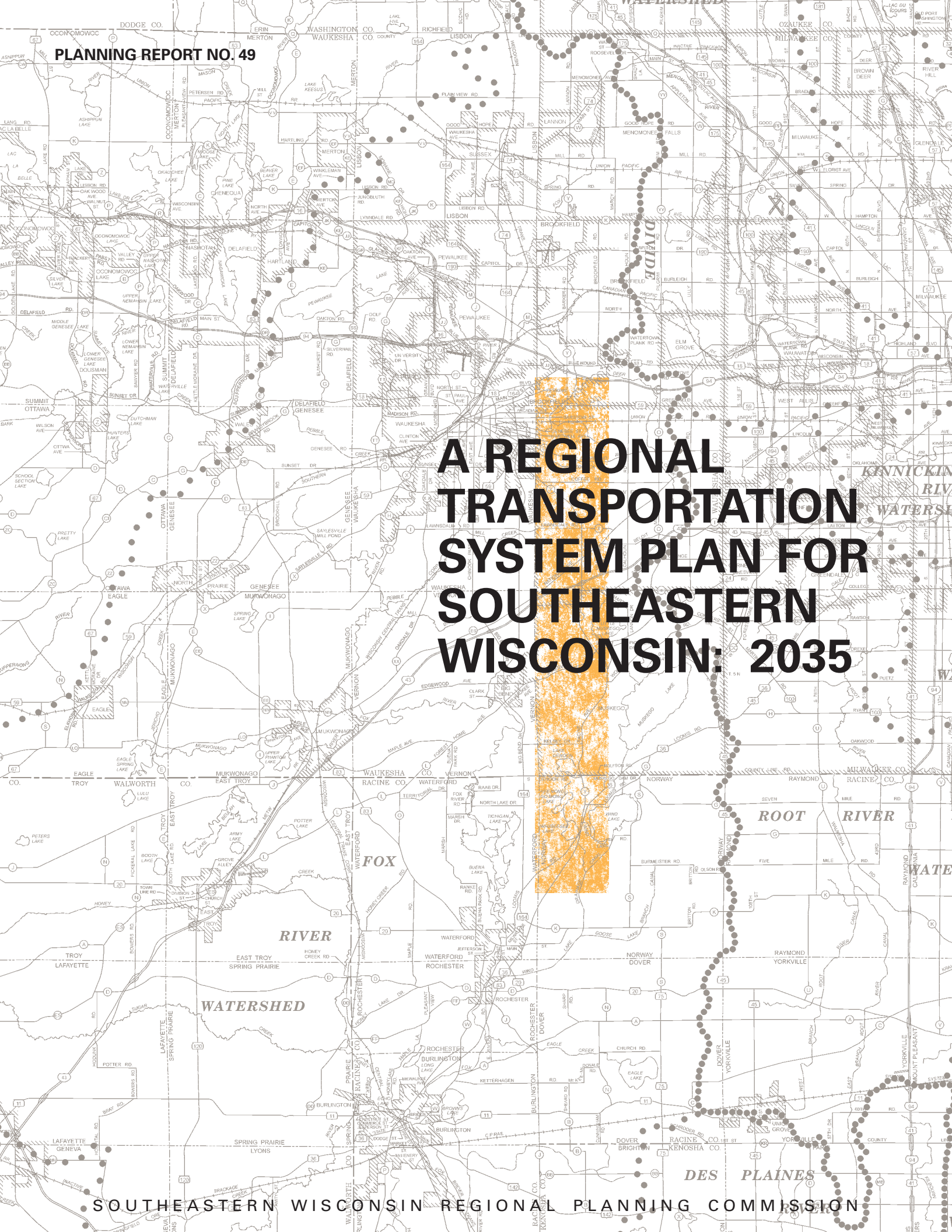
PLANNING REPORT NO. 49

A REGIONAL TRANSPORTATION SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN: 2035



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Special acknowledgement is due the following individuals who regularly served as alternate committee members during the course of the plan review and update process: Mr. Larry H. Bruss, Regional Pollutant and Mobile Source Section Chief, Bureau of Air Management, Wisconsin Department of Natural Resources, Mr. Michael Vebber, Deputy Director, Milwaukee County Transit System, and Mr Daniel A. Boehm, Manager of Research and Planning, Milwaukee County Transit System.

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SUBJECT: Certification of Adoption of the Year 2035 Regional Transportation System Plan for Southeastern Wisconsin

TO: The Legislative Bodies of All the Local Units of Government within the Southeastern Wisconsin Region, Consisting of the Counties of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha

This is to certify that at a regular meeting of the Southeastern Wisconsin Regional Planning Commission held at the Washington County Highway Department Building, West Bend, Wisconsin, on the 21st day of June 2006, the Commission, by unanimous vote of all Commissioners present, being 17 ayes and 0 nays, and by appropriate resolution, a copy of which is made a part hereof and is incorporated by reference to the same force and effect as if it had been specifically set forth herein in detail, did adopt a design year 2035 regional transportation system plan for Southeastern Wisconsin as part of the master plan for the physical development of the Southeastern Wisconsin Region. Said plan is documented in SEWRPC Planning Report No. 49, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035*, published in June 2006, which is attached hereto and made a part hereof. Such action taken by the Commission is hereby recorded on and is a part of said plan, which plan is hereby transmitted to all concerned levels and agencies of government in the Southeastern Wisconsin Region for implementation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and seal and cause the Seal of the Southeastern Wisconsin Regional Planning Commission to be hereto affixed.

Dated at the City of Pewaukee, Wisconsin, this 27th day of June 2006.

Thomas H. Buestrin, Chairman
Southeastern Wisconsin
Regional Planning Commission

ATTEST:

Philip C. Evenson

Philip C. Evenson, Deputy Secretary

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RESOLUTION NO. 2006-11

RESOLUTION OF THE SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION ADOPTING A DESIGN YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN, THE PLAN BEING A PART OF THE MASTER PLAN FOR THE PHYSICAL DEVELOPMENT OF THE REGION CONSISTING OF THE COUNTIES OF KENOSHA, MILWAUKEE, OZAUKEE, RACINE, WALWORTH, WASHINGTON, AND WAUKESHA IN THE STATE OF WISCONSIN

WHEREAS, under the guidance of the Advisory Committee on Regional Transportation System Planning, the Commission staff has completed all planning studies necessary for the preparation of the design year 2035 regional transportation plan, including the preparation of SEWRPC Planning Report No. 49, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035*, which report contains regional development proposals, programs, and descriptive and explanatory matter intended by the Commission to form the year 2035 regional transportation plan and to constitute an integral part of the master plan for the physical development of the Region; and

WHEREAS, the proposed design year 2035 regional transportation plan was subject to four series of public informational meetings held in each county in the Region, including a series of public hearings held in conjunction with the fourth series of informational meetings in April 2006; and

WHEREAS, the regional transportation system plan has been determined to conform to the State of Wisconsin implementation plan for the achievement of national air quality standards as required by the Federal Clean Air Act amendments of 1990; and

WHEREAS, the Advisory Committee on Regional Transportation System Planning unanimously approved the regional transportation plan at its meeting held on May 10, 2006; and

WHEREAS, under the provisions of Section 66.0309(9) of the Wisconsin Statutes, the Regional Planning Commission is authorized and empowered, as the work of making the whole master plan progresses, to adopt a resolution approving the design year 2035 regional transportation plan for Southeastern Wisconsin as a part of the master plan;

NOW THEREFORE, BE IT HEREBY RESOLVED:

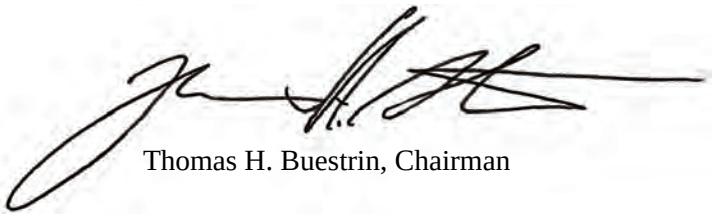
FIRST: That the design year 2035 regional transportation plan, being a part of the master plan for the physical development of the Region and set forth in SEWRPC Planning Report No. 49, *A Regional Transportation System Plan for Southeastern Wisconsin*, published in June 2006, shall be and the same hereby is in all respects ratified, approved, and officially adopted.

SECOND: That the said SEWRPC Planning Report No. 49, together with all maps, plats, charts, programs, and descriptive and explanatory matter contained therein, are hereby made a matter of public record, and the originals and true copies thereof shall be kept at all times at the offices of the Southeastern Wisconsin Regional Planning Commission, presently located in the City of Pewaukee, Waukesha County, and State of Wisconsin, or at any subsequent office that the Commission may occupy, for examination and study by whomsoever may desire to examine same.

THIRD: That a true, correct, and exact copy of this resolution and the aforereferenced planning report shall be forthwith distributed to each of the local legislative bodies of the government units within the Region entitled thereto and to such other bodies, agencies, or individuals as the law may require or as the Commission or its Executive Committee or its Executive Director in their discretion shall determine and direct.

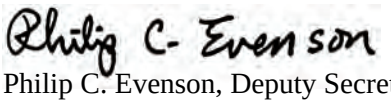
FOURTH: That the design year 2035 regional transportation plan for Southeastern Wisconsin, following the adoption of this resolution, shall become an element of the master plan for the entire Region, which master plan shall be made for the general purpose of guiding and accomplishing a coordinated, adjusted, and harmonious development of the entire Region and which will, in accordance with existing and future needs, best promote public health, safety, morals, order, convenience, prosperity, or the general welfare, as well as efficiency and economy in the process of development; and that the purpose and effect of the adoption of the master plan shall be solely to aid the Regional Planning Commission, the local governments and local government officials in the Region, the State government and State government officials, and the Federal government and Federal government officials in the performance of their functions and duties.

The foregoing resolution, upon motion duly made and seconded, was regularly adopted at the meeting of the Southeastern Wisconsin Regional Planning Commission held on the 21st day of June 2006, the vote being: Ayes 17; Nays 0.



Thomas H. Buestrin, Chairman

ATTEST:



Philip C. Evenson, Deputy Secretary

PLANNING REPORT
NUMBER 49

A REGIONAL TRANSPORTATION SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN: 2035

Prepared by the

Southeastern Wisconsin Regional Planning Commission
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STATEMENT OF THE CHAIRMAN

After careful evaluation and public review of alternatives, the Regional Planning Commission in 1966 adopted a regional transportation plan for the design year 1990 as a guide for growth and development in the seven-county Southeastern Wisconsin Region, Major reevaluations of the plan were completed in 1978, 1994, and 1997. These efforts culminated in the preparation and adoption of new transportation system plans, with the plan design period extended, first to the year 2000, then to the year 2010, and then to the year 2020.

In June 2006, the Commission completed the work necessary to extend the regional transportation plan further into the future to a new design year 2035. The new plan accommodates population, household, and employment levels anticipated in the Region through 2035. The new plan recommends the travel demand management, transportation systems management, public transit, bicycle and pedestrian, and arterial street and highway actions and improvements necessary to meet existing and year 2035 transportation needs and objectives within Southeastern Wisconsin.

The year 2035 regional transportation plan incorporates the basic principles and concepts of the previously adopted plans. The plan was explicitly designed to serve a companion year 2035 regional land use plan, which proposes a more compact, centralized regional development pattern than would result from a projection of current trends. The plan was also designed to minimize investment in the provision of additional highway capacity by considering highway capacity improvement and expansion as a measure of last resort in addressing traffic congestion problems. The plan recommends a substantial improvement and expansion of public transit to support the planned land use pattern, provide an alternative choice for travel, and provide access to the metropolitan region for that portion of the population without access to the automobile. Like the previous plans, the plan is advisory in nature. Plan implementation will depend upon the willingness and ability of the State, county, and local governments to fund and put in place the recommended highway, transit, and bicycle and pedestrian improvements.

With the plan design period extended to the year 2035, the regional transportation plan will continue to provide a sound regional framework for transportation system maintenance and development, guiding and supporting transportation system operation and construction by county and local units of government and the Wisconsin Department of Transportation in the Region.

Very truly yours,

Thomas H. Buestrin,
Chairman

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Chapter I

INTRODUCTION

This report documents the fifth-generation regional transportation system plan for the Southeastern Wisconsin Region, as well as the process used to arrive at that plan. The new plan is for the design year 2035. The plan is the result of a major review and reevaluation of the design year 2020 plan adopted by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in 1997, and its amendments and extensions to the design year 2025 adopted in 2003.

The Commission is the official areawide regional planning agency for the seven-county Southeastern Wisconsin Region under State law. The Commission is also the official metropolitan transportation planning organization for the Southeastern Wisconsin Region as designated by the Governor of the State of Wisconsin under Federal law and regulations. The Commission, therefore, under State and Federal law is responsible for preparing and maintaining a regional transportation plan for the seven-county southeastern Wisconsin Region.

The Commission has historically conducted transportation system planning concurrently with land use planning, recognizing that future land use will help determine the amount and spatial distribution of travel and the need for future transportation facilities and services and, in turn, the planned transportation system may have some impact on shaping land use patterns. The Commission has historically first proposed a regional land use plan representing a desirable future land use pattern, and then designed the regional transportation plan to serve, and promote the implementation of, the regional land use plan. The year 2035 regional land use plan is documented in SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035.*

The Commission first adopted regional land use and regional transportation system plans in 1966. These plans had a design year of 1990. Following a period of about 10 years, those plans underwent a major review and reevaluation, including analyses of population and employment growth and change, land development trends, trends in travel habits and patterns, trends in transit ridership and highway traffic, and the conformance of those trends to the forecasts used in the preparation of the plans. This plan reappraisal was supported by then-new 1970 and 1975 regional land use inventory data, 1970 U.S. Bureau of the Census population and household data, and 1972 regionwide surveys of travel and traffic. This major plan reappraisal, which included a review of the extent to which the 1990 regional land use and regional transportation system plans had been implemented over the previous 10 years, resulted in a second-generation design year 2000 regional land use plan, which was adopted by the Commission in 1977, and a second-generation design year 2000 regional transportation system plan, which was adopted by the Commission in 1978. Similarly, following a period of about 10 years, another major review and reevaluation was undertaken using 1980, 1985, and 1990 land use inventory data; 1980 and 1990 U.S. Bureau of the Census population and household data; and 1991 regional travel and traffic survey data. This review and reevaluation resulted in a third-generation design year 2010 regional land use plan, adopted by the Commission in 1992, and a third-generation design year 2010 regional transportation system plan, adopted by the Commission in 1994. In 1997, the regional land use and transportation plans were reviewed and reaffirmed, with amendment and extension of the plan design year to the year 2020, resulting in fourth-generation year 2020 regional land use and

transportation plans.[1] This report documents the fifth generation year 2035 regional transportation plan, and the planning process used to develop that plan.

THE REGION

The Southeastern Wisconsin Region consists of Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties (see Map 1). Exclusive of Lake Michigan, these seven counties have a total area of 2,689 square miles, or about 5 percent of the total area of Wisconsin. These counties, however, account for about 36 percent of the total population of the State, about 36 percent of all jobs in the State, and about 37 percent of the total tangible wealth of the State as measured by equalized property value. Exclusive of school and other special-purpose districts, the Region contains 154 local units of government, all of which participate in the work of the Commission.

Geographically, the Region is located in a relatively good position with regard to continued growth and development. It is bounded on the east by Lake Michigan, which is an integral part of a major international transportation network. It is bounded on the south by the rapidly expanding metropolitan region of northeastern Illinois, and on the west and north by the fertile agricultural lands and desirable recreation areas of the rest of the State of Wisconsin. Many of the most important industrial areas and heaviest population concentrations in the Midwest lie within 250 miles of the Region.

Map 1 also shows the boundaries of the urbanized areas within the Region as defined by the U.S. Bureau of the Census. Urbanized areas are delineated by the U.S. Bureau of the Census based on resident population and population density, and are intended to represent the intensively developed urban cores of metropolitan areas. There are four urbanized areas within the Region: the Kenosha, Milwaukee, and Racine urbanized areas; and the Round Lake Beach urbanized area in western Kenosha County, the greater portion of which is located in northeastern Illinois. By definition each urbanized area has a resident population of over 50,000 and a population density of at least 1,000 persons per square mile.

NEED FOR REGIONAL PLANNING

Regional, or areawide, planning has become increasingly accepted as a necessary governmental function in the large metropolitan areas of the United States. This acceptance is based, in part, on an awareness that problems of physical and economic development and of environmental deterioration transcend the geographic limits of local units of government. It has also been recognized that sound resolution of areawide problems requires the cooperation of all units and agencies of government concerned and of private interests as well.

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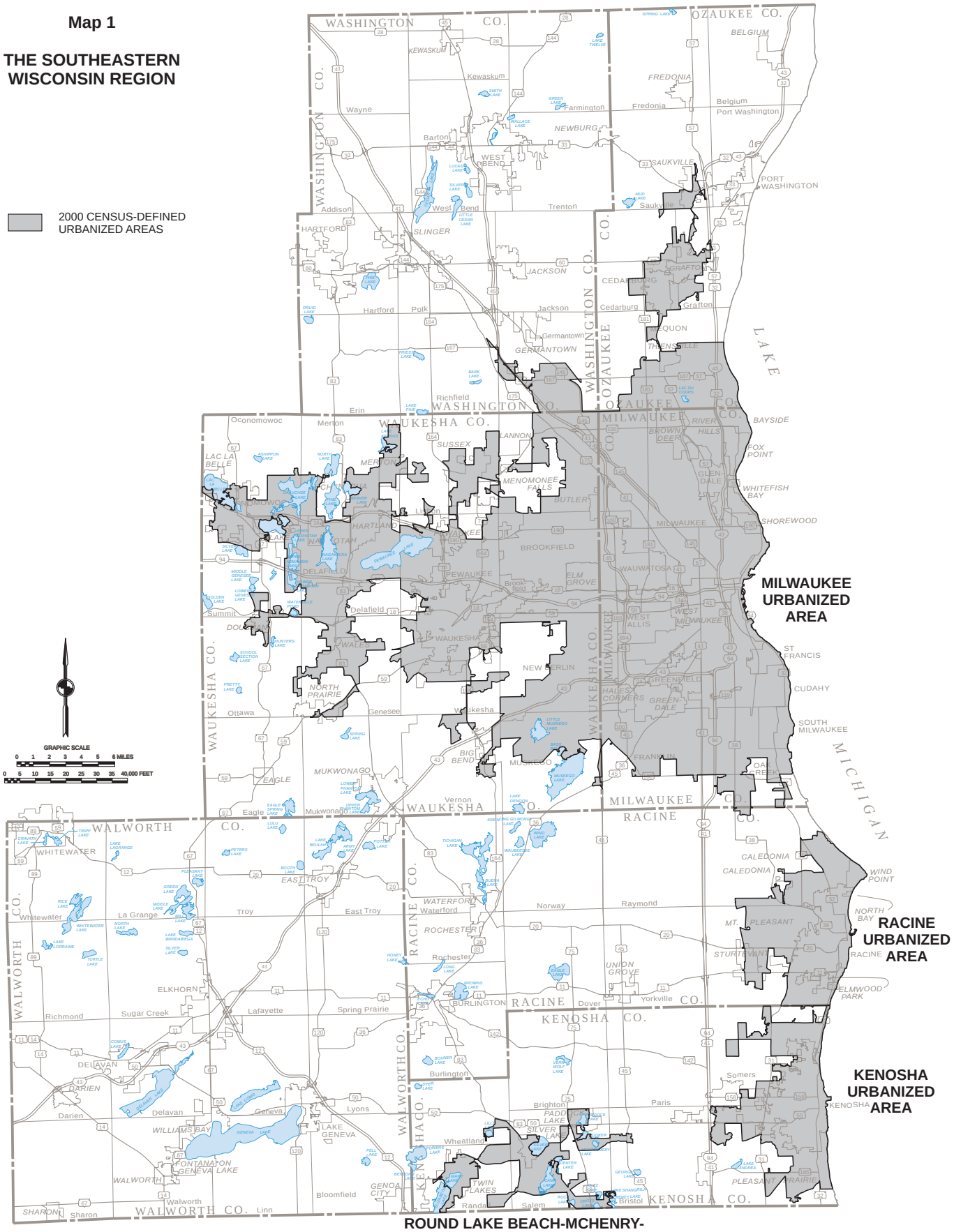
[1] *The first-generation regional land use and transportation plans are documented in SEWRPC Planning Report No.7,* Land Use-Transportation Study, *Volume One,* Inventory Findings: 1963, *May 1965; Volume Two,* Forecasts and Alternative Plans: 1990, *June 1966, and Volume Three,* Recommended Regional Land Use and Transportation Plans: 1990, *November 1966. The second-generation regional land use and transportation plans are documented in SEWRPC Planning Report No. 25,* A Regional Land Use Plan and a Regional Transportation Plan for Southeastern Wisconsin-2000, *Volume One,* Inventory Findings, *April 1975, and Volume Two,* Alternative and Recommended Plans, *May 1978. The third-generation regional land use plan is documented in SEWRPC Planning Report No. 40,* A Regional Land Use Plan for Southeastern Wisconsin-2010, *January 1992, and the third-generation regional transportation plan in SEWRPC Planning Report No. 41,* A Regional Transportation System Plan for Southeastern Wisconsin: 2010, *December 1994. The fourth-generation regional land use and transportation plans are documented in SEWRPC Planning Report No. 45,* A Regional Land Use Plan for Southeastern Wisconsin: 2020, *December 1997, and SEWRPC Planning Report No. 46,* A Regional Transportation System Plan for Southeastern Wisconsin: 2020, *December 1997. The review and reaffirmation of the fourth-generation plans and extension of design year to 2025 are documented in SEWRPC Memorandum Report No. 157,* Review and Reaffirmation of Year 2020 Regional Land Use and Transportation Plans and Extension of Plan Design Year to 2025, *April 2003.*

Map 1

THE SOUTHEASTERN WISCONSIN REGION



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

Public as well as private interests are vitally affected by areawide developmental and environmental problems and by proposed solutions to these problems. Regional planning is necessary to promote a consensus on proposed solutions and the necessary cooperation among urban and rural; local, State, and Federal; and public and private interests. In this light, regional planning is not a substitute for Federal, State, or local public planning or for private planning. Rather, regional planning is a vital supplement to such planning.

The Federal government recognizes this need, particularly for regional land use and transportation system planning, and mandates through Federal law and regulations the preparation and maintenance of a regional transportation system plan for the Southeastern Wisconsin Region. The Regional Planning Commission is the official "metropolitan planning organization" designated by the Governor of the State of Wisconsin under Federal law for such regional transportation planning in Southeastern Wisconsin.

The Commission's regional transportation plan under State law is an advisory plan, and provides the essential guidance and coordination to the 154 local units of government within Southeastern Wisconsin, the State government, the Federal government, and private interests with respect to the role of highway, public transit, and systems management improvement actions in addressing existing and future transportation problems; the necessary extension and coordination of street and highway improvements across jurisdictional boundaries; and the necessary extension and coordination of transit routes and improvements across jurisdictional boundaries. The Commission's regional transportation plan also satisfies for the Southeastern Wisconsin Region the Federal metropolitan area transportation planning requirements under the Federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), thus qualifying the State and constituent local units of government for Federal aids in partial support of the development of highway and transit facilities, and also assists in meeting the planning review requirements of Gubernatorial Order 29 which, in effect, continues the procedures established under Section 204 of the Federal Demonstration Cities and Metropolitan Development Act and the U.S. Bureau of the Budget Circular Memorandum A-95 issued pursuant to the Federal Intergovernmental Cooperation Act. The regional transportation plan also satisfies for the Southeastern Wisconsin Region the transportation planning requirements attendant to ozone-related air quality planning conducted by the Wisconsin Department of Natural Resources as required by the Federal Clean Air Act Amendments of 1990. This regional transportation plan reappraisal effort serves to update and revise the data collected in, and forecasts prepared under, the previous regional transportation plan and to update and revise the plan.

SCOPE OF THE REGIONAL TRANSPORTATION SYSTEM PLAN

The Commission's regional transportation plan, coordinated and integrated with other Commission, State, and local plans, provides the vision for the needed improvement and expansion of the transportation system serving southeastern Wisconsin.

The Commission's regional transportation plan primarily addresses intraregional travel, and the transportation system within southeastern Wisconsin which serves intraregional travel. Intraregional travel is travel by people and freight where both ends of the trip or travel is within the seven county Region. Commission studies over the past 40 years have consistently established that over 95 percent of total personal travel on an average weekday within Southeastern Wisconsin is intraregional travel made by Southeastern Wisconsin residents and is carried on streets and highways, public transit, and bicycle and pedestrian facilities. Also, over 90 percent of the commercial truck traffic on streets and highways within Southeastern Wisconsin on an average weekday is intraregional travel made by trucks registered within southeastern Wisconsin.

The Commission's regional transportation plan also addresses personal and freight interregional travel over streets and highways, which represents an estimated 90 percent of total personal and freight interregional travel within southeastern Wisconsin on an average weekday. Interregional travel is travel where one or both ends of the travel or trip are located outside of southeastern Wisconsin.

The Commission's regional transportation planning is necessarily closely coordinated with statewide transportation planning conducted by the Wisconsin Department of Transportation. The State of Wisconsin's transportation planning addresses interregional travel within and through Southeastern Wisconsin, and as well within and through the other regions of the State. The Wisconsin Department of Transportation statewide

transportation planning specifically addresses travel through the State, between the State of Wisconsin and other states, and between the regions of the State. The Wisconsin Department of Transportation's statewide transportation planning therefore focuses on commercial and general aviation, intercity bus and passenger rail service, freight railways, ports, and also streets and highways which carry interstate and interregional traffic, specifically the highest level of highways including freeways and other state trunk highways. Coordination between statewide transportation planning and regional transportation planning permits Commission traffic forecasts of interregional travel by personal vehicles and commercial trucks on State trunk highways to be consistent with statewide transportation plans and forecasts. As noted above, such interregional travel represents less than 10 percent of all commercial truck travel within Southeastern Wisconsin on an average weekday, and less than 5 percent of all personal travel on an average weekday.

The Commission's regional transportation planning particularly as it addresses arterial highway facilities and public transit facilities and services at and across the Region's boundaries is closely coordinated with the Wisconsin and Illinois Departments of Transportation, the Chicago Area Transportation Study, the Bay Lakes and East Central Wisconsin Regional Planning Commissions, and the Wisconsin and Illinois Counties along the Region's boundaries.

BASIC PRINCIPLES

The Commission's regional land use and transportation planning is based on eight basic principles:

1. **Land use and transportation system planning must be regional in scope.** Travel patterns develop over an entire urban region without regard to corporate limits. Thus, land use and transportation planning cannot be accomplished successfully within the confines of a single municipality or even a single county if that municipality or county is a part of a larger urban complex. The regional surface transportation system, which is composed of arterial streets and highways, transit facilities and services, bicycle and pedestrian facilities, and related terminal facilities, as well as transportation system management measures, should form a single integrated system over the entire Region, a system which can adequately serve changing regional land use and travel patterns.

2. **Transportation system planning must be conducted concurrently with, and cannot be separated from, land use planning.** The land use pattern determines the amount and spatial distribution of travel to be accommodated by the transportation system and the ability of various modes of transportation to serve travel demand cost-effectively. In turn, the transportation system may have some impact on shaping the future land use pattern. Although detailed land use patterns are primarily of local concern and properly subject to local planning and control, the aggregate effects of the spatial distribution of land use activities are regional in scope and interact strongly with the need for regional transportation facilities.

3. **Land use and transportation system planning must recognize the existence of a limited natural resource base to which urban and rural development must be properly adjusted to ensure the overall environmental quality of the Region.** Land, water, and air resources are limited and subject to potential misuse through improper land use and transportation system development.

4. **The regional land use and transportation planning process is cyclical in nature, alternating between areawide system planning and local project planning.** Under this concept, transportation-related proposals are initially advanced at the areawide systems level of planning and then an attempt is made to implement the proposals through local project planning and preliminary engineering. If, for whatever reasons, a particular transportation facility construction or management proposal advanced at the areawide systems planning level cannot be implemented at the project level, that determination is taken into account in the next cycle of systems planning. Similarly, land use-related proposals may be initially advanced at the areawide level of planning. If such proposals are not implemented at the local level, this must be taken into account in the next cycle of systems planning.

5. **Highway facilities, transit facilities, bicycle and pedestrian facilities, and travel demand and transportation systems management measures should be planned together.** Transit facilities, bicycle and pedestrian facilities, and travel demand and transportation systems management measures have the potential to affect and reduce future highway traffic and improvement needs. Their potential to address highway traffic volume and congestion should be quantitatively tested and determined, and highway improvements should then be considered to address highway traffic and congestion which may not be expected to be alleviated by transit facilities, bicycle and pedestrian facilities, or travel demand and transportation systems management measures.

6. **Highway facilities should be planned as an integrated system, as should transit facilities.** The capacities of each link in each system should be carefully fitted to travel or traffic loads, and the effects of each proposed facility on the remainder of the system should be quantitatively tested.

7. **Transportation system planning must recognize the role of transportation in the achievement of personal and community goals.** Access to high-quality transportation supports and promotes the maintenance and expansion of the Region's economy. Access to high-quality transportation, including a choice of modes, contributes to the Region's quality of life, reducing the amount of time which must be expended on transportation in daily life and facilitating the freedom to choose between a variety of places to live, work, shop, and recreate. Transportation plays a key role in making accessible environmentally sound economic, cultural, and educational opportunities; promoting sound economic development; and providing an attractive quality of life. The provision of a safe transportation system also contributes to an attractive quality of life by minimizing fatalities, injuries, and property damage, and the costs of transportation.

8. **Transportation systems planning must recognize the importance of properly relating the regional transportation system to the State and national systems.** The planning for the interregional movement of people and goods, particularly by railway, pipeline, and waterway, is primarily the responsibility of the State and Federal levels of government. Also, decisions made at the State and Federal levels of government affect the scale and timing of regional transportation system development and the availability of capital funds to implement regional transportation system improvements. Therefore, coordination in the planning process with the State and Federal levels of government becomes essential to the attainment of a balanced, integrated, and workable regional transportation system.

THE PLANNING PROCESS

Based on the foregoing regional transportation planning principles, Figure 1 outlines the regional transportation planning process followed in the preparation of the fifth-generation year 2035 regional transportation plan. Figure 1 also illustrates the relationships between the regional transportation planning process and the regional land use planning process, and the preparation of future population, household, and employment forecasts. The Commission's regional land use and transportation plans represent principal elements of a regional comprehensive plan, required under the State's expanded comprehensive planning legislation enacted in 1999.

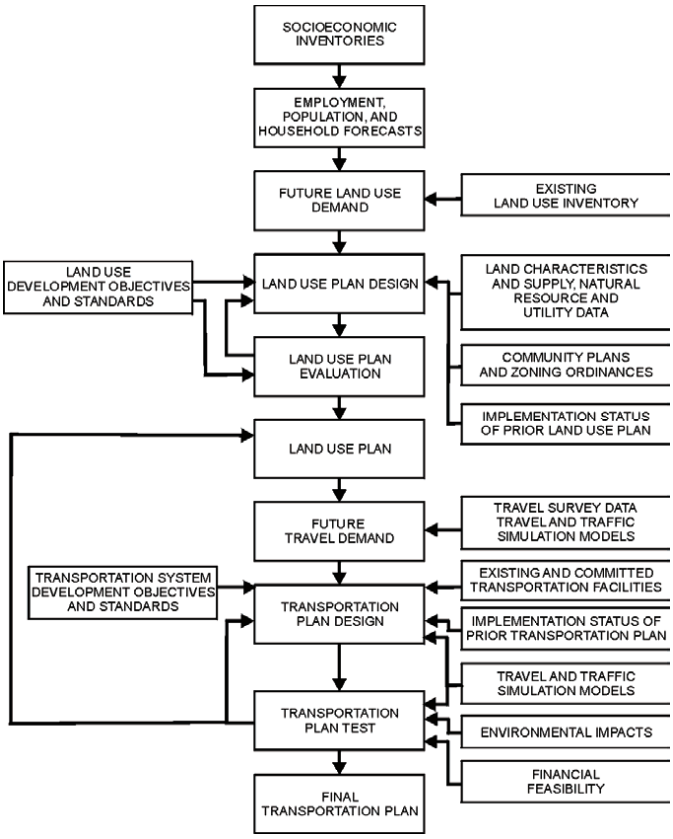
The regional land use and transportation planning process begins with consideration of probable future total regional economic and demographic change through the plan design year. Forecasts of future regional and county population, households, and employment and their characteristics are prepared for the plan design year, which for this fifth-generation plan is the year 2035.

The regional land use plan is then prepared to accommodate the future land use demand represented by the forecasts of total population, household, and employment change. The regional land use plan is designed to represent a desirable, and yet achievable, future land use pattern reasonably consistent with local land use plans and controls.

The regional land use plan proposes that future land use in the Region be shaped in three significant ways. First, the plan recommends that urban development be encouraged to occur only in those areas of the Region which are covered by soils suitable for such development; which are not subject to special hazards, such as flooding and shoreline erosion; and which can be readily served by essential municipal facilities and services, including centralized public sanitary sewerage, water supply, and public transit service. The plan further recommends that new residential development in the defined urban growth areas occur primarily in planned neighborhoods at medium urban densities, averaging about five dwelling units per net residential acre.

Figure 1

REGIONAL LAND USE-TRANSPORTATION PLANNING PROCESS



Source: SEWRPC.

Second, the regional land use plan recommends the protection of all primary environmental corridors of the Region from intrusion by incompatible urban development, and discourages the location of urban development, as well, in the secondary environmental corridors and isolated natural resource areas. The primary environmental corridors encompass only about 17 percent of the total area of the Region and include all the major lakes and streams and most of the associated undeveloped shorelands and floodlands; most of the best remaining woodlands, wetlands, and wildlife habitat areas; areas with rough topography and significant geologic formations; most of the best remaining sites having scenic, historic, and scientific value; the major groundwater recharge and discharge areas; and many existing park sites and most of the best remaining potential park sites. Primary environmental corridors are at least two miles long, 200 feet wide, and 400 acres in size. The regional land use plan also encourages the protection of secondary environmental corridors and isolated natural resource areas, which are identified as concentrations of natural resources which warrant consideration for preservation in county and local planning efforts. Secondary environmental corridors also contain a variety of resource elements, often remnant resources from primary environmental corridors which have been developed for intensive urban or agricultural purposes; they generally connect with primary environmental corridors. Secondary environmental corridors are at least 100 acres in size and one mile long. Isolated natural resource areas are smaller concentrations of natural resource base elements that are separated physically from the environmental corridors by intensive urban or agricultural land uses, and are at least five acres in size.

Third, the regional land use plan recommends the retention in essentially rural use of almost all remaining prime agricultural lands, consisting of the most productive farmlands in the Region. Rural residential development would occur outside prime agricultural lands and primary environmental corridors at densities of no more than one unit per five acres, and desirably in cluster designs to maintain rural character and preserve open space.

The regional transportation system plan is then designed to serve the regional land use plan, and not a projection of current land use development trends toward further decentralization of population, employment, and urban land uses. All future needs for transit, street and highway, and other transportation improvements considered in the regional transportation planning process are derived from the future growth proposed in the regional land use

plan. Thus, if transportation facilities and services do indeed promote land use development and redevelopment, implementation of the transportation system plan should promote implementation of the land use plan, which recommends a desirable pattern of future land use with respect to travel requirements.

Key steps in the regional transportation planning process as shown on Figure 1 are: 1) formulation of objectives and standards, 2) inventory, 3) analyses and forecast, 4) plan design, 5) plan test and evaluation, and 6) plan selection and adoption. Plan implementation, although a step beyond the foregoing planning process, is considered throughout the process so that realization of the plans may be fostered.

Formulation of Objectives and Standards

In its most basic sense, planning is a rational process for establishing and meeting objectives. The formulation of objectives is, therefore, an essential task to be undertaken before plans can be prepared. The objectives which are chosen guide the design and preparation of alternative plans and, when converted to standards, provide the criteria for evaluating, and selecting from among, the alternatives.

Since objectives provide the logical basis for the design of plans, formulation of sound objectives is a crucial step in the planning process. In order to be useful in plan design, the objectives must not only be stated clearly and be sound logically, but must also be related in a demonstrable way to alternative system development proposals. Only if the objectives are clearly relatable to system development and subject to objective test can a choice be made from among alternative plans in order to select that plan which best meets the agreed-upon objectives.

Inventory

Reliable basic planning and engineering data, collected on a uniform, areawide basis, are absolutely essential to the formulation of workable transportation system development plans. Consequently, inventory becomes the first operational step in any planning process. The crucial nature of factual information in the planning process should be evident, since no intelligent forecasts can be made, or alternative courses of action selected, without extensive knowledge of the current state of the system being planned.

The sound formation of a regional transportation system plan requires that factual data be developed on the existing and potential demand for transportation between various points inside the Region and outside the Region, on the relative demand for alternative modes of transportation, and on the major determinants of these demands, as well as on the existing supply of transportation system capacity.

The transportation-specific inventories conducted under this fifth-generation regional transportation plan include travel surveys on an average weekday of the Region's resident population, the Region's resident commercial trucks, the Region's public transit ridership, and of personal vehicle and commercial truck traffic traveling into and out of the Region. Other inventories include inventories of the Region's highway and transit facilities, including physical and operational characteristics and use.

Analyses and Forecast

Inventories provide factual information about the present situation, but analyses and forecasts are necessary to provide estimates of future needs for resources, land, and transportation. Analyses of the information provided by the inventories are required to provide an understanding of the existing situation, the future trends of change in that situation, and the factors influencing these trends. Particularly important among the analytical relationships established are those which link population and economic activity levels to the demand for land and transportation.

Future needs must be estimated from a sequence of interlocking forecasts founded in the results of the planning analyses. Economic activity and population forecasts set the general scale of future growth, which, in turn, is translated into future natural resources, land use, and ultimately, travel demands. These future demands can then be scaled against the existing transportation supply and plans formulated to meet deficiencies or to make more effective use of existing transportation supply.

Plan Design
Plan design, or synthesis, is the process of fusing separate but related elements determined to be needed into the existing system to be planned. The most well-conceived objectives, the most sophisticated results of data collection and analyses, and the most accurate forecasts are of little value if they do not ultimately result in sound plans to meet system development objectives. The outputs of each of the three planning steps—formulation of objectives and standards, inventory, and forecast—become inputs to the problem of plan design.

According to the regional transportation planning principles outlined earlier, regional transportation plan design is a sequential process beginning with consideration of public transit facilities and services, bicycle and pedestrian facilities, and travel demand and transportation systems management measures. Highway system capacity improvement and expansion is considered to address highway traffic volume and congestion which cannot be expected to be alleviated by public transit, bicycle and pedestrian, and travel demand and transportation systems management measures.

Plan Test and Evaluation
If plans, formulated in the design stage of the planning process, are to prove practical and thereby capable of realization in terms of actual transportation system development, some measures must be applied to test alternative plans quantitatively in advance of their adoption and implementation. Travel simulation models, developed and refined over the past four decades and applied in the planning process, make it possible to determine the existing and potential travel demand on any proposed transportation network, and, to test and verify the workability and efficiency of any transportation system development proposal.

Also, under this step alternative plans are evaluated with respect to their achievement of each defined planning objective, and each standard specified under each objective. This includes evaluation of the degree to which the alternative regional transportation system plans serve the adopted regional land use plan. The regional transportation plan is explicitly designed to serve the regional land use plan, as the travel and traffic forecasts based upon the levels and spatial distribution of the population, household, and economic activity envisioned in the regional land use plan, serve as the basis for identifying future transportation system deficiencies and future transportation system improvements in the regional transportation planning process. Under this step the consistency of the regional transportation and land use plans are evaluated by comparing the accessibility provided under the transportation plan, and the location of improvements proposed under the transportation plan, to the location of land use development and redevelopment proposed under the land use plan. As noted in Figure 1, there is the potential for the findings of transportation plan test and evaluation to suggest the need to consider changes in the regional land use plan. Also under this step, an evaluation is conducted of the equity of the impact of the plans on the Region, particularly with respect to minority and low income populations.

Plan Selection and Adoption
The last step in the six-step planning process is the selection and adoption of a final recommended plan from among the alternative plans considered. In this step, the alternative plan deemed most capable of meeting the stated objectives and standards is chosen for adoption by the Commission. The Commission has developed an extensive program to involve elected and appointed officials, citizen leaders, and the general public in plan selection and adoption. The public involvement program includes the use of advisory committees, public informational meetings, and formal public hearings. The program allows elected officials, technicians, and members of the general public concerned with regional development to participate in the selection and refinement of a final regional transportation system plan. After refinement, as warranted by the public review process, the plan is considered for adoption by the Regional Planning Commission. Upon adoption by the Commission, the plan is certified to concerned units and agencies of government for adoption and implementation.

ORGANIZATIONAL STRUCTURE AND PUBLIC INVOLVEMENT FOR THE STUDY

The work leading to the preparation of the year 2035 regional transportation system plan was carried out by the staff of the Commission under the guidance of the Commission's Advisory Committee on Regional Transportation System Planning. Membership on that Committee included representatives from each of the seven counties of Southeastern Wisconsin and several municipalities of southeastern Wisconsin, including the principal public transit providers within Southeastern Wisconsin; the Wisconsin Departments of Transportation and Natural

Resources; and the U.S. Department of Transportation, Federal Transit and Federal Highway Administrations, and the U.S. Environmental Protection Agency. A complete membership list of the Advisory Committee is provided on the inside front cover of this report.

The Advisory Committee guided and directed this plan reevaluation effort, reviewing and approving this study report, and proposing both preliminary and final recommended plans. The final recommended plan adopted by the Advisory Committee was subsequently submitted to the Regional Planning Commission for consideration and adoption. The Commission consists of 21 members, three from each of the seven member counties. One Commissioner from each county is appointed by the county and is usually an elected county board supervisor, or in some cases, the county board chairman or county executive. The remaining two Commissioners from each county are appointed by the Governor, one from a list prepared by the county, and one on the Governor's own motion.

Also, at appropriate times throughout the study, information was provided to, and input obtained from, each county's advisory committee on jurisdictional highway planning—which includes representation from each of the seven counties and 147 municipalities within the Region. In particular, these advisory committees met to consider, and review and approve, the preliminary and final recommended plans advanced by the Advisory Committee on Regional Transportation System Planning.

Also, throughout the study the Commission staff worked with a number of interests through individual and group briefings and meetings providing information about, and obtaining input on, the plans and planning process. The Commission staff met with interests representing minority and low-income populations, freight transportation, business and industry, natural resource agencies and transit operators. In particular, these meetings were intended to assist in the identification of transportation problems and needs, the design and evaluation of transportation plan alternatives, and the development of the preliminary and final recommended regional transportation system plans.

Also, during the study, a series of newsletters was issued to a wide audience including all elected officials in the Region, all technical and appointed planning and engineering officials within the Region, minority and low income population groups, business and industry groups, print and broadcast media including minority media, and Region residents who have indicated in the past, or during the study, an interest in planning or transportation issues.

The Commission also maintained a website–www.sewrpc.org/regionalplans–which included all materials prepared under the study including summary and background information; the study report as prepared chapter-by-chapter; Advisory Committee meeting agendas, minutes, and, presentations; newsletters; and an opportunity to provide comments on the study and alternative transportation plans.

Four series of public meetings were held during the study to provide information on, and obtain input to, the regional transportation system planning process. One series of public meetings was held at the initiation of the review and update of the regional land use and transportation plans. The second series of meetings was held at the initiation of consideration of alternative transportation plans. The third series of meetings was held following the test and evaluation of alternative plans. The fourth series of meetings presented the preliminary recommended plan, and included public hearings. The locations for the hearings were chosen to meet Americans with Disabilities Act of 1990 (ADA) standards, to be accessible by public transit, and to be convenient for minority and low income populations.

In addition, the Commission provided numerous briefings upon request to groups and individuals, and offered briefings through outreach, in particular to minority and low income population groups and elected officials.

The formal record of the public participation and comment during the study is provided in "Record of Public Comments: Review and Update of Regional Land Use and Transportation System Plans for Southeastern Wisconsin – 2035," Volumes I, II, and III, and is summarized in Chapter IX of this report. Public comment was considered by the staff and Advisory Committee in preparing recommendations with respect to both preliminary and final plans.

SCHEME OF PRESENTATION

The findings and recommendations of this year 2035 regional transportation system planning process are documented in this report. Following this introductory chapter, Chapter II describes the current regional transportation system plan, and assesses the progress made towards plan implementation. Chapter III describes the existing transportation system facilities and services within Southeastern Wisconsin, and assesses the changes which have occurred in the supply and use of transportation facilities within the Region over the past 40 years since 1963, the base year for the original regional transportation plan. Chapter IV presents the findings from the fourth major inventory of regional travel habits and patterns conducted by the Commission in 2001 and assesses the changes in regional travel habits and patterns since 1991, 1972, and 1963, the years in which the Commission has previously conducted major travel inventories.

The remaining chapters are concerned with the anticipated growth and change in the Region to the new plan design year of 2035. These chapters present the forecasts of future travel demand, and document the process of developing, evaluating, and selecting the recommended regional transportation system plan. Chapter V summarizes the regional land use plan for the year 2035 and the regional population, household, and employment forecasts for the year 2035 upon which the regional land use plan is based. Chapter VI documents the review, refinement, recalibration, and validation of travel simulation models used in this regional transportation system plan reevaluation effort to forecast future travel demand. Chapter VII presents the regional transportation system plan development objectives, principles, and standards. Chapter VIII presents the transportation system plan alternatives which were considered in the process which resulted in the development of the preliminary and final recommended regional transportation plans. Chapter IX presents the final recommended design year 2035 regional transportation system plan. Chapter X outlines the actions which will be necessary to implement the plan over the next 30 years. Finally, Chapter XI summarizes the report, restating the major findings, conclusions, and recommendations of this regional transportation plan reappraisal effort.

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Chapter II

REVIEW OF THE CURRENT ADOPTED REGIONAL TRANSPORTATION SYSTEM PLAN

INTRODUCTION

This chapter describes the current fourth generation regional transportation system plan as amended to date. Also discussed is the extent of regional transportation plan implementation which has occurred over the approximately last 10 years. Lastly, forecasts which were prepared as part of the fourth generation regional transportation plan in the mid-1990's are reviewed and compared to estimated actual current regional levels of population, employment, travel, and traffic.

PLAN DESCRIPTION: CURRENT ADOPTED REGIONAL TRANSPORTATION SYSTEM PLAN

The Commission's current regional transportation system plan is its fourth generation plan, adopted in 1997 with a design year of 2020[1]. The regional transportation system plan was explicitly designed to serve the travel demand generated by the year 2020 regional land use plan, which in turn was designed to represent a desired pattern of regional land use and not a projection of current land use development trends toward further decentralization of population, employment, and urban land uses. The regional transportation system plan thereby should serve to promote a more desirable pattern of future regional land use. Also, highway capacity additions were recommended in the regional transportation system plan to address the traffic congestion which may not be expected to be alleviated by land use, systems management, bicycle and pedestrian facilities, or public transit measures. The first elements considered for inclusion in the regional transportation plan were the public transit, bicycle and pedestrian facilities, and transportation system management elements. The potential of these elements to alleviate congestion was explicitly identified. Highway capacity additions were then recommended to be added to the regional transportation plan to resolve to the extent considered practicable the residual existing and probable future traffic

[1] *The fourth generation plan was reviewed and reaffirmed in the years 2000 and 2003, with the last review and reaffirmation providing an extension of plan design year to the year 2025.*

congestion. There are four elements of the current regional transportation system plan: transportation systems management, bicycle and pedestrian facilities, public transit, and arterial streets and highways. The four elements are described in the following sections.[2]

Transportation Systems Management Element

The transportation systems management element of the plan was intended to encourage more efficient use of the existing transportation system. It included travel demand management measures to encourage carpooling and transit travel and thereby reduce vehicular travel. It also included traffic management measures which seek to obtain the maximum vehicular capacity practicable from existing arterial street and highway facilities. The transportation systems management element of the plan recommended implementation of the following seven measures:

1. Freeway Traffic Management

   Implementation of an areawide freeway traffic management system, including elements of freeway system operational control, advisory information, and incident management. The systemwide operational control element would control single occupancy vehicle freeway access through ramp meters to reduce freeway traffic flow breakdown and stop-and-go traffic. Buses and high-occupancy vehicles would receive preferential access at the ramps. The advisory information element would provide information about current and projected freeway travel conditions. The incident management element would provide for improved detection, confirmation, and removal of freeway incidents.

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[2] *The Commission's regional transportation plan primarily addresses intraregional travel, and the transportation system within southeastern Wisconsin which serves intraregional travel. Intraregional travel is travel by people and freight where both ends of the trip or travel is within the seven county Region. Commission studies over the past 40 years have consistently established that over 95 percent of total personal travel on an average weekday within Southeastern Wisconsin is intraregional travel made by Southeastern Wisconsin residents and is carried on streets and highways, public transit, and bicycle and pedestrian facilities. Also, over 90 percent of the commercial truck traffic on streets and highways within Southeastern Wisconsin on an average weekday is intraregional travel made by trucks registered within southeastern Wisconsin. The Commission's regional transportation plan also addresses personal and freight interregional travel over streets and highways, which represents an estimated 90 percent of total personal and freight interregional travel within southeastern Wisconsin on an average weekday. Interregional travel is travel where one or both ends of the travel or trip are located outside of southeastern Wisconsin.*

The Commission's regional transportation planning is necessarily closely coordinated with statewide transportation planning conducted by the Wisconsin Department of Transportation. The State of Wisconsin's transportation planning addresses interregional travel within and through Southeastern Wisconsin, and as well within and through the other regions of the State. The Wisconsin Department of Transportation statewide transportation planning specifically addresses travel through the State, between the State of Wisconsin and other states, and between the regions of the State. The Wisconsin Department of Transportation's statewide transportation planning therefore focuses on commercial and general aviation, intercity bus and passenger rail service, freight railways, ports, and also streets and highways which carry interstate and interregional traffic, specifically the highest level of highways including freeways and other state trunk highways. Coordination between statewide transportation planning and regional transportation planning permits Commission traffic forecasts of interregional travel by personal vehicles and commercial trucks on State trunk highways to be consistent with statewide transportation plans and forecasts. As noted above, such interregional travel represents less than 10 percent of all commercial truck travel within Southeastern Wisconsin on an average weekday, and less than 5 percent of all personal travel on an average weekday.

2. Arterial Curb-Lane Parking Restrictions
   Restriction of curb-lane parking as needed during peak periods along about 400 miles, or about 11 percent, of the planned 3,600-mile arterial street and highway system in order to reduce traffic congestion and help provide good transit service. Local governmental units would consider the proposed curb-lane parking restrictions as traffic volumes and congestion increase, and implement these restrictions as a preferred alternative to expanding arterial highway capacity through widening and new construction beyond that envisioned in the plan.

3. Traffic Engineering
   The use of state-of-the-art traffic engineering practices to assist in achieving efficient traffic flow on arterial facilities, including intersection treatments with turn lanes as needed, and efficient traffic signalization, and the facilitation of pedestrian and bicycle movements on arterial streets and highways.

4. Traffic Management Technology
   The application of advanced traffic management technology, known as Intelligent Transportation Systems (ITS), as such technology becomes practicable and available over the plan implementation period. This may include traveler information for transit and highway travel, and advanced traffic management systems for improved transportation facility operation, such as centralized control of traffic signal systems.

5. Travel Demand Management Promotion
   Development and implementation of a regionwide program to promote travel through ride-sharing, transit use, bicycle use, and pedestrian movement, together with telecommuting and work-time rescheduling.

6. Detailed Land Use Planning and Site Design
   The preparation and implementation by local governmental units of detailed, site-specific neighborhood land use plans to facilitate travel by transit, bicycle, and pedestrian movement, as recommended in the adopted regional land use plan.

7. Transit Systems Management and Service Enhancement Measures
   The undertaking by the transit agencies in the Region of a range of activities to enhance the quality of transit services and to facilitate transit use, including conduct of marketing and public information and education activities, improvement of bus speeds through priority systems and signal preemption, and promotion of innovative fare-payment systems.

Bicycle and Pedestrian Facilities

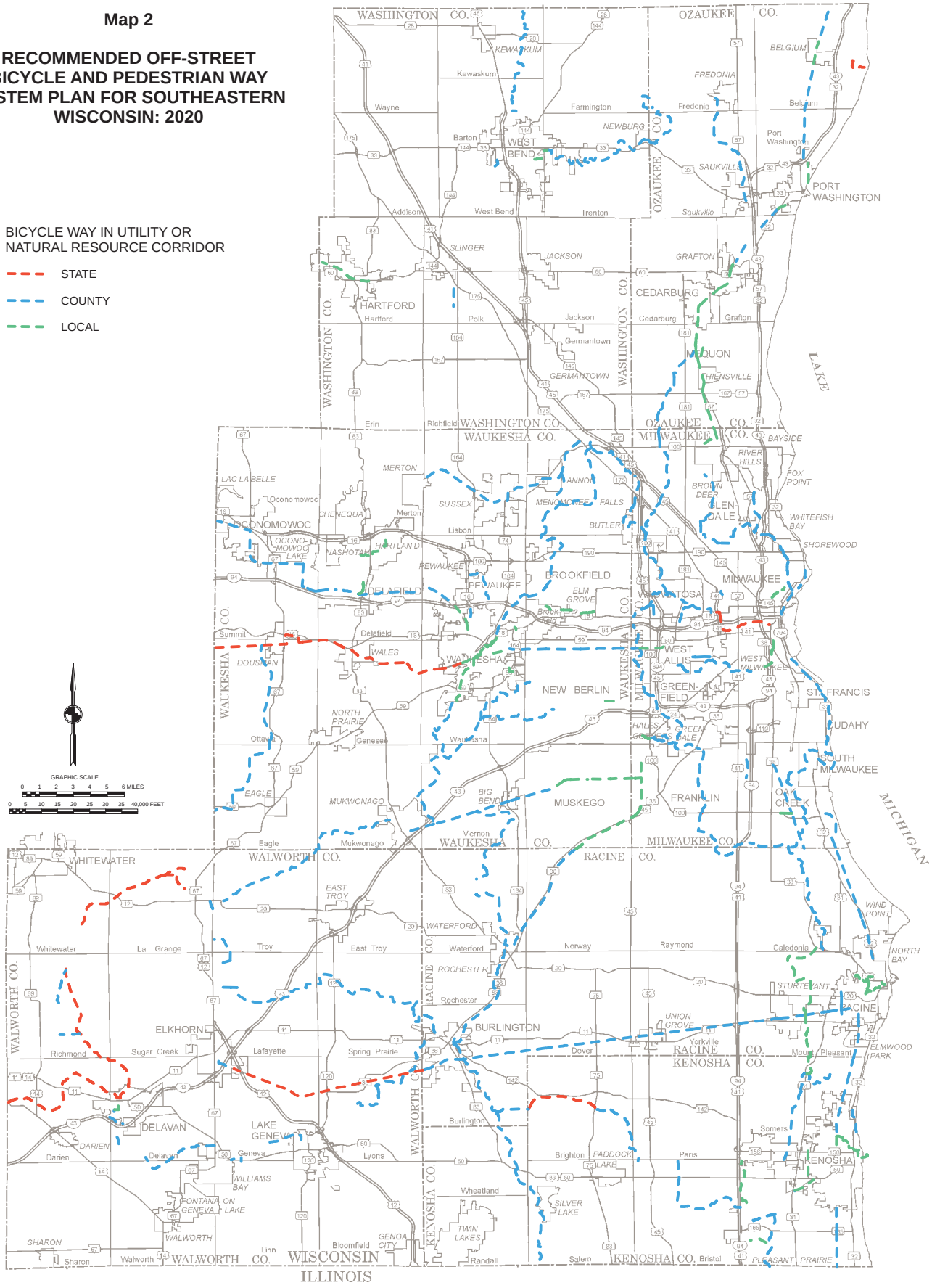
The bicycle and pedestrian facilities element of the plan was designed to provide for safe accommodation of bicycle and pedestrian travel, encourage bicycle and pedestrian travel, and to provide modal choice. The plan included improvements on, or adjacent to, arterial streets, and off-street networks of bicycle and pedestrian facilities. The plan recommended that as the surface arterial street system of 3,300 miles was resurfaced and reconstructed segment-by-segment, bicycle accommodation should be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened shoulders, and separate bicycle paths. Additionally, the plan also recommended development of a network of 575 miles of off-street bicycle and pedestrian paths intended for seasonal use (see Map 2).

Public Transit

The regional transportation system plan proposed the development of a true system of rapid and express transit routes integrated with expanded local transit service (see Table 1). Rapid transit routes would operate within all major travel corridors oriented to the Milwaukee central business district (CBD), with express transit operating over a grid pattern of routes largely within Milwaukee County. In total, the plan proposed an approximate 70 percent increase in transit service as measured by revenue vehicle-miles of service, from the 65,000 average weekday revenue vehicle-miles of such service in 1995 to 111,500 average weekday revenue vehicle-miles in 2020. The transit recommendations are shown in graphic summary form on Map 3 and discussed below by service type.

Map 2

RECOMMENDED OFF-STREET BICYCLE AND PEDESTRIAN WAY SYSTEM PLAN FOR SOUTHEASTERN WISCONSIN: 2020



Source: SEWRPC.

Table 1

TRANSIT SYSTEM OPERATING CHARACTERISTICS IN THE REGION: 1995 AND 2020 RECOMMENDED PLAN

Transit Service Characteristics	Existing 1995	Recommended Plan
Round-Trip Route Length (miles)		
Rapid Routes	736	1,360
Express Routes	224	430
Local Routes		
Kenosha Urbanized Area	192	210
Milwaukee Urbanized Area	1,135	1,530
Racine Urbanized Area	186	200
Subtotal	1,513	1,940
Total	2,473	3,730
Average Weekday Vehicle Requirements		
Peak Period	537	819
Midday Off-Peak Period	286	375
Revenue Vehicle-Miles (average weekday)		
Rapid	5,700	14,700
Express	3,500	21,500
Local	55,800	75,300
Total	65,000	111,500
Revenue Vehicle-Hours (average weekday)		
Rapid	270	600
Express	240	1,400
Local	4,730	6,600
Total	5,240	8,600

Source: SEWRPC.

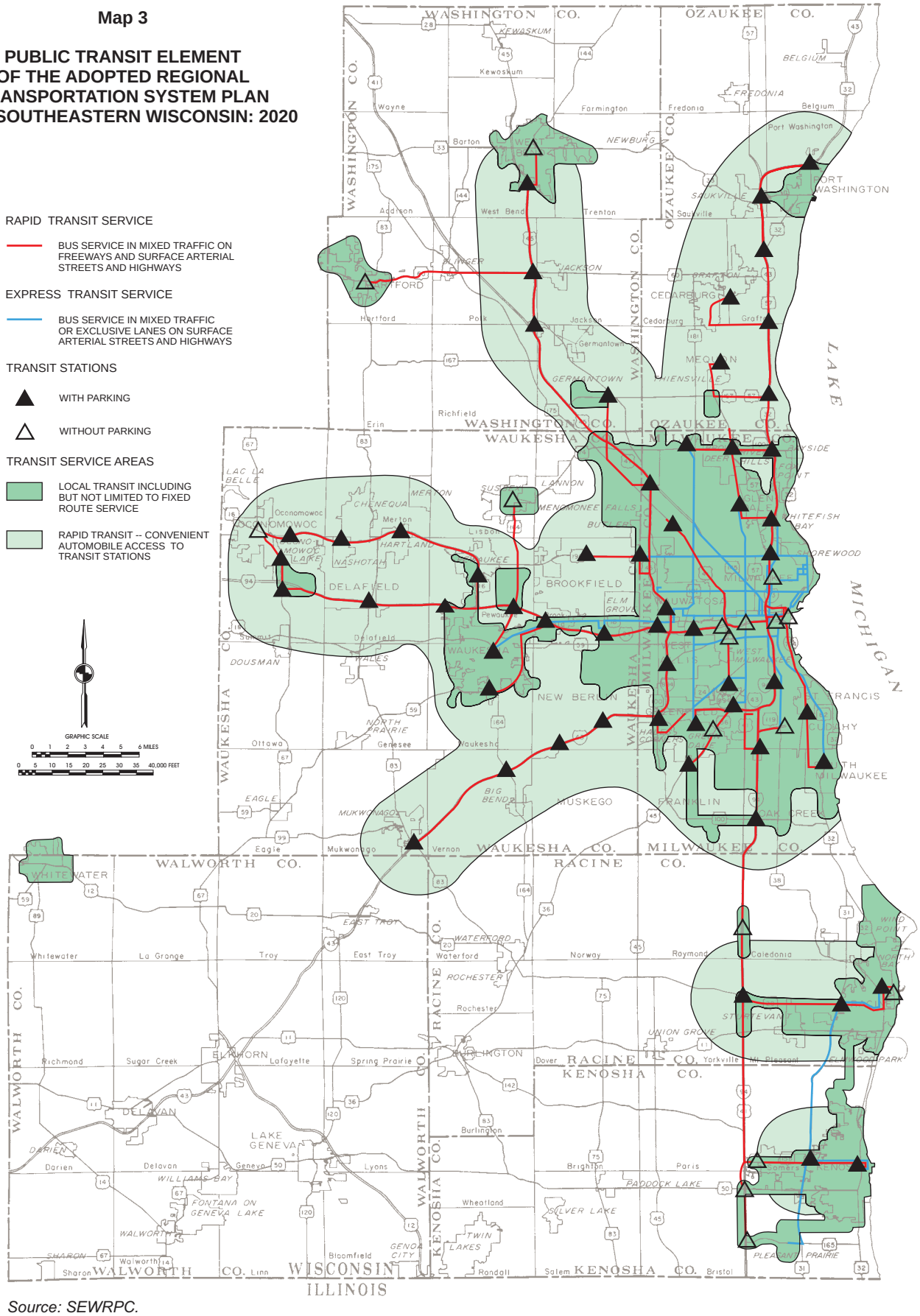
Rapid Transit Service

The plan recommended a substantial expansion of rapid transit service to connect the urban centers of the Region through buses operating over freeways with limited stops every three to five miles. Under the plan, rapid transit freeway flyer bus service would be operated from the Milwaukee CBD southwest to the Village of Mukwonago, west to the Cities of Waukesha and Oconomowoc, north to the Cities of Mequon, Cedarburg, and Port Washington, south to the Cities of Racine and Kenosha, and northwest to the City of West Bend. The network of rapid transit routes is shown in red on Map 3.

The plan recommended that the number of rapid transit revenue vehicle-miles of service provided be increased by 9,000 vehicle-miles, or by more than 150 percent, from 5,700 in 1995 to 14,700 by 2020. The rapid transit service provided under the recommended plan would operate in both directions during peak periods, from 6:00 a.m. to 8:30 a.m. and from 3:30 p.m. to 6:30 p.m. on weekdays. Midday and evening service would also be provided in both directions over most routes, with limited weekend service. Headways on the rapid transit system would range from five to 30 minutes during peak periods to 30 to 60 minutes during off-peak periods. The fares for rapid transit service were proposed to remain at 1997 levels, adjusted only for future general price inflation.

Map 3

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



Source: SEWRPC.

The plan also recognized the potential to establish commuter rail service as an alternative to bus freeway flyer rapid transit service in four major Milwaukee-oriented travel corridors: from Milwaukee through the Cities of St. Francis, Cudahy, South Milwaukee, Oak Creek, and Racine to the City of Kenosha and to northeastern Illinois over Canadian Pacific Railway and Union Pacific Railroad lines; from Milwaukee through the City of Wauwatosa, Village of Elm Grove, City of Brookfield, Village of Pewaukee, Village of Hartland, City of Delafield, and Village of Nashotah to the City of Oconomowoc over the Canadian Pacific Railway; from Milwaukee through the Villages of Germantown and Jackson to the City of West Bend over Canadian Pacific Railway, Union Pacific Railroad, and Canadian National Railway lines; and from Milwaukee through the Village of Brown Deer, City of Cedarburg, and Village of Grafton to the Village of Saukville over Canadian Pacific Railway and Canadian National Railway lines. The plan also recognizes the potential to provide commuter rail service in two Chicago-oriented corridors: from the Village of Walworth through the Village of Fox Lake, Illinois, to Chicago over Wisconsin & Southern Railroad Company and Metra lines and from the City of Burlington through the Village of Silver Lake and the Village of Antioch, Illinois, to Chicago over Canadian National Railway and Metra lines (See Map 4). The potential for upgrading to commuter rail would be considered in corridor alternatives analysis studies. Through these detailed corridor alternatives analysis studies, decisions would be made by the concerned local government sponsors and transit operators whether to provide rapid transit service through buses on existing freeways or through commuter rail.

Express Transit

The regional transportation system plan also recommended the development of a grid of 12 regular express transit bus routes, largely within Milwaukee County. The express transit—with stops limited to every one-quarter mile to one mile—would be provided in major travel corridors to connect major activity centers, including the Milwaukee CBD and high- and medium-density residential areas. One express transit route would also connect the CBD's of the Cities of Racine and Kenosha. The planned express routes are shown in blue on Map 3.

The plan recommended that the number of express transit revenue vehicle-miles provided on an average weekday be increased by 18,000 vehicle-miles, or more than 500 percent, from about 3,500 in 1995 to about 21,500 in 2020. Express transit service would be provided—in both directions—on weekdays from 6:00 a.m. to 6:00 p.m. on all routes and during weekday evenings and weekends on some routes. Peak-period headways would range from five to 15 minutes in the Milwaukee urbanized area and extend to 30 minutes on the route connecting Racine and Kenosha. Off-peak headways would range from 20 to 30 minutes within the Milwaukee urbanized area to 60 minutes on the Racine-Kenosha route. Express transit fares under the plan were proposed to remain at 1997 levels, adjusted only for future general price inflation.

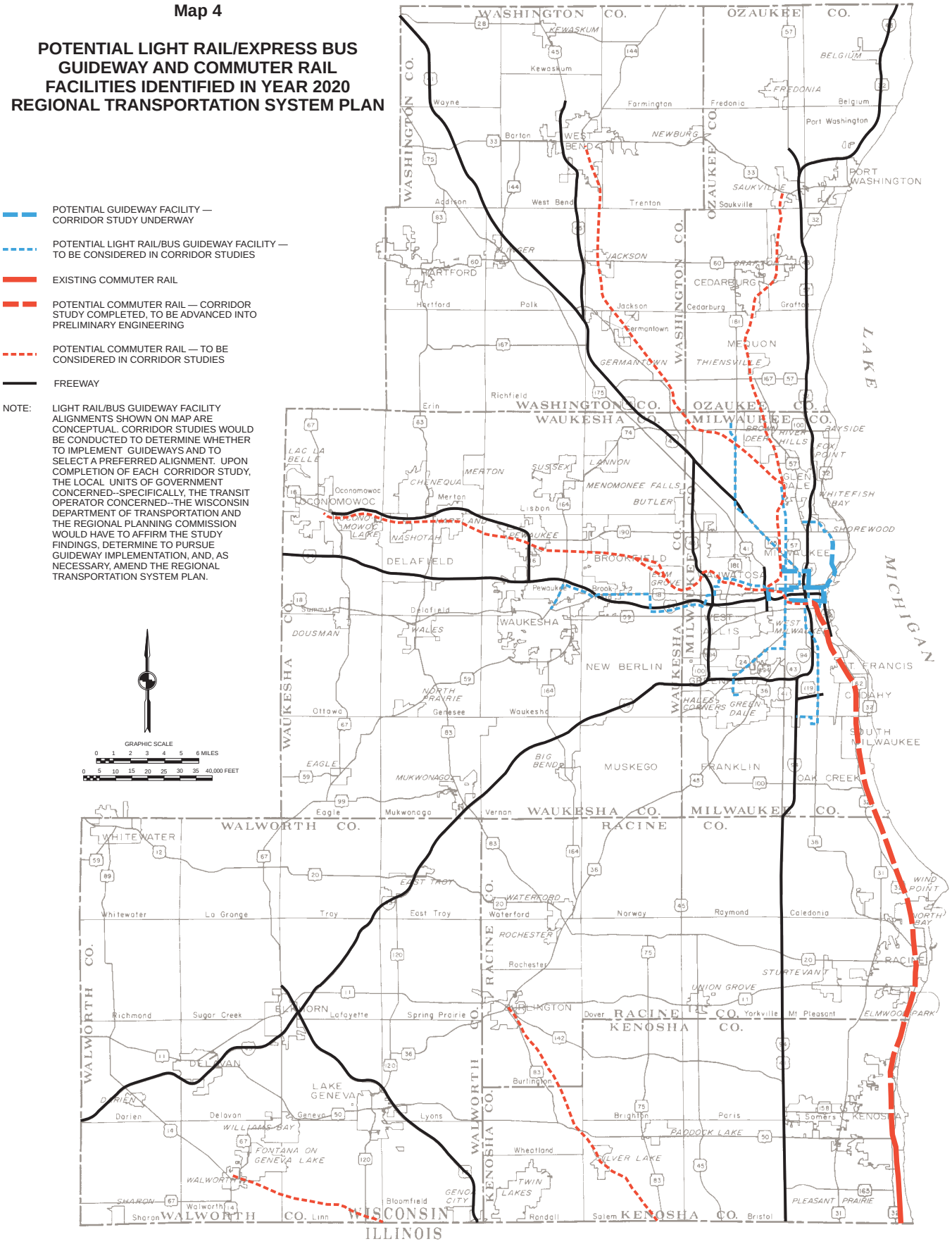
Six travel corridors were identified in the plan as having potential for light-rail or bus guideway transit service and would represent upgrading of the proposed express bus transit routes: East-West, North, Southwest, Northwest, Southeast, and Northeast (See Map 4). The potential for upgrading to light rail or bus guideways would be considered in corridor alternatives analysis studies. Through these detailed corridor alternatives analysis studies, decisions would be made by the concerned local government sponsors and transit operators whether to provide express transit service through buses on surface arterials, light rail, or exclusive bus guideways.

Local Transit

Local transit service bus—service operating over arterial and collector streets with frequent stops—represents the vast majority of transit service currently provided within the Region. The plan recommended the expansion of local fixed-route service throughout the Kenosha, Milwaukee, and Racine urbanized areas. Under the plan, local transit service would operate 75,300 vehicle-miles of service on an average weekday in 2020 within the Region, representing an increase of 19,500 vehicle-miles, or about 35 percent, over the approximately 55,800 vehicle-miles provided in 1995. The plan called for substantial improvements in the frequency of local transit service provided, particularly on major local routes. The plan also held open the potential to restructure local transit service to provide for transit center-oriented local systems to replace grid-route systems, depending upon detailed local plan implementation studies. The plan recommended the provision of local transit service through shared-ride taxis in the smaller urban areas of the Region. The plan also recommended the continuation of appropriate paratransit services to help meet the needs of disabled individuals in the Region. As shown on Map 3, the areas of expanded

Map 4

POTENTIAL LIGHT RAIL/EXPRESS BUS GUIDEWAY AND COMMUTER RAIL FACILITIES IDENTIFIED IN YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN



Source: SEWRPC.

service were generally located in southern and northern Milwaukee County and in the most heavily developed portions of Waukesha County. Under the plan, local transit fares were proposed to remain at 1997 levels, adjusted only for future general price inflation.

Arterial Street and Highway System

The plan included recommendations regarding the functional improvement and jurisdictional responsibility of each segment of the arterial street and highway system. Standard arterial streets and highways are arterials with at-grade intersections and may also provide direct access to abutting property through driveways. Together the arterial streets should form an integrated areawide system. Access to abutting property may be a secondary function of some types of arterial streets and highways, but it should always be subordinate to the primary function of traffic movement. The arterial street system may be divided into freeway facilities and nonfreeway or standard arterial streets and highways. A freeway is a special type of arterial providing the highest degree of mobility and the most limited degree of access. A freeway is defined as a divided arterial with full control of access and grade separations at all interchanges. Standard arterial streets and highways are arterials with at-grade intersections and may also provide direct access to abutting property through driveways. The plan recommendations regarding the arterial streets and highways are described below.

Functional Improvements

The plan recommendations for the arterial street and highway system can be divided into three categories: system preservation—the proposed resurfacing, reconstruction, and modernization as needed of arterials to largely the same capacity as exists today; system improvement—the proposed widening of existing arterials to carry additional traffic lanes; and system expansion—the proposed construction of new arterial facilities. Table 2 and Maps 5 through 11 display the recommended arterial system preservation, improvement, and expansion by county. Highway improvements are recommended in the regional transportation plan to address the congestion which may not be expected to be alleviated by proposed land use, systems management, bicycle and pedestrian facilities, or public transit measures.

System Preservation: Maintaining Existing Facilities

System preservation consists of arterial preservation projects required to maintain the structural adequacy and serviceability of the existing arterial system without significantly increasing the capacity of that system. This would include all projects classified as resurfacing and reconstruction for the same capacity. The plan proposed system preservation for about 2,943 route-miles of the arterial system representing about 82 percent of the total planned arterial system in the year 2020.

System Improvement: Widening Existing Facilities

System improvement consists of all projects which would significantly increase the capacity of the existing system through street widening to provide additional through traffic lanes. Under the plan, a total of 532 route-miles of facilities were proposed to be widened and improved with respect to traffic carrying capacity, representing about 15 percent of the total planned arterial system. This includes the recommended widening of 127 miles of freeways as the freeway system is reconstructed over the next approximately 30 years.

System Expansion: Constructing New Facilities

System expansion consists of the proposed construction of new arterial streets and highways. The plan proposed the construction of 124 route-miles of new arterial facilities, representing about 3 percent of the total planned arterial route-miles in the year 2020.

Jurisdictional Realignments

The plan also recommended changes in jurisdictional responsibility of the arterial street and highway system, indicating which level of government—State, county, or municipal—is recommended to be responsible for operating and maintaining each arterial street and highway facility. The jurisdictional realignment proposals were intended to achieve an equitable distribution of arterial street and highway development and maintenance costs among the various levels and agencies of government concerned. Criteria for recommending jurisdictional realignments were related to the kinds of trips and land uses served by, and the operational characteristics of, the

Table 2

ARTERIAL STREET AND HIGHWAY SYSTEM PRESERVATION, IMPROVEMENT, AND EXPANSION BY ARTERIAL FACILITY TYPE BY COUNTY: 2020 REGIONAL TRANSPORTATION SYSTEM PLAN

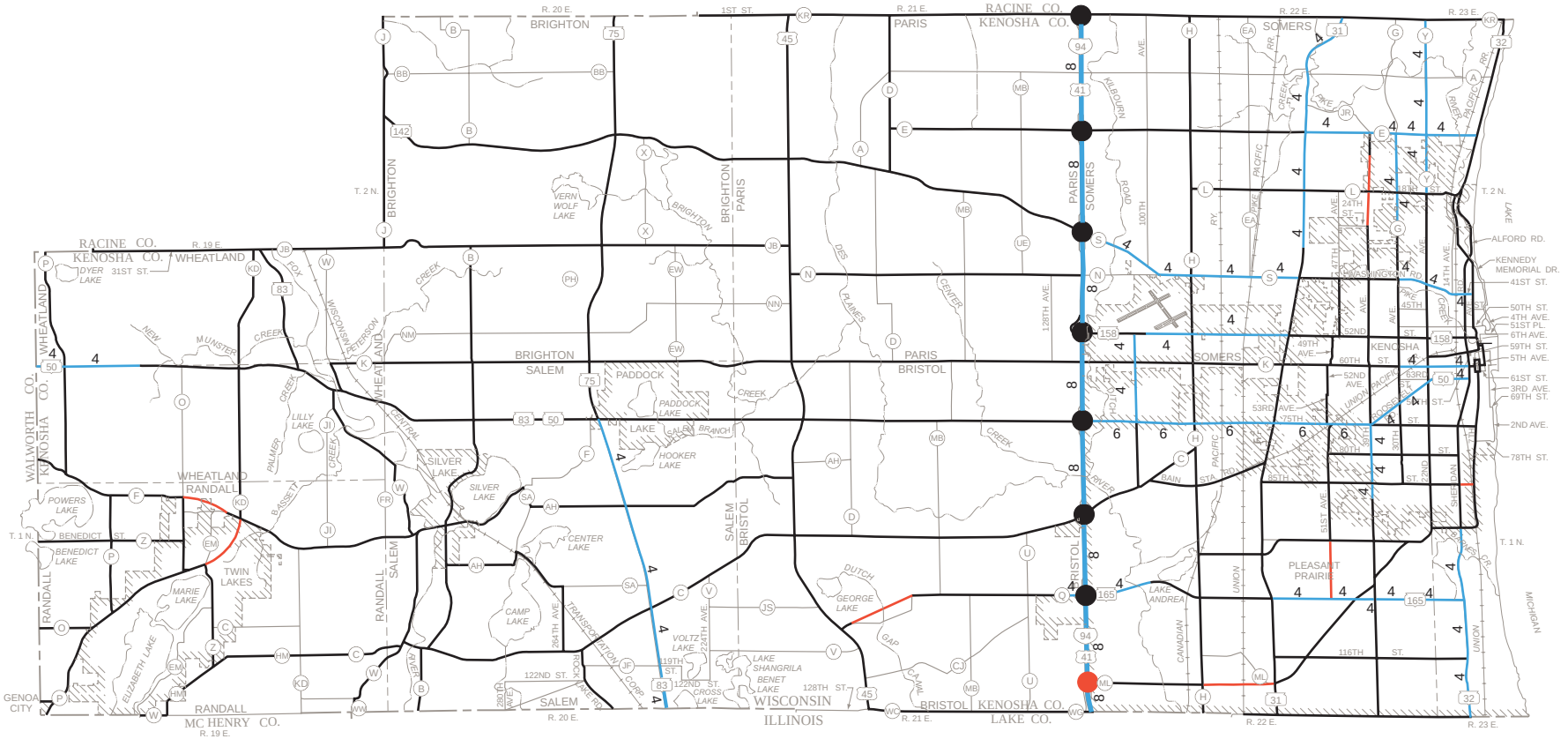
County	System Preservation (miles)	System Improvement (miles)	System Expansion (miles)	Total Miles
Kenosha				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	290.3	44.8	8.5	343.6
Subtotal	290.3	56.8	8.5	355.6
Milwaukee				
Freeway	12.8	55.0	0.0	67.8
Standard Arterial	679.9	40.3	10.3	730.5
Subtotal	692.7	95.3	10.3	798.3
Ozaukee				
Freeway	11.7	14.5	0.0	26.2
Standard Arterial	223.9	47.7	7.0	278.6
Subtotal	235.6	62.2	7.0	304.8
Racine				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	342.0	50.6	21.5	414.1
Subtotal	342.0	62.6	21.5	426.1
Walworth				
Freeway	48.9	0.0	16.7	65.6
Standard Arterial	361.0	36.7	17.8	415.5
Subtotal	409.9	36.7	34.5	481.1
Washington				
Freeway	36.1	6.7	0.0	42.8
Standard Arterial	348.2	43.6	21.8	413.6
Subtotal	384.3	50.3	21.8	456.4
Waukesha				
Freeway	33.2	26.8	5.7	65.7
Standard Arterial	555.2	141.6	15.0	711.8
Subtotal	588.4	168.4	20.7	777.5
Region				
Freeway	142.7	127.0	22.4	292.1
Standard Arterial	2,800.5	405.3	101.9	3307.7
Total	2,943.2	532.3	124.3	3599.8

Source: SEWRPC.

facilities. Applying such criteria, the plan recommended that State trunk highways serve the longest trips and the most important land uses, and carry the highest traffic volumes. The plan also recommended that county trunk highways serve trips of intermediate length and carry intermediate traffic volumes, and that local trunk arterials serve the shortest trips, access locally-oriented land uses, and carry the lightest traffic volumes. Thus, state trunk highways were proposed to principally serve traffic traveling through a county and between counties. County trunk highways were proposed to principally serve traffic between the municipalities of a county. Local trunk arterials were proposed to principally serve travel within a municipality.

Map 5

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN KENOSHA COUNTY: 2020



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. SUFFICIENT RIGHT-OF-WAY SHOULD BE RESERVED ALONG STH 158 FROM IH 94 TO STH 31 TO ACCOMMODATE ITS ULTIMATE IMPROVEMENT TO SIX TRAVEL LANES.

2. SUFFICIENT RIGHT-OF-WAY SHOULD BE RESERVED ALONG CTH K FROM IH 94 TO STH 31 TO ACCOMMODATE ITS ULTIMATE IMPROVEMENT TO SIX TRAVEL LANES.

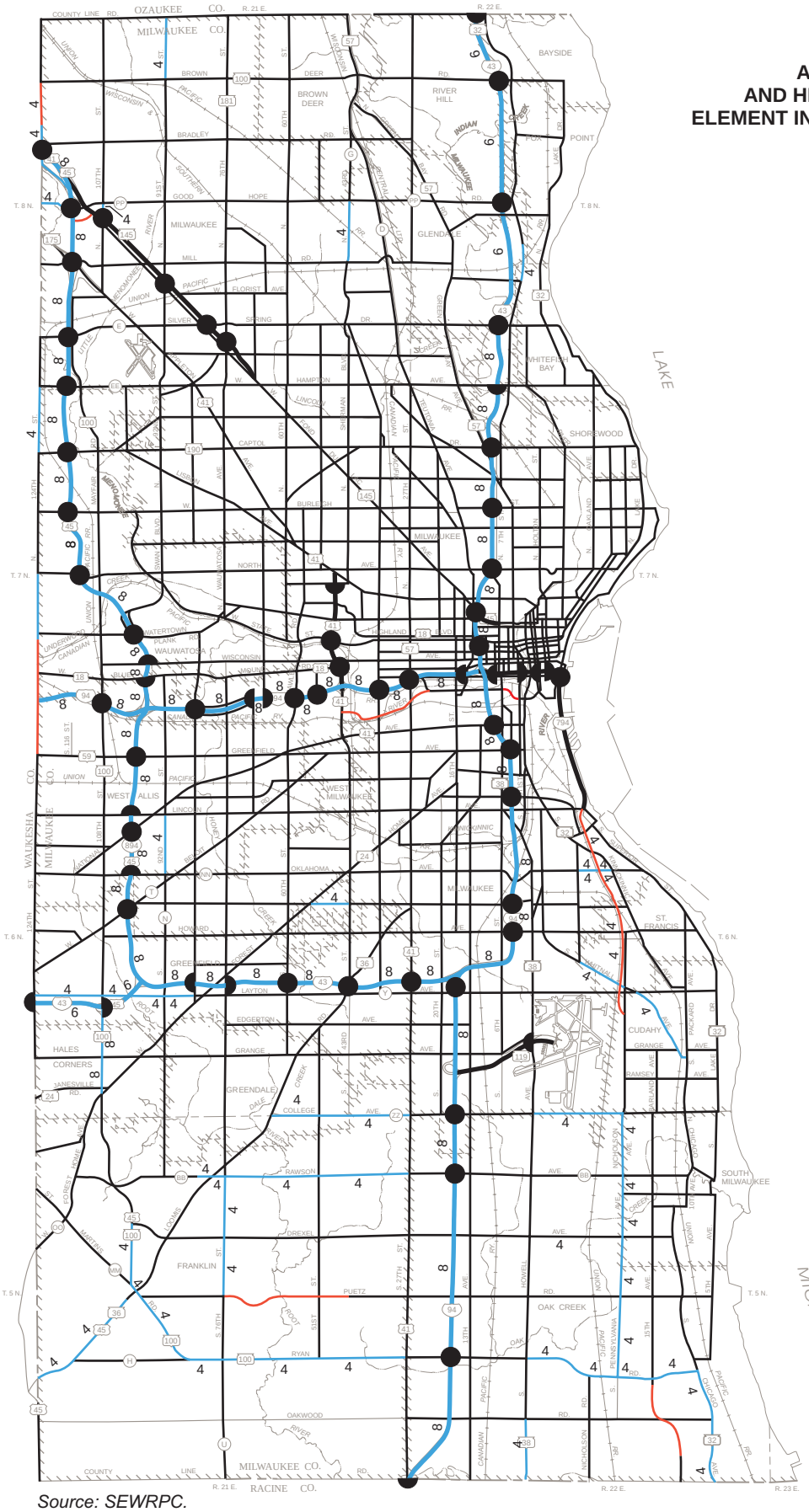
3. AS IMPROVEMENTS ARE MADE TO IH 94 AND THE FRONTAGE ROADS ALONG IN 94 IN THE VICINITY OF CTH K, THE ULTIMATE PROVISION OF AN INTERCHANGE WITH CTH K SHOULD BE TAKEN INTO CONSIDERATION.

4. AS URBAN DEVELOPMENT PROCEEDS ON LANDS ABUTTING CTH KR BETWEEN IH 94 AND STH 32, SUFFICIENT RIGHT-OF-WAY SHOULD BE RESERVED FOR THE ULTIMATE IMPROVEMENT OF CTH KR TO FOUR TRAVEL LANES.

Source: SEWRPC.

Map 6

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN MILWAUKEE COUNTY: 2020



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING

GRAPHIC SCALE

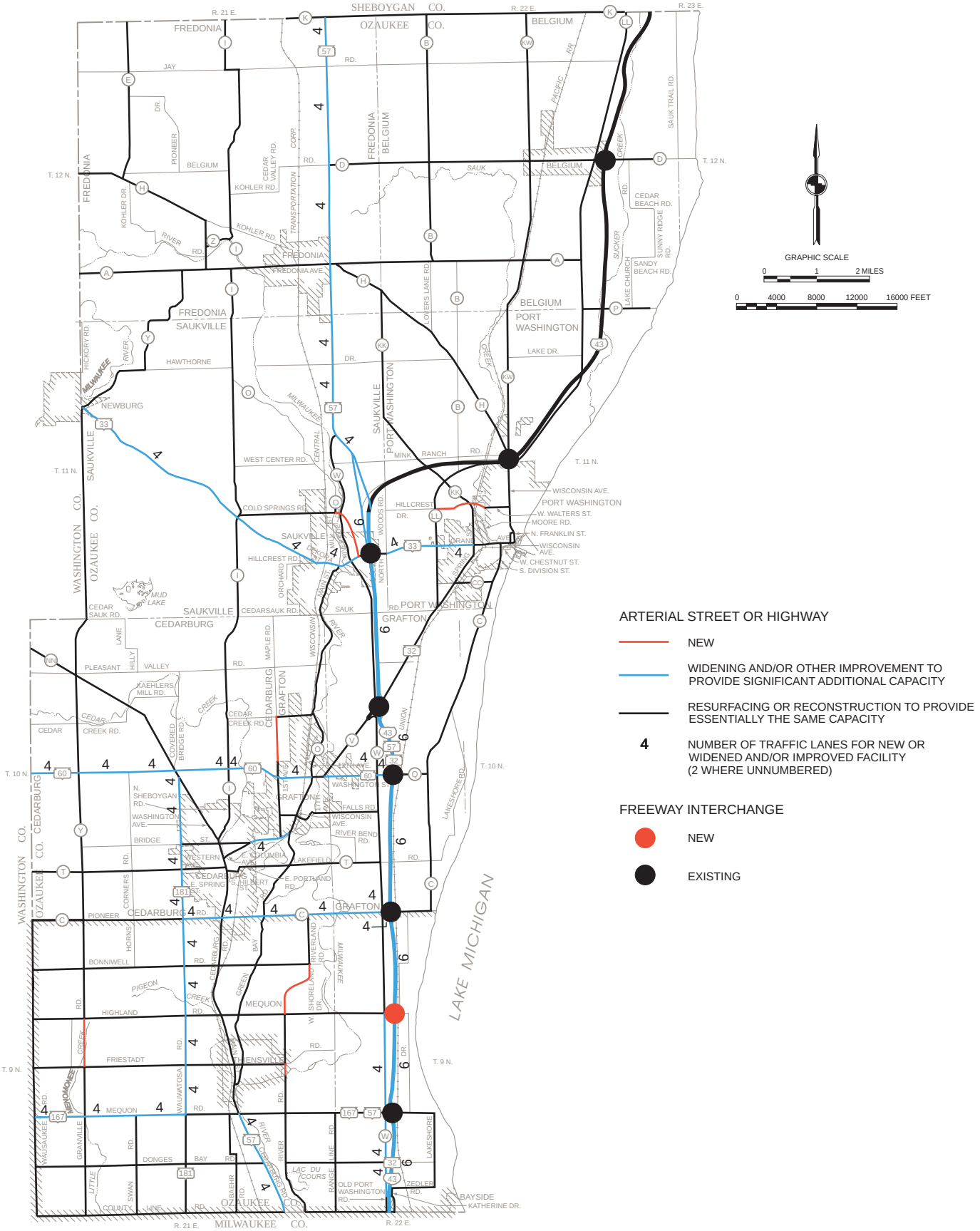
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 7

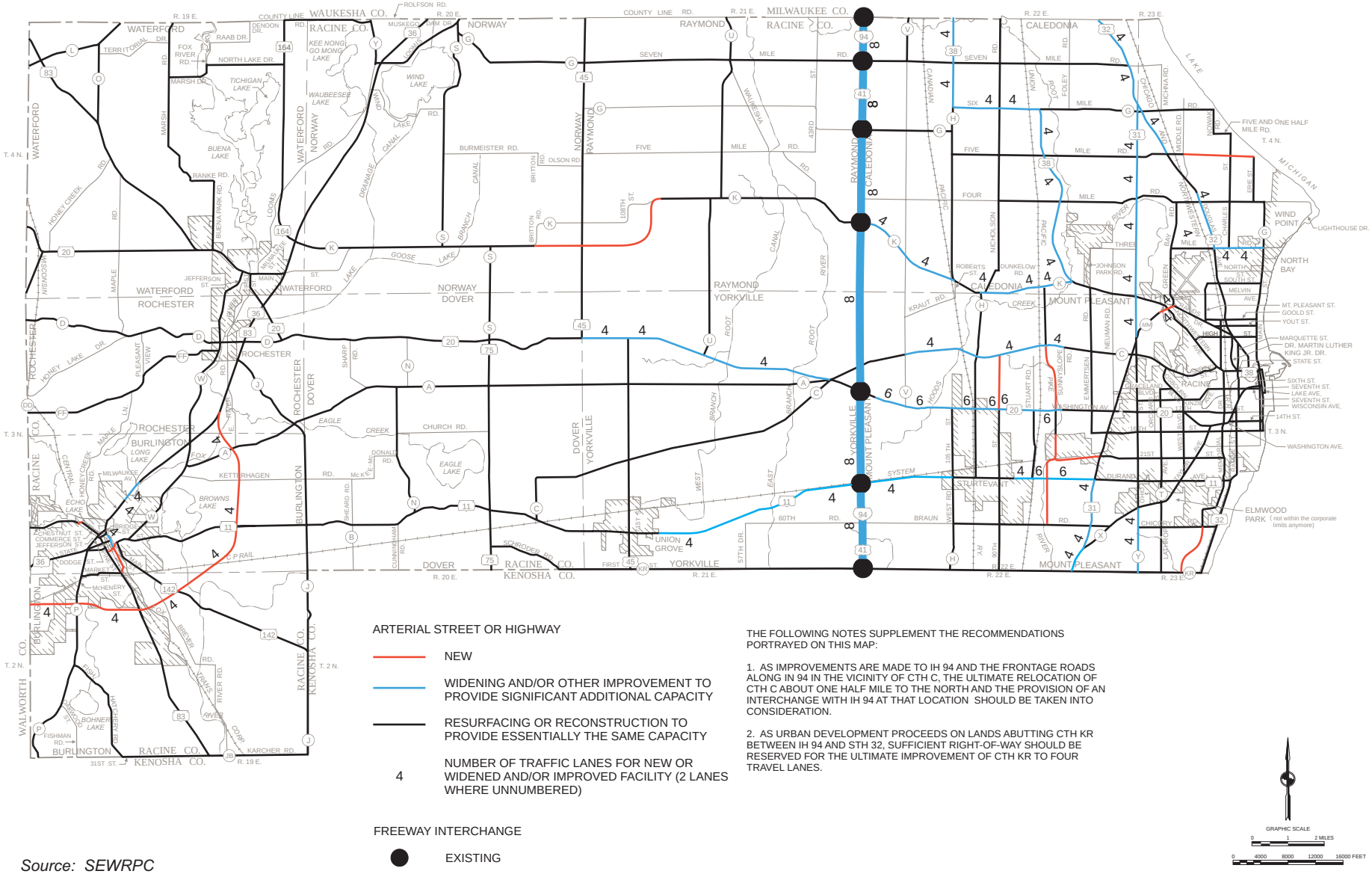
ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN OZAUKEE COUNTY: 2020



Source: SEWRPC.

Map 8

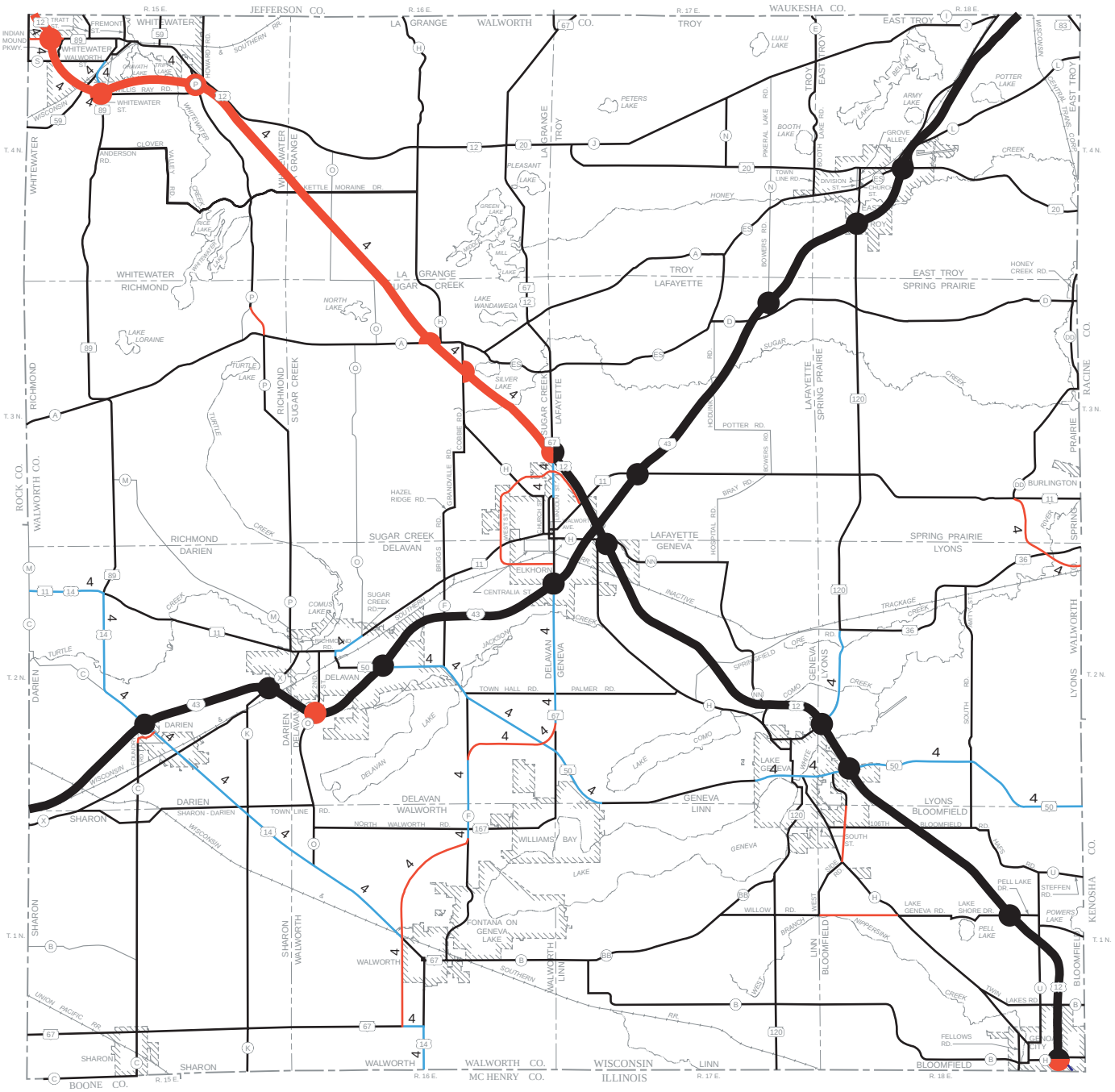
ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN RACINE COUNTY: 2020



Source: SEWRPC

Map 9

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WALWORTH COUNTY: 2020



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

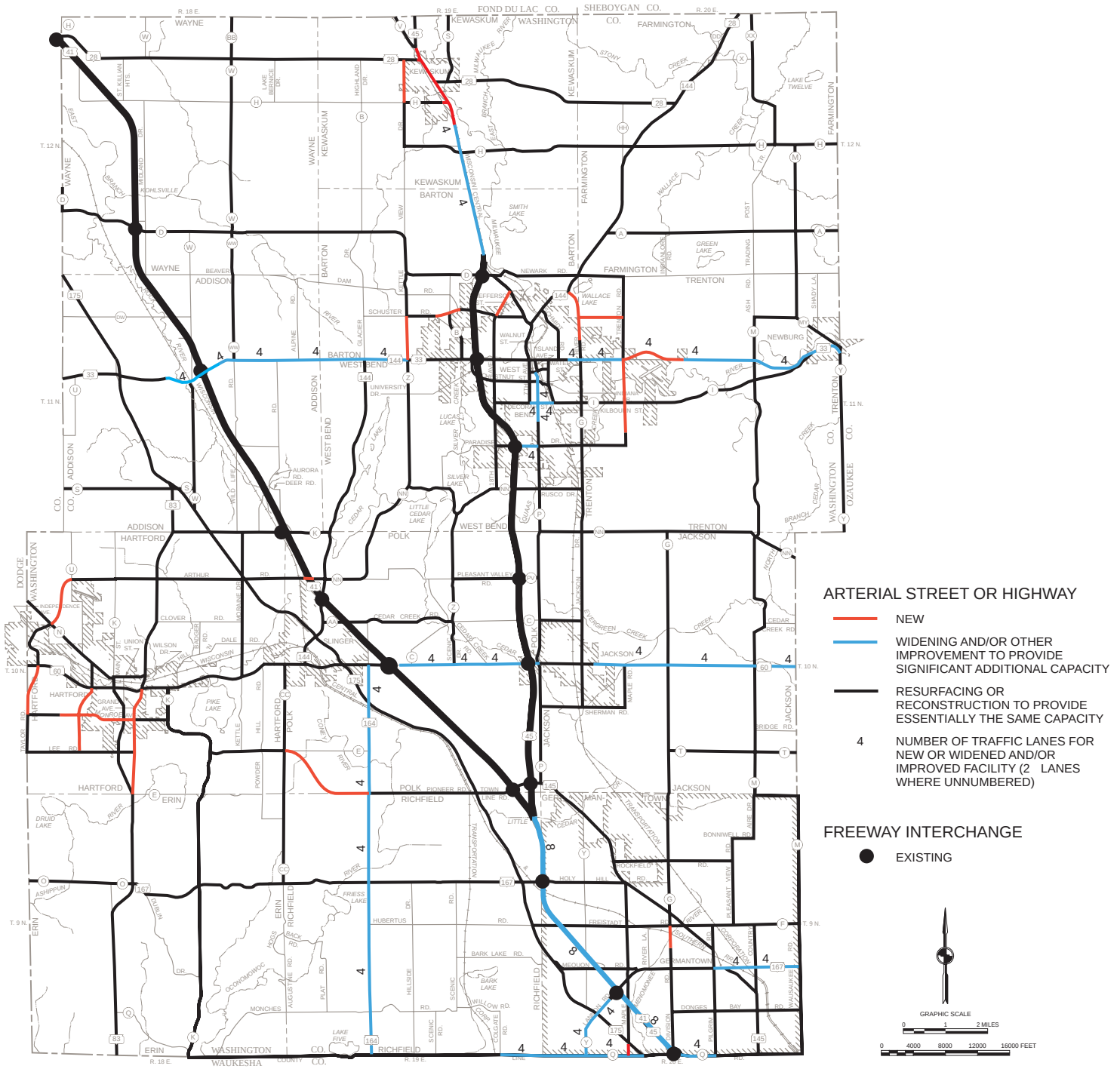
FREEWAY INTERCHANGE

- NEW INTERCHANGE
- NEW HALF INTERCHANGE
- EXISTING

Source: SEWRPC.

Map 10

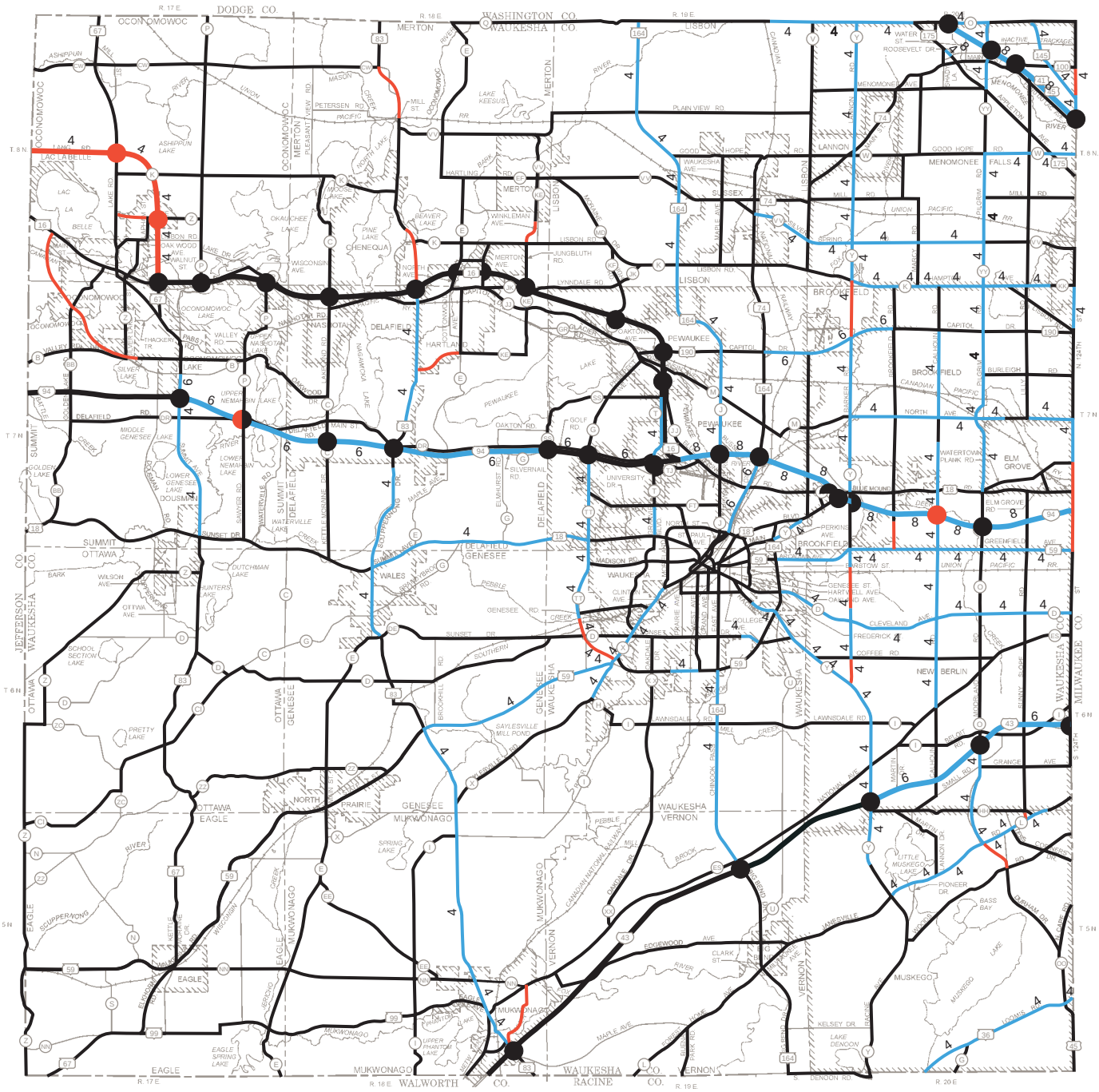
ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WASHINGTON COUNTY: 2020



Source: SEWRPC.

Map 11

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WAUKESHA COUNTY: 2020



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW INTERCHANGE
- NEW HALF INTERCHANGE
- EXISTING

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Table 3

DISTRIBUTION OF ARTERIAL STREET AND HIGHWAY MILEAGE WITHIN THE REGION BY JURISDICTIONAL CLASSIFICATION: 2020 RECOMMENDED PLAN

County	State		County		Local		Total	
	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total
Kenosha	103	8.9	204	13.1	49	5.5	356	9.9
Milwaukee	218	18.8	184	11.8	396	44.5	798	22.1
Ozaukee	72	6.2	154	9.9	79	8.9	305	8.5
Racine	160	13.8	156	10.0	110	12.4	426	11.8
Walworth	222	19.2	238	15.4	20	2.2	481	13.4
Washington	152	13.1	202	13.1	101	11.3	456	12.7
Waukesha	230	20.0	413	26.7	135	15.2	778	21.6
Total	1,157	100.0	1,553	100.0	890	100.0	3,600	100.0

Source: SEWRPC.

The plan recommended distribution of the arterial street and highway mileage among the three jurisdictional classifications is set forth in Table 3. Under the plan, state trunk highways would total 1,157 miles, or about 32 percent, of the planned regional arterial system. County trunk highways would total about 1,553 miles, or an additional 43 percent, of the regional system. Local arterial streets and highways would constitute the remaining 890 miles, or about 25 percent, of the regional system. This recommended distribution of arterial street and highway mileage would be achieved through the transfer of arterial miles among the State, counties, and cities, villages, and towns. The recommended distribution among the State, counties, cities, villages, and towns would require the following jurisdictional changes:

1. Approximately 71 miles would be transferred to the State trunk system from the county trunk system and the local arterial system.

2. Approximately 424 miles would be transferred to the county trunk system from the State trunk system and the local arterial system.

3. Approximately 106 miles would be transferred to the local arterial system from the State trunk system and the county trunk system.

4. Approximately 235 miles would be transferred to the local nonarterial system from the State trunk system and the county trunk system.

PLAN IMPLEMENTATION

The purpose of this section is to assess the extent of regional transportation system plan implementation over approximately the last decade, and specifically, since 1995, the base year of the fourth-generation year 2020 regional transportation plan as amended.

Transportation System Management

The progress made in implementing the transportation systems management element of the plan is outlined below:

- The Wisconsin Department of Transportation has implemented a regional freeway traffic management system which provides monitoring and management of freeway traffic, as well as freeway traffic advisory information. This system includes several related components:

— The Wisconsin Department of Transportation operates a traffic operation center, a staffed facility for the management of the operation of the Milwaukee area freeway system. The management of the system involves numerous activities, including communications with news media regarding traffic conditions, communications with law enforcement officials regarding the response to incidents on the freeway system, and operation of variable message boards, closed-circuit television cameras, and ramp meters.

— Variable message boards are used to provide advisory information about freeway conditions to Milwaukee area freeway system users as they approach freeway entrance ramps and while traveling on the freeway system.

— Closed-circuit television cameras provide information on freeway traffic conditions including congestion and incidents used for freeway system management, incident response, and traveler information.

— Ramp meters are used throughout the entire Milwaukee area to manage the volume of vehicles entering onto the freeway by controlling the rate at which vehicles enter the freeway. These ramp meters can be adjusted to manage the flow of vehicles onto the freeway system at specific locations in response to freeway conditions. Buses and other high-occupancy vehicles are granted preferential access to the freeway system at selected locations.

— Roadway sensors are devices that continually monitor traffic on the Milwaukee area freeway system. These sensors are embedded in the freeway pavement approximately every half mile in the Milwaukee area and at on-ramps where ramp metering is present. The data regarding traffic volumes and speeds are used for day-to-day monitoring and traveler advisory information.

- Improvements have been made with respect to advancing traffic engineering and traffic management technology throughout the Region. Examples of the progress made include the availability of travel times on the Milwaukee area freeway system to travelers before leaving home or work. Additionally, the State, counties, and municipalities have worked to implement state-of-the-art intersection designs and traffic control technologies at intersections. The units of government that own a significant number of traffic signals have interconnected the signals on major arterials to facilitate traffic flow along the signalized length of the arterials. Those traffic signal systems respond to real-time traffic conditions.

- The Wisconsin Department of Transportation has continued to promote carpooling in southeastern Wisconsin. The Department has operated, and continues to operate, a program that matches travelers interested in carpooling. The Department has also continued to support carpooling by maintaining and expanding the system of park-ride lots in the Region. In 1995, there were 38 such facilities in the Region, but by 2003, there were 46 of these facilities. Not only do these facilities support carpooling, they also support public transit service at most locations. In 1995, 25, or about 66 percent, of the 38 park-ride lots were served by rapid transit bus service, and in 2003, 32, or about 70 percent, of the 46 park-ride lots were served by rapid transit bus service.

- Innovative fare-payment methods for transit services have been implemented in the Milwaukee area. The Milwaukee County Transit System has implemented the UPASS program. Under this program, students at participating colleges and universities—the University of Wisconsin-Milwaukee, Marquette University, the Milwaukee Institute of Art and Design, and Columbia College of Nursing—receive unlimited use passes, with students charged a fee each semester. UPASS program participants also receive unlimited use of Ozaukee County Express services—which are operated by the Milwaukee County Transit System—with a fee of 25 cents per ride. In addition to these benefits, UPASS program participants also receive benefits when using Coach USA Milwaukee-Wisconsin Coach Lines and Waukesha Metro Transit services, with the extent of benefits for these transit providers determined by individual agreements between the colleges and universities and the transit operators. The Milwaukee County

Transit System also offers the commuter value pass and the commuter value certificate that allow employers to pay a portion of cost to use Milwaukee County Transit System services for their employees, with the employer contribution a deductible business expense that is tax-free to the employees. In 2004, approximately 110 employers participated in one or both of the commuter value pass and the commuter value certificate programs.

- The Wisconsin Department of Transportation has purchased and is renovating the Milwaukee intermodal terminal which will help to enhance public transit service in the Region. The facility, which is already an Amtrak station, will serve not only Amtrak, but also intercity bus, commuter bus, and the Milwaukee County Transit System. Additionally, the Department is constructing a new passenger rail station at General Mitchell International Airport. The station will serve Amtrak passengers connecting to the airport, as well as providing another station for travelers to access Amtrak's Hiawatha Service.

Bicycle and Pedestrian Facilities

The plan recommended development of a network of 575 miles of off-street bicycle and pedestrian paths. As of 1995, the base year of the year 2020 plan, 134 miles of the planned 575 mile system existed. Since 1995, additional progress has been made to implement the planned network of off-street paths. With the 69 miles implemented since 1995, the total network of off-street paths is now 203 miles. The increase in off-street bicycle and pedestrian paths from 1995 to 2004 of approximately 69 miles is about 16 percent of the total planned increase in such off-street paths from 1995 to 2020 of 441 miles. Map 12 displays the recommended network of off-street bicycle and pedestrian paths, and the implementation of that plan element which has occurred through 2004.

Public Transit

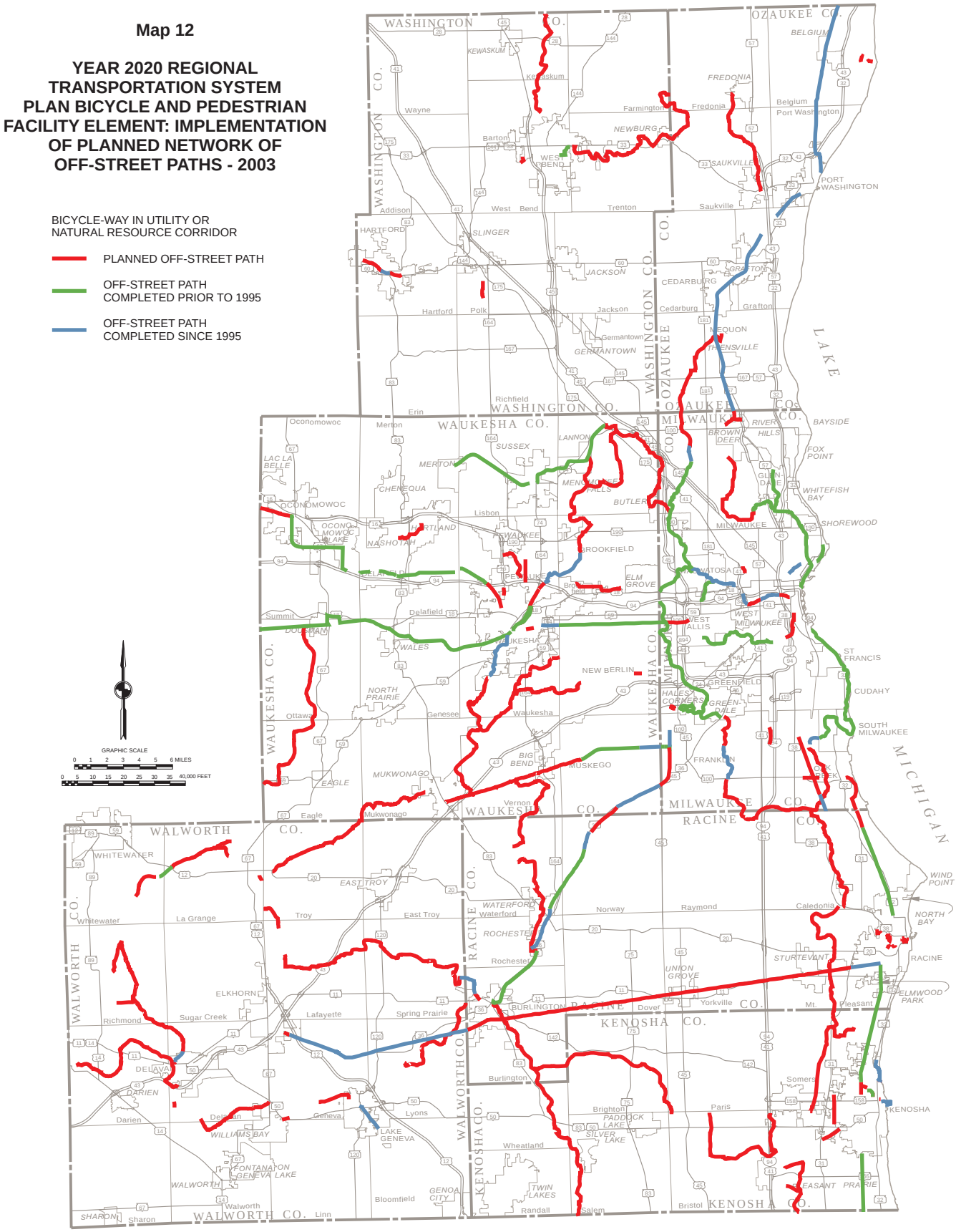
The adopted year 2020 regional transportation plan recommended a significantly expanded and improved transit system. Transit plan implementation may be measured by the level of revenue vehicle-miles of transit service provided. The plan recommended that transit service in the Region as measured by the number of average weekday revenue vehicle-miles of service provided be increased by about 70 percent, from about 65,000 in 1995 to about 111,500 average weekday revenue vehicle-miles in the year 2020.

