, bridge-approach signals would need to be installed. This will allow the bridge to be in the closed position when a train arrives, rather than requiring a train crew member to disembark, first to close and the to open the bridge. Although remote operation of the Kinnickinnic River Bridge is feasible, and although such control has been installed on some railroad bridges in other parts of the United States, it is not recommended for this bridge at this time. This is due to the difficulty in assuring that waterborne traffic, especially the smaller watercraft and pleasure boats which commonly use the Kinnickinnic River, are clear of the bridge before the bridge is closed.

Consideration of commuter rail service along the Union Pacific Railroad did not present any specific concerns about possible impacts on access to Port of Milwaukee facilities by rail freight service at the time this feasibility study was undertaken. However, Port officials noted that the railroad bridge crossing the Kinnickinnic River does constitute a restriction to navigation for ships and boats traveling between the Inner Harbor and Port facilities along the Kinnickinnic River. This is a result of the bridge's design as a swing span, which pivots on a central pier in the middle of the River channel, limiting the horizontal clearance for vessels to 60 feet. Port officials have indicated that there is a potential for future Port-related development along the Kinnickinnic River west of the bridge. As a long-term measure, it would be desirable eventually to eliminate this navigational restriction. This would require the replacement of the existing swing-span bridge with either a vertical-lift or bascule span.

The Canadian Pacific swing bridge over the Menomonee River was built in 1904: it is currently operated during the navigation season from a bridgetender's house on the bridge. This bridge normally remains in the closed position because of the volume of train traffic; it is opened as needed for waterborne traffic. Inspection of this bridge indicated that it is in good overall condition, with no apparent structural, mechanical, or electrical problems.

Other miscellaneous structures located along the Kenosha-Racine-Milwaukee line are few in number. These include a few buildings now used largely for maintenance activities or material and equipment storage plus a few overhead signal bridges. None of these miscellaneous structures are significant considerations in the development of commuter service. Most other wayside buildings and structures which once existed along the route, such as freight houses and crossing shanties, have been dismantled, removed, or sold as the railroad's needs have changed over the years.

Railroad Signals

As already noted, in 1997 signalization along most of the Kenosha-Racine-Milwaukee railway route was minimal. To provide for the operation of commuter trains along this route, the following signal-related improvements are recommended:

- Relocation and modification of certain existing signals and installation of additional signals, together with appropriate power-operated turnout machinery and equipment, on the proposed new end of double track north of Kenosha.

- Installation of signals, together with appropriate power-operated turnout machinery and equipment, at both ends of all proposed new passing sidings.

- Modification and rehabilitation, as necessary, of the signals controlling the junction of the Union Pacific Kenosha Subdivision with the Union Pacific Milwaukee Subdivision at St. Francis.

- Improvement of the signals controlling the crossing of the Union Pacific National Avenue Spur with the

Canadian Pacific Bay View Spur to Jones Island. This will require the installation of approach signals and related control equipment.

- Installation of signals, together with appropriate mechanical, electrical, and communications equipment, to protect both approaches to the Kinnickinnic River Bridge.

- Rehabilitation of the signals controlling the connecting track at Washington Street between the Union Pacific National Avenue Spur and the Canadian Pacific C&M Subdivision main line track.

- Installation of signals, together with appropriate power-operated turnout machinery and equipment, for the proposed new crossover on the Canadian Pacific main line just north of Washington Street.

This signal work is envisioned to include the installation, modification, or rehabilitation of all pertinent signals and power-operated turnout apparatus, mechanical and electrical equipment, and other remote-control and communication equipment necessary to either initiate these new systems or to integrate them into existing signal and train-control systems. For purposes of this feasibility assessment, it was assumed that remote operation of the signals and turnouts on the north side of the Kenosha, at all new passing sidings and at the junction at St. Francis would be under the control of the Union Pacific dispatching center. The crossing with the Canadian Pacific Jones Island Spur at Bay View could remain an automatic facility and continue to provide authority for trains to proceed on a first-come, first-served basis. However, because of the need for commuter trains using the Union Pacific trackage to maintain schedules, it is recommended that signals at this crossing also be placed under the control of the Union Pacific dispatching center. Signals and operation of the Kinnickinnic River Bridge would be controlled by an assigned bridgetender. Remote operation of the signals and turnouts for the Washington Street connection and the new crossover would be under the control of the Canadian Pacific dispatching center.

The signal improvements described above are recommended regardless of whether the service is to be provided at a maximum main line operating speed of 59 mph or of 79 mph. If a maximum main line operating speed of 79 mph is chosen, however, the installation of an ABS system would be required. A basic ABS system between Kenosha and Washington Street would divide the line into blocks, approximately two miles in length, with signals installed to control train movements into, and out of, each of the blocks. By installing ABS, closer spacing of trains and higher operating speeds would be permitted. The signals recommended above to be installed or improved for the proposed new sidings, the Kinnickinnic River Bridge, and the junctions could be used as integral parts of an ABS system. An ABS system would not need to be extended onto the Canadian Pacific main line since it is already equipped with a centralized traffic control system (CTC).

Equipment Storage and Servicing Facilities

For the purposes of this feasibility study, it was assumed that train inspections and heavy maintenance could be done at an existing Metra facility. This would be accomplished under a contractual agreement, thus avoiding the need to construct a major new maintenance facility. However, provisions for overnight storage, cleaning, and light maintenance of train sets in Milwaukee, and possibly Kenosha, will be necessary. The Milwaukee Passenger Station currently has the capacity to store a number of additional passenger trains. Canadian Pacific representatives have indicated that there are three tracks along the south side of the depot which could be used for storing commuter train equipment. These tracks are designated as "Depot 4", "Depot 5," and "Pocket 5." Overnight storage of commuter train equipment would have to be coordinated with Amtrak, which also uses these tracks to store two to three train sets and a few private passenger cars. Each track is approximately 3,000 feet long and could accommodate more than one train set on each track.

There is also room on the Canadian Pacific right-of-way between the west end of the Milwaukee Passenger Station and the N. 12th Street grade crossing to construct additional storage tracks, if necessary. This storage area would be convenient and provide easy access to the main line for "blocking" trains before departure from Milwaukee. In order to store trains at this location, an electrical bridge would need to be constructed to provide power so that internal functions of the trains can be maintained without operating the locomotive's engines. Also, a rest room and locker room for train crews and cleaning crews operating out of Milwaukee would need to be provided. This may require the construction of a new building or the adaptation and use of existing buildings recently vacated by the Canadian Pacific in the area. At Kenosha, there is sufficient room on the coachyard tracks already used by Metra to accommodate all train sets which would be stored there overnight if commuter rail service were extended from Kenosha to Racine and Milwaukee.

In the event a service provider other than Metra is contracted to operate the service, then a major equipment

maintenance facility may have to be constructed. Such a facility would have to allow for both light and heavy maintenance, at least light to medium repairs, and comprehensive inspections. This facility would most appropriately be located at one end of the route. A review of possible locations indicates that the Milwaukee area would provide sufficient room for such a facility, perhaps west of the Passenger Station, along the Canadian Pacific main line. For example, the facility may require a shop building of about 100,000 square feet on a 21-acre site and could be considered in conjunction with an overnight equipment storage yard.

EQUIPMENT

This section of the chapter describes the commuter rail rolling stock required to provide service in the Kenosha-Racine-Milwaukee Corridor. The following two basic types of rolling stock could be used and were considered to provide the proposed service: conventional locomotive-hauled train sets or self-propelled car sets. Each of these alternatives has its own characteristics and associated advantages and disadvantages, which must be carefully considered. Important among these characteristics are initial cost and operating and maintenance costs, flexibility, operational reliability, and conformance with requirements of the ADA.

Conventional Locomotive-Hauled Train Sets

Conventional commuter train equipment typically consists of a bidirectional train set consisting of a diesel locomotive and passenger coaches. This type of equipment has been used by Metra and Metra predecessors on most of the commuter routes serving the Chicago area, although two Chicago-area routes use trains of electrically powered coaches. Bidirectional trains operate on a "push-pull" principle, with a locomotive at one end of the train set and a coach equipped with a control cab at the opposite end. The locomotive supplies all the power necessary for operation of the train set. Thus, there is no need to turn the train at the end of a route to change the direction of travel, eliminating the need for attendant facilities and crews to handle this task. This reduces operating costs and turnaround and layover times.

Use of bilevel gallery coaches significantly increases passenger capacity without a corresponding increase in train length and concurrent platform length. Each bilevel gallery coach can typically accommodate from 120 to 150 seated passengers, compared to single-level coaches, which can each typically accommodate from 100 to 120 seated passengers. The exact seating configuration, interior appointments, and passenger amenities may alter these capacities. All new passenger coaches are designed to meet the requirements of the Federal ADA requirements and can generally be configured to utilize both high or low platforms.

Several domestic and foreign manufacturers of locomotives and passenger cars provide reliable equipment of this type. In 1997 dollars, the cost of a new diesel locomotive equipped for commuter service approximated $2.4 million. The average cost of a new passenger coach approximated $2.0 million. Actual equipment costs may vary, on the basis of the options selected, the quantities ordered, and other factors. In the normal rolling stock procurement process used in the industry, the equipment is built to order. The typical manufacturer's lead time for new locomotives and passenger cars is about two years.

Used equipment may be an option, depending on the availability of the equipment. The initial to purchase cost of used equipment may be significantly less than the initial cost of new equipment. However, costs to refurbish the used equipment must also be considered. These costs may be significant, especially for modifying older passenger coaches to meet ADA requirements. Operational and maintenance costs are also likely to be higher for used than for new equipment and the expected service life of used equipment may be shorter than that of new equipment.

Self-Propelled Car Sets

Self-propelled equipment has proved to be appropriate for commuter service in circumstances where the necessary train capacity is relatively low. The seating capacity of such rolling stock is about the same as that of a typical single-level passenger coach. Control cabs are located at each end of the car, and diesel-engine propulsion equipment is mounted beneath the floor. Self-propelled coaches are bidirectional, with multiple-unit operational capabilities, that is, they can be coupled into trains controlled by a single operator without significantly affecting operational characteristics, such as acceleration rates. Self-propelled coaches are sometimes referred to as a "DMU," or "diesel, multiple-unit," a term widely used in Europe for such equipment.

There are now no self-propelled coaches available for operation in the United States which meet Federal railcar design and manufacturing requirements. While such equipment is widely used in parts of the world outside the United States and Canada, the foreign designs are light in weight and generally do not meet the strength and crashworthiness standards prescribed by the FRA for use on railroads in the United States. In many countries outside the United States and Canada where this kind of equipment is used, especially in Western Europe, many of the passenger and freight routes are on separate tracks or

rights-of-way. Accordingly, the FRA and railroad companies have expressed concerns over the safety of such foreign railcar designs in mixed operations with standard North American freight and passenger equipment and considering the high number of street and highway crossings in the United States.

There has been a successful self-propelled American railcar design in the past. Known as the Rail Diesel Car (RDC) and manufactured by the Budd Company, this design was widely used for local intercity service and commuter service during the 1950s and 1960s. By the 1990s, most of these cars had been either scrapped or converted to nonpowered coaches, although a small number are rebuilt periodically and continue to operate. During the early 1980s, the Budd Company attempted to market a modernized version of its RDC, known as the SPV-2000. This design was demonstrated in several United States metropolitan areas, including Milwaukee, and a small number of the cars were sold. Ultimately, the SPV-2000 had ongoing performance problems, no more sales were made, and the few existing units were withdrawn from service.

Several foreign manufacturers, including, among others, Nippon Sharyo of Japan, Siemens-Duewag of Germany, and Bombardier of Canada and the United States, have begun development of self-propelled coaches which conform to FRA design requirements. Of these, the Nippon Sharyo equipment appears to be the most advanced. The latter design is intended to meet all FRA requirements and the applicable requirements of both the Federal Transit Administration (FTA) and the ADA. This unit has been designed around an existing carbody currently used on the Northern Indiana Commuter Transportation District South Shore Line service, which operates between Northwestern Indiana and Chicago. Although the proposed cars have been designed, none have as yet been built or placed into service.

The Nippon Sharyo cars are self-contained, diesel-powered units, providing both the propulsion and operating systems for the car as well as coach seating for passengers. They may be operated as single units or in train sets of up to 10 cars, seating approximately 85 to 105 passengers per car, depending on the seating configuration. All cars in a set may be either powered or unpowered "trailer" cars; in the latter case there is an impact on performance. The equipment operates on a "push-pull" principle, similar to traditional rolling stock, although there are cabs located at both ends of the train set. Although much lighter in weight than traditional North American rolling stock, the Nippon Sharyo cars are designed to meet FRA standards and are not anticipated to be affected adversely by such standard railroad engineering track standards as turnout design. The approximate cost of each powered unit is expected to range from $2.2 to $2.5 million. This cost will vary, depending on the options selected and the quantity ordered, among other variables.

The Nippon Sharyo cars are designed for maintenance in standard facilities. However, because most of the power equipment is located under the car, pit space must be provided for maintenance. Special equipment may be necessary to maintain the engines, transmissions, and gear units, because these are nonstandard elements, compared to existing traditional rolling stock.

Another self-propelled coach design which has received recent attention is the Flexliner, manufactured by ADtranz, a joint venture of ABB (Asea Brown Boveri) and Daimler-Benz. Each Flexliner consists of three cars, permanently coupled, seating a total of about 140 passengers. Propulsion may be either diesel or electric. Flexliners are intended for service in intercity corridors, especially on split routes. They are designed to be coupled rapidly and conveniently into trains. This equipment has been operated successfully in other countries for several years, but may require modifications in its design to meet FRA standards for operation in the United States. The manufacturer has indicated that it is prepared to make such modifications which would allow the Flexliner equipment to be in compliance with the appropriate standards, should a United States customer place an order.

Demonstration of the Flexliner equipment has been hosted by Amtrak, the manufacturer, and various States, including Wisconsin. Like other railroad passenger equipment exhibited by manufacturers for inspection by the general public and public officials, such luxurious passenger amenities as very spacious seating, work tables, food service facilities, and on-board telephones are provided. As a practical matter, however, use of this railcar design in commuter service would require efficient seating configurations and a level of passenger amenities consistent with the type of service being provided.

A variation of the self-propelled coach concept is the family of "railbus" vehicles. These are very light-weight, diesel-driven, single-unit passenger vehicles with typical seating capacities ranging of 40 to 60 people and were intended as an inexpensive replacement for older, self-propelled vehicles providing service on lightly used branch lines. Originally, these vehicles consisted of a bus body mounted on a two-axle railcar underframe. Such vehicles are used extensively outside the United States and Canada on branch lines and in remote areas.

Various versions of this kind of vehicle have been tested over the years in the United States and Canada. In general, this experience has indicated that such vehicles are inappropriate and unproven for any type of passenger service on United States lines. The light weight of these vehicles creates concerns over passenger safety in the event of a collision with standard equipment or with heavy motor vehicles in grade-crossing accidents, the ability of the vehicle to operate safely over icy grade crossings in winter, and the ability of the vehicle to activate signal circuits reliably. A high level of track rehabilitation and continuing maintenance of this type of vehicle is also necessary to provide a safe, smooth, and comfortable ride. These kinds of vehicles have a limited capacity and may not be able to be coupled into trains to increase their capacity. Many of these vehicles tested were found to provide an unacceptable quality of ride and to have high noise levels because of their light weight.

There have been recent demonstrations of "railbus" and other similar very lightweight railcar designs. In 1980 and 1981, the FRA tested the LEV-2, an Americanized version of the Leyland Experimental Vehicle, developed in Great Britain. In 1996, Siemens was promoting its Regio-Sprinter, which could physically operate on regular freight railroad or light rail trackage. This piece of equipment was demonstrated in Calgary, Alberta, along a three-mile long freight railway line. It operated as a feeder to one of the area light rail routes and required that no other freight or passenger train operations be permitted on the line during the period it was operating.

Evaluation of Equipment Alternatives

The advantages of using rolling stock consisting of engines and coach sets include availability, dependability, proven performance and safety records, compatibility with existing Metra equipment currently operating between Kenosha and Chicago, availability of repair parts, the existence of maintenance and repair facilities, the availability of trained operators and mechanics, and the lower initial capital investment required for procurement.

The major disadvantage of using such rolling stock is that there always needs to be a locomotive and a coach equipped with a control cab in each train set, regardless of train size. This may result in reduced flexibility in interchanging equipment and the need for the same size locomotive to power a train set, regardless of the number of passenger coaches in the train set.

Self-propelled coaches may be an appropriate option for low-density passenger corridors or corridors with high densities during certain peak-travel periods but with low densities during the remainder of the day. The individually powered cars enable trains to be coupled into larger sets to handle commuter rush hours and to be broken down easily into smaller sets to accommodate lower demands during off-peak periods. Self-propelled equipment also has an advantage over traditional train sets in that the self-propelled equipment may have higher acceleration rates, thereby offering some reductions in travel times.

Disadvantages of self-propelled equipment over traditional rolling stock include a higher capital cost, the need to stock specialized repair parts, the need to modify maintenance facilities or construct new maintenance facilities which may differ from conventional railroad repair and maintenance facilities, and need for specialized training of the operators and mechanics.

Traditional train sets have been successfully used in commuter railway applications for many years and have established a proven record, especially in the Chicago area. Traditional train sets have a lower initial capital cost than self-propelled equipment, there are existing maintenance facilities available, and operators and mechanics are trained on these types of rolling stock. Furthermore, conventional locomotive-hauled trains are compatible with the existing train sets used by Metra on the Kenosha-to-Chicago service. Such compatibility would be an important consideration if Chicago based Metra service were operated through to Kenosha, Racine, and Milwaukee. Also, at this time no self-propelled coaches meeting Federal requirements are available and it is not known when such units may become available. For these reasons, the use of traditional locomotive and coach train sets is recommended in the Corridor.

EVALUATION OF SERVICE PROVIDER ARRANGEMENTS

The following three alternative basic service provider arrangements were evaluated: 1) provision of the service directly by Metra, 2) provision of the service directly by a new local public provider, and 3) provision of the service by a public agency contracting with a private operator.

Operation by Metra

One service provider option is to have Metra provide the commuter service in the Kenosha-Racine-Milwaukee Corridor as an extension of its existing Chicago-Kenosha service. Metra is an established operating agency with a reliable service, safety, and dependability record, with ample experience in the operation of a successful commuter service. In initiating commuter service in the South Lakeshore Corridor, it may be more cost-effective to

expand the existing Metra staff of operators, mechanics, and ticket agents and use Metra rolling stock and crew facilities to provide the service, than to have a new agency procure equipment, assemble staff, and create the necessary infrastructure for the service. Metra is experienced in negotiating access rights and use agreements with railroad owners for commuter service and in purchase-of-service agreements with Union Pacific Railroad. Under this option, much of the responsibility for the provision of the service and for cost containment would be assigned to Metra. Any such arrangement would require negotiation and agreement between Metra and the entity responsible for implementing commuter rail service in Wisconsin.

In April 1992, Metra, along with Pace, the regional suburban bus agency for the six-county Northeastern Illinois Region, published a document titled *Future Agenda for Suburban Transportation*. This document outlined a long-term vision for the improvement and expansion of commuter rail service, including a list of corridors in which the possible extension of such service by Metra or others could be considered. It should be recognized that some of these corridors extend beyond the limits of Northeastern Illinois and may require consideration by local agencies in the area concerned as well as the necessary enabling legislation. One of these corridors involved the possible extension of commuter rail service to Milwaukee, either over the Union Pacific (then Chicago & North Western) North Line from Kenosha or over the Canadian Pacific Railway line now used by Amtrak. While Metra has not undertaken any feasibility studies pertaining to this Corridor, the agency has identified the extension of Chicago-based service through Kenosha and Racine to Milwaukee as a potential future opportunity.

New Local Public Provider As Direct Operator

Another option would be the creation of a new public agency to operate the commuter service. It is likely that such an agency would need to be multi-county in nature. This agency would be a single-purpose organization, that is, its sole responsibility would be to provide commuter service over the existing railroad line. Section 66.30 of the Wisconsin Statutes provides that municipalities[1] may contract with each other to provide jointly any services or exercise jointly any powers which such municipalities may be authorized to provide or exercise separately. While no transportation-related cooperative contract commissions currently exist within the Region, there is the potential to achieve significant economies through providing transportation services and facilities on a cooperative, areawide basis. Moreover, the nature of certain transportation problems often requires that solutions be approached on an areawide basis. Under this option, the public agency would serve as the operator of the service. This option would involve creating and empowering a new public agency, filling key positions in that agency with qualified individuals, and developing an effectively operating organization. Rolling stock would need to be procured; maintenance and storage yards and facilities would need to be built or leased; and a complete staff, including administrators, operators, and mechanics, would need to be hired. Enabling legislation may be required. In any case, the governance of the new agency would have to be agreed on by the county and local units of government concerned in order to assure adequate local control and financing.

A variation of this option is to have an existing areawide agency, such as the Wisconsin Department of Transportation, provide the proposed commuter rail service. This variation has the advantage of placing the responsibilities entailed with an established State agency familiar with providing transportation services. However, the problems entailed in procuring equipment and hiring and training operating staff would still exist under this variation.

Although staffing and management development and employee training would pose significant challenges in time and cost under this option, it would provide the greatest degree of local control over the level of service to be provided and the attendant local costs.

Public Agency Contracting with Private Operator

A third option would be to establish a new agency to contract out all operations to a private provider. As with the second option, a new public agency would need to be created or an existing agency designated to serve as the sponsoring agency for the proposed commuter rail service. Under this option, minimal staffing would be needed for the sponsoring agency, because the primary function of the agency would be administrative. The actual provision of the service would be contracted out to a private operator. A contractual arrangement with an experienced commuter rail service provider, such as Metra, would probably provide the most effective arrangement.

Assumed Service Provider

For purposes of this feasibility study, it was assumed that Metra would provide the commuter service from Kenosha through Racine to Milwaukee as an extension of

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[1] *Under this section of the Statutes, the term "municipality" is defined to include the State and any agency thereof, cities, villages, towns, counties, school districts, and regional planning commissions.*

their existing service on the Union Pacific North Line under a contractual arrangement with a public agency created to administer the service. This recommendation was based on Metra's experience and familiarity with large commuter operations and also the fact that Metra already provides service to Kenosha from Chicago.

