COMMUNITY ASSISTANCE
PLANNING REPORT NO. 241

BURLINGTON-ANTIOCH CORRIDOR COMMUTER RAIL AND BUS SERVICE FEASIBILITY STUDY

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Mr. Jeff Albrecht, Trustee, Village of Silver Lake; Mr. Brian Bliesner, Project Engineer, Systems Planning Group, Wisconsin Department of Transportation; Mr. Lester H. Boehm, Supervisor, Town of Burlington; Mr. Alan Bryner, Trustee, Village of Silver Lake; Mr. Douglas F. Dalton, Chief, Urban Planning, Wisconsin Department of Transportation; Mr. Thomas L. Frank, Systems Planning and Programs Engineer, Federal Highway Administration, U.S. Department of Transportation; Mr. Lyle G. Gomm, Section Manager, Office of Planning and Analysis, Metra; Ms. Jeannie Hefty, Mayor, City of Burlington; Ms. Sheila M. Siegler, Town Clerk, Town of Wheatland; Mr. David Torgler, City Administrator, City of Burlington; Mr. David M. Trowbridge, Transportation Planner, Bureau of Planning, Wisconsin Department of Transportation; and Mr. Robert G. Ward, Chief Engineer, Wisconsin Central, Ltd.

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Southeastern Wisconsin Regional Planning Commission
P.O. Box 1607
W239 N1812 Rockwood Drive
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 or commuter bus service in the Burlington-Antioch Corridor. The corridor extends from the City of Burlington in the western portion of Racine County, through the Village of Silver Lake in the western portion of Kenosha County, both in the Southeastern Wisconsin Region, to the Village of Antioch in the northwestern portion of Lake County in Northeastern Illinois. The service would be provided as an extension to the recently instituted commuter rail service between Antioch and the City of Chicago central business district which is operated by Metra—the Commuter Rail Division of the Regional Transportation Authority of Northeastern Illinois—as its North Central Service. Potential alternatives for the extension of the commuter service include operation of commuter rail trains beyond Antioch to Burlington, or operation of buses in feeder service between Burlington and Antioch.

Such a feasibility study would implement the year 2020 regional transportation system plan for Southeastern Wisconsin adopted by the Regional Planning Commission on December 3, 1997. 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 not only to each other and to the Milwaukee central business district, but also to Northeastern Illinois and the City of Chicago. 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.

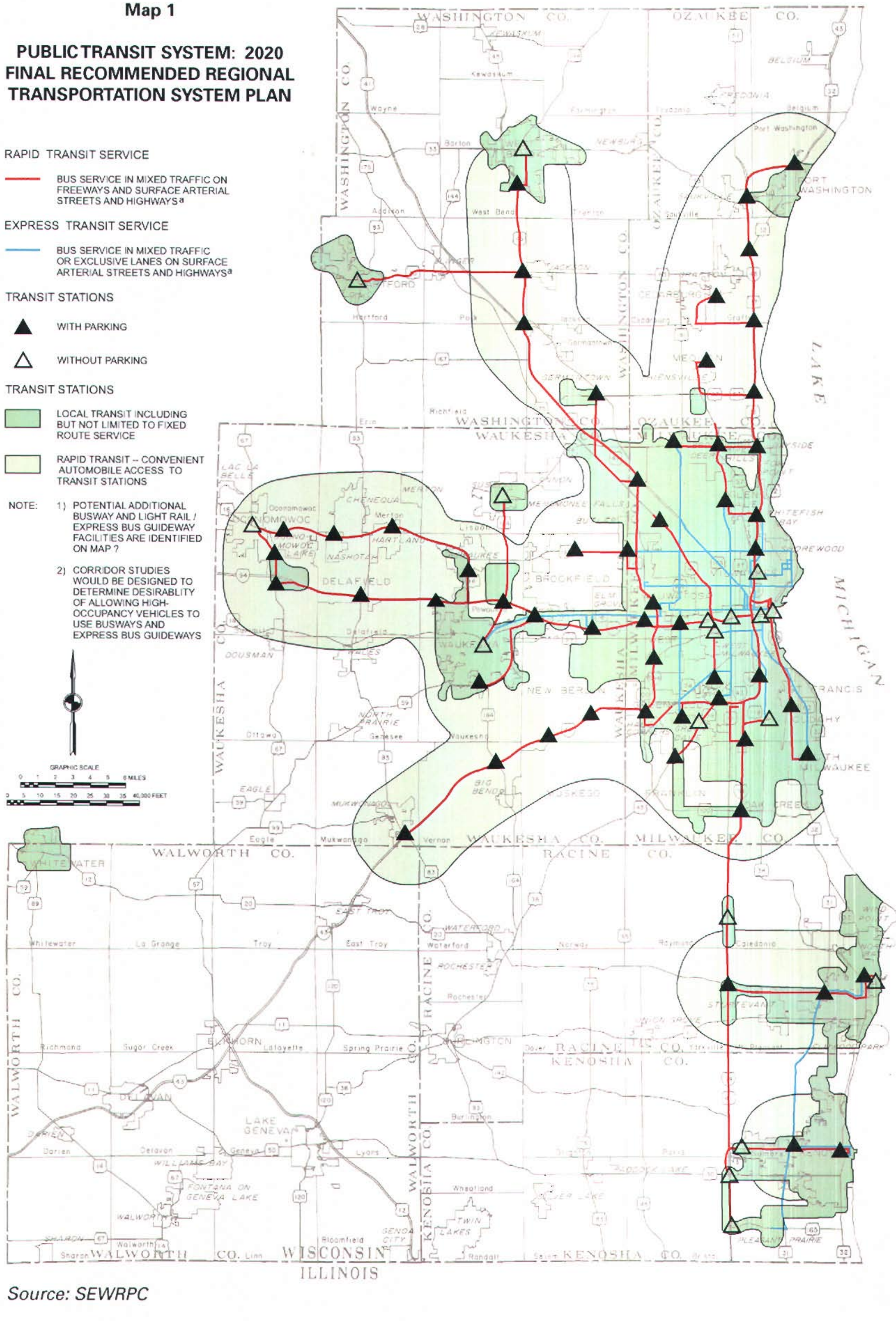
As shown on Maps 1 and 2, one of the several corridors identified in the adopted regional transportation system plan as warranting consideration in further studies for development of rapid transit service extends from the City of Burlington southeasterly through the Village of Silver Lake to the Village of Antioch in Northeastern Illinois. At an intergovernmental meeting held in November 1995, officials of the City of Burlington, Village of Silver Lake, and Kenosha and Racine Counties jointly requested the Regional Planning Commission to conduct a feasibility study of the extension of commuter service in this corridor, and approved a scope of work for the desired feasibility study. Funding arrangements for the study were completed in July 1996. Commuter rail service between Antioch and Chicago was initiated by Metra in August 1996.

STUDY PURPOSE

The requested study is intended to constitute a feasibility study which would provide information on the service characteristics, estimated cost, and potential ridership of railway and bus alternatives. Based on the findings of the feasibility study, public officials could determine whether or not to proceed with implementation of either commuter rail or bus service. Federal regulations as well as Federal funding in partial support of the extension of commuter rail service requires the conduct of a "major investment study" providing a more detailed evaluation

Map 1

PUBLIC TRANSIT SYSTEM: 2020 FINAL RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



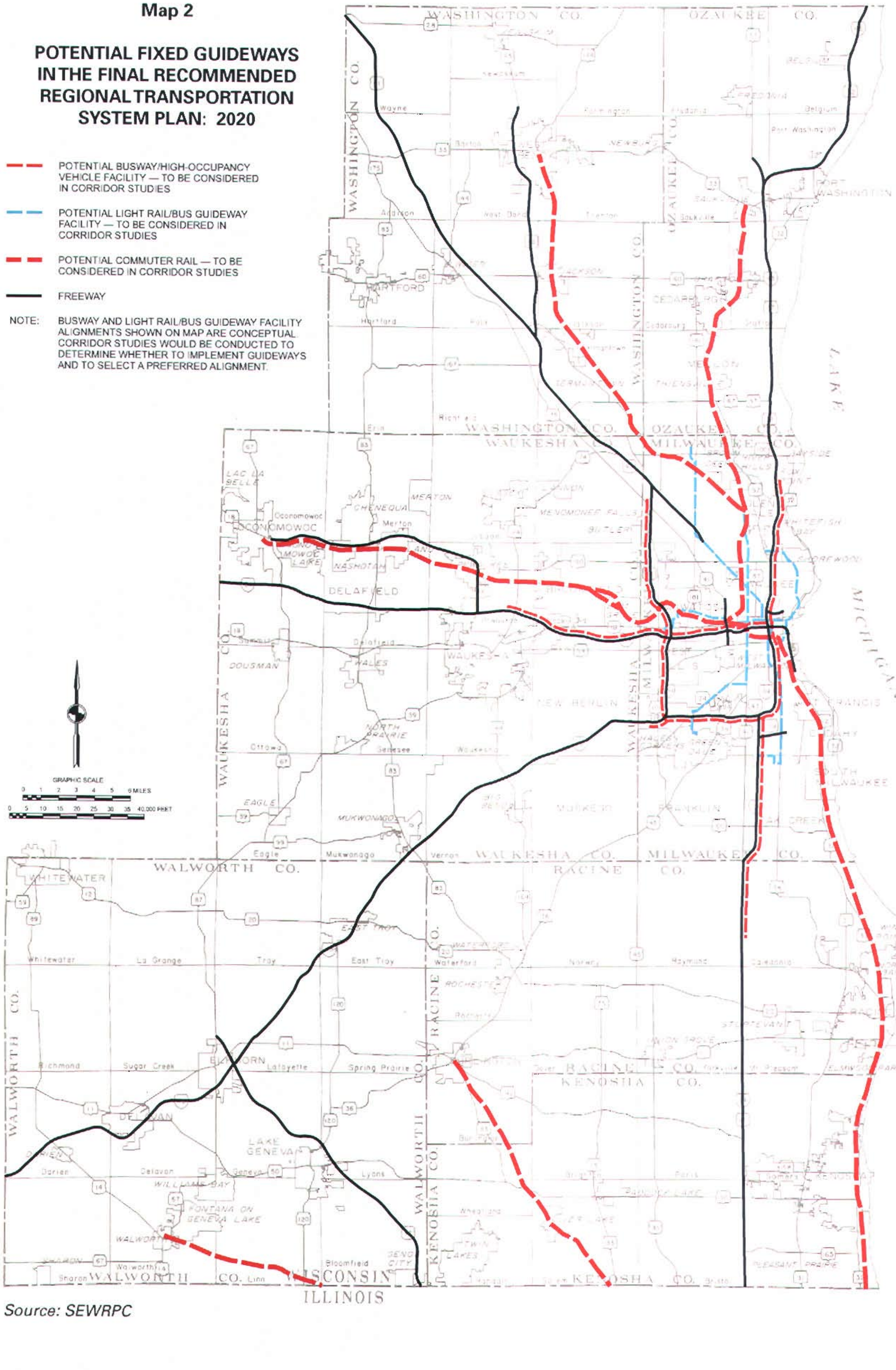
Source: SEWRPC

Map 2

POTENTIAL FIXED GUIDEWAYS IN THE FINAL RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN: 2020

- POTENTIAL BUSWAY/HIGH-OCCUPANCY VEHICLE FACILITY — TO BE CONSIDERED IN CORRIDOR STUDIES
- POTENTIAL LIGHT RAIL/BUS GUIDEWAY FACILITY — TO BE CONSIDERED IN CORRIDOR STUDIES
- POTENTIAL COMMUTER RAIL — TO BE CONSIDERED IN CORRIDOR STUDIES
- FREEWAY

NOTE: BUSWAY AND LIGHT RAIL/BUS GUIDEWAY FACILITY ALIGNMENTS SHOWN ON MAP ARE CONCEPTUAL. CORRIDOR STUDIES WOULD BE CONDUCTED TO DETERMINE WHETHER TO IMPLEMENT GUIDEWAYS AND TO SELECT A PREFERRED ALIGNMENT.



Source: SEWRPC

of bus and commuter rail alternatives, together with preparation of an environmental impact statement. Implementation of alternative bus service would not require such further study.

More specifically, the feasibility study of commuter rail and commuter bus service in the Burlington-Antioch Corridor is intended to serve the following purposes:

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

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

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

4. To identify the potential impacts of operating commuter rail service and current and future freight train operations over the railway line concerned;

5. To identify the potential ridership of the commuter rail and bus feeder 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 implementation of either bus or commuter rail service, and if appropriate, to proceed with the conduct of a major investment study.

DEFINITION OF COMMUTER RAIL SERVICE

Commuter rail service is a type of urban public transit that has been the subject of increasing interest within the United States in recent years 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 railway 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 as opposed to the only peak travel period, peak-direction service 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 the important characteristics that distinguish commuter rail from other railway passenger transit modes such as light rail, heavy rail, and high speed rail. Each of these railway transit modes has different technological, design, operational, performance, capacity, cost and economic characteristics. While different types of bus service are commonplace and familiar to most people throughout the United States, it is important and useful to define the term "commuter rail" and to describe how commuter rail service differs from other types of railway passenger transportation services. A comparison of some of the basic characteristics attendant to each of these types of railway passenger services is provided in Table 1.

Commuter Rail

Commuter rail may be defined as a type of passenger train transit service that utilizes diesel-electric or electrically propelled trains, operating over the same rights-of-way and trackage used by intercity railway freight and passenger train traffic. Common practice in the United States and Canada is to use trains of coaches drawn by 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 the train by cash or ticket, and boarding is normally from low platforms.

Table 1

COMPARISON OF SELECTED CHARACTERISTICS AMONG DIFFERENT TYPES OF RAIL PASSENGER SERVICES BASED UPON 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	Electric using overhead wire
Right-of-Way Requirements	New surface alignment	New grade separated alignment	Existing mainline railway trackage	Existing mainline railway trackage	Upgraded existing or new railway 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)	1/4 to 1	1/2 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 distance trips made within metropolitan regions during weekday peak travel periods at high overall average operating speeds of typically between 30 and 50 miles per hour with relatively few station stops. Typical commuter rail routes range from 20 to 50 miles in length. Because the railway track 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 main line railway 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 railway passenger transit modes, but presently exists only in corridors with substantial concentrations of passenger-trip origins in the outlying suburban areas of the corridors with destinations in the central business district of the corridor. The closest operating commuter rail system to Southeastern Wisconsin is the system centered on the central business district of the City of Chicago and operated by Metra. As already noted, Metra is the Commuter Rail Division of the Regional Transportation Authority of Northeastern Illinois. It operates one of the largest commuter rail systems in North America, and the Metra system is generally regarded as among the best managed and most cost-effective. Metra, as well as some other existing commuter rail systems in the United States and Canada, has made efforts to attract off-peak as well as peak travel period ridership and the services are marketed to attract passengers using the private automobile to the railway service. 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 noncentral business district oriented trips in 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 a 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 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 which include peak period service and some limited nonpeak weekday service have commenced 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 commenced operations in the southern New Jersey and Syracuse areas. 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 railway modes that were common in the United States from the 1890s through the World War II years. 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 trolley wires. Fare collection is typically self-service whereby tickets are 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 freight and other railway passenger 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 as well as 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 thus 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 ten 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 railway 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, both of which are costly and disruptive to construct. Fare collection is typically at stations, and boarding is from high level platforms.

The trackage used for heavy rail operations is not shared with freight and other railway 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 metropolitan areas during weekday peak travel periods as well as 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 existing railway 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 light rail route.

Within the United States and Canada, examples of heavy rail systems include the Chicago Transit Authority, or "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 railway passenger train 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, and not to serve passengers traveling within metropolitan areas as do the commuter rail, light rail, and heavy rail modes.

High speed rail would require the use of either an improved existing railway alignment or a new alignment that includes very gentle horizontal and vertical curvatures as well as 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 France, Germany, Great Britain, and Japan.

SCOPE OF WORK

The feasibility study was comprised of 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 railway, 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 the most appropriate commuter rail and bus service alternatives. The alternatives included the extension of commuter rail service from Antioch to Burlington; and the operation of buses in shuttle service from Burlington to Antioch via Silver Lake. The physical and operational characteristics of each of the alternatives was considered. 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 for the commuter rail alternatives, identification of needed signal systems, double track or passing sidings, and equipment storage and servicing facilities. The study defined the improvements necessary to accommodate commuter rail train traffic along with current and potential future freight train traffic.

The feasibility of instituting commuter rail or bus service in the travel corridor was evaluated on the basis of a number of cost, service, and other criteria. These included: necessary capital improvements and attendant costs; expected operating costs and deficits; anticipated ridership; potential frequency of service and travel times; impacts on street and highway traffic with respect to vehicle travel and grade crossings; and the potential impacts of higher growth development in the City of Burlington if such commuter service was implemented. Based upon the evaluations of the alternatives that were considered, the study identified whether or not each of the alternatives was feasible.

This report documents the findings and recommendations of the feasibility study, including the recommendation of the study Advisory Committee with respect to implementation.

STUDY AREA

The study area consisted of a "primary" study area, and a "secondary" study area, as shown on Map 3. The primary study area consisted of the Burlington-Antioch Corridor within the Southeastern Wisconsin Region comprised of the western portion of Racine County and the western portion of Kenosha County. The boundaries of the primary study area were delineated so as to be consistent with the conduct of comprehensive travel surveys by the Regional Planning Commission. The primary study area lies entirely within the Southeastern Wisconsin counties of Kenosha, and Racine.

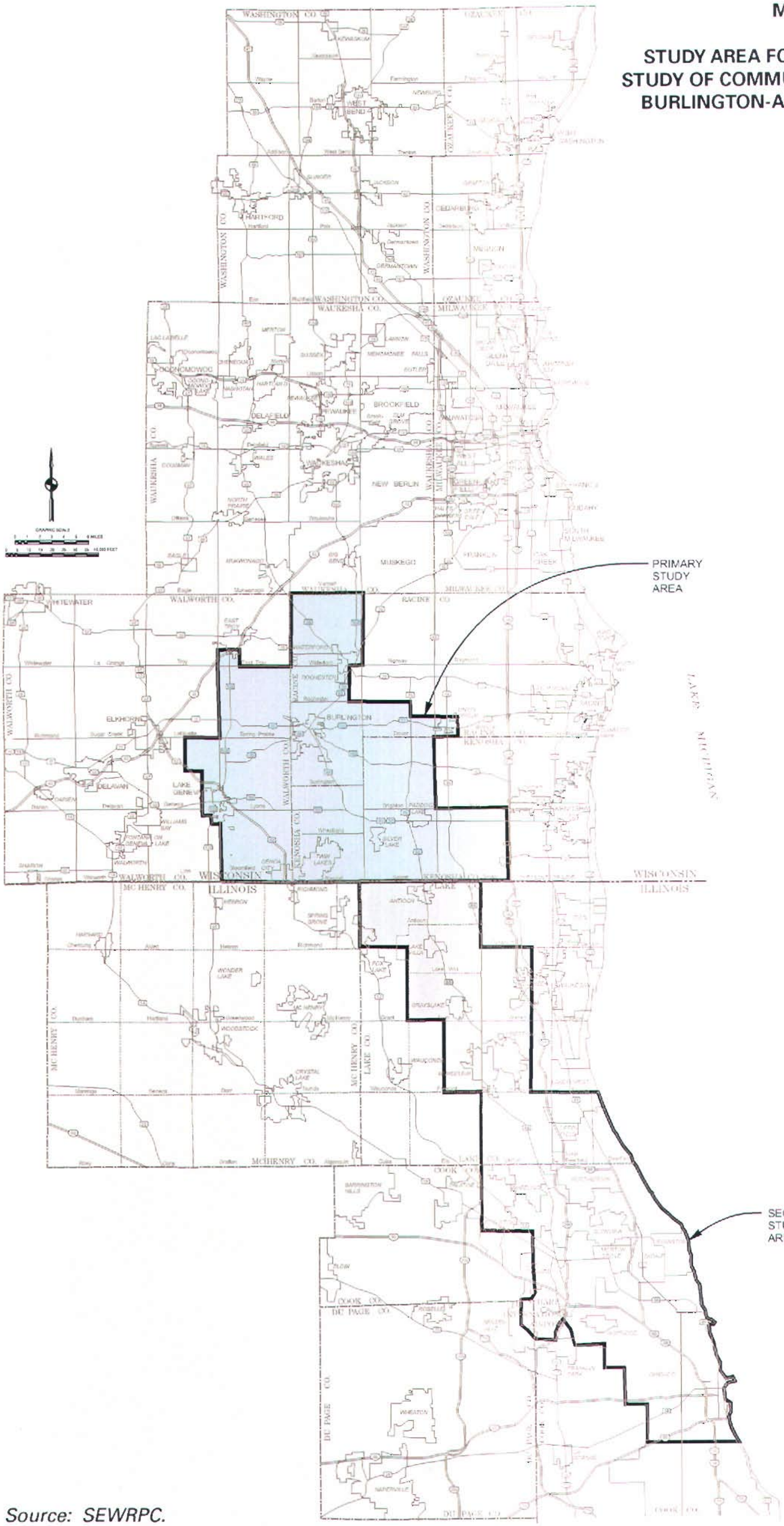
The secondary study area consisted of an extension of the corridor into northeastern Illinois and to the central business district of the City of Chicago. The boundaries of the secondary study area were delineated so as to be consistent with areas used in the conduct of comprehensive travel surveys by 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 railways concerned, and Metra.

Map 3

STUDY AREA FOR THE FEASIBILITY STUDY OF COMMUTER SERVICE IN THE BURLINGTON-ANTIOCH CORRIDOR



NOTE: DUE TO MAP SCALE LIMITATIONS, ONLY SELECTED CIVIL DIVISIONS ARE SHOWN FOR LAKE, MC HENRY, AND COOK COUNTIES IN ILLINOIS.

Source: SEWRPC.

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

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 using data collected in the comprehensive travel survey conducted by the Regional Planning Commission in 1991, supplemented with data collected in a similar study by the Chicago Area Transportation Study, and simulation modeling.

Chapter III presents a description of the existing transportation services and facilities within the study area. The existing bus services within the primary study area are identified and described as well as the existing commuter rail service presently operated by Metra between Antioch and Chicago. The existing arterial street and highway facilities are also described. This chapter also presents a description of the existing railway line and attendant facilities that would be necessary for the operation of commuter rail service in the corridor. The railway line is described in terms of its existing condition and current use. Chapter IV identifies the bus and commuter rail equipment and facility requirements as needed for the definition and evaluation of each of the alternative commuter services considered. This information is described in terms of the commuter service alternative alignments and routes, station locations, operational plans, service providers—for the commuter rail alternatives—track and signal improvements and locomotive and coach requirements.

Chapter V presents a comparison and evaluation of the alternatives considered. The principal evaluation measures include anticipated ridership, capital costs, operating costs and deficits, fare box revenues and deficits, reduction in highway traffic and attendant impacts, travel time improvements within the corridor, and impact on railway freight operations. This chapter also sets forth a description of the most promising alternative based upon the comparative evaluation of the alternatives considered. It also sets forth the recommendation of the Advisory Committee.

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

Chapter II

EXISTING LAND USE AND TRAVEL PATTERNS

INTRODUCTION

This chapter describes factors that may be expected to determine the potential demand for commuter rail or commuter bus service within the Burlington-Antioch transportation 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 forecast population, household, and employment levels, and planned land use and related travel patterns 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 4.

POPULATION, HOUSEHOLDS AND EMPLOYMENT

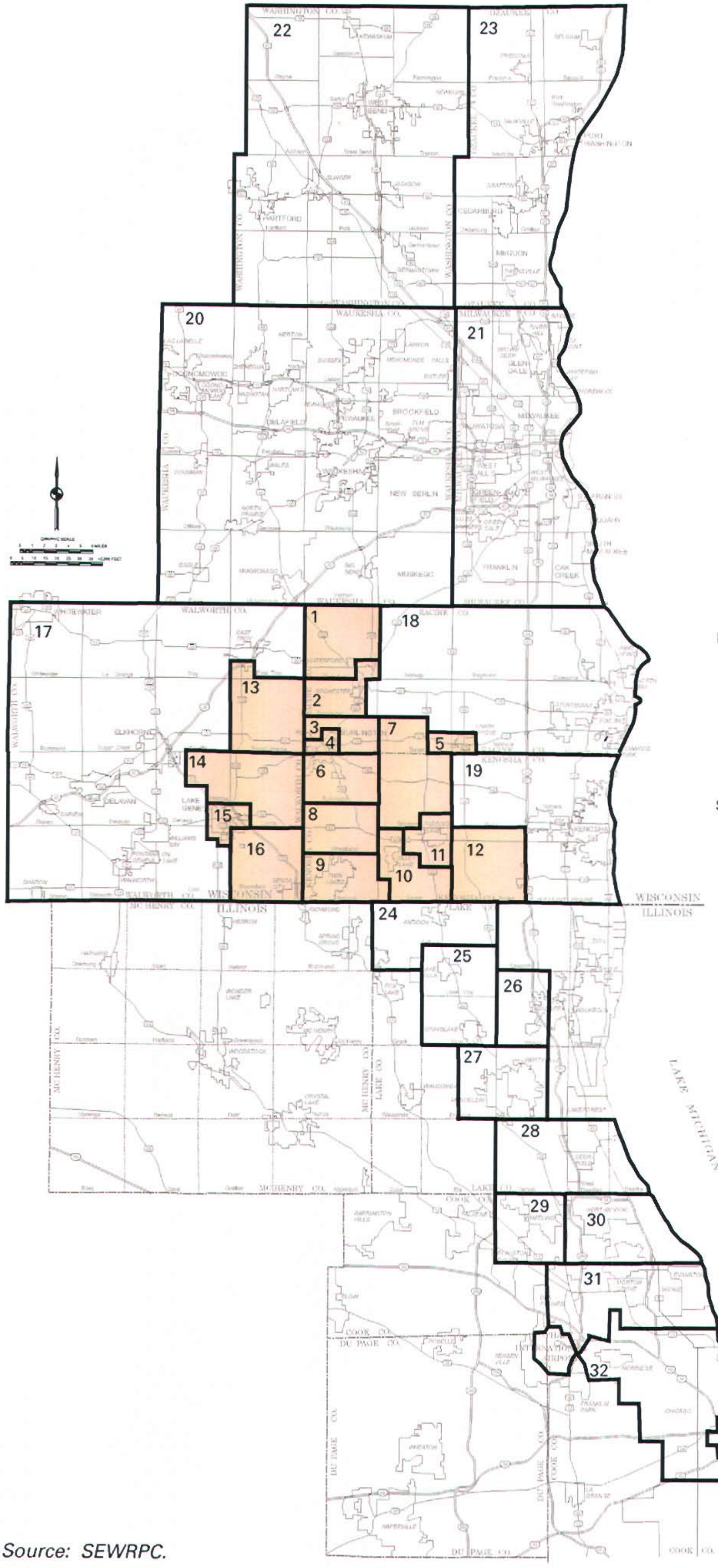
The existing 1990 and forecast 2020 resident population levels in the study area are set forth by subarea in Table 2. The resident population levels within the primary study area are anticipated to increase from about 28,400 persons in the Racine County portion of the primary study area to about 35,700 persons by 2020; to increase from about 28,100 persons in the Kenosha County portion of the primary study area in 1990 to about 38,700 persons by 2020; and from about 16,100 persons in the Walworth County portion of the primary study area in 1990 to about 20,400 persons by 2020. Thus, the resident population level of the primary study area as a whole may be expected to increase from 72,600 persons in 1990 to about 94,800 persons by 2020; an increase of 22,200 persons, or about 31 percent, over the planning period.

The existing 1990 and forecast 2020 household levels in the study area are set forth by subarea in Table 3. The number of households within the primary study area is anticipated to increase from about 10,200 households in the Racine County portion of the primary study area to about 13,900 households by 2020; from about 9,900 households in the Kenosha County portion of the primary study area to about 14,200 households by 2020; and from about 6,300 households in the Walworth County portion of the primary study area to about 8,400 households by 2020. Thus, the number of households in the primary study area as a whole may be expected to increase from 26,400 households in 1990 to about 36,500 households by 2020; an increase of 10,100 households, or about 38 percent, over the planning period.

The existing 1990 and forecast 2020 employment levels in the study area are set forth in Table 4. Employment levels within the primary study area are anticipated to increase from about 13,200 jobs in the Racine County portion of the primary study area to about 16,700 jobs in 2020; from about 7,600 jobs in the Kenosha County portion of the study area to about 11,000 jobs; and from about 9,800 jobs in 1990 in the Walworth County portion

Map 4

ANALYSIS SUBAREAS WITHIN THE PRIMARY AND SECONDARY STUDY AREAS



ANALYSIS SUBAREAS

NUMBER	NAME
PRIMARY STUDY AREA	
1	WATERFORD
2	ROCHESTER/WATERFORD
3	BURLINGTON - NORTH
4	BURLINGTON
5	UNION GROVE
6	BURLINGTON - SOUTH
7	BRIGHTON/DOVER
8	WHEATLAND
9	TWIN LAKES
10	SILVER LAKE/SALEM
11	SALEM/PADDOCK LAKE
12	BRISTOL
13	SPRING PRAIRIE
14	SPRINGFIELD
15	LAKE GENEVA
16	GENOA CITY
REMAINDER OF SOUTHEASTERN WISCONSIN	
17	BALANCE OF WALWORTH COUNTY
18	BALANCE OF RACINE COUNTY
19	BALANCE OF KENOSHA COUNTY
20	WAUKESHA COUNTY
21	MILWAUKEE COUNTY
22	WASHINGTON COUNTY
23	OZAUKEE COUNTY
SECONDARY STUDY AREA	
24	ANTIOCH
25	GRAYSLAKE
26	GURNEE
27	LIBERTYVILLE
28	DEERFIELD
29	WHEELING
30	NORTHBROOK
31	MORTON GROVE
32	CHICAGO-NORTHWEST
33	CHICAGO-CENTRAL BUSINESS DISTRICT

NOTE: DUE TO MAP SCALE LIMITATIONS, ONLY SELECTED CIVIL DIVISIONS ARE SHOWN FOR LAKE, MC HENRY, AND COOK COUNTIES IN ILLINOIS.

Source: SEWRPC.

Table 2

STUDY AREA RESIDENT POPULATION: EXISTING 1990 AND PLANNED 2020

Study Area		Population		Changes in Population 1990-2020	
Number Key on Map 4	Name	1990	Forecast Year 2020	Number	Percent
	Primary Study Area				
	Racine County				
1	Town of Waterford	3,400	4,800	1,400	41.2
2	Rochester/Waterford	6,000	8,100	2,100	35.0
3	Town of Burlington – North	1,400	2,600	1,200	85.7
4	City of Burlington	9,800	10,800	1,000	10.2
5	Union Grove	4,500	5,600	1,100	24.4
6	Town of Burlington-South	3,300	3,800	500	15.2
	Subtotal	28,400	35,700	7,300	25.7
	Kenosha County				
7	Brighton/Dover	2,700	2,800	100	3.7
8	Wheatland	3,300	3,400	100	3.0
9	Twin Lakes	6,800	10,300	3,500	51.5
10	Silver Lake	6,500	10,500	4,000	61.5
11	Paddock Lake	4,800	6,600	1,800	37.5
12	Bristol	4,000	5,100	1,100	27.5
	Subtotal	28,100	38,700	10,600	37.7
	Walworth County				
13	Spring Prairie	1,800	2,200	400	22.2
14	Springfield	2,700	3,400	700	25.9
15	Lake Geneva	6,800	9,100	2,300	33.8
16	Genoa City	4,800	5,700	900	18.8
	Subtotal	16,100	20,400	4,300	26.7
	Primary Study Area Total	72,600	94,800	22,200	30.6
	Secondary Study Area				
	Lake County				
24	Antioch	16,900	29,400	12,500	74.0
25	Grayslake	55,700	106,400	50,700	91.0
26	Gurnee	15,300	32,500	17,200	112.4
27	Libertyville	35,300	75,500	40,200	113.9
28	Deerfield	115,500	143,000	27,500	23.8
	Subtotal	238,700	386,800	148,100	62.0
	Cook County				
29	Wheeling	154,600	156,400	1,800	1.
30	Northbrook	139,000	157,400	18,400	13.2
31	Morton Grove	308,100	323,000	14,900	4.8
32	Chicago – Northwest	1,646,200	1,807,500	161,300	9.8
33	Chicago CBD	74,300	102,400	28,100	37.8
	Subtotal	2,322,200	2,546,700	224,500	9.7
	Secondary Study Area Total	2,560,900	2,933,500	372,600	14.5
	Corridor Total	2,633,500	3,028,300	394,800	15.0

NOTE: 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		Changes in Households 1990-2020	
Number Key on Map 4	Name	1990	Forecast Year 2020	Number	Percent
	Primary Study Area				
	Racine County				
1	Town of Waterford	1,100	1,700	600	54.5
2	Rochester/Waterford	2,100	3,100	1,000	47.6
3	Town of Burlington – North	500	900	400	80.0
4	City of Burlington	3,700	4,500	800	21.6
5	Union Grove	1,600	2,200	600	37.5
6	Town of Burlington-South	1,200	1,500	300	25.0
	Subtotal	10,200	13,900	3,700	36.3
	Kenosha County				
7	Brighton/Dover	900	1,000	100	11.1
8	Wheatland	1,100	1,200	100	9.1
9	Twin Lakes	2,400	3,700	1,300	54.2
10	Silver Lake	2,400	4,100	1,700	70.8
11	Paddock Lake	1,700	2,400	700	41.2
12	Bristol	1,400	1,800	400	28.6
	Subtotal	9,900	14,200	4,300	43.4
	Walworth County				
13	Spring Prairie	600	700	100	16.7
14	Springfield	1,000	1,300	300	30.0
15	Lake Geneva	2,900	4,100	1,200	41.4
16	Genoa City	1,800	2,300	500	27.8
	Subtotal	6,300	8,400	2,100	33.3
	Primary Study Area Total	26,400	36,500	10,100	38.3
	Secondary Study Area				
	Lake County				
24	Antioch	6,400	11,700	5,300	82.8
25	Grayslake	18,400	38,700	20,300	110.3
26	Gurnee	5,800	13,300	7,500	129.3
27	Libertyville	12,500	28,300	15,800	126.4
28	Deerfield	39,900	53,700	13,800	34.7
	Subtotal	83,000	145,700	62,700	75.5
	Cook County				
29	Wheeling	56,700	63,700	7,000	12.3
30	Northbrook	50,800	59,200	8,400	16.5
31	Morton Grove	117,400	168,000	50,600	43.1
32	Chicago – Northwest	619,800	702,900	83,100	13.4
33	Chicago CBD	39,600	55,400	15,800	39.9
	Subtotal	884,300	1,049,200	164,900	18.6
	Secondary Study Area Total	967,300	1,194,900	227,600	23.5
	Corridor Total	993,700	1,231,400	237,700	23.9

NOTE: Within the primary study area, the forecast year 2020 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 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		Changes in Employment 1990-2020	
Number Key on Map 4	Name	1990	Forecast Year 2020	Number	Percent
	Primary Study Area				
	Racine County				
1	Town of Waterford	500	600	100	20.0
2	Rochester/Waterford	1,600	2,100	500	31.3
3	Town of Burlington – North	300	400	100	33.3
4	City of Burlington	4,700	5,200	500	10.6
5	Union Grove	3,300	4,300	1,000	30.3
6	Town of Burlington – South	2,800	4,100	1,300	46.4
	Subtotal	13,200	16,700	3,500	26.5
	Kenosha County				
7	Brighton/Dover	500	500	- -	- -
8	Wheatland	600	600	- -	- -
9	Twin Lakes	1,700	2,100	400	23.5
10	Silver Lake	1,200	1,500	300	25.0
11	Paddock Lake	900	1,200	300	33.3
12	Bristol	2,700	5,100	2,400	88.9
	Subtotal	7,600	11,000	3,400	44.7
	Walworth County				
13	Spring Prairie	300	300	- -	- -
14	Springfield	2,000	2,300	300	15.0
15	Lake Geneva	6,500	9,000	2,500	38.5
16	Genoa City	1,000	2,500	1,500	150.0
	Subtotal	9,800	14,100	4,300	43.9
	Primary Study Area Total	30,600	41,800	11,200	36.6
	Secondary Study Area				
	Lake County				
24	Antioch	4,400	7,800	3,400	77.3
25	Grayslake	11,700	27,500	15,800	135.0
26	Gurnee	1,700	15,300	13,600	800.0
27	Libertyville	21,300	62,300	41,000	192.5
28	Deerfield	62,700	111,400	48,700	77.7
	Subtotal	101,800	224,300	122,500	120.3
	Cook County				
29	Wheeling	85,600	103,900	18,300	21.4
30	Northbrook	102,100	122,300	20,200	19.8
31	Morton Grove	247,100	289,600	42,500	17.2
32	Chicago – Northwest	655,600	781,700	126,100	19.2
33	Chicago CBD	569,800	670,300	100,500	17.6
	Subtotal	1,660,200	1,967,800	307,600	18.5
	Secondary Study Area Total	1,762,000	2,192,100	430,100	24.4
	Corridor Total	1,792,600	2,233,900	441,300	24.6

NOTE: Within the primary study area, the forecast year 2020 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 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.

to about 14,100 jobs in 2020. Thus, employment in the primary study area as a whole may be expected to increase from 30,600 jobs in 1990 to about 41,800 jobs by 2020; an increase of 21,200 jobs, or about 37 percent.

With respect to the secondary study area in the Illinois counties of Cook and Lake, the resident population levels are anticipated to increase from about 2,560,900 persons in 1990 to about 2,933,500 persons by 2020, an increase of 372,600 persons, or about 15 percent. The number of households within the secondary study area is anticipated to increase from about 967,300 households in 1990 to about 1,194,900 households by 2020; an increase of 227,600 households, or about by 24 percent. Employment within the secondary study area is anticipated to increase from about 1,762,00 jobs in 1990 to about 2,192,100 jobs by 2020, an increase of 430,100 jobs, or about 24 percent.

EXISTING LAND USE

Historic Urban Growth

The historic pattern of urban development in the primary study area is shown on Map 5. Prior to 1880, urban development within the primary study area was largely confined to areas within the communities of Burlington, Genoa City, Lake Geneva, Rochester, Silver Lake, and Waterford. The proliferation of scattered low-density urban development around the shorelines of the inland lakes in the area began after 1880, and has continued to date. This diffusion of urban development around the lake shorelines has been accompanied in more recent decades by more widely scattered urban development.

Planned Urban Development

The adopted year 2020 regional land use plan for the seven county Southeastern Wisconsin Region 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 locate.[1] 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 in Map 6. 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 operation of the urban land market.

Major Potential Trip Generators

Two major trip generators within the primary study area were identified: 1) the Burlington industrial center; and, 2) the Kenosha West retail center at STH 50 and IH 94. The locations of these two centers are shown on Map 7. Major industrial centers are identified as concentrations of industrial land uses having industry-related employment of at least 3,500 jobs. It is anticipated that industrial employment at the Burlington industrial center would increase from 5,200 jobs in 1990 to 6,700 jobs by the year 2020 and the amount of industrial land use would increase from 177 acres in 1990 to 372 acres by 2020. Major commercial centers are identified as concentrations of either retail and service land uses having retail- or service-related employment of at least 2,000 jobs or office development land uses having office and service employment of at least 3,500 jobs. It is anticipated that commercial employment at the Kenosha West retail center would increase from 1,600 jobs in 1990 to 4,300 jobs by the year 2020 and the amount of commercial land use would increase from 39 acres in 1990 to 124 acres by 2020.

Only the Burlington industrial center is located in proximity to—that is, within three miles of—the potential commuter rail or bus route and, as such, may be considered the only major trip generator in the primary study area.

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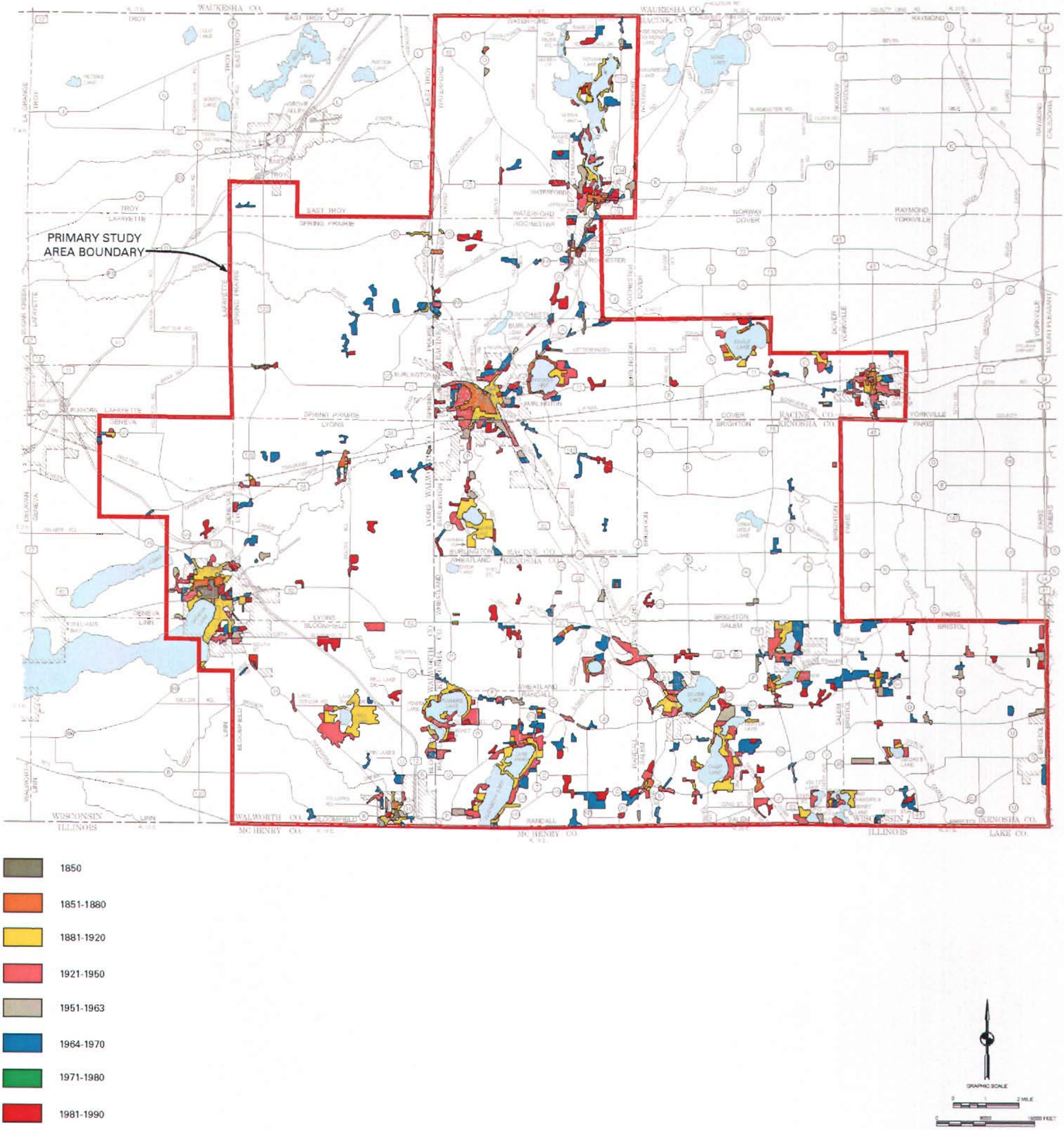
[1]*See SEWRPC Planning Report No. 45,* A Regional Land Use Plan for Southeastern Wisconsin—2020, *December 1997.*

Map 5

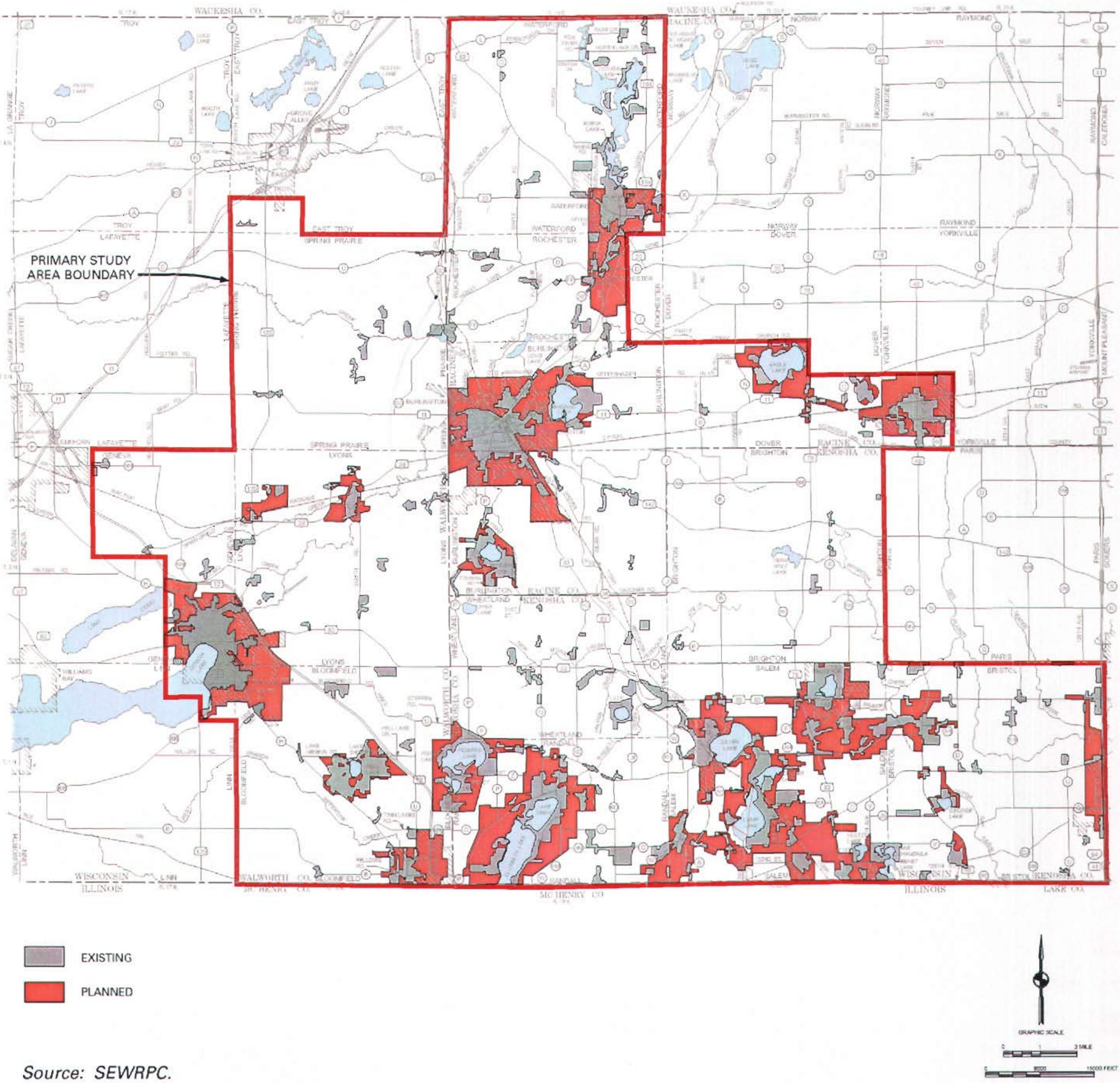
HISTORIC URBAN GROWTH IN THE PRIMARY STUDY AREA 1850-1990



Source: SEWRPC.

Map 6

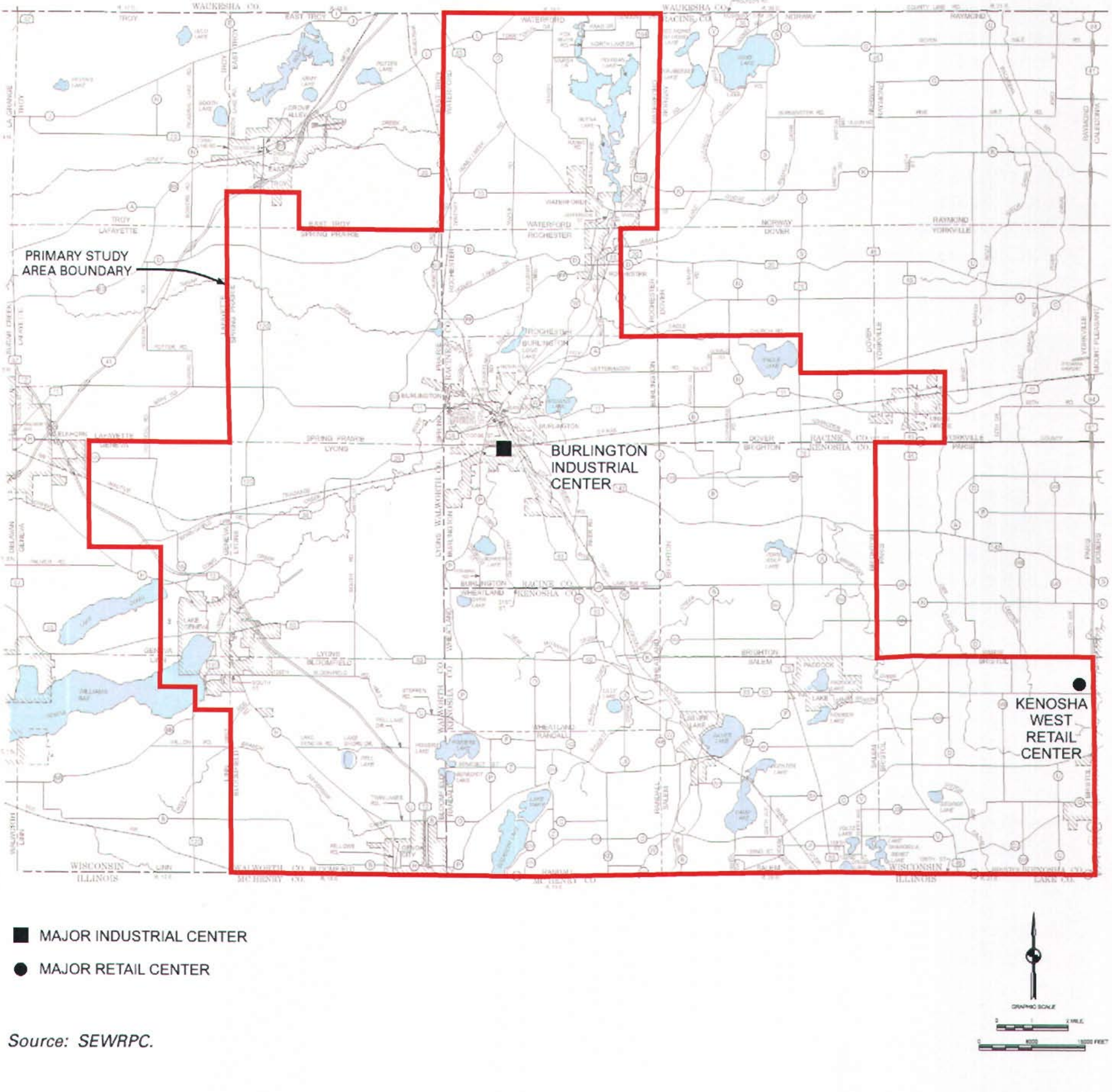
EXTENT OF EXISTING 1990 AND PLANNED YEAR 2020 URBAN DEVELOPMENT WITHIN THE PRIMARY STUDY AREA



Source: SEWRPC.

Map 7

MAJOR POTENTIAL TRIP GENERATORS IN THE PRIMARY STUDY AREA



■ MAJOR INDUSTRIAL CENTER

● MAJOR RETAIL CENTER

Source: SEWRPC.

The land use pattern of the primary study area consists primarily of a scattering of small cities with resident populations of less than 10,000 persons located in primarily rural settings, and of residential development around the various inland lakes within the study area. Of these cities in the primary study area and near the Burlington-Antioch corridor, Burlington has the largest concentration of retail, commercial, and service establishments and of public offices and agencies. The City of Lake Geneva and the Village of Union Grove also have such concentrations but are located on the periphery of the primary study area.