As shown on Figure 2, transit service is estimated to have increased from about 65,000 vehicle-miles on an average weekday in 1995 to about 71,900 vehicle-miles on an average weekday in 2003, or about 11 percent. The increase in average weekday transit service from 1995 to 2003 of approximately 6,900 weekday vehicle-miles of transit service is about 15 percent of the total planned increase in transit service from 1995 to 2020 of 46,500 vehicle-miles of transit service on an average weekday. The period of 1995 through 2003 was marked by an increase in transit service from 1995 through 2000, followed by a decrease in service from 2001 to 2003. Transit service increased by almost 25 percent between 1995 and 2000, from 65,000 to 81,000 average weekday vehicle-miles of service, and then declined by about 11 percent between 2000 and 2003. The increase in transit service from 1995 through 2000 occurred with a strong and growing regional economy, and was influenced by Federal demonstration funding made available through the Federal Highway Administration (FHWA) Congestion Mitigation and Air Quality (CMAQ) program and the Federal Transit Administration (FTA) Job Access Reverse Commute (JARC) program. The decreases in transit service which occurred from 2000 through 2003—and which are estimated to continue through 2004—occurred with the economic downturn following September 11, 2001, and the attendant and other State and local budget problems. In addition, Federal Transit Administration funding of transit capital and operating costs in the Milwaukee urbanized area increased by 50 percent from $14.2 million in 1995 to $21.2 million in 2002 and then declined by 10 percent to $19.2 million in 2004.

Since 1995, numerous transit service expansions recommended in the year 2020 plan were implemented and continued to be operated in 2004. These expansions included rapid transit services linking Milwaukee County with Ozaukee and Washington Counties weekday and Saturday evening service and Sunday service for the City of Racine Belle Urban System and the City of Waukesha Metro system. Additionally, transit service expansions were implemented to serve outlying employment centers in the Milwaukee area using Federal JARC funds as well as other funds available through the Wisconsin Employment Transportation Assistance Program (WETAP).

Map 12

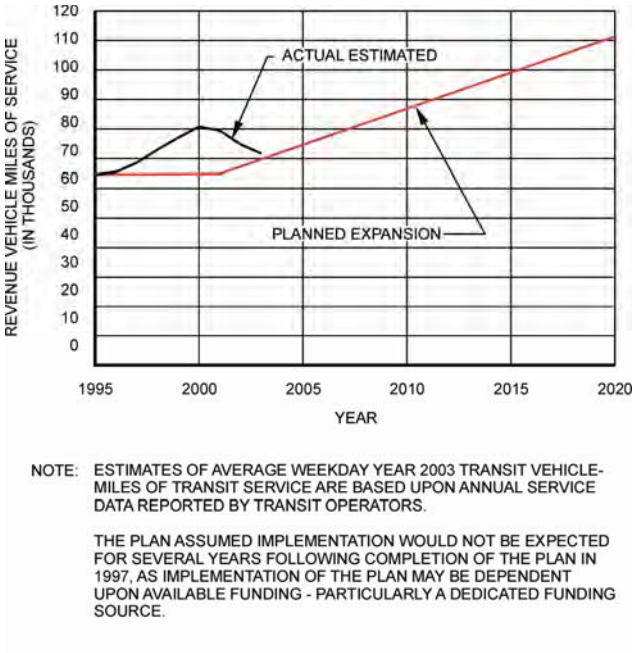
YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN BICYCLE AND PEDESTRIAN FACILITY ELEMENT: IMPLEMENTATION OF PLANNED NETWORK OF OFF-STREET PATHS - 2003



Source: SEWRPC.

Figure 2

HISTORIC AND PLANNED VEHICLE-MILES OF PUBLIC TRANSIT SERVICE ON AN AVERAGE WEEKDAY IN THE SOUTHEASTERN WISCONSIN REGION: 1995-2020



Source: SEWRPC.

The transit service provided as discussed above does not include service provided in the form of shared-ride taxicab service, which has expanded significantly since 1995. In 1995, about 1,500 revenue vehicle-miles of service were operated on an average weekday, but by 2003, about 7,800 revenue vehicle-miles of service were operated on an average weekday, an increase of over 400 percent. By 2003, shared-ride taxi service was operated in four smaller urban areas of the Region—Hartford, Port Washington, West Bend, and Whitewater—and countywide for two counties of the Region—Ozaukee and Washington Counties.

With respect to fixed guideway transit implementation, a transit corridor alternatives analysis study was completed in 2003 for the Milwaukee to Kenosha corridor. A feasibility study for this corridor had been previously completed. The final recommendation of the study called for the Northeastern Illinois Metra commuter rail service, which now operates from Chicago to Kenosha, to be extended to Racine and Milwaukee. The service would operate as a single through route between Milwaukee and Chicago, permitting travel throughout the day in both directions. The Counties and Cities of Kenosha, Milwaukee, and Racine together with the Wisconsin Department of Transportation are currently attempting to initiate the preliminary engineering of the commuter rail extension. Commuter rail feasibility studies were also completed in 2002 for the Walworth-Fox Lake, Illinois, corridor and the Burlington-Antioch, Illinois, corridor. These studies concluded with recommendations that further planning work not be pursued at that time, based on the anticipated ridership and cost-effectiveness of the proposed services. Also, an alternatives analysis study is underway in the Milwaukee East-West and Northeast corridors investigating bus guideway express transit system technologies and is scheduled for completion in 2005. Thus, additional studies have been completed or are underway for five of the total of 12 corridors identified for potential fixed guideway transit implementation—six potential corridors for commuter rail service and six potential corridors for light-rail or bus guideway transit service.

With respect to transit fares, the regional transportation plan recommended that transit fares should remain stable with increases reflecting general price inflation. Inflation is estimated at approximately 16 percent from 1997 through the year 2004. In considering transit fare changes, it should be recognized that the actual fare paid by transit users is a combination of cash fares, weekly and monthly pass fares, and pre-purchased ticket fares. To measure the actual change in fare paid by passengers from year to year taking into account payment by cash, pass, and tickets, the average fare paid per revenue transit passenger may be considered.

The change in fares by transit systems in southeastern Wisconsin generally has been consistent with the increase in inflation from the completion of the 2020 plan in 1997 to current year 2004. Transit fares in Ozaukee, Washington, and Waukesha Counties have increased by about 10 to 12 percent from 1997 to 2004, which is less than the rate of inflation. The cash transit fare in the City of Kenosha has not increased since 1997. The average transit fare per revenue passenger in the Cities of Waukesha and Racine has increased by about 20 percent since 1997, somewhat greater than inflation, but if not changed over the next two years, will be within the rate of inflation. The average transit fare paid per revenue passenger on the Milwaukee County Transit System is estimated to have increased by about 17 percent from 1997 to 2004, or about the same as the increase in inflation.

Table 4

IMPLEMENTATION STATUS OF FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM AS SET FORTH IN THE YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN AND SUBSEQUENT AMENDMENTS: 2004[a]

County	Year 2020 Planned Miles		Implemented Miles by 2004	
	Year 2020 System Improvement	Year 2020 System Expansion	System Improvement	System Expansion
Kenosha	56.8	8.5	11.1	0.5
Milwaukee	95.3	10.3	10.8	5.8
Ozaukee	62.2	7.0	14.3	0.0
Racine	62.6	21.5	11.3	0.6
Walworth	36.7	34.5	6.5	7.8
Washington	50.3	21.8	4.9	3.1
Waukesha	168.4	20.7	22.3	11.1
Region	532.3	124.3	81.1	28.9

[a] *Includes improvements and expansions implemented from 1995 to 2004 or those that were under construction in 2004.*

Source: SEWRPC.

Arterial Streets and Highways

Functional Improvements

Progress toward implementing the functional improvements to the arterial street and highway system is summarized by county in Table 4 and shown on Map 13.

System improvement is defined in the adopted regional transportation system plan as the widening of existing arterial streets and highways with additional traffic lanes to provide additional traffic capacity. The plan envisioned that by the year 2020 system improvement work would have been completed on about 532 miles of the arterial streets and highways within the Region. As of 2004, work on 81 miles, or 15 percent of the miles planned to be widened for added capacity, had been completed or was under construction.

System expansion is defined in the adopted regional transportation system plan as the construction of new arterial streets and highways. The plan envisioned that by the year 2020, 124 miles of new roadway would have been added to the regional arterial street and highway system. As of 2004, construction of nearly 29 miles, or 23 percent of the planned new miles, had been completed or was under construction.

Jurisdictional Realignment

The implementation status of the jurisdictional realignment element of the regional transportation plan as of 2004 is shown on Map 14. A summary of the status of the realignments planned to be implemented by the year 2020 among each jurisdiction follows.

1. Of the approximately 71 miles to be transferred to the State trunk system from the county trunk system and the local arterial system, 26 miles, or 37 percent, have been completed.

2. Of the approximately 424 miles to be transferred to the county trunk system from the State trunk system and the local arterial system, 18 miles, or 4 percent, have been completed.

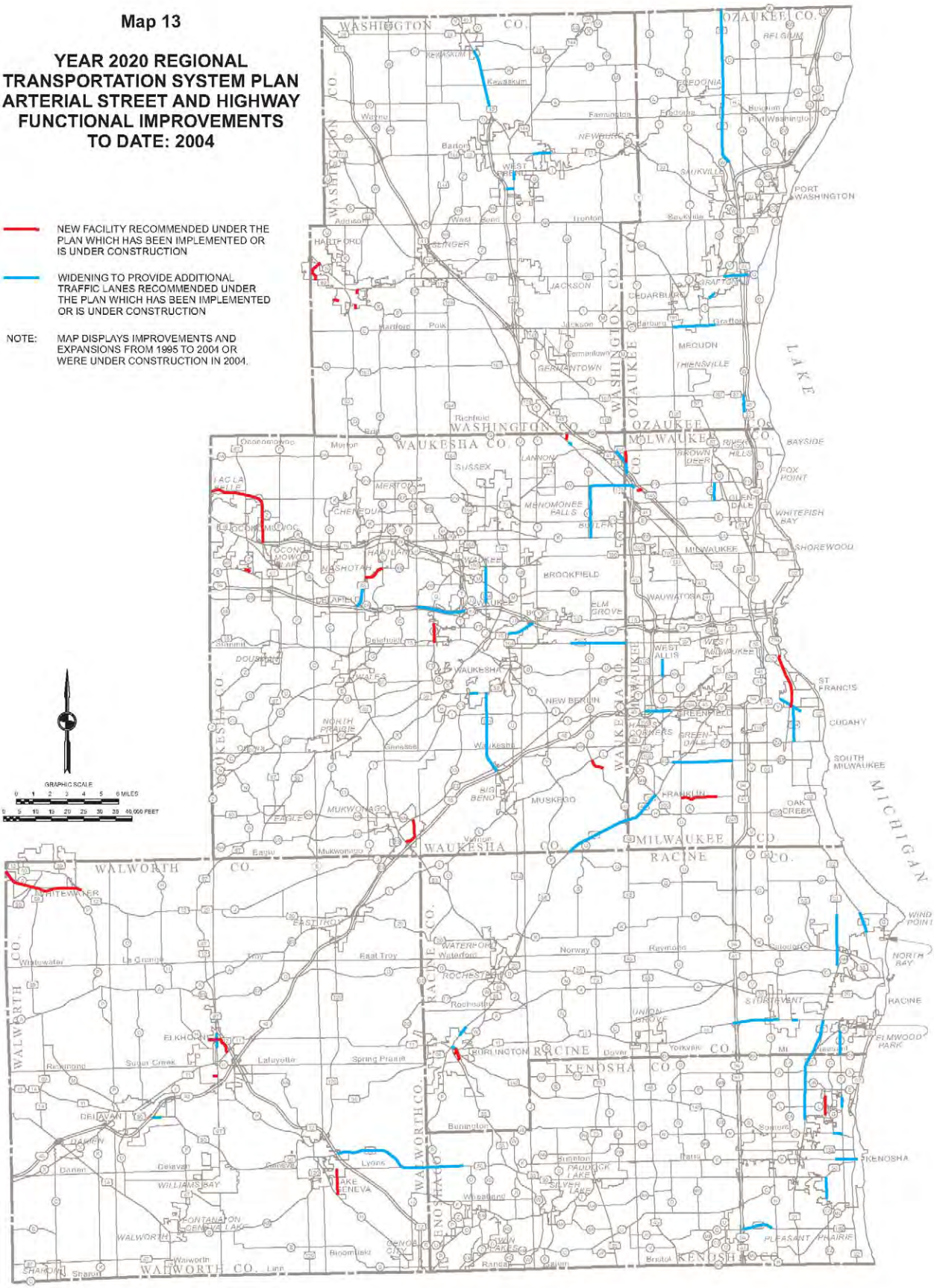
Map 13

YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN ARTERIAL STREET AND HIGHWAY FUNCTIONAL IMPROVEMENTS TO DATE: 2004

NEW FACILITY RECOMMENDED UNDER THE PLAN WHICH HAS BEEN IMPLEMENTED OR IS UNDER CONSTRUCTION

WIDENING TO PROVIDE ADDITIONAL TRAFFIC LANES RECOMMENDED UNDER THE PLAN WHICH HAS BEEN IMPLEMENTED OR IS UNDER CONSTRUCTION

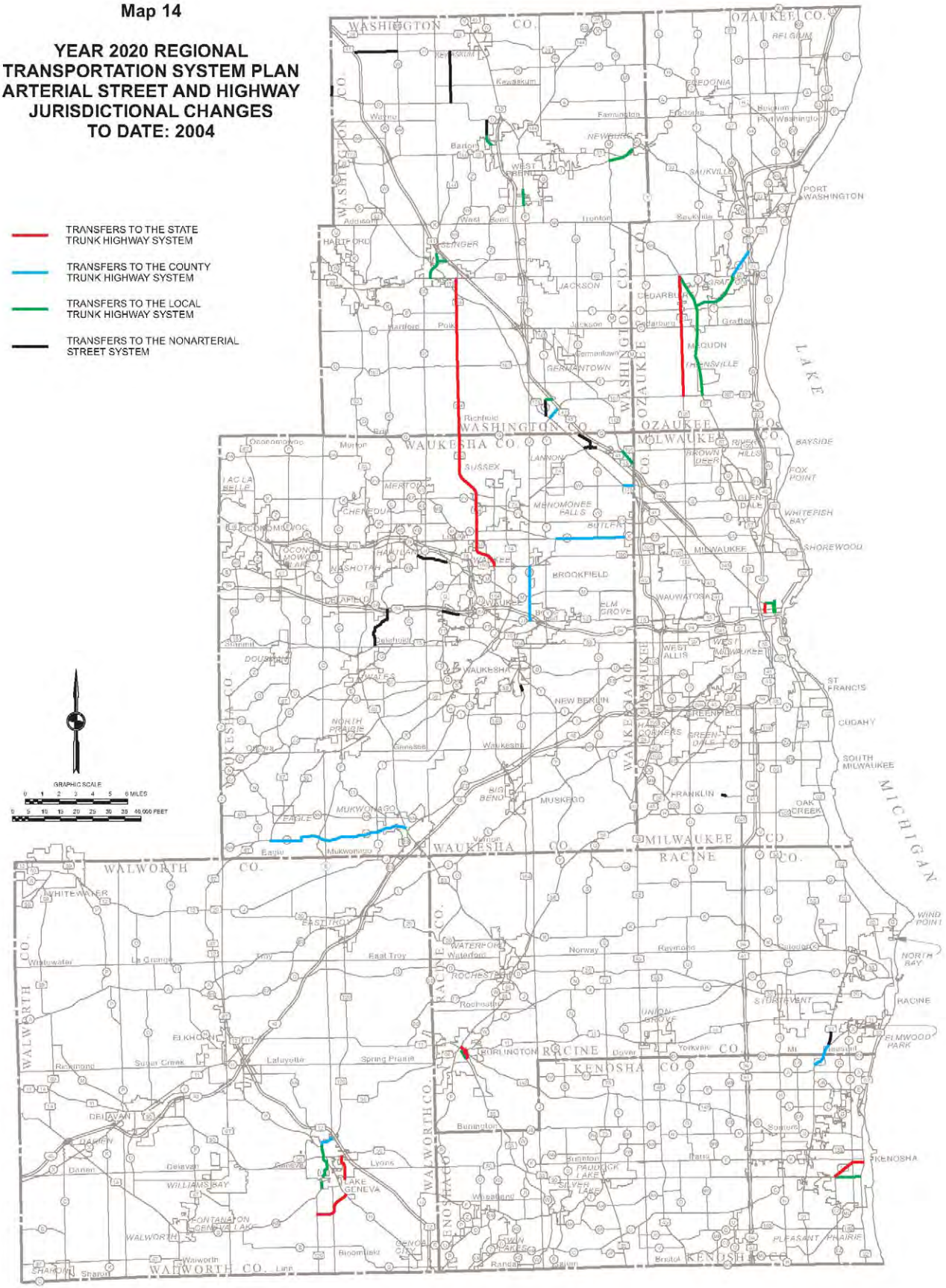
NOTE: MAP DISPLAYS IMPROVEMENTS AND EXPANSIONS FROM 1995 TO 2004 OR WERE UNDER CONSTRUCTION IN 2004.



Source: SEWRPC.

Map 14

YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN ARTERIAL STREET AND HIGHWAY JURISDICTIONAL CHANGES TO DATE: 2004



Source: SEWRPC.

Table 5

ESTIMATED ACTUAL AND FORECAST POPULATION LEVELS BY COUNTY: 2003

County	Census Estimated 1990 Population		Estimated Actual 2003 Population		Forecast 2003 Population –Year 2020 Regional Transportation Plan		Difference between Estimated Actual and Forecast 2003 Population	
	Number	Percent of Region	Number	Percent of Region	Number	Percent of Region	Number	Percent
Kenosha	128,200	7.1	154,200	7.9	149,500	7.6	4,700	3.0
Milwaukee	959,300	53.0	941,300	48.0	985,600	49.8	-44,300	-4.7
Ozaukee	72,800	4.0	84,500	4.3	85,200	4.3	-700	-0.8
Racine	175,100	9.7	191,100	9.8	186,800	9.4	4,300	2.3
Walworth	75,000	4.1	95,600	4.9	86,900	4.4	8,700	9.1
Washington	95,300	5.3	121,900	6.2	119,700	6.0	2,200	1.8
Waukesha	304,700	16.8	371,200	18.9	367,200	18.5	4,000	1.1
Region	1,810,400	100.0	1,959,800	100.0	1,980,900	100.0	-21,100	-1.1

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

3. Of the approximately 106 miles to be transferred to the local arterial system from the State trunk system and the county trunk system, 21 miles, or 20 percent, have been completed.

4. Of the approximately 235 miles to be transferred to the local nonarterial system from the State trunk system and the county trunk system, 15 miles, or 6 percent, have been completed.

REVIEW OF YEAR 2020 REGIONAL TRANSPORTATION PLAN FORECASTS

This section provides a review of the forecasts prepared under the year 2020 regional transportation plan. While the year 2020 plan was completed in 1997 and had a nominal base year of 1995, many of the forecasts under the plan had a true base year of 1990 or 1991, as those were the years of the last census of population and inventory of regional travel, respectively. The year 2020 forecasts reviewed include population, household, and employment levels; personal use vehicle availability; total internal person trips, vehicle trips, and transit trips on an average weekday; and average weekday vehicle-miles of travel.

Population, Household, and Employment Forecasts

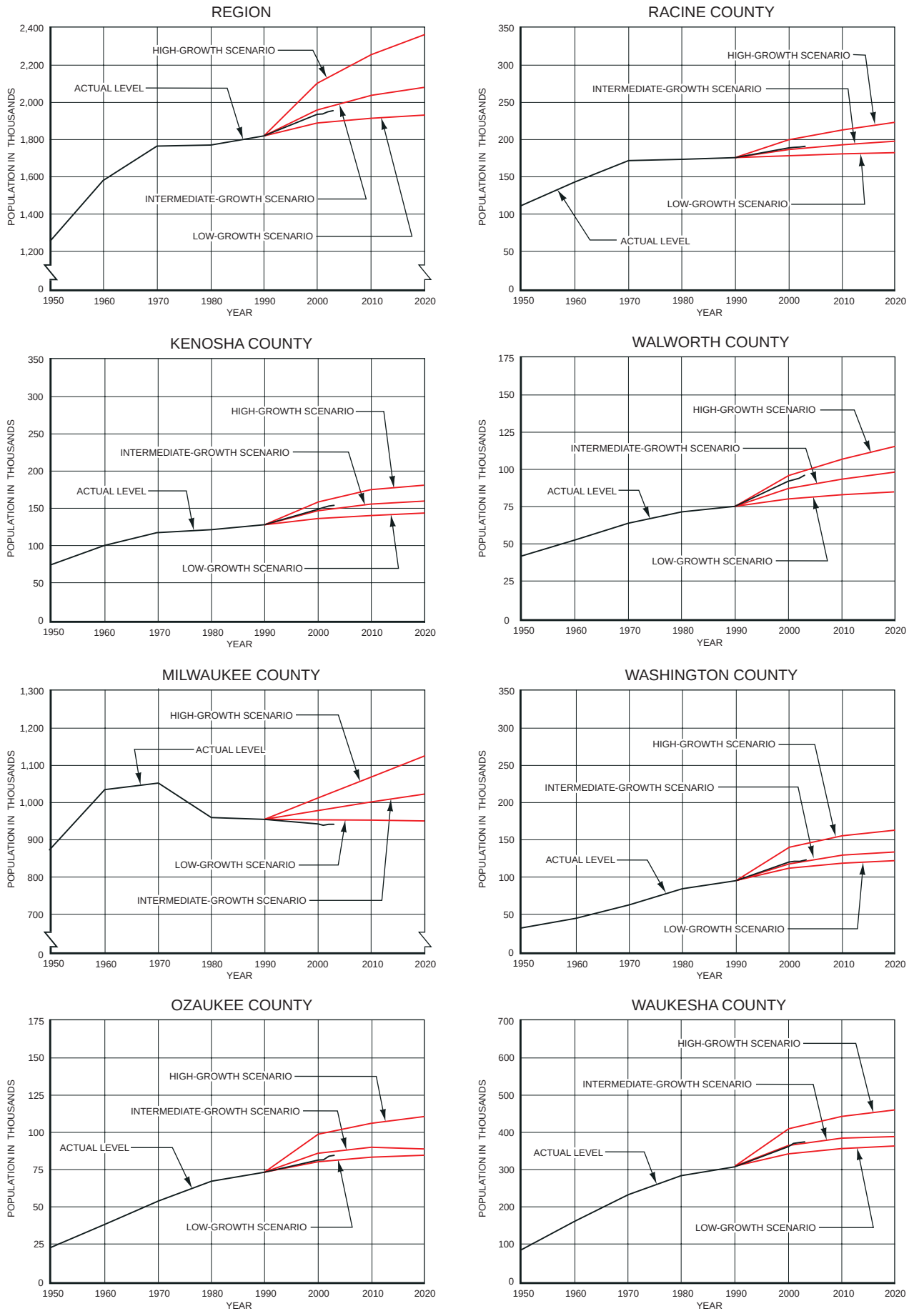
Under the year 2020 regional transportation plan, three projections – low, intermediate, and high – were prepared for population, households, and employment. The intermediate projections were considered the most likely to be achieved for the Region, and constituted the Commission's forecasts which were used as a basis for the preparation of the year 2020 regional land use and transportation plans. The high and low projections were intended to provide an indication of the range of population, household, and employment levels which could conceivably be achieved under significantly higher and lower, but nevertheless plausible, growth scenarios for the Region.

Population

The estimated actual population of the Region in 2003 was about 1,959,800 persons, or about 8 percent, greater than the 1990 base-year population of 1,810,400 persons. As set forth in Table 5 and shown in Figure 3, this estimated actual 2003 regional population was only about 21,100 persons, or 1 percent, less than the 2003 forecast population under the year 2020 regional transportation plan. With respect to each County, the forecast 2003 population was generally within 5 percent of the estimated actual 2003 population.

Figure 3

ACTUAL AND PROJECTED REGIONAL AND COUNTY POPULATION LEVELS: 1950-2020



Source: U.S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Table 6

ESTIMATED ACTUAL AND FORECAST HOUSEHOLD LEVELS BY COUNTY: 2003

County	Census Estimated 1990 Households		Estimated Actual 2003 Households		Forecast 2003 Households – Year 2020 Regional Transportation Plan		Difference between Estimated Actual and Forecast 2003 Households	
	Number	Percent of Region	Number	Percent of Region	Number	Percent of Region	Number	Percent
Kenosha	47,000	7.0	58,900	7.6	56,100	7.4	2,800	4.8
Milwaukee	373,100	55.2	381,000	49.4	389,700	51.4	-8,700	-2.3
Ozaukee	25,700	3.8	32,500	4.2	31,700	4.2	800	2.5
Racine	63,700	9.4	72,900	9.5	70,800	9.3	2,100	2.9
Walworth	27,600	4.1	36,700	4.8	32,800	4.3	3,900	10.6
Washington	33,000	4.9	46,600	6.0	44,400	5.9	2,200	4.7
Waukesha	106,000	15.7	142,300	18.5	133,300	17.6	9,000	6.3
Region	676,100	100.0	770,900	100.0	758,800	100.0	12,100	1.6

Source: U. S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Households

The estimated actual number of households in the Region in 2003 was about 770,900 households, or about 14 percent, greater than the 676,100 households in the 1990 base year. As set forth in Table 6 and shown in Figure 4, the estimated actual 2003 regional household level was only about 12,100 households, or 2 percent, greater than the 2003 forecast households under the year 2020 regional transportation plan. With respect to each County, the forecast 2003 number of households was generally within five percent of the estimated actual number of households.

Employment

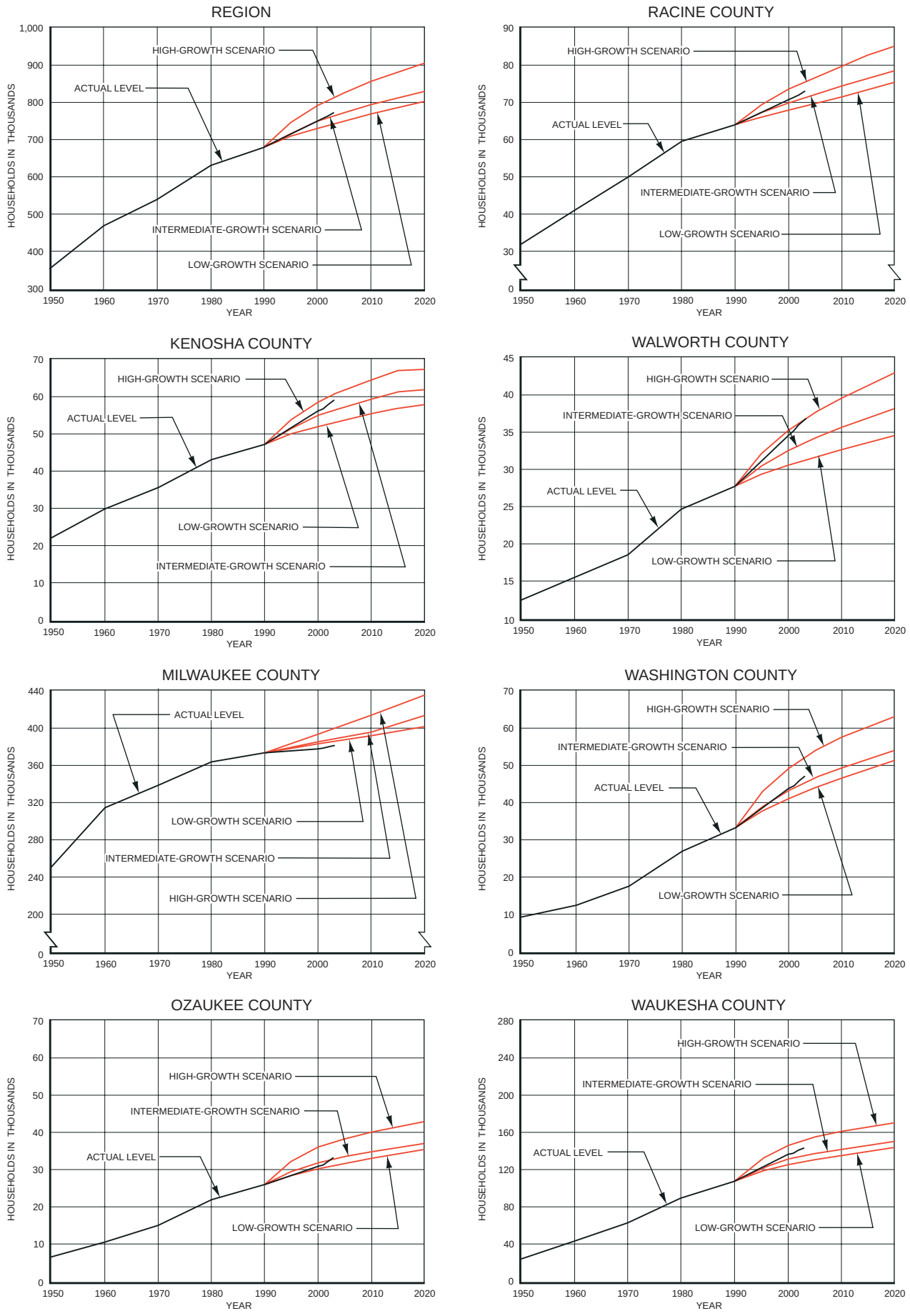
The estimated actual number of jobs in the Region in 2003 of 1,179,000 jobs was about 116,400 jobs, or more than 11 percent, greater than the 1990 base year employment of 1,062,600 jobs. As set forth in Table 7 and shown in Figure 5, the estimated actual 2003 employment level was only about 7,900 jobs, or 1 percent, less than the 2003 forecast level of employment under the year 2020 regional transportation plan. With respect to each County, the projected 2003 number of jobs was generally within 10 to 15 percent of the estimated actual number of jobs.

Vehicle Availability

The estimated actual number of personal-use vehicles—automobiles, vans, sport utility vehicles, and pickup trucks—owned, operated, and available for use by the Region's resident population in 2003 of about 1,328,900 vehicles was about 205,000 vehicles, or about 18 percent, greater than the 1990 base year number of personal-use vehicles of 1,123,900. As set forth in Table 8 and shown in Figure 6, the estimated actual number of personal-use vehicles in the Region in 2003 was about 96,300 vehicles, or about 6 percent, greater than the 2003 forecast of personal-use vehicles under the year 2020 regional transportation plan.

Figure 4

ACTUAL AND PROJECTED REGIONAL AND COUNTY HOUSEHOLD LEVELS: 1950-2020



Source: U.S. Bureau of the Census, Wisconsin Department of Administration, and SEWRPC.

Table 7

ESTIMATED ACTUAL AND FORECAST NUMBER OF AVAILABLE JOBS BY COUNTY: 2003

County	Estimated Actual 1990 Jobs		Estimated Actual 2003 Jobs		Forecast 2003 Jobs – Year 2020 Regional Transportation Plan		Difference between Estimated Actual and Forecast 2003 Jobs	
	Number	Percent of Region	Number	Percent of Region	Number	Percent of Region	Number	Percent
Kenosha	52,200	4.9	69,500	5.9	60,700	5.1	8,800	12.7
Milwaukee	609,800	57.4	589,800	50.0	646,800	54.5	-57,000	-9.7
Ozaukee	35,300	3.3	49,200	4.2	43,000	3.6	6,200	12.6
Racine	89,600	8.4	90,000	7.6	99,600	8.4	-9,600	-10.7
Walworth	39,900	3.8	52,300	4.4	54,500	4.6	-2,200	-4.2
Washington	46,100	4.3	61,800	5.3	54,400	4.6	7,400	12.0
Waukesha	189,700	17.9	266,400	22.6	227,900	19.2	38,500	14.5
Region	1,062,600	100.0	1,179,000	100.0	1,186,900	100.0	-7,900	-0.7

Note: The 1990 employment data presented in this table reflect U.S. Bureau of Economic Analysis data released in Spring 2003. These data differ slightly from 1990 employment data disseminated by the Bureau of Economic Analysis at the time the Commission's year 2020 employment projections were prepared.

Source: U. S. Bureau of Economic Analysis and SEWRPC.

Table 8

ESTIMATED ACTUAL AND FORECAST PERSONAL-USE VEHICLE AVAILABILITY IN THE SOUTHEASTERN WISCONSIN REGION: 1990 AND 2003

Existing 1990	Estimated Actual 2003	Forecast 2003	Difference between Estimated Actual and Forecast 2003 Vehicle Availability	
			Number	Percent
1,123,900	1,328,900	1,232,600	96,300	7.8

Source: Wisconsin Department of Transportation and SEWRPC.

Internal Person Trips

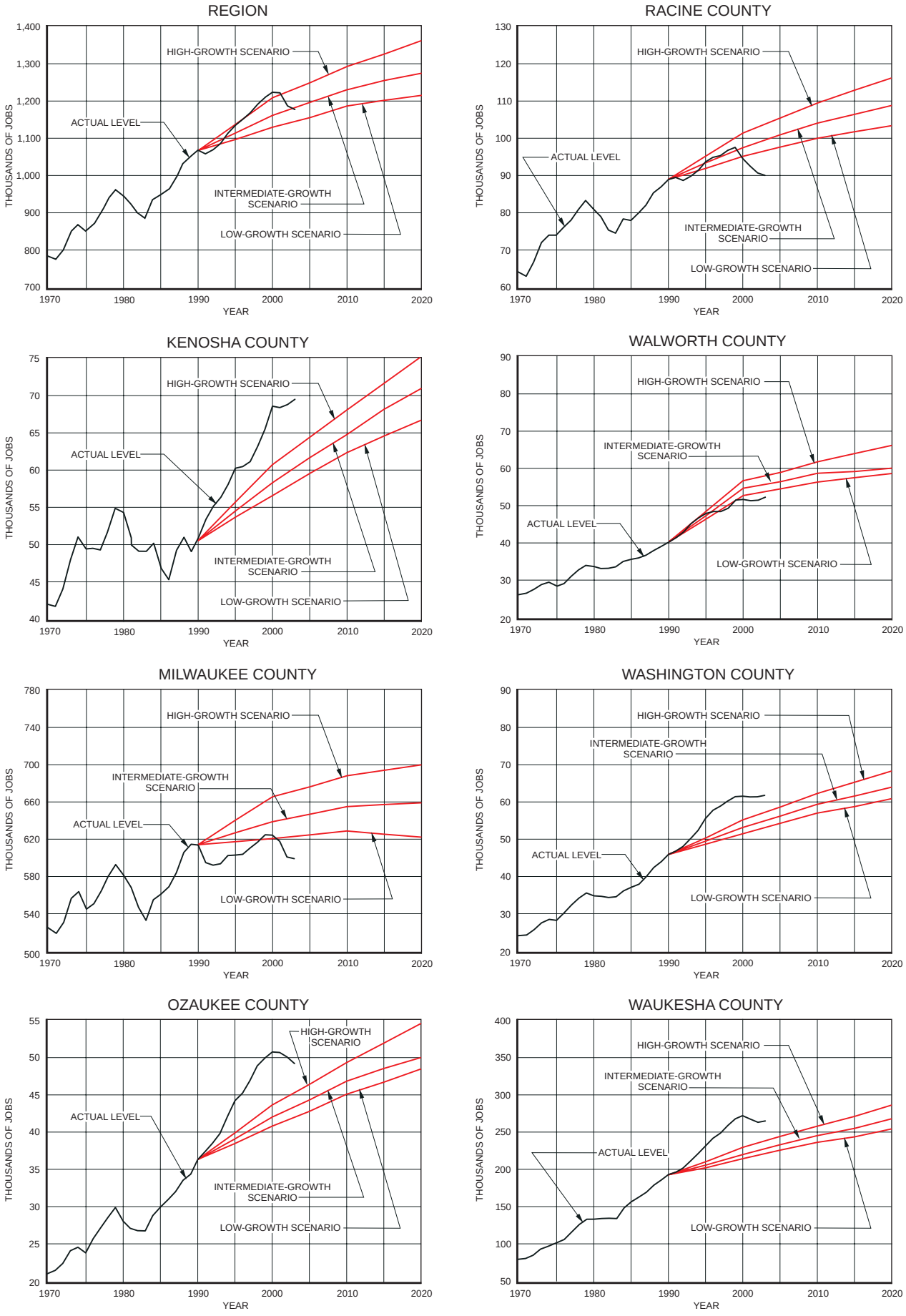
Over 90 percent of the travel on an average weekday in southeastern Wisconsin is travel made by residents of the Region, and is travel which is internal to the Region, that is, both ends of the travel are located within southeastern Wisconsin. The estimated number of such internal person trips within the Region on an average weekday in 2001 was about 6.0 million person-trips, or about 9 percent, greater than the estimated level of such person-trips in 1991 of 5.6 million. As shown in Table 9 and Figure 7, the forecast number of resident internal person-trips in the Region in 2001 was also 6.1 million on an average weekday, virtually the same as the 2001 estimated actual level of internal person-trips.

Internal Vehicle Trips

Over 85 percent of the total vehicle travel on an average weekday is travel made by residents of the Region and is travel which is internal to the Region. The estimated number of such resident internal vehicle trips within the Region in 2001 was about 4.53 million vehicle trips, or about 11 percent, more than the estimated level of such vehicle trips in 1991 of 4.08 million. As set forth in Table 9 and Figure 8, the estimated actual number of internal vehicle trips in the Region made by the residents of the Region was only about 0.04 million trips, or 0.9 percent, less than the 2001 forecast of 4.57 million vehicle trips on an average weekday.

Figure 5

ACTUAL AND PROJECTED REGIONAL AND COUNTY EMPLOYMENT LEVELS: 1970-2020



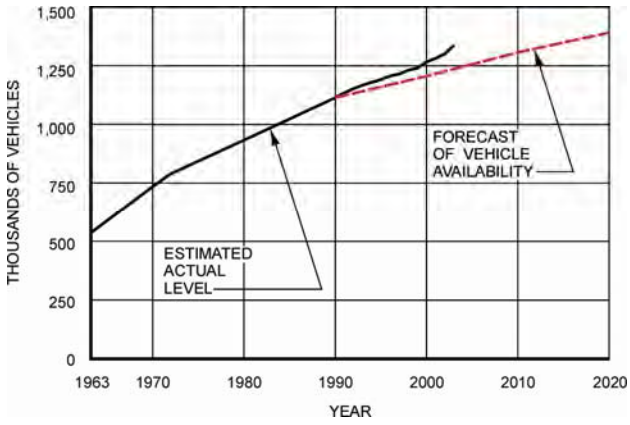
Source: U.S. Bureau of Economic Analysis and SEWRPC.

Vehicle-Miles of Travel (VMT)

The total amount of vehicle travel within the Region may be measured by the vehicle-miles of travel on the Region's arterial street and highway system. The estimated vehicle-miles of travel within the Region on an average weekday in 2001 was about 39.68 million vehicle-miles, or about 21 percent, more than the estimated vehicle-miles of travel in 1991 of 33.07 million. As set forth in Table 9 and Figure 9, the estimated actual vehicle-miles of travel within the Region on an average weekday was about 0.37 million vehicle-miles of travel, or about 1 percent, less than the 2001 forecast of 40.35 million vehicle-miles of travel.

Figure 6

ESTIMATED ACTUAL AND FORECAST PERSONAL-USE VEHICLE AVAILABILITY IN THE SOUTHEASTERN WISCONSIN REGION: 1963-2020



Source: SEWRPC.

Public Transit Ridership

As shown in Figure 10, based upon the planned improvement and expansion of transit service envisioned under the year 2020 regional transportation plan, transit ridership was forecast under the year 2020 plan to depart from a long-term decline and increase to approximately 207,300 trips per average weekday in the year 2020. This forecast level of year 2020 transit ridership represented approximately a 27 percent increase in transit ridership over the year 1991 level of 162,800 trips per weekday, and about a 40 percent increase over the 2020 plan base year 1995 level of 148,200 trips per weekday. However, in 2001, average weekday ridership was approximately 142,200, which was about 4 percent lower than the 148,200 trips per weekday forecast for 2001.

It was expected under the year 2020 plan that, due to the need to affect state and local budgets and probably to achieve dedicated local transit funding to achieve transit plan implementation, it may take up to four years following the completion of the plan in the year 1997 for any substantial transit plan implementation or increase in transit ridership over the base year 1995 ridership. However, substantial transit plan implementation—nearly an 18 percent expansion of transit—occurred between 1997 and 2000 due to increases in Federal funds, and increases also in State and local funds. Between 2000 and 2003, transit service is estimated to have declined by about 11 percent due to the economic downturn following September 11, 2001, and the attendant and other State and local budget problems.

SUMMARY AND CONCLUSIONS

The Commission's adopted regional transportation system plan as amended to date is its fourth generation plan, which was adopted in 1997 with a design year of 2020.

The following are key concepts of the adopted regional transportation system plan:

- The regional transportation system plan is designed to serve the travel demand generated by the year 2020 regional land use plan. The year 2020 regional land use plan was developed to represent a desired pattern of regional land use and not a projection of current land use development trends toward further decentralization of population, employment, and urban land uses.

- There are four elements of the regional transportation system plan: transportation systems management, bicycle and pedestrian facilities, public transit, and arterial streets and highways. Highway capacity additions were recommended in the regional transportation system plan to address the traffic congestion which may not be expected to be alleviated by land use, systems management, bicycle and pedestrian

Table 9

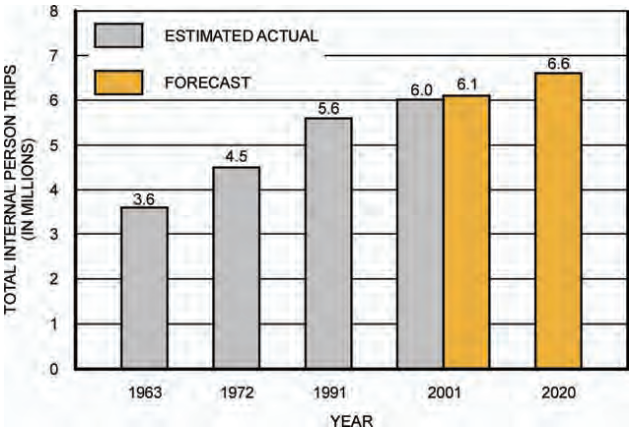
ESTIMATED ACTUAL AND FORECAST WEEKDAY INTERNAL PERSON TRIPS, INTERNAL PERSONAL VEHICLE TRIPS, AND VEHICLE MILES OF TRAVEL IN SOUTHEASTERN WISCONSIN REGION: 1991 AND 2001

Travel and Traffic	1991 In millions	Estimated Actual 2001			Forecast 2001			Difference between Year 2001 Estimated Actual and Forecast Levels	
		Change 1991-2001		Total	Change 1991-2001		Total		
		Number In millions	Percent	Number In millions	Number In millions	Percent	Number In millions	Number In millions	Percent
Resident Internal Person Trips	5.6	0.5	8.9	6.0	0.5	8.9	6.1	- -	- -
Resident Internal Personal Vehicle Trips	4.08	0.45	11.0	4.53	0.49	12.0	4.57	-0.04	-0.9
Vehicle Miles of Travel	33.07	6.61	20.0	39.68	7.28	22.0	40.35	-0.67	-1.6

Source: SEWRPC.

Figure 7

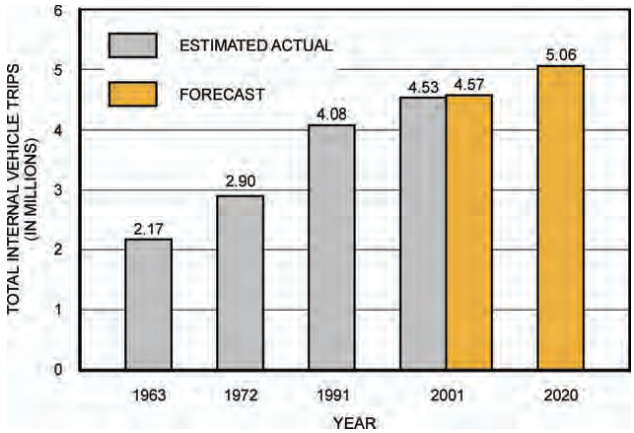
ESTIMATED ACTUAL AND FORECAST AVERAGE WEEKDAY RESIDENT INTERNAL PERSON TRIPS IN THE SOUTHEASTERN WISCONSIN REGION: 1963-2020



Source: SEWRPC.

Figure 8

ESTIMATED ACTUAL AND FORECAST AVERAGE WEEKDAY RESIDENT INTERNAL VEHICLE TRIPS IN THE SOUTHEASTERN WISCONSIN REGION: 1963-2020



Source: SEWRPC.

facilities, or public transit measures. The potential of transit, bicycle and pedestrian facilities, and transportation system management plan elements to alleviate congestion was first explicitly identified.

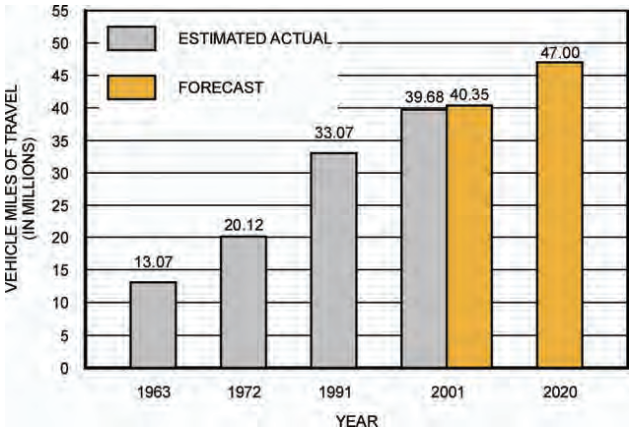
- Highway capacity additions were then recommended to be added to the regional transportation plan to resolve to the extent considered practicable the residual existing and probable future traffic congestion.

The adopted year 2020 regional transportation system plan, as amended and extended to the year 2025, recommends the following:

- Transportation systems management: The transportation systems management element of the plan is intended to encourage more efficient use of the existing transportation system. It includes travel demand management measures to encourage carpooling and transit travel and thereby reduce vehicular travel. It also includes traffic management measures which seek to obtain the maximum vehicular capacity practicable from existing arterial street and highway facilities. The transportation systems management

Figure 9

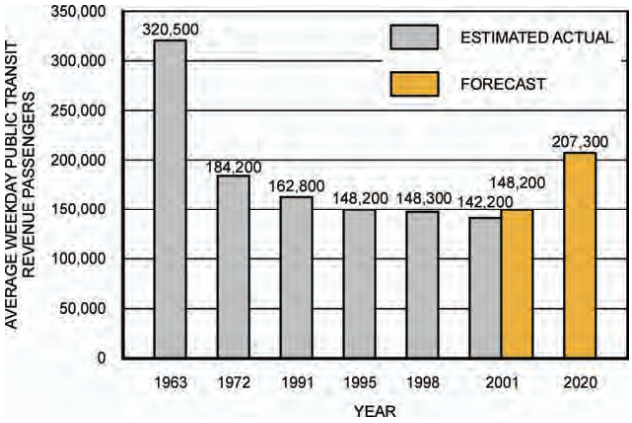
ESTIMATED ACTUAL AND FORECAST AVERAGE WEEKDAY VEHICLE MILES OF TRAVEL IN THE SOUTHEASTERN WISCONSIN REGION: 1963-2020



Source: SEWRPC.

Figure 10

ESTIMATED ACTUAL AND FORECAST AVERAGE WEEKDAY PUBLIC TRANSIT RIDERSHIP IN THE SOUTHEASTERN WISCONSIN REGION: 1963-2020



Source: SEWRPC.

element of the plan includes the following seven measures: freeway traffic management, arterial curb-lane parking restrictions, traffic engineering, traffic management technology, travel demand management promotion, detailed land use planning and site design, and transit systems management and service enhancement measures.

- Bicycle and pedestrian facilities: The bicycle and pedestrian facilities element of the plan is designed to provide for safe accommodation of bicycle and pedestrian travel, encourage bicycle and pedestrian travel, and to provide modal choice. The plan element recommends that as the surface arterial street system of 3,330 miles is resurfaced and reconstructed segment-by-segment, bicycle accommodation should be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened shoulders, and separate bicycle paths. Additionally, the plan element also recommends development of 575 miles of off-street bicycle and pedestrian paths.

- Public transit: The regional transportation system plan recommends a substantially improved and expanded regional transit system, including major increases in the levels of rapid and express transit service provided within the Region, as well as increases in the level of local service provided. The plan proposes the development of a true system of rapid and express transit routes integrated with local transit service. Rapid transit routes would operate within all major travel corridors oriented to the Milwaukee central business district (CBD), with express transit operating over a grid pattern of routes largely within Milwaukee County. In total, the plan proposes approximately a 70 percent increase in transit service as measured by revenue vehicle-miles of service, from the 65,000 average weekday revenue vehicle-miles of such service in 1995 to 111,500 average weekday revenue vehicle-miles in 2020. The plan also proposes establishing commuter-rail or light rail/bus guideway passenger service as an alternative to the recommended rapid and express bus transit service, and recommends the conduct of corridor alternatives analysis studies in 12 corridors.

- Arterial street and highway system: The adopted regional transportation system plan recommended three types of functional improvements to the arterial street and highway system: system preservation, consisting of the resurfacing and reconstruction necessary to properly maintain existing arterial roadways; system improvement, consisting of the widening of existing facilities to provide additional traffic lanes; and system expansion, consisting of the construction of new arterial facilities. About 2,943 miles, or 82 percent, of the total arterial street and highway system would require only preservation; about 532 miles, or about 15 percent, would require improvement; and about 124 miles, or about 3 percent would

constitute new facilities. The adopted regional transportation system plan also recommended jurisdictional realignment intended to achieve an equitable distribution of arterial street and highway development and maintenance costs among the various levels and agencies of government concerned. Under the plan, State trunk highways would total 1,157 miles, or about 32 percent, of the planned regional arterial system. County trunk highways would total about 1,553 miles, or an additional 43 percent, of the regional system. Local arterial streets and highways would constitute the remaining 890 miles, or about 25 percent, of the regional system. This recommended distribution of arterial street and highway mileage would be achieved through the planned transfer of arterial miles between the jurisdictional classifications.

The progress of implementing the year 2020 regional transportation system plan is set forth below.

- Transportation systems management: Implementation of the transportation systems management element of the plan has included a freeway traffic management system that provides for the monitoring and management of the Milwaukee area freeway system, and provides freeway traffic advisory information. The Wisconsin Department of Transportation has implemented a freeway traffic management system which includes a staffed traffic operations center, variable message boards, closed-circuit television cameras, ramp meters, and roadway sensors. This element of the regional transportation plan has also been implemented through advances in traffic engineering and traffic management technology, through the promotion of carpooling, and through the use of innovative fare-payment methods – particularly in the Milwaukee area.

- Bicycle and pedestrian facilities: Since 1995, an estimated 69 miles of the recommended 575 miles of off-street bicycle facilities have been implemented. With the 69 miles implemented since 1995, the total network of off-street paths is now 203 miles. The increase in off-street bicycle and pedestrian paths from 1995 to 2004 of approximately 69 miles is about 16 percent of the total planned increase in such off-street paths from 1995 to 2020 of 441 miles.

- Public transit: Transit service is estimated to have increased from about 65,000 vehicle-miles on an average weekday in 1995 to about 71,900 vehicle-miles on an average weekday in 2003, or about 11 percent. The increase in average weekday transit service from 1995 to 2003 of approximately 6,900 weekday vehicle-miles of transit service is about 15 percent of the total planned increase in transit service from 1995 to 2020 of 46,500 vehicle-miles of transit service on an average weekday. The period of 1995 through 2003 was marked by an increase in transit service from 1995 through 2000, followed by a decrease in service from 2001 to 2003. Transit service increased by almost 25 percent between 1995 and 2000, from 65,000 to 81,000 average weekday vehicle-miles of service, and then declined by about 11 percent between 2000 and 2003. In addition to the increase in fixed-route transit service discussed above, the level of shared-ride taxi service also increased between 1995 and 2003. Shared-ride taxi service expanded significantly between 1995 and 2003. In 1995, about 1,500 revenue vehicle-miles of service were operated on an average weekday, but by 2003, about 7,800 revenue vehicle-miles of service were operated on an average weekday, an increase of over 400 percent. As was recommended in the year 2020 regional transportation system plan, the change in fares by transit systems in southeastern Wisconsin has generally been consistent with the increase in inflation from the completion of the 2020 plan in 1997 to current year 2004.

- Arterial street and highway system: The regional transportation system plan includes recommendations regarding functional improvements to the arterial street and highway system as well as the jurisdictional responsibility of the arterial street and highway system. As of 2004, work on 81 miles, or 15 percent of the 532 miles planned to be widened with additional lanes for added capacity, had been completed or was under construction. Additionally, as of 2004, construction of nearly 29 miles, or 23 percent of the planned 124 new miles, had been completed or was under construction. With respect to jurisdictional realignments, 26 miles, or 37 percent, of the approximately 71 miles to be transferred to the State trunk system from the county trunk system and the local arterial system have been completed; 18 miles, or 4

percent, of the approximately 424 miles to be transferred to the county trunk system from the State trunk system and the local arterial system have been completed; 21 miles, or 20 percent, of the 106 miles to be transferred to the local arterial system from the State trunk system and the county trunk system have been completed; and 15 miles, or 6 percent, of the approximately 235 miles to be transferred to the local nonarterial system from the State trunk system and the county trunk system have been completed.

Thus, significant implementation of the year 2020 regional transportation plan has been achieved, including nearly equal implementation of each plan element. Plan implementation to date is estimated to include 16 percent of planned new off-street bicycle and pedestrian paths, 15 percent of planned transit service expansion, and 17 percent of planned widened and new arterial streets and highways. An estimated current modest shortfall between available funding and the funding necessary to implement the plan may have limited the extent of plan implementation, as the bulk of available funding is necessary for routine transportation system operations and maintenance and replacement, rehabilitation, and reconstruction needs.

The year 2020 regional transportation system plan was based upon forecasts of population, households, employment, personal vehicle availability, weekday person trips and vehicle trips, vehicle-miles of travel, and transit ridership. A review of these forecasts and comparison to actual current estimates indicates that the forecasts underlying the plan remain valid, and vary from current estimates generally by only 1 to 2 percent. While the year 2020 plan was completed in 1997 and had a nominal base year of 1995, many of these forecasts prepared under the plan had a true base year of 1990 or 1991, as those were the years of the last census of population and inventory of regional travel, respectively.

- The estimated population of the Region in 2003 was about 1,959,800 persons, or about 8 percent, greater than the 1990 base-year population. The estimated actual 2003 regional population of 1,959,800 persons was only about 21,100 persons, or 1 percent, less than the 2003 forecast population.

- The estimated number of households in the Region in 2003 was about 770,900 households, or about 14 percent, greater than the 1990 base year. The estimated actual 2003 regional household level of 770,900 households exceeded the 2003 forecast by only about 12,100 households, or 2 percent.

- The estimated number of jobs in the Region in 2003 was 1,179,000 jobs, or more than 11 percent, greater than the 1990 base year employment level. The estimated actual 2003 employment level was very similar to the 2003 forecast—only about 7,300 jobs, or less than 1 percent than forecast.

- The estimated actual number of personal-use vehicles available to region residents in 2003 was 1,320,900 vehicles, about 205,000, or about 18 percent greater than the 1990 base year. The estimated actual number of personal-use vehicles available to residents in the Region in 2003 was about 96,300 vehicles, or 6 percent, greater than the 2003 forecast of personal-use vehicles.

- From 1991 to 2001 the number of person trips within the Region made by residents of the Region on an average weekday was forecast to increase by about 9 percent, from about 5.6 million to 6.1 million. The number of internal person trips was estimated to have actually increased to about 6.0 million trips in 2001, virtually identical to the forecast.

- From 1991 to 2001, the number of vehicle trips within the Region made by residents of the Region on an average weekday was forecast to increase by about 12 percent, from 4.08 million to 4.57 million. The number of internal vehicle trips was estimated to have actually increased to about 4.53 million trips, or only about 0.04 million trips, or 0.9 percent less than the forecast.

- From 1991 to 2001, the number of vehicle miles of travel in the Region on an average weekday were forecast to increase by about 22 percent, from 33.07 million to 40.35 million. The number of weekday vehicle-miles of travel in the Region was estimated to have actually increased to 39.68 million vehicle-miles, or about 0.37 million vehicle-miles, or about 1 percent less than the forecast.

- Under the year 2020 regional transportation plan, transit ridership was forecast under the year 2020 plan to depart from a long-term decline and increase to approximately 207,300 trips per average weekday in the year 2020. This forecast level of year 2020 transit ridership represented approximately a 27 percent increase in transit ridership over year 1991 level of 162,800 trips per weekday, and about a 40 percent increase over the 2020 plan base year 1995 level of 148,200 trips per weekday. After adoption of the year 2020 plan, transit ridership initially increased with transit service expansion, but has declined since 2000 with transit service reductions. The average weekday ridership in 2001 was approximately 142,200, or about 4 percent lower than the 148,200 trips per weekday forecast for 2001.

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Chapter III

INVENTORY OF TRANSPORTATION FACILITIES AND SERVICES

INTRODUCTION

This chapter describes the existing regional transportation system of Southeastern Wisconsin in 2001, the plan base year, including streets and highways, public transit, intermodal parking facilities, bicycle and pedestrian facilities, and transportation system operations and management systems. The supply and use of the existing regional transportation system is presented, along with trends in transportation system supply and use over the past 40 years, comparing the current plan base year data to that of previous generation plan base years of 1991, 1972, and 1963.

STREETS AND HIGHWAYS

Classification of Streets and Highways

The street and highway system must serve several important functions, including providing for the movement of through vehicular traffic; providing for access of vehicular traffic to abutting land uses; providing for the movement of pedestrian and bicycle traffic; and serving as the location for utilities and stormwater drainage facilities. Two of these functions—traffic movement and land access—are basically incompatible. As a result, street and highway system design is based upon a functional grouping or classification of streets and highways, based upon primary function served. Three functional classifications of streets and highways are recognized: 1) arterial streets; 2) collector streets; and 3) land access streets.

Arterial streets are defined as streets and highways which are principally intended to provide a high degree of travel mobility, serving the through movement of traffic and providing transportation service between major subareas of an urban area or through the area. Together, the arterial streets should form an integrated, areawide system. Access to abutting property may be a secondary function of some types of arterial streets and highways, but it should always be subordinate to the primary function of traffic movement.

Land access streets are defined as streets and highways which are intended to serve primarily as a means of access to abutting properties, principally serving the residential areas of a community.

Collector streets are defined as streets and highways which are intended to serve primarily as connections between the arterial system and the land access street system. In addition to collecting traffic from, and distributing traffic to, the land access streets, the collector streets usually provide the same principal function as land access streets, that of providing access to abutting property. As a result, collector and land access streets are sometimes combined and referred to as nonarterial, or local, streets.

Arterial streets generally account for about 30 percent of the mileage of the total street and highway system, and carry about 90 percent of the total average weekday traffic in the Region. Arterial streets are typically spaced at about one-half mile intervals in high-density areas, one-mile intervals in medium-density areas, two-mile intervals in low-density areas, and intervals of more than two miles in rural areas. To serve travel effectively, and to make efficient use of public resources, the arterial street system should be planned as an integrated system, irrespective of jurisdictional boundaries and jurisdictional responsibilities for streets and highways, with consideration of existing and future traffic volumes, and with traffic capacities fitted to serve those traffic volumes. The Commission's regional transportation planning addresses only the arterial street and highway element of the total street and highway system. Arterial streets and highways are the only element of the total street and highway system for which existing and future traffic volume, and the need for additional traffic lanes or for a new arterial facility to relieve traffic, is a consideration in facility and system design. Working with local governments and the Wisconsin Department of Transportation, the Commission has defined the arterial street system of the Region for over 40 years. The definition of arterials has been determined by an evaluation of four major factors: 1) traffic characteristics— traffic volume and type, operating speeds, and average trip length; 2) physical characteristics—horizontal and vertical alignment, pavement width, and pavement type; 3) system integration—system continuity and facility spacing; and 4) land use service—the areawide significance of the land use activities served.

Collector and land access streets should form a street system within neighborhoods, with the boundaries of those neighborhoods determined by arterial streets, or other built or natural boundaries. Desirably, collector and land access streets should not extend directly through a neighborhood, or from neighborhood to neighborhood. Through traffic may begin to occur on the collector and land access streets, particularly if the arterial street system is experiencing traffic congestion. Neighborhood residents experience traffic concerns at relatively low levels of traffic volume, specifically, 1,500 to 2,500 vehicles per average weekday, or about one-ninth to one-sixth of the potential traffic-carrying design capacity of a two-lane urban arterial street. The collector and land access street system within a neighborhood should be designed to discourage through traffic from traveling within the neighborhood, but should also be designed to permit reasonably direct travel—by personal vehicle, bicycle, and walking—within the neighborhood by its residents to neighborhood parks, neighborhood schools, neighborhood commercial centers, and as well to all parts of the neighborhood, and to each arterial street along the neighborhood boundary. Otherwise, traffic internal to a neighborhood may almost exclusively be made by automobile, and unnecessarily over the arterials which form the boundaries of the neighborhood.

Arterial Street and Highway System

The arterial street and highway system of the Region may be further described and classified in a number of different ways. The arterial street system may be divided into freeway facilities and nonfreeway or standard arterial streets and highways. A freeway is a special type of arterial—the highest type of arterial—providing the highest degree of mobility and the most limited degree of access. A freeway is defined as a divided arterial highway with full control of access and grade separations at all interchanges. Standard arterial streets and highways are arterials with at-grade intersections and may as well provide direct access to abutting property through driveways. Table 10 shows the mileage of arterials in the Region in 2001, and as well for previous regional plan base years of 1963, 1972, 1991. The existing and historic mileage of collector and land access streets and of the total street and highway system within the Region are also shown. Over the past nearly 40 years, the mileage of arterials in the Region has increased from 3,188 miles in 1963 to 3,292 miles in 2001, an increase of only about 100 miles, or 3 percent. The lane-miles of arterials have increased over that same period by about 12 percent. During this same time period, vehicle-miles of travel on an average weekday on the arterial street and highway system has increased by over 200 percent.

Streets and highways may also be classified according to jurisdiction. Jurisdictional classification establishes which level of government—State, county, or local—has responsibility for the design, construction, maintenance, and operation of each segment of the total street and highway system. The existing jurisdictional highway subsystems are the result of a long evolutionary process influenced by many complex political, administrative, financial, and engineering considerations and constraints. The Commission has attempted over the past 35 years to recommend

Table 10

DISTRIBUTION OF TOTAL STREET AND HIGHWAY MILEAGE WITHIN THE REGION BY COUNTY: 1963, 1972, 1991, AND 2001[a]

County	1963			
	Arterial	Collector and /Land-Access	Total[b]	Arterial Mileage as a Percent of Total Mileage
Kenosha	281.5	547.1	828.6	34.0
Milwaukee	791.5	1,642.6	2,434.1	32.5
Ozaukee	264.9	366.9	631.8	41.9
Racine	351.3	632.4	983.7	35.7
Walworth	399.7	824.2	1,223.9	32.7
Washington	402.3	688.0	1,090.3	36.9
Waukesha	697.0	1,054.0	1,751.0	39.8
Total	3,188.2	5,755.2	8,943.4	35.6

County	1972			
	Arterial	Collector and /Land-Access	Total[b]	Arterial Mileage as a Percent of Total Mileage
Kenosha	287.1	593.4	880.5	32.6
Milwaukee	795.7	1,851.7	2,647.4	30.1
Ozaukee	253.5	466.7	720.2	35.2
Racine	355.4	728.0	1,083.4	32.8
Walworth	412.0	846.9	1,308.9	31.5
Washington	344.8	821.1	1,165.9	29.6
Waukesha	670.2	1,342.5	2,012.7	33.3
Total	3,118.7	6,700.3	9,819.0	31.8

County	1991			
	Arterial	Collector and /Land-Access	Total[b]	Arterial Mileage as a Percent of Total Mileage
Kenosha	317.1	660.7	978.3	32.5
Milwaukee	775.4	2,131.6	2,907.0	26.7
Ozaukee	250.7	610.3	861.0	29.1
Racine	349.9	814.4	1,164.3	30.1
Walworth	429.2	996.4	1,425.6	30.1
Washington	400.2	922.8	1,323.6	30.3
Waukesha	735.5	1,805.4	2,540.9	28.9
Total	3,259.1	7,941.6	11,200.7	29.1

County	2001			
	Arterial	Collector and /Land-Access	Total[b]	Arterial Mileage as a Percent of Total Mileage
Kenosha	317.6	715.3	1,032.9	30.7
Milwaukee	781.8	2,187.3	2,969.1	26.3
Ozaukee	250.7	643.7	894.4	28.0
Racine	352.6	909.7	1,262.3	27.9
Walworth	436.6	1,048.5	1,485.1	29.4
Washington	406.5	1,029.3	1,435.8	28.3
Waukesha	746.0	2,111.6	2,857.6	26.1
Total	3,291.8	8,645.4	11,937.2	27.6

[a] *The estimated lane-miles of arterials was 7,827 lane-miles in 1963, 7,627 lane-miles in 1972, 8,383 lane-miles in 1991, and 8,790 lane-miles in 2001.*

[b] *Total street and highway mileage does not include private streets and roads or roadways in public parks and on institutional lands.*

Source: SEWRPC.

changes in the jurisdictional classification of the arterial street and highway system so that the arterial street system is grouped into logical subsystems of jurisdictional responsibility with the appropriate streets and highways under the jurisdiction of each level of government—State, county, and local. The county jurisdictional highway system plans prepared by the Commission are based upon criteria established by the Commission in cooperation with Federal, State, and local units of government and include: 1) trip service—the average trip length on each segment during an average weekday; 2) land use service—the areawide significance of land use activities to be connected and served; and 3) facility operational characteristics and system continuity, including facility spacing, traffic volume, traffic mobility, and land access. State trunk highways should be those facilities intended to provide the highest level of mobility, to serve trips with the longest length, to provide minimal land access, to serve land uses of regional and statewide significance, and to have interregional continuity. State trunk highways are those arterial facilities which would principally serve travel through a county, and travel between counties. County trunk highways should be those arterial facilities intended to provide an intermediate level of traffic mobility and land access, to serve land uses of countywide significance, and to have intercommunity continuity. County trunk highways are those arterial facilities which would principally serve travel between the various municipalities of a county. Local or municipal arterial streets are intended to be those facilities that provide the lowest level of arterial traffic mobility and the highest degree of arterial land access, and which have intracommunity continuity and serve principally arterial travel within a municipality. Table 11 presents the distribution of existing arterial highway mileage within the Region in 2001 by State, county, and local jurisdictional classification.

Arterial Street and Highway System Traffic Volume

The average weekday traffic volume on each segment of the arterial street and highway system within the Region in 2001 is graphically displayed on Map 15, and compared to arterial street and traffic volume patterns of 1963, 1972, and 1991. The estimate of average weekday traffic volume is based upon traffic volume counting conducted principally by the Wisconsin Department of Transportation, and, as well, by county and municipal governments, particularly the City of Milwaukee. The effect of the completion of the freeway system between 1963 and 1972 is apparent in the significant reduction of traffic volume on the standard arterials in Milwaukee County.

The magnitude of arterial street and highway traffic volume can also be measured in terms of total arterial system average weekday vehicle-miles of travel, which is the average weekday traffic volume on each segment of arterial highway multiplied by the length in miles of each segment of arterial highway. As shown in Table 12, about 39.7 million vehicle-miles of travel occurred on the arterial street and highway system within the Region on an average weekday in 2001. Table 12 also compares the arterial vehicle-miles of travel within each County and the Region for the years 1963, 1972, 1991, and 2001. Between 1991 and 2001, the arterial vehicle-miles of travel within the Region on a average weekday increased from 33.1 million vehicle-miles of travel to 40.0 million vehicle-miles of travel, an increase of 21 percent, or 1.9 percent annually. Between 1972 and 1991, arterial vehicle-miles of travel within the Region on an average weekday increased from 20.1 million vehicle-miles of travel to 33.1 million vehicle-miles of travel, an increase of approximately 64 percent, or an annual increase of 2.6 percent. Between 1963 and 1972, the vehicles-miles of travel in the Region on an average weekday increased from 13.1 million to 20.1 million vehicle-miles of travel, an increase of 53 percent, or an annual increase of 4.8 percent. The annual rate of growth of average weekday vehicle-miles of travel for the Region and for each county is shown on Table 13.

Figure 11 compares the growth in vehicle-miles of travel in the Region from 1963 to 2001, with changes in travel characteristics over the same period, and with changes in the Region's population and economy. Contributing to the growth in vehicle-miles of travel was a growth in person-tripmaking due to increases in households and jobs, a decline in vehicle occupancy due to growth in vehicle availability and a change in population lifestyles including household size, and an increase in vehicle trip length. Per mile, freeways in the seven county Southeastern Wisconsin Region carried substantially more traffic than arterials and nonarterials. In 2001, freeways in Southeastern Wisconsin carried 55,100 vehicle-miles of traffic per mile on an average weekday, as compared to 8,300 vehicle-miles of traffic per mile on standard surface arterials, and 500 vehicle-miles of traffic per mile on collector and land access streets. Within Milwaukee County in 2001, freeways carried an average 102,300 vehicle-miles of traffic per mile on an average weekday.

Table 11

DISTRIBUTION OF EXISTING ARTERIAL STREET AND HIGHWAY MILEAGE WITHIN THE REGION BY COUNTY AND JURISDICTIONAL CLASSIFICATION: 2001

County	State			County		Local		Total	
	Trunk Highways (miles)	Connecting Streets (miles)	Percent of Total	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total
Kenosha	107.4	10.1	37.0	140.8	44.4	59.3	18.7	317.6	100.0
Milwaukee	175.3	87.3	33.6	87.7	11.2	431.5	55.2	781.8	100.0
Ozaukee	67.9	11.1	31.5	109.0	43.5	62.7	25.0	250.7	100.0
Racine	140.5	21.2	45.9	118.9	33.7	72.0	20.4	352.6	100.0
Walworth	193.0	18.4	48.4	168.9	38.7	56.3	12.9	436.6	100.0
Washington	173.3	14.4	46.2	149.8	36.9	69.0	16.9	406.5	100.0
Waukesha	220.5	18.4	32.1	351.7	47.1	155.4	20.9	746.0	100.0
Region	1,077.9	180.9	38.2	1,126.8	34.2	906.2	27.5	3,291.8	100.0

Source: Wisconsin Department of Transportation and SEWRPC.

The freeway system in Southeastern Wisconsin carries about 30 percent of all travel on an average weekday within Southeastern Wisconsin, as about 37 percent of all arterial street and highway system travel is carried on the freeway system, the arterial street and highway system carries about 90 percent of all street and highway traffic, and streets and highways carry about 90 to 95 percent of all travel within Southeastern Wisconsin.

Arterial Street System Traffic Congestion

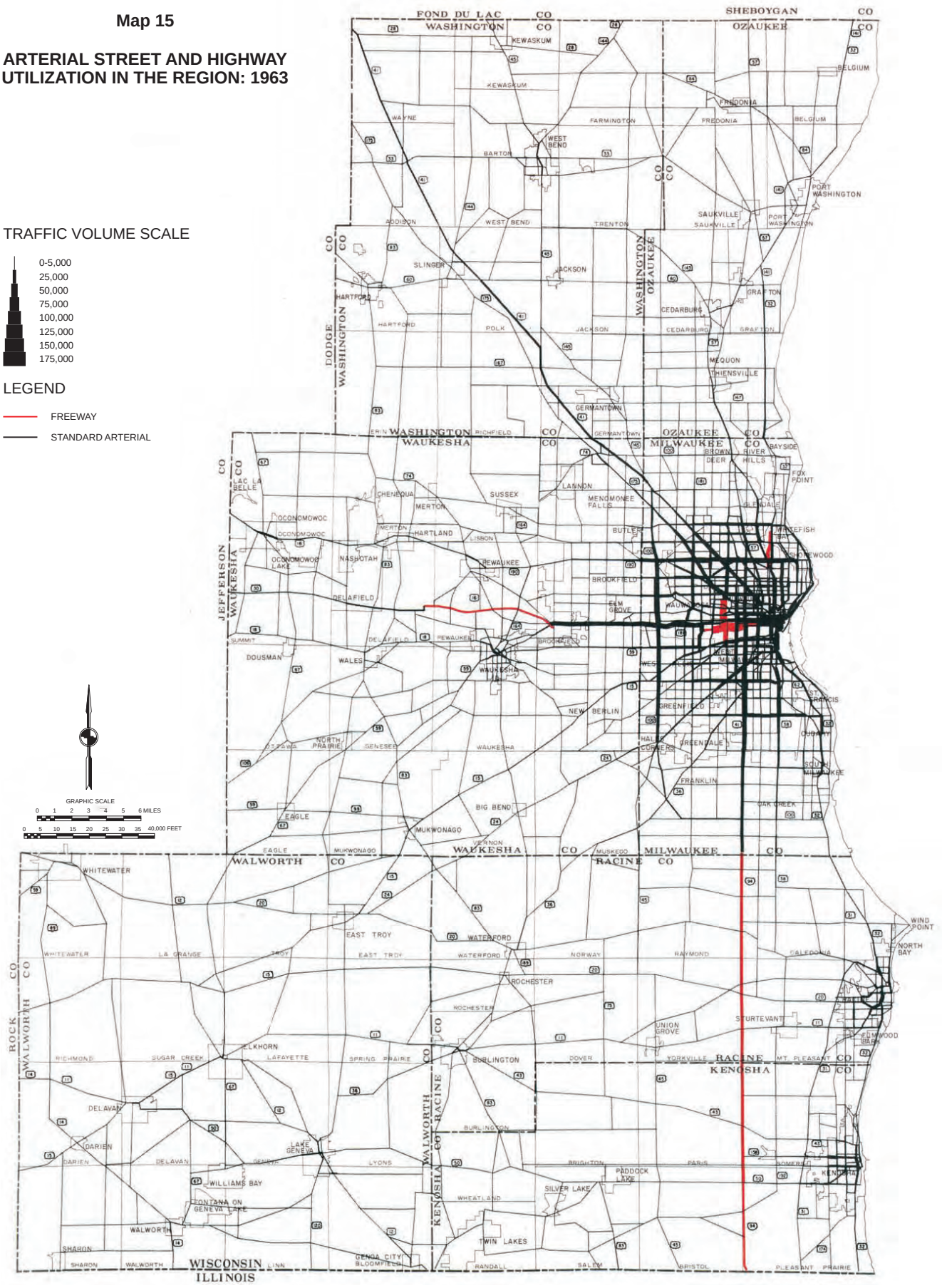
The traffic congestion on the arterial street and highway system can be assessed by comparing the average weekday traffic volume on each segment of arterial street and highway to its design capacity. Table 14 presents the estimated design capacity of freeway and surface arterial facilities, and the estimated traffic congestion which occurs as those design capacities are exceeded.

Table 15 and Map 16 present the existing level of traffic congestion experienced in the year 2001 on the arterial street system. Table 16 and Figure 12 present more detail on existing year 2001 congestion on the freeway system, and historic freeway congestion, including the number of hours of congestion experienced on congested freeway segments on an average weekday.

Table 17 and Figure 13 compare the estimated change in traffic congestion on the arterial street and highway system over the years 1963, 1972, 1991, and 2001. The miles of arterials carrying traffic volumes exceeding design capacity and experiencing traffic congestion declined from 217 miles in 1963 to 160 miles in 1972, even though traffic grew during that period by over 50 percent. The decline in traffic congestion may be attributed to the completion of the freeway system during that period. Between 1972 and 1991, the miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased from 160 miles to 273 miles, as traffic grew during that period by nearly 65 percent, as Regional employment and households increased by about 30 percent, and vehicle occupancy and carpooling significantly declined. The decline in vehicle occupancy from an average of 1.39 persons per vehicle to 1.22 persons per vehicle alone is estimated to have resulted in nearly a 15 percent increase in vehicle traffic. As well, limited transportation system improvement and expansion was completed between 1972 and 1991 in Southeastern Wisconsin. The miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased modestly from 273 miles in 1991 to 290 miles in 2001. During that period, traffic is estimated to have increased by about 21 percent. The modest increase in

Map 15

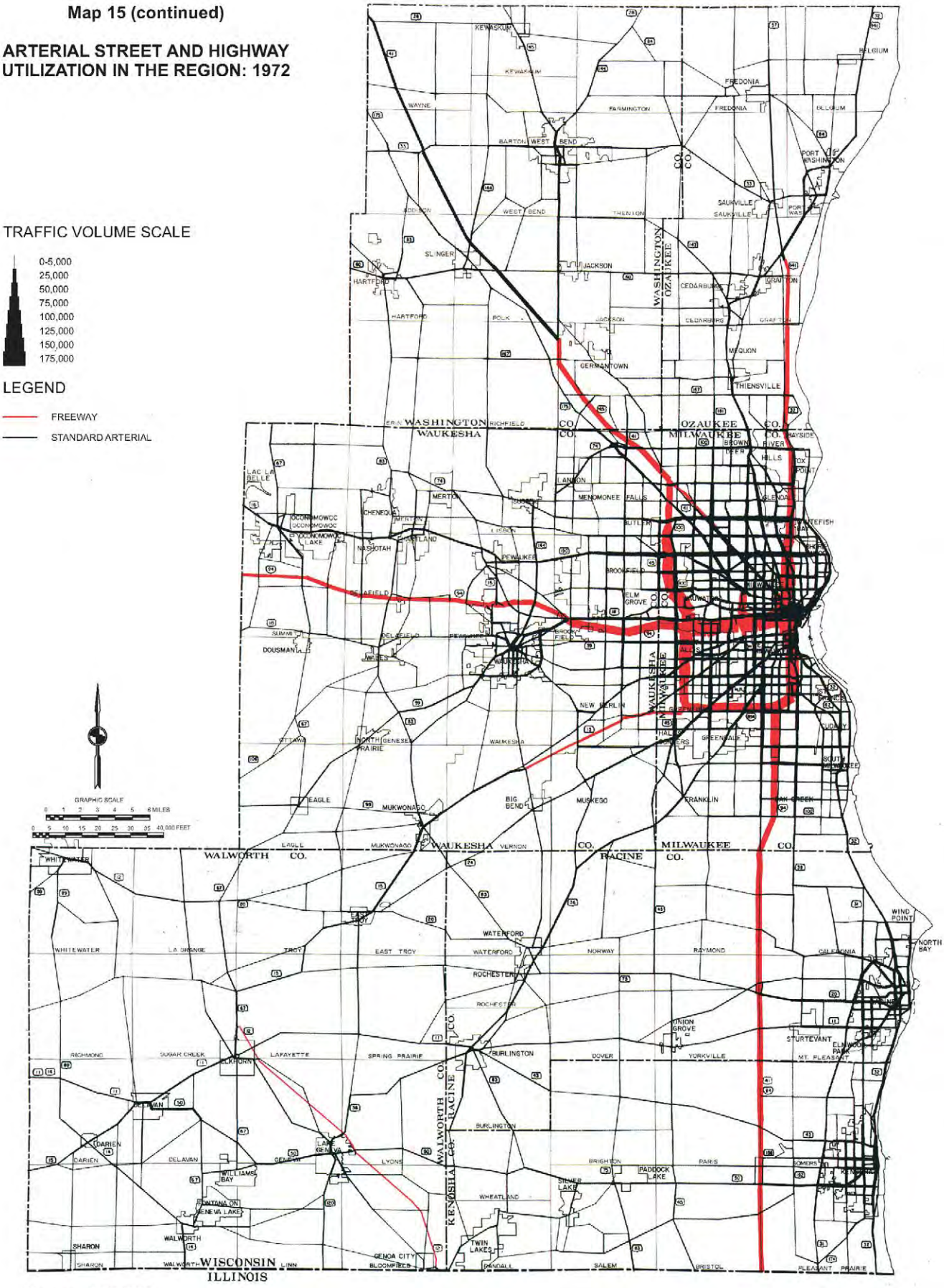
ARTERIAL STREET AND HIGHWAY UTILIZATION IN THE REGION: 1963



Source: SEWRPC.

Map 15 (continued)

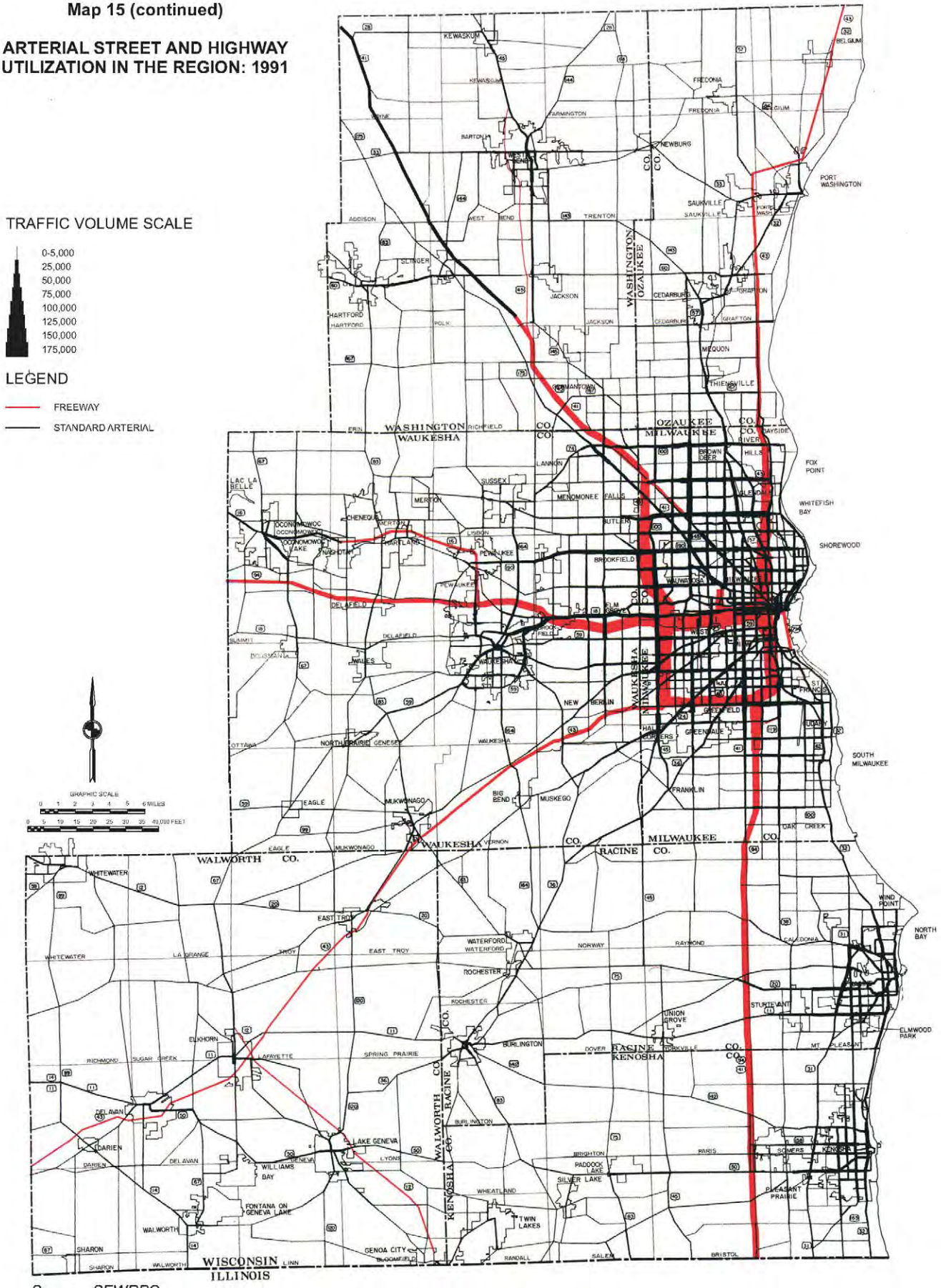
ARTERIAL STREET AND HIGHWAY UTILIZATION IN THE REGION: 1972



Source: SEWRPC.

Map 15 (continued)

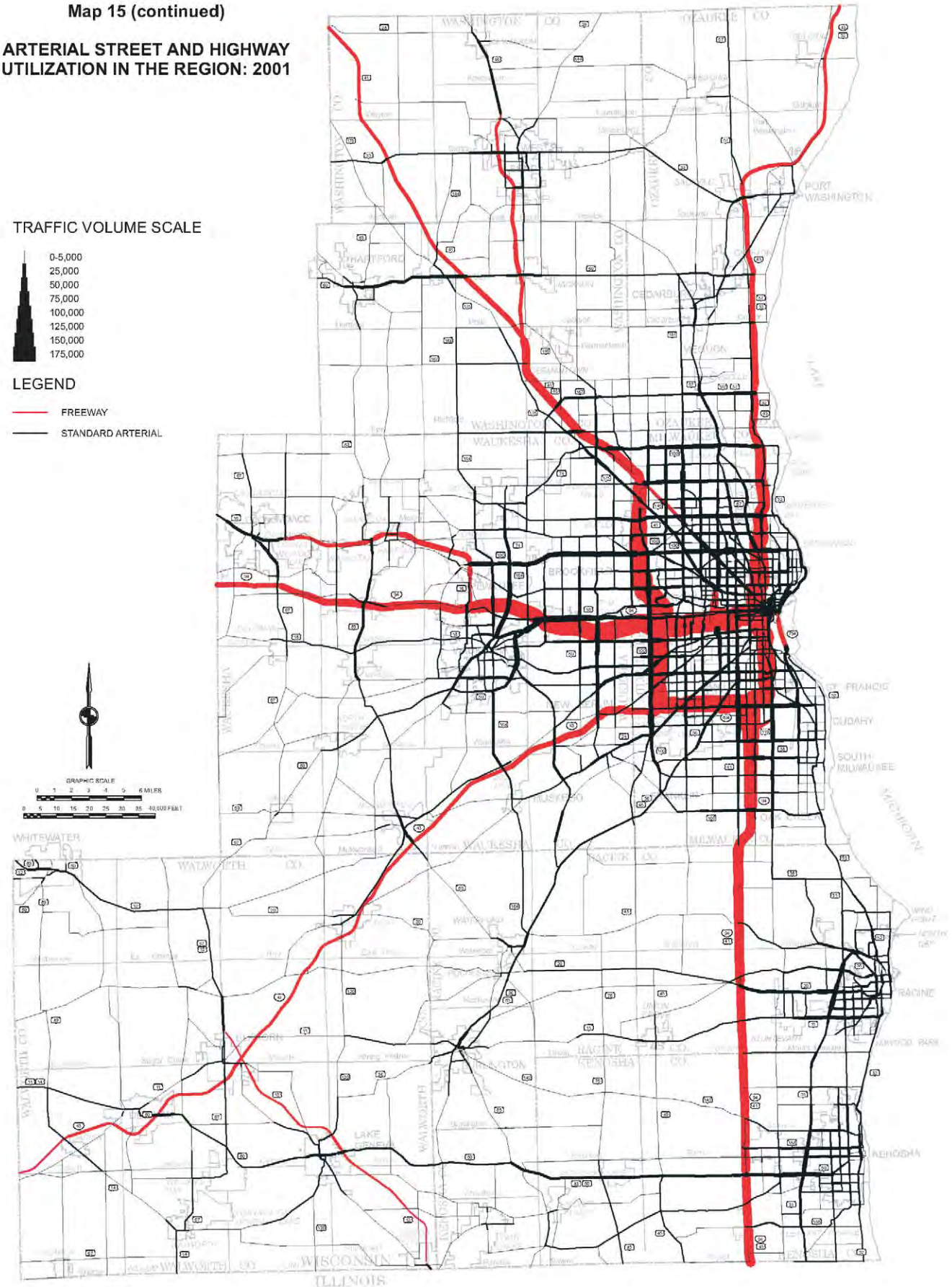
ARTERIAL STREET AND HIGHWAY UTILIZATION IN THE REGION: 1991



Source: SEWRPC.

Map 15 (continued)

ARTERIAL STREET AND HIGHWAY UTILIZATION IN THE REGION: 2001



Source: SEWRPC.

Table 12

ARTERIAL VEHICLE-MILES OF TRAVEL WITHIN THE REGION ON AN AVERAGE WEEKDAY BY COUNTY: 1963, 1972, 1991, AND 2001[a]

County	1963					
	Freeway		Standard Arterial		Total	
	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total
Kenosha	204	21.7	734	78.3	938	100.0
Milwaukee	531	7.2	6,817	92.8	7,348	100.0
Ozaukee	20	4.1	464	95.9	484	100.0
Racine	203	18.0	922	82.0	1,125	100.0
Walworth	- -	0.0	685	100.0	685	100.0
Washington	345	49.6	351	50.4	696	100.0
Waukesha	159	8.9	1,637	91.1	1,796	100.0
Region	1,462	11.2	11,610	88.8	13,072	100.0

County	1972					
	Freeway		Standard Arterial		Total	
	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total
Kenosha	382	26.8	1,046	73.2	1,428	100.0
Milwaukee	3,977	37.2	6,718	62.8	10,695	100.0
Ozaukee	223	26.2	627	73.8	850	100.0
Racine	415	22.9	1,398	77.1	1,813	100.0
Walworth	56	6.4	817	93.6	873	100.0
Washington	190	16.5	961	83.5	1,151	100.0
Waukesha	970	29.3	2,344	70.7	3,314	100.0
Region	6,213	30.9	13,911	69.1	20,124	100.0

County	1991					
	Freeway		Standard Arterial		Total	
	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total
Kenosha	675	27.0	1,825	73.0	2,500	100.0
Milwaukee	5,945	41.3	8,446	58.7	14,391	100.0
Ozaukee	762	39.2	1,180	60.8	1,942	100.0
Racine	708	23.9	2,258	76.1	2,966	100.0
Walworth	540	28.2	1,373	71.8	1,913	100.0
Washington	546	23.0	1,833	77.0	2,379	100.0
Waukesha	2,421	34.7	4,560	65.3	6,981	100.0
Region	11,597	35.1	21,475	64.9	33,072	100.0

County	2001					
	Freeway		Standard Arterial		Total	
	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total	Vehicle-Miles of Travel (thousands)	Percent of Total
Kenosha	805	25.8	2,321	74.2	3,126	100.0
Milwaukee	6,878	42.0	9,499	58.0	16,377	100.0
Ozaukee	951	42.1	1,308	57.9	2,259	100.0
Racine	864	25.5	2,519	74.5	3,383	100.0
Walworth	766	32.8	1,569	67.2	2,335	100.0
Washington	1,370	44.3	1,725	55.7	3,095	100.0
Waukesha	3,239	35.6	5,868	64.4	9,107	100.0
Region	14,873	37.5	24,809	62.5	39,682	100.0

[a] *Existing and historic estimates of arterial street system vehicle-miles of travel do not include vehicle miles of travel on freeway on- and off-ramps. An estimated 844,000 vehicle-miles of travel occurred on an average weekday in 2001 on the freeway on-ramps and off-ramps in Southeastern Wisconsin.*

Source: SEWRPC.

Table 13

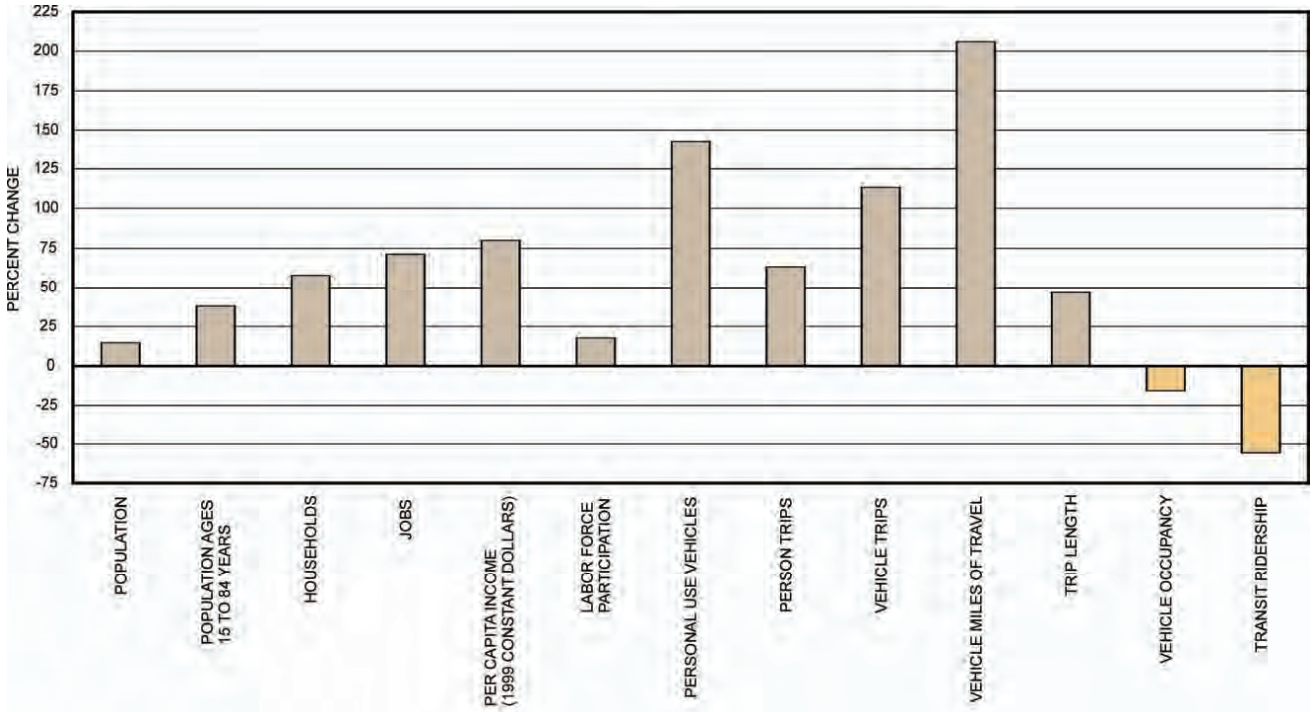
AVERAGE ANNUAL GROWTH RATE OF AVERAGE WEEKDAY VEHICLE-MILES OF TRAVEL WITHIN SOUTHEASTERN WISCONSIN BY COUNTY

County	Average Annual Growth Rate of Average Weekday Vehicle-Miles of Travel			
	1960s	1970s	1980s	1990s
Kenosha	4.8	3.4	2.7	2.2
Milwaukee	4.3	1.5	1.6	1.5
Ozaukee	6.5	4.1	4.6	1.4
Racine	5.4	2.7	2.5	1.3
Walworth	2.7	5.3	3.3	2.0
Washington	5.8	3.6	4.0	2.6
Waukesha	7.0	4.2	3.7	2.7
Region	4.9	2.7	2.6	1.9

Source: SEWRPC.

Figure 11

RELATIVE CHANGES IN SELECTED TRAVEL AND SOCIOECONOMIC CHARACTERISTICS WITHIN SOUTHEASTERN WISCONSIN: 1963 TO 2001



Source: SEWRPC.

Table 14

ESTIMATED FREEWAY AND SURFACE ARTERIAL FACILITY DESIGN CAPACITY AND ATTENDANT LEVEL OF CONGESTION[a]

Facility Type	Average Weekday Traffic Volumes (vehicles per 24 hours)			
	Design Capacity and Upper Limit of Level of Service C	Upper Limit of Moderate Congestion and Level of Service D	Upper Limit of Severe Congestion and Level of Service E	Extreme Congestion and Level of Service F
Freeway				
Four-lane	60,000	80,000	90,000	> 90,000
Six-lane	90,000	121,000	135,000	> 135,000
Eight-lane	120,000	161,000	180,000	> 180,000
Standard Arterial				
Two-lane	14,000	18,000	19,000	> 19,000
Four-lane Undivided	18,000	23,000	24,000	> 24,000
Four-lane with Two-way Left Turn Lane	21,000	29,000	31,000	> 31,000
Four-lane Divided	27,000	31,000	32,000	> 32,000
Six-lane Divided	38,000	45,000	48,000	> 48,000
Eight-lane Divided	50,000	60,000	63,000	> 63,000

The level of congestion on arterial streets and highways may summarized by the following operating conditions:

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Ability to maneuver and change lanes noticeably restricted.
Moderate	D	1 to 2 mph below free-flow speed	Ability to maneuver and change lanes more noticeably limited; reduced driver physical and psychological comfort levels.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Surface Arterial			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	70 to 100 percent of free-flow speed	Ability to maneuver within traffic stream is unimpeded. Control delay at signalized intersections is minimal.
None	C	50 to 100 percent of free-flow speed	Restricted ability to maneuver and change lanes at mid-block locations.
Moderate	D	40 to 50 percent of free-flow speed	Restricted ability to maneuver and change lanes. Small increases in flow lead to substantial increases in delay and decreases in travel speed.
Severe	E	33 to 40 percent of free-flow speed	Significant restrictions on lane changes. Traffic flow approaches instability.
Extreme	F	25 to 33 percent of free-flow speed	Flow at extremely low speeds. Intersection congestion with high delays, high volumes, and extensive queuing.

[a] *Design capacity is the maximum level of traffic volume a facility can carry before beginning to experience morning and afternoon peak traffic hour traffic congestion, and is expressed in terms of number of vehicles per average weekday.*

Source: SEWRPC

traffic congestion from 1991 to 2001 may be attributed to the implementation of an extensive number of significant surface arterial street and highway widening and new construction projects between 1991 and 2001. The estimated modest increase in congestion between 1991 and 2001 is not uniform systemwide, as for example, the extent and severity of congestion on the Milwaukee area freeway system is estimated to have substantially increased between 1991 and 2001 (see Table 16).

Table 15

TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION BY COUNTY: 2001

County	Under or At Design Capacity		Over Design Capacity						Total Mileage
			Moderate Congestion		Severe Congestion		Extreme Congestion		
	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	
Kenosha	303.2	95.5	9.9	3.1	1.5	0.5	3.0	0.9	317.6
Milwaukee	641.1	82.0	72.1	9.2	24.7	3.2	43.4	5.6	781.3
Ozaukee	244.2	97.4	4.3	1.7	1.5	0.6	0.8	0.3	250.8
Racine	341.3	96.8	9.4	2.7	0.5	0.1	1.4	0.4	352.6
Walworth	430.1	98.4	5.1	1.2	1.1	0.3	0.3	0.1	436.6
Washington	391.1	96.2	15.4	3.8	- -	- -	- -	- -	406.5
Waukesha	650.9	87.2	70.7	9.5	11.4	1.5	13.4	1.8	746.4
Region	3,001.9	91.2	186.9	5.7	40.7	1.2	62.3	1.9	3,291.8

Source: SEWRPC.

Traffic Safety—Vehicular Crashes

Traffic safety problems are typically identified by reviewing a three year history of traffic crash records and determining the crash rate—crashes per 100 million vehicle-miles of travel—on a roadway segment. Because a significant proportion—nearly 40 percent—of the vehicle miles of travel in the Region occurred on the freeway system in 2001—and the freeway system accounts for less than three percent of all streets and highways in the Region—the analysis of crash rates focused on the freeway system. Using the traffic crash history of the freeway system over a recent three year period of 1996, 1997, and 1998, the traffic crash rate for each one-tenth mile segment of the 270 mile regional freeway system was estimated for the three year period. The estimated traffic crash rate, expressed as the number of crashes per 100 million vehicle-miles for each freeway segment, was compared to both the regional freeway system average crash rates and the average crash rate for freeways within the county within which the freeway segment was located.

The average freeway crash rates within southeastern Wisconsin and within each of the seven counties of southeastern Wisconsin are shown on Figure 14. Only the Milwaukee County freeway crash rate, 106 crashes per 100 million vehicle-miles, is greater than the Region average freeway crash rate of 77 crashes per 100 million vehicle-miles.

Map 17 displays those freeway segments within southeastern Wisconsin with average traffic crash rates which exceed the regional average freeway crash rate. Within each county there are freeway segments which exceed the regional average crash rate.

Maps 18 through 24 display for each of the seven counties, those freeway segments which exceed the average crash rate for freeways within each county.

A three year period of historic freeway system traffic crash data was also analyzed by overall crash rate and the crash rate for four specific crash types—fixed object, rear end, angle, and sideswipe. Comparison of the crash rate on 16 segments of the regional freeway system to the level of traffic congestion—uncongested, moderately congested, severely congested, or extremely congested—on each segment indicated that the rear end crash rate with the level of traffic congestion (see Table 18). Rear end crash rates were five to 15 times greater for congested freeway segments than for uncongested freeway segments, with the highest rear end crash rates on the most extremely congested freeway segments.

Map 16

CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION: 2001



Table 16

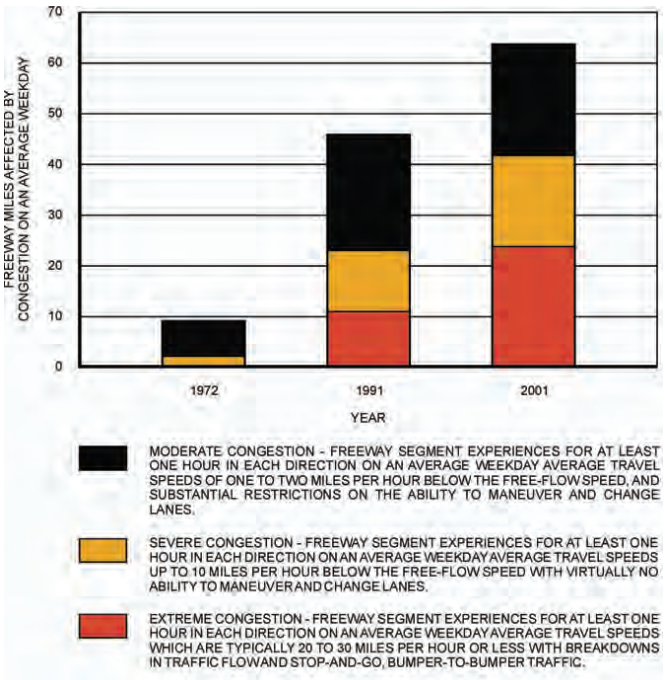
ESTIMATED EXISTING SOUTHEASTERN WISCONSIN FREEWAY SYSTEM TRAFFIC CONGESTION ON AN AVERAGE WEEKDAY: 1972, 1991, AND 2001

Year	Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
		Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
2001	Extreme	24	8.9	1.4	3.3	4.4	9.1
	Severe	18	6.7	- -	1.5	2.5	4.0
	Moderate	22	8.1	- -	- -	2.1	2.1
	Total	64	23.7	- -	- -	- -	- -
1991	Extreme	11	4.4	1.0	2.1	3.1	6.2
	Severe	12	4.8	- -	1.1	2.9	4.0
	Moderate	23	9.1	- -	- -	2.3	2.3
	Total	46	18.3	- -	- -	- -	- -
1972	Extreme	- -	- -	- -	- -	- -	- -
	Severe	2	1.2	- -	1.0	3.0	4.0
	Moderate	7	4.3	- -	- -	2.8	2.8
	Total	9	5.5	- -	- -	- -	- -

Source: SEWRPC.

Figure 12

ESTIMATED EXISTING SOUTHEASTERN WISCONSIN FREEWAY SYSTEM TRAFFIC CONGESTION ON AN AVERAGE WEEKDAY: 1972, 1991, AND 2001



Source: SEWRPC.

PUBLIC TRANSIT

This section of this chapter describes the existing provision and utilization of public transit within the Region. Public transit may be defined as the transportation of people by publicly operated vehicles between trip origins and destinations. A classification of all public transportation provided in the Region is shown in Figure 15. Public transportation may be divided into service provided for the general public and service provided to special population groups. Examples of special group public transportation include yellow school bus service operated by area school districts, and fixed-route bus and paratransit van service provided by counties or municipalities for the elderly and disabled. Service to special population groups is considered only implicitly in the planning process, with the exception of paratransit operated within urban fixed-route transit service areas to meet the transportation needs of those persons who because of mental or physical disability are unable to use conventional transit service. Such service is required to be provided within fixed-route urban transit service areas under the Federal Americans with Disabilities Act of 1990, and the costs of such service are explicitly considered by the Commission in regional transportation planning.

As shown in Figure 15, public transit service to the general public may further be divided into three categories: intercity, urban, and rural. Intercity or interregional public transportation provides service across regional boundaries and includes Amtrak railway passenger service, interregional bus service, and commercial air travel. Rural—and small

Table 17

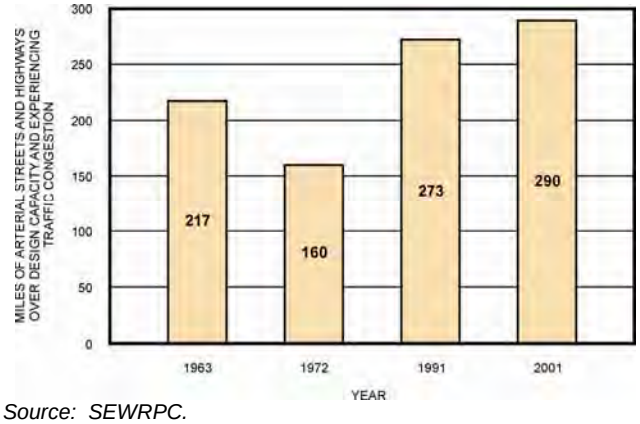
TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION: 1963, 1972, 1991, AND 2001

Traffic Congestion	Arterial Street and Highway Mileage			
	1963	1972	1991	2001
Under or At Design Capacity	2,971	2,959	2,986	3,002
Over Design Capacity and Experiencing Traffic Congestion	217	160	273	290
Total	3,188	3,119	3,259	3,292

Source: SEWRPC.

Figure 13

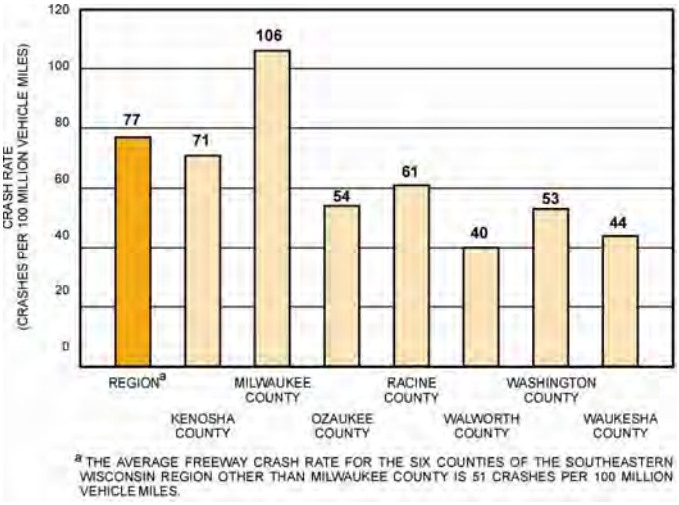
TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION: 1963, 1972, 1991, AND 2001



Source: SEWRPC.

Figure 14

FREEWAY CRASH RATES WITHIN THE SOUTHEASTERN WISCONSIN REGION: 1996-1998



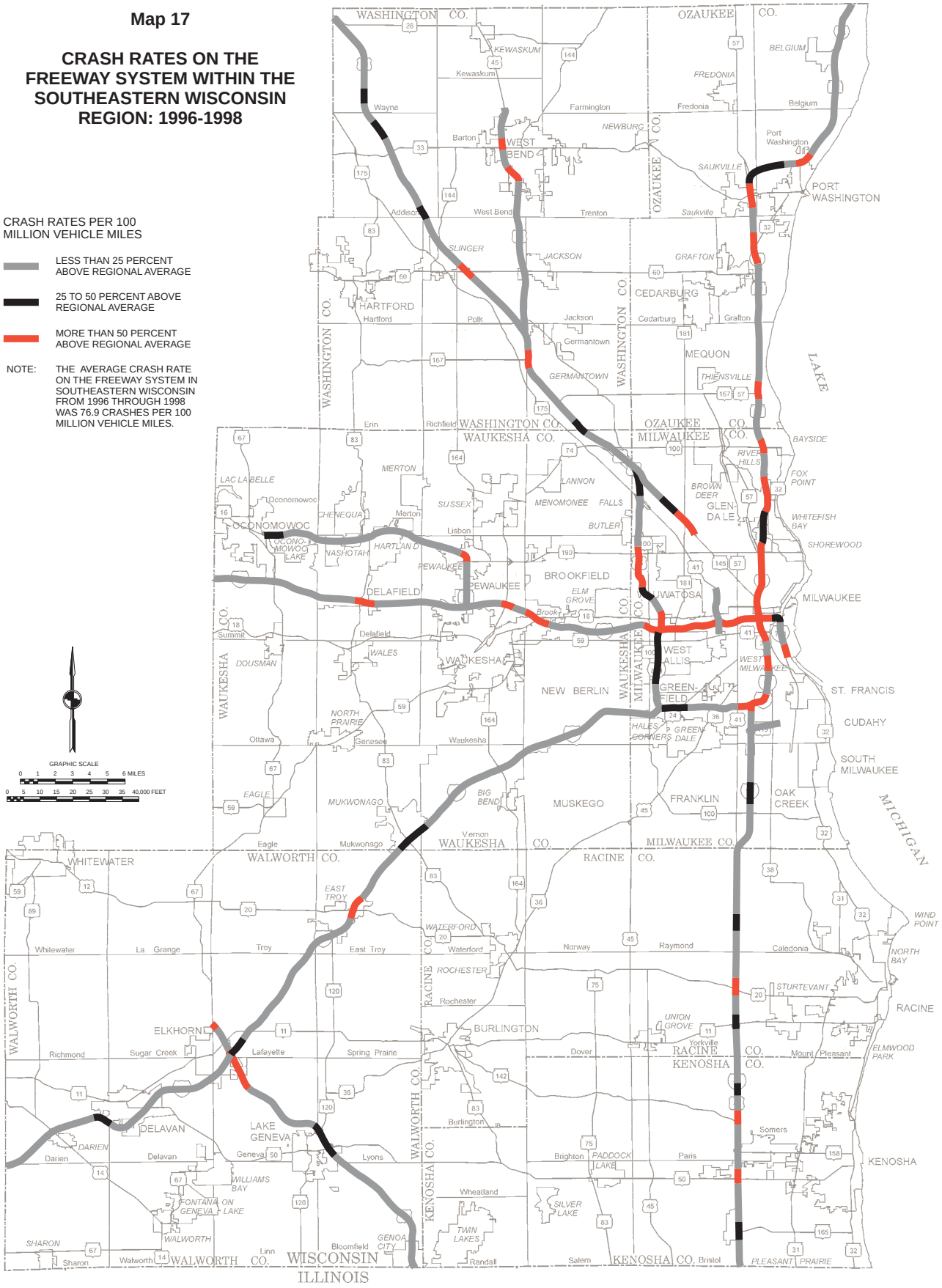
Source: Wisconsin Department of Transportation and SEWRPC.

urban community—public transportation provides service in and between small urban communities and rural areas, and may provide connections to urban areas. Urban public transportation, commonly referred to as public transit, provides service within and between the large urban areas of the Region. Public transit is essential in any metropolitan area to meet the travel needs of persons unable to use personal automobile transportation; to provide an alternative mode of travel, particularly in heavily traveled corridors within and between urban areas and in densely developed urban communities and activity centers; and to provide choice in transportation modes as an enhancement of quality of life and to support and enhance the Region's economy.