SUMMARY: COMMUTER RAIL FACILITIES AND SERVICES FOR FEASIBILITY ASSESSMENT

This chapter identified alternative alignments and operational characteristics for the provision of commuter service in the Kenosha-Racine-Milwaukee Corridor, also known as the South Lakeshore Corridor. A recommended alignment, and operational and service-related characteristics were identified based on consideration of these alternatives. The recommended alternative has the greatest potential for the provision of cost-effective commuter rail service in the South Lakeshore Corridor from Kenosha through Racine to Milwaukee. The principal characteristics considered in the formulation and exploration of alternatives included route alignment, station location, operating plan, needed track and signal improvements, equipment, and an institutional structure for the provision of the desired service.

Route Alignment

A route alignment was selected for further consideration under this feasibility study. The recommended alignment consisted of the Union Pacific Railroad's Kenosha Subdivision from Kenosha to St. Francis and National Avenue Spur from St. Francis to Washington Street, the existing Washington Street connection between the Union Pacific and Canadian Pacific lines, and the Canadian Pacific Railway's C&M Subdivision from Washington Street to Milwaukee. This alignment would terminate at the existing Amtrak Passenger Station in the Milwaukee CBD. Other alignment alternatives and options were examined which require more costly capital improvements without any such attendant advantages as higher operating speeds or better service to potential passenger markets.

Passenger Station Facilities

For purposes of this feasibility study, it was proposed that, at a minimum, a set of five passenger stations include Kenosha, Racine, South Milwaukee, Cudahy-St. Francis, and Milwaukee be considered. The average station spacing along the potential commuter rail line would be about 8.2 miles. In Kenosha and Milwaukee, the existing passenger stations would be utilized although some improvements would be necessary. In Racine, South Milwaukee, and Cudahy-St. Francis, new facilities would probably be necessary. In addition, on the basis of future urban development which may be expected to occur by the year 2020 and of experience with the actual operation of commuter rail service in the Corridor, it was recognized that three additional stations could be considered. The three additional passenger stations would include: Somers, Caledonia, and Oak Creek. Accordingly, the average spacing for all eight stations would then be about 4.7 miles.

Determination of the precise location and design of each passenger station is properly a function of the preliminary and final engineering studies which must follow the feasibility and major investment study phases of any commuter rail development effort. In any such succeeding phases, it will be important that local residents and public officials be involved in the selection of station locations and in the design of station facilities. Thus, the station characteristics and locations described herein should be regarded as preliminary.

Operating Plan

For purposes of this feasibility study, an operating plan was identified which provides an inherent flexibility to provide a feasible initial level of service and an improved level of service over time, both of which will generate the highest ridership levels.

The recommended operating plan includes the provision of commuter rail service between Kenosha, Racine, and Milwaukee as an extension of the existing Metra service over the Union Pacific North Line. Under the operating plan, selected existing Metra trains operating between Chicago and Kenosha would remain on their existing schedules but be operated throughout the entire length of the Corridor north of Kenosha to Racine and Milwaukee. A small number of trains would continue to originate and terminate at Kenosha. To the extent possible, the Chicago-Kenosha trains utilized for the extended service would be those which already provide some express service during peak-travel periods south of Waukegan. Trains would stop between Kenosha and Milwaukee at all intermediate stations. On weekdays, there would be three to four trains between Milwaukee, Racine, Kenosha, and Chicago during the morning and afternoon peak periods and some nonpeak-period service during the late morning, early afternoon, and evening periods. Weekend service would also be provided.

Track and Signal Improvements

For purposes of this feasibility study, an assessment was conducted by a consulting transportation engineering

firm working with the Commission staff and the railroad companies involved of the condition of the tracks and signals and the improvements which may be expected to be necessary to permit the possible initiation of commuter rail service along the existing Kenosha-Racine-Milwaukee rail line. The purpose of the assessment was to identify the existing facilities of the recommended alignment which would have to be rehabilitated, upgraded, or replaced in order to provide commuter railway service in an efficient, safe, and cost-effective manner, attracting an adequate level of patronage by a smooth and comfortable ride at acceptable operating speeds.

The Union Pacific Kenosha Subdivision between Kenosha and St. Francis was determined to be in generally good condition for existing freight operations. The line would require improvement and the installation of some new trackage to accommodate commuter operations in a safe, efficient, and reliable manner. The National Avenue Spur Track between St. Francis and Washington Street was determined to be in generally poor condition for accommodating commuter train operations except for that portion recently relocated and rebuilt as part of the Lake Parkway construction project. The National Avenue Spur Track would require significant upgrading and some new track improvements for use as a commuter rail route. The Canadian Pacific C&M Subdivision was determined to be in good condition to accommodate commuter rail operations.

To enable commuter train operation, the track improvements which would have to be undertaken along the railway line include the following: significant replacement of older, worn, jointed rail with continuous welded rail; replacement of all failing crossties along the entire route; repair, adjustment, and replacement, as necessary, of other track material, including tie plates, spikes, joint bars, joint bolts, and rail anchors; undercutting the ballast, adding new ballast as necessary, and bringing the track to the intended line and surface; providing proper superelevation on curves to accommodate passenger train operation at higher speeds; cleaning of drainage ditches along the roadbed; rehabilitation and replacement of turnouts along the entire line; rebuilding of street and highway grade crossings; improvements to the rail and expansion joints of the Kinnickinnic River Bridge; and provision of appropriate equipment storage and servicing areas at Milwaukee.

The assessment also concluded that new passing sidings would be required and three segments of the line would require some reconfiguration or improvement. These improvements would allow commuter trains traveling in opposite directions to meet and pass each other and allow the continued operation of freight trains on the line in a manner compatible with the commuter trains. The required number of sidings, as well as the precise location and length of each siding, will ultimately depend upon many factors, including: development of an actual schedule for the commuter trains; the final number and location of passenger stations, operating speeds, and negotiation and agreement with the freight railroad companies involved. For example, new sidings for a 59 mph operation may need to be as much as 3.5 miles in length. The three segments of line requiring some reconfiguration or improvement include the following: extension of the double track north of Kenosha; establishing separate tracks for commuter rail operations and local freight operations along the National Avenue Spur from Bay View to Washington Street; and upgrading of the Canadian Pacific trackage through the Muskego Yard to allow freight traffic to bypass the trackage between Washington Street and the Milwaukee Passenger Station, which is to be used by the commuter trains.

The assessment further concluded that a number of signal-related improvements would be required. These include the following: installing appropriate signals, power turnout machinery, and controls for the required new sidings, crossovers, the new end of double track north of Kenosha, and for the movable bridge crossing the Kinnickinnic River as well as the upgrading the signals and controls for the crossing of the Canadian Pacific track at Bay View, the connection with the Canadian Pacific main line at Washington Street, and the junction with the Union Pacific Milwaukee Subdivision main line at St. Francis.

The necessary track and signal improvements were determined on the basis of the improved line being able to accommodate specified maximum operating speeds. For example, under an alternative maximum main line operating speed of 59 mph, and a total of five passenger station stops, a one-way trip between Kenosha and Milwaukee would take a total of 56 minutes, with an average speed of 35 mph over the 33-mile-long route. Under an alternative maximum main line operating speed of 79 mph with five passenger station stops, a one-way trip between Kenosha and Milwaukee route would take a total of 49 minutes, with an average speed of 40 mph. Thus these differences in operating speeds would result in a difference of seven minutes' running time. The higher operating speed would, however, require a much more costly level of track rehabilitation and maintenance and the installation of an ABS system along the entire route. Accordingly, for purposes of this feasibility assessment, a maximum main line operating speed of 59 mph was assumed. It was recognized that higher main line operating speeds could be considered in the future.

Equipment

For purposes of this feasibility study, it was recommended that conventional equipment, consisting of locomotive and coach train sets, be used, rather than self-propelled equipment. The conventional train sets would be bidirectional, consisting of diesel locomotives with bilevel gallery coaches operating in a "push-pull" mode. The last coach would be equipped with an operating cab. This type ofequipment has a well-established record with respect to availability, dependability, performance, and safety and has been used by Metra and Metra's predecessors on most of the commuter routes in the Chicago area for many years. Importantly, such equipment would be compatible with the Metra equipment currently operated between Kenosha and Chicago and would meet current FRA and FTA requirements for safety, structural strength, and accessibility.

Service Provider

For purposes of this feasibility assessment, it was assumed that Metra would be the operator of the potential commuter rail service from Kenosha to Racine and Milwaukee as an extension of their existing service on the Union Pacific North Line. This recommendation was based on Metra's familiarity and experience with large commuter rail operations and on the fact that Metra already provides service to Kenosha from Chicago. Any such agreement would require negotiation and agreement between Metra and the entity responsible for implementing commuter rail service in Wisconsin.

Chapter V

EVALUATION OF POTENTIAL COMMUTER RAIL TRANSIT

INTRODUCTION

The purpose of this chapter is to provide an estimate of the capital and operating costs and of the ridership attendant to the potential extension of commuter rail passenger train service in the South Lakeshore Corridor from the City of Kenosha to the Cities of Racine and Milwaukee. Previous chapters of this study report have identified a range of possible physical and operational commuter rail extension options and, through a screening process, have identified the most promising physical, operational, and service characteristics of the potential extension of commuter rail service in this Corridor. The findings and conclusions of this screening process were used to design a conceptual commuter rail service extension for consideration and evaluation.

The first section of this chapter provides a description and evaluation of this potential extension of commuter rail service from Kenosha to Milwaukee in the South Lakeshore Corridor. This section includes a physical and operational description of the potential service, including an operating plan, an estimate of its attendant capital costs, a forecast of the potential rider-ship, an estimate of the attendant total operating costs and of net operating costs (total costs less farebox revenues attendant to ridership), and estimates of the principal impacts of the service extension, including reductions in travel time compared to existing bus service, reductions in highway traffic, and reductions in air pollutant emissions and motor fuel consumption.

The last sections of this chapter provide an evaluation of the extension of commuter rail passenger train service only to Racine, as an option with respect to the potential extension to Milwaukee, and a description of alternatives to the extension of commuter rail service in the Corridor.

DEFINITION AND EVALUATION OF POTENTIAL COMMUTER RAIL EXTENSION

Based upon the findings of the inventories, and of the screening of principal physical, operational, and service characteristic options presented in previous chapters of this report, a conceptual commuter rail extension proposal is herein identified and described for feasibility assessment. The commuter rail extension proposal would entail operation of commuter rail passenger trains throughout the day between Kenosha, Racine, and Milwaukee as an extension of Metra's existing Union Pacific-North Line service. Some existing Metra trains operating between Chicago and Kenosha or Waukegan would be extended along the entire length of the Corridor north of Kenosha to Racine and Milwaukee. One train in each direction would operate only between Kenosha and Milwaukee because of very early or late departure or arrival times. The service would be provided over the existing railway route which consists of the Union Pacific Railroad Kenosha Subdivision from Kenosha to St. Francis; the Union Pacific Railroad National Avenue spur track from St. Francis to Washington Street; the existing connecting track at Washington Street between the Union Pacific Railroad and Canadian Pacific Railway; and the Canadian Pacific Railway C&M Subdivision from Washington Street to the existing Milwaukee Amtrak station.

The largely single-track railway line would be upgraded to allow for a maximum mainline operating speed for commuter passenger trains of 59 miles per hour (mph). Passing sidings would need to be added or extended to allow trains traveling in opposite directions to meet each other. The passing sidings would be of sufficient length to enable opposing trains to meet at normal operating speeds and would be located to minimize the total number and length of sidings necessary. Turnouts at the ends of these passing sidings would be remotely controlled by railway dispatchers. Train operations would be governed by track warrant control and commuter operations train schedule authority under the direction of Union Pacific Railroad and Canadian Pacific Railway dispatchers. A more detailed description of the improvements attendant to the extension of commuter rail service has been provided in Chapter IV of this report, "Potential Commuter Rail Facilities and Services."

Freight train movements were assumed to remain relatively low in number. Thus, freight train traffic was not considered to be a constraint with respect to locating and sizing passing sidings and the operation of both commuter rail and freight trains was assumed to be accomplished through an operating agreement which includes the coordinated scheduling of all operations. Based upon the

best information available for this study, existing and likely future freight operations on the Kenosha Subdivision may be expected to be accommodated using the mainline track and siding configuration that now exists. The extension and addition of passing sidings identified in this feasibility study is primarily to provide meeting points for the commuter rail passenger trains and to provide some flexibility in the operation of both freight and commuter trains on the same line. The siding extensions and additions identified herein are described in Table 20 and are illustrated in Appendix A.

However, it is possible that the very modest amount of freight traffic which existed on the proposed commuter rail route in 1997 and which was anticipated in the future could increase substantially during the period between completion of this study and implementation of commuter rail service.[1] With the potential for additional mergers and ownership changes of North American freight railroads; the increasing volume of freight being moved by rail; the resulting rapidly changing traffic routings within the United States, including Wisconsin, Union Pacific Railroad officials have indicated that the future volume of freight traffic cannot be reliably foreseen. Unanticipated significant increases in the volume of freight traffic or changes in delivery schedules for customers may be expected to entail additional needed upgrades to the rail line, including additional passing sidings and improved signalization, or may affect the number, frequency, and schedule of possible commuter trains which could reasonably be operated.

In order to understand better the necessary coordination between commuter and freight train movements and attendant physical improvements, a detailed capacity analysis and operational simulation may need to be performed during a subsequent detailed planning study. By modeling the range of potential freight traffic volumes and the potential commuter rail service, along with proposed improvements to the railroad physical plant, a determination can be made regarding the number, length, and location of passing sidings, as well as necessary signalization and scheduling adjustments, under a range of potential future conditions.

The basic conceptual commuter rail extension described in this section of this chapter would serve all eight passenger stations described in Chapter IV, including Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee. At Kenosha, the existing Metra station facilities would be utilized. At Milwaukee, the existing station facilities currently used by Amtrak would be utilized. Some improvements would be necessary at both of these stations. At Racine, Somers, Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis, new station facilities would be necessary. The average station spacing would be 4.7 miles.

For the purposes of this feasibility assessment it was assumed that the Kenosha-Racine-Milwaukee service would be operated as an extension of Metra's existing service on the Union Pacific-North Line between Kenosha and Chicago. Such operation would provide a practical approach not only to starting service north of Kenosha but also to providing through service in the Corridor without requiring passengers to change trains at Kenosha, thus encouraging ridership. As noted previously, commuter rail service over the Union Pacific-North Line is not operated directly by Metra, but rather by the Union Pacific Railroad under a purchase-of-service agreement with Metra. Operation of commuter rail service between Kenosha, Racine, and Milwaukee will ultimately be subject to negotiation and cooperative agreements between the Union Pacific Railroad, the Canadian Pacific Railway, Metra, railroad labor unions, implementing agencies in Wisconsin, and local counties and communities involved concerning such matters as operating responsibilities; train

Table 20

POTENTIAL PASSING SIDING IMPROVEMENTS FOR KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL ROUTE

General Location	Approximate Milepost Limits	Improvement
Extension to Racine and Milwaukee		
Kenosha Area	53.0 - 55.4	Extend existing double track
Ives/Caledonia Area	62.4 - 65.8	Add new siding
South Milwaukee Area	72.0 - 75.0	Add new siding
Cudahy Area	77.8 - 79.8	Add new siding
Extension Only to Racine		
Kenosha Area	53.0 - 54.0	Extend existing double track

NOTE: The improvements described in this table represent a conceptual design for feasibility assessment. The location and design of actual improvements at the time of implementation may vary from these and will depend on the following: the recommendations of detailed planning and engineering work, review by local public officials, and negotiation and agreement with the railroad companies involved.

Source: SEWRPC.

[1] *The current 1997 weekday level of freight traffic on the Union Pacific Kenosha Subdivision includes one local train, one through freight train, and two coal trains; on the Union Pacific National Avenue Spur, there is one local train.*

crew agreements; railroad access and use or purchase-of-service agreements; and the division of revenues, expenses, and subsidies.

Operating Plan

On weekdays, the commuter rail service between Kenosha, Racine, and Milwaukee under the potential service extension alternative would consist of the following: four southbound and three northbound trains during the morning peak period; four northbound and three southbound trains during the afternoon peak period; and one train in each direction during the late morning, early afternoon, and evening periods. Thus, on weekdays, the service would provide a total of 10 trains in each direction. Weekend service would consist of four trains in each direction on Saturday and three trains in each direction on Sunday and holidays. All trains would make all stops between Kenosha and Milwaukee.

Other operating plan assumptions for this feasibility assessment included fare structure and feeder bus service. In order to determine the one-way adult fares to be charged, a zone system, based on an extension of the distance-based fare zone system used by Metra on its commuter rail lines radiating out of the Chicago central business district (CBD), was defined for the Kenosha-Racine-Milwaukee service. The fare structure assumed for the Kenosha-Racine-Milwaukee commuter rail service would therefore be integrated with the fare structure in place on the Metra system. This is important, because the service under this alternative is assumed to be operated as an extension of the Metra Union Pacific-North Line. The fare zone designations and the passenger stations within each zone for the Union Pacific-North Line between Chicago and Kenosha and the proposed Kenosha-Racine-Milwaukee service are shown on Table 21. The one-way fares used for feasibility assessment of the Kenosha-Racine-Milwaukee service as an extension of the Metra Union Pacific-North Line are shown on Table 22. They were based on the 1997 Metra fare structure, with some minor adjustments. Within Southeastern Wisconsin, commuter rail fares would be comparable to existing Kenosha-Racine-Milwaukee bus service fares. It was also assumed that multi-ride reduced fares in the form of 10-ride tickets and monthly passes similar to those available from Metra would be available for the Kenosha-Racine-Milwaukee service extension.

Table 21

FARE ZONE AND STATION ARRANGEMENT ASSUMED FOR PROPOSED KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE

Zone Designation	Passenger Stations within Zone
A	Chicago Passenger Terminal Clybourn
B	Ravenswood Rogers Park
C	Main Street, Evanston Davis Street, Evanston Central Street, Evanston Wilmette
D	Kenilworth Indian Hill Winnetka Hubbard Woods Glencoe
E	Braeside Ravinia Park Ravinia Highland Park Highwood
F	Fort Sheridan Lake Forest
G	Lake Bluff Great Lakes North Chicago
H	Waukegan
I	Zion Winthrop Harbor
J	(no stations)
K	Kenosha
L	Somers
M	Racine
N	Caledonia
O	Oak Creek South Milwaukee
P	Cudahy-St. Francis
Q	Milwaukee

Source: Metra and SEWRPC.

With respect to feeder buses, it was proposed that such service would be available at selected stations along the Kenosha-Racine-Milwaukee commuter rail route to enable passengers to travel between the commuter rail stations and nearby trip origins and destinations. For purposes of this feasibility study, a shuttle bus service operated in the Milwaukee central business district (CBD) by the Milwaukee County Transit System would be available at the Milwaukee passenger station to provide access for passengers to the entire CBD area. The shuttle bus service would connect with each arriving and departing commuter train. The feeder bus service at the Cudahy-St. Francis

Table 22

ONE-WAY ADULT FARES USED FOR FEASIBILITY ASSESSMENT OF KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL ROUTE IN 1997 DOLLARS

Zone	A Chicago CBD	B Rogers Park	C Evanston	D Winnetka	E Highland Park	F Lake Forest	G Lake Bluff	H Waukegan	I Zion	K Kenosha	L Somers	M Racine	N Caledonia	O - Oak Creek & South Milwaukee	P Cudahy-St. Francis	Q Milwaukee
A Chicago CBD	$1.80															
B Rogers Park	2.20	$1.80														
C Evanston	2.60	2.20	$1.80													
D Winnetka	3.00	2.60	2.20	$1.80												
E Highland Park	3.40	3.00	2.60	2.20	$1.80											
F Lake Forest	3.80	3.40	3.00	2.60	2.20	$1.80										
G Lake Bluff	4.20	3.80	3.40	3.00	2.60	2.20	$1.80									
H Waukegan	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80								
I Zion	5.00	4.60	4.20	3.80	3.40	3.00	2.60	$2.20	$1.80							
K Kenosha	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	$1.80						
L Somers	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	$2.20	$1.80					
M Racine	6.60	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.40	2.60	$2.20	$1.80				
N Caledonia	7.00	6.60	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.00	2.60	$2.20	$1.80			
O - Oak Creek & South Milwaukee	7.40	7.00	6.60	6.20	5.80	5.40	5.00	4.60	4.20	3.40	3.00	2.60	$2.20	$1.80		
P Cudahy-St. Francis	7.80	7.40	7.00	6.60	6.20	5.80	5.40	5.00	4.60	3.80	3.40	3.00	2.60	2.20	$1.80	
Q Milwaukee	8.20	7.80	7.40	7.00	6.60	6.20	5.80	5.40	5.00	4.20	3.80	3.40	3.00	2.60	$2.20	$1.80

Source: SEWRPC.

and South Milwaukee stations was assumed to consist of schedules coordinated with the existing local Milwaukee County Transit System bus routes. The feeder bus service at the Racine and Kenosha stations would consist of coordinated schedules with the already-established local bus routes operated as part of the Belle Urban System and the Kenosha transit system. In Racine, the commuter rail station would be directly served by Belle Urban System bus routes providing convenient access to and from all parts of the local transit service area. In Kenosha, the commuter rail station would be directly served by all Kenosha transit system bus routes at the adjacent downtown transfer point, assumed to be relocated to an area next to the existing Metra station.

Capital Costs

The capital costs of the potential commuter rail extension were estimated on the basis of a cost buildup approach with respect to track and signal improvements, locomotive and passenger coach equipment requirements, passenger station facilities, and equipment storage and servicing facilities. All capital costs are presented in constant 1997 dollars. The focus of these estimates was on identifying all capital cost items necessary for full implementation of the alternative by the design year. It is possible that the identified improvements, frequency of service and attendant equipment and storage needs and track and signal improvements, may be implemented in an incremental manner, thereby spreading the total required capital investment over a period of years. The estimated capital cost attendant to each of the categories is described below.

Track and Signal Improvements

To provide commuter rail service within the Corridor, the existing rail infrastructure requires rehabilitation and upgrading to provide a comfortable ride and acceptable operating speeds. Under this alternative, a maximum

mainline operating speed of 59 mph was designed to be achieved, however, maximum operating speeds would be lower along specific segments due to track alignment, junctions and crossings, and other operating factors.

The capital cost of track and signal improvements was estimated to total about $85.7 million, as shown in Table 23. The track and signal improvements were described in greater detail in Chapter IV of this report and include: overall rehabilitation and improvement of the main line track, roadbed, and right-of-way; rehabilitation of numerous grade crossings; and the construction of three new sidings, each up to three miles in length, to permit running meets of trains operating in opposing directions. Signal-related improvements would be required at the ends of sidings, at junctions, and at grade crossings to enable efficient and safe high-speed operation of commuter trains. Also, the reconfiguration and improvement of three other segments of the line have been identified as necessary to permit coordinated operation of both freight train and commuter rail passenger train traffic in the Corridor. One of these segments of improvement was identified as necessary by the Canadian Pacific Railway to allow the operation of its freight trains to operate through the Muskego Yard instead of through the Milwaukee passenger station. The other two segments to be improved are located on the Union Pacific Kenosha Subdivision. The estimated capital cost of track and signal improvements necessary to provide a freight main line through the Canadian Pacific Railway's Muskego Yard area in Milwaukee was estimated to total about $8.3 million total, or about 11 percent of the total track and signal improvement capital cost.