EXISTING TRAVEL PATTERNS

This section presents data on travel that occurs on an average weekday within the primary study area of the corridor, as well as 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 regional inventory of travel that included, in addition to the household travel and the external cordon surveys, a public transit user survey, and a truck and taxi survey. The household travel survey was the source of the information herein presented on person trips[2] within the primary study area, while the external cordon survey was the source of the information on person trips made between the primary and secondary study areas. Based on the travel surveys, approximately 174,200 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 of the trip 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 defined as 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 152,500 trips were made between origins and destinations entirely within the primary study area. Of these trips, about 62,200 or about 41 percent, were made between analysis areas within the primary study area, and about 90,300 trips, or 59 percent, were made totally within such analysis areas. Of the 62,200 person trips made between analysis areas, about 21,900 person trips, or about 35 percent, were intra-county trips, or trips made entirely within one of the portions of the three counties located within the primary study area. The remaining 40,300 person trips, or about 65 percent, were trips which crossed the county boundary. The pattern of person trips within the primary study area is presented in Table 5, and graphically displayed in Map 8.

The largest proportion of the person trips made within the primary study area in 1991 were "home-based other" trips. These would include trips made for medical, personal business, or social and recreational purposes. About 35 percent of all person trips in the primary study area were made for this purpose on an average weekday. The remaining person trips within the primary study area were relatively evenly distributed among the other trip purposes, with about 20 percent made for work, about 14 percent made for shopping, about 16 percent were nonhome-based, and about 15 percent were school trips.

The pattern of person trips between the primary study area and the remainder of the Southeastern Wisconsin Region was also an important consideration in the study. Data on these trips are also presented in Table 6 and graphically displayed on Map 9. The overall pattern of person trips among the seven counties of Southeastern Wisconsin is graphically displayed on Map 10.

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[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, motorcycle, school bus, or other mass transit carrier. To be considered, the trip must have been at least the equivalent of one full city block—that is, approximately, one-eighth mile—in length.*

Table 5

DISTRIBUTION OF AVERAGE WEEKDAY PERSON TRIPS WITHIN THE PRIMARY STUDY AREA AND BETWEEN THE PRIMARY STUDY AREA AND COUNTIES IN THE REGION: 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	Primary Study Area Total
Primary Study Area																	
1 Town of Waterford	800	1,350	280	1,040	90	240	0	0	50	0	0	0	0	0	170	0	4,020
2 Rochester/Waterford	210	8,370	1,330	2,980	110	440	0	0	0	0	0	70	90	80	210	0	3,890
3 Town of Burlington - North	0	440	0	800	0	80	0	0	0	0	0	0	0	0	0	0	1,320
4 City of Burlington	90	1,020	630	18,020	360	1,430	50	550	190	80	130	50	280	150	730	0	23,760
5 Union Grove	0	90	110	760	11,210	140	270	0	0	120	150	160	0	90	0	0	3,100
6 Town of Burlington - South	0	380	50	3,990	40	780	0	500	0	0	40	50	0	0	370	0	6,200
7 Brighton/Dover	0	70	100	1,620	1,660	80	1,090	50	30	80	770	470	0	40	0	0	6,060
8 Wheatland	0	90	0	1,580	60	270	210	1,500	510	230	560	40	40	0	170	0	5,260
9 Twin Lakes	0	0	0	210	50	0	40	180	2,300	720	150	70	0	30	120	0	3,870
10 Silver Lake	0	0	0	220	110	130	80	270	2,420	4,230	2,560	260	0	0	220	0	0,500
11 Paddock Lake	0	0	0	100	180	110	60	0	390	1,090	6,370	1,450	0	0	0	0	9,750
12 Bristol	0	0	0	180	400	0	0	150	450	690	2,390	8,560	0	0	40	0	2,860
13 Spring Prairie	40	0	0	1,000	0	60	0	0	0	0	0	40	0	0	0	0	1,140
14 Springfield	0	280	160	2,460	0	120	0	70	120	0	0	0	80	1,270	1,690	320	6,570
15 Lake Geneva	0	140	50	900	0	0	0	150	160	60	0	0	0	3,450	22,960	630	28,500
16 Genoa City	0	0	0	200	0	140	0	210	1,450	360	0	0	0	70	500	2,810	5,740
Balance of Total	1,140	12,230	2,710	36,060	14,270	4,020	1,800	3,630	8,070	7,660	13,120	11,220	490	5,180	27,180	3,760	152,540
Region																	
17 Balance of Walworth County	0	390	0	930	110	160	0	230	120	0	0	30	500	1,800	4,430	0	- -
18 Balance of Racine County	170	2,250	0	1,800	4,630	380	670	260	150	0	80	1,440	0	190	120	0	- -
19 Balance of Kenosha County	0	0	0	280	720	120	130	550	620	480	750	5,520	0	40	330	60	- -
20 Waukesha County	110	440	0	290	0	0	0	90	230	0	0	290	60	50	200	0	- -
21 Milwaukee County	140	560	0	730	380	50	30	0	0	0	20	510	40	0	160	60	- -
22 Washington County	0	0	0	50	0	20	0	0	0	0	0	50	0	0	0	20	- -
23 Ozaukee County	0	0	0	0	60	0	70	0	0	0	0	40	0	0	40	0	- -
Total	420	3,640	0	4,080	5900	730	900	1,130	1,120	480	850	7,880	600	2,080	5,280	140	- -
Region Total	1,560	15,870	2,710	40,140	20170	4,750	2,700	4,760	9,190	8,140	13,970	19,100	1,090	7,260	32,460	3,900	- -

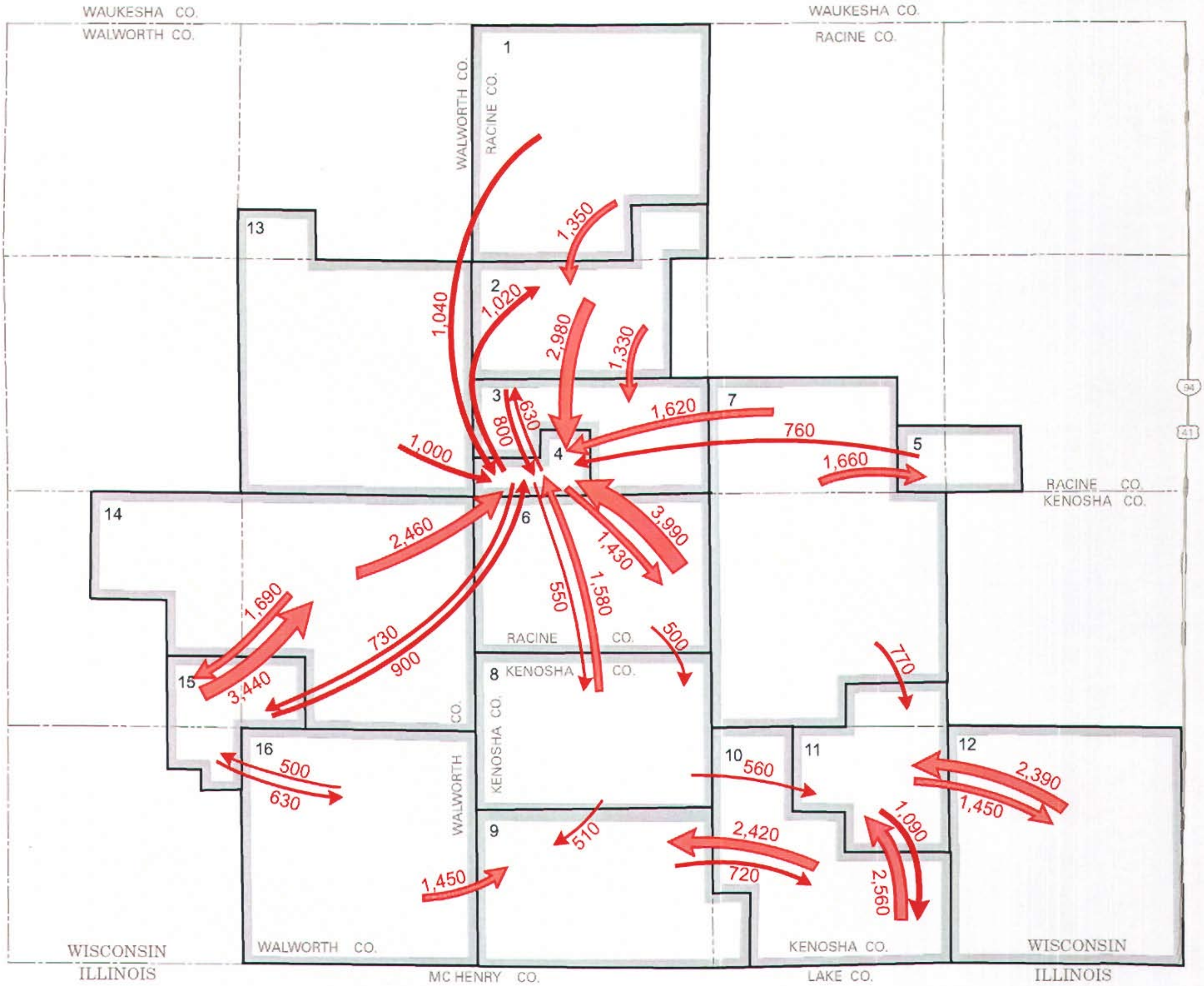
Area of Trip Production	Area of Trip Attraction								
	17	18	19	20	21	22	23	Secondary Study Area Total	Corridor Total
Secondary Study Area									
1 Town of Waterford	160	240	220	780	1,470	0	0	2,870	6,890
2 Rochester/Waterford	250	2,720	150	1,150	2,560	40	0	6,870	20,760
3 Town of Burlington - North	0	0	0	0	0	0	0	0	1,320
4 City of Burlington	650	800	250	360	910	0	0	2,970	26,730
5 Union Grove	530	4,910	1,130	110	510	0	30	7,220	20,320
6 Town of Burlington - South	90	160	190	0	370	20	0	830	7,030
7 Brighton/Dover	80	1,820	520	0	460	0	0	2,880	8,940
8 Wheatland	50	70	550	110	170	0	0	950	6,210
9 Twin Lakes	80	60	820	80	30	0	0	1,070	4,940
10 Silver Lake	40	260	830	140	150	0	0	1,420	11,920
11 Paddock Lake	0	390	2,840	50	470	0	0	3,750	13,500
12 Bristol	80	980	6,860	0	160	0	0	8,080	20,940
13 Spring Prairie	30	0	110	0	0	0	0	140	1,280
14 Springfield	2,320	60	140	360	0	0	0	2,880	9,450
15 Lake Geneva	6,350	270	430	240	520	0	0	7,810	36,310
16 Genoa City	320	200	0	0	0	0	0	520	6,260
Secondary Study Area Total	- -	- -	- -	- -	- -	- -	- -		
Region									
17 Balance of Walworth County	Not Shown							8,700	8,700
18 Balance of Racine County								12,140	12,140
19 Balance of Kenosha County								9,600	9,600
20 Waukesha County								1,760	1,760
21 Milwaukee County								2,680	2,680
22 Washington County								140	140
23 Ozaukee County								210	210
Balance of Region Total	11,030	12,940	15,040	3,380	7,780	60	30	35,230	
Corridor Total	11,030	12,940	15,040	3,380	7,780	60	30		238,030

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.

Source: SEWRPC.

Map 8

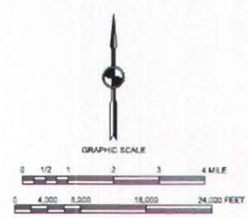
INTRACOUNTY AVERAGE WEEKDAY PERSON TRIPS BETWEEN SUBAREA ANALYSIS AREAS WITHIN THE PRIMARY STUDY AREA: 1991



TRIPS INTERNAL TO ANALYSIS SUBAREAS

NUMBER	NAME	TRIPS
PRIMARY STUDY AREA		
1	WATERFORD	800
2	ROCHESTER/WATERFORD	8,370
3	BURLINGTON - NORTH	- -
4	BURLINGTON	18,020
5	UNION GROVE	11,210
6	BURLINGTON - SOUTH	780
7	BRIGHTON/DOVER	1,090
8	WHEATLAND	1,500
9	TWIN LAKES	2,200
10	SILVER LAKE/SALEM	4,230
11	SALEM/PADDOCK LAKE	6,370
12	BRISTOL	8,560
13	SPRING PRAIRIE	- -
14	SPRINGFIELD	1,190
15	LAKE GENEVA	22,820
16	GENOA CITY	2,810

NOTE: Trips are shown in produced-attracted format; that is, from area of production to area of attraction. Travel between analysis subareas is not depicted unless there were a minimum of 500 trips from one subarea to another. Approximately 137,150 of the nearly 152,210 trips within the primary study area, or about 90 percent, are shown here.



Source: SEWRPC.

Table 6

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

	Area of Trip Attraction																
Area of Trip Production	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Primary Study Area Total
Primary Study Area																	
1 Town of Waterford	800	1,350	280	1,040	90	240	0	0	50	0	0	0	0	0	170	0	4,020
2 Rochester/Waterford	210	8,370	1,330	2,980	110	440	0	0	0	0	0	70	90	80	210	0	13,890
3 Town of Burlington - North	0	440	0	800	0	80	0	0	0	0	0	0	0	0	0	0	1,320
4 City of Burlington	90	1,020	630	18,020	360	1,430	50	550	190	80	130	50	280	150	730	0	23,760
5 Union Grove	0	90	110	760	11,210	140	270	0	0	120	150	160	0	90	0	0	13,100
6 Town of Burlington - South	0	380	50	3,990	40	780	0	500	0	0	40	50	0	0	370	0	6,200
7 Brighton/Dover	0	70	100	1,620	1,660	80	1,090	50	30	80	770	470	0	40	0	0	6,060
8 Wheatland	0	90	0	1,580	60	270	210	1,500	510	230	560	40	40	0	170	0	5,260
9 Twin Lakes	0	0	0	210	50	0	40	180	2,300	720	150	70	0	30	120	0	3,870
10 Silver Lake	0	0	0	220	110	130	80	270	2,420	4,230	2,560	260	0	0	220	0	10,500
11 Paddock Lake	0	0	0	100	180	110	60	0	390	1,090	6,370	1,450	0	0	0	0	9,750
12 Bristol	0	0	0	180	400	0	0	150	450	690	2,390	8,560	0	0	40	0	12,860
13 Spring Prairie	40	0	0	1,000	0	60	0	0	0	0	0	40	0	0	0	0	1,140
14 Springfield	0	280	160	2,460	0	120	0	70	120	0	0	0	80	1,270	1,690	320	6,570
15 Lake Geneva	0	140	50	900	0	0	0	150	160	60	0	0	0	3,450	22,960	630	28,500
16 Genoa City	0	0	0	200	0	140	0	210	1,450	360	0	0	0	70	500	2,810	5,740
Primary Study Area Total	1,140	12,230	2,710	36,060	14,270	4,020	1,800	3,630	8,070	7,660	13,120	11,220	490	5,180	27,180	3,760	152,540
Secondary Study Area																	
24 Antioch	0	0	0	40	70	0	60	0	50	390	190	190	0	0	30	0	- -
25 Grayslake	40	0	0	20	30	40	0	80	290	130	110	120	0	0	100	10	- -
26 Gurnee	0	0	0	0	10	0	0	0	0	70	10	130	0	0	0	0	- -
27 Libertyville	0	0	0	0	10	0	0	0	50	10	10	90	0	0	10	10	- -
28 Deerfield	0	10	0	30	0	70	0	0	50	10	0	80	0	0	50	0	- -
29 Wheeling	0	0	0	10	0	0	0	0	80	30	10	100	0	10	50	10	- -
30 Northbrook	0	0	0	10	0	10	0	30	80	80	10	90	0	10	60	10	- -
31 Morton Grove	0	0	0	0	10	10	10	10	70	20	20	70	0	0	80	30	- -
32 Chicago - Northwest	0	10	0	50	10	10	10	50	220	90	60	270	0	30	140	50	- -
33 Chicago CBD	0	10	10	20	10	10	10	20	240	90	50	240	0	10	160	60	- -
Secondary Study Area Total	40	30	10	180	150	150	90	190	1,130	920	470	1,380	0	60	680	180	- -
Corridor Total	1,180	12,260	2,720	36,240	14,420	4,170	1,890	3,820	9,200	8,580	13,590	12,600	490	5,240	27,860	3,940	- -

	Area of Trip Attraction											
Area of Trip Production	24	25	26	27	28	29	30	31	32	33	Secondary Study Area Total	Corridor Total
Primary Study Area												
1 Town of Waterford	20	0	10	0	0	0	0	10	0	0	40	4,060
2 Rochester/Waterford	20	0	0	0	30	0	0	10	20	0	80	13,970
3 Town of Burlington - North	10	10	0	30	0	20	30	0	10	0	110	1,430
4 City of Burlington	80	30	0	80	30	0	20	40	20	10	312	24,072
5 Union Grove	120	20	20	0	30	10	10	10	20	0	240	13,340
6 Town of Burlington - South	40	40	0	20	10	10	20	10	10	0	160	6,360
7 Brighton/Dover	250	50	10	10	20	0	20	20	10	0	390	6,450
8 Wheatland	380	170	20	70	10	0	30	10	10	10	710	5,970
9 Twin Lakes	840	370	0	260	260	50	100	70	190	220	2,360	6,230
10 Silver Lake	3,370	640	170	320	300	30	90	80	230	10	5,240	15,740
11 Paddock Lake	1,820	530	130	220	340	60	30	90	200	20	3,440	13,190
12 Bristol	590	190	160	140	300	50	100	30	110	10	1,680	14,540
13 Spring Prairie	20	0	0	0	0	20	0	0	0	10	50	1,190
14 Springfield	20	20	30	10	10	0	0	10	0	0	100	6,670
15 Lake Geneva	40	40	20	0	10	20	40	60	220	260	710	29,210
16 Genoa City	60	40	0	40	40	30	30	20	50	50	360	6,100
Primary Study Area Total	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -		
Secondary Study Area												
24 Antioch											1,020	1,020
25 Grayslake											970	970
26 Gurnee											220	220
27 Libertyville				Not Shown							190	190
28 Deerfield											300	300
29 Wheeling											300	300
30 Northbrook											390	390
31 Morton Grove											330	330
32 Chicago - Northwest											1,000	1,000
33 Chicago CBD											940	940
Secondary Study Area Total	7,680	2,150	570	1,200	1,390	300	520	470	1,100	600	5,660	
Corridor Total	7,680	2,150	570	1,200	1,390	300	520	470	1,100	600		174,182

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.

Source: SEWRPC.

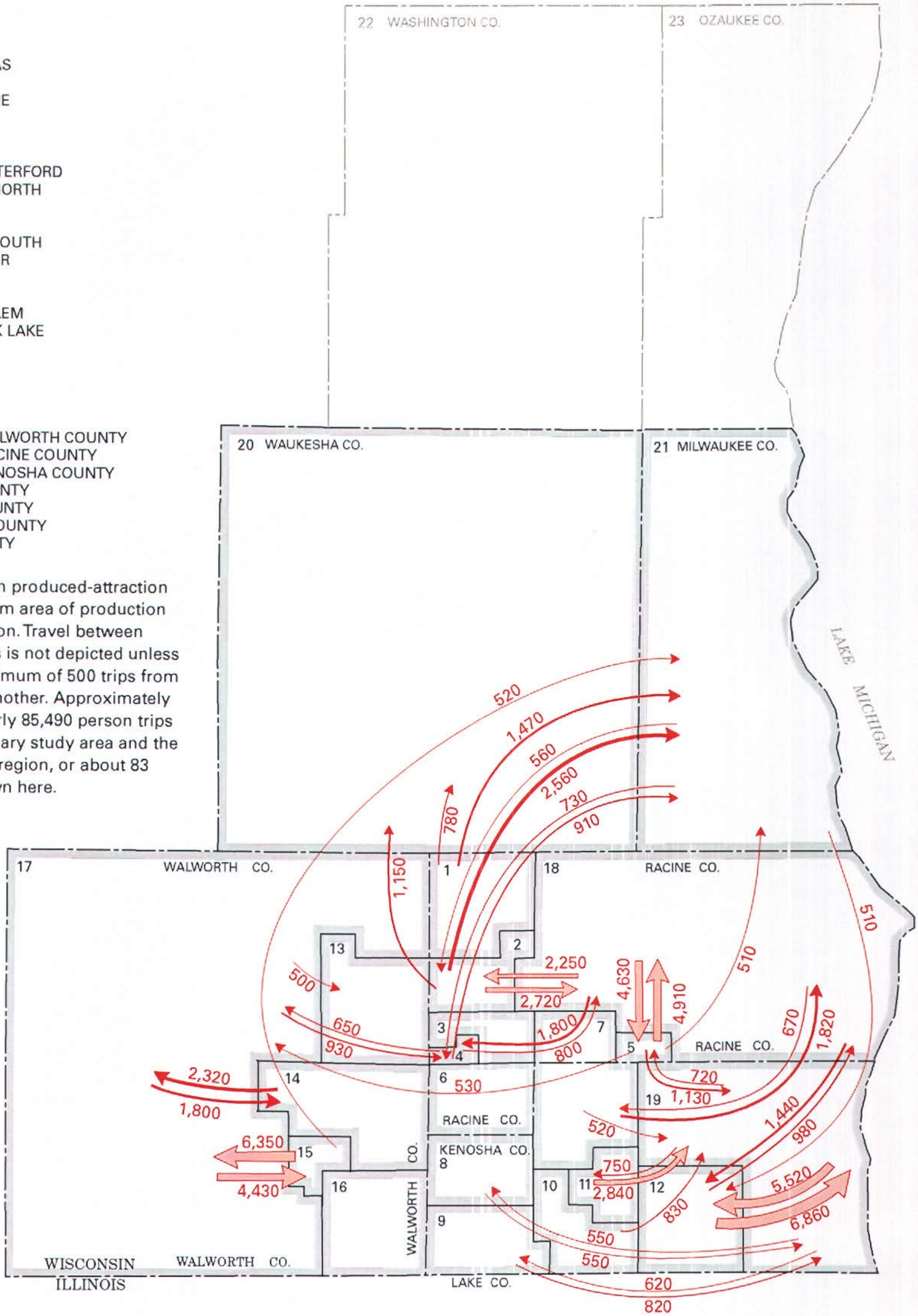
Map 9

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

ANALYSIS SUBAREAS

NUMBER	NAME
	PRIMARY STUDY AREA
1	WATERFORD
2	ROCHESTER/WATERFORD
3	BURLINGTON - NORTH
4	BURLINGTON
5	UNION GROVE
6	BURLINGTON - SOUTH
7	BRIGHTON/DOVER
8	WHEATLAND
9	TWIN LAKES
10	SILVER LAKE/SALEM
11	SALEM/PADDOCK LAKE
12	BRISTOL
13	SPRING PRAIRIE
14	SPRINGFIELD
15	LAKE GENEVA
16	GENOA CITY
17	BALANCE OF WALWORTH COUNTY
18	BALANCE OF RACINE COUNTY
19	BALANCE OF KENOSHA COUNTY
20	WAUKESHA COUNTY
21	MILWAUKEE COUNTY
22	WASHINGTON COUNTY
23	OZAUKEE COUNTY

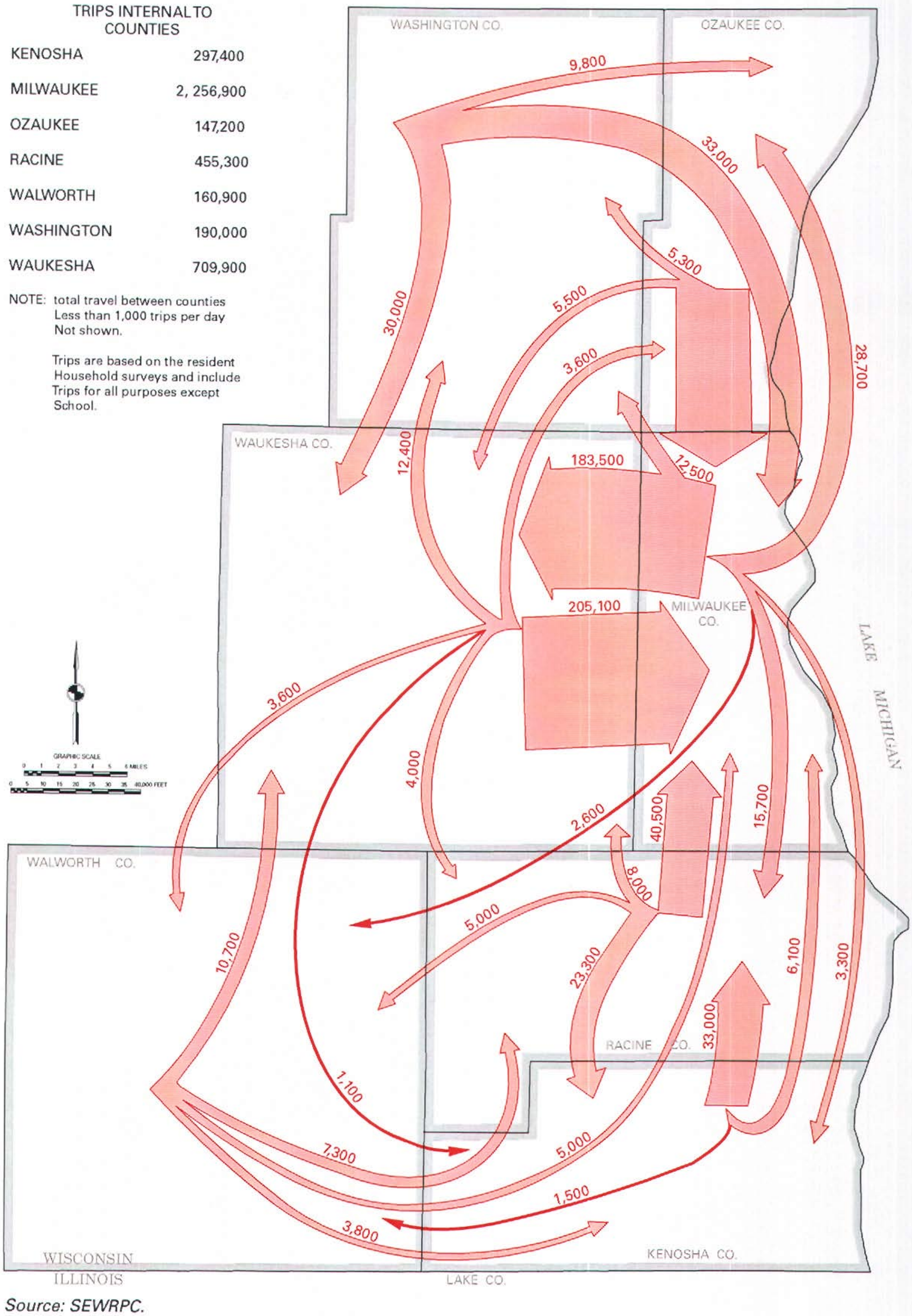
NOTE: Trips are shown in produced-attraction format; that is from area of production to area of attraction. Travel between analysis subareas is not depicted unless there were a minimum of 500 trips from one subarea to another. Approximately 70,940 of the nearly 85,490 person trips between the primary study area and the remainder of the region, or about 83 percent, are shown here.



Source: SEWRPC.

Map 10

AVERAGE WEEKDAY PERSON TRIPS BETWEEN COUNTIES IN THE REGION: 1991



Source: SEWRPC.

Interregional Travel
About 21,600 interregional person trips—that is, trips crossing the Wisconsin-Illinois state line—between the primary and secondary study areas, were made on an average weekday in 1991. This represents approximately 14 percent of the total of 150,200 person trips found to be crossing the Wisconsin-Illinois state line anywhere between the western boundary of Walworth County and the eastern boundary of Kenosha County on an average weekday in 1991.

The largest proportion of the 21,600 person trips made on an average weekday between the primary study area and the secondary study area—about 44 percent—were home-based work trips. Of the remaining person trips, about 21 percent were home-based shopping trips, about 25 percent were home-based other trips, about 10 percent were nonhome-based trips, and about 3 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 6, and illustrated graphically on Map 11.

SUMMARY

This chapter has presented information on existing and probable future characteristics of the primary study area pertinent to any consideration of the provision and potential use of commuter rail service, including information on population, households, employment, land use, and travel habits and patterns. The most important findings concerning these characteristics may be summarized as follows:

1. In 1990, the resident population of the primary study area totaled about 72,600 persons. The resident population within the primary study area is anticipated to increase to about 94,800 persons by 2020, or by about 31 percent.

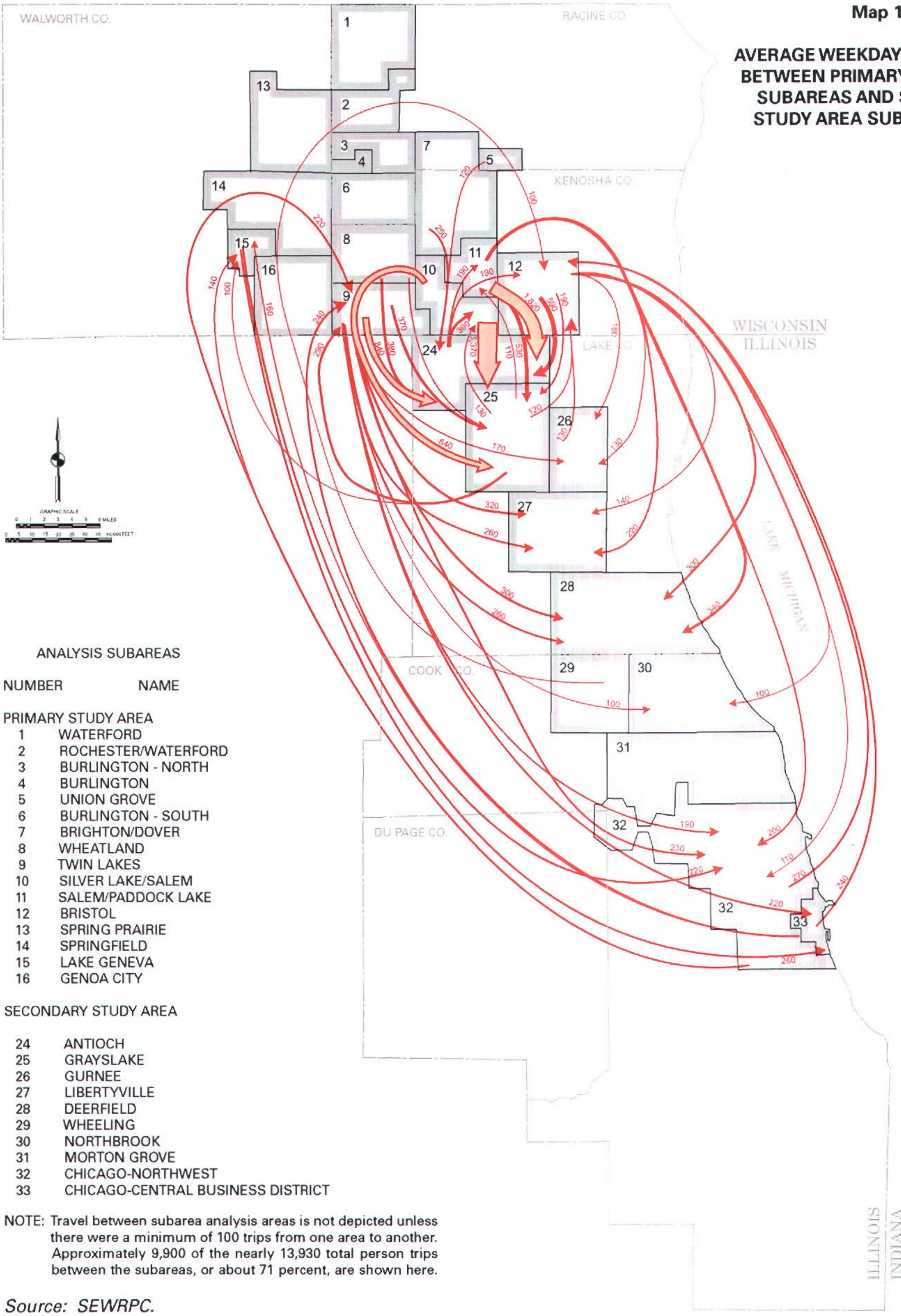
2. In 1990, the number of households in the primary study area totaled about 26,400. The number of households in the primary study area is anticipated to increase to about 36,500 households by 2020, or by about 38 percent.

3. In 1990, employment in the primary study area stood at about 30,600 jobs. The number of jobs in the primary study area is anticipated to increase to about 41,800 jobs by 2020, or by about 37 percent.

4. Based upon travel surveys undertaken by the Commission in 1991, about 152,500 person trips are made on an average weekday within the primary study area. Of those trips, about 90,300 trips were made entirely within the individual subarea analysis areas, and about 62,200 trips were made between subarea analysis areas. About 21,600 person trips crossed the Wisconsin-Illinois state line between the primary study area and the secondary study area on an average weekday in 1991.

Map 11

AVERAGE WEEKDAY PERSON TRIPS BETWEEN PRIMARY STUDY AREA SUBAREAS AND SECONDARY STUDY AREA SUBAREAS: 1991



ANALYSIS SUBAREAS

NUMBER	NAME
PRIMARY STUDY AREA	
1	WATERFORD
2	ROCHESTER/WATERFORD
3	BURLINGTON - NORTH
4	BURLINGTON
5	UNION GROVE
6	BURLINGTON - SOUTH
7	BRIGHTON/DOVER
8	WHEATLAND
9	TWIN LAKES
10	SILVER LAKE/SALEM
11	SALEM/PADDOCK LAKE
12	BRISTOL
13	SPRING PRAIRIE
14	SPRINGFIELD
15	LAKE GENEVA
16	GENOA CITY
SECONDARY STUDY AREA	
24	ANTIOCH
25	GRAYSLAKE
26	GURNEE
27	LIBERTYVILLE
28	DEERFIELD
29	WHEELING
30	NORTHBROOK
31	MORTON GROVE
32	CHICAGO-NORTHWEST
33	CHICAGO-CENTRAL BUSINESS DISTRICT

NOTE: Travel between subarea analysis areas is not depicted unless there were a minimum of 100 trips from one area to another. Approximately 9,900 of the nearly 13,930 total person trips between the subareas, or about 71 percent, are shown here.

Source: SEWRPC.

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Chapter III

EXISTING TRANSPORTATION SERVICES AND FACILITIES

INTRODUCTION

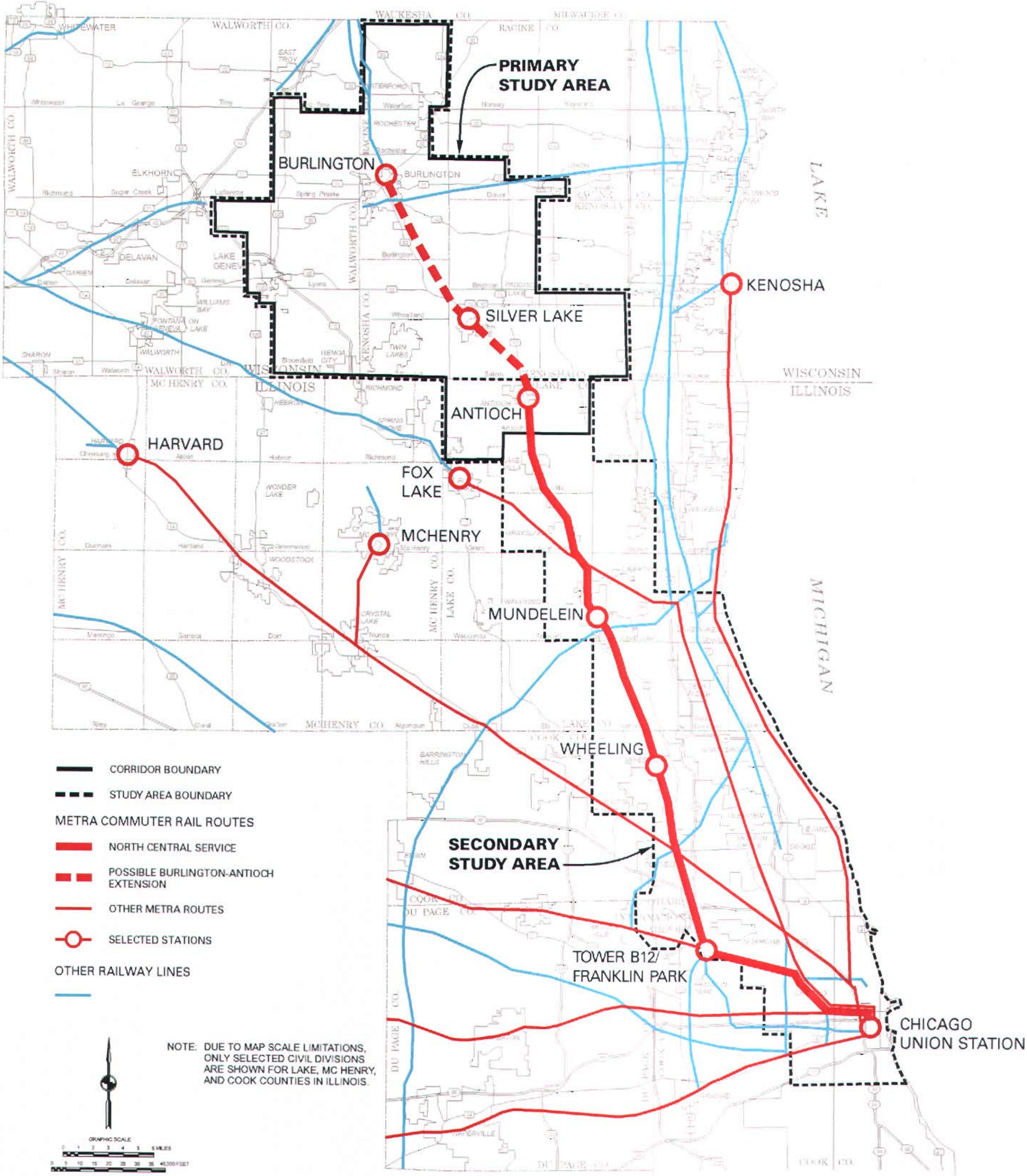
This chapter describes the existing transportation services and facilities within the Burlington-Antioch transportation corridor that are pertinent to commuter rail and bus feasibility planning. The section following this introduction provides a description of existing commuter rail and bus passenger transportation services in the corridor. This primarily consists of the existing commuter rail service between Antioch and Chicago which Metra refers to as its North Central Service and which is operated largely over the mainline of Wisconsin Central Ltd. The next section of the chapter provides a description of the existing railway facilities in the corridor with emphasis on the Wisconsin Central Chicago Subdivision between Burlington and Antioch. The last section of the chapter describes the existing arterial street and highway system within the primary study area.

For purposes of this inventory of existing transportation services and facilities, it is important to distinguish the Burlington-Antioch transportation corridor from the primary and secondary study areas that were described in Chapter I of this report. In order to analyze the necessary socioeconomic and travel data for use in preparing ridership projections, the primary and secondary study areas were delineated based on city, village, town, and county limits; the Wisconsin-Illinois State line; and planning analysis area boundaries already established by the regional planning agencies serving Southeastern Wisconsin and Northeastern Illinois. Since the potential commuter rail service between Burlington and Antioch would most likely be an extension of existing commuter rail service out of Chicago, it was necessary for the secondary study area to extend as far as the Chicago central business district. The actual Burlington-Antioch corridor, however, may be thought of as including the area served by the potential extension of commuter rail service and all of the primary study area between the City of Burlington and the State line, and that part of the secondary study area between the State line and the Village of Antioch, Illinois. The corridor and study areas are shown on Map 12. This map also shows the existing Metra commuter rail routes and other railway lines in or near the corridor.

Historic Perspective
Like many railway lines, the railway line that includes the Burlington-Antioch segment has seen a succession of owners and operators. The line between Burlington and Chicago was constructed in 1886 by the first Wisconsin Central Railway Company to operate along this route. In 1909, the Minneapolis, St. Paul & Sault Ste. Marie Railroad Company—better known by its popular name as the "Soo Line"—gained control of Wisconsin Central and operated it under lease as part of its system until 1961 when the two railroad companies and a third were merged. The new company was then officially called the Soo Line Railroad Company. For almost all of its existence, the Burlington-Antioch segment of the Chicago Subdivision has been maintained and operated as a

Map 12

BURLINGTON-ANTIOCH CORRIDOR AND METRA COMMUTER RAIL ROUTES IN OR NEAR THE CORRIDOR: 2000



Source: SEWRPC.

mainline between Chicago and the Twin Cities of Minneapolis and St. Paul, Minnesota via the Wisconsin cities of Fond du Lac, Stevens Point, and Chippewa Falls. During the 1950s through the 1970s, much of this route, including the Burlington-Antioch segment, was upgraded with the installation of a Centralized Traffic Control (CTC) signal system and replacement of old jointed rail with continuous welded rail. When the Soo Line purchased the remaining operating assets of the bankrupt Chicago, Milwaukee, St. Paul & Pacific Railroad Company (The Milwaukee Road) in 1985, it decided to transfer all through freight traffic between Chicago and Minneapolis-St. Paul from the Soo Line mainline via Fond du Lac and Stevens Point to the former Milwaukee Road mainline via Milwaukee and LaCrosse. Then, as part of an overall system restructuring, the Soo Line in October 1987 sold more than 2,000 miles of its system including the Burlington-Antioch-Franklin Park-Chicago mainline to Wisconsin Central Ltd., a newly formed company. Since this sale, the restructured Soo Line has lost its identity, its operations having been absorbed into the Canadian Pacific Railway, which has long been the majority stockholder in the Soo Line.

EXISTING PASSENGER TRANSPORTATION SERVICES IN THE CORRIDOR

Existing Commuter Rail Service

As of January 2001 there was one existing commuter rail route operating within the Burlington-Antioch corridor. This was Metra's North Central Service route, operated between the Village of Antioch and Chicago Union Station. The North Central Service utilizes the Wisconsin Central mainline from Antioch to Franklin Park, a suburb on the west side of Chicago, and then Metra's Milwaukee District West Line into downtown Chicago. Commuter service in the Burlington-Antioch corridor would likely constitute either an extension of, or a connection to, the existing Metra North Central Service.

The North Central Service between Antioch and Chicago is a relatively new addition to the Metra system. Service began on August 19, 1996, marking the first initiation of a new commuter rail line in the Chicago metropolitan area in almost 70 years. Until May 1971, when Amtrak assumed the operation of most remaining intercity passenger train service in the United States, private railway companies were responsible for operating virtually all commuter and long-distance railway passenger trains. Commuter rail service was never operated between Burlington and Antioch or along the Wisconsin Central mainline between Antioch and Franklin Park by the current Wisconsin Central or any of its predecessor railroad companies. The original Wisconsin Central Railway of the 1800s did, however, operate commuter trains between Chicago and suburban River Forest from 1887 to 1897 on a route completely different than that used for Metra's North Central Service. Otherwise, all regularly scheduled service along this line between Burlington, Antioch, and Chicago was provided by long-distance intercity passenger trains operated by the Soo Line.

Since the 1930s, passenger train service between Burlington and Chicago consisted of no more than two daily trains in each direction. After 1960, service consisted of one overnight train in each direction, daily except Saturdays, between Chicago and Duluth-Superior. This train made stops at both Burlington and Antioch and because of its early evening northbound departure from Chicago and early morning southbound arrival in Chicago, could have at least theoretically been available for use by regular commuters. However, due to frequent seasonal schedule adjustments together with the large volume of mail and express handled at some stations which resulted in significant delays, the service was really never conducive for use by commuters. The last regular passenger trains serving Burlington and Antioch on the Soo Line were discontinued in January 1965.[1]

During the first few years of Metra North Central Service operation, ridership has steadily increased, and the new service has generally been regarded as very successful by Metra, surrounding communities, and local public officials. This has resulted in widespread general support for an increased level of service along the route and for improvements to the railway line necessary to accommodate the improved service. Recognition of the successful implementation of new commuter rail service between Antioch and Chicago has provided one basis on which

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[1]*Mainline passenger train service to and from Burlington was also provided by the Milwaukee Road until October 1965 by a pair of local trains that operated between Milwaukee, Sturtevant, Burlington, Beloit, and Savanna, Illinois. These trains, however, were not scheduled to provide direct service between Burlington and Chicago.*

individuals, public officials, and organized groups have proposed the extension of such service beyond Antioch to Burlington.

Planning for the new Metra North Central Service evolved through a number of stages. During the late 1970s both the Regional Transportation Authority of Northeastern Illinois and the Chicago Area Transportation Study considered the viability of several new potential commuter rail routes. One of these routes was between Antioch, Mundelein, and downtown Chicago largely over what was then the Soo Line mainline. During the early 1980s, the North Suburban Mass Transit District also considered commuter rail service along this route and ultimately urged Metra to undertake a detailed feasibility analysis to determine the potential for service along this route. The resulting study was completed in 1986 by the consulting firm of R. L. Banks and Associates, and the findings were documented in a report entitled "Feasibility Study/Alternatives Analysis of Commuter Rail Service on the Soo Line Railroad." This study concluded that there was a potential for commuter rail service in this corridor.

In 1987, the Wisconsin Central route was included among 17 future corridors of opportunity for commuter rail route development by Metra. These corridors were described in a Metra planning document entitled "A Proposal for an Expanded Planning Framework at Metra." In 1989, Metra, with the support of local communities worked to include the Wisconsin Central commuter rail route in a long range transportation system plan for Northeastern Illinois. Prepared by the Chicago Area Transportation Study, this plan was documented in a report entitled "2010 Transportation System Development Plan." The plan was adopted by the Northeastern Illinois Planning Commission. Inclusion of the Wisconsin Central commuter rail route in this long range plan assured that the proposed service would be eligible for Federal funding if and when such funding became available.

During 1990, a project proposal for commuter rail service in this corridor was completed by Metra. An important element of this proposal was the designation of a route terminal, that being Antioch near the Wisconsin-Illinois state line. As envisioned in this proposal, the commuter rail route would extend south from Antioch to Des Plaines where the route would connect with the Metra-Union Pacific-Northwest Line to downtown Chicago. The proposed project was documented in the Metra report entitled "Wisconsin Central Corridor Commuter Rail Service: Project Proposal."

In 1992, Metra, along with Pace, the regional suburban bus agency serving the six county Northeastern Illinois Region, published a document entitled "Future Agenda for Suburban Transportation." This document outlined a long-term plan 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. This document introduced a revised and expanded proposal for commuter rail service in the Wisconsin Central corridor. Under this plan, service over the Wisconsin Central mainline would extend from Antioch to suburban Franklin Park instead of Des Plaines and would use the Metra-Milwaukee District West Line into Chicago instead of the Metra-Union Pacific-Northwest Line. The proposed project as described in this report was refined in 1993 resulting in lower cost estimates. Also, in 1993, Metra received a grant under the Congestion Mitigation and Air Quality (CMAQ) section of the Federal Clean Air Act to begin preliminary engineering and environmental assessment work. The implementation process for the provision of commuter rail service along Wisconsin Central mainline was thus initiated. Improvements to the railway line such as lengthening of mainline sidings, construction of new railway junctions, construction of a new overnight train storage facility in Antioch, and improvement and installation of new signals was begun in 1994 and completed in 1996. Construction of station facilities including platforms, depot buildings, and parking lots was undertaken during late 1995 and 1996. The new commuter rail service was initiated, as already noted, on August 19, 1996.

The North Central Service route extends from Chicago Union Station to Antioch, a distance of 52.8 miles. The line is one of 12 commuter rail routes 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 230 stations within the Northeastern Illinois Region, which includes the six Illinois counties of Cook, DuPage, Kane, Lake, McHenry, and Will.

The route of Metra's North Central Service consists of two distinct segments. The first segment extends 40.1 miles from Antioch to a junction at Tower B 12, located in suburban Franklin Park. This segment utilizes the Wisconsin Central mainline, which is owned and operated by Wisconsin Central Ltd. A large number of mainline freight trains are operated over this line. The second segment of the route extends 12.7 miles from Tower B 12 in Franklin Park to Chicago Union Station. This segment utilizes the Metra Milwaukee District West Line which is owned by Metra, having been purchased from the Chicago Milwaukee Corporation—formerly the parent company of the Milwaukee Road—in 1987. This segment is shared with Metra commuter rail trains operating between Chicago and Elgin, as well as with Canadian Pacific and other carrier mainline and local freight trains. Along the last 5.4 miles of this route into Chicago Union Station the railway line is also shared with the Metra Milwaukee District North Line commuter trains and Amtrak Hiawatha and Empire Builder intercity passenger trains operating between Chicago, Milwaukee, and Seattle. Responsibility for dispatching train movements and maintenance along the Antioch-Franklin Park section of the route rests with Wisconsin Central, and along the Franklin Park-Chicago Union Station section is with Canadian Pacific Railway, the successor to Milwaukee Road freight operations in the Chicago area.

Commuter rail service on the North Central Service route is oriented toward serving passengers who reside along the route in suburban Lake and Cook Counties and work in the central business district of the City of Chicago. The train service on this line originates and terminates at Antioch, where there is an overnight storage yard for equipment. As of October 1998, weekday service on this route consisted of five trains in each direction. Four trains operated inbound from Antioch to Chicago during the morning peak period, and four trains operated outbound from Chicago to Antioch during the afternoon peak period. In addition, one round trip operated during the midday period primarily to provide an early afternoon departure for customers with only morning business. All trains stopped at all stations along the route. There was no regular commuter train service provided on Saturdays, Sundays, and major holidays, although a limited number of special Saturday trains have been operated as Christmas season shopper specials. Trains used for the North Central Service typically consist of one locomotive and four or five bi-level gallery coaches.

In 2001, there were 14 passenger stations located along the 52.8-mile long commuter rail route. Antioch was the only station located within the Burlington-Antioch corridor. The travel time between Antioch and Chicago in both directions for peak period trains was 85 minutes resulting in an average overall speed of 37 miles per hour. The travel time between Antioch and Chicago for the midday trains varied from 83 to 87 minutes resulting in an average overall speed of 36 to 38 miles per hour.

Ridership on the North Central Service trains has increased steadily since initiation of the service. During the first two weeks of operation in August 1996, it was estimated that an average of about 1,900 passenger trips per day were made on the new service. Between September 1996—the first full month of operation—and September 1999, average weekday ridership on the line increased from about 2,100 trips to about 4,500 trips, as shown in Table 7. During this period, the highest use on a single day approached 5,100 trips. It was estimated that a little under 2 percent of all passengers were carried on the midday trains, the remaining trips being carried on peak-period peak-direction trains. During fiscal year 1999, about 1,001,000 passenger trips were carried on this Metra line; or an average of about 21,100 per week. The average passenger trip length for all trips was 29.3 miles on the 52.8-mile route.

Although extensive ridership data are not yet available for this route because it is relatively new, some ridership information specific to individual stations is available from special surveys conducted by Metra. While passenger boardings and alightings at any Metra station will vary from day to day, the counts resulting from these surveys are considered to be representative of weekday passenger activity at individual stations. Between October 1996 and September 1999, weekday boardings at the Antioch station have increased from 86 to 141, and weekday alightings have increased from 82 to 120, as shown in Table 8. For comparison purposes, the 1999 weekday boardings and alightings for all stations along the North Central Service route including Antioch are shown in Table 9.

Table 7

DAILY AVERAGE PASSENGER TRIPS ON METRA'S NORTH CENTRAL SERVICE: 1996-1999

Year	Average Number of Trips
September, 1996	2,125
December, 1996	2,145
April, 1997	3,158
June, 1997	3,616
September, 1997	3,941
December, 1997	3,792
April, 1998	4,169
June, 1998	4,438
September 1998	4,409
September, 1999	4,480

Source: Metra.

Table 8

WEEKDAY PASSENGER BOARDINGS AND ALIGHTINGS AT THE ANTIOCH STATION ON METRA'S NORTH CENTRAL SERVICE ROUTE: 1996-1999

Year	Weekday Boardings	Weekday Alightings
October 1996	86	82
March 1997	100	90
September 1997	124	117
September 1999	141	120

Source: Metra.