The public transit principally addressed in the Commission's regional transportation system planning is urban public transit—the public transit which serves intraregional travel demand, which is open to serving the general public, and which operates within and between the Region's large urban areas. This includes the urban fixed-route bus transit systems operated by Ozaukee, Milwaukee, Washington, and Waukesha Counties and the Cities of Kenosha, Racine, and Waukesha. The Commission's regional transportation planning also addresses rural—and small urban

Map 17

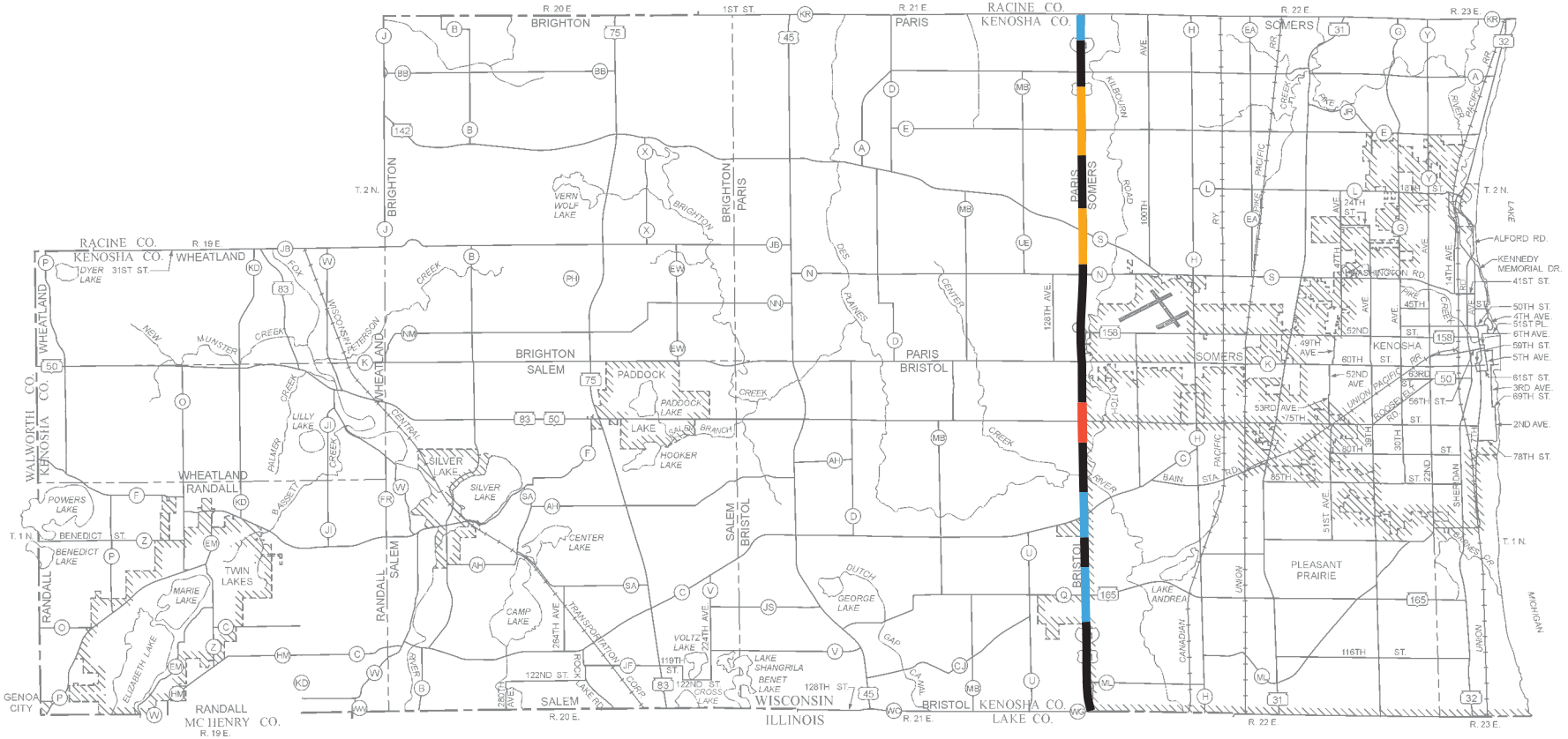
CRASH RATES ON THE FREEWAY SYSTEM WITHIN THE SOUTHEASTERN WISCONSIN REGION: 1996-1998



Source: Wisconsin Department of Transportation.

Map 18

CRASH RATES ON THE FREEWAY SYSTEM IN KENOSHA COUNTY: 1996-1998



PERCENT OF COUNTYWIDE
FREEWAY AVERAGE CRASH RATE

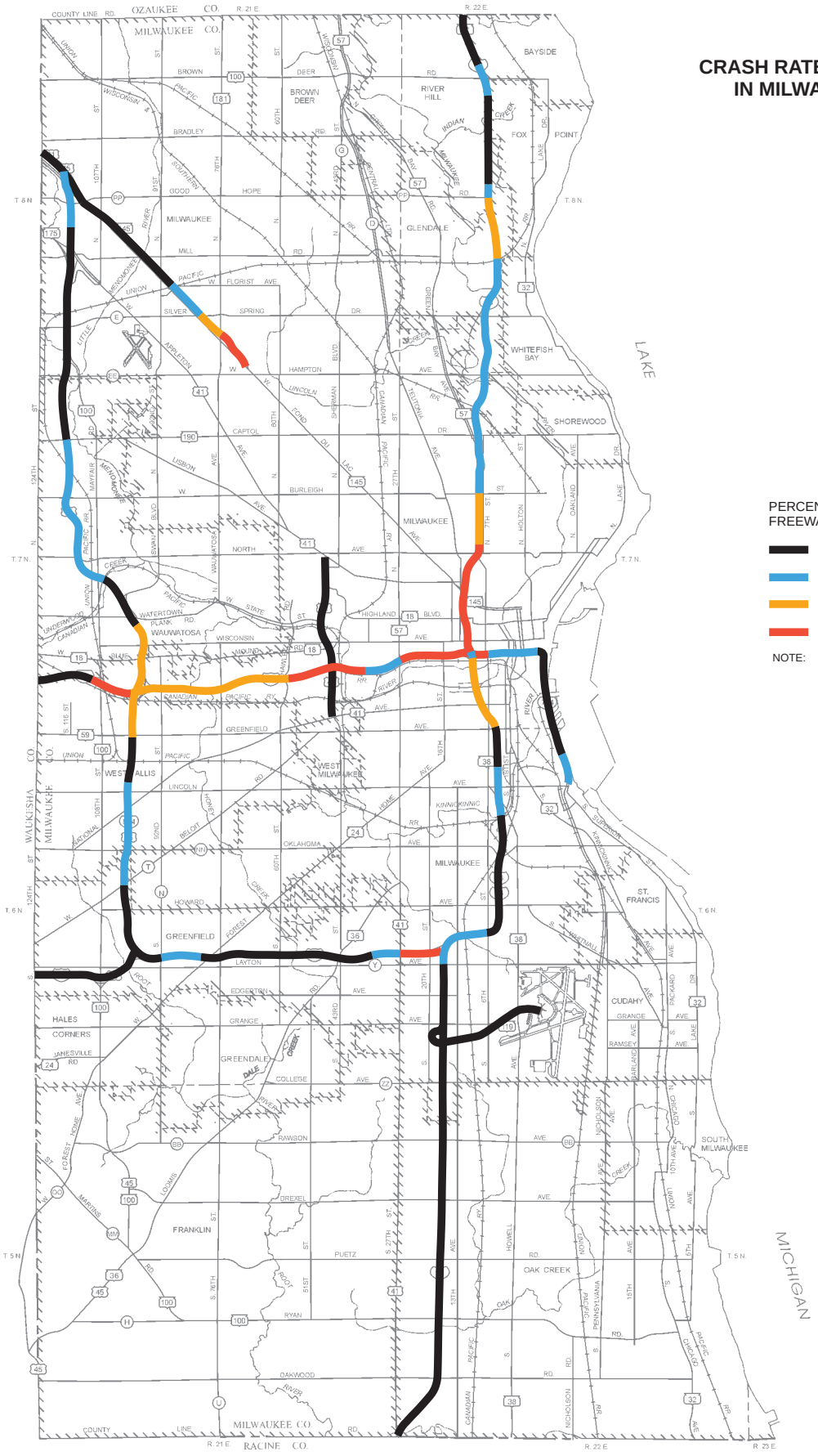
- AT OR BELOW COUNTYWIDE AVERAGE
- 1 PERCENT TO 50 PERCENT ABOVE
- 51 PERCENT TO 100 PERCENT ABOVE
- MORE THAN 100 PERCENT ABOVE

NOTE: THE AVERAGE CRASH RATE ON THE FREEWAY SYSTEM IN KENOSHA COUNTY FROM 1996 THROUGH 1998 WAS 70.6 CRASHES PER 100 MILLION VEHICLE MILES.

Source: Wisconsin Department of Transportation.

Map 19

CRASH RATES ON THE FREEWAY SYSTEM IN MILWAUKEE COUNTY: 1996-1998



PERCENT OF COUNTYWIDE FREEWAY AVERAGE CRASH RATE

- AT OR BELOW COUNTYWIDE AVERAGE
- 1 PERCENT TO 50 PERCENT ABOVE
- 51 PERCENT TO 100 PERCENT ABOVE
- MORE THAN 100 PERCENT ABOVE

NOTE: THE AVERAGE CRASH RATE ON THE FREEWAY SYSTEM IN MILWAUKEE COUNTY FROM 1996 THROUGH 1998 WAS 106.1 CRASHES PER 100 MILLION VEHICLE MILES.

GRAPHIC SCALE

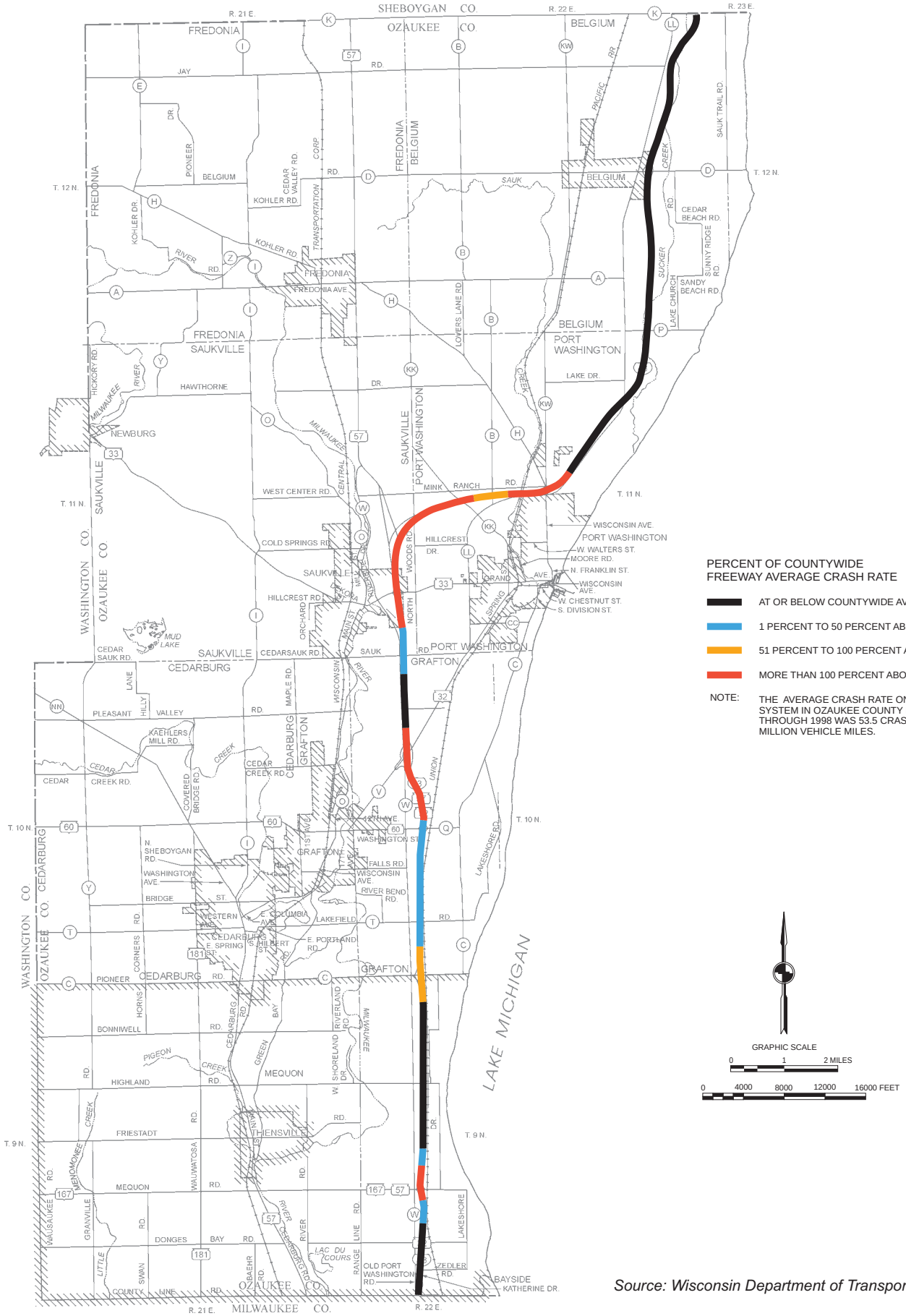
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: Wisconsin Department of Transportation.

Map 20

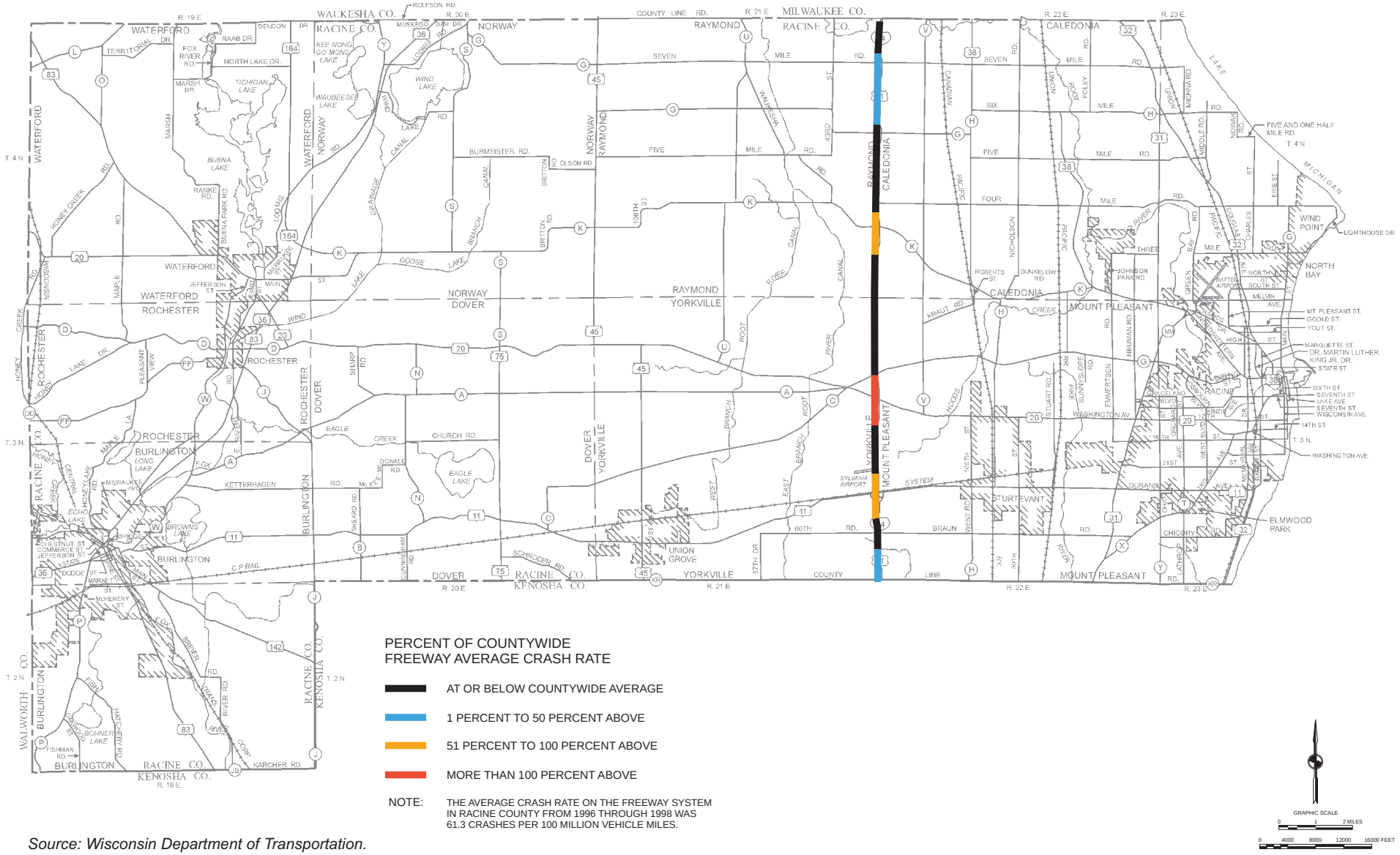
CRASH RATES ON THE FREEWAY SYSTEM IN OZAUKEE COUNTY: 1996-1998



Source: Wisconsin Department of Transportation.

Map 21

CRASH RATES ON THE FREEWAY SYSTEM IN RACINE COUNTY: 1996-1998



Source: Wisconsin Department of Transportation.

Map 22

CRASH RATES ON THE FREEWAY SYSTEM IN WALWORTH COUNTY: 1996-1998



PERCENT OF COUNTYWIDE
FREEWAY AVERAGE CRASH RATE

- AT OR BELOW COUNTYWIDE AVERAGE
- 1 PERCENT TO 50 PERCENT ABOVE
- 51 PERCENT TO 100 PERCENT ABOVE
- MORE THAN 100 PERCENT ABOVE

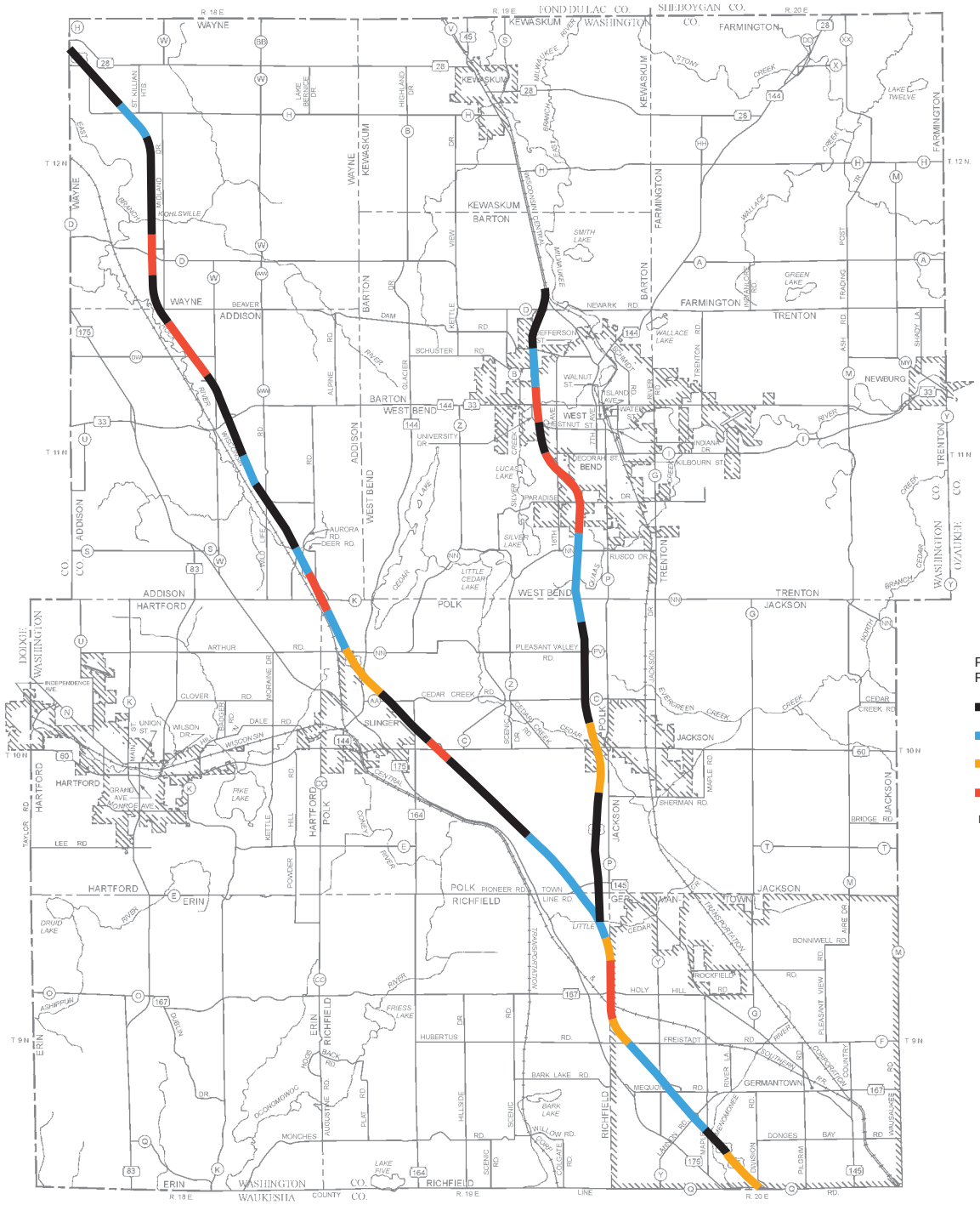
NOTE: THE AVERAGE CRASH RATE ON THE FREEWAY SYSTEM IN WALWORTH COUNTY FROM 1996 THROUGH 1998 WAS 40.3 CRASHES PER 100 MILLION VEHICLE MILES.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: Wisconsin Department of Transportation.

Map 23

CRASH RATES ON THE FREEWAY SYSTEM IN WASHINGTON COUNTY: 1996-1998



PERCENT OF COUNTYWIDE FREEWAY AVERAGE CRASH RATE

- AT OR BELOW COUNTYWIDE AVERAGE
- 1 PERCENT TO 50 PERCENT ABOVE
- 51 PERCENT TO 100 PERCENT ABOVE
- MORE THAN 100 PERCENT ABOVE

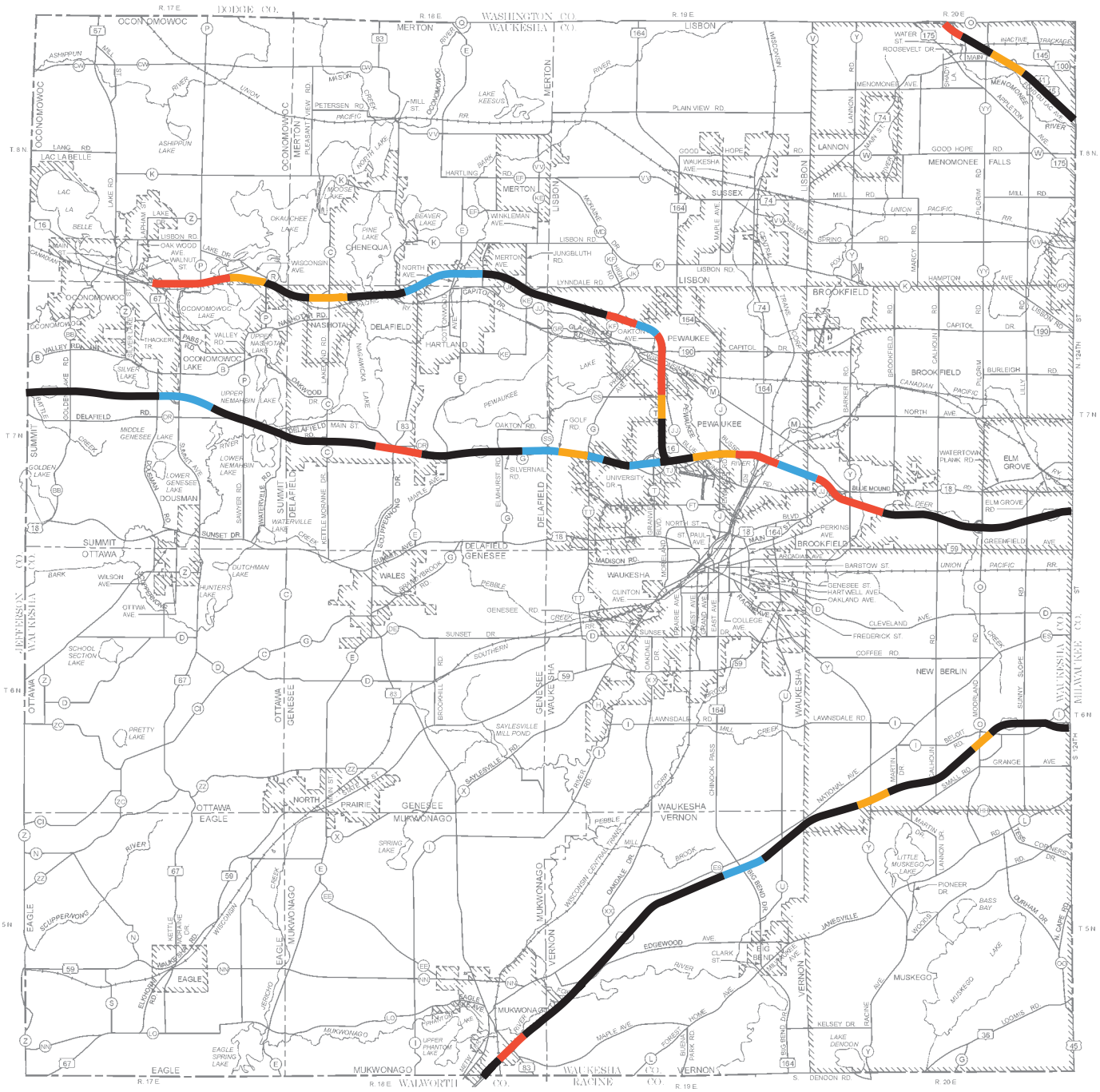
NOTE: THE AVERAGE CRASH RATE ON THE FREEWAY SYSTEM IN WASHINGTON COUNTY FROM 1996 THROUGH 1998 WAS 52.8 CRASHES PER 100 MILLION VEHICLE MILES.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: Wisconsin Department of Transportation.

Map 24

CRASH RATES ON THE FREEWAY SYSTEM IN WAUKESHA COUNTY: 1996-1998



PERCENT OF COUNTYWIDE
FREEWAY AVERAGE CRASH RATE

- AT OR BELOW COUNTYWIDE AVERAGE
- 1 PERCENT TO 50 PERCENT ABOVE
- 51 PERCENT TO 100 PERCENT ABOVE
- MORE THAN 100 PERCENT ABOVE

NOTE: THE AVERAGE CRASH RATE ON THE FREEWAY SYSTEM IN WAUKESHA COUNTY FROM 1996 THROUGH 1998 WAS 43.7 CRASHES PER 100 MILLION VEHICLE MILES.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: Wisconsin Department of Transportation.

Table 18

COMPARISON OF SELECTED HISTORIC CRASH RATES TO LEVELS OF CONGESTION BY SEGMENT OF THE REGIONAL FREEWAY SYSTEM IN SOUTEASTERN WISCONSIN[a]

Freeway Segment	Level of Traffic Congestion in 1999	Crash Rate Per 100 Million Vehicle Miles of Travel				
		Overall	Fixed Object	Rear End	Angle	Side Swipe
IH 94 in Kenosha and Racine Counties.....	Uncongested	65	34	14	7	9
USH 41/45 from STH 145 to STH 167	Uncongested	24	12	5	3	3
USH 41/45 from STH 167 to STH 28	Uncongested	57	37	8	5	6
IH 43 from Hale Interchange to USH 14.....	Uncongested	34	17	7	5	5
STH 16 from IH 94 to STH 67	Uncongested	41	20	6	9	6
IH 94 from STH 16 to Jefferson County line.....	Uncongested to Moderate	43	19	12	4	5
IH 794 from Marquette Interchange to Carferry Drive	Uncongested to Moderate	82	36	32	6	7
IH 94 from Milwaukee-Racine County line to Mitchell Interchange	Uncongested to Extreme	43	14	13	3	11
IH 94 from Zoo Interchange to STH 16	Moderate to Extreme	62	15	28	9	8
IH 894 from-Mitchell Interchange to Hale Interchange	Severe	75	19	33	8	15
IH 94 from Mitchell Interchange to Marquette Interchange	Severe to Extreme	103	26	47	5	24
USH 45 from Zoo Interchange to STH 145	Severe to Extreme	92	22	40	4	18
IH 894 from Hale Interchange to Zoo Interchange	Severe to Extreme	86	21	49	3	16
IH 94 from Stadium Interchange to Marquette Interchange	Extreme	156	19	114	3	2
IH 94 from Zoo Interchange to Stadium Interchange	Extreme	168	29	114	5	18
IH 43 from Marquette Interchange to Sheboygan County line	Uncongested to Extreme	115	32	53	7	21

[a] *The data in this table were derived from data set forth in Table 7 of a draft document dated August 3, 2001, prepared by the Wisconsin Department of Transportation entitled* System-wide Crash Analysis Information Report. *The data is for the years 1996, 1997, and 1998.*

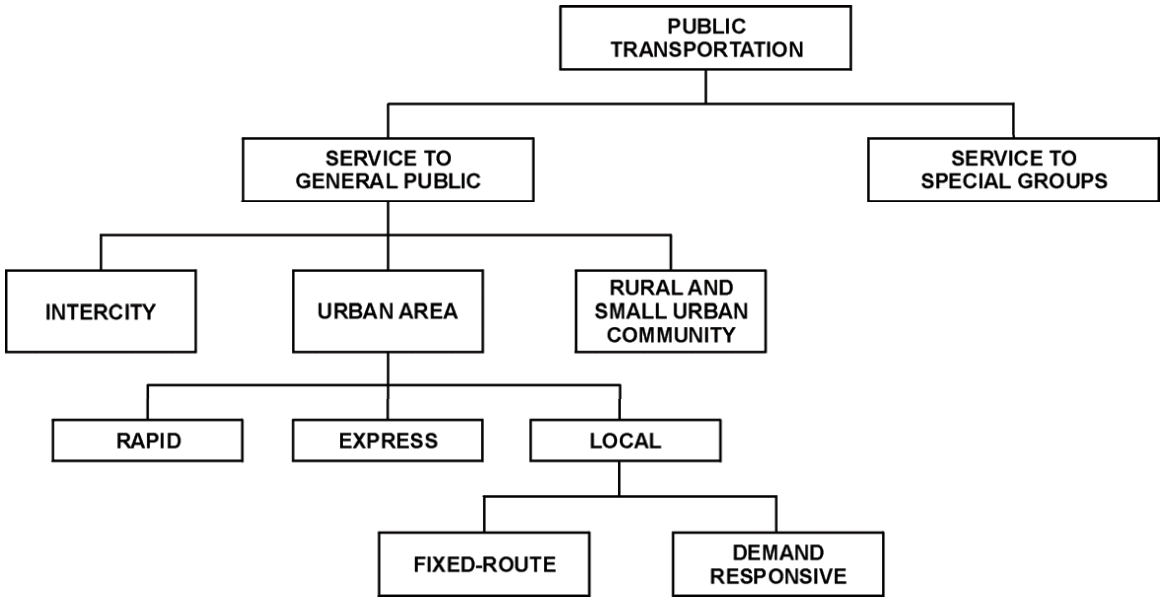
Source: Wisconsin Department of Transportation and SEWRPC.

community public transit—public transit which also serves intraregional travel demand, is open to the general public, and operates within the Region's small urban communities and rural areas. This includes nonfixed-route shared-ride taxi systems operated by Ozaukee and Washington Counties, and the Cities of Hartford, Port Washington, Whitewater, and West Bend.[1] Interregional public transit service is considered by the Wisconsin Department of Transportation in statewide transportation planning. Regional transportation planning incorporates this statewide planning, and recognizes that terminal and intermodal facilities, such as airports and intercity bus and railway stations, may comprise major trip generators affecting internal travel demand and patterns. Interregional commercial air travel is explicitly considered by the Commission under a separate comprehensive regional airport system planning program. Interregional public transportation travel has historically represented about 5 to 15 percent of all public transportation travel on an average weekday, about 5 percent of all interregional travel on an average weekday, and less than 0.5 percent of all person travel within the Region on an average weekday.

[1]*Fixed-route public transportation operates relatively large vehicles over predetermined routes on regular schedules between or along concentrations of related trip origins and destinations. Nonfixed-route public transportation provides service on a demand-responsive or as-requested basis, and is characterized by the flexible routing and scheduling of relatively small vehicles to provide shared-occupancy door-to-door transportation. Such nonfixed-route demand-responsive transit service is also referred to as paratransit service.*

Figure 15

CLASSIFICATION OF PUBLIC TRANSPORTATION



Source: SEWRPC.

Urban public transit may be further divided into rapid, express, and local levels of service. Rapid transit is intended to facilitate relatively fast and convenient transportation along heavily traveled corridors and between major activity centers and high- and medium-density urban centers and communities within the Region. Rapid transit has relatively high average operating speeds and relatively low accessibility, with station spacing one to three miles or more apart. Rapid transit service can be provided by commuter, heavy, or light rail operating over exclusive, grade-separated rights-of-way or by motor buses operating over exclusive, grade-separated busways. Rapid transit can also be provided by motor buses operating in mixed traffic on freeways and by light rail operating over exclusive, though not fully grade-separated, rights-of-way.

Express transit service is provided over arterial streets and highways or on exclusive rights-of-way with stops generally one-quarter to two miles apart at intersecting transit routes, intersecting arterial streets, and major traffic generators. Express transit serves trips of moderate length and can be provided by motor bus, guided electric bus, or by light rail operating in mixed traffic on shared rights-of-way, in reserved street lanes, or on exclusive rights-of-way. Express transit service provides a greater degree of accessibility at somewhat slower operating speeds than rapid transit and may provide “feeder” service to the rapid transit system.

Local transit service is characterized by a high degree of accessibility and low operating speeds. Local service is provided over arterial and collector streets with stops generally one-eighth to one-quarter miles apart. Such service can be provided by motor bus, electric trolleybus, or streetcar. Local transit service can also be provided on a demand-responsive basis, such as with automobiles or vans operating as a shared-ride taxi.

Urban Public Transit

Rapid Transit

Rapid transit service within the Region in 2001 consisted of 20 motor-bus routes operating primarily over the freeway system with extensions over major arterial highways to serve communities or major trip generators located off the freeway system. These routes principally served and connected the Milwaukee urban area with extensions beyond the urban areas in Ozaukee, Walworth, Washington, and Waukesha Counties. Twelve "freeway flyer" bus routes were provided by Milwaukee County and operated by the Milwaukee County Transit System. Four routes were provided by Waukesha County. One route between the Village of Menomonee Falls and the central business district (CBD) of Milwaukee was operated for Waukesha County by the Milwaukee County Transit System. The other three routes between the City of Waukesha, City of Oconomowoc, and the Village of Mukwonago and the Milwaukee CBD were operated for Waukesha County by Wisconsin Coach Lines, Inc., a private transit operator (see Map 25). Selected bus trips on the Waukesha-Milwaukee route were extended to serve the University of Wisconsin-Milwaukee. Ozaukee County provided one route between the City of Port Washington and central Milwaukee County, including the Milwaukee CBD, operated by the Milwaukee County Transit System. The remaining three routes were provided by Washington County between the Cities of Hartford and West Bend and central Milwaukee County, including the Milwaukee CBD, and were operated under contract by Riteway Bus Service, Inc. Both Ozaukee and Washington Counties also provided connecting shuttle bus and van services as extensions of the rapid bus routes to serve major employment centers.

During 2001, rapid transit service was operated primarily during weekday peak periods from 6:00 a.m. to 8:30 a.m. and from 3:30 p.m. to 6:30 p.m. Rapid service during weekday off-peak periods was limited to that provided only over selected routes in Milwaukee County serving the University of Wisconsin-Milwaukee (UWM), on the Waukesha County route operated between Waukesha and Milwaukee, and on routes operated by Ozaukee and Washington Counties to serve major employment centers in each county. On weekends, service was provided only on the Waukesha-Milwaukee route. During weekday peak periods, headways on the rapid transit services ranged from 12 to 30 minutes on the routes operated within Milwaukee County and from 15 to 60 minutes on the routes serving adjacent Ozaukee, Washington and Waukesha Counties. Headways were generally hourly on the service operated during weekday midday and evening periods, and at least two to three hours on the Waukesha-Milwaukee service provided on weekends. The adult cash fare for rapid transit service within Milwaukee County was $1.80 per trip while the adult fares charged between points in the adjacent counties and Milwaukee County ranged from $1.25 to $3.00 per trip.

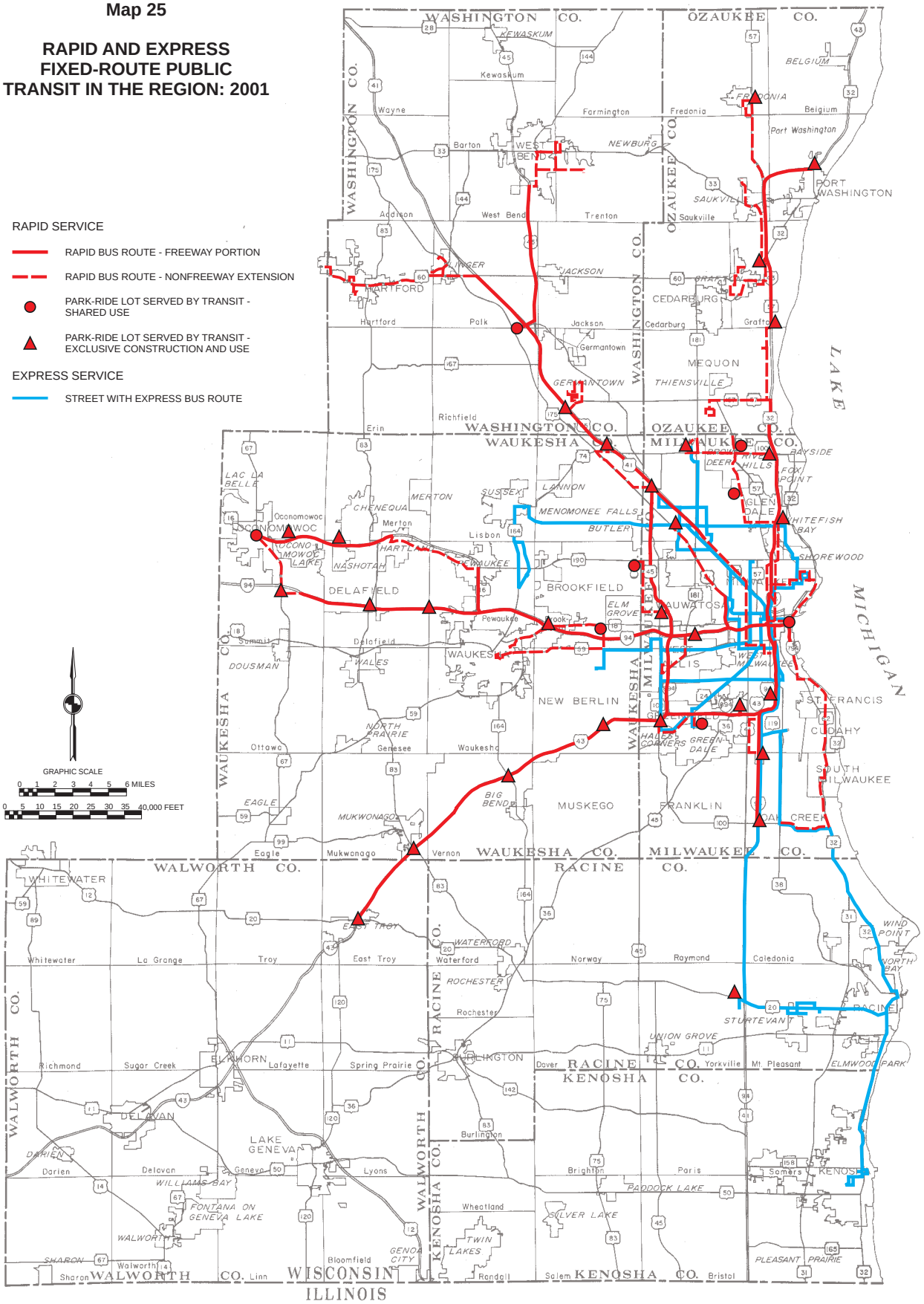
In the fall of 2004, rapid transit service within the Region was provided over 18 bus routes. The reduction reflects the elimination of one Milwaukee County Transit System freeway flyer route through combination with another route, the elimination of two Washington County routes that connected Milwaukee County workers with Washington County employment centers, and the addition of a new Washington County route connecting Washington County residents with the Milwaukee County Regional Medical Center and the Mayfair Shopping Center. In addition, the rapid transit services provided by Ozaukee and Waukesha Counties were reduced in 2004 through the elimination of some bus trips on the Ozaukee County service and the elimination of weekend service on the Waukesha County route operated between Waukesha and Milwaukee. Service periods and headways on the other rapid transit services were similar to those operated in 2001. The 2004 adult cash fare for rapid transit service within Milwaukee County was $2.05 per trip while the adult cash fares charged between points in the adjacent counties and Milwaukee County ranged from $2.25 to $3.00 per trip.

Express Transit

Express transit service provided within the Region in 2001 is shown on Map 25 and included service provided over a total of eleven motor bus routes. Seven express routes were operated by the Milwaukee County Transit System including three routes serving the Milwaukee CBD, three routes serving the UWM, and one special route operated on weekends to serve a Milwaukee County correctional facility. Milwaukee County, Waukesha County, and Quad Graphics, Inc., sponsored the operation of two other Milwaukee County Transit System routes operated between Milwaukee County and the Quad Graphics, Inc., plants in Waukesha County. Two express routes were operated by the

Map 25

RAPID AND EXPRESS FIXED-ROUTE PUBLIC TRANSIT IN THE REGION: 2001



Source: SEWRPC.

City of Racine, one operated directly by the City transit system between a transfer point with other City bus routes near J.I. Case High School in Mount Pleasant and an industrial park at IH 94 and STH 20 in Yorkville and one operated by Wisconsin Coach Lines, Inc. between the Milwaukee CBD and the Cities of Racine and Kenosha that has been sponsored by the City since 1984.

The most extensive express service in the Region in 2001 was provided on the Milwaukee County Transit System express route operated between the Northridge Shopping Center and the Milwaukee CBD, with service operated at about 10- to 15-minute headways during weekday peak travel periods, at 20- to 30-minute headways during weekday off-peak travel periods and on weekends. Weekday and weekend service was also operated over the express route operated between the Milwaukee CBD and the Cities of Racine and Kenosha with headways of 15 to 60 minutes during weekday peak periods and one to three hours during weekday off-peak periods and on weekends. Service over the other express routes operated by the Milwaukee County Transit System and the City of Racine transit system was largely operated during weekday peak periods and had headways ranging from 15 to 60 minutes. The adult cash fare charged for the express transit service operated by the Milwaukee County Transit System in 2001 was $1.50 per trip while the adult cash fares charged for the services operated or sponsored by the City of Racine ranged from $1.00 to $4.00 per trip.

In the fall of 2004, express transit service within the Region was provided over five bus routes. The difference from 2001 of six bus routes reflects service reductions implemented by the Milwaukee County Transit System due to budgetary constraints which caused the system to eliminate the three express routes serving the Milwaukee CBD, two routes serving the UWM, and one route serving the Quad Graphics Plant in the City of New Berlin. The service periods and headways on the remaining express services in the Region were similar to those operated in 2001. The adult cash fare for express transit service within Milwaukee County was $1.75 per trip while the adult cash fares charged for the services operated or sponsored by the City of Racine ranged from $1.25 to $4.00 per trip.

Local Transit: Fixed-Route

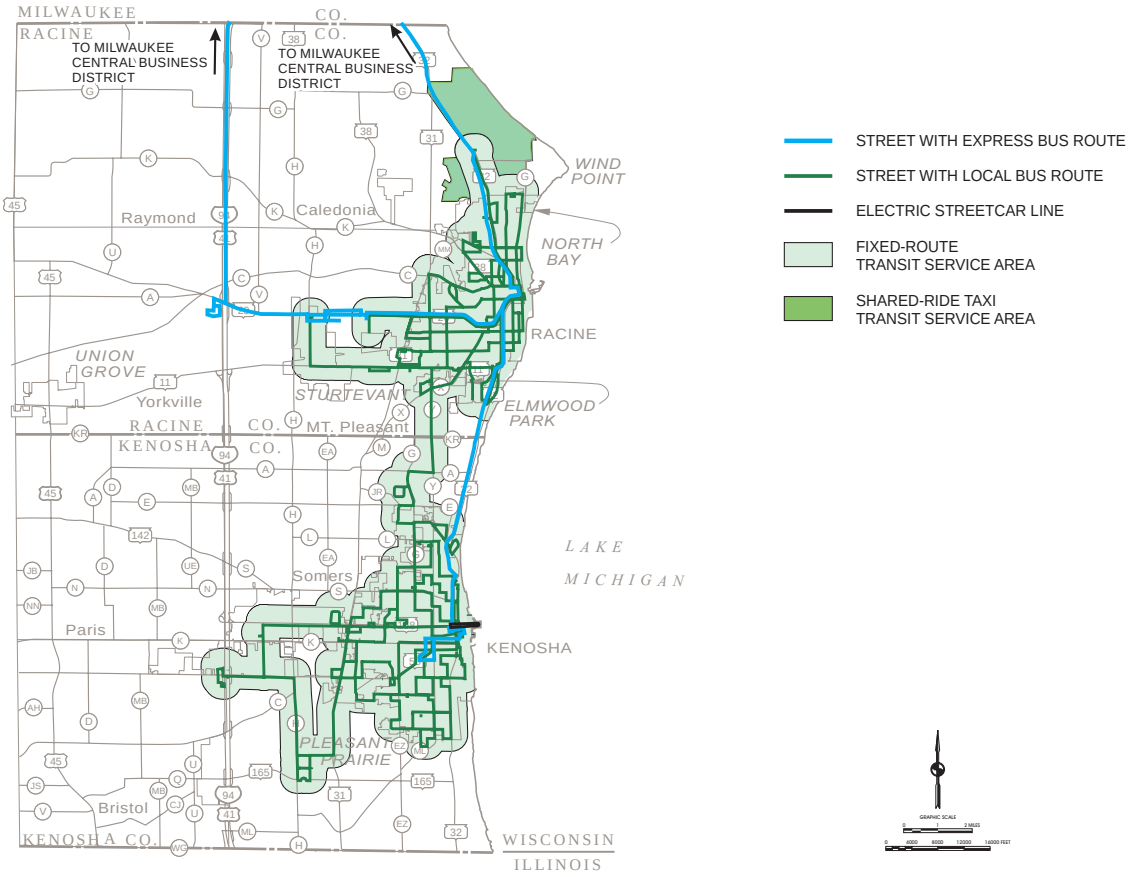
Fixed-route local public transit service was provided in 2001 within the Kenosha, Milwaukee, and Racine urban areas. Local transit in the Kenosha area was provided by the City of Kenosha Transit Commission, which operated service over 20 fixed routes. The City system included six regular bus routes, radial in design and emanating from downtown Kenosha, with direct, nontransfer service from the downtown area to all portions of the City and its immediate environs, including the University of Wisconsin-Parkside (see Map 26). Two other bus routes provided local transit service to major commercial, recreational, and employment centers which have developed west of Green Bay Road (STH 31) outside the regular Kenosha local transit service area. The system also included 11 school day bus routes to serve Kenosha secondary schools and an electric streetcar line in downtown Kenosha which connected the central transfer terminal for the bus routes, the Metra commuter rail station, the Kenosha central business district, and the Harborpark development. In 2001, the bus system provided service on most routes from 6:00 a.m. to 7:30 p.m., Monday through Saturday, with 30- to 60-minute headways during weekday peak-periods and 60-minute headways during weekday off-peak periods and on Saturday. Service was provided on the streetcar line with 15 minute headways from 11:00 a.m. to 7:00 p.m. on weekdays and from 10:00 a.m. to 5:30 p.m. on Saturdays. The adult cash fares charged by the Kenosha transit system were $1.00 per trip for bus service and $0.25 per trip for the streetcar line.

By fall 2004, the Kenosha transit system had made modest route revisions to improve coverage of the developing areas west of Green Bay Road. Service was provided over 24 fixed routes including seven regular bus routes serving downtown Kenosha, three shuttle routes serving the major commercial, recreational, and employment centers located west of Green Bay Road, 13 school day bus routes, and the electric streetcar line in downtown Kenosha. Service periods, operating headways, and adult cash fares for the system remained largely as in 2001.

Local transit service was provided in the Milwaukee area in 2001 by the Milwaukee County Transit System, the City of Waukesha Metro Transit System, and the Waukesha County transit system. As shown on Map 27, the Milwaukee County Transit System provided local transit service in the Milwaukee area in 2001 over 51 fixed routes. Of these local routes, 14 were radial routes serving downtown Milwaukee; 20 were crosstown or feeder routes not serving downtown

Map 26

LOCAL FIXED-ROUTE PUBLIC TRANSIT SERVICE IN THE KENOSHA AND RACINE AREAS: 2001



Source: SEWRPC.

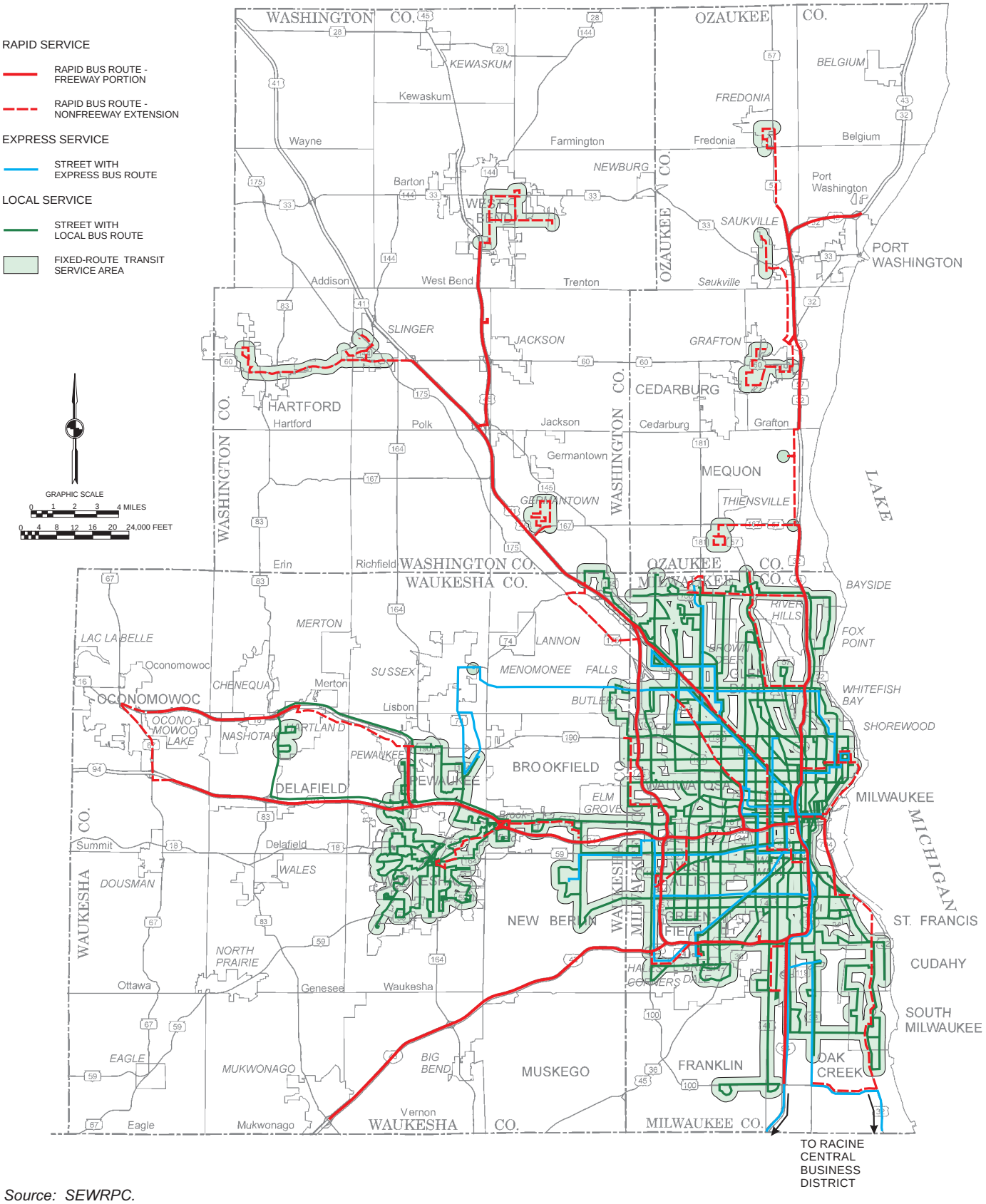
Milwaukee; seven were shuttle routes providing connections from other routes to major concentrations of jobs in industrial parks and commercial development in the outlying portions of the County; and 10 were school day routes principally designed to serve secondary schools in Milwaukee County. The system provided local bus service seven days a week, typically from 5:00 a.m. to 1:00 a.m. at an adult cash fare of $1.50 per trip. On most routes serving central Milwaukee County, weekday headways were between 10 and 20 minutes during peak periods and between 15 and 30 minutes during off-peak periods. Headways of between 15 and 60 minutes were operated on the routes serving the outer portions of the County on weekdays and on most routes on weekends.

By fall 2004, the Milwaukee County Transit System local bus service had been reduced and consisted of service provided over 39 routes. Faced with budgetary constraints, the transit system eliminated service on four crosstown or feeder routes, six shuttle routes, and two school day routes after 2001. Service periods remained largely unchanged although the number of routes operating during evenings and on weekends was reduced. Operating headways were also increased on many routes during weekday evenings and on weekends. The adult cash fare for local bus service was also increased to $1.75 per trip.

The fixed-route bus system operated by the City of Waukesha Transit Commission, Waukesha Metro Transit, provided service over 10 fixed radial routes. The routes began in downtown Waukesha and provided direct nontransfer service from the downtown to all portions of the City and its immediate environs. As shown on Map 27, two of the

Map 27

LOCAL FIXED-ROUTE PUBLIC TRANSIT SERVICE IN THE MILWAUKEE AREA: 2001



Source: SEWRPC.

routes served traffic generators outside of the City: the Waukesha County Technical College in the Village of Pewaukee and the Goerke's Corners public transit station in the Town of Brookfield. In 2001, the system provided service from 6:00 a.m. to 10:30 p.m. on weekdays, from 8:00 a.m. to 10:00 p.m. on Saturdays, and from 9:00 a.m. to 7:00 p.m. on Sundays. Headways on the routes ranged from 15 to 60 minutes during weekday peak periods and from 30 to 60 minutes during weekday off-peak periods and on weekends. The adult cash fare was $1.00 per trip for the local bus service provided by the City of Waukesha.

By fall 2004, the City of Waukesha had made modest changes to the bus system. A new bus route was added to serve commercial and office development located north of the City in the City of Pewaukee, increasing the number of routes operated by the City from 10 to 11. The weekday service period was reduced slightly to extend from 6:00 a.m. to 9:30 p.m., and weekday peak period headways on some routes were increased from 30 to 60 minutes. In addition, the adult cash fare for the City's local bus service was increased to $1.25 per trip.

Local public transit was provided in the Racine area by the City of Racine Belle Urban System, which in 2001 operated local service over 12 fixed routes, including 10 regular routes and two school day routes to serve Racine secondary schools. As shown on Map 26, nine of the 11 regular fixed routes were radial in design, emanating from downtown Racine, and provided service to all portions of the City and to its immediate environs. The tenth regular route, a crosstown route, was routed to the west of downtown Racine. The Belle Urban System also provided a demand-responsive, shared-ride taxi service serving the eastern half of the Town of Caledonia which connected with the regular City bus service and was integrated into the bus system. The City of Racine contracted for the shared-ride taxi service from a private transportation operator. The Town of Caledonia provided the local funding for the service. In 2001, the system provided service from 5:30 a.m. to 10:30 p.m. on weekdays and Saturdays and from 9:30 a.m. to 7:00 p.m. on Sundays. Headways on the bus routes were between 30 and 60 minutes on weekdays and Saturdays and were 60 minutes on Sundays. The adult cash fares charged by the City of Racine were $1.00 per trip for local bus service and $1.50 per trip for the Caledonia taxi service.

The City of Racine made significant changes to its bus system by the fall of 2004. The transit system relocated the common transfer point used by its routes from Monument Square in the center of downtown Racine to a new central transfer terminal located on State Street on the north side of the Racine downtown. The system also began using pulse scheduling for all routes to provide for coordinated transfers at the transfer point and adjusted the alignments of some routes to facilitate operation with pulse scheduling. Local service continued to be provided over 12 fixed routes with the same service periods as in 2001. However, headways during weekday midday and evening periods and on Saturdays were increased to 60 minutes on all routes and the Caledonia shared-ride taxi service was discontinued. The adult cash fare charged by the City for bus service was also increased to $1.25 per trip.

In 2001, the Waukesha County transit system provided local bus service over eight routes. The routes included four operated for Waukesha County by the Milwaukee County Transit System, three operated by the City of Waukesha Metro Transit System, and one operated by Wisconsin Coach Lines, Inc. The routes were operated as extensions of existing local bus routes and as separate shuttle routes, primarily to connect Milwaukee County and the City of Waukesha residents with jobs in office and industrial parks or major commercial developments located largely in the areas in eastern Waukesha County adjacent to Milwaukee County or along IH 94 and STH 16. All the routes provided service on weekdays and on weekends. Four of the routes operated for short periods in the mornings, afternoons, and evenings as dictated by the work shift times at the employers served and three routes operated throughout the day to serve business and commercial development along each route. Headways on the routes ranged from 15 to 45 minutes during weekday peak periods and from 30 to 60 minutes during all other times of operation. The adult cash fares charged on the Waukesha County routes ranged from $1.00 to $1.75 per trip.

In the fall of 2004, local bus service was provided by Waukesha County over five routes, as three routes that had been operated in 2001 through Federal demonstration grants were discontinued. Weekend service was provided over only two of the five County routes, those being the local route extensions operated by the Milwaukee County Transit

System and the City of Waukesha Metro Transit System in the Blue Mound Road corridor serving the Brookfield Square Shopping Center. Headways on the local routes were similar to those operated in 2001. The adult cash fares charged on the Waukesha County routes in 2004 ranged from $1.25 to $1.75 per trip.

Rural and Small Urban Community Transit: Demand-Responsive

Demand-responsive rural public transit in the form of publicly operated shared-ride taxicab service was also provided in the Region in 2001 (see Map 28). Shared-ride taxicab service was provided by the City of Port Washington Transport Taxi Service in Ozaukee County, and the Hartford City Taxi Service and City of West Bend Taxi Service in Washington County. These three systems served local travel in and immediately adjacent to the sponsoring municipality. In addition, both Ozaukee and Washington Counties provided shared-ride taxicab service on a countywide basis. The two county taxi systems principally served travel in the small urban communities and rural areas in each county and between the rural areas and all communities. The Ozaukee and Washington County taxi systems did serve some communities located within the Milwaukee urban area including the communities of Germantown in Washington County and Mequon, Cedarburg and Grafton in Ozaukee County. These county taxi systems, however, did not serve trips that could be made on municipal systems in each county—Port Washington in Ozaukee County and Hartford and West Bend in Washington County. Public shared-ride taxicab service was also provided in Walworth County by Browns Cab Service which served local travel in and immediately adjacent to the City of Whitewater.

Each of the taxicab systems in the Region operated seven days a week in 2001 with the hours of operation varying by system. Typically, the most extensive service was provided on weekdays and Saturdays when taxicab service was available for between 12 and 16 hours a day. The four municipally operated systems provided service with 30-minute maximum response times. The two County systems provided service with 60-minute maximum response times for trips made in the urban communities of each county, and a four-hour maximum response time for trips made between urban areas, between urban and rural areas, or entirely within rural areas. Adult cash fares for the municipal taxi systems ranged from $1.75 to $2.25 per trip. The adult fares charged by the county taxi systems varied by the length of the trip and were between $2.00 and $2.25 per trip for short trips and between $6.25 and $6.50 per trip for the longest trips in each County. Rather than using public employees, five of the six taxi systems contract with private companies to provide the service including: Specialized Transportation Services, Inc., which operated both the Port Washington and West Bend taxi systems; G and G Enterprises, Inc., which operated both the Ozaukee and Washington County taxi systems; and Browns Cab Service which operated the Whitewater taxi system.

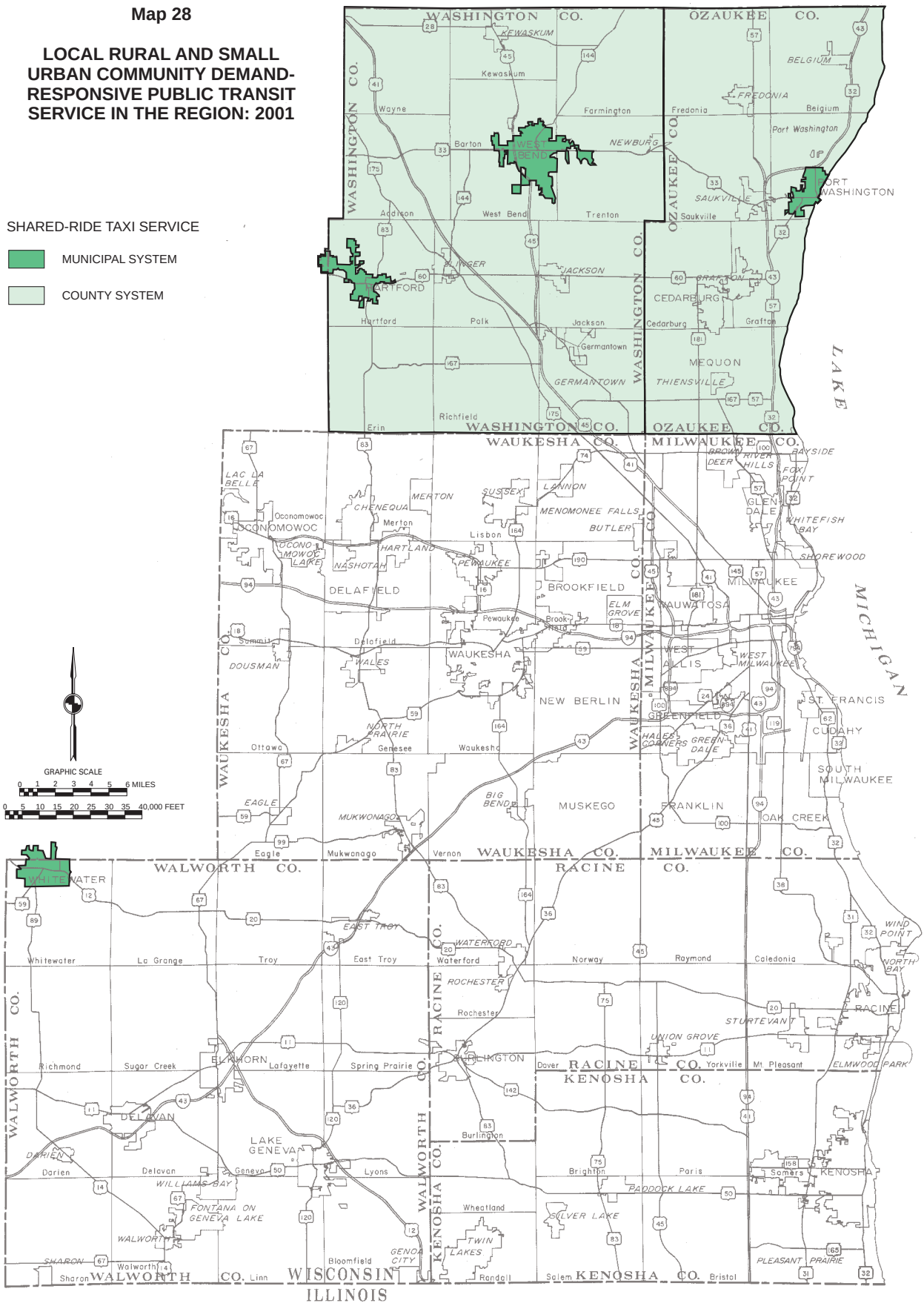
In the fall of 2004, shared-ride taxicab service continued to be provided by the six systems identified above with the same service periods and response times operated in 2001 albeit with higher fares. Adult cash fares for the municipal taxi systems ranged from $2.00 to $2.75 per trip. The adult fares charged by the county taxi systems were between $2.00 and $2.75 per trip for short trips and $6.50 per trip for the longest trips in each County.

Extent of Transit Service

The extent of public fixed-route transit service provided within the Region may be measured by the vehicle-miles of transit service provided on an average weekday. Vehicle-miles of fixed route transit service is a measure of the extent of transit routes, and the amount of service provided on those routes. As shown on Table 19, between 1991 and 2001 the average weekday vehicle-miles of fixed route transit service provided within the Region increased significantly, by about 26 percent. The level of fixed route vehicle-miles of transit service provided within the Region on an average weekday in 2001 was also approximately 24 percent greater than the level provided in 1972, and about 6 percent less than the level provided in 1963. Since 2001, the extent of fixed-route service provided within Region has been reduced to an estimated 71,900 vehicle miles of service on an average weekday in 2003, due to an economic downturn following September 11, 2001, reduced Federal funding, and State and local budget problems. In general, transit vehicle-miles of service provided in the Region declined significantly throughout the 1950s, 1960s, and early 1970s. Public transit service began to increase in the mid 1970s with the initiation of public acquisition and operation of transit service. Public transit service continued to increase to the early 1980s due to motor fuel price increases in the mid and late 1970s, and attendant transit ridership increases. Transit service in the Region then declined slightly through the middle and late 1980s. During the 1990s, transit service increased substantially through the year 2000. Since 2001, transit service has decreased each year.

Map 28

LOCAL RURAL AND SMALL URBAN COMMUNITY DEMAND-RESPONSIVE PUBLIC TRANSIT SERVICE IN THE REGION: 2001



Source: SEWRPC.

Table 19

PUBLIC TRANSIT VEHICLE MILES PROVIDED IN THE REGION BY SERVICE TYPE: 1963, 1972, 1991, AND 2001

Service Type	Average Weekday Revenue Vehicle Miles[a]				Change in Average Weekday Revenue Vehicle Miles					
					1963-2001		1972-2001		1991-2001	
	1963	1972	1991	2001	Number	Percent	Number	Percent	Number	Percent
Fixed-Route (Bus)	84,900	64,000	63,300	79,600	-5,300	-6.2	15,600	24.4	16,300	25.8
Demand Responsive (Shared-Ride Taxi)	- -	- -	400	7,700	- -	- -	- -	- -	7,300	1,825.0

[a]*Figures presented in this table are for publicly sponsored transit services for the general public. The data exclude special paratransit services directed at the elderly and disabled population including federally required complementary paratransit services for disabled individuals operated by fixed-route bus systems. On an average weekday during 2001, approximately 19,500 revenue vehicle miles of service were operated in the Region as federally required complementary paratransit services for disable individuals. Comparable data for 1991 are not available as paratransit service data was not reported by most transit systems in the Region. Complementary paratransit services were not required or provided in 1963 or 1972.*

Source: SEWRPC.

The level of demand-responsive service provided by public shared-ride taxicab systems increased significantly since 1991 as the number of public systems in the Region increased from two in 1991 to six in 2001. In 2001, about 7,700 vehicle miles of service were provided on an average weekday by the six public taxicab systems in the Region, representing an increase of over 1,800 percent from the 1991 average weekday level of about 400 vehicle miles of service. Since 2001, the level of public shared-ride taxicab service provided within the Region has remained stable, increasing by only 1 percent to about 7,800 vehicle miles of service on an average weekday in 2003.

Public Transit Ridership

Public transit ridership levels within the Region on an average weekday in 1963, 1972, 1991, and 2001 are set forth in Table 20. Public transit ridership within the Region on fixed-route services has declined significantly over time. In 1963, over 320,500 transit trips[2] were made on an average weekday on fixed-route public transit services within the Region, representing about 8 percent of average weekday regional travel. In 1972, about 184,200 transit trips were made on an average weekday on fixed-route services, about 43 percent fewer than in 1963, and representing about 4 percent of average weekday regional travel. In 1991, about 172,200 transit trips were made on an average weekday on fixed-route services, 47 percent fewer than in 1963 and about 7 percent fewer than in 1972. This represented about 3 percent of average weekday regional travel. In 2001, about 142,200 transit trips were made on an average weekday on fixed-route services, about 17 percent less than in 1991, 23 percent less than in 1972, and 44 percent less than in 1963. In comparison, the vehicle-miles of transit service provided on fixed-route services in 2001 was 26 percent more than in 1991, 24 percent more than in 1972, and 6 percent less than in 1963. The 2001 transit trips represented about 2 percent of average weekday regional travel.

Since 2001, ridership on fixed-route service in the Region has continued to decrease. An estimated 119,500 transit trips were made on fixed-route bus services on an average weekday in 2003, about 16 percent less than in 2001. In comparison, the vehicle-miles of transit service provided on fixed-route bus services in 2003 was about 10 percent less than in 2001. The decrease in ridership reflects the service reductions that have been implemented by the transit operators in the Region, particularly the Milwaukee County Transit System, since 2001, largely to meet constrained operating budgets. The fare increases that were implemented on five of the eight bus systems between 2001 and 2003 also contributed to declining ridership.

[2]*The transit trips discussed in this section approximate the number of one-way trips made on the transit system between specific origins and destinations. Passengers are counted only once for each origin and destination, and transfers between routes are not counted as they are a continuation of a single trip.*

Table 20

AVERAGE WEEKDAY PUBLIC TRANSIT IN THE REGION BY SERVICE TYPE: 1963, 1972, 1991, AND 2001

Service Type	Average Weekday Transit Trips[a]				Change in Average Weekday Transit Trips					
					1963-2001		1972-2001		1991-2001	
	1963	1972	1991	2001	Number	Percent	Number	Percent	Number	Percent
Fixed-Route (Bus)	320,500	184,200	172,200	142,200	-178,300	-55.6	-42,000	-22.8	-30,000	-17.4
Demand Responsive (Shared-Ride Taxi)	- -	- -	200	1,100	- -	- -	- -	- -	900	450.0

[a]*Average weekday transit trips shown in this table approximate the number of one-way trips made by transit 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. Ridership figures are for publicly sponsored transit services for the general public. The data exclude special paratransit services directed at the elderly and disabled population including federally required complementary paratransit services for disabled individuals operated by fixed-route bus systems. During 2001, approximately 1,099,200 annual passengers were carried on federally required complementary paratransit services for disabled individuals in the Region, or about 216 percent more than the 446,300 annual passengers that were carried on complementary paratransit services in 1991. Complementary paratransit services were not required or provided in 1972 or 1963.*

Source: SEWRPC.

The transit ridership levels on demand-responsive, public shared-ride taxicab service increased significantly between 1991 and 2001 with the increase in the number of public systems in operation in the Region. No public shared-ride taxicab systems were in operation in 1972 or 1963. In 2001, about 1,100 transit trips were made on an average weekday on the six public taxicab systems in the Region. This represented an increase of about 450 percent from the 1991 average weekday ridership of about 200 transit trips on public taxicab services. Average weekday ridership on public shared-ride taxicab services in the Region remained at about 1,100 transit trips in 2003.

In general, transit ridership in the Region and in the United States was in decline throughout the 1950s and 1960s. Ridership on public transit began a gradual growth in the mid 1970s with the initiation of public transit operations. Motor fuel price increases in the mid and late 1970s contributed to the ridership increases which peaked in 1980. Transit ridership in the Region then experienced a moderate decline through the 1980s and the early 1990s, and then increased somewhat through the year 2000. Since 2001, ridership has decreased in each year. Factors which have contributed to the general decline in transit ridership in the Region since 1980 include the location of housing and jobs outside established transit service areas; the continuing decline in population and employment density; the increase in household income and automobile ownership and use, particularly in terms of the number of households with two or more vehicles; increases in transit adult cash fares to defer service reductions; and the inability, owing to lack of funding, to significantly improve and expand transit service to the entire metropolitan area, provide faster express transit and rapid transit service, and reasonably attractive and convenient frequent transit service.

Interregional Public Transit

In 2001, intercity passenger train service in Southeastern Wisconsin was provided by Amtrak over Canadian Pacific Railway trackage, with stops within the Region at Milwaukee and Sturtevant. Amtrak operated six weekday trains in each direction between Milwaukee and Chicago and one weekday train in each direction between Chicago, Milwaukee, St. Paul-Minneapolis, and Seattle. By comparison, Amtrak operated five weekday trains in 1991 in each direction between Milwaukee and Chicago and one weekday train in each direction between Chicago, Milwaukee, St. Paul-Minneapolis, and Seattle. In 1972, Amtrak—which had assumed operation of most intercity passenger trains from the private railroad companies on May 1, 1971—operated three weekday trains in each direction between Milwaukee and Chicago, two weekday trains in each direction between Milwaukee, Chicago, and St. Louis, and two weekday trains in each direction between Chicago, Milwaukee, St. Paul-Minneapolis, and Seattle.

In 1963, intercity passenger trains in the United States were operated by private railroad companies and still provided extensive service in southeastern Wisconsin. At this time, passenger train service in the Region was provided by three railroads: the Chicago, Milwaukee, St. Paul and Pacific Railroad (known as the Milwaukee Road and predecessor to Canadian Pacific Railway); the Chicago and North Western Railway (predecessor to the Union Pacific Railroad); and the Soo Line Railroad (predecessor to the Canadian National Railway). Some of this intercity train service, through intermediate stops, provided commuter rail service within southeastern Wisconsin, and between southeastern Wisconsin and northeastern Illinois. The Milwaukee Road operated eight weekday passenger trains in each direction between Milwaukee and Chicago with no other stops in Wisconsin south of Milwaukee. Five of these trains in each direction continued beyond Milwaukee west to Minneapolis-St. Paul via La Crosse with some of these trains stopping at Oconomowoc. One of the Milwaukee-Chicago trains in each direction continued north to Green Bay and Calumet, Michigan, also stopping within the Region at Fredonia. In addition, the Milwaukee Road operated one weekday train in each direction between Milwaukee and Savanna, Illinois via Beloit stopping within the Region at Sturtevant, Union Grove, Burlington, Lyons, Elkhorn, Delavan, and Darien. The Milwaukee Road also operated two weekday trains in each direction between Chicago and Madison via Janesville, stopping within southeastern Wisconsin at Walworth. The Chicago and North Western operated eight weekday trains in each direction between Milwaukee and Chicago also stopping in Wisconsin at Racine and Kenosha. Five of these trains in each direction continued beyond Milwaukee north to Green Bay; three via Fond du Lac and Appleton and two via Sheboygan and Manitowoc. Trains via Fond du Lac also stopped within the Region at West Bend and Kewaskum and trains via Sheboygan also stopped within the Region at Port Washington and Belgium. Some of the Green Bay trains continued further north to Ashland, Wisconsin and Ishpeming, Michigan. One of the Chicago trains in each direction continued beyond Milwaukee west to Minneapolis-St. Paul via Eau Claire. Soo Line operated one weekday passenger train in each direction between Chicago and Duluth-Superior via Stevens Point stopping within southeastern Wisconsin at Silver Lake, Burlington, Mukwonago, Waukesha, and Slinger.

Also during 1963, the Chicago, North Shore, and Milwaukee Railway (North Shore Line), one of the last electric interurban railways in the United States, ceased operations. Prior to abandonment, the North Shore Line operated 19 passenger trains in each direction between Milwaukee and Chicago stopping within southeastern Wisconsin on the south side of the City of Milwaukee at several neighborhood locations, and at Racine and Kenosha. All North Shore Line service was discontinued in January 1963.

The only interregional, or intraregional, commuter rail service operated in the Region in 2001 was Metra's Union Pacific North Line between Kenosha and Chicago, with intermediate stops in the north shore suburbs of northeastern Illinois. Metra is the commuter rail service division of the Regional Transportation Authority, which serves the six-county northeastern Illinois region. Service on this route was provided by the Union Pacific Railroad under contract with Metra and at no cost to Wisconsin residents. On weekdays in 2001, this service consisted of nine commuter trains in each direction between Kenosha and Chicago. In 1993, this service consisted of nine commuter trains in each direction on weekdays between Kenosha and Chicago. In 1972, weekday commuter rail service in southeastern Wisconsin consisted of nine trains in each direction between the City of Kenosha and Chicago; two trains in each direction between the City of Lake Geneva and Chicago; one train in each direction between the Village of Walworth and Chicago; and one train in each direction between Watertown and Milwaukee making intermediate stops throughout Waukesha and Milwaukee Counties. The Watertown-Milwaukee train—known as the *Cannonball*—was discontinued during 1972. In 1963, weekday commuter rail service consisted of the same trains operating in 1972 except that the Lake Geneva trains continued west to the Village of Williams Bay until their discontinuance in 1965.

In 2001, scheduled intercity bus services were provided by four carriers: Badger Coaches, Inc.; Greyhound Lines, Inc.; Lamers Bus Lines, Inc.; and United Limo, Inc. Service provided on weekdays by Badger Coaches included seven daily round-trips between Madison, downtown Milwaukee, and General Mitchell International Airport. Service provided by Greyhound in Southeastern Wisconsin was centered in Milwaukee, which the carrier used as a regional hub at which passengers had the opportunity to transfer between buses. In 2001, Greyhound operated a total of 21 daily one-way bus trips to and from Milwaukee. Most of these trips were Chicago-based, going to and from Madison,

Minneapolis-St. Paul, Green Bay, Stevens Point, Wausau, Minocqua, Marquette, and Calumet. Some of these bus trips made only limited stops and some made local stops. Daily service provided by Lamers Bus Lines included one bus trip in each direction between Milwaukee and Wausau with a stop in Appleton. Weekday service provided by United Limo, Inc., included 11 round-trips between downtown Milwaukee and Chicago O'Hare International Airport with a stop at General Mitchell International Airport. Together, the four intercity motor coach carriers operated a combined total of 58 weekday one-way bus trips.

In 1993, there were four intercity carriers providing service through the operation of 71 weekday one-way bus trips in the Region. Of these 71 weekday one-way bus trips, 39 trips were operated by Greyhound to Chicago, to various locations in Wisconsin and Upper Michigan, and to cities as far away as Minneapolis-St. Paul; 12 trips were operated by Badger Coaches between Milwaukee and Madison; 18 trips were operated by United Limo between Milwaukee and Chicago's O'Hare International Airport with stops at General Mitchell International Airport and at the interchanges of IH 94 and STH 20 in Racine County and IH 94 and STH 50 in Kenosha County; and two trips were operated by Lamers Bus Lines between Milwaukee and Wausau with a stop in Appleton.

In 1972, there were six intercity carriers providing service through the operation of 142 weekday one-way bus trips in the Region. Of these 142 weekday one-way bus trips, 96 trips were operated by Greyhound to Chicago, to and from various locations in Wisconsin and Upper Michigan, and to cities as far away as Seattle; 12 trips were operated by Tri-State Coach Lines, Inc., between Milwaukee and Chicago's O'Hare International Airport; eight trips were operated by Wisconsin-Michigan Coach Lines, Inc., between Milwaukee and Green Bay, Sister Bay, and Marshfield; four trips were operated by Peoria-Rockford Bus Company between Milwaukee, Rockford, and Dixon, Illinois; 14 trips were operated by Badger Coaches between Milwaukee and Madison; and a total of eight intercity trips were operated by Wisconsin Coach Lines, with four trips operated between Milwaukee and Fond du Lac, and four trips between Milwaukee and Rockford, Illinois.

In 1963, there were four private intercity motor coach carriers providing interregional bus service to and from southeastern Wisconsin. These included Greyhound Lines, Badger Coaches, Peoria-Rockford Bus Company, and Wisconsin Coach Lines. Greyhound provided by far the greatest amount of service with Milwaukee serving as a regional network hub for routes radiating from Milwaukee to Chicago using two routes, along IH 94/USH 41 and through Racine; to Madison using three routes, along IH 94, through Oconomowoc and Watertown, and through Waukesha and Fort Atkinson; to Minneapolis-St. Paul and Seattle using two routes, through Columbus and Portage and through Madison; to Dubuque through Madison; to Stevens Point using two routes, through Hartford and Beaver Dam, and through Fond du Lac and Appleton; to Duluth-Superior via Fond du Lac and Stevens Point, and to Green Bay using three routes, through Fond du Lac, through Plymouth, and through Sheboygan. Many of the Green Bay buses continued north to various northern Wisconsin and Upper Michigan communities. Greyhound also operated a route between Chicago and Madison via Lake Geneva and Whitewater. Weekday scheduled bus frequencies varied from a low of one or two bus trips in each direction on some routes to a high of 23 bus trips in each direction between Milwaukee and Chicago. Badger Coaches operated between Milwaukee and Madison along IH 94 providing seven scheduled weekday bus trips in each direction. Peoria-Rockford operated between Milwaukee and Rockford via Whitewater and Janesville providing two scheduled weekday bus trips in each direction. Wisconsin Coach Lines operated three intercity bus routes radiating out of Milwaukee: Milwaukee to Fond du Lac via West Bend with two weekday trips in each direction; Milwaukee to Rockford, Illinois via Lake Geneva with four weekday trips in each direction; and Milwaukee to Watertown via Oconomowoc with three weekday trips in each direction.

There was no cross-lake ferry service to the Region in 2001 and 1991. In 1972, cross-lake car ferry service on Lake Michigan was operated by the Chesapeake & Ohio Railway Company between Milwaukee and Ludington, Michigan. This service, which carried passengers, automobiles, and railway freight cars had two scheduled weekday departures from each port during the summer season and was discontinued in 1984. In 1963, cross-lake ferry service serving southeastern Wisconsin was operated across Lake Michigan by three carriers. Service between Milwaukee and Ludington, Michigan was operated by the Chesapeake & Ohio Railway Company and carried passengers, automobiles, and railroad freight cars on three scheduled round trips per day. Service between Milwaukee and

Muskegon, Michigan was provided by two carriers. The Wisconsin and Michigan Steamship Company, which operated the *Milwaukee Clipper*, carried passengers and automobiles on one scheduled daily round trip; and the Grand Trunk Western Railway carried railroad freight cars and passengers on one to two regular daily round trips, depending on railroad traffic. In 2004, a passenger and car cross-lake ferry was initiated between Milwaukee and Muskegon, Michigan with two daily scheduled round trips.

Scheduled air carrier service to and from Milwaukee County's General Mitchell International Airport was provided by 19 airline companies in 2001. These airline companies included: Air Canada, Air Wisconsin, America West, American Eagle, Atlantic Southeast, Comair, Continental Airlines, Continental Express, Delta Air Lines, Mesa Airlines, Midwest Express Airlines, Northwest Airlines, Skyway Airlines, Sun Country, Trans World Airlines, United Airlines, US Airways, and US Air Express. In 2001, these carriers provided over 450 scheduled nonstop weekday flights between Mitchell International and 50 other cities or metropolitan areas. Cities with 10 or more nonstop weekday flights to or from Milwaukee included: Chicago, Detroit, Grand Rapids, Atlanta, Cincinnati, New York, Minneapolis-St. Paul, Appleton, Cleveland, Indianapolis, St. Louis, Madison, Dallas-Ft. Worth, Kansas City, Philadelphia, Pittsburgh, Toronto, Washington D.C., Columbus, and Denver. Many of these flights continued on to other cities.

Scheduled air carrier service to and from Milwaukee County's General Mitchell International Airport was provided by 16 airline companies in the fall of 1989. These airline companies included: American Airlines, Comair, Continental Airlines, Delta Air Lines, Eastern Airlines, Enterprise Airlines, Express Airlines, Midway Airlines, Midway Commuter, Midwest Express Airlines, Mesaba Airlines, Northwest Airlines, Skyway Airlines, Trans World Airlines, United Airlines, and USAir. In 1989, these carriers provided a total of 364 scheduled nonstop weekday flights between Mitchell International and 33 other cities or metropolitan areas. Cities with 10 or more nonstop weekday flights to or from Milwaukee included: Chicago, Detroit, Grand Rapids, Atlanta, Cincinnati, New York, Minneapolis-St. Paul, Appleton, Cleveland, Indianapolis, St. Louis, Madison, Green Bay, Boston, Columbus, and Wausau. Many of these flights continued on to other cities.

By comparison, in 1971, there were six airline companies providing a total of 250 scheduled nonstop weekday flights between Milwaukee and 32 other cities or metropolitan areas. These airline companies included: Air Michigan, Eastern Airlines, North Central Airlines, Northwest Airlines, Ozark Airlines, and United Airlines. Cities with 10 or more nonstop weekday flights to or from Milwaukee included: Chicago, New York, Madison, Minneapolis-St. Paul, Detroit, and Oshkosh. In 1963, scheduled air carrier service to and from Milwaukee County's General Mitchell Field was provided by six airline companies providing about 150 scheduled nonstop flights between Milwaukee and 30 other cities or metropolitan areas with direct service continuing on to many other cities. The airline companies serving Milwaukee included: American Airlines, Eastern Airlines, North Central Airlines, Northwest Airlines, Ozark Airlines, and United Airlines.

Table 21 displays an estimate of existing and historic interregional person trips on an average weekday, including travel on interregional public transit modes of intercity rail and bus, commercial air carrier, and car ferry, and also travel by personal vehicle. Interregional travel by personal vehicle has consistently accounted for about 95 percent of total interregional travel within southeastern Wisconsin over the past 40 years.

PARK-RIDE FACILITIES

Park-ride facilities enable more efficient travel within southeastern Wisconsin through transfer of mode between private vehicle and public transit, and between single occupant or solo driver private vehicles and carpools, and also from bicycle to transit and carpools, and also from bicycle to transit and carpools. In 2004, there were 48 park-ride lots serving intra-regional travel within the Region, with 35 served by rapid or express transit bus service. In comparison, there were 37 park-ride lots within southeastern Wisconsin in 1991 including 19 served by public transit, and, eight park-ride lots all served by public transit in 1972.

Table 21

NUMBER OF INTERREGIONAL PERSON TRIPS ON INTERCITY MODES IN THE REGION: 1963, 1972, 1993, AND 2001

Mode	1963		1972		1993		2001	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent Of Total
Intercity Motor Bus	2,000	1.0	1,300	0.7	1,300	0.4	1,200	0.3
Intercity Rail	4,000	2.0	900	0.3	1,800	0.5	1,900	0.4
Cross-Lake Car Ferry	1,200	0.6	700	0.4	--	--	--	--
Commercial Air Carrier	2,600	1.3	6,200[a]	3.3	12,600[b]	3.8	16,400	4.0
Personal Vehicle	191,700	95.1	176,900	95.1	317,400[c]	95.3	394,900	95.3
Total	201,500	100.0	186,000	100.0	333,100	100.0	414,400	100.0

[a]*Survey taken in 1971.*

[b]*Survey taken in 1989.*

[c]*Survey taken in 1991.*

Source: SEWRPC.

Park-Ride Lots Served by Transit

In 2004, rapid or express transit bus service was provided to 35 park-ride lots within the Region, as shown on Map 29 and in Table 22. These intermodal parking facilities provided 5,595 parking spaces. The utilization of parking spaces at all park-ride lots served by transit in 2004 is set forth in Table 22, and ranged from a high of 81 percent, at the Southridge park-ride lot in the Village of Greendale, to a low of 10 percent, at the STH 57 and CTH H park-ride lot in the Town of Fredonia. In addition to the Southridge site, other park-ride lots served by transit with utilization rates greater than 60 percent, include: Pilgrim Road park-ride lot in the Village of Menomonee Falls; IH 43 and CTH C in the Town of Grafton; State Fair Park in the City of Milwaukee; IH 94 at CTH Y (Goerke's Corners) in the Town of Brookfield; and Kohl's Shopping Center in the Village of Brown Deer. On an average weekday during 2004, nearly 41 percent of the 5,595 parking spaces at park-ride lots served by transit were in use.

Park-Ride Lots Not Served by Transit

In 2004, there were 13 park-ride lots not served by transit located within the Region containing 670 parking spaces as shown on Map 30 and in Table 23. Of these parking spaces, about 29 percent, were located within Waukesha County, about 21 percent within Racine County, about 18 percent in Walworth County, about 17 percent in Washington County, and the remaining 15 percent in Milwaukee County.

The utilization of parking spaces on an average weekday at the individual park-ride lots not served by transit varied from a high of 90 percent at the STH 60 and CTH P park-ride lot in the Village of Jackson to a low of 15 percent at the USH 12 and CTH P park-ride lot in the Village of Genoa City. In addition to the STH 60 and CTH P park-ride lot, other park-ride lots not served by transit with average weekday utilization rates greater than 60 percent included: USH 41 and STH 33 (Allenton) in the Town of Addison, IH 94 and CTH C in the City of Delafield, and IH 94 and STH 20 (Ives Grove) in the Town of Yorkville.

BICYCLE AND PEDESTRIAN FACILITIES

This section of the chapter documents the existing bicycle and pedestrian facilities in the Region associated with the arterial street and highway system and public transit system, including the accommodation of bicycles on the Region's arterial street and highway system, the provision of a system of off-street bicycle paths connecting the Region's urban centers and communities, and the provision of bicycle parking and storage facilities at the Region's park-ride lots.

Table 22

AVERAGE WEEKDAY USE OF PARK-RIDE LOTS SERVED BY TRANSIT: 2004

Number[a]	Location	Available Parking Spaces	Autos Parked on an Average Weekday: 2001	Percent of Spaces Used
	Public Transit Stations			
1	STH 57 and CTH H (Fredonia)	60	6	10
2	IH 43 and STH 32-CTH H (Port Washington)	50	19	38
3	IH 43 and CTH V (Grafton)	85	30	35
4	IH 43 and CTH C (Grafton)	65	47	72
5	Brown Deer (River Hills)	360	80	22
6	North Shore (Glendale)	195	87	45
7	USH 41 and Lannon Road (Germantown)	100	49	49
8	Pilgrim Road (Menomonee Falls)	70	56	80
9	W. Good Hope Road (Milwaukee)	135	33	24
10	Timmerman Field (Milwaukee)	140	51	36
11	W. Watertown Plank Road (Wauwatosa)	240	131	55
12	Collins Street Parking Lot (Oconomowoc)[b]	- -[c]	- -[c]	- -[c]
13	STH 16 and CTH P (Oconomowoc)	45	- -[c]	- -[c]
14	STH 16 and CTH C (Nashotah)	60	7	12
15	STH 67 and CTH DR (Summit)	100	51	51
16	IH 94 and STH 83 (Delafield)	200	65	33
17	IH 94 and CTH G (Pewaukee)	245	45	18
18	Goerke's Corners (Brookfield)	315	249	79
19	State Fair Park (Milwaukee)	285	176	62
20	IH 43 and STH 83 (Mukwonago)	165	62	38
21	IH 43 and STH 164 (Big Bend)	145	51	35
22	IH 43 and Moorland Road (New Berlin)	175	60	34
23	Whitnall (Hales Corners)	360	202	56
24	W. Loomis Road (Greenfield)	410	97	24
25	W. Ryan Road (Oak Creek)	305	137	45
26	W. College Avenue (Milwaukee)	650	286	44
27	W. Holt Avenue (Milwaukee)	230	103	45
28	Downtown Transit Center (Milwaukee)[b]	- -[c]	- -[c]	- -[c]
29	Downtown Transit Center (Waukesha)[b]	- -[c]	- -[c]	- -[c]
	Subtotal	5,190	2,180	42
	Shared-Use Lots			
30	Fields Furniture (West Bend)	50	- -[c]	- -[c]
31	Washington County Fair Park (Polk)	100	- -[c]	- -[c]
32	Pioneer Plaza (Polk)	25	- -[c]	- -[c]
33	Wal-Mart (Saukville)	50	- -[c]	- -[c]
34	Kohl's (Brown Deer)	100	60	60
35	Southridge (Greendale)	80	65	81
	Subtotal	405	125	31
- -	Total	5,595	2,305	41

[a] *See Map 29.*

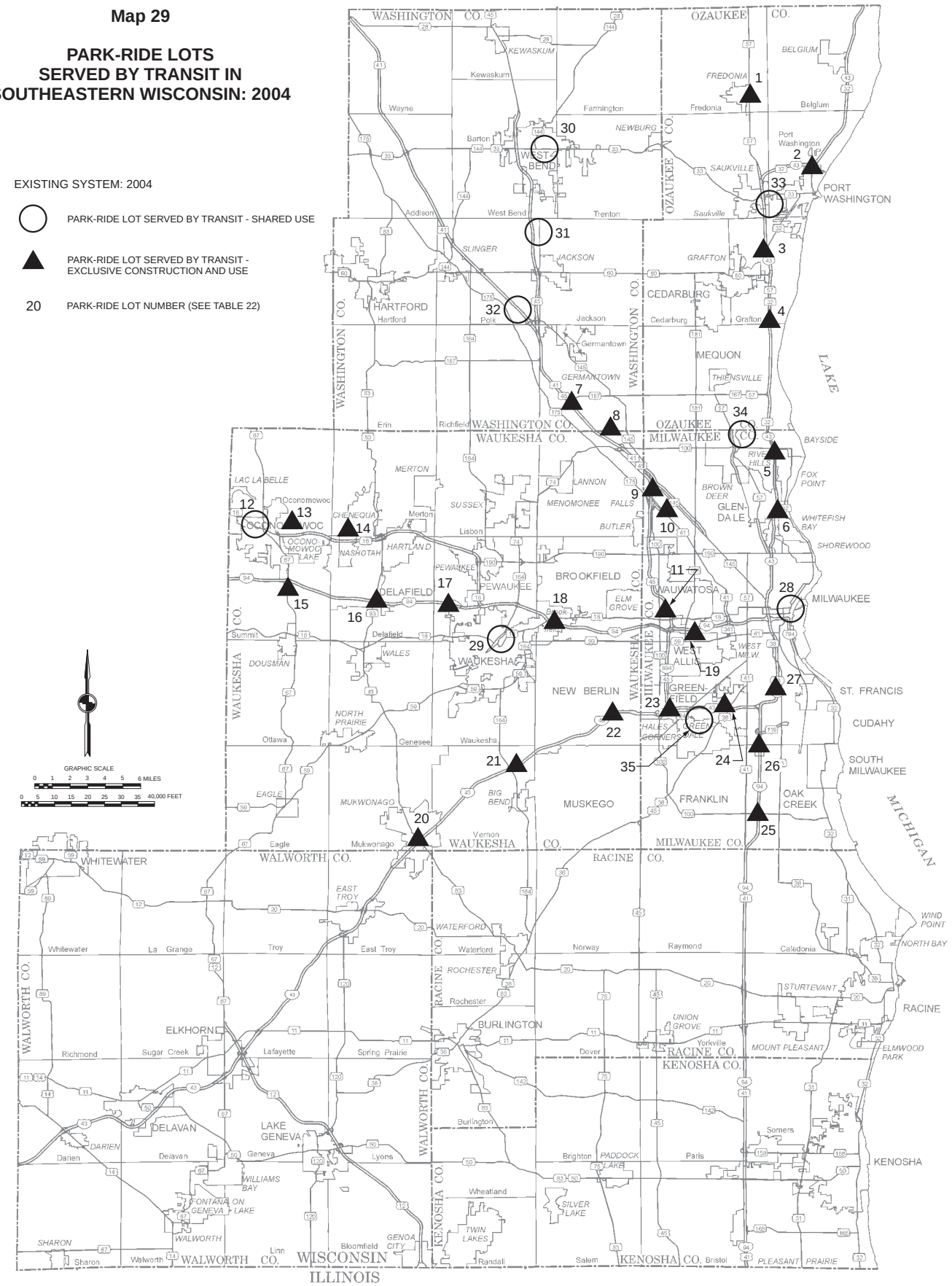
[b] *There is a fee for parking at these facilities.*

[c] *Data not available.*

Source: SEWRPC.

Map 29

PARK-RIDE LOTS SERVED BY TRANSIT IN SOUTHEASTERN WISCONSIN: 2004



Source: SEWRPC.

Map 30

PARK-RIDE LOTS NOT SERVED BY TRANSIT IN SOUTHEASTERN WISCONSIN: 2004

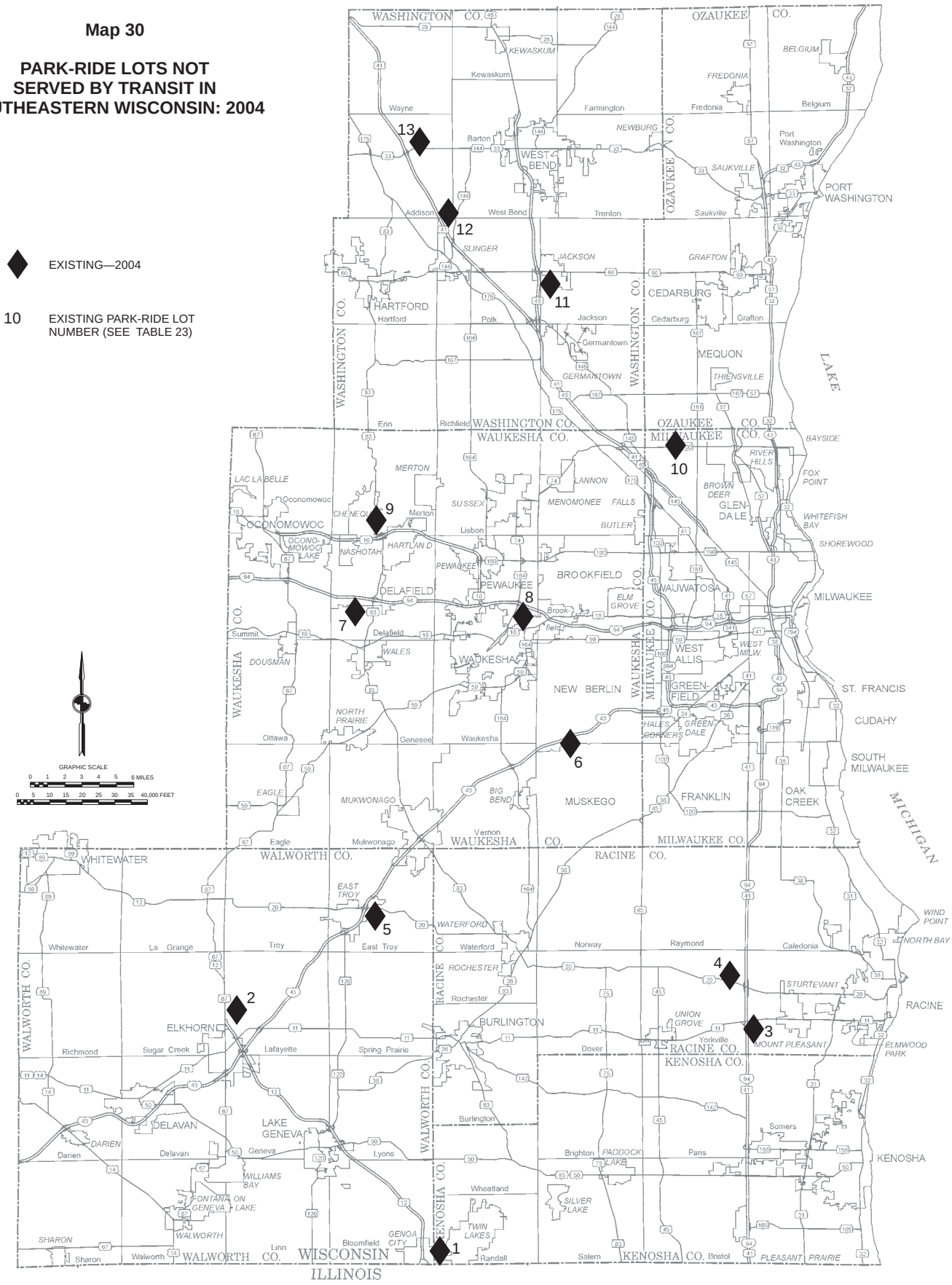

EXISTING—2004
10 EXISTING PARK-RIDE LOT NUMBER (SEE TABLE 23)
GRAPHIC SCALE
0 1 2 3 4 5 6 MILES
0 5 10 15 20 25 30 35 40,000 FEET
WASHINGTON CO.
OZAUKEE CO.
WAUKESHA CO.
MILWAUKEE CO.
RACINE CO.
WALWORTH CO.
KENOSHA CO.
WISCONSIN
ILLINOIS
MICHIGAN
LAKE
Kewaskum
Wayne
Farmington
Fredonia
Belgium
Barton
West Bend
Trenton
Saukville
Port Washington
Addison
Hartford
Polk
Jackson
Cedarburg
Grafton
Germantown
Richfield
Erin
Merton
Lisbon
Summit
Delafield
Pewaukee
Brookfield
Waukesha
Wauwatosa
West Allis
Milwaukee
New Berlin
Greenfield
St. Francis
Cudahy
South Milwaukee
Oak Creek
Franklin
Muskego
Ottawa
Genesee
Mukwonago
Eagle
Vernon
Whitewater
La Grange
Troy
East Troy
Waterford
Norway
Raymond
Caledonia
Rochester
Burlington
Yorkville
Dover
Sugar Creek
Lafayette
Spring Prairie
Richmond
Elkhorn
Delavan
Darien
Geneva
Lyons
Lake Geneva
Brighton
Paris
Somers
Kenosha
Wheatland
Bristol
Salem
Randall
Bloomfield
Linn
Walworth
Sharon
Fontana on Geneva Lake
Williams Bay
Twin Lakes
Genoa City
Silver Lake
Paddock Lake
Pleasant Prairie
Mount Pleasant
Elmwood Park
North Bay
Wind Point
Sturtevant
Union Grove
Racine
Menomonee Falls
Germantown
Jackson
Grafton
Cedarburg
Mequon
Thiensville
Bayside
River Hills
Fox Point
Brown Deer
Glendale
Whitefish Bay
Shorewood
Butler
Elm Grove
West Milw.
Hales Corners
Greendale
Oconomowoc
Lac La Belle
Merton
Sussex
Lannon
Hartland
Nashotah
Pewaukee
Chenequa
Dousman
Wales
North Prairie
Eagle
Mukwonago
Big Bend
Waterford
Rochester
Union Grove
Yorkville
Mount Pleasant
Somers
Paddock Lake
Silver Lake
Twin Lakes
Genoa City
Williams Bay
Fontana on Geneva Lake
Walworth
Sharon
Darien
Delavan
Elkhorn
Whitewater
Burlington
Wheatland
Bristol
Pleasant Prairie
Oconomowoc Lake
Newburg
Saukville
Belgium
Fredonia
Kewaskum
Port Washington
West Bend
Hartford
Germantown
Menomonee Falls
Brookfield
Delafield
Waukesha
New Berlin
Greenfield
Oak Creek
Franklin
Muskego
Cudahy
St. Francis
South Milwaukee
Milwaukee
Wauwatosa
Whitefish Bay
Shorewood
Glendale
Brown Deer
Fox Point
Bayside
River Hills
Mequon
Thiensville
Cedarburg
Grafton
Jackson
Germantown
Hartford
Addison
Barton
Wayne
Farmington
Fredonia
Belgium
Kewaskum
Newburg
Saukville
Port Washington
Trenton
Slinger
Jackson
Grafton
Cedarburg
Hartford
Polk
Germantown
Mequon
Thiensville
Richfield
Erin
Merton
Lisbon
Summit
Delafield
Pewaukee
Brookfield
Waukesha
Wauwatosa
West Allis
Milwaukee
New Berlin
Greenfield
St. Francis
Cudahy
South Milwaukee
Oak Creek
Franklin
Muskego
Ottawa
Genesee
Mukwonago
Eagle
Vernon
Whitewater
La Grange
Troy
East Troy
Waterford
Norway
Raymond
Caledonia
Rochester
Burlington
Yorkville
Dover
Sugar Creek
Lafayette
Spring Prairie
Richmond
Elkhorn
Delavan
Darien
Geneva
Lyons
Lake Geneva
Brighton
Paris
Somers
Kenosha
Wheatland
Bristol
Salem
Randall
Bloomfield
Linn
Walworth
Sharon
Fontana on Geneva Lake
Williams Bay
Twin Lakes
Genoa City
Silver Lake
Paddock Lake
Pleasant Prairie
Mount Pleasant
Elmwood Park
North Bay
Wind Point
Sturtevant
Union Grove
Racine
Menomonee Falls
Germantown
Jackson
Grafton
Cedarburg
Mequon
Thiensville
Bayside
River Hills
Fox Point
Brown Deer
Glendale
Whitefish Bay
Shorewood
Butler
Elm Grove
West Milw.
Hales Corners
Greendale
Oconomowoc
Lac La Belle
Merton
Sussex
Lannon
Hartland
Nashotah
Pewaukee
Chenequa
Dousman
Wales
North Prairie
Eagle
Mukwonago
Big Bend
Waterford
Rochester
Union Grove
Yorkville
Mount Pleasant
Somers
Paddock Lake
Silver Lake
Twin Lakes
Genoa City
Williams Bay
Fontana on Geneva Lake
Walworth
Sharon
Darien
Delavan
Elkhorn
Whitewater
Burlington
Wheatland
Bristol
Pleasant Prairie
Oconomowoc Lake
Newburg
Saukville
Belgium
Fredonia
Kewaskum
Port Washington
West Bend
Hartford
Germantown
Menomonee Falls
Brookfield
Delafield
Waukesha
New Berlin
Greenfield
Oak Creek
Franklin
Muskego
Cudahy
St. Francis
South Milwaukee
Milwaukee
Wauwatosa
Whitefish Bay
Shorewood
Glendale
Brown Deer
Fox Point
Bayside
River Hills
Mequon
Thiensville
Cedarburg
Grafton
Jackson
Germantown
Hartford
Addison
Barton
Wayne
Farmington
Fredonia
Belgium
Kewaskum
Newburg
Saukville
Port Washington
West Bend

Table 23

AVERAGE WEEKDAY USE OF PARK-RIDE LOTS NOT SERVED BY TRANSIT: 2004

Number[a]	Location	Available Parking Spaces	Autos Parked on an Average Weekday: 2004	Percent of Spaces Used
1	USH 12 and CTH P (Genoa City)	40	6	15
2	USH 12 and STH 67 (Elkhorn)	40	9	23
3	East Troy Municipal Airport (East Troy)	40	14	35
4	IH 94 and STH 11 (Mount Pleasant)	65	20	31
5	IH 94 and STH 20 (Ives Grove)	75	59	79
6	STH 16 and STH 83 (Chenequa)	35	11	31
7	IH 94 and CTH C (Delafield)	30	20	67
8	IH 94 and STH 164 (Pewaukee)	85	33	39
9	IH 43 and CTH Y (New Berlin)	45	16	36
10	STH 100 and N. 85th Street (Milwaukee)	100	- -[b]	- -[b]
11	STH 60 and CTH P (Jackson)	30	27	90
12	USH 41 and CTH K (Addison)	50	9	18
13	USH 41 and STH 33 (Allenton)	35	27	77
- -	Total	670	251	37

[a]*See Map 30.*

[b]*Data not available.*

Source: SEWRPC.

Accommodation of Bicycles on the Arterial Street and Highway System

On arterial streets and highways with a rural cross-section, bicycles may be accommodated with a four foot paved shoulder and six foot gravel shoulder on a two traffic-lane facility, and with an eight foot paved shoulder on a four-traffic lane facility. On arterial streets with an urban cross-section, bicycles may be accommodated with bicycle lanes five to six feet in width, or with a widened outside lane of 14 feet. Accommodations may also be provided on urban and rural arterials with parallel, physically separate paths of eight to 12 feet in width (five to six feet for one-way paths) and ten feet of separation from the travel lanes. Map 31 identifies those 633 miles of arterial streets and highways which provided accommodation through paved shoulders, bicycle lanes, or separate paths in 2004. Data is not available to identify those urban arterials with outside lanes of 14 feet in width which also accommodate bicycles.

Off-Street Bicycle Paths

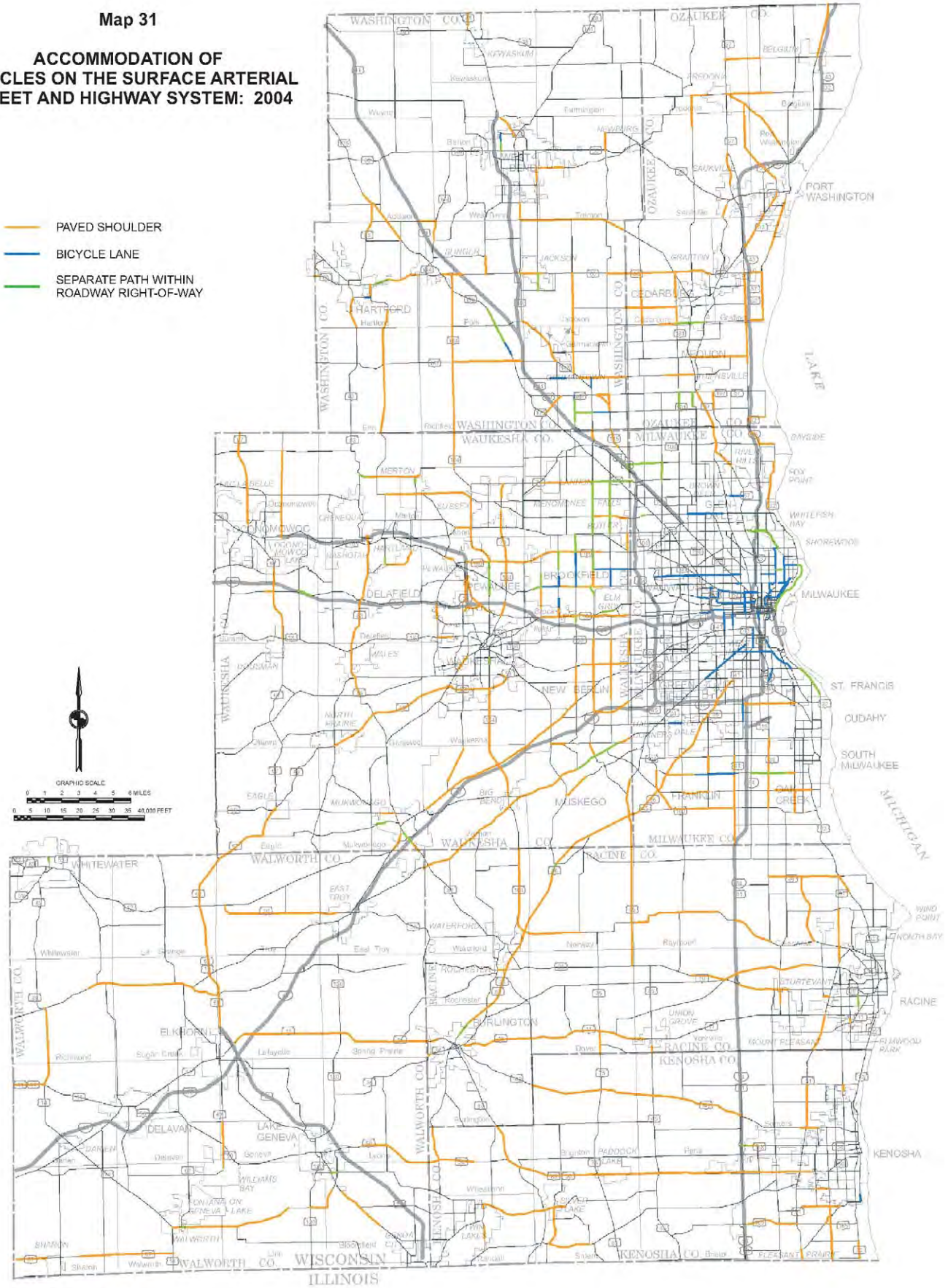
Map 32 displays the existing 203 miles of regional off-street bicycle paths largely developed within former railway rights-of-way and parkway corridors in 2004. These paths are envisioned, upon completion, to connect the Region's major urban centers—Milwaukee, Racine, Kenosha, and Waukesha—and the Region's urban communities. These paths—intended for seasonal use—provide particularly safe and aesthetically attractive routes with separation from motor vehicle traffic.

Park-Ride Lot Bicycle Parking and Storage

Map 33 displays the 48 park-ride lots within the Region as of 2004. Of the 35 lots with transit service, 16 have bicycle racks, and 19 have no bicycle parking facilities. Of the 13 lots without transit service, two of them have bicycle racks.