With respect to signalization, the improvements and attendant capital costs were based on the upgrading of the line to provide a 59 mph commuter train operation with remote controlled passing sidings and dispatching using track warrant control procedures. While an automatic block signal (ABS) system along the entire Kenosha-Racine-Milwaukee route would afford an extra measure of safety and would allow higher operating speeds, such a system has not been included in the capital costs for the purposes of this feasibility study. However, it was suggested, by railroad company and Metra officials, that installation of some type of signal system, such as ABS, may ultimately be required by the service operator, whether it is Metra or some other operator, regardless of the desired maximum operating speed. This consideration arose from the anticipated number of weekday peak-period trains proposed to be operated on a largely single-track line, with a high number of meets between trains operating in opposing directions. Installation of an ABS system along the entire commuter rail extension may be expected to increase the total capital cost of signal improvements by about $1.8 million, including contingencies, and preliminary engineering, design, and construction management. Much of the hardware and equipment required for an ABS system would be installed in any case as part of the necessary signalization for the passing sidings. It was also recognized that the state-of-the-art of railroad signal systems may change significantly in upcoming years and signal technologies may become available which may be better and less expensive than a standard ABS system.

Equipment Requirements

With respect to equipment, conventional locomotive-hauled commuter train equipment, consisting of bi-directional trains made up of diesel locomotives and bi-level gallery coaches, would be operated in a push-pull mode. This type of equipment and mode of operation is compatible with, and identical to, the equipment and operation used by Metra in the Chicago area.

The capital cost of the required equipment under the basic alternative was estimated to total about $54.0 million as shown in Table 24. To operate the Kenosha-Racine-Milwaukee service, a total of five locomotives and 21 coaches would need to be procured, in addition to the equipment already required by Metra for its Kenosha-Chicago service. Equipment needs were based upon the incremental number of train sets, locomotives, and coaches required to operate the additional service along the Union Pacific-North Line between Kenosha and Milwaukee plus an appropriate ratio of spare equipment. Analysis of equipment utilization on the Union Pacific-North Line indicated that a total of 14 train sets made up of 14 locomotives and 79 coaches, not including spare equipment, was required to operate the 62 revenue weekday trains on the route in 1997. The 62 weekday trains varied from four to eight coaches in length.

For purposes of this feasibility study, the assessment of equipment needs was based on the anticipated volume of passengers on each train, analysis of the proposed frequency of service between Kenosha and Milwaukee, integration with existing commuter train schedules on the Metra Union Pacific-North line, and attempting to maintain the most efficient equipment utilization possible. The minimum size of trains between Kenosha and Milwaukee was estimated to be one locomotive and four coaches in length, consistent with the minimum train size on existing Kenosha-Chicago trains. The control cab coach on each train would be equipped to meet the requirements of the Federal Americans with Disabilities Act. In actual practice, nonpeak-period trains may require less than four coaches, but experience on Metra and other commuter rail systems has shown that, except on the longest trains, changing train

Table 23

CAPITAL COSTS OF TRACK AND SIGNAL IMPROVEMENTS FOR KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE

Category and Item	Quantity	Cost of Material and Installation
Upgrade Existing Mainline Track		
Install new continuous welded rail	67,440 Track Feet	$ 8,430,000
Crosstie replacement	32,500	2,600,000
Undercutting, surfacing, and alignment work	239,448 Track Feet	4,607,000
Construct new track for sidings	55,212 Track Feet	9,938,000
Install new turnouts	15	2,090,000
Relocate existing turnouts	5	400,000
Remove existing turnouts	15	300,000
Miscellaneous turnout rehabilitation and upgrading	Lump Sum	180,000
Rehabilitate Bay View crossing	Lump Sum	20,000
Rail inspection and testing	5 Days	20,000
Miscellaneous rail replacement	200 Tons	200,000
Drainage ditch cleaning and cutting	331,584 Linear Feet	497,000
Miscellaneous subgrade work	Lump Sum	117,000
Upgrade Existing Structures: Kinnickinnic River Bridge		
Install new continuous welded rail	480 Track Feet	84,000
Install Conley safety joints	Lump Sum	210,000
Mainline Signal Work		
Install power turnout machinery, controls, and home signals for new sidings	7 Locations	10,500,000
Install approach signals on single track	15 Locations	2,250,000
Install approach signals on double track	3 Locations	900,000
Install remote control for Bay View crossing	Lump Sum	250,000
Miscellaneous modification of existing signals	3 Locations	300,000
Remove existing signals	1 Location	50,000
Provide Freight Main Line Through Muskego Yard		
Construct new track	9,200 Track Feet	1,900,000
Rehabilitate existing track	6,200 Track Feet	600,000
Install new crossover	Lump Sum	300,000
Rehabilitate existing crossovers	10 Locations	750,000
Install and upgrade signals	Lump Sum	500,000
Replace Burnham Bridge with fixed span	Lump Sum	3,000,000
Construct employee overpass	Lump Sum	500,000
Upgrade At-Grade Street and Highway Crossings		
Rebuild existing crossings	7	175,000
Install crossing for new second track	24	2,520,000
Relocate and upgrade grade crossing signals	21 Crossings	5,250,000
Install constant warning time device equipment for grade crossing signals	39 Crossings	5,850,000
Subtotal	--	$65,288,000
Contingencies	15 percent[a]	9,411,000
Preliminary engineering, design, and construction management	20 percent[b]	11,548,000
Less salvage and scrap	Lump Sum	584,000
Total	--	$85,663,000

[a] *Applies to all items other than work necessary to provide main line through Muskego Yard, for which contingencies were calculated at 10 percent.*

[b] *Applies to all items other than Muskego Yard mainline work, for which these costs have already been included above.*

Source: SEWRPC.

Table 24

CAPITAL COSTS OF LOCOMOTIVES AND ROLLING STOCK FOR KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE

Item	Quantity	Cost
Diesel-Electric Passenger Locomotive	5	$12,000,000
Bi-level Gallery Coach		
Straight Coach	16	32,000,000
Coach with Control Cab	5	10,000,000
Total	--	$54,000,000

Source: SEWRPC.

lengths for midday and evening periods becomes inefficient because of additional operating costs and the time consumed and possible delays. Also, in practice, the actual peak period train size may be more than four coaches to furnish the capacity required for passenger loads between Chicago and Waukegan. Because the Kenosha-Racine-Milwaukee service would be operated as part of the Metra Kenosha-Chicago service, it was assumed that the equipment to be acquired would actually be used in an overall Chicago-Kenosha-Milwaukee equipment pool, regardless of ownership. The spare equipment required and identified above would be integrated with Metra's general spare equipment pool already in place for the Union Pacific-North Line service and would be available for Kenosha-Racine-Milwaukee trains as needed.

Passenger Station Facilities

With respect to stations, new facilities would need to be constructed at Somers, Racine, Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis. Existing facilities would be used at Kenosha and Milwaukee, but some improvements would be necessary at both of these stations. The size and extent of the necessary improvements were based upon the overall design guidelines set forth in Chapter IV of this report. They, in turn, are based upon the anticipated passenger demand at each station. As noted earlier, it is not the purpose of this feasibility study to determine the exact details or specifications for individual stations, including their locations. Much of this work should include the input and consideration of the appropriate local officials from the area in which the station will be sited. However, overall basic design assumptions were made to enable generalized station spatial needs and cost requirements to be determined. The basic elements for each station were assumed to include: boarding platforms, access facilities meeting the requirements of the Federal Americans with Disabilities Act, buildings and shelter areas, parking for automobiles, drop-off and pick-up areas for passengers using connecting taxis and bus services, and certain station amenities.

The capital cost of passenger station facility improvements under the basic alternative was estimated to total about $8.0 million, as shown in Table 25. Based upon the year 2020 ridership forecasts that were prepared for this alternative, Table 25 sets forth the basic facility needs and the capital cost requirements for each of the eight stations.

With respect to the stations at Kenosha and Milwaukee, it was assumed that the existing facilities would be utilized to the fullest extent. Both of these stations were concluded to already include sufficient trackage and platforms for the boarding and deboarding of passengers and sufficient depot building and shelter areas for passengers. Upgrades and improvements to the Milwaukee passenger depot to handle commuter rail passengers would be to the platform area, the depot interior area, and the depot exterior area and could be expected to include: installation of signage, provision of shelter areas, and provision of pavement markings to delineate bus, taxi, and automobile loading and unloading areas; additional signage for the depot interior directing and separating commuter rail service and Amtrak service passengers; conversion of an existing ticket window and attendant area to an exclusive commuter rail ticket agent office; installation of a public address system inside the depot building and along the platforms; installation of a changeable message sign inside the depot building and along the platforms; and installation of pedestrian crossing signals and fencing between Tracks 1 and 2. Upgrades and improvements to the Kenosha passenger depot could be expected to include: installation of additional signage and pavement markings to delineate bus, taxi, and automobile loading and unloading areas and additional signage for the depot interior directing commuter rail passengers.

Ticket sales for the Kenosha-Racine-Milwaukee service would be handled in much the same manner as does Metra. For purposes of this feasibility study, tickets would be available in one-way, multi-ride, and monthly pass denominations and could be purchased from ticket agents, by mail, or, at stations where no agent is on duty, on board trains from conductors. It was assumed that, at least initially, ticket sales at depots would be available only at Milwaukee because of the relatively large passenger volume and centralized location. Ticket sales at other stations, such as Racine and Kenosha, could be added at a later date based on sufficient passenger volumes, available funding and facility resources, or other local needs. In 1997, only the 12 busiest of the 27 stations along the Union Pacific-North line had ticket agents on duty during at least part of each weekday.

Table 25

CAPITAL COSTS OF PASSENGER STATION FACILITIES FOR KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE

Item	Assumed Size	Cost of Material and Installation
Kenosha		
Access and signage improvements	Item	$ 17,000
Parking lot expansion	50 spaces[a]	125,000
Land Acquisition	0.4 acres	10,000[b]
Contingencies	15 percent	23,000
Preliminary engineering, design, and construction management	20 percent	30,000
Subtotal	--	$ 205,000
Somers		
Platform and access	300 feet	$ 150,000
Shelters	Two	40,000
Park-ride lot	85 spaces	262,000[a]
Land acquisition	1.8 acres	45,000[b]
Contingencies	15 percent	75,000
Preliminary engineering, design, and construction management	20 percent	99,000
Subtotal	--	$ 671,000
Racine		
Platform and access	300 feet	$ 150,000
Depot waiting room th small canopy	710 square feet	320,000
Park-ride lot	150 spaces	475,000[a]
Land acquisition	2.4 acres	52,000[b]
Contingencies	15 percent	150,000
Preliminary engineering, design, and construction management	20 percent	149,000
Subtotal	--	$1,346,000
Caledonia		
Platform and access	300 feet	150,000
Shelters	Two	40,000
Park-ride lot	100 spaces	300,000[a]
Land acquisition	1.9 acres	48,000[b]
Contingencies	15 percent	81,000
Preliminary engineering, design, and construction management	20 percent	108,000
Subtotal	--	$ 727,000
Oak Creek		
Platform and access	300 feet	$ 150,000
Shelters	Two	40,000
Park-ride lot	225 spaces	662,000[a]
Land acquisition	3.0 acres	67,000[b]
Contingencies	15 percent	138,000
Preliminary engineering, design, and construction management	20 percent	184,000
Subtotal	--	$1,241,000
South Milwaukee		
Platforms and access	600 feet	$ 496,000
Shelters	Two	40,000
Park-ride lot	100 spaces	300,000[a]
Land acquisition	1.9 acres	48,000[b]
Contingencies	15 percent	133,000
Preliminary engineering, design, and construction management	20 percent	177,000
Subtotal	--	$1,194,000
Cudahy-St. Francis		
Platforms and access	600 feet	496,000
Shelters	Two	40,000
Park-ride lot	240 spaces	700,000[a]
Land acquisition	3.1 acres	70,000[b]
Contingencies	15 percent	196,000
Preliminary engineering, design, and construction management	20 percent	261,000
Subtotal	--	$1,763,000
Milwaukee		
Access, signing and communication improvements	Item	169,000
Ticket office improvements	Item	35,000
Park-ride lot	150 spaces	375,000
Land acquisition	1.1 acres	28,000[b]
Contingencies	15 percent	91,000
Preliminary engineering, design, and construction management	20 percent	121,000
Subtotal	--	$ 819,000
Total	--	$7,966,000

NOTE: Costs include design features to make all stations accessible.

[a] *Cost includes area to be used for passenger drop-off and pick-up.*

[b] *Actual land acquisition costs will be dependent upon specific parcels to be acquired and attendant negotiation efforts. For purposes of this feasibility study, such lands in developed areas assumed to be $25,000 per acre.*

Source: SEWRPC.

Equipment Storage and Servicing Facilities

Appropriate facilities for overnight storage, cleaning, and light servicing of equipment will need to be provided at terminals where trains begin and end their runs. These locations include Chicago, Kenosha, and Milwaukee. The existing facilities used for this purpose at Kenosha and Chicago would continue to be so used with no significant improvements being necessary. Under this alternative, a smaller number of trains would continue to originate and terminate at Kenosha than do now. However, the northerly terminal for most trains would be Milwaukee, where some equip-ment storage and servicing facility improvements would be necessary.

The capital cost of equipment storage and servicing facilities at Milwaukee under this alternative was estimated to total about $4.8 million, as shown in Table 26. Equipment servicing improvements which would be necessary at Milwaukee include: installation of an electrical bridge to provide hookups for power and heat to the train sets while they are serviced, cleaned, and stored overnight; a crew facility for use by train crews, cleaning staff, and any other inspection and maintenance personnel; and adequate access to these functions to be performed. A crew facility could consist of a new building which would either have to be constructed or perhaps could be provided in existing building space in the depot no longer used by Canadian Pacific Railway staff.

At the Milwaukee passenger depot, it was found that sufficient track capacity currently exists to provide overnight

Table 26

CAPITAL COSTS OF STORAGE AND SERVICING FACILITIES FOR KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE

Item	Quantity	Cost of Material and Installation
Milwaukee		
Electrical Bridge	Item	$630,000
Crew Facility	Item	1,002,000
Other		
Initial Spare Parts Inventory	Item	1,925,000
Subtotal	--	$3,557,000
Contingencies	15 percent	534,000
Preliminary Engineering, Design, and Construction Management	20 percent	711,000
Total	--	$4,802,000

Source: SEWRPC.

storage and servicing for the commuter rail trains sets proposed under this alternative in addition to the existing schedule of Amtrak intercity passenger trains. A significant increase in the number of daily commuter or Amtrak trains in the future, however, would likely require the construction of additional storage tracks in the depot area. If necessary, there is room on the right-of-way west of the depot to construct additional trackage for more storage space. The rerouting of Canadian Pacific freight trains, which now operate through the depot, through Muskego Yard, as has been proposed above, may also allow additional trackage in the depot area to be made available for overnight equipment storage.

For the purposes of this feasibility study, it was assumed that major inspection, maintenance, and repair work will be performed under agreement or contract at existing Metra facilities. If such a facility were required to be constructed along the Kenosha-Racine-Milwaukee Corridor, a suitable site would need to be located somewhere near the Milwaukee station, preferably immediately west of the depot area. The cost of such a facility was estimated to be about $16.5 million, plus property acquisition.

Summary of Capital Costs

A summary of the capital costs attendant to the extension of commuter rail service in the Kenosha-Racine-Milwaukee travel Corridor under the basic alternative is presented in Table 27. The total cost of the necessary capital improvements under the basic alternative was estimated to be $152.4 million in 1997 constant dollars.

Table 27

SUMMARY OF CAPITAL COSTS OF COMMUTER RAIL SERVICE IN THE KENOSHA-RACINE-MILWAUKEE CORRIDOR

Item	Cost of Material and Installation
Track and Signal Improvements	
Upgrade existing track	$ 39,105,000
Upgrade existing structures	397,000
Mainline signal work	19,238,000
Upgrade grade crossings	18,623,000
Muskego yard freight main line	8,300,000
Subtotal	$ 85,663,000
Train Equipment	
Locomotives	$ 12,000,000
Coaches	42,000,000
Subtotal	$ 54,000,000
Passenger Station Facilities	
Platforms and access	$ 2,400,000
Shelters and depot improvements	752,000
Park-ride lots	4,317,000
Land acquisition	497,000
Subtotal	$ 7,966,000
Storage and Servicing Facilities	$ 4,802,000
Total	$152,431,000

NOTE: Estimates presented in this table include appropriate costs for contingencies and preliminary engineering, design, and construction management.

Source: SEWRPC.

The two line items identified as "Contingencies" and "Preliminary Engineering, Design, and Construction Management" have been added to all capital cost estimates, except for equipment procurement, at a rate of 15 and 20 percent, respectively, of the total material and installation costs. These factors have been long accepted as appropriate for use in long-range capital cost estimation. Should detailed planning and engineering work continue, it may be appropriate to use different factors for these items. Use of any revised rates for these line items will affect the total estimated capital cost. For example, since this feasibility study was begun, Metra has begun using revised rates of 30 and 12 percent, respectively, for these items in its feasibility studies. Use of the new Metra rates for these items may be appropriate for more detailed planning work and could be expected to increase affected capital costs by about 5 percent.

It is important to note that the capital costs presented above, while representing the best possible estimates

available for feasibility assessment, must be considered preliminary in nature. If and when commuter rail service is implemented in the Kenosha-Racine-Milwaukee Corridor, potential changes in the nature of freight traffic, as discussed earlier, may affect the capital improvements required for operating commuter rail service. As a result, actual capital costs for commuter rail service at the time of implementation may vary from those presented here; they will ultimately be determined through agreement with the freight railroad companies involved.

Ridership Forecasts

A forecast of probable ridership on the proposed commuter rail extension was prepared. The forecast is based upon the application of the Regional Planning Commission battery of travel simulation models. The travel forecasts were prepared for the design year 2020 on the basis of the Commission year 2020 adopted regional population and employment forecasts and regional land use and transportation system plans for Southeastern Wisconsin and the Northeastern Illinois year 2020 population and employment forecasts and regional land use and transportation system plans, prepared by the Northeastern Illinois Planning Commission and the Chicago Area Transportation Study. The travel simulation models predict the relative number of trips made by auto and by commuter rail between subareas within Southeastern Wisconsin and between those subareas and subareas of Northeastern Illinois based upon the relative travel time and costs of commuter rail and auto travel, and the characteristics of the tripmaker, including auto ownership, income, household size, and residential density. Before the travel models were applied to predict future trips on the potential commuter rail extension, the models were validated by comparing current-year model application results to actual current-year commuter rail ridership on the existing Metra service to Kenosha. This validation indicated that the models predicted the ridership within a tolerance of 5 percent.

The forecast number of commuter rail trips made on an average weekday in the year 2020 on the potential commuter rail extension was estimated at 4,000 trips, with another 680 trips projected to be made between the existing Kenosha station and Illinois. As shown on Table 28, the projected 4,000 trips included 3,050 trips with both ends of the trip made within the potential commuter rail extension service area, that is, between the Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee stations. These trips may be termed "internal" to the extension service area. The remaining 950 trips may be expected to be made between Southeastern Wisconsin and Northeastern Illinois, principally the Chicago CBD, and have one trip end at one of the new stations in the potential commuter rail extension

Table 28

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE EXTENSION

Number of Average Weekday Trips: 2020	
Trips within Southeastern Wisconsin	3,050[a]
Trips between New Commuter Rail Stations in Southeastern Wisconsin and Northeastern Illinois[b]	950[c]
Total	4,000

[a]A forecast 2,150 of these trips would have both trip ends within Milwaukee County.

[b]An additional 680 trips on an average weekday may be expected to be made between the existing Kenosha station and Northeastern Illinois.

[c]A forecast 660 of these trips would be produced or generated, by Southeastern Wisconsin residents; 290 of these trips would be produced or generated by Northeastern Illinois residents.

Source: SEWRPC.

service area in Southeastern Wisconsin and the other at a station in Northeastern Illinois. As noted above, an additional forecast 680 trips on an average weekday in the year 2020 may be expected to be made between the existing Kenosha station and Northeastern Illinois. The forecast number of passenger boardings and alightings at each station is shown on Table 29. Forecast annual total year 2020 ridership is shown on Table 30.

It is important to recognize that the ridership forecast was prepared for a specific future design year 2020, which is consistent with ridership and travel forecast levels prepared for Southeastern Wisconsin and Northeastern Illinois. Potential current-year ridership may be expected to be about 20 percent less than the projected 2020 ridership, based upon forecast total travel growth to the year 2020. Potential "start-up" ridership immediately upon the initiation of service would be less than the potential current-year ridership during the first one to three years following service initiation, as is typical of new-start commuter rail systems.

The forecast ridership may be considered conservative, as it assumes that the cost of motor fuel per mile of automobile operation will remain at current levels, adjusted for inflation; that parking costs will remain at current levels, adjusted for inflation; that total travel within the Corridor will not significantly increase as a result of commuter rail service initiation; and that Amtrak service

Table 29

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE EXTENSION BY STATION: 2020

Station	Average Weekday Ridership: 2020[a]	
	Ons	Offs
Milwaukee	1,230	1,230
Cudahy-St. Francis	730	730
South Milwaukee	480	480
Oak Creek	170	170
Caledonia	160	160
Racine[b]	450	450
Somers	130	130
Kenosha[c]	510	510
Winthrop Harbor	--[d]	--[d]
Zion	30	30
Waukegan	20	20
North Chicago	10	10
Great Lakes	10	10
Lake Bluff	10	10
Lake Forest	30	30
Fort Sheridan	--[d]	--[d]
Highwood	10	10
Highland Park	20	20
Ravinia	--[d]	--[d]
Ravinia Park	--[d]	--[d]
Braeside	--[d]	--[d]
Glencoe	10	10
Hubbard Woods	--[d]	--[d]
Winnetka	--[d]	--[d]
Indian Hill	--[d]	--[d]
Kenilworth	--[d]	--[d]
Wilmette	10	10
Central Street, Evanston	10	10
Davis Street, Evanston	30	30
Main Street, Evanston	10	10
Rogers Park	30	30
Ravenswood	30	30
Clybourn	20	20
Chicago	510	510

[a]The ridership shown at stations in Northeastern Illinois is only that ridership with the other end of the trip within Southeastern Wisconsin.