Table 9

WEEKDAY PASSENGER BOARDINGS AND ALIGHTINGS AT STATIONS ON METRA'S NORTH CENTRAL SERVICE: SEPTEMBER 1999

Station	Weekday Boardings	Weekday Alightings
Antioch	141	120
Lake Villa	108	100
Round Lake Beach	130	127
Prairie Crossing	54	54
Mundelein	227	221
Vernon Hills	272	249
Prairie View	232	238
Buffalo Grove	599	562
Wheeling	282	247
Prospect Heights	228	216
O'Hare Transfer	83	91
River Grove	176	117
Western Avenue	43	98
Chicago Union Station	1,905	2,040
Total	4,480	4,480

Source: Metra.

Because the line is new, there have not been a large number of changes in the level of commuter rail service provided between Antioch and Chicago. The level of service at the initiation of service in August 1996 was three inbound trains during the morning peak period, three outbound trains during the afternoon peak period, and one midday train in each direction. In February 1997, one additional train was added during each peak period. This has resulted in a peak period service frequency of about 30 minutes. In addition, all trains began stopping at the Western Ave. station in the City of Chicago. This is the stop nearest to Chicago Union Station and allows passengers to make easy bus connections to the North Michigan Avenue commercial and retail area.

Existing Bus Transportation Services

Existing public bus transportation service within the Burlington-Antioch corridor is very limited. As of January 2001, the only such public services within the corridor were those of a specialized nature primarily intended to provide transportation for the elderly and disabled. Within the Kenosha County portion of the corridor, such service is provided by the Kenosha County Department of Aging and Long-Term Care. Within the Racine County portion of the corridor, such service is provided by the Racine County Human Services Department. Within the Walworth County portion of the corridor, such service is provided by the Walworth County Department of Human Services and by Vocational Industries, Inc. There are no specific routes for these services, advance reservations are necessary, and priority is given to trips made for nutritional, medical, and work purposes.

At one time long-distance intercity motor coach carriers, such as Greyhound Lines, Wisconsin Coach Lines, and predecessors of these companies operated daily bus routes that connected Burlington, Lake Geneva, and other communities in the corridor with major cities such as Milwaukee, Chicago, Madison, and Racine. However, the last of these bus routes was discontinued during the 1980s.

Two Pace bus routes were also operated in conjunction with the Metra North Central Service. Pace is the marketing name utilized by the suburban bus operating division of the Regional Transportation Authority of Northeastern Illinois. Pace provides municipal bus service within individual satellite cities in the six-county Northeastern Illinois Region as well as service between Chicago area suburbs. Much of this bus service is coordinated with Metra commuter rail service. Pace supplemental bus operations also provide service along Metra routes that have limited or no train service during nonpeak periods. These supplemental services provide connecting buses between the Metra stations with limited service and stations on other Metra routes with more frequent service during nonpeak times. When the North Central Service was initiated, supplemental bus service was also initiated on two routes parallel to the Wisconsin Central railway line.

One route operated between Antioch and Grayslake and the other route operated between Mundelein and Des Plaines. Buses on both routes only stopped at established commuter rail stations. In June 1997, Saturday bus service was added on these routes. In August 1998, both supplemental bus routes were discontinued.

EXISTING BURLINGTON-ANTIOCH RAILWAY LINE

A potential new commuter rail route serving the Burlington-Antioch corridor of the Southeastern Wisconsin Region would extend from the existing Metra passenger station in the Village of Antioch to the City of Burlington. The 17.3-mile long route extension would utilize trackage owned and operated by Wisconsin Central Ltd. Approximately 1.1 miles of the route would be located within Lake County, Illinois, and would be located in the Village of Antioch. Approximately 10.1 miles of the route would be located within Kenosha County and would pass through the Village of Silver Lake, the Towns of Salem and Wheatland, and the unincorporated communities of Trevor and Camp Lake. Approximately 6.1 miles of the route would be located within Racine County and would pass through the Town of Burlington and end in the City of Burlington.

As of October 1998, there were a total of six stations along the Burlington-Antioch route as shown in Table 10. It should be noted that these stations are specific locations designated in the operating timetables of railway companies and are used in the dispatching and operation of trains. Such stations do not necessarily denote the existence of depot buildings or other facilities; and, in fact, are sometimes marked only by signs. The Burlington-Antioch route is part of the Wisconsin Central freight mainline between Chicago and North Fond du Lac, Wisconsin. For reference purposes, Table 10 also shows the other stations along the Wisconsin Central mainline between Antioch and Tower B 12 as well as other selected stations and railway junctions between Tower B 12 and Chicago Union Station.

The potential Burlington-Antioch commuter rail route extension would be located along the Wisconsin Central Chicago Subdivision, a 147.5 mile long route extending from Forest Park, Illinois, to Shops Yard in North Fond du Lac, Wisconsin. At Forest Park, a suburb west of downtown Chicago, connections are made to other railway lines. At North Fond du Lac, the Wisconsin Central maintains a large freight car classification yard and repair shop facilities. On this subdivision, mileposts are measured from downtown Chicago.

Alignment and Right-of-Way

The vertical and horizontal alignment of the railway line between Antioch and Burlington is generally well suited for high speed passenger train operation. Because the route was constructed as a mainline, its alignment was well engineered. Accordingly, most of the route is well located on the surrounding topography with minimal grades. Starting at Antioch, the line ascends from an elevation of about 790 feet above mean sea level on a 1 percent grade for about 0.5 mile to Milepost 56.0 where it then levels out for about one mile. The line then begins an overall gradual descent for about three miles through Trevor to Camp Lake which is at an elevation of about 760 feet. The average descent along this segment is about 0.5 percent. Between Mileposts 60.0 and 61.0 on the south side of Silver Lake, there is a summit with grades of between 0.5 and 1 percent on both sides. The railway line is at an elevation of about 750 feet in Silver Lake. The grade is then relatively level to the south side of Burlington

Table 10

EXISTING RAILWAY STATIONS ON THE POTENTIAL BURLINGTON-ANTIOCH COMMUTER RAIL ROUTE

Milepost	Station Name[a]	Distance (miles) From Chicago	Distance (miles) From Burlington
	Canadian Pacific C & M Subdivision		
0.0	Chicago Union Station	--	70.1
2.9	Tower A 2 – Western Ave.	2.9	67.2
5.4	Tower A 5	5.4	64.7
	Canadian Pacific Elgin Subdivision		
5.4	Tower A 5	5.4	64.7
6.4	Cragin Jct.	6.4	63.7
11.4	River Grove	11.4	58.7
12.7	Tower B 12	12.7	57.4
	Wisconsin Central Chicago Subdivision		
15.5	Tower B 12	12.9	57.2
15.9	Jct. 16	13.3	56.8
17.0	Jct. 17	14.4	55.7
17.8	Schiller Park	15.2	54.9
18.8	Jct. 19	16.2	53.9
19.8	O'Hare	17.2	52.9
20.4	Jct. 20	17.8	52.3
22.8	Des Plaines	20.2	49.9
23.4	Deval	20.8	49.3
26.6	Prospect Heights	24.0	46.1
27.4	East Wheeling	24.8	45.3
30.0	West Wheeling	--	42.7
32.2	Buffalo Grove	29.6	40.5
34.4	Prairie View	31.8	38.3
35.7	Vernon Hills	33.1	37.0
37.9	Leithton	35.3	34.8
38.6	EJ & E Jct.	36.0	34.1
39.6	Mundelein	37.0	33.1
40.5	West Mundelein	37.9	32.2
43.4	Prairie Crossing	40.8	29.3
44.0	Grays Lake	41.4	28.7
48.6	Round Lake Beach	46.0	24.1
50.7	Lake Villa	48.1	22.0
52.5	West Lake Villa	49.9	20.2
55.4	Antioch	52.8	17.3
56.2	West Antioch	53.6	16.5
58.3	Trevor	55.7	14.4
61.1	Silver Lake	58.5	11.6
71.3	Nestle	68.7	1.4
72.7	Burlington	70.1	--

[a]Stations are specific locations designated by operating timetables or engineering records and do not necessarily denote the existence of depot buildings or other facilities. Not all stations between Chicago Union Station and Fox Lake are shown.

Source: Canadian Pacific Railway, Wisconsin Central Ltd., and Metra.

except for a small number of minor crests and sags before it begins gradually rising through the City of Burlington. The elevation at the Burlington depot near the intersection of Commerce and Kendall Streets is about 770 feet above mean sea level. The alignment is located on several small to medium sized fills through wetland and other low areas, chiefly in the Camp Lake, north of Silver Lake, and Wheatland areas.

With respect to horizontal alignment, there are 14 horizontal curves along the entire route. Most of these are relatively short. Only five of these curves are greater than 2°00′. The sharpest of these is in the City of Burlington, at the E. Washington Street grade crossing. This curve is a 4°15′ curve, but is located along a segment of the railway line passing through the densely developed central portion of Burlington where all trains are already limited to a maximum speed of 20 miles per hour. The only other horizontal curve greater than 3°00′ is located between Mileposts 64.2 and 64.4 where the maximum speed for trains is reduced to 45 miles per hour from the normal mainline speed of 50 miles per hour.

The basic right-of-way width of the railway line concerned is 100 feet between Antioch and Burlington with the main track located on the centerline of the right-of-way along the entire segment. There are a number of locations at which additional right-of-way was acquired to accommodate additional tracks, facilities, or related uses. Such segments of right-of-way were typically located near existing and former stations, and are generally up to 250 feet in width.

There are no vertical or horizontal clearance restrictions along the route that would prohibit the use of conventional commuter rail trains or rolling stock over this route. In fact, bi-level gallery coaches of the type extensively used by Metra have been operated over this entire route on a special basis in the past.

Track Structure and Condition

The Wisconsin Central Chicago Subdivision between Burlington and Antioch consists of a single-track mainline with passing sidings. There are two passing sidings located along this segment, these being a 6,330 foot long siding at Silver Lake and a 5,160 foot long siding at Burlington. It should be noted that many of these sidings including those at Silver Lake and Burlington are considered to be relatively short for contemporary mainline freight train lengths; that is, under 7,500 feet in length. At four separate locations south of Antioch, two main tracks have been installed as part of the improvements that were necessary to initiate the Metra North Central Service. This was accomplished by lengthening and converting existing passing sidings and by constructing new trackage alongside the existing mainline track. Other trackage exists along the line for local switching or storage purposes, or for providing service to local freight customers. Such additional trackage is primarily located at Antioch, Silver Lake, and Burlington. On the south side of Burlington, the Nestle Spur branches off to the west to serve several major customers. The Nestle Spur is a remnant of a former Milwaukee Road mainline.

Between Burlington and Antioch, the mainline track is laid with 115-pound continuous welded rail rolled in 1972 and 1973 with some small segments in the Silver Lake area rolled in 1995 and 1997, and in the Burlington area rolled in 1998. Rail on passing sidings and other tracks varies. For example, the Silver Lake passing siding is mostly 100-pound jointed rail rolled in 1926 and 1927 with a short section of 132-pound rail rolled in 1996. The north half of the Burlington passing siding has 100-pound jointed rail and the south half of the siding is laid with 115-pound continuous welded rail. The main track of the Nestle Spur has 112-pound jointed rail and the Metra overnight storage yard at West Antioch has 115-pound continuous welded rail. The rail used for other miscellaneous trackage is all jointed rail and varies from 85-pound to 100-pound weights rolled in various years dating back to the 1920s. Major tie replacement and surfacing of the mainline between Burlington and Antioch was undertaken during 1996 and 1997.

The condition of the railway track along the Burlington-Antioch route may be characterized in terms of maximum permissible train operating speeds. The maximum practical operating speed along any specific section of railway track is dependent upon four principal factors: alignment, special track work, 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 grades. Maximum operating speed limits over special track work such as turnouts and crossings are determined by the curvature of the turnouts and by the angle of the crossings. Other factors affecting speeds at special track work 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 factors such 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 these factors. The operational requirements of passenger trains are generally more demanding of track and signal systems than are the operational requirements of freight trains. In most cases, the slower operating speeds of freight trains compared with passenger trains permits use of less sophisticated track and signal systems as well as comparatively lower levels of maintenance.

With respect to the physical condition of railway tracks, the Federal Railroad Administration (FRA) has prescribed minimum requirements for the safe operation of freight and passenger trains over railway lines that are a part of the general railway 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 track work 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 11, there are a total of five classes that apply to specific track conditions that would be pertinent to this feasibility study. Based upon the detailed technical requirements of each class, the FRA allows train movements over railway trackage in the United States up to specified operating speed limits for each class. These five FRA classes provide a good basis for an initial evaluation of the condition of railway trackage and for estimation of the costs of improvements needed in an existing track structure to meet desired operating speeds.

The trackage and roadbed along the Wisconsin Central Chicago Subdivision between Antioch and Burlington is in very good condition and meets FRA Class 4 track safety standards. As of January 2001, the maximum authorized speed limit for freight trains on the Chicago Subdivision was 50 miles per hour between Milepost 55.0 in Antioch and Milepost 64.2, just north of STH 50 and Silver Lake; and 60 miles per hour between Milepost 64.4 and Milepost 72.2 in Burlington. There were permanent speed restrictions of 45 miles per hour on the curve between Milepost 64.2 and Milepost 64.4 and 20 miles per hour between Milepost 72.2 and 72.9 through the City of Burlington until the locomotive has passed these limits and the rear of train has gone through the curve between Milepost 72.1 and Milepost 72.3. There was no specific speed limit for passenger trains identified on this subdivision north of Antioch. Other special speed restrictions apply to specific freight trains which include certain kinds of cars or loads in the train, maintenance of way or work trains and equipment, and when outside temperatures reach certain specified levels. The maximum speed limit on the Burlington and Silver Lake passing sidings was 25 miles per hour and 10 miles per hour on all other nonmainline trackage. The maximum speed limit through the mainline turnouts for the Burlington and Silver Lake sidings was 25 miles per hour and 10 miles per hour on all other nonmainline turnouts.

Table 11

OPERATING SPEED LIMITS PRESCRIBED BY FEDERAL RAILROAD ADMINISTRATION FOR CLASSES OF TRACK 1 THROUGH 5

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

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

Source: Federal Railroad Administration.

Street, Highway, and River Crossings

In 2001, there were a total of 26 public street and highway crossings along the potential commuter rail route extension between Burlington and Antioch of which 25 were at-grade, and one was grade separated. These crossings are listed in Table 12. Of the 25 at-grade public crossings, all were protected by crossbucks and 21 were also equipped with automatic flashing lights, bells, and gates. Of the four remaining at-grade public crossings, one had flashing lights and bells, the other three were equipped with stop signs in addition to crossbucks. The one grade separated public crossing was the STH 50 crossing over the railway line in the Town of Wheatland. There were also a total of 19 private crossings along the potential commuter rail route extension, of which 18 were at-grade and one was an underpass. None of the private crossings were equipped with automatic warning devices, only one had crossbucks, and four of the private crossings had some type of nonstandard warning signs. In general, the approach circuits for activating the automatic grade crossing signals at public crossings were timed for train operations with a maximum speed of 50 or 60 miles per hour, except in the City of Burlington where signals were timed for a maximum speed of 20 miles per hour. There were five bridges over rivers and other major watercourses along the Burlington-Antioch railway line. These are also listed in Table 12. Minor streams, creeks, and ditches also cross under the railway line by means of culverts and pipes at numerous locations.

Passenger Depot Buildings

In 2001, there were two passenger depot buildings located along the Burlington to Antioch route. These were located at Burlington and Antioch. For purposes of this study the term "depot" refers to a building and attendant facilities used for passenger boarding and alighting. This differs from the meaning of the term "station." In railway terminology, stations are specific locations designated for operating and engineering purposes and do not necessarily denote the existence of a depot building or other facilities.

The Burlington depot building is located on the west side of the main track at 256 Commerce Street. This site is at the foot of Kendall Street and alongside Echo Lake about three blocks north of downtown Burlington. This depot is a single story traditional-style brick building that appears to be in good condition. The building and property are owned by Wisconsin Central and continue to be used by the railway as a base for track and signal maintenance forces. The depot site is relatively small and is situated between the mainline and an agricultural cooperative facility. Most of the land not occupied by trackage or the depot itself is used for material and equipment storage and for railroad maintenance and vehicle parking. The 630-foot long concrete and blacktop platform at this depot still exists and appears to be in fair condition. The driveway, parking, and storage areas surrounding the depot are unpaved.

The Antioch passenger depot building is located on the west side of the mainline on Depot Street about three blocks east of downtown Antioch. This depot is a single story brick building owned by the Village of Antioch and constructed in 1996. The depot building was constructed for the North Central Service and includes an enclosed and heated waiting room and rest rooms. In addition to the depot building, this station facility consists of a 225-foot long blacktop platform with lighting, benches, and other passenger amenities. The depot building is open from 5:00 a.m. to 8:00 p.m. on weekdays but is not staffed. Room in the depot is available for an eventual

Table 12

INVENTORY OF CROSSINGS ALONG POTENTIAL BURLINGTON-ANTIOCH COMMUTER RAIL ROUTE EXTENSION: JANUARY 2001

Milepost	Type of Crossing or Other Feature	Name	Crossing Protection[a]	Number of Tracks
55.31	At-Grade	Depot Street	CB, FL, B, G	1
55.40	Station	ANTIOCH	--	--
55.92	At-Grade	North Avenue	CB, FL, B, G	1
56.04	At-Grade	Main Street (STH 83)	CB, FL, OHL,G, B	1
56.20	Station	WEST ANTIOCH	--	--
56.86	At-Grade	Private Farm Road		1
57.50	At-Grade	119th Street (CTH JF)	CB, FL, B, G	1
58.00	At-Grade	Wilmot Road (CTH C)	CB, FL, B, G	1
58.19	At-Grade	Salem Road	CB, FL, B, G	1
58.30	Station	TREVOR	--	--
58.45	At-Grade	Private Commercial Road	S	1
58.72	Bridge	Unnamed Stream	--	1
58.82	At-Grade	264th Avenue	CB, FL, B, G	1
59.06	At-Grade	104th Street	CB, FL, B, G	1
59.70	At-Grade	272nd Avenue	CB, FL, B, G	1
60.04	At-Grade	276th Avenue (CTH AH)	CB, FL, B, G	1
61.05	At-Grade	Silver Lake Road (CTH F)	CB, FL, B, G	2
61.10	Station	SILVER LAKE	--	--
61.39	At-Grade	S. Cogswell Drive (CTH B)	CB, FL, B, G	2
61.62	At-Grade	E. Park Street	CB, FL, B, G	2
61.69	At-Grade	E. Lake Street	CB, FL, B, G	2
62.12	At-Grade	W. Maple Street	CB, S	1
63.08	At-Grade	76th Street	CB, FL, B, G	2
63.69	Underpass	Geneva Road (STH 50)	--	1
63.93	Bridge	Unnamed Stream	--	1
64.46	At-Grade	60th Street (CTH K)	CB, FL, B, OHL, G	1
64.62	Bridge	Unnamed Stream	--	1
64.89	At-Grade	Private Farm Road	--	1
65.05	Overpass	Private Farm Road	--	1
65.16	At-Grade	Private Farm Road	--	1
65.25	At-Grade	Private Farm Road	--	1
65.52	At-Grade	328th Avenue (CTH W)	CB, FL, B, G	1
65.73	At-Grade	Private Farm Road	--	1
65.91	At-Grade	Private Farm Road	--	1
66.35	At-Grade	Private Farm Road	--	1
66.63	At-Grade	Karcher Road (CTH JB)	CB, FL B, G	1
67.06	At-Grade	Private Farm Crossing		1
67.40	At-Grade	Hoosier Creek Road	CB, S	1
67.54	At-Grade	Private Farm Road	--	1
67.65	At-Grade	Private Residence Driveway	S	1
68.11	At-Grade	Private Farm Road	--	1
68.61	Bridge	Hoosier Creek	--	1
68.87	At-Grade	Private Farm Road	--	1
69.46	At-Grade	Private Farm Road	--	1
69.61	Bridge	Fox River	--	1
69.86	At-Grade	Private Utility Driveway	S	1
69.95	At-Grade	Private Farm Road	--	1
71.12	At-Grade	Private Farm Road	S	1
71.21	At-Grade	Private Utility Driveway	CB, S	2
71.30	Station	NESTLE	--	--
71.59	At-Grade	Robert Street	CB, S	1
71.99	At-Grade	Adams Street	CB, FL, B	2
72.19	At-Grade	Jefferson Street	CB, FL, B, OHL,G	1
72.25	At-Grade	E. Washington Street	CB, FL, B, G	1
72.32	At-Grade	Chestnut Street	CB,FL, B, G	1
72.39	At-Grade	Milwaukee Avenue (STH 36)	CB, FL, B,OHL,G	1
72.70	Station	BURLINGTON	--	--

[a] The following abbreviations are used:
CB–Crossbucks; B–Bells; FL–Flashing Lights; OHL–Overhead Flashing Lights; G–Gates; S–Stop or Other Warning Signs

Source: SEWRPC.

installation of a ticket agent area. The depot building is presently closed on Saturdays, Sundays, and major holidays. Outside the depot, there is a park-ride lot that has a total capacity of 76 automobiles and an automobile and bus passenger drop-off and pick-up area.

Traffic Control

Train operations along the entire Chicago Subdivision including the segment between Burlington and Antioch are controlled by Wisconsin Central. Centralized Traffic Control (CTC) is in use on this subdivision. CTC is a type of traffic control system whereby the movement of trains is conducted through a series of consecutive segments—or "blocks"—of railway line. CTC uses signal indications to authorize train movements from one block to the next as well as into and out of passing sidings and through junctions and crossings. Normally, dispatchers activate the various signal indications and the mainline turnouts at sidings and junctions from a remote, or centralized location. Dispatchers who govern train movements on this subdivision work out of the Wisconsin Central dispatching center located in Stevens Point, Wisconsin.

As with all railways, such train operations are also subject to extensive sets of operating and safety rules and instructions set forth by the railroad company. These rules and instructions include the current General Code of Operating Rules, safety rules, air brake rules and instructions, timetable, rules and instructions for train dispatchers and control operators, hazardous materials special instructions and guide, general orders, and other circulars, bulletins, and notices in effect.

Current Utilization

The Wisconsin Central mainline between Chicago and North Fond du Lac—which includes the Burlington-Antioch segment—carries a large number of freight trains on a regular daily basis. Since beginning operations in 1987, Wisconsin Central has pursued a policy of aggressively building freight traffic on its system throughout Wisconsin. This has been accomplished through a combination of increasing traffic from established customers, regaining former customers who had switched to other forms of transportation, and securing short- and long-term contracts for new and overhead traffic. Overhead traffic—sometimes referred to as bridge traffic—is defined as freight traffic that neither originates or terminates on the railway line concerned. Rather, it is traffic received from one connecting carrier and delivered to another connecting carrier. These traffic expansion efforts have generally been very successful and have resulted in a continual increase in the number of freight trains operated by the railway.

In 1987 when Wisconsin Central began operations, a total of seven freight trains were operated on a typical weekday over the Burlington-Antioch segment. At the time, these seven trains represented an increase over the three daily trains operated by Soo Line over this segment in 1986, just after the Soo Line transferred all of the through freight traffic from this line to the former Milwaukee Road mainline. In 1998, 26 freight trains were being operated over this segment on a typical weekday by the Wisconsin Central. Because the North Fond du Lac-Chicago railway line functions as the main route funneling traffic between customers throughout central and northern Wisconsin and the Upper Peninsula of Michigan and other railways at Chicago, this has become one of the busiest railway lines in the State of Wisconsin. In addition, eight of the ten weekday Metra commuter trains operating between Antioch and Chicago also operate between the Metra depot in Antioch and the Metra overnight storage yard at West Antioch.

In general, freight trains have significantly different operational characteristics than commuter rail passenger trains. Many of these operational characteristics are important to understanding and planning for the possible operation of commuter rail and especially to the coordinated operation of freight and commuter trains. Several considerations in this regard are pertinent:

- Commuter rail passenger trains operate according to strict printed schedules. Arrivals and departures for a particular train at specific stations occur at the same time every day. Also, train size, weight, and type of equipment normally do not change from day to day. Therefore, the operation and performance of commuter trains is normally very predictable.

- Unlike commuter trains, most freight trains do not operate on a specific schedule. While the crew for a particular freight train may be called for the same time every day, while the train may have the same departure time from its originating terminal every day, and while the train may even tend to operate at about the same time on successive days, its actual progress over the line on any given trip will depend on a variety of factors. These may include: the amount of work to be done enroute; the timeliness of connecting freight trains; the amount of opposing train traffic to be met; and traffic congestion at crossings and junctions. Thus, on a mainline such as the one being considered under this study, actual freight train operations will be different every day.

- The frequency of freight train operations differs from that of commuter rail operations. Commuter trains operate every day Mondays through Fridays, and depending upon the level of service offered, possibly on Saturdays, Sundays, and major holidays. On the other hand, freight train frequencies will vary depending upon the volume and nature of the traffic to be carried. Common frequencies for individual freight trains may be Monday through Friday, Monday through Saturday, Tuesday through

Saturday, three or four days per week, or only once or twice a week. These frequencies may change from week to week, or month to month. Unlike passenger trains, freight train frequencies and schedules may undergo major changes based on customer needs, seasonal and cyclical factors, and railway operating policies.

- The actual performance of individual freight trains also normally varies from day to day. Factors influencing the operation of individual trains include: type and amount of tonnage on the train; number of locomotives and locomotive performance; weather; temporary speed restrictions for operational or maintenance reasons, train crew availability, and traffic priorities. Unlike passenger trains, the weight and length of a freight train may vary considerably from one day to the next. Also unlike passenger trains, freight train operation and speeds are generally affected by grades along the railway line.

- Maximum allowable operating speeds for freight trains are generally lower than maximum allowable operating speeds for passenger trains. Passenger trains accelerate and decelerate significantly faster than do freight trains because of their lighter gross weight. This means that freight trains require longer distances and more time to accelerate from a stop, to pull in to and out of passing sidings, and to come to a stop. Average speeds over a specific segment of railway line will almost always be lower for freight trains than for passenger trains. In practice, commuter trains are normally able to operate at the maximum allowable passenger train speed limit for most of the distance between stations while freight trains often operate well below the maximum allowable freight train speed limit.

- To a large extent, much of the freight traffic now handled by railways is under contracts for a specified period of time, such as from one to five years. As these contracts begin and expire, the nature of train operations—such as the size, length, frequency, and tonnage of particular trains—can dramatically change over the course of only a few years.

- Because of the relative unpredictability of freight train operations along a busy mainline compared with passenger trains, dispatchers must have a high level of flexibility in terms of available mainline trackage and passing sidings. In many instances, a regular freight train may be expedited or held for an appropriate window of time so that it may be kept moving, combined with another train, annulled, or split into sections for any one of several operational or traffic reasons.

Freight train operations in 1998 on the line concerned consisted of a variety of types, each of which possess different operational characteristics. On a typical weekday, 11 of the 26 freight trains may be expected to be through trains—sometimes referred to as "time freights"—carrying general and mixed freight operating between North Fond du Lac and various classification yards of other major railways in the Chicago terminal district. Some of these trains may regularly stop at intermediate stations such as Leithton, Burlington, and Waukesha to set out and pick up cars. These trains typically operate seven days a week. They usually range in length from 40 to 120 cars, with 75 cars being a typical size, although train lengths in excess of 100 cars are not uncommon. This translates to train lengths ranging from 2,400 feet to 6,800 feet, with 4,300 feet being a typical size. The maximum operating speed for these trains between Burlington and Antioch is 50 miles per hour, subject to the special speed restrictions noted previously. In general, most of these through trains can normally attain the maximum allowable operating speed along most segments of the railway line. However, as these trains get longer and consequently are carrying greater tonnage, their average operating speed will be affected to a greater degree by grades and other operating conditions.

On a typical weekday, four of the 26 freight trains may be expected to be "run-through" trains for the Canadian National Railway Company (CN). These trains are operated by Wisconsin Central between Superior and Chicago under contract for CN and carry general and mixed freight. These trains do not make any intermediate stops to set out or pick up cars and typically operate seven days a week. They usually range in length from 60 to 120 cars, with 90 cars being a typical size. This translates to train lengths ranging from 3,800 feet to 7,400 feet, with 5,600 feet being a typical size. The maximum operating speed for these trains between Burlington and Antioch is also 50 miles per hour. In general, these trains can also attain the maximum allowable operating speed along most segments of the railway line. However, as these trains get longer and consequently are carrying greater tonnage, their average operating speed will be affected to a greater degree by grades and other operating conditions.

On a typical weekday, three of the 26 freight trains may be expected to be intermodal trains that carry only containers and truck trailers. Two of these trains operate between Green Bay and Chicago and the third operates between Superior and Chicago under contract for CN. These trains do not make any intermediate stops in the Burlington-Antioch corridor to set out or pick up cars and typically operate five to seven days a week. They usually range in length from 50 to 120 cars, with 80 cars being a typical size, although train lengths in excess of 100 cars are not uncommon. This translates to train lengths ranging from 3,200 feet to 8,800 feet, with 4,800 feet being a typical size. The maximum operating speed for these trains between Burlington and Antioch is also 50 miles per hour, subject to any special speed restrictions noted previously. In general, intermodal trains can normally attain the maximum allowable operating speed along most segments of the railway line concerned because they are lighter than most general freight trains. On many segments of the railway line, intermodal trains are allowed to operate at passenger train speeds.

On a typical weekday, an average of three of the 26 freight trains noted above may be expected to be unit trains. Unit trains transport a single commodity from one shipper to one consignee under a single rate or contract with dedicated sets of cars. Unit trains are generally used to ship large volumes of bulk commodities such as coal, metallic ores, aggregates, agricultural fertilizer ingredients, and harvested crops such as wheat and corn. These trains typically run loaded in one direction and empty in the other direction. The frequency of unit trains varies considerably, depending upon the needs of the shipper. For example, coal trains running to electric power generation plants may require a frequency of two to three trains per week with a contract period of one or more years. Taconite trains may require a frequency ranging from one or two trains per week to daily, but only during certain seasons. Trains handling agricultural products or grains may only require a single train during a planting, growing, or harvesting season. Of the three unit trains usually operated over the railway line concerned on a typical day in 1998, two—one loaded and one empty—were for hauling taconite between Superior and Chicago; while the third would be either a coal, coke, or potash train, alternating between a loaded or empty train. Also, because of loading, stockpiling, or transshipment schedules, the movement of unit trains may become bunched or very erratic. These trains do not normally stop to pick up or set out cars en route, but are interchanged with other railways as an entire unit.

Unit trains are among the heaviest and longest of all freight trains. They range in length from 80 to 120 cars, with 100 cars being a typical size. This translates to train lengths ranging from 4,200 feet to 6,200 feet, with 5,200 feet being a typical size. The maximum operating speed for these trains varies according to the commodity, gross weight, and equipment, but 40 miles per hour is frequently the maximum allowable speed in the Burlington-Antioch line. Because of size and weight, the average operating speed of these trains will be significantly affected by grades and other operating conditions, and will be lower than average operating speeds for most other kinds of freight trains. Steep or long ascending grades will have a pronounced effect on these trains and can slow their speed to between 10 and 20 miles per hour.

On a typical weekday, four of the 26 freight trains operated over the railway line concerned may be expected to be local trains. One of these is the local freight that sets out, picks up, and switches cars for customers between Waukesha and Lake Villa, the first station south of Antioch. This train is based out of Waukesha and makes a round trip five to six days a week. Most of the regular work of this train is performed at Burlington where sorting cars is handled in the yard near the depot. Most customers are located near the depot area, on the south side of Burlington, or on the Nestle Spur. This train usually ranges in length from 10 to 20 cars, with 15 cars being a typical size. This translates to a train length ranging from 500 feet to 900 feet, with 700 feet being a typical size. The maximum operating speed for local trains such as this one between Burlington and Antioch is also 50 miles per hour.

Of the four local trains operated over the railway line concerned, three are rock trains. These are dedicated shuttles that move trainloads of crushed stone from quarries in Wisconsin near Sussex and Cedar Lake to aggregate distributors in Northeastern Illinois and then return empty. In essence, these are mini-unit trains operated on a rigorous cycle. The trains normally operate from five to seven days per week depending on demand and are coordinated with the seasonal operation of the quarries, usually about nine months out of the year. The trains are normally 25 cars long with a train length of 700 feet. The maximum operating speed for these trains is 30 miles per hour when loaded and 40 miles per hour when empty.

On a typical weekday, at least one of the 26 trains operated over the line may be expected to be miscellaneous or special purpose trains. These may include maintenance-of-way or work trains for handling ballast or welded rail, company inspection trains, equipment trains for moving damaged or fragile rolling stock, or trains for moving excess dimension loads. The characteristics will vary with each individual train, but in general, most are relatively short, move at slow to moderate speeds, and can be expected to work anywhere along the railroad.

Existing Railway Mainline Beyond Antioch and Burlington

As noted previously, the Wisconsin Central Chicago Subdivision between Chicago and North Fond du Lac is a single-track mainline with passing sidings which carries a large number of daily freight train movements as well as Metra North Central Service commuter trains south of Antioch. Capacity issues concerning the Burlington-Antioch segment may affect, or be affected by, operations south of Antioch and north of Burlington.

South of Antioch, the route over which the Metra North Central Service operates is 52.8 miles in length and consists of two distinct segments. The first segment extends 12.7 miles from Chicago Union Station to Tower B 12 and utilizes the Metra Milwaukee District West Line between Chicago and Elgin. There are nine Metra passenger stations along this segment although North Central Service trains stop at only two, those being Western Ave. and River Grove. From Chicago Union Station to Tower A 5, this route is also shared with the Metra Milwaukee District North Line between Chicago and Fox Lake. Both of these Metra routes are busy and provide all-day, seven days per week service. The Canadian Pacific Railway operates regular local freight service and occasional mainline freight trains over this trackage. Other rail carriers—including the Wisconsin Central—also have operating or haulage rights on this segment or portions thereof. Between Chicago Union Station and Tower A 5, the line also handles Amtrak intercity passenger trains. The line between Chicago Union Station and Tower B 12 consists of three main tracks and is protected by an Automatic Block Signal (ABS) system. Two of the three main tracks are signaled for bi-directional operation at maximum allowable speeds. Power operated crossovers between the main tracks are available at seven locations. The segment between Chicago Union Station and Tower A 5 is referred to as the Canadian Pacific C&M Subdivision and the segment between Tower A 5 and Tower B 12 is referred to as the Canadian Pacific Elgin Subdivision Chicago Union Station and its approaches are owned by, and are under the operating authority of, Amtrak.

The second segment over which the Metra North Central Service operates extends 40.1 miles from Tower B 12 to Antioch and utilizes the mainline of Wisconsin Central's Chicago Subdivision. This mainline segment handles a high volume of freight trains in addition to the 10 weekday Metra commuter trains. It is a single-track line with CTC in use along the entire line. There are four segments of two main tracks along this line that are used as passing sidings. These extend a distance of 1.6 miles at Schiller Park, 2.6 miles at Wheeling, 2.6 miles at Mundelein, and 4.0 miles at Lake Villa. The turnouts at the ends of these segments are designed for high-speed operation. The connection used by North Central Service trains between the Wisconsin Central mainline and the Metra Milwaukee District West Line at Tower B 12 in Franklin Park also has two main tracks and is equipped with power turnouts. Many of the track and signal improvements along this segment are the result of implementation of the new North Central Service in 1996. These improvements included extension of the passing sidings into a second main track, installation of high-speed power turnouts, replacement of the CTC and signal systems, and construction of the new connection at Tower B 12.

It is the long-term goal of Metra to continue making facility and service improvements to the North Central Service so that it has a physical plant and level of all-day service comparable to that of most other Metra commuter rail routes. As of October 1998, a Major Investment Study had largely been completed and a preferred alternative selected for the next phase of such improvements. This next phase would provide for a partial upgrade of service along the route. The 10 weekday trains would be expanded to 22 weekday trains providing more frequent peak period service with bi-hourly off-peak service and limited weekend service. Many of the capital improvements necessary for this service upgrade are designed to increase capacity of the railway route.

The improvements along the Wisconsin Central Antioch-Franklin Park portion of the route would include:

- Construction of 12 miles of new second main track;
- Improvement of train control systems at 22 at-grade highway crossings;
- Upgrade of signal systems along 24.5 miles of line;
- Construction of six new railroad bridges;
- Development of five new passenger stations;
- Development of 4,500 new automobile parking spaces at existing and new stations;
- Street, highway, and utility modifications at grade crossings;
- Acquisition of one additional train set.

Capital improvements necessary for this service upgrade along the Metra Franklin Park-Chicago Union Station portion of the route would include:

- Upgrading two mainline tracks with continuous welded rail for a distance of about 12 miles;
- Installation of six crossovers;
- Improvement of grade crossing signals at 12 at-grade street and highway crossings;
- Upgrade of train control signals;
- Reconfiguration of platforms at stations between River Grove and Hermosa.;
- Miscellaneous improvements to all existing stations.

It is envisioned that all improvements on both portions of the route can be made within the existing railroad rights-of-way.

The Wisconsin Central Chicago Subdivision north of Burlington extends another 85.7 miles to North Fond du Lac. Passing sidings are located an average of about every 10 miles and are equipped with power turnouts at both ends. While some of these sidings are relatively short for current freight train lengths, Wisconsin Central has pursued a continuing program of lengthening many of the sidings. The next three passing sidings immediately north of Burlington are Midway (located in the Town of East Troy), 8,340 feet; Vernon, 5,125 feet; and Waukesha, 8,723 feet. The siding at Midway was reactivated and lengthened in 1997 and replaced a long-unused smaller siding at that location. Responsibility for dispatching train movements rests with Wisconsin Central and CTC is in use along the entire line.

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. 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 as well as 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 347 miles, is shown on Map 13.

Freeways are arterial highway facilities that provide the highest level of service, that carry the heaviest volumes of traffic at the highest speeds, and that are fully grade separated with no access provided to abutting properties. Freeway facilities currently accommodate a significant amount of travel into and out of the primary study area. Of the 106,600 vehicular crossings of the Wisconsin-Illinois State line to and from the primary study area observed on an average weekday in 1997, approximately 76,700 vehicle crossings, or about 72 percent, were made on IH 94 and USH 12. The freeway component of the arterial street and highway system within the primary study area is also shown on Map 13. Of the 29,900 vehicle crossings not made on IH 94 or USH 12, about 15,000 were made on either USH 45 or STH 83, the two primary highway facilities connecting the primary and secondary study areas.

SUMMARY

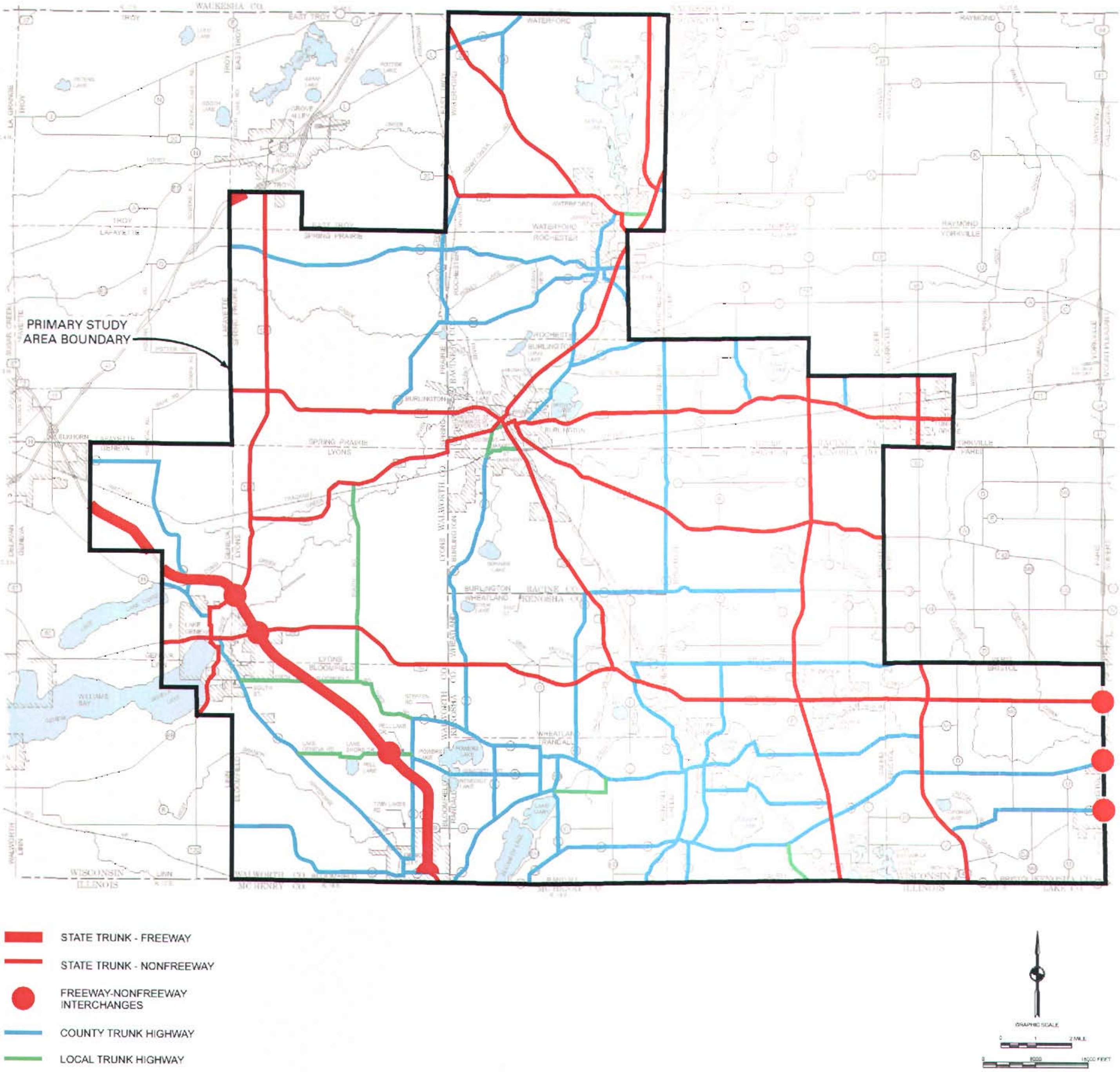
This chapter has presented information on the existing transportation services and facilities within the Burlington-Antioch corridor and between the primary and secondary study areas of the corridor which may be pertinent to consideration of providing commuter rail or commuter bus service within the corridor. The information presented included a description of the existing railway and bus passenger transportation services in the corridor; a description of existing railway facilities within the study area that could be used to provide commuter rail service between Burlington, Antioch, and Chicago; and a description of the existing arterial street and highway system within the corridor. The most important findings concerning these services and facilities may be summarized as follows:

- Existing commuter rail service was provided by Metra—the commuter rail service division of the Regional Transportation Authority for Northeastern Illinois—over a 52.8-mile long route extending from Antioch through the northern suburbs of Lake County and Cook County to Chicago Union Station in the Chicago central business district. The commuter rail route is referred to by Metra as its North Central Service. The first portion of this route extends 40.1 miles from Antioch to a railway junction at Tower B 12, located in suburban Franklin Park. This segment utilizes the Wisconsin Central mainline, which is owned and operated by Wisconsin Central Ltd. and is shared with a large number of mainline freight trains. The second portion of this route extends 12.7 miles from Tower B 12 to Chicago Union Station. This segment utilizes the Metra Milwaukee District West Line which is owned by Metra and is shared with Metra commuter trains operating between Chicago and Elgin, and between Chicago and Fox Lake, as well as with Canadian Pacific freight trains and Amtrak intercity passenger trains operating between Chicago, Milwaukee, and Seattle. The North Central Service commuter trains originate or terminate at the outlying Chicago suburb of Antioch, Illinois, which is on the Wisconsin-Illinois state line.

- The North Central Service between Antioch and Chicago is a relatively new addition to the Metra system. Service began on August 19, 1996, marking the first initiation of a new commuter rail line in the Chicago metropolitan area in almost 70 years. Planning for the new North Central Service involved many phases, including initial consideration by both the Regional Transportation Authority of Northeastern Illinois and the Chicago Area Transportation Study during the late 1970s, and

Map 13

ARTERIAL STREET AND HIGHWAY SYSTEM SERVING THE BURLINGTON-ANTIOCH CORRIDOR PRIMARY STUDY AREA: 1998



Source: SEWRPC.

completion of a detailed feasibility study in 1986. Improvements necessary for the initiation of commuter rail service such as lengthening of mainline sidings, construction of new railroad junctions, a new overnight train storage facility in Antioch, and station facilities, and installation of new signals were initiated in 1994 and completed in 1996.

- Ridership on the North Central Service trains has increased steadily since the service was initiated. Between August 1996—when the service was initiated—and September 1999, average weekday ridership on the line has increased from about 1,900 trips to about 4,500 trips. It was estimated that a little under 2 percent of all passengers were carried on the midday trains, the remaining trips being carried on peak-period peak-direction trains. During the 1999 fiscal year, about 1,001,000 annual passenger trips were carried on this Metra line; or about 21,100 during an average week. The average passenger trip length for all trips was 29.3 miles on the 52.8-mile route.

- Existing public bus transportation service within the Burlington-Antioch corridor is very limited. As of January 2001, the only such public services within the corridor were those of a specialized nature within each of the three Wisconsin counties primarily intended to provide transportation for the elderly and disabled. There are no specific routes for these services, advance reservations were necessary, and priority is given to trips made for nutritional, medical, and work purposes. At one time, long-distance intercity motor coach carriers companies operated daily bus routes in the corridor, but the last of these bus routes were discontinued during the 1980s. Two Pace bus routes were also operated in Illinois in conjunction with Metra's North Central Service, offering supplemental service connecting North Central Service stations with stations on other Metra routes with more frequent service during nonpeak times. The Pace bus routes began service at the same time commuter train service was started but was discontinued in August 1998.

- A potential new commuter rail route within the Burlington-Antioch corridor would extend from the existing Metra passenger station in the Village of Antioch, Illinois, to the City of Burlington. The 17.3-mile long route extension would utilize trackage owned and operated by Wisconsin Central Ltd. The potential Burlington-Antioch extension would be located along the Wisconsin Central Chicago Subdivision, the railway's main freight line between Chicago and North Fond du Lac, Wisconsin.

- Because the route was constructed as a mainline, the vertical and horizontal alignment of the railway line between Antioch and Burlington is generally well suited for high speed passenger train operation. The line consists of a single-track mainline with passing sidings. Centralized Traffic Control (CTC) is in use along this route and is controlled by Wisconsin Central dispatchers located in Stevens Point, Wisconsin. Between Burlington and Antioch, the mainline track is laid with 115-pound continuous welded rail rolled in 1973 with some small segments mostly in the Silver Lake area rolled in 1995 and 1997. Major tie replacement and surfacing of the mainline between Burlington and Antioch was undertaken during 1996 and 1997.

- The trackage and roadbed along between Antioch and Burlington are in very good condition and meet Federal Railroad Administration Class 4 track safety standards. As of January 2001, the overall maximum operating speed for freight trains was 50 miles per hour south of the STH 50 overpass and 60 miles per hour north of this overpass. There were other speed restrictions at various locations along the route such as a 20-mile per hour limit through the City of Burlington. There was no specific speed limit for passenger trains identified north of Antioch.

- The mainline between Chicago and North Fond du Lac—which includes the Burlington-Antioch segment—carries a large number of freight trains on a regular daily basis. In 1987 when Wisconsin Central assumed operations from the Soo Line Railroad Company, a total of seven freight trains were operated on a typical weekday on the Burlington-Antioch segment. In 1998, an average of 26 freight trains was being operated over this segment by Wisconsin Central on a typical weekday. These freight trains represented a variety of types including through time freights, run-through trains for the Canadian National Railway Company, intermodal trains, single commodity unit trains, local freights, and miscellaneous or special purpose trains. Because the North Fond du Lac-Chicago railway line functions as the main route funneling traffic between customers throughout central and northern Wisconsin and the Upper Peninsula of Michigan and other railways at Chicago, this has become one of the busiest railway lines in the State of Wisconsin. In addition, eight of the 10 weekday Metra commuter trains operating between Antioch and Chicago also operate between the Metra depot in Antioch and the Metra overnight storage yard at West Antioch.

- 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 106,600 vehicular crossings of the Wisconsin-Illinois State line to and from the primary study area observed on an average weekday in 1997, approximately 76,700 vehicle crossings, or about 72 percent, were made on IH 94 and USH 12. Of the 29,900 vehicle crossings not made on IH 94 or USH 12, about 15,000 were made on either USH 45 or STH 83, the two primary highway facilities connecting the primary and secondary study areas. The existing arterial street and highway system within the primary study area totaled about 347 miles.

Chapter IV

POTENTIAL COMMUTER ROUTE FACILITIES AND SERVICES

INTRODUCTION

The purpose of this chapter is to identify potential alternative commuter rail and bus facility and service options in the Burlington-Antioch corridor; to screen those alternatives; and, based upon that screening, to recommend the most practical and reasonable commuter rail alternative and bus commuter alternative for further evaluation with respect to attendant benefits and costs. The commuter rail and bus alternatives proposed for such evaluation were those exhibiting the greatest potential to provide cost effective commuter rail or bus service within the Burlington-Antioch corridor extending from Burlington to Antioch and on into the Chicago area.

The principal physical, operational, and service characteristics of any potential commuter rail or bus service in the corridor considered in the analyses included: commuter rail route alignment, commuter bus route alignment, passenger station locations and facilities, service provider arrangements, operating plans, rolling stock and vehicle requirements, railway line improvements such as necessary track and signal improvements and capacity improvements, and equipment storage and servicing needs. Alternatives for each of these characteristics were identified as necessary. The alternatives were then screened with respect to attendant advantages and disadvantages with the most promising alternative identified for more detailed evaluation.

COMMUTER RAIL AND BUS ROUTE ALIGNMENTS

The purpose of this section is to identify the most promising commuter rail and commuter bus route alignment options within the Burlington-Antioch corridor and to eliminate from further consideration alternative route alignments which are less promising.

With respect to potential commuter rail route alignment options, a prerequisite for the initiation of commuter rail service is the availability of already existing railway lines used for intercity freight or passenger train service. Ideally, such railway lines would be constructed to mainline railway standards, and connect major trip generators and residential areas. The most important advantage of an existing railway line in this respect is that its use does not entail the very high costs, disruption, and impacts associated with assembling a new right-of-way and constructing a new track where one does not already exist. Consideration was given as to whether or not there were other promising mainline route alignments within the Burlington-Antioch corridor in addition to the Wisconsin Central Chicago Subdivision. As shown on Map 12, the Wisconsin Central alignment is the only existing railway line that directly connects the western portions of Kenosha and Racine Counties with Northeastern Illinois. No other possible commuter railway line alignments are apparent.

With respect to potential commuter bus alignment options, development of a promising commuter bus route alignment was based on the following general considerations:

- The commuter bus route alignment should be designed to be comparable to the potential commuter rail route alignment with respect to the area within the Burlington-Antioch corridor to be served.

- The commuter bus route alignment should be designed to optimize its ability to provide an attractive and efficient service within the Burlington-Antioch corridor.

- The commuter bus route alignment should be designed to take advantage of the express bus mode's inherent advantages, such as the ability to provide some degree of local collection and distribution service along its route.

A prerequisite for the initiation of commuter bus service in the corridor concerned is the availability of already-existing arterial streets and highways that connect the areas of existing and planned development with already-existing Metra commuter rail routes serving the northern Lake County area of the Chicago metropolitan area. Arterial streets and highways are necessary to provide a roadway facility with pavement strength that can handle the relatively heavy motor bus vehicles on a regular basis during all seasons, as well as provide a smooth, comfortable, and rapid ride for passengers.