Map 31

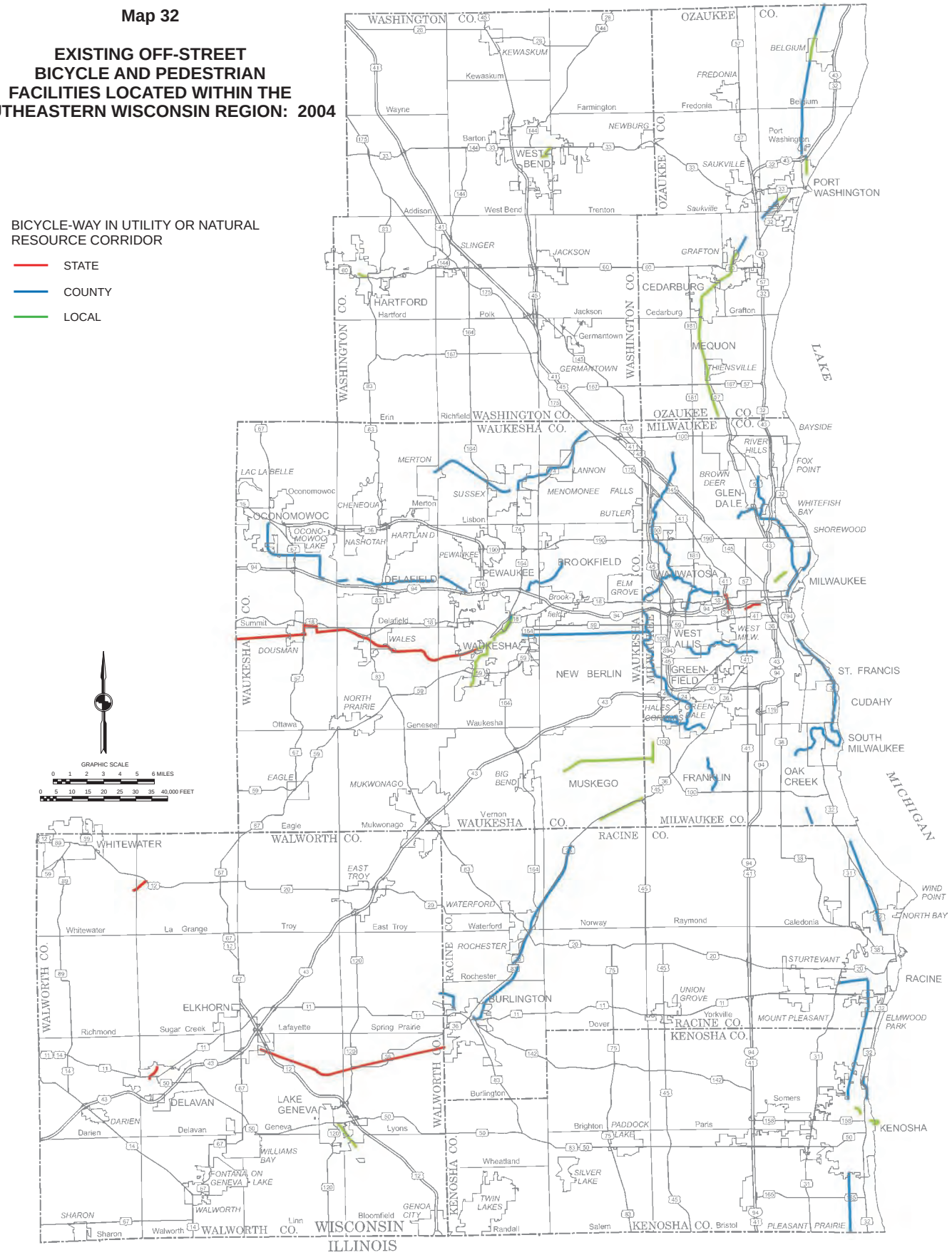
ACCOMMODATION OF BICYCLES ON THE SURFACE ARTERIAL STREET AND HIGHWAY SYSTEM: 2004



Source: SEWRPC.

Map 32

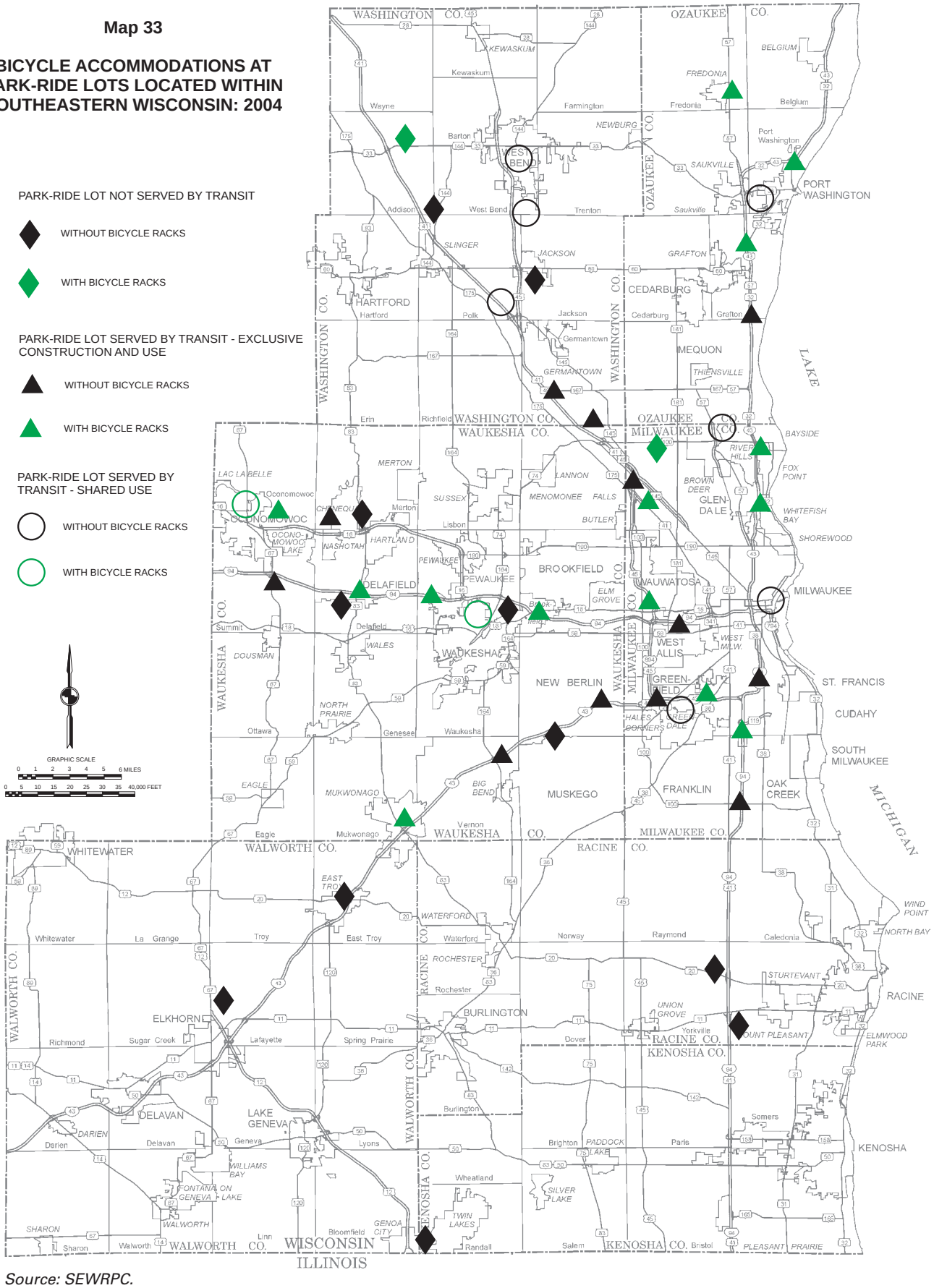
EXISTING OFF-STREET BICYCLE AND PEDESTRIAN FACILITIES LOCATED WITHIN THE SOUTHEASTERN WISCONSIN REGION: 2004



Source: SEWRPC.

Map 33

BICYCLE ACCOMMODATIONS AT PARK-RIDE LOTS LOCATED WITHIN SOUTHEASTERN WISCONSIN: 2004



Source: SEWRPC.

TRANSPORTATION MANAGEMENT AND OPERATIONS SYSTEMS

Regional transportation system management and operations systems currently exist on the regional freeway system, selected elements of the standard arterial street and highway system, and the public transit system. The goals of these systems include improving operations, reducing travel time, improving safety, and reducing operating costs.

Freeway Traffic Management and Operation System

The existing freeway traffic management system in southeastern Wisconsin consists of many elements which are often referred to as intelligent transportation systems. The elements of the southeastern Wisconsin freeway traffic management system include: traffic detectors, ramp metering, high-occupancy vehicle bypass ramps, variable message signs, highway advisory radio, closed-circuit television, service patrols, crash investigation sites, and enhanced reference markers.

Traffic detectors measure the speed, volume, and density of freeway traffic. This data is monitored at the Wisconsin Department of Transportation's Traffic Operation Center in Milwaukee for disruptions in traffic flow and for use in determining the operation of the ramp meter system in southeastern Wisconsin. Congestion information derived from the speed, volume, and density data collected via the detectors is mapped, and may be viewed by the traveling public through the Department's website. In 2004, the traffic detectors were located throughout the Milwaukee area freeway system and on the freeways in Racine and Kenosha Counties. The spacing of these traffic detectors is about one-half mile on the freeways in Milwaukee County and on IH 94 in Waukesha County, and about one to two miles on the remaining freeway segments.

In 2004, 120 freeway on-ramps were equipped with ramp meters and attendant traffic detectors in southeastern Wisconsin. The metered on-ramps are located adjacent to and upstream of freeway segments that experience traffic congestion during the morning and evening peak-traffic periods. In 2004, preferential access was provided at 63 freeway on-ramps to high-occupancy vehicles[3]. Map 34 and Table 24 indicate the location and ramp meter type provided on the freeway system in southeastern Wisconsin.

Variable message signs provide real-time information to travelers about downstream freeway traffic conditions. The Wisconsin Department of Transportation uses the variable message signs to display current travel times to selected areas and to display information about lane and ramp closures as well as where travel delays begin and end. In the event of child abduction, the variable message signs are also used to display an amber alert. In 2004, there were 21 variable message signs at fixed locations on the freeway system in southeastern Wisconsin as shown on Map 35 and in Table 25, as well as six portable variable message signs used primarily for special events and incident management.

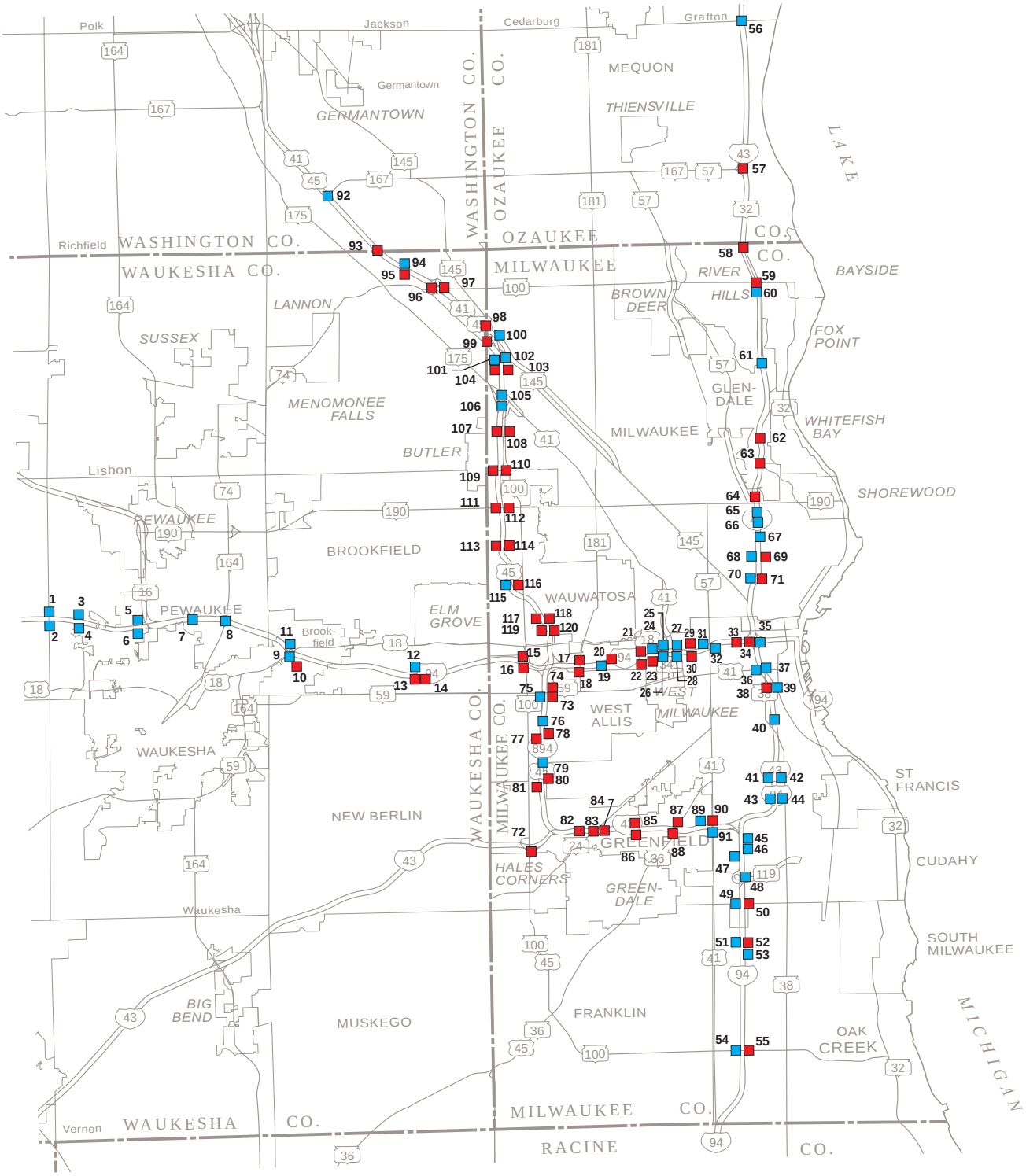
Highway advisory radio is a system of low-power radio transmitters licensed for state use. The Wisconsin Department of Transportation uses highway advisory radio to transmit pre-recorded messages in areas with ongoing highway construction projects as well as information regarding special events to the motoring public. In the event of child abduction, the highway advisory radio system is also used to broadcast the amber alert. Roadside signing with flashing beacons is used to advise motorists of the specific locations of individual transmitters and the frequency to which they need to tune to receive the transmission.

In 2004, 83 closed-circuit television cameras (see Map 35 and Table 25) provided live video of traffic conditions. The video provided by these cameras allows for the identification and confirmation of congested areas and incident locations. Video is monitored at the Wisconsin Department of Transportation Traffic Operation Center in Milwaukee. Video is supplied to some emergency response agencies so that their dispatchers can provide personnel with incident locations and information. The Wisconsin Department of Transportation also provides some of its camera images to the media and to its website for viewing by the general public.

[3] *In southeastern Wisconsin the definition of high-occupancy vehicle is defined as a transit vehicle or passenger vehicle with a minimum of at least two occupants.*

Map 34

LOCATION OF RAMP METERS ON THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004



Source: Wisconsin Department of Transportation and SEWRPC.

Table 24

LOCATION OF RAMP METERS ON THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004

Reference Number[a]	Ramp Meter Location
IH 94 East-West Corridor	
1	Westbound at CTH SS
2	Eastbound at CTH SS
3	Westbound at CTH G
4	Eastbound at CTH G
5	Westbound at CTH T
6	Eastbound at CTH T (Grandview Boulevard)
7	Eastbound at CTH J
8	Eastbound at STH 164
9	Eastbound at USH 18
10	Eastbound at Barker Road
11	Westbound at CTH JJ
12	Westbound at CTH O (Moorland Road)
13	CTH O (Moorland Road) Southbound to Eastbound IH 94
14	CTH O (Moorland Road) Northbound to Eastbound IH 94
15	Westbound at STH 100 (S. 108th Street)
16	Eastbound at STH 100 (S. 108th Street)
17	Westbound at STH 181 (N. 84th Street)
18	Eastbound at STH 181 (N. 84th Street)
19	Westbound at N. 70th Street
20	Eastbound at N. 68th Street
21	Westbound at Hawley Road
22	Eastbound at Hawley Road
23	Eastbound at Mitchell Boulevard
24	Westbound at Mitchell Boulevard
25	USH 41 Southbound to Westbound IH 94
26	USH 41 Southbound to Eastbound IH 94
27	STH 341 Northbound to Eastbound IH 94
28	STH 341 Northbound to Westbound IH 94
29	Westbound at N. 35th Street
30	Eastbound at N. 35th Street
31	Westbound at N. 28th Street
32	Eastbound at N. 25th Street
33	Westbound at N. 17th Street
34	Westbound at N. 13th Street and Clybourn Avenue
35	Westbound at N. 7th Street and Clybourn Avenue
IH 94 South Corridor	
36	Southbound at S. 9th Street and Mineral Street
37	Southbound at Mineral Street and National Avenue
38	Southbound at Lapham Boulevard
39	Northbound at Lapham Boulevard
40	Southbound at Becher Street
41	Southbound at Holt Avenue
42	Northbound at Holt Avenue
43	Southbound at W. Howard Avenue
44	Northbound at W. Howard Avenue
45	Westbound CTH Y (W. Layton Avenue) to Northbound IH 94
46	Eastbound CTH Y (W. Layton Avenue) to Northbound IH 94
47	Southbound at S. 20th Street, south of CTH Y (W. Layton Avenue)
48	STH 119 Westbound to Northbound IH 94
49	Southbound at CTH ZZ (W. College Avenue)
50	Northbound at CTH ZZ (W. College Avenue)
51	Southbound at CTH BB (W. Rawson Avenue)
52	Westbound CTH BB (W. Rawson Avenue) to Northbound IH 94
53	Eastbound CTH BB (W. Rawson Avenue) to Northbound IH 94
54	Southbound at STH 100 (W. Ryan Road)

Table 24 (continued)

Reference Number[a]	Ramp Meter Location
IH 43 North Corridor	
55	Northbound at STH 100 (W. Ryan Road)
56	Southbound at CTH C (Pioneer Road)
57	Southbound at STH 57/167 (Mequon Road)
58	Southbound at Milwaukee—Ozaukee County Line Road
59	Eastbound STH 100 (W. Brown Deer Road) to Southbound IH 43
60	Westbound STH 100 (W. Brown Deer Road) to Southbound IH 43
61	Southbound at CTH PP (W. Good Hope Road)
62	Southbound at W. Silver Spring Drive
63	Southbound at W. Hampton Avenue
64	Southbound at Green Bay Avenue
65	Southbound at N. 9th Street and W. Abert Place
66	Northbound at Atkinson Avenue
67	Southbound at W. Keefe Avenue
68	Southbound at W. Locust Street
69	Northbound at W. Locust Street
70	Southbound at W. North Avenue
71	Northbound at W. North Avenue
IH 43 South Corridor	
72	Eastbound at STH 100 (S. 108th Street)
IH 894 Corridor	
73	Eastbound STH 59 (W. Greenfield Avenue) to Northbound IH 894
74	Westbound STH 59 (W. Greenfield Avenue) to Northbound IH 894
75	Southbound at STH 59 (W. Greenfield Avenue)
76	Northbound at W. Lincoln Avenue
77	Southbound at W. National Avenue
78	Northbound at W. National Avenue
79	Northbound at CTH NN (W. Oklahoma Avenue)
80	Northbound at W. Beloit Road
81	Southbound at W. Beloit Road
82	Westbound at S. 84th Street
83	Eastbound at STH 24 (W. Forest Home Avenue)
84	Eastbound at CTH U (S. 76th Street)
85	Westbound at S. 60th Street
86	Eastbound at S. 60th Street
87	Westbound at STH 36 (S. Loomis Road)
88	Eastbound at STH 36 (S. Loomis Road)
89	Southbound USH 41 (S. 27th Street) to Westbound IH 894
90	Northbound USH 41 (S. 27th Street) to Westbound IH 894
91	Eastbound at USH 41 (S. 27th Street)
USH 45 Corridor	
92	Southbound at Lannon Road
93	Southbound at CTH Q (Washington—Waukesha County Line Road)
94	Northbound at Pilgrim Road
95	Southbound at Pilgrim Road
96	Southbound at STH 74 (Main Street)
97	Northbound at STH 74 (Main Street)
98	Northbound at N. 124th Street (Waukesha—Milwaukee County Line)
99	Southbound at N. 124th Street (Waukesha—Milwaukee County Line)
100	Northbound STH 145 to Northbound USH 45
101	Westbound CTH PP (W. Good Hope Road) to Southbound USH 45
102	Southbound from STH 145 to USH 45
103	Northbound at CTH PP (W. Good Hope Road)
104	Eastbound CTH PP (W. Good Hope Road) to Southbound USH 45
105	Northbound at USH 41 (W. Appleton Avenue)
106	Southbound at STH 175 (W. Appleton Avenue)
107	Southbound at CTH E (W. Silver Spring Drive)
108	Northbound at CTH E (W. Silver Spring Drive)

Table 24 (continued)

Reference Number[a]	Ramp Meter Location
USH 45 Corridor (continued)	
109	Southbound at CTH EE (W. Hampton Avenue)
110	Northbound at CTH EE (W. Hampton Avenue)
111	Southbound at STH 190 (W. Capitol Drive)
112	Northbound at STH 190 (W. Capitol Drive)
113	Southbound at W. Burleigh Street
114	Northbound at W. Burleigh Street
115	Southbound at W. North Avenue
116	Northbound at W. North Avenue
117	Southbound at Watertown Plank Road
118	Northbound at Watertown Plank Road
119	Southbound at N. 97th Street and W. Wisconsin Avenue
120	Northbound at W. Wisconsin Avenue

[a]*See Map 34.*

Source: Wisconsin Department of Transportation and SEWRPC.

Freeway service patrols assist disabled motorists with specially equipped vehicles. When freeway service patrols encounter severe incidents, they have the appropriate communication equipment to ensure that the appropriate personnel and equipment may be dispatched to the scene, prior to arrival by a first responder. In 2004, there were freeway service patrols in Kenosha, Milwaukee, Racine, and Waukesha Counties (see Map 36 and Table 26). In Milwaukee County, the enhanced freeway patrol is operated by the Milwaukee County Sheriff's Department and consists of a special fleet of two vehicles dedicated to handling and clearing incidents. There is one vehicle on duty during the morning and evening peak-traffic periods, which are staffed with uniformed officers. In Kenosha, Racine, and Waukesha Counties, the freeway service patrol is known as the Gateway Patrol. Gateway Patrol involves four vehicles under contract with the Wisconsin Department of Transportation. The Gateway Patrol vehicles are tow vehicles which have been painted bright lime green for better visibility at night and during inclement weather. The Gateway Patrol operates on IH-94 throughout Racine and Kenosha Counties, and between STH 67 and the Milwaukee-Waukesha County line in Waukesha County.

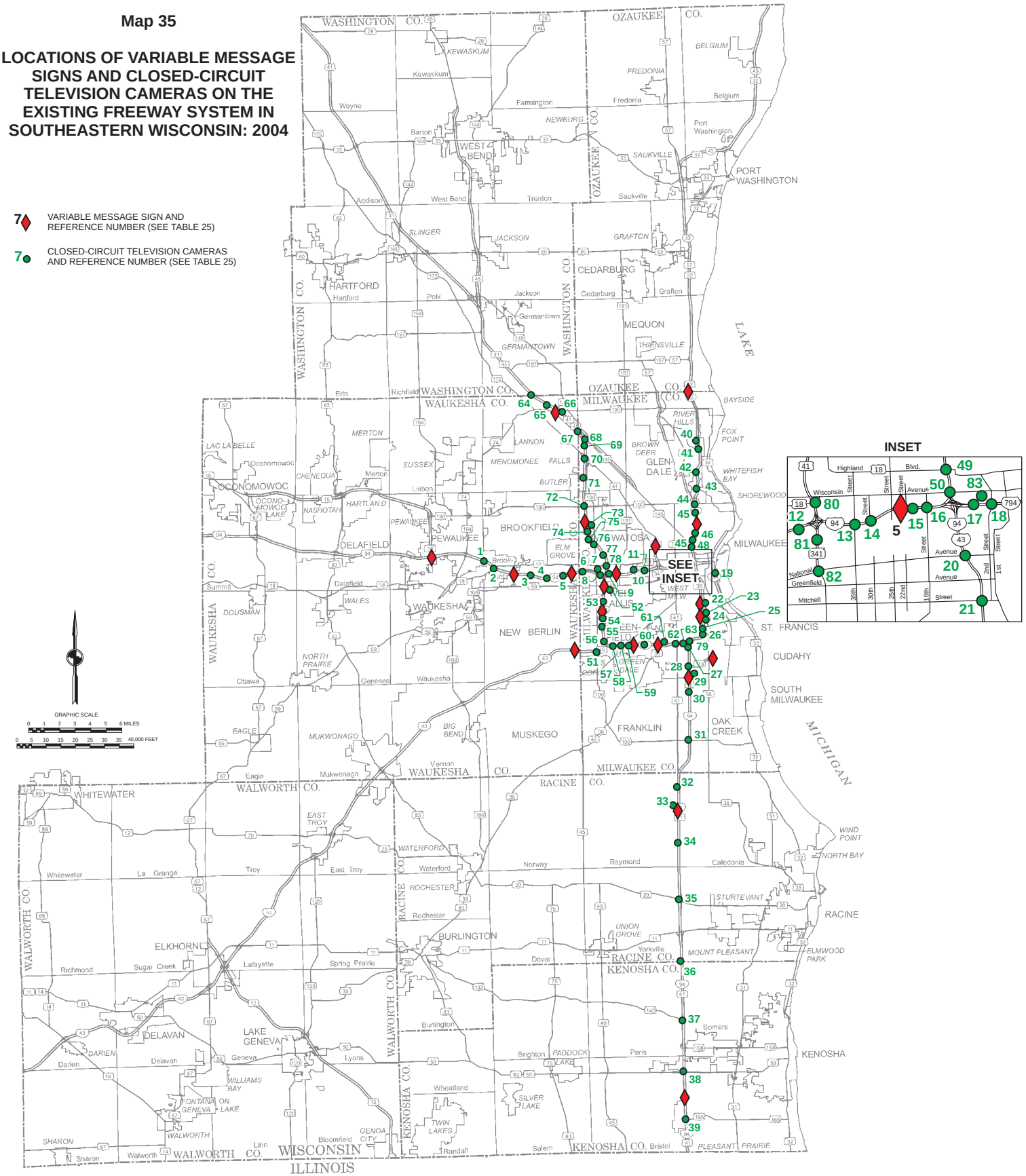
Crash investigation sites are designated safe zones for distressed motorists to relocate to if they are involved in a crash or an incident on the freeway. In 2004, there were 35 crash investigation sites (see Map 36 and Table 27) on the freeway system in southeastern Wisconsin. These sites are intended for use by motorists involved in an incident to exchange insurance information or to make emergency repairs to their vehicle following a minor collision or breakdown. These sites are also used by the freeway service patrols to relocate the distressed motorists they assist.

Enhanced reference markers are designed to save time in identifying locations of disabled motorists to improve emergency response times to highway incidents. Enhanced reference markers can improve emergency response times, improve traffic incident clearance times, reduce crash related delays, and reduce the number of secondary crashes. In southeastern Wisconsin enhanced reference markers have been installed in Milwaukee County in the freeway median at each one-tenth of a mile on IH-94 from the Mitchell Interchange to the Illinois-Wisconsin State line and on USH 45 from the Zoo Interchange to the Milwaukee-Waukesha County line.

The day to day operation and management of the southeastern Wisconsin regional freeway system is conducted at the Wisconsin Department of Transportation Traffic Operations Center in Milwaukee. The traffic operation center staff coordinates the freeway lane and ramp closures in southeastern Wisconsin, including construction projects and county maintenance work. Additionally, the Wisconsin Department of Transportation works closely with local law enforcement, media, emergency responders, tow operators, transit operators, municipal governments, and others

Map 35

LOCATIONS OF VARIABLE MESSAGE SIGNS AND CLOSED-CIRCUIT TELEVISION CAMERAS ON THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004



Source: Wisconsin Department of Transportation and SEWRPC.

Table 25

LOCATIONS OF VARIABLE MESSAGE SIGNS AND CLOSED-CIRCUIT TELEVISION CAMERAS ON THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004

Reference Number[a]	Variable Message Sign Locations
1	IH 94 eastbound at STH 16
2	IH 94 eastbound at Brookfield Road
3	IH 94 eastbound at Elm Grove Road
4	IH 94 eastbound at S. 89th Street
5	IH 94 westbound at N. 22nd Street
6	IH 43 and IH 94 northbound at Kinnickinnic River
7	IH 43 and IH 94 southbound at Oklahoma Avenue
8	IH 94 northbound at CTH ZZ (W. College Avenue)
9	IH 94 northbound at CTH G
10	IH 94 northbound at CTH C
11	IH 43 southbound at Ozaukee—Milwaukee County Line Road
12	IH 43 southbound at W. Locust Street
13	IH 43 northbound at CTH T (W. Beloit Road)
14	IH 894 and USH 45 southbound at STH 59 (W. Greenfield Avenue)
15	IH 894 and USH 45 northbound at Cleveland Avenue
16	IH 43 and IH 894 eastbound at S. 72nd Street
17	IH 43 and IH 894 westbound at STH 36 (W. Loomis Road)
18	USH 41 and USH 45 southbound at STH 74 (Main Street)
19	USH 45 southbound at W. Burleigh Street
20	USH 41 southbound at W. Cherry Street
21	STH 119 westbound at General Mitchell International Airport

Reference Number[a]	Closed-Circuit Television Camera Locations
1	IH 94 at Springdale Road
2	IH 94 at USH 18 (Blue Mound Road)
3	IH 94 at Calhoun Road
4	IH 94 at CTH O (Moorland Road)
5	IH 94 at Sunnyslope Road
6	IH 94 at S. 121st. Street
7	IH 94 at STH 100 (N. 108th Street)
8	IH 94 at IH 894 and USH 45 (Zoo Interchange)
9	IH 94 at S. 92nd Street
10	IH 94 at S. 76th Street
11	IH 94 at Hawley Road
12	IH 94 at Mitchell Boulevard
13	IH 94 at N. 35th Street
14	IH 94 at N. 30th Street
15	IH 94 at N. 22nd Street
16	IH 94 at N. 16th Street
17	IH 794 at James Lovell Drive
18	IH 794 at N. 2nd Street
19	IH 794 at Daniel W. Hoan bridge
20	IH 94 and IH 43 at STH 59 (W. National Avenue)
21	IH 94 and IH 43 at W. Mitchell Street
22	IH 94 and IH 43 at STH 38 (Chase Avenue)
23	IH 94 and IH 43 at W. Oklahoma Avenue
24	IH 94 and IH 43 at W. Holt Street
25	IH 94 and IH 43 at W. Howard Avenue
26	IH 94 and IH 43 at W. Plainfield Avenue
27	IH 94 at CTH Y (W. Layton Avenue)
28	IH 94 at STH 119 (Airport Interchange)

Table 25 (continued)

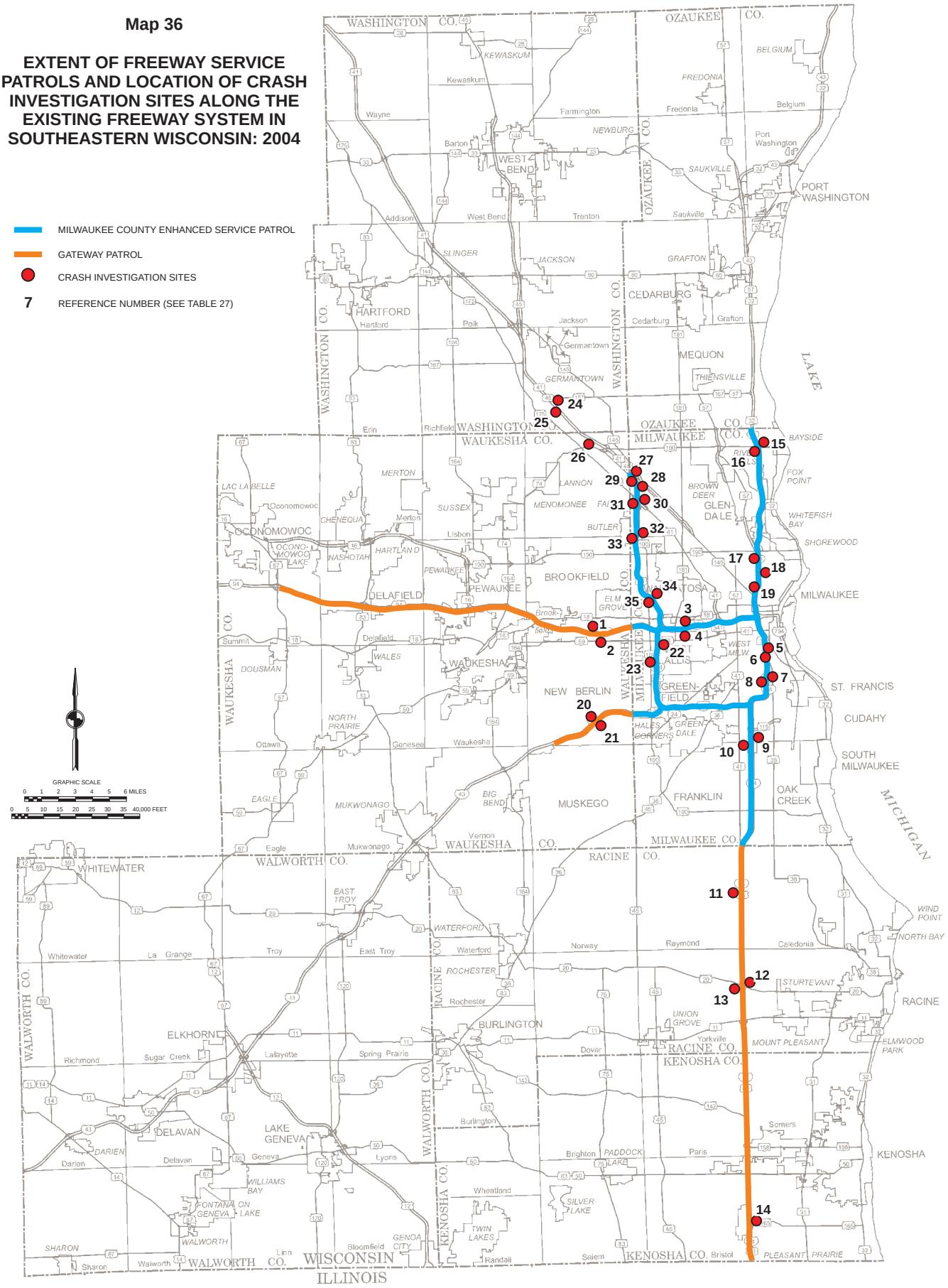
Reference Number[a]	Closed-Circuit Television Camera Locations
29	IH 94 at CTH ZZ (W. College Avenue)
30	IH 94 at CTH BB (W. Rawson Avenue)
31	IH 94 at STH 100 (W. Ryan Road)
32	IH 94 at Seven Mile Road
33	IH 94 at CTH G
34	IH 94 at CTH K
35	IH 94 at STH 20 (Washington Avenue)
36	IH 94 at CTH KR (County Line Road)
37	IH 94 at STH 142 (Burlington Road)
38	IH 94 at STH 50 (75th Street)
39	IH 94 at STH 165 (104th Street)
40	IH 43 at CTH PP (W. Good Hope Road)
41	IH 43 at W. Daphne Road
42	IH 43 at W. Silver Spring Drive
43	IH 43 at W. Hampton Avenue
44	IH 43 at STH 190 (W. Capitol Drive)
45	IH 43 at W. Keefe Avenue
46	IH 43 at W. Wright Street
47	IH 43 at W. Brown Street
48	IH 43 at Hillside Interchange (former Park East Freeway)
49	IH 43 at W. Highland Avenue
50	IH 43 at W. Wisconsin Avenue
51	IH 43 at STH 100 (S. 108th Street)
52	IH 894 and USH 45 at STH 59 (W. Greenfield Avenue)
53	IH 894 and USH 45 at W. Lincoln Avenue
54	IH 894 and USH 45 at CTH NN (W. Oklahoma Avenue)
55	IH 894 and USH 45 at CTH T (W. Beloit Road)
56	IH 894 and USH 45 at Cold Spring Road
57	IH 894 and IH 43 at CTH N (S. 92nd Street)
58	IH 894 and IH 43 at S. 84th Street
59	IH 894 and IH 43 at CTH U (S. 76th Street)
60	IH 894 and IH 43 at S. 60th Street
61	IH 894 and IH 43 at STH 36 (W. Loomis Road)
62	IH 894 and IH 43 at USH 41 (S. 27th Street)
63	IH 894 and IH 43 at S. 20th Street
64	USH 41 and USH 45 at CTH Q (Washington—Waukesha County Line Road)
65	USH 41 and USH 45 at CTH YY (Pilgrim Road)
66	USH 41 and USH 45 at STH 74 (Main Street)
67	USH 41 and USH 45 at Waukesha—Milwaukee County Line (N. 124th Street)
68	USH 41 and USH 45 at STH 145
69	USH 41 and USH 45 at CTH PP (W. Good Hope Road)
70	USH 45 and STH 100 at USH 41 (W. Appleton Avenue)
71	USH 45 at CTH E (W. Silver Spring Drive)
72	USH 45 at STH 190 (W. Capitol Drive)
73	USH 45 at W. Burleigh Road
74	USH 45 at W. Center Street
75	USH 45 at W. North Avenue
76	USH 45 at STH 100 (Mayfair Road)
77	USH 45 at Watertown Plank Road
78	USH 45 at USH 18 (Bluemound Road)
79	IH 43 and IH 94 at Mitchell Interchange
80	USH 41 at USH 18 (Bluemound Road)
81	STH 341 at Stadium
82	STH 341 at STH 59 (W. National Avenue)
83	Wisconsin Department of Transportation Traffic Operations Center

[a]*See Map 35.*

Source: Wisconsin Department of Transportation and SEWRPC.

Map 36

EXTENT OF FREEWAY SERVICE PATROLS AND LOCATION OF CRASH INVESTIGATION SITES ALONG THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004



Source: Wisconsin Department of Transportation and SEWRPC.

Table 26

EXTENT OF FREEWAY SERVICE PATROLS IN SOUTHEASTERN WISCONSIN: 2004

Service Patrol	Freeway Segment	Service Hours
Milwaukee County	Systemwide within Milwaukee County	Monday-Friday 6 a.m. to 10 p.m.
Gateway Patrol	Kenosha County – IH 94: State-line to the Racine County line	Monday-Thursday 7 a.m. to 10 a.m., 4 p.m. to 7 p.m. Friday-Sunday 10 a.m. to 8 p.m.
Gateway Patrol	Racine County – IH 94: Kenosha County line to the Milwaukee County line	Monday-Thursday 7 a.m. to 10 a.m., 4 p.m. to 7 p.m. Friday-Sunday 10 a.m. to 8 p.m.
Gateway Patrol	Waukesha County – IH 94: STH 67 to the Milwaukee County line	Monday-Friday 6 a.m. to 9 a.m., 3 p.m. to 7 p.m.

Source: Wisconsin Department of Transportation and SEWRPC.

through the Traffic Incident Management Enhancement (TIME) program. The TIME program's goals are to improve and enhance freeway incident management, improve freeway safety, and enhance the quality and efficiency of freeway travel.

Standard Arterial Street and Highway Traffic Management and Operation Systems

In 2004, the standard arterial street and highway traffic management systems in southeastern Wisconsin consisted mainly of coordinated traffic signal systems, emergency vehicle preemption, closed-circuit television cameras, and variable message signs.

Coordinated traffic signal systems provide for the efficient progression of traffic along arterial streets and highways allowing motorists to travel through multiple signalized intersections along an arterial route at the speed limit minimizing or eliminating the number of stops at signalized intersections. In 2004, coordinated traffic signal systems in southeastern Wisconsin generally ranged from systems comprised of two traffic signals to systems comprised of about 100 traffic signals. Approximately 1,100 of the 1,700 traffic signals in southeastern Wisconsin in 2004, or about 65 percent, were part of a coordinated signal system.

Coordinated traffic signal systems included the Wisconsin Department of Transportation Integrated Corridor Operations Project (ICOP). A multi-agency initiative, ICOP provides a traffic management system for local arterial streets and highways as alternatives to freeway travel. The initial ICOP route consisted of a number of signal system upgrades along Layton Avenue between Packard Avenue and S. 20th Street and along STH 38 between Layton Avenue and STH 119 in the City of Milwaukee. This project was to improve traffic flow through the corridor by automatically adjusting red-green times of traffic signals along the route regardless of the jurisdiction of the signal (State, county, or municipal) to accommodate freeway traffic diverted to the ICOP route as a result of an incident or special event.

Emergency vehicle preemption allows emergency vehicles to intervene in the normal operation of surface arterial intersection traffic signal systems using wireless communications installed on the traffic signal and the emergency vehicles. Light, radio waves, or sound emitted by the emergency vehicle allow the emergency vehicle to interrupt the regular signal cycle and either change the traffic signal cycle to initiate and hold green indication for the approach from which the emergency vehicle is oriented, or to extend the green indication for the which the emergency vehicle is oriented until the emergency vehicle has cleared the intersection. Emergency vehicle preemption reduces the amount of time for response and increases the safety for the law enforcement and emergency responder communities. In 2004, emergency preemption was deployed on selected signal systems in the following communities or entities: Cities of Kenosha, Milwaukee, Waukesha, and Wauwatosa; Milwaukee and Waukesha Counties; and the Wisconsin Department of Transportation. In total, traffic signals at nearly 580 intersections, or about 34 percent of signalized intersections, were equipped with emergency vehicle preemption capability.

Table 27

LOCATION OF CRASH INVESTIGATION SITES ALONG THE EXISTING FREEWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004

Reference Number[a]	Crash Investigation Site
IH 94 Corridor	
1	Westbound exit ramp to CTH O (Moorland Road)
2	Eastbound exit ramp to CTH O (Moorland Road)
3	Westbound exit ramp to State Fair Park park-ride lot (S. 76th Street)
4	Eastbound exit ramp to State Fair Park park-ride lot (S. 76th Street)
5	Northbound exit ramp to E. Becher/Mitchell (exit #312 A-B)
6	Southbound exit ramp to E. Becher/Lincoln (exit #312 B)
7	Northbound exit ramp to Holt Avenue park-ride lot
8	Southbound exit ramp to Holt Avenue park-ride lot
9	Northbound exit ramp to CTH ZZ (W. College Avenue) park-ride lot
10	Southbound exit ramp to CTH ZZ (W. College Avenue) park-ride lot
11	Southbound exit ramp to State Patrol truck weigh station (CTH G)
12	Northbound exit ramp to Racine County Sheriff's substation (STH 20)
13	Southbound exit ramp to Racine County Sheriff's substation (STH 20)
14	Northbound exit ramp to Wisconsin Tourism Information Center (STH 165)
IH 43 Corridor	
15	Northbound exit ramp to STH 100 (W. Brown Deer Road) park-ride lot
16	Southbound exit ramp to STH 100 (W. Brown Deer Road) park-ride lot
17	Southbound exit ramp to Atkinson Avenue
18	Northbound exit ramp to Locust Street
19	Southbound exit ramp to W. North Avenue
20	Westbound exit ramp to CTH O (Moorland Road)
21	Westbound exit ramp to CTH O (Moorland Road)
IH 894 Corridor	
22	Northbound exit ramp to STH 59 (W. Greenfield Avenue)
23	Southbound exit ramp to W. Lincoln Avenue
USH 45 Corridor	
24	Northbound exit ramp to Lannon Road park-ride lot
25	Southbound exit ramp to Lannon Road park-ride lot
26	Southbound exit ramp to Pilgrim Road
27	Northbound exit ramp to STH 145
28	Northbound exit ramp to CTH PP (W. Good Hope Road) park-ride lot
29	Southbound exit ramp to CTH PP (W. Good Hope Road) park-ride lot
30	Northbound exit ramp to USH 41 (W. Appleton Avenue)
31	Southbound exit ramp to USH 41 (W. Appleton Avenue)
32	Northbound exit ramp to CTH EE (W. Hampton Avenue)
33	Southbound exit ramp to CTH EE (W. Hampton Avenue)
34	Northbound exit ramp to Milwaukee County Sheriff's substation (Watertown Plank Road)
35	Southbound exit ramp to Milwaukee County Sheriff's substation (Watertown Plank Road)

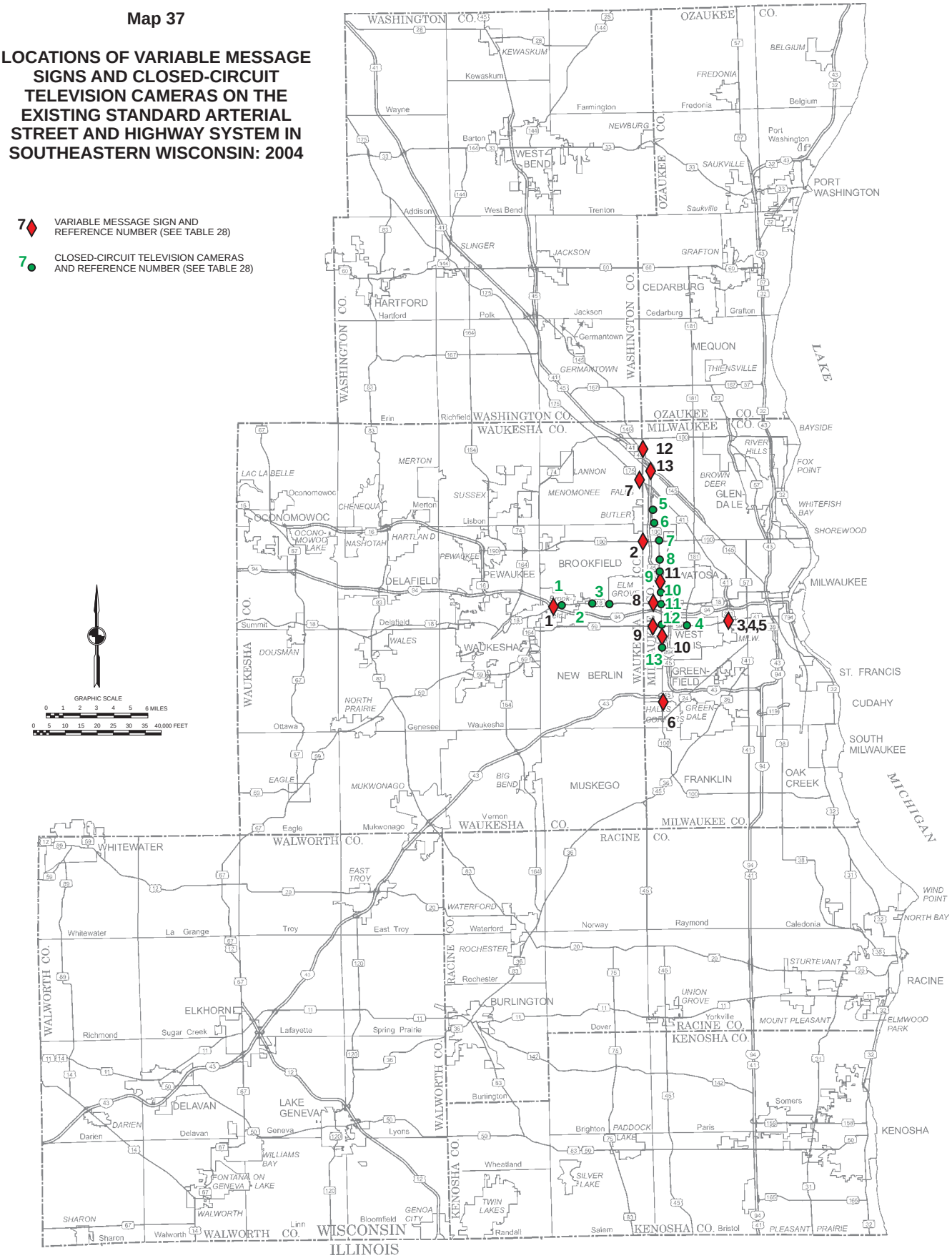
[a]*See Map 36.*

Source: Wisconsin Department of Transportation and SEWRPC.

In 2004, 13 closed-circuit television cameras (see Map 37 and Table 28) provided live video of traffic conditions. The video provided by these cameras allows for the identification and confirmation of congested areas and incident locations. Video is monitored at the Wisconsin Department of Transportation Traffic Operation Center in Milwaukee. Video is supplied to some emergency response agencies so that their dispatchers can provide personnel with incident locations and information.

Map 37

LOCATIONS OF VARIABLE MESSAGE SIGNS AND CLOSED-CIRCUIT TELEVISION CAMERAS ON THE EXISTING STANDARD ARTERIAL STREET AND HIGHWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004



Source: Wisconsin Department of Transportation and SEWRPC.

Table 28

LOCATIONS OF VARIABLE MESSAGE SIGNS AND CLOSED-CIRCUIT TELEVISION CAMERAS ON THE EXISTING STANDARD ARTERIAL STREET AND HIGHWAY SYSTEM IN SOUTHEASTERN WISCONSIN: 2004

Reference Number[a]	Variable Message Sign Locations
1	USH 18 (Blue Mound Road) eastbound at IH 94 (Goerke's Corners)
2	STH 190 (W. Capitol Drive) eastbound at N. 124th Street
3	STH 59 (W. National Avenue) westbound at Miller Park Way
4	Miller Park Way northbound at STH 59 (W. National Avenue)
5	STH 59 (W. National Avenue) eastbound at Miller Park Way
6	STH 100 northbound at Edgerton Avenue
7	STH 175 (W. Appleton Avenue) eastbound at STH 100
8	USH 18 (W. Bluemound Road) eastbound at STH 100
9	STH 59 (W. Greenfield Avenue) eastbound at STH 100
10	STH 100 northbound at W. Lapham Street
11	STH 100 southbound at W. Walnut Street
12	N. 124th Street southbound at W. Bradley Road
13	CTH PP (W. Good Hope Road) westbound at USH 45

Reference Number[a]	Closed-Circuit Television Camera Locations
1	USH 18 (Blue Mound Road) at CTH Y (Barker Road)
2	USH 18 (Blue Mound Road) at Calhoun Road
3	USH 18 (Blue Mound Road) at CTH O (Moorland Road)
4	STH 181 (S. 84th Street) at STH 59 (W. Greenfield Avenue)
5	STH 100 (N. 108th Street) at CTH E (W. Silver Spring Drive)
6	STH 100 (N. 108th Street) at CTH EE (W. Hampton Avenue)
7	STH 100 (N. 108th Street) at STH 190 (W. Capitol Drive)
8	STH 100 (N. 108th Street) at W. Burleigh Road
9	STH 100 (N. 108th Street) at W. North Avenue
10	STH 100 (N. 108th Street) at Watertown Plank Road
11	STH 100 (N. 108th Street) at USH 18 (W. Bluemound Road)
12	STH 100 (S. 108th Street) at STH 59 (W. Greenfield Avenue)
13	STH 100 (S. 108th Street) at W. Lincoln Avenue

[a]*See Map 37.*

Source: Wisconsin Department of Transportation and SEWRPC.

Variable message signs provide real-time information to travelers about upcoming traffic conditions. The Wisconsin Department of Transportation uses the variable message signs to display current travel times to selected areas and to display information about lane closures as well as where travel delays begin and end. In the event of child abduction, the variable message signs are also used to display an amber alert. In 2004, there were 13 variable message signs on the surface arterial street and highway system in southeastern Wisconsin, all located near freeway access points, as shown on Map 37 and in Table 28.

Public Transit Operation and Management Systems

In 2004, the public transit operation and management systems in southeastern Wisconsin were limited to the Milwaukee County Transit System (MCTS) and the City of Waukesha Metro Transit System. The MCTS has operational a computer-aided dispatch and automatic vehicle location (CAD/AVL) system. The CAD/AVL system

enhances communication between bus operators and dispatchers and allows MCTS to use global positioning technology to provide updated location information of transit vehicles to dispatchers, and can be used to check the on-time performance of the system. The City of Waukesha Metro Transit CAD/AVL system was operational beginning in June 2004. The MCTS and the City of Waukesha Metro Transit also utilize designated shoulder lanes on USH 18 in Waukesha County between Barker Road and the Milwaukee-Waukesha County line. These shoulder lanes are designated as through lanes for transit vehicles only, and may only be accessed by passenger vehicles for right-turning movements or during distress.

An area which public transit operation and management systems in southeastern Wisconsin are beginning to explore is transit priority signal systems. Transit priority signal systems allow transit operators to extend the green phase of signal cycles using wireless communications between the transit vehicle and the traffic signal. In 2004, City of Milwaukee traffic signals located at the intersections of W. Fond du Lac Avenue and N. 60th Street and at W. Fond du Lac Avenue and W. Congress Street had transit priority programmed into their operation. Currently, MCTS does not utilize the transit signal priority programmed into these two traffic signals.

SUMMARY

This chapter has described the characteristics of the existing regional transportation system, including arterial streets and highways, public transit, park-ride lots, bicycle and pedestrian facilities, and transportation management and operations systems. The chapter has also documented to the extent data is available the changes that have occurred in the system since 1991, 1972, and 1963, the base years of the third, second, and first generation regional transportation system plans. Inventory findings include:

1. As of 2001, there were approximately 11,937 miles of streets and highways—land-access, collector, and arterial—within the Region. Only 27.5 percent, or 3,292 miles, of the street and highway system were arterials with the principal function of moving traffic. The miles of arterials within the Region have increased from 3,188 in 1963 to 3,292 miles in 2001, an increase of 100 miles or 3 percent. The freeway system in 2001 of 270 miles accounted for 8 percent of the total arterial street and highway system and 2 percent of the total street and highway system.

2. In 2001, approximately 39.7 million vehicle-miles of travel were estimated to occur on the arterial street and highway system on an average weekday within the Region. The arterial street and highway system accounted for about 28 percent of the total miles of streets and highway within the Region, and 90 percent of the total average weekday traffic within the Region. Freeways within the Region constituted about 270 miles and 8 percent of the total arterial system, but carried 37 percent of total arterial system vehicle-miles of travel on an average weekday in 2001. Between 1963 and 2001, average weekday vehicle-miles of travel on the arterial street and highway system increased by over 200 percent, while centerline miles of arterial streets and highways increased by only about 3 percent and arterial lane-miles increased by only about 12 percent. The growth in vehicle-miles of travel which has slowed in the rate of growth each decade is a result of growth in average weekday trips made by Region residents due to increases in households and jobs; increases in the proportion of drive-alone trips due to increases in vehicle ownership and changes in population lifestyles, including declines in household size; and increases in trip length.

3. The miles of arterials carrying traffic volumes exceeding design capacity and experiencing traffic congestion declined from 217 miles in 1963 to 160 miles in 1972, even though traffic grew during that period by over 50 percent. The decline in traffic congestion may be attributed to the completion of the freeway system during that period. Between 1972 and 1991, the miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased from 160 miles to 273 miles, as traffic grew during that period by nearly 65 percent, as Regional employment and households increased by about 30 percent, and vehicle occupancy and carpooling significantly declined. The decline in vehicle

occupancy from an average of 1.39 persons per vehicle to 1.22 persons per vehicle alone is estimated to have resulted in nearly a 15 percent increase in vehicle traffic. As well, limited transportation system improvement and expansion was completed between 1972 and 1991 in Southeastern Wisconsin. The miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased modestly from 273 miles in 1991 to 290 miles in 2001. During that period, traffic is estimated to have increased by about 21 percent. The modest increase in traffic congestion from 1991 to 2001 may be attributed to the implementation of an extensive number of significant arterial street and highway widening and new construction projects between 1991 and 2001. The estimated modest increase in congestion between 1991 and 2001 is not uniform systemwide, as for example, the extent and severity of congestion on the Milwaukee area freeway system is estimated to have substantially increased between 1991 and 2001.

4. Review of a three year history—1996, 1997, and 1998—of traffic crashes on the Regional freeway system determined that the average crash rate was 77 crashes per 100 million vehicle-miles of travel. Countywide freeway system crash rates ranged from a low of 40 to a high of 106 crashes per 100 million vehicle-miles of travel for the seven counties in southeastern Wisconsin. During that period, only Milwaukee County's crash rate exceeded the Regional average crash rate. Analyses of selected crash types found that the rear end crash rate on the freeway system was five to 15 times higher on congested freeway segments than on uncongested freeway segments with the highest rear end crash rates on the most extremely congested freeway segments.

5. The extent of fixed route public transit service in southeastern Wisconsin significantly increased from 1991 to 2001 from 63,300 vehicle-miles of service on an average weekday to 79,600 vehicle-miles of service, an increase of 26 percent. The extent of fixed route service provided in 2001 was also 24 percent greater than that provided in 1972 and only 6 percent less than that provided in 1963. Demand-responsive transit service in the Region also significantly increased from 1991 to 2001, from 1,800 vehicle-miles of service on an average weekday to 7,700 vehicle-miles of service. However, since 2001, the extent of fixed route transit service has significantly declined by about 10 percent to 71,900 vehicle-miles of service on an average weekday due to the economic downturn following September 11, 2001, reduced Federal funds, and State and local budget problems.

6. Public transit ridership measured in terms of transit passenger trips made from origin to destination on an average weekday has declined from 320,500 trips, representing 8 percent of regional internal personal travel, to 184,200 trips and 4 percent of travel in 1972, to 172,200 trips and 3 percent in 1991, and to 142,200 trips and 2 percent in 2001.

7. Between 1963 and 2001, the amount of commercial air passenger service and passengers traveling to and from southeastern Wisconsin has significantly increased, while significant declines in service and in passengers have occurred on other intercity modes of passenger travel, including rail, bus, and ferry. Commercial air carrier passengers represented only 27 percent of intercity transit passenger travel in southeastern Wisconsin in 1963, and represented over 84 percent of intercity passenger travel to, from, and through, southeastern Wisconsin in 2001. During this period from 1963 to 2001, passenger travel measured in average weekday passenger trips on intercity transit modes to and from southeastern Wisconsin increased by about 100 percent. Over that same period, intercity personal vehicle travel to, from, and through southeastern Wisconsin also experienced about a 100 percent increase. Of total intercity or interregional travel over the past 40 years to and from southeastern Wisconsin, personal vehicle travel has consistently accounted for 95 percent of total travel, and intercity transit modes for 5 percent of total travel.

8. The number of park-ride lots enabling the transfer of mode between private vehicles and public transit and from solo driver private vehicles to carpools has increased from eight in 1972, to 37 in 1991, and to 48 in 2004. Of the 48 park-ride lots in 2004, 35 were provided with transit service. On an average weekday in 2004, about 41 percent of the approximately 6,300 spaces at the 48 park-ride lots were estimated to be in use.

9. Of the Region's 3,020 miles of surface arterial streets and highways, it is estimated that 534 miles accommodate bicycles through paved shoulders, 55 miles through exclusive bicycle lanes, and 44 miles through physically separate parallel off-street paths. Also, 203 miles of regional off-street bicycle paths exist on former railway rights-of-way and in parkways. These off-street paths provide particularly safe and aesthetically attractive routes separate from motor vehicle traffic which connect—though with gaps—the Region's urban centers and communities.

10. Transportation management and operations systems on the transportation system of southeastern Wisconsin include an extensive freeway traffic management system, including monitoring, metering, advisory information, and incident management elements; coordinated standard arterial traffic signal systems; and public transit computer aided dispatch and automated vehicle location systems.

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Chapter IV

TRAVEL HABITS AND PATTERNS

INTRODUCTION

This chapter describes existing travel behavior and patterns within the seven-county southeastern Wisconsin Region, as determined by travel inventories conducted by the Commission in 2001 and 2002. The forces shaping regional travel habits and patterns are also described, and the findings of the 2001 regional travel inventory[1] are compared with those of the previous 1963, 1972, and 1991 regional travel inventories.

THE 2001 REGIONAL INVENTORY OF TRAVEL: MAJOR ELEMENTS

Findings of the 1963, 1972, and 1991 regional inventories of travel were described in SEWRPC Planning Report No. 7, Volume One, *The Land Use-Transportation Study: Inventory Findings: 1963*, May 1965; SEWRPC Planning Report No. 25, *A Regional Land Use Plan and a Regional Transportation Plan for Southeastern Wisconsin: 2000*, Volume One, *Inventory Findings*, April 1975, and, SEWRPC Planning Report No. 41, *A Regional Transportation Plan for Southeastern Wisconsin: 2010*, December, 1994, respectively.

The 2001 survey of resident households was based on a sample of 16,500 households, or approximately 2 percent of the estimated total of 759,500 households in the Region. This large scale sample provides a rich set of data, permitting the description and analysis of resident household travel both by subarea and between subareas of the Region. Information obtained through telephone interviews from each sampled household included detailed data concerning: specific household characteristics, including the number of household members, number of vehicles available, structure type of residence, and household income range; specific data for each household member, such as relationship to head of household, age, license-to-drive status, sex, and employment status; and, for each trip made by persons over the age of five on the assigned travel day, the origin and destination of trip, trip purpose, time of day, mode of travel, blocks walked at origin of trip and destination of trip, and, for drivers of personal vehicles—automobiles, vans, sport utility vehicles, or pickup trucks—the number of passengers in the vehicle, parking location, type of parking, duration of parking, and cost of parking.

In addition, 1,100 samples, representing approximately 2.5 percent of the 46,200 residents of the Region living in group quarters, such as Huber law jail facilities, shelters, nursing homes, and schools and other institutions, were surveyed. The sample was drawn from a list of such facilities compiled by the Commission using telephone

[1]*Although the most recent regional travel inventory was conducted from 2001 to 2002, this inventory has been designated the "2001" inventory for purposes of reference and of comparison to the 1963, 1972, and 1991 inventories.*

directories and consultations with various agencies of government. Residents who were group-quartered but who were severely restricted in their ability to travel were not surveyed. This group included residents of facilities for the developmentally disabled, correctional facilities, and homes for the aged.

The five major public transit systems operating in the Region in 2001 were also surveyed. Each of the five systems were sampled at rates designed to permit analysis of the characteristics of existing transit system ridership. For the Kenosha area transit system, 600 samples were obtained, representing a 35 percent rate of return and an 8 percent sample of its estimated 7,300 average weekday riders. For the Milwaukee area transit system, 5,700 samples were obtained, representing a 30 percent rate of return and a 3 percent sample of its estimated 180,400 average weekday boarding passengers, including transfer passengers. For the Racine area transit system, 300 samples were obtained, representing a 50 percent rate of return and a 5 percent sample of its estimated 6,500 average weekday riders. For the City of Waukesha transit system, 400 samples were obtained, representing a 15 percent rate of return and a 15 percent sample of its estimated 2,700 average weekday riders. For the Waukesha County transit system, 300 samples were obtained, representing a 68 percent rate of return and a 27 percent sample of its estimated 1,100 average weekday riders. Information obtained through mail-back survey forms included detailed data concerning specific household characteristics, including the location of each tripmaker's home, the number of household members, number of vehicles available, and household income range; specific data regarding each tripmaker, such as age, sex, license-to-drive status, and race; and for each trip, the origin and destination of the trip, trip purpose, time of day, transfer information, mode of travel to the bus stop, fares, round-trip frequency, and length of time using transit.

The 2001 regional travel inventory also included a commercial truck survey. The truck survey was intended to provide information regarding the movement of freight and the delivery of services within the Region by commercial trucks registered and garaged within the Region. The survey of commercial truck travel was based on a sample of about 2,000 commercial trucks, or approximately 2 percent of the estimated 129,500 commercial trucks registered in the Region. Information obtained through a mail survey for each sampled truck included detailed data concerning: the business or industry of the truck owner; the truck garaging location, carrier type, odometer reading at the beginning and end of the travel day, and vehicle type; and for each trip made using the truck on the assigned travel survey day, the origin and destination of the trip, trip purpose, and time of day.

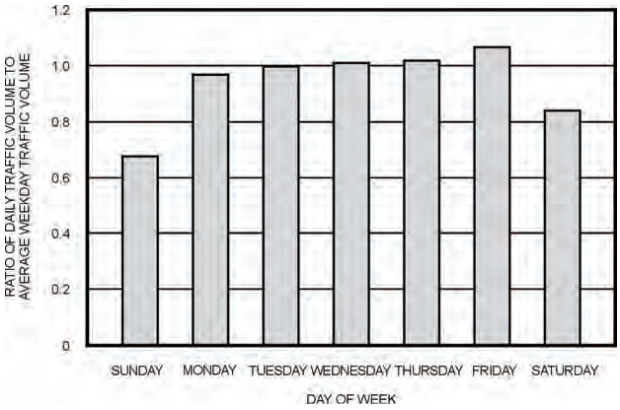
The 2001 survey also included an external cordon survey of interregional vehicle traffic. Interregional or external travel is travel where one or both ends of the trip are located outside of Southeastern Wisconsin. In the external cordon survey, roadside interview stations were established on 44 major streets and highways crossing the boundaries of the Region. At these stations, mail-back survey forms were distributed to 143,600 motorists between the hours of 6:00 a.m. and 6:00 p.m. in September and October 2002. Approximately 26,100 usable survey forms were returned, representing more than 7 percent of the 375,400 regional boundary crossings by vehicles estimated to occur at the interview stations during an average weekday. Information obtained through the mail-back survey included: the vehicle used in making the trip, the garaging address of the vehicle, type of vehicle, and number of passengers carried; and, for trucks, the carrier type. For trips crossing the cordon line, data regarding the origin, destination, and purpose of each trip were also obtained.

The Commission staff also prepared estimates of other interregional travel within and through Southeastern Wisconsin in 2001, including intercity bus and rail, and commercial air carrier travel.

The expanded data obtained in these surveys and estimates provided a representation of the total travel occurring within the Region on an average weekday in 2001. In each survey, careful attention was given to data collection scheduling to prevent any day-related or seasonal bias in the information. Travel surveys are usually conducted by the Commission in either the spring (March through May), or in the fall (September through November), in order to obtain travel data which is representative of average weekday conditions. Traffic volume counts collected by the Wisconsin Department of Transportation in southeastern Wisconsin indicate that traffic volumes on Tuesdays, Wednesdays, and Thursdays most closely approximate average weekday traffic volumes, while those on Fridays

Figure 16

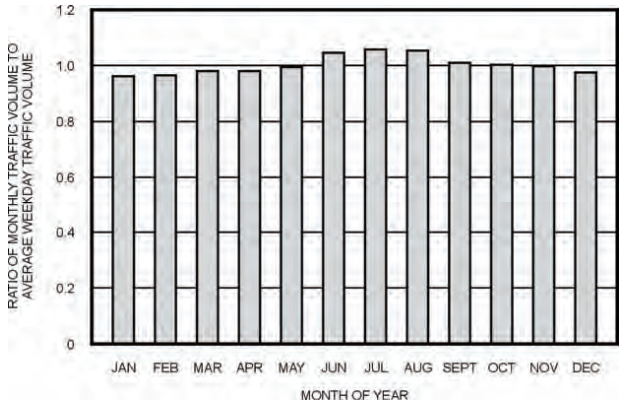
COMPARISON OF THE RATIO OF DAILY TRAFFIC VOLUMES TO AVERAGE WEEKDAY TRAFFIC VOLUMES BY DAY OF WEEK: 2002



Source: Wisconsin Department of Transportation and SEWRPC.

Figure 17

COMPARISON OF THE RATIO OF AVERAGE MONTHLY WEEKDAY TRAFFIC VOLUMES TO AVERAGE WEEKDAY TRAFFIC VOLUMES BY MONTH OF YEAR: 2002



Source: Wisconsin Department of Transportation and SEWRPC.

are slightly higher, and on Mondays are slightly lower, than the average weekday (see Figure 16). Traffic volumes on Saturdays and Sundays are substantially lower than the average weekday. With respect to monthly variations, traffic volumes in the spring, represented by the months of March through May, and the fall, represented by the months of September through November, generally approximate average weekday traffic volumes (see Figure 17). Traffic volumes in the summer months of June, July, and August are generally higher than average, and traffic volumes in the winter months of January and February are lower than average.

Two distinct sets of accuracy checks were employed to determine the degree of accuracy and completeness of data obtained in the major travel surveys. In one set, data on socio-economic characteristics obtained from the major surveys were compared with data from the 2000 Federal Census and other independent sources. In the other set of accuracy checks, vehicle trip volumes derived from travel surveys were compared to vehicle trip volumes obtained by classification counts made at screenlines and cordon lines.[2] The level of vehicle-miles of travel derived from travel surveys was also compared to actual vehicle-miles of travel estimated from traffic counts. The results of the accuracy checks are documented in Appendix A of this report.

[2] *A screenline is an imaginary line extending through a selected portion of a geographic area along natural or built barriers providing a limited number of crossing points established for the purpose of comparing and analyzing travel data as estimated from traffic counts with data derived from travel surveys. A cordon line is an imaginary line extending around a selected geographic area for the purpose of comparing and analyzing external travel data as estimated from traffic counts with data derived from travel surveys.*

Table 29

AVERAGE WEEKDAY PERSON AND VEHICLE TRIPS BY TRIP TYPE: 1963, 1972, 1991, AND 2001[a]

	Person Trips													
	1963		1972		1991		2001		Change: 1963-2001		Change: 1972-2001		Change: 1991-2001	
Trip Type	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent	Number	Percent	Number	Percent
Region Resident Internal Person Trips	3,969,700	95.4	4,947,500	96.5	5,839,100	94.8	6,355,200	94.1	2,385,500	60.1	1,407,700	28.5	516,100	8.8
External Person Trips	191,700	4.6	176,900	3.5	317,400	5.2	394,900	5.9	203,200	106.0	218,000	123.2	77,500	24.4
Total	4,161,400	100.0	5,124,400	100.0	6,156,500	100.0	6,750,100	100.0	2,588,700	62.2	1,625,700	31.7	593,600	9.6

	Vehicle Trips													
	1963		1972		1991		2001		Change: 1963-2001		Change: 1972-2001		Change: 1991-2001	
Trip Type	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent	Number	Percent	Number	Percent
Region Resident Personal Vehicle and Commercial Truck Trips	2,459,400	96.0	3,268,000	96.3	4,597,600	94.4	5,109,200	93.5	2,649,800	107.7	1,841,200	56.3	511,600	11.1
External Personal Vehicle and Commercial Truck Trips	101,600	4.0	125,700	3.7	273,300	5.6	357,500	6.5	255,900	251.9	231,800	184.4	84,200	30.8
Total	2,561,000	100.0	3,393,700	100.0	4,870,900	100.0	5,466,700	100.0	2,905,700	113.5	2,073,000	61.1	595,800	12.2

[a]Internal person trips as shown in this table include trips made internal to the Region on an average weekday by the resident households and group-quartered persons of the Region. They include trips made by personal vehicle—automobile, van, truck, or sport utility vehicle—either as a driver or passenger, public transit, school bus, motorcycle, taxi, bicycle, and walking. All trips shown in this table were estimated from Commission travel surveys with the exception of trips by bicycle and walking for other than work purposes for the year 1963, 1972, and 1991. Only the 2001 survey gathered data on all bicycle and walking trips, with previous surveys in 1963, 1972, and 1991 gathering this data only for work trips. In 2001, the estimated number of resident household internal person trips made by bicycle or walking on an average weekday within southeastern Wisconsin totaled 297,300 trips, including 40,200 trips to and from work. Estimates of average weekday internal trips made by the Region's households by bicycle or walking for work trip purposes totaled 33,600 trips in 1991, 58,800 in 1972, and 47,000 in 1963. Bicycle and walking nonwork trips were estimated for the years 1963, 1972, and 1991 assuming that nonwork trips would represent 87 percent of all bicycle and walking trips, as estimated in the year 2001 survey.

The external person trips shown in this table only include trips made by personal vehicle, which have consistently represented 95 percent of estimated total external person trips within Southeastern Wisconsin on an average weekday. Estimated external person trips by other modes of intercity bus and rail, cross-lake ferry, and commercial air carrier totaled on an average weekday 8,800 trips in 1963, 9,100 trips in 1972, 15,700 trips in 1991, and 19,500 trips in 2001.

Source: SEWRPC.

INVENTORY FINDINGS

Quantity of Total Travel

An estimated 6.75 million person trips[3] were made within the Region on an average weekday in 2001, as shown in Table 29. This represents an increase of about 2.59 million person trips per weekday, or an increase of about 62 percent, since 1963; an increase of 1.63 million person trips per weekday, or 32 percent, since 1972; and an increase of 0.59 million person trips per weekday, or 10 percent, since 1991. Of these 6.75 million person trips, about 6.36 million, or 94 percent, were internal person trips. Internal trips have both trip origin and trip destination within the Region. The 6.36 million internal person trips in 2001 represent an increase of 2.39 million trips, or 60 percent, since 1963; an increase of 1.41 million trips, or 29 percent, since 1972; and an increase of 0.52 million trips, or 9 percent, since 1991.

In 2001, an estimated 5.47 million vehicle trips, consisting of personal vehicle and commercial truck trips, were made within the Region on an average weekday. This represents an increase of 2.91 million vehicle trips, or 114 percent, since 1963, an increase of 2.07 million vehicle trips, or 61 percent, since 1972 and an increase of 0.60 million trips or 12 percent since 1991. Of the 5.47 million vehicle trips, about 5.11 million, or 94 percent, were internal vehicle trips. Internal vehicle trips increased by 2.65 million, or 108 percent, since 1963, by 1.84 million, or 56 percent, since 1972 and by 0.51 million trips, or 11 percent, since 1991. Vehicle trips made within the Region have increased faster than person trips, particularly between 1972 and 1991, principally as a result of a decline in automobile occupancy and carpooling. The percentage increase between 1991 and 2001 for vehicle trips was 12 percent, as compared with 10 percent for person trips. The percentage increase in vehicle trips between 1972 and 1991 was 44 percent, compared with 20 percent for person trips.

[3] *A person trip is 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 by public transit, school bus, bicycle, or walking or as a driver or as a passenger in a personal vehicle—automobile, van, pickup truck, sport utility vehicle—or taxi or motorcycle. To be considered, the trip must have been at least the equivalent of one full city block in length. The 1963, 1972, and 1991 surveys did not inventory walk and bicycle trips for nonwork purposes. The 2001 survey did inventory walk and bicycle trips for all purposes, both work and nonwork.*

Table 30

COMPARISON OF HISTORIC REGIONAL INTERNAL PERSON TRIPS, HOUSEHOLDS, EMPLOYMENT, AND POPULATION: 1963, 1972, 1991, AND 2001[a]

Internal Person Trips	1963	1972	1991	2001	Percent Change 1963-2001	Percent Change 1972-2001	Percent Change 1991-2001
Internal Person Trips	3,933,100	4,917,300	5,755,700	6,327,000	60.9	28.7	9.9
Households.....	481,200	557,300	676,100	759,500	57.9	36.3	12.3
Employment (jobs).....	706,600	802,500	1,058,200	1,210,700	71.3	50.9	14.4
Population[b]	1,636,300	1,750,500	1,780,300	1,899,300	16.1	8.5	6.7

[a]*Internal person trips as shown in this table include trips made internal to the Region on an average weekday by the resident households of the Region. They include trips made by personal vehicle—automobile, van, truck, or sport utility vehicle—either as a driver or passenger, public transit, school bus, motorcycle, taxi, bicycle, and walking. All trips shown in this table were estimated from Commission travel surveys with the exception of trips by bicycle and walking for other than work purposes for the year 1963, 1972, and 1991. Only the 2001 survey gathered data on all bicycle and walking trips, with previous surveys in 1963, 1972, and 1991 gathering this data only for work trips. In 2001, the estimated number of resident household internal person trips made by bicycle or walking on an average weekday within southeastern Wisconsin totaled 297,300 trips, including 40,200 trips to and from work. Estimates of average weekday internal trips made by the Region's households by bicycle or walking for work trip purposes totaled 33,600 trips in 1991, 58,800 in 1972, and 47,000 in 1963. Bicycle and walking nonwork trips were estimated for the years 1963, 1972, and 1991 assuming that nonwork trips would represent 87 percent of all bicycle and walking trips, as estimated in the year 2001 survey.*

The internal person trips shown in this table also only include trips made by the Region's households, and not by group-quartered persons in the Region. Group-quartered person trips within the Region were estimated to total 36,600 trips in 1963, 30,200 trips in 1972, 83,400 trips in 1991, and 28,200 trips in 2001, or only about one percent or less of the total internal person trips made by the residents of the Region on an average weekday.

[b]*Does not include Regional group-quartered population.*

Source: SEWRPC.

Table 29 also shows that an estimated 394,900 external person trips and 357,500 external vehicle trips were made in 2001. External trips have one end or both ends located outside of the Region. From 1963 to 2001, external travel increased by 203,200 person trips, or by about 106 percent; and by 255,900 vehicle trips, or by about 252 percent.

The increase in internal person trips is on par with increases in the number of households and jobs within the Region. As shown in Table 30, between 1963 and 2001 internal person tripmaking increased by 61 percent, households increased by 58 percent, and employment increased by 71 percent. The number of internal person trips per household in the Region has remained relatively constant over the past 40 years, at about 8 trips per household. The increase in person trips far exceeded the 15 percent increase in population during the same time period. The number of internal trips per person in the Region increased from 2.4 trips per person in 1963 to 3.3 trips per person in 2001. These findings demonstrate the substantial changes which occurred in the Region's population over the past 40 years, including the substantial increase in the proportion of the Region's population in the labor force—principally due to the increase of women in the labor force—and the significant changes which occurred in household formation and composition.

Table 31

AVERAGE WEEKDAY INTERNAL PERSON TRIPS PER HOUSEHOLD IN THE REGION BY VEHICLE AVAILABILITY: 1963, 1972, 1991, AND 2001[a]

Vehicle Available	1963 Households Number	1963 Households Percent of Total	1963 Person Trips Number	1963 Person Trips Percent of Total	1972 Households Number	1972 Households Percent of Total	1972 Person Trips Number	1972 Person Trips Percent of Total	1991 Households Number	1991 Households Percent of Total	1991 Person Trips Number	1991 Person Trips Percent of Total	2001 Households Number	2001 Households Percent of Total	2001 Person Trips Number	2001 Person Trips Percent of Total	Person Trips per Household 1963	1972	1991	2001
None	83,400	17.3	188,200	5.2	88,500	15.9	171,400	3.8	61,900	9.1	156,300	2.8	64,300	8.5	161,000	2.7	2.3	1.9	2.5	2.5
One	282,000	58.6	2,097,000	58.5	276,300	49.6	1,953,300	43.6	233,800	34.6	1,292,000	23.5	267,500	35.2	1,588,300	26.3	7.4	7.1	5.5	5.9
Two	102,700	21.4	1,120,800	31.3	160,900	28.9	1,848,700	41.3	281,200	41.6	2,801,800	50.9	294,200	38.7	2,787,000	46.2	10.9	11.5	10.0	9.5
Three or More	13,100	2.7	177,400	5.0	31,600	5.6	506,400	11.3	99,300	14.7	1,255,600	22.8	133,500	17.6	1,495,000	24.8	13.5	16.0	12.6	11.2
Total	481,400	100.0	3,583,400	100.0	557,300	100.0	4,479,800	100.0	676,100	100.0	5,505,600	100.0	759,500	100.0	6,031,300	100.0	7.4	8.0	8.1	7.9

[a]*Trips made by bicycle and walking are not included in this analysis, as they were not surveyed for nonwork trip purposes in 1963, 1972, and 1991.*

Source: SEWRPC.

Internal Person Travel

The number of internal person trips made on an average weekday by the resident households of the Region may be correlated with household vehicle availability, size, and income.

Relationship of Vehicle Availability

A strong correlation exists between person trip production and the number of vehicles available to households. The 2001 survey findings indicated that about 1,313,700 vehicles were available in the Region. This represents an average of 1.73 vehicles per household, as compared to 1.07 vehicles per household in 1963, 1.24 vehicles per household in 1972, and 1.60 vehicles per household in 1991.

Table 31 shows the relationship of vehicle availability to person trip production in the Region. Household person trip production increases sharply in relation to increased vehicle availability. From 1963 to 1991, household vehicle availability increased substantially. From 1963 to 1991, the percentage of households with two or more automobiles increased from 24 percent to 56 percent of all households, the percentage of households with zero automobiles declined from 17 percent to 9 percent of all households, and the percentage with one automobile declined from 59 percent to 35 percent of all households. From 1991 to 2001, the percentage of households with zero, one, or two or more vehicles available experienced minimal change. The increase in household vehicle availability from 1963 to 2001 likely contributed to the increase in person trips generated within the Region since 1963.

Relationship of Household Size

Person trip production within the Region is also strongly related to the number of persons comprising the household. Table 32 indicates that in 2001 one-person households averaged about four weekday internal person trips per household, two-person households averaged about seven such trips per household, three-person households averaged about nine such trips per household, four-person households averaged about 12 such trips per household, and five-or-more-person households averaged about 15 such trips per household. The distribution of the number of households by household size changed markedly from 1963 to 1991 with one-person households increasing from 11 percent of all households in 1963 to 25 percent in 1991, and five-or-more-person households decreasing from 25 percent to 11 percent of all households during the same period. The distribution of the number of households by household size changed minimally between 1991 and 2001, with continuing small increases in the percentages of one and two person households and small decreases in the percentages of households with three or more persons. The decline in household size from 1963 to 2001 likely contributed to the increase in internal person trips in the Region over the same period, as the attendant increase in households outweighed the decline in the number of households of larger sizes.

Table 32

AVERAGE WEEKDAY INTERNAL PERSON TRIPS PER HOUSEHOLD IN THE REGION BY HOUSEHOLD SIZE: 1963, 1972, 1991, AND 2001[a]

Household Size	1963				1972				1991				2001				Person Trips per Household			
	Households		Person Trips		Households		Person Trips		Households		Person Trips		Households		Person Trips					
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	1963	1972	1991	2001
One	52,000	10.8	106,500	3.0	93,800	16.8	223,500	5.0	168,700	24.9	565,500	10.3	211,100	27.8	810,100	13.4	2.0	2.4	3.4	3.8
Two	135,100	28.1	681,400	19.0	159,500	28.6	892,900	19.9	214,100	31.7	1,526,100	27.7	247,300	32.6	1,769,800	29.4	5.0	5.6	7.1	7.2
Three	87,500	18.2	666,000	18.6	91,900	16.5	760,200	17.0	116,100	17.2	1,075,700	19.5	118,900	15.7	1,104,600	18.3	7.6	8.3	9.3	9.3
Four	83,700	17.4	805,900	22.5	86,300	15.5	903,100	20.1	104,300	15.4	1,282,900	23.3	106,400	14.0	1,249,300	20.7	9.6	10.5	12.3	11.7
Five or More	122,900	25.1	1,323,600	36.9	125,800	22.6	1,700,100	38.0	72,900	10.8	1,055,500	19.2	75,800	10.0	1,097,500	18.2	10.8	13.5	14.5	14.5
Total	481,200	100.0	3,583,400	100.0	557,300	100.0	4,479,800	100.0	676,100	100.0	5,505,700	100.0	759,500	100.0	6,031,300	100.0	7.4	8.0	8.1	7.9

[a] *Trips made by bicycle and walking are not included in this analysis, as they were not surveyed for nonwork trip purposes in 1963, 1972, and 1991.*

Source: SEWRPC.

Relationship of Household Annual Income

A third factor strongly correlated with person trip production is annual household income. Table 33 shows the 2001, 1991 and 1972 inventory findings, based upon data collected for the entire seven-county Region, together with the 1963 findings, based upon data collected only in the three urbanized areas of the Region. Table 33 indicates that the average number of weekday internal person trips per household in each of the survey years increased in direct proportion to annual household income.

Mode of Internal Person Trips

The year 2001 survey findings as shown in Table 34 indicate that internal travel within southeastern Wisconsin by resident households on an average weekday in 2001 is predominately by personal vehicle, representing 89 percent of weekday travel. Walk and bicycle travel represent the next largest percentage of internal weekday travel by resident households of the Region at about 5 percent, followed by travel by school bus at about 4 percent, public transit at about 2 percent, and other travel modes including taxi and motorcycle at less than 1 percent.

The proportion of travel by mode changed significantly between 1963 and 2001, with relatively little change occurring between 1991 and 2001. The most significant change in personal vehicle travel occurred between 1972 and 1991, as personal vehicle travel increased from 84 to 89 percent of all travel, and travel by personal vehicle drivers increased from 59 to 71 percent of all travel. Also, the greatest change in travel by walking and bicycle occurred between 1972 and 1991, travel by walking and bicycling declined from 9 to 4 percent of all travel.

The largest change in public transit travel occurred between 1963 and 1972, as public transit travel declined from 8 percent to 4 percent of total weekday internal travel by resident households.

The proportion of total weekday internal travel by the Region's households by school bus has remained relatively constant from 1963 to 1991 at 3 to 4 percent, and also for other modes including taxi and motorcycle at less than one percent.

Public Transit Trip Production

The relationships of public transit trip-making to vehicle ownership, household size, and income are shown in Tables 35, 36, and 37. Both currently and historically, a substantial percentage—between 39 percent in 1963 and 44 percent in 2001—of total weekday public transit trips in southeastern Wisconsin were made by households with no personal vehicle available for travel. These transit trips represented between 39 percent (2001) to 66 percent (1963) of all trips made on all modes on an average weekday by these households with no vehicle

Table 33

AVERAGE WEEKDAY INTERNAL HOUSEHOLD PERSON TRIPS PER HOUSEHOLD IN THE REGION BY INCOME GROUP: 1963, 1972, 1991, AND 2001[f]

Income Range (1963 actual dollars)	1963[a] Households[b] Number	Households[b] Percent of Total	Person Trips Number	Person Trips Percent of Total	Person Trips per Household
Under 4,000	86,500	23.2	283,900	9.6	3.3
4,000 to 5,999	91,000	24.5	643,100	21.8	7.1
6,000 to 7,999	94,200	25.3	863,800	29.2	9.2
8,000 or Over	100,300	27.0	1,163,400	39.4	11.6
Total	372,000	100.0	2,954,200	100.0	7.9

Income Range (1972 actual dollars)	1972 Households[c] Number	Households[c] Percent of Total	Person Trips Number	Person Trips Percent of Total	Person Trips per Household
Under 8,000	80,600	23.7	533,100	15.3	6.6
8,000 to 11,999	111,200	32.7	1,048,800	30.1	9.4
12,000 to 14,999	66,400	19.5	776,600	22.3	11.7
15,000 or Over	81,900	24.1	1,124,600	32.3	13.7
Total	340,100	100.0	3,483,100	100.0	10.2

Income Range (1991 actual dollars)	1991 Households[d] Number	Households[d] Percent of Total	Person Trips Number	Person Trips Percent of Total	Person Trips per Household
Under 20,000	130,300	23.9	670,400	15.0	5.1
20,000 to 29,999	117,800	21.6	770,500	17.3	6.5
30,000 to 49,999	173,600	31.8	1,611,400	36.2	9.3
50,000 or Over	124,100	22.7	1,401,900	31.5	11.3
Total	545,800	100.0	4,454,200	100.0	8.2

Income Range (2001 actual dollars)	2001 Households[e] Number	Households[e] Percent of Total	Person Trips Number	Person Trips Percent of Total	Person Trips per Household
Under 30,000	181,600	26.0	965,900	17.3	5.3
30,000 to 49,999	181,300	26.0	1,323,200	23.7	7.3
50,000 to 74,999	167,100	23.9	1,518,200	27.2	9.1
75,000 or Over	167,900	24.1	1,773,100	31.8	10.6
Total	697,900	100.0	5,580,400	100.0	8.0

[a]Income data was collected only for the urbanized areas in 1963.
[b]Approximately 23 percent of total households did not provide household annual income data.
[c]Approximately 39 percent of total households did not provide household annual income data.
[d]Approximately 19 percent of total households did not provide household annual income data.
[e]Approximately 8 percent of total households did not provide household annual income data
[f]Trips made by bicycle and walking are not included in this analysis, as they were not surveyed for nonwork trip purposes in 1963, 1972, and 1991.

Source: SEWRPC.

available for travel. Households owning one or two personal vehicles, accounted also for a substantial percentage of total weekday transit trips, in the Region ranging from 60 percent in 1963 to 47 percent in 2001. The transit trips made by households with one or two personal vehicles available for travel, however, represented only about 1 to 2 percent of all trips made on an average weekday in 2001 on all modes by these households.

Table 34

DISTRIBUTION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS BY HOUSEHOLDS IN THE REGION BY MODE OF TRAVEL: 1963,1972,1991, AND 2001

	Person Trips													
	1963		1972		1991		2001		Change: 1963-2001		Change: 1972-2001		Change: 1991-2001	
Mode of Travel	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent	Number	Percent	Number	Percent
Auto Driver	2,156,700	54.8	2,884,900	58.7	4,060,800	70.6	4,507,400	71.2	2,350,700	109.0	1,622,500	56.2	446,600	11.0
Auto Passenger	978,100	24.9	1,217,100	24.8	1,029,800	17.9	1,130,800	17.9	152,700	15.6	-86,300	-7.1	101,000	9.8
Public Transit	320,500	8.1	184,200	3.7	172,200	3.0	142,200	2.2	-178,300	-55.6	-42,000	-22.8	-30,000	-17.4
School Bus	119,900	3.1	173,600	3.5	228,600	4.0	227,400	3.6	107,500	89.7	53,800	31.0	-1,200	-0.5
Walk and Bicycle	349,700	8.9	437,500	8.9	250,000	4.3	295,700	4.7	-54,000	-15.4	-141,800	-32.4	45,700	18.3
Other[a]	8,200	0.2	20,000	0.4	14,300	0.2	23,500	0.4	15,300	186.6	3,500	17.5	9,200	64.3
Total	3,933,100	100.0	4,917,300	100.0	5,755,700	100.0	6,327,000	100.0	2,393,900	60.9	1,409,700	28.7	571,300	9.9

[a] *Includes motorcycle and taxi.*

Source: SEWRPC.

Household size is not nearly as strongly correlated with transit tripmaking as household vehicle ownership. The average number of transit trips per household generally increase with household size, but the average number of transit trips per person generally is greater for smaller household sizes.

Household income is strongly correlated with transit tripmaking. Households in the lowest quartile of household income, particularly over the last 10 years, make up a substantial share of total weekday transit trips—about 64 percent in 1991 and 54 percent in 2001.

Purposes of Internal Trips

Table 38 displays by trip purpose the current and historic internal trips made by resident households of the Region on an average weekday. Most trips made on an average weekday are home-based trips, with home being either the origin or destination of the trips.

The percentage distributions of the purposes of weekday internal person trips have remained remarkably stable from 1963 to 2001. During this period, home-based work trips comprised between 23 and 25 percent of all such trips; home-based shopping trips, between 13 and 15 percent; home-based trips in other categories, between 31 and 34 percent; nonhome-based trips, between 18 and 20 percent; and school trips, between 9 and 11 percent. These percentage distributions remained stable over four decades despite substantial increases in the absolute numbers of trips in all categories. This stability demonstrates that some aspects of travel are indeed orderly and regular over time. Home-based shopping trips showed a slight decline of about 5 percent between 1991 and 2001. This may possibly be attributed to fewer grocery shopping trips and more eating meals at restaurants, more home shopping via the telephone or internet, and a slightly depressed level of shopping trips immediately following the September 11, 2001, terrorist attacks.

Trip Length

As shown in Table 39, the average trip length of trips made within the Region on an average weekday by the Region's resident households measured in terms of distance has increased between 1963 and 2001 by about 10 percent each decade, with a similar increase for trips made for work purposes and trips made for other than work purposes. Thus, work trips made during peak traffic periods and nonwork trips made during nonpeak traffic periods have experienced a similar increase in travel distance.

With respect to trip length measured in terms of travel time, a decline of about 9 percent was estimated to have occurred between 1963 and 1972, followed by a modest decline of 2 percent between 1972 and 1991, and an increase of 13 percent between 1991 and 2001.

Table 35

AVERAGE WEEKDAY INTERNAL TRANSIT TRIPS PER HOUSEHOLD IN THE REGION BY VEHICLE AVAILABILITY: 1963, 1972, 1991, AND 2001

Vehicles Available per Household	1963					
	Households		Transit Trips			
	Number	Percent of Total	Number	Percent of Total	Average Transit Trips per Household	Percent of Total Trips Made on Public Transit
None	83,400	17.3	124,100	38.7	1.49	65.9
One	282,000	58.6	154,800	48.3	0.55	7.4
Two	102,700	21.4	37,600	11.7	0.37	3.4
Three or More	13,100	2.7	4,000	1.3	0.31	2.3
Total	481,200	100.0	320,500	100.0	0.67	8.9

Vehicles Available per Household	1972					
	Households		Transit Trips			
	Number	Percent of Total	Number	Percent of Total	Average Transit Trips per Household	Percent of Total Trips Made on Public Transit
None	88,500	15.9	73,000	39.6	0.82	42.6
One	276,300	49.6	73,800	40.1	0.27	3.8
Two	160,900	28.9	30,600	16.6	0.19	1.7
Three or More	31,600	5.6	6,800	3.7	0.22	1.3
Total	557,300	100.0	184,200	100.0	0.27	4.1

Vehicles Available per Household	1991					
	Households		Transit Trips			
	Number	Percent of Total	Number	Percent of Total	Average Transit Trips per Household	Percent of Total Trips Made on Public Transit
None	61,900	9.1	74,700	43.4	1.21	47.8
One	233,800	34.6	46,400	26.9	0.19	3.6
Two	281,100	41.6	36,100	21.0	0.13	1.3
Three or More	99,300	14.7	15,000	8.7	0.15	1.2
Total	676,100	100.0	172,200	100.0	0.25	3.1

Vehicles Available per Household	2001					
	Households		Transit Trips			
	Number	Percent of Total	Number	Percent of Total	Average Transit Trips per Household	Percent of Total Trips Made on Public Transit
None	64,300	8.5	63,000	44.3	0.98	39.1
One	267,500	35.2	37,000	26.0	0.14	2.3
Two	294,200	38.7	29,300	20.6	0.10	1.1
Three or More	133,500	17.6	12,900	9.1	0.10	0.9
Total	759,500	100.0	142,200	100.0	0.19	2.4

Source: SEWRPC.

Average Personal Vehicle Occupancy by Selected Trip Purpose

Average personal vehicle occupancy represents the number of persons per vehicle for vehicle trips, or carpooling. Declines in vehicle occupancy represent corresponding increases in vehicle trips. The overall average number of persons per vehicle, including the driver, declined slightly from 1963 to 1972, from 1.42 to 1.39, as shown in Table 40. From 1972 to 1991, however, the overall occupancy rate decreased substantially by 12 percent, from 1.39 to 1.22 persons per vehicle with significant declines in every trip purpose. From 1991 to 2001 average personal vehicle occupancy experienced another slight decline of about 3 percent from 1.22 to 1.19 persons per vehicle.

Table 36

AVERAGE WEEKDAY INTERNAL TRANSIT TRIPS PER HOUSEHOLD IN THE REGION BY HOUSEHOLD SIZE: 1963, 1972, 1991, AND 2001

Household Size (persons)	1963 Households Number	1963 Households Percent of Total	1963 Transit Trips Number	1963 Transit Trips Percent of Total	1963 Average Transit Trips per Household	1963 Average Transit Trips per Person	1963 Percent of Total Trips Made on Public Transit
One	52,000	10.8	31,800	9.9	0.61	0.61	29.9
Two	135,100	28.1	77,900	24.3	0.58	0.29	11.4
Three	87,500	18.2	64,300	20.1	0.73	0.24	9.7
Four	83,700	17.4	51,700	16.1	0.62	0.15	6.4
Five or More	122,900	25.5	94,800	29.6	0.77	0.13	7.2
Total	481,200	100.0	320,500	100.0	0.67	0.09	8.9

Household Size (persons)	1972 Households Number	1972 Households Percent of Total	1972 Transit Trips Number	1972 Transit Trips Percent of Total	1972 Average Transit Trips per Household	1972 Average Transit Trips per Person	1972 Percent of Total Trips Made on Public Transit
One	93,800	16.8	27,300	14.8	0.29	0.29	12.2
Two	159,500	28.6	37,500	20.3	0.24	0.12	4.2
Three	91,900	16.5	27,200	14.8	0.30	0.15	3.6
Four	86,300	15.5	30,700	16.7	0.36	0.09	3.4
Five or More	125,800	22.6	61,500	33.4	0.49	0.08	3.6
Total	557,300	100.0	184,200	100.0	0.33	0.04	4.1

Household Size (persons)	1991 Households Number	1991 Households Percent of Total	1991 Transit Trips Number	1991 Transit Trips Percent of Total	1991 Average Transit Trips per Household	1991 Average Transit Trips per Person	1991 Percent of Total Trips Made on Public Transit
One	168,700	25.0	26,900	15.6	0.16	0.16	4.8
Two	214,100	31.7	26,700	15.5	0.12	0.06	1.7
Three	116,100	17.2	34,200	19.9	0.29	0.09	3.2
Four	104,300	15.4	36,100	21.0	0.35	0.09	2.8
Five or More	72,900	10.8	48,300	28.0	0.66	0.12	4.6
Total	676,100	100.0	172,200	100.0	0.25	0.03	3.1

Household Size (persons)	2001 Households Number	2001 Households Percent of Total	2001 Transit Trips Number	2001 Transit Trips Percent of Total	2001 Average Transit Trips per Household	2001 Average Transit Trips per Person	2001 Percent of Total Trips Made on Public Transit
One	211,100	27.8	36,200	25.4	0.17	0.17	4.5
Two	247,300	32.5	36,100	25.4	0.15	0.07	2.0
Three	118,900	15.7	25,400	17.9	0.21	0.07	2.3
Four	106,400	14.0	18,700	13.2	0.18	0.04	1.5
Five or More	75,800	10.0	25,800	18.1	0.34	0.06	2.3
Total	759,500	100.0	142,200	100.0	0.19	0.08	2.4

Source: SEWRPC.

Hourly Patterns of Internal Person Travel

The hourly distributional patterns of internal person trips indicated that although total person trip volumes increased substantially on an average weekday from 1963 to 2001, the regular ebb and flow of travel remained very similar both in the proportion of trips by trip purpose and in the proportion and times of peak periods (see

Table 37

AVERAGE WEEKDAY INTERNAL HOUSEHOLD TRANSIT PERSON TRIPS PER HOUSEHOLD IN THE REGION BY INCOME GROUP: 1963, 1972, 1991, AND 2001

Income Range (1963 actual dollars)	1963[a] Households[b] Number	Households[b] Percent of Total	Transit Person Trips[b] Number	Transit Person Trips[b] Percent of Total	Transit Person Trips per Household	Percent of Total Trips Made on Public Transit
Under 4,000	86,500	23.2	69,800	24.8	0.81	24.6
4,000 to 5,999	91,000	24.5	72,800	25.9	0.80	11.3
6,000 to 7,999	94,200	25.3	69,600	24.7	0.74	8.1
8,000 or Over	100,300	27.0	69,300	24.6	0.69	6.0
Total	372,000	100.0	281,500	100.0	0.59	9.5

Income Range (1972 actual dollars)	1972 Households[c] Number	Households[c] Percent of Total	Transit Person Trips[c] Number	Transit Person Trips[c] Percent of Total	Transit Person Trips per Household	Percent of Total Trips Made on Public Transit
Under 8,000	80,600	23.7	43,800	31.4	0.54	8.2
8,000 to 11,999	111,200	32.7	32,800	23.6	0.29	3.1
12,000 to 14,999	66,400	19.5	22,400	16.1	0.34	2.9
15,000 or Over	81,900	24.1	40,300	28.9	0.49	3.6
Total	340,100	100.0	139,300	100.0	0.41	4.0

Income Range (1991 actual dollars)	1991 Households[d] Number	Households[d] Percent of Total	Transit Person Trips[d] Number	Transit Person Trips[d] Percent of Total	Transit Person Trips per Household	Percent of Total Trips Made on Public Transit
Under 20,000	130,300	23.9	75,500	64.2	0.58	11.3
20,000 to 29,999	117,800	21.6	26,200	22.3	0.22	3.4
30,000 to 49,999	173,600	31.8	11,500	9.8	0.07	0.7
50,000 or Over	124,100	22.7	4,400	3.7	0.04	0.3
Total	545,800	100.0	117,600	100.0	0.22	2.6

Income Range (2001 actual dollars)	2001 Households[e] Number	Households[e] Percent of Total	Transit Person Trips[e] Number	Transit Person Trips[e] Percent of Total	Transit Person Trips per Household	Percent of Total Trips Made on Public Transit
Under 30,000	181,600	26.0	71,500	54.1	0.39	7.4
30,000 to 49,999	181,300	26.0	27,900	21.1	0.15	2.1
50,000 to 74,999	167,100	23.9	18,400	13.9	0.11	1.2
75,000 or Over	167,900	24.1	14,400	10.9	0.09	0.8
Total	697,900	100.0	132,300	100.0	0.19	2.4

[a] *Income data was collected only for the urbanized areas in 1963.*

[b] *Approximately 23 percent of total households did not provide household annual income data.*

[c] *Approximately 39 percent of total households did not provide household annual income data.*

[d] *Approximately 19 percent of total households did not provide household annual income data.*

[e] *Approximately 8 percent of total households did not provide household annual income data*

Source: SEWRPC.

Figures 18, 19, 20, and 21). Approximately 33 percent of daily travel within the Region occurred in the two morning and two afternoon peak hours of the day in each survey year. Of these peak-hour movements, trips to and from work comprised 47 percent of the total in 1963, 44 percent in 1972, and 41 percent in 1991 and 39 percent in 2001. These findings indicate that one of the primary transportation problems within the Region continues to be meeting the peak demand of the journeys to and from work.

Table 38

DISTRIBUTION OF AVERAGE WEEKDAY INTERNAL HOUSEHOLD PERSON TRIPS IN THE REGION BY TRIP PURPOSE: 1963, 1972, 1991, AND 2001

	Person Trips								Change: 1963-2001		Change: 1972-2001		Change: 1991-2001	
	1963		1972		1991		2001							
Trip Purpose[a]	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent	Number	Percent	Number	Percent
Home-Based Work	890,700	24.9	1,062,600	23.7	1,269,100	23.1	1,435,300	23.8	544,600	61.1	372,700	35.1	166,200	13.1
Home-Based Shopping	543,800	15.2	675,000	15.1	798,000	14.5	761,600	12.6	217,800	40.1	86,600	12.8	-36,400	-4.6
Home-Based Other	1,188,600	33.1	1,541,200	34.4	1,687,300	30.6	1,962,500	32.5	773,900	65.1	421,300	27.3	275,200	16.3
Nonhome-Based	647,600	18.1	783,500	17.5	1,125,900	20.4	1,215,000	20.2	567,400	87.6	431,500	55.1	89,100	7.9
School	312,700	8.7	417,500	9.3	625,400	11.4	656,900	10.9	344,200	110.1	239,400	57.3	31,500	5.0
Total	3,583,400	100.0	4,479,800	100.0	5,505,700	100.0	6,031,300	100.0	2,447,900	68.3	1,551,500	34.6	525,600	9.5

[a] *A home-based trip is a trip with either the origin or destination being the traveler's home. A non-home-based trip has neither the origin nor destination being the home. A school trip is any trip by a student for which the purpose of the trip at its origin or destination is to attend school.*

Source: SEWRPC.

Table 39

AVERAGE TRIP LENGTHS AND TIMES FOR INTERNAL HOUSEHOLD PERSON TRIPS IN THE REGION BY TRIP PURPOSE: 1963, 1972, 1991, AND 2001

	1963 Trip Length		1972 Trip Length		1991 Trip Length		2001 Trip Length		Percent Change 1963-2001		Percent Change 1972-2001		Percent Change 1991-2001	
Trip Purpose	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles
Home-Based Work	18.5	6.1	16.1	7.5	16.9	9.1	19.1	9.8	3.2	60.7	18.6	30.7	13.0	7.7
Home-Based Shopping	9.7	3.3	9.6	4.0	9.1	4.3	9.6	4.7	-1.0	42.4	--	17.5	5.5	9.3
Home-Based Other	12.7	4.6	11.6	4.9	10.9	5.4	11.6	6.0	-8.7	30.4	--	22.4	6.4	11.1
Nonhome-Based	13.0	4.0	12.4	4.9	11.6	5.7	12.3	5.9	-5.4	47.5	-0.8	20.4	6.0	3.5
Average	13.8	4.7	12.6	5.4	12.3	6.3	13.7	6.9	-0.7	46.8	8.7	27.8	11.4	9.5

Source: SEWRPC.

Table 40

AVERAGE PERSONAL VEHICLE OCCUPANCY OF AVERAGE WEEKDAY HOUSEHOLD INTERNAL TRIPS IN THE REGION BY SELECTED TRIP PURPOSE: 1963, 1972, 1991, AND 2001

	Average Personal Vehicle Occupancy by Selected Trip Purpose (number of persons)				
Year	Home-Based Work	Home-Based Shopping	Home-Based Other	Nonhome Based	Total Travel
1963	1.21	1.53	1.58	1.34	1.42
1972	1.17	1.47	1.54	1.38	1.39
1991	1.06	1.27	1.34	1.20	1.22
2001	1.05	1.22	1.32	1.18	1.19

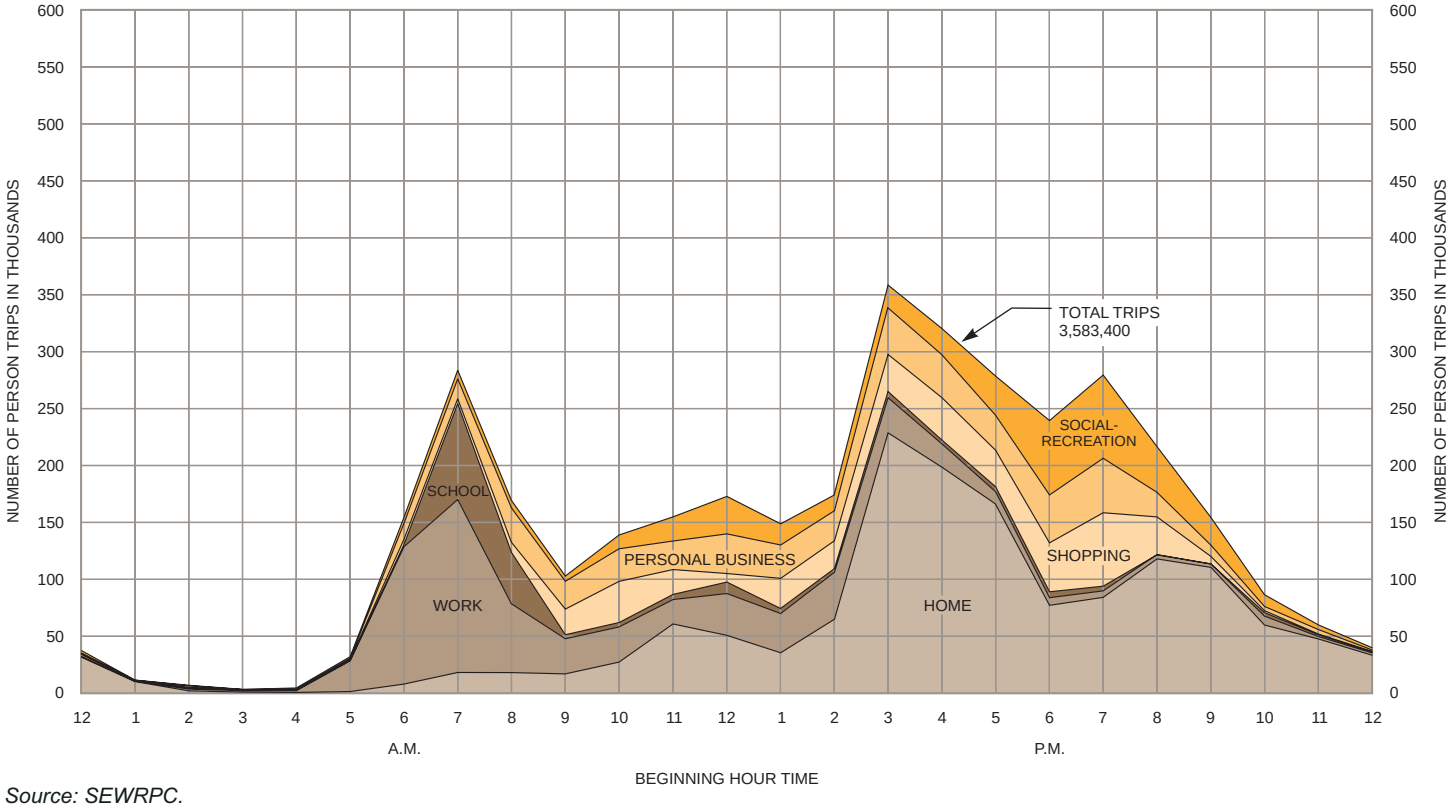
Source: SEWRPC.

County-to-County Trip Patterns

Map 38 and Table 41 show the magnitude of intra- and inter-county travel within the Region, excluding school trips, on an average weekday in 1963, 1972, 1991 and, 2001. Trips are shown in produced-attracted format—that is, from area of production to area of attraction. The production county for a trip having one end at "home", that is either beginning at or ending at home, is the county location of the "home" and the attraction county is the "non-home" end county location for that trip. The production county for trips having neither end at "home" is the

Figure 18

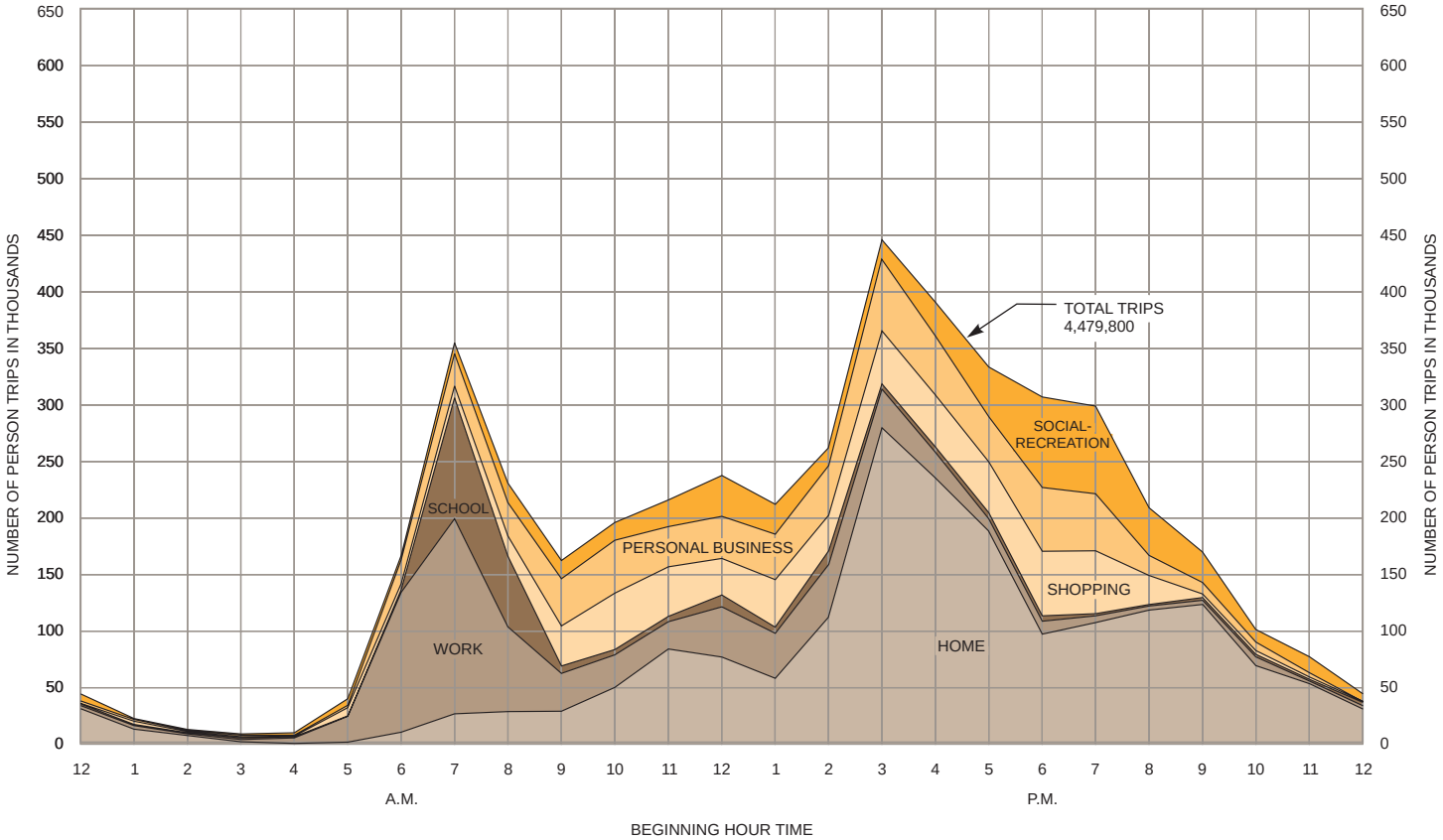
HOURLY VARIATION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS IN THE REGION BY TRIP PURPOSE AT DESTINATION: 1963



Source: SEWRPC.