[b]The ridership shown at this station includes passengers traveling between the Racine area and Northeastern Illinois, passengers traveling between the Racine area and the Kenosha area, and passengers traveling between the Racine area and the Milwaukee area.

[c]680 of the 1,020 total ons and offs at the Kenosha station are between Kenosha and Northeastern Illinois stations.

[d]Forecast average weekday ons and offs are less than 10.

Source: SEWRPC.

Table 30

FORECAST ANNUAL RIDERSHIP ON POTENTIAL KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE EXTENSION[a]

Day of Week	Projected Number of Annual Trips: 2020
Weekday	1,020,000
Saturday[b]	47,800
Sunday and Holiday[c]	41,500
Total	1,109,300[c]

[a]The forecast annual ridership shown does not include the ridership between the existing Kenosha station and Northeastern Illinois, which is forecast to be 188,700 trips.

[b]Saturday ridership is estimated at 23 percent of weekday ridership based upon existing Metra Union Pacific North Commuter rail ridership

[c]Sunday and holiday ridership is estimated at 17 percent of weekday ridership based upon existing Metra Union Pacific North Commuter rail ridership.

Source: SEWRPC.

will continue to operate at current levels of service. In addition, long-term future improvements which have been considered for Metra's existing Kenosha-Chicago service, such as improved express service, could also foster increased ridership. The forecast ridership, however, does assume that existing and planned bus service which could otherwise serve potential commuter rail passengers within the Milwaukee-Racine-Kenosha Corridor will be eliminated, including: the existing Milwaukee-Racine-Kenosha bus service; the existing Holt Avenue, College Avenue, and Ryan Road freeway flyers; planned flyer service along the Lake Parkway from Layton Avenue; and planned express service between the Milwaukee CBD, Bay View, St. Francis, Cudahy, and South Milwaukee.

Total and Net Operating Costs

The total annual operating cost of the potential commuter rail extension was estimated to total about $7.8 million expressed in 1997 dollars, as shown in Table 31. The total annual operating cost was determined by estimating the operating costs of major functional elements of the service, utilizing unit operating costs from actual Metra operations, Metra service cost estimation and planning procedures, and Commission transit service planning unit costs based on actual transit operations in Southeastern Wisconsin. The total annual operating costs for the extension of commuter

Table 31

ESTIMATED ANNUAL TOTAL AND NET OPERATING COSTS OF KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE EXTENSION

Category and Items	Projected Annual Amount (in 1997 dollars)
Total Operating Cost[a,b]	
Train crew personnel	$3,479,000
Fuel and power	747,000
Railroad access and use	1,434,000
Maintenance of equipment	879,000
Kinnickinnic River bridge	240,000
Milwaukee ticket agents	114,000
Administrative	696,000
Insurance	113,000
Net operating cost of feeder bus services	51,000
Total Cost	$7,753,000
Total Operating Revenues[c,d]	
Commuter rail passengers	$2,990,000
Net Operating Costs	$4,763,000
Percent of Total Operating Costs Recovered through Operating Revenues	39

[a] *Total operating cost is the incremental cost of extending service north of the Kenosha station. Approximately $6.6 million, or 85 percent, of the total operating cost is attributable to weekday service, and about $1.1 million, or 15 percent, to Saturday, Sunday, and holiday service.*

[b] *The estimated total annual operating cost of the Metra service between the Wisconsin-Illinois State Line and the Kenosha station under this alternative is $1.2 million.*

[c] *Total operating revenue is the total of projected fares generated by ridership entirely within Southeastern Wisconsin and between the new stations in Southeastern Wisconsin and Northeastern Illinois. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts. Approximately $2,751,000, or 92 percent, of the total operating revenue is attributable to weekday ridership; $239,000, or 8 percent, to Saturday, Sunday, and holiday service.*

[d] *An additional estimated $560,000 in annual revenue is forecast in the year 2020 to be generated by the existing Kenosha station for trips between the Kenosha station and Northeastern Illinois. This includes $516,000 for weekday ridership and $44,000 for Saturday, Sunday, and holiday ridership.*

Source: SEWRPC.

rail service represent the incremental resources required to operate the potential commuter rail extension over the total resources required to operate existing Metra service on its Union Pacific-North Line between the Chicago CBD station and the Kenosha station.[2]

[2] *The estimated incremental total annual operating cost of the Metra service between the Wisconsin-Illinois State line and the Kenosha station under this alternative is $1.2 million.*

Cost estimates of the train crew personnel element of operating costs were based on current Metra basic wage rates plus benefits and estimated overtime for three-person crews. The three-person crew includes an engineer, conductor, and assistant conductor. Determination of whether train crews are employees of Metra, the Union Pacific Railroad, or a new or other operating entity would be the result of negotiation and cooperative agreements pursuant to prevailing labor contracts.

The railroad access and use element of the total operating cost includes the charges and fees for use of Union Pacific and Canadian Pacific trackage, facilities, property, and attendant support personnel and services. This category includes access to, use of, and shared maintenance costs for trackage, right-of-way, bridges and other structures, signals, train dispatching, communication, grade crossings, and other operational functions and reflects labor, material, equipment, overhead, and other appropriate charges. Incentive compensation for on-time train performance may also be a component of this cost. Future agreements for access and use will be subject to negotiation and agreement between the agency responsible for implementing Kenosha-Racine-Milwaukee commuter rail service, the Union Pacific Railroad, and the Canadian Pacific Railway.

There are many components to the development, negotiation, and agreement of compensation to a freight railroad from a commuter operating entity in exchange for operation over the freight railroad's tracks and right-of-way. These costs have varied significantly over the years and are highly dependent on the corporate philosophy of the freight railroad at any given point in time. In the late 1970s and early 1980s, due to a reduction in the usage of railways for the movement of freight, commuter rail was viewed by some freight railroads as a profitable market for generating additional revenue. By the late 1990s, however, the overall volume of freight traffic had begun increasing dramatically and is expected to continue to do so. As a result, the freight railroad industry generally appears to be much more closely scrutinizing existing and future capacity along their rail lines to ensure preservation of adequate capacity for future freight traffic. In turn, this appears to be increasing the costs that the freight railroads are charging commuter rail entities for operating over their rights-of-way.

To compensate for the costs associated with the operation of commuter rail, freight railroads charge usage, or "access," fees in exchange for commuter rail services having the right to operate over their lines. Typically, access fees provide for the commuter operating entity to share in the costs associated with dispatching, maintenance of the railroad physical plant, labor for maintenance of the

physical plant, supervisory personnel, and other ancillary items inherent to operation of the rail line. Such fees will ultimately be based on: the value of the line in question to the freight railroad; the need for the freight railroad to be confident that its ability to serve customers now and in the future is not compromised; the need for the commuter rail operation to be confident that its trains will operate on schedule; and an agreeable allocation of any liability arising out of joint commuter rail; and freight operations in the event of damage or injury to persons and property of the railroad, commuter rail operating entity, passengers, customers, employees, or third parties. The issue of liability may be expected to be a complicated and possibly even a pivotal concern. In any case, these and other issues will need to be negotiated in an acceptable agreement between the railroads involved and the commuter rail operating entity.

A review of data from recent new-start commuter rail systems in the United States indicates that railroad access and use costs vary quite widely, ranging from approximately $4.00 to $23.00 per train-mile. While there are many factors which will affect a final negotiated agreement, in general such access and use costs appeared to be directly proportional to the relative volume of freight traffic handled on the line in question. Most unit cost estimates are clustered in the range of $6.00 to $11.00 per train-mile. For purposes of this feasibility study, an estimated cost of $7.50 per train-mile was used. An exact determination of access and use charges cannot be made until negotiations are entered into with the freight railroad.

While the estimated access and use fee reflects such fees around the country, it should be noted that there are generally three different options about the form an operating agreement between the freight railroad and the commuter operating entity may take. As noted above, operation over the rail line will be subject to negotiation and agreement between the freight railroad and the commuter operating entity. The three operating options are the following:

- Lease of Rail Line. Under this option, the commuter operating entity would enter into a lease agreement with the freight railroad(s). In essence, the freight railroad would lease rail line capacity and attendant services to the commuter operating entity. The commuter service would operate over the freight railroad's right-of-way, in turn compensating the freight railroad for its share of the operation and maintenance of the rail line, as previously discussed. All rolling stock and train crews would be provided by the commuter operating entity.

- Purchase of Services Agreement. Under this option, the freight railroad would operate the commuter rail service under contract with the commuter rail operating entity. This contract would entail complete operation of the commuter service by the freight railroad, in exchange for compensation for all costs to operate the commuter service, as well as for a share of the operation and maintenance of the rail line, as previously discussed. All train crews, ticket agents, and possibly even rolling stock would be provided by the freight railroad.

- Purchase of the Rail Line. Under this option, the freight railroad would sell ownership of the rail line to the commuter operating entity. This option may be appropriate where the commuter rail service may be expected to be the principal user, where there is a low volume of existing freight traffic, or where no or minimal freight growth is expected. Thus, it may be more beneficial to the freight railroad to sell the rail line to the commuter operating entity. If freight service were to continue on the line, the freight railroad may then enter into a lease agreement with the commuter rail operating entity for freight movements. Ownership of the trackage and right-of-way by the commuter rail operating entity may be the most positive means of maintaining a specific service quality, providing for possible service increases, and controlling costs over the long-term future.

The maintenance of equipment operating cost element includes the labor, materials and supplies, overhead, and other appropriate charges for normal daily servicing, cleaning, and inspection, light running repairs, and heavy "backshop" repairs. Heavier inspection, maintenance, and repair work would be contracted out to either Metra or to another, independent, shop. This category also includes the operation and maintenance of the necessary facilities and the cost of overnight heating and power for trains at Milwaukee and Kenosha.

The administrative operating cost element includes management and other related staff, associated building space, utilities, and marketing. The Milwaukee ticket agent was noted as a separate item and includes personnel, building space, supplies, equipment, and other attendant costs related to this function. Another support cost included in this category is maintenance at the stations other than Milwaukee. This would primarily involve cleaning, trash pickup, snow removal, and minor repairs.

The feeder bus service category includes all labor, operating, fuel, maintenance, and other operating costs

associated with the new shuttle bus services in downtown Milwaukee. All other local and suburban bus routes that may serve as feeders in Kenosha, Racine, and Milwaukee were assumed to be a part of the regular bus system that would be operating at a similar level of service irrespective of the proposed commuter rail service.

Other major operating cost elements include fuel and insurance. The fuel category includes the cost of the fuel itself and its delivery. The insurance item reflects the share of the overall liability charges which could be expected to be attributable to the Kenosha-Racine-Milwaukee commuter rail service.

The annual operating revenue of the potential commuter rail extension was estimated to total about $3.0 million, as shown in Table 31. The projected operating revenue includes all projected fares paid by trips entirely within Southeastern Wisconsin and trips between Southeastern Wisconsin and Northeastern Illinois, except for those trips between the existing Kenosha station and Northeastern Illinois. The revenue projections account for the effects of monthly pass and multi-ticket purchase discounts.[3]

It is important to note that the operating revenues, operating costs, and ridership projections, while representing the best possible estimates for feasibility assessment, must be considered preliminary in nature. Furthermore, they represent an assumed operating and coordination plan with the freight railroads involved. If and when commuter rail service is implemented in the Kenosha-Racine-Milwaukee Corridor, actual ridership, revenues, and operating costs may vary from those presented here; and will ultimately depend on the actual operating plan and the railroad access charges negotiated between the freight railroad companies involved and the commuter rail operating entity.

Travel Time, Highway Traffic, Energy Consumption, and Air Pollutant Emission Reduction Impacts

Among the benefits of the commuter rail extension would be potential reductions in travel time, highway traffic, automobile motor fuel consumption, and air pollutant emissions.

Table 32 compares commuter rail travel times between Milwaukee, South Milwaukee, Racine, and Kenosha to travel times by existing bus service and existing peak-hour street and highway travel times. The commuter rail travel times represent a significant improvement over existing bus travel times and are comparable to, and for some travel less than, highway travel times.

The estimated reduction in consumption of motor fuel attributable to the forecast 4,000 commuter rail trips on an average weekday is approximately 3,800 gallons per average weekday, assuming 25 miles per gallon and automobile occupancy of 1.15. On an average weekday in Southeastern Wisconsin in 1995, automobiles and trucks consumed an estimated 1.6 million gallons of motor fuel.

The estimated reduction in volatile organic compound air pollutant emissions attendant to the forecast 4,000 commuter rail weekday trips is 215 pounds of volatile organic compounds, based on year 1996 emission factors. On an average weekday in Southeastern Wisconsin in 1996, automobiles and trucks generated an estimated 60 tons of volatile organic compound emissions.

The estimated reduction in highway traffic attendant to the 4,000 commuter rail trips is an estimated 95,000 vehicle-miles of travel on an average weekday. On an average weekday within Southeastern Wisconsin in 1995, approximately 36 million vehicle-miles of travel are made by automobiles and trucks. Table 33 presents forecast reductions in highway traffic on selected arterial street and highway segments.

COMMUTER RAIL EXTENSION ONLY TO RACINE

An option of the potential commuter rail extension was also evaluated which would extend service only from Kenosha to Racine. This option would, in all other respects, be similar to the potential commuter rail extension to Milwaukee. The extension of commuter rail service under this option would entail operation of commuter trains throughout the day between Kenosha and Racine as an extension of Metra's existing Union Pacific-North Line service. Existing Metra trains operating between Chicago and Kenosha or Waukegan would be extended north of Kenosha to Racine. The service would be provided over the existing railway route of the Union Pacific Railroad Kenosha Subdivision to the location of a new Racine station.

The largely single-track railway line would be upgraded to allow for a maximum mainline operating speed for

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[3] *The forecast year 2020 operating revenue attendant to the existing Kenosha station for trips between the station and Northeastern Illinois is an estimated $560,600 annually, including $516,100 for weekday ridership and $44,500 for Saturday, Sunday, and holiday ridership.*

Table 32

COMPARISON OF TRAVEL TIMES[a] BY COMMUTER RAIL, EXISTING BUS SERVICE,[b] AND AUTOMOBILE[c]

Mode of Transportation	Kenosha	Racine	South Milwaukee	Milwaukee
Kenosha				
Bus	--	18	55	82
Commuter Rail	--	15	41	65
Automobile	--	18	42	51
Racine[d]				
Bus	18	--	37	64
Commuter Rail	15	--	24	48
Automobile	18	--	25	43
South Milwaukee[e]				
Bus	55	37	--	27
Commuter Rail	41	24	--	23
Automobile	42	25	--	22
Milwaukee[f]				
Bus	82	64	27	--
Commuter Rail	65	48	23	--
Automobile	51	43	22	--

[a] *Travel times between Milwaukee, South Milwaukee, Racine, and Kenosha commuter rail stations.*

[b] *Travel times for existing Kenosha-Racine-Milwaukee bus service.*

[c] *Estimated current peak-period automobile street and highway travel times.*

[d] *Estimated weekday peak-period travel times between Racine and Chicago are 102 minutes by commuter rail, 69 minutes by Amtrak using the Sturtevant station, and 122 minutes by automobile.*

[e] *Travel time for existing Kenosha-Racine-Milwaukee service is measured to the intersection of W. Drexel Avenue and S. Howell Avenue, approximately three miles south and west of the proposed South Milwaukee commuter rail station.*

[f] *Estimated weekday peak-period travel times between Milwaukee and Chicago are 152 minutes by commuter rail, 97 minutes by Amtrak, and 147 minutes by automobile.*

Source: SEWRPC.

commuter passenger trains of 59 mph. The double-track line in Kenosha would need to be extended for of about one mile to allow trains traveling in opposite directions to meet and pass each other. Freight train movements were assumed to remain relatively low in number and would be operated in a coordinated manner around the commuter rail operations. Thus, freight train traffic was not considered to be a constraint with respect to locating and sizing passing sidings. Train operations would be governed by track warrant control and commuter operations by train schedule authority under the direction of Union Pacific Railroad dispatchers. A more detailed description of the improvements attendant to the extension of commuter rail service is provided in Chapter IV, "Potential Commuter Railway Facilities and Services."

The commuter rail extension would serve three passenger stations, at Kenosha, Somers, and Racine. At Kenosha, the existing Metra station would be utilized. At Racine and Somers, new facilities would be necessary. The average station spacing would be 4.5 miles.

With respect to a service provider, it was assumed that the Kenosha-Racine service would be operated as an extension of Metra's existing service on the Union Pacific-North Line between Kenosha and Chicago.

Operating Plan

On weekdays, commuter rail service between Kenosha and Racine would consist of four southbound and three northbound trains during the morning peak period; four

Table 33

FORECAST REDUCTION IN IH 94 TRAFFIC ATTRIBUTABLE TO POTENTIAL COMMUTER RAIL EXTENSION

Selected Locations on IH 94	Forecast Commuter Rail Average Weekday Trips[a]		IH 94 Existing 1997 Average Weekday Traffic	
	Total Weekday (equivalent vehicles per weekday)	Peak Hour[a] (equivalent vehicles per hour)	Total Weekday (vehicles per average weekday)	Peak Hour (vehicles per hour)
IH 94 at Scott Street	1,700	290 Southbound	141,200	5,600 Southbound
IH 94 at College Avenue	1,300	210 Southbound	132,200	5,200 Southbound
IH 94 at 7 Mile Road	800	70 Southbound	77,200	2,310 Southbound
IH 94 at CTH KR	800	110 Northbound	66,100	2,310 Northbound
IH 94 at Wisconsin-Illinois State Line[b]	1,300	160 Northbound	65,200	2,560 Northbound

[a]*Commuter rail trips have been converted to equivalent automobile trips with an automobile occupancy of 1.15.*

[b]*Includes commuter rail trips between existing Kenosha station and Northeastern Illinois.*

Source: SEWRPC.

northbound and three southbound trains during the afternoon peak period; and one train in each direction during the late morning, early afternoon, and evening periods. Thus, on weekdays, the service would provide a total of 10 trains in each direction. Weekend service would consist of four trains in each direction on Saturday and three trains in each direction on Sunday and holidays. All trains would make stops at Kenosha, Somers, and Racine. Zone fare structure and connecting bus service were assumed to be the same as for the alternative extension of service to Milwaukee.

Capital Costs

The capital costs of the potential commuter rail extension to Racine were estimated by using the same procedures applied for estimating capital costs for the extension to Milwaukee.

Track and Signal Improvements

The capital cost of track and signal improvements was estimated to total about $20.5 million, as shown in Table 34. The track and signal improvements necessary for this segment were described in more detail in Chapter IV of this report. They include: overall rehabilitation and improvement of the mainline track, roadbed, and right-of-way; rehabilitation of grade crossings; the extension of the double track in Kenosha for about one mile; and signal improvements.

Installation of an ABS system along this commuter rail extension may be expected to increase the total capital cost of signal improvements by about $800,000 including contingencies and preliminary engineering, design, and construction management.

Equipment Requirements

Equipment requirements, with respect to type of locomotives and coaches, would be the same as under the potential extension of commuter rail service from Kenosha to Milwaukee. This will provide the necessary compatibility with equipment used by Metra in the Chicago area. The capital cost of the required equipment for this extension was estimated to total about $45.1 million as shown in Table 35. Four locomotives, 17 coaches, and an initial spare parts inventory for this equipment would need to be procured. This would cost somewhat less than what would be required for the potential extension to Milwaukee.

Passenger Station Facilities

With respect to passenger stations, new facilities would need to be constructed at Somers and Racine. Existing facilities would be used at Kenosha, but some improvements would be necessary.

The capital cost of passenger station facility improvements for the service extension to Racine was estimated to total about $2.2 million as shown in Table 36. Based upon the year 2020 ridership forecasts which were prepared for this alternative, Table 36 sets forth the basic facility needs and capital cost requirements for each of these three stations.

With respect to the station at Kenosha, it was assumed that existing facilities would be utilized to the fullest extent. This station already includes sufficient trackage and platforms for the boarding and deboarding of

Table 34

CAPITAL COSTS OF TRACK AND SIGNAL IMPROVEMENTS FOR KENOSHA-RACINE COMMUTER RAIL SERVICE EXTENSION OF SERVICE ONLY TO RACINE

Category and Item	Quantity	Cost of Material and Installation
Upgrade Existing Mainline Track		
Install new continuous welded rail	42,240 Track Feet	$ 5,280,000
Crosstie replacement	9,500	760,000
Undercutting, surfacing, and alignment work	93,456 Track Feet	2,414,000
Construct new track for sidings	5,280 Track Feet	950,000
Install new turnouts	Four	520,000
Relocate existing turnouts	Four	80,000
Miscellaneous turnout rehabilitation and upgrading	Lump Sum	39,000
Rail inspection and testing	One Day	4,000
Drainage ditch cleaning and cutting	99,264 Linear Feet	149,000
Mainline Signal Work		
Install power turnout machinery, controls, and home signals for new sidings	One Location	1,500,000
Install approach signals on single track	One Location	150,000
Miscellaneous modification of existing signals	One Location	100,000
Remove existing signals	One Location	50,000
Upgrade At-Grade Street and Highway Crossings		
Rebuild existing crossings	Five	125,000
Install crossing for new second track	Three	315,000
Relocate and upgrade grade crossing signals	Five Crossings	1,250,000
Install constant warning time device equipment for grade crossing signals	12 Crossings	1,800,000
Subtotal	--	$15,486,000
Contingencies	15 percent	$ 2,323,000
Preliminary engineering, design, and construction management	20 percent	3,097,000
Less salvage and scrap	Lump Sum	363,000
Total	--	$20,543,000

Source: SEWRPC.

passengers and sufficient depot building and shelter areas for passengers.

Ticket sales for the Kenosha-Racine service would be handled in much the same manner as does Metra. For purposes of this feasibility study, tickets would be available in one-way, multi-ride and monthly pass denominations and could be purchased by mail or on board trains from conductors at stations where no agent is on duty. Ticket sales at stations such as Racine and Kenosha could be added at a later date if warranted by sufficient passenger volume, available funding and facility resources, or other local needs.