With respect to identifying a potential commuter bus route alignment within the Burlington-Antioch travel corridor which could function as a feeder to already-established commuter rail services in Northeastern Illinois, the following fundamental findings were evident. These included:

- A major highway facility—STH 83—parallels the proposed Burlington-Antioch commuter rail route only between Burlington and STH 50, just north of Silver Lake;

- In that portion of the Burlington-Antioch travel corridor between Silver Lake and Antioch, there is no highway facility that parallels the proposed commuter rail route. While the proposed commuter rail route is located on a direct northwest-southeast alignment in this area, the arterial highways in this same area—such as CTH B and CTH AH—are generally located at right-angles to the railway line and change direction frequently;

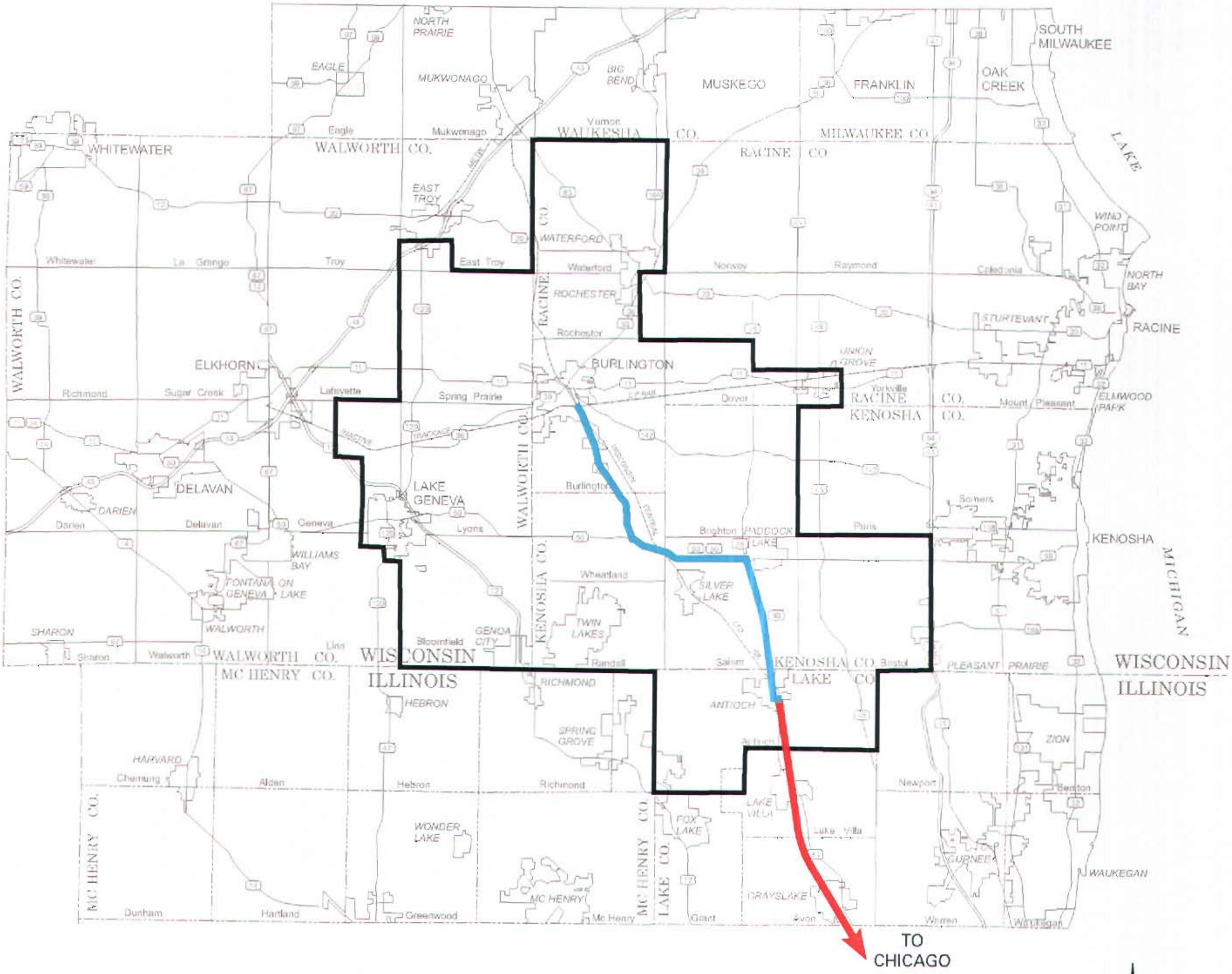
- South of STH 50, a bus route connecting the established centers of Silver Lake, Camp Lake, and Trevor would need to follow a relatively circuitous route over local streets and highways;

- Several already-established commuter rail passenger stations in Lake and McHenry Counties could be utilized as transfer locations between commuter bus feeder routes and existing Metra commuter rail services. However, the most direct and convenient transfer location for a bus feeder service in the Burlington-Antioch corridor would be the existing Metra commuter rail station in Antioch.

Based upon these considerations and findings, it was concluded that only one feasible commuter bus route existed between Burlington and Antioch. This route would extend from Burlington along STH 83 to Antioch, passing along the north side of the Village of Silver Lake and the west side of the Village of Paddock Lake, a distance of 18.4 miles. The purpose of this route would be to provide a comparable level of service under the commuter bus alternative to that provided under the commuter rail alternative for passengers traveling to and from western Kenosha and Racine Counties. The highway routing proposed for use was found to represent the most direct, as well as the only feasible route for such a feeder bus service. The route is shown on Map 14.

Map 14

PROPOSED COMMUTER BUS ROUTE ALIGNMENT



PROPOSED COMMUTER BUS FEEDER ROUTE

METRA COMMUTER RAIL ROUTE

TRAVEL CORRIDOR BOUNDARY

Source: SEWRPC.

PASSENGER STATION FACILITIES

The purpose of this section of the chapter is to identify and screen preliminary commuter rail and bus passenger station needs within the Burlington-Antioch corridor. In the context of this section, a passenger station is defined as the site, structures, and other equipment necessary to allow passengers to access commuter rail or bus services including platforms, depot buildings, shelters, parking lots, entrance drives, and other passenger amenities. The exact site, specifications, and design of such passenger facilities are more properly considered under subsequent more detailed planning, environmental assessment, and engineering phases of the development of commuter rail or bus services. Such work would follow completion of a feasibility study, and would involve cooperative assessments with 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 adequately define commuter service alternatives for feasibility assessment. The purpose of this section is to establish the likely number and approximate spacing of passenger stations; the generalized location of such facilities for purposes of feasibility assessment; and basic facility characteristics that can be used in evaluating the alternatives developed under this study.

Overall Considerations for Station Planning

Passenger stations should be located close enough to each other to conveniently serve as much of the surrounding existing and planned future urban development as possible, but far enough apart to allow trains or buses to maintain adequate average running speeds. The preliminary number of passenger stations and their spacing was determined on the basis of two principal criteria. These were the proximity of the proposed commuter rail or bus routes to concentrations of existing and planned urban development, and sufficient distance between stations to permit acceptable operating speeds, given vehicle acceleration and deceleration performance.

The proximity of potential stations to existing and planned concentrations of urban development is crucial since most of the potential ridership may be expected to 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 is shown on Map 6 in Chapter II. Much of the existing and planned urban development in the primary study area is located in and around the City of Burlington and in the Town of Salem. It was therefore concluded that, at a minimum, potential commuter stations be located either in these communities, or as near as possible to provide convenient access to and from these communities.

Stations should be spaced far enough apart so that commuter trains and buses 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 transit service.

With respect to the spacing of commuter rail stations, those serving older, established commuter rail routes have average spacings ranging from two to five miles, with three miles being typical. For example, the average station spacings on several Metra commuter rail lines serving the Lake and McHenry County areas of Northeastern Illinois range from 2.8 miles to 3.2 miles. The average station spacing on the new Metra North Central Service between Chicago and Antioch is 2.9 miles. Station spacings on some recent new-start commuter rail routes in other areas of the United States and Canada, however, are longer. Stations on such new-start lines have been centrally located only within the most densely developed urban areas that may be expected to generate the largest number of potential passengers. The advantages of longer station spacings include: 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 cost requirements for passenger station facilities. The primary disadvantage of longer station spacings is the lower level of accessibility provided along the route, resulting in a smaller potential passenger market. In most cases, it is the intent of the operators 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. The average station spacing 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.

The spacing of commuter bus stations varies considerably depending upon the characteristics of each individual route. There are many existing rapid transit and express bus routes in Southeastern Wisconsin that provide what is essentially commuter service. Many of the freeway flyer routes operated by Milwaukee County Transit System stop only at designated park-ride lots in outlying areas, resulting in a typical station spacing of two to five miles; but make stops every one-quarter mile in the Milwaukee central business district. The suburban bus routes operated by Wisconsin Coach Lines, Inc., in the Milwaukee-Waukesha-Oconomowoc and Milwaukee-Racine-Kenosha corridors also have stop spacing in the outlying areas varying from one to five miles, but have short stop spacing varying from one-quarter to one-half mile in the more densely developed urban areas. Some of these commuter bus services will also make stops at other than the regular stop locations at the request of passengers.

Some of the bus routes operated by Pace, the suburban bus operating division of the Regional Transportation Authority for Northeastern Illinois, are specifically coordinated with Metra commuter rail service and function largely as feeders to Metra commuter rail routes. These Pace bus services are referred to as supplemental routes and provide service to commuter rail stations during periods when train service is not operated. Since these supplemental bus services typically stop only at the commuter rail stations, the station spacing of the bus routes is very similar to the commuter rail station spacing, which varies from two to three miles. In actuality, the supplemental bus service station spacing is somewhat longer than the commuter rail station spacing along the same route since the bus routes must follow a more circuitous route over local streets and highways between the stations. The Pace supplemental bus service operated for the Metra North Central Service commuter rail route between Antioch and Chicago and for the Metra SouthWest Service commuter rail route between Orland Park and Chicago provide examples of the type of potential feeder bus service contemplated in the Burlington-Antioch corridor.

Once the overall number and spacing of passenger stations along the commuter rail route is determined, further consideration may be given to the specific location of each facility. The primary criteria used to identify specific passenger station locations for this feasibility study included:

- The location, extent and intensity of existing and planned urban and suburban development in the vicinity of the stations. It is desirable that commuter rail and bus stations be centrally located in concentrations of existing and planned residential development as well as in central business districts and as close as possible to other major traffic generators. Concentrations of residential development located up to a distance of three miles from a station can be adequately served since commuter rail and bus services will generally be dependent upon park-ride lot and feeder bus access as well as upon direct walk 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 and possibly feeder bus access facilities. Commuter rail stations can be the least elaborate of all types of rail transit stations and bus stations or stops are typically the least elaborate of all types of public transit stations. However, significant area may be required for park-ride lot 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. Convenient access by automobile is particularly important since commuter rail normally relies heavily on passengers who use the train by choice and who drive to and from outlying stations. The arterial street and highway system in the corridor is shown on Map 13 in Chapter III. Passengers should also be able to readily interconnect with other urban and intercity transportation modes;

- Historic locations of rail and bus 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.

Number and Locations of Passenger Stations

Based on these considerations, a basic set of station locations within the corridor was identified for the commuter rail alternative and for the commuter bus alternative.

With respect to commuter rail stations, it was determined that, at a minimum, the long established community areas in and around Burlington and Silver Lake should be served by appropriately located stations. Additional commuter rail stations were considered near other areas of already-established development. For example, a station at the CTH C crossing or the CTH AH crossing could serve residents in the Trevor and Camp Lake areas. A station at the CTH JB crossing could serve residents in the Bohner Lake area. It was noted, however, that the resident populations of these areas that would be directly served by the additional stations would be relatively small. Moreover, because these additional potential stations are located relatively close together—and close to the proposed Antioch, Silver Lake, or Burlington stations—they would offer little, if any, advantage with respect to determining the feasibility of such a service. In addition, several stations located close together could keep trains from attaining relatively high average running speeds. It was also recognized that should commuter rail service be implemented in this corridor, alternative station locations or additional stations could be considered.

Accordingly, for purposes of this feasibility study, a basic set of commuter rail stations for a Burlington-Antioch corridor commuter rail extension was identified consisting of three stations, as listed in Table 13, and as shown on Map 15. The average station spacing would be about eight miles. This relatively wide spacing is reflective of the absence of urban development between Silver Lake and Burlington. Specific locations for the two potential commuter rail stations were identified as follows:

- BURLINGTON–As shown on Map 16, this station site would be located along the Wisconsin Central Nestle Spur track on the south side of the City of Burlington. This station site is envisioned as being located immediately west of the Wisconsin Central mainline and Pine Street (STH 83) and parallel to Market Street. This location is about eight blocks south of downtown Burlington and would be immediately northeast of the Burlington industrial park and along the north edge of the Nestle Foods Corporation plant. This location would facilitate walk access to and from the residential area south of downtown Burlington and some firms in the industrial park. This location would also be intended to serve trips arriving by automobile from throughout the City of Burlington and environs. Development of a station at this site may require acquisition of some adjacent land for parking and access through purchase or lease. The amount of additional land that would be needed would be dependent upon final design of the station facility. This site would also allow the already-existing Nestle Spur to be used to hold commuter trains off the mainline before and after deadheading to and from an overnight storage yard.

  One alternative station site, also as shown on Map 16, would be located along the Wisconsin Central mainline in the same general area as the Nestle site. The alternative site is envisioned as being parallel to, and along the east side of, the mainline at the east end of Market Street on what is now largely vacant land. Primary access to this site would be via the proposed extension of Calumet Street, which upon completion could offer good access to the arterial street and highway system. Development of a station at this site would require the use of municipally owned land and would be dependent upon the ultimate disposition of that land. Land in the immediate area that is now occupied by the former sewage treatment plant facility could also be utilized. Development of a station at this site would be dependent upon the ultimate design of the Calumet Street extension including its bridge over the Wisconsin Central mainline as well as the disposition of the sewage treatment facility.

  Another alternative station site, also shown on Map 16, would be located in the vicinity of where a proposed highway bypass around the east and south sides of the City of Burlington would cross the Wisconsin Central mainline. This would be located about one mile south of the Nestle station sites. As of December 1999, the Wisconsin Department of Transportation had completed preliminary engineering work and a draft environmental impact statement for the bypass. This location would be intended to serve trips arriving by automobile from throughout the City of Burlington and environs

Table 13

POTENTIAL PASSENGER STATIONS TO BE USED FOR FEASIBILITY ASSESSMENT ON THE BURLINGTON–ANTIOCH COMMUTER RAIL ROUTE

Milepost Location	Passenger Station Name	Distance (miles)	
		Southbound	Northbound
55.4	Antioch..............	- -	16.0
61.5	Silver Lake	6.1	9.9
71.4	Burlington	16.0	- -

Source: SEWRPC.

and would require land acquisition. It is recommended that any further planning efforts for commuter rail service in the Burlington-Antioch corridor consider this alternative station site.

Another alternative station site, also shown on Map 16, would be located at the existing Wisconsin Central depot on Commerce Street about three blocks north of downtown Burlington. The site is relatively small and is situated between an active agricultural cooperative to the west and the shore of Echo Lake to the east.

The railroad buildings and property on this site continue to be used as a maintenance base and storage area for equipment and materials. Thus, securing adequate space for passenger boarding facilities and a park-ride lot may be difficult without acquiring adjacent, already-developed property. With respect to automobile access, use of this location would require that most traffic travel through the center of downtown Burlington. Accordingly, this site was judged to be more restrictive and less attractive than either the Nestle or Market Street sites. Also, because the Nestle and Market Street sites are located on the south side of the city, commuter trains operating between Burlington and Antioch would have a shorter operating time and higher average speed, and would need to cross fewer grade crossings through the City of Burlington.

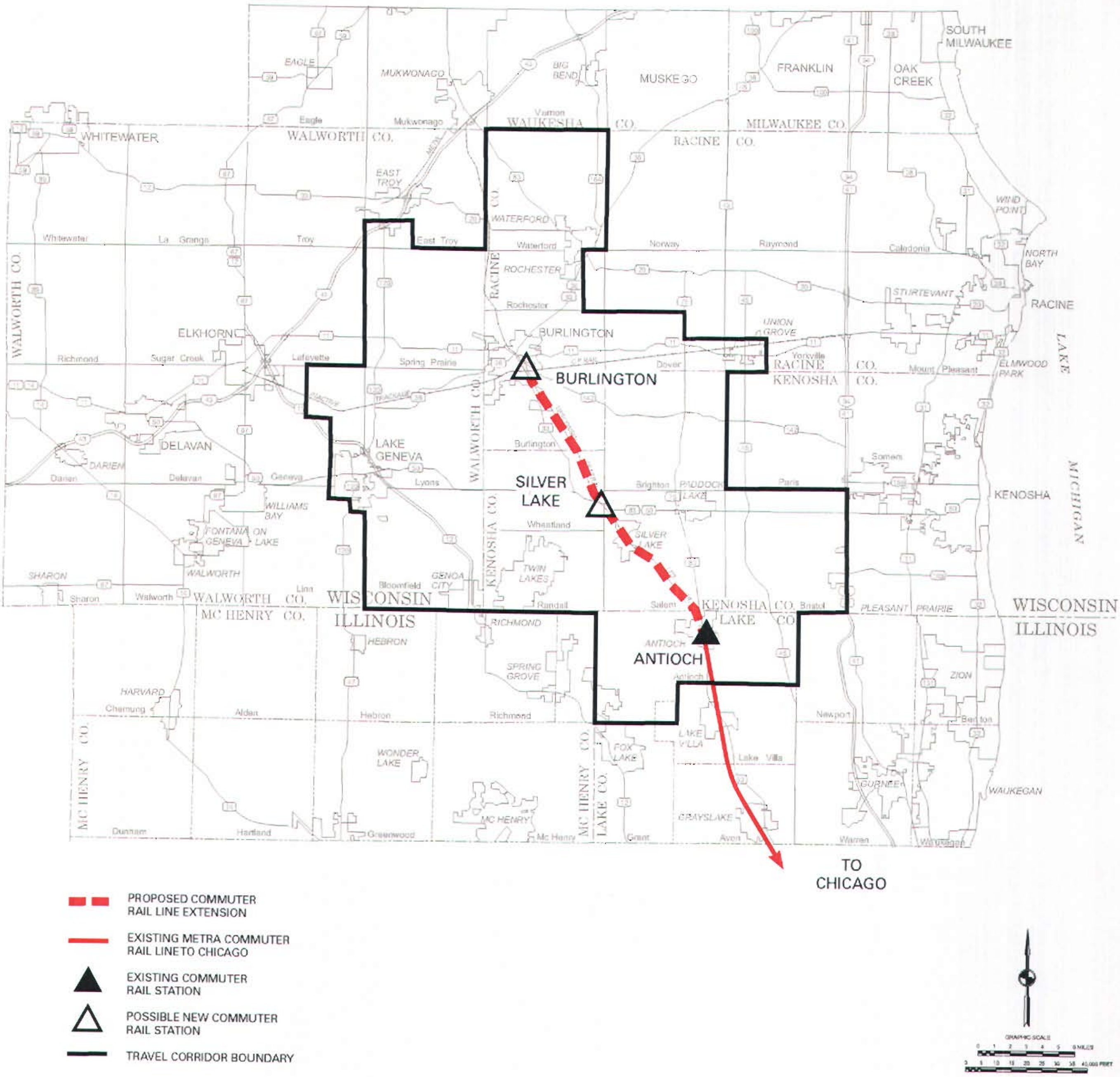
- SILVER LAKE—As shown on Map 17, a potential station could be located where the Wisconsin Central mainline crosses underneath STH 50 near the north side of the Village of Silver Lake. This site would be located about 2.3 miles north of the center of Silver Lake and would be well located to serve trips arriving by automobile via STH 50 from throughout the surrounding area. This would include not only the Villages of Paddock Lake and Silver Lake, and the Town of Wheatland, but also the City of Lake Geneva. The major east-west arterial highway serving western Kenosha County is STH 50. The location of a station along STH 50 could be expected to open up a larger potential passenger market for this service.

  Another potential station site serving the Silver Lake area would be located along the Wisconsin Central mainline in the center of the Village of Silver Lake, as shown on Map 17. This site would be located near the east end of Depot Street between the S. Coswell Drive (CTH B) and E. Park Street grade crossings, and is the approximate location of the former Soo Line passenger depot for Silver Lake. The site would be well located to provide direct walk access to and from much of the older, developed portions of the Village of Silver Lake. It could also serve trips arriving by automobile from throughout the surrounding area although that traffic would have to use the county highways leading into Silver Lake. Compared to the STH 50 site, it was suggested that this site might require much simpler station parking lot and driveway design. Parking areas could be easily accommodated in the surrounding area. It was concluded that the above considerations with respect to both potential station sites were important and the study should keep open both of these options. A final decision would be made only after cooperative input from officials and citizens in the local area, participating railroad companies, and the service-operating agency involved.

- ANTIOCH - This station would utilize the existing Metra passenger depot located on Depot Street about three blocks east of downtown Antioch. Because Metra already uses this facility, it is already established as a commuter rail passenger station and as a transportation center for the Antioch area. This site is well located to provide direct walk access to the older developed portion of Antioch and to serve trips from throughout the area arriving by automobile, taxi,

Map 15

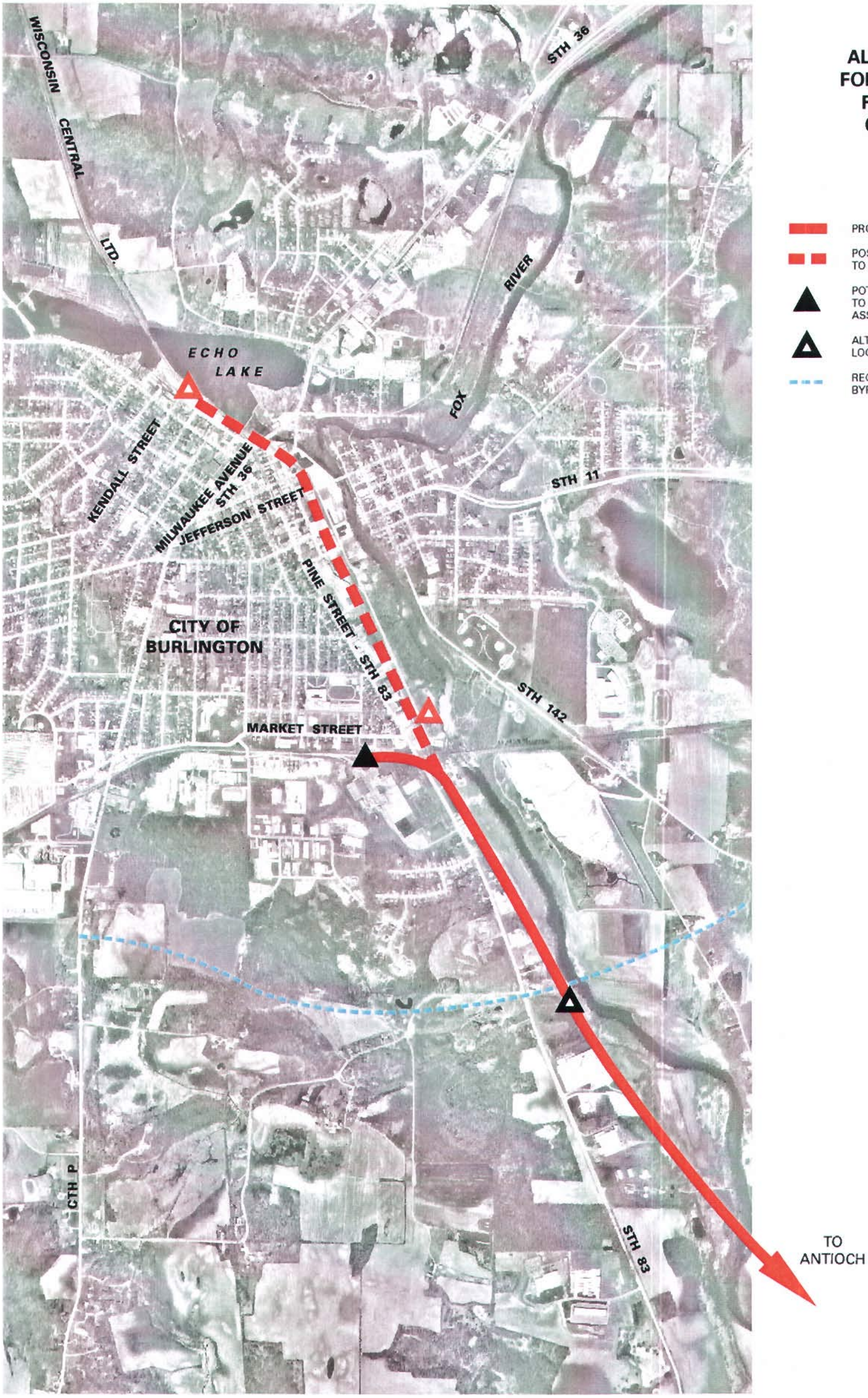
GENERAL LOCATIONS FOR POSSIBLE COMMUTER RAIL PASSENGER STATIONS IN THE BURLINGTON-ANTIOCH CORRIDOR



Source: SEWRPC.

Map 16

ALTERNATIVE LOCATIONS FOR POSSIBLE COMMUTER RAIL STATION FOR THE CITY OF BURLINGTON



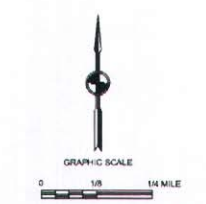
PROPOSED COMMUTER RAIL ROUTE

POSSIBLE COMMUTER RAIL ROUTE TO ALTERNATIVE STATION LOCATIONS

POTENTIAL NEW STATION LOCATION TO BE USED FOR FEASIBILITY ASSESSMENT

ALTERNATIVE STATION LOCATIONS (RED OR BLACK)

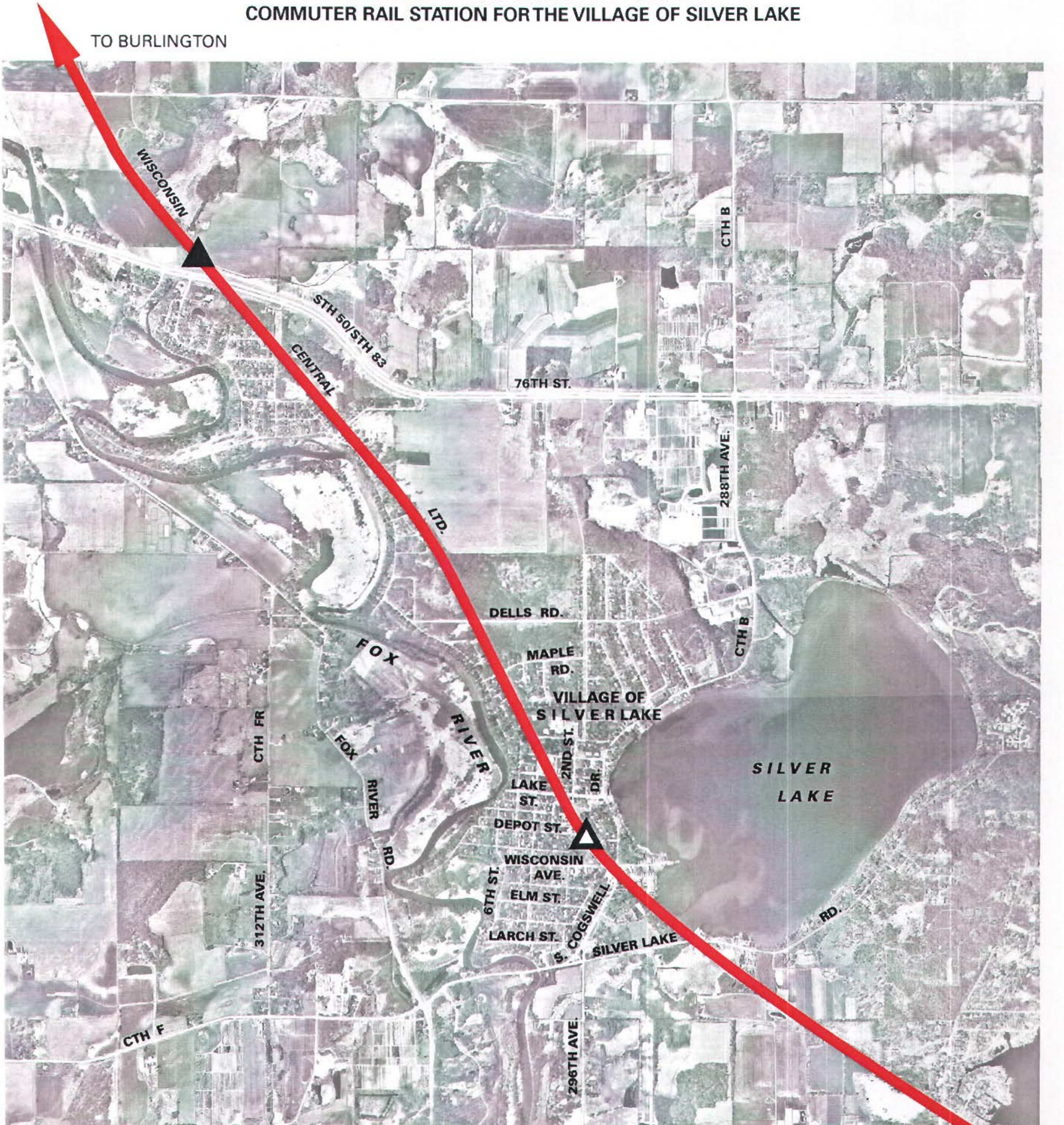
RECOMMENDED HIGHWAY BYPASS ROUTE



Source: SEWRPC.

Map 17

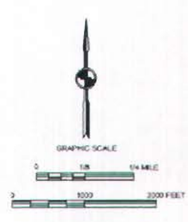
ALTERNATIVE LOCATIONS FOR POSSIBLE
COMMUTER RAIL STATION FOR THE VILLAGE OF SILVER LAKE



PROPOSED COMMUTER RAIL ROUTE

POTENTIAL NEW STATION LOCATION TO BE USED FOR FEASIBILITY ASSESSMENT

ALTERNATIVE STATION LOCATION



Source: SEWRPC.

Table 14

POTENTIAL PASSENGER STATIONS TO BE USED FOR FEASIBILITY ASSESSMENT OF THE BURLINGTON-ANTIOCH CORRIDOR COMMUTER BUS SERVICE

Station Name	Distance (miles)	
	Southbound	Northbound
Burlington Park-Ride Lot	- -	18.4
Silver Lake	9.8	8.6
Antioch–Metra Depot	18.4	- -

Source: SEWRPC.

and local bus routes. The depot area already has automobile parking facilities and good access from the arterial street and highway system.

With respect to commuter bus stations, it was concluded that at a minimum, the long-established community areas along the proposed bus route should be served by appropriately located stations or stops. Because the acceleration, deceleration, and operating speed characteristics for buses differ from that of commuter rail equipment, stations or stops for commuter bus services can be located closer together. Also, since the commuter buses are not confined to a single railway line routing, they have the ability to connect a larger number of communities or developed areas. It was recognized that should commuter bus service be implemented in the corridor, alternative station and depot locations and additional stations and stops could be considered.

Accordingly, for purposes of this feasibility study, a basic set of commuter bus stations in the Burlington-Antioch corridor was identified consisting of three stations, as listed in Table 14, and as shown on Map 18. The commuter bus stations are intended to be comparable to the commuter rail stations described earlier. The average commuter bus station spacing would be about 9.2 miles. Specific locations of the three potential commuter bus stations were identified as follows:

- BURLINGTON—As shown on Map 19, this station would be located near the intersection of Pine and Wainwright Streets on the south side of the City of Burlington. This station would be located along the proposed Calumet Street and STH 83 extension on property that would be acquired and cleared for the Calumet Street extension and overpass at the Wisconsin Central railway line. This station would include a parking lot and would be primarily intended to serve trips from throughout the Burlington area arriving by automobile, taxicabs, and shuttle vans.

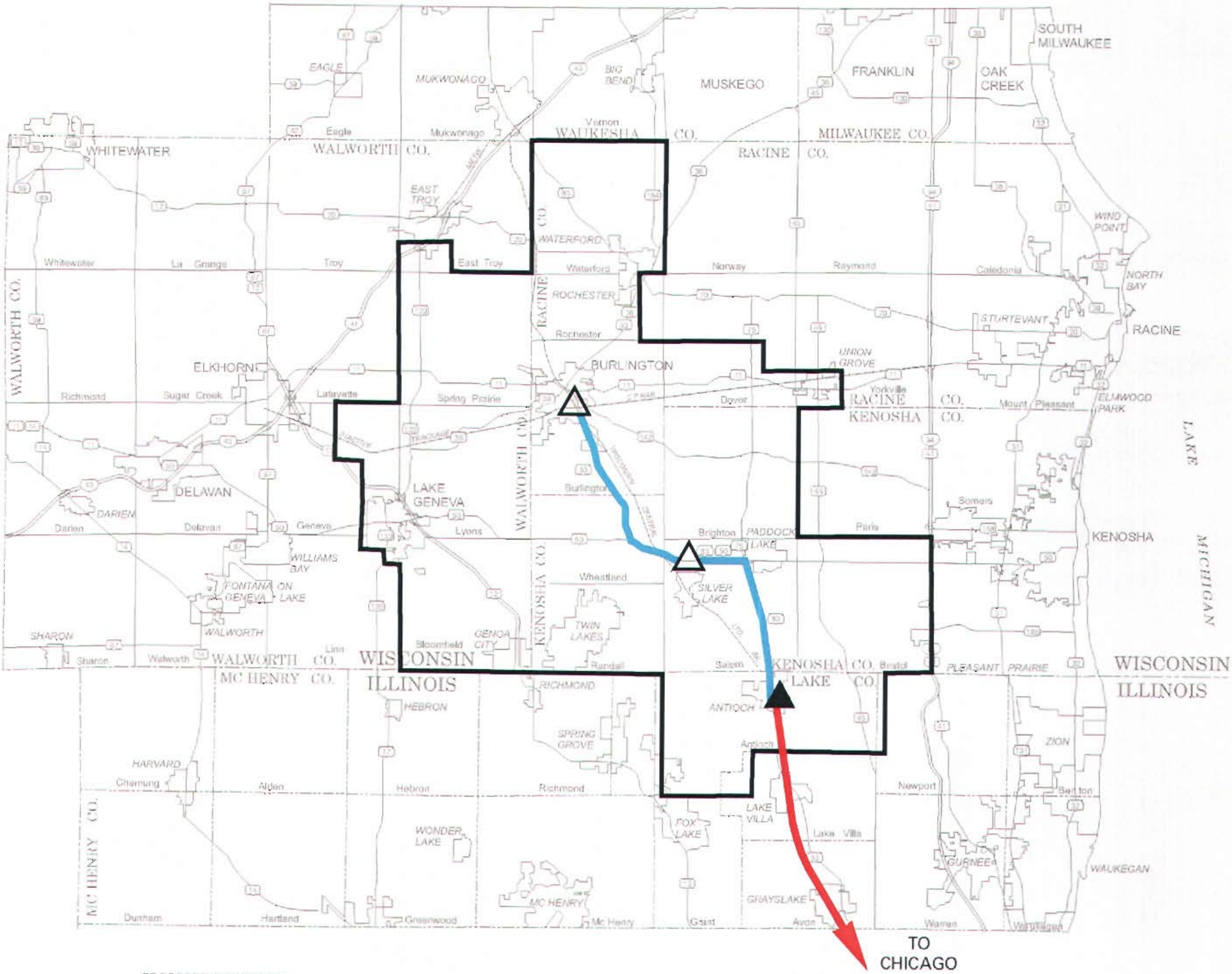
  Another alternative station site, also as shown on Map 19 would be located in the vicinity of where a proposed highway bypass around the east and south sides of the City of Burlington would cross the Wisconsin Central mainline. This would be located about one mile south of the Nestle station sites. As of December 1999, the Wisconsin Department of Transportation had completed preliminary engineering work and a draft environmental impact statement for the bypass. This location would be intended to serve trips arriving by automobile from throughout the City of Burlington and environs and would require land acquisition. It is recommended that any further planning efforts for commuter bus service in the Burlington-Antioch corridor consider this alternative station site.

- SILVER LAKE—As shown on Map 20, this station would be located near the intersection of 75th Street—STH 83 and 50—and 288th Avenue—CTH B, about 1.5 miles north of downtown Silver Lake. This station would include a parking lot and would be primarily intended to serve trips from throughout the Silver Lake area arriving by automobile.

- ANTIOCH—This station would utilize the existing Metra passenger depot located on Depot Street about three blocks east of downtown Antioch. Because Metra already uses this facility, it is already established as a commuter rail passenger station and would be an appropriate location for passengers transferring between the feeder bus route and already-established Metra commuter trains to and from Chicago.

Map 18

GENERALIZED LOCATIONS FOR POSSIBLE COMMUTER BUS PASSENGER STATIONS AND STOPS IN THE BURLINGTON-ANTIOCH CORRIDOR



PROPOSED COMMUTER BUS FEEDER ROUTE

EXISTING METRA COMMUTER RAIL LINE TO CHICAGO

EXISTING COMMUTER RAIL STATION

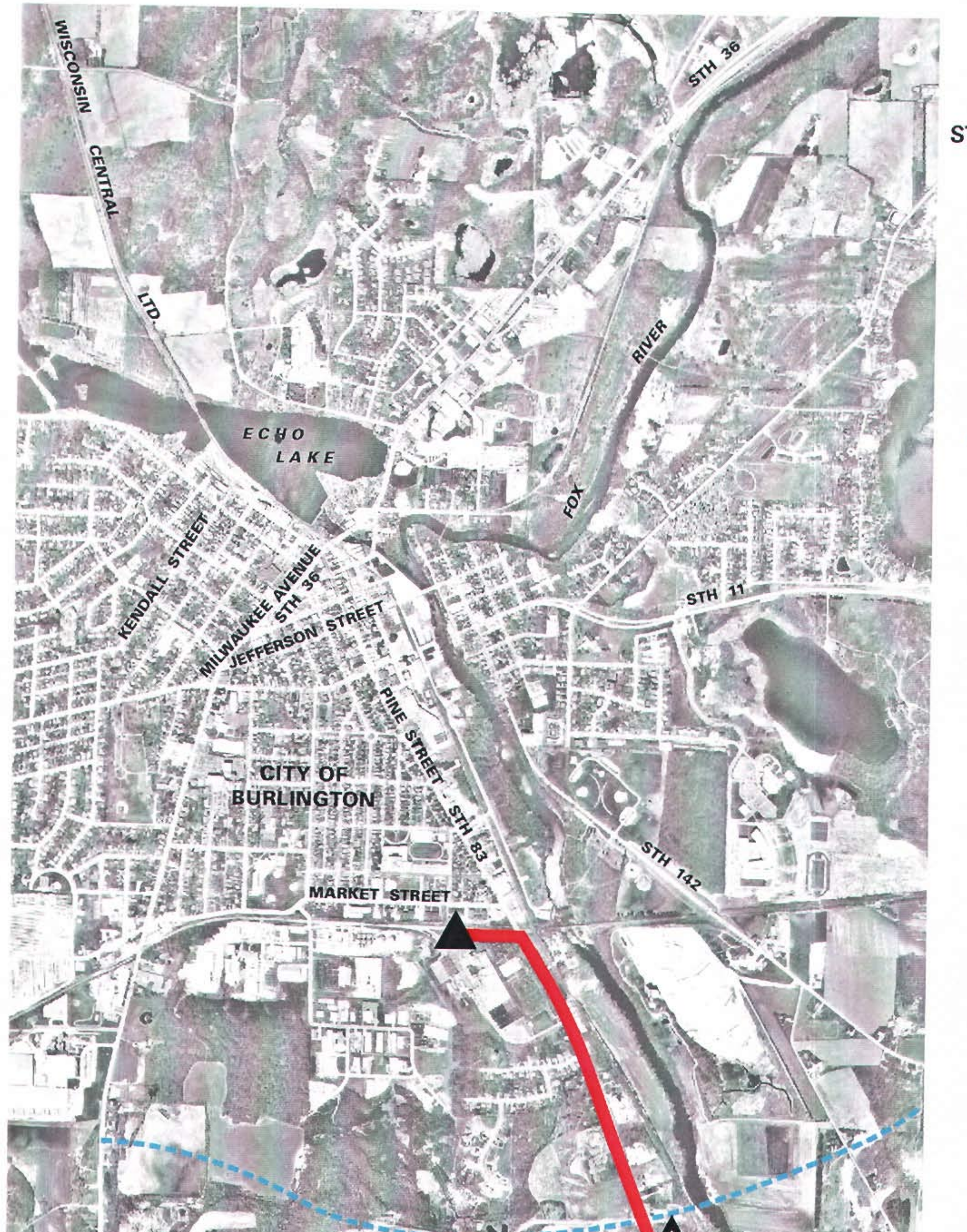
POSSIBLE NEW COMMUTER BUS PARK AND RIDE LOT

TRAVEL CORRIDOR BOUNDARY

Source: SEWRPC.

Map 19

ALTERNATIVE LOCATIONS FOR POSSIBLE COMMUTER BUS STATION FOR THE CITY OF BURLINGTO



PROPOSED COMMUTER BUS ROUTE

POTENTIAL NEW STATION LOCATION USED FOR FEASIBILITY ASSIGNMENT

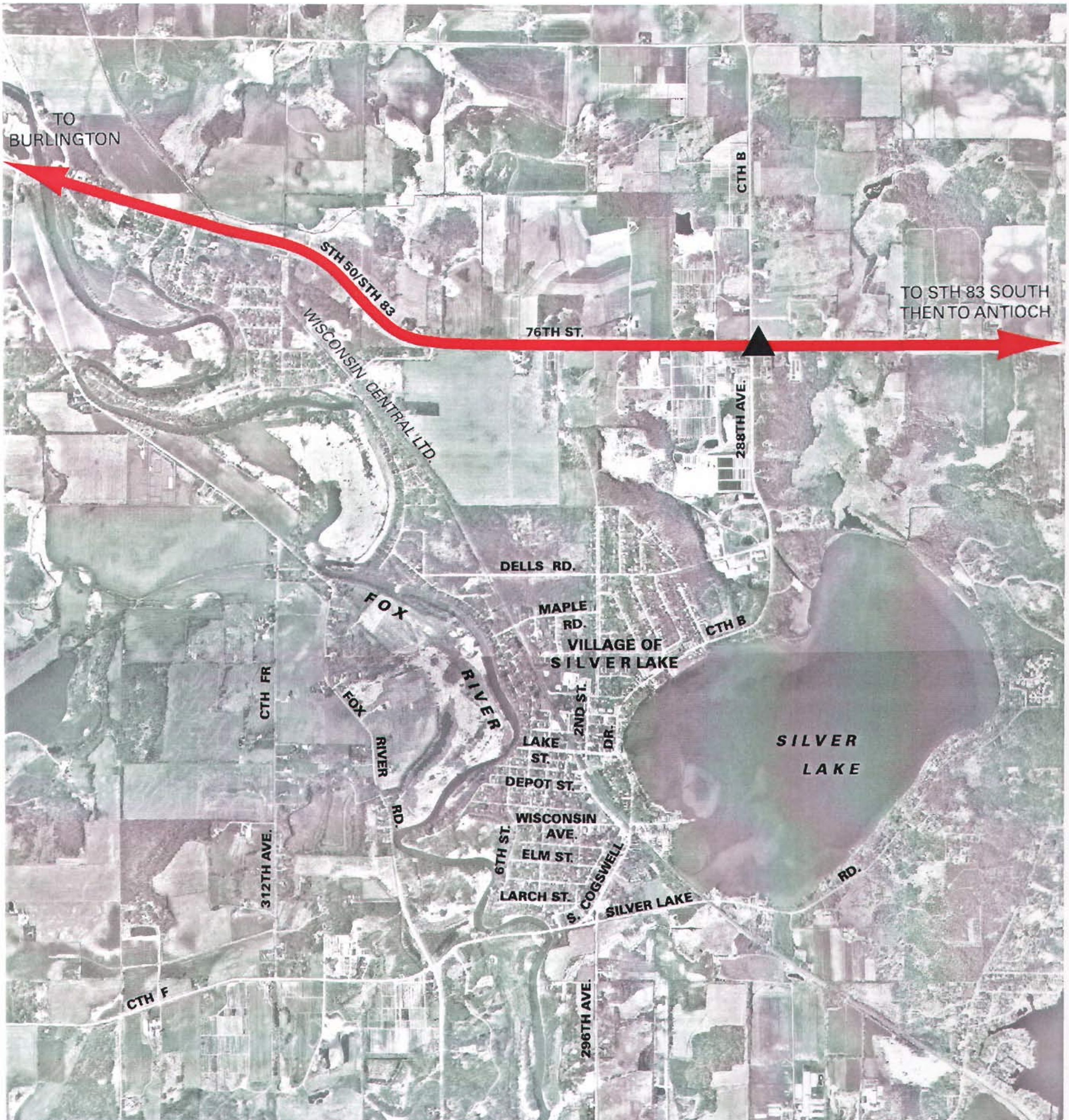
ALTERNATIVE STATION LOCATION

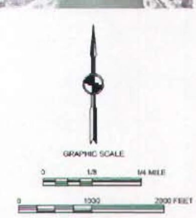
RECOMMENDED HIGHWAY BYPASS ROUTE

Source: SEWRPC

Map 20

GENERALIZED LOCATION FOR POSSIBLE COMMUTER BUS STATION FOR THE VILLAGE OF SILVER LAKE





Source: SEWRPC.

Basic Commuter Rail and Commuter Bus Passenger Station Facility Requirements
As already noted, determination of the precise configurations and details for individual bus or rail 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 used are generally consistent with railway and bus station design guidelines and standards utilized in Southeastern Wisconsin and Northeastern Illinois. The guidelines seek to minimize capital cost requirements while providing adequate station facilities.

The size and complexity of railway and bus stations varies widely. Such stations may simply consist of one or more boarding platforms, a waiting shelter, and pedestrian access and small automobile parking facilities. Stations at locations generating large volumes of passengers may have very elaborate facilities and especially for commuter rail systems, may include 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 for present-day commuter rail systems were originally constructed by private railway companies when those companies operated extensive intercity and commuter rail passenger train services. This is especially true of the commuter rail depot buildings located in the central business districts of the larger cities of the United States. In any case, the facility needs for commuter rail stations are usually greater and more complex than the facility needs for commuter bus stations. Thus, certain portions of the following description of station facilities will pertain only to commuter rail stations.

The design of commuter stations must facilitate access by passengers to station facilities and to buses and trains 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 such as Metra, which provides the existing commuter rail service between Antioch and Chicago and bus services in Wisconsin or Illinois.

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

Platforms
To facilitate movement of passengers in commuter rail and commuter bus station areas, the design of platforms should consider the existing and future location of depot buildings, shelters, automobile parking, and points of public access. Platforms for commuter rail stations are usually longer than those for commuter bus stations since passengers on commuter trains will board or disembark from several coaches at once during a station stop. Where commuter rail platforms are located near existing streets and highways with at-grade crossings, interruption of vehicular traffic at the crossings should be minimized to the extent possible. Boarding trains across active tracks should be avoided. On single-track lines, such as the Burlington-Antioch route, one platform should be provided on the same side of the track as the public access and parking facilities. Consideration should be given to the possible need to add a second track at the station in the future.

In general, platforms should be located along tangent segments of track or roadways. For commuter rail stations, this is important since it will provide the train crew with a clear view of boarding and alighting passengers. Platforms should be of low level design. Such design will, however, require the provisions of the Federal Americans with Disabilities Act to be met. For commuter rail stations, the platform width should be a minimum of ten feet. Platform length should be based upon projected peak passenger boarding volumes and train operational requirements as shown in Table 15.

For commuter bus stations, the paved platform waiting areas should be a minimum of 12 feet in width by 25 feet in length for each bus loading position. If the bus station is anticipated to have heavy peak passenger volumes, multiple bus loading bays may be necessary.

Table 15

MINIMUM COMMUTER RAIL PASSENGER STATION PLATFORM LENGTHS

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

Source: Metra and SEWRPC.

Platform Access

For both commuter rail and commuter bus stations, sidewalks, stairways, and ramps should be located to provide a clear and direct path for passengers going to and from the platforms. Where public access and platforms are at different elevations, ramps or stairs, or both, should be provided. Whereas the parking areas and platforms for commuter bus stations are normally at the same elevation, parking areas and platforms for commuter rail stations are sometimes at different elevations. 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 individuals with disabilities. Where elevators need to be provided, they should be located adjacent to the main access point of the platform, and should conform to the applicable requirements for accessibility for individuals with disabilities.

At commuter rail stations, special consideration should be given to minimize the need for passengers to cross active railway tracks at grade. Crossings that are necessary shall be planned to provide direct, but safe, access between platforms, depot buildings, parking areas, pickup points, and connecting taxi and bus service. Locations where pedestrians must cross tracks should be provided with warning devices such as flashing lights and bells.

At commuter rail stations, site conditions and 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 upon the peak boardings in the plan design year. Specific passenger station design will depend upon forecast ridership and local community desires. Typically, the only structures used at bus stations—such as park-ride lots—are one or more modular shelters. Depot buildings are usually used at bus stations only where several bus routes converge and the location is used as a major transit center or transfer point between bus routes. However, the type of structures at commuter rail stations will vary. At commuter rail stations, forecast passenger demand will help to identify the type of waiting area structure to be used at a given station based on the general guidelines provided in Table 16.

With respect to commuter rail station structures, a passenger depot is an enclosed, heated structure that includes a passenger waiting area and possibly other areas for ticket agent operations, vendor space, public rest rooms, storage, crew facilities, janitor and maintenance operations, and miscellaneous passenger furnishings and amenities. A small depot may have a daily ridership of 500 to 1,000 boardings. A large depot may have a daily ridership of over 1,000 boardings. The complexity of an individual depot will be dependent upon 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 17. A warming house is defined as a fully enclosed and heated structure providing accommodations for waiting passengers only. A shelter is an open structure having three or four sides 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 that provides a covered connection between station buildings and boarding trains.

Parking and Drop-Off Areas

Both commuter rail and commuter bus station sites should be designed to accommodate a variety of access modes including pedestrian, bicycle, bus, taxi, automobile drop-off and pick-up, shuttle vans, and park-ride. Circulation

Table 16

GUIDELINES FOR TYPES OF STRUCTURES AT COMMUTER RAIL AND BUS PASSENGER STATIONS

Projected Peak Train or Peak Bus Passenger Boardings	Type and Number of Structures
1 - 24	1 Standard Shelter
25 - 49	2 Standard Shelters or 1 Large Shelter
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.

Table 17

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.

patterns on the station site should be designed to provide good transition and eliminate conflicts between different modes of transportation.

Adequate public parking is important in the design of commuter rail and commuter bus stations. Stations should provide the number of parking stalls required based on projected peak usage during the plan design period.

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 passenger environment. Such amenities consist of those fixtures, furnishings, and equipment providing conveniences to passengers. These may include, but not be limited to: 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 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 site.

ALTERNATIVE SERVICE PROVIDER ARRANGEMENTS

The purpose of this section of the chapter is to provide an evaluation of alternative service provider arrangements for commuter rail and commuter bus service within the Burlington-Antioch corridor. An appropriate public entity within Wisconsin would need to be designated as responsible for implementation, funding, and operation of the service and to serve as the administrative organization and sponsoring agency for this service. This could be an office or department of an existing unit of government or agency at the municipal, county, or state level; or a new public agency specifically created for this purpose. Such entities already exist within Illinois in the form of Metra and Pace.

The range of possible service provider arrangements include: 1) provision of service by a public entity contracting with an existing operator; 2) provision of service by a public entity contracting with a new private operator through a competitively awarded contract; and 3) provision of service by a new local public provider as the direct operator. These alternative service provider arrangements are described below.

Provision of Service by a Public Entity Contracting with an Existing Operator
Under this type of arrangement, service would be provided by an existing transit operator. With respect to commuter rail, the only existing operator in the area is Metra. Metra is an established operating agency with a reliable service, safety, and dependability record and has the experience to operate a successful commuter rail

service. In providing service in the Burlington-Antioch corridor, it may be most cost effective to expand as necessary Metra's existing staff of operators, mechanics, and ticket agents, as well as rolling stock fleet and facilities than to have a new agency procure equipment, assemble staff, and create the necessary infrastructure for commuter service. Metra is also experienced in negotiating trackage use and purchase-of-service agreements with freight railroads for commuter service. Under this alternative, the day-to-day control over service, costs, and other factors would be the responsibility of Metra. Because Metra already operates the Antioch-Chicago commuter rail service, it could readily provide a through service between the Burlington-Antioch extension and Chicago, which would not require passengers to transfer between trains at Antioch. Through service to and from Chicago is considered to be essential in attracting any ridership to the Burlington-Antioch service. It was therefore concluded that provision of potential commuter rail service in the Burlington-Antioch corridor by Metra was a reasonable and practical service provider arrangement.