Figure 19

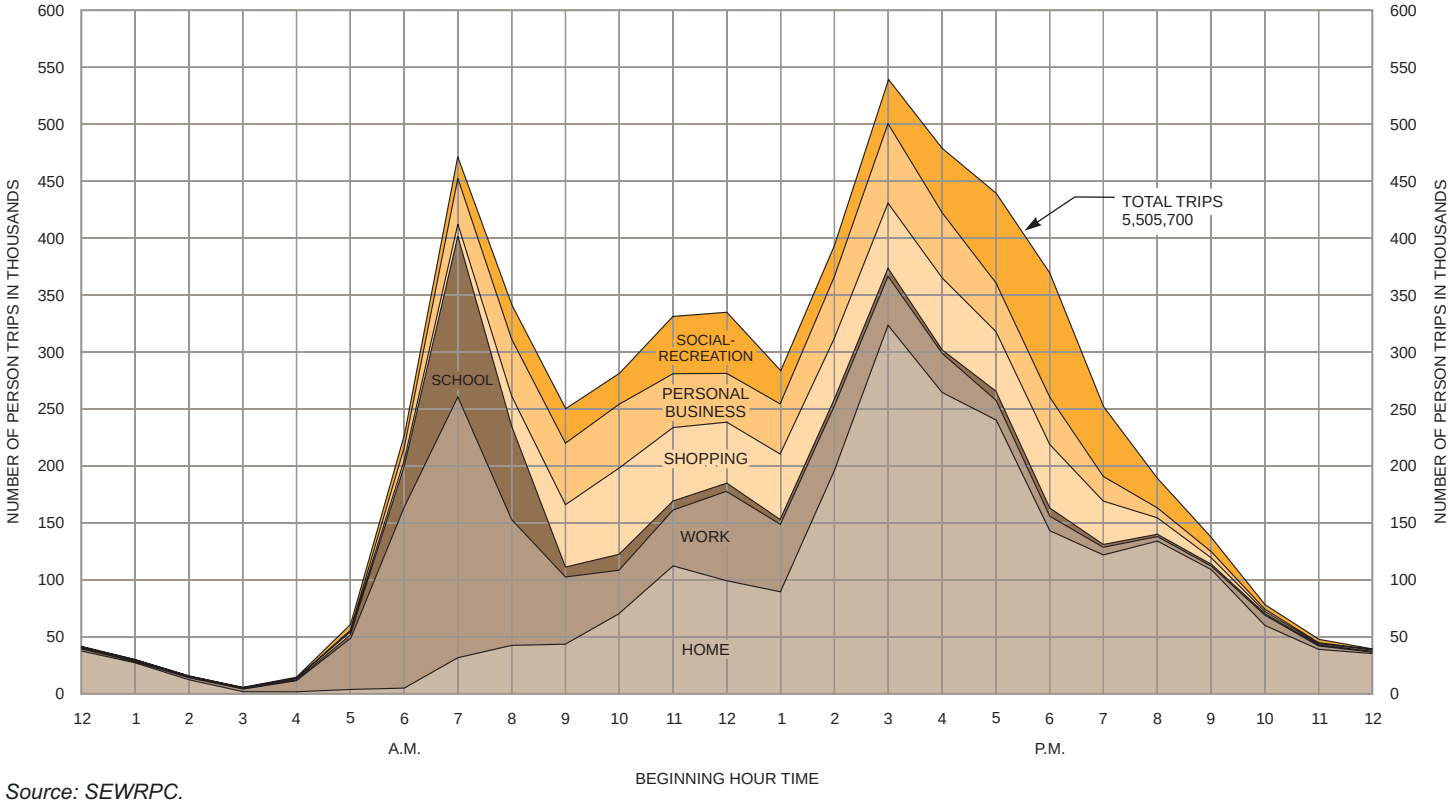
HOURLY VARIATION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS IN THE REGION BY TRIP PURPOSE AT DESTINATION: 1972



Source: SEWRPC.

Figure 20

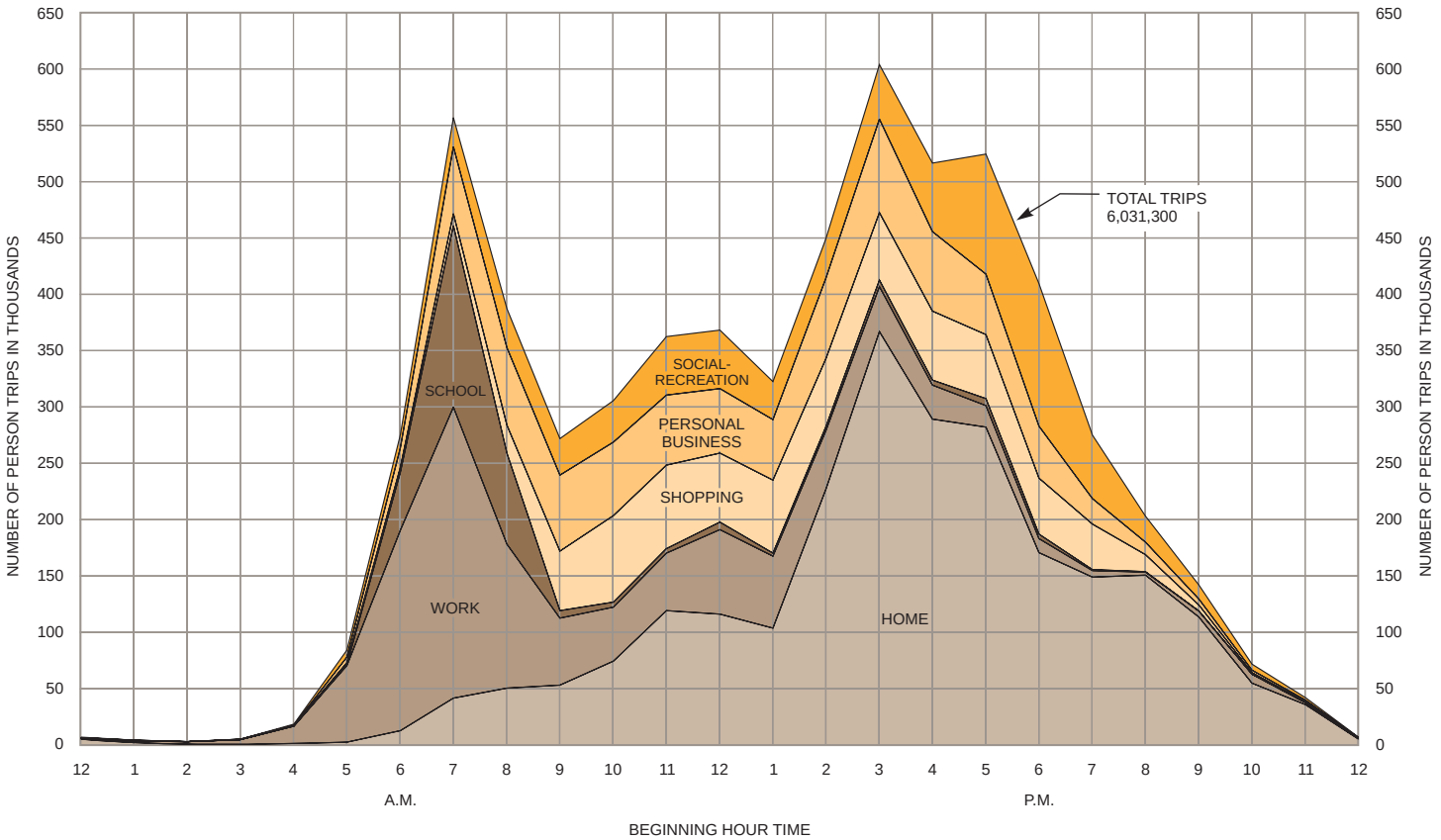
HOURLY VARIATION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS IN THE REGION BY TRIP PURPOSE AT DESTINATION: 1991



Source: SEWRPC.

Figure 21

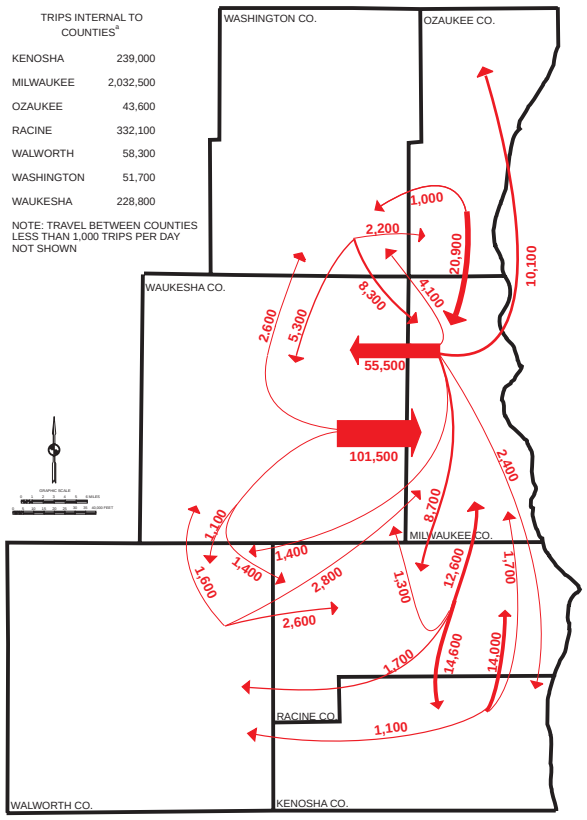
HOURLY VARIATION OF AVERAGE WEEKDAY INTERNAL PERSON TRIPS IN THE REGION BY TRIP PURPOSE AT DESTINATION: 2001



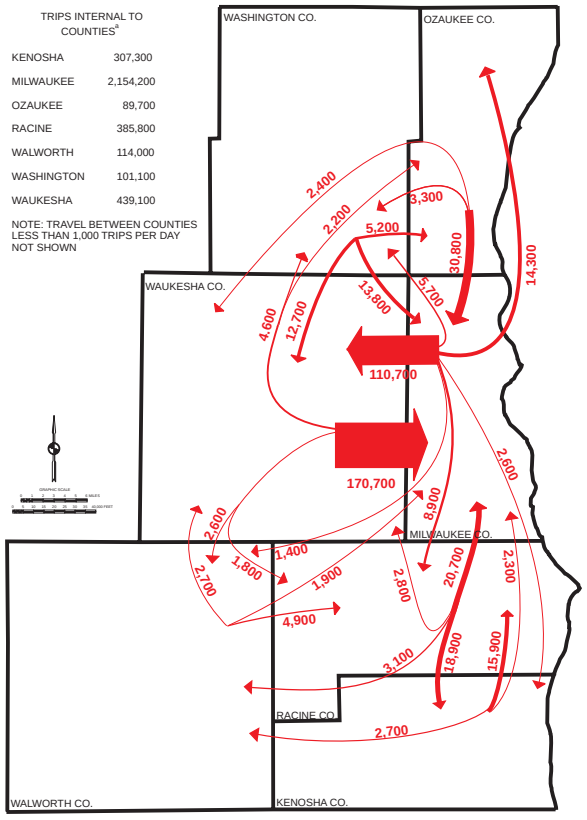
Source: SEWRPC.

AVERAGE WEEKDAY PERSON TRIPS BETWEEN COUNTIES IN THE REGION: 1963, 1972, 1991, AND 2001

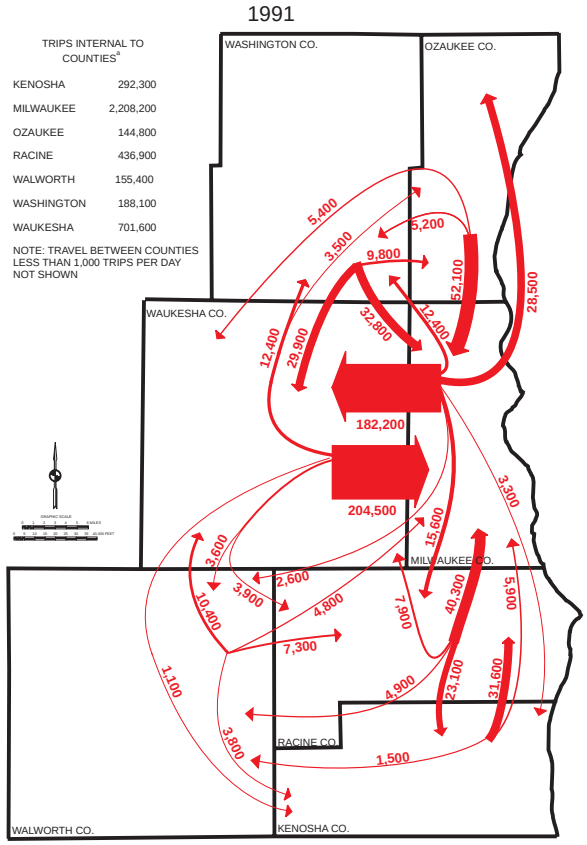
1963



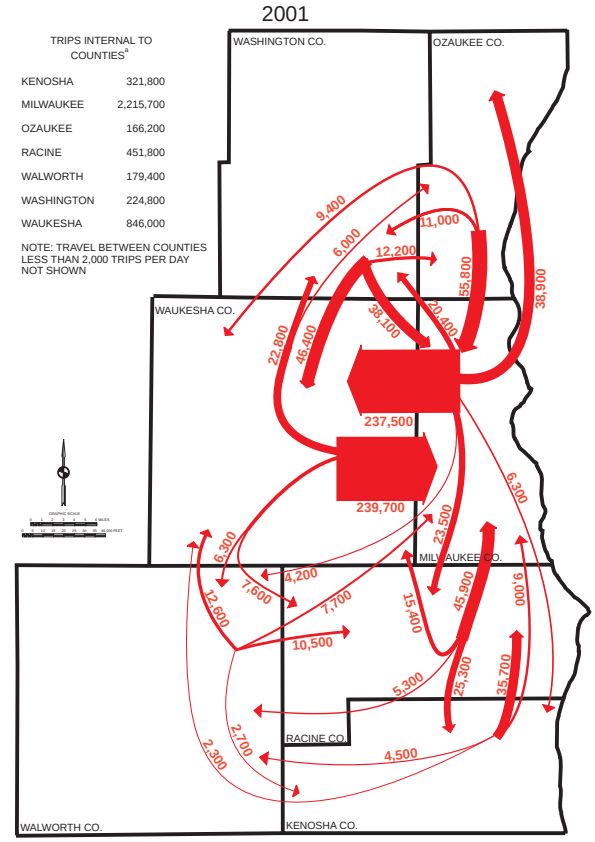
1972



1991



2001



[a] Trips are based on the resident household survey and include all trip purposes except school trips. Trips are shown in produced-attracted format--that is, from area of production to area of attraction. The production county for a trip having one end at "home", that is either beginning at or ending at home, is the county location of the "home" and the attraction county is the "nonhome" end county location for that trip. The production county for trips having neither end at "home" is the county location of the trip origin and the attraction county is the county location of the trip destination. Thus, the trips shown on the map generally indicate the trips made on an average weekday by the residents of a county to and from each other county.

Source: SEWRPC.

Table 41

AVERAGE WEEKDAY PERSON TRIPS (EXCLUDING SCHOOL TRIPS) BETWEEN, AND WITHIN, COUNTIES IN THE REGION: 1963, 1972, 1991, AND 2001[a]

	Attraction County: 1963							
Production County	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	Total
Kenosha	240,900	1,700	0	14,200	1,100	0	100	258,000
Milwaukee	2,300	2,054,900	11,300	8,700	1,400	4,400	60,200	2,143,200
Ozaukee	0	20,500	42,700	0	0	1,000	600	64,800
Racine	15,000	12,600	0	332,800	1,700	0	1,300	363,400
Walworth	1,200	2,800	0	2,600	58,300	200	1,600	66,700
Washington	300	8,100	2,200	0	200	51,700	5,500	68,000
Waukesha	300	97,500	900	1,300	1,100	2,600	221,700	325,400
Total	260,000	2,198,100	57,100	359,600	63,800	59,900	291,000	3,289,500

	Attraction County: 1972							
Production County	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	Total
Kenosha	309,600	2,300	100	16,500	2,700	0	100	331,300
Milwaukee	2,700	2,166,000	14,300	9,200	1,400	5,700	110,900	2,310,200
Ozaukee	0	30,800	89,700	100	0	3,300	2,400	126,300
Racine	18,900	20,800	0	388,100	3,100	100	2,900	433,900
Walworth	800	2,200	0	5,000	117,900	0	2,700	128,600
Washington	100	13,800	5,200	200	0	101,300	12,700	133,300
Waukesha	100	170,900	2,200	1,800	2,600	4,600	440,900	623,100
Total	332,200	2,406,800	111,500	420,900	127,700	115,000	572,600	4,086,700

	Attraction County: 1991							
Production County	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	Total
Kenosha	297,400	6,100	100	33,100	1,500	0	700	338,900
Milwaukee	3,300	2,256,900	28,800	15,700	2,600	12,500	183,500	2,503,300
Ozaukee	200	53,000	147,200	200	100	5,300	5,500	211,500
Racine	23,300	40,500	500	445,300	4,900	300	8,000	522,800
Walworth	3,800	5,000	100	7,300	160,900	0	10,700	187,800
Washington	100	33,000	9,800	300	100	190,000	30,000	263,300
Waukesha	1,100	205,100	3,600	3,900	3,600	12,400	709,900	939,600
Total	329,200	2,599,600	190,100	505,800	173,700	220,500	948,300	4,967,200

	Attraction County: 2001							
Production County	Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	Total
Kenosha	321,800	9,000	100	35,700	4,500	300	2,300	373,700
Milwaukee	6,300	2,215,700	38,900	23,500	4,200	20,400	237,500	2,546,500
Ozaukee	0	55,800	166,200	500	0	11,000	9,400	242,900
Racine	25,300	45,900	1,600	451,800	5,300	700	15,400	546,800
Walworth	2,700	7,700	100	10,500	179,400	300	12,600	213,300
Washington	300	38,100	12,200	300	100	224,800	46,400	322,200
Waukesha	1,400	239,700	6,000	7,600	6,300	22,800	846,000	1,129,800
Total	357,800	2,611,900	225,100	529,900	199,800	280,300	1,169,600	5,374,400

[a] *Trips are based on the resident household survey and include all trip purposes except school. Trips are shown in produced-attracted format – that is, from area of production to area of attraction. The production county for a trip having one end at "home", that is either beginning at or ending at home, is the county location of the "home" and the attraction county is the "nonhome" end county location for that trip. The production county for trips having neither end at "home" is the county location of the trip origin and the attraction county is the county location of the trip destination. Thus, the trips shown in the table largely indicate the trips made by residents of each county of the Region on an average weekday to and from each other county.*

Source: SEWRPC.

county location of the trip origin and the attraction county is the county location of the trip destination. Thus, the trips shown on Map 38 and in Table 41 largely indicate the trips made by residents of each county of the Region on an average weekday to and from each other county. Several important conclusions can be drawn from these data. First, travel internal to counties dominates total travel within the Region. However, there has been a small shift over time away from intra-county travel toward increased inter-county travel. In 1963, 91 percent of trips, excluding school trips, were intra-county, that is, they had both origin and destination within the same county, while 9 percent of trips were inter-county. In 1972, 88 percent of trips were intra-county, while 12 percent were inter-county. In 1991, 85 percent of the trips were intra-county, while 15 percent were inter-county. In 2001, 82 percent of the trips were intra-county, while 18 percent were inter-county. Second, the proportion of travel internal to the three urbanized counties, Kenosha, Milwaukee, and Racine, to total regional travel has decreased. As shown in Table 41, travel internal to the urbanized counties has decreased from 80 percent of all travel in 1963, to 70 percent in 1972, to 60 percent in 1991, and to 56 percent in 2001. Third, the number of trips to and within Milwaukee County decreased from 67 percent of all trips in 1963 to 59 percent in 1972, to 52 percent in 1991, and to 49 in 2001.

Internal Commercial Truck Travel

The number of trucks available within the Region increased from 58,500 in 1963 to 77,250 in 1972 and to 87,500 in 1991, and to 129,500 in 2001, as shown in Table 42. Because of the substantial increase in the use of light trucks as personal vehicles rather than as commercial vehicles, the 1991 and 2001 commercial truck totals exclude trucks employed primarily for personal use. Such personal-use trucks were included in 1991 and 2001 with automobiles as personal-use vehicles. In 1963, personal-use trucks represented 5,100, or only about 9 percent, of the total 58,500 trucks available; in 1972 they represented 18,100, or about 23 percent, of the total 77,250 trucks available. By 1991, personal use trucks were estimated to total about 80,600 trucks, or about 48 percent of the total 168,100 trucks available.

Together, the 129,500 light, medium, heavy, and municipal trucks in commercial use in 2001 made an estimated total of 582,500 trips on an average weekday in 2001, representing an increase of 62,400 trips, or 12 percent, from 1991; an increase of 211,500 trips or 57 percent since 1972; and an increase of 289,100 rips or 99 percent since 1963. The average number of trips per weekday for all trucks in commercial use has been fairly stable over the last four decades and was an estimated 4.5 trips per day in 2001, 5.9 trips per vehicle in 1991, 4.8 in 1972, and 5.0 in 1963. As shown in Table 43 the average miles traveled per truck trip increased from 4.9 miles per trip in 1963, to 7.3 miles per trip in 1972, to 8.4 miles per trip in 1991, and to 8.7 miles per trip in 2001, a 78 percent increase between 1963 and 2001, a 14 percent increase between 1972 and 2001, and a 4 percent increase between 1991 and 2001.

External Trip Production

In addition to the 6.36 million internal person trips and 5.11 million internal vehicle trips made within the Region on an average weekday in 2001, there were 394,900 personal vehicle person trips and 357,500 total vehicle trips—including personal vehicle and commercial truck trips—entering, leaving, or passing through the Region. In each of the survey years, as indicated in Table 44, the numbers of external personal vehicle person and total vehicle trips entering the Region were very similar to the respective numbers of such trips leaving the Region, ranging from 45 to 48 percent in the case of total external personal vehicle person trips and from 46 to 48 percent of total external vehicle trips. External personal vehicle person and total vehicle trips which passed through the Region, which remained at about 8 percent of all external trips between 1963 and 1972, decreased to about 5 percent of all external trips in 1991 and 2001.

External personal vehicle person trips decreased from 191,700 in 1963 to 176,900 in 1972, a decrease of 8 percent. External personal vehicle person trips then increased from 176,900 in 1972 to 317,400 in 1991, an increase of 79 percent, and increased again to 394,900 trips in 2001, an increase of 24 percent from 1991. External personal vehicle trips, however, exhibited uniform increases from 85,600 in 1963 to 100,800 in

Table 42

COMMERCIAL-USE TRUCK AVAILABILITY AND AVERAGE WEEKDAY INTERNAL TRUCK TRIPS IN THE REGION BY TYPE: 1963, 1972, 1991, AND 2001

Type of Truck	Year	Trucks			Truck Trips			
		Number	Percent of Total	Percent Change	Number	Percent of Total	Percent Change	Trips per Truck
Light	1963	33,800	57.8	- -	169,500	57.8	- -	5.0
	1972	51,000	66.0	50.9	185,800	50.1	9.6	3.6
	1991	49,100	56.1	-3.7	214,300	41.1	15.3	4.4
	2001	79,600	61.5	62.1	319,100	54.8	48.9	4.0
Medium	1963	20,500	35.0	- -	110,900	37.8	- -	5.4
	1972	22,850	29.6	11.5	173,500	46.8	56.4	7.6
	1991	28,400	32.5	24.3	259,700	49.8	49.7	9.1
	2001	35,600	27.5	25.4	196,200	33.7	-24.5	5.5
Heavy	1963	4,200	7.2	- -	13,000	4.4	- -	3.1
	1972	3,400	4.4	-19.0	11,700	3.1	-10.0	3.4
	1991	3,100	3.5	-8.8	17,500	3.6	49.6	5.6
	2001	6,600	5.1	112.9	41,200	7.1	135.4	6.2
Municipal	1963	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]
	1972	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]	- -[a]
	1991	6,900	7.9	- -	28,600	5.5	- -	4.1
	2001	7,700	5.9	11.6	26,000	4.4	-9.1	3.4
Total	1963	58,500	100.0	- -	293,400	100.0	- -	5.0
	1972	77,250	100.0	32.1	371,000	100.0	26.4	4.8
	1991	87,500	100.0	13.3	520,100	100.0	40.2	5.9
	2001	129,500	100.0	48.0	582,500	100.0	12.0	4.5

[a]*Data for Municipal trucks for 1963 and 1972 was not collected.*

Source: SEWRPC.

1972, or by 18 percent, and from 100,800 in 1972 to 229,000 in 1991, an increase of 127 percent, and to 290,900 in 2001, an increase of 27 percent. As shown in Table 45, the occupancy of external personal vehicle person trips has declined from 2.24 persons per vehicle in 1963, to 1.75 in 1972, to 1.38 in 1991, and to 1.36 in 2001.

While growth in external person trips has occurred across all trip purposes, the greatest growth in external person trips has occurred with respect to work and school trips. The volume of external commercial truck trips, as shown in Table 46, increased from 15,300 trips per day in 1963 to 22,500 trips per day in 1972, an increase of 47 percent. From 1972 to 1991, such trips increased from 22,500 trips per day to 44,100 trips per day, an increase of 96 percent and again increased to 66,600 trips in 2001, an increase of 51 percent since 1991.

Mass Transit User Survey

The Commission conducted special surveys of transit passengers on the public transit systems operated by the Cities of Kenosha, Racine, and Waukesha, and Counties of Milwaukee, Ozaukee, Washington, and Waukesha. Transit passengers on the express transit route between the Cities of Milwaukee, Racine, and Kenosha were also surveyed. The principal purpose of these surveys was to obtain descriptions of the socioeconomic and travel characteristics of the ridership of the overall regional mass transit system.

Table 43

SELECTED TRIP MAKING CHARACTERISTICS OF COMMERCIAL-USE TRUCKS GARAGED IN THE REGION: 1963, 1972, 1991, AND 2001

Trip Characteristics	1963	1972	1991	2001	Change: 1963-2001		Change: 1972-2001		Change: 1991-2001	
					Number	Percent	Number	Percent	Number	Percent
Average Weekday Trips per Truck	5.0	4.8	5.9	4.5	-0.5	-10.0	-0.3	-6.3	-1.4	-23.7
Average Trip Length (miles).....	4.9	7.3	8.4	8.7	3.8	77.6	1.4	19.2	0.3	3.6

Source: SEWRPC.

Table 44

AVERAGE WEEKDAY EXTERNAL PERSON AND VEHICLE TRIPS IN THE REGION BY DIRECTION: 1963, 1972, 1991, AND 2001

Direction	Year	Personal Vehicle Driver[a]		Personal Vehicle Passenger[a]		Personal Vehicle Person Trips			Commercial Truck Trips		Total Vehicle Trips		
		Number	Percent Change	Number	Percent Change	Number	Percent Change	Percent of All Directions	Number	Percent Change	Number	Percent Change	Percent of all Directions
Inbound	1963	39,700	- -	47,900	- -	87,600	- -	45.7	7,100	- -	46,800	- -	46.1
	1972	46,700	17.6	33,500	-30.1	80,200	-8.4	45.3	10,900	53.5	57,600	23.1	45.8
	1991	107,300	129.8	40,300	20.3	147,600	84.0	46.5	19,300	77.1	126,600	119.8	46.3
	2001	137,500	28.1	47,700	18.4	185,200	25.5	46.9	32,000	65.8	169,500	33.9	47.4
Outbound	1963	40,000	- -	48,100	- -	88,100	- -	46.0	7,200	- -	47,200	- -	46.4
	1972	47,500	18.8	35,900	-25.4	83,400	-5.3	47.2	10,700	48.6	58,200	23.3	46.3
	1991	111,900	135.6	41,800	16.4	153,700	84.3	48.4	19,800	85.0	131,700	126.3	48.2
	2001	142,200	27.1	48,400	15.8	190,600	24.0	48.3	27,900	40.9	170,100	29.2	47.6
Through	1963	5,900	- -	10,100	- -	16,000	- -	8.3	1,700	- -	7,600	- -	7.5
	1972	6,600	11.9	6,700	-33.7	13,300	-16.9	7.5	3,300	94.1	9,900	30.3	7.9
	1991	10,000	51.5	6,100	-9.0	16,100	21.1	5.1	5,000	51.5	15,000	51.5	5.5
	2001	11,200	12.0	7,900	29.5	19,100	18.6	4.8	6,700	34.0	17,900	19.3	5.0
All Directions	1963	85,600	- -	106,100	- -	191,700	- -	100.0	16,000	- -	101,600	- -	100.0
	1972	100,800	17.8	76,100	-28.3	176,900	-7.7	100.0	24,900	55.6	125,700	23.7	100.0
	1991	229,200	127.4	88,200	15.9	317,400	79.4	100.0	44,100	77.1	273,300	117.4	100.0
	2001	290,900	26.9	104,000	17.9	394,900	24.4	100.0	66,600	51.0	357,500	30.8	100.0

[a]*Includes personal-use trucks.*

Source: SEWRPC.

As Table 47 shows, home-based work and school trips constituted the major portion of bus passenger travel on each of the transit systems in 2001, as well as in 1972 and 1991.

Table 48 presents the distribution of bus passenger travel on the transit systems as reported in the 1972, 1991, and 2001 surveys by sex, age, annual household income, and race.

- Female passengers made the majority of trips on all systems in all years with the exception of the Milwaukee-Racine-Kenosha transit service in 2001, and the Ozaukee and Washington County transit systems in 2001. From 1972 to 2001, the percentage of male passengers has generally been increasing and approaching 50 percent.

Table 45

AVERAGE WEEKDAY EXTERNAL PERSONAL VEHICLE TRIPS AND VEHICLE OCCUPANCY IN THE REGION BY TRIP PURPOSE: 1963, 1972, 1991, AND 2001

Trip Purpose	1963 Personal Vehicle Driver Trips Number	1963 Personal Vehicle Driver Trips Percent of Total	1963 Total Personal Vehicle Person Trips Number	1963 Total Personal Vehicle Person Trips Percent of Total	1963 Vehicle Occupancy
Home-Based Work	24,600	28.7	36,900	19.2	1.50
Home-Based Shopping	5,200	6.1	12,300	6.4	2.37
Home-Based Other	45,000	52.6	121,600	63.5	2.70
Nonhome-Based	9,400	11.0	18,200	9.5	1.94
School	1,400	1.6	2,700	1.4	1.93
Total	85,600	100.0	191,700	100.0	2.24

Trip Purpose	1972 Personal Vehicle Driver Trips Number	1972 Personal Vehicle Driver Trips Percent of Total	1972 Total Personal Vehicle Person Trips Number	1972 Total Personal Vehicle Person Trips Percent of Total	1972 Vehicle Occupancy
Home-Based Work	36,700	36.4	49,400	27.9	1.35
Home-Based Shopping	7,200	7.1	15,100	8.5	2.10
Home-Based Other	41,000	40.7	87,900	49.7	2.14
Nonhome-Based	12,300	12.2	18,700	10.6	1.52
School	3,600	3.6	5,800	3.3	1.61
Total	100,800	100.0	176,900	100.0	1.75

Trip Purpose	1991 Personal Vehicle Driver Trips Number	1991 Personal Vehicle Driver Trips Percent of Total	1991 Total Personal Vehicle Person Trips Number	1991 Total Personal Vehicle Person Trips Percent of Total	1991 Vehicle Occupancy
Home-Based Work	112,900	49.3	129,600	40.8	1.15
Home-Based Shopping	15,700	6.8	26,200	8.2	1.67
Home-Based Other	59,800	26.1	106,300	33.5	1.78
Nonhome-Based	33,200	14.5	44,300	14.0	1.33
School	7,600	3.3	11,000	3.5	1.45
Total	229,200	100.0	317,400	100.0	1.38

Trip Purpose	2001 Personal Vehicle Driver Trips Number	2001 Personal Vehicle Driver Trips Percent of Total	2001 Total Personal Vehicle Person Trips Number	2001 Total Personal Vehicle Person Trips Percent of Total	2001 Vehicle Occupancy
Home-Based Work	152,200	52.4	170,800	43.3	1.12
Home-Based Shopping	17,200	5.9	27,200	6.9	1.58
Home-Based Other	82,100	28.2	140,600	35.6	1.71
Nonhome-Based	27,100	9.3	38,000	9.6	1.40
School	12,300	4.2	18,300	4.6	1.49
Total	290,900	100.0	394,900	100.0	1.36

Source: SEWRPC.

- The largest portion of 2001 bus passenger trips consisted of passengers 25 through 54 years of age on all transit systems, with the exception of the City of Kenosha transit system. On the Kenosha system, the largest portion of bus passenger trips in 2001 was made by passengers under 15 years of age. The year

Table 46

DISTRIBUTION OF AVERAGE WEEKDAY EXTERNAL COMMERCIAL TRUCK TRIPS IN THE REGION BY DESTINATION TRIP PURPOSE: 1963, 1972, 1991, AND 2001

Trip Purpose	1963		1972		1991		2001		Percent Change 1963-2001	Percent Change 1972-2001	Percent Change 1991-2001
	Number	Percent	Number	Percent	Number	Percent	Number	Percent			
Base of Operations	4,200	27.5	9,400	41.8	17,600	39.9	13,500	20.3	221.4	43.6	-23.3
Work-Connected Business	700	4.6	3,200	14.2	9,700	22.0	26,200	39.3	3,642.9	718.8	170.1
Pick-Up/Delivery of Goods	10,100	66.0	9,800	43.6	15,300	34.7	25,600	38.4	157.4	161.2	67.3
Customer Service	300	2.0	100	0.4	1,500	3.4	1,300	2.0	-66.7	1,400.0	-13.3
Total	15,300	100.0	22,500	100.0	44,100	100.0	66,600	100.0	335.3	196.0	51.0

Source: SEWRPC.

Table 47

PERCENTAGE DISTRIBUTION OF AVERAGE WEEKDAY BUS PASSENGER TRIPS IN THE REGION BY TRIP PURPOSE AND TRANSIT SYSTEM: 1972, 1991, AND 2001

Trip Purpose	Transit System														
	Milwaukee					Racine					Waukesha				
	Percent of Trips			Percent Change		Percent of Trips			Percent Change		Percent of Trips			Percent Change	
	1972	1991	2001	1972-2001	1991-2001	1972	1991	2001	1972-2001	1991-2001	1972	1991	2001	1972-2001	1991-2001
Home-Based Work	56.8	26.4	42.8	-14.0	16.4	42.2	25.0	39.4	-2.8	14.4	35.5	29.0	34.6	0.9	5.6
Home-Based Shopping	6.5	9.6	8.4	1.9	-1.2	11.2	8.6	9.6	-1.6	1.0	10.3	5.7	14.1	3.8	8.4
Home-Based Other	12.5	17.3	16.8	4.3	-0.5	19.9	23.3	21.1	1.2	-2.2	13.1	10.0	12.5	-0.6	2.5
Nonhome-Based	4.7	7.0	7.9	3.2	0.9	3.9	10.6	5.2	1.3	-5.4	0.0	4.4	9.7	9.7	-5.3
School	19.5	39.7	24.1	4.6	-15.6	22.8	32.5	24.7	1.9	-7.8	41.1	50.9	29.1	-12.0	-21.8
Total	100.0	100.0	100.0	--	--	100.0	100.0	100.0	--	--	100.0	100.0	100.0	--	--

Trip Purpose	Transit System														
	Kenosha					Milwaukee-Racine-Kenosha[a]			Ozaukee[b]	Washington[b]	Waukesha-Milwaukee				
	Percent of Trips			Percent Change		Percent of Trips		Percent Change			Percent of Trips			Change in Percent	
	1972[c]	1991	2001	1972-2001	1991-2001	1991	2001	1991-2001	2001	2001	1972	1991	2001	1972-2001	1991-2001
Home-Based Work	26.5	16.4	15.8	-10.7	-0.6	53.8	48.0	-5.8	91.5	91.3	72.0	71.2	74.9	2.9	3.7
Home-Based Shopping	12.3	8.0	6.6	-5.7	-1.4	1.4	13.3	11.9	0.0	0.4	12.2	6.9	0.0	12.2	6.9
Home-Based Other	19.8	13.7	8.4	-11.4	-5.3	14.0	25.3	11.3	2.8	0.0	4.1	4.8	2.2	-1.9	-2.6
Nonhome-Based	3.7	5.1	4.4	0.7	-0.7	9.1	9.8	0.7	1.6	2.6	4.6	5.4	1.5	-3.1	-3.9
School	37.7	56.8	64.8	27.1	8.0	21.7	3.6	-18.1	4.1	5.7	7.1	11.7	21.4	14.3	9.7
Total	100.0	100.0	100.0	--	--	100.0	100.0	--	100.0	100.0	100.0	100.0	100.0	--	--

[a] *Service not provided in 1972.*

[b] *Service not provided in 1972 or in 1991.*

[c] *Excludes school "trippers," or bus runs designed to accommodate school-aged children.*

Source: SEWRPC.

2001 survey finding was similar to that of the 1991 and 1972 surveys, except for the Kenosha transit system where the largest portion of passengers were of 16 through 24 years of age in 1972 and 1991, and the City of Waukesha transit system where the largest portion of bus passengers were under 15 years of age in 1991 and between 16 through 24 years of age in 1972.

- With respect to household income, in each of the surveys—1972, 1991, and 2001—the largest portion of public transit passengers are in the lowest range of income, with the exception of the Waukesha, Ozaukee, and Washington County transit systems.

Table 48

PERCENTAGE DISTRIBUTION OF AVERAGE WEEKDAY BUS PASSENGER TRAVEL IN THE REGION BY TRANSIT SYSTEM AND SELECTED CHARACTERISTICS OF TRANSIT USERS: 1972, 1991, AND 2001

Selected Characteristics	Percent of Trips by Transit System: 1972				
	Milwaukee	Racine	Waukesha[a]	Kenosha[a]	Waukesha-Milwaukee
Sex					
Male	27.7	20.1	7.7	29.1	38.2
Female	72.3	79.9	92.3	70.9	61.8
Total	100.0	100.0	100.0	100.0	100.0
Age					
One to 15	7.2	10.5	4.0	11.2	--
16 to 24	31.8	29.8	43.0	35.7	20.6
25 to 54	38.7	31.5	31.0	21.7	47.8
55 to 64	15.0	14.6	11.7	11.3	24.1
65 or Older	7.3	13.6	10.3	20.1	7.5
Total	100.0	100.0	100.0	100.0	100.0
Household Income (actual dollars)					
Under 8,000	50.0	54.7	28.6	54.0	24.9
8,000 to 11,999	26.9	23.3	42.3	19.9	26.8
12,000 to 14,999	12.3	11.0	12.9	14.6	19.9
15,000 or Over	10.8	11.0	16.2	11.5	28.4
Total	100.0	100.0	100.0	100.0	100.0
Race					
Black/African American	12.3	8.8	- -	2.4	- -
White	85.3	87.6	93.5	96.0	97.5
Other Minority	2.4	3.6	6.5	1.6	2.5
Total	100.0	100.0	100.0	100.0	100.0

Selected Characteristics	Percent of Trips by Transit System: 1991					
	Milwaukee	Racine	Waukesha	Kenosha	Waukesha-Milwaukee	Milwaukee-Racine-Kenosha[b]
Sex						
Male	38.1	38.2	43.3	39.3	37.3	46.9
Female	61.9	61.8	56.7	60.7	62.7	53.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Age						
One to 15	4.9	15.4	32.4	25.4	3.0	--
16 to 24	31.3	35.9	27.3	33.9	20.7	17.1
25 to 54	52.2	39.1	28.3	26.3	62.3	73.1
55 to 64	6.3	3.9	6.2	5.0	11.8	4.4
65 or Older	5.3	5.7	5.8	9.4	2.2	5.4
Total	100.0	100.0	100.0	100.0	100.0	
Household Income (actual dollars)						
Under 20,000	50.3	62.7	54.1	55.6	18.3	33.9
20,000 to 29,999	20.7	15.2	12.3	13.3	17.1	25.1
30,000 to 49,999	20.1	17.2	17.8	18.1	29.7	30.1
50,000 or Over	8.9	6.9	15.8	13.0	34.9	10.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
Race						
Black/African American	30.6	39.9	4.5	13.7	4.2	18.8
White	63.3	49.7	84.1	77.5	90.3	68.8
Other Minority	6.1	10.4	11.4	8.8	5.5	12.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 48 (continued)

Selected Characteristics	Percent of Trips by Transit System: 2001							
	Milwaukee	Racine	Waukesha	Kenosha	Waukesha-Milwaukee	Milwaukee-Racine-Kenosha[b]	Ozaukee[c]	Washington[c]
Sex								
Male	40.2	41.4	48.2	39.1	41.9	54.0	57.2	60.3
Female	59.8	58.6	51.8	60.9	58.1	46.0	42.8	39.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Age								
One to 15	4.3	9.2	19.8	39.4	0.5	0.0	3.0	2.0
16 to 24	35.6	33.2	22.6	27.8	24.4	5.6	13.4	14.6
25 to 54	51.2	47.9	45.0	24.6	62.3	72.4	68.9	77.7
55 to 64	5.5	5.4	6.5	3.0	11.7	15.4	11.4	4.9
65 or Older	3.4	4.3	6.1	5.2	1.1	6.6	3.3	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Household Income (actual dollars)								
Under 30,000	60.1	65.2	60.5	54.6	10.9	54.5	36.4	30.2
30,000 to 49,999	27.3	27.7	25.5	27.8	21.1	20.8	35.9	34.2
50,000 or Over	12.6	17.3	14.0	17.6	68.0	24.7	27.7	35.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Race								
Black/African American	49.1	48.6	9.5	18.7	5.6	42.0	38.0	23.2
White	41.4	47.8	78.2	69.5	87.8	48.9	59.7	53.5
Other Minority	9.5	3.6	12.3	11.8	6.6	9.1	2.3	23.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a]*Excludes school "trippers," or bus runs designed to accommodate school-aged children.*

[b]*Service not provided in 1972.*

[c]*Service not provided in 1972 or 1991.*

Source: SEWRPC.

- With respect to race, public transit passengers in 2001 were about 50 percent minority on the transit systems of Milwaukee County, City of Racine, Milwaukee-Racine-Kenosha, Ozaukee County, and Washington County. The percentage of minority passengers on the City of Kenosha, City of Waukesha, and Waukesha County transit systems were 30, 22, and 12 percent, respectively. The proportion of public transit passengers that are minorities has increased since 1991, and particularly since 1972 when less than 5 to 15 percent of transit passengers were minorities.

Interregional Passenger Travel

Table 49 displays an estimate of existing and historic interregional person trips, including personal vehicle travel as presented earlier in this chapter and travel on other modes including intercity rail and bus, commercial air carrier, and car ferry. Interregional travel by personal vehicle has consistently accounted for about 95 percent of total interregional travel within southeastern Wisconsin over the past 40 years.

SUMMARY AND CONCLUSIONS

The Commission's comprehensive inventories of travel conducted in 1963, 1972, 1991, and 2001 describe in detail the total travel pattern of the Region and each of its component parts. This chapter has presented, in summary form, the basic findings of the 2001 Commission inventory of travel within the Region. In order to assess any changes occurring in travel habits and patterns within the Region over time, comparisons have been

Table 49

NUMBER OF AVERAGE WEEKDAY INTERREGIONAL PERSON TRIPS ON INTERCITY MODES IN THE REGION: 1963, 1972, 1993, AND 2001

Mode	1963		1972		1993		2001	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Intercity Motor Bus	2,000	1.0	1,300	0.7	1,300	0.4	1,200	0.3
Intercity Rail	4,000	2.0	900	0.3	1,800	0.5	1,900	0.4
Cross-Lake Car Ferry	1,200	0.6	700	0.4	--	--	--	--
Commercial Air Carrier	2,600	1.3	6,200[a]	3.3	12,600[b]	3.8	16,400	4.0
Personal Vehicle	191,700	95.1	176,900	95.1	317,400[c]	95.3	394,900	95.3
Total	201,500	100.0	186,000	100.0	333,100	100.0	414,400	100.0

[a]*Survey taken in 1971.*

[b]*Survey taken in 1989.*

[c]*Survey taken in 1991.*

Source: SEWRPC.

made between the findings of the 2001 inventory with those of earlier Commission travel inventories of 1963, 1972, and 1991. The Commission travel surveys conducted for 1963, 1972, 1991, and 2001 demonstrate that travel is an orderly, regular, and measurable occurrence, with recognizable travel patterns.

- On an average weekday in 2001, about 6.8 million person trips were made within the Region. This represents an increase from 1963 of 2.6 million person trips, or 63 percent. The increase in regional tripmaking reflects the increases in the number of households within the Region of 58 percent from 1963 to 2001, as well as the increases in employment of 71 percent from 1963 to 2001. The increases in person trips in the region were substantially greater than the increase in the resident population of the Region, of 15 percent from 1963 to 2001. Future levels of households and employment, rather than of resident population, should be considered key indicators of potential future travel growth.

- The number of internal person trips per resident household of the Region has remained stable, at about eight trips per household. The level of average weekday internal person trips per capita, however, has increased from slightly greater than two trips per capita in 1963 to slightly greater than three trips per capita in 2001. The stability in the household trip rate occurred even with the substantial socio-economic, land use, and transportation changes that have occurred within the Region over the last 40 years, including the change from a manufacturing to a service economy, the increase in labor force participation among women, the change in age composition of the Region, the change in average household size in the Region, the increase in vehicle ownership, the change in land use density of the Region, and the construction of the freeway system.

- On an average weekday in 2001, nearly 5.5 million vehicle trips were made within the Region. This represents an increase of about 2.9 million vehicle trips, or 113 percent from 1963. The increase in vehicle trips from 1963 to 2001 is more substantial than the increase in person trips, specifically, an increase of 2.9 million vehicle trips and of 2.6 million person trips over the 38 year period. The principal factor contributing to the more rapid increase in vehicle trips is the decline in average vehicle occupancy or carpooling observed in the surveys, from 1.42 persons per vehicle in 1963 to 1.20 persons per vehicle in 2001 with respect to all trips and from 1.21 persons per vehicle in 1963 to 1.05 persons per vehicle in 2001 for work trips. Vehicle tripmaking may not be expected to increase significantly faster than person tripmaking in the future, as a result of declining vehicle occupancy because vehicle occupancy can no longer experience declines of the magnitude exhibited historically.

- On an average weekday in 2001, 39.7 million vehicle-miles of travel occurred within the Region as a result of the 5.5 million vehicle trips. The historic increases in vehicle-miles of travel from 13.1 million in 1963, to 20.1 million in 1972, to 33.1 million in 1991, and to 39.7 million in 2001—a total of 203 percent—have been more rapid than the corresponding historic increases in total person tripmaking and vehicle tripmaking. The principal contributing factor to the more substantial increase in vehicle-miles of travel has been an increase in the average length of internal person trips from 4.7 miles in 1963, to 5.4 miles in 1972, to 6.3 miles in 1991, to 6.9 miles in 2001, for an increase of about 47 percent from 1963 to 2001. Thus, the 203 percent increase in highway traffic in the Region from 1963 to 2001 has been the result only in part of demographic and economic growth and change and related person tripmaking. Only about 50 percent of the growth in highway traffic over the past 40 years may be attributed to increased tripmaking as a result of demographic and economic growth and change. The remaining 50 percent may be attributed to the decline in vehicle occupancy and carpooling and the increase in trip length.

- About 94 percent in 2001 and in each survey year of the person and vehicle trips made within the Region on an average weekday were made by residents of the Region. Therefore, the location and capacity of future transportation facilities will largely be based upon the patterns of travel of the regional residents.

- The number of personal vehicles—automobiles, vans, sport utility vehicles, and pick up trucks—available to residents of Region increased from about 527,000 in 1963 to 705,000 in 1972 to 1,142,500 in 1991, and to 1,313,900 in 2001, an increase of 149 percent from 1963 to 2001. The percentage of total households in the Region having two or more personal vehicles available increased from 24 percent in 1963 to 34 in 1972, and to 56 percent in 1991 and 2001, while the percentage of total households having no personal vehicle available decreased from 17 percent in 1963 to 16 percent in 1972, and to 9 percent in 1991 and 2001. In addition, while automobile travel increased from about 80 percent of all internal person travel in the Region in 1963 to 84 percent in 1972, and to 89 percent in 1991 and 2001, public transit travel decreased from 8 percent of total internal person travel in 1963 to 4 percent in 1972, to 3 percent in 1991, and to 2 percent in 2001. Average weekday public transit travel decreased sharply within the Region, from 320,500 trips in 1963, to 184,200 trips in 1972, to 172,200 trips in 1991, and to 142,200 trips in 2001.

- In each of the survey years, approximately 89 percent of total internal vehicle trips were made by personal vehicle and about 11 percent were made by commercial truck. These findings indicate that with respect to highway facilities, the principal contributor to the transportation problem within the Region is the movement of people rather than goods, particularly since personal vehicle trips display sharp concentrations during peak traffic periods, while commercial truck trips do not.

- Approximately 80 percent of total internal person trips within the Region on an average weekday in 1963, 1972, and 1991 and 2001 consisted of trips made to or from places of residence. The amount and location of future residential development will affect future travel demands.

- The percentage distributions of internal person trips by trip purpose have remained very stable over the past 40 years with trips between home and work accounting for 23 to 25 percent of all internal person trips, trips between home and shopping accounting for 13 to 15 percent of trips, school trips for 9 to 11 percent of all trips, trips between home and other destinations for social, recreation, and personal business purposes for 31 to 34 percent of all trips, and trips between nonhome origins and destinations for about 18 to 20 percent of all trips.

Chapter V

ANTICIPATED REGIONAL GROWTH AND CHANGE

INTRODUCTION

This chapter presents the anticipated regional growth and change within Southeastern Wisconsin in population, households, employment, and personal income to the year 2035. The chapter also presents the planned accommodation and allocation of that growth and change within and throughout the Region as recommended in the companion year 2035 regional land use plan. The projected growth and change in the Southeastern Wisconsin Region in population, households, and employment to the year 2035 are more fully documented in SEWRPC Technical Report No. 10 (4th Edition), *The Economy of Southeastern Wisconsin* and SEWRPC Technical Report No. 11 (4th Edition), *The Population of Southeastern Wisconsin*, and the year 2035 regional land use plan and planning process is fully documented in SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035*.

REGIONAL GROWTH AND CHANGE

In any planning effort, forecasts are required of those future events and conditions which are outside the scope of the plan but which will affect plan design and implementation. In the preparation of the regional land use plan, the future demand for land which the plan must seek to accommodate depends primarily upon future population, household, and employment levels. Control of changes in such levels lies largely outside the scope of governmental activity and outside the scope of the physical planning process. Future population, household, and employment levels must therefore be forecast, with land use and supporting facility plans being designed to accommodate forecast conditions.

Following major analyses of the regional population and economy, the Commission in 2004 completed demographic and economic projections for the Region for the period from 2000 to 2035 as basis for the preparation of the year 2035 regional land use and transportation plans and for updating other elements of the comprehensive plan for the Region. The projections took into account the results of the 2000 Federal census and the most recent economic base data available. The projections were prepared under the guidance of the Commission's Advisory Committee on Regional Population and Economic Forecasts, consisting of individuals from the public and private sectors who have backgrounds and expertise in the area of socioeconomic projections and who are familiar with population and economic trends within the Region.

This chapter presents an overview of the methodology and assumptions that underlie the new population, household, employment, and personal income projections, along with the projections themselves. The new employment projections and projection methodology are fully documented in SEWRPC Technical Report No. 10 (4th Edition), *The Economy of Southeastern Wisconsin*. The new population and household projections and

projection methodology are fully documented in SEWRPC Technical Report No. 11 (4th Edition), *The Population of Southeastern Wisconsin*. These two reports were prepared in tandem to ensure consistency between the Commission's long-range population, household, and employment projections. The Commission projected a range of future population, household, employment, and personal income levels—high, intermediate, and low—for the Region. This approach recognizes the uncertainty that surrounds any effort to predict future socioeconomic conditions. The intermediate projection is considered the most likely to be achieved for the Region overall, and, in this sense, constitutes the Commission's "forecast," intended to be used as a basis for the preparation of the regional land use and transportation plans.[1] The high and low projections are intended to provide an indication of the range of population, household, and employment levels which could conceivably be achieved under significantly higher and lower, but nevertheless plausible, growth scenarios for the Region.

Projection Methodology and Assumptions

This section provides an overview of the methodology and assumptions used in the preparation of the population, household, employment, and personal income projections for the year 2035.

Employment Projections—Methodology and Assumptions

Future employment levels in the Region may be expected to be strongly influenced by the strength of the regional economy relative to the rest of the State and Nation. The Commission's recently completed economic study found no reason to conclude that the regional economy is likely to significantly increase or decrease in strength relative to the State or Nation over the course of the projection period. While there are some indications that the Region's economy has diminished marginally relative to the State and Nation over the past several decades—for example, a gradual decline in the Region's share of total State and national employment—a material change in the relative competitiveness of the regional economy has not occurred, and is not expected.

The intermediate employment projection for the Region reflects the foregoing general economic outlook. It assumes that the regional economy would generally maintain its competitive position, but would not significantly increase or decrease in strength relative to the rest of the State and Nation. The high projection, on the other hand, would be expected to be achieved only if the regional economy were to become significantly more competitive relative to the State and Nation, resulting in the creation of a significantly greater number of employment opportunities, and inducing a substantial net in-migration of workers to fill those jobs. Conversely, the low projection would be expected to be achieved only with a stagnating regional economy that becomes substantially less competitive in relation to the rest of the State and Nation in the coming decades.

Procedurally, the Commission utilized a disaggregate approach to the preparation of employment projections. As applied by the Commission, this approach involves the explicit consideration of employment in "dominant" and "subdominant" industry groups, along with certain residual groups, and the preparation of projections for those groups. "Dominant" industries are those which account for at least 4.0 percent of total regional employment; "subdominant" industries are those which account for 2.0 percent to 3.9 percent.

The employment-level projections for each industry were developed based upon a consideration of past industry trends, available indicators of future trends nationally and in the State and Region, and relative industry and sector strength in the Region as compared to State and national industries and sectors. Projections by State agencies and other recently published projections were consulted. The projected employment levels take into account the employment declines of the 2001 recession and use 2003 data estimates as the last historical data points.

[1] *This usage is consistent with the generally accepted distinction between the terms "projection" and "forecast." A projection is an indication of the future value of a variable, such as population or employment levels, under a set of assumptions which affect that variable. Typically, more than one projection is developed, each with its own set of assumptions. A forecast, on the other hand, involves an element of judgment, it being the projection deemed most likely to occur.*

Table 50

HISTORIC PERSONAL INCOME LEVELS IN THE REGION: 1959-1999[a]

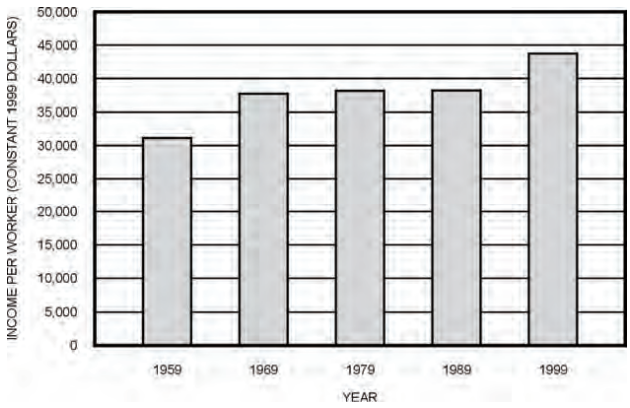
Year	Income Per Worker	Per Capita Income	Mean Household Income
1959	$31,100	$12,600	$42,600
1969	$37,700	$15,800	$51,700
1979	$38,100	$18,900	$53,100
1989	$38,200	$19,700	$52,700
1999	$43,700	$22,800	$58,800

[a]*All income levels shown in 1999 constant dollars.*

Source: U.S. Bureau of the Census, U. S. Bureau of Labor Statistics, and SEWRPC.

Figure 22

HISTORIC INCOME PER WORKER IN SOUTHEASTERN WISCONSIN: 1959-1999



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

Still another important consideration in the preparation of the employment projections was the future available labor force in the Region. Commission population projections indicate that a leveling-off in the regional labor force may be expected, particularly toward the middle of the projection period, as much of the baby-boom generation (those born from 1946 through 1964) reaches retirement age. This leveling-off in the labor force may be expected to moderate the number of jobs able to be accommodated in the Region.

Personal Income Projections—Methodology and Assumptions

The projection of income—worker, per capita, and household—was dependent on the projections for the Region's economy, which form the basis for the Region's employment and population projections. Under the intermediate projection, it is anticipated that the Region will continue to maintain its historic competitive economic position, not significantly increasing or decreasing in strength relative to the Nation. Continuing annual increases in worker income similar to historic levels of 0.85 percent annually would be consistent with this intermediate economic future. Historic trends in income per worker, per capita income, and household income are shown in Table 50 and Figures 22, 23, and 24. Increases in worker income historically occurred during those decades of little population out-migration or population in-migration, and the intermediate population projection anticipates little population out-migration and some modest population in-migration. Projected increases in household income and per capita income were a function of the relative projected growth of households, population, and labor force under the intermediate future. Projected income increases under the high and low demographic and economic futures were similarly coordinated with the population and employment projections under those futures.

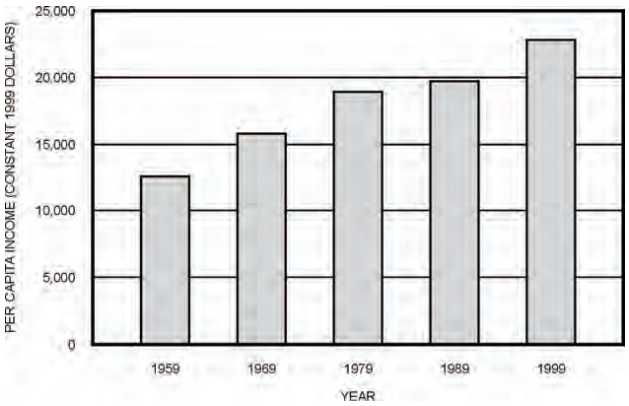
Population Projections—Methodology and Assumptions

The intermediate population projection was developed using a cohort-component population projection model, with specific assumptions made regarding vital events that affect population levels—births, deaths, and migration.[2] In general, the intermediate population projection envisions a modest increase in fertility rates, a modest improvement in survival rates, and a relatively stable migration pattern for the Region overall in the coming decades.

[2] *The cohort-component model is a widely used population projection method. Its name reflects the fact that the method involves disaggregating the population into cohorts, or subgroups, based upon characteristics such as age and gender, and explicitly considering the three components of population change—births, deaths, and migration—with respect to each cohort.*

Figure 23

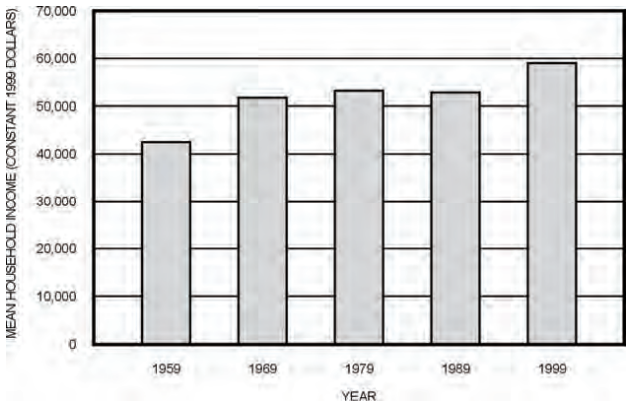
HISTORIC PER CAPITA INCOME IN SOUTHEASTERN WISCONSIN: 1959-1999



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

Figure 24

HISTORIC MEAN HOUSEHOLD INCOME IN SOUTHEASTERN WISCONSIN: 1959-1999



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

As shown in Figure 25, the Region's total fertility rate increased slightly during the 1990s, from 1.99 births per childbearing-age female in 1990 to 2.04 in 2000. The intermediate projection assumes a long-term gradual increase in the total fertility rate to a level of 2.12 births per childbearing-age female in 2035. The fertility rate assumption is based partially upon a consideration of past fertility rate trends in the Region; U.S. Census Bureau fertility rate projections for the Nation; and Wisconsin Department of Administration fertility rate projections for the State.[3]

The intermediate population projection assumes a modest increase in survival rates over the course of the projection period. At the regional level, the relative rates of change in survival rates assumed in the Commission projections are the same as the rates of change in survival rates projected by the Wisconsin Department of Administration for the State overall. With the assumed improvement in survival rates, the male life expectancy in the Region would increase from an estimated 74.7 years in 2000 to 77.6 years in 2035. Female life expectancy would increase from 80.4 years in 2000 to 83.0 years in 2035 (see Figure 26).

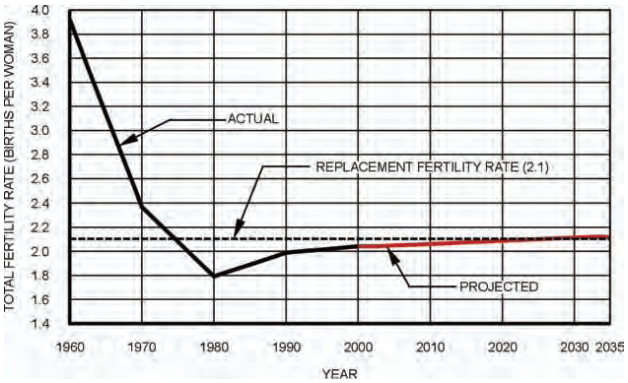
The migration assumptions underlying the Commission intermediate population projections were developed within the context of what is considered to be the most likely future economic growth scenario for the Region. As noted above, under the concurrent Commission economic study, it was concluded that, overall, the economy of Southeastern Wisconsin is not likely to significantly increase or decrease in strength relative to other areas of the State or Nation. Under this assumption, major changes in population migration patterns for the Region from the recent past would not be expected. Accordingly, the intermediate population projection envisions a relatively stable migration pattern for the Region, with minimal net migration anticipated for the Region overall throughout the projection period (see Figure 27).

The development of the high and low population projections involved less mathematical formulation than the intermediate projection, and relied heavily upon the professional judgment and experience of the Forecast Advisory Committee and Commission staff. The projections are the result of careful consideration by the Committee and the staff of factors having the potential to augment or dampen future population growth in the

[3] *The Wisconsin Department of Administration completed a set of population projections the State for the period from 2000 to 2030 in 2004.*

Figure 25

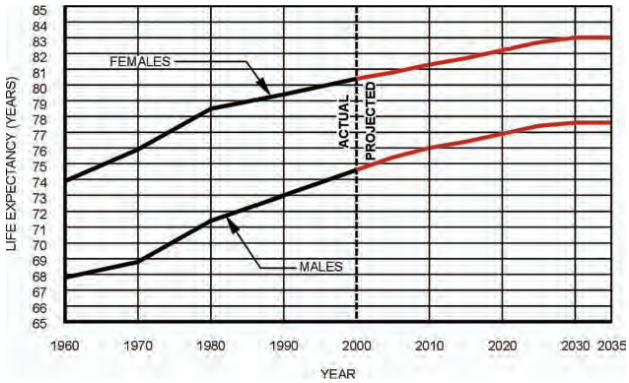
HISTORIC AND PROJECTED TOTAL FERTILITY RATE FOR THE REGION



Source: U.S. Bureau of the Census, Wisconsin Department of Health and Family Services, and SEWRPC.

Figure 26

HISTORIC AND PROJECTED LIFE EXPECTANCY FOR THE REGION



Source: U.S. Bureau of the Census, Wisconsin Department of Health and Family Services, and SEWRPC.

Region. The resulting projections represent the Committee and staff consensus regarding conceivable high and low population levels for the Region. In deliberating on the possible range of future population levels, the Advisory Committee and the Commission staff identified the relative strength of the regional economy as the primary factor which could result in future population levels significantly greater or less than the intermediate projection. Implicit in the high population projection is an assumption that the regional economy would become significantly more competitive, creating an increased demand for workers and inducing a substantial net in-migration of people to meet that demand. Implicit in the low population projection is a significantly less competitive regional economy, resulting in an out-migration of population, as workers move to areas experiencing stronger economic growth. In developing the high and low population projections, an effort was made to ensure consistency between those projections and the corresponding high and low employment level projections developed under the concurrent Commission study of the regional economy.

Household Projections—Methodology and Assumptions

Accompanying the changes in the size of the resident population of the Region will be changes in the number and size of households. In the preparation of the intermediate household projections, it was assumed that, over the course of the projection period, the relative shares of the population residing in households and group quarters by age group would not change significantly from the current situation. It was further assumed that the average household size in the Region would continue to decrease, but not as rapidly as in the past (see Figure 28).

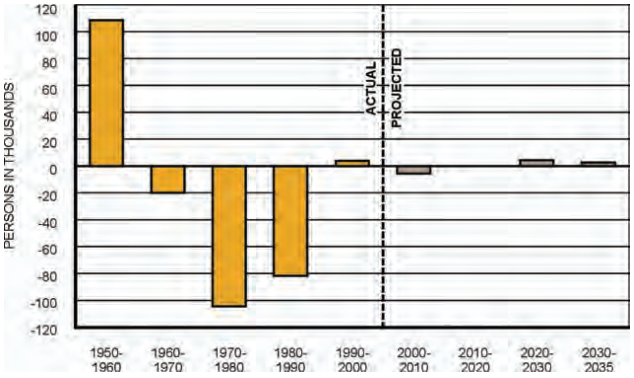
In developing the high and low household projections, it was assumed that the relative strength of the regional economy in the years ahead would not have a significant effect on the size of households in the Region, and, accordingly, that the trend in household size might be expected to be similar under high-, intermediate-, and low-growth conditions in the Region. It was also assumed that the relative shares of the total population residing in households and in group quarters would be similar under high-, intermediate-, and low-growth conditions.

Employment Projections

Commission employment projections for the year 2035 are presented in Table 51 and in Figure 29. Under the intermediate projection, total employment in the Region would recover from the reduced levels of the early 2000s, experiencing fairly strong growth until about the middle of the projection period. At that time, employment growth is projected to moderate, coinciding with an anticipated leveling-off in the labor force, particularly as large

Figure 27

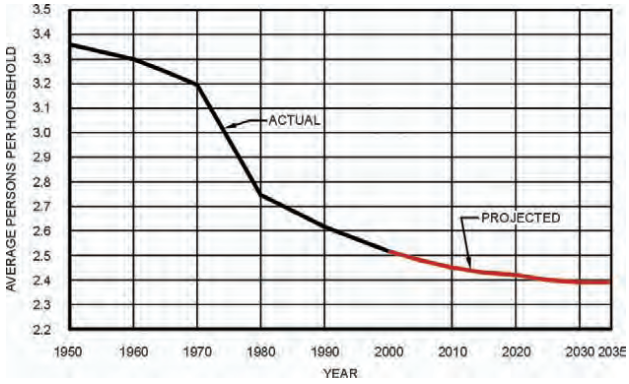
HISTORIC AND PROJECTED NET MIGRATION FOR THE REGION



Source: U.S. Bureau of the Census, Wisconsin Department of Health and Family Services, and SEWRPC.

Figure 28

ACTUAL AND PROJECTED HOUSEHOLD SIZE IN THE REGION: 1950-2035



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

Table 51

ACTUAL AND PROJECTED EMPLOYMENT IN THE REGION BY COUNTY: 2000-2035

Data Item	Kenosha County			Milwaukee County			Ozaukee County			Racine County		
Actual Employment: 2000	68,700			624,600			50,800			94,400		
Percent of Region: 2000	5.6			51.1			4.2			7.7		
Projected Employment:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	71,800	71,400	71,000	591,100	587,600	584,400	51,400	51,200	50,900	92,400	91,900	91,400
2010	77,100	75,300	73,600	615,600	600,800	587,900	55,700	54,300	53,100	97,900	95,500	93,500
2015	82,500	78,900	75,900	638,600	610,600	587,900	60,000	57,300	55,200	103,100	98,600	94,900
2020	86,200	80,800	76,900	651,100	611,100	581,200	62,800	59,000	56,100	106,900	100,300	95,400
2025	88,600	81,900	77,200	663,500	613,400	578,000	64,600	59,700	56,300	109,300	101,100	95,200
2030	91,100	83,300	77,800	676,400	618,100	577,300	66,300	60,600	56,600	111,900	102,300	95,500
2035	93,700	85,000	78,700	689,500	624,900	578,900	68,100	61,700	57,200	114,700	104,000	96,300
Projected Change: 2000-2035												
Employment	25,000	16,300	10,000	64,900	300	-45,700	17,300	10,900	6,400	20,300	9,600	1,900
Percent	36.4	23.7	14.6	10.4	- -[a]	-7.3	34.1	21.5	12.6	21.5	10.2	2.0
Percent of Region: 2035	6.2	6.2	6.2	45.7	45.7	45.7	4.5	4.5	4.5	7.6	7.6	7.6

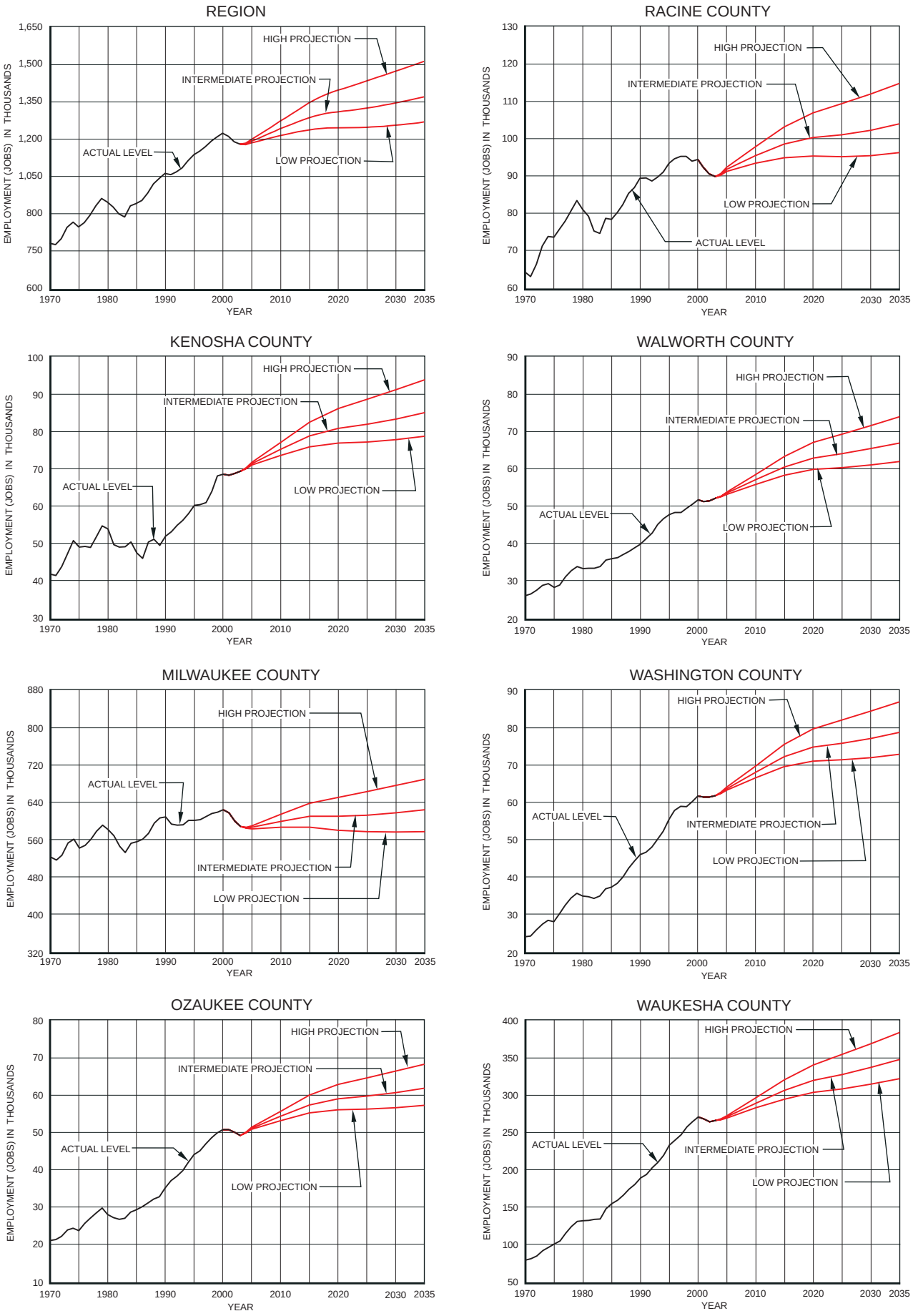
Data Item	Walworth County			Washington County			Waukesha County			Region		
Actual Employment: 2000	51,800			61,700			270,800			1,222,800		
Percent of Region: 2000	4.2			5.0			22.2			100.0		
Projected Employment:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	53,800	53,500	53,200	64,000	63,700	63,300	272,800	271,300	269,800	1,197,300	1,190,600	1,184,000
2010	58,500	57,100	55,900	69,600	68,000	66,500	296,200	289,100	282,800	1,270,600	1,240,100	1,213,300
2015	63,300	60,600	58,300	75,400	72,100	69,500	320,300	306,300	294,900	1,343,200	1,284,400	1,236,600
2020	67,000	62,900	59,800	79,600	74,700	71,000	340,300	319,400	303,800	1,393,900	1,308,200	1,244,200
2025	69,200	64,000	60,300	81,900	75,700	71,300	354,100	327,300	308,400	1,431,200	1,323,100	1,246,700
2030	71,500	65,300	61,000	84,300	77,000	71,900	368,300	336,500	314,400	1,469,800	1,343,100	1,254,500
2035	73,800	66,900	62,000	86,700	78,600	72,800	383,100	347,200	321,600	1,509,600	1,368,300	1,267,500
Projected Change: 2000-2035												
Employment	22,000	15,100	10,200	25,000	16,900	11,100	112,300	76,400	50,800	286,800	145,500	44,700
Percent	42.5	29.2	19.7	40.5	27.4	18.0	41.5	28.2	18.8	23.5	11.9	3.7
Percent of Region: 2035	4.9	4.9	4.9	5.7	5.7	5.7	25.4	25.4	25.4	100.0	100.0	100.0

[a] *Less than 0.1 percent*

Source: U. S. Bureau of Economic Analysis and SEWRPC.

Figure 29

ACTUAL AND PROJECTED EMPLOYMENT IN THE REGION BY COUNTY: 1970-2035



Source: U.S. Bureau of Economic Analysis and SEWRPC.

numbers of baby-boomers retire. Relatively modest employment growth is envisioned over the last 10 years of the projection period. The intermediate projection envisions total employment of 1,368,300 jobs in the Region in 2035, an increase of 145,500 jobs, or 12 percent, over the 2000 level of 1,222,800 jobs.[4] The high projection indicates that employment in the Region could be as high as 1,509,600 jobs in 2035, an increase of about 286,800 jobs, or 24 percent, over the 2000 level. The low projection indicates that employment in the Region could be as low as 1,267,500 jobs in 2035, about 44,700 jobs, or 4 percent, over the 2000 level.

Commission projections for the year 2035 envision a continuation of historic change in the distribution of jobs within the Region but at a moderated pace. It is envisioned that Milwaukee County's share of total regional employment would decrease by just over 5 percentage points between 2000 and 2035, while Waukesha County's share would increase by just over 3 percentage points. It is further envisioned that Kenosha, Ozaukee, Walworth, and Washington Counties would experience relative increases of less than 1 percentage point and that Racine County's relative share would remain essentially unchanged.

The sectoral changes—particularly, a shift from a goods producing economy to a services providing economy—that have occurred in the Region in recent decades are projected to continue (see Table 52). The general outlook for manufacturing in the Region does not appear promising, except for the printing and publishing sector. A key factor expected to impact the manufacturing sector in the Region, and for that matter the State and the Nation, is the movement of jobs overseas. Overseas labor, particularly in Asia, is substantially cheaper than the American counterpart. Low overseas labor costs more than offset the transportation costs of raw materials and finished goods to market. Some of this dynamic will change as the overseas demand for personnel and material raises prices, decreasing the margins for goods produced overseas. However, that shift is not expected to offset job losses in U.S. manufacturing over the foreseeable future. Also affecting manufacturing employment in the Region, State, and Nation is productivity gains in the sector. Manufacturing output continues to increase, but it is done with less labor. As a result, there is relatively less demand for manufacturing labor even within growing manufacturing industries.

Employment in the services sector may be expected to experience substantial growth, continuing a trend that is now decades old. Employment in the business services sector, in particular, may be expected to experience significant growth. As companies focus on core competencies, cost competition, and market expansion, many tasks that were completed in-house will be subcontracted to other firms specializing in auxiliary tasks such as marketing, payroll, human resources, and information technology. Employment in the health and social services sectors may also be expected to increase at relatively rapid rates. The most profound effect on health and social services in the Region will be the aging of the population. As the baby-boomers reach retirement age, health and social services will be in greater demand, directly affecting employment in these sectors. The outlook for entertainment services is also promising; rising personal income and retirees having more leisure time are expected to play a role in that growth.

Personal Income Projections

The Commission personal income projections are presented in Table 53 and Figures 30, 31, and 32. The intermediate projection envisions that the per worker income in the Region would increase by $15,000, or 34 percent, from $43,700 in 1999 to $58,700 in 2035. The intermediate projection assumed a 0.85 percent average annual increase in per worker income. The high projection indicates that the per worker income in the Region could be as high as $73,600 in 2035, an increase of $29,900 or 68 percent, over the 1999 level. The high projection assumed a 1.5 percent average annual increase in per worker income. The low projection indicates that

[4] *The intermediate projection of a 12 percent increase in total regional employment over the 35-year period from 2000 to 2035 compares to the forecast increase of 20 percent over the 30-year period from 1990 to 2020 indicated in the previous Commission forecast prepared in 1995. The intermediate projection of 1,368,300 jobs for the year 2035 is 7 percent greater than the figure of 1,277,100 jobs for the year 2020 indicated in the previous forecast.*

Table 52

PROJECTED EMPLOYMENT BY INDUSTRY GROUP IN THE REGION: 2035

Industry	2000 Employment		Projected 2035 Employment					
			High		Intermediate		Low	
	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total	Number of Jobs	Percent of Total
Manufacturing:								
Printing and Publishing	24,500	2.0	27,900	1.8	24,700	1.8	22,800	1.8
Fabricated Metal Products	25,600	2.1	12,800	0.9	11,600	0.9	10,700	0.9
Industrial Machinery and Equipment	48,000	3.9	27,800	1.8	24,900	1.8	22,900	1.8
Electronic and Other Electrical Equipment	27,000	2.2	16,800	1.1	15,300	1.1	14,100	1.1
All Other Manufacturing	99,200	8.1	89,400	5.9	83,900	6.1	77,600	6.1
Subtotal Manufacturing	224,300	18.3	174,700	11.5	160,400	11.7	148,100	11.7
Construction	53,800	4.4	62,600	4.1	57,100	4.2	53,200	4.2
Retail Trade	193,700	15.8	223,900	14.8	205,400	15.0	190,600	15.0
Wholesale Trade	64,400	5.3	68,800	4.6	64,400	4.7	59,600	4.7
Transportation, Communication, and Utilities	54,800	4.5	56,700	3.8	51,100	3.7	47,800	3.8
Services:								
Business Services	102,800	8.4	188,200	12.5	164,600	12.0	152,500	12.0
Health Services	97,700	8.0	148,100	9.8	132,000	9.7	122,400	9.7
Social Services	34,300	2.8	69,900	4.6	62,100	4.5	57,400	4.5
All Other Services	171,200	14.0	257,500	17.1	231,300	16.9	213,300	16.8
Subtotal Services	406,000	33.2	663,700	44.0	590,000	43.1	545,600	43.0
Finance, Insurance, and Real Estate	93,700	7.7	113,200	7.5	103,600	7.6	96,400	7.6
Government and Government Enterprises[a]	114,400	9.3	123,100	8.2	115,300	8.4	106,900	8.4
Agriculture	6,000	0.5	5,200	0.3	4,800	0.4	4,500	0.4
Other[b]	11,700	1.0	17,700	1.2	16,200	1.2	14,800	1.2
Total Regional Employment	1,222,800	100.0	1,509,600	100.0	1,368,300	100.0	1,267,500	100.0

[a] *Includes all nonmilitary government agencies and enterprises, regardless of SIC code.*

[b] *Includes agricultural services, forestry, commercial fishing, mining, and unclassified jobs.*

Source: U.S. Bureau of Economic Analysis and SEWRPC.

Table 53

ACTUAL AND PROJECTED PERSONAL INCOME LEVELS IN THE REGION: 1959-2035[a]

Income Category	Year	Income Per Worker			Per Capita Income			Mean Household Income		
Actual Income	1959	$31,100			$12,600			$42,600		
	1969	$37,700			$15,800			$51,700		
	1979	$38,100			$18,900			$53,100		
	1989	$38,200			$19,700			$52,700		
	1999	$43,700			$22,800			$58,800		
Projected Income		High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
	2010	$50,700	$47,500	$45,000	$27,400	$25,700	$23,200	$68,800	$64,400	$59,500
	2020	58,900	$51,700	$46,400	$31,000	$27,200	$23,600	$77,200	$67,200	$60,000
	2030	68,300	$56,300	$47,800	$34,500	$28,500	$24,000	$85,000	$70,000	$60,500
	2035	73,600	$58,700	$48,500	$37,000	$29,500	$24,400	$91,000	$72,600	$61,100

[a] *All income levels shown in 1999 constant dollars.*

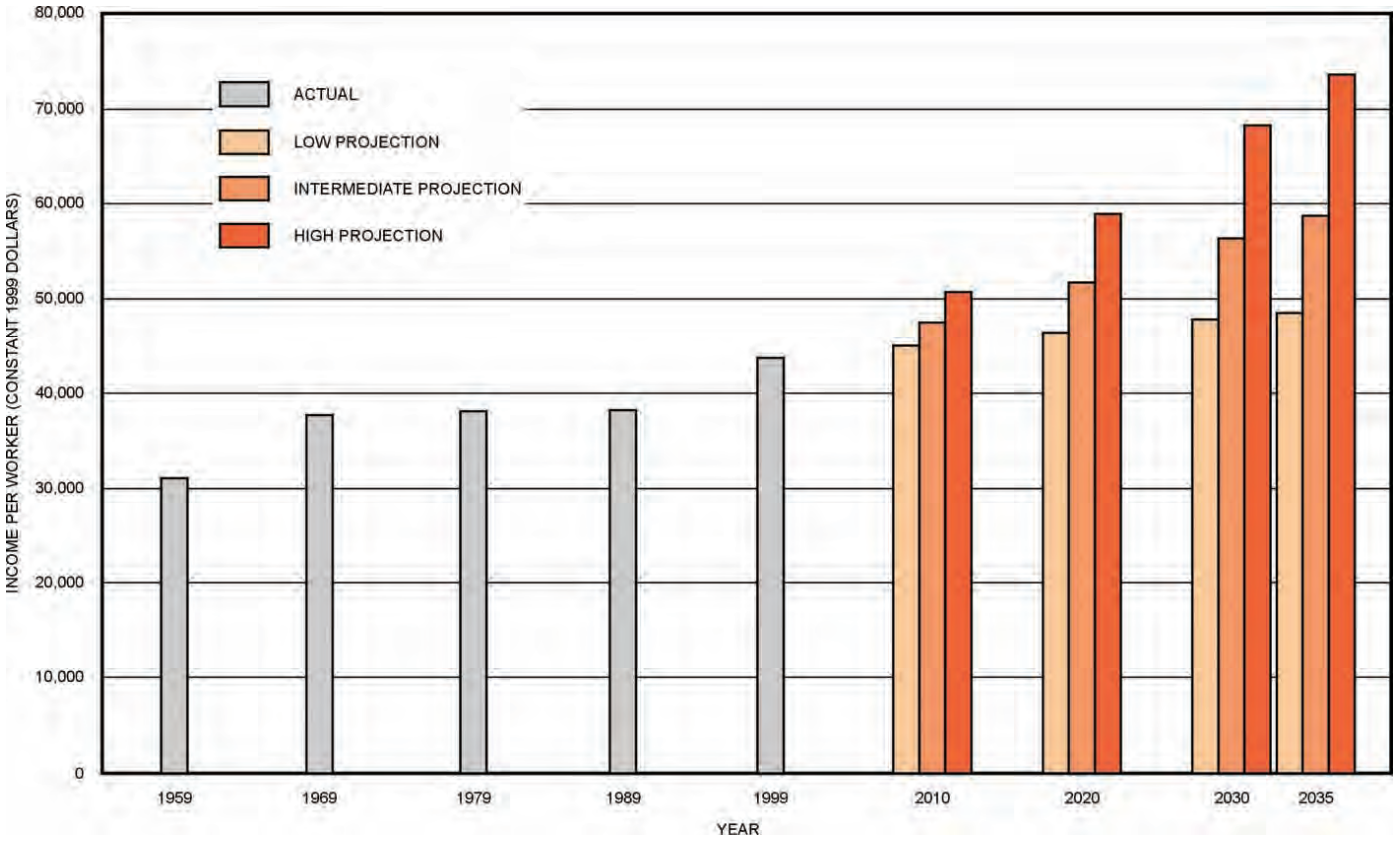
Source: U.S. Bureau of the Census, U. S. Bureau of Labor Statistics, and SEWRPC.

the per worker income could be as low as $48,500 in 2035, an increase of $4,800, or about 11 percent, over 1999 (all figures expressed in constant 1999 dollars). The low projection assumed a 0.3 percent average annual increase in per worker income.

The intermediate projection envisions that the per capita income in the Region would increase by $6,700, or 29 percent, from $22,800 in 1999 to $29,500 in 2035. The high projection indicates that the per capita income in the Region could be as high as $37,000 in 2035, an increase of $14,200, or 62 percent, over the 1999 level. The low projection indicates that the per capita income could be as low as $24,400 in 2035, an increase of $1,600, or 7 percent, over the 1999 level (all figures expressed in constant 1999 dollars).

Figure 30

ACTUAL AND PROJECTED INCOME PER WORKER IN SOUTHEASTERN WISCONSIN: 1959-2035



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

With respect to mean household income, the intermediate projection envisions that the mean household income in the Region would increase by $13,800, or 23 percent, from $58,800 in 1999 to $72,600 in 2035. The high projection indicates that the mean household income in the Region could be as high as $91,000 in 2035, an increase of $32,200, or 55 percent, over the 1999 level. The low projection indicates that the mean household income could be as low as $61,100 in 2035, an increase of $2,300, or 4 percent, over the 1999 level (all figures expressed in constant 1999 dollars).

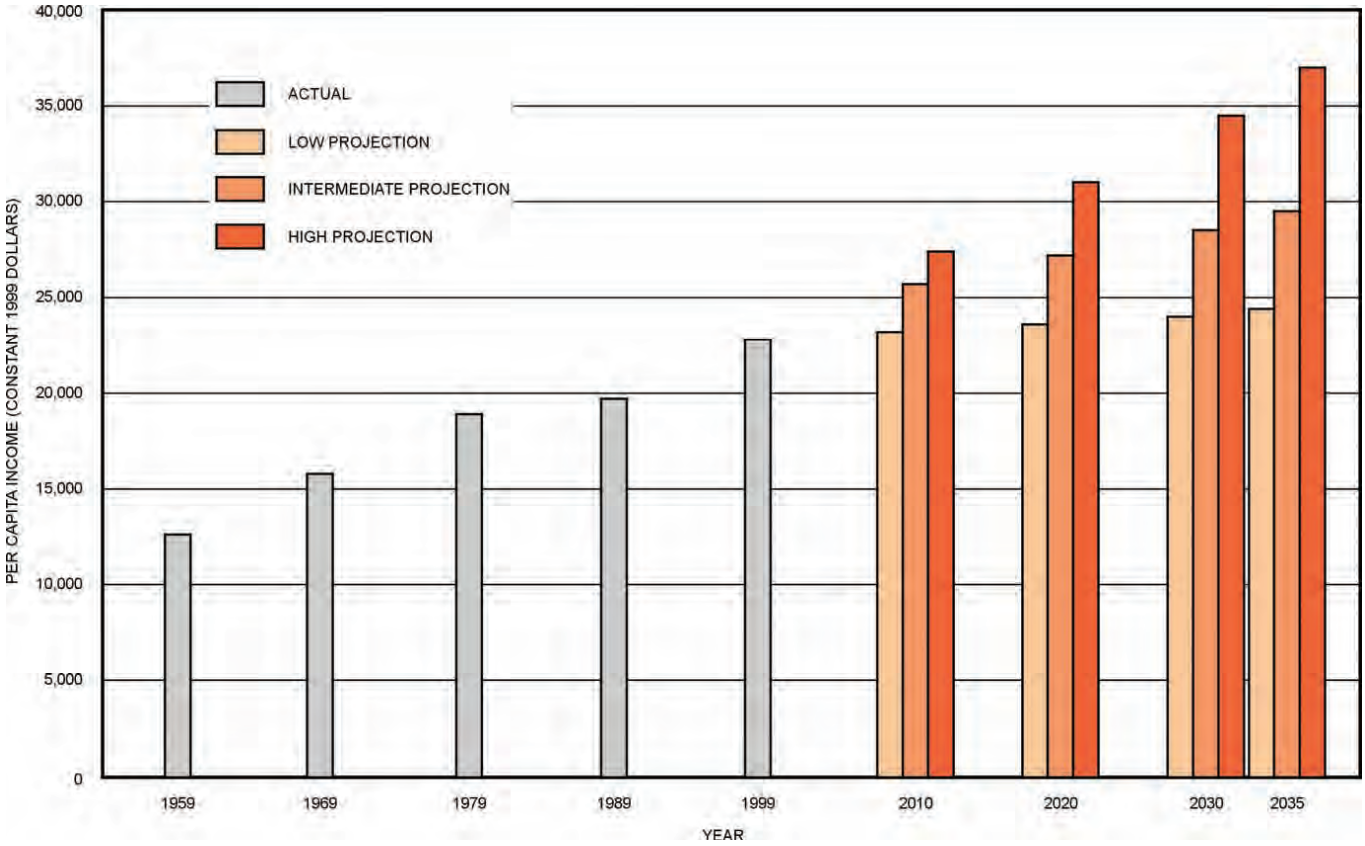
Population Projections

Commission population projections for the year 2035 are presented in Table 54 and in Figure 33. The intermediate projection envisions that the regional population would increase by 344,800 persons, or 18 percent, from 1,931,200 persons in 2000 to 2,276,000 persons in 2035.[5] Under the intermediate projection, population

[5] *The intermediate projection of an 18 percent increase in the regional population over the 35-year period from 2000 to 2035 compares to the forecast increase of 15 percent over the 30-year period from 1990 to 2020 indicated in the previous Commission forecast prepared in 1995. The intermediate population projection of 2,276,000 persons for the year 2035 is 10 percent greater than the figure of 2,077,900 persons for the year 2020 indicated in the previous forecast.*

Figure 31

ACTUAL AND PROJECTED PER CAPITA INCOME IN SOUTHEASTERN WISCONSIN: 1959-2035



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

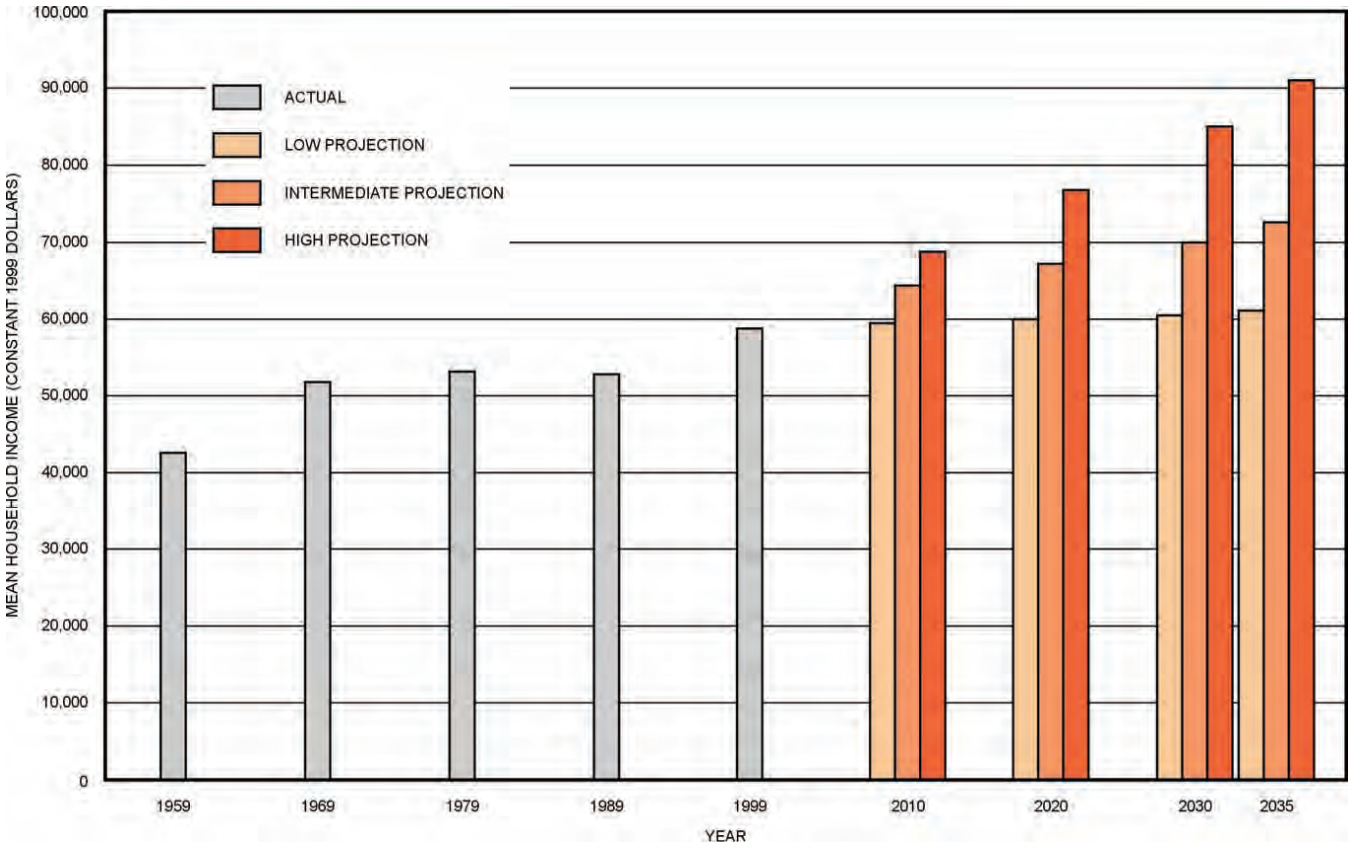
growth would range between 50,000 and 55,000 during each five-year period from 2000 to 2025, with slightly smaller increases projected for 2025 to 2035. The high projection indicates that the population of the Region could be as high as 2,501,100 persons in 2035, an increase of about 569,900 persons, or 30 percent, over the 2000 level; the high population projection for the year 2035 exceeds the intermediate projection by about 10 percent. Conversely, the low projection indicates that the regional population could be as low as 2,090,500 persons in 2035, an increase of 159,300 persons, or 8 percent, over 2000; the low population projection for the year 2035 is about 8 percent less than the intermediate projection.

Among the seven counties in the Region, population increases envisioned under the intermediate projections range from 18,800 persons in Ozaukee County to 86,000 persons in Waukesha County. The historic decline in Milwaukee County's relative share of the regional population would continue, but at moderated rate in comparison to the historic trend. The projections envision a continuation of an "Illinois influence"—characterized by persons from Northeastern Illinois seeking residences in Wisconsin—on future population growth in Kenosha and Walworth Counties.

Commission projections envision change in the age composition of the regional population in the coming decades (see Figure 34). Particularly noteworthy is the expected influence of the large baby-boom generation on the future age structure. By 2030, essentially all baby-boomers will be over the age of 65. The intermediate population projection envisions that persons 65 years of age and older would comprise 20 percent of total

Figure 32

ACTUAL AND PROJECTED MEAN HOUSEHOLD INCOME IN SOUTHEASTERN WISCONSIN: 1959-2035



Source: U.S. Bureau of the Census, U.S. Bureau of Labor Statistics, and SEWRPC.

population in the year 2035, compared to about 13 percent in 2000. Changes in the age composition of the population may be expected to have a range of impacts, including, importantly, impacts on the available labor force in the Region, as baby-boomers move into their retirement years.

Household Projections

Commission household projections for the year 2035 are presented in Table 55 and in Figure 35. The intermediate projection envisions that the number of households in the Region would increase by 176,700, or 24 percent, from 749,000 households in 2000 to 925,700 households in 2035.[6] The high projection indicates that the number of households in the Region could be as high as 1,016,400 in 2035, an increase of 267,400 households, or 36 percent, over the 2000 level. The low projection indicates that the number of households could be as low as 850,300 in 2035, an increase of 101,300 households, or 14 percent, over the 2000 level.

[6] *The intermediate projection of 24 percent in the Region's households over the 35-year period from 2000 to 2035 compares to the forecast increase of 22 percent over the 30-year period from 1990 to 2020 indicated in the previous Commission forecast prepared in 1995. The intermediate projection of 925,700 households for the year 2035 is 12 percent greater than the figure of 827,100 households for the year 2020 indicated in the previous forecast.*

Table 54

ACTUAL AND PROJECTED POPULATION IN THE REGION BY COUNTY: 2000-2035

Data Item	Kenosha County			Milwaukee County			Ozaukee County			Racine County		
Actual Population: 2000	149,600			940,200			82,300			188,800		
Percent of Region: 2000	7.7			48.7			4.2			9.8		
Projected Population:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	162,300	157,600	154,000	962,500	946,000	930,600	88,800	85,700	84,100	197,100	191,900	189,800
2010	173,600	166,100	160,500	978,900	953,900	921,000	93,400	88,700	86,100	205,400	195,200	190,800
2015	185,600	175,000	167,200	1,000,400	966,600	921,600	97,900	91,500	87,900	213,100	199,200	193,200
2020	198,100	184,300	174,000	1,020,600	977,800	922,600	102,900	94,600	89,900	220,900	203,200	195,500
2025	210,600	193,300	180,200	1,041,900	989,900	923,800	107,700	97,500	91,600	229,000	207,200	197,900
2030	223,100	201,900	186,000	1,060,300	999,100	925,100	112,000	99,800	92,800	236,400	210,600	199,500
2035	235,300	210,100	191,200	1,077,600	1,007,100	926,600	115,300	101,100	93,000	243,500	213,600	200,800
Projected Change: 2000-2035												
Population	85,700	60,500	41,600	137,400	66,900	-13,600	33,000	18,800	10,700	54,700	24,800	12,000
Percent	57.3	40.4	27.8	14.6	7.1	-1.4	40.1	22.8	13.0	29.0	13.1	6.4
Percent of Region: 2035	9.4	9.2	9.2	43.1	44.3	44.3	4.6	4.4	4.4	9.7	9.4	9.6

Data Item	Walworth County			Washington County			Waukesha County			Region		
Actual Population: 2000	92,000			117,500			360,800			1,931,200		
Percent of Region: 2000	4.8			6.1			18.7			100.0		
Projected Population:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	100,400	98,400	95,500	128,800	125,000	121,700	389,600	377,400	369,800	2,029,500	1,982,000	1,945,500
2010	108,100	105,300	100,600	137,700	131,800	127,100	410,600	391,500	379,800	2,107,700	2,032,500	1,965,900
2015	116,000	112,200	105,500	146,300	138,000	131,800	430,300	404,100	387,900	2,189,600	2,086,600	1,995,100
2020	124,200	119,400	110,400	154,900	144,100	136,400	451,300	417,400	396,500	2,272,900	2,140,800	2,025,300
2025	132,200	126,300	114,900	163,000	149,500	140,200	471,500	429,600	403,900	2,355,900	2,193,300	2,052,500
2030	140,400	133,300	119,300	170,400	154,200	143,200	490,400	440,300	409,500	2,433,000	2,239,200	2,075,400
2035	148,400	140,000	123,200	176,100	157,300	144,700	504,900	446,800	411,000	2,501,100	2,276,000	2,090,500
Projected Change: 2000-2035												
Population	56,400	48,000	31,200	58,600	39,800	27,200	144,100	86,000	50,200	569,900	344,800	159,300
Percent	61.3	52.2	33.9	49.9	33.9	23.1	39.9	23.8	13.9	29.5	17.9	8.2
Percent of Region: 2035	5.9	6.2	5.9	7.1	6.9	6.9	20.2	19.6	19.7	100.0	100.0	100.0

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

The intermediate projection envisions a significant increase in the number of households in each county in the Region between 2000 and 2035. In each county, the relative increase in households is expected to exceed the relative increase in population, as household sizes continue to decline in each county (see Table 56).

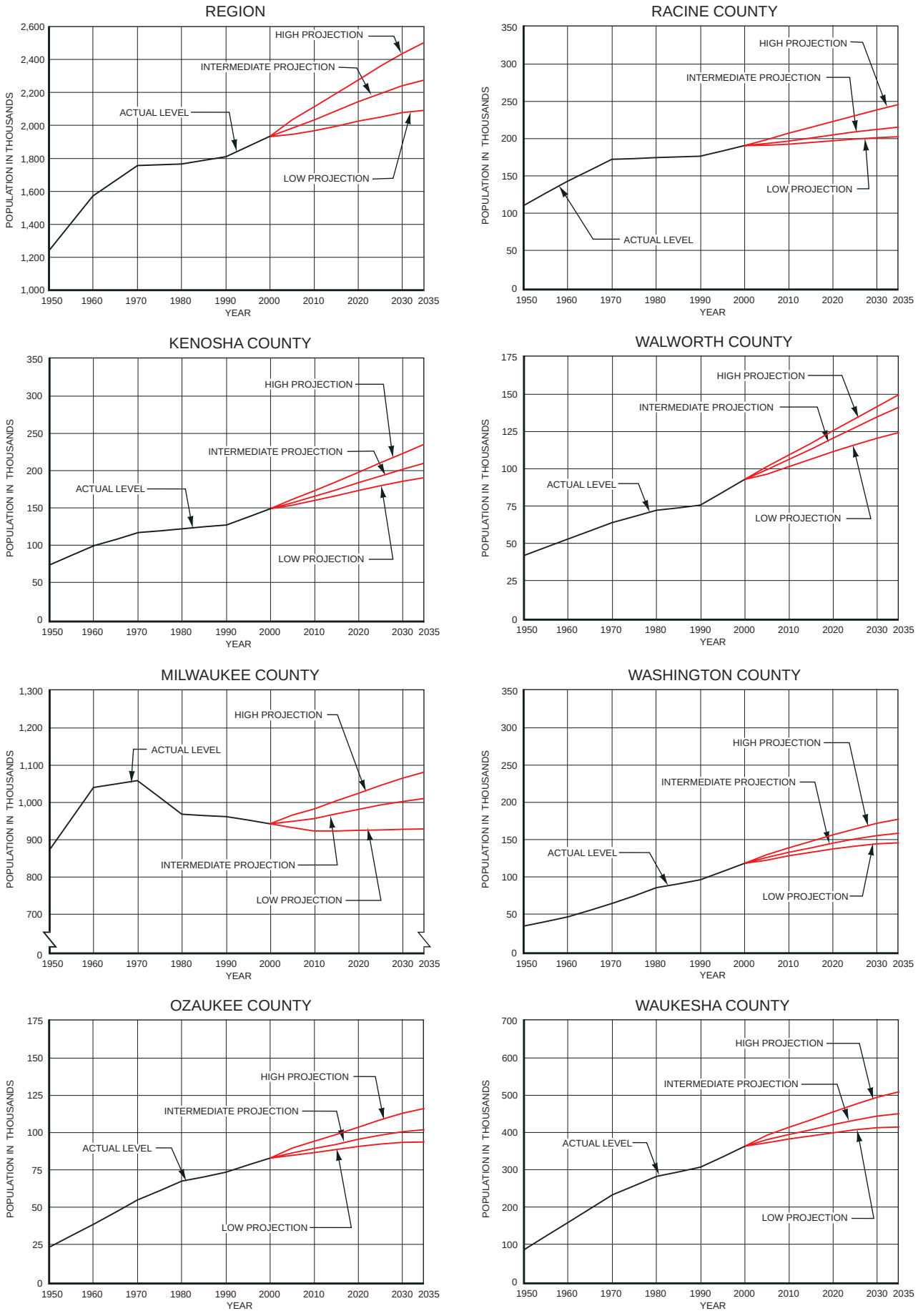
Relationship Between Population and Employment Projections

As noted earlier, the processes of preparing projections of future population and employment levels were closely coordinated to ensure consistency between the resulting projections. Of primary concern in this regard is that the labor force trends which may be expected in light of projected changes in the regional population are consistent with the projected employment trends.

As part of the Commission's forecasting efforts, the regional labor force was projected based upon the high, intermediate, and low population projections and anticipated future labor force participation rates. The results indicate that, between 2000 and 2035, the regional labor force would increase by 14 percent under the intermediate projection, 25 percent under the high projection, and 4 percent under the low projection. The relative increases in employment—12 percent under an intermediate-growth scenario, 24 percent under a high-growth scenario, and 4 percent under a low-growth scenario—very closely approximate these projected labor force increases. This would indicate basic conformity between the regional employment projections and population projections.

Figure 33

ACTUAL AND PROJECTED POPULATION IN THE REGION BY COUNTY: 1950-2035



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

Table 55

ACTUAL AND PROJECTED HOUSEHOLDS IN THE REGION BY COUNTY: 2000-2035

Data Item	Kenosha County			Milwaukee County			Ozaukee County			Racine County		
Actual Households: 2000	56,100			377,700			30,900			70,800		
Percent of Region: 2000	7.5			50.4			4.1			9.5		
Projected Households:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	61,600	59,800	58,500	392,300	385,600	379,300	33,800	32,700	32,000	75,100	73,100	72,300
2010	66,400	63,600	61,400	404,200	393,900	380,400	36,100	34,300	33,300	78,900	74,900	73,200
2015	71,700	67,600	64,600	417,000	403,000	384,200	38,300	35,800	34,400	82,500	77,100	74,800
2020	77,200	71,800	67,800	429,100	411,200	387,900	40,600	37,300	35,500	85,800	78,900	75,900
2025	82,700	75,800	70,700	439,400	417,500	389,600	42,800	38,800	36,400	89,600	81,000	77,400
2030	87,800	79,500	73,200	448,500	422,700	391,400	44,500	39,600	36,800	92,700	82,600	78,200
2035	92,900	82,900	75,500	457,400	427,500	393,300	45,600	40,000	36,800	95,700	84,000	78,900
Projected Change: 2000-2035												
Households	36,800	26,800	19,400	79,700	49,800	15,600	14,700	9,100	5,900	24,900	13,200	8,100
Percent	65.6	47.8	34.6	21.1	13.2	4.1	47.6	29.4	19.1	35.2	18.6	11.4
Percent of Region: 2035	9.1	8.9	8.9	45.0	46.2	46.3	4.5	4.3	4.3	9.4	9.1	9.3

Data Item	Walworth County			Washington County			Waukesha County			Region		
Actual Households: 2000	34,500			43,800			135,200			749,000		
Percent of Region: 2000	4.6			5.8			18.1			100.0		
Projected Households:	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low	High	Intermediate	Low
2005	38,400	37,600	36,500	49,000	47,500	46,300	149,000	144,300	141,400	799,200	780,600	766,300
2010	41,700	40,600	38,800	53,200	50,900	49,100	158,100	150,800	146,200	838,600	809,000	782,400
2015	44,900	43,500	40,800	57,300	54,000	51,600	166,900	156,700	150,400	878,600	837,700	800,800
2020	48,300	46,400	42,900	61,300	57,100	54,000	175,500	162,300	154,200	917,800	865,000	818,200
2025	51,500	49,200	44,800	65,100	59,800	56,100	183,800	167,400	157,400	954,900	889,500	832,400
2030	54,600	51,800	46,400	68,200	61,700	57,400	191,500	171,900	159,900	987,800	909,800	843,300
2035	57,700	54,400	47,900	70,400	62,800	57,800	196,700	174,100	160,100	1,016,400	925,700	850,300
Projected Change: 2000-2035												
Households	23,200	19,900	13,400	26,600	19,000	14,000	61,500	38,900	24,900	267,400	176,700	101,300
Percent	67.2	57.7	38.8	60.7	43.4	32.0	45.5	28.8	18.4	35.7	23.6	13.5
Percent of Region: 2035	5.7	5.9	5.6	6.9	6.8	6.8	19.4	18.8	18.8	100.0	100.0	100.0

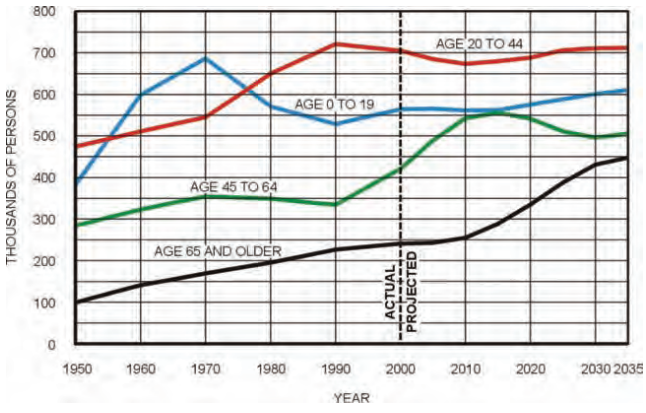
Source: U. S. Bureau of the Census and SEWRPC.

YEAR 2035 REGIONAL LAND USE PLAN

This section of this chapter presents the year 2035 regional land use plan for southeastern Wisconsin. The year 2035 regional land use plan and the process followed in developing the plan are fully documented in SEWRPC Planning Report No. 48, "*A Regional Land Use Plan for Southeastern Wisconsin: 2035.*" The plan was designed to accommodate the intermediate population, household, and employment projections for the Region, including an 18 percent increase in the resident population, a 24 percent increase in the number of households, and a 12 percent increase in the number of jobs in the Region between 2000 and 2035. Under the plan, growth in population, households, and employment would be accommodated through a 13 percent increase in the urban land area of the Region.

Figure 34

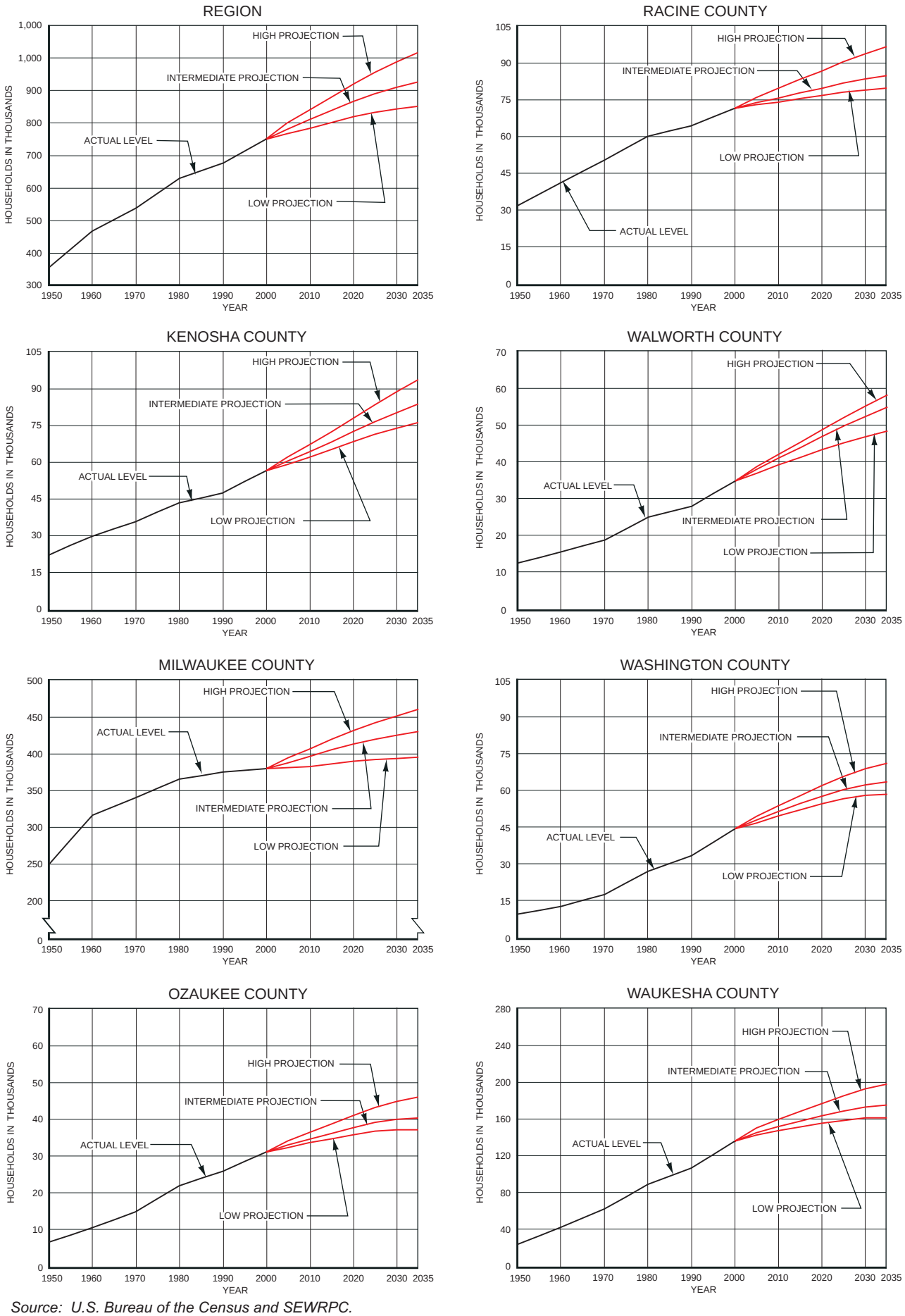
ACTUAL AND PROJECTED POPULATION IN THE REGION BY GENERAL AGE GROUP: 1950-2035 (INTERMEDIATE PROJECTION)



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

Figure 35

ACTUAL AND PROJECTED HOUSEHOLDS IN THE REGION BY COUNTY: 1950-2035



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

Table 56

HOUSEHOLD SIZE IN THE REGION BY COUNTY: ACTUAL 2000 AND PROJECTED 2035

County	Actual 2000	Projected 2035
Kenosha	2.60	2.46
Milwaukee	2.43	2.29
Ozaukee	2.61	2.45
Racine	2.59	2.46
Walworth	2.57	2.47
Washington	2.65	2.45
Waukesha	2.63	2.50
Region	2.52	2.39

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

Map 39 provides an overview of the land use pattern for the Region in the year 2035 as envisioned under the new regional plan. This map shows urban areas in the Region as envisioned under the plan; sub-urban areas, which are neither truly urban or rural in character; primary environmental corridors—i.e., areas containing concentrations of the best remaining elements of the natural resource base—which are recommended for preservation in essentially natural open uses; and rural areas consisting of prime agricultural land, other agricultural land, rural-density residential land, and other open lands. The various components of the regional land use plan, as depicted on Map 39, are described in this section.