Equipment Storage and Servicing Facilities

The existing facilities for equipment storage and servicing at Kenosha and Chicago would be used for overnight train storage, cleaning, and light servicing. It was assumed that this would be preferable to building a new storage facility at Racine when one already exists at Kenosha, a relatively short distance away. Also, a new storage and servicing facility at Racine could become redundant should the service eventually be extended further northward to Milwaukee. Use of the existing servicing facility at Kenosha would require the regular nonrevenue operation, or "deadheading," of some equipment between Kenosha and

Table 35

CAPITAL COSTS OF LOCOMOTIVES AND ROLLING STOCK FOR KENOSHA-RACINE COMMUTER RAIL SERVICE

Item	Quantity	Cost
Diesel-Electric Passenger Locomotive	4	$ 9,600,000
Bi-level Gallery Coach		
Straight Coach	13	26,000,000
Coach with Control Cab	4	8,000,000
Initial Spare Parts Inventory	Item	1,507,000
Total	--	$45,107,000

Source: SEWRPC.

Racine. These costs have been included in the operating cost estimate.

Summary of Capital Costs

A summary of the capital costs attendant to the extension of commuter rail service from Kenosha to Racine is presented in Table 37. The total cost of the necessary capital improvements under the basic alternative was estimated to be $67.9 million in 1997 constant dollars. If different factors are used for "Contingencies" and "Preliminary Engineering, Design, and Construction Management" during the more detailed planning and engineering work which may be conducted following this feasibility study, the total estimated capital cost may vary accordingly.

It is important to note that the capital costs presented above, while representing the best possible estimates available for this feasibility assessment, must be considered preliminary in nature. If and when commuter rail service is implemented between Racine and Kenosha, the unanticipated changes in the nature of freight traffic, as discussed earlier, may affect the capital improvements required for operating commuter rail service. As a result, actual capital costs for commuter rail service at the time of implementation may vary from those presented here and will ultimately be determined through agreement with the freight railroad companies involved.

Ridership Forecasts

A forecast of probable ridership on the commuter rail extension to Racine was prepared, using the same procedures as for the extension to Milwaukee.

The forecast number of commuter rail trips made on the potential commuter rail extension on an average weekday in the year 2020 was estimated at 1,000 trips, with another 680 trips projected to be made between

Table 36

CAPITAL COSTS OF PASSENGER STATION FACILITIES FOR KENOSHA-RACINE COMMUTER RAIL SERVICE

Item	Assumed Size	Cost of Material and Installation
Kenosha		
Access and signing improvements	Item	$ 8,000
Parking lot expansion	50 spaces	125,000
Land acquisition	0.4 acre	10,000[a]
Contingencies	15 percent	21,000
Preliminary engineering, design, and construction management	20 percent	29,000
Subtotal	--	$ 193,000
Somers		
Platform and access	300 feet	$ 150,000
Shelters	Two	40,000
Park-ride lot	85 spaces	262,000[b]
Land acquisition	1.8 acres	45,000[a]
Contingencies	15 percent	75,000
Preliminary engineering, design, and construction management	20 percent	99,000
Subtotal	--	$ 671,000
Racine		
Platform and access	300 feet	$ 150,000
Depot waiting room with small canopy	710 square feet	320,000
Park-Ride lot	150 spaces	475,000[b]
Land acquisition	2.4 acres	52,000[a]
Contingencies	15 percent	150,000
Preliminary engineering, design, and construction management	20 percent	149,000
Subtotal	--	$1,346,000
Total	--	$2,210,000

NOTE: Costs include design features to make all stations accessible.

[a] *Actual land acquisition costs will depend on specific parcels to be acquired and related negotiation efforts. For purposes of this feasibility study, such lands in developed areas assumed to be $25,000 per acre.*

[b] *Cost includes area to be used for passenger drop-off and pick-up.*

Source: SEWRPC.

the existing Kenosha station and Northeastern Illinois. As shown on Table 38, the projected 1,000 weekday trips include 480 trips with both ends of the trip made within the potential commuter rail extension service area, that is, between Kenosha, Somers, and Racine stations. These may be termed "trips internal to the extension service area." The remaining 520 trips may be expected to be made between the new commuter rail stations in Southeastern Wisconsin (Somers and Racine stations) and Northeastern Illinois, principally the Chicago CBD, and have one trip end at a new station in the potential commuter rail extension service area in Southeastern Wisconsin and the other trip end at a station in Northeastern Illinois. As noted above, a forecast 680 trips on an average weekday in the year 2020 may also be expected to be made between the existing Kenosha station and Northeastern Illinois. The forecast number of passenger boardings and alightings at each station is shown on Table 39. Forecast annual total year 2020 ridership is shown on Table 40.

Table 37

SUMMARY OF CAPITAL COSTS FOR KENOSHA-RACINE COMMUTER RAIL SERVICE IN THE KENOSHA-RACINE CORRIDOR

Item	Cost of Material and Installation
Track and Signal Improvements	
Upgrade existing track	$13,401,000
Mainline signal work	2,430,000
Upgrade grade crossings	4,712,000
Subtotal	$20,543,000
Train Equipment	
Locomotives	$ 9,600,000
Coaches	34,000,000
Initial spare parts inventory	1,507,000
Subtotal	$45,107,000
Passenger Station Facilities	
Platforms and access	$ 416,000
Shelters and depot improvements	486,000
Park-ride lots	1,164,000
Land Acquisition	144,000
Subtotal	$ 2,210,000
Total	$67,860,000

NOTE: Estimates presented in this table include appropriate costs for contingencies and preliminary engineering, design, and construction management.

Source: SEWRPC.

Table 38

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL KENOSHA-RACINE COMMUTER RAIL SERVICE EXTENSION

Number of Average Weekday Trips: 2020	
Trips within Southeastern Wisconsin	480
Trips between New Somers and Racine Commuter Rail Stations in Southeastern Wisconsin and Northeastern Illinois[a]	520[b]
Total	1,000

[a]An additional 680 trips on an average weekday may be expected to be made between the existing Kenosha station and Northeastern Illinois.

[b]A forecast 410 of these trips would be produced, or generated, by Southeastern Wisconsin residents, and 110 of these trips would be produced, or generated, by Northeastern Illinois residents.

Source: SEWRPC.

Total and Net Operating Costs

The total annual operating cost of the potential commuter rail extension was estimated to total about $2.7 million, as shown in Table 41. The total annual operating cost was determined by the same procedure used to estimate the operating cost of the potential extension to Milwaukee. The total annual operating costs for the extension of commuter rail service represent the incremental resources required to operate the potential commuter rail extension to Racine over the total resources required to operate existing Metra service on its Union Pacific-North Line between the Chicago CBD station and the Kenosha station.[4]

The annual operating revenue of the potential commuter rail extension was estimated to total about $1.1 million as shown in Table 41. The projected operating revenue includes all projected fares paid for by trips between Racine and Kenosha within Southeastern Wisconsin and trips between Southeastern Wisconsin and Northeastern Illinois, except for those trips between the existing Kenosha station and Northeastern Illinois. These revenue projections account for the effects of discounts on monthly passes and multi-ticket purchases.[5]

It is important to note that the operating revenues, operating costs and ridership projections, while representing the best possible estimates for feasibility assessment, must be considered preliminary in nature. Furthermore, they represent an assumed operating and coordination plan with the freight railroads involved. If and when commuter rail service is implemented between Racine and Kenosha, actual ridership, revenues, and operating costs may vary from those presented here and will ultimately depend on the actual operating plan and railroad access charges negotiated between the freight railroad companies involved and the commuter rail operating entity.

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[4]*The estimated incremental total annual operating cost of the Metra service between the Wisconsin-Illinois State line and the Kenosha station is $1.2 million.*

[5]*The forecast year 2020 operating revenue attendant to the existing Kenosha station for trips between the station and Northeastern Illinois is an estimated $560,600 annually, including $516,100 for weekday ridership and $44,500 for Saturday, Sunday, and holiday ridership.*

Table 39

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL KENOSHA-RACINE COMMUTER RAIL SERVICE BY STATION: 2020

Station	Average Weekday Ridership: 2020[a]	
	Ons	Offs
Racine[b]	450	450
Somers	130	130
Kenosha[c]	500	500
Winthrop Harbor	--[d]	--[d]
Zion	10	10
Waukegan	20	20
North Chicago	10	10
Great Lakes	10	10
Lake Bluff	10	10
Lake Forest	20	20
Fort Sheridan	--[d]	--[d]
Highwood	--[d]	--[d]
Highland Park	10	10
Ravinia	--[d]	--[d]
Ravinia Park	--[d]	--[d]
Braeside	--[d]	--[d]
Glencoe	--[d]	--[d]
Hubbard Woods	--[d]	--[d]
Winnetka	--[d]	--[d]
Indian Hill	--[d]	--[d]
Kenilworth	--[d]	--[d]
Wilmette	10	10
Central Street, Evanston	10	10
Davis Street, Evanston	10	10
Main Street, Evanston	--[d]	--[d]
Rogers Park	10	10
Ravenswood	10	10
Clybourn	10	10
Chicago	430	430

[a]The ridership shown at stations in Northeastern Illinois is only that ridership with the other end of the trip in Southeastern Wisconsin.

[b]The ridership shown at this station includes passengers traveling between the Racine area and Northeastern Illinois, passengers traveling between the Racine area and the Kenosha area, and passengers who would drive from the Milwaukee area to the Racine station to board trains to Northeastern Illinois. Passengers driving from the Milwaukee area to the Racine station would offset those passengers who, under the Kenosha-Racine-Milwaukee extension alternative, would board trains north of Racine, in Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis.

[c]680 of the 1,000 total ons and offs at the Kenosha station are between Kenosha and Northeastern Illinois stations.

[d]Forecast average weekday ons and offs are less than 10.

Source: SEWRPC.

Table 40

FORECAST ANNUAL RIDERSHIP ON POTENTIAL KENOSHA-RACINE COMMUTER RAIL SERVICE[a] BY STATION: 2020

Day of Week	Projected Number of Annual Trips: 2020
Weekday	255,000
Saturday[b]	12,000
Sunday and Holiday[c]	10,000
Total	277,000

[a]The forecast annual ridership does not include the ridership between the existing Kenosha station and Northeastern Illinois, forecast to be 188,700 trips.

[b]Saturday ridership is estimated at 23 percent of weekday ridership on the basis of existing Metra Union Pacific North commuter rail ridership.

[c]Sunday and holiday ridership is estimated at 17 percent of weekday ridership on the basis of existing Metra Union Pacific North commuter rail ridership.

Source: SEWRPC.

POTENTIAL COMMUTER RAIL EXTENSION OPTIONS

A number of options may be identified for the potential extension of commuter rail service in the Kenosha to Milwaukee travel corridor. Those options include providing for higher speed service by improving the railway line in Southeastern Wisconsin rated for a maximum speed of 79 mph. Such improvement may be expected to reduce the commuter rail travel time from Milwaukee to Kenosha by seven minutes, from 65 minutes to 58 minutes, and from Milwaukee to the Chicago CBD by seven minutes, from 150 minutes to 143 minutes. The effect on ridership may be expected to be an increase of 200 trips on an average weekday, or 5 percent. However, capital costs may be expected to increase by about $17 million, to $169.4 million, or by 11 percent.

Another option would be operating with fewer stations, specifically, five stations, including Kenosha, Racine, South Milwaukee, Cudahy-St. Francis, and Milwaukee. Reducing the number of stations to five stations may be expected to result in a reduction in ridership of about 300 trips on an average weekday because of the expected reduction in commuter rail travel time of about nine minutes because of fewer stops may be expected to offset

partially the reduction in accessibility to commuter rail stations. The reduction in number of stations to five stations may be expected to reduce capital costs by about $13 million, to $139.4 million, or by 8 percent, and to reduce annual total and net operating costs by only a negligible amount.

COMPARISON OF PROPOSED COMMUTER RAIL SERVICE WITH OTHER EXISTING COMMUTER RAIL AND TRANSIT SERVICES

To assist in the assessment of the feasibility of the proposed Kenosha-Racine-Milwaukee commuter rail service, this proposed service was compared with other existing new-start commuter rail systems in the United States, other long-established commuter rail systems in the United States, and existing public transit systems in Southeastern Wisconsin. These comparisons are provided in the accompanying tables.

While any number of physical, ridership, operating, and cost characteristics may be compared among the various systems, of particular interest is the operating cost recovery rate, which represents the percentage of total annual operating costs recovered through annual revenues generated by passengers. This particular measure provides a very good indication of the long-term financial feasibility of such a service and is a standardized criterion for comparison among various systems.

A comparison of selected characteristics of the proposed Kenosha-Racine-Milwaukee commuter rail service and other existing new-start commuter rail services in the United States is presented in Table 42. The other commuter rail services in this table have all begun operations during the past 10 years. The comparisons presented in this table indicated that the estimated operating cost recovery rate of about 40 percent for the Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail extensions compares favorably on an overall basis with these new-start systems. It would have a smaller recovery rate than that of Metra's Chicago-Antioch route and the Virginia Railway Express system in Washington, D.C., but a greater recovery rate than the four new-start commuter rail systems serving Los Angeles, New Haven, Miami, and San Diego.

A comparison of selected characteristics of the proposed Kenosha-Racine-Milwaukee commuter rail service and other long-established commuter rail services in the United States is presented in Table 43. This comparison includes all the long-established commuter rail systems operating in the United States as of 1998, organized by metropolitan area. The operating characteristics of these commuter rail services are further subdivided on the basis of the operator involved. The comparison presented in this table indicates that the estimated operating cost recovery rate of about 40 percent for the Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail extensions would be greater than the recovery rate for the commuter rail system in San Francisco, would be similar to the recovery rates for commuter rail systems in the Boston, Philadelphia,

Table 41

ESTIMATED ANNUAL TOTAL AND NET OPERATING COSTS OF KENOSHA-RACINE COMMUTER RAIL SERVICE EXTENSION

Category and Items	Projected Annual Amount (in 1997 dollars)
Total Operating Cost[a,b]	
Train Crew Personnel	$1,261,000
Fuel and Power	300,000
Railroad Access and Use	520,000
Maintenance of Equipment	319,000
Administrative	285,000
Insurance	32,000
Total Cost	$2,717,000
Total Operating Revenues[c,d]	
Commuter Rail Passengers	$1,080,000
Net Operating Costs	$1,637,000
Percent of Total Operating Costs Recovered Through Operating Revenues	40

[a]Total operating cost is the incremental cost of extending service north of the Kenosha station. Approximately $2.4 million, or 87 percent, of the total operating cost is attributable to weekday service and about $300,000, or 13 percent, to Saturday, Sunday, and holiday service.

[b]The estimated total annual operating cost of the Metra service between the Wisconsin-Illinois State Line and the Kenosha station under this alternative is $1.2 million.

[c]Total operating revenue is the total projected fares generated by ridership entirely within Southeastern Wisconsin and between the new Somers and Racine commuter rail stations in Southeastern Wisconsin and Northeastern Illinois. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts. Approximately $994,000, or 92 percent, of the total operating revenue is attributable to weekday ridership, and $86,000, or 8 percent, to Saturday, Sunday, and holiday service.

[d]An additional estimated $560,000 in annual revenue in the year 2020 is forecast to be generated by the existing Kenosha station for trips between the Kenosha station and Northeastern Illinois. This includes $516,000 for weekday ridership and $44,000 for Saturday, Sunday, and holiday ridership.

Source: SEWRPC.

Table 42

COMPARISON OF SELECTED CHARACTERISTICS OF PROPOSED KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE AND OTHER EXISTING NEW-START COMMUTER RAIL SERVICES

Item	Potential Commuter Rail Extension[a,c]		Other Existing New-Start Systems						
	Kenosha-Racine-Milwaukee	Kenosha-Racine	Metra North Central Service (Chicago-Antioch)		Metro Link (Los Angeles)	Shoreline East (New Haven)	Tri-Rail (Miami)	Virginia Railway Express (Washington)	Coaster (San Diego)
	Forecast 2020	Forecast 2020	Existing 1997	Forecast 2010					
Route Characteristics									
Number (of routes)	1	1	1	1	7	1	1	2	1
Length (in miles)	33	9	53	53	416	51	70	96	41
Year Opened	--	--	1996	1996	1992	1990	1994	1992	1995
Ridership Characteristics									
Weekday Passengers	4,000	1,000	3,600	5,900	18,000	1,200	9,000	8,000	3,500
Annual Passengers	1.1 million	277,000	670,000	1.5 million	4.4 million	291,500	2.7 million	1.8 million	910,000
Annual Passenger-Miles	24.0 million	9.2 million	20.2 million	45.3 million	155.1 million	5.9 million	87.0 million	62.3 million	24.8 million
Operating Characteristics									
Annual Train-Miles	191,200	69,300	134,600	188,500	840,600	129,900	625,300	199,000	198,400
Passengers per Train-Mile	5.7	4.0	5.0	8.0	5.2	2.2	4.3	9.0	4.6
Operating Cost Characteristics									
Annual Total Operating Cost	$7.8 million	$2.7 million	N/A	$6.1 million	$52.0 million	$5.8 million	$21.7 million	$13.7 million	$9.2 million
Annual Revenues	$3.0 million	$1.1 million	N/A	$3.7 million	$16.4 million	$1.1 million	$5.3 million	$7.9 million	$1.8 million
Recovery Rate (percent)	39	40	N/A	61	31	19	24	58	19
Annual Net Operating Cost	$4.8 million	$1.6 million	N/A	$2.4 million	$35.6 million	$4.7 million	$16.4 million	$5.8 million	$7.4 million
Net Operating Cost per Passenger	$4.29	$5.91	N/A	$1.60	$8.09	$16.12	$6.07	$3.22	$8.13
Net Operating Cost per Passenger-Mile	$0.20	$0.18	N/A	$0.05	$0.23	$0.80	$0.19	$0.09	$0.30
Total Operating Cost per Train-Mile	$40.79	$50.56[b]	N/A	$32.36	$61.92	$44.83	$34.63	$68.63	$46.56

[a] *The estimated total and net operating costs are the estimated costs for extending service north of the existing Kenosha station. The estimated annual total operating cost of planned year 2020 service between the Kenosha station and the Wisconsin-Illinois state line is $1.2 million in 1997 dollars. The forecast year 2020 ridership does not include the ridership between the existing Kenosha station and Northeastern Illinois which is forecast to be 680 trips on an average weekday, or 188,000 trips annually, representing a forecast annual $561,000 in farebox revenue in 1997 dollars.*

[b] *Based on 53,400 revenue, "in-service" train-miles.*

[c] *The estimated capital costs attendant to the Kenosha-Racine-Milwaukee extension are $152 million in 1997 dollars and to the Kenosha-Racine extension are $68 million. The estimated capital costs to date of the Metra North Central service are $131 million.*

Source: SEWRPC.

Baltimore, and Washington, D.C., areas and certain Metra routes in the Chicago area; and would be less than the recovery rates for commuter rail systems operated in the New York and New Jersey area and some Metra routes in the Chicago area.

A comparison of selected characteristics of the proposed Kenosha-Racine-Milwaukee commuter rail service and existing bus transit systems in Southeastern Wisconsin is presented in Table 44. This comparison includes the bus transit systems operated by Milwaukee, Ozaukee, and Waukesha Counties; systems operated by the Cities of Kenosha, Racine, and Waukesha; and the existing Kenosha-Racine-Milwaukee bus service sponsored by the City of Racine. The comparison presented in this table indicated that the estimated operating cost recovery rate of about 40 percent for the Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail extensions would be comparable to the recovery rate of 42 percent by Milwaukee County Transit System and would be greater than the recovery rates of the remaining transit systems in Southeastern Wisconsin.

ADVISORY COMMITTEE ACTION

Based upon their review and consideration of the material presented in this and previous chapters of the study report, the Advisory Committee at its meeting held on February 18, 1998, accepted the findings of the feasibility study. Furthermore, the Advisory Committee concluded that the potential extension of commuter rail service between Kenosha, Racine, and Milwaukee, as well as the potential extension of commuter rail service between

Table 43

COMPARISON OF SELECTED CHARACTERISTICS OF PROPOSED KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL SERVICE AND OTHER LONG-ESTABLISHED COMMUTER RAIL SERVICES

Item	Potential Commuter Rail Extension[a,c]		Chicago				New York City Area			Other Northeast United States Cities			San Francisco
	Kenosha-Racine-Milwaukee	Kenosha-Racine	Metra										
	Forecast 2020	Forecast 2020	Union Pacific Lines	BNSF Line	Metra Operated	South Shore Line	Long Island Railroad	Metro-North	New Jersey Transit	MBTA (Boston)	SEPTA (Philadelphia)	MARC (Baltimore Washington)	CalTrain
Route Characteristics													
Number of Routes	1	1	3	1	8	1	10	5	10	9	7	3	1
Length in Miles	33	9	155	38	463	90	319	268	348	287	292	187	77
Ridership Characteristics													
Weekday Passengers	4,000	1,000	72,600	37,800	96,600	8,700	325,800	208,000	158,500	85,000	77,700	20,000	18,500
Annual Passengers (millions)	1.1	277,000	23.1	12.0	30.7	2.6	97.7	62.4	47.5	25.5	23.3	4.8	5.5
Annual Passenger-Miles (millions)	24.0	9.2	504.8	253.6	641.7	72.8	2,224.4	2,001.7	1,169.2	476.5	328.5	144.5	126.6
Operating Characteristics													
Annual Train-Miles	191,200	69,300	2.16	839,800	3.93	340,000	16.90	12.24	8.05	2.29	2.22	914,400	920,600
Passengers per Train-Mile	5.7	4.0	10.7	14.3	7.8	7.6	5.8	5.1	5.9	11.1	10.5	5.2	6.0
Operating Cost Characteristics													
Annual Total Operating Cost (millions)	$7.8	$2.7	$92.2	$33.1	$184.3	$21.0	$634.1	$469.2	$332.1	$108.7	$142.8	$37.3	$41.4
Annual Revenues (millions)	$3.0	$1.1	$58.1	$29.1	$72.1	$10.7	$298.4	$262.2	$182.1	$45.0	$62.0	$15.7	$12.8
Recovery Rate (percent)	39	40	63	88	39	51	47	56	55	41	43	42	31
Annual Net Operating Cost (millions)	$4.8	$1.6	$34.1	$4.0	$112.2	$10.3	$335.7	$207.0	$150.0	$63.7	$80.8	$21.6	$28.6
Net Operating Cost per Passenger	$4.29	$5.91	$1.48	$0.33	$3.65	$3.96	$3.44	$3.32	$3.16	$2.50	$3.47	$4.50	$5.20
Operating Cost per Passenger-Mile	$0.20	$0.18	$0.07	$0.02	$0.17	$0.14	$0.15	$0.10	$0.13	$0.13	$0.25	$0.15	$0.23
Total Operating Cost per Train-Mile	$40.79	$50.56[b]	$42.70	$39.45	$46.89	$61.88	$37.52	$38.33	$41.27	$47.46	$64.31	$40.78	$45.03

[a]The estimated total and net operating costs are the estimated costs for extending service north of the existing Kenosha station. The estimated annual total operating cost of planned year 2020 service between the Kenosha station and the Wisconsin-Illinois State Line is $1.2 million in 1997 dollars. The forecast year 2020 ridership does not include the ridership between the existing Kenosha station and Northeastern Illinois, which is forecast to be 680 trips on an average weekday, or 188,000 trips annually, representing a forecast annual $561,000 in farebox revenue in 1997 dollars.