Most of the potential Burlington-Antioch extension would be in Wisconsin, and it is likely that virtually all of the passengers anticipated to use such an extension would board at Wisconsin stations. Thus, it may be assumed that the costs for such a service extension would have to be borne by an appropriate Wisconsin public entity. Metra responsibilities lie entirely with addressing transportation needs and providing service within the six-county Northeastern Illinois Region. The Metra service territory includes Lake County as well as Cook, Du Page, Kane, McHenry, and Will Counties. Metra officials have indicated that providing regularly scheduled weekday commuter rail service outside its territory could be considered. However, such service could only be operated if another responsible party provides funding for all necessary capital costs and all net operating costs for that portion of the service outside Metra territory; and if Metra has the equipment and staff to undertake such an extension. While Metra may be able to provide service outside its territory, as of the end of 1998, no such service was being provided on a regular basis with one exception, that being the Metra Union Pacific North Line which provides service to Kenosha, Wisconsin. This route is unique in that it is the only Metra route that currently extends outside the six-county Northeastern Illinois Region without receiving any public funding other than by Metra. The primary reason for this is the existence of overnight train storage facilities at Kenosha that are currently used by Metra and are, therefore, an operational convenience to Metra and Union Pacific Railroad. Any provision of commuter rail service in the Burlington-Antioch corridor will require sponsorship and funding for almost all capital and operating cost needs by a Wisconsin entity.

With respect to commuter bus, the only existing operator of fixed-route service in the corridor is Pace. Pace is an established operator with a reliable service, safety, and dependability record and has the experience to operate commuter bus service. As noted previously, Pace provides the suburban bus service in the Chicago metropolitan area and, in fact, has provided the supplemental and feeder bus services that have been coordinated with some Metra commuter rail routes. Pace operates a wide variety of local and express fixed-route services as well as dial-a-ride, paratransit, and vanpool services throughout Northeastern Illinois. Fixed-route services include bus routes operated as feeders and supplements to Metra commuter rail service, and many of the outlying routes serving low-density areas such as those in Lake County. For many of these routes, and especially where such a route would require a lengthy deadhead mileage from Pace garage facilities, Pace contracts with private transit providers. In 1998, Pace contracted directly with eight such private providers for fixed-route service throughout its territory.

Like Metra, Pace responsibilities lie entirely with addressing transportation needs and providing service within the six-county Northeastern Illinois Region. Also, like Metra, Pace does not normally provide fixed-route bus services outside its six-county territory, and to date, the only Pace routes that operate outside the six counties do so to reach the Hammond, Indiana, transit center, a major transfer point located only about one mile east of the Illinois-Indiana state line. Pace officials have indicated that Pace would provide fixed-route service—such as the commuter feeder route envisioned in this study—between Northeastern Illinois and Southeastern Wisconsin only under contract with a private operator. This would provide no advantage over a Wisconsin public entity directly contracting with a private operator. In fact, the extra step of providing such service through Pace would serve to complicate the service procurement process and could increase the cost entailed because of the need to reimburse Pace for overhead costs. For this reason, it was concluded that provision of potential commuter bus service in the

Burlington-Antioch corridor by an existing public operator was not a practical service provider arrangement and would not be considered further.

Provision of Service by a Public Entity Contracting with a New Private Operator through a Competitively Awarded Contract

Under this type of arrangement, service would be provided by a new private operator through a competitively awarded contract. This service provider arrangement would be expected to be more practical for a commuter bus alternative than for a commuter rail alternative. Within the Southeastern Wisconsin Region, Waukesha County utilizes this kind of arrangement to provide Milwaukee oriented suburban and commuter bus transit services.

With respect to commuter rail, a new private operator could conceivably be any other private firm—including another railroad company—that was qualified to operate passenger train service. However, it was considered unlikely that any operators would be permitted to operate passenger trains south of Antioch on Metra-owned trackage other than Metra. Thus, passengers would be required to change trains at Antioch. The inconvenience of changing trains at Antioch, and the attendant adverse effect on potential ridership levels; together with the operational complexity of operating non-Metra commuter trains into Antioch, provided sufficient reason to conclude that provision of potential commuter rail service in the Burlington-Antioch corridor by a new private operator would not be a practical service provider arrangement and should not be considered further in this feasibility study.

With respect to commuter bus, the service contract between the responsible public entity and the successful private transit operator would cover all of the costs of day-to-day operations, including the provision of necessary capital facilities such as a storage and maintenance garage. Under this kind of arrangement, the private transit operator would supply the necessary operating equipment, staff and facilities as part of its service contract. The private operator may require a garage facility for overnight bus storage, cleaning, and servicing somewhere in the Burlington area. If the successful operator did not already have such a facility, one would have to be developed. This, however, would be the responsibility of the operator under terms of the contract. An advantage of this arrangement is that the responsible public entity would not have the responsibility to make potentially large capital outlays for equipment and facilities. It was concluded that provision of potential commuter bus service in the Burlington-Antioch corridor by a public entity contracting with a new private operator was a reasonable and practical service provider arrangement.

A variation of this service provider arrangement would be for the responsible public entity to purchase the operating equipment and facilities that would be necessary and provide them to a private transit operator who would be selected through a competitively awarded contract. This variation would also recognize that the potential transit operators might not have the financial resources or capability to fund the needed level of capital expenditures. Under this variation, the responsible entity could draw on Federal transit programs to offset the major portion of the major expenditures required for capital equipment and facilities. This variation would assure the responsible public entity of having the desired equipment and facilities. This arrangement, however, would be more complicated and could require greater lead time than simply contracting with an operator for the service as well as the necessary equipment and support facilities.

New Local Public Provider as Direct Operator

Under this type of arrangement, a potential new commuter rail or bus service would be owned and operated directly by a public entity such as a local unit of government or agency. The responsible public entity would purchase and own the operating equipment and facilities needed for the commuter service. The public entity would also operate the system, using public employees, and would be responsible for overseeing all activities related to the administration, as well as day-to-day management and operation, of the service. This service provider arrangement would permit the public entity to have the greatest amount of control over the operating equipment and facilities to be used and over all aspects of service administration, management, and operation. Within the Southeastern Wisconsin Region, the City of Kenosha utilizes this kind of arrangement to provide transit services.

This arrangement, however, would require a significant increase in public staff with the appropriate expertise and require the responsible public entity to assume direct responsibility for resolving any potential labor relations problems and negotiation of potential union contracts with such personnel as vehicle operators and mechanics. Also, public ownership of the operating equipment and facilities would require a significant capital outlay to initiate service. Thus, this service provider arrangement was concluded to be relatively complicated and not have any real advantage over the other arrangements described above. With respect to commuter rail, an additional disadvantage of this arrangement lies in that Metra would probably not allow any other provider to operate its passenger trains south of Antioch on Metra-owned trackage. Thus, passengers would be required to change trains at Antioch, significantly affecting potential ridership levels.

It was therefore concluded that the provision of either commuter rail or commuter bus service in the Burlington-Antioch corridor by a new local public provider as the direct operator was not a practical service provider arrangement and would not be considered further.

Evaluation of Service Provider Alternatives
Based on the review of the alternative service provider arrangements, the arrangement most practical for further consideration in this feasibility study of commuter rail service in the Burlington-Antioch corridor is operation by Metra.[1] For further consideration of commuter bus service in the Burlington-Antioch corridor, it was concluded that provision of such service in the Burlington-Antioch corridor by a public entity contracting with a new private operator through a competitively awarded contract was the most reasonable and practical service provider arrangement.

OPERATING PLANS

The purpose of this section of the chapter is to identify and describe operating plans appropriate for use in this feasibility assessment. Two basic categories of operating plans were considered, one consisting of rail operating plans, the other consisting of bus operating plans. For each of these two categories, alternative operating scenarios were considered as needed to provide the most appropriate levels of service.

The general methodology utilized to develop operating plans was to first identify the basic service characteristics for the commuter rail and commuter bus alternatives. Then, other operating alternatives would be considered as variations to each basic alternative. Differences in ridership, capital costs, and operating costs could result from such alternative levels of service. The level of service characteristics that are critical to forecasting potential ridership included average operating speeds, days and hours of service, frequency of service, and headways. Developing detailed schedules, or exact timetables, was not essential to the feasibility planning effort. Operating plan scenarios were designed to be representative of new-start commuter rail passenger train service and feeder bus service intended to be coordinated with commuter rail routes.

Operating Plan Assumptions and Development
It was necessary that certain assumptions be made as a basis for the design of various operating plan alternatives. The intent of these assumptions was to enable the alternatives to be designed in a realistic and implementable manner in a corridor where no such service has existed previously. For the commuter rail operating alternatives, the following assumptions were based upon a review of the characteristics and recent experience of other new-start commuter rail 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 rail services being developed by Metra in the Chicago area.

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[1]*Although Metra has participated in this study in a technical advisory role, the recommendations and conclusions of this study do not constitute or represent any endorsement, proposal, or commitment by Metra. The responsibility of Metra lies solely in addressing commuter rail needs in Northeastern Illinois. Any provision of service in the Burlington-Antioch corridor would require sponsorship and funding by a Wisconsin-based agency or unit of government.*

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

- On new-start commuter rail 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 in the nonpeak direction has been forecast.

- A small number of weekday, midday, and early evening trains have been operated on new-start commuter rail routes to provide more schedule choices for passengers. Such service has been initiated in some cases as part of the start up of service and in other cases only when the initial peak-period service has been in operation for some time.

- Service in late evenings on weekdays and on Saturdays, Sundays, and Holidays is rare on contemporary new-start commuter rail lines. Institution of service during these periods has been viewed as a potential improvement over the long-term future. In the interim, some new-start services provide shuttle buses to the commuter railway stations during periods that 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 that does operate during those periods.

- Improvements and enhancements to contemporary new-start commuter rail 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 been dependent upon sufficient resources being available and the ability to integrate the added services with existing passenger and freight train traffic.

To facilitate the design of preliminary operating schedules under this feasibility assessment, existing and desirable future operating speeds were identified by zones along the potential Burlington-Antioch commuter rail route extension. Existing speeds were identified from the current operating timetables of the railway companies involved. Desirable future operating speeds were based upon possible operational considerations, possible signal system improvements, operating speeds of other existing commuter rail systems, and historical operating speeds of passenger train operations along the same route. Following this review, it was concluded that for purposes of this feasibility study, a maximum mainline operating speed of 60 miles per hour would be desirable. This would be consistent with the prevailing maximum operating speed of 60 miles per hour between Antioch and Tower B 12 in Franklin Park. In some zones, the maximum operating speeds would be proportionally lower because of alignment, operational, or safety constraints. The operating speeds for each zone 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. A one-way trip in either direction between Burlington and Antioch would take a total of 23 minutes including the Silver Lake stop during both weekday peak and nonpeak periods. A one-way trip in either direction along the entire Burlington-Antioch-Chicago route would take one hour and 49 minutes during both weekday peak periods and nonpeak periods. All trains were assumed to make all normal intermediate stops south of Antioch. The travel times to be used under this feasibility assessment between stations, as well as station dwell times, and total travel time along the route for trains are presented in Table 19. Meets between commuter rail trains and freight trains operations will also have to be accommodated.

With respect to average speeds for the potential commuter rail service, an average speed of about 42 miles per hour would be attained over the 16-mile long Burlington-Antioch extension. An average speed of about 38 miles

Table 18

MAXIMUM OPERATING SPEEDS FOR POSSIBLE COMMUTER RAIL PASSENGER TRAIN SERVICE IN THE BURLINGTON–ANTIOCH CORRIDOR

Zone	Description	Mileposts	Distance	Maximum Operating Speed	
				Existing	Proposed
A	Antioch Depot to West Antioch	55.4 - 56.6	1.2	50	50
B	West Antioch to Wheatland	56.6 – 64.2	7.6	50	60
C	Through Three Degree Curve	64.2 - 64.4	0.2	45	50
D	Wheatland to Nestle	64.4 - 72.1	7.7	60	60
E	Nestle to Burlington Depot	72.1 – 72.7	0.6	20	20
- -	Total	- -	17.3	- -	- -

Source: SEWRPC.

Table 19

ASSUMED OPERATING TIMES TO BE USED FOR FEASIBILITY ASSESSMENT OF COMMUTER RAIL PASSENGER TRAIN SERVICE IN THE BURLINGTON–ANTIOCH–CHICAGO CORRIDOR

Measured Distance	Passenger Stations and Route Segments	Travel and Dwell Times (in minutes)[a]
- -	*Burlington*	- -
9.9	Burlington–Silver Lake	13
- -	*Silver Lake*	*1*
6.1	Silver Lake–Antioch	9
- -	*Antioch*	*1*
6.8	Antioch–Round Lake Beach	9
- -	*Round Lake Beach*	*1*
9.0	Round Lake Beach–Mundelein	11
- -	*Mundelein*	*1*
7.4	Mundelein–Buffalo Grove	12
- -	*Buffalo Grove*	*1*
2.2	Buffalo Grove–Wheeling	4
- -	*Wheeling*	*1*
3.4	Wheeling–Prospect Heights	4
- -	*Prospect Heights*	*1*
6.8	Prospect Heights–O'Hare	10
- -	*O'Hare*	*1*
17.2	O'Hare–Chicago CBD	29
- -	*Chicago CBD*	- -
16.0	Burlington–Antioch	0:23
52.8	Antioch–Chicago	1:25
68.8	Burlington–Chicago	1:49

[a]*Times shown for stations are in italics and indicate dwell times. Times shown for route segments are not in italics and indicate running times. Times shown are for weekday peak and all nonpeak periods.*

Source: SEWRPC.

per hour would be attained over the entire 69-mile long Burlington-Antioch-Chicago route. As noted earlier, commuter rail service, in general, operates at relatively high overall average speeds ranging from 30 to 50 miles per hour. By comparison, typical average speeds on the Metra Milwaukee District North Line between Antioch and Chicago range from 35 to 38 miles per hour, and average speeds on the Metra new North Central Service between Chicago and Antioch are 37 miles per hour.

For the commuter bus operating alternatives, the following assumptions were used as a basis for design based on a review of the characteristics and recent experience of express and commuter bus services in North America. Of particular interest were such bus services operating in Southeastern Wisconsin and Northeastern Illinois, especially the feeder and supplemental bus services operated by Pace which provides connecting services to Metra commuter rail routes in the Chicago area.

- The overall experience of commuter bus routes in the United States and Canada indicates that a majority of these routes provides service only in the peak direction and only during weekday peak periods.

- In some cases, such commuter bus services operate primarily as feeders terminating at outlying commuter rail stations. In other cases, such commuter bus services operate as supplemental services providing service along the entire commuter rail corridor; sometimes only during periods of the day when commuter trains do not operate, and in other cases as additional service during weekday peak periods when commuter trains are operated.

- In situations where commuter buses are intended to act as feeders during periods when commuter trains do not operate, the buses may be designed to connect with other commuter rail routes that do operate during the entire day.

- For commuter bus services intended to act as feeders for commuter rail lines, some service was found to be provided during middays and early evening hours on weekdays and also on Saturdays, but rarely on Sundays and major holidays.

- The number and spacing of stations and stops along commuter bus routes was found to vary considerably. On commuter bus routes providing feeder or supplemental service to commuter rail routes; however, these services were found to have station spacings very similar to the attendant commuter rail route. On some of these bus services, the only stops in fact were at the actual commuter rail stations in the particular corridor.

Commuter bus travel times were developed upon maximum permissible speed limits on streets and highways, location of traffic signals, anticipated traffic congestion, design of stations and stops, and the average speeds of other express and feeder bus services in Southeastern Wisconsin and Northeastern Illinois. A one-way trip in either direction between Downtown Burlington and Antioch would take a total of 43 minutes including all intermediate stops during weekday peak periods and 35 minutes including all intermediate stops during weekday nonpeak periods and on weekends and holidays. Therefore, a one-way trip in either direction along the entire Burlington-Antioch-Chicago route including changing between the bus and train at Antioch would typically take two hours and 13 minutes during weekday peak periods and two hours and five minutes during weekday nonpeak periods and on weekends and holidays. The travel times to be used under this feasibility assessment between stations, station dwell times, and total travel time along the Burlington-Antioch route are presented in Table 20.

With respect to average speeds for the potential commuter bus service, an average speed of 27 to 34 miles per hour would be attained over the 20-mile long Burlington-Antioch bus route. An average speed of 33 to 35 miles per hour would be attained over the combined 73-mile long Burlington-Antioch-Chicago route depending upon the time of day. This includes an assumed transfer time of five minutes for passengers changing between buses and trains at Antioch. By comparison, average speeds on the Pace supplemental bus service which is coordinated with the Metra North Central Service ranged from 16 to 24 miles per hour depending upon the time of day, and

Table 20

ASSUMED OPERATING TIMES TO BE USED FOR FEASIBILITY ASSESSMENT OF COMMUTER BUS SERVICE IN THE BURLINGTON–ANTIOCH–CHICAGO CORRIDOR

Measured Distance	Passenger Stations and Route Segments	Travel and Dwell Times (in minutes)[a] Weekday Peak	Weekday Nonpeak
- -	*Burlington–Park Ride Lot*	- -	- -
9.8	Burlington–Silver Lake	15	13
- -	*Silver Lake*	*1*	*1*
8.6	Silver Lake–Antioch	17	13
- -	*Antioch*	*5*	*5*
6.8	Antioch–Round Lake Beach	9	9
- -	*Round Lake Beach*	*1*	*1*
9.0	Round Lake Beach–Mundelein	11	11
- -	*Mundelein*	*1*	*1*
7.4	Mundelein–Buffalo Grove	12	12
--	*Buffalo Grove*	*1*	*1*
2.2	Buffalo Grove–Wheeling	6	6
- -	*Wheeling*	*1*	*1*
3.4	Wheeling–Prospect Heights	4	4
- -	*Prospect Heights*	*1*	*1*
6.8	Prospect Heights–O'Hare	10	10
- -	*O'Hare*	*1*	*1*
17.2	O'Hare–Chicago CBD	29	29
- -	*Chicago CBD*	- -	- -
18.4	Burlington–Antioch	0:33	0:27
52.8	Antioch–Chicago	1:25	1.25
71.2	Burlington–Chicago	2:03	1:57

[a]*Times shown for stations are in italics and indicate dwell times. Times shown for route segments are not in italics and indicate running times.*

Source: SEWRPC.

average speeds on Wisconsin Coach Lines express bus service between Milwaukee, Racine, and Kenosha range from 29 to 33 miles per hour depending upon the time of day.

Operating Plans for Feasibility Assessment

Given the range of possible station, operating plan, track and signal improvement, equipment, and service provider options and the large number of possible combinations of these elements available, it was concluded to be desirable to focus upon a single basic operating plan for the commuter rail alternative and a single basic operating plan for the commuter bus alternative as a basis for assessing long-term feasibility. It was recognized that as the ridership forecast and cost estimation steps of this work are undertaken, certain refinements could be made, or additional alternatives designed, with respect to operating plan, track and signal, station, and equipment assumptions so that the best commuter rail and bus alternatives are identified. 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 either the commuter rail or commuter bus service. The two basic operating plans are described below.

Alternative No. 1—Operation of Commuter Rail Passenger Trains Between Burlington, Antioch, and Chicago as an Extension of the Existing Metra North Central Service with a Moderate Level of Service

Under this alternative, Metra trains currently operating between Antioch and Chicago would essentially remain on their existing schedules but would be extended along the entire length of the corridor north of Antioch to Burlington. The frequency of service would be four inbound trains from Burlington to Chicago during the morning peak period and four outbound trains from Chicago to Burlington during the afternoon peak period. The service headway during peak periods would be about 35 minutes. In addition, one train would operate in each direction during the midday period to provide passengers with an early afternoon departure from Chicago.

Even though no weekend commuter train service was being provided between Antioch and Chicago as of December 1999, the addition of limited weekend train service at some time in the future was anticipated by Metra and communities along the route. Because this feasibility study is examining ridership and costs over the long term, this alternative also assumes limited operation on weekends. On Saturdays, two morning inbound trains, two afternoon outbound trains and one midday round trip would be provided. On Sundays and major holidays, one morning inbound train, one afternoon outbound train, and one midday round trip would be provided. All trains would be operated as through trains along the entire corridor and would continue to make all existing stops between Antioch and Chicago, and would also stop at Silver Lake and Burlington. Ultimately, operation of weekend service between Burlington and Antioch would be dependent upon the eventual initiation of weekend service between Antioch and Chicago.

This alternative recognizes several considerations with regard to how many Chicago-Antioch trains could be expected to be potentially extended to Burlington:

- The highest level of service will be during weekday peak periods. Any capacity constraints with respect to accommodating an increase in the number of commuter trains or in the number of commuter and freight trains will likely occur during these periods. Thus, it may be expected, that if railway line and operational improvements are made to accommodate a specific number of peak period trains, accommodating off-peak and weekend trains is not likely to pose a problem.

- If service to Burlington were being considered and Chicago-Antioch service remained at the 1998 level—that is, four peak period trains and one midday round trip—extension of all of these trains would represent a logical and practical level of service between Antioch and Burlington. Saturday, Sunday, and holiday service would be considered only if such service were implemented south of Antioch.

- If service to Burlington were being considered and Chicago-Antioch service remained at the 1998 level, extension of only selected peak period trains could also represent a logical and practical initial step. For example, only two of the peak period trains as well as the one midday round trip could be considered. In this instance, the level of railway line and operational improvements that would be required may be the same or possibly less than that required to operate all four peak period commuter trains.

- If service to Burlington were being considered and Chicago-Antioch service was eventually increased, extension of four peak period trains and one midday round trip would still represent a logical and practical level of weekday service between Antioch and Burlington. As noted in Chapter III of this report, long–term plans of Metra include expansion of service between Chicago and Antioch to 22 weekday trains that would include additional peak and off-peak service as well as some weekend service. When and if the additional Chicago-Antioch service is implemented, it would be expected that only some of the trains would continue north of Antioch to Burlington because of the significantly smaller potential demand for such service north of the Wisconsin-Illinois state line. Under this scenario, Saturday, Sunday, and holiday service would be considered north of Antioch, but only using a limited number of trains.

Accordingly, a commuter rail operating plan that envisions extension of the four existing weekday peak period trains, one weekday midday round trip, and limited weekend service was initially viewed as providing a sufficient base for assessing the feasibility of Burlington-Antioch service, regardless of the level of service improvements that might occur to the existing Chicago-Antioch service.

Alternative No. 2—Operation of Commuter Bus Service in the Burlington-Antioch Corridor as Feeder Service to the Existing Metra North Central Service with a Moderate Level of Service
Under this alternative, new commuter bus service would be operated over a single route from the City of Burlington to the Metra North Central Service commuter rail route. The bus route would operate almost entirely over STH 83 between downtown Burlington and the Metra station at Antioch, stopping at New Munster, Silver Lake, Paddock Lake, and Salem.

Service on these bus routes would be coordinated with Metra North Central Service train schedules, and would be designed to be comparable to the level of service envisioned for commuter rail under Alternative No. 1. The frequency of service would be four inbound bus runs from Burlington to Antioch during the weekday morning peak period and four outbound bus runs from Antioch to Burlington during the weekday afternoon peak period. In the morning, buses would be scheduled to arrive at the Metra Antioch depot just prior to train departure times. In the afternoon, buses would be scheduled to depart from the Metra depot immediately following train arrivals. Service headway would be about 35 minutes. In addition, there would be one round trip during the weekday midday period. A limited amount of weekend service would also be provided. On Saturdays, two morning inbound bus runs, two afternoon outbound bus runs, and one midday round trip would be provided. On Sundays and major holidays, one morning inbound bus run, one afternoon outbound bus run, and one midday round trip would be provided. Midday and weekend buses would also be scheduled to directly connect with Metra trains at the Antioch depot. Buses would make all stops between Burlington and Antioch.

ROLLING STOCK AND VEHICLE REQUIREMENTS

The purpose of this section of the chapter is to describe the commuter rail rolling stock and commuter bus vehicles required for providing possible service within the Burlington-Antioch corridor.

For the commuter rail alternatives, it was recommended that conventional locomotive-hauled commuter train equipment be assumed for use instead of other types such as self-propelled equipment. Conventional commuter train equipment consists of bi-directional trains of diesel locomotives with bi-level passenger coaches operating in a "push-pull" mode. A locomotive is at one end of the train set, and a coach equipped with a control cab is at the opposite end. The locomotive supplies all of the power necessary for operation of the train set. Thus, there is no need to turn the train around 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 as well as turnaround and layover times.

This type of equipment has proved to have a long and established record with respect to availability, dependability, performance and safety in use by Metra and Metra predecessors on most of the commuter rail routes in the Chicago area for many years. It would be compatible with existing Metra equipment that currently operates between Antioch and Chicago, and meets current Federal Railroad Administration and Federal Transit Administration requirements with respect to safety, structural strength, and accessibility. In fact, since some of the trains that now operate between Antioch and Chicago would conceptually be extended to Burlington, the entire Burlington-Antioch-Chicago service would likely be operated with one common pool of equipment. Use of other types of equipment could require passengers to change trains at Antioch, which was concluded to be undesirable for attracting ridership.

Use of bi-level coaches significantly increases passenger capacity without a corresponding increase in train length and station platform length. Bi-level coaches can each 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 as well as interior appointments and passenger amenities may vary these capacities.

All new passenger coaches are designed to meet the requirements of the Federal Americans with Disabilities Act, and can generally be configured to utilize both high and low level platforms.

Several domestic and foreign manufacturers of locomotives and passenger cars provide reliable equipment of this type. In 1998 dollars, the cost of a new diesel locomotive equipped for commuter railway service approximated $2.4 million. The cost of a new passenger coach approximated $2 million. Actual equipment costs will vary based on the options selected, the quantities ordered, and other factors. In the normal rolling stock procurement process used in the railway industry, the equipment is built to order. The typical manufacturing lead time for new locomotives and passenger cars is about two years once funding arrangements are in place.

For the commuter bus alternatives, it was recommended that conventional transit buses be assumed for use. Most conventional transit buses range from 30 to 40 feet in length, and seat from 28 to 48 passengers depending upon the vehicle size and interior configuration. The interior configuration of seats and aisles will be dependent upon the style and size of seats that are used, the relative comfort level desired for passengers, and the arrangement of space for wheelchair passengers. Compared to buses used in regular urban transit service, interior appointments and amenities are particularly important for buses utilized in commuter service because of longer trip duration for many passengers and higher passenger expectations. In some cases, larger, higher quality, or more plush seats similar to those used on intercity and long-distance charter buses are used for buses intended for longer commuter trips. Also, other passenger amenities such as reading lights, improved interior ventilation, and luggage racks are common on buses used in commuter or suburban service. It is therefore recommended that the transit buses assumed for use include these interior passenger amenities. Some commuter bus services in the United States have utilized intercity motor coaches for commuter service because of those vehicles higher level of performance and comfort.

Vehicles smaller than conventional transit buses represent another option that has been gaining acceptance for use in low-ridership and special applications. A wide variety of such models are available ranging from vehicles resembling van conversions to bus bodies mounted on truck chassis to shortened versions of regular buses. Most buses operated in commuter service by transit operators in Southeastern Wisconsin and by Pace are the standard urban transit buses. While most buses are full-size models, which are 40 feet in length, smaller vehicles with a length of 30 to 35 feet are sometimes used where passenger demand is lighter or where maneuverability in tight areas is required. All new passenger coaches are designed to meet the requirements of the Federal Americans with Disabilities Act.

Several domestic and foreign manufacturers of transit buses provide reliable equipment of this type. In 1998 dollars, the cost of a new 40-foot urban transit bus, approximated $260,000 and the cost of a new 35-foot transit bus approximated $240,000. Actual equipment costs will vary based on the options selected, the quantities ordered, and other factors. In the normal vehicle procurement process, equipment is built to order. The typical manufacturing lead time for urban transit buses is about one year once funding arrangements are in place.

ASSESSMENT OF RAILWAY LINE CONDITION

An important objective of this study is a determination of the improvements to the existing railway line that may be expected to be necessary to operate commuter railway passenger trains in the Burlington-Antioch corridor. This determination was made by a two-part procedure. In the first part of the procedure, an assessment was made of the physical condition of the railway line concerned—including an assessment of the rail, ties, ballast and roadbed, bridges, and street and highway grade crossings—to determine the condition of these elements and to identify any improvements that would be necessary to operate commuter railway passenger trains over the line. In the second part of the procedure, an assessment was made of the capacity of the railway line to identify any improvements that would be necessary to enable commuter traffic to be operated with existing and future freight traffic.

The railway line condition and capacity assessment work were conducted by a transportation engineering consulting firm working with the Commission staff. The assessment was completed through a review of

Wisconsin Central Ltd. engineering and operating data and records, field inspection of the Burlington-Antioch railway line, and consultations with railway company operating and engineering staffs. The work was undertaken with the full cooperation of the Wisconsin Central Ltd. The track condition assessment was undertaken for the segment of railway line from Milepost 55.4 at the Metra depot in Antioch to Milepost 72.7 at the Wisconsin Central depot in Burlington, a distance of 17.3 miles.

In order to operate commuter railway passenger train service in an efficient, safe, and cost-effective manner that may be expected to attract an adequate level of patronage, the railway line must be maintained in an appropriate condition. To attract patronage the commuter service must be high speed, and dependable at all times. 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 are the operational requirements of freight trains.

The following assumptions were used as a basis for identifying condition-related railway line improvements:

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

- That the maximum practical operating speed along any specific section of railway track will be dependent upon four principal factors: horizontal and vertical alignment, physical condition, special track work, and operational considerations. Any one or any combination of these may be the limiting factor along a specific segment of track;

- With respect to the physical alignment of the potential route, that maximum train speeds will be determined primarily by horizontal curvature and to a lesser extent by the severity of grades. Since the potential commuter railway passenger train service would be operated over an existing railway mainline, 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;

- That the track safety standards set forth by the Federal Railroad Administration (FRA) prescribe minimum requirements for the physical condition of railway tracks to provide for the safe operation of freight and passenger trains. The standards specify maximum allowable speeds based on the condition of the track structure including the age and condition of rails, ties, and ballast, the degree of curvature and superelevation, as well as the quality of drainage and vegetation. These standards were used in the evaluation of the condition of the railway 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;

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

- That the extent of some necessary track and signal improvements will be dependent upon the intended level of service to be offered. That is, a greater number of commuter trains on a daily basis, or 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 railway passenger train service, regardless of the number of intended trains, or the level of service intended to be offered.

Track, Ballast, and Roadway

Track refers to the various components that comprise the railway track structure including the rails, ties, and other track material such as tie plates, spikes, joint bars, joint bolts, and rail anchors. Ballast is the material—usually crushed stone—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 ballast; and in addition, includes the slopes of cuts, ditches, and other drainage structures, and access roads.

In general, the Wisconsin Central Chicago Subdivision between Burlington and Antioch was found to be in very good condition for existing and anticipated future freight operations. Since purchasing this line in 1987, the Wisconsin Central has pursued a policy of reinvesting a significant portion of its earnings into its physical plant to maintain and upgrade facilities such as the track and signal systems. Much of this reinvestment has occurred on the Chicago-Fond du Lac mainline of which the Burlington-Antioch segment is a part. As a result, freight train speed limits are 50 and 60 miles per hour and the track meets FRA Class 3 track safety standards between Antioch and Milepost 64.2, and Class 4 track safety standards between Milepost 64.4 and Burlington. The condition of rail, other track materials, ties, and turnouts was found to be very good with no need for major rehabilitation to correct any existing substandard or defective conditions.

With respect to the mainline track between Burlington and Antioch, it was concluded that the existing track condition was suitable for 60 mile per hour passenger train operation and only relatively minor work would be required to provide for the introduction of commuter railway passenger train service. Specifically, it is recommended that the superelevation of the three-degree curve between Mileposts 64.2 and 64.4 north of Silver Lake be increased to accommodate a maximum allowable speed for passenger trains of 50 miles per hour. The work would allow passenger trains and some freight trains to traverse this curve at a higher speed.

Bridges

Bridges and other structures along the proposed Burlington-Antioch commuter rail route were also examined. Bridges carry the rail line over or under streets, highways, other railway lines, and major rivers. There are a total of seven bridges along the route, five of which are over rivers or other watercourses, one of which passes under STH 50, and one which passes over a private farm road. The largest of the bridges is a two-span through truss bridge over the Fox River at Milepost 69.6 south of Burlington. The bridges are listed in Table 12 in Chapter III. The condition of the bridges was found to be good with no need for repairs or major rehabilitation to correct any existing substandard or defective conditions.

Other structures consist mainly of culverts that allow the railway line to cross over minor watercourses and drainage features. These consist of a variety of culvert types. The majority of the culverts consist of cast iron pipe or reinforced concrete. Inspection indicated that the condition of these culverts is generally good, with some showing evidence of normal wear and aging.

Street and Highway Grade Crossings

There are 43 at-grade street, highway, and driveway crossings along the Burlington-Antioch railway line.[2] Of these, 25 are public and 18 are private. The condition of these crossings ranges from fair to good. A number of factors contribute to the existing condition of the crossings, including failure of the roadway pavement or pavement subgrade and deterioration, wear, aging, or failure of the grade crossing surface or material. It is recommended that all crossings be rebuilt or reconditioned.

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[2]*This assumes the closure of two public grade crossings in the Village of Silver Lake. As of March 1999, the crossings for E. North Street and either W. Maple Street or Dell's Avenue were recommended to be closed by the State of Wisconsin Office of the Commissioner of Railroads.*

Of the 25 public grade crossings along the route, 21 are protected by automatic crossing signals consisting of flashing lights and bells; 11 of these crossings also have crossing gates. Four public grade crossings are protected only by crossbucks and stop signs. A complete listing of all at-grade crossings is provided in Table 12. It is recommended that crossings already equipped with lights and bells have the signals upgraded to include installation of gates. At public street and highway crossings that are protected only by crossbucks and stop signs, automatic signals should be installed that include lights, bells, and gates. It is recommended that all automatic grade crossing signals be upgraded so that they are 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.

At most private at-grade crossings, there are no warning signs. Where signs have been installed, they are of minimal or nonstandard design. It is recommended that all private at-grade road and driveway crossings have crossbucks and stop signs installed on both sides of each crossing. It is also recommended that efforts be made to close those private crossings that are used little or no longer used at all; if feasible, combining private crossings that are close to each other. This will require negotiation with the landowners who have rights to a particular private crossing or crossings.

RAILWAY LINE CAPACITY ASSESSMENT

The railway line capacity assessment was accomplished in three steps. First, a forecast of the anticipated future level of freight train operations was prepared. Second, a railway line capacity analysis was undertaken consisting of the simulation of freight and potential commuter railway passenger train operations on the railway line. To carry out the simulations, the consulting firm responsible for assisting the Commission staff subcontracted with another consulting firm that specializes in preparing computer-based railway line simulations and had, in fact, conducted simulations of the line concerned when the initiation of commuter railway passenger train service between Chicago and Antioch was being considered. Even though the potential commuter railway service extension considered in this study would not extend beyond Burlington, it was necessary to simulate train operations as far south as the junction at Franklin Park and as far north as the passing siding at Vernon to ascertain possible delays and impacts to freight train operations which might occur on the approaches to the limits of the potential commuter rail service. Third, appropriate means for providing additional capacity that may be necessary to accommodate the joint operation of freight and commuter railway passenger trains were identified and described. As part of this third step, the necessary track, signal, and other appropriate improvements required to accommodate the combined operation of freight trains and commuter railway passenger trains on the line were identified and described.

The following assumptions were used as a basis for performing the capacity analysis and for identifying capacity-related railway line improvements:

- That the impact on freight train operations were measured by the delay to freight train movements caused by the operation of both commuter railway passenger trains and anticipated increased freight train traffic;

- That the overall operational efficiency and flexibility of the existing and future freight train operations not be compromised by the addition of commuter train operations.

- That the current level of four weekday peak period inbound and outbound commuter trains represents a reasonable maximum level of peak period service in the future for the potential Burlington-Antioch extension. Therefore, even if peak period commuter train service south of Antioch to Chicago is eventually increased to more than the existing four trains, it can be expected that only a limited number of Antioch-Chicago trains would be extended beyond Antioch to Burlington.

Forecast of Future Freight Train Operations

As of December 1998, the Wisconsin Central mainline through Burlington and Antioch was carrying an average of 26 freight trains on a typical weekday. This existing level of train traffic was described in Chapter III of this report. The start-up of Metra North Central Commuter Service in August 1996 has not created any significant operational problems. In general, the Wisconsin Central Railroad has chosen not to operate freight trains while commuter trains are operating. When the North Central Commuter Service was initiated, weekday peak period service consisted of only three inbound passenger trains in the morning and three outbound passenger trains in the afternoon. Because of the low number of trains, freight trains could, and were, sometimes operated in between commuter trains. When an additional commuter train was added during each of the peak periods in February 1997, commuter train headways were reduced so that the occasional operation of freight trains in between the passenger trains was no longer practical. This essentially has created a window of almost two hours in length during each weekday peak period when only commuter trains are operated between Antioch and Tower B 12 at Franklin Park.

Due to a wide variety of variables that affect the demand for railroad freight service and freight train operations, railway industry officials frequently indicate that future volumes of freight traffic along specific corridors cannot always be reliably forecast. This is largely the result of the potential for additional mergers, sales, and ownership changes of North American freight railroads; the increasing volume of freight being moved by rail; and the rapidly changing traffic routings within the United States, including Wisconsin. Unanticipated increases in the volume of freight traffic, changes in delivery schedules for customers, and temporary reroutings or detours of traffic from other railway lines may also affect traffic volumes along a specific route. Also, much of the freight moving by rail is governed by proprietary contracts or agreements between shippers and railroad companies. Such agreements may be for time periods ranging anywhere from a few months to several years or more. Often, these agreements are conceived and developed over short periods of time ranging from one week to perhaps a few months as a result of customer decisions, commodity and market prices, or changes in other transportation choices for the customer. This makes forecasting the movement of freight traffic difficult.

Nevertheless, a forecast of potential freight train traffic on the line concerned was prepared. An approximately five-year time horizon was used since a forecast beyond a five-year period was considered to be too speculative to be meaningful. Five years also represents a realistic time frame within which the potential commuter railway service could be implemented, should such a decision ultimately be made.

Under the forecast, the average weekday freight train activity may be expected to increase from 26 freight trains in 1998 to 34 freight trains by the year 2005. Much of this increase—about six trains per day—would be the result of a steady increase in the Canadian National Railway Company through trains operating over the Wisconsin Central between Superior and Chicago. In August 1998, the Wisconsin Central began handling the Canadian National trains under a renewable 20-year agreement. The additional Canadian National traffic would be a mixture of general freight trains, unit trains such as those hauling potash, and intermodal trains. It was assumed that one pair of new Canadian National trains would begin operation each year from 1999 through 2001. The forecast increase in Canadian National trains is consistent with anticipated and continuing changes in the North American railway system. In response to other recent large-scale railway mergers, Canadian National, which operates primarily in Canada, has proposed to acquire the Illinois Central Corporation railway system, which operates primarily between Chicago and several deep seaport cities on the Gulf of Mexico. Use of the Wisconsin Central mainline between Duluth-Superior and Chicago provides a critical link between the existing Canadian National and Illinois Central systems.

Two additional forecast trains would be the result of continued increases in Wisconsin Central traffic. These trains were assumed to consist of general freight trains and would begin operating about every other day in 1999 and become daily trains by 2005.

A summary of existing, incremental increase, and anticipated year 2005 volumes of freight train operations is provided in Table 21.

Table 21

EXISTING 1998 AND FORECAST 2005 FREIGHT TRAIN TRAFFIC ON THE WISCONSIN CENTRAL MAINLINE BETWEEN BURLINGTON AND ANTIOCH

Type of Train	Average Number of Trains on a Typical Weekday		
	Existing 1998	Incremental Change	Forecast 2005
Through Freight	14	6	20
Intermodal	3	1	4
Unit Trains	4	1	5
Local Freight	4	- -	4
Miscellaneous	1	- -	1
Total	26	8	34

Source: SEWRPC.

Capacity Analysis

The objective of the capacity analysis was to identify any improvements that would be required to allow commuter railway passenger trains to be operated on schedule along with the forecast number of freight trains between Burlington, Antioch, and Chicago without delay to freight traffic. The approach taken was to assume a base operating scenario consisting of the existing facilities and forecast train movements, and incrementally add the improvements required to avoid excessive delays in train operations.

The computer program used to simulate the train operations was a network dispatching simulation program that mimics the logic of an experienced railway dispatcher. The program is event-based and can therefore replicate a wide variety of variables and parameters that affect actual railway operations including unanticipated or unscheduled conditions that may impact train performance. The output of the simulations produced by this program include a variety of train performance reports for many features—most importantly including train delays—which can be evaluated in tabular and time versus distance graph formats.

Three capacity analysis simulations were prepared for this feasibility study. Each simulation was designed to reflect a specific operating scenario. All simulations were for weekdays when the greatest number of trains may be expected to be operated. All simulations included the Wisconsin Central Chicago Subdivision between Forest Park, Illinois (Milepost 10.9)—just south of the junction at Tower B 12 in Franklin Park—and the passing siding at Vernon, Wisconsin (Milepost 90.9)—north of Burlington, a distance of 80 miles. This allowed the impacts to be assessed for Wisconsin Central freight trains approaching the proposed commuter railway service territory.

Capacity Scenario A—The first scenario assumed the existing railway line infrastructure, forecast freight train operations in the year 2005, and existing Metra North Central Service commuter train operations between Antioch and Chicago. The simulation under this scenario was intended to represent a base case situation to which other simulations could be compared. To provide a detailed data base for this and other simulations, actual train operations were examined and analyzed for a typical five-day (Monday through Friday) week in May 1998 based on dispatcher records. This provided detailed data concerning train consists, sizes, tonnage, average speed, and other factors for the trains that were actually operated during that period and were used as inputs to the simulations. Data concerning trains to be added during the next five years such as the new Wisconsin Central time freights and the additional Canadian National freights were based on information provided by Wisconsin Central officials. Scheduling of these new trains was according to Wisconsin Central current practice of avoiding the weekday commuter railway passenger train operating windows. Data concerning the Metra commuter trains was based on existing schedules.

The average train count for the Monday-through-Friday period on the Burlington-Antioch segment of the Chicago Subdivision is expected to increase from 130 freight trains in 1998 to 170 trains in 2005. In addition, the simulation for this and the other scenarios considered took into consideration other freight train movements on the Wisconsin Central mainline between Forest Park, Illinois and Vernon, Wisconsin. These other movements included additional local trains as well as transfer service in the Chicago area that may affect the operation of other trains approaching the segment used by the commuter railway trains. Thus, the average train count for the Monday-through-Friday period on the entire segment of railway that was simulated—from Forest Park to Vernon—and including the Metra commuter passenger trains and other miscellaneous local freight trains, were anticipated to increase from 201 trains in 1998, to 241 trains in 2005.

Simulations for each scenario were performed for a typical Monday-through-Friday week of train operations projected to the year 2005. Delays were estimated for a 48-hour period following detailed examination of train operations, meets, delays, and other operating characteristics and patterns. The two-day period chosen was Thursday and Friday, as these are typically the busiest days of the week for freight railways and would therefore reflect the most demanding operational needs. Each simulation generated several reports, the most important of which was a line diagram showing the progress of each train movement. In addition to these schematic diagrams, the simulations also generated detailed reports that identified delays by train, location, time of day, signals, and events.

Simulation of the base scenario determined that some delay could be expected to occur in the future as a result of the increase in freight trains combined with the already-operating Antioch-Chicago commuter passenger trains. Over the 48-hour period, the cumulative delay to Wisconsin Central freight trains was estimated to total an average of 17 hours and 22 minutes. Commuter trains, which are operated on a strict schedule and would therefore normally receive priority over other trains, were assumed to incur no delays under normal operation. Delays to freight trains were identified by train type for this and the following scenarios in Table 22.

As a result of the large volume of traffic on the line, an operating window has essentially been created during each weekday peak period when only commuter passenger trains are operated between Antioch and Tower B 12. Each window is about two hours long in the peak direction and about three hours long in the nonpeak direction. These weekday commuter train windows have important impacts on freight train operations. For example, during the morning peak period, all southbound freights must clear Metra's Antioch storage yard no later than 5:15 a.m. when the first southbound commuter train departs. Southbound freights cannot proceed south of the Antioch storage yard until 7:15 a.m. following departure of the last morning commuter train. During the same morning peak period, all northbound freights must be past the Antioch storage yard no later than 5:15 a.m. or be held back south of Tower B 12 or at Schiller Park until 8:10 a.m. after the last southbound morning commuter train has passed. Northbound freight trains could theoretically also be held at one of the sections of double track between Antioch and Tower B 12, which are essentially used as passing sidings. The sections of double track are located at Lake Villa, Mundelein, and Wheeling. However, once a northbound freight gets to one of these locations, it would probably need to wait for almost two hours for the southbound commuter trains to pass. Because of this unavoidable delay for northbound freight trains, such trains may be expected to be held normally either south of Tower B 12 or at Schiller Park until after the morning peak period.

During the evening peak period, a similar commuter train window impacts freight train operations. All northbound freights must clear Tower B 12 no later than 4:50 p.m. when the first northbound commuter train is due from downtown Chicago. No northbound freight trains can then proceed north of Tower B 12 until 6:45 p.m. following the last evening commuter train. During the same evening peak period, all southbound freights must be past Tower B 12 no later than 4:50 p.m. or be held back north of Antioch until 7:55 p.m. after the last northbound commuter train has returned to the storage yard. Southbound freight trains could also be held on one of the sections of double track between Antioch and Tower B 12. However, any southbound freights held at these locations would probably need to wait for almost two hours until the northbound commuter trains have passed. Because of this unavoidable delay for southbound freight trains and crews, it may be expected that they would normally be dispatched in such a manner so as to not arrive at Antioch until after the evening peak period.

Table 22

ESTIMATED DELAYS OVER AN AVERAGE 48-HOUR TIME PERIOD TO TRAINS OPERATING ON THE WISCONSIN CENTRAL MAINLINE BY CAPACITY ANALYSIS SCENARIO: 2005

Type of Train	Estimated Cumulative Delay By Capacity Scenario[a]		
	A – Base Situation with No Commuter Trains	B – Extension of Commuter Trains with No Improvements	C – Extension of Commuter Trains with Capacity Improvements
Through Freight	10 H 00 M	14 H 16 M	8 H 36 M
Intermodal	1 H 23 M	1 H 38 M	2 H 20 M
Unit Trains	3 H 33 M	2 H 25 M	0 H 47 M
Local Freight	2 H 26 M	4 H 15 M	4 H 09 M
Total Freight	17 H 22 M	22 H 34 M	15 H 52 M
Morning Commuter Deadhead	--	0 H 42 M	0 H 16 M
Afternoon Commuter Deadhead	--	2 H 29 M	0 H 24 M

[a]Delays shown in total accumulated hours (H) and minutes (M).

Source: SEWRPC.

The overall quality and efficiency of freight train operations on the Wisconsin Central mainline will be sensitive to any changes in these commuter train windows. Because the line is operated as a single track line with passing sidings and already handles a large volume of daily train movements, the addition of more trains may be expected to entail more frequent and longer delays. On a busy single-track line such as this, it is not uncommon for freight train delays along one segment of the Chicago-Fond du Lac mainline to ripple through the entire subdivision. Delays to freight trains in the Chicago area and between Chicago and Antioch can disrupt the sequence of meets between trains along the entire Chicago Subdivision all the way to Fond du Lac. Also, as noted previously, the performance of individual freight trains is subject to a wide variety of factors such as train size, weight, and length, locomotives used, grades and alignment along the route, weather, train crews, traffic conditions, and temporary speed restrictions. Of special importance are traffic conditions on other railway lines that Wisconsin Central freight trains use, connect with, and cross in the Chicago area. Virtually all Wisconsin Central freight trains except for locals use other company's railway lines in the Chicago area to gain access to classification yards and connections. Traffic congestion, track conditions, and dispatching priorities on these other lines have a major impact on how readily Wisconsin Central freight trains can get on or off the Burlington-Antioch-Tower B 12 mainline. For example, a Wisconsin Central train delayed on another railway line may arrive at Tower B 12 too late to be ahead of a commuter window. It would then have to wait for two or more hours until after the commuter window and possibly other waiting freight traffic clears. Many Wisconsin Central trains such as the intermodal trains and the Canadian National run-through trains are time-sensitive and are intended to be operated on a scheduled basis.

Capacity Scenario B—The second scenario assumed the extension of commuter railway passenger from Antioch to Burlington. All five existing Metra commuter train round trips would be operated to Burlington with one intermediate stop at Silver Lake. Overnight storage and servicing of trains would be at the existing Metra Antioch Coach Yard. All commuter trains would be deadheaded from Antioch to Burlington prior to the morning peak period and back to the storage yard following the evening peak period. Freight train operations would be as forecast to the year 2005 and were assumed to be identical to those under Scenario A. The existing railway line infrastructure would have only the minimal improvements necessary to extend commuter service from Antioch to Burlington without regard to the effect on the freight operation. Such work would be limited to: improving a segment of the Nestle spur track in Burlington for use as a station and layover track for commuter trains; and converting the mainline turnout at the north end of the Metra storage yard at Antioch and at the Nestle spur track in Burlington from manual to remote control operation.

For purposes of this capacity analysis, it was assumed that the commuter train equipment used for the Burlington-Antioch extension would consist of the same trains used for the existing Antioch-Chicago service. It was assumed that this equipment would continue to be based at the Metra Antioch storage yard facility. There were several reasons for this assumption. First, adding an overnight train storage facility at Burlington would result in duplicative facilities along the same commuter railway service route. As noted in the previous chapter, over the long term, service on the Antioch-Chicago route is envisioned as being expanded to all day service consisting of more trains than are now operated. If service were extended to Burlington, it is likely that Antioch would still remain the northern terminal for most trains and only a limited number of trains would operate beyond Antioch. This may be expected because of the higher population levels and attendant greater anticipated demand for services in Lake and Cook Counties of Illinois. Also, it is likely that if service to Burlington were provided, probably no more than two peak period trains would be required initially with additional trains provided at later dates. Thus, a large storage facility would not initially be required at Burlington. If implementation were staged in this manner, it may not be cost-effective to provide a second and smaller but still duplicative overnight storage facility at Burlington. Adding a second storage facility and train crew base may complicate the Metra operating plan with respect to equipment and crew rotation needs and would complicate or be in conflict with existing train crew labor agreements.

Having a single storage yard, however, would simplify operational considerations for Metra as the existing commuter railway service operator, since all trains and crews on the North Central Service would be based out of the same facility. If the extended trains did not have to deadhead to and from Antioch, there would be a reduction in the number of train movements over the Burlington-Antioch line section of the mainline. A number of the trade-offs would need to be considered regarding this issue. Among them would be:

- The capital cost of providing a second storage facility for the route;
- The higher operating cost of maintaining a second storage facility;
- The potential cost and labor considerations inherent in dealing with a second storage facility;
- The probable reduced need and utilization of the already existing Antioch storage yard.

In addition, locating and acquiring an appropriate site for a storage yard facility in the Burlington area would be required. A preliminary review of such potential sites as part of this feasibility study concluded that such a site might be difficult to identify without going some distance away from the City of Burlington. If this is indeed the case, than some deadheading costs and time would still be required, reducing the advantage of a storage yard at Burlington. In any case, it was concluded that comparing the advantages and disadvantages of an overnight equipment storage yard in the Burlington area in greater detail would warrant detailed consideration should this service proposal proceed to more detailed planning and engineering phases.

Simulation of the second scenario determined that a significant level of delay to freight train movements could be expected as a result of extending the Chicago-Antioch commuter trains to Burlington without any capacity improvements to the mainline. Over the 48-hour period, the cumulative delay to Wisconsin Central freight trains was estimated to total an average of 22 hours and 34 minutes. Over the course of one year, this amount of delay becomes very significant, totaling almost 3,000 hours of delay for all freight trains. Delays to trains under this scenario are identified by train type in Table 22. When Scenario B is compared with Scenario A, the cumulative delay to Wisconsin Central freight trains increased by an average of five hours and 12 minutes over the 48-hour period, or by about 30 percent. In addition, there would be delays incurred for the deadhead commuter train movements totaling an average of about three hours and 11 minutes over the 48-hour period. The regularly scheduled commuter trains, which would normally receive priority over other trains, were assumed to normally not incur any delays.