Urban Centers and Development

Under the regional plan, development would be encouraged to occur within and around existing urban service areas—areas that are intended to accommodate urban development insofar as they are served by basic urban services and facilities, including public sanitary sewer service and typically also including public water supply service and a local park, school, and shopping area. To the extent practicable, urban land would be accommodated within urban service areas, as compact and contiguous infill development, and through redevelopment as appropriate. This is intended to maintain and enhance the viability of existing urban areas, maximize the use of existing public infrastructure and services, and moderate the amount of open land converted to urban use. Other urban development required to meet projected needs of the growing Region would be accommodated on lands proximate to existing urban service areas where basic urban services and facilities can be readily provided, resulting in the orderly expansion of existing urban service areas. These recommended urban service areas are shown on Map 40.

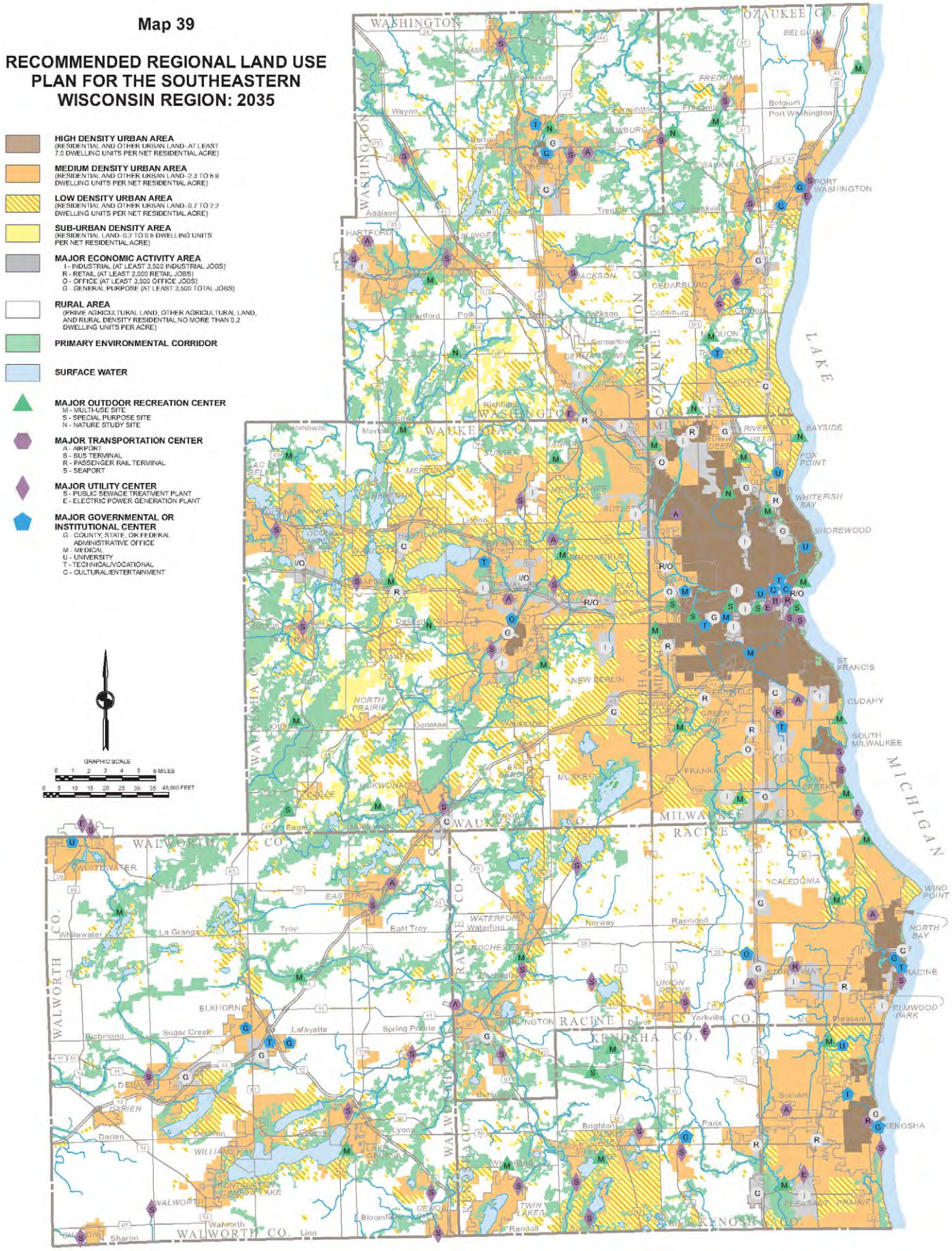
Urban Residential Land

Under the regional plan, urban residential land includes high density areas (at least 7.0 dwelling units per net residential acre), medium density areas (2.3 to 6.9 dwelling units per net residential acre), and low density areas (0.7 to 2.2 dwelling units per net residential acre).[7] The plan envisions that high, medium, and low density residential land would increase by a total of 69 square miles, or 21 percent, from 333 square miles in 2000 to 402 square miles in 2035 (see Tables 57 and 58). This includes increases of 4 square miles in high density residential land, 53 square miles in medium density residential land, and 12 square miles in low density residential land. About 154,800 housing units, or 88 percent of the total projected increase in housing units between 2000 and 2035, would occur at high and medium densities. About 14,800 housing units, or 8 percent of the projected increase, would occur at low density.

[7]*For purposes of the regional plan, residential densities are intended to be applied on an overall neighborhood, rather than a parcel-by-parcel, basis. The density categories represent overall densities that may be achieved within developing and redeveloping areas through various combinations of lot sizes and housing structure types over entire neighborhoods. The density ranges are broadly defined so as to provide flexibility to local units of government as they prepare local land use plans and administer local land use regulations within the framework of the regional plan. With regard to high density development, it is recognized that communities may choose to accommodate residential neighborhoods at densities substantially greater than the minimum threshold for the high density range, particularly in redevelopment situations. Accordingly, no maximum density—or upper limit—is specified for the high density category.*

Map 39

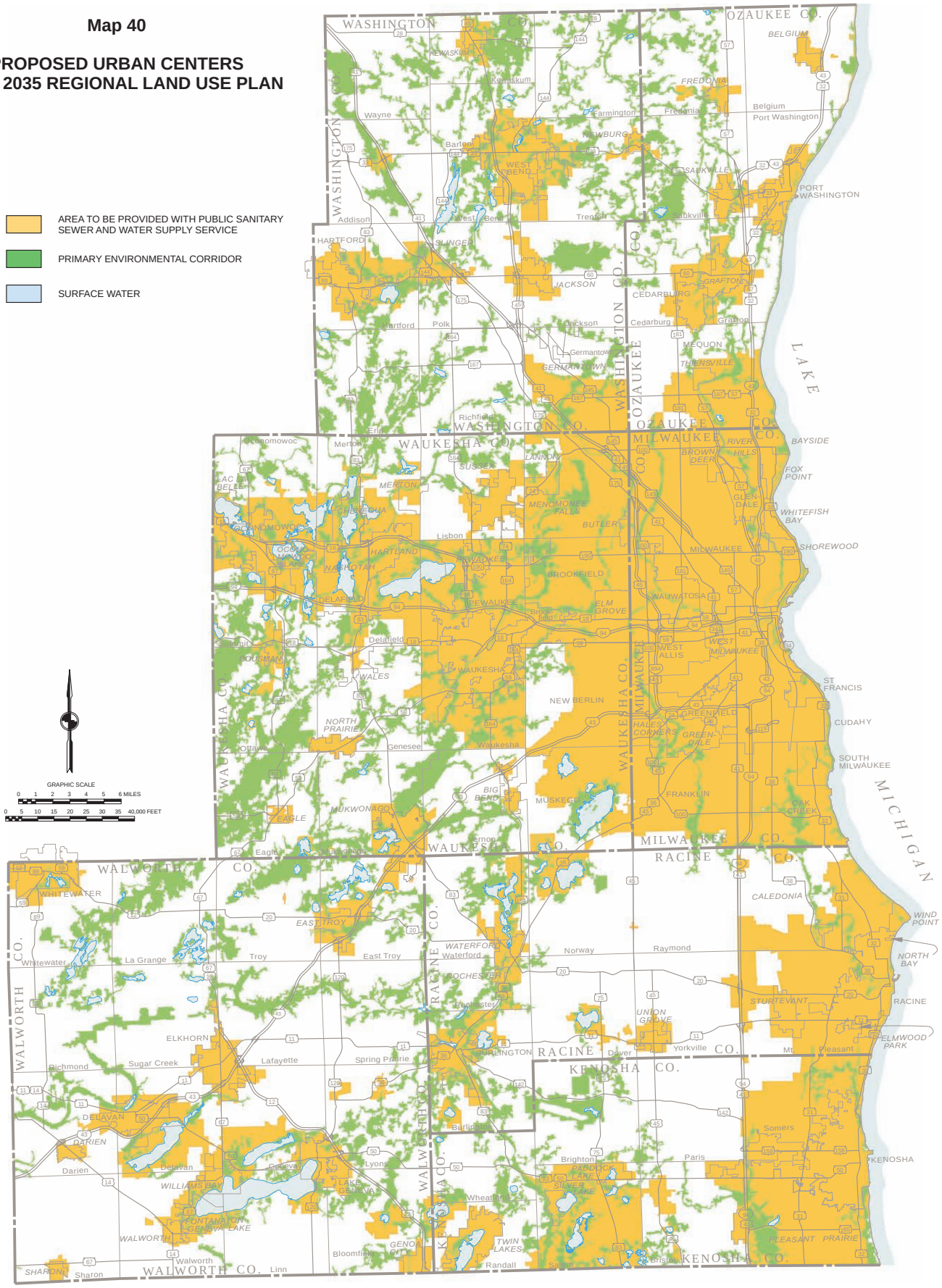
RECOMMENDED REGIONAL LAND USE PLAN FOR THE SOUTHEASTERN WISCONSIN REGION: 2035



Source: SEWRPC.

Map 40

PROPOSED URBAN CENTERS YEAR 2035 REGIONAL LAND USE PLAN



Source: SEWRPC.

Table 57

EXISTING AND PROPOSED LAND USE IN THE REGION: 2000 AND 2035 REGIONAL LAND USE PLAN

Land Use Category	Existing 2000		Planned Increment: 2000-2035		Planned 2035	
	Square Miles	Percent of Total	Square Miles	Percent	Square Miles	Percent of Total
Urban						
Residential						
High Density[a]	46.0	1.7	3.8	8.3	49.8	1.9
Medium Density[b]	109.0	4.1	52.8	48.4	161.8	6.0
Low Density[c]	178.0	6.6	12.0	6.7	190.0	7.1
Subtotal	333.0	12.4	68.6	20.6	401.6	15.0
Commercial	30.3	1.1	12.8	42.2	43.1	1.6
Industrial	32.9	1.2	5.3	16.1	38.2	1.4
Transportation, Communication, and Utilities	200.9	7.5	19.5	9.7	220.4	8.2
Governmental and Institutional[d]	33.7	1.2	2.2	6.5	35.9	1.3
Recreational[e]	50.4	1.9	7.7	15.3	58.1	2.2
Unused Urban	50.9	1.9	-23.4	-46.0	27.5	1.0
Urban Subtotal	732.1	27.2	92.7	12.7	824.8	30.7
Nonurban						
Sub-urban Density Residential[f]	29.1	1.1	9.0	30.9	38.1	1.4
Rural Density Residential[g]	- -	- -	5.9	- -	5.9	0.2
Agricultural	1,259.4	46.8	-103.9	-8.2	1,155.5	43.0
Other Open Land[h]	669.3	24.9	-3.7	-0.6	665.6	24.7
Nonurban Subtotal	1,957.8	72.8	-92.7	-4.7	1,865.1	69.3
Total	2,689.9	100.0	- -	- -	2,689.9	100.0

Note: Offstreet parking area is included with the associated land use.

[a] *7.0 or more dwelling units per net residential acre.*

[b] *2.3-6.9 dwelling units per net residential acre.*

[c] *0.7-2.2 dwelling units per net residential acre.*

[d] *Increment consists, for the most part, of the increase at public sites.*

[e] *Includes only that land that is intensively used for recreational purposes. Increment consists, for the most part, of the increase at public sites.*

[f] *0.2-0.6 dwelling unit per net residential acre.*

[g] *No more than 0.2 dwelling unit per acre. Only the planned incremental rural residential area is indicated on this table; the area associated with existing (2000) rural residential development is included in the urban and sub-urban residential land categories. The planned incremental rural residential area assumes that there would be one acre of developed homesite area per dwelling, the remainder of the required area being retained in open space use.*

[h] *Includes woodlands, water, wetlands, landfill sites, quarries, and unused rural lands.*

Source: SEWRPC.

The plan's emphasis on medium and high residential densities as indicated above is intended to facilitate the efficient provision of public utilities such as sanitary sewerage and water supply facilities and public services including schools, public safety services, and public transit. In addition the plan emphasis on medium and high densities would serve to moderate the amount of open space required to be converted to urban use in order to accommodate growth in population, households, and employment in the Region.

The regional plan encourages residential development and redevelopment in predominantly residential neighborhoods as well as in more mixed-use settings. The plan envisions residential neighborhoods designed as cohesive units, properly related to the larger community of which they are a part, and served by an interconnected internal street, bicycle-way, and pedestrian system and by a neighborhood school, park, and shopping area.[8] In addition to such neighborhood residential development, the regional plan envisions residential development in

[8]*As a practical matter, smaller household sizes and the attendant lower neighborhood population levels often require that an elementary school or retail and service area be provided to serve two or more contiguous neighborhoods, rather than a single neighborhood.*

Table 58

EXISTING AND PROPOSED LAND USE IN THE REGION BY COUNTY: 2000 AND 2035 REGIONAL LAND USE PLAN

Land Use Category	Kenosha County (square miles)			Milwaukee County (square miles)			Ozaukee County (square miles)			Racine County (square miles)		
	2000	Increment	2035	2000	Increment	2035	2000	Increment	2035	2000	Increment	2035
Urban												
Residential												
High Density[a]	2.8	0.6	3.4	37.0	2.8	39.8	0.1	- -	0.1	3.9	0.2	4.1
Medium Density[b]	12.5	8.6	21.1	28.2	8.8	37.0	7.4	3.5	10.9	14.5	4.8	19.3
Low Density[c]	12.3	1.8	14.1	12.2	-1.1	11.1	18.2	0.9	19.1	18.1	1.8	19.9
Subtotal	27.6	11.0	38.6	77.4	10.5	87.9	25.7	4.4	30.1	36.5	6.8	43.3
Commercial	2.3	1.5	3.8	11.2	2.9	14.1	1.5	0.9	2.4	3.0	1.3	4.3
Industrial	2.2	0.8	3.0	11.9	-0.3	11.6	1.7	0.5	2.2	3.8	0.8	4.6
Transportation, Communication, and Utilities	17.9	3.3	21.2	52.0	2.4	54.4	15.1	1.3	16.4	20.8	2.0	22.8
Governmental and Institutional[d]	2.6	0.5	3.1	12.8	0.2	13.0	2.0	0.1	2.1	3.6	0.3	3.9
Recreational[e]	5.3	0.9	6.2	12.1	1.2	13.3	3.8	0.4	4.2	4.7	0.7	5.4
Unused Urban	5.5	-2.8	2.7	16.7	-6.9	9.8	3.3	-1.5	1.8	6.1	-2.2	3.9
Urban Subtotal	63.4	15.2	78.6	194.1	10.0	204.1	53.1	6.1	59.2	78.5	9.7	88.2
Nonurban												
Sub-urban Density Residential[f]	0.9	0.2	1.1	1.9	0.1	2.0	2.8	1.2	4.0	0.2	0.2	0.4
Rural Density Residential[g]	- -	0.4	0.4	- -	- -	- -	- -	0.4	0.4	- -	0.5	0.5
Agricultural	148.0	-16.2	131.8	20.2	-8.6	11.6	127.0	-7.7	119.3	195.5	-10.8	184.7
Other Open Land[h]	66.1	0.4	66.5	26.5	-1.5	25.0	52.6	- -	52.6	66.4	0.4	66.8
Nonurban Subtotal	215.0	-15.2	199.8	48.6	-10.0	38.6	182.4	-6.1	176.3	262.1	-9.7	252.4
Total	278.4	- -	278.4	242.7	- -	242.7	235.5	- -	235.5	340.6	- -	340.6

Land Use Category	Walworth County (square miles)			Washington County (square miles)			Waukesha County (square miles)			Region (square miles)		
	2000	Increment	2035	2000	Increment	2035	2000	Increment	2035	2000	Increment	2035
Urban												
Residential												
High Density[a]	- -	- -	- -	0.7	- -	0.7	1.6	0.1	1.7	46.0	3.8	49.8
Medium Density[b]	10.2	7.6	17.8	8.5	7.0	15.5	27.8	12.2	40.0	109.0	52.8	161.8
Low Density[c]	20.1	1.1	21.2	24.6	-0.7	23.9	72.5	8.1	80.6	178.0	12.0	190.0
Subtotal	30.3	8.7	39.0	33.8	6.3	40.1	101.9	20.4	122.3	333.0	68.6	401.6
Commercial	2.0	1.1	3.1	2.0	1.5	3.5	8.4	3.5	11.9	30.3	12.8	43.1
Industrial	2.2	0.9	3.1	2.4	0.8	3.2	8.6	1.8	10.4	32.9	5.3	38.2
Transportation, Communication, and Utilities	23.8	2.5	26.3	24.4	2.7	27.1	46.9	5.2	52.1	200.9	19.5	220.4
Governmental and Institutional[d]	2.7	0.3	3.0	2.3	0.3	2.6	7.6	0.6	8.2	33.7	2.2	35.9
Recreational[e]	6.7	0.8	7.5	4.8	1.0	5.8	12.9	2.9	15.8	50.4	7.7	58.1
Unused Urban	3.7	-2.0	1.7	3.3	-1.8	1.5	12.2	-6.2	6.0	50.9	-23.4	27.5
Urban Subtotal	71.4	12.3	83.7	73.0	10.8	83.8	198.5	28.2	226.7	732.1	92.7	824.8
Nonurban												
Sub-urban Density Residential[f]	1.4	0.1	1.5	6.2	4.2	10.4	15.7	3.1	18.8	29.1	9.0	38.1
Rural Density Residential[g]	- -	1.0	1.0	--	1.5	1.5	--	2.1	2.1	- -	5.9	5.9
Agricultural	371.3	-13.1	358.2	221.6	-15.8	205.8	175.9	-31.6	144.3	1,259.4	-103.9	1,155.5
Other Open Land[h]	132.4	-0.3	132.1	134.8	-0.7	134.1	190.4	-1.8	188.6	669.3	-3.7	665.6
Nonurban Subtotal	505.1	-12.3	492.8	362.6	-10.8	351.8	382.0	-28.2	353.8	1,957.8	-92.7	1,865.1
Total	576.5	- -	576.5	435.6	- -	435.6	580.5	- -	580.5	2,689.9	- -	2,689.9

Note: Offstreet parking area is included with the associated land use.

[a] 7.0 or more dwelling units per net residential acre.

[b] 2.3-6.9 dwelling units per net residential acre.

[c] 0.7-2.2 dwelling units per net residential acre.

[d] Increment consists, for the most part, of the increase at public sites.

[e] Includes only that land that is intensively used for recreational purposes. Increment consists, for the most part, of the increase at public sites.

[f] 0.2-0.6 dwelling unit per net residential acre.

[g] No more than 0.2 dwelling unit per acre. Only the planned incremental rural residential area is indicated on this table;. the area associated with existing (2000) rural residential development is included in the urban and sub-urban residential land categories. The planned incremental rural residential area assumes that there would be one acre of developed homesite area per dwelling, the remainder of the required area being retained in open space use.

[h] Includes woodlands, water, wetlands, landfill sites, quarries, and unused rural lands

Source: SEWRPC.

settings having an even greater mixture of land uses. Examples of such mixed-use settings include dwellings above the ground floor of commercial uses and residential structures intermixed with, or located adjacent to, compatible commercial, institutional, or civic uses.

As already noted, the low density range is defined under the plan as 0.7 to 2.2 dwelling units per net residential acre—equivalent to single-family lots of about 0.5 to 1.5 acres. The regional plan discourages development at the lower end of this density range within urban service areas, given the inefficiencies attendant to the provision of

basic urban facilities and services to large residential lots. The plan further recommends that low (and sub-urban) density residential development beyond planned urban service areas be limited to that which is already committed in subdivision plats and certified surveys.

Commercial and Industrial Land

Under the regional land use plan, the total amount of commercial and industrial land in the Region would increase by 18 square miles, or 28 percent, from about 63 square miles in 2000 to 81 square miles in 2035. Commercial land accommodating retail and service activities would increase by 12.8 acres; industrial land accommodating manufacturing, wholesaling, and construction activities would increase by 5.3 square miles.

The commercial and industrial land recommendations of the regional plan take into account the employment projections for the Region, including a projected continuing shift from a manufacturing-based to a service-based economy and anticipated reductions in employment densities (i.e., the number of jobs per acre) for industrial and retail activities. Recommendations of community land use plans regarding the development and redevelopment of commercial and industrial areas were also an important consideration in the design of the regional plan.

The regional plan envisions a range of commercial and industrial areas. Thus, the plan envisions neighborhood, community, and regional commercial centers, including both mixed-use areas with a residential component and areas devoted more exclusively to commercial uses. Likewise, the plan envisions both community-level and regional industrial centers. The plan envisions a continuation of the trend toward mixing industrial and commercial (especially service) activities within the same area.

The largest commercial and industrial areas, in terms of employment levels, anticipated under the plan are identified as major economic activity centers. These are defined as areas containing a concentration of commercial and/or industrial land having at least 3,500 total jobs or 2,000 retail jobs. Major economic activity centers are further classified based upon their employment levels as follows: industrial center—at least 3,500 industrial jobs; office center—at least 3,500 office jobs; retail center—at least 2,000 retail jobs; and general purpose center—at least 3,500 total jobs (but not meeting the employment threshold for designation as a major industrial, retail, or office center). The designation of a site as a major industrial, retail, or office center is intended to indicate the predominant type of activity. It should be recognized, however, that many such sites accommodate a mixture of uses. A major industrial center may accommodate offices, service operations, and research facilities in addition to manufacturing, wholesaling, and distribution facilities. A major retail center may accommodate office and service uses in addition to retail operations. Some sites meet more than one of the afore-noted employment thresholds.

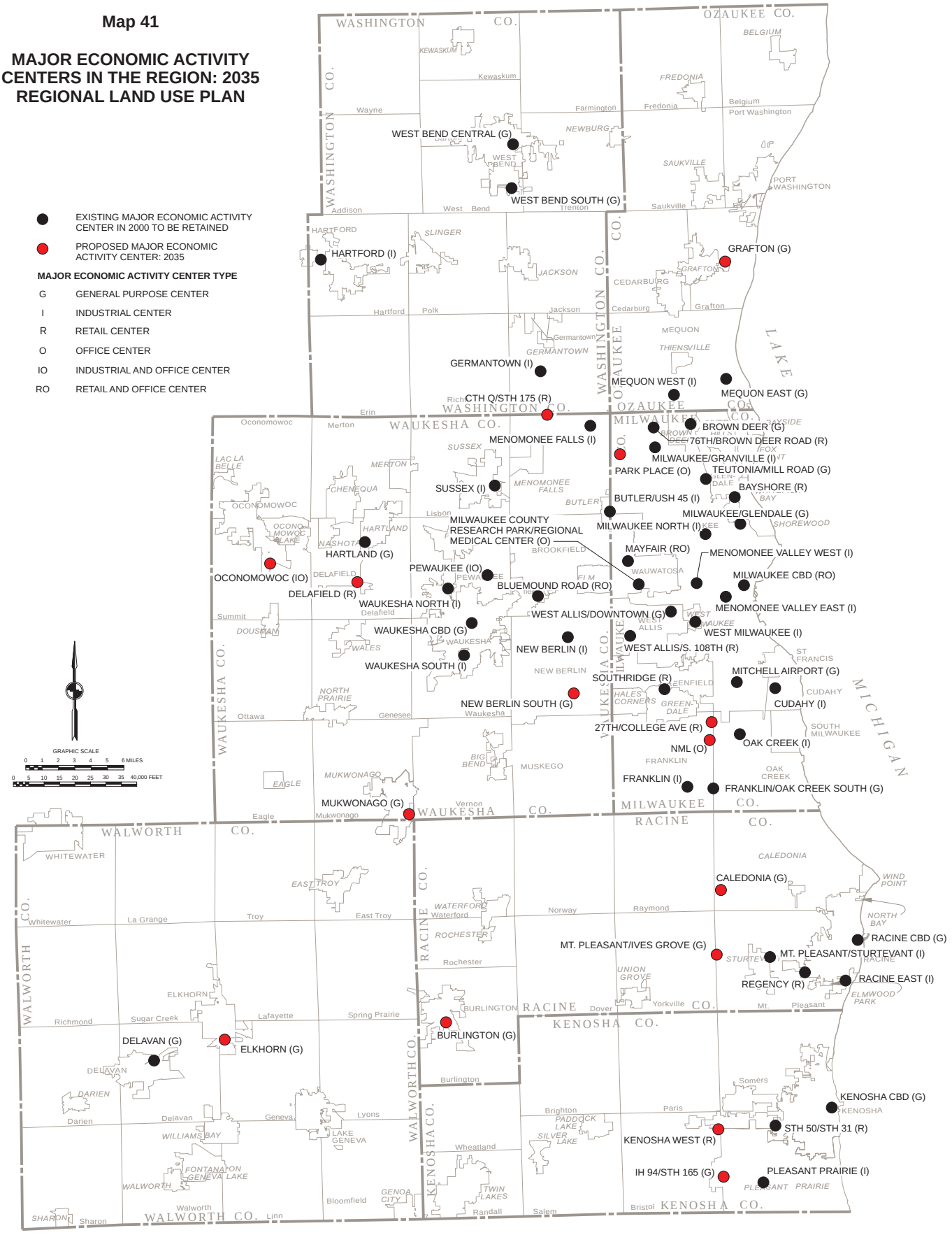
The regional plan envisions a total of 60 major economic activity centers in the Region in 2035 (see Map 41). This includes 45 centers that met the major economic activity center threshold in 2000 and 15 additional areas that are envisioned to reach major center status by 2035. Included in the 45 existing centers are 14 general purpose centers, 20 industrial centers, six retail centers, one office center, three combined retail and office centers, and one combined industrial and office center. Included in the 15 proposed additional sites are eight general purpose centers, four retail centers, two office centers, and one combined industrial and office center. With the exception of a proposed site in the Village of Caledonia (Racine County), each of the major economic activity centers was developed, under development, or being redeveloped in 2005. The general boundaries of the major economic activity centers envisioned under the regional plan are delineated on the plan map (Map 39). The delineation of major centers on Map 39 is based largely upon a consideration of community land use plans and zoning as well as existing land use.

Governmental and Institutional Land

The regional land use plan envisions the development of about two square miles of governmental and institutional land within the Region, increasing the total amount of such lands by 7 percent, from about 34 square miles to about 36 square miles. The planned increase consists, for the most part, of the increase at public sites. The major

Map 41

MAJOR ECONOMIC ACTIVITY CENTERS IN THE REGION: 2035 REGIONAL LAND USE PLAN



Source: SEWRPC.

governmental and institutional centers envisioned under the plan—including county courthouses and State and Federal office buildings, medical complexes,[9] universities,[10] technical colleges, and major cultural centers—are shown on Map 42. No new major governmental or institutional centers are envisioned.

Transportation, Communication, and Utility Land

The regional land use plan envisions that the areas devoted to transportation, communication, and utilities would increase by about 19 square miles, or 10 percent, from 201 square miles in 2000 to 220 square miles in 2035. Included in this planned increase are lands needed for streets and highways, airport expansions, and utility facilities such as sewage treatment plants. Major transportation and utility facilities envisioned under the plan—including public sewage treatment plants,[11] major electric power generation plants, major airports, major bus and railway passenger stations, and the Milwaukee seaport—are shown on Map 43.

Recreational Land

The regional land use plan envisions the development of about eight square miles of recreational land in the Region, increasing land area in outdoor recreational use from 50 square miles in 2000 to 58 square miles in 2035, or by 13 percent. The recreational land area pertains to "intensive use" areas—that is, land actually developed, or anticipated to be developed, as outdoor recreation facility areas. The planned increase in recreational land consists, for the most part, of the increase at public outdoor recreation sites.

The planned increase in recreation land is based in part upon neighborhood development standards that are intended to provide adequate neighborhood parkland in developing residential areas. The planned increase also reflects specific park site acquisition and development proposals set forth in county park and open space plans (which, taken together, comprise the regional park and open space plan) and in community park and open space plans.

The land use plans envisions a system of 32 major parks of regional size and significance. Such parks have an area of at least 250 acres and provide opportunities for a variety of resource-oriented outdoor recreational activities. All of the proposed major parks were at least partially acquired as of 2005. The recommended major parks, along with existing major special-use outdoor recreation sites and existing or proposed major nature study centers in the Region, are shown on Map 44.[12]

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[9]*Includes those medical centers with 600 or more beds.*

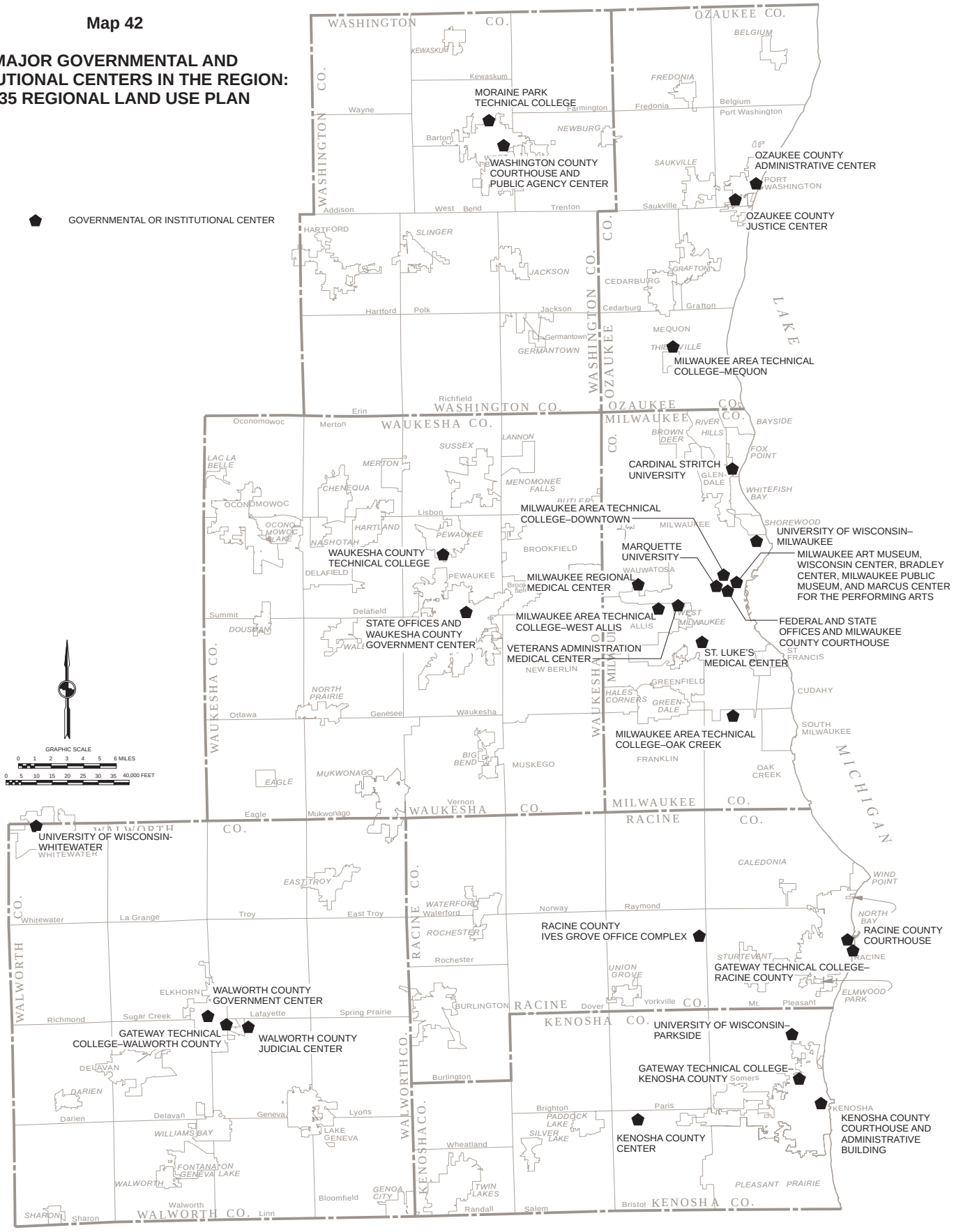
[10]*Includes institutions with accredited bachelor's degree programs that have a total enrollment of 4,500 or more students.*

[11]*It should be noted that the regional plan no longer envisions sewage treatment plants in the Village of Wales or the Village of North Prairie. An amendment to the regional water quality management plan adopted in 2001 ("Amendment to the Regional Water Quality Management Plan—Northwestern Waukesha County," dated March 2001), recommended that future sewer service to the Wales area be provided through the Delafield-Hartland Water Pollution Control Commission sewage treatment plant. A facilities plan for the Village of North Prairie ("Final Report, Village of North Prairie Wastewater Treatment Facility Plan," dated December 1989) concluded that the sewerage system needs in the North Prairie area can most cost-effectively be solved through onsite sewage disposal systems.*

[12]*On Map 44, the sites in Milwaukee County identified as "Lake Michigan North" and "Lake Michigan South" refer to clusters of parks along the Lake Michigan shoreline. Lake Michigan North includes Back Bay, Juneau, Lake, McKinley, O'Donnell, and Veterans Parks and Bradford Beach. Lake Michigan South includes Bay View, Grant, Sheridan, South Shore, and Warnimont Parks.*

Map 42

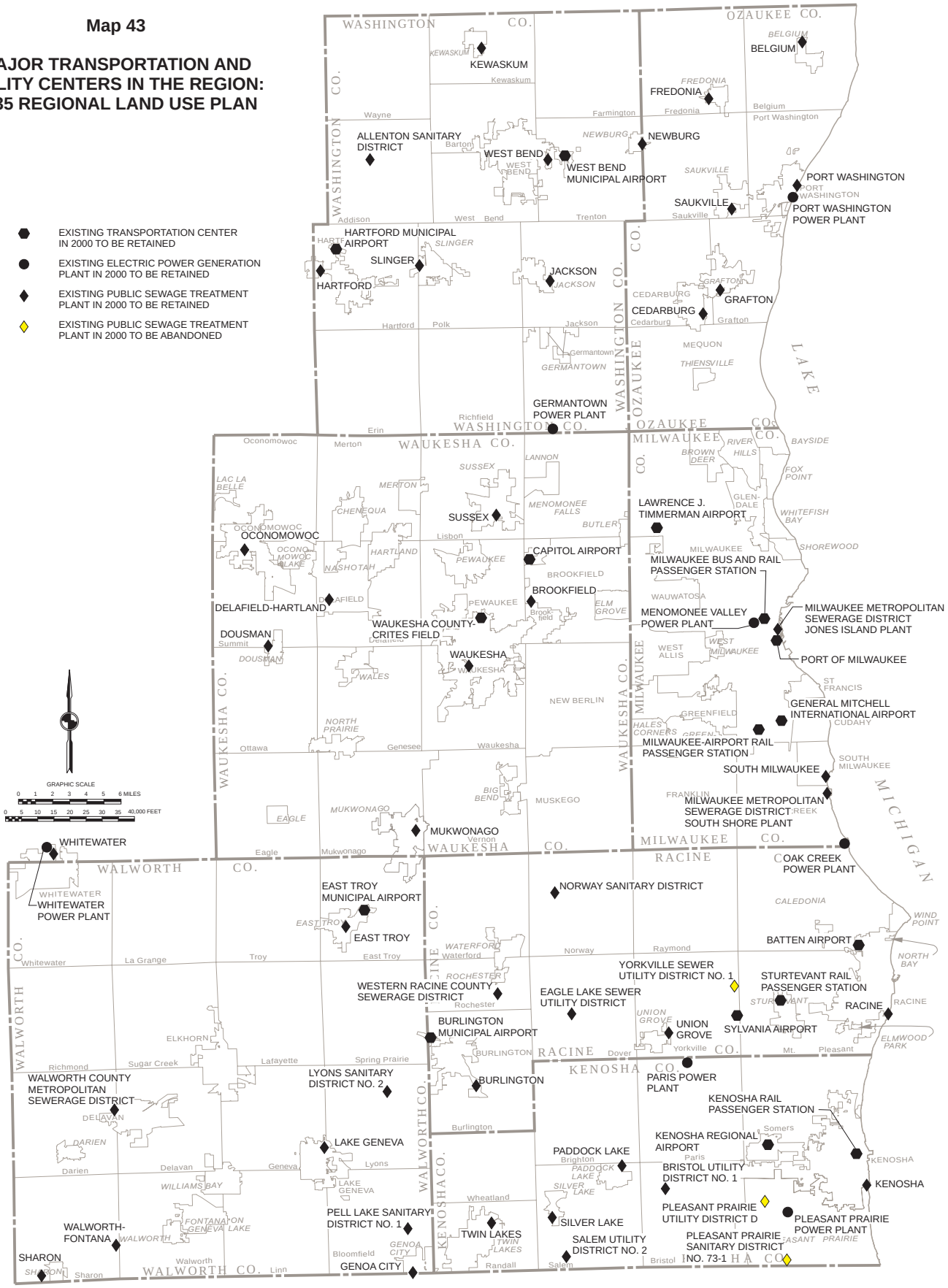
MAJOR GOVERNMENTAL AND INSTITUTIONAL CENTERS IN THE REGION: 2035 REGIONAL LAND USE PLAN



Source: SEWRPC.

Map 43

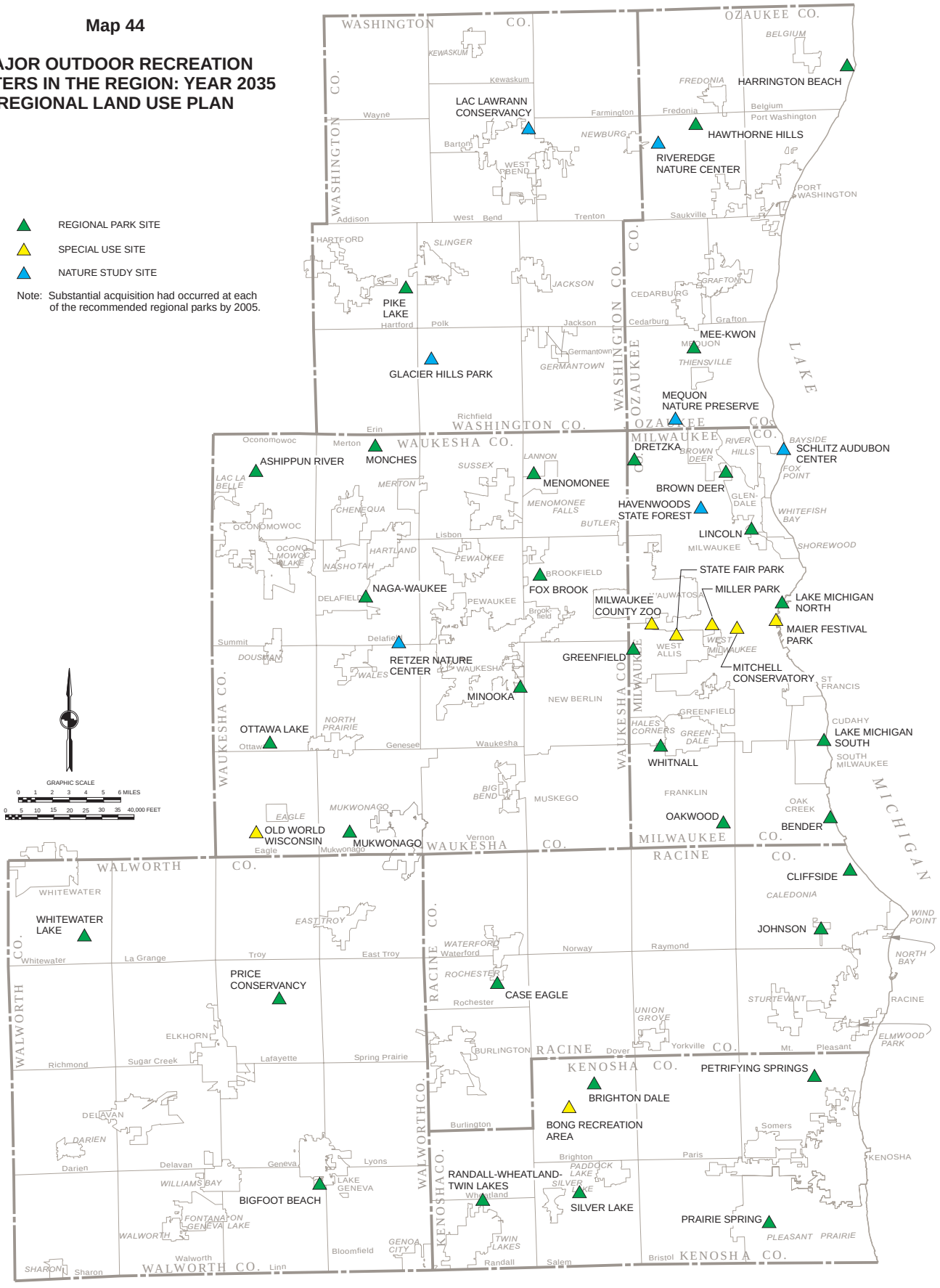
MAJOR TRANSPORTATION AND UTILITY CENTERS IN THE REGION: 2035 REGIONAL LAND USE PLAN



Source: SEWRPC.

Map 44

MAJOR OUTDOOR RECREATION CENTERS IN THE REGION: YEAR 2035 REGIONAL LAND USE PLAN



Source: SEWRPC.

Sub-urban Density Residential Land

Under the regional plan, sub-urban density residential land is defined as residential development at a density of 0.2 to 0.6 dwelling unit per net residential acre. Such development is neither truly urban nor rural in character. Development at this density generally precludes the provision of centralized sanitary sewer and water supply service and other urban amenities.

The regional land use plan recommends that sub-urban density residential land be limited to that which is already committed through approved subdivision plats and certified surveys. In this respect, the plan envisions that the amount of sub-urban density residential land would increase by nine square miles, or by about 31 percent, between 2000 and 2035. This would accommodate about 3,400 households, or about 2 percent of the projected increase in households in the Region between 2000 and 2035. No additional sub-urban density residential land beyond the already committed areas is recommended.

Environmentally Significant Lands

The most important elements of the natural resource base of the Region, including the best remaining woodlands, wetlands, prairies, wildlife habitat, surface water and associated shorelands and floodlands, and related features, including existing park and open space sites, scenic views, and natural areas and critical species habitat sites, occur in linear patterns in the landscape, termed "environmental corridors." The most important of these have been identified as "primary environmental corridors," which are by definition at least two miles long, 200 feet wide, and 400 acres in area. Shown in green on the proposed urban centers map (Map 40), primary environmental corridors in the Region are generally located along major stream valleys, along the Lake Michigan shoreline, around major inland lakes, and in the Kettle Moraine. The regional land use plan recommends the preservation of primary environmental corridors in essentially natural, open use. The preservation of these corridors is considered essential to the overall environmental quality of the Region and the maintenance of its unique cultural and natural heritage and natural beauty. Because these corridors are generally poorly suited for urban development owing to soil limitations, steep slopes, or flooding potential, their preservation will also help to avoid the creation of new environmental and developmental problems.

In addition to primary environmental corridors, other concentrations of natural resources—referred to as "secondary environmental corridors" and "isolated natural resource areas"—have been identified as warranting strong consideration for preservation. Secondary environmental corridors contain a variety of resource features and are by definition at least one mile long and 100 acres in area. Isolated natural resource areas are concentrations of natural resources of at least five acres in size that have been separated from the environmental corridor network by urban or agricultural use. Existing secondary environmental corridors and isolated natural resource areas are identified on Map 10 in Chapter II of SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035*. The regional land use plan recommends that these areas be retained in natural open use as determined in county and local plans.

In the preparation of the regional plan, other than for a limited number of exceptions, incremental urban and rural development was not allocated to primary or secondary environmental corridors or isolated natural resource areas. The exceptions pertain to local commitments to development that have been identified in local sanitary sewer service area plans adopted as part of the regional water quality management plan.

While the design of the regional land use plan does not allocate incremental development to the environmental corridors and isolated natural resource areas, other than to reflect local commitments as noted above, the plan recognizes that certain development may be accommodated in such areas without jeopardizing their overall integrity. The plan recognizes that certain transportation and utility uses may of necessity have to be located within such areas and that limited residential and recreational uses may be accommodated in such areas. Guidelines pertaining to such development within environmental corridors are presented in Table 27 in Chapter IV of SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035*. Under these guidelines, residential development in environmental corridors would be limited to upland environmental corridors at an overall density of no more than one dwelling unit per five upland acres. Conservation subdivision designs are strongly encouraged where such rural density residential development is

accommodated. Under the guidelines, in lieu of rural density residential development, up to 10 percent of the upland corridor area may be disturbed in order to accommodate urban-density residential, commercial, industrial, and other urban development. Additional details are set forth in the afore-referenced table in Planning report No. 48.

Under the regional plan, the existing (year 2000) configuration of environmental corridors and isolated natural resource areas would be modified slightly. These modifications include minor deletions attendant to prior local commitments to development as noted above, along with certain additions. The additions include currently farmed floodplains adjacent to existing environmental corridors within planned urban service areas that may be expected to revert to more natural conditions over time and become part of the corridor. The additions also include certain other open lands that are envisioned to revert to more natural conditions and become part of the environmental corridor as proposed in county park and open space plans.

As indicated in Table 59, under the regional land use plan, primary environmental corridors in the Region would encompass about 481 square miles, or 18 percent of the Region, in 2035. This represents a net increase of 18 square miles, or 4 percent, over the existing 2000 area. Secondary environmental corridors would encompass 77 square miles in 2035, a net increase of about two square miles, or 3 percent, over 2000. Isolated natural resource areas would encompass about 63 square miles in 2035, about the same as in 2000.

The regional land use plan supports carefully planned efforts—such as the Wisconsin Department of Natural Resources Turtle Valley Wildlife Area project in the west central area of Walworth County—to restore farmland and open space to more natural conditions, resulting in the re-establishment of wetlands, woodlands, prairies, grasslands, and forest interiors. Such efforts could expand the environmental corridor network in the Region. The results of such restoration efforts would be reflected in future generations of the regional land use plan.[13]

Finally, it is recommended that all remaining natural areas and critical species habitat sites identified in the regional natural areas and critical species habitat protection and management plan be preserved. Natural areas are tracts of land or water that contain plant and animal communities believed to be representative of the pre-European-settlement landscape; critical species habitat sites are other areas that support endangered, threatened, or rare plant or animal species. The location of these sites within the Region is shown on Map 9 in Chapter II of SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035*. Almost all of the natural area and critical species habitat sites are located within environmental corridors or isolated natural resource areas.

Rural Lands

The area of the Region shown as white on the regional plan map is recommended to remain in essentially rural use—primarily agriculture use and rural density residential use, the latter defined as residential development at a density of no more than one dwelling per five acres. Also included within the white area on Map 39 are secondary environmental corridors and isolated natural resource areas beyond the planned urban service areas; plan recommendations for secondary environmental corridors and isolated natural resource areas were described in the previous section of this chapter.

The regional plan recommends the preservation of prime agricultural land—land best suited for agricultural use. Prime agricultural lands should be identified based upon soil suitability for agriculture, with high priority placed on farmland covered by Natural Resources Conservation Service Class I and Class II soils. In addition to soil suitability, other factors—the size of individual farm units and overall size of the farming area, the availability of agricultural services, and the degree of encroachment from urban uses—may also be considered. The regional plan recommends that counties in the Region, in cooperation with the concerned local units of government, carry out planning programs to identify prime farmland. In Milwaukee County, the City of Franklin is the only

[13] *The expanded primary environmental corridor within the Turtle Valley Wildlife Area is reflected on the regional land use plan map (Map 39) as well as in Table 59.*

Table 59

EXISTING AND PROPOSED ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS IN THE REGION BY COUNTY: 2000 AND 2035 REGIONAL LAND USE PLAN

	Primary Environmental Corridors					
	Existing 2000		Planned Increment: 2000-2035		Total 2035	
County	Square Miles	Percent of Total	Square Miles	Percent	Square Miles	Percent of Total
Kenosha	43.8	9.5	2.0	4.6	45.8	9.6
Milwaukee	14.5	3.1	2.3	15.9	16.8	3.5
Ozaukee	32.2	7.0	1.1	3.4	33.3	6.9
Racine	35.5	7.7	1.4	3.9	36.9	7.7
Walworth	99.2	21.4	2.8	2.8	102.0	21.2
Washington	94.2	20.4	3.0	3.2	97.2	20.2
Waukesha	142.8	30.9	5.7	4.0	148.5	30.9
Region	462.2	100.0	18.3	4.0	480.5	100.0

	Secondary Environmental Corridors					
	Existing 2000		Planned Increment: 2000-2035		Total 2035	
County	Square Miles	Percent of Total	Square Miles	Percent	Square Miles	Percent of Total
Kenosha	10.0	13.4	1.4	14.0	11.4	14.8
Milwaukee	5.2	6.9	-0.4	-7.7	4.8	6.3
Ozaukee	7.6	10.2	0.2	2.6	7.8	10.2
Racine	10.8	14.4	0.9	8.3	11.7	15.2
Walworth	14.6	19.5	-0.1	-0.7	14.5	18.9
Washington	15.4	20.6	0.2	1.3	15.6	20.3
Waukesha	11.2	15.0	-0.2	-1.8	11.0	14.3
Region	74.8	100.0	2.0	2.7	76.8	100.0

	Isolated Natural Resource Areas					
	Existing 2000		Planned Increment: 2000-2035		Total 2035	
County	Square Miles	Percent of Total	Square Miles	Percent	Square Miles	Percent of Total
Kenosha	6.0	9.5	- -	- -	6.0	9.6
Milwaukee	3.3	5.2	-0.1	-3.0	3.2	5.1
Ozaukee	5.6	8.9	-0.1	-1.8	5.5	8.8
Racine	12.0	19.1	0.2	1.7	12.2	19.5
Walworth	12.9	20.5	0.4	3.1	13.3	21.2
Washington	10.1	16.1	-0.1	-1.0	10.0	15.9
Waukesha	13.0	20.7	-0.5	-3.8	12.5	19.9
Region	62.9	100.0	-0.2	-0.3	62.7	100.0

Source: SEWRPC.

community where prime farmland has been identified for purposes of the Wisconsin Farmland Preservation program. The City of Franklin would be responsible for reviewing and updating the delineation of prime farmland that may remain in the City. Most county planning in this regard was carried out more than 20 years ago with the advent of the Wisconsin Farmland Preservation program and needs to be reviewed and updated. Prime farmland cooperatively identified by counties and the concerned communities should be preserved for agricultural use, with residential development generally limited to no more than one dwelling unit per 35 acres.

While much progress has been made in preserving primary environmental corridors and other environmentally significant lands in the Region, the preservation of prime farmland remains a difficult and challenging issue, one that involves the balancing of land use planning objectives and the economic realities faced by farmers. Efforts to

ensure the preservation of farmland within the Region will continue to rely heavily on the application of exclusive agricultural zoning, which limits development to one dwelling unit per 35 acres, by county and local units of government. Although not yet widely embraced within the Region, programs that involve the purchase or transfer of development rights have the potential for preserving farmland in some areas. Purchase of development rights programs, or "PDR" programs, provide compensation to landowners for permanently committing their land to agricultural and open space use. Deed restrictions or easements are used to ensure that the lands concerned remain in agricultural or other open use. The primary drawback of PDR programs is the potentially high cost. Given the cost, PDR programs should be strategically targeted toward agricultural land where long-term preservation is particularly important. Transfer of development rights programs, or "TDR" programs, involve the transfer of the right to develop a specified number of dwelling units under existing zoning from one parcel, which would remain in open use, to another parcel where the number of dwelling units permitted would be correspondingly increased. Such a program may be implemented only if authorized under county or local zoning.

The regional plan also encourages the preservation of nonprime farmland for agricultural use. This could be in the form of traditional agricultural use or alternative agricultural uses such as smaller hobby farms or specialty farms including community supported agricultural operations. The plan recommends that any development of nonprime farmland be limited to rural residential development at a density of no more than one dwelling unit per five acres.

Where rural residential development is accommodated, the regional plan encourages the use of conservation subdivision designs. Conservation subdivision designs generally involve locating dwelling units in clusters surrounded by open space, thereby achieving the desired density (no more than one dwelling unit per five acres) on an overall basis. The layout of lots and supporting streets is done in a manner that preserves the most significant natural resource features to the extent practicable. Farming activity may be continued on open space lands within conservation subdivisions.

Regional plan recommendations for nonprime farmland are intended to provide the opportunity for some development, with potential significant economic return, in a manner that is consistent with location in a rural area. The plan recommendation that development be limited to no more than one dwelling unit per five acres is intended to achieve a number of objectives—including minimizing traffic volumes; minimizing demands for public services, such as fire and emergency medical services, in outlying areas where a high level of such services may be difficult and costly to provide; preserving natural drainage systems; preserving open space and rural character; and minimizing the potential risk to the environment attendant to the widespread use of onsite sewage disposal systems.

The regional land use plan envisions that about 2 percent of the increment in households in the Region between 2000 and 2035, or about 3,700 households, would be accommodated through rural density residential development. In developing the plan, these households were generally not allocated to Class I and Class II farmland. The allocation of rural residential development to Class I and Class II farmland under the plan was limited to existing platted rural density lots.

Overall, the regional plan envisions that the agricultural land base of the Region would decrease by about 104 square miles, or 8 percent, between 2000 and 2035 (see Tables 57 and 58 presented earlier in this chapter).

Population, Households, and Employment

The regional land use plan was designed to accommodate the intermediate projections of population, households, and employment for the Region prepared by the Regional Planning Commission in 2004, and re-presented earlier in this chapter. Under the plan, the resident population of the Region would increase by 344,800 persons, or 18 percent, from 1,931,200 persons in 2000 to 2,276,000 persons in 2035. Under the plan, the regional population would be distributed among the seven counties as indicated in Table 60. Population increases between 2000 and 2035 would range from about 18,800 persons in Ozaukee County to 86,000 persons in Waukesha County. Comparatively high relative rates of increase for Kenosha and Walworth Counties evident in Table 60—40 percent and 52 percent, respectively—reflect an expected continuation of a strong "Illinois influence", characterized by persons from Northeastern Illinois seeking residences in Wisconsin.

Table 60

ACTUAL AND PLANNED POPULATION IN THE REGION BY COUNTY: 1970-2035

County	Population											
	Actual 1970		Actual 1980		Actual 1990		Actual 2000		Actual (Estimated) 2003		Planned 2035	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Kenosha	117,917	6.7	123,137	7.0	128,181	7.1	149,577	7.7	154,200	7.9	210,100	9.2
Milwaukee	1,054,249	60.1	964,988	54.7	959,275	53.0	940,164	48.7	941,300	48.0	1,007,100	44.3
Ozaukee	54,461	3.1	66,981	3.8	72,831	4.0	82,317	4.2	84,500	4.3	101,100	4.4
Racine	170,838	9.7	173,132	9.8	175,034	9.7	188,831	9.8	191,100	9.8	213,600	9.4
Walworth	63,444	3.6	71,507	4.0	75,000	4.1	92,013	4.8	95,600	4.9	140,000	6.2
Washington	63,839	3.6	84,848	4.8	95,328	5.3	117,496	6.1	121,900	6.2	157,300	6.9
Waukesha	231,335	13.2	280,203	15.9	304,715	16.8	360,767	18.7	371,200	18.9	446,800	19.6
Region	1,756,083	100.0	1,764,796	100.0	1,810,364	100.0	1,931,165	100.0	1,959,800	100.0	2,276,000	100.0

County	Population Change									
	1970-1980		1980-1990		1990-2000		2000-2003		2003-2035	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Kenosha	5,220	4.4	5,044	4.1	21,396	16.7	4,623	3.1	55,900	36.3
Milwaukee	-89,261	-8.5	-5,713	-0.6	-19,111	-2.0	1,136	0.1	65,800	7.0
Ozaukee	12,520	23.0	5,850	8.7	9,486	13.0	2,183	2.7	16,600	19.6
Racine	2,294	1.3	1,902	1.1	13,797	7.9	2,269	1.2	22,500	11.8
Walworth	8,063	12.7	3,493	4.9	17,013	22.7	3,587	3.9	44,400	46.4
Washington	21,009	32.9	10,480	12.4	22,168	23.3	4,404	3.7	35,400	29.0
Waukesha	48,868	21.1	24,512	8.7	56,052	18.4	10,433	2.9	75,600	20.4
Region	8,713	0.5	45,568	2.6	120,801	6.7	28,635	1.5	316,200	16.1

Source: U. S. Bureau of the Census; Wisconsin Department of Administration; and SEWRPC.

Under the regional plan, the number of households in the Region would increase by 176,700, or 24 percent, from 749,000 households in 2000 to 925,700 households in 2035. Households would continue to increase at a faster relative rate than the regional population, with average household sizes continuing to decline somewhat. Among the seven counties in the Region, the increase in households would range from 9,100 in Ozaukee County to 49,800 in Milwaukee County (see Table 61).

Under the regional plan, total employment in the Region would increase by 145,500 jobs, or 12 percent, from 1,222,800 in 2000 to 1,368,300 jobs in 2035.[14] As indicated on Table 62, total employment in the Region declined by about 4 percent from 2000 to 2003, from 1,222,800 jobs to 1,179,000 jobs. The year 2035 employment level in Milwaukee County envisioned under the regional plan is about 39,000 jobs greater than the estimated 2003 level, in Waukesha County about 67,000 jobs greater than the 2003 level and in the other counties about 13,000 to 19,000 jobs greater than the estimated 2003 levels.

The regional plan envisions moderating the historic trend of decentralization of population, households, and employment relative to Milwaukee County within the Region. Milwaukee County's share of the total regional population would decrease from about 49 percent in 2000 to about 44 percent in 2035; this compares to a decrease in relative share of 11 percentage points during the previous 30-year period. Similarly, Milwaukee County's share of total regional employment would decrease from 51 percent in 2003 to 46 percent in 2035—compared to a decrease in relative share of about 16 percentage points over the previous 30 years.

[14]*Total employment in the Region as envisioned under the regional plan is the same as the intermediate employment projection presented in earlier in this chapter. However, county-level employment levels under the plan differ somewhat from these projected county employment levels. The planned county employment level was lower than the projected level in Waukesha County; higher than projected in Kenosha, Milwaukee, Racine, and Walworth Counties; and about the same as projected in Ozaukee and Washington Counties. The trend-based county employment projections were used as a starting point in preparing the regional land use plan; the variation from these projections under the regional plan is based upon a consideration of local land use plans.*

Table 61

ACTUAL AND PLANNED HOUSEHOLDS IN THE REGION BY COUNTY: 1970-2035

County	Households											
	Actual 1970		Actual 1980		Actual 1990		Actual 2000		Actual (Estimated) 2003		Planned 2035	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Kenosha	35,468	6.6	43,064	6.9	47,029	6.9	56,057	7.5	58,900	7.6	82,900	8.9
Milwaukee	338,605	63.1	363,653	57.9	373,048	55.2	377,729	50.4	381,000	49.4	427,500	46.2
Ozaukee	14,753	2.8	21,763	3.5	25,707	3.8	30,857	4.1	32,500	4.2	40,000	4.3
Racine	49,796	9.3	59,418	9.5	63,736	9.4	70,819	9.5	72,900	9.5	84,000	9.1
Walworth	18,544	3.5	24,789	3.9	27,620	4.1	34,505	4.6	36,700	4.8	54,400	5.9
Washington	17,385	3.2	26,716	4.2	32,977	4.9	43,843	5.8	46,600	6.0	62,800	6.8
Waukesha	61,935	11.5	88,552	14.1	105,990	15.7	135,229	18.1	142,300	18.5	174,100	18.8
Region	536,486	100.0	627,955	100.0	676,107	100.0	749,039	100.0	770,900	100.0	925,700	100.0

County	Household Change									
	1970-1980		1980-1990		1990-2000		2000-2003		2003-2035	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Kenosha	7,596	21.4	3,965	9.2	9,028	19.2	2,843	5.1	24,000	40.7
Milwaukee	25,048	7.4	9,395	2.6	4,681	1.3	3,271	0.9	46,500	12.2
Ozaukee	7,010	47.5	3,944	18.1	5,150	20.0	1,643	5.3	7,500	23.1
Racine	9,622	19.3	4,318	7.3	7,083	11.1	2,081	2.9	11,100	15.2
Walworth	6,245	33.7	2,831	11.4	6,885	24.9	2,195	6.4	17,700	48.2
Washington	9,331	53.7	6,261	23.4	10,866	32.9	2,757	6.3	16,200	34.8
Waukesha	26,617	43.0	17,438	19.7	29,239	27.6	7,071	5.2	31,800	22.3
Region	91,469	17.0	48,152	7.7	72,932	10.8	21,861	2.9	154,800	20.1

Source: U. S. Bureau of the Census; Wisconsin Department of Administration; and SEWRPC.

Table 62

ACTUAL AND PLANNED EMPLOYMENT IN THE REGION BY COUNTY: 1970-2035

County	Employment											
	Actual 1970		Actual 1980		Actual 1990		Actual 2000		Actual (Estimated) 2003		Planned 2035	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Kenosha	42,100	5.4	54,100	5.7	52,200	4.9	68,700	5.6	69,500	5.9	88,500	6.5
Milwaukee	525,200	66.9	583,200	61.5	609,800	57.4	624,600	51.1	589,800	50.0	628,900	45.9
Ozaukee	21,300	2.7	28,200	3.0	35,300	3.3	50,800	4.2	49,200	4.2	62,300	4.5
Racine	64,600	8.2	81,200	8.6	89,600	8.4	94,400	7.7	90,000	7.6	106,600	7.8
Walworth	26,400	3.4	33,500	3.5	39,900	3.8	51,800	4.2	52,300	4.4	69,400	5.1
Washington	24,300	3.1	35,200	3.7	46,100	4.3	61,700	5.0	61,800	5.3	78,900	5.8
Waukesha	81,000	10.3	132,800	14.0	189,700	17.9	270,800	22.2	266,400	22.6	333,700	24.4
Region	784,900	100.0	948,200	100.0	1,062,600	100.0	1,222,800	100.0	1,179,000	100.0	1,368,300	100.0

County	Employment Change									
	1970-1980		1980-1990		1990-2000		2000-2003		2003-2035	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Kenosha	12,000	28.5	-1,900	-3.5	16,500	31.6	800	1.2	19,000	27.3
Milwaukee	58,000	11.0	26,600	4.6	14,800	2.4	-34,800	-5.6	39,100	6.6
Ozaukee	6,900	32.4	7,100	25.2	15,500	43.9	-1,600	-3.1	13,100	26.6
Racine	16,600	25.7	8,400	10.3	4,800	5.4	-4,400	-4.7	16,600	18.4
Walworth	7,100	26.9	6,400	19.1	11,900	29.8	500	1.0	17,100	32.7
Washington	10,900	44.9	10,900	31.0	15,600	33.8	100	0.2	17,100	27.7
Waukesha	51,800	64.0	56,900	42.8	81,100	42.8	-4,400	-1.6	67,300	25.3
Region	163,300	20.8	114,400	12.1	160,200	15.1	-43,800	-3.6	189,300	16.1

Source: U. S. Bureau of Economic Analysis and SEWRPC.

SUMMARY

This chapter has presented projections for Southeastern Wisconsin Region population, household, and employment looking forward to the year 2035, and has also presented a regional land use plan which proposes to accommodate this projected growth in the regional population, households, and employment. The plan embodies the following vision for the Region over the course of the next three decades:

- Development would be directed to occur in urban service areas—areas that are intended to accommodate urban development insofar as they are served by basic urban services and facilities, including public sanitary sewer and typically also including public water supply and other urban facilities and services. New urban development would be accommodated through the infilling and renewal of existing urban service areas as well as through the orderly expansion of existing urban service areas, resulting in a relatively compact and efficient overall settlement pattern, one that is readily served by basic urban services and facilities and that maximizes the use of existing urban service and facility systems.

- Urban residential development would occur primarily at medium and high densities in predominantly residential neighborhoods as well as in more mixed-use settings. Residential neighborhoods would be designed as cohesive units, properly related to the larger community of which they are a part, and served by an interconnected internal street, bicycle-way, and pedestrian system and by a neighborhood school, park, and shopping area. In addition to neighborhood development, other residential development would occur in settings having an even greater mixture of land uses. Examples of such mixed-use settings include dwellings above the ground floor of commercial uses and residential structures intermixed with, or located adjacent to, compatible commercial, institutional, or civic uses. The bulk of residential development would occur at medium or higher densities, facilitating the efficient provision of public utilities and services and moderating the amount of open space required to be converted to urban use.

- Lands beyond planned urban service areas would be retained in essentially rural use, with highly productive farmlands preserved and with development limited to overall densities, and accommodated through designs, that are consistent with the maintenance of rural character and consistent as well with the capacities of existing street and other public facility and service systems in those areas.

- The land development needs of the Region would be met while preserving the best remaining elements of the natural resource base—most of which are located within environmental corridors and isolated natural resource areas—and preserving productive farmland, resulting in an interconnected, integrated system of open space lands within the Region.

The regional land use plan was designed to accommodate the intermediate projection of population, household, and employment levels for the Region. Under the plan, the resident population of the Region would increase by 344,800 persons, or 18 percent, from 1,931,200 persons in 2000 to 2,276,000 persons in 2035. The number of households in the Region would increase by 176,700, or 24 percent, from 749,000 households in 2000 to 925,700 households in 2035. Households would continue to increase at a faster relative rate than the regional population, with average household sizes continuing to decline somewhat. Under the regional plan, total employment in the Region would increase by 145,500 jobs, or 12 percent, from 1,222,800 in 2000 to 1,368,300 jobs in 2035, with job types changing as the Region continues to experience a shift from a manufacturing-based to a service-based economy.

Chapter VI

TRAVEL SIMULATION MODELS

Transportation system plans prepared without quantitative test and evaluation are little more than policy driven, intuitively created street patterns and transit networks. Unless transportation system plans are subject to quantitative test and evaluation including preparation of forecasts of the amount of travel and traffic the transportation system may be expected to carry, the adequacy of the plans to meet existing and future travel needs remains in doubt.

Two of the eight basic principles, set forth in Chapter I of this report, upon which this regional transportation plan review and update is based, are as follows:

- Highway facilities, transit facilities, bicycle and pedestrian facilities and travel demand and transportation systems management measures should be planned together. Transit facilities, bicycle and pedestrian facilities, and travel demand and transportation systems management measures have the potential to affect, and reduce future highway traffic and improvement needs. Their potential to address highway traffic volume and congestion should be quantitatively tested and determined, and highway improvements should then be considered to address highway traffic and congestion which may not be expected to be alleviated by transit facilities, bicycle and pedestrian facilities, or travel demand and transportation systems management measures.

- Highway facilities should be planned as an integrated system, as should transit facilities. The capacities of each link in each system should be carefully fitted to travel or traffic loads, and the effects of each proposed facility on the remainder of the system should be quantitatively tested.

These principles require the quantitative testing and evaluation of alternative transportation system plans, through the development and application of travel simulation models.

BASIC CONCEPTS OF TRAVEL SIMULATION MODELS

The simulation of existing and future travel demand through travel simulation models is a complex procedure requiring development and application of a variety of mathematical and statistical techniques. The simulation of travel and traffic is based upon the premise that the magnitude and pattern of travel is a stable function of the characteristics of the land use pattern and of the transportation system, with the term land use broadly referring not only to land use type and intensity, but also to population, household, and employment levels and characteristics. In travel simulation modeling, those aspects and characteristics of the land use pattern and of the highway and public transit system which affect the magnitude and distribution of travel demand are identified,

quantified, and correlated through the analysis of detailed travel, land use, and transportation system survey data. It has been demonstrated that the relationships between travel and land use and transportation system characteristics remain reasonably stable over time, thus enabling the forecast of future travel and traffic patterns based upon postulated future land use patterns and transportation system configurations.

Typically, the sequence of travel simulation occurs in four steps, although there are variations which include additional steps such as time-of-day of travel, and models which combine some steps, or combine all steps into a single model:

1. Trip generation, in which the total number of trips generated in each subarea of the planning area for the time period under analysis is determined by using relationships established to exist between land use and travel by analyses of the land use and travel inventory data. The output from this step is the total number of trip ends, that is, trips entering and leaving each subarea of the study area.

2. Trip distribution, in which the trips generated in each subarea are linked with trip ends in other subareas, thereby defining the universe of trips by point of origin and point of destination. The output from this step is the number of trips made between each subarea pair.

3. Modal choice, in which the number of trips between each subarea pair is divided among the travel modes, primarily public transit and automobile. The output of this step is the number of trips made between each subarea pair by each mode.

4. Traffic assignment, in which the subarea transit trips are assigned to existing or proposed alternative future transit system networks and the subarea vehicle trips are assigned to existing or proposed alternative arterial street and highway facility networks. The output of this step is the number of people utilizing the routes and facilities of the existing or proposed public transit system and the number of vehicles utilizing each segment of the existing or proposed public transit and arterial street and highway systems.

The result of the four-step travel simulation process is a complete description of the use of an existing or proposed transportation system consisting of both arterial streets and highways and transit lines.

HISTORY OF SOUTHEASTERN WISCONSIN TRAVEL SIMULATION MODELS

About 45 years ago, travel simulation models were first developed and applied in transportation planning. The first time that travel simulation models were developed and applied on a regional scale in Wisconsin was over 40 years ago during the initial regional land use-transportation planning study for Southeastern Wisconsin conducted by the Commission in the early to mid 1960's.[1] These models were developed by using an extensive data base developed from land use, socio-economic, and travel inventories conducted by the Commission. A massive travel survey was conducted in the late spring of 1963 to obtain data describing the amount, kind, and distribution of travel occurring throughout the Region on an average weekday and the characteristics of the tripmakers. Three separate travel surveys were conducted, including a resident household travel survey, a resident truck travel survey, and an external travel survey. The resident household travel survey was the largest of the surveys, providing an inventory of the travel habits and patterns and socio-economic characteristics of over 20,000 households, or about 4 percent of the Region's households. The truck travel survey provided an inventory of the travel of over 7,500 commercial trucks, or over 12 percent of the Region's registered commercial trucks. In the external travel survey, nearly 75,000 of the 101,500 vehicles crossing the boundaries of the Region, or about 74 percent, were stopped and interviewed. The extensive travel inventory data were combined for the purposes of travel model development with 1963 land use inventory data and 1960 U.S. Census data on population and housing.

[1] *See SEWRPC Planning Report No. 7,* The Regional Land Use-Transportation Study, *Volume Two,* Forecasts and Alternative Plans: 1990, *June 1966.*

The development of the Commission's original design year 1990 regional transportation system plan was in part based upon quantitative analyses of the performance of alternative highway and transit systems permitted by the battery of travel simulation models developed under that study. This first generation battery of travel simulation models was subsequently applied in detailed jurisdictional highway planning studies for each of the seven counties in the Region, freeway and other arterial highway location and design studies, a preliminary engineering study of a busway in the Milwaukee east-west corridor, and other transportation studies.

As part of the preparation of the design year 2000 second generation regional transportation plan in the 1970's, this initial battery of Commission travel simulation models was reviewed and refined.[2] This review and refinement of the initial models was possible because the Commission conducted a new regional inventory of travel in 1972. The 1972 surveys included all the basic origin-destination surveys conducted in 1963, including household, truck, and external travel surveys, and also a public transit user survey. The household travel survey included 17,500 households, or about 3 percent of the Region's households. About 5 percent of all commercial trucks registered within the Region were surveyed under the truck travel inventory. In the external travel survey, interviewers at roadside stations stopped and interviewed about 80,300 of the 130,300 motor vehicles crossing the Region's boundaries, or about 59 percent. About 25 percent of all weekday transit riders, representing about 50,000 transit trips, were surveyed under the transit travel survey. Land use and employment data for the Region were also updated to the year 1970 and 1970 U.S. Census data was collated and analyzed, as was done in 1963, for use in the review and refinement of the models. These refinements included increasing the number of traffic analysis zones in the Region from 619 to 1,220 zones; use of cross-classification in place of linear regression for trip production forecasting; use of a post-trip distribution logit mode choice model in place of a pre-trip distribution regression equation mode choice model; calibration of trip production and mode choice models with household rather than zonal data; and development of a vehicle ownership forecasting model.

The first step in this model review and refinement process consisted of an analysis of the adequacy to predict actual 1972 travel of the original travel simulation model battery and of each individual model developed in the initial study. The Commission's original travel simulation models, calibrated using 1963 home interview survey data, were shown through this testing to estimate accurately travel and traffic in Southeastern Wisconsin in 1972. This successful testing of the initial study procedures constituted an important validation of the accuracy of those procedures. The testing included a test of each individual model, as well as a comparison of the final model estimate of transit ridership and highway traffic to actual counts of transit ridership and highway traffic. Although the validity of the initial study procedures was proven through these analyses, an investigation of alternative modeling strategies was conducted and, as applicable, refined techniques were incorporated into a second-generation battery of travel simulation models.

This refined second-generation battery of travel simulation models was used in the design year 2000 regional land use-transportation plan reevaluation effort completed in 1978, and in several short-and long-range highway and transit planning studies. One such study which involved extensive application of travel simulation models was the areawide rapid transit system planning study completed in 1982, which extensively evaluated alternative rapid transit systems for the Milwaukee area.[3] Another such study which involved extensive application of the models was the Northwest Corridor Rapid Transit Study, an in-depth analysis of light-rail and express bus alternatives in the corridor and which constituted a transit alternatives analysis under the review of the Federal Transit Administration.[4]

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[2] *See SEWRPC Planning Report No. 25,* A Regional Land Use Plan and a Regional Transportation Plan for Southeastern Wisconsin: 2000, *Volume Two,* Alternative and Recommended Plans, *1978.*

[3] *See SEWRPC Planning Report No. 33,* A Primary Transit System Plan for the Milwaukee Area, *June 1982.*

[4] *See SEWRPC Community Assistance Planning Report No. 150,* A Rapid Transit Facility Plan for the Milwaukee Northwest Corridor, *January 1988, and the* Milwaukee Northwest Corridor Rapid Transit Study, *Report No. 2, "Travel Simulation Models," 1986.*

As part of the preparation of the third-generation design year 2010 regional transportation plan in the early 1990's, the refined second generation battery of Commission travel simulation models was reviewed and refined.[5] A third regional inventory of travel was conducted in the fall of 1991 and spring of 1992. The 1991-1992 survey included all the basic travel surveys conducted in 1972, including household, truck, external cordon, and public transit travel surveys. The household travel and public transit user surveys were conducted in the fall of 1991; the external and truck travel surveys were conducted in the spring of 1992. The household survey involved about 17,500 households, or about 2.5 percent of the Region's households. About 5 percent of all commercial trucks within the Region were sampled under the truck survey. In the external travel survey, interviewers at roadside stations stopped and distributed postal card interview forms to about 160,000 of the 230,000 motor vehicles crossing the Region's boundaries. Approximately 30 percent of the vehicles surveyed returned the survey forms, providing about a 20 percent sample. About 10 percent of average weekday transit riders or over 15,000 transit riders were surveyed. Land use and employment data for the Region were updated to the year 1990 and 1990 U.S. Census data was collated and analyzed for use in the review and refinement of the models.

The first step in the travel model review and refinement process again consisted of an analysis of the adequacy of the travel simulation model battery and of each individual model to predict actual current year 1991 travel. The Commission's second-generation travel simulation models, developed in the early 1970's with 1972 data, were shown through this testing, to estimate accurately travel in Southeastern Wisconsin in 1991—nearly 20 years later. This successful testing of the travel modeling procedures constituted an important validation of the accuracy of those procedures. Although the validity of the second-generation travel modeling procedures developed in the mid-1970s was proven through these analyses, an investigation of alternative modeling strategies was again conducted and, as applicable, refined techniques were incorporated into a refined battery of travel and traffic simulation models. These refinements included increasing the number of traffic analysis zones in the Region from 1,220 to 1,431; use of trip rates in place of linear regression equations for person trip attraction forecasting; the inclusion of travel cost in addition to travel time in the gravity model used for trip distribution forecasting; the development of a mode choice model for work trips which would forecast choice between public transit, drive alone, and shared ride alternatives; use of a vehicle occupancy model based on cross-classification; and development of alternative means to forecast peak hour and period travel as well as travel by time period of the day.

This refined third-generation battery of travel simulation models was used in the Kenosha-Racine-Milwaukee corridor commuter rail transit alternatives analysis, the Milwaukee east-west corridor study, the regional freeway system reconstruction study, and the update and extension of the regional transportation plan to the year 2020. The models were also applied several times throughout the 1990's and early 2000's to demonstrate the conformity of the regional transportation plan and improvement program to the State of Wisconsin implementation plan to attain ozone air quality standards. Six of the seven counties in Southeastern Wisconsin are designated as ozone nonattainment areas, and pursuant to Federal regulations, the Commission's travel simulation models must meet a higher level of requirements than other metropolitan planning organizations and are subject to review and approval by the U.S. Department of Transportation. The U.S. Department of Transportation reviewed the Commission's travel simulation models and modeling process in 1997, and concluded that the Commission's third-general battery of travel simulation models substantially met the Federal requirements for travel simulation modeling.

The remainder of this chapter describes the review and refinement of this third-generation battery of travel simulation models, and the new fourth-generation battery of travel simulation models. First, the current third-generation battery of travel simulation models developed in the early 1990's with 1990-1992 data are described, and the ability of the third-generation models to predict year 2001 actual travel and traffic is documented. Next, the third-generation model battery is compared to the travel simulation models used by regional planning agencies nationwide. Based upon this peer review of the Commission third-generation models to the state of the practice of

[5] *See SEWRPC Planning Report No. 41,* A Regional Transportation System Plan for Southeastern Wisconsin: 2010*, 1994.*

travel simulation models nationwide, and the results of the testing of the ability of the third-generation models to predict current travel, the fourth-generation battery of travel simulation models is presented, incorporating refinements to the third-generation models. Lastly, the validation of the ability of the fourth-generation models to predict current year 2001 travel is presented.

The review and refinement of the third-generation models and the development of the fourth-generation models was possible, because a fourth regional inventory of travel was conducted in 2001 and 2002. The 2001 and 2002 survey included all the basic surveys conducted in 1963, 1972, and 1991, including household, truck, public transit, and external travel surveys. The household survey conducted in fall 2001 involved about 17,000 households, or over 2 percent of the Region's households. About 2,000 commercial trucks within the Region were sampled under the truck survey conducted in spring 2002. In the external travel survey conducted in spring 2002, about 150,000 of the 350,000 vehicles crossing the region's boundaries were surveyed, with 20 percent of the vehicles surveyed returning survey forms, providing about a 10 percent sample. About 7 percent of weekday public transit riders or over 10,000 transit riders were surveyed in Spring 2001. Land use and employment data were updated to the year 2000 and year 2000 U.S. Census data was collated for use in model development and application.

DESCRIPTION AND VALIDATION OF THIRD-GENERATION TRAVEL SIMULATION MODELS

This section of the report describes in summary form the Commission's third-generation travel simulation models, and presents the results of a review of the ability of the third-generation models developed and calibrated in the early 1990's to predict actual year 2001 travel and traffic. The third-generation models are described in detail in Chapter VII, "Travel Simulation Models", of SEWRPC Planning Report No. 41, *A Regional Transportation System Plan for Southeastern Wisconsin*.

Classification of Travel

The Commission's battery of travel simulation models, and indeed travel simulation models for all urban regions, are based upon a classification of the different components of travel within an urban region. This classification of travel is necessary because different types of trips exhibit different characteristics and, as a consequence, require different simulation techniques. In addition, some of these types of trips represent very small proportions of total travel in an urban region. The classification of trips and the determination of the relative proportion of total travel they represent allow travel simulation modeling resources to be focused on those types of trips which represent the greater proportions of travel.

As shown in Table 63, the first major division of trips involves the distinction between internal and external trips. Internal trips are defined as those trips which have both ends within the Southeastern Wisconsin Region. External trips are defined as those trips which have one or both ends outside of the Region. As internal travel has consistently, since 1963, accounted for over 95 percent of the person and vehicle trips observed on an average weekday, the primary emphasis in the travel modeling process is on internal trips. External trips do, however, have important effects on the use of facilities in certain travel corridors, particularly near the boundaries of the Region.

Among internal travel a further classification is made between commercial truck and personal travel. The vast majority of total weekday internal travel—nearly 95 percent—belongs to the category of internal personal travel. Internal personal travel may be further classified into travel by resident households and resident group-quartered persons. Travel by group-quartered persons of the Region is separated for special consideration because of the unique travel habits and patterns exhibited by these persons. Group-quartered persons are defined as those persons residing in dormitories, convents, homes for the aged, and similar group residences. Group-quartered person trips have consistently accounted for substantially less than 1 percent of the total travel within the Region since 1963.

The primary emphasis of travel simulation models in Southeastern Wisconsin and all urban regions is on internal resident household travel. These trips represent nearly 90 percent of total travel made within the Southeastern

Table 63

TRIP CLASSIFICATION AND THIRD-GENERATION TRAVEL SIMULATION MODEL PROCEDURE

Trip Classification					Simulation Model				
					Trip Generation				
Internal or External	Type of Travel	Tripmaker	Trip Purpose	Percent of Total Trips[a]	Production	Attraction	Trip Distribution	Modal Split	Traffic Assignment
Internal	Personal Travel	Resident Households	Home-based work	21	Cross-classification analysis	Trip rate analysis	Gravity model	Logit analysis	Minimum path
			Home-based shopping	12					
			Home-based other (excluding school)	27					
			Nonhome-based (excluding school)	18					
			School						
			Central Milwaukee area colleges and universities[b]	10	Factor existing total person trip levels and adjust existing patterns			Logit analysis	
			Other		Factor existing trip levels and adjust existing patterns by mode				
		Group Quartered Residents	All	[c] --	Factor existing trip levels and adjust existing patterns by mode				
	Commercial Truck Travel	Resident Trucks	All	7	Multiple Regression Analysis		Fratar Factor Model		
External	Personal and Commercial Truck Travel	Resident and Nonresident personal vehicles and commercial trucks	All	5	Factor existing trip levels		Fratar Factor Model		

[a] *Percentage of total travel based upon 1991 travel surveys.*

[b] *Includes University of Wisconsin-Milwaukee, Marquette University, Milwaukee Area Technical College, and Milwaukee School of Engineering.*

[c] *Substantially less than one percent.*

Source: SEWRPC.

Wisconsin Region on an average weekday. This group of trips may be further subdivided by trip purpose. For the third-generation models, the trip purposes used were home-based work; home-based shopping; home-based other (excluding school); nonhome-based (excluding school); and school trips. Home-based trips are defined as those trips having one end located at the residence of the tripmaker. The purpose of a home-based trip is thus determined by the nonhome end of the trip as either work, shopping, or other (including personal business, medical-dental, social-eat meal, recreation, and serve passenger purposes). Nonhome-based trips are defined as those trips having neither end located at the place of residence of the tripmaker and can be made for any purpose except school. Separate consideration of home-based and nonhome-based school trips is necessary because of the constraints imposed upon travel patterns by elementary and junior and senior high school service area boundaries. Trips to and from all schools, elementary, junior and senior high, vocational and technical schools, and colleges and universities, have consistently represented approximately 10 percent of all travel observed in the Region on an average weekday.

Table 63 also indicates the specific modeling techniques used for each type of trip in the Commission's third-generation travel simulation model battery. Following a discussion of the geographic aggregation system utilized in the Commission's third-generation battery of travel simulation models, each of the Commission's third-generation models will be described.

Geographic Aggregation System

All travel simulation models are developed and/or applied by subarea of the region under study. The greater the degree of homogeneity of the land uses in the subareas and the closer the replication of subarea access to the transportation system, the better able the models are to accurately simulate actual travel and traffic.

The basic unit of geographic identification used by the Commission for the collection and analysis of land use, demographic and economic, and travel inventory data is the U.S. Public Land Survey quarter-section, consisting of an approximately one-half mile on a side rectilinear area containing approximately 160 acres. The principal system of region subareas used in the third-generation travel simulation models was a system of 1,431 traffic

analysis zones, composed of entire quarter-sections, combinations of quarter-sections, or groupings of city blocks smaller than a quarter-section—the latter principally in the Milwaukee, Racine, and Kenosha central business districts (CBDs). The traffic analysis zones, as shown on Map 45, range in area from 0.04 square mile in the Milwaukee central business district to 36 square miles in the more sparsely settled portions of the Region.

Aggregations of these traffic analysis zones are used from time-to-time for planning analysis purposes, such as travel pattern analysis. One such aggregation system of planning analysis area is shown on Map 1. These analysis areas are intended to represent rational areas for comprehensive urban planning purposes and are generally intended to be composed of a number of "neighborhoods" grouped to form "communities," which may consist of smaller minor civil divisions—cities, villages, and towns—groupings of the smallest minor civil divisions, or subareas of the larger minor civil divisions.

Personal Vehicle Availability Model

The availability of a personal vehicle (automobile, van, or truck) is a significant variable in travel simulation modeling, influencing not only the number of trips made by a household, or trip generation, but also the choice of mode. Under the Commission's third-generation battery of travel simulation models, household vehicle availability was determined with two equations developed through multiple regression analyses with 1991 household travel survey, 1990 U.S. Bureau of Census data, and 1990 Commission land use data. The model for household vehicle availability in central Milwaukee County expresses household vehicle availability as a function of household income and transit accessibility. For the remainder of the Region, the model expresses household vehicle availability as a function of household income, household size, residential density, and transit accessibility. A household stratification model was also developed and applied to forecast the distribution of households by both vehicle availability and household size, specifically, the distribution of households with zero, one, or two or more vehicles available by household size—one person, two persons, three or four persons, and five or more persons.

The ability of the third-generation travel simulation model for personal vehicle availability to predict year 2000 vehicle availability was determined by applying the third-generation model with year 2000 socio-economic and land use data, and year 2001 travel survey and transportation system network data. Between 1990 and 2000 regional personal vehicle availability is estimated to have increased from 1,095,730 to 1,227,050 personal vehicles, an increase of 131,320 vehicles, or 12 percent. As shown in Table 64, the third-generation model was able to accurately estimate this change in vehicle availability, as model-estimated year 2000 vehicle availability of 1,213,290 personal vehicles was only 13,760 personal vehicles or 1.1 percent less than estimated actual vehicle availability.

The third-generation model-estimated year 2000 distribution of households by vehicle availability and household size is compared to the estimated actual year 2000 distribution of households in Table 65. The third-generation model calibrated with 1990 and 1991 data is able to closely predict the distribution of households by vehicle availability and household size within the Region 10 years later in 2000.

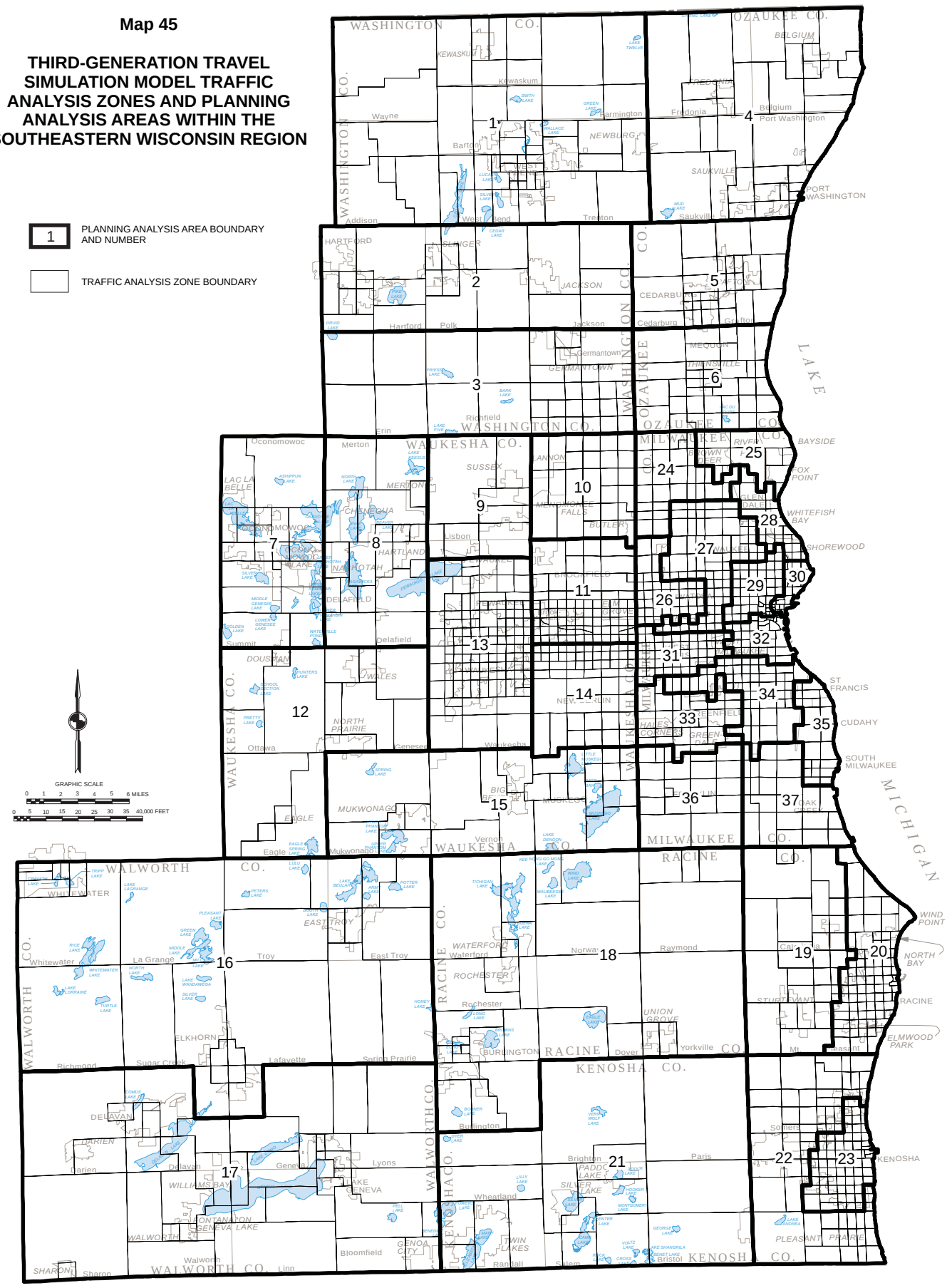
Trip Generation Model

The first major step in the Commission's third-generation travel simulation models is trip generation whereby the total number of trip ends generated within each zone of the study area is determined through the identification and quantification of relationships between travel and land use. The third-generation trip generation models developed by the Commission with 1991 travel survey data for internal regional travel by resident households of the Region use cross-classification analysis for trip productions and trip attractions for all trip purposes except school trips.

Internal home-based and nonhome-based trips by the resident households in the Region for all purposes except school constitute the vast majority of daily trips made within the Region, nearly 80 percent. The production of these home-based and nonhome-based trips was analyzed and forecast under the third-generation models through the use of cross-classification analysis. Home-based trips were stratified into trip purpose categories of home-based work, home-based shopping, and home-based other. Cross-classification models were developed for each

Map 45

THIRD-GENERATION TRAVEL SIMULATION MODEL TRAFFIC ANALYSIS ZONES AND PLANNING ANALYSIS AREAS WITHIN THE SOUTHEASTERN WISCONSIN REGION



Source: SEWRPC.

Table 64

COMPARISON OF ESTIMATED ACTUAL AND TRAVEL MODEL ESTIMATED PERSONAL VEHICLE AVAILABILITY: 2000

County	1990 Census Estimate	2000 Census Estimate	Percent Change 1990-2000	2000 Travel Model Estimate[a]	Percent Difference 2000 Census and Travel Model Estimates[b]
Kenosha	81,460	98,970	21.5	97,480	-1.5
Milwaukee	513,720	526,340	2.5	517,170	-1.7
Ozaukee	51,940	60,440	16.4	61,990	2.5
Racine	111,080	123,940	11.6	122,470	-1.2
Walworth	50,460	65,690	30.2	63,230	-3.7
Washington	67,400	86,320	28.1	84,780	-1.9
Waukesha	219,670	265,350	20.8	266,170	0.3
Region	1,095,730	1,227,050	12.0	1,213,290	-1.1

[a]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

[b]*Percent difference* $= \frac{(2000\ Model\ Estimate - 2000\ Census\ Estimate)}{2000\ Census\ Estimate} \times 100$

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

Table 65

COMPARISON OF ESTIMATED ACTUAL AND TRAVEL MODEL ESTIMATED DISTRIBUTION OF SOUTHEASTERN WISCONSIN REGION HOUSEHOLDS BY VEHICLES AVAILABLE AND HOUSEHOLD SIZE: YEAR 2000

U.S. Bureau of Census Estimate					
	Household Size				
Vehicles Available	One	Two	Three to Four	Five or More	Total
None	6.0	2.0	2.0	0.7	10.7
One	18.8	9.1	5.3	1.8	35.0
Two or More	3.0	21.4	22.3	7.6	54.3
Total	27.8	32.5	29.6	10.1	100.0

Model Estimate[a]					
	Household Size				
Vehicles Available	One	Two	Three to Four	Five or More	Total
None	5.0	2.7	2.6	1.0	11.2
One	13.8	10.8	7.7	2.3	34.6
Two or More	7.6	18.4	21.4	6.7	54.2
Total	26.4	31.8	31.8	10.0	100.0

[a]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

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

trip purpose for the Milwaukee urban area, the Racine urban area, the Kenosha urban area, and the remaining area within the Region. Household automobile availability and household size were selected to quantify the level of tripmaking in the third-generation trip production model, and the number of jobs by type and number of households were used to quantify tripmaking in the trip attraction model. The ability of the third-generation trip production and attraction models to simulate year 2001 internal person tripmaking was investigated by comparing to actual year 2001 travel survey trip generation data the results of the application of the third-generation models using year 2000 land use data. As shown in Table 66, the travel surveys conducted by the Commission indicated that resident household trip generation within Southeastern Wisconsin increased by about 10 percent from 1991 to 2001. The ability of the trip generation models developed in 1991 to predict these changes in regional trip generation accurately is also demonstrated in Table 66. Model-estimated year 2001 region resident household trip generation of 5,287,700 trips on an average weekday was only 58,700 trips, or 1.1 percent less than travel survey estimated actual trips of 5,346,400 trips in 2001.

Table 66

COMPARISON OF SURVEY ESTIMATED ACTUAL AND THIRD-GENERATION MODEL ESTIMATED INTERNAL RESIDENT HOUSEHOLD TRIP GENERATION WITHIN THE SOUTHEASTERN WISCONSIN REGION: 1991 AND 2001

Trip Purpose	1991 Survey Estimated	2001 Survey Estimated	Percent Change 1991-2001	2001 Model Estimated[a]	Percent Difference[b]
Home-Based Work	1,265,500	1,435,400	13.4	1,496,800	4.3
Home-Based Shopping	796,100	769,300	-3.4	843,900	9.7
Home-Based Other	1,682,000	1,967,700	17.0	1,751,800	-11.0
Nonhome-Based	1,122,800	1,211,000	7.9	1,195,200	-1.3
Total	4,866,400	5,346,400	10.4	5,287,700	-1.1

[a]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

[b]$\text{Percent Difference} = \dfrac{\text{2001 Model Estimate - 2001 Survey Estimate}}{\text{2001 Survey Estimate}} \times 100$

Source: SEWRPC.

The generation—and distribution—of school trips in the third-generation travel models was accomplished by factoring existing school travel volumes and patterns. Such separate consideration of school trips was necessitated by the limitations imposed by fixed elementary and junior and senior high school service area boundaries. Trips to and from all schools, including elementary, junior and senior high, vocational and technical schools, and colleges and universities, amounted to about 10 percent of total trips generated within the Region on an average weekday in 1991. Growth factors were applied by mode—automobile, school bus, and public transit—to the observed 1991 trip tables of elementary and junior and senior high school trips. The growth factors were based upon the forecast changes in population, and were adjusted to account for potential changes in school service boundaries and the construction of new schools. With respect to trips to universities and colleges such as the University of Wisconsin-Milwaukee, Marquette University, Milwaukee Area Technical College, and Milwaukee School of Engineering, the growth factor procedure was applied to total person, rather than to individual mode travel volume and patterns, and the growth factor was based on projected enrollment. A mode choice model, described later in this report then was used to divide the total person trips into those using public transit and those using the automobile.

The ability of the third-generation model procedures to predict the future generation of school trips can be discerned by a comparison of the model estimated and travel survey estimated trip generation for 2001. The travel surveys indicated that the number of school trips in the Region on an average weekday increased by 5.1 percent between 1991 and 2001, from 624,100 to 655,900, respectively. These totals represent all school trips made on an average weekday by personal vehicle driver or passenger, public transit or school bus. Using the third-generation travel models, a 2001 estimate of 599,100 school trips was derived, a total approximately 8.7 percent less than that observed.

The generation—and distribution—of internal personal vehicle trips by group-quartered persons was forecast in the third-generation travel models by the application of growth factors, reflecting the anticipated change in the number of group-quartered persons by zone of residence. The travel surveys indicated that, from 1991 to 2001, average weekday personal vehicle travel by group-quartered persons decreased from 16,700 trips to 9,100 trips, due to a redefinition by the U.S. Bureau of Census of the group-quartered population. Due to this redefinition of group-quartered persons, the third-generation models developed in 1991 predicted a total of 6,400 personal vehicle trips by group-quartered persons on an average weekday in 2001.

Travel internal to the Region by commercial trucks registered within the Region constituted in 1991 about 7 percent of total tripmaking within the Region on an average weekday and, approximately 10 percent of total vehicle trips generated within the Region on an average weekday. In the third-generation travel simulation models

the generation—and distribution—of truck trips was accomplished by factoring the existing volume and pattern of truck trips. The forecast future generation of truck trips was accomplished by the use of multiple linear regression analysis relating truck trips to population and employment.

The ability of the commercial truck trip generation model utilized in the third-generation travel model battery to predict year 2001 truck travel was evaluated by using data from the 2001 travel surveys. The travel surveys indicated that truck travel within the Region had increased from 520,100 to 582,500 trips per average weekday over the past decade. The third-generation travel forecasting techniques, as developed in 1991, predicted this increase in regional truck travel within 3.8 percent of the actual number of truck trips observed in the 2001 travel survey.

External trips comprised about 5 percent of total tripmaking and total vehicle trips within the Region in 1991. In the third-generation travel simulation models, the generation—and distribution—of external travel was forecast by extrapolating the existing 1991 pattern of external tripmaking by applying growth factors to the 1991 trips on the basis of the forecast changes in households and employment at the production and attraction ends of the trips, respectively. In addition, third-generation model forecast external travel was compared to, and adjusted by, statewide external travel forecasts prepared by the Wisconsin Department of Transportation.

The ability of this forecasting technique to forecast external tripmaking within the Region in 2001 was tested by using the travel inventory data collected by the Commission in 2001. Over the past decade, external vehicle travel affecting the Region was estimated to have increased by approximately 30.6 percent, from 273,700 vehicle trips per average weekday in 1991 to 357,500 trips in 2001. Comparison of observed and model forecast 2001 external travel indicated that the third-generation model procedures developed modestly underestimated the increase in external travel by 30,000 trips, or 8.4 percent, predicting an increase to 327,500 trips.

Trip Distribution

The second major step in the travel simulation process is trip distribution whereby the number of trips between each zonal pair is determined. The input to this step from trip generation includes the number of trips ends produced by, or attracted to, each zone by resident households of the Southeastern Wisconsin Region for home-based work, home-based shopping, home-based other, and nonhome-based trips.

The third-generation model battery's trip distribution procedure was the gravity model, which is the most widely accepted and used trip distribution model. In the gravity model, the number of trips between two zones in the study area, is a function of the number of trip ends in each zone and their spatial separation measured in terms of travel time, distance, and/or cost. The third-generation model used both travel time (peak hour for work trips and off-peak for other trips) and travel cost as the measure of spatial separation. The third-generation trip distribution models were developed with 1991 travel survey and transportation system network data. Individual gravity models were calibrated for home-based work, home-based shopping, home-based other and nonhome-based trip purposes for resident household internal trips. As noted earlier, the distribution of internal school trips, group-quartered person trips, internal truck trips, and external trips was accomplished by factoring and adjusting then existing 1991 trip travel patterns.

The ability of the third-generation gravity trip distribution models to predict changes to the year 2001 in trip distribution, as measured by average trip lengths and trip length frequency distribution, was determined through the application of the models with year 2001 data. Average trip length between 1991 and 2001 increased from 12.3 minutes to 13.7 minutes, or about 11.4 percent, and from 6.3 miles to 6.9 miles, or about 9.5 percent. As shown in Table 67, the average trip length in 2001 was predicted by the third-generation models within 6.6 percent in terms of travel time and 4.3 percent in terms of travel distance, an adequate degree of accuracy considering that the actual estimated trip lengths were estimates derived from travel surveys.

Modal Choice

The third major step in the travel simulation process is modal choice, or split, whereby the total number of trips traveling between each pair of traffic analysis zones by trip purpose is divided on the basis of travel mode used.

Table 67

COMPARISON OF SURVEY ESTIMATED ACTUAL AND THIRD-GENERATION MODEL ESTIMATED AVERAGE TRIP LENGTH FOR INTERNAL RESIDENT HOUSEHOLD PERSON TRAVEL WITHIN THE REGION: 1991 AND 2001

Trip Purpose	1991 Survey Estimated Trip Length		2001 Survey Estimated Trip Length		Percent Change 1991 - 2001		2001 Model Estimated[a] Trip Length		Percent Difference[b]	
	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles	Minutes	Miles
Home-Based Work	16.9	9.1	19.1	9.8	13.0	7.7	16.6	8.5	-13.1	-13.3
Home-Based Shopping	9.1	4.3	9.6	4.7	5.5	9.3	10.0	5.1	4.2	8.5
Home-Based Other	10.9	5.4	11.6	6.0	6.4	11.1	11.6	6.2	0.0	3.3
Nonhome-Based	11.6	5.7	12.3	5.9	6.0	3.5	11.7	6.0	-4.9	1.7
Average	12.3	6.3	13.7	6.9	11.4	9.5	12.8	6.6	-6.6	-4.3

[a]Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.

[b]Percent Difference $= \frac{\text{2001 Model Estimate - 2001 Survey Estimate}}{\text{2001 Survey Estimate}} \times 100$

Source: SEWRPC.

Primarily, this step involves the division of internal person trips between the two major modes of travel, public transit and the private automobile. The determination of modal choice is essentially an evaluation of the potential demand for public transit service. The modal choice step must also determine for each zone-to-zone interchange those auto trips which will drive alone and those which will carpool, or "share a ride," and thus determine the average number of persons per automobile trip. Both automobile vehicle trips and transit person trips are determined in this step as necessary inputs to the final traffic assignment step of the travel simulation process.

The third-generation modal choice models developed with 1991 travel survey and transportation network data use logit analysis for the trip purposes of home-based work, home-based shopping and other purposes combined, nonhome-based, and home-based school (trips to and from colleges and universities). The modal choice model calibrated for the home-based work trip purpose expresses the probability of mode choice as a function of household automobile availability, in-vehicle travel time, out-of-vehicle travel time, and out-of-pocket cost differences between three modes: public transit, drive alone, and shared ride. The models calibrated for home-based shopping and other trip purposes and for home-based school trip purposes express the probability of mode choice as a function of household automobile availability, in-vehicle travel time, out-of-vehicle travel time, and out-of-pocket cost differences between automobile and transit modes. The nonhome-based mode choice model expresses the probability of mode choice as a function of in-vehicle time, out-of-vehicle travel time, and out-of-pocket cost differences between automobile and transit modes. An automobile occupancy model is used to convert total automobile person trips to vehicle trips for home-based shopping and other trips, nonhome-based trips and home-based school trips based on household size and personal vehicle availability.

The ability of the third-generation modal choice model calibrated with 1991 travel survey and transportation network data to predict changes to the year 2001 in mode choice and transit ridership was determined by applying the models with year 2001 data. A comparison of the average weekday linked passenger trips from origin to destination and unlinked passenger trips, or boarding passengers, observed in the Region during 2001 versus those estimated by the third-generation model for 2001 is presented in Table 68. About 243,400 average weekday boarding passengers were simulated for 2001 by the models, or about 23.7 percent greater than the 196,800 average weekday boarding passengers observed during 2001. About 175,500 linked passenger trips from trip origin to destination were simulated by the models for 2001, or about 27.0 percent greater than the 138,200 linked passenger trips observed in 2001. The model estimated transfer ratio of 1.39 transfers per linked revenue trip simulated on the transit network for 2001 was only slightly less than the transfer ratio of 1.42 transfers per trip observed for the same routes in 2001. A comparison of the linked passenger trip transit ridership by trip purpose as estimated by travel surveys and travel models for the year 2001 is shown in Table 69. A comparison of the

Table 68

COMPARISON OF ESTIMATED ACTUAL AND THIRD-GENERATION MODEL ESTIMATED AVERAGE WEEKDAY TRANSIT RIDERSHIP IN THE SOUTHEASTERN WISCONSIN REGION AREA: 2001

Trip Category	Average Weekday Transit Passengers		
	2001 Estimated[a]	2001 Model Estimated[b]	Percent Difference
Linked Revenue Passenger Trips	138,200	175,500	27.0
Unlinked Passenger Trips (boarding passengers)	196,800	243,400	23.7
Boards per Passenger Trip	1.42	1.39	-2.1

[a]*Does not include 4,000 transit trips made by disabled individuals on complimentary paratransit service.*

[b]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

Source: SEWRPC.

Table 69

COMPARISON OF ESTIMATED ACTUAL AND THIRD-GENERATION MODEL ESTIMATED AVERAGE WEEKDAY LINKED PASSENGER TRIP TRANSIT RIDERSHIP BY TRIP PURPOSE IN THE SOUTHEASTERN WISCONSIN REGION: 2001

Trip Category	Linked Transit Revenue Passenger Trips		
	Survey Estimated[a] 2001	Model Estimated[b] 2001	Percent Difference
Home-Based Work	47,600	50,800	6.7
Home-Based Shopping	13,700	17,300	26.3
Home-Based Other	26,000	34,900	34.2
Nonhome-Based	13,800	15,300	10.7
School[c]	37,100	57,200	54.2
Total	138,200	175,500	27.0

[a]*Does not include 4,000 transit trips made by disabled individuals on complimentary paratransit service.*

[b]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

[c]*Excludes trips made on yellow school bus.*

Source: SEWRPC.

linked passenger trip transit ridership by time period of the average weekday as estimated by travel surveys and travel models for 2001 is shown in Table 70. The third-generation travel simulation models developed in 1991 generally over-predict 2001 transit ridership, and more specifically, school purpose trips and other nonwork purpose trips. The over-prediction is also more with respect to the smaller transit systems of the Region, as year 2001 Milwaukee County Transit System linked revenue passenger trips and unlinked boarding passenger trips are predicted by the third-generation models developed in 1991 within 13 percent in total, and within 7 percent for selected major routes (see Table 71). These selected major routes of the Milwaukee County Transit System are shown on Map 46.

With respect to automobile occupancy, Table 72 compares the 2001 survey-estimated and third-generation model estimated-automobile occupancy by trip purpose. The third-generation models were able to predict the modest change in automobile occupancy which occurred between 1991 and 2001.

Table 70

COMPARISON OF ESTIMATED ACTUAL AND THIRD-GENERATION MODEL ESTIMATED AVERAGE WEEKDAY LINKED PASSENGER TRIP TRANSIT RIDERSHIP BY TIME PERIOD IN THE SOUTHEASTERN WISCONSIN REGION

Time Period	Average Weekday Linked Passenger Trips				
	2001 Survey Estimated[a]		2001 Model Estimated[b]		
	Number	Percent of Daily Total	Number	Percent of Daily Total	Percent Difference
Morning Peak Period	38,200	27.6	41,800	23.8	9.4
Midday Nonpeak Period	37,900	27.4	54,400	31.0	43.5
Evening Peak Period	43,600	31.6	57,100	32.5	31.0
Night Nonpeak Period	18,500	13.4	22,200	12.7	20.0
Total	138,200	100.0	175,500	100.0	27.0

[a]*Does not include 4,000 transit trips made by disabled individuals on complimentary paratransit service.*

[b]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

Source: SEWRPC.

Table 71

COMPARISON OF ESTIMATED ACTUAL TRANSIT RIDERSHIP BOARDING PASSENGER COUNTS TO THIRD-GENERATION MODEL ESTIMATED TRANSIT RIDERSHIP ON MILWAUKEE COUNTY TRANSIT SYSTEM SELECTED BUS ROUTES AND TOTAL SYSTEM: 2001[a]

Milwaukee County Transit System	Average Weekday Unlinked Trips (boarding passengers)			
			Difference	
	2001 Estimated Actual[b]	2001 Model Estimated[c]	Amount	Percent
Selected Major Routes				
Route No. 10	7,500	10,120	2,620	34.9
Route No. 12	8,840	10,100	1,260	14.3
Route No. 14, 2	5,810	7,940	2,130	36.7
Route No. 15	8,160	10,430	2,270	27.8
Route No. 18	6,740	6,710	-30	-0.4
Route No. 19	13,080	10,930	-2,150	-16.4
Route No. 23, 1	12,410	10,490	-1,920	-15.5
Route No. 27	12,170	11,170	-1,000	-8.2
Route No. 30, 30X	20,170	22,860	2,690	13.3
Route No. 31	3,270	2,900	-370	-11.3
Route No. 62	8,400	7,030	-1,370	-16.3
Route No. 76	6,080	7,790	1,710	28.1
Route No. 80	7,960	10,480	2,520	31.7
Subtotal	120,590	128,950	8,360	6.9
Remainder of Routes	60,080	75,400	15,320	25.4
Total	180,670	204,350	23,680	13.1

[a]*Includes Waukesha County Transit System routes operated by Milwaukee County Transit System.*

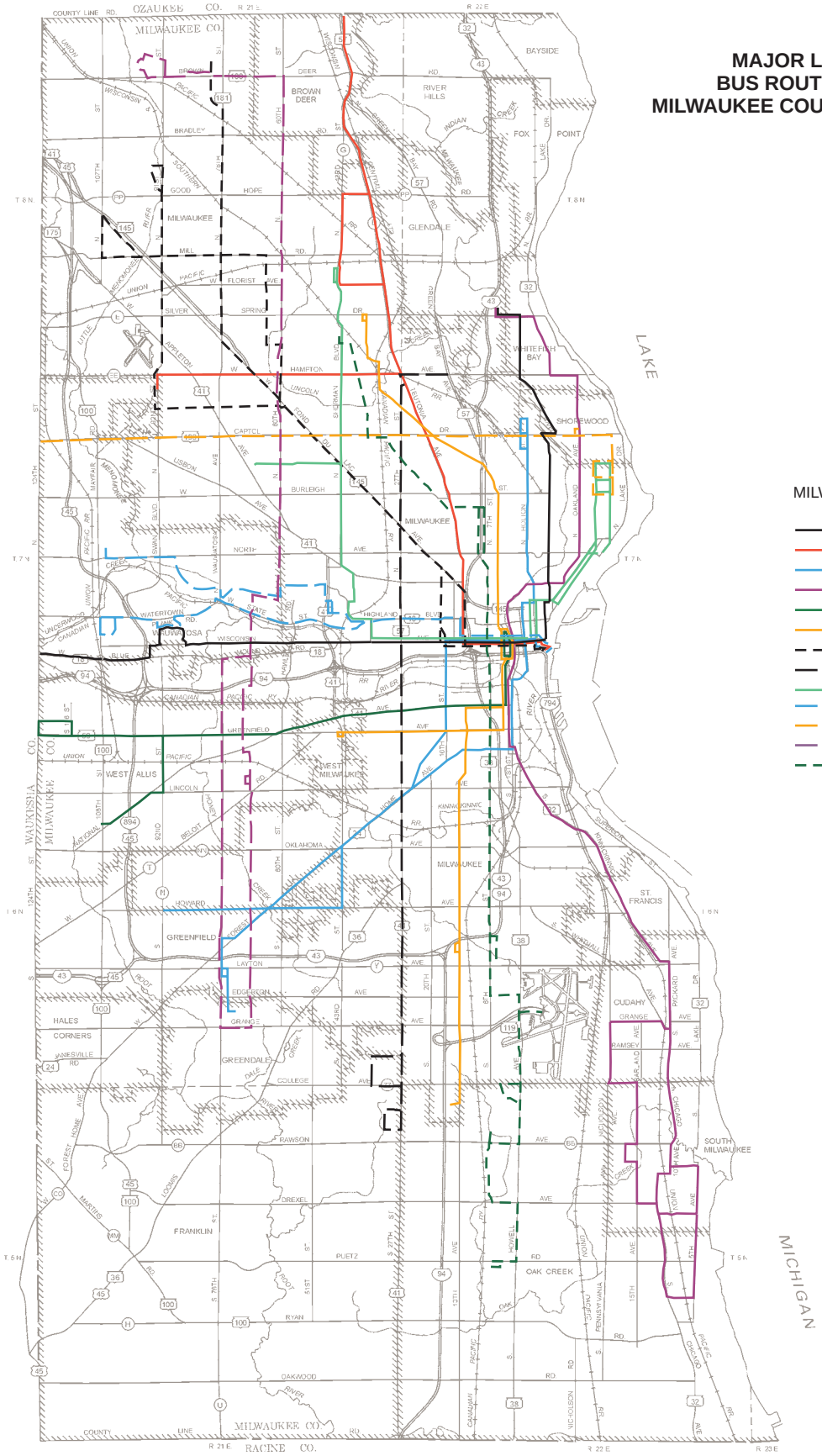
[b]*Based on actual operator counts taken during the months of September through May during 2000 and 2001 by the Milwaukee County Transit System.*

[c] *Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

Source: SEWRPC.