[b]Based on 53,400 revenue "in-service" train-miles.

[c]The estimated capital costs attendant to the Kenosha-Racine-Milwaukee extension are $152 million in 1997 dollars; to the Kenosha-Racine extension they are $68 million. The estimated capital costs, to date, of the Metra North Central service are $131 million.

Source: SEWRPC.

Kenosha and Racine, would be feasible and recommended that the next phase of the possible development of such service be initiated. The Advisory Committee reached this conclusion because the operating cost recovery of the potential commuter rail extension was comparable to both existing public transit systems in Southeastern Wisconsin and also to new-start commuter rail lines in the United States. Also, the projected level of ridership at the proposed stations along the potential commuter rail line was comparable to existing commuter rail in the Chicago area. The Advisory Committee requested that the Regional Planning Commission complete publication of the final report for the feasibility study phase, prepare a Scope of Work for the next phase of work, which would be a detailed planning study and transmit both the completed feasibility study and the Scope of Work to the Wisconsin Department of Transportation and to the local units of government involved.

SUMMARY AND CONCLUSIONS

This chapter has provided an evaluation of the feasibility assessment of two principal versions of a conceptual commuter rail extension in the South Lakeshore Corridor from

Table 44

COMPARISON OF POTENTIAL COMMUTER RAIL EXTENSIONS IN KENOSHA-RACINE-MILWAUKEE CORRIDOR TO EXISTING BUS TRANSIT SYSTEMS IN SOUTHEASTERN WISCONSIN

Item	Potential Commuter Rail Extension		Existing Systems						
	Extension to Milwaukee[a]	Extension to Racine[a]	Kenosha-Racine-Milwaukee Bus Service	Kenosha Transit System[b]	Milwaukee County Transit System[b]	Ozaukee County Transit System	Racine Transit System[b]	City of Waukesha Transit System[b]	Waukesha County Transit System[b]
	Forecast Year 2020	Forecast Year 2020	Estimated 1997	Estimated 1997	Estimated 1997	Estimated 1997	Estimated 1977	Estimated 1997	Estimated 1997
Route Characteristics									
Route-Miles	32.6	9.1	42.7	100.4	728.5	75.0	93.0	62.8	200.4
Operating Characteristics									
Annual Vehicle-Miles	191,200[c]	69,300[c]	265,400	952,200	17,164,900	330,000	1,244,600	746,500	564,900
Ridership Characteristics									
Annual Passengers[d]	1,109,000	277,000	73,800	1,340,700	44,908,000	80,200	1,532,400	569,100	439,800
Annual Passenger-Miles	23,988,000	9,196,000	1,107,000	5,050,000	170,398,000	1,443,600	5,132,500	2,411,200	6,167,500
Cost Characteristics									
Annual Total Operating Cost	$7,753,000	$2,717,000	$628,800	$3,278,800	$92,009,000	$608,700	$4,644,000	$2,155,200	$2,543,200
Annual Revenues	$2,990,000	$1,080,000	$226,500	$769,500	$38,351,000	$136,300	$1,220,300	$420,000	$652,600
Recovery Rate (percent)	39	40	36	23	42	22	26	19	26
Annual Net Operating Cost	$4,763,000	$1,637,000	$402,300	$2,509,300	$53,658,000	$472,400	$3,423,700	$1,735,200	$1,890,600
Net Operating Cost per Passenger	$4.29	$5.91	$5.45[d]	$1.87	$1.19	5.89[d]	$2.23	$3.05	$4.30[d]
Net Operating Cost per Passenger-Mile	$0.20	$0.18	$0.36[a]	$0.50	$0.31	$0.33[a]	$0.67	$0.72	$0.31[a]
Capital Cost (1997 dollars)	$152,400,000	$67,900,000	--[f]	N/A	N/A	--[f]	N/A	N/A	--[f]
Annualized Capital Cost per Passenger	$4.58[e]	$8.17[e]	--[f]	N/A	N/A	--[f]	N/A	N/A	--[f]
Annualized Capital Cost per Passenger-Mile	$0.21	$0.25	--[f]	N/A	N/A	--[f]	N/A	N/A	--[f]

NA - Not available.

[a] *The estimated total and net opertaing costs are the estimated costs for extending service north of the existing Kenosha station. The estimated annual total operating cost of planned year 2020 service between the Kenosha station and the Wisconsin-Illinois state line is $1.2 million in 1997 dollars. The forecast year 2020 ridership does not include the ridership between the existing Kenosha station and Northeastern Illinois, which is forecast to be 680 trips on an average weekday, or 188,000 trips annually, representing a forecast annual $561,000 in farebox revenue in 1997 dollars.*

[b] *Does not include costs and ridership attendant to ADA-required paratransit service. Ozaukee County and Kenosha-Racine-Milwaukee are not required to provide such service.*

[c] *Train-miles.*

[d] *Annual passengers shown in this table approximate the number of one-way trips made on the system between specific origins and destinations. Passengers are counted only once and transfers between routes are not counted as the transfer is a continuation of a single trip.*

[e] *Capital cost has been annualized by dividing total cost by a factor of 30.*

[f] *Capital costs are included in operating costs for these transit systems.*

Source: SEWRPC.

Previous chapters of this study report have identified a range of possible physical and operational commuter rail extension options and, through an extensive screening process, have identified the most promising physical, operational, and service characteristics of the potential extension of commuter rail in this Corridor. The findings and conclusions of this screening process were used to design the two principal versions presented in this chapter.

The first version of the commuter rail extension proposal would entail operation of commuter rail trains throughout the day over the entire 33-mile distance between Kenosha, Racine, and Milwaukee as an extension of Metra's existing Union Pacific-North Line service. The largely single-track line would be upgraded to allow for a maximum mainline operating speed for commuter passenger trains of 59 mph. Track and signal improvements would include adding or extending passing sidings to allow trains traveling in

opposite directions to meet each other and to be coordinated with the relatively low number of anticipated freight train movements.

On weekdays, the commuter rail service between Kenosha, Racine, and Milwaukee would provide a total of 10 trains in each direction consisting of four southbound and three northbound trains during the morning peak period; four northbound and three southbound trains during the afternoon peak period; and one train in each direction during the late morning, early afternoon, and evening periods. Weekend service would consist of four trains in each direction on Saturday and three trains in each direction on Sunday and major holidays. All trains would make all stops between Kenosha and Milwaukee. The commuter rail extension would serve eight passenger stations, including Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee providing an average station spacing of 4.7 miles. Special shuttle buses would provide feeder service between the Milwaukee passenger station and the Milwaukee CBD.

The most important findings concerning the first version of the commuter rail extension proposal may be summarized as follows:

- The capital cost of the track and signal improvements necessary to provide a comfortable ride and acceptable operating speeds for commuter rail service between Kenosha and Milwaukee was estimated to total about $85.7 million. These improvements include: overall rehabilitation and improvement of the mainline track, roadbed, and right-of-way on Union Pacific Railroad's Kenosha Subdivision and National Avenue Spur Track; construction of three new passing sidings; improvement of Canadian Pacific Railway's freight main line through Muskego Yard in Milwaukee; rehabilitation of grade crossings; and installation of new signals and other signal-related improvements.

- The capital cost of the required equipment was estimated to total about $54.0 million. To operate the Kenosha-Racine-Milwaukee service, a total of five locomotives and 21 coaches would need to be procured in addition to the equipment already required by Metra for its Kenosha-Chicago service.

- The capital cost of passenger station facility improvements was estimated to total about $8.0 million. New facilities would need to be constructed at Somers, Racine, Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis. Existing facilities would be used at Kenosha and Milwaukee, but some improvements would be necessary at both of these stations.

- The capital cost of equipment storage and servicing facilities was estimated to total about $4.8 million for improvements at Milwaukee. The facilities already in place and used for this purpose at Kenosha and Chicago would continue to be so used with no significant improvements being necessary. It was assumed that major inspection, maintenance, and repair work will be performed under agreement or contract at existing Metra facilities. If this work requires a new facility along the Kenosha-Racine-Milwaukee route, an additional capital investment of about $16.5 million would be required, not including property acquisition.

- The total cost of the necessary capital improvements under the basic Kenosha-Racine-Milwaukee commuter rail proposal was estimated to be $152.4 million in year 1997 dollars.

- The number of trips which could be expected to be made on the potential commuter rail extension during an average weekday in the year 2020 was forecast to be a total of 4,000 trips, with another 680 trips projected to be made between the existing Kenosha station and Illinois. The projected 4,000 trips would include 3,050 trips with both ends of the trip within Southeastern Wisconsin between the stations of Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee; and 950 trips between the new commuter rail stations in Southeastern Wisconsin and Northeastern Illinois, principally the Chicago CBD. The annual total year 2020 ridership was forecast to be a total of about 1.3 million trips, including the trips between the existing Kenosha station and Illinois.

- The annual total operating cost of the potential commuter rail extension north of the existing Kenosha station was estimated to be about $7.8 million. The annual operating revenue of the potential commuter rail extension was estimated to be about $3.0 million, not including the estimated $560,000 in annual revenue attributable to trips between the existing Kenosha station and Northeastern Illinois, resulting in a net annual operating cost of about $4.8 million.

- Commuter rail travel times were estimated to be a significant improvement over existing Kenosha-Racine-Milwaukee bus service travel times, and

are comparable to, and for some travel less than, highway travel times. On an average weekday, commuter rail travel could be expected to result in a reduction in motor fuel consumption of approximately 3,800 gallons, a reduction in air pollutant emissions of 215 pounds of volatile organic compounds, and a reduction in highway traffic by 95,000 vehicle-miles of travel.

The second version of the commuter rail extension proposal would entail operation of commuter rail trains throughout the day only over the nine-mile distance between Kenosha and Racine as an extension of Metra's existing Union Pacific North Line service. Such an extension could be considered as a first step toward eventual provision of service all the way to Milwaukee. In terms of level of service and capital improvements, this version would otherwise be similar to the potential commuter rail extension to Milwaukee. This version of the commuter rail extension proposal would serve three passenger stations, Kenosha, Somers, and Racine, providing an average station spacing of 4.5 miles.

The most important findings concerning the second version of the commuter rail extension proposal may be summarized as follows:

- The capital cost of track and signal improvements necessary to provide a comfortable ride and acceptable operating speeds for commuter rail service between Kenosha and Racine was estimated to total about $20.5 million. These improvements include: overall rehabilitation and improvement of the mainline track, roadbed, and right-of-way on Union Pacific Railroad's Kenosha Subdivision; rehabilitation of grade crossings; and signal-related improvements.

- The capital cost of the required equipment was estimated to total about $45.1 million. To operate the Kenosha-Racine service, a total of four locomotives and 17 coaches would need to be procured, in addition to the equipment already required by Metra for its Kenosha-Chicago service.

- The capital cost of passenger station facility improvements was estimated to total about $2.2 million. New facilities would need to be constructed at Somers and Racine; the existing station facilities would be used at Kenosha.

- The existing equipment storage and servicing facilities at Kenosha and Chicago would continue to be used with no significant improvements being necessary. Some nonrevenue operation of equipment between Kenosha and Racine on a regular basis would be necessary. It was assumed that major inspection, maintenance, and repair work will be performed under agreement or contract at existing Metra facilities.

- The total cost of the necessary capital improvements under the basic Kenosha-Racine commuter rail proposal was estimated to be $67.9 million in 1997 dollars.

- The number of trips which could be expected to be made on the potential commuter rail extension during an average weekday in the year 2020 was forecast to be a total of 1,000 trips, with another 680 trips projected to be made between the existing Kenosha station and Northeastern Illinois. This would include 480 trips with both trip ends inside Southeastern Wisconsin between the stations of Kenosha, Somers, and Racine and 520 trips between the new Somers and Racine stations in Southeastern Wisconsin and Northeastern Illinois, principally the Chicago CBD. The annual total year 2020 ridership was forecast to be a total of about 465,000 trips, including trips between the existing Kenosha station and Northeastern Illinois.

- The annual total operating cost of the potential commuter rail extension north of Kenosha was estimated to be about $2.7 million. The annual operating revenue of the potential commuter rail extension was estimated at about $1.1 million, not including the estimated $560,000 in annual revenue attributable to trips between the existing Kenosha station and Northeastern Illinois, resulting in a net annual operating cost of about $1.6 million.

A comparison of these two versions of the potential extension of commuter rail service north of Kenosha is provided in Table 45.

A comparison of selected characteristics of the proposed Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail services with other existing new-start and long-established commuter rail systems in the United States and with the existing bus transit systems in Southeastern Wisconsin was made. Of particular interest are the operating cost recovery rates for these systems, since this measure provides a very good indication of long-term financial feasibility. The comparison indicated that the

Table 45

COMPARISON OF CHARACTERISTICS OF THE POTENTIAL EXTENSION OR COMMUTER RAILWAY SERVICE FROM KENOSHA TO RACINE AND TO MILWAUKEE

Characteristics	Alternative Extension	
	Kenosha-Racine-Milwaukee	Kenosha-Racine
Length of Route	32.6 miles	9.1 miles
Number of Stations	8	3
Annual Ridership (Year 2020)[a]	1.1 million trips	277,000 trips
Total Capital Cost	$152.4 million	$67.9 million
Total Annual Operating Cost[b]	$7.8 million	$2.7 million
Total Annual Operating Revenue[c]	$3.0 million	$1.1 million
Net Annual Operating Cost[d]	$4.8 million	$1.6 million

[a]*Does not include 188,700 million annual trips between existing Kenosha station and Northeastern Illinois.*

[b]*Does not include estimated annual cost of $1.2 million of existing commuter rail service provided between Wisconsin-Illinois State line and existing Kenosha station.*

[c]*Does not include $560,000 projected in annual revenue attributable to trips between existing Kenosha station and Northeastern Illinois.*

[d]*Does not include $560,000 projected in annual revenue attributable to trips between existing Kenosha station and Northeastern Illinois, or estimated $1.2 million in annual total operating cost of existing commuter service provided between Wisconsin-Illinois State line and existing Kenosha station.*

Source: SEWRPC.

estimated operating cost recovery rate of about 40 percent, for the proposed Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail extensions compared favorably with these other systems. This service had a recovery rate similar to, or higher than, than most of the other new-start commuter rail systems, many of the long-established commuter rail systems, and all of the bus transit systems.

The Advisory Committee at its meeting held on February 18, 1998, accepted the findings of the feasibility study presented in this report. The Committee concluded that the potential extension of commuter rail service between Kenosha, Racine, and Milwaukee, as well as the potential extension of commuter rail service between Kenosha and Racine, would be feasible and recommended that the next phase of the possible development on such service be initiated. The Committee requested the Regional Planning Commission complete publication of the final report of the feasibility study phase, prepare a Scope of Work for the next phase of work, which would be a detailed planning study, and transmit both the completed feasibility study and the Scope of Work to the Wisconsin Department of Transportation and the local units of government involved.

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Chapter VI

SUMMARY

INTRODUCTION

This report documents the findings and recommendations of a study of the feasibility of instituting commuter railway passenger train service in the South Lakeshore Corridor of the Southeastern Wisconsin Region. The service would be provided between the cities of Kenosha, Racine, and Milwaukee over the Union Pacific Railroad (former Chicago & North Western Railway) Kenosha Subdivision, as a potential extension of existing service between Kenosha and Chicago. This 33-mile long route is shown on Map 28.

This study was conducted within the framework of the adopted regional transportation system plan for Southeastern Wisconsin. That plan recommends significant improvement and expansion of public transit service within the Region, including the development of rapid and express transit service and the improvement and expansion of existing local transit services. The rapid transit component of the regional public transit system is envisioned as connecting the urban centers of the Region to each other and to the Milwaukee central business district (CBD). Buses operating over freeways in mixed traffic, buses operating over special busways, and commuter rail trains are identified in the adopted plan as potential modes for providing the recommended rapid transit service.

This feasibility study was intended to examine the potential costs and ridership attendant to commuter rail service for trips originating and ending in the Kenosha and Racine areas oriented to the Milwaukee area and attendant to trips originating and ending in the Kenosha, Racine, and Milwaukee areas oriented to the Chicago area. The potential commuter rail service would be intended to operate in addition to, but not in place of, the existing intercity Amtrak service. This service is operated between Chicago and Milwaukee, with a stop within the Region at Sturtevant, over the Canadian Pacific Railway main line. Accordingly, in the conduct of the feasibility study no replacement or reduction in Amtrak service was assumed. This study also recognizes that future improvements of the Amtrak service are being considered and that the Amtrak service and the new commuter rail service would serve quite generally different passenger trips and markets.

STUDY PURPOSE

This study, undertaken at the request of the Cities and Counties of Kenosha, Milwaukee, and Racine, is intended to constitute a feasibility study conducted prior to the initiation of a detailed planning study and preparation of an attendant environmental impact statement (EIS). A detailed planning study is the next phase of corridor planning which has, until recently, been called a Major Investment Study—or MIS—under provisions of the Federal surface transportation assistance program. As this feasibility study was being completed during mid-1998, the surface transportation program had just been reauthorized for the next six years under the Transportation Equity Act for the 21st Century, or "TEA-21." While it was certain that the detailed corridor planning work conducted under a Major Investment Study will remain a requirement, it was anticipated that the title and rules for this study phase will undergo revision through the Federal rulemaking process. For purposes of facilitating this next phase of work for the Kenosha-Racine-Milwaukee corridor, it will be referred to hereafter simply as a "detailed planning study" until such time that a new title and new Federal rules have been set forth. The feasibility study was intended to provide the information needed by the public officials concerned to make a decision as to whether or not to proceed with further consideration of potential implementation of commuter rail service. The next step would be a detailed planning study. Such a study must provide a detailed design and evaluation of bus and fixed-guideway transit alternatives in a travel corridor, as well as an analysis and recommendations with respect to the means of funding each alternative, before final decisions on implementation and specific mode and alignment are made. The necessary environmental impact assessment may be conducted as part of, or subsequent to, the detailed planning study.

Accordingly, this feasibility study was designed to provide an estimate of the total capital and operating costs of the commuter rail service in the Corridor, together with an estimate of the potential ridership. The feasibility study was also designed to assist in the ultimate conduct of a detailed planning study, should it be decided to proceed with such a study, as well as the preparation of an EIS, by

Map 28

POTENTIAL COMMUTER RAIL SERVICE IN THE MILWAUKEE-RACINE-KENOSHA CORRIDOR

Source: SEWRPC.

identifying key issues and options which must considered in a more detailed design and evaluation of transit service alternatives in the Corridor.

More specifically, this feasibility study was intended to serve the following purposes:

1. To identify the route alignment and physical and operational characteristics of commuter rail service alternatives in the Corridor;

2. To identify the capital costs of the commuter rail service alternatives;

3. To identify the anticipated operating costs of, and necessary public subsidies for, those alternatives;

4. To identify impacts of the alternatives on freight train operations over the line concerned;

5. To identify the potential ridership of the commuter rail service alternatives, the attendant revenues, and the impact on highway traffic in the Corridor;

6. To provide the basis for a determination by the public officials concerned as to whether or not to proceed with any further consideration of potential implementation of commuter rail service, with the next step being a detailed planning study in the Corridor.

STUDY ORGANIZATION

The lead agency conducting the feasibility study was the Southeastern Wisconsin Regional Planning Commission. The study was conducted by the Commission staff, with the assistance of a consulting transportation engineering firm; the staffs of the Counties and communities in the study area; and the staffs of the Wisconsin Department of Transportation, the Chicago Area Transportation Study, the various freight railroad companies concerned, and Metra.

To provide guidance to the Commission staff in conducting the study and to involve concerned and affected public officials more directly and actively in the development and conduct of the study, a 20-member Advisory Committee was created. The membership of this Committee is listed on the inside front cover of this report.

EXISTING LAND USE, SOCIO-ECONOMIC CHARACTERISTICS, AND TRAVEL PATTERNS

Study Area

The study area consisted of a "primary" study area and a "secondary" study area. The primary study area consisted of the South Lakeshore Corridor within the confines of the Southeastern Wisconsin Region, extending along the Lake Michigan shoreline between Kenosha, Racine, and Milwaukee. The boundaries of the primary study area were delineated so as to be consistent with study areas already developed and used for local transit system planning in the Kenosha, Racine, and greater Milwaukee areas and in conducting comprehensive travel surveys by the Regional Planning Commission. The primary study area lies entirely within the Southeastern Wisconsin Counties of Kenosha, Racine, and Milwaukee.

The secondary study area consisted of an extension of the travel corridor into Northeastern Illinois and to the City of Chicago central business district (CBD). The boundaries of the secondary study area were delineated so as to be consistent with the delineation of areas used in the conduct of comprehensive travel surveys by the Regional Planning Commission and by the Chicago Area Transportation Study. The secondary study area lies entirely in the Northeastern Illinois Counties of Lake and Cook.

Population and Households

In 1990 the resident household population of the primary study area totaled about 1,171,900 persons. The population in the primary study area is anticipated to increase to about 1,265,000 persons by the year 2020, an increase of about 8 percent.

In 1990 the number of households in the primary study area totaled about 462,800. The number of households in the primary study area is anticipated to increase to about 524,000 households by the year 2020, an increase of about 13 percent.

Employment

In 1990 employment in the primary study area stood at about 687,400 jobs. The number of jobs in the primary study area is anticipated to increase to about 761,800 jobs by the year 2020, an increase of about 11 percent.

Travel Habits and Patterns

Based upon travel surveys undertaken by the Commission in 1991, on an average weekday about 3.30 million person trips were made in the primary study area with both ends

of the trip occurring within that area. Only about 96,100 of these 3,300,000 trips, or about 3 percent, were made between the Counties of the primary study area. An estimated 56,900 person trips per average weekday were made between the primary study area and the secondary study area, crossing the Illinois-Wisconsin state line.

EXISTING TRANSPORTATION SERVICES IN THE CORRIDOR

The existing transportation services and facilities within the Corridor primary study area and between the primary and secondary study areas include the following:

- In 1997 commuter rail service was provided by Metra, the commuter rail division of the Chicago Regional Transportation Authority (RTA), over a 52-mile long route extending from Kenosha through the north shore suburbs of Chicago to the Chicago CBD over the Union Pacific Railroad. Referred to as Metra's Union Pacific-North Line, this long-established commuter rail service is strongly oriented to serving passengers residing in the Corridor but employed in the City of Chicago, especially in and around the Chicago CBD. Most of the passenger trains on this route originate or terminate at Waukegan, Illinois, but nine passenger trains in each direction serve Kenosha on weekdays, five trains on Saturdays, and three trains on Sundays and holidays.