Much of the increased delay to freight train movements under this scenario may be attributed to the additional time the revenue commuter trains require to travel over the extended route. Simply extending the distance that the commuter trains travel increases the commuter train operating windows by 30 minutes thereby reducing the available time in which opposing freight trains could be operating. Because of the time needed for the extended trains, Wisconsin Central freight operations would have to be scheduled around a commuter window of about two hours in the peak direction and about three and one-half hours in the nonpeak direction during each of the weekday peak periods. In addition, the freight trains must be held back for much of the commuter train window which will cause the freight trains to bunch up both north and south of the commuter train territory. Following the peak periods, the waiting freight trains can then be expected to proceed one after another, or in sets. When a number of trains are operating this close together, all of them will be very sensitive to any delays. Two or more trains in succession will also be very sensitive to one or more trains operating in an opposing direction.

It was determined that freight trains could operate either in between the commuter trains in the same direction, or opposing the commuter trains operating from one siding to the next, but not in both directions simultaneously during one of the peak periods. Also, review of the simulation outputs showed a frequent bunching of freight trains. Some of this bunching would be caused by dispatchers holding trains out of the commuter windows. Other bunching would occur independently of the North Central Service commuter trains and can be attributed to conditions such as track work or congestion elsewhere along the Chicago Subdivision. Also, as the commuter window gets longer, either because more commuter trains are added or because the trains run over a longer distance, the policy of keeping a commuter window open becomes more tenuous. In Scenarios B and C, it was necessary to allow freight trains to intermingle with commuter train operations between Burlington and Antioch during the final portion of the evening peak period.

If the priority of the evening deadhead commuter trains is increased, then freight trains will incur even greater delays. Due to the headways between the passenger trains, it is possible for each northbound to make only one meet with southbound traffic over the Burlington-Antioch section of track. When a freight train or a deadhead commuter train uses the siding at Silver Lake to meet a commuter train, no other trains can make a meet for that time period. The eight deadhead trains alone added six more meets per day between the Antioch storage yard and Burlington. These were with opposing revenue passenger trains and would be in addition to meets that would be created with existing freights. Therefore, an overall objective in identifying capacity improvements for Scenario C was to be able to make more meets between Antioch and Burlington.

Some of the increased delay to freight train movements under this scenario can also be attributed to the need for deadheading commuter train equipment. In the morning, it will be crucial for the deadhead trains to get to the Nestle spur track with sufficient time to turn around, load passengers, and depart Burlington on time as a revenue train. Thus, the morning deadhead trains must have priority over any freight trains trying to move between Burlington and Tower B 12 before the morning commuter train rush begins. In the evening, the deadhead trains have to come back in the face of northbound freight trains that can be expected to follow the last northbound revenue commuter train. In addition, the simulation indicated that some of the evening deadhead trains are likely to be delayed because of the bunching of freight train movements following the regularly scheduled commuter trains. It was concluded that the deadhead commuter trains might return to the Antioch storage yard so late that there is insufficient time for train crews to be rested prior to returning to work the next morning. Delay to the evening deadhead trains was estimated to total almost 2.5 hours for the 48-hour period that was simulated. From the point of view of the commuter railway service operator, this will ultimately result in higher operating costs.

Based on the results of this simulation, it was concluded that a significant increase in delays to Wisconsin Central freight train operations over that experienced under Scenario A would be incurred as a result of operating commuter rail trains between Burlington and Antioch. It was further concluded that this increase in delays would be unacceptable. These conclusions established the need to consider capacity-related improvements to the Burlington-Antioch railway line.

As part of this capacity analysis work, the issue of freight train length was also considered. As Wisconsin Central business continues to increase, the average length of freight trains may also be expected to increase. However, an increase in the average length of the freight trains may not be expected to affect the capacity of the railway line. An increase in the normal maximum freight train length may be expected to significantly affect the capacity of the railway line. However, the normal maximum train length may be expected to remain unchanged for several reasons:

- If the normal maximum train lengths were increased, the maximum stopping distance might lengthen along the entire subdivision from Chicago to Fond du Lac, thereby effectively requiring a major signal redesign and reconstruction for the entire line. Existing signal block lengths—that is, the distance between signals—are already designed to accommodate the current normal maximum train length and provide for an ample stopping distance from the maximum allowable speed.

- If trains are operated that are longer than one or more of the available passing sidings that need to be used for meeting an opposing train, the operation of the railway line along the entire subdivision immediately becomes more complex. On a single-track mainline, operations can be slowed or restricted by even one extra-long train. This would not be a significant problem on a railway line with only a few trains a day. However, the existing and anticipated future volume of traffic on the Wisconsin Central Chicago Subdivision dictates that all passing sidings be readily available for meets.

- In some cases, stopping positions at signals on passing sidings have been designed to leave specific street and highway crossings clear when a stopped train is occupying the siding. Longer trains that stop in those same positions may cause crossings to be blocked.

Capacity Scenario C—The third scenario also assumed the extension of commuter railway service from Antioch to Burlington. As in Scenario B, all five existing Metra commuter train round trips would be operated to Burlington with one intermediate stop at Silver Lake. Overnight storage and servicing of trains would be at the existing Metra Antioch Coach Yard. All commuter trains would be deadheaded from the Antioch storage yard to Burlington prior to the morning peak period and back to the storage yard following the evening peak period. Freight train operations would be as forecast to the year 2005 and were assumed to be identical to those under Scenarios A and B. The principal difference between Scenario C and Scenario B is that Scenario B incorporates extensive track and signal improvements north of Antioch to reduce delays to freight trains and deadheading commuter trains. Such improvements include: converting the existing Silver Lake passing siding into a section of double track and extending it a distance of two miles to the north; constructing a new 2.1 mile section of double track south of Nestle; and adding two additional intermediate block signals, one between Midway and Vernon and one between Silver Lake and Nestle. In addition, the improvements included those made under Scenario B with respect to upgrading a segment of the Nestle spur track in Burlington and converting the manual turnouts at the north end of the Metra Antioch storage yard and at the Nestle spur track to remote control operation.

Simulation of the third scenario determined that delays to freight train movements experienced under Scenario B could be significantly reduced by capacity improvements to the mainline. Over the 48-hour period, the cumulative delay to Wisconsin Central freight trains was estimated to total an average of 15 hours and 52 minutes. When Scenario C is compared with Scenario B, the cumulative delay to Wisconsin Central freight trains decreased by an average of six hours and 42 minutes over the 48-hour period, or by about 30 percent. Scenario C also showed a decrease in the cumulative delay to Wisconsin Central freight trains from the base conditions represented in Scenario A, which assumed no extension of passenger trains between Antioch and Burlington. The estimated decrease in delay was one hour and 30 minutes over the 48-hour period, or by about nine percent. The delays to trains under this scenario are identified by train type in Table 22. In addition, delays incurred by deadhead commuter train movements would decrease from an average of three hours and 11 minutes under Scenario B to an average of 40 minutes under Scenario C over the 48-hour period, a reduction of about 80 percent.

The reduction in train delays under Scenario C is attributable to the improvements which make it possible for two meets between trains to occur simultaneously on the proposed new double track at Silver Lake and an additional meet to occur on the proposed new double track at Nestle. Thus, it is possible to make more meets between successive commuter trains, resulting in a significant increase in capacity along the Burlington-Antioch segment of the mainline. In the Scenario C simulation, there were 13 meets that occurred at Nestle and 10 double meets that occurred at Silver Lake during the 48-hour period. A total of 14 of these meets took place during the time passenger trains were operating between Antioch and Burlington or during the fleeting of freight trains following the evening commuter trains. In addition, the new Nestle double track was also used effectively for meets between freight trains, apart from the commuter rush periods. It was noted that the proposed new double track segments at Silver Lake and Nestle were both required for meets between trains to occur in a timely manner even if the commuter railway deadhead trains did not operate. Essentially, these two sections of double track are required to provide an adequate supply of passing lengths, especially when freight trains become bunched prior to, and following, the lengthened commuter train operating windows.

The reliability of the deadhead commuter movements also increased dramatically under Scenario C. Delay for the morning deadhead commuter train moves decreased primarily because of the lengthened Silver Lake double track. Because of this improvement, trains would not have to wait as long and could probably be scheduled to make running meets reliably. The delay to the evening deadhead commuter trains, which were given a lower priority than the morning deadhead moves, decreased by almost 85 percent. This was due to both a deadhead commuter train and a freight train being able to fit on the Silver Lake segment of double track and by shortening the length of the single track segment between Nestle and Silver Lake so two successive trains could move between Nestle and Silver Lake between opposing trains.

Scenario C illustrates that the combined operation of commuter railway passenger trains and freight trains on the Burlington-Antioch mainline can be facilitated while total delays to freight train movements are minimized and even reduced while at the same time accommodating the timely operation of commuter railway service. However, to accomplish this will require capital improvements to maintain the integrity of Wisconsin Central's freight train operations. Because of the high volume of train traffic on the line, it is very important that any such improvements be designed to keep all trains moving in the most expeditious manner and to provide the greatest amount of flexibility in dispatching and coordinating meets among those trains.

If consideration of commuter railway passenger train service is continued into a more detailed planning phase, additional simulations will likely be warranted. The additional simulations would be similar in nature and detail to the simulations undertaken for implementation of Metra's North Central Service between Antioch and Chicago. The additional simulations may provide a more detailed examination of design issues including:

- Extending the section of Silver Lake double track beyond its proposed new length of 3.2 miles but not constructing the proposed Nestle double track, which could avoid the cost of constructing a new bridge for the second track over the Fox River;

- Constructing a new section of double track at Nestle beyond its proposed length of 2.1 miles, but not extending the double track at Silver Lake;

- Testing alternative operating plans in which fewer Antioch-Chicago commuter trains are extended all the way to Burlington. Commuter trains that have the potential to cause obvious impacts to freight train operations would not be extended beyond Antioch. In particular, extending the first and last morning peak period trains and the last two evening peak period trains to Burlington were found to produce conflicts with freight train movements;

- Providing overnight equipment storage facilities at or near Burlington to reduce or eliminate deadhead train movements;

- Performing a sensitivity analysis on the forecast year 2005 level of freight traffic by increasing or decreasing the level of future freight traffic to determine what impacts there might be on delays to freight train traffic;

- Extending the four-aspect signal system installed as part of the improvements for the Metra North Central Service from Tower B 12 to Antioch to Burlington. Four aspect signaling includes green, flashing yellow, yellow, and red aspects instead of just green, yellow, and red and could provide shorter blocks and more frequent and more precise signal speed indications to following trains. As a result, four aspect signal systems allow trains to follow more closely. The shorter minimum headway between trains increases the maximum possible trains per hour along a line. Four aspect signals are the standard for Metra-funded improvements.

Based upon the overall results of the simulations, some possible variations in the design of the service and improvements could be expected to have little impact on freight train delays and the overall performance of commuter railway operations between Burlington and Antioch. Some of these possible variations include:

- Locating the Silver Lake station at any of a number of different local sites along the Silver Lake siding, including at the former depot site or at STH 50;

- Adding additional double track sections south of Antioch;

- Increasing the maximum operating speeds south of Antioch;

- Increasing the Metra North Central Service train frequency between Antioch and Chicago by up to 22 or more trains per weekday.

Railway Line Capacity Improvements
The potential initiation of commuter railway passenger train service and its joint operation with existing and forecast future freight train operations would require capacity-related improvements to the Burlington-Antioch railway line. These improvements consist of converting an existing passing siding into a section of double track and extending it, constructing a new section of double track, and installing appropriate new signals and signal upgrades. These improvements are identified and described in the following sections.

Mainline Track Improvements
The assessment of railway line capacity in the Burlington-Antioch corridor concluded that there would be a need for new sections of double track between Burlington and Antioch. These segments of mainline would consist of two main tracks as has recently been done along the Wisconsin Central mainline extending south of Antioch to Tower B 12. The double track segments would essentially act as high-speed passing sidings providing more places for trains traveling in opposite directions to meet each other. Maximum train operating speeds on the second main track would be at or close to the existing main track. The need for additional passing siding capacity was based on an analysis of future commuter train and freight train operations along the line. The existing sidings along the Burlington-Antioch line were found to be insufficient for accommodating the anticipated level of train traffic without inducing increased delays.

Two segments of double track would be required. The first would consist of the extension of the already existing siding at Silver Lake. The second would consist of the construction of a new second track between Silver Lake and Burlington, the north end of which would be at Nestle. It should be noted that a major reason no other passing siding-related improvements are recommended is because a number of other sidings on Wisconsin Central's Chicago Subdivision have been recently lengthened. This work has been undertaken either as part of the improvements necessary to implement the Metra North Central Service or as part of the Wisconsin Central ongoing investment in, and upgrading of, its mainline. For example, Wisconsin Central recently rebuilt and lengthened the siding at Midway—about eight miles north of Burlington—to a length of 1.6 miles. Its existing length now allows it to accommodate most existing freight trains. Also, as part of the improvements necessary for the existing Antioch-Chicago commuter railway service, a second main track was constructed in four locations on the mainline south of Antioch. These are at Schiller Park, Wheeling, Mundelein, and Lake Villa and vary in length from 1.6 to 4.0 miles.

It is recommended that the existing passing siding at Silver Lake be converted to a second main track and extended in a northerly direction about two miles from Milepost 61.4 to the existing approach signal at Milepost 63.4. This would create a 3.2-mile long segment of double track. This would allow the longest freight train to make a meet on the move, as opposed to having to stop, meet the opposing train, and then restart and pull out of the siding. Also, this improvement would allow a double meet to occur where two of the longer trains can both stop and meet an opposing train. In the course of performing the simulations, however, this situation did occur. Given the volume of train traffic on this segment, double meets may occur on the outlying portion of a commuter railway service route where freight trains may be expected to bunch up immediately before and after commuter train peak period windows. In addition, the length of this double track segment would allow most trains to either keep moving or stop in an area between grade crossings with streets and highways. The conversion and extension of the Silver Lake siding would require the following work:

- Installation of two miles of new track including 115-pound continuous welded rail, ties, other track material, ballast, and sub-ballast. No land acquisition would be required since this extension can be accommodated within the available right-of-way width.

- Replacement of 1.2 track miles of existing 100-pound jointed rail with new 115-pound continuous welded rail and other associated track material such as tie plates, joint bars, and anchors; replacement of worn and aged cross ties; addition of ballast as required; alignment and surfacing of track.

- Replacement of the existing No. 15 turnouts at each end of the siding with new No. 24 turnouts at each end of the new siding. This will allow the speed of trains going into and out of the siding to be raised from 25 miles per hour to 50 miles per hour. Both turnouts would be equipped with switch heaters.

- Reconstruction of seven street and highway grade crossings to accommodate either the installation of the new second track or the upgrading of the existing siding track.

- Excavation, grading, and environmental mitigation work to construct the subgrade for the extension of the existing siding track. This would require extension of four existing culverts.

It is recommended that a new second main track be constructed from Milepost 69.2 in a northerly direction to Milepost 71.3 at Nestle on the south side of the City of Burlington. This would create a 2.1-mile long segment of double track. The new second main track would function as a passing track for single or double meets as well as a lead track for commuter trains entering and departing the Burlington station track. A universal crossover would be installed at the north end of the siding at Nestle consisting of two, back-to-back single crossovers. This would increase the flexibility of the new double track segment by allowing commuter trains to enter the mainline immediately after leaving the Burlington passenger station, by allowing commuter trains to meet, and by allowing two freight trains to meet with one using the new second track for this move. The double track section of mainline would also allow the longest freight trains to clear the street and highway grade crossings in the City of Burlington and remain moving while commuter trains are entering and leaving the Nestle spur track. The new second main track at Nestle would require the following work:

- Installation of 2.1 miles of new track including 115-pound continuous welded rail, ties, other track material, ballast, and sub-ballast. No land acquisition would be required since this extension can be accommodated within the available right-of-way width;

- Replacement of the existing mainline turnout for the Nestle spur track with a universal crossover at Nestle. The universal crossover would be made up of four No. 15 turnouts. No. 15 turnouts, while intended for lower operating speeds, are recommended for use at this location since trains would entering or leaving the Burlington-area speed restriction immediately north of Nestle. All turnouts would be equipped with switch heaters;

- Installation of a new No. 24 turnout at the south end of the new second track. This would allow trains to enter or leave the new second main track at an operating speed of 50 miles per hour. The new turnout would be equipped with a switch heater;

- Reconstruction of five private farm road and utility driveway grade crossings to accommodate installation of the new second track;

- Excavation, grading, and environmental mitigation work to construct the subgrade for the second main track. This would require extension of six existing culverts;

- Construction of a new bridge consisting of two 100-foot spans plus approaches over the Fox River at Milepost 69.6 for the second mainline track. This would include significant excavation, grading, and placement of fill. No land acquisition is required since the new bridge can be accommodated within the available right-of-way width.

A more detailed determination of the costs and benefits of constructing a bridge over the Fox River for the second track would be warranted during later stages of more detailed planning and engineering. To avoid the capital cost attendant to construction of such a bridge; it may be possible for the new second track to be shortened by approximately 0.5 mile. The turnout for the new double track segment would then be located just north of the Fox River bridge. While many freight trains could physically be accommodated in the length of a shorter second track, running meets with both trains moving may no longer be able to be made. As a result, this could increase the amount of delay to trains required to stop for meets since at least one of the trains will have to stop, wait for the opposing train to pass by, and then restart and pull out of the siding.

Railway Signal Improvements

Railway signals perform two basic functions: 1) allowing faster, and more efficient operation of trains along mainlines 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 and crossings. The signal improvements identified below would increase the capacity of the Burlington-Antioch mainline so that commuter railway passenger and freight operations can be jointly operated in an efficient manner while minimizing delays. To provide for such operation of commuter railway passenger trains along this extension, the following signal-related improvements are recommended:

- Installation of signals, together with appropriate power-operated turnout machinery and equipment, at both ends of the new Nestle double track segment of mainline. Included with this work would be equipment and signals necessary to protect train movements using the Nestle spur track;

- Replacement and relocation of the existing signals at both ends of the extended segment of double track mainline at Silver Lake. As part of this work, the existing power-operated machinery and equipment at both ends of the existing siding would need to be upgraded and relocated;

- Modification of the existing signal at the north end of the existing Silver Lake siding to be converted to an intermediate signal for both of the proposed main tracks;

- Upgrading of the existing manual turnout at the north end of Metra Antioch Yard to remote control operation to more efficiently handle deadhead commuter trains operating between the Metra storage yard and Burlington. This would require the installation of signals, together with appropriate power-operated turnout machinery and equipment and a switch heater;

- Installation of an intermediate signal in the middle of the 5.8-mile long block to be created between the new double track segments at Silver Lake and Burlington. The signal would be installed in the vicinity of Milepost 66.4 and would help maintain the fleeting of freight trains, particularly following the weekday peak period commuter train windows.

- Installation of an intermediate signal in the middle of the existing 6.1 mile long block between the passing sidings at Midway and Vernon, north of Burlington. The signal would be installed in the vicinity of Milepost 85.8 and would help maintain the fleeting of freight trains, particularly following the weekday peak period commuter train windows.

The two new intermediate signals to be installed at Milepost 66.4 and Milepost 85.8 would divide the existing blocks into two blocks each. While these signals would be beyond the limits of the proposed commuter service extension, they would be required to ensure the minimization of delays to freight trains approaching the commuter railway service area. In both cases, the resulting new blocks would still be longer than other existing blocks on the mainline. Therefore, the new blocks may be assumed to be long enough to accommodate the necessary stopping distances for the largest regular trains. The signaling along the Burlington-Antioch portion of the mainline was assumed to remain a three-aspect system, with no recommendation for upgrading to a four-aspect system at this time.

EQUIPMENT STORAGE AND SERVICING FACILITY NEEDS

The proposed commuter railway service would be operated as an extension of the existing Metra Antioch-Chicago route. Therefore, any additional equipment would need to be compatible with, and operated as part of, the existing fleet of locomotives and coaches used on that route. It was, therefore, assumed that major train inspections and heavy maintenance could be done at an existing Metra facility as is now done for equipment used for the Antioch-Chicago service. This would likely be accomplished as part of the contractual agreement for the Burlington-Antioch extension and would avoid the need to construct a major new maintenance facility.

As already noted earlier in this chapter, it was assumed that the equipment to be used for the Burlington-Antioch extension would consist of the trains already used for the Metra North Central Service and would continue to be based at the Metra Antioch overnight storage yard facility. Equipment used for the Burlington trains would be deadheaded between Antioch and Burlington. However, provision for commuter trains to layover between runs, to reverse direction, and to load and unload passengers while the commuter trains are off the main track at Burlington would be necessary. Such provision could be accomplished through improvement of a portion of Wisconsin Central Nestle spur track on the south side of the City of Burlington. The section of the spur track to be improved would be sufficient to accommodate a platform for the passenger depot facilities and to hold two commuter trains end-to-end between runs.

To provide for this facility, the following improvements would be required:

- Reconstruction of the Nestle spur track for a distance of about 1,300 feet including replacement of the existing 112-pound jointed rail with new 115-pound continuous welded rail and other associated track material such as tie plates, joint bars, and anchors; replacement of worn and aged cross ties; addition of ballast as required; alignment and surfacing of track;

- Excavation, grading, and environmental mitigation work to perform reconstruction and improvement for the spur track;

- Installation of a signal to provide authority for trains on the Nestle spur to enter either of the two main tracks extending to the south;

- Reconstruction of the Pine Street (STH 83) grade crossing surface and upgrading of the existing automatic crossing signals to include the installation of gates.

Since this location would also serve as the Burlington passenger depot, improvements would also include the appropriate passenger platform, shelter areas, parking lot, access road, passenger amenities, and necessary land acquisition as described elsewhere in this report.

Required improvements at the existing Antioch storage yard would be limited to upgrading of the existing manual turnout at the north end of the yard to remote control operation as described earlier in this chapter.

With respect to the commuter bus alternative, an equipment storage and servicing facility would be the responsibility of the service provider. As noted earlier in this chapter, the most appropriate service provider arrangement for commuter bus service would be a public agency or unit of government contracting with a private operator through a competitively awarded contract. In this situation, it is envisioned that the successful private operator would provide not only the equipment and staff, but also all other day-to-day functions necessary for the commuter bus service to operate. Therefore, any costs attendant to the provision of such a facility were assumed to be included under the operating costs for that service.

SUMMARY

The purpose of this chapter was to identify the various options, and to identify the most promising option, with respect to physical, operational and service characteristics for potential commuter railway or commuter bus service in the Burlington-Antioch corridor. The principal characteristics that were considered included commuter railway and bus route alignments, passenger station facilities, service providers, operating plans, rolling stock and vehicles, and track and signal improvements.

Commuter Railway and Bus Route Alignments

A single commuter railway route alignment was determined to be sufficiently promising to warrant further consideration under this feasibility study. This route was along the Wisconsin Central Railway Chicago Subdivision, a distance of about 16 miles between Burlington and Antioch. This route alignment was found to be well suited for accommodating potential commuter railway service operations. This is the only existing railway route that directly connects western Kenosha and Racine Counties with Northeastern Illinois.

A single commuter bus route alignment was determined to be sufficiently promising to warrant further consideration under this feasibility study. This route would extend from Burlington along STH 83 to Antioch, passing along the north side of the Village of Silver Lake and the west side of the Village of Paddock Lake, a distance of about 18 miles. This bus route would connect with the existing Metra North Central Service route at Antioch. The purpose of this route would be to provide a comparable level of service under the commuter bus alternative to that provided under the commuter rail alternative for passengers traveling to and from western Kenosha and Racine Counties.

Passenger Station Facilities

A set of three stations was proposed for the commuter railway service alternative along the Burlington-Antioch railway line. The stations would include Burlington, Silver Lake, and Antioch. The average station spacing would be about eight miles. In Antioch the existing Metra passenger station would be utilized. In Silver Lake and Burlington, new facilities would need to be constructed.

With respect to the commuter bus alternative, three stations were also identified to be located along the Burlington-Antioch route. The bus route stations would also be located at Burlington, Silver Lake, and Antioch. The average station spacing would be about nine miles. Like the commuter rail alternative, the existing Metra passenger station would be utilized in Antioch while new facilities would need to be constructed in Silver Lake and Burlington.

Determination of the precise location and design of each passenger station or stop is properly a function of preliminary and final engineering studies that must follow the feasibility and detailed planning phases of any commuter service development effort. In any such succeeding phases, it will be important that local residents and public officials be involved in station location and design work. Thus, the station characteristics and locations described herein should be regarded as preliminary for purposes of this feasibility study.

Service Provider

Several alternative service provider arrangements were considered for commuter rail and commuter bus service within the Burlington-Antioch corridor. For commuter railway service, it was concluded that operation by Metra as an extension of its already-existing Antioch-Chicago service would be the most reasonable and practical arrangement. This recommendation was based on Metra's familiarity and experience with large commuter railway operations and Metra's ability to readily provide a through service between the Burlington-Antioch extension and Chicago which would not require passengers to transfer between trains at Antioch. Operation of such service by Metra would require negotiation and agreement between Metra and a public entity responsible for implementing commuter rail service in Wisconsin.

For commuter bus service in the Burlington-Antioch corridor, it was concluded that provision of such service be a public entity contracting with a new private operator through a competitively awarded contract process would be the most reasonable and practical arrangement. This recommendation was based on the absence of any similar bus service in the corridor and the successful and efficient operation of bus services under this kind of arrangement elsewhere in Southeastern Wisconsin.

Operating Plans

For purposes of this feasibility study, it was concluded those operating plans for the commuter railway and commuter bus alternatives should provide the inherent flexibility to attract the highest ridership over the entire plan design period.

The recommended commuter railway service operating plan provides for service between Burlington and Antioch as an extension of the existing Metra North Central Service route. Selected existing Metra trains operating between Antioch and Chicago would remain on their existing schedules but be extended north of Antioch to Burlington. Equipment used for the Burlington trains would be deadheaded between Antioch and Burlington. Trains would stop at all intermediate stations. On weekdays, there would be four inbound trains from Burlington to Chicago during the morning peak period, and four outbound trains from Chicago to Burlington during the afternoon peak period, together with a limited amount of nonpeak period service during the early afternoon period and on weekends.

The recommended commuter bus operating plan provides for service over a single route connecting Burlington and Silver Lake with existing Metra commuter rail service at Antioch. Service on this bus route would be coordinated with Metra's North Central Service route train schedules. The frequency of service would be four inbound bus runs from Burlington to Antioch during the morning peak period, and four outbound bus runs from Antioch to Burlington during the afternoon peak period. There would also be a limited amount of service on this route during the early afternoon period and on weekends.

Rolling Stock and Vehicle Requirements

It was assumed that conventional locomotive-hauled commuter train equipment would be used in the provision of the commuter railway service instead of other types of equipment such as self-propelled equipment. Conventional commuter train equipment consists of bi-directional trains consisting of a diesel locomotive with bi-level passenger coaches operating in a "push-pull" mode. This type of equipment has had a long record with respect to availability, dependability, performance, and safety in use by Metra and Metra's predecessors on most of the commuter railway routes in the Chicago area. The equipment would be compatible with the Metra equipment currently operated between Antioch and Chicago.

With respect to commuter bus service, it was recommended that conventional transit buses be assumed for use. Such vehicles would range from 30 to 40 feet in length, the exact size and configuration to be determined by passenger demand and the service provider. These vehicles would be similar to most buses operated in commuter service by transit operators in Southeastern Wisconsin and by Pace in Northeastern Illinois and would include passenger amenities appropriate for the service. The buses and trains would need to meet the accessibility requirements of the Federal Americans with Disabilities Act.

Railway Line Improvements

An assessment of the condition and capacity of the railway line concerned was conducted and an identification of improvements that would be necessary to permit the initiation of commuter railway passenger train service along the existing Burlington-Antioch railway line was made. This work was conducted by a consulting transportation engineering firm working with the Commission staff and with the cooperation of the railway companies involved. The purpose of the assessment was to identify the existing railway line facilities that would have to be rehabilitated, upgraded, or replaced in order to jointly operate commuter railway service with the anticipated future level of freight train traffic in an efficient, safe, and cost-effective manner.

In general, the Wisconsin Central Chicago Subdivision between Burlington and Antioch was found to be in very good condition for existing and anticipated future freight train operations. However, the line would require certain improvements to accommodate both freight and commuter railway passenger train operations in a safe, efficient, and reliable manner without either type of traffic incurring unacceptable levels of delay. The level of freight train activity on the line was forecast to increase from a typical weekday average of 26 freight trains in 1998 to an average of 34 freight trains on a typical weekday by the year 2005. A maximum mainline operating speed of 60 miles per hour between Burlington and Antioch was assumed for the commuter railway passenger trains under for purposes of this feasibility study. Most of the proposed improvements are capacity-related and would be necessary regardless of the maximum mainline operating speed.

Based on the assessment of railway line capacity in the Burlington-Antioch corridor, it was determined that two new segments of double track would be required between Burlington and Antioch to provide additional capacity. The double track segments would essentially act as high-speed passing sidings providing more places for trains traveling in opposite directions to meet each other. It was determined that the existing passing siding at Silver Lake would have to be converted to a second main track and extended in a northerly direction about two miles from Milepost 61.4 to the existing approach signal at Milepost 63.4. This would create a 3.2-mile long segment of double track. It was further determined that a new second main track would have to be constructed from Milepost 69.2 in a northerly direction to Milepost 71.3 at Nestle on the south side of the City of Burlington. This would create a 2.1-mile long segment of double track that would function as a passing track as well as a lead track for commuter trains entering and departing the Burlington station track. This segment of double track would require construction of a new bridge consisting of two 100-foot spans plus approaches over the Fox River.

A number of associated signal and signal-related improvements would also be required. These would include the installation, relocation, and upgrading of signals, together with appropriate power-operated turnout machinery and equipment, at both ends of the new Nestle double track segment of mainline and the lengthened Silver Lake siding. The existing manual turnout at the north end of the Metra Antioch Yard would be upgraded to remote control operation to more efficiently handle deadhead commuter trains operating between the Metra storage yard and Burlington. This would require the installation of signals, together with appropriate power-operated turnout machinery and equipment. Two new intermediate mainline signals would be installed to help maintain the fleeting of freight trains, particularly following the weekday peak period commuter train windows. These would be installed in the middle of the single track section of mainline between the new double track segments at Silver Lake and Burlington and in the middle of the single track section of mainline between the Midway and Vernon passing sidings, north of Burlington.

Other required improvements that were identified included upgrading of the three-degree curve between Mileposts 64.2 and 64.4 north of Silver Lake to increase the maximum allowable speed for passenger trains from 45 to 50 miles per hour and rehabilitation of grade crossings along with upgrading of grade crossing signals. All crossings already equipped with lights and bells would be upgraded to include the installation of gates. At public street and highway crossings that are protected only by crossbucks and stop signs, automatic signals would be installed that include lights, bells, and gates. Constant warning time devices would activate the signals. All private at-grade road and driveway crossings would have crossbucks and stop signs installed on both sides of each crossing.

Equipment Storage and Servicing Facility Needs

For purposes of this feasibility study, it was assumed that the equipment to be used for the Burlington to Antioch extension would consist of the trains already used for the Metra North Central Service. The trains would continue to be based at the Metra Antioch overnight storage yard facility and would be deadheaded to and from Burlington. Provision for commuter trains to layover between runs, to reverse direction, and to load and unload passengers while the commuter trains are off the main track at Burlington would be necessary. This would require upgrading of a portion of Wisconsin Central Nestle spur track on the south side of the City of Burlington. Major train inspections and heavy maintenance work could be done at an existing Metra facility.

Provision of a storage and servicing facility for the commuter bus alternative would be the responsibility of the service provider under a contractual agreement with a private operator. It is envisioned that the operator would provide not only the equipment and staff, but also equipment and facilities such as for the storage and maintenance of buses for all other day-to-day functions necessary for the commuter bus service to operate.

Chapter V

EVALUATION OF POTENTIAL COMMUTER RAIL AND BUS TRANSIT ALTERNATIVES

INTRODUCTION

The purpose of this chapter is to provide an estimate of capital costs, operating costs, and potential ridership attendant to the provision of commuter rail or commuter bus service in the Burlington-Antioch corridor. This information is essential to the assessment of feasibility of commuter rail service and bus service. Previous chapters of this report have identified a conceptual design including physical, operational, and service characteristics for the potential extension of commuter rail service and the alternative provision of commuter bus service in this corridor.

The first section of this chapter provides a description and evaluation of the potential extension of commuter rail service from Antioch to Burlington. This section includes a physical and operational description of the potential service extension, including an operating plan; an estimate of its attendant capital costs; a forecast of potential ridership; an estimate of 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 travel time reductions compared to existing automobile travel, reductions in highway traffic, and reductions in air pollutant emissions and motor fuel consumption.

The next section of this chapter provides a description and evaluation of the potential provision of commuter bus service from Burlington to Antioch. 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 potential ridership; 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 travel time reductions compared to existing automobile travel, reductions in highway traffic, and reductions in air pollutant emissions and motor fuel consumption.

The next section of this chapter provides a comparison of potential commuter rail service with potential commuter bus service in the corridor, and then compares both of these types of services with other existing commuter rail services in the United States and with other bus transit systems in Southeastern Wisconsin. Following this section, the recommendations and conclusions of the Advisory Committee are documented.

DEFINITION AND EVALUATION OF THE POTENTIAL COMMUTER RAIL EXTENSION

Based upon the findings of the inventories, and of the identification of principal physical, operational, and service characteristics presented in previous chapters of this report, a conceptual commuter rail extension proposal was identified and described for feasibility assessment. The commuter rail extension proposal would entail operation of commuter rail passenger trains between Burlington and Antioch as an extension of Metra's existing North Central Service. Selected existing Metra trains operating between Chicago and Antioch would be extended along the entire length of the corridor north of Antioch to Burlington. The service would be provided over the existing railway route which consists of the Metra Milwaukee District West Line from Chicago Union Station to a junction at Tower B 12 in Franklin Park, and the Wisconsin Central System Chicago Subdivision from Tower B 12 to Burlington.[1]

The foregoing service provider recommendation is a preference that 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 Burlington-Antioch corridor will require sponsorship and funding for capital and operating cost needs by Wisconsin governments or agencies.

To provide for commuter rail service between Burlington and Antioch, a route extension of 16 miles, the single-track railway line would require improvements to allow for the joint operation of commuter rail passenger and freight train traffic in an efficient and reliable manner. The existing passing siding at Silver Lake would need to be rehabilitated, extended to a length of 3.2 miles, and converted to a double track segment of mainline. A second track would also need to be added for a distance of 2.1 miles at Nestle, to the south of Burlington. These double track sections of mainline would be needed to allow trains traveling in opposite directions to meet and pass each other. Train operations would continue to be governed by Centralized Traffic Control (CTC) under the direction of Wisconsin Central dispatchers. A more detailed description of the improvements attendant to the extension of commuter rail service was provided in Chapter IV, "Potential Commuter Route Facilities and Services."

The basic conceptual commuter rail extension described herein would serve two new passenger stations described in Chapter IV: Burlington and Silver Lake. At Antioch, the existing Metra station facilities would be utilized. At Burlington and Silver Lake, new station facilities would be necessary. The average station spacing would be about eight miles.

As already noted, for purposes of this feasibility assessment it was assumed that the Burlington-Antioch service would be operated as an extension of Metra's existing service on its North Central Service route between Antioch and Chicago. Such operation would provide a practical approach to both extending service north of Antioch and providing through service in the corridor without requiring passengers to change trains at Antioch, thus encouraging ridership. Commuter rail service on the North Central Service route is operated directly by Metra. The extension of commuter rail service between Burlington and Antioch would be ultimately subject to negotiation and cooperative agreements between the Wisconsin Central System, Metra, railway labor unions, implementing agencies in Wisconsin, and local counties and communities concerning such matters as operating responsibilities, train crew agreements, railroad access and use agreements, and the division of revenues, expenses, and subsidies.

Joint Operation of Commuter Rail Service with Freight Train Traffic

The level of freight train movements along Wisconsin Central's Chicago Subdivision will remain an important consideration. As of December 2000, the Wisconsin Central mainline between Burlington and Antioch was handling a large volume of freight train traffic, estimated as an average of 26 freight trains on a typical weekday.

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[1]*As noted in Chapter III of this report, although train operations on the Milwaukee District West Line are controlled by Canadian Pacific Railway dispatchers, most of the Milwaukee District West Line is owned by Metra.*

These trains represent a wide mix of lengths, tonnage, and operating characteristics and include through trains—or "time freights"—run-through trains for other railway companies such as the Canadian National, intermodal trains, unit trains, and local trains that include way freights and dedicated crushed rock unit trains. By the year 2005, this traffic may be expected to increase to an average of 34 freight trains on a typical weekday between Burlington and Antioch. The installation of double track segments of mainline as well as signal improvements as identified in this feasibility study would provide the ability for both commuter rail passenger trains and the forecast level of freight train traffic to be accommodated on the same line in an efficient, timely, and safe manner and without causing undue additional delays to freight trains.

Operating Plan

On weekdays, commuter rail service between Burlington, Antioch, and Chicago under the potential service extension would consist of four inbound trains from Burlington to Chicago during the morning peak period, and four outbound trains from Chicago to Burlington during the afternoon peak period. Equipment used for the peak-period Burlington trains would be deadheaded between Antioch and Burlington. Service headway would be about 30 minutes during the peak periods. In addition, one train would operate in each direction during the midday period. The trains would be operated as through trains along the entire corridor. Some weekend service would also be provided. On Saturdays, two trains—and on Sundays and major holidays, one train—would operate inbound from Burlington to Chicago during the morning period and outbound from Chicago to Burlington during the late afternoon period. In addition, one midday round trip would be provided on Saturdays, Sundays, and major holidays. This operating plan is intended to provide a full level of service north of Antioch. If the decision were made to implement this proposed extension, the initial service could consist of only one or two trains in each direction with service expanded incrementally over time as ridership warranted.

Other operating plan assumptions for this feasibility assessment pertained to the fare structure. For determining the one-way adult fares assumed to be charged, a zone system was defined for the Burlington-Antioch-Chicago service 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. The assumed fare structure would therefore be integrated with the fare structure in place on the Metra system. This is important since the service under this alternative was assumed to be operated as an extension of the Metra North Central Service route. The fare zone designations and the passenger stations within each zone between Chicago, Antioch, and Burlington are shown on Table 23. The one-way fares used for feasibility assessment of the Burlington-Antioch service as an extension of the Metra North Central Service are shown on Table 24 and were based on the 2000 Metra fare structure, with some minor adjustments. It was also assumed that multi-ride reduced fares in the form of ten-ride tickets and monthly passes similar to those available from Metra would be available for the Burlington-Antioch service extension. The fares assumed under this study are comparable to commuter rail fares on other systems in the United States as shown in Table 25.

Capital Costs

The capital costs attendant to the potential commuter rail extension were estimated based on a cost build-up 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 2000 dollars. The capital costs include all 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 Improvements

To provide commuter rail service within this corridor, the existing rail infrastructure requires some upgrading and improvements to accommodate acceptable operating speeds and the efficient joint operation of both commuter rail passenger and freight trains without unacceptable delays. A maximum mainline operating speed of 60 miles per hour for commuter trains was assumed; however, maximum operating speeds would be lower along some specific segments due to track alignment and other operating factors.

The capital cost of track and signal improvements was estimated to total about $21.5 million as shown in Table 26. The necessary track improvements include: rehabilitation and extension of an existing siding at Silver Lake and conversion into a second main track; construction of a new segment of second main track at Nestle; and rehabilitation of a portion of the Nestle spur track to be used as a station and equipment layover facility off the mainline. The new second main track at Nestle would require construction of a second bridge over the Fox River south of Burlington. Necessary signal improvements would include installation of power turnout machinery, controls, signals, and switch heaters for the new sections of double track. As of 2001, Wisconsin Central was continuing to pursue a program of adding passing sidings to its mainline. It is possible that at some time in the future, these sidings will be connected up to form a double track mainline. Double tracking the railroad line or adding additional passing sidings will make train movements more efficient in the future. Such capacity improvements by the railroad might reduce the capital investment required to initiate commuter rail service in the future. Upgrading the street and highway grade crossings would require installation of new and upgrading of existing grade-crossing signals and installation of signs at the existing private crossings.

Table 23

FARE ZONE AND STATION ARRANGEMENT ASSUMED FOR PROPOSED CHICAGO-ANTIOCH-BURLINGTON COMMUTER RAIL AND COMMUTER BUS SERVICE

Fare Zone Designation	Passenger Stations within Zone
A	Chicago Union Station Western Ave.
B	(No Stations)
C	River Grove
D	O'Hare Transfer
E	Prospect Heights
F	Wheeling Buffalo Grove
G	Prairie View Vernon Hills
H	Mundelein Prairie Crossing/Libertyville
I	(No Stations)
J	Round Lake Beach Lake Villa
K	Antioch
L	Silver Lake
M	(No Stations)
N	Burlington

Source: Metra and SEWRPC.

As this feasibility study was being completed, Wisconsin Central was continuing to pursue a program of adding passing sidings to its mainline between Chicago and Fond du Lac. Adding additional passing sidings or segments of double-track will make the movement of trains more efficient in the future. Such mainline capacity improvements might serve to reduce the capital investment required to initial commuter rail service between Burlington and Antioch.

Equipment Requirements

To provide commuter rail service on the Burlington-Antioch extension, it was assumed that selected Metra trains that now operate between Antioch and Chicago would simply be extended to Burlington. Therefore, the type of equipment and mode of operation would be fully compatible with, and indeed identical to, the equipment and operation used by Metra in the Chicago area and on the North Central Service route. With respect to equipment, this would be conventional locomotive-hauled commuter trains consisting of diesel locomotives with bi-level gallery coaches operated in a push-pull mode.

Equipment needs were based on the anticipated volume of passengers on each train, analysis of the proposed frequency of service between Burlington and Chicago, integration with existing commuter train schedules on the Metra North Central Service route, and maintenance of an efficient level of equipment utilization. To meet the ridership demands of the potential Burlington-Antioch extension, one coach would need to be added to each of the trains extended beyond Antioch. The minimum train size on this line is one locomotive and four coaches. 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 lengths for midday and

Table 24

ONE-WAY ADULT FARES FOR TRAVEL BETWEEN ZONES USED FOR FEASIBILITY ASSESSMENT OF BURLINGTON–ANTIOCH–CHICAGO COMMUTER RAIL AND BUS SERVICE IN 2000 DOLLARS

Fare Zone	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A	$1.80													
B	2.20	$1.80												
C	2.60	2.20	$1.80											
D	3.00	2.60	2.20	$1.80										
E	3.40	3.00	2.60	2.20	$1.80									
F	3.80	3.40	3.00	2.60	2.20	$1.80								
G	4.20	3.80	3.40	3.00	2.60	2.20	$1.80							
H	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80						
I	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80					
J	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80				
K	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80			
L	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80		
M	6.60	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80	
N	7.00	6.60	6.20	5.80	5.40	5.00	4.60	4.20	3.80	3.40	3.00	2.60	2.20	$1.80

Source: SEWRPC.

evening periods becomes inefficient because of additional operating costs and is time-consuming and may cause delays. Because the Burlington-Antioch service would be operated as part of the Metra Antioch-Chicago service, it was assumed that the equipment to be acquired would actually be used in the overall North Central Service equipment pool. The spare equipment required would be integrated with the Metra general spare equipment pool already in place and would be available as needed.

Additional weekday peak-period equipment needs to operate the Burlington-Antioch extension would require that four coaches be procured in addition to the equipment already required by Metra for its Antioch-Chicago service. It was also concluded that an appropriate ratio of spare equipment would need to be contributed. This would total one coach. Accordingly, a total of five coaches would need to be acquired for the Burlington-Antioch extension. The capital cost of the required equipment under this alternative was estimated to total about $10 million.

Passenger Station Facilities

With respect to stations, new facilities would need to be constructed at Burlington and Silver Lake. Existing facilities would be utilized at Antioch. The size and extent of the necessary improvements were based upon the overall design guidelines set forth in Chapter IV of this report and 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 location. This process 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 needs and cost requirements must be determined. The basic elements for each station include: boarding platforms, waiting shelters, parking for automobiles, drop-off and pick-up areas for passengers, and certain station amenities. Station facilities will meet the requirements of the Federal Americans with Disabilities Act.

The capital cost of passenger station facility improvements was estimated to total about $1.2 million as shown in Table 27. Based upon the year 2020 ridership forecasts that were prepared for this alternative, Table 27 sets forth

Table 25

COMPARISON OF PEAK PERIOD FARES ON SELECTED COMMUTER RAIL SERVICES IN THE UNITED STATES: 1999

Sample Trip Endpoints	Distance (miles)	Adult Fares			
		One-Way Ticket[a]		Monthly Pass	
		Actual Cost	Cost per Mile	Actual Cost	Cost per Mile
Potential Burlington-Antioch Extension					
Burlington – Chicago	68.8	$ 7.00	$0.10	$189.00	$0.07
Existing Metra Commuter Rail Routes					
Kenosha – Chicago	51.6	$ 5.80	$0.11	$156.60	$0.07
Antioch – Chicago	52.8	5.80	0.11	156.60	0.07
Fox Lake – Chicago	49.5	5.45	0.11	147.15	0.07
Harvard – Chicago	63.1	6.60	0.10	178.20	0.07
Existing Amtrak Services Used By Commuters					
Milwaukee – Chicago	85.4	$19.00	$0.22	$480.00	$0.13
New York – Philadelphia	91.0	22.00	0.24	501.00	0.13
San Diego - Los Angeles	129.0	28.00	0.22	532.00	0.10
Sample Routes On Other Existing Commuter Rail Systems (Operator)[b]					
Boston - Fitchburg (MBTA)	49.6	$ 4.75	$0.10	$136.00	$0.06
New York - Poughkeepsie (Metro-North)	74.0	13.00	0.18	257.00	0.08
New York - New Haven (Metro-North)	72.0	15.25	0.21	319.00	0.10
New York - Riverhead (Long Island Rail Road)	75.2	15.25	0.20	251.00	0.08
New York - Trenton (NJT)	58.1	9.45	0.16	265.00	0.11
Hoboken - Hackettstown (NJT)	54.7	6.65	0.12	186.00	0.08
Philadelphia - Doylestown (SEPTA)	34.2	5.00	0.15	142.00	0.10
Washington - Martinsburg (MARC)	73.3	8.25	0.11	205.00	0.07
Washington - Fredericksburg (VRE)	54.1	6.70	0.12	197.00	0.08
Miami - West Palm Beach (Tri-Rail)	71.0	5.50	0.08	80.00	0.03
Los Angeles - San Bernadino (Metrolink)	56.2	7.75	0.14	216.00	0.09
Stockton - San Jose (ACE)	85.0	10.00	0.12	279.00	0.08
San Francisco - Morgan Hill (CalTrain)	67.1	6.75	0.10	177.25	0.06

[a]*Normal peak-period fares are shown. Normal nonpeak one-way fares as well as other discounted and promotional fares may be available.*

[b]*Station pairs selected to represent distances comparable to Burlington-Chicago (69 miles) where possible.*

Source: SEWRPC.

the basic facility needs and capital cost requirements for each of the two new stations along the extension route. The Antioch station would require only some minor signage additions.

Ticket sales for service on the Burlington-Antioch extension would be handled in much the same manner as is presently done by 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 on board trains from conductors at stations where no agent is on duty. It was assumed that, at least initially, ticket sales would only be available at Chicago, which is the only station along the route already staffed with ticket agents. Ticket sales at any of the other stations could be added at a later date based on sufficient passenger volume, available funding and facility resources, or other local needs. Some of the new depot buildings between Chicago and Antioch were constructed with provisions for station ticket agents at some time in the future as service along the route is expanded.

Table 26

CAPITAL COST OF TRACK AND SIGNAL IMPROVEMENTS FOR BURLINGTON-ANTIOCH COMMUTER RAIL SERVICE IN 2000 DOLLARS

Category	Quantity	Cost of Material and Installation
Upgrade Existing Mainline Track		
Construct second main track	21,650 Track Feet	$ 5,776,000
Rehabilitate existing siding track	6,920 Track Feet	425,000
Superelevation work on curve at Milepost 64.3	Lump Sum	65,000
Rehabilitate Nestle spur track	1,400 Track Feet	234,000
Install new turnouts	7	1,023,000
Construct bridge over Fox River for second main track	Lump Sum	1,635,000
Install new culverts	10	82,000
Mainline Signal Work		
Install power turnout machinery, controls, and home signals for new sidings and upgraded turnouts	3 Locations	3,270,000
Install new intermediate signals	2 Locations	157,000
Install switch heaters	8	126,000
Upgrade At-Grade Street and Highway Crossings		
Rebuild existing crossings	17	463,000
Install crossing for new second track	5	136,000
Upgrade and install signal equipment for single-track grade crossings	2 Crossings	377,000
Upgrade and install signal equipment for double-track grade crossings	5 Crossings	1,362,000
Install crossbucks and stop signs at private crossings	18 Crossings	40,000
Subtotal	- -	$15,171,000
Contingencies	30 percent	4,551,000
Preliminary engineering, design, and construction management	12 percent	1,821,000
Total	- -	$21,543,000

Source: SEWRPC.

Equipment Storage and Servicing Facilities

Since train equipment would be deadheaded from Antioch to Burlington, necessary equipment storage facilities under this alternative would be minimal and consist of improving a section of the Nestle spur track in Burlington. This track would be used for the Burlington station as well as a place to hold trains off the Wisconsin Central mainline between runs. The capital cost of upgrading the Nestle spur track has been included in the track and signal improvements described above.

For purposes of this study, train equipment would be deadheaded between the Burlington station and the storage yard at Antioch. This would eliminate the need for a duplicative storage and servicing facility along the Metra North Central service route. If it were concluded that trains should be stored overnight in Burlington instead of deadheading them to and from Antioch, then an appropriate facility would need to be provided. The facility would be used for overnight storage, cleaning, and light servicing of locomotives and coaches. Improvements that would be necessary at such a facility would include: construction of at least two storage tracks along with attendant turnouts and signals; installation of an electrical bridge to provide connections for the provision of power and heat to the train sets while they were being 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 drives to the facility. Although the capital cost of such a facility would be dependent upon its final design and location, that cost may be expected to total about $2.6 million, not including any land acquisition and preparation costs. For purposes of this feasibility study, it was assumed that major inspection, maintenance, and repair work would be performed on the additional coaches required for the Burlington-Antioch extension under agreement with Metra at its existing facilities.

Summary of Capital Costs

A summary of the capital costs attendant to the extension of commuter rail service in the Burlington-Antioch corridor is presented in Table 28. The total cost of the necessary capital improvements under this alternative was estimated to be $32.8 million in 2000 constant dollars.

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—as a percentage of the total material and installation costs. These factors have been long accepted as appropriate for use in long-range capital-cost estimation. The rates used for these two items are 30 percent and 12 percent, respectively. These rates are based on similar rates used by Metra in its feasibility and long-range planning work. Should detailed planning and engineering work continue and the estimation of capital costs becomes more precise, it may be appropriate to revise the factors for these items.

Table 27

CAPITAL COST OF PASSENGER STATIONS FOR BURLINGTON-ANTIOCH COMMUTER RAIL SERVICE IN 2000 DOLLARS

Item	Assumed Size	Cost of Material and Installation
Burlington		
Platform and access	210 feet	$ 110,000
Shelters	2	42,000
Park-Ride lot	30 spaces	131,000[a]
Land acquisition	2.0 acres	52,000[b]
Contingencies	30 percent	100,000
Preliminary engineering, design, and construction management	12 percent	40,000
Subtotal	--	$ 475,000
Silver Lake		
Platform and access	210 feet	110,000
Shelters	2	42,000
Park-ride lot and driveway	60 spaces	310,000[a]
Land acquisition	3.0 acres	78,000[b]
Contingencies	30 percent	162,000
Preliminary engineering, design, and construction management	12 percent	65,000
Subtotal	--	$ 767,000
Antioch		
Signing improvements	Lump Sum	1,000[c]
Total	--	$1,243,000

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 assumed to be $26,000 per acre. Land acquisition cost for Burlington also includes in-kind replacement of industrial parking lot areas for station development.*

[c]*Includes contingencies and preliminary engineering, design, and construction management.*

Source: SEWRPC.