Map 46

MAJOR LOCAL AND EXPRESS BUS ROUTES OPERATED BY THE MILWAUKEE COUNTY TRANSIT SYSTEM: 2001



Source: Milwaukee County Transit System and SEWRPC.

Table 72

COMPARISON OF SURVEY- AND THIRD-GENERATION MODEL ESTIMATED AUTOMOBILE OCCUPANCY BY TRIP PURPOSE: 1991 AND 2001

Trip Purpose	1991 Survey Estimated Persons per Automobile	2001 Survey-Estimated Persons per Automobile	2001 Model-Estimated Persons per Automobile[a]	Percentage Difference – 2001 Survey and Model Estimates
Home-Based Work	1.06	1.05	1.05	0.0
Home-Based Shopping	1.27	1.22	1.25	2.4
Home-Based Other	1.34	1.32	1.32	0.0
Nonhome-Based	1.20	1.18	1.19	0.8
Average	1.22	1.19	1.20	0.8

[a]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

Source: SEWRPC.

Table 73

COMPARISON OF THIRD-GENERATION MODEL ESTIMATED AND TRAFFIC COUNT ESTIMATED ARTERIAL SYSTEM VEHICLE-MILES OF TRAVEL ON AN AVERAGE WEEKDAY IN THE REGION: 2001

County	Estimated 2001 Average Weekday Vehicle-Miles of Travel from Traffic Counts (thousands)	Estimated 2001 Average Weekday Vehicle-Miles of Travel from Travel Simulation Models[a] (thousands)	Percent Difference
Kenosha	3,119	3,222	3.3
Milwaukee	16,666	14,069	-15.6
Ozaukee	2,235	2,191	-2.0
Racine	3,374	3,454	2.4
Walworth	2,338	2,480	6.1
Washington	3,091	3,001	-2.9
Waukesha	9,160	9,714	6.0
Region	39,983	38,131	-4.6

[a]*Estimated with 1991 models and 2000 land use and socio-economic data and 2001 transportation system data.*

Source: SEWRPC.

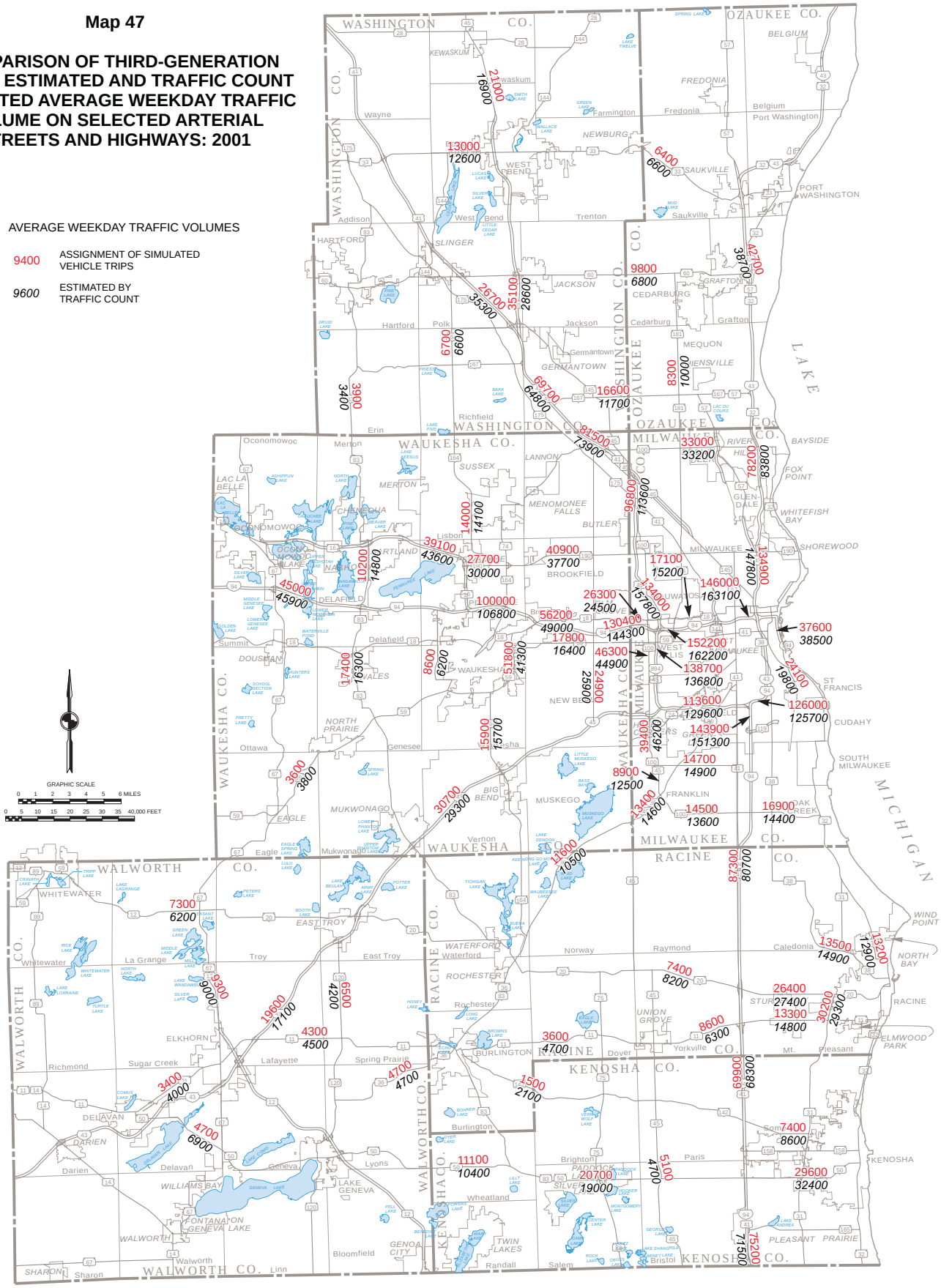
Traffic Assignment

The fourth and final step in the travel simulation modeling process is the assignment of the zone-to-zone trip volumes forecast in the modal choice step to specific routes of existing and proposed transportation systems. The output of traffic assignments for the arterial street and highway system is a forecast of the number of vehicles on an annual average weekday that may be expected to use each segment of the arterial street and highway system. The output of traffic assignment for the transit system is an estimate of the number of passengers on an annual average weekday that may be expected to use each segment of the transit system.

The ability of the third-generation traffic assignment model, and entire third-generation travel simulation model battery as developed in 1991 and calibrated with 1990 and 1991 travel, transportation, socio-economic and land use data to predict year 2001 traffic and transit ridership was determined through application of the entire third-generation model battery with 2001 socio-economic, land use, and transportation network data. The estimated 2001 arterial street average weekday traffic volumes derived from application of the third-generation traffic simulation model battery were compared to estimated 2001 average weekday traffic volumes derived from actual traffic counts. Table 73 presents a comparison of estimated vehicle-miles of travel from the traffic models and from actual traffic volume counts for each county within Southeastern Wisconsin. Map 47 presents a comparison

Map 47

COMPARISON OF THIRD-GENERATION MODEL ESTIMATED AND TRAFFIC COUNT ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUME ON SELECTED ARTERIAL STREETS AND HIGHWAYS: 2001



Source: SEWRPC.

Table 74

COMPARISON OF COMMISSION TRAVEL FORECASTS TO ACTUAL ESTIMATED TRAVEL: 1990, 2000, 2010, AND 2020 PLANS

Average Weekday Travel Measure	Plan Base Year	Plan Forecast	Estimated Actual	Percent Difference: Estimated Actual and Forecast
Year 1990 Plan				
Resident Internal Person Trips	3.60 million (1963)	6.02 million (1990)	5.59 million (1991)	+7.7 percent
Resident Internal Personal Vehicle Trips	2.17 million (1963)	3.94 million (1990)	4.08 million (1991)	-3.4 percent
Vehicle- Miles of Travel	13.1 million (1963)	32.3 million (1990)	32.4 million (1990)	-0.3 percent
Year 2000 Plan				
Resident Internal Person Trips	4.46 million (1972)	5.75 million (2000)	6.11 million (2001)	-5.9 percent
Resident Internal Personal Vehicle Trips	2.89 million (1972)	3.77 million (2000)	4.53 million (2001)	-16.8 percent
Vehicle- Miles of Travel	20.1 million (1972)	30.1 million (2000)	39.2 million (2000)	-23.2 percent
Year 2010 Plan				
Resident Internal Person Trips	5.59 million (1991)	5.91 million (2001)	6.11 million (2001)	-3.2 percent
Resident Internal Personal Vehicle Trips	4.08 million (1991)	4.43 million (2001)	4.53 million (2001)	-2.2 percent
Vehicle- Miles of Travel	33.1 million (1991)	38.1 million (2001)	40.0 million (2001)	-4.7 percent
Year 2020 Plan				
Resident Internal Person Trips	5.59 million (1991)	6.10 million (2001)	6.11 million (2001)	-0.2 percent
Resident Internal Personal Vehicle Trips	4.08 million (1991)	4.57 million (2001)	4.53 million (2001)	+0.9 percent
Vehicle- Miles of Travel	33.1 million (1991)	40.3 million (2001)	40.0 million (2001)	+0.7 percent

Source: SEWRPC.

of the model and actual traffic count estimated average weekday traffic for the freeway system and selected major arterials within Southeastern Wisconsin. The third-generation models calibrated with 1990 and 1991 data were able to predict year 2001 regional vehicle-miles of travel within 3.9 percent, and year 2001 freeway system and major arterial average weekday traffic volumes generally within 5 to 15 percent.

As presented earlier, the third-generation travel simulation models developed in 1991 with 1990 and 1991 data were able to predict within 27 percent year 2001 average weekday transit ridership within the Region, and within 13 percent of the year 2001 average weekday ridership of the Milwaukee County Transit System. Table 71 presented a comparison of the year 2001 average weekday transit ridership for selected major Milwaukee County Transit System routes as observed through passenger counts and as estimated by application of the third-generation simulation models. Map 46 showed the location of these routes.

Another test of the validity of travel simulation models is the degree to which the forecasts provided by the models are consistent with actual estimates, as the design year of the plan is approached 20 to 30 years in the future. Table 74 provides the results of such a review of the validity of travel models and forecasts for the year

1990 regional plan which used the Commission's first generation models, for the year 2000 regional plan which used the second generation models, and for the year 2010 and 2020 plans which used the third generation models. This test of forecast validity is a test of both the travel models and the underlying plan forecasts, including population, household, and employment levels. Commission travel forecasts have generally proven to be very accurate, with year 1990 plan travel forecasts being within about 5 percent of actual year 1990 travel, and year 2010 and 2020 plan forecasts being within about 3 percent of actual year 2001 travel. The only exception was the year 2000 plan with forecasts of vehicle trips and vehicle-miles of travel being about 20 percent less than actual estimated year 2000 travel, and forecast person trips under the year 2000 plan being about 5 percent less than actual year 2000 person trips. The reason for the differences between actual and forecast travel in the year 2000 was the significant decline in ridesharing and vehicle occupancy which occurred between 1972 and 1991, due to declining household size, increasing personal vehicle availability, and changing population lifestyles. The vehicle occupancy forecast under the year 2000 plan assumed no change in vehicle occupancy over the plan forecast period. Vehicle occupancy forecasts under the subsequent year 2010 and 2020 plans were based upon a model which projected vehicle occupancy based upon household size and personal vehicle availability.

Summary and Conclusions

The third-generation simulation models developed in the early 1990s with 1990 and 1991 data were proven to forecast year 2001 travel, traffic volume, and transit ridership with a high degree of accuracy, and certainly meet the requirements for transportation planning and facility design purposes. This is particularly true when it is recognized that the year 2001 travel data are estimated based on surveys, and traffic and ridership counts are estimates themselves, with some counts having been taken during earlier and later years, and the counts reflect seasonal and daily variations in traffic flow and random errors that occur in the counting process itself. The only area where the models did substantially over- or under-estimate travel was with respect to nonwork travel transit ridership on the Region's small transit systems, and improvements should be considered in the modeling of travel for these transit systems.

COMPARISON OF COMMISSION THIRD-GENERATION TRAVEL SIMULATION MODELS TO THE STATE-OF-THE-PRACTICE OF TRAVEL SIMULATION MODELS OF PEER METROPOLITAN PLANNING ORGANIZATIONS

This section of the report presents the results of a comparison of the Commission's third-generation travel simulation models developed in the early 1990's with 1990 and 1991 data to the travel simulation models used by a sample of 10 metropolitan planning organizations (MPOs) throughout the United States. Travel simulation models can be placed into four basic categories: outmoded methods, state-of-the-practice methods, advanced methods, and experimental methods. An outmoded method is a procedure or model which while once widely used, is no longer widely employed in travel demand models. An example of an outmoded method is the modeling of mode choice prior to destination choice. A travel demand modeling method referred to as a state-of-the-practice method is defined as a procedure or model which is in widespread use in travel demand modeling. An example of such a method is the use of the gravity model for the modeling of trip distribution. Advanced methods are those procedures or models that are not widely implemented and have only recently begun to be used and experience does not yet exist with respect to their accuracy and practical application. As experience is gained with advanced travel demand modeling methods and they become proven in terms of accuracy and practical application, they become state-of-the-practice methods. An example of an advanced practice is the modeling of travel as a trip chain, or tour. Experimental methods are those methods which are currently under development and are yet to be employed in the forecast of travel by MPOs as a part of developing and testing alternative transportation system plans. An example of an experimental method is the TRANSIMS program which synthesizes and tracks individual travel behavior for the entire population of a regional study area. State-of-the-practice travel demand modeling is influenced by travel demand modeling practices required by the Federal Transit Administration for analysis of fixed guideway transit projects and by the U.S. Environmental Protection Agency and U.S. Department of Transportation for air quality conformity analysis of regional transportation plans and improvement programs. The Commission's current third-generation models developed in the early 1990's

have been reviewed and approved by the Federal Transit Administration in the early 1990's for use in alternatives analysis studies and by the U. S. Department of Transportation for use in transportation air quality conformity analysis.

Ten MPOs from across the United States were selected for comparison of their travel modeling practices to the Commission's third-generation models. The 10 MPOs selected generally serve areas with a similar or larger population than southeastern Wisconsin. They include MPOs from the Midwest, and selected MPOs from across the nation which are generally recognized as among the most accomplished in technical planning practice. The 10 MPOs include: the Chicago Area Transportation Study (CATS) in Chicago, Illinois; the East-West Gateway Council of Governments (EWGCOG) in St. Louis, Missouri; the Metropolitan Transportation Commission (MTC) in Oakland, California; the Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board (COG/TPB) in Washington, D.C.; Metro in Portland, Oregon; the North Central Texas Council of Governments (NCTCOG) in Arlington, Texas; the Northwestern Indiana Regional Planning Commission (NIRPC) in Portage, Indiana; the Puget Sound Regional Council (PSRC) in Seattle, Washington; the Sacramento Area Council of Governments (SACOG) in Sacramento, California; and the Southeast Michigan Council of Governments (SEMCOG) in Detroit, Michigan. The travel demand models of these 10 MPOs are summarized in Table 75 along with the Commission's current third-generation models. Staff of the 10 MPOs did review Table 75, and confirmed that it was an accurate representation of their travel simulation models. The remainder of this section of the report compares the structure, and components or steps, of the travel demand models of the 10 peer MPOs to the Commission's third-generation models.

Model Structure

Travel demand modeling may be conducted using one of three forms of model structure. These three basic model types are the trip-based model, the tour-based model, and the activity-based model. The model type refers to the way in which the amount and type of travel is generated within the model. The travel demand models of all 10 MPOs and the Commission's third-generation models use a trip-based model structure.

Trip-Based Model Structure

The most widely used model structure is the trip-based model or, as it is more commonly referred to, the four-step model. This model structure is based upon the premise that the magnitude and pattern of travel is a stable function of the characteristics of land use type and intensity, population and employment levels, and the transportation system. In this modeling structure, trips are developed at some aggregate area level, typically referred to as a traffic analysis zone (TAZ), based on the characteristics within the area. Traveler behavior is modeled using four steps. These steps are trip generation, trip distribution, mode choice, and travel assignment. The development of the relationships which are used to estimate and forecast travel require survey data which can be used to relate survey estimated travel habits and patterns to the socio-economic characteristics of households within TAZs, and to transportation system characteristics. In addition to household socio-economic data, data on land use type and intensity and data on employment by TAZ are necessary. Today's current computer processing allows even the most detailed trip-based models to be executed in as little as a day. Although some planning organizations choose to write custom programs for model application, a variety of flexible, commercial software packages are available. This model structure produces results which can be repeated, and models based on this structure have been proven to remain stable over time.

Tour-Based Model Structure

A second type of travel demand modeling structure, called the tour-based model, describes an individual's travel as a tour. A tour is defined as a series of trips starting and ending at a given place. For example, a home-based work tour starts and ends at home and the primary activity of the tour is work. It should be noted that a tour with no intermediate stops would be the same as a trip pair with the same purpose as the primary purpose of the tour. A tour-based model addresses the problem caused by independently generating trips because the intermediate stops are related to the primary purpose of the tour. Thus, nonhome-based trips become intermediate stops along the route taken for the primary purpose of the tour, and can now be related to the household. Tour based models can be developed in one of three ways: in an aggregate fashion similar to that of the trip-based models, through

Table 75

COMPARISON OF SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION TRAVEL DEMAND MODELING PROCEDURES TO THOSE EMPLOYED BY OTHER METROPOLITAN PLANNING ORGANIZATIONS

Agency	Trip Maker	Trip Purposes Modeled	Trip Generation Model: Basic Trip Purposes: Home-Based Work P	Home-Based Work A	Home-Based Other P	Home-Based Other A	Nonhome-Based P	Nonhome-Based A	Trip Distribution Model	Mode Split Model	Post Mode Split Auto Occupancy Model	Traffic Assignment Model: Highway	Traffic Assignment Model: Transit
Southeastern Wisconsin Regional Planning Commission (SEWRPC) Milwaukee, Wisconsin	Resident Households	HBW	XC_A	TR					Gravity	Multinomial Logit		Daily & Time-of-Day (Nine Periods) Equilibrium Assignment	Time-of-Day (Four Periods) Shortest Path Assignment
		HBS			XC	TR_P			Gravity	Binomial Logit	XC		
		HBO			XC	TR_P			Gravity	Binomial Logit	XC		
		HBSCH			GF	GF			Existing Trip Patterns	Binomial Logit	Factors		
		NHB					TR_{XC}	TR_P	Gravity	Binomial Logit	XC		
		NHBSCH	GF										
	Group-Quartered		GF										
	Commercial		FF										Not Applicable
	External	Personal	FF										
		Commercial	FF										
Chicago Area Transportation Study (CATS)[a] Chicago, Illinois	Resident and Group-Quartered Households	W HBW	XC	LR_P					Intervening Opportunity	Binomial Logit[b]	Factors	Time-of-Day (Eight Period) Multiclass Equilibrium Assignment	Daily Multipath Assignment
		GQ HBW	XC	LR_P									
		W HBS			XC	LR_P			Intervening Opportunity	Binomial Logit[b]	Factors		
		NW HBS			XC	LR_P							
		GQ HBS			XC	LR_P							
		W HBO			XC	LR_P							
		NW HBO			XC	LR_P							
		GQ HBO			XC	LR_P							
		C HB			XC	LR_P							
		W WBW					XC	LR_P	Intervening Opportunity	Binomial Logit[b]	Factors		
		W WBS					XC	LR_P					
		W WBO					XC	LR_P					
		W NHNWB					XC	LR_P					
		NW NHNWB					XC	LR_P					
		GQ NHNWB					XC	LR_P					
	Commercial		$P = LR_{GF}$ $A = LR_{GF}$						Gravity Model				Not Applicable
	External		$P = LR_{GF}$ $A = LR_{GF}$						Existing Trip Patterns				
East-West Gateway Council of Governments (EWGCOG)[c] St. Louis, Missouri-Illinois	Resident Households	HBW1	XC	TR_P					Gravity	Mode Share[d]	Factors	Time-of-Day (Three Period) Equilibrium Assignment	Daily Shortest Path Assignment
		HBW2	XC	TR_P					Gravity				
		HBS			XC	TR_P			Gravity	Mode Share[d]	Factors		
		HBO			XC	TR_P			Gravity	Mode Share[d]	Factors		
		HBDP			XC	P			Gravity		Factors		
		NHB					XC	TR_P	Gravity	Mode Share[d]	Factors		
	Group-Quartered		Not Modeled										
	Commercial		P = A = TR						Gravity				Not Applicable
	External	IE-EI	Observed External Station Crossings						Gravity				
		EE	EE Trips from MoDOT										
Metropolitan Transportation Council (MTC)[e] Oakland, California	Resident and Group-Quartered Households[f]	HBW1	MR	MR_P					Gravity	Nested Logit		Peak Period (Two AM Peak Periods) Equilibrium Assignment Time-of-Day (Three Period) Shortest Path Assignment	Time-of-Day (Two Periods) Shortest Path Assignment
		HBW2	MR	MR_P					Gravity	Nested Logit			
		HBW3	MR	MR_P					Gravity	Nested Logit			
		HBW4	MR	MR_P					Gravity	Nested Logit			
		HBSO			MR	MR_P			Gravity	Nested Logit			
		HBSR			LR	TR_P			Gravity	Nested Logit			
		HBGSCH			TR	TR_P			Gravity	Multinomial Logit			
		HBHSCH			TR	TR_P			Gravity	Nested Logit			
		HBC			TR	TR_P			Gravity	Nested Logit			
		NHB					TR	TR_P	Gravity	Nested Logit			
	Commercial		$P=LR$ $A=LR_P$						Gravity				Not Applicable
	External		GF										

Table 75 (continued)

Agency	Trip Maker	Trip Purposes Modeled	Trip Generation Model: Basic Trip Purposes: Home-Based Work P	Home-Based Work A	Home-Based Other P	Home-Based Other A	Nonhome-Based P	Nonhome-Based A	Trip Distribution Model	Mode Split Model	Post Mode Split Auto Occupancy Model	Traffic Assignment Model: Highway	Traffic Assignment Model: Transit
Metropolitan Washington Council of Governments, National Capital Region Transportation Planning Board (COG/TPB)[g] Washington, D.C.	Resident Households[h]	HBW1	XC	TR_P					Gravity	Sequential Multinomial Logit		Time-of-Day (Three Periods) Equilibrium Assignment	Time-of-Day (Three Period) Not Executed Presently
		HBW2	XC	TR_P					Gravity				
		HBW3	XC	TR_P					Gravity				
		HBW4	XC	TR_P					Gravity				
		HBS1			XC	TR_P			Gravity	Sequential Multinomial Logit			
		HBS2			XC	TR_P			Gravity				
		HBS3			XC	TR_P			Gravity				
		HBS4			XC	TR_P			Gravity				
		HBO1			XC	TR_P			Gravity	Sequential Multinomial Logit			
		HBO2			XC	TR_P			Gravity				
		HBO3			XC	TR_P			Gravity				
		HBO4			XC	TR_P			Gravity				
		NHB[i]					XC_A	TR	Gravity	Sequential Multinomial Logit			
	Group-Quartered		Not Modeled										
	Commercial	Medium	P = A = TR						Gravity				
		Heavy	P = A = TR						Gravity				
		Taxi	GF										
	School Auto Driver		GF										
	Airport Auto Driver		FF										
	Visitor/Tourist Auto Driver		GF										
	External	INT HBW	GF	GF					Gravity				
		ART HBW	GF	GF					Gravity				
		INT HBS			GF	GF			Gravity				
		ART HBS			GF	GF			Gravity				
		INT HBO			GF	GF			Gravity				
		ART HBO			GF	GF			Gravity				
		INT NHB					GF	GF	Gravity				
		ART NHB					GF	GF	Gravity				
		Medium Truck	A = P = TR						Gravity				
		Heavy Truck	A = P = TR						Gravity				
		EE Auto	GF										
		EE Truck	GF										
Metro[j] Portland, Oregon	Resident Households	HBW	TR	TR_P					Destination Choice[k]	Multinomial Logit		Time-of-Day (Hourly) Equilibrium Assignment	Time-of-Day (Hourly) Multipath Assignment
									Destination Choice[k]	Multinomial Logit			
									Destination Choice[k]	Multinomial Logit			
		HBS			XC	NC			Destination Choice	Multinomial Logit			
		HBO			XC	NC			Destination Choice	Multinomial Logit			
		HBSR			XC	NC			Destination Choice	Multinomial Logit			
		HBSCH			XC	P			Destination Choice	XC			
		HBC			XC	TR_P			Destination Choice	Multinomial Logit			
		NHBW					U_{TR}	NC	Destination Choice	Multinomial Logit			
		NHNWB					U_{TR}	NC	Destination Choice	Multinomial Logit			
	Group-Quartered		Not Modeled										Not Applicable
	Commercial		FF										
	External	Airport	GF^l						Destination Choice	Multinomial Logit			Time-of-Day (Hourly) Multipath Assignment
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
									Destination Choice	Multinomial Logit			
		EI-IE HBW	GF	GF					Destination Choice	Existing Trip Patterns			Not Applicable
		EI-IE NHBW					GF	GF	Destination Choice	Existing Trip Patterns			
		EI-IE NHBR					GF	GF	Destination Choice	Existing Trip Patterns			
		EI-IE NHBNR					GF	GF	Destination Choice	Existing Trip Patterns			
		EE	GF										

Table 75 (continued)

Agency	Trip Maker	Trip Purposes Modeled	Trip Generation Model: Basic Trip Purposes: Home-Based Work P	Home-Based Work A	Home-Based Other P	Home-Based Other A	Nonhome-Based P	Nonhome-Based A	Trip Distribution Model	Mode Split Model	Post Mode Split Auto Occupancy Model	Traffic Assignment Model: Highway	Traffic Assignment Model: Transit
North Central Texas Council of Governments (NCTCOG)[m] Arlington, Texas	Resident Households	HBW1	XC_A	XC					Gravity	Nested Logit		Time-of-Day (Three Period) Multi-Class Equilibrium Assignment	Time-of-Day (Two Period) Multipath Assignment
		HBW2	XC_A	XC					Gravity	Nested Logit			
		HBW3	XC_A	XC					Gravity	Nested Logit			
		HBW4	XC_A	XC					Gravity	Nested Logit			
		HBO			XC	XC_P			Gravity	Nested Logit			
		NHB					XC_A	XC_P	Gravity	Multinomial Logit			
	Airport	HBO	FF										Not Applicable
		NHB	FF										
	Group-Quartered		Not Modeled										
	Commercial		$P = XC$ $A = TR_P$						Gravity				
	External		FF										
Northwestern Indiana Regional Planning Commission (NIRPC)[n] Portage, Indiana	Resident Households	HBW	XC	LR					Gravity	Multinomial Logit		Time-of-Day (Three Period) Equilibrium Assignment	Time-of-Day Multipath Assignment
									Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
		HBS			XC	LR			Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
		HBO			XC	LR			Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
		NHB					XC	LR	Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
									Gravity	Multinomial Logit			
	Group-Quartered		Not Modeled										Not Applicable
	Commercial	Light & Medium	FF										
		Heavy IE	FF										
		Heavy EI	FF										
	External	IC HBW	GF	GF					Existing Trip Patterns	Multinomial Logit			Time-of-Day Multipath Assignment
									Existing Trip Patterns	Multinomial Logit			
									Existing Trip Patterns	Multinomial Logit			
		HBO			GF	GF			Existing Trip Patterns	Multinomial Logit			
									Existing Trip Patterns	Multinomial Logit			
									Existing Trip Patterns	Multinomial Logit			
		NHB					GF	GF	Existing Trip Patterns	Multinomial Logit			
									Existing Trip Patterns	Multinomial Logit			
									Existing Trip Patterns	Multinomial Logit			
		Remainder	GF										Not Applicable
Puget Sound Regional Council (PSRC)[o] Seattle, Washington	Resident and Group-Quartered Households	R HBW	XC	TR_P					Destination/Mode Choice Model			Time-of-Day (Five Period) Multi-Class Equilibrium Assignment	Time-of-Day Multipath Assignment
		GQ HBW	TR										
		R HBS			XC	TR_P			Gravity	Sequential Multinomial Logit	Factors		
		GQ HBS			TR								
		R HBO			XC	TR_P			Gravity				
		GQ HBO			TR								
		R HBSCH			TR_A	TR			Gravity	Binomial Logit	Factors		Not Assigned
		GQ HBSCH			TR_A	TR							
		R HBC			TR_A	TR			Gravity	Multinomial Logit			Time-of-Day Multipath Assignment
		GQ HBC			TR_A	TR							
		R NHBW					TR	P	Gravity	Sequential Binomial Logit	Factors		
		GQ NHBW					TR	P					
		R NHNWB					TR	P	Gravity	Sequential Binomial Logit	Factors		
		GQ NHNWB					TR	P					
	Commercial	Light	$P = TR_A$ $A = TR$						Gravity				Not Applicable
		Medium	$P = TR_A$ $A = TR$						Gravity				
		Heavy	$P = TR_A$ $A = TR$						Gravity				
	External		GF										

Table 75 (continued)

Agency	Trip Maker	Trip Purposes Modeled		Trip Generation Model: Basic Trip Purposes: Home-Based Work P	Home-Based Work A	Home-Based Other P	Home-Based Other A	Nonhome-Based P	Nonhome-Based A	Trip Distribution Model	Mode Split Model	Post Mode Split Auto Occupancy Model	Traffic Assignment Model: Highway	Traffic Assignment Model: Transit
Sacramento Area Council of Governments (SACOG)[p] Sacramento, California	Resident Households	HBW		TR	TR					Destination/Mode Choice Model			Time-of-Day (Four Period) Equilibrium Assignment	Time-of-Day Shortest Path Assignment
		HBS				XC	TR			Gravity	Multinomial Logit	Factor		
		HBO				XC	TR			Gravity	Multinomial Logit	Factor		
		HBSCH				XC	TR			Gravity	Binomial Logit	Factor		
		WBO						TR	TR	Gravity	Multinomial Logit	Factor		
		NHNWB						TR	TR	Gravity	Multinomial Logit	Factor		
	Group-Quartered			P = TR A = TR						Not Modeled				
	Commercial									Gravity				Not Applicable
	External	IE-EI	HBW	GF^q	GF^q					Combined with resident household trip purposes and passed to the trip distribution and mode split models.				
			HBS			GF^q	GF^q							
			HBO			GF^q	GF^q							
			HBSCH			GF^q	GF^q							
			WBO					GF^q	GF^q					
			NHNWB					GF^q	GF^q					
		EE		GF										
Southeast Michigan Council of Governments (SEMCOG)[r] Detroit, Michigan	Resident Households	HBW		XC	LR					Gravity	Multinomial Logit	Factor	Time-of-Day (Four Period) Multi-Class Equilibrium Assignment	Time-of-Day Drive Access Assignment (Two Period) Walk Access Assignment (Four Period)
		HBS				XC	LR			Gravity	Multinomial Logit	Factor		
		HBO				XC	LR			Gravity	Multinomial Logit	Factor		
		HBSCH				XC	LR			Gravity	Multinomial Logit	Factor		
		NHBW						LR	LR	Gravity	Multinomial Logit	Factor		
		NHNWB						LR	LR	Gravity	Multinomial Logit	Factor		
	Group-Quartered			Not Modeled										
	Commercial			$P = LR_A$ A = LR						Gravity				
	External[s]	ART	NF	GF						Gravity				
		ART	NNF	GF						Gravity				
		INT		GF						Gravity				
		CAN		GF						Gravity				
		LOC		GF						Gravity				

Note: Table cells indicate model uniqueness and multiple references within a cell indicate a stratification of data. The extension of a cell across multiple columns indicates either the ability of a model to account for multiple steps or, in the case of mode specific trip purposes, a step being skipped.

Model Abbreviations:

X_Y	X = Trip Generation Method, Y = Control Total
A	Trip Attraction End
FF	Fratar Factor
GF	Growth Factor
LR	Linear Regression
MR	Multiple Regression
NC	Not Calculated
P	Trip Production End
TR	Trip Rate
U	Logit Utility Function
XC	Cross Classification

Trip Purpose Abbreviations:

*Purpose*1-4	Trip Purpose Stratification
ART	External trips entering on a surface arterial
C	Children ages 12 through 15
CAN	Canadian Trips
EE	External-External
EI	External-Internal
GQ	Group-Quartered Households
HB	Home-Based
HBC	Home-Based College
HBDP	Home-Based Drop Passenger
HBGSCH	Home-Based Grade School
HBHSCH	Home-Based High School
HBO	Home-Based Other
HBS	Home-Based Shop
HBSCH	Home-Based School
HBSO	Home-Based Shop/Other
HBSR	Home-Based Social/Recreational
HBW	Home-Based Work
IC	Indiana-Chicago CBD
IE	Internal-External
INT	External trips entering on an interstate
LOC	Local Trips
NF	Near Freeway
NHB	Nonhome-Based
NHBSCH	Nonhome-Based School
NHBW	Nonhome-Based Work
NHNWB	Nonhome Nonwork-Based
NNF	Not Near Freeway
NW	Nonworking Adults
R	Resident Households
W	Working Adults
WBO	Work-Based Other
WBS	Work-Based Shop
WBW	Work-Based Work

Footnotes to Table 75

[a] *As documented in,* Travel Demand Modeling for the Conformity Process in Northeastern Illinois, Public Hearing Draft, *Chicago Transportation Study, September 1997.*

[b] *With stochastic enumeration (i.e. monti carlo simulation).*

[c] *As documented in,* Travel Demand Model Documentation, *East West Gateway Coordinating Council, November 1997.*

[d] *A logit model, which is run only once due to the relatively low proportion of transit trips, is utilized to develop the proportionate share of trips by auto and transit on a zone to zone basis for work and nonwork trip purposes. These proportions are then applied to determine the total transit trips for work and nonwork trips. For nonwork trips--excluding the drop-passenger purpose which is auto only—the transit trips are proportioned between the three trip purposes (50 percent HBO, 25 percent HBS, and 25 percent NHB). These trips are then removed from the trip tables by purpose.*

[e] *As documented in,* Travel Models for the San Francisco Bay Area (BAYCAST-90), Technical Summary, *Metropolitan Transportation Commission, June 1997.*

[f] *Group-quartered person trips are included only in the home-based work and home-based school (grade school, high school, and college) trip generation models.*

[g] *As documented in,* COG/TPB Travel Forecasting Model Version 2.1 D.1 Draft #50 Calibration Report—Draft, *Metropolitan Washington Council of Governments, September 17, 2004.*

[h] *Resident household trip productions and attractions include internal-external productions, and the home-based work productions and attractions include nonmotorized trips as well. An internal-external extraction model was developed to remove trips from the productions that are internal-external trips. Attractions are scaled to remove external-internal trips. For the home-based work purpose, nonmotorized trips are estimated and removed from the productions and attractions. The nonmotorized trips are maintained in a separate trip table. The nonhome-based trip purpose includes light and panel trucks.*

[i] *Nonhome-based trip purpose includes resident travel for all modes, as well as commercial travel using light truck.*

[j] *As documented in,* Metro Travel Demand Forecasting 2004 Trip-Based Demand Model Methodology Report, *Draft, Metro Planning Department, Travel Forecasting Section, November 8, 2004.*

[k] *For the HBW destination choice model, utility functions have been calibrated for three income categories. The productions from any given zone are linked to destination zones based on the sum of the three utility functions for that zone. Productions, which were not generated by income category, for each zone are split into the three income categories and distributed between destination zones. It does not appear, based on documentation, attractions developed in the trip generation step play any part in how the productions are ultimately distributed.*

[l] *Airport related travel is divided into nine market segments: resident business from a private home, resident business from a place of business, resident nonbusiness from a private home, resident nonbusiness from other, nonresident business from a hotel/motel, non-resident nonbusiness from hotel/motel, nonresident nonbusiness from a private home.*

[m] *No current model documentation available. Information collected from NCTCOG staff, November, 2004.*

[n] *As documented in,* NIRPC Travel Model Documentation, *Cambridge Systematics, Inc., January 1999.*

[o] *As documented in,* PSRC Travel Demand Model Update and Calibration, Model Calibration and Validation, *Cambridge Systematics, Inc., March 2003.*

[p] *As documented in,* Model Update Report, Sacramento Regional Travel Demand Model, *Version 2001 (SACMET 01), DKS Associates, March 8, 2002.*

[q] *Internal trip end included in the resident household trip generation model. External trip end is growth factored and combined with the resident household trip productions and attractions by purpose prior to the trip distribution step.*

[r] *As documented in,* SEMCOG Travel Model Documentation, *November, 2002.*

[s] *Base year trips generated using trip rates and then distributed using gravity model. Future year developed by applying growth factors to productions and attractions and then distributed using gravity model.*

Source: SEWRPC.

sample enumeration, or using microsimulation. Sample enumeration refers to a process in which survey data, such as Census or a local household survey, are randomly sampled to create a synthetic population with all of the associated travel characteristics. Microsimulation is a technique in which a synthetic population is estimated by randomly estimating individual or household characteristics based on the probability of those characteristics occurring in the population. Tour-based model results developed using sample enumeration or microsimulation trip generation techniques are not repeatable, and require running the model multiple times to determine the variability of the model. Tours are generated based on the trip making characteristics of the population, and then disaggregated into component trips for assignment to a network. The data necessary to estimate a tour-based model are similar to that of the trip-based model, although additional data analysis may need to be conducted to ensure the tours reported are logical. The primary advantage of this modeling structure is that there are no nonhome-based trips since the sequences of trips are maintained. The primary drawback to this model structure is the practicality of model application. Custom programs for application are required to be written, as commercial software is not yet available. These complicated programs typically have much longer model run times and generate large amounts of data, which directly translate into a need for greater computer processing power and larger memory requirements.

Activity-Based Model Structure

A third type of travel demand modeling structure is the activity-based model. The activity-based model is an enhancement of a tour-based model. Rather than generating tours, an activity-based model treats travel as a demand derived from the desire to participate in activities. Activity patterns are first generated which consider the timing and duration of activities. Activity-based models also consider how all individuals within a household may or may not impact each other's travel throughout the day, such as a parent taking a child to school or needing to pick up a child from an extracurricular activity. From these activity patterns, tours are created. After tours have been developed, like the tour-based model, they are divided into individual trips and are then assigned to a network. Activity-based models can assess the impacts of policy and level-of-service changes in the transportation system on individual households or persons within a household, or groups of households. The data requirements for activity-based models are different than those of the tour- or trip-based models, as the primary data needed to develop the model requires an activity-based household survey. This model type may require additional surveys, such as panel surveys or stated preference surveys, depending on the types of decisions needing to be modeled. Activity-based models require additional models to be developed which describe the more complex interactions between individuals in a household with even more data being generated. This translates into even more significant computer processing power and memory requirements than a tour-based model. Activity-based models also have significant run times on the order of hundreds of hours for a single iteration. Additionally, because of the use of microsimulation, multiple runs are necessary to determine the variability of the model.

Activity- and tour-based modeling structures are advanced practice, if not experimental methods, given their relatively recent entry into modeling practice in the United States and fairly limited use. To date, only four models have been developed and are currently in use in the United States: a statewide tour-based model developed for the State of New Hampshire by the New Hampshire Department of Transportation; an activity-based model developed by the San Francisco County Transportation Authority, San Francisco, CA; an activity-based model developed by the New York Metropolitan Transportation Council, New York, NY; and an activity-based model developed by the Mid-Ohio Regional Planning Commission, Columbus, OH. In addition to the four models described above, a tour-based model has been developed and calibrated by Metro in Portland, Oregon, but is not used as the travel demand model. Portland Metro continues to use a trip based model for travel demand forecasting. While activity- and tour-based models may present a more theoretically appealing structure from which to model decisions related to travel, no documented comparisons are available to demonstrate the benefits of an activity- or tour-based model over that of the four-step model with regard to travel demand forecast accuracy over the short or long term. The activity- and tour-based models represent advanced or experimental methods in travel demand modeling, and while interest in their use is growing, none of the 10 peer MPOs use an activity or tour-based model as their travel demand forecasting model. The current state-of-the-practice is the four-step model.

Classification of Travel

The Commission's third-generation travel simulation models, and the travel simulation models of all 10 MPOs, are based upon a classification of the different components of travel within an urban region. This classification of travel is necessary because different types of trips exhibit different characteristics and, as a consequence, require different simulation techniques. In addition, some of these types of trips represent very small proportions of total travel in an urban region. The classification of trips and the determination of the relative proportion of total travel they represent allow travel simulation modeling resources to be focused on those types of trips which represent the greater proportions of travel. The SEWRPC travel simulation model, and the models of all 10 MPOs, classify travel into three separate components and develop modeling procedures for each component—resident personal travel, commercial truck travel, and external travel.

The SEWRPC models and those of two other MPOs further classify resident internal personal travel into travel by resident households and resident group-quartered persons. One MPO does not classify resident group-quartered travel specifically but does account for some of the trips generated by group-quartered persons. Travel by group-quartered persons is typically separated for special consideration because of the unique travel habits and patterns exhibited by these persons. Group-quartered persons are defined as those persons residing in dormitories, convents, homes for the aged, and similar group residences. Group-quartered person trips have consistently accounted for substantially less than 1 percent of the total travel within the Southeastern Wisconsin Region since 1963. Owing to their small contribution to total travel, seven of the 10 MPOs do not even model, and therefore do not account for, group-quartered person travel. The only other classification of travel employed by the 10 MPOs is a separate modeling of visitor/tourist travel by the Washington, D.C. area MPO, and a separate modeling of commercial airport related travel by the MPOs for the Washington, D.C. and Dallas, Texas areas.

Trip Generation

In the first step of the trip-based or four-step model, commonly referred to as trip generation, travel is modeled as total trip ends—trip productions and attractions by purpose—for each zone. The travel models used employ one or more of four basic modeling approaches: factoring of existing trip patterns, trip rates, linear and nonlinear regression, and cross-classification.

Resident household internal travel represents the vast majority of the average weekday travel in the Southeastern Wisconsin Region, and in the planning areas of all 10 MPOs. Therefore, the most detail is provided in the models for such travel, including with respect to trip generation. For trip production, nine of the 10 selected MPOs use cross-classification, with three of these nine agencies also using a simple trip rate and one agency using regression for some forecasting of trip productions. One MPO uses nonlinear regression for the forecasting of trip productions. The Regional Planning Commission's third-generation models use cross-classification and growth factoring for the trip production model.

With respect to the forecasting of trip attractions, four of the 10 MPOs use trip rates, three MPOs use linear or nonlinear regression, one MPO uses cross-classification, and one MPO uses a combination of trip rates and regression. One MPO uses trip rates for some of the trip attractions and does not forecast the remaining trip attractions, as it uses a trip distribution model—the second step in the four step modeling process—which does not require the forecast of trip attractions. The Commission's trip attraction model uses trip rates and growth factoring.

Travel simulation modeling for resident households for trip productions and attractions, and the other three steps of the travel modeling process is done by trip purpose. The 10 selected MPOs use similar trip purposes of home-based work (HBW), home-based shopping (HBS), home-based other (HBO), home-based school (HBSch), and nonhome-based (NHB), with some variations. All 10 MPOs forecast HBW trips, and eight forecast HBS trips, with the other two combining HBS with HBO trips. Five of the 10 MPOs forecast HBSch trips, with the other five including HBSch with HBO trips. Only three MPOs separately model other types of trips from HBO trips, with two addressing home-based social-recreational trips and one addressing home-based "drop passenger". With respect to NHB trips, five of the 10 MPOs model all NHB trips together, and the other five MPOs separately

model NHB trips in which one or both ends of the trip is for a work purpose, and NHB trips in which neither end of the trip is for a work purpose. The Commission's third-generation models use similar trip purposes as the 10 selected MPOs of HBW, HBS, HBSch, HBO, NHB, and NHBSch (nonhome-based school) trips.

Thus, with respect to travel simulation modeling for trip productions and attractions for resident household travel, the Commission's third-generation models are consistent with the state-of-the practice of the 10 selected MPOs, including with respect to trip purpose, and use of cross-classification for trip production, and trip rates for trip attraction.

With respect to trip generation by group-quartered residents, seven of the 10 MPOs do not model such travel, as it represents such a small portion of total travel—less than 0.5 percent of total resident internal travel in Southeastern Wisconsin. Two of the 10 MPOs model group-quartered resident travel using cross-classification, regression, and trip rates and one MPO generates travel for some productions and attractions which include group-quartered resident travel. The Commission's third-generation models for group-quartered resident travel are similar to a trip rate approach, as existing group-quartered resident travel is factored by the forecast change in group-quartered resident population.

With respect to commercial truck trip generation, five of the 10 MPOs use trip rates, or cross-classification models, two use a growth factor approach, and three use a regression model. The Commission's third-generation models use a regression model to forecast commercial truck trip generation.

With respect to external trips—those trips having one or both ends outside the MPO planning area—most of the 10 MPOs use a growth factor method, with a few using trip rates or regression. Some MPOs apply different approaches for internal-external and external-external travel, or for external travel on different arterial facility types. Similar to most of the 10 MPOs, the Commission's third-generation models use a growth factor approach to forecasting external travel.

Thus, the Commission's third-generation models for group-quartered resident trip generation, commercial truck trip generation, and external travel trip generation are consistent with the state-of-the-practice of the 10 selected MPOs as was determined for the Commission's third-generation models for trip generation by the Region's resident household.

Trip Distribution

The second step of the four-step model is referred to as trip distribution. In this step, the number of trips between each pair of zones in the planning area is determined by linking trip productions to trip attractions. There are four basic types of trip distribution models in general use: growth factor models, the gravity model, the intervening opportunity model, and the destination choice model. A growth factor model adjusts the estimated existing base year pattern of trips based on the forecast increase or decrease in trips to and from each zone of the planning area. The gravity model links productions to attractions based on the number of trip ends in each zone and an inverse function of the spatial separation—travel time and costs between zones. The intervening opportunity model is a variation of the gravity model, also considering the probability that the nearest zone of destination opportunity will be selected. The destination choice model links trip productions to zones of destination by forecasting the probability of such linkage, based upon the spatial separation and amount of potential trip destinations in each zone.

With respect to the modeling of trip distribution for resident households, six of the 10 selected MPOs use the gravity model for all trip purposes, and another two MPOs use the gravity model for all trip purposes except home-based work. Those two MPOs use a destination choice model for home-based work trips. One of the 10 MPOs uses a destination choice model for all trip purposes. One MPO uses the intervening opportunity model for resident household travel trip distribution modeling. The Commission's third-generation trip distribution model for resident household travel is the gravity model, the same as most of the 10 MPOs.

With respect to resident group-quartered person travel, seven of the 10 MPOs do not model such travel, and the remaining three combine such travel with resident household travel and use the gravity model for trip distribution. The Commission's third-generation models use a growth factor approach for trip distribution of group-quartered person travel.

With respect to commercial truck trip distribution, seven of the 10 MPOs use a gravity model, and three use a growth factor model. And, with respect to external travel, eight of the 10 MPOs use a growth factor model for external travel distribution, with three of the eight also using a gravity model and/or destination choice model. The remaining two MPOs use a gravity model for external travel distribution. The Commission's third-generation models use a growth factor approach for trip distribution for commercial and external travel.

Mode Split

The third step in the four step model is mode split, or mode choice. In this step, the total person trips between each pair of zones is allocated to the available modes of travel. A single model may be used to forecast the division of trips between automobile and transit trips, and to determine for auto trips the number of auto trips at multiple levels of vehicle occupancy. Alternatively, two models may be sequentially applied, with the first forecasting the division of trips between auto and transit, and the second forecasting the vehicle occupancy of auto trips. Three of the 10 MPOs use this sequential approach, with a logit model forecasting the division of total trips between auto and transit trips, and a cross-classification or factor model subsequently forecasting the occupancy of auto trips. Another two of the 10 MPOs use this approach for all but home-based work trips, and for home-based work trips use a logit model which combines destination choice, and choice between walking, biking, transit and auto, and choice of multiple levels of vehicle occupancy for auto trips. The other five MPOs use a single logit model to forecast the division between auto and transit trips, and to forecast the levels of occupancy for auto trips.

Also, five of the 10 MPOs forecast within their mode choice model the division of trips between not only auto and transit, but also walk and bicycle modes. Two of the 10 MPOs addresses walk and bicycle in trip generation, one by forecasting their trip generation based on traffic analysis zone population and employment density, and subtracting bicycle and walk trip generation from total trip generation, and the other MPO by applying factors to extract the motorized trips from total trip generation. The other three MPOs do not address trips by bicycle and walk modes.

The Commission's third-generation mode choice model uses the two step approach, with the first step being a logit model forecasting the division between auto and transit and the second step being a cross-classification model forecasting the vehicle occupancy of auto trips. Walk and bicycle trips are addressed in trip generation, with a vehicle ownership model, which forecasts reduced vehicle ownership and vehicle trip generation with increasing population density.

Traffic Assignment

Traffic assignment is the fourth and final step in the four-step model. In the step of traffic assignment, the travel or trips between each pair of origin and destination zones are assigned to routes of minimum impedance—travel time, cost, and/or distance—between each pair of zones. Because of characteristics unique to vehicle and transit travel—different operating speeds, transfers for transit, potentially different assignment time periods, and others—highway and transit assignments are performed separately on highway and transit networks. All of the 10 selected MPOs use separate transit and highway networks.

Highway Assignment

All of the 10 selected MPOs use a capacity-restrained, equilibrium assignment method to assign highway travel. Capacity-restrained equilibrium assignment is an iterative process of adjusting the impedance—usually travel time—on street segments based on congestion levels until the system-wide travel delay does not change between successive assignments. All of the 10 MPOs conduct time-of-day assignments with between three and 24 time periods. The time-of-day assignment method of the MPOs disaggregates forecast total daily trips into discrete time periods based on the directional proportion of the total daily vehicle trips by purpose occurring by time period. One MPO only conducts capacity restrained, equilibrium traffic assignments for two morning time periods, and then uses those paths or free flow travel times for all remaining time periods.

Four of the 10 MPOs conduct traffic assignment as a multi-class assignment. In a multi-class assignment, trips are stratified by vehicle types and assigned to the network separately. Multi-class assignments are used to restrict selected vehicles from selected facilities, forecast use by vehicle type by facility, and forecast emissions by vehicle type.

The Commission's third-generation highway traffic assignment model is a capacity-restrained equilibrium assignment model like the 10 MPOs. The Commission's model forecasts total average weekday traffic volumes, and the Commission has developed a procedure like the 10 MPOs to conduct the assignment for nine time periods.

Transit Assignment

Nine of the 10 MPOs conduct an assignment of forecast transit ridership to the transit system network. Seven MPOs conduct the transit assignment by time-of-day—typically two to four time periods—and the other two MPOs perform a single daily assignment. Six of the nine MPOs conducting transit assignment use a multipath assignment method, and the other three use a shortest path method. A multipath assignment, determines a small set of the shortest impedance paths—usually based on travel time—for each pair of trip origin and destination zones and proportions the zone-to-zone transit trips among this set of paths. The shortest path assignment method assigns all the transit trips between each pair of zones to that path of shortest impedance. Of the nine MPOs conducting a transit assignment, six MPOs assign trips to the transit network based on mode of access, and as well include forecasting mode of access to transit—walk, drive, or feeder bus—in their mode choice model.

The Commission's third-generation travel simulation model for transit assignment is a time-of-day assignment for four time periods, and uses the shortest path method.

Findings and Conclusions Concerning Review of Commission Third-Generation Models with Respect to Modeling State-of-the-Practice

The review of the state-of-the-practice of travel simulation modeling as conducted by a peer group of 10 selected MPOs clearly indicates that the Commission's third-generation models developed with 1990 and 1991 data are consistent with current travel simulation modeling state-of-the-practice. Based on the review of current state-of-the-practice of the 10 selected peer MPOs, a number of refinements would merit, and are recommended for, consideration as the Commission develops its fourth generation of travel simulation models with year 2000 and 2001 data. Recommendations are also made for model refinements that should be considered beyond the fourth generation models over the next 10 years.

With regard to classification of travel—resident households, resident group-quartered persons, commercial truck travel, and external travel—the Commission models are consistent with state-of-the-practice and no potential refinement of Commission models is warranted.

With regard to model structure, the trip-based structure of the Commission models is consistent with state-of-the-practice and should continue to be the basis of the fourth generation models. However, like a few other MPOs, the Commission should explore and experiment with development of a tour- or activity-based model over the next 10 years.

With respect to resident household travel, the Commission models for trip generation, distribution, and mode choice were determined to be consistent with state-of-the practice. The following refinements are recommended for consideration in the fourth generation models:

- Trip purpose – stratification of nonhome-based trips into work and nonwork related trips.
- Trip distribution – continue use of gravity model, but give consideration to alternative destination choice models.

- Mode choice – incorporate choice of mode of transit access in mode choice model, and consider development of nested and/or multinomial logit models which would include choice between auto and transit, and multiple levels of auto occupancy. Also consider inclusion in mode choice model, or trip generation model, of the forecast of trips by walk and bicycle modes.

With respect to group-quartered resident, commercial, and external travel, the Commission models were determined to be consistent with state-of-the-practice.

Lastly, with respect to traffic and transit assignment, the Commission models were determined to be consistent with state-of-the-practice. Refinement of the highway traffic assignment for the fourth generation models will include recently developed and applied time-of-day traffic assignments, and possibly multi-class assignment. Refinement of the transit assignment should include mode of access to transit. Also, the Commission should explore development of, and experiment with, an alterative multipath transit assignment method over the next 10 years.

COMMISSION FOURTH GENERATION TRAVEL SIMULATION MODELS

This section of the chapter presents the Commission's fourth generation of travel simulation models calibrated with year 2000 U.S. Census data, year 2000 regional land use inventory and employment data, year 2001 regional highway and transit system network data, and year 2001 regional travel behavior and pattern survey data.

Classification of Travel

The Commission's fourth generation travel simulation models, as the Commission's previous generations of travel simulation models and travel simulation models for all urban regions, are based upon a classification of the different components of travel within an urban region. This classification of travel is necessary because the different types of trips exhibit different characteristics and, as a consequence, require different simulation techniques. In addition, some of these types of trips represent very small proportions of total travel in an urban region. The classification of trips and the determination of the relative proportion of total travel they represent allow travel simulation modeling resources to be focused on those types of trips which represent the greater proportions of travel.

As shown in Table 76, the first major division of trips in the Commission's fourth generation models involves the distinction between internal and external trips. Internal trips are defined as those trips which have both ends within the Southeastern Wisconsin Region. External trips are defined as those trips which have one or both ends outside of the Region. As internal travel has consistently, since 1963, accounted for about 95 percent of the person and vehicle trips observed on an average weekday, the primary emphasis in the travel modeling process is on internal trips. External trips do, however, have important effects on the use of facilities in certain travel corridors, particularly near the boundaries of the Region.

Among internal travel a further classification is made between commercial truck and personal travel. The vast majority of total weekday internal travel—nearly 95 percent—belongs to the category of internal personal travel. Internal personal travel may be further classified into travel by resident households and resident group-quartered persons. Travel by group-quartered persons of the Region is separated for special consideration because of the unique travel habits and patterns exhibited by these persons. Group-quartered persons are defined as those persons residing in dormitories, convents, homes for the aged, and similar group residences. Group-quartered person trips have consistently accounted for substantially less than 1 percent of the total travel within the Region since 1963.

The primary emphasis of travel simulation models in Southeastern Wisconsin and all urban regions is on internal resident household travel. These trips represent nearly 90 percent of total travel made within the Southeastern Wisconsin Region on an average weekday. This group of trips may be further subdivided by trip purpose. For the fourth-generation models, the trip purposes used were home-based work; home-based shopping; home-based other (excluding school); nonhome-based work and nonhome-based other (excluding school); and school trips.

Table 76

TRIP CLASSIFICATION AND FOURTH-GENERATION TRAVEL SIMULATION MODEL PROCEDURE

Trip Classification					Simulation Model				
					Trip Generation				
Internal or External	Type of Travel	Tripmaker	Trip Purpose	Percent of Total Trips[a]	Production	Attraction	Trip Distribution	Modal Split	Traffic Assignment
Internal	Personal Travel	Resident Households	Home-based work	21	Cross-classification analysis	Trip rate analysis	Gravity model	Logit analysis	Minimum path (24 hour and time period)
			Home-based shopping	11					
			Home-based other (excluding school)	28					
			Nonhome-based work and nonhome-based other (excluding school)	17					
			School	9	Factor existing total college and university person trip levels and adjust existing patterns			Logit analysis	
					Factor existing other school trip levels and adjust existing patterns by mode				
		Group Quartered Residents	All	--[b]	Factor existing trip levels and adjust existing patterns by mode				
	Commercial Truck Travel	Resident Trucks	All	8	Multiple Regression Analysis		Fratar Factor Model		
External	Personal and Commercial Truck Travel	Resident and Nonresident personal vehicles and commercial trucks	All	6	Factor existing trip levels		Fratar Factor Model		

[a] *Percentage of total travel based upon 2001 travel surveys.*

[b] *Substantially less than one percent.*

Source: SEWRPC.

Home-based trips are defined as those trips having one end located at the residence of the tripmaker. The purpose of a home-based trip is determined by the nonhome end of the trip as either work, shopping, or other (including personal business, medical-dental, social-eat meal, recreation, and serve passenger purposes). Nonhome-based trips are defined as those trips having neither end located at the place of residence of the tripmaker and can be made for any purpose except school. Separate consideration of home-based and nonhome-based school trips is necessary because of the constraints imposed upon travel patterns by elementary and junior and senior high school service area boundaries. Trips to and from all schools, elementary, junior and senior high, vocational and technical schools, and colleges and universities, have consistently represented approximately 10 percent of all travel observed in the Region on an average weekday.

Table 76 also indicates the specific modeling techniques used for each type of trip in the Commission's fourth-generation travel simulation model battery. Following a discussion of the geographic aggregation system utilized in the Commission's fourth-generation battery of travel simulation models, each of the Commission's fourth-generation models will be described.

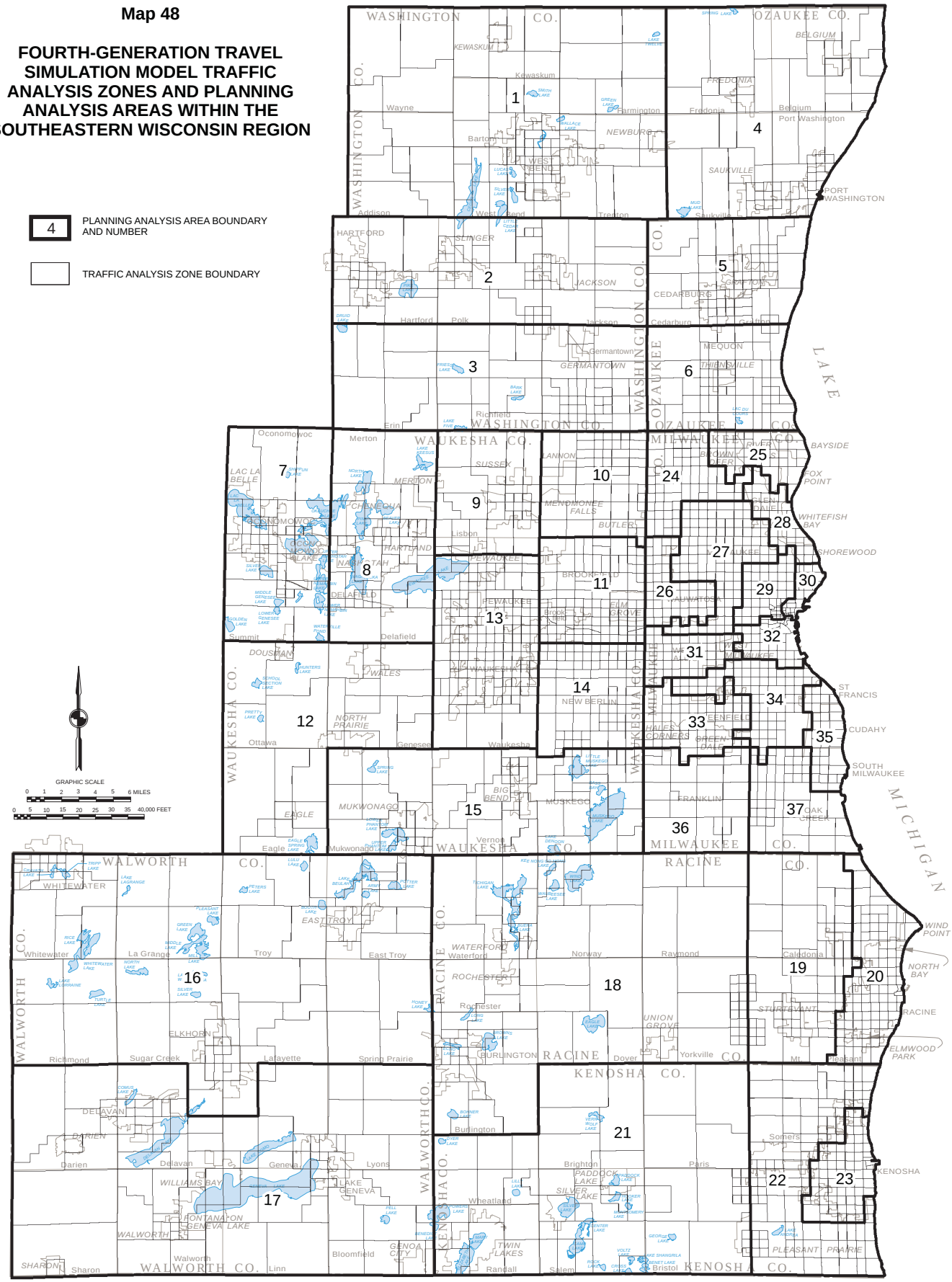
Geographic Aggregation System

All travel simulation models are developed and/or applied by subarea of the region under study. The greater the degree of homogeneity of the land uses in the subareas and the closer the replication of subarea access to the transportation system, the better able the models are to accurately simulate actual travel and traffic.

The basic unit of geographic identification used by the Commission for the collection and analysis of land use, demographic and economic, and travel inventory data is the U.S. Public Land Survey quarter-section, consisting of an approximately one-half mile on a side rectilinear area containing approximately 160 acres. The principal system of region subareas used in the fourth-generation travel simulation models was a system of 2,470 traffic analysis zones, composed of entire quarter-sections, combinations of quarter-sections, or groupings of city blocks smaller than a quarter-section—the latter principally in the Milwaukee, Racine, and Kenosha central business districts (CBDs). The traffic analysis zones as shown on Map 48, range in area from 0.04 square mile in the Milwaukee central business district to 18 square miles in the more sparsely settled portions of the Region.

Map 48

FOURTH-GENERATION TRAVEL SIMULATION MODEL TRAFFIC ANALYSIS ZONES AND PLANNING ANALYSIS AREAS WITHIN THE SOUTHEASTERN WISCONSIN REGION



Source: SEWRPC.

Aggregations of these traffic analysis zones are used from time-to-time for planning analysis purposes, such as travel pattern analysis. One such aggregation system of planning analysis area is shown on Map 48. These analysis areas are intended to represent rational areas for comprehensive urban planning purposes and are generally intended to be composed of a number of "neighborhoods" grouped to form "communities," which may consist of smaller minor civil divisions—cities, villages, and towns—groupings of the smallest minor civil divisions, or subareas of the larger minor civil divisions.

Personal Vehicle Availability Model

The availability of a personal vehicle (automobile, van, or truck) is a significant variable in travel simulation modeling, influencing not only the number of trips made by a household, or trip generation, but also the choice of mode. Household vehicle availability is logically affected by household income indicating ability of ownership, household size indicating possible need for multiple vehicles, and residential density and public transit accessibility indicating ability to use, and attractiveness of, public transit or walking as a means of transportation. Under the Commission's fourth-generation battery of travel simulation models, household vehicle availability is determined with three equations based upon multiple regression analyses with year 2001 household travel survey, year 2000 U.S. Bureau of Census data, and year 2000 Commission land use data. These analyses indicated the principal factors influencing vehicle ownership in central Milwaukee County, the remainder of the Milwaukee area and the remainder of the Region. The model for household vehicle availability in central Milwaukee County expresses household vehicle availability as a function of household income. For the remainder of the Milwaukee area, the model expresses household vehicle availability as a function of household income, household size, and transit accessibility. For the remainder of the Region, the model expresses household vehicle availability as a function of household size and residential density. A household stratification model was also developed and applied to forecast the distribution of households by both vehicle availability and household size, specifically, the distribution of households with zero, one, or two or more vehicles available by household size—one person, two persons, three or four persons, and five or more persons. The specific fourth-generation vehicle availability models are as follows:

Central Milwaukee County

$PUV = 0.15 + 0.259 \ln HI$

Remainder of Milwaukee Area

$PUV = 0.280 + 0.243 \ln HI + 0.209 PH - 0.108 \ln TA$

Remainder of Region

$PUV = 0.830 + 0.465 PH - 0.198 \ln RD$

Where:

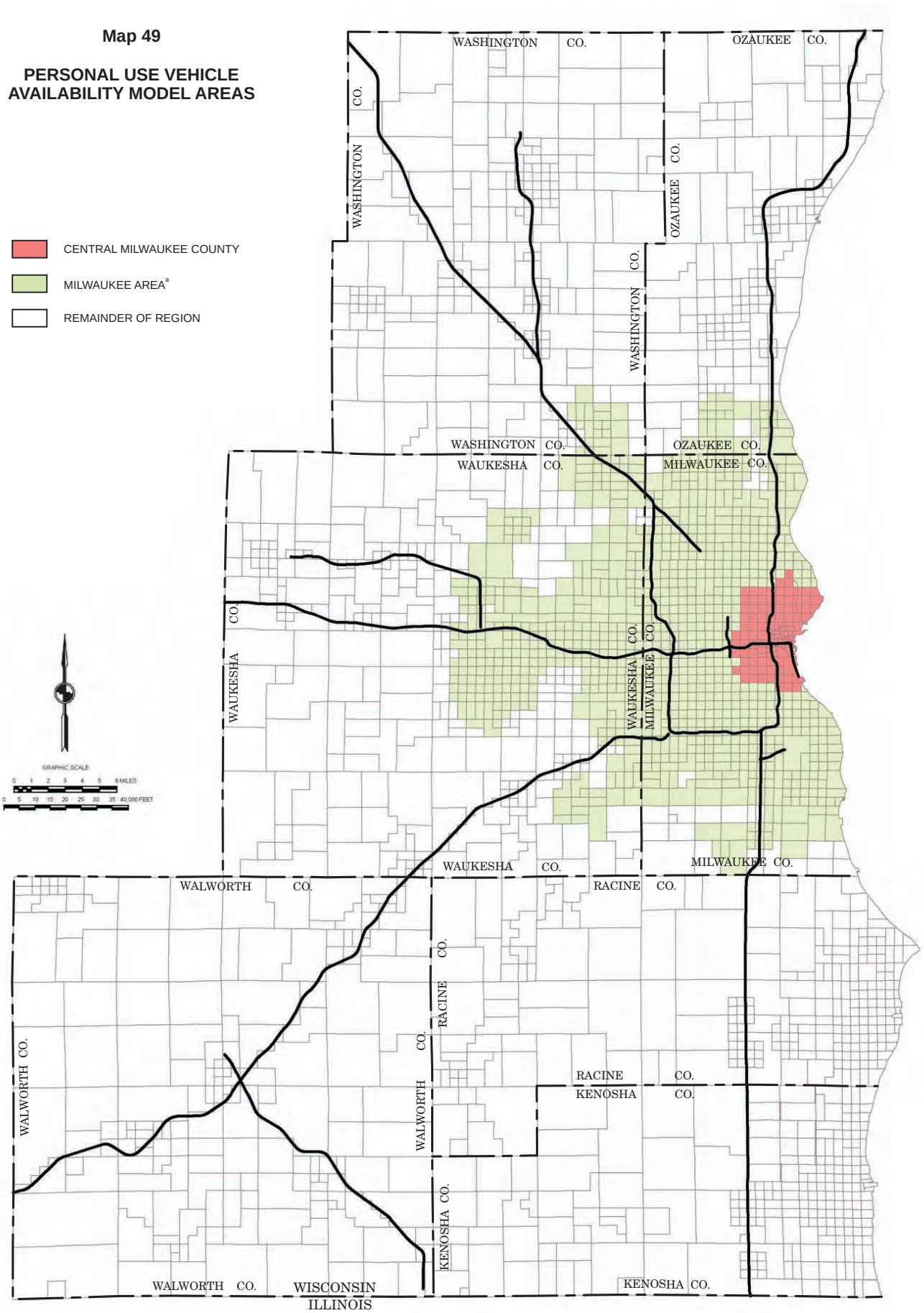
PUV = Personal Use Vehicle Availability per Household
HI = Mean Household Income ($1,000's)
PH = Persons per Household
RD = Residential Density (Household per Gross Residential Acre)
TA = Transit Accessibility x 10^{-9} (Walk to transit accessibility for HBW, HBS, HBO attractions)

Map 49 shows these three areas of the Region.

The household stratification model is a combination of a household size stratification model and vehicle ownership stratification model. The household size stratification model provides estimates of the proportion of households within a zone for each specific household size category, given the zonal average household size as derived from forecast population and household levels. Similarly, the vehicle ownership stratification model provides estimates of the proportion of households within a zone for each vehicle ownership category, given the

Map 49

PERSONAL USE VEHICLE AVAILABILITY MODEL AREAS



[a]The Milwaukee area is defined as that portion of the contiguous Milwaukee area with a density exceeding 2.3 persons and/or jobs per acre (not including surface water area).

Source: SEWRPC.

zonal average household vehicle ownership as derived by the above equation. The household size and vehicle ownership stratification models were verified and calibrated by using zonal population, household, and vehicle data from the year 2000 census.

In order to determine the number of households within each category by both household size and vehicle availability, the results of the two individual stratification models were combined. This was done by defining the proportions of households in each category as probabilities and then applying elementary probability theory to determine the joint probability of a household possessing a specific family size and a specific vehicle availability. If the two characteristics were considered independent, then the joint probability of a particular household size category K (HHS_k), and a particular vehicle availability category j (AA_j) for a zone i would merely be the product of the two probabilities, or:

$$P(HHS_k - AA_j)i = P(HHS_k)i \times P(AA_j)i.$$

Examination of the available data, however, indicated that there was a certain degree of dependence between the two characteristics. The joint probability thus includes a conditional probability, that is:

$$P(HHS_k - AA_j)i = P(AA_j)i \times P(HHS_k/AA_j)i.$$

The value of the conditional probability $P(HHS_k/AA;)i$, representing the probability of vehicle availability category j given the household size category K, was determined by the calibration of the equation:

$$P(HHS_k/AA_j)i = C_1P(HHS_k)i + C_2P(HHS_k/AA_j)region.$$

Where: C_1 and C_2 are the calibrated weights reflecting the amount of independence and dependence, respectively, of the two characteristics, and C_1 and $C_2 = 1$. The observed conditional probability for the Region is $P(HHS_k/AA_j)region$.

A number of combinations of C_1 and C_2 were examined to find that combination which best replicated the observed household classification. The final version of the household stratification model, using equal dependent and independent weights, is summarized as:

$$P(HHS_k - AA_j)i = P(AA_j)i \times [0.4\ P(HHS_k)i + 0.6\ P(HHS_k/AA_j)region]$$

Trip Generation Model

The first major step in the Commission's fourth-generation travel simulation models is trip generation whereby the total number of trip ends generated within each zone of the study area is determined through the identification and quantification of relationships between travel and land use. The fourth-generation trip generation models developed by the Commission with year 2001 travel survey data for internal regional travel by resident households of the Region use cross-classification analysis for trip productions and trip rate analyses for trip attractions for all trip purposes except school trips.

Internal home-based and nonhome-based trips by the resident households in the Region for all purposes except school constitute the vast majority of daily trips made within the Region, nearly 80 percent. The production of these home-based and nonhome-based trips is analyzed and forecast under the fourth-generation models through the use of cross-classification analysis. Home-based trips were stratified into trip purpose categories of home-based work, home-based shopping, and home-based other, and nonhome-based trips into nonhome-based work and nonhome-based other (excluding school) trips. Household automobile availability and household size were determined to best quantify the level of tripmaking in the fourth-generation trip production model, and the number of jobs by type and number of households were used to quantify tripmaking in the trip attraction model.

The cross-classification trip production models were developed for three areas within the Region—urban, suburban, and rural as shown on Map 50—based upon population and employment density. For each of these three areas, cross-classification models were developed to forecast total personal travel by all modes and nonmotorized person travel—that is, travel by the modes of walking and bicycle. The remainder of the Commission's models address motorized travel, by personal vehicle or public transit, or total travel less travel by walking and bicycle. The cross-classification model for nonmotorized travel permits estimates of travel by walking and bicycle modes which based on the model increase with population and employment density. The cross-classification models estimate motorized travel by subtracting estimated nonmotorized travel from estimated total travel. Tables 77, 78, 79, 80, and 81 display the cross-classification trip production models for total and nonmotorized trips for home-based work, home-based shopping, home-based other, nonhome-based work, and nonhome-based other trips.

While Tables 80 and 81 include a cross-classification trip rate model for nonhome-based trip productions, the forecast of nonhome-based trip production by zone must be accomplished through an additional step which allocates the forecast regional total production of nonhome-based trips to zones. The production of nonhome-based trips cannot be directly estimated by zone with the cross-classification approach since neither end of the trip represents the place of residence of the tripmaker. Cross-classification, however, can provide an estimate of total regional nonhome-based trip productions based on the total number of regional households and their characteristics. The allocation of the regional totals of nonhome-based motorized trip productions to each zone is accomplished through equations developed through multiple regression analysis. These equations relate the number of nonhome-based motorized trip productions in a zone to the number of households, retail employment, and other employment in a zone, based upon analyses of the 2001 household travel survey data with respect to nonhome-based motorized trip production from residential land uses, retail land uses, and other land uses.

NHBW = 0.084 x HH + 0.778 x REMP + 0.315 x OEMP
NHBO = 0.174 x HH + 2.858 x REMP

Where:

NHBW = nonhome-based work motorized trips
NHBO = Nonhome-based other (excluding school) motorized trips
HH = Number of households
REMP = Retail employment
OEMP = Other (than retail) employment

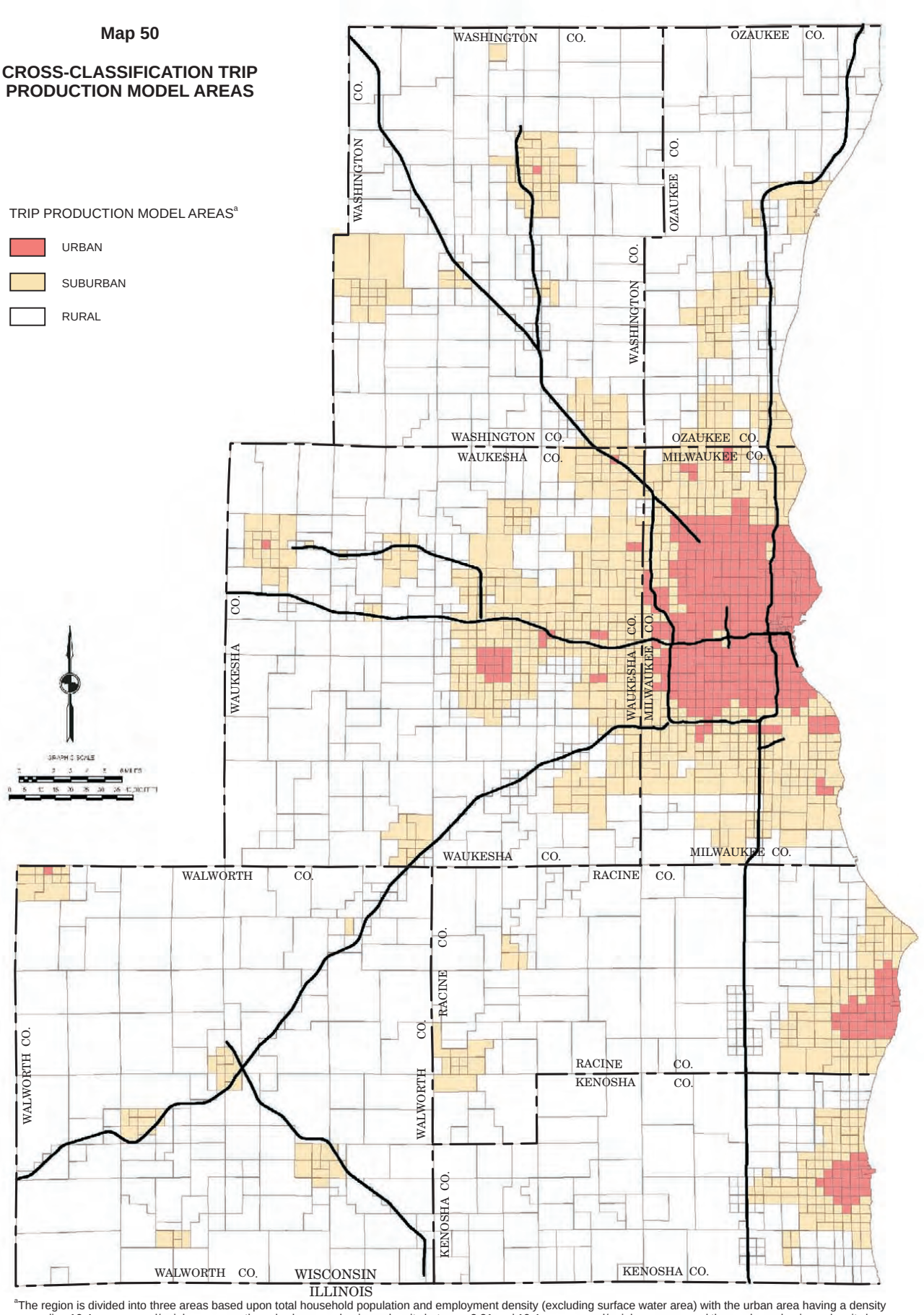
The other set of trip end relationships developed in the trip generation process was for trip attraction which is primarily a function of the nonresidential land use activity within the subareas of the Region. Person trip attraction relationships were developed through the calibration of trip rate models, representing home-based work, home-based shopping, home-based other, and nonhome-based work and nonhome-based other trip purposes. The models relate person trip attractions to employment type and households on the basis of analysis of the 2001 household travel survey and land use and employment inventories. The calibrated trip attraction equations are presented in Table 82.

An adjustment is made to the forecast trip attractions to balance the total number of forecast trip attractions and the total number of trip productions. Because trip productions and attractions are forecast independently, the total number of forecast trip productions do not always match the total number of forecast trip attractions. For each trip purpose, the zonal trip attractions derived from application of the trip attraction model are factored so that the sum of the zonal trip attractions for each trip purpose equals the total regional cross-classification estimate of trip productions for that trip purpose.

The generation—and distribution—of school trips in the fourth-generation travel models was accomplished by factoring existing school travel volumes and patterns. Such separate consideration of school trips was necessitated by the limitations imposed by fixed elementary and junior and senior high school service area boundaries. Trips to

Map 50

CROSS-CLASSIFICATION TRIP PRODUCTION MODEL AREAS



[a]The region is divided into three areas based upon total household population and employment density (excluding surface water area) with the urban area having a density exceeding 10.4 persons and/or jobs per acre, the suburban area having a density between 2.31 and 10.4 persons and/or jobs per acre and the rural area having a density less than 2.3 persons and/or jobs per acre.

Source: SEWRPC.

Table 77

INTERNAL PERSON TRIP PRODUCTION CROSS-CLASSIFICATION MODELS: HOME-BASED WORK TRIPS

Trip Production Area	Vehicles Available	Total Trips Per Household						Nonmotorized Trips Per Household					
		Household Size						Household Size					
		One	Two	Three	Four	Five or More	Average	One	Two	Three	Four	Five or More	Average
Urban	None	0.45	1.00	1.16	1.32	1.38	0.73	0.09	0.25	0.30	0.35	0.40	0.18
	One	1.14	1.30	1.92	2.04	2.16	1.41	0.05	0.07	0.10	0.20	0.30	0.09
	Two	1.27	2.49	2.65	2.82	2.85	2.52	0.01	0.03	0.07	0.09	0.15	0.06
	Three	1.55	2.66	3.49	3.57	3.63	3.24	- -	0.02	0.05	0.07	0.10	0.05
	Four or More	1.75	2.75	3.56	4.23	4.49	3.64	- -	0.01	0.03	0.05	0.07	0.04
	Average	0.96	1.87	2.40	2.67	2.68	1.81	0.06	0.07	0.10	0.14	0.21	0.09
Suburban	None	0.24	0.90	1.12	1.30	1.32	0.41	0.06	0.20	0.25	0.30	0.35	0.10
	One	0.98	0.99	1.85	1.98	2.01	1.10	0.01	0.05	0.08	0.11	0.14	0.03
	Two	1.26	2.06	2.60	2.70	2.77	2.31	0.01	0.02	0.03	0.04	0.05	0.03
	Three	1.49	2.54	3.40	3.55	3.60	3.19	- -	0.01	0.02	0.03	0.04	0.02
	Four or More	1.50	2.56	3.45	3.74	4.10	3.45	- -	0.01	0.01	0.02	0.03	0.02
	Average	0.94	1.82	2.77	2.94	3.06	2.01	0.02	0.03	0.03	0.04	0.05	0.03
Rural	None	0.20	0.63	1.00	1.03	1.10	0.30	0.02	0.04	0.06	0.09	0.12	0.03
	One	0.87	0.90	1.45	1.89	1.96	1.00	0.01	0.03	0.04	0.06	0.09	0.02
	Two	0.96	1.73	2.15	2.53	2.56	1.98	- -	0.02	0.02	0.02	0.03	0.02
	Three	1.03	2.21	3.03	3.07	3.12	2.75	- -	0.01	0.01	0.02	0.03	0.02
	Four or More	1.34	2.40	3.17	3.60	3.79	3.19	- -	0.01	0.01	0.01	0.02	0.01
	Average	0.88	1.71	2.54	2.86	2.92	2.08	0.01	0.02	0.02	0.02	0.03	0.02

Note: Trip production rates less than 0.005 are denoted using "- -".

Source: SEWRPC.

Table 78

INTERNAL PERSON TRIP PRODUCTION CROSS-CLASSIFICATION MODELS: HOME-BASED SHOPPING TRIPS

Trip Production Area	Vehicles Available	Total Trips Per Household						Nonmotorized Trips Per Household					
		Household Size						Household Size					
		One	Two	Three	Four	Five or More	Average	One	Two	Three	Four	Five or More	Average
Urban	None	0.46	0.57	0.58	0.59	0.90	0.53	0.18	0.22	0.32	0.36	0.54	0.23
	One	0.67	1.03	1.12	1.19	1.25	0.89	0.02	0.06	0.08	0.15	0.20	0.06
	Two	0.70	1.19	1.20	1.29	1.40	1.20	0.01	0.04	0.03	0.06	0.15	0.05
	Three	0.79	1.22	1.25	1.40	1.60	1.32	- -	0.01	0.02	0.03	0.09	0.03
	Four or More	0.85	1.24	1.30	1.47	1.65	1.38	- -	- -	- -	- -	0.05	0.01
	Average	0.61	1.06	1.12	1.23	1.34	0.96	0.06	0.07	0.08	0.10	0.19	0.08
Suburban	None	0.49	0.73	0.80	0.93	1.00	0.55	0.09	0.14	0.25	0.30	0.50	0.11
	One	0.73	1.14	1.26	1.33	1.49	0.91	0.01	0.03	0.06	0.10	0.15	0.02
	Two	0.76	1.21	1.30	1.37	1.59	1.27	0.01	0.01	0.01	0.01	0.01	0.01
	Three	0.85	1.23	1.33	1.45	1.64	1.37	- -	- -	- -	- -	- -	- -
	Four or More	0.90	1.27	1.35	1.50	1.70	1.44	- -	- -	- -	- -	- -	- -
	Average	0.71	1.19	1.30	1.40	1.61	1.15	0.02	0.02	0.02	0.02	0.02	0.02
Rural	None	0.45	0.50	0.57	0.58	0.89	0.47	- -	- -	- -	- -	- -	- -
	One	0.50	0.99	1.00	1.05	1.09	0.74	- -	- -	- -	- -	- -	- -
	Two	0.53	1.00	1.05	1.09	1.11	1.00	- -	- -	- -	- -	- -	- -
	Three	0.55	1.05	1.09	1.11	1.15	1.08	- -	- -	- -	- -	- -	- -
	Four or More	0.57	1.09	1.11	1.15	1.19	1.12	- -	- -	- -	- -	- -	- -
	Average	0.51	1.01	1.07	1.11	1.13	0.97	- -	- -	- -	- -	- -	- -

Note: Trip production rates less than 0.005 are denoted using "- -".

Source: SEWRPC.

and from all schools, including elementary, junior and senior high, vocational and technical schools, and colleges and universities, amounted to about 9 percent of total trips generated within the Region on an average weekday in 2001. Growth factors were applied by mode—automobile, school bus, and public transit—to the observed 2001 trip tables of elementary and junior and senior high school trips. The growth factors were based upon forecast changes in population, and were adjusted to account for potential changes in school service boundaries and the

Table 79

INTERNAL PERSON TRIP PRODUCTION CROSS-CLASSIFICATION MODELS: HOME-BASED OTHER TRIPS

Trip Production Area	Vehicles Available	Total Trips Per Household						Nonmotorized Trips Per Household					
		Household Size						Household Size					
		One	Two	Three	Four	Five or More	Average	One	Two	Three	Four	Five or More	Average
Urban	None	1.06	1.36	1.60	1.75	2.57	1.31	0.26	0.33	0.39	0.46	0.87	0.34
	One	1.30	2.54	2.90	3.66	3.70	2.14	0.05	0.15	0.23	0.33	0.66	0.16
	Two	1.45	2.60	2.95	4.10	5.27	3.20	0.04	0.05	0.19	0.21	0.46	0.16
	Three	1.50	2.68	3.16	4.25	5.45	3.63	- -	0.04	0.09	0.13	0.17	0.10
	Four or More	1.60	2.70	3.60	4.35	6.00	3.99	- -	- -	0.04	0.06	0.09	0.04
	Average	1.25	2.44	2.84	3.83	4.58	2.47	0.11	0.12	0.21	0.24	0.50	0.18
Suburban	None	1.06	1.37	1.61	1.76	2.58	1.15	0.15	0.25	0.35	0.40	0.86	0.18
	One	1.35	2.60	2.95	3.80	6.00	1.97	0.03	0.11	0.20	0.31	0.65	0.09
	Two	1.49	2.66	3.00	4.21	6.25	3.38	0.01	0.02	0.04	0.12	0.26	0.07
	Three	1.55	2.75	3.20	4.35	6.40	3.83	- -	0.01	0.01	0.10	0.16	0.05
	Four or More	1.64	2.80	3.80	4.50	6.80	4.37	- -	- -	0.01	0.06	0.08	0.04
	Average	1.34	2.63	3.11	4.23	6.32	2.93	0.04	0.05	0.06	0.13	0.24	0.08
Rural	None	1.00	1.20	1.60	1.70	2.40	1.09	0.05	0.08	0.10	0.16	0.25	0.06
	One	1.30	1.95	2.25	3.50	3.64	1.75	0.01	0.04	0.07	0.11	0.20	0.03
	Two	1.35	2.03	2.66	3.55	4.91	2.71	- -	0.01	0.03	0.07	0.07	0.03
	Three	1.40	2.11	2.80	3.75	5.00	3.12	- -	- -	0.01	0.03	0.05	0.02
	Four or More	1.45	2.20	2.90	3.99	5.15	3.48	- -	- -	- -	0.01	0.03	0.01
	Average	1.31	2.04	2.71	3.69	4.92	2.68	0.01	0.01	0.02	0.05	0.06	0.03

Note: Trip production rates less than 0.005 are denoted using "- -".

Source: SEWRPC.

Table 80

INTERNAL PERSON TRIP PRODUCTION CROSS-CLASSIFICATION MODELS: NONHOME-BASED WORK TRIPS

Trip Production Area	Vehicles Available	Total Trips Per Household						Nonmotorized Trips Per Household					
		Household Size						Household Size					
		One	Two	Three	Four	Five or More	Average	One	Two	Three	Four	Five or More	Average
Urban	None	0.09	0.12	0.18	0.21	0.24	0.12	0.03	0.06	0.08	0.12	0.13	0.05
	One	0.57	0.61	0.67	0.70	0.75	0.61	0.01	0.01	0.01	0.07	0.08	0.02
	Two	0.63	0.85	0.86	0.88	0.89	0.84	0.01	0.01	0.01	0.01	0.02	0.01
	Three	0.79	0.87	0.88	0.89	0.89	0.88	0.01	0.01	0.01	0.01	0.01	0.01
	Four or More	0.87	0.88	0.89	0.89	0.89	0.89	- -	- -	0.01	0.01	0.01	0.01
	Average	0.44	0.68	0.73	0.78	0.78	0.62	0.02	0.02	0.02	0.04	0.05	0.02
Suburban	None	0.09	0.12	0.18	0.21	0.24	0.10	0.01	0.04	0.05	0.06	0.07	0.02
	One	0.57	0.61	0.67	0.70	0.75	0.60	0.01	0.01	0.02	0.03	0.05	0.01
	Two	0.63	0.85	0.86	0.88	0.89	0.85	0.01	0.01	0.01	0.01	0.02	0.01
	Three	0.79	0.87	0.89	0.89	0.89	0.88	- -	0.01	0.01	0.01	0.02	0.01
	Four or More	0.87	0.88	0.89	0.89	0.89	0.89	- -	- -	0.01	0.01	0.01	0.01
	Average	0.53	0.78	0.84	0.86	0.88	0.74	0.01	0.01	0.01	0.01	0.02	0.01
Rural	None	0.09	0.12	0.25	0.38	0.40	0.11	0.01	0.01	0.01	0.01	0.01	0.01
	One	0.60	0.61	0.69	0.71	0.76	0.62	- -	- -	- -	0.01	0.01	- -
	Two	0.75	0.86	0.87	0.90	0.93	0.87	- -	- -	- -	- -	- -	- -
	Three	0.81	0.89	0.90	0.97	0.99	0.93	- -	- -	- -	- -	- -	- -
	Four or More	0.90	0.92	1.00	1.02	1.04	0.99	- -	- -	- -	- -	- -	- -
	Average	0.62	0.83	0.88	0.93	0.96	0.84	- -	- -	- -	- -	- -	- -

Note: Trip production rates less than 0.005 are denoted using "- -".

Source: SEWRPC.

construction of new schools. With respect to trips to universities and colleges such as the University of Wisconsin-Milwaukee, Marquette University, Milwaukee Area Technical College, and Milwaukee School of Engineering, the growth factor procedure was applied to total person, rather than to individual mode travel volume and patterns, and the growth factor was based on projected enrollment. A mode choice model, described later in this report then is used to divide the total person trips into those using public transit and those using the automobile.

Table 81

INTERNAL PERSON TRIP PRODUCTION CROSS-CLASSIFICATION MODELS: NONHOME-BASED OTHER TRIPS

Trip Production Area	Vehicles Available	Total Trips Per Household						Nonmotorized Trips Per Household					
		Household Size					Average	Household Size					Average
		One	Two	Three	Four	Five or More		One	Two	Three	Four	Five or More	
Urban	None	0.36	0.49	0.55	0.60	0.63	0.43	0.11	0.19	0.23	0.24	0.25	0.15
	One	0.68	0.91	0.93	0.95	1.00	0.81	0.01	0.03	0.05	0.10	0.12	0.03
	Two	0.72	0.95	0.96	0.99	1.07	0.96	0.01	0.01	0.02	0.03	0.03	0.02
	Three	0.86	1.02	1.06	1.07	1.40	1.11	- -	0.01	0.01	0.02	0.03	0.02
	Four or More	0.94	1.05	1.07	1.17	1.56	1.19	- -	0.01	0.01	0.02	0.02	0.01
	Average	0.59	0.89	0.92	0.97	1.07	0.82	0.04	0.04	0.05	0.06	0.08	0.05
Suburban	None	0.40	0.55	0.95	1.05	1.10	0.45	0.06	0.08	0.09	0.10	0.12	0.07
	One	0.76	0.97	1.00	1.08	1.25	0.85	0.01	0.02	0.02	0.03	0.07	0.02
	Two	0.85	1.00	1.05	1.09	1.45	1.07	- -	0.01	0.01	0.02	0.02	0.01
	Three	0.90	1.06	1.09	1.23	1.55	1.18	- -	- -	0.01	0.01	0.01	0.01
	Four or More	1.00	1.10	1.20	1.33	1.73	1.32	- -	- -	- -	- -	0.01	- -
	Average	0.73	0.99	1.06	1.15	1.49	1.00	0.01	- -	0.01	0.01	0.02	0.01
Rural	None	0.39	0.54	0.75	0.80	0.90	0.43	0.01	0.03	0.04	0.05	0.09	0.02
	One	0.71	0.92	0.96	0.97	1.03	0.82	0.01	0.02	0.02	0.02	0.04	0.02
	Two	0.74	0.96	0.97	1.00	1.08	0.97	- -	0.01	0.01	0.01	0.01	0.01
	Three	0.87	1.03	1.07	1.08	1.41	1.10	- -	- -	0.01	0.01	0.01	0.01
	Four or More	0.95	1.05	1.17	1.18	1.57	1.22	- -	- -	- -	- -	0.01	- -
	Average	0.71	0.97	1.03	1.06	1.26	0.99	0.01	0.01	0.01	0.01	0.01	0.01

Note: Trip production rates less than 0.005 are denoted using "- -".

Source: SEWRPC.

The generation—and distribution—of internal personal vehicle trips by group-quartered persons is forecast in the fourth-generation travel models by the application of growth factors, reflecting the anticipated change in the number of group-quartered persons by zone of residence.

Travel internal to the Region by commercial trucks registered within the Region constituted in 2001 about 8 percent of total tripmaking within the Region on an average weekday and, approximately 11 percent of total vehicle trips generated within the Region on an average weekday. In the fourth-generation travel simulation models the generation—and distribution—of truck trips is accomplished by factoring the existing volume and pattern of truck trips. The forecast future generation of truck trips was accomplished by the use of multiple linear regression analysis relating truck trips to households and employment.

$$TTRP = 0.123\ HH + 0.304\ REMP + 0.196\ OTHEMP + 96.650$$

Where:

TTRP	=	Number of commercial truck trip ends
HH	=	Number of households
REMP	=	Number of retail employees
OTHEMP	=	Number of other (than retail) employees

External trips comprised about 6 percent of total tripmaking and total vehicle trips within the Region in 2001. In the fourth-generation travel simulation models, the generation—and distribution—of external travel was forecast by extrapolating the existing 2001 pattern of external tripmaking by applying growth factors to the 2001 trips on the basis of the forecast changes in households and employment at the production and attraction ends of the trips, respectively. In addition, fourth-generation model forecast external travel is compared to, and adjusted by, statewide external travel forecasts prepared by the Wisconsin Department of Transportation.

Table 82

INTERNAL PERSON TRIP ATTRACTION MODELS

Trip Purpose	Area	Variable	Trip Attraction Rate (per Job or Household)
Home-Based Work	Region	Total Employment	1.17
Home-Based Shopping	Central Milwaukee	Retail Employment	1.85
	Remainder of Region	Retail Employment	4.24
Home-Based Other (excluding school)	Central Milwaukee	Households	0.86
		Retail Employment	1.37
		Other Employment	0.36
	Remainder of Milwaukee County	Households	1.42
		Retail Employment	2.03
		Other Employment	0.58
	Remainder of Region	Households	1.60
		Retail Employment	2.71
		Other Employment	0.35
Nonhome-Based Work	Central Milwaukee	Households	0.15
		Retail Employment	1.02
		Other Employment	0.15
	Remainder of Milwaukee County	Households	0.22
		Retail Employment	0.90
		Other Employment	0.23
	Remainder of Region	Households	0.13
		Retail Employment	1.22
		Other Employment	0.19
Nonhome-Based Other (excluding school)	Central Milwaukee	Households	0.22
		Retail Employment	0.48
		Other Employment	0.06
	Remainder of Milwaukee County	Households	0.34
		Retail Employment	2.04
		Other Employment	0.09
	Remainder of Region	Households	0.22
		Retail Employment	2.77
		Other Employment	0.03

Source: SEWRPC.

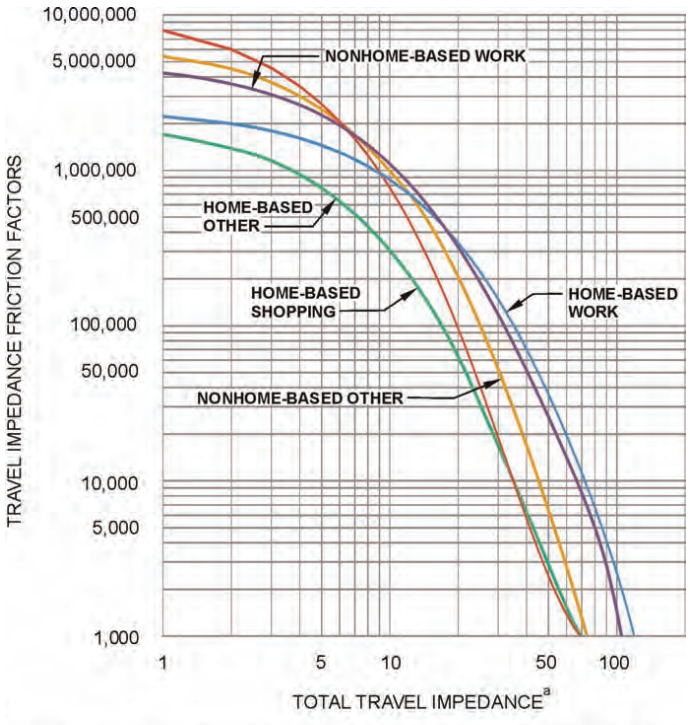
Trip Distribution

The second major step in the travel simulation process is trip distribution whereby the number of trips between each zonal pair is determined. The input to this step from trip generation includes the number of trip ends produced by, or attracted to, each zone by resident households of the Southeastern Wisconsin Region for home-based work, home-based shopping, home-based other, and nonhome-based trips.

The fourth-generation model battery's trip distribution procedure is the gravity model, which is the most widely accepted and used trip distribution model. In the gravity model, the number of trips between two zones in the region, is a function of the number of trip ends in each zone and their spatial separation measured in terms of travel time, distance, and/or cost. The fourth-generation model uses both travel time (peak hour for work trips and off-peak for other trips) and out-of-pocket travel cost as the measure of spatial separation. The fourth-generation trip distribution models were developed with year 2001 travel survey and transportation system network data. Individual gravity models were calibrated for home-based work, home-based shopping, home-based other, nonhome-based work, and nonhome-based other trip purposes for resident household internal trips. As noted

Figure 36

TRAVEL IMPEDANCE FRICTION FACTORS FOR INTERNAL TOTAL PERSON TRIPS IN THE REGION: 2001



[a] *Impedance is a combination of travel time in minutes and the cost of travel per mile.*

Source: SEWRPC.

earlier, the distribution of internal school trips, group-quartered person trips, internal truck trips, and external trips was accomplished by factoring and adjusting existing 2001 trip travel patterns. Indicating the effect of spatial separation on trip interchanges observed in the 2001 travel surveys, the calibrated friction factors for each trip purpose are shown in Figure 36. Since friction factors are relative, of greater importance than their absolute magnitudes is the slope of the smoothed friction factor curve. For this reason, the friction factor curves in Figure 36 were normalized and plotted on logarithmic scales to facilitate a comparison of trip purposes. As shown in Figure 36, the friction factor curve with the smallest negative slope is that for home-based work, indicating the smaller effects of spatial separation on the distribution of work trips as the travel time and cost increases. Conversely, the curve for home-based other and shopping trips shows the greatest sensitivity to spatial separation, as the travel time increases.

Modal Choice

The third major step in the travel simulation process is modal choice whereby the total number of trips traveling between each pair of traffic analysis zones by trip purpose is divided on the basis of travel mode used. Primarily, this step involves the division of internal person trips between the two major modes of travel, public transit and the private automobile. The determination of modal choice is essentially an evaluation of the potential demand for public transit service. The modal choice step must also determine for each zone-to-zone interchange those auto trips which will drive alone and those which will carpool, or "share a ride," and thus determine the average number of persons per automobile trip. Both automobile vehicle trips and transit person trips are determined in this step as necessary inputs to the final traffic assignment step of the travel simulation process.

The fourth-generation modal choice models developed with 2001 travel survey and transportation network data use logit analysis for the trip purposes of home-based work, home-based shopping, home-based other, nonhome-based work and other purposes combined, and home-based school (trips to and from colleges and universities) (see Table 83). The modal choice model calibrated for the home-based work trip purpose expresses the probability of mode choice as a function of household automobile availability, in-vehicle travel time, out-of-vehicle travel time, and out-of-pocket cost differences between modes. The modes addressed in the model include drive alone, shared ride, and public transit, including walk, drive, and shared-ride access to public transit. The models calibrated for home-based shopping and other trip purposes and for home-based school (college and university) trip purposes express the probability of mode choice as a function of household automobile availability, in-vehicle travel time, out-of-vehicle travel time, and out-of-pocket cost differences between automobile and transit modes. The nonhome-based mode choice model expresses the probability of mode choice as a function of in-vehicle travel time, out-of-vehicle travel time, and out-of-pocket cost differences between automobile and transit modes. An automobile occupancy model shown in Table 84 is used to convert total automobile person trips to vehicle trips for home-based shopping and other trips, nonhome-based trips and home-based school trips based on household size and personal vehicle availability.

Table 83

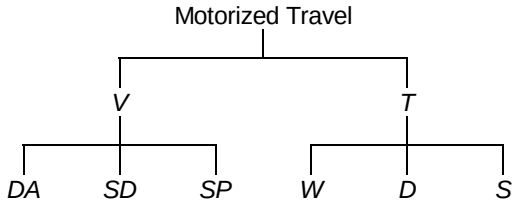
MODE CHOICE MODELS

Home-Based Work

$$P_W^T = P_W \times P^T$$

$$P^T = \frac{e^{U^T}}{e^{U^T} + e^{U^V}}$$

$$P_W = \frac{e^{U_W}}{e^{U_W} + e^{U_D} + e^{U_S}}$$



Where:

$$U^T = 0.9364 \ln\left(e^{U_W} + e^{U_D} + e^{U_S}\right)$$

$$U_W = -0.005526\, C_W - 0.02842\, I_W - 0.06503\, O_W + 3.219\, VA_0$$

$$U_D = -0.005526\, C_D - 0.02842\, I_D - 0.06503\, O_D - 2.102$$

$$U_S = -0.005526\, C_S - 0.02842\, I_S - 0.06503\, O_S - 3.891$$

$$U^V = 0.9364 \ln\left(e^{U_{DA}} + e^{U_{SD}} + e^{U_{SP}}\right)$$

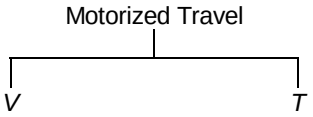
$$U_{DA} = -0.005526\, C_{DA} - 0.02842\, I_{DA} - 0.06503\, O_{DA} + 0.6037\, VA$$

$$U_{SD} = -0.005526\, C_{SD} - 0.02842\, I_{SD} - 0.06503\, O_{SD} - 0.8352$$

$$U_{SP} = -0.005526\, C_{SP} - 0.02842\, I_{SP} - 0.06503\, O_{SP} - 1.631$$

Home-Based Shopping

$$P^T = \frac{e^{U^T}}{e^{U^T} + e^{U^V}}$$



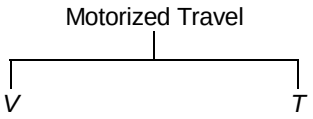
Where:

$$U_T = -0.02895\, C_T - 0.05338\, I_T - 0.06815\, O_T$$

$$U_V = -0.02895\, C_V - 0.05338\, I_V - 0.06815\, O_V + 4.213\, VA - 5.294$$

Home-Based Other

$$P^T = \frac{e^{U^T}}{e^{U^T} + e^{U^V}}$$



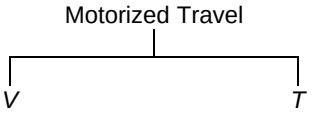
Where:

$$U_T = -0.01190\, C_T - 0.01028\, I_T - 0.0459\, O_T$$

$$U_V = -0.01190\, C_V - 0.01028\, I_V - 0.0459\, O_V + 2.613\, VA - 1.473$$

Table 83 (continued)

Nonhome-Based Work and Nonhome-Based Other

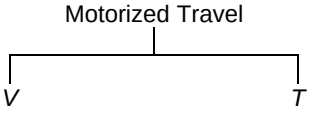


$$P^T = \frac{e^{U^T}}{e^{U^T} + e^{U^V}}$$

Where:

$$U_T = -0.007848\, C_T - 0.006614\, I_T - 0.06824\, O_T$$
$$U_V = -0.007848\, C_V - 0.006614\, I_V - 0.06824\, O_V + 1.359$$

Home-Based School[a]



$$P^T = \frac{e^{U^T}}{e^{U^T} + e^{U^V}}$$

Where:

$$U_T = -0.009212\, C_T - 0.0116\, I_T - 0.01713\, O_T$$
$$U_V = -0.009212\, C_V - 0.0116\, I_V - 0.01713\, O_V + 0.338\, VA - 0.05045$$

Where:

U	=	utility
T	=	travel by transit
W	=	walk to transit
D	=	drive alone to transit
S	=	shared-ride driver/passenger to transit
V	=	travel by personal use vehicle (PUV)
DA	=	drive alone by PUV
SD	=	shared-ride driver by PUV
SP	=	shared-ride passenger by PUV
C	=	person cost
I	=	in-vehicle travel time
O	=	out-of-vehicle travel time
VA	=	number of PUVs available in household (0 for 0 PUV, 1 for 1 PUV, 2 for 2 PUVs, and 3 for 3 or more PUVs)
VA_0	=	zero PUV available in household (0 for 1 or more PUVs, 1 for 0 PUV)
IO	=	total travel time (in-vehicle time plus out-of-vehicle time)

[a]*The home-based school trip model is applied to trips to and from colleges and universities in the study area and is applied to trips by households with one or more automobiles.*

Source: SEWRPC.

In development and application of the modal choice models, two basic sets of transportation system variables are prepared: one to represent the in-vehicle and out-of-vehicle travel times and out-of-pocket costs of the automobile and transit modes during average weekday peak travel periods and one to represent the in-vehicle and out-of-

Table 84

VEHICLE PERSON TRIPS PER VEHICLE DRIVER TRIP BY PURPOSE[a]

Home-Based Shopping Trips					
Vehicles Available	Household Size				
	One	Two	Three	Four	Five or More
None	11.50	2.70	2.50	2.35	4.50
One	1.02	1.38	1.43	1.48	1.61
Two	1.02	1.14	1.23	1.26	1.38
Three	1.00	1.12	1.14	1.28	1.34
Four or More	1.00	1.08	1.09	1.15	1.19

Nonhome-Based Work Trips					
Vehicles Available	Household Size				
	One	Two	Three	Four	Five or More
None	2.17	2.14	2.20	2.25	2.30
One	1.02	1.04	1.06	1.08	1.12
Two	1.00	1.05	1.06	1.06	1.07
Three	1.00	1.04	1.05	1.06	1.09
Four or More	1.00	1.02	1.03	1.05	1.06

Home-Based Other Trips					
Vehicles Available	Household Size				
	One	Two	Three	Four	Five or More
None	13.75	3.25	4.80	4.85	9.00
One	1.05	1.37	1.48	1.54	1.65
Two	1.04	1.18	1.30	1.40	1.57
Three	1.03	1.17	1.19	1.35	1.42
Four or More	1.00	1.17	1.20	1.24	1.28

Nonhome-Based Other Trips					
Vehicles Available	Household Size				
	One	Two	Three	Four	Five or More
None	9.10	2.66	2.75	6.00	6.05
One	1.05	1.48	1.48	1.50	1.69
Two	1.03	1.19	1.30	1.45	1.63
Three	1.00	1.14	1.19	1.43	1.45
Four or More	1.00	1.15	1.17	1.20	1.41

[a]By definition, model predicted nonhome-based trips cannot be related to the characteristics of the tripmaker on a zone-by-zone basis. Therefore, for the nonhome-based trip purpose, average automobile occupancies were calculated for all zone-by-zone interchanges based on 2001 travel survey, and these automobile occupancies are adjusted based upon forecast regional changes in automobile availability and household size.

The table identifies the number of vehicle person trips per vehicle driver trip; as an example, for home-based shopping trips for single person households having no personal vehicles available, about 11.5 home-based shopping vehicle person trips are made for each home-based shopping vehicle driver trip made. The remaining trips are made as a vehicle passenger. These data are based upon the household travel survey conducted in 2001, and the pattern of vehicle person trips per vehicle driver trip observed in 2001 is similar to those observed in the 1963, 1972, and 1991 household travel surveys.

Source: SEWRPC.

vehicle travel times and out-of-pocket costs of the automobile and transit modes during average weekday off-peak-travel periods. The transportation system variables for the peak-travel period are used to forecast home-based work trips made by automobile and transit.

Traffic and Transit Assignment

The fourth and final major step in the travel forecasting and analysis process is the assignment of the zone-to-zone trip volumes forecast in the trip distribution and modal split phases to specific routes of existing and proposed alternative transportation systems. The output of assignments for the arterial street and highway system is a forecast of the number of vehicles on an average weekday that may be expected to use each segment of the arterial street and highway system by direction. The output of assignments for the transit system is an estimate of the number of passengers on an annual average weekday that may be expected to use each segment of the transit system by direction, complete with transfers at route intersections. The assignment of travel demand to the transportation system is accomplished separately for the highway and transit systems and in several steps.

The first step in the assignment process is the preparation of highway and transit networks to provide a definitive description of the arterial street and highway system and the transit system to be tested. The definitive description of the highway and transit system includes the collection, coding, and transfer to computer-usable form of data describing each link in the two networks—such as location, capacity, and operating speed—so that the operation of the overall transportation system can be simulated. Inasmuch as the transit and highway networks are the source of the zonal travel time information used in the trip distribution and modal split steps, the initial preparation of highway and transit networks must be completed near the beginning of the entire travel simulation process.

The first step in the preparation of the highway network is to define in detail the existing highway system and the highway system for each alternative plan to be tested, identifying all freeways and standard surface arterial streets

Table 85

TYPE OF DATA ENCODED FOR LINKS IN HIGHWAY NETWORK

Type of Information	Description
Distance	Distance in miles by direction
Speed or Time	Speed in miles per hour by direction for arterial link; time in minutes by direction for centroid connector links
24-Hour Traffic Count	Average daily vehicles by direction (coded for existing or base year networks only)
Administrative Classification	Jurisdiction
Assignment Group Code	Type of link in network
Cross-section	Number of traffic lanes and divided or undivided
County	County in Region in which link is located
Speed Limit	Miles per hour

Source: SEWRPC.

constituting the system. The highway network includes all arterial streets in the Region, which represents about 35 percent of total street mileage and on which about 90 percent of vehicle miles of travel occur on an average weekday. The highway network is constructed using the battery of urban transportation planning programs known as TRANPLAN.

The transfer of information on the highway system to computer-usable form requires the assignment of node numbers to all intersections of, and access points to, the arterial street and highway system. Each arterial street segment between two nodes is defined as an arterial link. All freeways and freeway ramps, all surface arterial streets, and some nonarterial local roads are represented in the highway network for the Region as different types of arterial links. For each arterial link, data is encoded. The types of data which are encoded for each arterial link are listed in Table 85. Link operating speeds represent estimated free-flow speed and are estimated by travel time studies for existing facilities, by speed limit, and number and type of traffic controls. Hourly, time period and 24-hour average weekday capacities for each link are calculated as a function of the typical cross-section of the facility, which includes consideration of number of through traffic lanes, and whether the facility is a divided or undivided facility.