- Average weekday ridership on Metra's Union Pacific-North Line totaled about 26,000 boarding passengers, with about 300 passengers boarding (and about 300 passengers alighting) at the Kenosha stop on an average weekday. Surveys of passengers using this service indicate that the travel patterns of such users are fairly typical of what would be expected on such a CBD-oriented commuter rail service; with the majority of the passengers making work related trips on a daily, or every-other-day, basis. Most passengers using this service who board or alight at Kenosha are residents of Kenosha or Racine Counties and are traveling to and from the Chicago CBD.

- In 1997 intercity passenger trains were operated between Milwaukee and Chicago under the name "*Hiawatha* Service" by Amtrak over Canadian Pacific Railway trackage lying about three miles west of the Union Pacific-North Line. While this service was offered within the primary study area, it did not directly serve the Cities of Racine and Kenosha, but did stop at Sturtevant, just west of the City of Racine. In 1996 it was estimated that this service carried about 330,000 trips, or about 900 passengers on an average weekday. Surveys of passengers using this service indicate that about 7 percent of the trips boarded or alighted at Sturtevant. About half of the trips using the Sturtevant stop are made by passengers who are residents of Racine County. Almost three-quarters of the trips boarding at Milwaukee were by passengers who were residents of the Milwaukee metropolitan area, consisting of Milwaukee, Ozaukee, Washington, and Waukesha Counties.

- In 1997 six bus systems operated within the South Lakeshore Corridor. Three of these systems were publicly owned, providing local transit service within the urbanized areas of the Corridor. These systems could provide feeder bus service to potential commuter rail service in the Corridor. They include the Kenosha Transit System, owned and operated by the City of Kenosha; the Belle Urban System, owned and operated by the City of Racine; and the Milwaukee County Transit System, owned and operated by Milwaukee County. Express bus service is provided by Wisconsin Coach Lines, Inc., within the Corridor over a single route between the Milwaukee CBD, the City of Racine, and the City of Kenosha. It is publicly subsidized by the State through the City of Racine, providing eight round trips on weekdays and four round trips on weekends and holidays. Intercity bus service in the Corridor is provided by Greyhound Lines, Inc., and United Limo, Inc. Most Greyhound buses operate nonstop along IH 94 between Milwaukee and Chicago, although two runs in each direction stop in the City of Kenosha. United Limo, Inc., provides intercity bus service within the Corridor from Milwaukee to Chicago's O'Hare and Midway Airports, with stops along IH 94 west of Racine and Kenosha. Neither Greyhound Lines, Inc., nor United Limo, Inc., receives public financial assistance.

- The street and highway system within the primary study area is comprised of land-access, collector, and arterial facilities. Freeways are those components of the arterial street and highway system which provide the highest level of service and carry the heaviest and fastest volumes of traffic, including traffic between the primary and secondary study areas. Of the nearly 72,600 vehicular crossings at the Wisconsin-Illinois border between Lake Michigan and the western boundary of the study area at IH 94 on an average day in 1990, approximately

50,800 vehicle crossings, or about 70 percent, were made on IH 94. The existing arterial street and highway system in the primary study area totaled about 828 miles.

POTENTIAL COMMUTER RAIL FACILITIES AND SERVICES

Various options for the provision of commuter rail service with respect to physical, operational, and service characteristics were evaluated. Consideration was given to route alignment, station locations, operating plan, track and signal improvements, equipment, and service provider. Alternatives for each of these areas were identified and screened for their advantages and disadvantages. The most practical and reasonable facility and service options were then used to develop a basic commuter rail alternative with the greatest potential to provide cost-effective service in the Kenosha-Racine-Milwaukee Corridor.

Route Alignment

A single route alignment was identified as sufficiently promising to warrant further consideration. It consisted of the Union Pacific Railroad Kenosha Subdivision from the existing Metra passenger station in Kenosha to St. Francis; the Union Pacific Railroad National Avenue Spur Track from St. Francis to Washington Street, in the City of Milwaukee; the existing Washington Street connection between the Union Pacific Railroad and the Canadian Pacific Railway and the Canadian Pacific Railway C&M Subdivision from Washington Street to the existing Amtrak Passenger Station in the Milwaukee CBD. Other alignment alternatives and options were determined to be less acceptable or desirable and to require more costly capital improvements without offering any advantages, such as higher operating speeds or better service to potential passenger markets.

The potential new commuter rail route within the South Lakeshore Corridor would extend through the Counties of Kenosha, Racine, and Milwaukee. From south to north, the route would extend from the City of Kenosha, through the Towns of Somers and Mt. Pleasant; the City of Racine; the Town of Caledonia, the Cities of Oak Creek, South Milwaukee, and Cudahy; and the Village of St. Francis, to the City of Milwaukee. The 32.6-mile long route consists of three major line segments.

The first segment is referred to as the Kenosha Subdivision, owned and operated by the Union Pacific Railroad, for a distance of 28.3 miles between Kenosha and St. Francis junction. This line is operated primarily as a secondary freight line consisting of a single-track main line with passing sidings. It has been maintained in good condition and currently permits freight train operating speeds of 40 mph over most of the line.

The second segment is referred to as the National Avenue Spur Track, also owned and operated by the Union Pacific Railroad, for a distance of 3.1 miles between St. Francis Junction and the connection with the Canadian Pacific Railway main line at Washington Street. This line is operated as a local switching line, is single-tracked, and provides access to customers in the Bay View, the Port of Milwaukee, and the Third Ward of the City of Milwaukee. The portion of this segment between St. Francis junction and E. Lincoln Avenue has recently been reconstructed as part of the Lake Parkway project and is in good condition. The section from E. Lincoln Avenue to Washington Street is in poor condition. The entire length of the National Avenue Spur is limited to freight trains operating at maximum speeds of 10 mph.

The third segment is referred to as the C&M Subdivision, owned and operated by Canadian Pacific Railway, for a distance of 1.2 miles between Washington Street and the Milwaukee passenger depot. This line is operated as a double-track main line and handles through freight trains operated by Canadian Pacific as well as Amtrak passenger trains. It has been maintained in good condition and currently permits passenger train operating speeds varying between 15 and 30 mph. These speed limits are largely determined by horizontal curvature restrictions along the alignment.

For most of its historic existence, the Kenosha-St. Francis-Washington Street portion of the potential commuter rail route, now owned and operated by the Union Pacific Railroad was formerly owned and operated by the Chicago & North Western Railway as its passenger main line between Milwaukee and Chicago. When intercity passenger train operation ceased along this route, the physical plant and facilities underwent significant changes, including the elimination of trackage and signal systems no longer necessary for continued freight operations. One of the original two mainline tracks along the route was removed; the signal system necessary for efficient high-speed passenger train operation was removed; maintenance levels were reduced from those required for high speed passenger train operations; and passenger depot facilities were sold to private interests.

Passenger Station Facilities

Eight potential passenger stations along the proposed commuter rail route were identified. These include Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee. The

average station spacing along the potential commuter rail line would approximate 4.7 miles. In Kenosha and Milwaukee, the existing passenger station facilities would be utilized, although some improvements would be necessary. Shuttle buses would carry passengers between the Milwaukee commuter rail station and the Milwaukee CBD. In Somers, Racine, Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis, new stations would be necessary. Three of the eight stations were identified as not being essential to the initiation of commuter rail service, those being at Somers, Caledonia, and Oak Creek. The average spacing for the five essential stations would be about 8.2 miles. The precise location, size, and design of each station would meet the requirements of the Federal Americans with Disabilities Act and should reflect consideration of comments and concerns expressed by appropriate local officials.

Operating Plan

Under this feasibility study, the operating plan assumes the operation of commuter rail trains between Kenosha, Racine, and Milwaukee as an extension of Metra's existing Union Pacific North Line. Selected existing Metra trains operating between Kenosha and Chicago would essentially remain on their existing schedules but be operated along the entire length of the Corridor northward of Kenosha to Racine and Milwaukee. Through operation of trains between Milwaukee, Racine, Kenosha, and Chicago would not require passengers to change trains at Kenosha, thus providing a higher level of service and attracting a greater number of potential passengers. A small number of trains would originate or terminate at Kenosha. To the extent possible, the existing Kenosha-Chicago trains assumed to be utilized would be those which already provide some express service during peak periods south of Waukegan. All trains would stop between Kenosha and Milwaukee at Somers, Racine, Caledonia, Oak Creek, South Milwaukee and Cudahy-St. Francis. On weekdays, there would be three to four trains between Milwaukee, Racine, Kenosha, and Chicago during the morning and afternoon peak periods, along with one train in each direction during the late morning, early afternoon, and evening periods. Weekend service would consist of four trains in each direction on Saturdays and three trains in each direction on Sundays and major holidays.

Track and Signal Improvements

An assessment of track and signal conditions and the improvements which will be necessary to permit the initiation of commuter rail service along the existing Kenosha-Racine-Milwaukee route was conducted by a consulting transportation engineering firm working with the Commission staff and with the cooperation of the railroad companies involved. The purpose of the assessment was to identify the existing facilities which would have to be rehabilitated, upgraded, or replaced in order to operate commuter rail service in an efficient, safe, and cost-effective manner and to attract an adequate level of patronage by providing a smooth and comfortable ride at acceptable operating speeds.

The Union Pacific Kenosha Subdivision between Kenosha and St. Francis was determined to be in generally good condition for existing freight operations, but would require overall upgrading and the installation of some new trackage to accommodate commuter passenger train operations in a safe, efficient, and reliable manner. The National Avenue Spur Track between St. Francis and Washington Street was determined to be in generally poor condition for accommodating commuter railway passenger train operations except for that portion recently relocated and rebuilt as part of the Lake Parkway construction project. The National Avenue Spur Track would require significant upgrading and some new track improvements for use as a commuter rail route. The Canadian Pacific C&M Subdivision was determined to be in very good condition for accommodating commuter rail operations.

To enable commuter train operation, the track improvements which would have to be undertaken along the railway line include the following: significant replacement of older, worn jointed rail with continuous welded rail; replacement of all bad crossties along the entire route; repair, adjustment, and replacement as necessary of other track material, primarily tie plates, spikes, joint bars, joint bolts, and rail anchors; undercutting the ballast, adding new ballast where necessary, and then bringing the track to the intended surface and line; providing superelevation on curves for higher-speed passenger train operation; cleaning and cutting drainage ditches along the roadbed; rehabilitation and replacement of turnouts along the entire line; rebuilding of grade crossings now in poor condition; improvements to the rail and expansion joints on the Kinnickinnic River Bridge; and provision of appropriate equipment storage and servicing areas at Milwaukee.

The necessary track and signal improvements were determined on the basis of allowing a maximum mainline operating speed of 59 miles per hour (hereinafter "mph"). With these improvements, a one-way trip between Kenosha and Milwaukee would take a total of 56 minutes, with an average speed of 35 mph, if there were a total of five passenger stations along the 33-mile long route and would take a total of 65 minutes with an average speed of 30 mph, if all eight passenger stations along the route were included. A higher maximum mainline operating speed of

79 mph was considered which would allow a one-way trip between Kenosha and Milwaukee route in 49 and 58 minutes, respectively. This would result in an average speed, including station stops, of 40 mph and 34 mph, respectively. The difference in operating speeds would result in only a seven minute travel time difference over the entire length of the route, but could be expected to require a much more costly level of track rehabilitation and maintenance, as well as the installation of an automatic block signal system (ABS). It was recognized, however, that a higher mainline operating speed could be considered in the future. Regardless of maximum operating speeds, installation of an ABS may be required because of the expected number of meets between trains.

Three new sidings would be required and three segments of the line would require some reconfiguration or improvement to allow commuter trains traveling in opposite directions to meet and pass each other and to allow the coordination of existing and future freight train operations.

The new sidings would vary from 2.0 to 3.4 miles in length and be located in the Caledonia, South Milwaukee, and Cudahy areas. The three segments of railway line requiring some reconfiguration or improvement would include the following: extension of the double track along the Kenosha Subdivision in Kenosha a distance of 2.4 miles further north; establishing separate tracks for commuter rail operations and local freight switching operations along the National Avenue Spur Track from Bay View to Washington St.; and upgrading of Canadian Pacific trackage through the Muskego Yard to allow freight traffic to bypass that trackage between Washington St. and the Milwaukee Passenger Station which is proposed to be used by the commuter rail trains.

The number and location of potential passing sidings was based on the assumption that the volume of freight train movements will remain relatively low. Therefore, freight train traffic was not considered to be a constraint with respect to locating and sizing passing sidings. The operation of both commuter rail and freight trains was assumed to be accomplished through an operating agreement which includes the coordinated scheduling of all operations. However, it is possible that the very modest amount of freight traffic which existed on the proposed commuter rail route in 1997, and what was anticipated in the future, could increase substantially during the period between completion of this study and implementation of commuter rail service. Should this occur, or if delivery schedules or procedures for customers dramatically change, additional needed upgrades to the rail line, such as additional passing sidings and improved signalization, may affect the number, frequency, and schedule of possible commuter trains which could reasonably be operated. In this case, detailed capacity analyses or operational simulations may need to be performed.

Signal-related improvements would also be needed, including the following: installing appropriate signals, power turnout machinery, and controls for new sidings, crossovers, the new end of double track north of Kenosha, and the Kinnickinnic River Bridge, and upgrading the signals and controls for the crossing at Bay View, the connection at Washington St., and the junction at St. Francis. These track and signal improvements represent a conceptual design for feasibility assessment. The location and design of actual improvements at the time of implementation may vary from these, and will depend on the recommendations of detailed planning and engineering work, review by local public officials, and negotiation and agreement with the railroad companies involved. Accordingly, the recommendations for track and signal improvements presented herein do not represent or constitute a commitment by any of the railroad companies which may be involved.

Equipment

Conventional locomotive-hauled commuter train equipment was assumed to be used for potential commuter rail service instead of other types of equipment, such as self-propelled equipment. Conventional commuter train equipment consists of bi-directional trains of diesel locomotives with bi-level gallery coaches operating in a "push-pull" mode. This type of equipment has been proven to have a long and established record for availability, dependability, performance, and safety in use by Metra and Metra's predecessors on most of the commuter rail routes in the Chicago area. This equipment would be compatible with existing Metra equipment currently operated between Kenosha and Chicago and meets current Federal Railroad Administration and Federal Transit Administration requirements for safety, structural strength, and accessibility.

Service Provider

For purposes of this feasibility study, it was assumed that the potential commuter rail service from Kenosha to Racine and Milwaukee would be provided as an extension of Metra's existing service on its Union Pacific-North Line. The necessary agreement with Metra would be handled under a contractual agreement with a Wisconsin-based public agency created or authorized to administer such service. This recommendation was considered to be appropriate and reasonable considering Metra's familiarity and experience with extensive commuter rail operations, the fact that Metra already provides service to Kenosha

from Chicago under a purchase-of-service agreement with the Union Pacific Railroad, and the fact that through service in the Corridor would eliminate the need for a passenger transfer between commuter rail services at the Kenosha station.

The foregoing service provider recommendation is a preference which is entirely and solely a result of this feasibility study. It does not constitute or represent a commitment or endorsement by Metra with respect to any of the proposals or recommendations contained in this study. While Metra has participated in this study in a technical advisory role, its responsibility lies in addressing needs within the six-county Northeastern Illinois Region. Any provision of service in the Kenosha-Racine-Milwaukee Corridor will require sponsorship and funding for all capital and operating cost needs by Wisconsin governments or agencies.

EVALUATION OF POTENTIAL COMMUTER RAIL TRANSIT

Following consideration and screening of various physical, operational, and service options, two versions of the basic alternative for potential extension of commuter rail service were evaluated with respect to cost and ridership. One would extend service 33 miles, from Kenosha to Milwaukee; the other would extend service nine miles, from Kenosha to Racine.

The principal findings concerning the proposal to extend commuter rail to Milwaukee are as follows:

- The capital cost of track and signal improvements necessary to provide a comfortable ride and acceptable operating speeds for commuter railway service between Kenosha and Milwaukee was estimated to total about $85.7 million. These improvements include the following: overall rehabilitation and improvement of the mainline track, roadbed, and right-of-way on Union Pacific Railroad's Kenosha Subdivision and National Avenue Spur Track; construction of three new passing sidings; improvement of Canadian Pacific Railway's freight main line through the Muskego Yard in Milwaukee; rehabilitation of grade crossings; and installation of new signals and other signal-related improvements.

- The capital cost of the required equipment was estimated at $54.0 million. To operate the Kenosha-Racine-Milwaukee service, a total of five locomotives and 21 coaches would need to be procured in addition to the equipment already required by Metra for its Kenosha-Chicago service.

- The capital cost of passenger station facility improvements was estimated at $8.0 million. New facilities would need to be constructed at Somers, Racine, Caledonia, Oak Creek, South Milwaukee, and Cudahy-St. Francis. Existing facilities would be used at Kenosha and Milwaukee, but some improvements would be necessary at both of these stations.

- The capital cost of equipment storage and servicing facilities was estimated at $4.8 million for improvements at Milwaukee. The existing facilities used for this purpose at Kenosha and Chicago would continue to be so used with no significant improvements necessary. It was assumed that major inspection, maintenance, and repair work will be performed under agreement or contract at existing Metra facilities. If this work requires a new facility along the Kenosha-Racine-Milwaukee route, an additional capital investment of about $16.5 million would be required, not including property acquisition costs.

- The total cost of the necessary capital improvements under the basic Kenosha-Racine-Milwaukee commuter railway proposal was estimated at $152.4 million in 1997 dollars.

- The number of trips which could be expected to be made on the potential commuter rail extension during an average weekday in the year 2020 was forecast to total 4,000 trips, with another 680 trips projected to be made between the existing Kenosha station and Northeastern Illinois. The projected 4,000 trips would include 3,050 trips with both trip ends in Southeastern Wisconsin, between the stations of Kenosha, Somers, Racine, Caledonia, Oak Creek, South Milwaukee, Cudahy-St. Francis, and Milwaukee; and 950 trips between the new commuter rail stations in Southeastern Wisconsin and Northeastern Illinois, principally the Chicago CBD. The annual total year 2020 ridership was forecast at about 1.3 million trips, including the trips between the existing Kenosha station and Illinois.

- The annual total operating cost of the potential commuter rail extension north of the existing Kenosha station was estimated at $7.8 million. The annual operating revenue of the potential commuter railway extension was estimated at about $3.0 million, not including the estimated $560,000 in annual revenue attributable to trips between the existing

Kenosha station and Northeastern Illinois. This results in a net annual operating cost of about $4.8 million.

- Commuter rail travel times were estimated to represent a significant improvement over existing Kenosha-Milwaukee-Racine travel times by bus and are comparable to, and, for some travel, less than, highway travel times. Commuter rail travel could be expected to result on an average weekday in a reduction in motor fuel consumption of approximately 3,800 gallons, a reduction in air pollutant emissions of 215 pounds of volatile organic compounds (VOCs), and a reduction in highway traffic of 95,000 vehicle-miles of travel.

The second version of the commuter rail extension proposal would entail operation of commuter rail trains throughout the day over only the nine-mile distance between Kenosha and Racine as an extension of Metra's existing Union Pacific-North Line service. This version of the extension proposal would serve three passenger stations, Kenosha, Somers, and Racine, providing an average station spacing of 4.5 miles.

The principal findings concerning the proposed commuter rail extension proposal to Racine are as follows:

- The capital cost of track and signal improvements necessary to provide a comfortable ride and acceptable operating speeds for commuter rail service between Kenosha and Racine was estimated at $20.5 million. These improvements include the following: overall rehabilitation and improvement of the mainline track, roadbed, and right-of-way on Union Pacific Railroad's Kenosha Subdivision; rehabilitation of grade crossings; and signal-related improvements.

- The capital cost of the required equipment was estimated at $45.1 million. To operate the Kenosha-Racine service, a total of four locomotives and 17 coaches would need to be procured in addition to the equipment already required for Metra's Kenosha-Chicago service.

- The capital cost of passenger station facility improvements was estimated at $2.2 million. New facilities would need to be constructed at Somers and Racine.

- The existing equipment storage and servicing facilities and used for this purpose at Kenosha and Chicago would continue to be so used with no significant improvements being necessary. Some nonrevenue, or "deadhead," operation of equipment between Kenosha and Racine on a regular basis would be necessary. It was assumed that major inspection, maintenance, and repair work will be performed under agreement or contract at existing Metra facilities.

- The total cost of the necessary capital improvements under the basic Kenosha-Racine commuter rail proposal was estimated at $67.9 million in year 1997 dollars.

- The number of trips which could be expected to be made on the potential commuter rail extension during an average weekday in the year 2020 was forecast at 1,000 trips, with another 680 trips projected to be made between the existing Kenosha station and Northeastern Illinois. This would include 480 trips with both trip ends in Southeastern Wisconsin between the stations of Kenosha, Somers, and Racine and 520 trips between the new Somers and Racine stations in Southeastern Wisconsin and Northeastern Illinois, principally the Chicago CBD. The annual total year 2020 ridership was forecast at 465,000 trips, including trips between the existing Kenosha station and Northeastern Illinois.

- The annual total operating cost of the potential commuter rail extension north of Kenosha to Racine was estimated at $2.7 million. The annual operating revenue of the potential commuter rail extension was estimated at $1.1 million, not including the estimated $560,000 in annual revenue attributable to trips between the existing Kenosha station and Northeastern Illinois, resulting in a net annual operating cost of about $1.6 million.

It was recognized that the capital costs developed in this study, while representing the best possible estimates available for feasibility assessment, must be considered preliminary in nature. If and when commuter rail service is implemented in the Kenosha-Racine-Milwaukee Corridor, potential changes in the nature of freight traffic may affect the capital improvements required for operating such service. As a result, actual capital costs for commuter rail service at the time of implementation may vary from those presented herein and will ultimately be determined through agreement concerning the necessary improvements among the freight railroad companies and other parties involved. Similarly, it was recognized that the operating revenues, operating costs, and ridership projections, while representing the best possible estimates for feasibility assess-

ment, must also be considered preliminary in nature. They represent an assumed operating and coordination plan with the freight railroads involved. If and when commuter rail service is implemented in the Kenosha-Racine-Milwaukee Corridor, actual ridership, revenues, and operating costs may vary from those presented herein and will ultimately be dependent upon the actual operating plan and railroad access charges negotiated between the freight railroad companies involved and the commuter rail operating entity.