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 future design year 2020 based upon 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. Also considered was data from the 1990 U.S. Census, which estimates the workplace locations of residents of Southeastern Wisconsin and Northeastern Illinois. The travel simulation models predict the relative proportion of trips made by auto and 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 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 at existing Metra stations. This validation indicated that the models predicted the total ridership and the ridership by Wisconsin residents, within a tolerance of five to 10 percent.[2]

The forecast number of trips made on an average weekday in the year 2020 on the potential commuter rail extension was estimated to be 180 trips, as shown in Table 29. Approximately 158, or almost 90 percent of the projected 180 trips may be expected to be made between stations on the potential new extension and the Union Station terminal in the Chicago central business district. About 60, or 33 percent of the trips on the extension may be expected to be generated at the Burlington station and about 120, or 67 percent of the trips on the extension may be expected to be generated at the Silver Lake station. Forecast annual total year 2020 ridership is shown in Table 30. A significant proportion of the estimated ridership attributable to the potential Burlington-Antioch extension would likely consist of Wisconsin residents who would otherwise drive to existing Metra stations.

Table 28

SUMMARY OF CAPITAL COSTS FOR COMMUTER RAIL SERVICE IN THE BURLINGTON–ANTIOCH CORRIDOR IN 2000 DOLLARS

Item	Cost of Material and Installation
Track and Signal Improvements	$21,543,000
Passenger Station Facilities	1,243,000
Train Equipment	10,000,000
Total	$32,786,000

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

Source: SEWRPC.

Table 29

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL BURLINGTON–ANTIOCH COMMUTER RAIL SERVICE EXTENSION BY STATION: 2020

Station	Average Weekday Ridership: 2020	
	Ons	Offs
Burlington	30	30
Silver Lake	60	60
Total	90	90

Source: SEWRPC.

Table 30

FORECAST ANNUAL RIDERSHIP ON POTENTIAL BURLINGTON-ANTIOCH COMMUTER RAIL SERVICE EXTENSION

Day of Week	Projected Number of Annual Trips: 2020
Weekdays	45,900
Saturdays[a]	1,500
Sunday and Holidays[b]	1,000
Total	48,400

[a]*Saturday ridership is estimated at 16 percent of weekday ridership based on existing Metra Milwaukee District North Line commuter rail ridership.*

[b]*Sunday and holiday ridership is estimated at 10 percent of weekday ridership based on existing Metra Milwaukee District North Line commuter rail ridership.*

Source: SEWRPC.

The ridership forecast was prepared for the 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 30 to 40 percent less than the projected year 2020 ridership, based upon forecast total travel growth to and travel conditions in, the year 2020. Potential "start-up" ridership immediately upon service initiation would be less than this potential current year ridership during the first one to three years following service initiation, as is typical of new-start commuter rail systems.

[2]*Appendix A to this report provides the results of a license plate survey conducted at the passenger stations along the Metra North Central Service and Milwaukee District North Line commuter rail routes.*

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 land-use development and total travel within the corridor of the commuter rail extension will not significantly increase as a result of commuter rail service initiation; and that Metra service on other nearby commuter rail routes will continue to operate at current levels of service. In addition, long-term future improvements which are being considered for Metra's existing Antioch-Chicago service—such as additional trains—could also foster increased ridership.

During the preparation of this feasibility study, a question was raised as to whether omitting the Silver Lake station would increase ridership to and from Burlington. The idea behind this question was that omitting a stop would increase the average speed of the trains and therefore make the service more attractive. This issue was considered. It was found that omitting the Silver Lake station would have little, if any, effect on the ridership generated at Burlington, largely because the number of passengers forecast to board at Burlington is relatively small. As noted above, it was estimated that about one-third of the passengers boarding along the extension would do so at Burlington. The remainder would be boarding at Silver Lake. Omitting the Silver Lake station stop would only save from two to three minutes running time for trains between Burlington and Silver Lake. Furthermore, passengers in the Silver Lake area who could not board at Silver Lake would be expected to drive to the Metra stations at Antioch, Lake Villa, or Fox Lake and would not be expected to drive north to the Burlington station to travel by train into Chicago.

Total and Net Operating Costs

The total annual operating cost of the potential commuter rail extension was estimated to be about $4.1 million expressed in 2000 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 rail service represent the incremental resources required to operate the entire extension beyond the current Antioch terminal.

Cost estimates of the train crew personnel element of operating costs represent 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 Wisconsin Central System, or a new or other operating entity would be the result of negotiation and cooperative agreements pursuant to prevailing labor contracts. Train crew expenses were based on the incremental time required to operate trains beyond Antioch to Burlington according to the operating plan described herein.

The total operating cost also includes a railroad access and use element which represents the charges and fees for use of the 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 implementing agency responsible for implementing Burlington-Antioch commuter rail service, the Wisconsin Central System, and Metra.

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 upon the corporate philosophy of the freight railroads at a 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

Table 31

ESTIMATED ANNUAL TOTAL AND NET OPERATING COST OF BURLINGTON-ANTIOCH COMMUTER RAIL SERVICE EXTENSION

Category and Items	Projected Annual Amount (in 2000 dollars)		
	Weekday Service	Weekend and Holiday Service	Total
Operating Cost[a]			
Annual Train-Miles	72,700	13,800	86,500
Operating Cost per Train-Mile	$46.89	$46.89	$46.89
Total Cost	$3,409,000	$647,000	$4,056,000
Operating Revenue[b]			
Number of Annual Commuter Rail Passengers	45,900	2,500	48,400
Total Operating Revenue	$212,000	$12,000	$224,000
Net Operating Cost[c]	$3,197,000	$635,000	$3,832,000
Percent of Total Operating Cost Recovered through Operating Revenue	6	2	6

[a]*Total operating cost is the incremental cost of extending service north of the Antioch station.*

[b]*Total operating revenue is the total projected fare generated by ridership at all new stations. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts.*

[c]*Represents the projected amount of annual subsidy that would be required.*

Source: SEWRPC.

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 right-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's 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 liability arising out of joint commuter rail and frequent 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 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 throughout the United States indicated 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 that 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 $6.00 to $11.00 per train mile range. In some cases, the access fee is a negotiated contact amount that is applied on an annual basis. An exact determination of access-and-use charges cannot be determined until negotiations are entered into with the freight railroad.

While the estimated access-and-use fee is reflective of such fees around the country, it should be noted that there are generally three different options regarding what 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:

- Use of Trackage Rights—Under this option, the commuter operating entity would enter into a "trackage rights" agreement with the freight railroad(s) to use its facilities. In essence, under this type of agreement, the freight railroad would provide rail-line capacity and attendant support 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. All rolling stock and train crews would be provided by the commuter operating entity, but the rail line would be operated and controlled by the owning railroad.

- Purchase of Service 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, including the operation and maintenance of the rail line. All train crews, ticket agents, and staff and services would be provided by the freight railroad. Rolling stock including locomotives and cars could be provided by either the freight railroad or the entity sponsoring the commuter rail service.

- 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 enter into a trackage rights agreement with the commuter rail operating entity for freight movements. A variation of this option would have ownership of the rail line transferred from the freight railroad to the commuter operating entity for a specified period under a long-term lease agreement. For example, that period could be 25 or 50 years. Ownership of the track 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.

Another operating-cost element is the maintenance-of-equipment which 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 another independent shop. This category would also include the cost of overnight heating and power for trains at the storage yard. Equipment maintenance expenses were based on the incremental use of the additional coaches necessary to operate the commuter rail service according to the operating plan described herein.

An administrative operating-cost element includes management and other related staff functions that would be the responsibility of the service sponsor in Wisconsin as well as marketing expense. Another support cost included in this category is maintenance at stations. This would primarily involve cleaning, trash pickup, snow removal, and minor repairs.

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 that could be expected to be attributable to the Burlington-Antioch extension of commuter rail service.

The annual operating revenue of the potential commuter rail extension was estimated to total about $224,000 as shown in Table 31. The projected operating revenue includes all projected fares paid by trips between Southeastern Wisconsin and Northeastern Illinois. The revenue projections account for the effects of monthly pass and multi-ticket purchase discounts. The net annual operating costs—or the difference between the total annual operating cost and the annual operating revenue—was estimated to be about $3.8 million. This amount represents the necessary operating subsidy that would be required.

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 and with Metra. If and when commuter rail service is implemented in the Burlington-Antioch 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.

The estimated reduction in motor fuel consumption attributable to the forecast 180 commuter rail trips on an average weekday is approximately 400 gallons of motor fuel per average weekday (assuming 25 miles per gallon and automobile occupancy of 1.15). On an average weekday in Southeastern Wisconsin in 2020, automobiles and trucks are projected to consume an estimated 1.6 million gallons of motor fuel.

The estimated reduction in ozone-related air pollutant emissions attendant to the forecast 180 commuter rail weekday trips is seven pounds of volatile organic compounds and 19 pounds of nitrogen oxide (based upon year 2020 emission factors). Automobiles and trucks within Southeastern Wisconsin are projected to generate on a hot summer weekday in the year 2020 an estimated 24 tons of volatile organic compound emissions and 49 tons of nitrogen oxide emissions.

The estimated reduction in highway traffic attendant to the 180 commuter rail trips is an estimated 10,000 vehicle-miles of travel on an average weekday. On an average weekday within Southeastern Wisconsin in 2020, approximately 47 million vehicle-miles of travel are projected to be made by automobiles and trucks.

DEFINITION AND EVALUATION OF POTENTIAL COMMUTER BUS ROUTE

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 bus option was identified and described for feasibility assessment. The commuter bus option would consist of a feeder route extending from the City of Burlington to the existing Metra commuter rail station in Antioch. The route would extend a distance of about 18 miles primarily along STH 83. The purpose of this route would be to provide bus service that directly connects with established Metra commuter train routes and to provide a comparable level of service to that provided under the commuter rail alternative for passengers traveling between Burlington and Silver Lake, and the Chicago area.

The conceptual commuter bus service would serve three passenger stations as described in Chapter IV. These include Burlington, Silver Lake, and Antioch. At Antioch, the existing Metra station facilities would be utilized. At Burlington and Silver Lake, new station facilities, including park-ride lots for automobiles, would be necessary. The average station spacing would be about nine miles.

For purposes of this feasibility assessment, it was assumed that commuter bus service in the Burlington-Antioch corridor would be provided by a public entity contracting with a private operator through a competitively awarded contract process. This kind of arrangement has been used to provide successful and efficient bus services elsewhere in Southeastern Wisconsin.

Operating Plan

On weekdays, commuter bus service would consist of four inbound runs from Burlington to Antioch during the morning peak period and four outbound runs from Antioch to Burlington. Service headway would be about 30 minutes during the peak periods. In addition, one bus would operate in each direction during the midday period. A limited amount of weekend service would also be provided. On Saturdays, two bus runs—and on Sundays, one bus run—would operate inbound from Burlington to Antioch during the morning period and outbound from Antioch to Burlington during the late afternoon period. In addition, one midday round trip would be provided on Saturdays, Sundays, and major holidays.

Other operating plan assumptions for this feasibility assessment pertained to the fare structure. For determining the one-way adult fares assumed to be charged, a zone system was defined for the Burlington-Chicago coordinated bus-rail service 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. The assumed fare structure would therefore be integrated with the fare structure in place on the Metra system. This is important since the bus service under this alternative was assumed to be operated in a coordinated manner with Metra's North Central Service. The fare zone designations and the passenger stations within each zone between Chicago and Burlington are shown on Table 23. The one-way fares used for feasibility assessment of the Burlington-Antioch corridor bus service are shown on Table 24 and were based on the 2000 Metra fare structure, with some minor adjustments. It was also assumed that multi-ride reduced fares in the form of ten-ride tickets and monthly passes similar to those available from Metra would be available for the Burlington-Chicago coordinated bus-rail service.

Capital Costs

The capital costs attendant to the potential commuter bus alternative were estimated based on a cost build-up approach with respect to the necessary facilities and equipment requirements. The capital cost requirements for the commuter bus alternative will be less than that for the commuter rail alternative because bus transit services are normally far less capital-intensive than are rail transit services. As discussed earlier, the commuter bus service may be expected to be provided by a private operator who would be responsible for furnishing vehicles, maintenance services and facilities, and an overnight storage facility under contract with the responsible public entity. Accordingly, many potential capital-cost items under this type of service-provider arrangement would be accounted for as an addition to operating-cost items. 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—may be implemented in an incremental manner, thereby spreading the total required capital investment over a period of years. All capital costs are presented in constant 2000 dollars. The estimated capital costs are described below.

The principal capital cost associated with the commuter bus alternative is for station facilities. Because the commuter bus operations would use the public street and highway system, there would be no improvements required that would be attendant to right-of-way, roadway, or signals. With respect to equipment, overnight storage, and maintenance facilities, these items would be the responsibility of the operator to whom the service is contracted. It is anticipated that the vehicles to be used would be required to be full-sized transit buses similar to most buses operated in commuter service by transit operators in Southeastern Wisconsin and Northeastern Illinois and would include passenger amenities appropriate for the service. In general, the operator would be responsible for all day-to-day functions necessary to the operation of the bus service.

With respect to stations, new facilities with park-ride lots would need to be constructed at Silver Lake and Burlington. The existing Metra station would be used at Antioch. The size and extent of the necessary improvements were based upon the overall design guidelines set forth in Chapter IV of this report which, 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 with respect to location. Much of this work should include the input and consideration of the appropriate local officials for the area in which the station will be located. 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 for the Antioch-Burlington bus route was estimated to total about $501,000 as shown in Table 32. Based upon the year 2020 ridership forecasts that were prepared for the commuter bus alternative, these two tables set forth the basic facility needs and capital-cost requirements for each of the stations along the route. This amount represents the total capital cost for the commuter bus service in the Burlington-Antioch corridor.

Ticket sales for this coordinated bus-rail 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 on board trains and buses from conductors and drivers at stations and stops where no agent is on duty. It was assumed that, at least initially, ticket sales at depots would only be available at Metra commuter rail stations that are already staffed with ticket agents because of large passenger volumes. Ticket sales at other stations could be added at a later date based on sufficient passenger volume, available funding and facility resources, or other local needs.

Table 32

CAPITAL COST OF PASSENGER STATIONS FOR BURLINGTON–ANTIOCH COMMUTER BUS SERVICE IN 2000 DOLLARS

Item	Assumed Size	Cost of Material and Installation
Burlington		
Platform and access	100 feet	$ 52,000
Shelters	1	26,000
Park-ride lot	5 spaces	65,000[a]
Land acquisition	1.0 acres	26,000[b]
Contingencies	30 percent	51,000
Preliminary engineering, design, and construction management	12 percent	20,000
Subtotal	- -	$240,000
Silver Lake		
Platform and access	100 feet	$ 52,000
Shelters	1	26,000
Park-ride lot	10 spaces	79,000[a]
Land acquisition	1.0 acres	26,000[b]
Contingencies	30 percent	55,000
Preliminary engineering, design, and construction management	12 percent	22,000
Subtotal	- -	$260,000
Antioch		
Signing improvements	Lump Sum	$ 1,000[c]
Total	- -	$501,000

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 assumed to be $26,000 per acre. Land acquisition cost for Burlington also includes in-kind replacement of industrial parking lot areas for station development.*

[c]*Includes 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 as a percentage of the total material and installation costs. These factors have been long accepted as appropriate for use in long-range capital cost estimation. The rates used for these two items are 30 and 12 percent, respectively. These rates are based on similar rates used by Metra in its feasibility and long-range planning work. Should detailed planning and engineering work continue and the estimation of capital costs becomes more precise, it may be appropriate to revise the factors for these items.

Ridership Forecasts

A forecast of probable ridership on the proposed coordinated commuter bus and rail services 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 future design year 2020 based upon 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. Also considered was data from the 1990 U.S. Census, which estimates the workplace location of residents of Southeastern Wisconsin and Northeastern Illinois. The travel-simulation models predict the relative proportion of trips made by auto and commuter rail/commuter bus 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, commuter bus, and auto travel, and 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 bus routes, the models were validated by comparing current year model application results to actual current year commuter rail ridership at existing Metra stations and to actual ridership on existing bus services in Southeastern Wisconsin. This validation indicated that the models predicted the ridership within a tolerance of 5 to 10 percent.

The forecast number of trips made on an average weekday in the year 2020 on both of the potential commuter bus routes was estimated to be 40 trips as shown in Table 33. About 34, or 85 percent of the projected 40 trips may be expected to be made between stops on the bus route and the Union Station terminal in the Chicago central business district. About 10, or 25 percent of the total trips could be expected to be generated at the Burlington station and about 30, or 75 percent of the total trips, could be expected to be generated at the Silver Lake station. Almost all of the ridership attributable to this bus extension would likely consist of Wisconsin residents who would otherwise drive to existing Metra stations, as opposed to new trips attracted to the service. Forecast annual total year 2020 ridership is shown on Table 34.

Table 33

FORECAST AVERAGE WEEKDAY RIDERSHIP ON POTENTIAL BURLINGTON–ANTIOCH COMMUTER BUS SERVICE EXTENSION BY STATION: 2020

Station	Average Weekday Ridership: 2020	
	Ons	Offs
Burlington	5	5
Silver Lake	15	15
Total	20	20

Source: SEWRPC.

Table 34

FORECAST ANNUAL RIDERSHIP ON POTENTIAL BURLINGTON–ANTIOCH COMMUTER BUS SERVICE EXTENSION

Day of Week	Projected Number of Annual Trips: 2020
Weekdays	5,100
Saturdays[a]	200
Sunday and Holidays[b]	100
Total	5,400

[a]Saturday ridership is estimated at 16 percent of weekday ridership based on existing Metra Milwaukee District North Line commuter rail ridership

[b]Sunday and holiday ridership is estimated at 10 per-cent of weekday ridership based on existing Metra Milwaukee District North Line commuter rail ridership.

Source: SEWRPC.

The ridership forecast was prepared for the 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 30 to 40 percent less than the projected year 2020 ridership, based upon forecast total travel growth to the year 2020. Potential "start-up" ridership immediately upon service initiation would be less than this potential current year ridership during the first one to three years following service initiation, as is typical of newly implemented commuter bus services.

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 land development and total travel within the corridor will not significantly increase as a result of the coordinated bus-rail service initiation; and that Metra service on other nearby commuter rail routes will continue to operate at current levels of service. In addition, long-term future improvements which could be considered for Metra's existing Antioch-Chicago service—such as additional trains—could also foster increased ridership.

Table 35

ESTIMATED ANNUAL TOTAL AND NET OPERATING COST OF BURLINGTON-ANTIOCH COMMUTER BUS SERVICE EXTENSION

Category and Items	Projected Annual Amount (in 2000 dollars)		
	Weekday Service	Weekend and Holiday Service	Total
Operating Cost[a]			
Annual Bus-Miles	84,400	16,000	100,400
Operating Cost per Bus-Mile	$3.65	$3.65	$3.65
Total Cost	$308,100	$58,400	$366,500
Operating Revenue[b]			
Number of Annual Commuter Bus Passengers	5,100	300	5,400
Total Operating Revenue	$6,700	$500	$7,200
Net Operating Cost[c]	$301,400	$57,900	$359,300
Percent of Total Operating Cost Recovered through Operating Revenue	2	1	2

[a] *Total operating cost is the incremental cost of extending service north of the Antioch station.*

[b] *Total operating revenue is the total projected fare generated by ridership at all new stations. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts.*

[c] *Represents the projected amount of annual subsidy that would be required.*

Source: SEWRPC.

Total and Net Operating Costs

The total annual operating cost of the potential commuter bus route was estimated to be about $366,000 expressed in 2000 dollars, as shown in Table 35. The annual operating cost in Table 35 is also presented by weekday and weekend periods for the route.

As described in Chapter IV of this report, it was assumed that the coordinated bus-rail service over these two routes would be provided by a public entity which would contract with a private bus operator through a competitively awarded contract. The service contract between the responsible public entity and the private bus operator would cover all of the costs of day-to-day operations. This would include providing capital facilities such as the storage and maintenance garage as well as vehicles. This type of arrangement is typical for many local and suburban transit systems in Southeastern Wisconsin. Examples include the suburban bus services operating between Kenosha, Racine, and Milwaukee sponsored by the City of Racine and between Oconomowoc, Waukesha, and Milwaukee sponsored by Waukesha County. Only the stations and park-ride lots would be provided through a public source such as a county or the State Department of Transportation since these facilities would most likely be located on publicly owned lands. Maintenance of the bus stations and stops, however, could be the responsibility of the private operator under terms of the agreement.

The total annual operating cost for the bus routes in this feasibility study was determined by utilizing comparable operating unit costs from actual transit operations in Southeastern Wisconsin. A review of operating cost data based on the experience of transit systems in Southeastern Wisconsin indicates that such unit costs vary widely, ranging from approximately $2.40 to $5.60 per revenue vehicle mile based on system-wide averages. Operating unit costs within a specific system may also vary by route and were found to range up to $8.00 per revenue vehicle mile. For purposes of this feasibility study, an estimated cost of $3.65 per revenue vehicle mile was used. An exact determination of bus route operating costs cannot be determined until bids are solicited and negotiations are entered into with an operator. The total annual operating costs for the coordinated bus services represent the incremental resources required to operate the entire routes beyond the current Antioch terminal.

The annual operating revenue of the potential commuter bus service was estimated to total about $7,200 as shown in Table 35. The annual operating revenue in Table 35 is also presented by weekday and weekend portions of the service. The projected operating revenue includes all projected fares paid by trips between Southeastern Wisconsin and Northeastern Illinois, but only on the new bus route. The projected operating revenue does not include any revenue attributable to the rail portion of trips south of Antioch. The revenue projections account for the effects of monthly pass and multi-ticket purchase discounts. The net annual operating cost—or the difference between the total annual operating cost and the annual operating revenue—was estimated to be about $359,000. This amount represents the necessary operating subsidy that would be required.

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. If and when commuter bus service is implemented in the Burlington-Antioch corridor, actual ridership, revenues, and operating costs may vary from those presented herein and will ultimately be dependent upon the actual operating plan and negotiated agreements between the service providers involved and the public sponsoring entity.

The estimated reduction in motor fuel consumption attributable to the forecast 40 commuter trips on an average weekday is approximately 100 gallons of motor fuel per average weekday (assuming 25 miles per gallon and automobile occupancy of 1.15 and including both bus and commuter rail segments of the trips). On an average weekday in Southeastern Wisconsin in 2020, automobiles and trucks are projected to consume 1.6 million gallons of motor fuel.

The estimated reduction in ozone-related air pollutant emissions attendant to the forecast 40 weekday commuter bus trips is 1.5 pounds of volatile organic compounds and four pounds of nitrogen oxide (based upon year 2020 emission factors including both bus and commuter rail segments of the trips). Automobiles and trucks are projected to generate on a hot summer weekday an estimated 24 tons of volatile organic compound emissions and 49 tons of nitrogen oxide emissions in Southeastern Wisconsin in the year 2020.

The estimated reduction in highway traffic attendant to the 40 weekday commuter bus trips is an estimated 2,000 vehicle-miles of travel on an average weekday (including both bus and commuter rail segments of the trips). On an average weekday within Southeastern Wisconsin in 2020, approximately 47 million vehicle-miles of travel are projected to be made by automobiles and trucks.

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

To assist in the assessment of the feasibility of the proposed Burlington-Antioch corridor commuter rail and bus service, these proposed services were compared with each other and with other existing new-start commuter rail systems in the United States, 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 are two of these characteristics: ridership and the operating-cost recovery rate. The operating-cost recovery rate 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 financial feasibility of such a service as well as a criterion for comparison among various systems.

It is apparent from the ridership, revenue, and operating cost projections presented in Tables 31 and 35 that both the commuter rail and commuter bus extension alternatives are expected to perform poorly. The commuter rail alternative would generate about 180 trips on an average weekday, or about 48,400 trips annually; and the commuter bus alternative would generate about 40 trips on an average weekday, or about 5,400 trips annually. Thus, the commuter rail alternative may be expected to attract about four and one-half times the ridership than would a commuter bus alternative in the corridor. The estimated operating-cost recovery rate for the commuter rail alternative would be about 6 percent, and the estimated operating-cost recovery rate for the commuter bus alternative would be only about 2 percent. The higher ridership level for commuter rail can be attributed to faster travel times and passengers not having to transfer between vehicles during the trip. This translates to a more convenient and thus more attractive trip for many passengers. However, for the commuter rail alternative to attract the higher level of ridership, the annual operating cost could be expected to be about 11 times that for the bus alternative and the total capital cost could be expected to be up to 70 times that of the bus alternative.

Because of these results, the initial commuter rail and bus alternatives were reviewed and their assumed level of service subsequently cut-back in an attempt to bring the annual operating cost more in line with the anticipated level of ridership. For both the rail and bus alternatives, the weekday peak-period, peak-direction service was reduced from four to two scheduled runs and weekend and holiday service was removed. The weekday midday round trip was also removed from both alternatives. It was assumed that the anticipated ridership for these revised "cut-back" alternatives would remain about the same as under the initial alternatives. This should be regarded as an optimistic assumption since transit service ridership is normally responsive to service changes. However, for longer trips such as would be made between Burlington and Silver Lake and Chicago, potential passengers are sometimes more willing to adjust their personal schedule to meet a more limited selection of train or bus departure times. Thus, this assumption while being optimistic, was considered acceptable for purposes of this feasibility study.

The resulting ridership, revenue, and operating cost projections for the cut-back versions of the alternatives are presented in Tables 36 and 37. The commuter rail extension alternative is assumed to generate about 180 trips on an average weekday, or about 45,900 trips annually; and the commuter bus extension alternative is assumed to generate about 40 trips on an average weekday, or about 5,100 trips annually. The estimated operating-cost recovery rate for the commuter rail alternative would increase from 6 to 14 percent and the estimated operating-cost recovery rate for the commuter bus alternative would increase from 2 to 5 percent. For the commuter rail alternative to attract the higher level of ridership, the annual operating-cost could still be expected to be about 11 times that for the bus alternative and the total capital cost could still be expected to be up to 50 times that of the bus alternative.

A summary comparison of selected characteristics for the commuter rail extension and commuter bus extension alternatives under both the initial and cut-back versions are presented in Table 38. Under the commuter rail alternative, the additional ridership resulting from extending Metra North Central Service from Antioch to Burlington would increase the line's total weekday boardings by about 4 percent over the 1999 ridership level. As shown previously in Table 29, average weekday boardings at the potential new commuter rail stations—Burlington (30 boardings), and Silver Lake (60 boardings)—would be modest compared to weekday boardings at most Chicago-area Metra stations. Very few Metra stations including those of the North Central Service route to Antioch experience weekday boardings of less than 100 passengers as shown in Table 9 in Chapter III of this report.

A comparison of selected characteristics for the cut-back versions of the commuter rail and commuter bus alternatives in the Burlington-Antioch corridor with other existing new-start commuter rail services in the United

Table 36

ESTIMATED ANNUAL TOTAL AND NET OPERATING COSTS OF BURLINGTON-ANTIOCH COMMUTER RAIL SERVICE EXTENSION: CUT-BACK VERSION

Category and Items	Projected Annual Amount for Weekday-Only Service (in 2000 dollars)
Operating Cost[a]	
Annual Train-Miles	32,200
Total Operating Cost per Train-Miles	$46.89
Total Cost	$1,510,000
Operating Revenue[b]	
Commuter Rail Passengers	45,900
Total Operating Revenue	$212,000
Net Operating Cost[c]	$1,298,000
Percent of Total Operating Costs Recovered through Operating Revenue	14

[a]*Total operating cost is the incremental cost of extending service north of the Antioch station.*

[b]*Total operating revenue is the total projected fare generated by ridership at all new stations. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts.*

[c]*Represents the projected amount of annual subsidy that would be required.*

Source: SEWRPC.

Table 37

ESTIMATED ANNUAL TOTAL AND NET OPERATING COSTS OF BURLINGTON-ANTIOCH COMMUTER BUS SERVICE EXTENSION: CUT-BACK VERSION

Category and Items	Projected Annual Amount for Weekday-Only Service (in 2000 dollars)
Operating Cost[a]	
Annual Bus-Miles	37,500
Total Operating Cost per Bus-Mile	$3.65
Total Cost	$136,900
Operating Revenue[b]	
Commuter Bus Passengers	5,100
Total Operating Revenue	$6,700
Net Operating Cost[c]	$130,200
Percent of Total Operating Cost Recovered through Operating Revenue	5

[a]*Total operating cost is the incremental cost of extending service north of the Antioch station.*

[b]*Total operating revenue is the total projected fare generated by ridership at all new stations. Nominal one-way fares have been reduced by 27 percent to reflect Metra fare revenue experience with monthly pass and multi-ticket purchase discounts.*

[c]*Represents the projected amount of annual subsidy that would be required.*

Source: SEWRPC.

States is presented in Table 39. The other commuter rail services in this table have all begun operations during the past 10 years. The comparison presented in this table indicates that the estimated operating-cost recovery rates of 14 percent for the commuter rail alternative and 5 percent for the commuter bus alternative are significantly less than that for all of the other systems shown in the table.

A comparison of selected characteristics for the cut-back versions of the commuter rail and commuter bus alternatives in the Burlington-Antioch corridor with other long-established commuter rail services in the United States is presented in Table 40. This comparison includes all of the long-established commuter rail systems operating in the United States and is organized by metropolitan area. The operating characteristics for these commuter rail services are further subdivided based on the operator involved. The comparison presented in this table indicates that the estimated operating-cost recovery rates of 14 percent for the commuter rail alternative and 5 percent for the commuter bus alternative are significantly less than that for all of the other systems shown in the table. The number of passengers per train-mile of commuter rail service is also significantly less for the proposed Burlington-Antioch service as compared to existing new-start and long-established commuter rail systems.

A comparison of selected characteristics for the cut-back versions of the commuter rail and commuter bus alternatives in the Burlington-Antioch corridor with existing bus transit systems in Southeastern Wisconsin is presented in Table 41. This comparison includes the bus transit systems operated by Milwaukee, Ozaukee, Waukesha, and Washington Counties, systems operated by the Cities of Kenosha, Racine, and Waukesha, and the existing Kenosha-Racine-Milwaukee bus service that is sponsored by the City of Racine. The comparison presented in this table indicates that the estimated operating-cost recovery rate of 14 percent for the commuter rail alternative is comparable to four of the smaller bus transit systems in Southeastern Wisconsin, those being the Kenosha Transit System, the Ozaukee County Transit System, the Washington County Transit System, and the

Table 38

COMPARISON OF POTENTIAL COMMUTER RAIL
AND BUS ALTERNATIVES IN THE BURLINGTON-ANTIOCH CORRIDOR

Category	Initial Alternatives		Cut-Back Alternatives	
	Rail	Bus	Rail	Bus
Route Characteristics				
Number	1	1	1	1
Total Length (miles)	16.2	18.4	16.2	18.4
Number of Stations and Stops	2	2	2	2
Level of Service Characteristics				
Number of Scheduled Round Trips				
Weekdays	5	5	2	2
Saturdays	3	3	0	0
Sundays and Holidays	2	2	0	0
Sample One-Way Travel Times[a]				
Burlington to Chicago	1 hour 49 minutes	2 hours 3 minutes	1 hour 49 minutes	2 hours 3 minutes
Ridership Characteristics				
Weekday Passengers	180	40	180	40
Annual Passengers	48,400	5,400	45,900	5,100
Cost Characteristics				
Total Capital Cost	$35.2 million	$501,000	$26.8	$501,000
Annual Operating Cost	$4.1 million	$366,000	$1.5 million	$137,000
Annual Operating Revenue	$224,000	$7,200	$212,000	$6,700
Net Annual Operating Cost[b]	3.8 million	$359,000	$1.3 million	$130,000
Operating Cost Recovery Rate	6 percent	2 percent	14 percent	5 percent

[a]Weekday peak period.

Source: SEWRPC.

City of Waukesha Transit System. The commuter rail recovery rate is significantly less than that for the remaining systems shown in the table. The comparison presented in this table indicates that the estimated operating-cost recovery rate of 5 percent for the commuter bus alternative is significantly less than that for all of the other systems shown in the table.

Other Considerations

Implementation and Funding

Although the commuter rail and bus extension alternatives extend from Wisconsin into Illinois, both alternatives would entirely serve Wisconsin passenger markets. All of the new stations for both alternatives would also be located within Wisconsin. Therefore, it is reasonable to expect that Wisconsin agencies or units of government would be entirely responsible for sponsoring and funding a project related to such a service extension.

The State of Wisconsin presently plays no role in the implementation, operation, or funding of existing or potential commuter rail services. The State role could change in the future. As this feasibility study was being completed, a special blue ribbon passenger rail task force appointed by the Governor was studying what role the State of Wisconsin should have in possible commuter rail as well as other types of passenger rail services. The task force did determine that some level of State participation in the development of commuter rail services was appropriate. The task force, however, could not agree whether commuter rail should be State operated and funded with Federal and State funds, or locally operated and funded with a combination of Federal, State, and local funds. The State's role will ultimately be established by the State Legislature and Governor. There is a need to consider that local units of government may be responsible for some share of annual operating subsidy and the capital costs of any commuter rail service, as well as may have the responsibility for operation and management. Also, there may be a need for a multi-county agency or cooperative agreement or a regional transportation or commuter rail authority to provide for the implementation, oversight, and management of commuter rail.

Table 39

COMPARISON OF SELECTED CHARACTERISTICS FOR COMMUTER SERVICE ALTERNATIVES IN THE BURLINGTON-ANTIOCH CORRIDOR AND OTHER EXISTING NEW-START COMMUTER RAIL SERVICES

Item	Potential Commuter Service Extension–Forecast 2020		Other Existing New-Start Systems						
			Metra North Central Service (Chicago-Antioch)						
	Commuter Rail	Commuter Bus	Existing 1997	Forecast 2010	Metro Link–Los Angeles	Shoreline East–New Haven	Tri-Rail–Miami	Virginia Railway Express–Washington	Coaster–San Diego
Route Characteristics									
Number (of routes)	1	1	1	1	7	1	1	2	1
Length (in miles)	16.2	18.4	53	53	416	51	70	96	41
Year Opened	- -	- -	1996	1996	1992	1990	1994	1992	1995
Ridership Characteristics									
Weekday Passengers	180	40	3,600	5,900	18,000	1,200	9,000	8,000	3,500
Annual Passengers	45,900	5,100	670,000	1.5 million	4.4 million	291,500	2.7 million	1.8 million	910,000
Annual Passenger-Miles	2.8 million	113,000	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/Bus Miles	32,200	37,500	134,600	188,500	840,600	129,900	625,300	199,000	198,400
Passengers per Train-Mile	1.4	0.1	5.0	8.0	5.2	2.2	4.3	9.0	4.6
Operating Cost Characteristics									
Annual Total Operating Cost	$1.5 million	$136,900	N/A	$6.1 million	$52.0 million	$5.8 million	$21.7 million	$13.7 million	$9.2 million
Annual Revenues	$212,000	$6,700	N/A	$3.7 million	$16.4 million	$1.1 million	$5.3 million	$7.9 million	$1.8 million
Recovery Rate (percent)	14	5	N/A	61	31	19	24	58	19
Annual Net Operating Cost	$1.3 million	$130,200	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	$28.28	$25.53	N/A	$1.60	$8.09	$16.12	$6.07	$3.22	$8.13
Net Operating Cost per Passenger-Mile	$0.47	$1.15	N/A	$0.05	$0.23	$0.80	$0.19	$0.09	$0.30
Total Operating Cost per Train-Mile/Bus Mile	$46.89	$3.65	N/A	$32.36	$61.92	$44.83	$34.63	$68.63	$46.56

Source: SEWRPC.

City of Waukesha Transit System. The commuter rail recovery rate is significantly less than that for the remaining systems shown in the table. The comparison presented in this table indicates that the estimated operating-cost

Impact of At-Grade Crossings in the City of Burlington

During this study, the question was raised as to whether there would be an increase in delays to street and highway traffic at the numerous grade crossings in the City of Burlington as a result of adding the proposed commuter train service. As noted in the above description of the commuter rail extension alternative, the commuter trains were assumed to use a new station site located on the south side of the City of Burlington. Thus, the commuter trains themselves would not be operating over any of the mainline at-grade street and highway crossings in the City. These crossings include Robert Street, Adams Street, Jefferson Street, E. Washington Street, Chestnut Street, or Milwaukee Avenue (STH 36). Therefore, commuter train operation would not cause any increased delays at these crossings. The operation of commuter trains would also not be expected to affect the amount of time freight trains occupy these same mainline street and highway crossings.

The commuter trains would be using the Nestle spur track to gain access to the Burlington commuter station. The spur track has one crossing with Pine Street (STH 83). The local freight train, which serves customers on the Nestle spur track, typically crosses Pine Street from two to four times on weekdays with a short train to serve customers in the Burlington industrial park. If this spur track were used for access to the station, commuter trains would also pass over the Pine Street crossing a total of 10 times on weekdays under the cut-back version of the commuter rail alternative. Normally, these crossings would be expected to be during the time periods from 5:30 a.m. to 6:45 a.m.; 3:00 p.m. to 3:30 p.m.; and 6:45 p.m. to 8:30 p.m. It was estimated that each crossing would require about one minute of time when the crossing signals would be activated or a cumulative total of about 10 minutes during each 24-hour period on weekdays. This would be in addition to the existing activity at the crossing due to the local freight train operation. If the station site near the proposed highway bypass on the far south side of the City of Burlington were used, then the commuter trains would not cross Pine Street.

Table 40

COMPARISON OF SELECTED CHARACTERISTICS FOR COMMUTER SERVICE ALTERNATIVES IN THE BURLINGTON–ANTIOCH CORRIDOR AND OTHER LONG-ESTABLISHED COMMUTER RAIL SERVICES

Item	Potential Commuter Service Extension–Forecast 2020		Chicago				New York City Area			Other Northeast United States Cities			San Francisco
			Metra										
	Commuter Rail	Commuter Bus	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)	16.2	18.4	155	38	463	90	319	268	348	287	292	187	77
Ridership Characteristics													
Weekday Passengers	180	40	72,600	37,800	96,600	8,700	325,800	208,000	158,500	85,000	77,700	20,000	18,500
Annual Passengers	45,900	5,100	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	2.8 million	113,000	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/Bus-Miles	32,200	37,500	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/Bus-Mile	1.4	0.1	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	$1.5 million	$136,900	$92.2	$33.1	$184.3	$21.0	$634.1	$469.2	$332.1	$108.7	$142.8	$37.3	$41.4
Annual Revenues	$212,000	$6,700	$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)	14	5	63	88	39	51	47	56	55	41	43	42	31
Annual Net Operating Cost	$1.3 million	$130,200	$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	$28.28	$25.53	$1.48	$0.33	$3.65	$3.96	$3.44	$3.32	$3.16	$2.50	$3.47	$4.50	$5.20
Net Operating Cost per Passenger-Mile	$0.47	$1.15	$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/Bus-Mile	$46.89	$3.65	$42.70	$39.45	$46.89	$61.88	$37.52	$38.33	$41.27	$47.46	$64.31	$40.78	$45.03

Source: SEWRPC.

Table 41

COMPARISON OF SELECTED CHARACTERISTICS FOR COMMUTER SERVICE ALTERNATIVES IN THE BURLINGTON–ANTIOCH CORRIDOR AND EXISTING BUS TRANSIT SYSTEMS IN SOUTHEASTERN WISCONSIN

Item	Potential Commuter Service Extension– Forecast 2020		Existing Bus Systems[a]—Actual 1999							
	Commuter Rail	Commuter Bus	Kenosha-Racine-Milwaukee Bus Service	Kenosha Transit System	Milwaukee County Transit System	Ozaukee County Transit System	Racine Transit System	Washington County Transit System	City of Waukesha Transit System	Waukesha County Transit System
Route Characteristics										
Route Miles	16.2	18.4	42.7	76.5	804.2	93.1	88.5	136.5	70.4	294.5
Operating Characteristics										
Annual Vehicle-Miles	32,200	37,500	265,600	1,108,400	19,320,000	473,400	1,339,700	188,600	801,200	845,900
Ridership Characteristics										
Annual Passengers[a]	45,900	5,100	69,700	1,672,000	47,887,900	83,100	1,491,300	24,100	558,900	674,900
Annual Passenger-Miles	2.8 million	113,000	1,742,500	5,640,800	190,469,100	1,495,800	6,673,100	590,000	2,179,800	9,347,500
Cost Characteristics										
Annual Total Operating Cost	$1.5 million	$136,900	$796,400	$3,782,900	$102,202,300	$851,300	$4,519,300	412,600	$2,326,300	$4,262,700
Annual Revenues	$212,000	$6,700	$207,900	$583,400	$37,385,500	$151,200	$1,167,600	53,600	$408,800	$949,900
Recovery Rate (percent)	14	5	26.1	15.4	36.6	17.8	25.8	13.0	17.6	22.3
Annual Net Operating Cost	$1.3 million	$130,200	$588,500	$3,199,500	$64,816,800	$700,100	$3,351,700	359,000	$1,917,500	$3,312,800
Net Operating Cost per Passenger	$28.28	$25.53	$8.44	$1.91	$1.35	$8.42	$2.25	$14.90	$3.43	$4.91
Net Operating Cost per Passenger-Mile	$0.47	$1.15	$0.34	$0.57	$0.34	$0.47	$0.50	$0.61	$0.88	$0.35
Capital Cost (2000 dollars)	$26.8 million	$501,000	--	N/A	N/A	--	N/A	--	N/A	--
Annualized Capital Cost per Passenger	$50.90[c]	$8.56[c]	--	N/A	N/A	--	N/A	--	N/A	--
Annualized Capital Cost per Passenger-Mile	$0.83[c]	$0.39[c]	--	N/A	N/A	--	N/A	--	N/A	--

[a]*Does not include costs, service, and ridership attendant to ADA required paratransit service. Ozaukee County, Washington County, and Kenosha-Racine-Milwaukee are not required to provide such service.*

[b]*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.*

[c]*Capital cost has been annualized on the basis of the present value of a 20-year amortization period and a 6 percent rate inflation rate.*

Source: SEWRPC.

Impact on Development in Burlington Area

During this study, the question was raised as to what degree the possible extension of commuter rail service from Antioch to Burlington may result in additional Northeastern Illinois-related growth of population and employment in and around the City of Burlington. The impact of the extension of commuter rail service on the growth of the Burlington area may be expected to be modest, if not minimal.

First, many factors affect the demand for land development, and according to many surveys and analyses, transportation is not one of the most important factors. Second, the overwhelming amount of the Northeastern Illinois-related growth which has occurred in Kenosha County consists of people choosing to reside in Kenosha County and work in Lake County. The 1991 travel surveys conducted by the Regional Planning Commission indicated that almost 14,000 people resided in Kenosha County and worked in Lake County, and traveled between home and work by automobile. In comparison, only about 360 people board Metra commuter rail services each weekday and travel principally to the Chicago central business district.

ADVISORY COMMITTEE CONCLUSIONS AND RECOMMENDATION

Based upon review and consideration of the material and findings presented in this and previous chapters of the study report, the following conclusions concerning a possible extension of either commuter rail or commuter bus service in the Burlington-Antioch corridor can be made based upon the feasibility study.

- The anticipated ridership on both the commuter rail extension and the commuter bus route would be very small, even during weekday peak periods. The average weekday ridership would total only 180 trips for the commuter rail extension and only 40 trips for the commuter bus route. The commuter rail extension would be expected to generate more ridership due to the commuter buses' longer travel times and the need for passengers to change from buses to commuter trains at Antioch.

- The anticipated ridership on the commuter rail and bus alternatives would be modest, especially compared to the level of passenger boardings at Metra stations in Northeastern Illinois, most of which board at least 200 passengers per weekday. The population and number of households are much lower in the Burlington area of Racine County than Lake and McHenry Counties in Northeastern Illinois. The anticipated ridership on Saturdays, Sundays, and holidays would also be very low when compared to weekday ridership.

- The operating-cost recovery rate—that is, the percent of total operating cost recovered through operating revenue—may be expected to be very low for both the commuter rail and commuter bus extensions even under the most optimistic conditions. The highest operating-cost recovery rate was for the cut-back version of the commuter rail alternative, which was projected to be 14 percent. This is much lower than the operating-cost recovery rates of the existing and new-start commuter rail systems which range from 19 to 88 percent and of existing bus transit systems in Southeastern Wisconsin which range from 13 to 37 percent. The Metra commuter rail system that serves the Chicago metropolitan area is required by law to recover at least 55 percent of its operating costs through operating revenue.

- The net operating cost per passenger and per passenger-mile could be expected to be high when compared with other transit systems. The net operating cost per passenger was estimated to be $28.28 for the commuter rail alternative and $25.53 for the commuter bus alternative. Both of these statistics were higher than all of the existing established commuter rail systems, which ranged from $0.33 to $5.20; higher than all of the new-start commuter rail systems, which ranged from $3.22 to $16.12; and higher than all of the bus transit systems in Southeastern Wisconsin, which ranged from $1.35 to $14.90. The net operating cost per passenger-mile was estimated to be $0.47 for the commuter rail alternative and $1.15 for the commuter bus alternative. The net operating cost per passenger-mile for the commuter rail alternative was higher than all of the existing established commuter rail systems, which ranged from $0.02 to $0.25; higher than all except one of the new-start commuter rail systems, which ranged from $0.09 to $0.80; and about the same as five of the bus transit systems in Southeastern Wisconsin, which ranged from $.0.34 to $0.88. The net operating cost per passenger-mile for the commuter bus alternative was higher than all of the existing established and new-start commuter rail systems as well as the bus transit systems in Southeastern Wisconsin.

- The State of Wisconsin presently plays no role in the implementation, operation, or funding of existing or potential commuter rail services. However, a special blue ribbon passenger task force appointed by the Governor determined that some level of State participation was appropriate, but could not agree whether commuter rail should be State operated and funded with Federal and State funds, or locally operated and funded with Federal, State, and local funds. The State's role will ultimately be established by the Governor and State Legislature. Local units of government may be responsible for some share of operating subsidy and the capital cost of commuter rail extension, and may also be responsible for implementation, operation, and management. To facilitate such a project, there may be a need for a multi-county agency, a regional transportation authority, or some other entity at the local level of government.

As noted previously, the possible extension of commuter rail service beyond Antioch is being considered entirely and solely within the context of this feasibility study and does not in any way constitute or represent a commitment or endorsement by Metra.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of operating commuter bus service in the Burlington-Antioch corridor as an extension of the existing Metra commuter rail service to Antioch, the Advisory Committee concluded that:

- Feeder bus service in the corridor would attract minimal ridership and would have a very low operating cost recovery rate, particularly when compared to existing bus systems within Southeastern Wisconsin and new-start and established commuter rail services.
- Feeder bus service in the corridor would have a very low level of cost-effectiveness.
- Therefore, the potential operation of feeder bus service in the corridor cannot be justified.

Based upon these conclusions, the Advisory Committee recommended that no further consideration of commuter bus service in the Burlington-Antioch corridor is warranted at this time.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of extending commuter rail service from Antioch to Burlington, the Advisory Committee concluded that:

- Extension of commuter rail service into the Burlington-Antioch corridor is physically feasible.
- Commuter rail service in the corridor would attract more ridership than would the bus alternative, but that ridership would still be modest. The operating cost recovery rate may be expected to be very low compared to other new-start and established commuter rail services in the United States and to existing bus systems within Southeastern Wisconsin.
- Commuter rail service in the corridor would have a low level of cost-effectiveness.
- Therefore, the potential operation of commuter rail service in the corridor cannot be justified at this time.

Based upon these conclusions, the Advisory Committee recommended that implementation of commuter rail service should not be further pursued at this time. In drawing these conclusions and making the foregoing recommendations, the Advisory Committee recognized that at some time in the future, other factors may prompt revisiting the issue of extending commuter rail in this corridor. Such factors may include increasing traffic congestion, increases in the price of motor fuel, and changes in development and travel patterns, particularly a substantial increase in the number of people living in western Kenosha and Racine Counties and working in the Chicago central business district.

The Advisory Committee requested that the Regional Planning Commission complete publication of the final report for this feasibility study phase, and subsequently transmit the completed feasibility study to the Wisconsin Department of Transportation and the local units of government involved.

SUMMARY

This chapter has provided an evaluation for feasibility assessment of a proposed commuter rail service or a commuter bus service in the Burlington-Antioch corridor extending from the Village of Antioch, Illinois to the City of Burlington, Wisconsin.

Previous chapters of this study report have identified a range of possible physical, operational, and service characteristics for potential rail or bus extension. Through an extensive screening process, the most promising physical, operational, and service characteristics for the potential commuter rail service or the potential commuter bus service in this corridor were identified. The findings and conclusions of this screening process were used to design the two principal alternatives presented in this chapter.

The commuter rail alternative would entail operation of commuter trains over the entire 16-mile distance between Burlington and Antioch as an extension of Metra's existing North Central Service route. The single-track railway line would require improvements to allow for the joint operation of commuter rail passenger and freight train traffic in an efficient and reliable manner. The principal track improvements would include the rehabilitation and extension of the existing passing siding at Silver Lake and the addition of a second main track at Nestle, south of Burlington.

As part of this feasibility evaluation, both the commuter rail and bus alternatives were initially assumed to provide a reasonable level of service appropriate for attracting the greatest ridership. On weekdays, both the commuter rail and bus service between Burlington, Antioch, and Chicago would consist of: four southbound trains or buses during the morning peak period and four northbound trains or buses during the afternoon peak period. In addition, one train or bus would operate in each direction during the midday period. Weekend service would consist of two trains or buses on Saturdays and one train or bus on Sundays and major holidays in each direction—southbound in the morning period and northbound in the late afternoon period. In addition, one midday round trip would be provided on Saturdays, Sundays, and major holidays. The commuter rail and bus service would serve three passenger stations including Burlington, Silver Lake, and Antioch, providing an average station spacing of about eight miles.

As analysis of these alternatives proceeded, it became apparent from the initial ridership, revenue, and operating cost projections that both the commuter rail and commuter bus extensions would perform poorly when assuming these levels of service. Because of these results, the initial commuter rail and bus alternatives were reviewed and their assumed levels of service were subsequently cut back in an attempt to bring the projected annual operating costs and capital costs more in line with the anticipated level of ridership. For the rail and bus alternatives, the weekday peak-period, peak-direction service was reduced from four to two scheduled runs in each direction and midday, weekend, and holiday service was removed.

The most important findings concerning the cut-back version of the commuter rail alternative may be summarized as follows:

- The total cost of the necessary capital improvements under the cut-back version of the Burlington-Antioch commuter rail alternative was estimated to be $26.8 million in year 2000 dollars. This includes $21.6 million for track and signal improvements, $1.2 million for passenger station facilities, and $4.0 million for train equipment. Since train equipment would be deadheaded from the existing Metra storage yard at Antioch, the cost of a new overnight train storage yard at Burlington was not included. The ongoing future addition of mainline capacity improvements by Wisconsin Central might serve to reduce the capital investment required to initiate commuter rail service between Burlington and Antioch.

- The number of trips that could be expected to be made on the potential commuter rail service during an average weekday in the year 2020 was forecast to be a total of 180 trips. Approximately 90 percent of the projected 180 trips may be expected to be made between stations on the potential new extension and Union Station in the Chicago central business district. About 60, or 33 percent of the trips on the extension may be expected to be generated at the Burlington station and about 120, or 67 percent, of the trips on the extension may be expected to be generated at the Silver Lake station.

- The annual total operating cost of the potential commuter rail extension beyond the existing Antioch station was estimated to be about $1.5 million. The annual operating revenue of the service was estimated to be about $212,000. This would result in a net annual operating cost or subsidy of about $1.3 million.

The most important findings concerning the cut-back version of the commuter bus alternative may be summarized as follows:

- The total cost of the necessary capital improvements under the cut-back version of the Burlington-Antioch commuter bus alternative was estimated to be $501,000 in year 2000 dollars. The entire capital cost would be for construction of new station facilities with park-ride lots at Burlington and Silver Lake, and for minor improvements at Antioch.