CONCLUSIONS

A comparison was made with other existing new-start and long-established commuter rail systems in the United States and with the existing bus transit systems in Southeastern Wisconsin of selected characteristics for the proposed Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail services. Tables providing these comparisons were presented in Chapter V of this report. Of particular interest were the operating cost recovery rates for these systems, since this measure provides a good indication of political and financial feasibility. The comparison indicated that the estimated operating cost recovery rate of about 40 percent for the proposed Kenosha-Racine-Milwaukee and Kenosha-Racine commuter rail extensions compared favorably with other such systems; this rate is similar to, or higher than, the recovery rate of most of the other new-start commuter rail systems, many of the long-established commuter rail systems, and all of the bus transit systems.

At its meeting held on February 18, 1998, the Advisory Committee accepted the findings of the feasibility study presented in this report. The Committee concluded that the potential extension of commuter rail service between Kenosha, Racine, and Milwaukee, as well as the potential extension of commuter rail service between Kenosha and Racine, was feasible. The Committee recommended that the next phase of the possible development of such service be initiated. The Committee requested that the Regional Planning Commission complete publication of the final report for the feasibility study phase, prepare a Scope of Work for the next phase of work, which would be a detailed planning study, and transmit both the completed feasibility study and the Scope of Work to the Wisconsin Department of Transportation and to the local units of government concerned for their consideration and determination.

APPENDIX

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Appendix A

STREET, HIGHWAY, AND RIVER CROSSINGS ALONG POTENTIAL KENOSHA-RACINE-MILWAUKEE COMMUTER RAIL ROUTE: JUNE 1997

Milepost	Type of Crossing or Other Feature	Street, Highway, or Station Name	Crossing Protection [a]	Number of Tracks [b]
51.60	Station	Kenosha	--	--
51.65	Overpass	Pedestrian	--	4
51.80	Overpass	52nd Street (STH 158)	--	4
51.90	Overpass	50th Street	--	5
52.50	Overpass	43rd Street	--	5
52.60	Overpass	Washington Road (CTH S)	--	5
52.90	At-Grade	35th Street	FL,G	1
53.20	At-Grade	31st Street	FL,G	1
53.60	At-Grade	24th Street	FL,G	1
54.19	At-Grade	Birch Road (CTH EE)	FL,G	1
55.05	Bridge	Pike River	--	1 (2)
55.25	At-Grade	12th Street (CTH E)	FL,G	1
56.40	At-Grade	Berryville Road (CTH A)	FL,G	1
57.36	At-Grade	County Line Road (CTH KR)	FL,G	1
58.21	At-Grade	Hanche Road	FL	1
58.43	At-Grade	Chickory Road	FL	1
59.50	Overpass	Durand Avenue (STH 11)	--	3 (4)
60.22	At-Grade	De Koven Avenue	FL,G	3
60.50	Station	Racine (Former Racine Junction)	--	--
60.56	At-Grade	16th Street	FL,G	1
60.76	At-Grade	14th Street	FL,G	1
60.87	At-Grade	13th Street	FL,G	1
60.92	At-Grade	Washington Avenue (STH 20)	FL,G	1
60.97	At-Grade	12th Street	FL,G	1
61.07	At-Grade	11th Street	FL,G	1
61.30	Overpass	9th Street	--	1 (2)
61.40	Bridge	Root River	--	1 (2)
61.50	Overpass	6th Street	--	2
61.60	Overpass	Mound Avenue	--	2
61.80	Former Station	Racine (Old Passenger Depot)	--	--
61.88	At-Grade	State Street (STH 38)	FL,G	1
61.99	At-Grade	West Street	FL,G	1
62.10	At-Grade	Prospect Street	FL,G	2
62.15	At-Grade	Hamilton Street	FL,G	2
62.30	At-Grade	Albert Street	FL,G	1
62.60	At-Grade	High Street	FL,G	1
62.93	At-Grade	Rapids Drive	FL,G	1
62.96	At-Grade	Yout Street	FL,G	1
63.00	At-Grade	Goold Street	FL,G	1
63.11	At-Grade	Layard Avenue	FL,G	1
63.80	At-Grade	South Street	FL,G	1

Appendix A (continued)

Milepost	Type of Crossing or Other Feature	Street, Highway, or Station Name	Crossing Protection [a]	Number of Tracks [b]
64.60	Former Station	Ives	--	--
64.70	At-Grade	Three Mile Road	FL,G	1
65.60	At-Grade	Four Mile Road	FL,G	1
66.20	Overpass	Douglas Avenue (STH 32)	--	1 (2)
66.70	At-Grade	Five Mile Road	FL,G	1
67.75	At-Grade	Six Mile Road	FL,G	2
68.80	At-Grade	Seven Mile Road	FL,G	2
69.30	Station	Oak Creek	--	--
70.30	At-Grade	Oak Creek Private	FL,G	1
70.40	At-Grade	E. Elm Road	FL,G	1
71.00	At-Grade	E. Oakwood Road	FL,G	1
71.40	At-Grade	E. Fitzsimmons Road	FL,G	1
72.00	At-Grade	E. Ryan Road	FL,G	1
72.40	Overpass	E. American Avenue	--	1 (2)
72.60	Former Station	Oak Creek (Old Location)	--	--
73.30	At-Grade	E. Puetz Road	FL,G	1
73.80	At-Grade	Columbia Avenue	FL,G	1
74.60	Overpass	Marquette Avenue (STH 32)	--	1 (4)
74.70	Former Station	South Milwaukee	--	--
74.76	At-Grade	Milwaukee Avenue	FL,G	1
75.07	At-Grade	Rawson Avenue	FL,G	4
75.70	Overpass	Oak Creek Parkway	--	2
76.30	Overpass	E. College Avenue (CTH ZZ)	--	2
76.60	At-Grade	E. Ramsey Avenue	FL,G	2
77.03	At-Grade	Ladish Avenue	FL,G	1
77.50	At-Grade	Ladish (Private)	FL,G	6
78.00	At-Grade	E. Barnard Avenue	WW	3
78.10	At-Grade	E. Layton Avenue (CTH Y)	FL,G,OHL	2
78.20	Station	Cudahy	--	--
78.40	At-Grade	E. Van Norman Avenue	FL,G	2
78.90	At-Grade	E. Denton Avenue	FL,G	1
79.20	At-Grade	E. Norwich Avenue	FL,G	1
79.36	-- [c]	E. Howard Avenue	FL,G,OHL	1
79.51	At-Grade	E. Crawford Avenue	FL,G	1
79.85	At-Grade	E. St. Francis Avenue	FL,G	1
79.90	Station	St. Francis	--	--
80.20	Former Station	St. Francis (Old Location)	--	--
80.50	Overpass	E. Oklahoma Avenue (CTH NN)	--	1
80.80	Overpass	S. Kinnickinnic Ave. (STH 62)	--	1
81.00	Overpass	E. Pryor Avenue	--	1
81.30	Overpass	E. Russell Avenue	--	1
81.60	Underpass	E. Lincoln Avenue	--	1

Appendix A (continued)

Milepost	Type of Crossing or Other Feature	Street, Highway, or Station Name	Crossing Protection [a]	Number of Tracks [b]
81.80	At-Grade	E. Bay Street (Private)	CB only	1
81.80	Station	Bay View	--	--
81.80	At-Grade	DCS Co. (Private)	none	3
82.50	Movable bridge	Kinnickinnic River Bridge	--	--
82.72	At-Grade	E. Greenfield Avenue	FL,G	2
83.00	Station	Washington Street (U.P.)	--	--
83.00	Overpass	E. Washington Street	--	3 (4)
84.20	Station	Washington Street (C.P.)	--	--
84.50	Overpass	E. National Avenue	--	3 (4)
84.90	Overpass	E. Florida Street	--	3 (4)
84.90	Overpass	S. 1st Street (STH 32)	--	2
85.00	Overpass	E. Pittsburgh Avenue	--	2
85.10	Overpass	Pedestrian	--	2
85.30	Movable bridge	Menomonee Drawbridge	--	--
85.35	At-Grade	S. Plankinton Avenue	FL,G	2
85.70	Station	Milwaukee Passenger Depot	--	--

[a] *Crossbucks and bells at all crossings unless otherwise indicated. The following abbreviations are used:*
FL - Flashing Lights OHL - Overhead Flashing Lights G - Gates
CB - Crossbucks WW - Wig-Wag Signals

[b] *Numbers in parentheses indicate width of bridge by number of bridge spans.*

[c] *New at-grade crossing under construction in June 1997.*

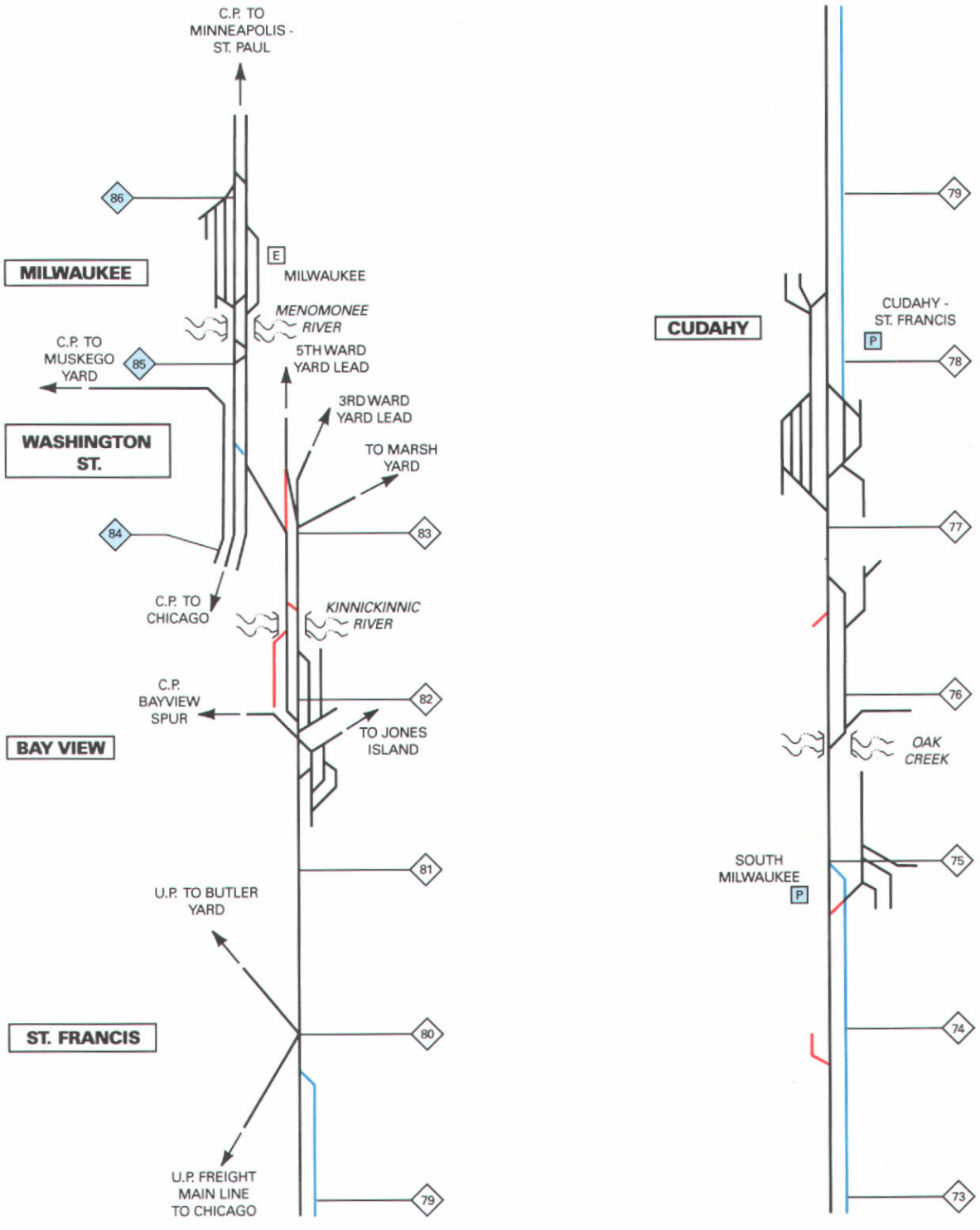
Source: SEWRPC.

Appendix B

EXISTING TRACK DIAGRAMS WITH IMPROVEMENTS FOR POTENTIAL COMMUTER RAIL SERVICE

Appendix B-1

TRACK DIAGRAM OF EXISTING KENOSHA-RACINE-MILWAUKEE RAILWAY LINE WITH IMPROVEMENTS FOR POTENTIAL COMMUTER RAIL SERVICE

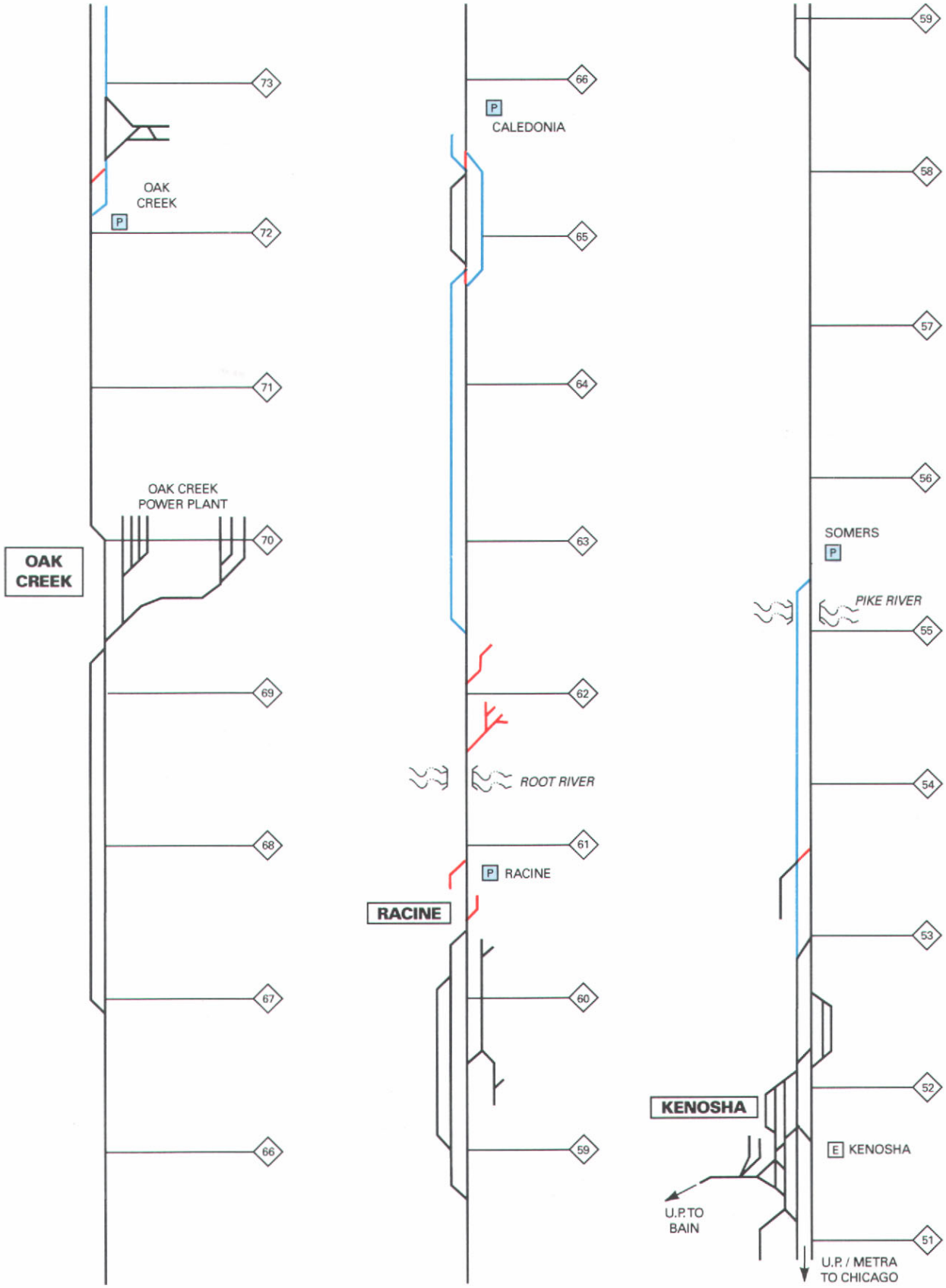


LEGEND

- EXISTING TRACKAGE
- TRACKAGE TO BE ADDED
- TRACKAGE TO BE REMOVED
- UNION PACIFIC RAILROAD (U.P.) MILEPOST
- CANADIAN PACIFIC RAILWAY (C.P.) MILEPOST
- E — EXISTING PASSENGER DEPOT LOCATION AND NAME
- P — PROPOSED PASSENGER DEPOT LOCATION AND NAME
- BAY VIEW — EXISTING STATION
- RIVERS

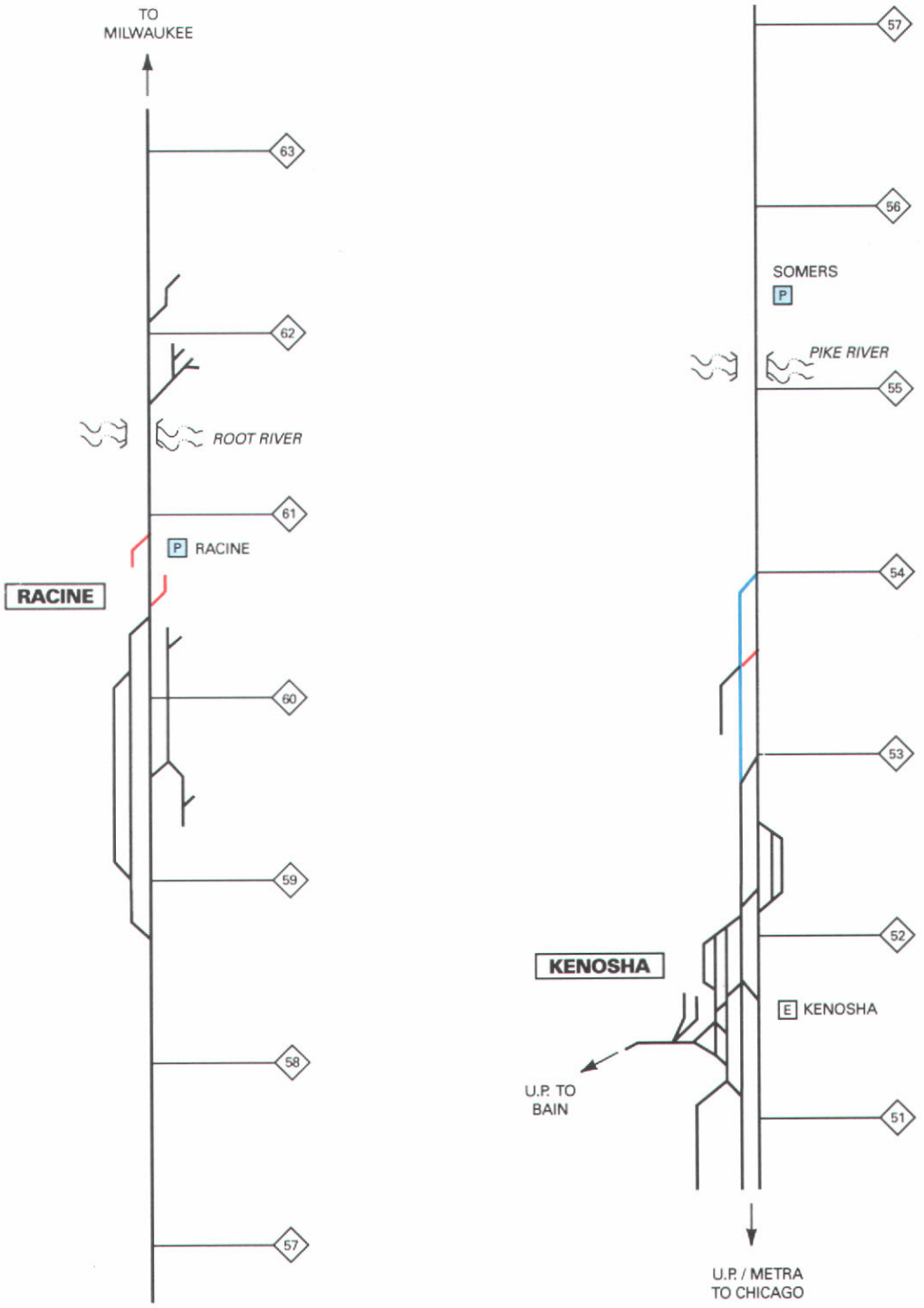
NOTE: THE IMPROVEMENTS DESCRIBED IN THIS DIAGRAM REPRESENT A CONCEPTUAL DESIGN FOR FEASIBILITY ASSESSMENT. THE LOCATION AND DESIGN OF ACTUAL IMPROVEMENTS AT THE TIME OF IMPLEMENTATION MAY VERY FROM THESE AND WILL DEPEND ON: THE RECOMMENDATIONS OF DETAILED PLANNING AND ENGINEERING WORK; REVIEW BY LOCAL PUBLIC OFFICIALS, AND NEGOTIATION AND AGREEMENT WITH THE RAILROAD COMPANIES INVOLVED.

Appendix B-1 (continued)



Appendix B-2

TRACK DIAGRAM OF EXISTING KENOSHA-RACINE RAILWAY LINE WITH IMPROVEMENTS FOR POTENTIAL COMMUTER RAIL SERVICE



LEGEND

- EXISTING TRACKAGE
- TRACKAGE TO BE ADDED
- TRACKAGE TO BE REMOVED
- 57 UNION PACIFIC RAILROAD (U.P.) MILEPOST
- E EXISTING PASSENGER DEPOT LOCATION AND NAME
- KENOSHA EXISTING STATION
- P PROPOSED PASSENGER DEPOT LOCATION AND NAME
- RIVERS

NOTE: THE IMPROVEMENTS DESCRIBED IN THIS DIAGRAM REPRESENT A CONCEPTUAL DESIGN FOR FEASIBILITY ASSESSMENT. THE LOCATION AND DESIGN OF ACTUAL IMPROVEMENTS AT THE TIME OF IMPLEMENTATION MAY VERY FROM THESE AND WILL DEPEND ON: THE RECOMMENDATIONS OF DETAILED PLANNING AND ENGINEERING WORK; REVIEW BY LOCAL PUBLIC OFFICIALS, AND NEGOTIATION AND AGREEMENT WITH THE RAILROAD COMPANIES INVOLVED.