- The number of trips that could be expected to be made on the potential commuter bus service during an average weekday in the year 2020 was forecast to be a total of 40 trips. Approximately 85 percent of the projected 40 trips may be expected to be made between stations on the potential new extension and Union Station in the Chicago central business district. About 10, or 25 percent of the trips on the extension may be expected to be generated at the Burlington station and about 30, or 75 percent, of the trips on the extension may be expected to be generated at the Silver Lake station.

- The annual total operating cost of the potential commuter bus service between Burlington and Antioch was estimated to be about $137,000. The annual operating revenue of the service was estimated to be about $6,700. This would result in a net annual operating cost or subsidy of about $130,000.

A comparison of selected characteristics for the reduced-service versions of the proposed Burlington-Antioch commuter service alternatives was made between the alternatives and 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 particular interest among these characteristics were the estimated ridership and the operating cost recovery rates since these measures provides a very good indication of long-term financial feasibility.

The comparison between the commuter rail and commuter bus alternatives indicated that commuter rail may be expected to attract over four times the ridership than would commuter bus in the corridor. The commuter rail alternative would generate about 180 trips on an average weekday, or about 45,900 trips annually; and the commuter bus alternative would generate about 40 trips on an average weekday, or about 5,100 trips annually. Average weekday boardings for the commuter rail alternative range from 30 at Burlington to 60 at Silver Lake. These could be considered modest compared to weekday boardings at most Chicago-area Metra stations, of which very few experience weekday boardings of less than 100 passengers. The estimated operating cost recovery rate for the cut-back version of the commuter rail alternative would be about 14 percent compared to about 6 percent for the initial version of the rail alternative. The estimated operating cost recovery rate for the cut-back version of the commuter bus alternative would be about 5 percent compared to about 2 percent for the initial version of the bus alternative.

The comparison of the commuter rail and commuter bus alternatives with other commuter transit systems indicated that the estimated operating-cost recovery rates of 14 percent for the commuter rail alternative and 5 percent for the commuter bus alternative were significantly less than that for almost all of the other systems. This included all of the other new-start commuter rail services and all of the other long-established commuter rail services in the United States that were compared. In addition, the number of passengers per train-mile for the potential Burlington-Antioch service was also significantly less than for the existing new-start and long-established commuter rail systems. A comparison with existing bus transit systems in Southeastern Wisconsin indicated the operating-cost recovery rate for the commuter rail alternative to be comparable to four of the smaller bus transit systems in Southeastern Wisconsin, those being the Kenosha Transit System, the Ozaukee County Transit System, the Washington County Transit System, and the City of Waukesha Transit System. The commuter rail operating-cost recovery rate was significantly less than that for the remaining bus systems. The operating-cost recovery rate for the commuter bus alternative was significantly less than that for all of the bus transit systems shown in Southeastern Wisconsin.

Implementation and funding represent other important considerations. Although the commuter rail and bus extension alternatives extend from Wisconsin into Illinois, both alternatives would entirely serve Wisconsin passenger markets. All of the new stations for both alternatives would be located within Wisconsin. Therefore, it is reasonable to expect that Wisconsin agencies or units of government would be entirely responsible for sponsoring and funding a project related to such a service extension.

The State of Wisconsin presently plays no role in the implementation, operation, or funding of existing or potential commuter rail services. The State role could change in the future. As this feasibility study was being completed, a special blue ribbon passenger rail task force appointed by the Governor was studying what role the State of Wisconsin should have in possible commuter rail as well as other types of passenger rail services. The task force did determine that some level of State participation in the development of commuter rail services was appropriate. The task force, however, could not agree whether commuter rail should be State operated and funded with Federal and State funds, or locally operated and funded with a combination of Federal, State, and local funds. The State's role will ultimately be established by the State Legislature and Governor. There is a need to consider that local units of government may be responsible for some share of annual operating subsidy and the capital costs of any commuter rail service, as well as may have the responsibility for operation and management. Also, there may be a need for a multi-county agency or cooperative agreement or a regional transportation or commuter rail authority to provide for the implementation, oversight, and management of commuter rail.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of operating commuter bus service in the Burlington-Antioch corridor as an extension of the existing Metra commuter rail service to Antioch, the Advisory Committee concluded that:

- Feeder bus service in the corridor would attract minimal ridership and would have a very low operating cost recovery rate, particularly when compared to existing bus systems within Southeastern Wisconsin and new-start and established commuter rail services.

- Feeder bus service in the corridor would have a very low level of cost-effectiveness.

- Therefore, the potential operation of feeder bus service in the corridor cannot be justified.

Based upon these conclusions, the Advisory Committee recommended that no further consideration of commuter bus service in the Burlington-Antioch corridor is warranted at this time.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of extending commuter rail service from Antioch to Burlington, the Advisory Committee concluded that:

- Extension of commuter rail service into the Burlington-Antioch corridor is physically feasible.

- Commuter rail service in the corridor would attract more ridership than would the bus alternative, but that ridership would still be modest. The operating cost recovery rate may be expected to be very low compared to other new-start and established commuter rail services in the United States and to existing bus systems within Southeastern Wisconsin.

- Commuter rail service in the corridor would have a low level of cost-effectiveness.

- Therefore, the potential operation of commuter rail service in the corridor cannot be justified at this time.

Based upon these conclusions, the Advisory Committee recommended that implementation of commuter rail service should not be further pursued at this time. In drawing these conclusions and making the foregoing recommendations, the Advisory Committee recognized that at some time in the future, other factors may prompt revisiting the issue of extending commuter rail in this corridor. Such factors may include increasing traffic congestion, increases in the price of motor fuel, and changes in development and travel patterns, particularly a substantial increase in the number of people living in western Kenosha and Racine Counties and working in the Chicago central business district.

The Advisory Committee requested that the Regional Planning Commission complete publication of the final report for this feasibility study phase, and subsequently transmit the completed feasibility study to the Wisconsin Department of Transportation and the local units of government involved.

Chapter VI

SUMMARY

INTRODUCTION

This report documents the findings and recommendations of a study of the feasibility of instituting commuter rail or commuter bus service in the Burlington-Antioch corridor. The potential service would be operated as an extension of the Metra commuter rail service currently operating between the Village of Antioch in the northwestern portion of Lake County in Northeastern Illinois and the City of Chicago central business district. The study was undertaken at the request of the City of Burlington, Village of Silver Lake, and Kenosha and Racine Counties.

The study was carried out within the context of the adopted design year 2020 regional transportation system plan for Southeastern Wisconsin. That plan recommends significant improvement and expansion of public transit service within the Region, including 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. Some of the services would also connect urban centers in the southern portion of the Region to the Chicago metropolitan area. Buses operating over freeways in mixed traffic, buses operating over special busways, and commuter rail passenger trains are identified in the adopted plan as potential ways of providing the recommended rapid transit service.

The technical work for the feasibility study was performed by Commission staff with the assistance of: the transportation engineering consulting firm of Parsons Brinckerhoff Quade & Douglas, Inc. of Chicago, Illinois; officials and staffs from the counties and communities within the study area; the Wisconsin Department of Transportation; the Chicago Area Transportation Study; Wisconsin Central, Ltd.; and Metra, the Chicago-based commuter rail operator. It should be noted that the possible extension of commuter rail service beyond Antioch is being considered entirely and solely within the context of this feasibility study and does not in any way constitute or represent a commitment or endorsement by Metra. Conduct of the study was guided by a 16-member Advisory Committee consisting of representatives from concerned local, county, State, and Federal units of government, other public agencies and railway companies concerned. The membership of this Committee is listed on the inside front cover of this report.

STUDY PURPOSE

The purpose of this study was to determine the feasibility of operating Chicago-oriented commuter rail or bus service between Burlington and Antioch and to provide the information needed by public officials to make a decision as to whether or not to proceed further with consideration of commuter rail or bus service in the corridor. The feasibility study was also designed to assist in the ultimate conduct of a transit alternatives analysis study, should it be decided to proceed with such a study, as well as the preparation of an attendant environmental impact statement (EIS), 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, this feasibility study was intended to serve the following purposes:

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

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

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

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

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

6. To provide the basis for a determination by the public officials concerned as to whether or not to proceed with implementation of either bus or commuter rail service and if appropriate, to proceed with the conduct of a transit alternatives analysis.

In the conduct of the study, several other tasks were performed. These included an inventory and analysis of the existing land uses and of the current travel habits, patterns, and needs of the residents of the area; an identification of past and existing commuter transit services in the corridor; and an inventory of the existing condition and use of the potential commuter rail line. The study additionally provided designs for commuter rail and bus alternatives and identification of the most feasible alternatives.

EXISTING SOCIOECONOMIC CHARACTERISTICS AND TRAVEL PATTERNS

Study Area

The study area consisted of a "primary" study area, and a "secondary" study area, as shown on Map 3 in Chapter 1. The primary study area consisted of the Burlington-Antioch corridor within the Southeastern Wisconsin Region comprised of the western portion of Racine County and the western portion of Kenosha County. The boundaries of the primary study area were delineated so as to be consistent with the conduct of comprehensive travel surveys by the Regional Planning Commission. The primary study area lies entirely within the Southeastern Wisconsin Counties of Racine and Kenosha.

The secondary study area consisted of an extension of the travel corridor to Northeastern Illinois and to the central business district of the City of Chicago. 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.

Population and Households
In 1990, the resident population of the primary study area totaled about 72,600 persons. The resident population within the primary study area is anticipated to increase to about 94,800 persons by 2020, or by about 31 percent. In 1990, the number of households in the primary study area totaled about 26,400. The number of households in the primary study area is anticipated to increase to about 36,500 households by 2020, or by about 38 percent.

Employment
In 1990, employment in the primary study area stood at about 30,600 jobs. The number of jobs in the primary study area is anticipated to increase to about 41,800 jobs by 2020, or by about 37 percent.

Travel Habits and Patterns
Based upon travel surveys undertaken by the Commission in 1991, about 152,500 person trips are made on an average weekday within the primary study area. Of those trips, about 90,300 trips were made entirely within the individual subarea analysis areas, and about 62,200 trips were made between subarea analysis areas. About 21,600 person trips crossed the Wisconsin-Illinois state line between the primary study area and the secondary study area on an average weekday in 1991.

EXISTING TRANSPORTATION SERVICES AND FACILITIES

The existing transportation services and facilities within the Burlington-Antioch corridor, as well as between the primary and secondary study areas of the corridor, pertinent to any consideration of the provision of commuter rail or bus service within the corridor are described below.

- In 2001, commuter rail service was provided by Metra—the commuter rail service division of the Regional Transportation Authority for Northeastern Illinois—over a 52.8-mile long route extending from Antioch through the northern suburbs of Lake County and Cook county to Chicago Union Station in the Chicago central business district. The commuter rail route is referred to by Metra as its North Central Service. The first portion of this route extends 40.1 miles from Antioch to a railway junction at Tower B 12, located in suburban Franklin Park. This segment utilizes the Wisconsin Central mainline, which was owned and operated by Wisconsin Central, Ltd. and is shared with a large number of mainline freight trains. The second portion of this route extends 12.7 miles from Tower B 12 to Chicago Union Station. This segment utilizes the Metra Milwaukee District West Line which is owned by Metra and is shared with Metra commuter trains operating between Chicago and Elgin, and between Chicago and Fox Lake, as well as with Canadian Pacific freight trains and Amtrak intercity passenger trains operating between Chicago, Milwaukee, and Seattle. The North Central Service commuter trains originate or terminate at the outlying Chicago suburb of Antioch, Illinois, which is on the Wisconsin-Illinois state line.

- The North Central Service between Antioch and Chicago is a relatively new addition to the Metra system. Service began on August 19, 1996, marking the first initiation of a new commuter rail line in the Chicago metropolitan area in almost 70 years. Planning for the new North Central Service involved many phases, including initial consideration by both the Regional Transportation Authority of Northeastern Illinois and the Chicago Area Transportation Study during the late 1970s, and completion of detailed feasibility study in 1986. Improvements necessary for the initiation of commuter rail service such as lengthening of mainline sidings, construction of new railroad junctions, a new overnight train storage facility in Antioch, and station facilities, and installation of new signals was initiated in 1994 and completed in 1996.

- Ridership on the North Central Service trains has increased steadily since the service was initiated. Between August 1996—when the service was initiated—and September 1998, average weekday ridership on the line has increased from about 1,900 trips to about 4,400 trips. It was estimated that a little under 2 percent of all passengers were carried on the midday trains, the remaining trips being carried on peak-period peak-direction trains. During the 1998 fiscal year, about 895,000 annual passenger trips were carried on this Metra line; or about 18,700 during an average week. The average passenger trip length for all trips was 29.5 miles on the 52.8-mile route.

- Existing public bus transportation service within the Burlington-Antioch corridor is very limited. As of October 1998, the only such public services within the corridor were those of a specialized nature within each of the three Wisconsin counties primarily intended to provide transportation for the elderly and disabled. There are no specific routes for these services, advance reservations were necessary, and priority is given to trips made for nutritional, medical, and work purposes. At one time, long-distance intercity motor coach carriers companies operated daily bus routes in the corridor, but the last of these bus routes were discontinued during the 1980s. Two Pace bus routes were also operated in Illinois in conjunction with Metra's North Central Service, offering supplemental service connecting North Central Service stations with stations on other Metra routes with more frequent service during nonpeak times. The Pace bus routes began service at the same time commuter train service was started but were discontinued in August 1998.

- A potential new commuter rail route within the Burlington-Antioch corridor would extend from the existing Metra passenger station in the Village of Antioch, Illinois, to the City of Burlington, Wisconsin. The 16-mile long route extension would utilize trackage owned and operated by Wisconsin Central, Ltd. The potential Burlington-Antioch extension would be located along the Wisconsin Central Chicago Subdivision, the railway's main freight line between Chicago and North Fond du Lac, Wisconsin.

- Because the route was constructed as a mainline, the vertical and horizontal alignment of the railway line between Antioch and Burlington is generally well suited for high speed passenger train operation. The line consists of a single-track mainline with passing sidings. Centralized Traffic Control (CTC) is in use along this route and is controlled by Wisconsin Central dispatchers located in Stevens Point, Wisconsin. Between Burlington and Antioch, the mainline track is laid with 115-pound continuous welded rail rolled in 1973 with some small segments mostly in the Silver Lake area rolled in 1995 and 1997. Major tie replacement and surfacing of the mainline between Burlington and Antioch was undertaken during 1996 and 1997.

- The trackage and roadbed along between Antioch and Burlington are in very good condition and meet Federal Railroad Administration Class 4 track safety standards. As of October 1998, the overall maximum operating speed for freight trains was 50 miles per hour south of the STH 50 overpass and 60 miles per hour north of this overpass. There were other speed restrictions at various locations along the route such as a 20-mile per hour limit through the City of Burlington. There was no specific speed limit for passenger trains identified north of Antioch.

- As of October 1998, the mainline between Chicago and North Fond du Lac—which includes the Burlington-Antioch segment—was carrying a large number of freight trains on a regular daily basis. In 1987 when Wisconsin Central assumed operations from the Soo Line Railroad Company, a total of seven freight trains were operated on a typical weekday on the Burlington-Antioch segment. In 1998, an average of 26 freight trains were being operated over this segment by Wisconsin Central on a typical weekday. These freight trains represented a variety of types including through time freights, run-through trains for the Canadian National Railway, intermodal trains, single commodity unit trains, local freights, and miscellaneous or special purpose trains. Because the North Fond du Lac-Chicago railway line functions as the main route funneling traffic between customers throughout central and northern Wisconsin and the Upper Peninsula of Michigan and other railways at Chicago, this has become one of the busiest railway lines in the State of Wisconsin. In addition, eight of the ten weekday Metra commuter trains operating between Antioch and Chicago also operate between the Metra depot in Antioch and the Metra overnight storage yard at West Antioch.

- 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 106,600 vehicular crossings of the Wisconsin-Illinois state line to and from the primary study area observed on an average weekday in 1997, approximately 76,700 vehicle crossings, or about 72 percent, were made on IH 94 and USH 12. Of the 29,900 vehicle crossings not made on IH 94 or USH 12, about 15,000 were made on either USH 45 or STH 83, the two primary highway facilities connecting the primary and secondary study areas. The existing arterial street and highway system within the primary study area totaled about 347 miles.

POTENTIAL COMMUTER RAIL AND BUS SERVICES AND FACILITIES

Various options with respect to physical, operational and service characteristics for potential commuter rail or commuter bus service in the Burlington-Antioch corridor were identified and evaluated. The most practical and reasonable facility and service options were then used to develop basic commuter rail and bus alternatives with the greatest potential for providing cost-effective service in the Burlington-Antioch corridor.

Commuter Rail and Bus Route Alignments

A single commuter rail route alignment was determined to be sufficiently promising to warrant further consideration under this feasibility study. This route was along the Wisconsin Central Railway Chicago Subdivision, a distance of about 16 miles between Burlington and Antioch. This route alignment was found to be well suited for accommodating potential commuter rail operations. This is the only existing railway route that directly connects western Kenosha and Racine Counties with Northeastern Illinois.

A single commuter bus route alignment was determined to be sufficiently promising to warrant further consideration under this feasibility study. This route would extend from Burlington along STH 83 to Antioch, passing along the north side of the Village of Silver Lake and the west side of the Village of Paddock Lake, a distance of about 18 miles. This bus route would connect with the existing Metra North Central Service route at Antioch. The purpose of this route would be to provide a comparable level of service under the commuter bus alternative to that provided under the commuter rail alternative for passengers traveling to and from western Kenosha and Racine Counties.

Passenger Station Facilities

A set of three stations was proposed for the commuter rail alternative along the Burlington-Antioch railway line. The stations would include Burlington, Silver Lake, and Antioch. The average station spacing would be about eight miles. In Antioch the existing Metra passenger station would be utilized. In Silver Lake and Burlington, new facilities would need to be constructed.

With respect to the commuter bus alternative, three stations were also identified to be located along the Burlington-Antioch route. The bus route stations would also be located at Burlington, Silver Lake, and Antioch. The average station spacing would be about nine miles. Like the commuter rail alternative, the existing Metra passenger station would be utilized in Antioch while new facilities would need to be constructed in Silver Lake and Burlington.

Determination of the precise location and design of each passenger station or stop is properly a function of preliminary and final engineering studies that must follow the feasibility and detailed planning phases of any commuter service development effort. In any such succeeding phases, it will be important that local residents and public officials be involved in station location and design work. Thus, the station characteristics and locations described herein should be regarded as preliminary for purposes of this feasibility study.

Rolling Stock and Vehicle Requirements
It was assumed that conventional locomotive-hauled commuter train equipment would be used in the provision of the commuter rail service instead of other types of equipment such as self-propelled equipment. Conventional commuter train equipment consists of bi-directional trains consisting of a diesel locomotive with bi-level passenger coaches operating in a "push-pull" mode. This type of equipment has had a long record with respect to availability, dependability, performance, and safety in use by Metra and Metra's predecessors on most of the commuter rail routes in the Chicago area. The equipment would be compatible with the Metra equipment currently operating between Antioch and Chicago.

With respect to commuter bus service, it was recommended that conventional transit buses be assumed for use. Such vehicles would range from 30 to 40 feet in length, the exact size and configuration to be determined by passenger demand and the service provider. These vehicles would be similar to most buses operated in commuter service by transit operators in Southeastern Wisconsin and by Pace in Northeastern Illinois and would include passenger amenities appropriate for the service. The buses and trains would need to meet the accessibility requirements of the Federal Americans with Disabilities Act.

Railway Line Improvements
An assessment of the condition and capacity of the railway line concerned was conducted and an identification of improvements that would be necessary to permit the initiation of commuter rail service along the existing Burlington-Antioch railway line was made. This work was conducted by a consulting transportation engineering firm working with the Commission staff and with the cooperation of the railway companies involved. The purpose of the assessment was to identify the existing railway line facilities that would have to be rehabilitated, upgraded, or replaced in order to jointly operate commuter rail service with the anticipated future level of freight train traffic in an efficient, safe, and cost-effective manner.

In general, the Wisconsin Central Chicago Subdivision between Burlington and Antioch was found to be in very good condition for existing and anticipated future freight train operations. However, the line would require certain improvements to accommodate both freight and commuter rail passenger train operations in a safe, efficient, and reliable manner without either type of traffic incurring unacceptable levels of delay. The level of freight train activity on the line was forecast to increase from a typical weekday average of 26 freight trains in 1998 to an average of 34 freight trains on a typical weekday by the year 2005. A maximum mainline operating speed of 60 miles per hour between Burlington and Antioch was assumed for the commuter rail passenger trains for purposes of this feasibility study. Most of the proposed improvements are capacity-related and would be necessary regardless of the maximum mainline operating speed.

Based on the assessment of railway line capacity in the Burlington-Antioch corridor, it was determined that two new segments of double track would be required between Burlington and Antioch to provide additional capacity. The double track segments would essentially act as high-speed passing sidings providing more places for trains traveling in opposite directions to meet each other. It was determined that the existing passing siding at Silver Lake would have to be converted to a second main track and extended in a northerly direction about 2.0 miles from Milepost 61.4 to the existing approach signal at Milepost 63.4. This would create a 3.2-mile long segment of double track. It was further determined that a new second main track would have to be constructed from Milepost 69.2 in a northerly direction to Milepost 71.3 at Nestle on the south side of the City of Burlington. This would create a 2.1-mile long segment of double track that would function as a passing track as well as a lead track for commuter trains entering and departing the Burlington station track. This segment of double track would require construction of a new bridge consisting of two 100-foot spans plus approaches over the Fox River.

A number of associated signal and signal-related improvements would also be required. These would include the installation, relocation, and upgrading of signals, together with appropriate power-operated turnout machinery and equipment, at both ends of the new Nestle double track segment of mainline and the lengthened Silver Lake siding. The existing manual turnout at the north end of the Metra Antioch Yard would be upgraded to remote control operation to more efficiently handle deadhead commuter trains operating between the Metra storage yard and Burlington. This would require the installation of signals, together with appropriate power-operated turnout machinery and equipment. Two new intermediate mainline signals would be installed to help maintain the fleeting of freight trains, particularly following the weekday peak period commuter train windows. These would be installed in the middle of the single track section of mainline between the new double track segments at Silver Lake and Burlington and in the middle of the single track section of mainline between the Midway and Vernon passing sidings, north of Burlington.

Other required improvements that were identified included upgrading of the three-degree curve between Mileposts 64.2 and 64.4 north of Silver Lake to increase the maximum allowable speed for passenger trains from 45 to 50 miles per hour and rehabilitation of grade crossings along with upgrading of grade crossing signals. All crossings already equipped with lights and bells would be upgraded to include the installation of gates. At public street and highway crossings that are protected only by crossbucks and stop signs, automatic signals would be installed that include lights, bells, and gates. Constant warning time devices would activate the signals. All private at-grade road and driveway crossings would have crossbucks and stop signs installed on both sides of each crossing.

Equipment Storage and Servicing Facility Needs

For purposes of this feasibility study, it was assumed that the equipment to be used for the Burlington to Antioch extension would consist of the trains already used for the Metra North Central Service. The trains would continue to be based at the Metra Antioch overnight storage yard facility and would be deadheaded to and from Burlington. Provision for commuter trains to lay over between runs, to reverse direction, and to load and unload passengers while the commuter trains are off the main track at Burlington would be necessary. This would require upgrading of a portion of Wisconsin Central Nestle spur track on the south side of the City of Burlington. Major train inspections and heavy maintenance work could be done at an existing Metra facility.

Provision of a storage and servicing facility for the commuter bus alternative would be the responsibility of the service provider under a contractual agreement with a private operator. It is envisioned that the operator would provide not only the equipment and staff, but also equipment and facilities such as for the storage and maintenance of buses for all other day-to-day functions necessary for the commuter bus service to operate.

Service Provider

Several alternative service provider arrangements were considered for commuter rail and commuter bus service within the Burlington-Antioch corridor. For commuter rail service, it was concluded that operation by Metra as an extension of its already-existing Antioch-Chicago service would be the most reasonable and practical arrangement. This recommendation was based on Metra's familiarity and experience with large commuter rail operations and Metra's ability to readily provide a through service between the Burlington-Antioch extension and Chicago which would not require passengers to transfer between trains at Antioch. Operation of such service by Metra would require negotiation and agreement between Metra and a public entity responsible for implementing commuter rail service in Wisconsin.

For commuter bus service in the Burlington-Antioch corridor, it was concluded that provision of such service be a public entity contracting with a new private operator through a competitively awarded contract process would be the most reasonable and practical arrangement. This recommendation was based on the absence of any similar bus service in the corridor and the successful and efficient operation of bus services under this kind of arrangement elsewhere in Southeastern Wisconsin.

Operating Plans

For purposes of this feasibility study, it was concluded that operating plans for the commuter rail and commuter bus alternatives should provide the inherent flexibility to attract the highest ridership over the entire plan design period.

The recommended commuter rail operating plan provides for service between Burlington and Antioch as an extension of the existing Metra North Central Service route. Selected existing Metra trains operating between Antioch and Chicago would remain on their existing schedules but be extended north of Antioch to Burlington.

Equipment used for the Burlington trains would be deadheaded between Antioch and Burlington. Trains would stop at all intermediate stations. On weekdays, there would be four inbound trains from Burlington to Chicago during the morning peak period, and four outbound trains from Chicago to Burlington during the afternoon peak period, together with a limited amount of nonpeak period service during the early afternoon period and on weekends.

The recommended commuter bus operating plan provides for service over a single route connecting Burlington and Silver Lake with existing Metra commuter rail service at Antioch. Service on this bus route would be coordinated with Metra's North Central Service route train schedules. The frequency of service would be four inbound bus runs from Burlington to Antioch during the morning peak period, and four outbound bus runs from Antioch to Burlington during the afternoon peak period. There would also be a limited amount of service on this route during the early afternoon period and on weekends.

EVALUATION OF ALTERNATIVES

Following consideration and screening of various physical, operational, and service options, a basic commuter rail alternative and a basic commuter bus alternative were developed using the most promising characteristics as described above. As part of this feasibility evaluation, both the commuter rail and bus alternatives were initially assumed to provide a reasonable level of service appropriate for attracting the greatest ridership. On weekdays, both the commuter rail and bus service between Burlington, Antioch, and Chicago would consist of: four southbound trains or buses during the morning peak period and four northbound trains or buses during the afternoon peak period. In addition, one train or bus would operate in each direction during the midday period. Weekend service would consist of two trains or buses on Saturdays and one train or bus on Sundays and major holidays in each direction—southbound in the morning period and northbound in the late afternoon period. In addition, one midday round trip would be provided on Saturdays, Sundays, and major holidays. The commuter rail and bus service would serve three passenger stations including Burlington, Silver Lake, and Antioch, providing an average station spacing of about eight miles.

As analysis of these alternatives proceeded, it became apparent from the initial ridership, revenue, and operating cost projections that both the commuter rail and commuter bus extensions would perform poorly when assuming these levels of service. Because of these results, the initial commuter rail and bus alternatives were reviewed and their assumed levels of service were subsequently cut back in an attempt to bring the projected annual operating costs and capital costs more in line with the anticipated level of ridership. For the rail and bus alternatives, the weekday peak-period, peak-direction service was reduced from four to two scheduled runs in each direction and midday, weekend, and holiday service was removed.

The most important findings concerning the cut-back version of the commuter rail alternative may be summarized as follows:

- The total cost of the necessary capital improvements under the cut-back version of the Burlington-Antioch commuter rail alternative was estimated to be $26.8 million in year 2000 dollars. This includes $21.6 million for track and signal improvements, $1.2 million for passenger station facilities, and $4.0 million for train equipment. Since train equipment would be deadheaded from the existing Metra storage yard at Antioch, the cost of a new overnight train storage yard at Burlington was not included. The ongoing future addition of mainline capacity improvements by Wisconsin Central might serve to reduce the capital investment required to initiate commuter rail service between Burlington and Antioch.

- The number of trips that could be expected to be made on the potential commuter rail service during an average weekday in the year 2020 was forecast to be a total of 180 trips. Approximately 90 percent of the projected 180 trips may be expected to be made between stations on the potential new extension and Union Station in the Chicago central business district. About 60, or 33 percent of the trips on the extension may be expected to be generated at the Burlington station and about 120, or 67 percent, of the trips on the extension may be expected to be generated at the Silver Lake station.

- The annual total operating cost of the potential commuter rail extension beyond the existing Antioch station was estimated to be about $1.5 million. The annual operating revenue of the service was estimated to be about $212,000. This would result in a net annual operating cost or subsidy of about $1.3 million.

The most important findings concerning the cut-back version of the commuter bus alternative may be summarized as follows:

- The total cost of the necessary capital improvements under the cut-back version of the Burlington-Antioch commuter bus alternative was estimated to be $501,000 in year 2000 dollars. The entire capital cost would be for construction of new station facilities with park-ride lots at Burlington and Silver Lake, and for minor improvements at Antioch.

- The number of trips that could be expected to be made on the potential commuter bus service during an average weekday in the year 2020 was forecast to be a total of 40 trips. Approximately 85 percent of the projected 40 trips may be expected to be made between stations on the potential new extension and Union Station in the Chicago central business district. About 10, or 25 percent, of the trips on the extension may be expected to be generated at the Burlington station and about 30, or 75 percent, of the trips on the extension may be expected to be generated at the Silver Lake station.

- The annual total operating cost of the potential commuter bus service between Burlington and Antioch was estimated to be about $137,000. The annual operating revenue of the service was estimated to be about $6,700. This would result in a net annual operating cost or subsidy of about $130,000.

A comparison of selected characteristics for the reduced-service versions of the proposed Burlington-Antioch commuter service alternatives was made between the alternatives and 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 particular interest among these characteristics were the estimated ridership and the operating cost recovery rates since these measures provides a very good indication of long-term financial feasibility.

The comparison between the commuter rail and commuter bus alternatives indicated that commuter rail may be expected to attract over four times the ridership than would commuter bus in the corridor. The commuter rail alternative would generate about 180 trips on an average weekday, or about 45,900 trips annually; and the commuter bus alternative would generate about 40 trips on an average weekday, or about 5,100 trips annually. Average weekday boardings for the commuter rail alternative range from 30 at Burlington to 60 at Silver Lake. These could be considered modest compared to weekday boardings at most Chicago-area Metra stations, of which very few experience weekday boardings of less than 100 passengers. The estimated operating cost recovery rate for the cut-back version of the commuter rail alternative would be about 14 percent compared to about 6 percent for the initial version of the rail alternative. The estimated operating cost recovery rate for the cut-back version of the commuter bus alternative would be about 5 percent compared to about 2 percent for the initial version of the bus alternative.

The comparison of the commuter rail and commuter bus alternatives with other commuter transit systems indicated that the estimated operating-cost recovery rates of 14 percent for the commuter rail alternative and 5 percent for the commuter bus alternative were significantly less than that for almost all of the other systems. This included all of the other new-start commuter rail services and all of the other long-established commuter rail services in the United States that were compared. In addition, the number of passengers per train-mile for the potential Burlington-Antioch service was also significantly less than for the existing new-start and long-established commuter rail systems. A comparison with existing bus transit systems in Southeastern Wisconsin indicated the operating-cost recovery rate for the commuter rail alternative to be comparable to four of the smaller bus transit systems in Southeastern Wisconsin, those being the Kenosha Transit System, the Ozaukee County Transit System, the Washington County Transit System, and the City of Waukesha Transit System. The commuter rail operating-cost recovery rate was significantly less than that for the remaining bus systems. The operating-cost recovery rate for the commuter bus alternative was significantly less than that for all of the bus transit systems shown in Southeastern Wisconsin.

Implementation and funding represent other important considerations. Although the commuter rail and bus extension alternatives extend from Wisconsin into Illinois, both alternatives would entirely serve Wisconsin passenger markets. All of the new stations for both alternatives would be located within Wisconsin. Therefore, it is reasonable to expect that Wisconsin agencies or units of government would be entirely responsible for sponsoring and funding a project related to such a service extension.

The State of Wisconsin presently plays no role in the implementation, operation, or funding of existing or potential commuter rail services. The State role could change in the future. As this feasibility study was being completed, a special blue ribbon passenger rail task force appointed by the Governor was studying what role the State of Wisconsin should have in possible commuter rail as well as other types of passenger rail services. The task force did determine that some level of State participation in the development of commuter rail services was appropriate. The task force, however, could not agree whether commuter rail should be State operated and funded with Federal and State funds, or locally operated and funded with a combination of Federal, State, and local funds. The State's role will ultimately be established by the State Legislature and Governor. There is a need to consider that local units of government may be responsible for some share of annual operating subsidy and the capital costs of any commuter rail service, as well as may have the responsibility for operation and management. Also, there may be a need for a multi-county agency or cooperative agreement or a regional transportation or commuter rail authority to provide for the implementation, oversight, and management of commuter rail.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of operating commuter bus service in the Burlington-Antioch corridor as an extension of the existing Metra commuter rail service to Antioch, the Advisory Committee concluded that:

- Feeder bus service in the corridor would attract minimal ridership and would have a very low operating cost recovery rate, particularly when compared to existing bus systems within Southeastern Wisconsin and new-start and established commuter rail services.

- Feeder bus service in the corridor would have a very low level of cost-effectiveness.

- Therefore, the potential operation of feeder bus service in the corridor cannot be justified.

Based upon these conclusions, the Advisory Committee recommended that no further consideration of commuter bus service in the Burlington-Antioch corridor is warranted at this time.

Following careful consideration of the study findings concerning the potential ridership, capital costs, and operating costs of extending commuter rail service from Antioch to Burlington, the Advisory Committee concluded that:

- Extension of commuter rail service into the Burlington-Antioch corridor is physically feasible.

- Commuter rail service in the corridor would attract more ridership than would the bus alternative, but that ridership would still be modest. The operating cost recovery rate may be expected to be very low compared to other new-start and established commuter rail services in the United States and to existing bus systems within Southeastern Wisconsin.

- Commuter rail service in the corridor would have a low level of cost-effectiveness.
- Therefore, the potential operation of commuter rail service in the corridor cannot be justified at this time.

Based upon these conclusions, the Advisory Committee recommended that implementation of commuter rail service should not be further pursued at this time. In drawing these conclusions and making the foregoing recommendations, the Advisory Committee recognized that at some time in the future, other factors may prompt revisiting the issue of extending commuter rail in this corridor. Such factors may include increasing traffic congestion, increases in the price of motor fuel, and changes in development and travel patterns, particularly a substantial increase in the number of people living in western Kenosha and Racine Counties and working in the Chicago central business district.

The Advisory Committee requested that the Regional Planning Commission complete publication of the final report for this feasibility study phase, and subsequently transmit the completed feasibility study to the Wisconsin Department of Transportation and the local units of government involved.

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APPENDIX

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Appendix A

LICENSE PLATE SURVEY OF WISCONSIN RESIDENTS USING THE NORTH CENTRAL SERVICE AND THE MILWAUKEE DISTRICT NORTH COMMUTER RAIL LINES

To estimate the existing number of Wisconsin residents who use a nearby Metra commuter rail line, a one-day weekday survey of automobiles with Wisconsin license plates was conducted at Metra commuter rail park-ride lots. The survey included all park-ride lots at Lake County stations alongMetra's North Central Service (Antioch-Chicago) and Milwaukee District North (Fox Lake-Chicago) commuter rail lines.

The results of this survey are summarized in Table A-1. An estimated 150 Wisconsin residents used these two Metra commuter rail routes on a typical weekday. About 27 percent of these used the Antioch-Chicago route and the remaining 73 percent used the Fox Lake-Chicago route. Most of these passengers used a commuter rail station closest to Wisconsin, which in most cases is also the station furthest from downtown Chicago. About 57 percent of the Wisconsin residents used the Fox Lake station, about 23 percent used the Antioch station; about 5 percent used the Lake Forest station, and about 3 percent used the Ingleside, Grayslake, and Lake Cook Rd. stations. The remaining passengers—about 6 percent—used other stations in Lake County on these two lines. Analysis of the home county for these passengers based on vehicle-garaging locations found that most of the Wisconsin passengers reside in Walworth, Kenosha, or Racine Counties. About 41 percent of these passengers resided in Kenosha County, about 27 percent resided in Walworth County, about 13 percent resided in Racine County, about 9 percent resided in other Southeastern Wisconsin counties, and the remaining 10 percent resided in Wisconsin counties outside Southeastern Wisconsin. The home locations within Kenosha, Racine and Walworth Counties of Wisconsin residents who use Metra's Antioch-Chicago and Fox Lake-Chicago commuter rail lines, and the stations used by those passengers, are shown on Maps A-1 and A-2, respectively. Map A-3 shows the home location of all Wisconsin residents who use either one of these two commuter rail routes.

A review of this data suggests that Wisconsin residents who commute to Chicago do not necessarily drive to the nearest Metra commuter rail station.

- Passengers may be expected to board at stations with more frequent peak period as well as nonpeak period service. For example, the Fox Lake-Chicago line has a long-established pattern of frequent peak period service as well as hourly midday and evening service. This has resulted in the Fox Lake station being a popular station for Wisconsin passengers because of the wide variety of train schedules available. On the other hand, the Antioch station has fewer peak period and nonpeak period trains, and is a relatively new service, and is therefore used by fewer Wisconsin passengers.

- Passengers may also be expected to use stations where parking is more readily available. Because the Fox Lake station is popular, its park-ride lots fill up quickly during peak periods. Because the Antioch station has a small lot, it can also fill up quickly. This causes some passengers to drive to other commuter rail stations—such as Ingleside or Lake Villa—where parking spaces are more readily available. In some cases, passengers driving from Wisconsin may choose a station—such as Lake Forest or Lake Cook Rd.—because of those stations' proximity to a convenient freeway or tollway exit. It should be noted that Wisconsin residents' choice of stations might also be guided by local parking restrictions. Some commuter rail station park-ride lots are restricted to use only by residents of the community in which the station is located.

- Passengers may also be expected to choose a commuter rail station based on the specific downtown Chicago terminal used by a specific commuter rail route. For example, trains on both the Antioch-Chicago and Fox Lake-Chicago routes arrive at Chicago Union Station. However, trains on other Metra routes serving Lake County such as the Harvard-Chicago and Kenosha-Chicago routes arrive at the

Table A-1

ESTIMATED NUMBER OF WISCONSIN RESIDENTS BOARDING WEEKDAY METRA COMMUTER TRAINS BY EXISTING SELECTED ROUTES AND STATIONS: 1998

Routes and Stations Used	County of Residence					Total
	Within Southeastern Wisconsin				Outside Southeastern Wisconsin	
	Walworth	Kenosha	Racine	Other		
Milwaukee District North Line (Fox Lake-Chicago)						
Fox Lake	38	29	9	5	4	85
Ingleside	-	2	- -	1	1	4
Long Lake	-	- -	1	- -	1	2
Round Lake	- -	- -	- -	- -	- -	- -
Grayslake	1	2	1	- -	1	5
Libertyville	- -	- -	- -	2	- -	2
Lake Forest	1	1	1	4	- -	7
Deerfield	- -	- -	- -	- -	- -	- -
Lake Cook Rd.	- -	- -	1	- -	3	4
North Central Service Line (Antioch-Chicago)						
Antioch	1	24	7	1	2	35
Lake Villa	- -	1	- -	- -	1	2
Round Lake Beach	- -	1	- -	- -	- -	1
Prairie Crossing	- -	- -	- -	- -	- -	- -
Mundelein	- -	1	- -	- -	- -	1
Vernon Hills	- -	- -	- -	- -	- -	- -
Prairie View	- -	- -	- -	- -	- -	- -
Buffalo Grove	- -	- -	- -	- -	2	2
Total	41	61	20	13	15	150

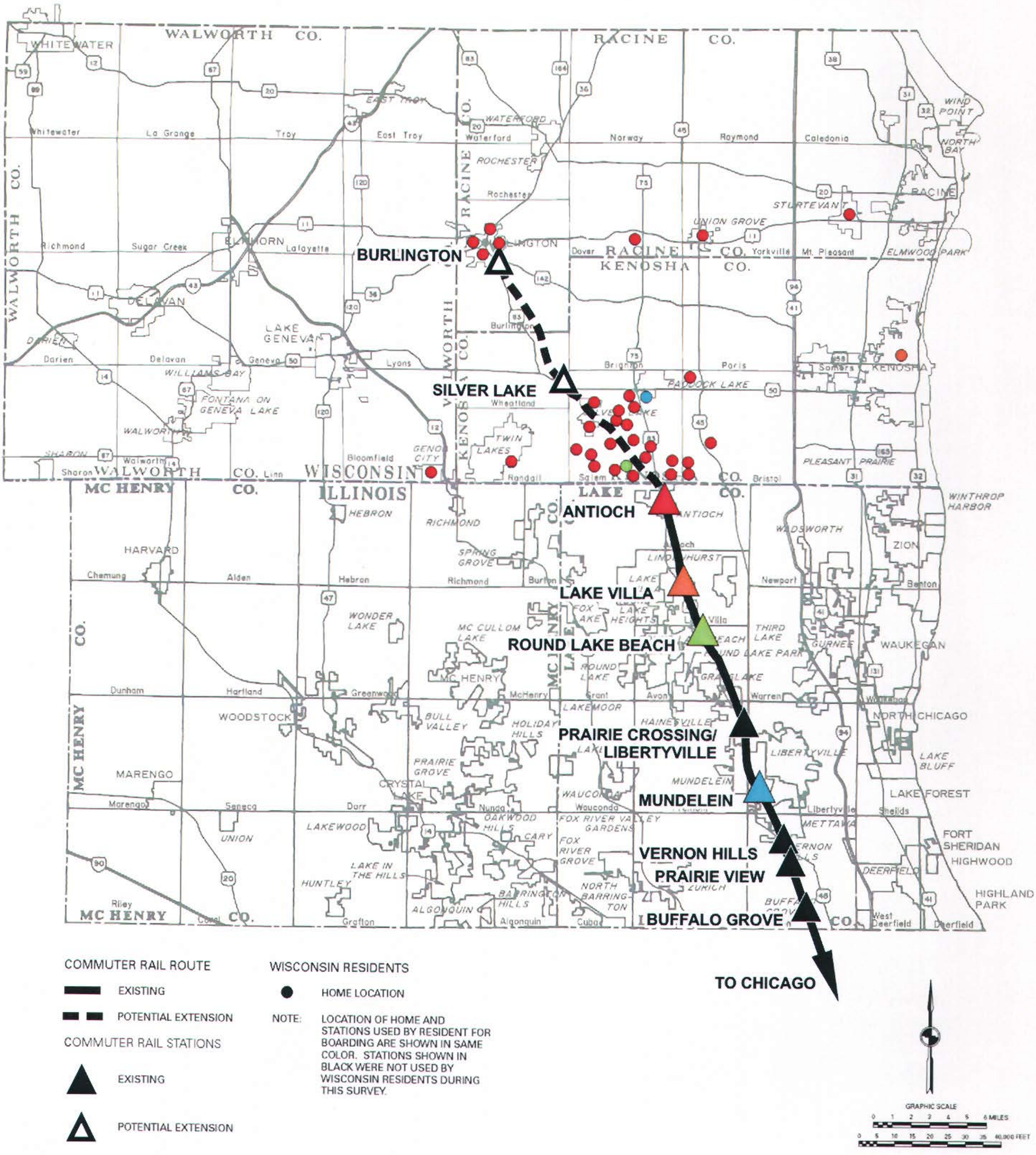
Source: SEWRPC.

North Western terminal. In many instances, Chicago area commuters will choose a commuter rail route based on the proximity of the downtown terminal for that route to their place of work or other destination.

- Passengers may also choose a station based on other travel requirements for a particular day. In some cases, a passenger may choose a station because of business that needs to be conducted later in the day. For example, a passenger from Paddock Lake may board a commuter train at a station such as Mundelein to travel to downtown Chicago. When that person returns by train to Mundelein, he or she may have business nearby and will be conveniently positioned to drive there as quickly as possible.

Map A-1

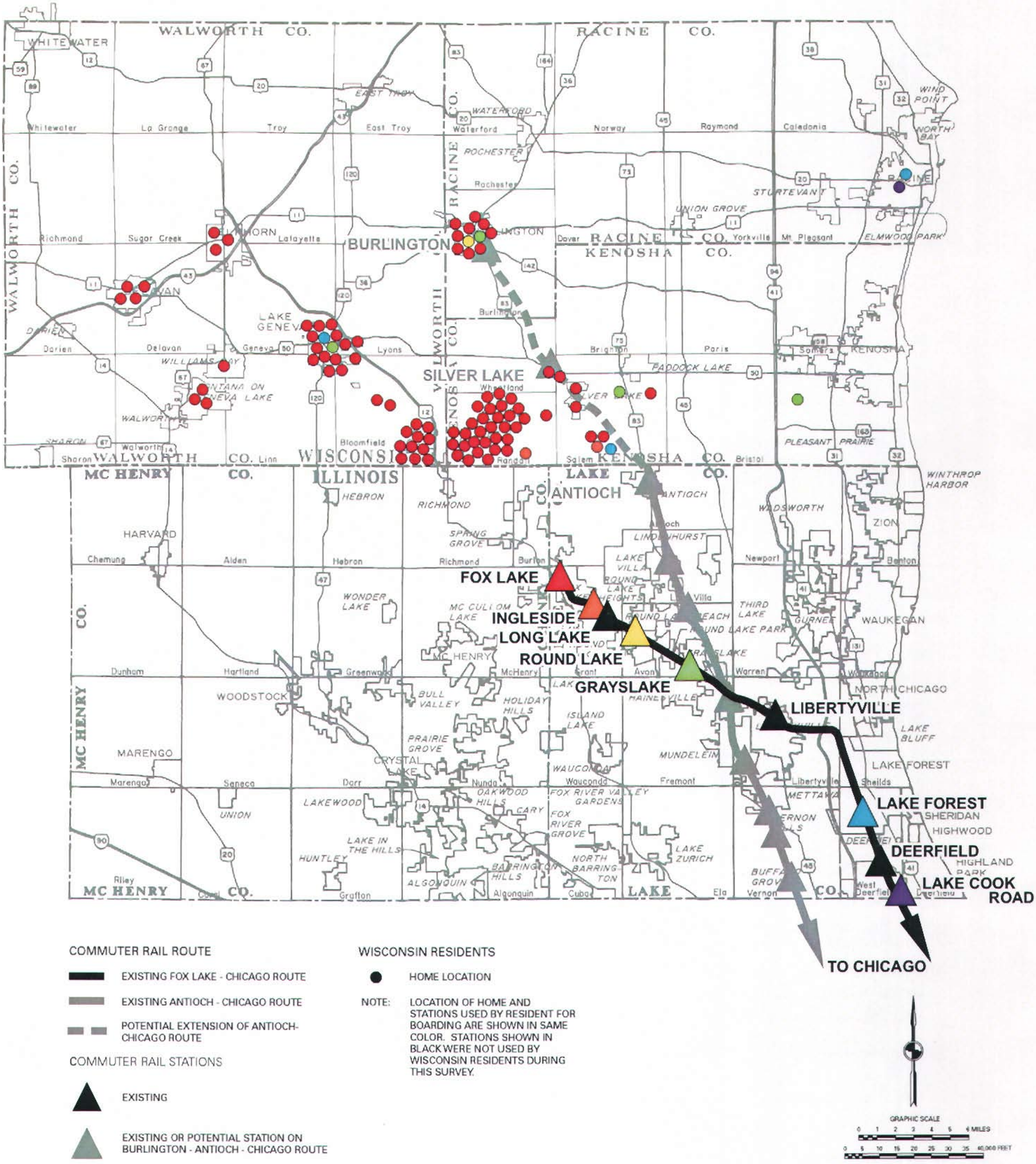
HOME LOCATION OF WISCONSIN RESIDENTS USING METRA'S ANTIOCH-CHICAGO COMMUTER RAIL LINE BY BOARDING STATION IN ILLINOIS ON A TYPICAL WEEKDAY: 1998



Source: SEWRPC.

Map A-2

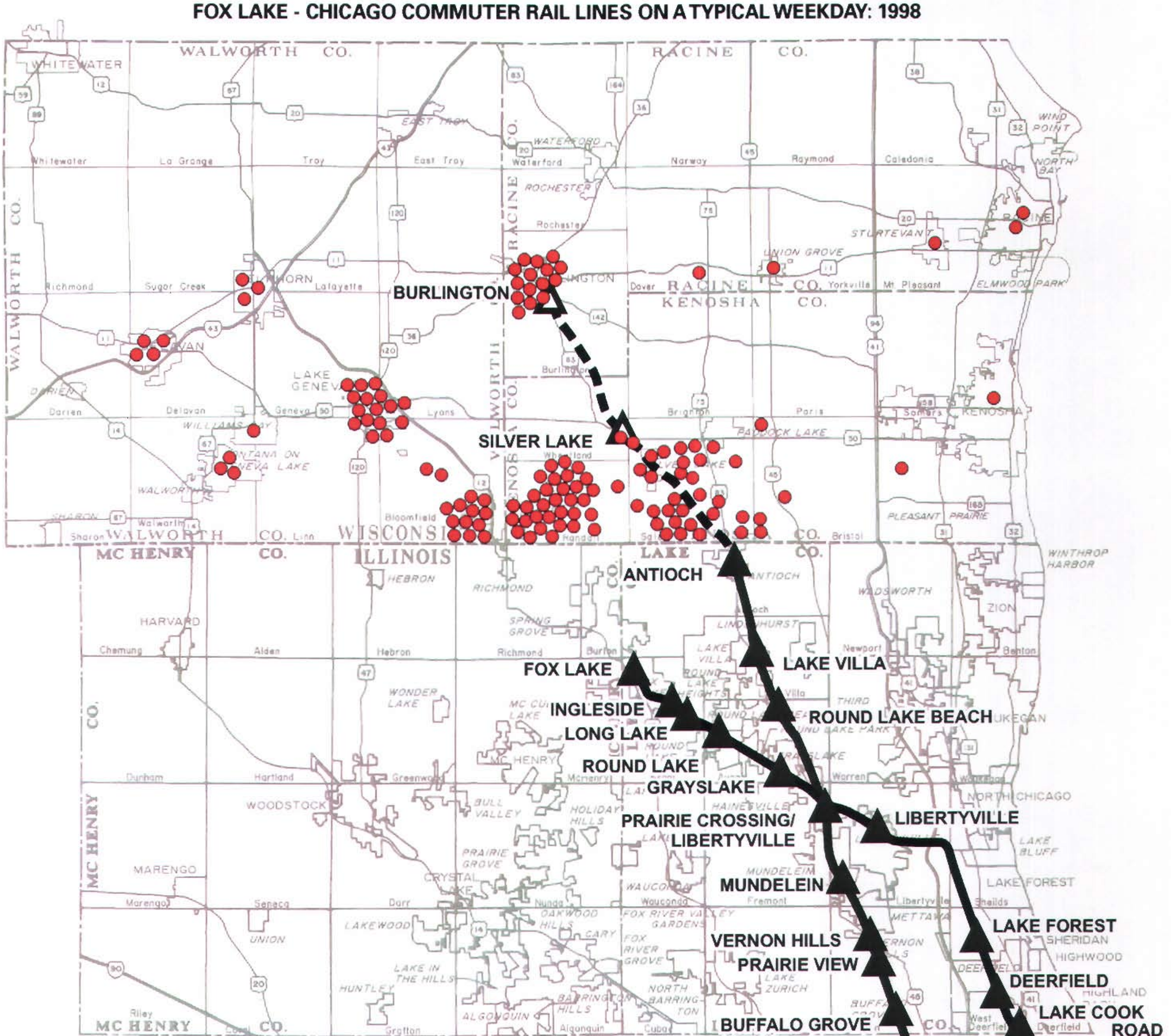
HOME LOCATION OF WISCONSIN RESIDENTS USING METRA'S FOX LAKE - CHICAGO COMMUTER RAIL LINE BY BOARDING STATION IN ILLINOIS ON A TYPICAL WEEKDAY: 1998



Source: SEWRPC.

Map A-3

HOME LOCATION OF WISCONSIN RESIDENTS WHO USE METRA'S ANTIOCH - CHICAGO OR FOX LAKE - CHICAGO COMMUTER RAIL LINES ON A TYPICAL WEEKDAY: 1998



COMMUTER RAIL ROUTE

EXISTING

POTENTIAL EXTENSION

COMMUTER RAIL STATIONS

EXISTING

POTENTIAL EXTENSION

WISCONSIN RESIDENTS

HOME LOCATION

Source: SEWRPC.