A second type of link is used in the highway network to connect the land uses served to the arterial street and highway system. For each traffic analysis zone in the Region, the center of activity is determined and marked by centroids, representing the points from which all trips originate, and to which they are destined. The centroids are connected to the access points on the highway network by access links termed centroid connector links, representing the nonarterial collector and land access street system. Access times coded on the centroid connector links are a function of the time required to access a vehicle and the time required to access the arterial system over the collector and land access streets within each zone.

The first step in the preparation of the transit network is to define in detail the transit system to be tested. This involves the identification of all existing and planned routes in the public transit system to be simulated, along with the street and highway facilities and special rapid and express transit facilities over which the routes of the

Table 86

MODE DESIGNATIONS FOR TRANSIT AND ACCESS LINKS USED IN ENCODED TRANSIT NETWORKS

Mode and Link Type	Designated Mode Number	Information Code
Access		
Walk Access Link	1	Distance and speed
Automobile Access Link	2,7	Distance and speed
Special Access Transfer Link	3,5,6,8,9	Distance and time
Dummy Park-Ride Transfer Link	4	Distance and time
Transit		
Local/Shuttle/Feeder Transit Link	12,13,14,15	Distance and time
Rapid Transit Link: Freeway Flyer	16	Distance and time
Rapid Transit Link: Suburban Commuter Bus	17	Distance and time
Express Transit Link: Arterial Street	18	Distance and time
Rapid/Express Guideway (bus guideway/streetcar/lightrail/ commuter rail) Link	19,20	Distance and time

Source: SEWRPC.

system are to operate. The transit network includes all existing transit routes, with the exception of special school routes. The transit network is also constructed using the aforementioned urban transportation planning programs known as TRANPLAN.

After the transit routes and facilities have been identified, node numbers are assigned to all terminal and transfer points for each route. Each section of street or special transit facility between two nodes is defined as a transit link. Different types of transit links are encoded in the network to represent the different types of transit service provided on the transit system, including local/shuttle and feeder bus transit service, express transit service, and rapid transit service. In addition, where different types of transit service with different operating characteristics and speeds, such as local bus service and skip-stop express bus service, are provided over the same street, a separate set of parallel transit links is encoded to represent each type of service. The types of data which are encoded for each transit link are listed in Table 86.

Each transit link is encoded with travel times by direction of travel for both morning and afternoon peak and mid-day travel periods. The travel times are initially based upon current schedules for the existing routes operating over each transit link; for the future, networks are modified to reflect future conditions on the arterial street and highway and transit systems. In this step, forecast future traffic volumes and design capacity of arterial streets carrying transit routes are compared to existing traffic volumes and capacities. If the comparison indicates a significant decline in the level of service, the effects on the arterial travel speeds are estimated and the transit route travel times during peak periods are adjusted accordingly. Specifically, existing 2001 peak and off-peak travel speeds were plotted for each segment of the arterial street system. Forecast plan design year 2035 highway traffic volumes under each plan alternative were utilized to forecast future peak and off-peak arterial street travel speeds and travel times. The forecast year 2035 travel speeds and travel times were compared to the estimated year 2001 travel speeds and travel times to identify changes in arterial street system speed and travel time. These changes were reviewed to identify those transit routes which required adjustment to reflect increased traffic congestion.

Generally, current local bus speeds, including dwell time in the outlying portions of the urban areas of the Region, range from 15 to 18 miles per hour; in the areas surrounding the central business districts, from 12 to 15 miles per hour; and in the central business districts, from five to 10 miles per hour. Some arterial streets in the urban areas

of the Region may experience future increases in traffic sufficient to result in weekday traffic volumes exceeding arterial design capacity and, thereby, result in congestion severe enough to reduce transit running speeds. For planned local routes, such as for extensions of routes into areas presently unserved by the existing transit system, transit running speeds were based upon scheduled times observed for transit routes operating in similar areas over similar streets. Travel times for express bus services provided on arterial streets and for bus-on-busway and light-rail transit service were specifically developed as part of the operational plan for each such alternative considered.

The transit network is more complex than the highway network in that access to the transit system both by walking and by automobile must be allowed for in the simulation, as must the transfer between the different types of transit service. To allow for the different access methods and transfer capabilities, four different types of nontransit access links are used: walk access links, special service access and transfer links, auto drive access links, and auto drive dummy transfer links.

Walk access links are used to represent walk access to the transit system from the areas which each route serves. Each traffic analysis zone is directly connected by walk access only to those routes which directly serve the zone. Exceptions to this rule are made if over 50 percent of the development or a major traffic generator within the zone is within one-quarter mile of a route not directly serving the zone. Special attention is given to the presence of any natural or man-made geographic barriers, such as rivers, railways, and freeways, which would prevent direct walk access from a zone to transit service unless pedestrian bridges are available. Each walk link is encoded with the distance measured from the zone centroid to the access node on the network at an average walking speed of three miles per hour.

Walk access links are generally used only to connect zone centroids to access nodes on transit links representing local transit service. The resulting times represent times associated with accessing local transit service. Where local transit service is available, access from a zone centroid to a rapid or express transit service is provided through special access links encoded between access nodes on the local transit links and access nodes on the rapid and express transit links. Such links also allow for the simulation of the transfer of passengers between the different types of transit service and for simulation of “timed transfers” on routes operated with pulse scheduling in the cities of Kenosha, Racine, and Waukesha.

The third and fourth types of nontransit links, auto drive access and auto drive transfer links, are used to represent access to transit service by automobile to loading points on the transit system where such access is feasible. For the existing and planned public transit system networks serving the Milwaukee area, auto drive access is limited to rapid and express transit service at both formally designated park-ride lots, and at some stops where patrons are known to “park-and-ride” or “kiss-and-ride,” although a formal park-ride lot may not be designated.

Automobile drive access is only considered to be available where park-and-ride or kiss-and-ride facilities are provided unless it is known that sufficient on-street parking is available in the vicinity of the transit stops. In areas with extensive local bus or feeder bus service to the park-ride lot, auto drive access is generally limited to an area within three miles of the station. In outlying areas with little or no feeder bus service to the park-ride lot, auto drive access is generally limited to an area within five to six miles of a station. Exceptions for longer distances are made where a zone has access to a park-ride lot via a freeway or major arterial street. In defining the service areas for auto drive access of each park-ride lot, the presence of competing lots is taken into consideration, as well as the reluctance of tripmakers to “backtrack” to access a particular transit route or type of service if another route or type of service is available which would allow a more direct travel route.

The coding of modes of access to rapid and express transit services in the transit networks utilizes all four of the above access links. Three potential access modes to transit stations served by rapid and express transit services may be provided: walk, feeder bus, and automobile. Walk access is provided for by encoding walk access links between the stations and the zones located within one-half mile of the stations. The transfer of passengers between feeder bus lines and rapid transit lines at a station is provided for by encoding transfer links between the

transfer node on the feeder bus line and the station node. Finally automobile access is provided for by encoding automobile access links between the zones served and the transit station. The automobile access connection includes the travel time of automobile access between the zone and the park-ride lot, taken directly from the highway network. The encoding of automobile access links utilizes an auto drive transfer link between all automobile access links and the transit station node. A time of one minute is encoded on the transfer link to reflect the time spent in walking from the automobile to the boarding platform at each station.

As the final step in encoding the transit network, the routes of the transit system are converted to transit lines on the network. Where a route operates regular service with specific branches and turnback points, separate lines are encoded on the network to represent each branch or truncated portion of the route. Separate lines are also encoded where routes utilize different streets by direction of travel or where headways on a route or portion thereof vary by direction of travel or during peak periods. All routes which regularly provide a significant level of transit service on an average weekday are encoded on the transit system.

Special routes providing a limited level of service, such as special school routes operating only one or two bus trips per day, are not included in the transit network. As was done in coding transit links, different types of transit lines are encoded to represent the different types of transit service provided on the transit system. Operating headways are encoded for each line to reflect the level of service provided during each of four times: a morning peak hour, a midday off-peak period, an afternoon peak hour, and a night off-peak period. The routes and operating headways encoded in the transit network are defined by the operational plans prepared for each alternative.

The second step in the traffic assignment process involves the computation, from the descriptions of the transportation networks, of two sets of minimum time paths from each traffic analysis zone within the Region to all other such zones, one for automobile travel and one for transit travel. For the highway network, the minimum time paths are computed by systematically comparing travel time for all links in the system in successively outward steps from the starting zone until the shortest time paths to all other zones have been computed. The minimum time paths represent the shortest door-to-door travel times between any two zones within the Region, including walk times at either end of the trip and park and unpark times for automobile trips.

A similar process is used to define the zone-to-zone travel paths for transit except that the computed time paths are weighted to reflect the different coefficients assigned to work and nonwork trips in the modal choice model. In this respect, the out-of-vehicle times, such as walk and drive access times, initial waiting times, and waiting times incurred in transferring between bus routes, along the transit travel path are factored by the ratio of the out-of-vehicle and in-vehicle travel time coefficients in the modal split model. The minimum time path for a particular zonal pair, consequently, reflects the path with the lowest combined in-vehicle and weighted out-of-vehicle time. While this path may not reflect the shortest absolute time path for a zonal pair on the transit network, it is believed to be more representative of the path a transit patron would take since out-of-vehicle time is viewed as the most onerous part of a transit trip.

From minimum time paths for the highway and transit networks, the zone-to-zone travel times for automobile and transit trips can be determined. These zone-to-zone travel times are used as inputs to the trip distribution and modal choice steps in the travel simulation process.

In the third step in the traffic assignment process, matrices, or tables, of both vehicle trip interchanges and transit passenger trip interchanges are prepared from the matrices of average weekday trip interchange volumes created by the process of trip generation, trip distribution, and modal split. For assignment of traffic demand to the highway network system, approximately 10 individual trip interchange tables which are direct outputs of the application of the modal split and trip distribution models must be combined to provide total zonal trip interchanges volumes. The individual trip interchange tables which are thus combined include tables for internal vehicle trips by automobile for each of the five trip purposes derived from the modal choice phase plus those made for school purposes, tables for automobile trips made by persons residing in group quarters, tables for

Table 87

FACTORS TO CONVERT AVERAGE WEEKDAY TRANSIT TRAVEL BY TRIP PURPOSE TO TRAVEL BY TIME PERIOD

Trip Purpose	6:00 A.M. to 9:00 A.M. Morning				9:00 A.M. to 2:30 P.M.[a] Midday				2:30 P.M. to 6:00 P.M.[a] Evening				6:00 P.M. to 6:00 A.M. Night			
	1972	1984	1991	2001	1972	1984	1991	2001	1972	1984	1991	2001	1972	1984	1991	2001
Home-Based Work	0.37	0.38	0.33	0.35	0.16	0.19	0.16	0.13	0.39	0.34	0.34	0.34	0.08	0.09	0.17	0.18
Home-Based Shopping	0.00	0.02	0.02	0.08	0.59	0.58	0.59	0.54	0.34	0.28	0.25	0.22	0.07	0.12	0.14	0.16
Home-Based Other	0.08	0.12	0.11	0.14	0.48	0.45	0.45	0.47	0.27	0.22	0.27	0.20	0.17	0.21	0.17	0.19
Nonhome-Based	0.08	0.07	0.04	0.04	0.45	0.45	0.50	0.52	0.41	0.32	0.33	0.35	0.06	0.16	0.13	0.09
School	0.42	0.30	0.35	0.44	0.19	0.38	0.22	0.14	0.39	0.24	0.37	0.39	0.00	0.08	0.06	0.08

[a] *For 1972 and 1984, the midday period is defined as 9:00 a.m. to 3:00 p.m. and the evening period is defined as 3:00 p.m. to 6:00 p.m.*

Source: SEWRPC.

external vehicle trips made by automobile, and tables for internal and external truck trips. For assignment of trips to the transit system, the individual trip interchange tables for transit passenger trips for each of the four trip purposes derived from the modal split phase plus those transit passenger trips made for school purposes are factored to create tables of transit passenger trips by purpose made during specific time periods of each weekday and then combined by time period. Four tables are thus created to represent transit passenger trips made during each of the aforementioned time periods using specific factors and on the basis of origin-destination surveys. The factors obtained in the Commission 1972, 1984, 1991 and 2001 travel surveys are shown in Table 87. The factors display considerable stability; the most current factors from the most recent survey are those used to convert average weekday transit passenger trips made by time period for current year transit ridership estimation and future year ridership forecasts.

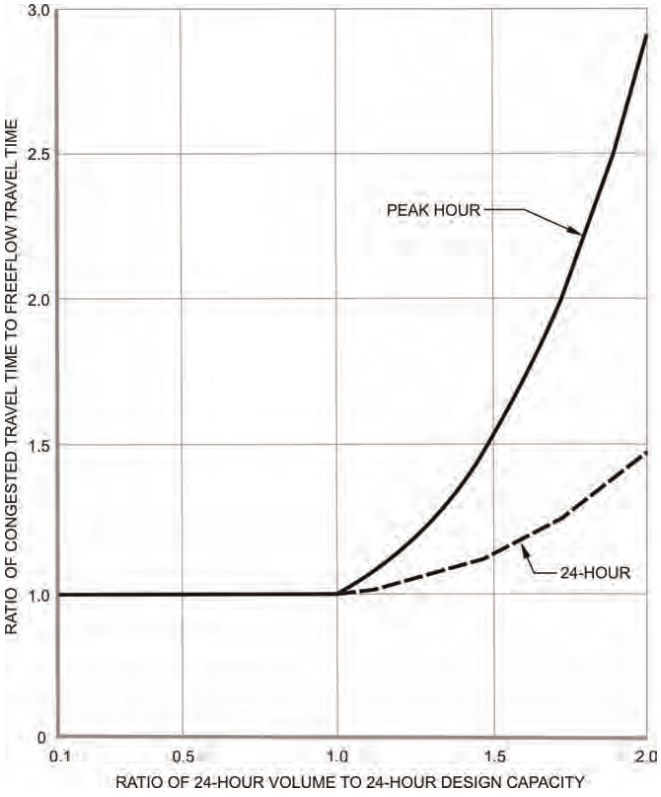
In the final step of the traffic assignment process, the tables of zone-to-zone trip volumes for vehicles and transit passengers created in the previous step are assigned to all the individual arterial street segments and route segments comprising the minimum time paths for all zonal interchanges on the highway and transit networks. Thus, traffic volumes are accumulated on the links for all zonal interchanges, resulting in a complete assignment of traffic demand to the network.

In assigning travel to the highway network, an iterative process is used to account for the impact of assigned traffic volumes and congestion on link speeds and zone-to-zone travel times. In this respect, since vehicle trips are assigned to the shortest time paths on the highway network, some of the volumes on the individual links of the network may exceed the actual design capacity of the arterial street facilities being simulated, thus affecting the travel time used initially to determine the minimum time paths. The output of the assignment program at this stage is termed an “unrestrained” assignment. The ratios of the assigned volumes to the capacity of each link in the highway network are then calculated. The travel times are then increased for those links having a volume-to-design capacity ratio of greater than one. Minimum time paths are reassigned on the basis of the revised minimum time path through the highway network. This iterative process is continued until the assigned volumes are observed to stabilize. Thus, the operating speed at which each segment of the transportation system can be traveled is modified to simulate the affect of increasing congestion in the system. The resulting capacity restraint serves to modify the unrestrained assignment volumes and provide an accurate distribution of vehicular traffic over the highway system and accurate travel times and travel speeds by simulating the manner in which vehicle operators will seek less congested arterial routes in tripmaking.

The travel time-volume-to-design capacity ratio relationship used to establish 24-hour average weekday travel times is shown in Figure 37. The 24-hour average weekday average travel times include about one-third peak travel period travel time and two-thirds off-peak travel period travel time. These travel times are used for highway traffic assignment. Such travel times have been shown to permit accurate 24-hour assignments within the Region, including the assignment of the 2001 travel survey vehicle trip data to the 2001 highway networks. Also shown in

Figure 37

TRAVEL TIME TO VOLUME/CAPACITY RATIO RELATIONSHIPS: 24-HOUR PEAK-HOUR



Source: SEWRPC.

Figure 37 is the travel time and volume-to-design capacity ratio relationship used to establish peak hour travel times based on average weekday total traffic volume-to-design capacity ratios. The estimated peak hour travel times are used for home-based work trip distribution and modal choice.

As noted above, one output of the highway traffic assignment is an adjusted set of capacity-restrained travel times. As travel times are also input to trip distribution and mode choice steps, the resulting travel times from traffic assignment must be reviewed and compared to those input to trip distribution and modal choice. If differences are found, then the trip distribution and modal choice steps in the simulation process must be repeated with the revised travel times. The percentile difference considered significant for this purpose is 5 percent. The travel simulation model estimated 2001 travel speeds under peak-hour and off-peak-hour conditions were found to be within 5 percent of observed 2001 travel speeds.

The vehicle traffic loadings determined with the above procedure are expressed in terms of 24-hour average weekday vehicle traffic volumes, which are comparable to the highway network capacities derived from the transportation system inventories conducted by the Commission. The Commission has also developed procedures to forecast traffic by time period of the average weekday. Based on data obtained in the 2001 travel survey, the proportion of trips occurring within each time period of the day was estimated, as shown in Table 88. These proportions are applied to forecasts of future trips to permit traffic assignments by weekday time period.

The assignment of transit passenger travel to the transit network involves the assignment of transit passenger trips by time period, using minimum time paths created for each of the time periods. Unlike the highway assignment, the capacity of the transit system is not restrained because additional transit capacity can be readily provided by the provision of additional transit vehicles and the attendant reduction of headways. The adjustment of headways based upon assigned passenger volumes is performed to balance the supply of transit service with the simulated demand, providing for realistic estimates of equipment requirements and operating characteristics for the transit system and consistent assumptions for ridership and cost estimation. Significant changes in operating headways require repetition of the simulation of the modal split with the modified headways.

A pair of models are used to determine the access and egress modes of transit passengers at public transit stations. These special models were developed primarily to obtain estimates of parking demand at public transit stations, utilizing information on the characteristics of transit passenger trips made using rapid transit services provided in the Milwaukee area. This service currently consists solely of “freeway flyer” bus service operated from outlying park-ride lots to the Milwaukee central business district. On-bus and household survey data were analyzed regarding trip purpose and the mode used by freeway flyer passengers to access freeway flyer bus service at park-ride lots. About 98 percent of these transit trips were made for the purpose of going to work. Consequently, three transit access modes—walk to transit, drive alone to transit, and shared-ride driver/passenger to transit—are

Table 88

PROPORTION OF VEHICLE TRIPS OCCURRING WITHIN EACH TIME PERIOD OF AN AVERAGE WEEKDAY WITHIN THE SOUTHEASTERN WISCONSIN REGION: 2001

Model of Travel	Trip Purpose	Trip Direction	Proportion of Vehicle Trips									Total
			Pre-AM	AM	Post-AM	Midday	Pre-PM	PM	Post-PM	Evening	Night	
			6:00 - 7:00	7:00 - 8:00	8:00 - 9:00	9:00 - 2:30	2:30 - 4:30	4:30 - 5:30	5:30 - 6:30	6:30 - 9:00	9:00 - 6:00	
Internal Household Resident	Home-Based Work	From Home	0.213	0.305	0.130	0.146	0.038	0.016	0.012	0.012	0.128	1.000
		To Home	0.006	0.012	0.007	0.146	0.309	0.260	0.106	0.076	0.078	1.000
	Home-Based Shopping	From Home	0.013	0.032	0.059	0.477	0.134	0.063	0.079	0.125	0.018	1.000
		To Home	0.002	0.007	0.015	0.393	0.183	0.098	0.090	0.174	0.038	1.000
	Home-Based Other	From Home	0.028	0.082	0.098	0.322	0.135	0.079	0.103	0.125	0.028	1.000
		To Home	0.010	0.037	0.047	0.263	0.169	0.083	0.075	0.189	0.127	1.000
	Home-Based School	From Home	0.159	0.411	0.125	0.184	0.029	0.034	0.042	0.011	0.005	1.000
		To Home	-	0.007	0.011	0.278	0.413	0.066	0.047	0.102	0.076	1.000
	Nonhome-Based School		0.007	0.039	0.044	0.452	0.278	0.075	0.045	0.050	0.010	1.000
	Nonhome-Based Work		0.012	0.031	0.051	0.537	0.195	0.094	0.043	0.024	0.013	1.000
	Nonhome-Based Other		0.002	0.011	0.030	0.539	0.166	0.066	0.063	0.103	0.020	1.000
Internal Group Quartered Resident			0.036	0.040	0.037	0.297	0.211	0.094	0.067	0.160	0.058	1.000
Internal Commercial Truck			0.050	0.081	0.095	0.525	0.145	0.034	0.020	0.014	0.036	1.000
External Personal Use Vehicle	Outbound		0.024	0.078	0.070	0.273	0.150	0.099	0.060	0.116	0.130	1.000
	Inbound		0.021	0.104	0.079	0.272	0.158	0.085	0.056	0.109	0.116	1.000
	Through		0.006	0.037	0.047	0.428	0.132	0.065	0.048	0.114	0.123	1.000
External Truck	Outbound		0.014	0.078	0.060	0.363	0.120	0.082	0.051	0.079	0.153	1.000
	Inbound		0.018	0.086	0.115	0.331	0.118	0.029	0.033	0.086	0.184	1.000
	Through		0.002	0.034	0.061	0.470	0.074	0.059	0.028	0.089	0.183	1.000
Total			0.044	0.081	0.065	0.342	0.161	0.087	0.063	0.091	0.066	1.000

Source: SEWRPC.

modeled as part of the home-based work mode split model. The feeder bus access mode would be equal to the total simulated transit trips at each park-ride lot less the total transit trips obtained from the mode split model. For the nonwork trip purposes, the density of development within the service areas of each of the existing park-ride lots and the extent and quality of local bus service to and from park-ride lots explained the mode of access and egress at each park-ride lot. Therefore, a model was developed to estimate the percent of total boarding passengers for nonwork trips that may be expected to use different access modes as a function of the density of residential development in the service area of the park-ride lot and the level of local bus service provided to each park-ride lot (see Table 89). The model projects that the percentage of passengers using the automobile for access to, or egress from, a park-ride lot will be highest in areas of low residential density and poor local feeder bus service, and lowest in areas of high residential density and good local feeder bus service. For alternatives which propose an expanded system of express bus routes that would also serve some park-ride lots, the simulated passengers boarding express transit service at park-ride lots would also be included in the mode of access calculations. The mode of access model does include an equilibration step which assures that the automobile parking demand at any given station, as determined by the mode of access model, does not exceed the proposed parking supply at the station.

The traffic assignment process was calibrated by assigning trip interchanges from the 2001 Commission travel survey to the existing highway network and comparing link volumes with corresponding actual volumes determined by ground counts. If the comparisons so indicated, appropriate modifications were coded into the network describing the highway system so that the simulated traffic volumes would correspond with the observed volumes. Such modifications included, as necessary, adjustments in link operating speeds, addition or deletion of loading links and modification in the location of load nodes. Such adjustments were required for less than 1 percent of the arterial street system.

Table 89

PERCENT OF BOARDING AND ALIGHTING PASSENGERS BY MODE OF ACCESS/EGRESS AT PUBLIC TRANSIT STATIONS FOR NONWORK TRIP PURPOSES

Access/Egress Mode	Type of Station[a]			
	Stations Serving High- to Medium-Density Residential Areas with Good Local Feeder-Bus Service	Stations Serving Medium- to Low-Density Residential Areas with Poor Local Feeder-Bus Service	Stations Serving Low- to Rural-Density Residential Areas with Demand-Responsive Feeder-Bus Service	Stations Serving Low- to Rural-Density Residential Areas with Poor Local Feeder-Bus Service
Walk	20	15	10	10
Feeder-Bus	20	20	20	- -
Auto				
Park-Ride	30	41	56	72
Kiss-Ride	30	34	14	18
Subtotal	60	75	70	90
Total	100	100	100	100

[a]High density is 7.0 or more dwelling units per net residential acre; medium density is 2.3 to 6.9 dwelling units per net residential acre; low density is 0.7 to 2.2 dwelling units per net residential acre; and, rural density is less than 0.7 dwelling unit per net residential acre.

Poor local feeder-bus service to a transit station is considered to be bus service which has headways of 30 minutes or more, and only one to two local bus routes serve the station. Good local feeder-bus service is considered to be bus service with headways of about 15 minutes, and multiple routes serve the station, including local and express routes.

Source: SEWRPC.

Calibration of the transit assignment process was accomplished through a detailed analysis of the minimum time paths and associated zone-to-zone travel times on the simulated transit network utilizing data such as current route schedules. Where necessary, modifications were made in the transit network so that simulated travel paths would reflect the most logical path followed by the trip concerned. These modifications included changes similar to those made in the highway network regarding adjustment of link speeds and location of access links, and also included adjustments made to the wait and transfer times on the network. Minimal adjustments were made to transit route segments and access links in the transit network to bring the 2001 simulated transit passenger volumes into conformance with actual 2001 transit system ridership. The minimal changes necessary included limited changes in access links to provide more direct access from selected zones to selected routes, and adjustments in route speeds for selected routes by about 5 percent.

Travel Simulation Model Validation

The fourth-generation travel simulation models developed by the Commission using the new 2001 travel survey data to forecast design year travel demand were described in the preceding sections of this chapter. This section of the chapter presents the findings of the validation effort for the fourth-generation travel simulation models.

The model validation entailed applying the full battery of simulation models with inventoried 2000 demographic, economic, and land use data and 2001 transportation system data to estimate year 2000/2001 travel demand and traffic flows. First, automobile availability and trip production and attraction models were applied to estimate total travel demand in 2000. Then, the trip distribution model was applied to estimate zone-to-zone travel demand and the mode choice model was applied to estimate zone-to-zone travel demand by individual mode. The estimated year 2000 travel demand was then assigned to the 2001 transportation system to produce simulated volumes of vehicle trips and transit passengers. The result of the transit and highway traffic assignments were then used to evaluate the performance of the travel simulation models by comparing the simulated volumes of highway vehicle and transit passenger trips to observed vehicle and transit passenger counts. In this respect, it should be recognized that the observed counts of vehicle and transit trips to which the model estimates are compared represent “estimates” which contain their own errors. Many of the counts were taken on only one or two days of the entire year and, therefore, reflect the effects of the daily and monthly variations in travel, required estimated adjustment to reflect average weekday conditions.

Table 90

COMPARISON OF CENSUS AND MODEL-ESTIMATED PERSONAL USE VEHICLE AVAILABILITY BY COUNTY: 2000

County	Estimated Number of Vehicles Available		Difference	
	Year 2000 Census	Year 2000 Model Estimate	Number	Percent
Kenosha	99,000	97,400	-1,600	-1.6
Milwaukee	526,300	527,000	+700	+0.1
Ozaukee	60,400	58,600	-1,800	-3.0
Racine	123,900	123,100	-800	-0.6
Walworth	65,700	64,200	-1,500	-2.3
Washington	86,300	83,000	-3,300	-3.8
Waukesha	265,400	259,500	-5,900	-2.2
Region	1,227,000	1,212,800	-14,200	-1.2

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

Total Travel Demand

The year 2000/2001 was selected as the base year for model validation. Major inventories of population, employment, and land use within the Region were undertaken by the Commission in 2000 as part of its continuing efforts to maintain an accurate and up-to-date planning data base for the Region. Also, the latest Federal census of population and housing was conducted in 2000. Computer encoded networks representing the 2001 arterial street and highway system within the Region and the 2001 public transit systems in the Milwaukee, Racine, and Kenosha urbanized areas were also available. In addition, a comprehensive survey of travel was conducted in the Region by the Commission in 2001.

Starting with the trip generation and trip distribution steps in the travel simulation process, the basic socio-economic and land use inventory data were input into the automobile availability and trip generation models to obtain estimates of the total number of trips made by trip purpose. The results of the application of the fourth-generation models to estimate year 2000 travel are presented in Tables 90 and 91 with respect to personal use vehicle availability and Table 92 with respect to trip generation. The results of the application of the trip distribution step are presented in Tables 93 and 94 and on Figure 38, which compare model-estimated to survey-estimated trip length and travel patterns.

Transit Travel Demand

The estimated travel demand was divided into automobile and transit person trips by applying the modal split and auto occupancy travel simulation models. The procedure followed to validate the simulation of transit passenger travel included the model estimation of transit trips by trip purpose, the conversion of trips by purpose to trips by time period, and the assignment of trips by time period to the 2001 transit networks. The transit passenger volumes derived from the traffic assignment were then compared with 2001 passenger count information obtained from the local transit operators. The comparisons used to evaluate the transit assignment and the overall travel simulation process included systemwide comparisons of estimated actual and model estimated transit passengers in total, and comparisons on selected major transit routes.

A comparison of the average weekday linked passenger trips by trip purpose as determined from the Commission travel survey, with those estimated by the application of the simulation models for the southeastern Wisconsin Region is presented in Table 95.

Table 96 presents a comparison of the 2001 average weekday transit ridership for selected routes as observed through passenger counts with that estimated by application of the simulation models. Map 51 shows the routes considered. The passenger count information is based upon actual weekday passenger counts taken by the transit operators in 2000 and 2001 as adjusted to account for monthly and annual variations in ridership levels so as to be representative of average weekday 2001 ridership.

Table 91

COMPARISON OF CENSUS AND MODEL-ESTIMATED PERCENTAGE OF HOUSEHOLDS BY VEHICLES AVAILABLE AND HOUSEHOLD SIZE WITHIN SOUTHEASTERN WISCONSIN: 2000

Census Estimate: 2000						
	Household Size					
Vehicles Available	One	Two	Three	Four	Five or More	Total
None	6.0	2.0	1.1	0.9	0.7	10.7
One	18.8	9.1	3.3	2.1	1.7	35.0
Two	2.4	18.1	6.9	7.0	4.8	39.2
Three	0.4	2.7	3.6	2.7	1.9	11.3
Four or More	0.2	0.6	0.8	1.3	0.9	3.8
Total	27.8	32.5	15.7	14.0	10.0	100.0

Model Estimate: 2000						
	Household Size					
Vehicles Available	One	Two	Three	Four	Five or More	Total
None	5.5	2.9	1.4	1.3	1.0	12.1
One	13.5	10.0	4.1	3.2	2.4	33.2
Two	5.3	16.5	7.0	7.4	4.9	41.1
Three	1.2	3.1	2.9	2.3	1.6	11.1
Four or More	0.2	0.6	0.5	0.7	0.5	2.5
Total	25.7	33.1	15.9	14.9	10.4	100.0

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

Table 92

COMPARISON OF TRAVEL SURVEY AND MODEL ESTIMATED AVERAGE WEEKDAY MOTORIZED AND NONMOTORIZED TRIPS BY TRIP PURPOSE: 2001

	2001 Motorized Trips						
		Trip Production Model Estimate			Trip Attraction Model Estimate		
Trip Purpose	Travel Survey Estimate	Number	Difference from Survey	Percent Difference	Number	Difference from Survey	Percent Difference
Home-based Work	1,435,300	1,433,700	-2,200	-0.2	1,430,700	-5,200	-0.4
Home-Based Shopping	761,600	758,600	-3,000	-0.4	762,400	800	0.1
Home-Based Other	1,962,500	1,962,900	300	0.0	1,962,200	-400	0.0
Nonhome-Based Work	531,100	531,200	100	0.0	531,100	0	0.0
Nonhome-Based Other	683,900	683,500	-400	-0.1	684,100	200	0.0
Total	5,374,400	5,369,900	-5,200	-0.1	5,370,500	-4,600	-0.1

	2001 NonMotorized Trips			
		Fourth Generation Production Model Estimate		
Trip Purpose	Travel Survey Estimate	Number	Difference from Survey	Percent Difference
Home-Based Work	40,000	40,400	400	1.0
Home-Based Shopping	29,100	31,000	1,900	6.5
Home-Based Other	84,700	83,000	-1,700	-2.0
Nonhome-Based Work	12,000	10,200	-1,800	-15.0
Nonhome-Based Other	18,600	20,200	1,600	8.6
Total	184,400	184,800	400	0.2

Source: SEWRPC.

Table 93

COMPARISON OF TRAVEL SURVEY AND MODEL ESTIMATED AVERAGE TRIP LENGTH WITHIN THE REGION: 2001

	2001 Travel Survey Estimated Trip Length		2001 Travel Model Estimated Trip Length		Percent Difference	
Trip Purpose	Minutes	Miles	Minutes	Miles	Minutes	Miles
Home-Based Work	19.1	9.8	18.7	9.7	-2.6	-1.0
Homes-Based Shopping	9.6	4.7	9.8	5.0	2.1	4.2
Home-Based Other	11.6	6.0	12.0	6.3	3.4	5.0
Nonhome-Based Work	14.7	6.9	14.6	7.0	-0.7	1.4
Nonhome-Based Other	10.0	5.0	10.0	5.0	--	--

Source: SEWRPC.

Table 94

COMPARISON OF TRAVEL SURVEY AND MODEL ESTIMATED INTERNAL PERSON TRIP TRAVEL PATTERNS: 2001

Production Zone	Attraction Zone: 2001 Survey																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	112,757	9,992	3,615	1,860	2,659	1,215	0	136	369	3,438	869	65	769	43	197	0	36	0	0
2	12,210	37,054	4,180	314	2,214	899	75	779	609	4,965	1,112	42	994	269	0	31	0	31	0
3	3,508	6,397	34,773	378	969	1,748	343	1,235	2,530	21,279	3,729	67	1,764	617	75	0	41	172	55
4	2,731	255	708	34,853	10,297	4,453	0	53	155	572	481	0	257	177	0	0	0	94	0
5	2,259	1,851	1,227	6,961	53,975	8,642	181	142	57	1,286	632	0	91	337	0	0	0	0	0
6	518	476	961	817	7,533	38,308	154	280	74	2,752	884	96	476	147	138	0	0	61	130
7	222	523	300	0	86	118	39,286	10,665	637	716	4,345	2,072	6,214	662	394	141	103	0	0
8	130	373	676	32	0	176	6,955	42,365	3,288	1,490	7,874	4,257	15,430	1,370	503	206	0	0	0
9	511	847	2,277	47	27	199	475	4,513	17,943	8,728	5,773	142	9,535	927	141	0	0	0	0
10	1,008	929	9,606	256	744	1,009	357	1,149	3,639	58,701	10,731	193	3,384	582	265	229	54	230	0
11	182	537	737	56	303	686	847	1,855	2,252	5,338	104,739	762	24,360	7,493	1,185	368	160	178	137
12	22	193	279	27	0	0	3,564	6,209	450	210	3,691	12,743	9,957	1,123	4,196	1,006	128	119	145
13	881	328	1,477	524	222	466	2,944	9,307	4,059	3,698	39,113	3,902	158,811	5,824	5,005	1,070	563	1,626	157
14	125	168	153	109	45	560	82	439	245	1,242	16,305	306	8,098	43,778	3,187	259	302	1,145	141
15	93	0	189	0	33	314	389	1,058	0	1,219	6,763	1,992	10,586	5,874	44,558	1,372	373	1,860	232
16	0	118	164	48	0	0	127	226	76	141	1,325	719	2,388	856	5,211	53,024	14,685	5,873	526
17	66	0	0	0	0	24	65	0	0	45	395	0	396	91	507	11,542	100,049	3,028	0
18	90	144	38	768	0	392	38	180	0	258	1,268	315	2,212	1,646	4,167	2,054	1,873	74,233	5,501
19	0	61	0	103	0	254	0	52	101	152	364	55	241	403	183	69	90	2,642	27,791
20	0	61	258	0	0	86	93	40	0	128	1,829	45	1,012	599	0	483	563	6,408	47,782
21	0	0	0	0	0	0	0	0	100	0	0	0	342	44	113	428	3,153	4,842	726
22	55	0	0	38	0	60	0	0	0	0	178	0	237	0	0	0	71	716	4,379
23	150	0	92	0	0	0	98	111	0	182	141	0	156	457	189	199	637	2,176	3,268
24	576	1,039	3,973	102	1,105	4,705	94	336	831	14,371	6,531	0	2,172	465	402	100	99	0	237
25	25	271	984	456	1,380	6,499	71	97	31	1,335	1,344	45	430	284	0	0	51	44	245
26	633	196	913	251	614	814	424	983	445	4,630	25,302	40	3,763	2,282	827	67	97	225	118
27	1,432	569	3,195	243	770	5,330	696	1,662	1,902	12,315	27,182	84	6,297	3,866	1,309	69	97	556	272
28	153	66	670	629	908	6,115	32	72	52	1,817	2,456	105	1,063	451	126	0	488	38	171
29	554	230	379	32	409	821	0	61	47	654	2,818	45	2,518	1,016	197	69	297	91	441
30	414	0	347	281	475	1,622	108	257	215	1,373	3,008	40	2,433	924	47	0	181	171	263
31	210	215	619	63	357	797	413	507	600	2,267	8,824	201	4,404	8,773	1,026	313	145	1,320	162
32	367	122	163	93	77	894	360	30	192	917	2,015	228	1,256	1,065	533	0	0	98	349
33	0	66	302	194	167	375	186	570	411	1,620	5,535	117	3,889	6,603	3,613	663	437	1,309	591
34	407	99	582	303	197	666	299	831	212	2,254	6,371	260	4,224	4,333	1,691	68	326	1,144	781
35	143	118	0	93	0	322	0	155	576	684	1,428	0	640	610	778	175	85	471	933
36	0	44	133	70	44	145	0	247	143	503	1,752	282	1,247	1,504	777	48	62	734	571
37	36	0	139	0	267	214	156	103	32	679	1,281	58	580	1,025	846	27	212	522	1,289
Total	142,468	63,342	74,109	50,001	85,877	88,928	58,912	86,705	42,273	161,959	308,388	29,278	292,626	106,520	82,386	74,080	125,458	112,157	97,393

Table 94 (continued)

Production Zone	Attraction Zone: 2001 Survey																		Total
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
1	32	0	122	115	1,830	749	2,748	1,607	363	1,176	402	321	107	0	571	149	102	242	148,657
2	27	0	0	49	2,448	379	928	803	436	701	407	391	318	202	540	0	139	0	73,548
3	0	0	0	0	4,105	2,294	3,347	2,381	1,173	2,188	919	795	700	597	1,067	72	54	263	99,638
4	25	0	0	0	1,069	863	741	536	1,207	658	570	169	971	19	102	160	0	109	62,289
5	90	0	0	0	2,553	2,275	1,267	1,973	1,857	1,329	2,101	646	1,628	383	418	0	95	133	94,394
6	92	0	0	0	4,921	8,032	2,097	2,767	5,582	1,452	3,217	541	1,391	439	1,271	0	124	145	85,882
7	0	37	46	0	256	74	1,649	353	326	293	369	422	395	456	699	0	250	150	72,266
8	0	0	69	0	657	176	3,000	1,607	287	1,079	870	1,570	940	273	1,160	30	151	27	97,029
9	0	0	0	0	1,765	632	2,138	1,411	756	578	676	927	568	237	918	225	163	96	63,184
10	0	0	0	55	6,810	2,619	5,937	3,232	1,427	2,554	1,667	1,609	1,485	318	1,759	336	212	105	123,201
11	206	237	213	91	2,747	1,137	20,629	7,095	1,576	4,434	3,213	7,740	3,531	2,087	2,401	552	414	597	211,086
12	123	0	0	0	214	90	938	286	148	798	275	634	381	308	509	0	13	211	49,002
13	626	0	210	46	1,637	308	7,418	4,322	1,161	3,316	3,094	5,670	2,551	2,385	2,420	516	429	730	276,829
14	368	43	0	239	935	440	6,034	3,477	1,228	2,586	2,084	17,226	2,759	10,686	2,805	725	1,081	1,082	130,501
15	167	43	89	0	376	34	2,810	1,266	278	1,505	1,184	3,791	2,530	7,591	3,138	658	2,340	955	105,675
16	1,088	347	351	393	367	66	497	132	0	644	0	627	201	427	274	432	222	155	91,746
17	0	924	262	415	0	0	316	1,057	95	313	85	247	0	702	811	43	0	0	121,495
18	7,722	2,545	1,331	1,827	127	106	770	1,042	67	1,159	235	2,927	1,420	3,472	2,960	774	1,789	1,857	127,325
19	39,652	261	1,711	1,586	187	0	206	267	81	1,234	269	488	554	997	1,812	840	402	1,832	84,959
20	239,658	814	7,281	7,975	163	223	1,491	532	355	1,741	1,901	960	1,179	1,601	2,646	1,675	1,332	2,069	333,003
21	1,641	33,783	5,200	7,442	0	0	153	0	64	257	0	0	420	52	394	106	81	197	59,559
22	7,164	3,186	24,657	37,634	28	33	95	260	97	244	117	392	244	140	316	59	174	315	80,911
23	10,632	8,192	51,742	149,900	0	0	1,036	620	160	527	267	374	73	0	950	103	312	390	233,157
24	72	0	0	114	48,843	14,517	13,293	19,322	6,710	7,639	3,331	5,528	2,776	2,111	1,813	574	163	437	164,405
25	91	85	32	106	11,883	30,361	2,454	3,748	10,842	3,765	4,543	761	1,949	233	1,473	281	67	78	86,369
26	267	0	99	79	5,169	1,287	69,243	20,257	1,920	7,818	5,577	12,659	4,941	3,328	2,874	916	469	617	180,170
27	473	0	90	189	35,544	8,868	73,587	133,275	13,600	38,675	19,009	23,252	15,426	6,874	12,159	1,308	1,181	2,007	453,390
28	370	30	225	0	5,842	11,146	3,614	7,346	50,767	7,660	15,580	2,105	3,984	1,288	2,935	782	352	698	130,164
29	488	180	31	155	3,973	3,001	10,355	35,115	9,461	52,363	21,212	5,955	13,522	3,037	7,350	2,946	520	1,148	181,520
30	711	0	49	0	1,468	3,303	6,352	9,343	10,600	18,493	36,065	3,681	8,994	1,513	5,222	1,282	133	1,287	120,685
31	329	100	228	140	2,971	1,049	15,214	10,491	1,983	8,264	3,834	90,970	8,331	20,553	16,006	1,709	2,503	1,386	217,308
32	364	0	31	0	2,112	893	3,991	7,022	1,835	11,468	6,687	13,890	28,004	9,629	33,700	5,728	1,339	2,604	138,088
33	1,183	221	389	70	1,565	440	7,227	6,150	1,389	5,016	4,436	20,821	7,270	88,200	28,403	3,216	14,730	7,972	225,379
34	1,577	917	570	326	3,462	1,155	8,693	10,162	4,161	18,565	12,160	29,027	26,752	44,600	113,410	17,327	8,979	15,274	342,199
35	665	106	85	0	1,429	979	1,478	2,060	1,108	3,832	3,315	3,301	6,008	7,939	18,678	61,168	2,638	13,766	135,801
36	1,430	64	395	29	905	126	1,844	1,150	471	2,801	2,332	4,389	2,780	15,910	7,133	3,373	19,461	9,762	82,697
37	2,380	133	562	439	784	793	2,237	1,505	370	2,000	1,792	1,579	1,991	5,881	12,551	9,279	4,512	31,445	87,736
Total	319,713	52,248	96,070	209,414	159,145	98,448	285,827	303,972	133,941	219,125	163,795	266,385	157,074	244,468	293,648	117,344	66,926	100,141	5,370,544

Table 94 (continued)

Production Zone	Attraction Zone: 2001 Trip Distribution Model																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	106,560	9,743	3,615	3,097	3,367	1,467	237	437	571	3,473	1,547	63	1,355	385	181	80	81	165	84
2	9,857	35,866	5,518	624	2,559	1,199	440	888	658	3,445	1,244	83	1,358	282	123	76	53	83	46
3	3,025	5,843	28,607	395	1,766	4,068	603	1,850	2,900	19,960	3,657	138	3,120	637	214	103	96	147	55
4	3,494	721	565	33,780	8,746	3,138	48	87	90	703	430	9	303	130	73	36	27	74	57
5	2,848	2,213	1,938	7,251	48,674	10,693	65	150	198	1,876	783	25	447	201	92	42	47	90	71
6	610	554	2,915	1,406	7,411	31,233	68	139	260	3,025	963	28	507	214	95	47	45	99	61
7	266	715	587	66	129	184	37,900	9,746	1,037	1,105	2,975	2,536	6,176	688	555	361	240	220	72
8	405	1,112	1,438	91	182	319	7,477	38,901	4,474	2,656	6,696	3,660	15,561	1,246	933	356	227	279	89
9	587	887	3,544	90	263	600	992	4,513	13,399	8,708	6,273	217	10,724	862	269	95	80	138	41
10	1,115	1,127	9,493	174	703	1,903	377	978	3,875	44,705	12,330	117	4,398	1,258	260	83	66	146	63
11	420	378	1,459	93	258	598	826	2,357	2,610	9,718	85,601	434	27,058	9,668	1,387	232	136	408	123
12	133	194	212	58	70	103	3,236	5,471	389	514	2,538	11,781	10,407	1,099	3,952	1,757	545	596	116
13	532	605	1,332	128	272	507	2,688	9,876	5,426	4,726	43,719	3,676	144,213	11,658	6,187	901	510	1,302	251
14	166	129	349	63	111	253	289	716	433	1,619	19,574	259	11,452	27,074	4,976	363	230	816	212
15	166	159	238	79	112	192	543	1,260	336	847	5,038	2,604	10,784	7,425	34,836	3,125	881	4,507	492
16	75	110	123	41	66	106	442	611	109	357	1,222	1,182	2,431	1,002	5,922	48,853	14,285	5,549	350
17	42	43	88	22	29	76	154	239	77	189	601	258	880	381	926	11,379	92,552	4,822	257
18	122	123	168	85	125	190	171	359	171	501	1,933	345	3,130	1,936	5,817	3,349	3,425	64,453	5,412
19	44	36	40	33	65	81	26	51	19	124	311	18	254	214	266	125	133	3,375	26,458
20	121	96	139	111	152	249	66	140	64	347	799	88	758	547	616	341	394	4,942	44,986
21	34	32	51	38	47	70	44	87	33	130	328	71	392	203	363	876	4,555	6,709	997
22	24	16	30	26	36	64	16	40	18	65	182	17	142	116	130	120	264	1,713	4,607
23	49	40	72	50	77	98	32	70	28	148	322	36	302	185	222	255	550	2,019	5,277
24	832	777	3,769	385	1,619	6,681	212	462	1,041	15,313	7,562	73	2,056	977	264	82	70	165	104
25	299	257	1,105	515	1,661	9,170	61	112	232	3,038	1,079	21	467	232	77	35	28	82	69
26	382	311	1,088	104	281	753	240	581	652	5,334	23,350	122	4,296	3,318	629	134	88	297	131
27	1,062	945	3,232	531	1,442	4,823	510	1,108	1,452	14,493	25,985	212	6,697	4,605	1,034	254	225	588	355
28	278	217	640	411	977	3,738	88	179	227	2,160	1,854	35	769	416	158	49	58	151	140
29	265	216	546	300	603	1,679	149	275	225	1,696	4,322	56	1,672	1,269	401	118	97	319	236
30	167	118	276	202	398	999	76	155	98	845	1,977	38	871	625	234	76	66	207	190
31	253	191	556	102	227	547	271	582	334	2,142	13,241	151	5,187	10,371	1,652	243	152	605	285
32	145	116	264	143	272	644	114	212	129	834	3,178	65	1,420	1,386	476	114	93	366	315
33	196	158	362	107	196	445	164	380	228	1,300	5,975	143	3,487	8,505	4,420	351	239	1,715	809
34	285	219	483	255	453	1,043	238	441	263	1,583	6,371	166	3,592	6,144	2,165	354	269	1,488	1,324
35	111	82	144	113	190	383	68	142	74	422	1,204	47	806	866	587	143	126	737	1,368
36	77	68	120	57	85	183	75	142	62	415	1,533	67	1,188	1,990	2,300	149	119	1,866	1,066
37	74	57	94	64	113	206	56	105	50	268	852	38	649	701	691	107	100	1,368	2,883
Total	135,121	64,474	75,200	51,090	83,737	88,685	59,062	83,842	42,242	158,784	297,549	28,879	289,309	108,816	83,483	75,164	121,152	112,606	99,452

Table 94 (continued)

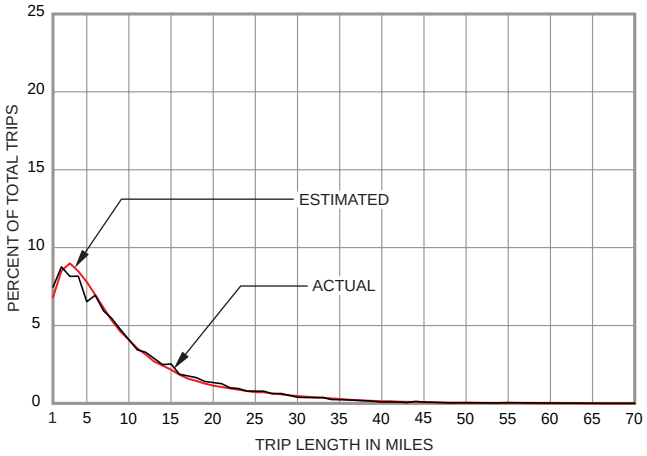
Production Zone	Attraction Zone: 2001 Trip Distribution Model																		Total
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
1	180	36	42	54	2,197	968	1,666	1,745	811	1,002	729	763	584	441	492	179	123	136	148,656
2	81	28	20	28	1,953	747	1,316	1,437	557	712	502	542	393	260	315	113	57	83	73,546
3	144	35	32	53	6,143	2,352	3,244	3,600	1,242	1,265	884	1,174	700	545	616	181	126	115	99,635
4	125	25	42	39	1,157	1,531	525	1,033	1,133	1,169	909	355	716	228	422	177	67	121	62,285
5	137	22	51	53	3,153	3,389	939	1,814	1,789	1,494	1,169	479	885	295	575	208	83	150	94,389
6	130	23	23	49	7,182	12,025	1,334	3,513	4,454	2,221	1,617	737	1,104	402	815	292	97	178	85,876
7	116	56	37	57	577	207	1,183	902	248	595	427	777	404	367	419	132	96	101	72,259
8	159	46	51	77	1,046	343	2,146	1,545	371	849	569	1,360	611	640	649	165	151	141	97,021
9	87	23	25	40	2,100	611	2,180	1,769	549	682	442	899	419	388	409	105	87	78	63,175
10	108	11	28	48	11,559	2,697	8,068	7,446	1,910	1,687	1,073	2,142	909	918	868	227	178	143	123,191
11	236	44	44	71	4,360	809	24,936	10,419	1,243	3,188	1,824	10,574	2,031	3,450	2,646	441	597	398	211,075
12	173	113	56	82	293	132	907	605	162	461	333	750	373	494	481	130	156	118	48,990
13	439	142	99	175	1,997	620	8,051	4,662	866	2,698	1,732	6,762	2,028	3,359	2,730	594	806	547	276,816
14	328	106	72	111	1,082	314	8,153	4,017	557	2,413	1,438	18,724	2,073	12,772	5,744	824	1,838	837	130,487
15	735	316	170	255	582	230	2,737	1,673	408	1,520	1,040	4,079	1,429	7,933	3,425	874	3,403	1,227	105,660
16	604	864	266	345	289	127	821	601	187	554	417	866	502	849	794	260	308	240	91,730
17	436	3,282	493	574	133	98	424	353	140	297	229	430	258	424	424	153	162	153	121,478
18	5,350	4,448	1,959	1,797	391	245	1,477	1,099	406	1,435	1,068	1,904	1,333	3,501	2,850	1,121	3,041	2,067	127,307
19	36,398	555	2,724	2,746	136	99	368	361	201	696	523	510	616	863	1,609	1,238	889	2,735	84,940
20	229,402	1,254	9,273	12,636	367	298	953	1,073	500	1,756	1,426	1,176	1,715	1,717	3,408	4,279	1,599	5,195	332,983
21	1,486	29,296	6,064	4,235	110	89	242	249	125	293	232	273	255	370	445	204	241	269	59,538
22	9,941	4,080	25,662	29,986	85	59	213	224	105	290	245	227	298	307	556	294	260	431	80,889
23	15,248	5,137	46,276	150,732	179	111	363	392	195	561	436	413	510	477	840	449	369	614	233,134
24	149	21	38	67	45,790	15,581	13,355	23,642	8,410	3,941	2,448	3,151	1,768	1,242	1,488	375	244	227	164,381
25	114	15	25	41	13,169	26,511	1,717	6,314	10,212	3,055	2,331	844	1,431	449	978	305	101	192	86,344
26	211	34	49	71	6,612	1,206	55,380	28,123	2,260	8,097	3,782	16,876	4,265	4,681	4,502	693	710	501	180,144
27	672	120	141	239	30,515	10,396	74,363	119,608	23,626	36,704	17,980	29,274	15,551	7,600	12,160	2,257	1,242	1,362	453,363
28	234	34	52	82	6,760	10,431	3,327	16,174	39,924	13,120	14,752	2,177	4,878	1,096	2,895	899	263	493	130,136
29	472	70	105	152	3,075	2,959	11,381	25,364	13,565	41,656	25,688	9,194	16,219	3,611	9,425	2,189	678	1,244	181,491
30	330	47	79	116	1,441	1,774	3,844	8,703	10,590	22,833	38,534	3,713	10,892	1,862	5,164	1,854	400	861	120,655
31	453	88	103	153	2,295	794	22,917	16,397	1,824	9,968	5,092	64,350	9,807	20,891	19,745	1,559	2,287	1,462	217,277
32	502	58	146	143	1,105	973	6,597	8,956	2,886	17,191	10,267	13,581	26,506	7,242	24,325	4,047	1,140	2,105	138,056
33	1,063	203	261	295	1,261	593	8,779	6,224	1,342	6,215	3,902	23,990	7,311	73,588	35,845	5,255	11,877	8,162	225,346
34	1,887	248	440	489	1,974	1,550	11,334	12,246	4,010	19,560	13,173	31,751	28,716	46,751	99,553	18,965	7,416	14,966	342,165
35	3,082	146	280	351	545	552	1,898	2,497	1,352	5,559	5,246	2,838	7,463	6,678	22,540	49,381	2,978	14,767	135,766
36	1,247	173	283	307	413	241	2,181	1,641	516	2,275	1,612	4,289	2,431	15,371	9,931	3,498	14,588	10,102	82,661
37	4,114	196	429	468	322	291	1,157	1,302	642	2,599	1,989	1,936	2,901	5,705	12,171	11,100	6,086	25,815	87,699
Total	316,573	51,395	95,940	207,217	162,348	101,953	290,476	327,723	139,318	220,611	166,060	263,880	160,285	237,767	292,254	115,017	64,744	98,336	5,370,544

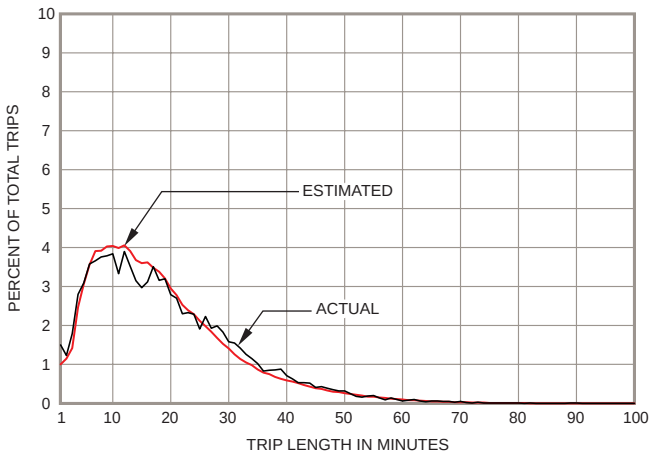
Source: SEWRPC.

Figure 38

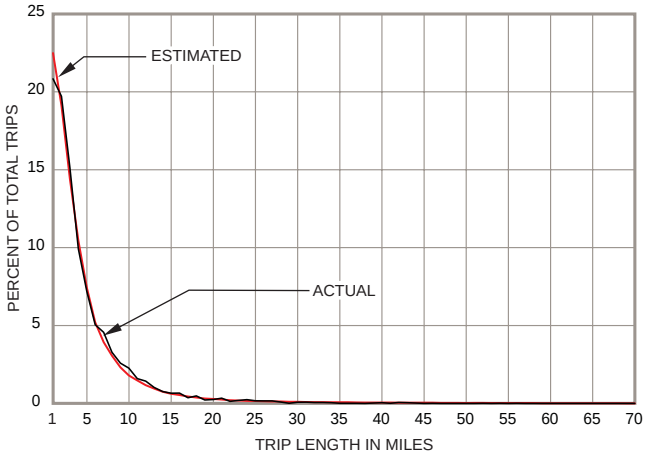
COMPARISON OF TRAVEL SURVEY AND MODEL ESTIMATED AVERAGE WEEKDAY TRIP LENGTH FREQUENCY DISTRIBUTION WITHIN SOUTHEASTERN WISCONSIN: 2001

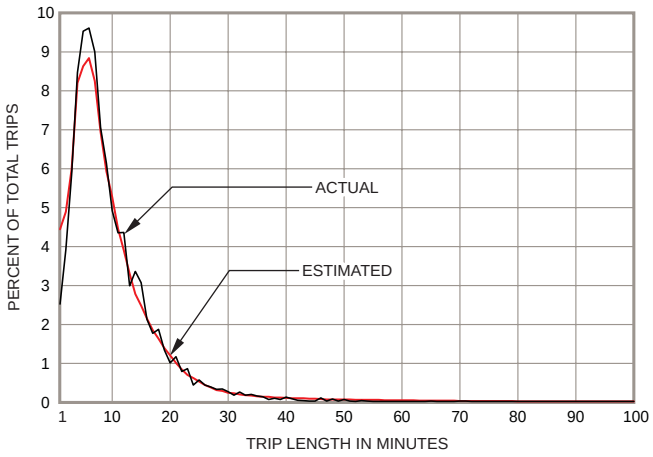
HOME-BASED WORK TRIPS



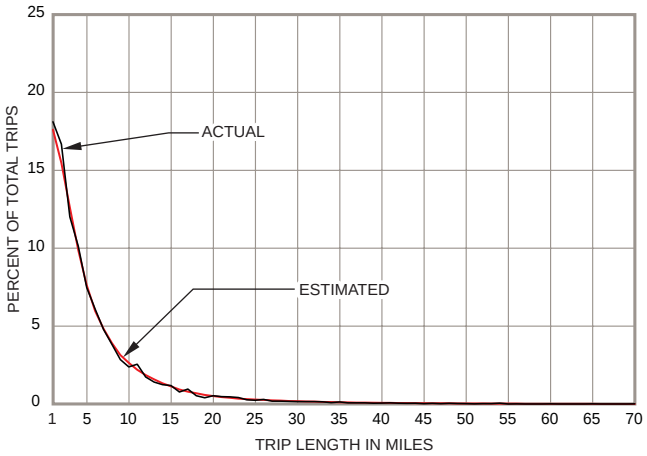


HOME-BASED SHOPPING TRIPS





HOME-BASED OTHER TRIPS



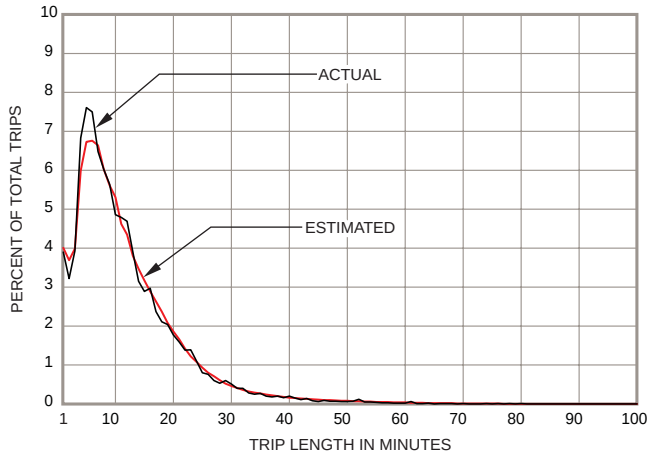
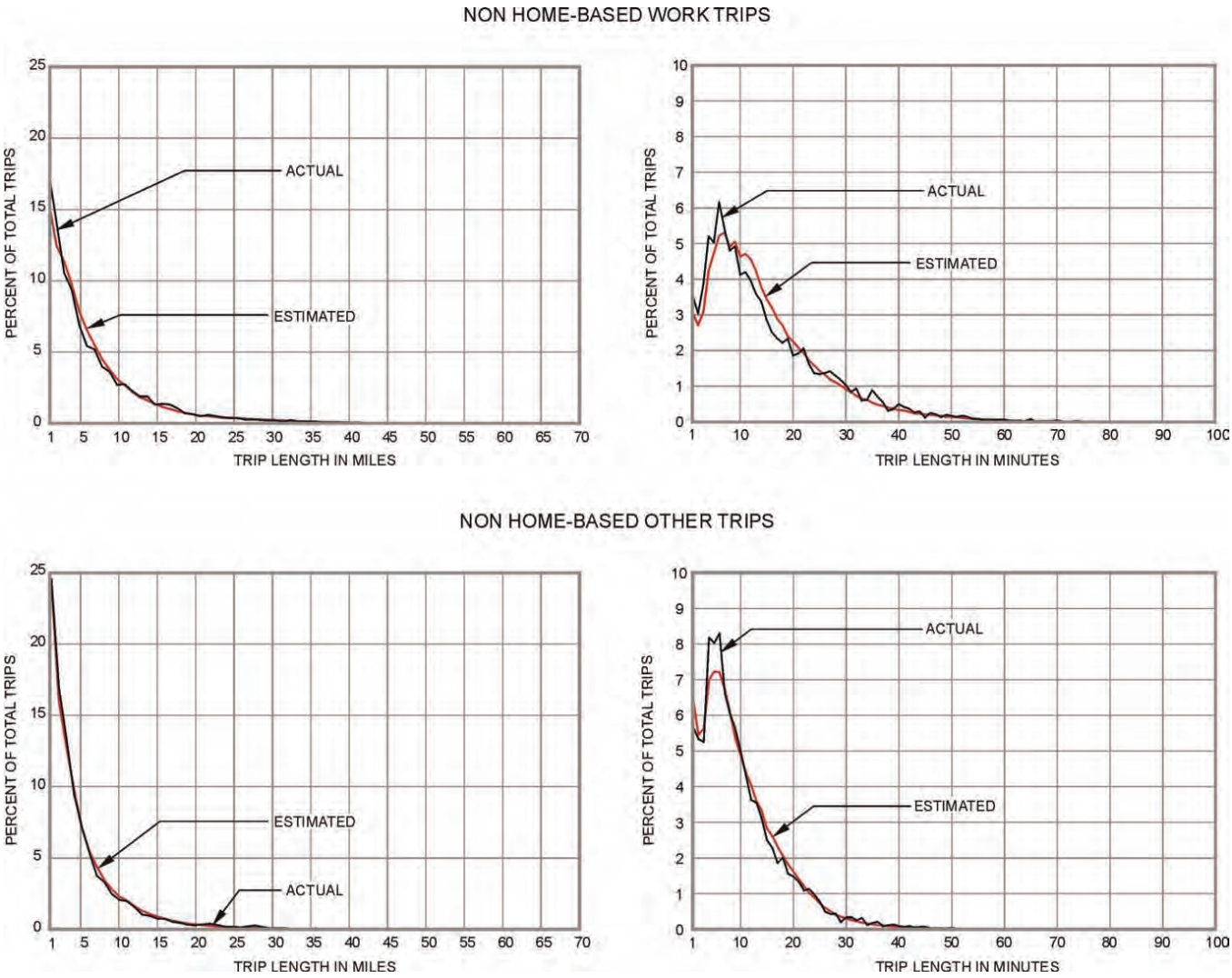


Figure 38 (continued)



Source: SEWRPC.

Highway Travel Demand

The estimated 2001 arterial street system average weekday traffic volumes derived from application of the traffic simulation models were compared to estimated 2001 average weekday traffic volumes derived from actual traffic counts. Table 97 presents a comparison of estimated vehicle-miles of travel from the traffic models and traffic counts for each county within Southeastern Wisconsin. Map 52 presents a comparison of the estimated average weekday traffic for the freeway system and selected major arterials within Southeastern Wisconsin.

It may be concluded that the traffic simulation models have the ability to forecast traffic volume with adequate accuracy for transportation planning and facility design purposes. This is particularly true when it is recognized that the actual traffic counts are estimates themselves, having been taken over a triennial period centered on the base year. As such, the counts reflect yearly as well as seasonal variations in traffic flow and random errors that occur in the counting process itself.

Table 95

COMPARISON OF AVERAGE WEEKDAY RIDERSHIP BY URBANIZED AREA: 2001 OBSERVED VERSUS 2001 MODEL ESTIMATED

Trip Category	Linked Transit Revenue Trips		
	Observed 2001	Estimated 2001	Percent Difference
Milwaukee Urbanized Area			
Home-Based Work	46,800	45,800	-2.1
Home-Based Shopping	13,100	12,700	-3.1
Home-Based Other	24,500	24,600	0.4
Nonhome-Based	13,500	15,100	11.9
School[a]	32,600	32,900	0.9
Total	130,500	131,100	0.5
Kenosha Urbanized Area			
Home-Based Work	700	2,000	185.7
Home-Based Shopping	400	1,700	325.0
Home-Based Other	1,100	1,400	27.3
Nonhome-Based	400	1,200	200.0
School[a]	4,100	3,900	-4.9
Total	6,700	10,200	52.2
Racine Urbanized Area			
Home-Based Work	1,500	2,600	73.3
Home-Based Shopping	600	700	16.7
Home-Based Other	1,100	1,700	54.5
Nonhome-Based	200	1.700	750.0
School[a]	1,600	1,700	6.3
Total	5,000	8,400	68.0
Region			
Home-Based Work	49,000	50,400	2.9
Home-Based Shopping	14,100	15,100	7.1
Home-Based Other	26,700	27,700	3.7
Nonhome-Based	14,100	18,000	27.7
School[a]	38,300	38,500	0.5
Total	142,200	149,700	5.3

[a] *Excludes trips made on yellow school bus.*

Source: SEWRPC.

SUMMARY AND CONCLUSIONS

This chapter describes the travel simulation models used in the design, test, and evaluation of the alternative transportation system plans under the regional transportation system plan preparation process. These models and the relationships and techniques incorporated in these models are important because they provide the technical basis for the design of a regional transportation system plan which is properly related to the travel patterns that the planned system must serve, and they provide the necessary link between land use and transportation system planning.

The Commission has over 40 years of experience in travel simulation modeling. The initial travel simulation models were developed in 1963, utilizing the findings of comprehensive travel survey and applied in the initial regional land use-transportation study. The initial models were validated in 1972, utilizing the results of a second full-scale travel survey and demonstrated to simulate accurately 1972 travel patterns, arterial street and highway traffic volumes, and transit ridership. Some refinements were made to the models in 1972 before their application in the second-generation transportation study. The refined set of models was revalidated in 1991, utilizing the findings of a third comprehensive travel survey. The models developed in 1972 were demonstrated to accurately

Table 96

COMPARISON OF ESTIMATED ACTUAL TRANSIT RIDERSHIP BOARDING PASSENGER COUNTS TO MODEL ESTIMATED TRANSIT RIDERSHIP ON MILWAUKEE COUNTY TRANSIT SYSTEM SELECTED BUS ROUTES AND TOTAL SYSTEM: 2001[a]

Milwaukee County Transit System	Average Weekday Unlinked Trips (boarding passengers)			
			Difference	
	2001 Estimated Actual[b]	2001 Model Estimated	Amount	Percent
Selected Major Routes				
Route No. 10	7,500	9,740	2,240	29.9
Route No. 12	8,840	6,860	-1,980	-22.4
Route No. 14, 2	5,810	8,740	2,930	50.4
Route No. 15	8,160	8,480	320	3.9
Route No. 18	6,740	6,300	-440	-6.5
Route No. 19	13,080	8,610	-4,470	-34.2
Route No. 27	12,170	10,100	-2,070	-17.0
Route No. 30, 30X	20,170	21,580	1,410	7.0
Route No. 31	3,270	1,710	-1,560	-47.7
Route No. 62	8,400	7,060	-1,340	-16.0
Route No. 76	6,080	4,670	-1,410	-23.2
Route No. 80	7,960	7,970	10	0.1
Subtotal	108,180	101,820	-6,360	-5.9
Remainder of Routes	72,490	64,360	-8,130	-11.2
Total	180,670	166,180	-14,490	-8.0

[a]*Includes Waukesha County Transit System routes operated by Milwaukee County Transit System.*

[b]*Based on actual operator counts taken during the months of September through May during 2000 and 2001 by the Milwaukee County Transit System.*

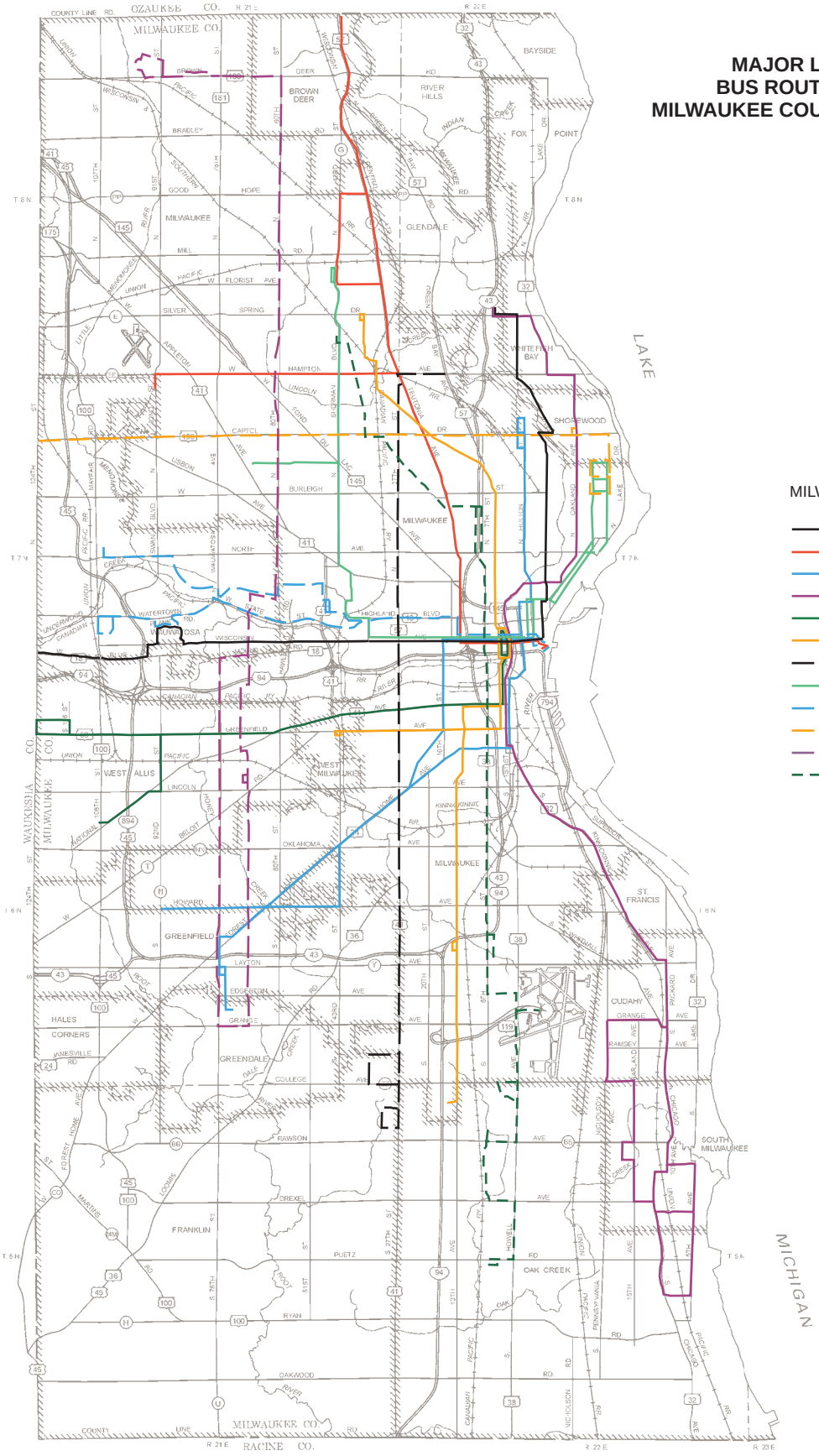
Source: SEWRPC.

simulate 1991 conditions. Again, some refinements were made to produce a third-generation set of travel models. The third-generation models developed with 1991 data were demonstrated to accurately simulate 2001 travel. Again, some refinements were made to produce a fourth generation of travel models with 2001 data. The Commission staff thus has substantially demonstrated expertise and experience in the development and application of travel simulation models, as well as intimate knowledge of the travel habits and patterns of the Region and of changes in these habits and patterns over time. The Commission believes that the most rigorous test possible of a set of travel simulation models consists of applying the full set of models to socio-economic and transportation system data from a year, be it past or future, other than the year of the data from which the models were calibrated and then comparing the model-estimated travel and traffic to survey-estimated travel and actual measured traffic counts. The Commission models have passed this test, not once, but three times, as demonstrated by comparisons indicating model-estimated traffic volumes that are within 10 percent of ground traffic counts.

The travel simulation process used by the Commission consists of four major steps: trip generation, trip distribution, modal split, and traffic assignment. The first step in the development of these models for the fourth-generation planning effort consisted of an assessment of the models developed and used in the third-generation land use-transportation planning effort. Such an assessment was possible because the findings of four identical large-scale comprehensive travel surveys were available for 1963, 1972, 1991, and 2001, allowing the testing of the temporal stability of the models. Despite the changes in socio-economic conditions, in land use development, and in transportation system development that occurred in the interims involved, the travel simulation models from the first-, second-, and third-generation planning efforts demonstrated an ability to simulate current travel habits and patterns with accuracy.

Map 51

MAJOR LOCAL AND EXPRESS BUS ROUTES OPERATED BY THE MILWAUKEE COUNTY TRANSIT SYSTEM: 2001



MILWAUKEE COUNTY TRANSIT SYSTEM

- ROUTE NO. 10
- ROUTE NO. 12
- ROUTE NO. 14, 2
- ROUTE NO. 15
- ROUTE NO. 18
- ROUTE NO. 19
- ROUTE NO. 27
- ROUTE NO. 30, 30X
- ROUTE NO. 31
- ROUTE NO. 62
- ROUTE NO. 76
- ROUTE NO. 80

GRAPHIC SCALE

0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: Milwaukee County Transit System and SEWRPC.

Table 97

COMPARISON OF MODEL ESTIMATED AND TRAFFIC COUNT ESTIMATED ARTERIAL SYSTEM VEHICLE-MILES OF TRAVEL ON AN AVERAGE WEEKDAY IN THE REGION: 2001

County	Estimated 2001 Average Weekday Vehicle-Miles of Travel from Traffic Counts (thousands)	Estimated 2001 Average Weekday Vehicle-Miles of Travel from Travel Simulation Models (thousands)	Percent Difference
Kenosha	3,126	3,182	1.8
Milwaukee	16,377	15,454	-5.6
Ozaukee	2,259	2,524	11.7
Racine	3,383	3,710	9.7
Walworth	2,335	2,664	14.1
Washington	3,095	3,477	12.3
Waukesha	9,107	9,593	5.3
Region	39,682	40,604	2.3

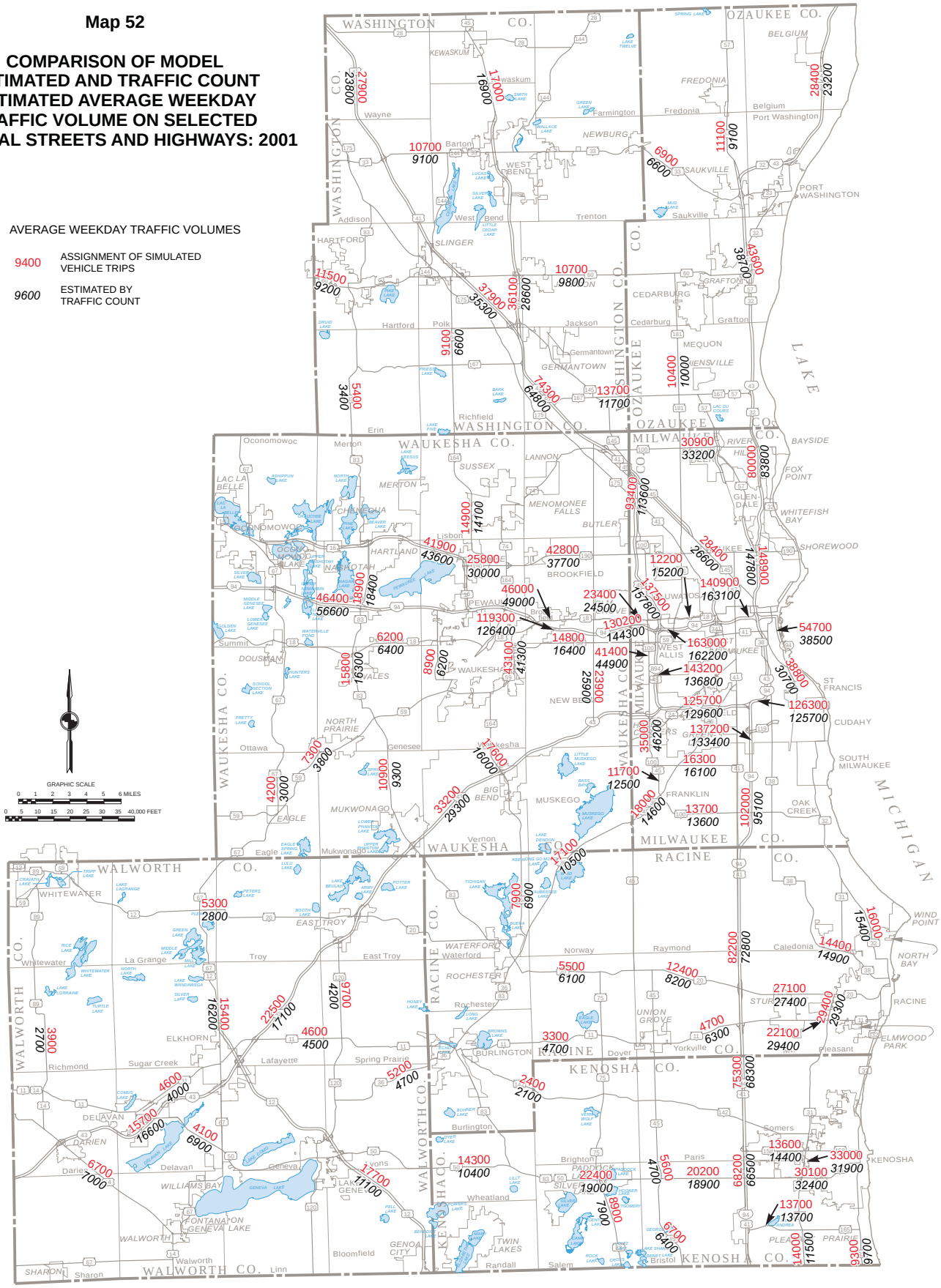
Source: SEWRPC.

In spite of the excellent performance of the travel and traffic forecasting models developed under the first-, second-, and third-generation transportation planning efforts and the conclusions that these models could continue to be used with confidence in either their original form or in a refined form through re-calibration with more recent travel survey data, certain refinements in the models were determined to be desirable.

A summary description of the travel simulation models used in this transportation planning effort can be found in Table 76. Each of these models was individually validated by using travel survey data; the entire model process chain validated by comparing the outputs of the models to observed ground counts, transit and highway. These analyses clearly demonstrated the validity of the calibrated models to predict travel and traffic conditions with accuracies adequate for transportation system planning and engineering. The Commission models are believed to provide the Region with a technically sound transportation systems planning tool which can be used with confidence in the planning and design of surface transportation facilities within the Region.

Map 52

COMPARISON OF MODEL ESTIMATED AND TRAFFIC COUNT ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUME ON SELECTED ARTERIAL STREETS AND HIGHWAYS: 2001



Source: SEWRPC.

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Chapter VII

OBJECTIVES, PRINCIPLES, AND STANDARDS

INTRODUCTION

Planning may be described as a rational process for formulating and meeting objectives. The formulation of objectives is an essential task to be undertaken to guide the preparation and evaluation of alternative plans. This chapter presents a set of transportation system objectives along with supporting principles and related standards recommended by the Advisory Committee on Regional Transportation System Planning as a basis for the preparation and evaluation of the year 2035 regional transportation system plan.

The objectives, principles, and standards set forth in this chapter reflect the insight of Commission advisory committees operating within the framework of the continuing regional land use-transportation study since the original design year 1990 regional transportation system plan completed in 1966. Advisory committees have guided all major Commission regional and subregional transportation planning efforts including the following: the jurisdictional highway system plans prepared for all seven counties in the Region; the regional freeway reconstruction study; and the transit system development plans prepared for the Racine, Kenosha, and Waukesha areas, and for Ozaukee, Washington, and Waukesha Counties. The advisory committees involved have had a combined membership of hundreds of elected and appointed officials, concerned citizens, and other interests.

BASIC CONCEPTS AND DEFINITIONS

The terms “objective,” “principle,” “standard,” “plan,” “policy,” and “program” are subject to a range of interpretations. Although this chapter deals with only the first three of these terms, an understanding of the interrelationships between the foregoing terms and the basic concepts which they represent is essential to any consideration of objectives, principles, and standards. Under the regional planning program, these terms have been defined as follows:

1. Objective: a goal or end toward the attainment of which plans and policies are directed.

2. Principle: a fundamental, primary, or generally accepted tenet used to support objectives and prepare standards and plans.

3. Standard: a criterion used as a basis of comparison to determine the adequacy of plan proposals to attain objectives.

4. Plan: a design which seeks to achieve agreed upon objectives.

5. Policy: a rule or course of action used to ensure plan implementation.

6. Program: a coordinated series of policies and actions to carry out a plan.

OBJECTIVES

In order to be useful in the regional transportation system planning process, objectives must be logically sound and related in a demonstrable and measurable way to alternative transportation system development proposals. Only if the objectives can be clearly related to transportation system development and only if they can be subject to objective test can the objectives be used to guide the design and evaluation of alternative plans, and the selection of the plan which best meets the agreed upon objectives.

The objectives adopted for the regional transportation system plan are largely self-descriptive. They are concerned primarily with providing a multi-modal transportation system; reducing travel time, traffic congestion, and accident exposure; minimizing costs; and minimizing disruptive effects upon communities and upon the natural resource base. The following specific transportation development objectives have been adopted by the Commission after careful review and recommendation by the Advisory Committee on Regional Transportation System Planning:

1. A multi-modal transportation system which, through its location, capacity, and design, will effectively serve the existing regional land use pattern and promote the implementation of the regional land use plan, meeting and managing the anticipated travel demand generated by the existing and proposed land uses.

2. A multi-modal transportation system which is economical and efficient and best meets all other objectives while minimizing public and private costs.

3. A multi-modal transportation system which provides appropriate types of transportation needed by all residents of the Region at an adequate level of service; provides choices among transportation modes; and provides inter-modal connectivity.

4. A multi-modal transportation system which minimizes disruption of existing neighborhood and community development, including adverse effects upon the property tax base.

5. A multi-modal transportation system which serves to protect the overall quality of the natural environment.

6. A multi-modal transportation system which facilitates the convenient and efficient movement of people and goods between component parts of the Region.

7. A multi-modal transportation system which reduces accident exposure and provides for increased travel safety.

8. A multi-modal transportation system which minimizes the amount of energy consumed, especially non-renewable energy sources such as fossil fuels.

These transportation development objectives define the basic needs which a transportation system should seek to satisfy in the Region, and have been refined, modified, and amended by the Commission staff, Advisory Committees, and the Commission itself as the Commission has conducted regional transportation planning over the past 45 years.

The objectives when combined provide the following vision for the transportation system of southeastern Wisconsin:

> A multimodal transportation system with high quality public transit, bicycle and pedestrian, and arterial street and highway elements which add to the quality of life of Region residents and support, and promote expansion of, the Region's economy, by providing for convenient, efficient, and safe travel by each mode,

while protecting the quality of the Region's natural environment, minimizing disruption of both the natural and manmade environment, serving to support implementation of the regional land use plan and minimizing the capital and annual operating costs of the transportation system.

PRINCIPLES AND STANDARDS

A planning principle and one or more accompanying planning standards complement each of the foregoing specific transportation system development objectives, as shown in Table 98. Each standard is directly related to the accompanying planning principle, as well as to the objective, and serves to facilitate application of the objectives in plan design, test, and evaluation.

The planning standards herein adopted fall into two groups: comparative and absolute. Comparative standards can be applied only through a comparison of alternative plan proposals, as in the example, minimizing the total vehicle-miles of travel within the Region. No desirable value can be realistically assigned to the standard, therefore, its application must be a comparative one, in which the alternative plan resulting in the lowest vehicle-miles of travel is deemed to best meet this standard. Absolute standards can be applied individually to each alternate plan proposal since they are expressed in terms of maximum, minimum, or desirable values, as, for example, a maximum overall travel time of 60 minutes to General Mitchell International Airport, the Region's commercial air carrier airport.

OVERRIDING CONSIDERATIONS

In applying planning standards and in preparing the regional transportation system plan, a number of overriding considerations must be recognized:

1. It is unlikely that any one plan proposal will be determined to best meet all the objectives and standards. Certain objectives and standards are complementary; however, other objectives and standards are conflicting. Consideration will need to be given to a comparison of how well each plan achieves each objective, followed by resolution through balancing competing objectives.

2. An overall evaluation of each transportation plan proposal may need to be made on the basis of cost. Such an analysis may show that the attainment of one or more of the objectives, and implementation of some alternate plans, are beyond the economic capability of the Region.

3. An assessment of the distribution of the benefits and costs of transportation plans within the Region will be conducted to determine whether there are any disproportionate impacts, particularly on minority and low-income populations.

The formulation of objectives and standards may continue throughout the planning process. As alternative plan proposals are designed and evaluated and as plan implementation is considered, objectives and standards may change. In the planning process, the ability of alternatives to meet the objectives is evaluated. If alternative plans fall short of meeting the chosen objectives, either better plans must be designed or the objectives may need to be compromised. The plan evaluation process provides the basis for deciding which objectives to compromise. The compromises may take three forms: certain objectives may be dropped because their satisfaction has been proven unrealistic, new objectives may be suggested, or conflicts between inconsistent objectives may need to be balanced.

Table 98

TRANSPORTATION SYSTEM DEVELOPMENT OBJECTIVES, PRINCIPLES, AND STANDARDS

OBJECTIVE NO. 1

A multi-modal transportation system which, through its location, capacity, and design, will effectively serve the existing regional land use pattern and promote the implementation of the regional land use plan, meeting and managing the anticipated travel demand generated by the existing and proposed land uses.

PRINCIPLE

An integrated multi-modal regional transportation system connects major land use activities within the Region, providing the accessibility essential to the support of these activities. The regional transportation system should provide higher accessibility to areas recommended for development and redevelopment, and lower accessibility to areas not recommended for development.

STANDARDS

1. The regional transportation system should be consistent with and serve to support, and promote the implementation of the regional land use plan.

    a. Higher relative transportation accessibility should be provided to areas recommended for development than to areas not recommended for development;

    b. Improvements in accessibility should be provided to areas recommended for development rather than to areas not recommended for development.

OBJECTIVE NO. 2

A multi-modal transportation system which is economical and efficient and best meets all other objectives while minimizing public and private costs.

PRINCIPLE

The total resources of the Region are limited, and any undue investment in transportation facilities and services must occur at the expense of other public and private investment; therefore, total transportation costs for the desired level of service should be minimized.

STANDARDS

1. The sum of transportation system capital investment costs and annual operating costs should be minimized, while meeting other objectives.[a]

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[a]*The costs to be considered may be termed "life-cycle costs" and include capital, maintenance, and operational costs for facilities over the projected physical and economic life of the facility.*

2. Full use of all existing major transportation facilities should be considered and encouraged through low-capital and operating cost transportation system management and travel.

OBJECTIVE NO. 3

A multi-modal transportation system which provides appropriate types of transportation needed by all residents of the Region at an adequate level of service; provides choices among transportation modes; and provides inter-modal connectivity.

PRINCIPLE

A multi-modal regional transportation system is necessary to provide transportation service to all segments of the population and to support and enhance the Region's economy and quality of life. The arterial street and highway system serving personal travel by automobile and freight travel by truck is, has been, and will likely continue to be the dominant element of the Region's transportation system carrying over 90 percent of total daily travel, and serving the overwhelming majority of the Region's population. However, there are substantial reasons for a multi-modal regional transportation system in southeastern Wisconsin, including public transit and bicycle-pedestrian elements. For that substantial portion of the Region's population without access to an automobile, access to the metropolitan area—jobs, medical and other services, parks and recreation, and shopping—is only available if provided by public transit. Moreover, in the most heavily traveled corridors and subareas of the Region, public transit and bicycle and pedestrian facilities can alleviate peak travel loadings on highway facilities and the demand for land for parking facilities. Also, a multi-modal transportation system can support and enhance the Region's quality of life and economy by providing a choice of modes.

STANDARDS

1. ARTERIAL STREET AND HIGHWAY SYSTEM

a. A grid of arterial streets and highways should be provided in urban areas of the Region at intervals of no more than one-half mile in each direction in urban high-density areas, at intervals of no more than one mile in each direction in urban medium-density areas, and at intervals of no more than two miles in each direction in urban low-density and suburban-density areas. In rural areas, arterials should be provided at intervals of no less than two miles in each direction.

b. In urban areas of the Region, the grid of arterial streets should be direct and understandable.

c. Arterial street and highway facilities should be provided with adequate traffic-carrying capacity to minimize traffic congestion.[b]

2. PUBLIC TRANSIT

a. The public transit system should serve and connect medium and high density areas of the Region and the Region's major activity centers that currently generate, or have the potential to generate, ridership including:[c]

1) Housing facilities serving transit-dependent persons who are living independently including elderly, disabled, and low-income individuals;

2) Major hospitals and medical centers;

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[b]*Design capacity is the maximum level of traffic volume a facility can carry before beginning to experience morning and afternoon peak traffic hour traffic congestion, and is expressed in terms of number of vehicles per average weekday. The design capacity and level of congestion thresholds are set forth in the following table:*

Facility Type	Average Weekday Traffic Volumes (vehicles per 24 hours)			
	Design Capacity and Upper Limit of Level of Service C	Upper Limit of Moderate Congestion and Level of Service D	Upper Limit of Severe Congestion and Level of Service E	Extreme Congestion and Level of Service F
Freeway				
Four-lane	60,000	80,000	90,000	> 90,000
Six-lane	90,000	121,000	135,000	> 135,000
Eight-lane	120,000	161,000	180,000	> 180,000
Standard Arterial				
Two-lane	14,000	18,000	19,000	> 19,000
Four-lane Undivided	18,000	23,000	24,000	> 24,000
Four-lane with Two-way Left Turn Lane	21,000	29,000	31,000	> 31,000
Four-lane Divided	27,000	31,000	32,000	> 32,000
Six-lane Divided	38,000	45,000	48,000	> 48,000
Eight-lane Divided	50,000	60,000	63,000	> 63,000

The level of congestion on arterial streets and highways may summarized by the following operating conditions:

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Some restrictions on ability to maneuver and change lanes.
Moderate	D	1 to 2 mph below free-flow speed	Substantial restrictions on ability to maneuver and change lanes.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Surface Arterial			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	70 to 100% of free-flow speed	Ability to maneuver within traffic stream is unimpeded. Control delay at signalized intersections is minimal.
None	C	50 to 100% of free-flow speed	Restricted ability to maneuver and change lanes at mid-block locations.
Moderate	D	40 to 50% of free-flow speed	Restricted ability to maneuver and change lanes. Small increases in flow lead to substantial increases in delay and decreases in travel speed.
Severe	E	33 to 40 percent of free-flow speed	Significant restrictions on lane changes. Traffic flow approaches instability.
Extreme	F	25 to 33 percent of free-flow speed	Flow at extremely low speeds. Intersection congestion with high delays, high volumes, and extensive queuing.

[c]*High density is defined as 7 to 17.9 dwelling units per net acre, and medium density is defined as 2.3 to 6.9 dwelling units per net acre.*

3) Major retail centers;

4) Major colleges and universities;

5) Regional and county government offices;

6) Major employers with more than 500 employees at one site;

7) Major industrial and office centers;

8) Passenger terminals for intercity bus, passenger rail, and airline carriers;

9) Major parks and outdoor recreation areas and recreational facilities and complexes hosting high attendance events.

b. The public transit services provided should include rapid, express, local, shuttle, and paratransit services: [d]

1) Rapid and express service should be provided to reduce travel times for the longest trips, to connect areas of high and medium density urban development and the largest major activity centers, and to provide an alternative in the most heavily traveled corridors and subareas of the Region. As possible, rapid and express services should be extended to provide a collection and distribution function as well.

2) Local service should be provided within and between residential areas, to link residential areas with nearby major activity centers, and to provide for transfer connections with rapid, express, and other local services.

3) Shuttle services should be provided to connect with rapid, express and local services serving major activity centers.

4) Paratransit service should be provided to meet the needs of disabled individuals who are unable to use regular bus service.

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[d] *Rapid transit is intended to facilitate relatively fast and convenient transportation along heavily traveled corridors and between major activity centers and high-density residential communities. Rapid transit has relatively high average operating speeds and relatively low accessibility, with station spacings located one to three miles or more apart. Rapid transit service can be provided by commuter rail and heavy rail operating over exclusive, grade-separated rights-of-way or by buses operating over exclusive, grade-separated busways. Rapid transit can also be provided by buses operating in mixed traffic on freeways and by light rail operating over exclusive, though unseparated-grade, rights-of-way.*

Express transit service is provided over arterial streets and highways with stops generally located one-half mile or more apart at intersecting transit routes, intersecting arterial streets, and major traffic generators. Express transit serves trips of moderate length and can be provided by bus or by light rail operating in mixed traffic on shared rights-of-way or an exclusive lanes or right-of-way. Express mass transit service provides a greater degree of accessibility at somewhat slower operating speeds than rapid transit; it may provide "feeder" service to the rapid transit system.

Local transit service is characterized by a high degree of accessibility and low operating speeds. Local service is provided over arterial and collector streets, with stops located no more than 1,200 feet apart. Such service can be provided by bus, trolley, or streetcar vehicles. Local transit also provides a passenger collection-circulation-distribution function within major activity centers. The collection-circulation-distribution function of local transit service may include the use of buses, vans, trolleys, streetcars, automated guideway vehicles, and other types of people movers, such as moving ramps.

Shuttle service is a type of local transit service as defined above that is operated to provide connections to major land use activity centers, including employment and recreational centers, for passengers using rapid, express, and local transit services. Shuttle service may be provided on a regular basis such as to serve regular work-shift times at employment centers or to serve special high attendance events such as fairs or festivals, large meetings or conventions, and sporting events. It is typically provided using buses, vans, or taxicabs.

Paratransit service is provided on a nonfixed-route, demand-responsive basis by the flexible routing and scheduling of relatively small vehicles to provide a shared-occupancy transit service. Examples of paratransit service for the general population include the service provided by the public shared-ride taxicab systems in the Region. Paratransit service for special subgroups includes transportation services for elderly and disabled persons provided by various public and private agencies and organizations. Paratransit service is required by Federal regulations to be provided within urban fixed-route transit service areas to meet the transportation needs of those persons who because of mental or physical disability are unable to use conventional transit service.

c. The population served by public transit should be maximized. The population shall be considered as served when it resides within the following distances of transit service:

Maximum Distance from a Bus Stop

Service Type	Walking	Driving
Rapid	1/2 mile	3 miles
Express	1/2 mile	--
Local	1/4 mile	--
Shuttle	1/4 mile	--

d. The major activity centers and jobs served by public transit should be maximized. Major activity centers and jobs shall be considered as served when located within the following distance of transit service:

Service Type	Maximum Walking Distance from a Bus Stop
Rapid	1/2 mile
Express	1/2 mile
Local	1/4 mile
Shuttle	1/4 mile

e The contiguous transit supportive land area served by public transit should be maximized. To be considered transit supportive, an area should have a density of at least 4 dwelling units per net residential acre, or at least 4 jobs per total acre.

f. The use of public transit in corridors of high travel demand should be maximized.

g. Public transit routes should have direct alignments with a limited number of turns, and should be arranged to minimize duplication of service and unnecessary transfer which would otherwise discourage transit use.

h. Bus stops should be clearly marked by easily recognized bus stop signs and located so as to minimize the walking distance to and from residential areas and major activity centers, and to facilitate connections with other transit services where appropriate. The suggested locations and spacing for stops are as follows:

Service Type	Stop Locations and Spacing
Rapid	At terminal areas and one-mile or more on line-haul sections
Express	At terminal areas, intersecting transit routes, signalized intersections with arterial streets, and major activity centers
Local	600 to 1200 feet (two to three blocks) apart
Shuttle	As appropriate for the activity center served

i. The public transit system should be designed and operated so as to achieve the following minimum overall travel speeds by area based on average weekday conditions:

	Travel Speed (miles per hour)		
Service Type	CBD	Central City	Outlying Areas
Rapid	5-10	15-30	40-55
Express	5-10	15-20	25-35
Local	5-10	12-15	18-25

j. The hours of service operation for the public transit system should serve the demand generated by the land use activities served by, and the function of, each route. Service periods should also accommodate the travel needs of those who depend on the transit system as their primary travel mode. The transit system should, therefore, strive to operate routes with service hours as follows:

	Desirable Service Hours		
Service Type	Weekdays	Saturdays	Sundays/Holidays
Rapid	6:00a.m.-10:00p.m.	6:00a.m.-10:00p.m.	6:00a.m.-10:00p.m.
Express	5:00a.m.-11:00p.m.	5:00a.m.-11:00p.m.	5:00a.m.-11:00p.m.
Local	5:00a.m.-1:00a.m.	5:00a.m.-1:00a.m.	5:00a.m.-1:00a.m.

The availability of weekend and holiday service enhances the attractiveness of weekday service and positively affects system ridership by providing that regular weekday riders need not seek alternative travel modes. Therefore, a reasonable level of service should also be maintained on weekends and holidays.

k. Operating headways[e] for public transit fixed-route service should be capable of accommodating passenger demand at the recommended load standards, and should also desirably provide convenient service so as to encourage transit use. The desirable headways presented below represent a frequency of transit service that would be desirable to provide a service of high quality and to promote transit ridership. Lower headways may be provided in high density corridors of heavy travel demand, and higher headways may only be feasible in areas of low and medium density.

	Desirable Headway (minutes)		
	Weekday		Weekend
Service Type	Peak Period	Off-Peak Period	Periods/Holidays
Rapid	10	20	30
Express	10	20	30
Local	10	20	30

Operating headways should not exceed the following maximum headways throughout the service area when service is offered:

	Maximum Headway (minutes)		
	Weekday		Weekend
Service Type	Peak Period	Off-Peak Period	Periods/Holidays
Rapid	30	60	60
Express	30	60	60
Local	30	60	60

l. Park-ride facilities should be provided at appropriate stops on rapid and express services to serve transit users from medium and low density residential areas. Sufficient off-street automobile parking should be provided at park-ride facilities to accommodate the total parking demand generated by transit users and carpoolers.

m. The average maximum load factor, measured as the ratio of passengers to bus seats at that point on a route where passenger loads are highest, should not exceed the following during any one-hour period:

	Average Maximum Load Factor	
Service Type	Peak Periods	All Other Times
Rapid	1.00	1.00
Express	1.33	1.00
Local	1.33	1.00
Shuttle	1.33	1.00

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[e] *The term "operating headway" is defined as the time between any two vehicles operating with fixed routes and schedules.*

n. Travel for public transit passengers should be reasonable in comparison to travel by private automobile for trips made between component parts of the service area. Transit travel distances and times should not be more than 1.5 times longer than with the automobile travel for comparable trips.

o. Transit service as provided by express and local public transit routes should be provided at intervals of no more than one-half mile in all high and medium density residential areas and at intervals of no more than one-quarter mile in central business districts.

p. Public transit stops should be located and designed to minimize walking distance to and from major trip generators; to provide protection from inclement weather; to promote ready access by feeder bus service where appropriate; and to provide, to the greatest extent practicable, modal interface with other forms of personal and public transportation service.

q. Paratransit service for disabled individuals should be available as a complement to the fixed route bus and demand-responsive public transit services provided within the Region in accordance with the requirements of the Americans with Disabilities Act of 1990.

r. All arterial streets and highway in existing and planned transit service areas should provide accommodations for existing and planned public transit services.

3. BICYCLE AND PEDESTRIAN FACILITIES

a. All arterial streets and highways (including their bridge and underpass facilities) except freeways should provide accommodation for bicyclists upon construction or reconstruction, or—for arterial facilities having a rural cross-section—if possible, when resurfaced. On two-lane streets and highways having a rural cross-section, a four feet paved shoulder with a 6 feet graded shoulder is desirable, and on four lane rural highways an eight feet paved shoulder is desirable. On streets and highways having an urban cross-section, accommodation may be provided through bicycle lanes of 5 to 6 feet in width, or through provision of widened outside travel lanes. The outside travel lane should have a minimum usable width of 14 feet. On streets and highways without parking lanes, the usable lane width should be measured from the inside edge of the lane to the edge of the gutter section. The provision of a physically separate bicycle path (one-way width of 5 to 6 feet and two-way width of 8 to 12 feet with separation from highway of 10 feet) should be considered if the above accommodation cannot be provided and/or the following criteria are generally met:

1. More than four travel lanes for motor vehicles;
2. Average weekday motor-vehicle traffic includes more than 10 percent heavy trucks and buses;
3. Grades in excess of 5 percent for segments of more than 500 feet in length;
4. More than 30 public street intersections or commercial driveways per mile;
5. Motor-vehicle operating speeds exceed 35 miles per hour;
6. Average weekday traffic volumes exceed arterial design capacity, and result in traffic congestion.

As an alternative, the designation of bicycle routes on parallel collector or land access streets may be considered. Bicyclists should be accommodated either on-street or on a parallel collector or land access street, particularly if there are 30 or more street intersections or commercial driveways per mile.

b. A regional system of off-street bicycle paths should be provided in accordance with the recommendations set forth in the adopted park and open space plans for each of the seven counties in the Region. These off-street bicycle paths should provide reasonably direct connections between the urban areas and communities of the Region on safe and aesthetically attractive routes with separation from motor vehicle traffic. Support facilities such as restrooms, drinking fountains, and information kiosks should be provided along off-street bicycle paths and hiking trails at intervals of no more than 15 miles.

c. Sidewalks should be provided in areas of urban development of the Region as follows:

Roadway Functional Classification	Land Use	New Streets	Existing Streets
Arterial Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential	Both Sides	Both Sides
Collector Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential	Both Sides	At least one side
Land Access Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential (medium-and high-density)	Both Sides	At least one side
	Residential (low density)	At least one side	At least one side

- Sidewalks may be omitted on one side of streets where there are no existing or anticipated uses that would generate pedestrian trips on that side.
- Where there are marginal access control or service roads, the sidewalk along the main road may be eliminated and replaced by a sidewalk along the service road on the side away from the main road.
- Sidewalks need not be provided along court and cul-de-sac streets less than 600 feet in length, unless such streets serve multi-family development; or along streets served by parallel off-street walkways.
- In low density residential cluster developments, sidewalks could be replaced by perimeter and internal pathway systems.

d. All transit stations should be readily accessible by bicyclists and pedestrians. All transit stops should be served by sidewalks or walkways.

e. Secure bicycle parking should be provided at all park-ride lots and where off-street parking is provided or where parking demand is met by on-street parking. Bicycle parking should be provided at the entrance to buildings.

f. Provision for transporting bicycles on transit vehicles should be considered.

OBJECTIVE NO. 4

A multi-modal transportation system which minimizes disruption of existing neighborhood and community development, including adverse affects upon the property tax base.

PRINCIPLE

The social and economic costs attendant to the disruption and dislocation of homes, businesses, industries, and communication and utility facilities as well as the adverse affects on the natural resource base can be minimized through the proper location, design, and operation of transportation facilities and terminals.

STANDARDS

1. The dislocation of households, businesses, industries, and public and institutional buildings caused by the reconstruction of existing or the construction of new transportation facilities and terminals should be minimized.

2. The total amount of land used for transportation facilities and terminals should be minimized.

3. The reduction of the property tax base caused by the reconstruction of existing or the construction of new transportation facilities and terminals should be minimized.

4. The penetration of neighborhood units and of neighborhood facility service areas by arterial streets and highways and rapid transit routes should be minimized.

5. The destruction of historic buildings and of historic, scenic, scientific, archaeological, and cultural sites caused by the reconstruction of existing or the construction of planned transportation facilities and terminals should be minimized.

6. The proper use of land for, and adjacent to, transportation facilities should be maximized and the disruption of future development minimized through advance reservation of rights-of-way for transportation facilities.

7. Transportation facility construction plans should be developed which use sound geometric, structural, and landscape design standards which consider the aesthetic quality of the transportation facilities and the areas through which they pass and which consider any environmental enhancement activities likely to be required.

8. Transportation facilities should be so located as to avoid destruction of visually pleasing buildings, structures, and natural features and to enhance vistas to such features.

OBJECTIVE NO. 5

A multi-modal transportation system which serves to protect the overall quality of the natural environment.

PRINCIPLE

Adverse effects on the natural environment, air pollution, water pollution, and the loss of natural habitat and biological diversity should be minimized through the proper location, design, and operation of the transportation system.

STANDARDS

1. The location of transportation facilities in or through primary environmental corridors, particularly through the woodland and wetland portions of such corridors, should be minimized along with impacts on secondary environmental corridors and isolated natural resource areas.

2. The amount of air pollutants emitted through the operation of the transportation system should be minimized, and should be less than the emission budgets in the State Implementation Plan for air quality.

3. The loss of prime agricultural farmland as defined by Class I and II soils to transportation facility construction should be minimized.

4. The location of transportation facilities in or through State, county, or municipal park lands should be minimized.

5. The location of transportation facilities in or through the Region's natural areas, critical species habitat areas, and geological and archeological areas should be minimized.

6. Total vehicle–miles of travel should be minimized.

7. The location of transportation facilities—other than bicycle and pedestrian facilities—in or through Wisconsin Department of Natural Resources managed lands, Wisconsin Department of Natural Resources land legacy places, and lands protected by land trusts and other non-profit natural resource conservation organizations should be minimized.

8. The increase in impervious surface area attendant to improvement and expansion of the transportation system should be minimized.

9. Arterial street and highway system corridors should be considered for the location of major utility facilities—electrical transmission, communication, major pipeline—to the extent practical as those utility facilities are expanded and upgraded.

OBJECTIVE NO. 6

A multi-modal transportation system which facilitates the convenient and efficient movement of people and goods between component parts of the Region.

PRINCIPLE

To support and enhance the Region's economy and a high quality of life within the Region, a transportation system which provides for reasonably fast, convenient travel is essential. In corridors of high travel demand, traffic congestion can result in travel delays, traffic accidents, and uncertainty of travel times, as well as, excessive air pollutant emissions, and unnecessary motor fuel consumption. Traffic congestion increases the costs of transportation and can adversely affect the attractiveness of an area for residential use and for the location and operation of businesses and industries.

STANDARDS

1. Total passenger-hours of travel, by highway and public transit modes, within the Region should be minimized.

2. The average travel time of highway and transit travel should be minimized.

3. Highway transportation facilities should be located and designed so as to provide adequate capacity, minimizing traffic congestion and attendant impacts.

4. The transportation system should provide service by highway within the urbanized areas of the Region so that residents of an urbanized area are:

    a. within 30 minutes overall travel time[f] through travel by personal vehicle on the arterial street and highway system of 40 percent of that urbanized area's jobs;

    b. within 35 minutes overall travel time by personal vehicle of 3 of the major retail centers in the Milwaukee urbanized area and 1 major retail center in the Kenosha and Racine urbanized areas;

    c. within 30 minutes overall travel time by personal vehicle of a hospital;

    d. within 40 minutes overall travel time by personal vehicle of a major park or outdoor recreation area;

    e. within 40 minutes overall travel time by personal vehicle of a technical college and university; and

    g. within 60 minutes overall travel time by personal vehicle of General Mitchell International Airport.

5. The transportation system should provide service by public transit modes within each urbanized area of the Region so that residents of the transit service area of an urbanized area are:

    a. within 45 minutes overall travel time through travel on the public transit system of 40 percent of that transit service area's jobs;

    b. within 35 minutes overall travel time by public transit of 3 of the major retail centers in the Milwaukee urbanized area and 1 major retail center in the Kenosha and Racine urbanized areas;

    c. within 30 minutes overall travel time by public transit of a hospital;

    d. within 40 minutes overall travel time by public transit of major park or outdoor recreation area;

    e. within 40 minutes overall travel time by public transit of a technical college and university; and

    f. within 60 minutes overall travel time by public transit of General Mitchell International Airport.

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[f] *Overall travel time is defined as the total door-to-door time of travel from origin to destination, including the time required to arrive at the vehicle and leave the vehicle as well as over-the-road travel time.*

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OBJECTIVE NO. 7

A multi-modal transportation system which reduces accident exposure and provides for increased travel safety.

PRINCIPLE

Accidents take a heavy toll in life, property damage, and human suffering; contribute to overall transportation costs; and increase public costs for police, emergency medical services, and other social services. Therefore, every attempt should be made to reduce both the incidence and severity of accidents.

STANDARDS

1. Travel on facilities and services which exhibit the lowest accident exposure should be maximized.

2. Traffic congestion and attendant vehicle safety problems should be reduced.

OBJECTIVE NO. 8

A multi-modal transportation system which minimizes the amount of energy consumed, especially nonrenewable energy sources such as fossil fuels.

PRINCIPLE

The environmental costs attendant to the widespread consumption, as well the mining, drilling, and transport, of fossil fuels used in the operation of the transportation system can include air and water pollution and the despoiling of natural land- and water-based wildlife habitats. The long-term efficiency of the transportation system depends on the conservation of existing nonrenewable energy sources and the increased application of renewable energy sources to fuel transportation.

STANDARDS

1. The total amount of nonrenewable energy consumed in the operation of the transportation system, particularly petroleum-based fuels, should be minimized.

Source: SEWRPC.

Chapter VIII

REGIONAL TRANSPORTATION PLAN DEVELOPMENT AND EVALUATION

INTRODUCTION

This chapter documents the development and evaluation of a new regional transportation system plan for southeastern Wisconsin looking forward to the year 2035. The development and evaluation of the new transportation plan is guided by the Commission's basic principles for regional transportation planning as set forth in Chapter I of this report, and the Commission's adopted transportation planning objectives set forth in Chapter VII.

The objectives, when combined, provide the following vision for the transportation system of southeastern Wisconsin:

> A multimodal transportation system with high quality public transit, bicycle and pedestrian, and arterial street and highway elements which add to the quality of life of Region residents and support, and promote expansion of, the Region's economy, by providing for convenient, efficient, and safe travel by each mode, while protecting the quality of the Region's natural environment, minimizing disruption of both the natural and manmade environment, and serving to support implementation of the regional land use plan, while minimizing the capital and annual operating costs of the transportation system.

The Commission's transportation planning principles support and enhance this vision. Principles supporting this vision call for the regional transportation plan to be designed to serve, and to be consistent with, the regional land use plan, and for the transportation system to have minimum impacts on the Region's limited natural resource base. Principles adding to this vision include a principle which calls for highway facilities, transit facilities, bicycle and pedestrian facilities, and travel demand and transportation systems management measures to be planned together, and quantitatively tested and evaluated.[1] Specifically, the potential of transit facilities, bicycle

[1] *The U.S. Department of Energy in December 2005 forecast that motor fuel in the year 2030 will cost $2.19 per gallon, in year 2004 dollars. The motor fuel cost utilized by Commission staff during the testing and evaluation of year 2035 transportation system alternatives was based upon the U.S. Department of Energy forecast, and for the year 2035 was $2.30 per gallon in year 2005 dollars. Assuming about 2 percent annual inflation, as has occurred over the last 10 years, the price per gallon of motor fuel would be about $4.20 in the year 2035. The forecast motor fuel efficiency utilized in the testing and evaluation of transportation system alternatives in the year 2035 was 30 miles per gallon (See Appendix C).*

and pedestrian facilities, and travel demand and transportation systems management measures to address highway traffic volume and congestion is to be first quantitatively tested and determined, and only then are highway improvements to be considered to address highway traffic volumes and congestion which may not be expected to be alleviated by transit facilities, bicycle and pedestrian facilities, or travel demand and transportation systems management measures. Another principle which adds to this vision is one which recognizes the cyclical nature of the regional land use and transportation planning process, alternating between areawide system planning and local project planning. Under this concept, transportation-related proposals are initially advanced at the areawide systems level of planning and then an attempt is made to implement the proposals through local project planning and preliminary engineering. If, for whatever reasons, a particular transportation facility construction or management proposal advanced at the areawide systems planning level cannot be implemented at the project level, that determination is to be taken into account in the next cycle of systems planning.

The development of the regional transportation system plan for the year 2035, as documented in the following sections of this chapter, is consistent with this vision, and the supporting objectives and principles. First, the development of the new year 2035 plan builds upon the current adopted year 2020 regional transportation plan, recognizing the cyclical nature of the regional transportation planning and implementation process. The development of the year 2035 plan explicitly considers the record of implementation of the year 2020 plan as documented in Chapter II of this report. Approximately 15 to 20 percent of the plan has been implemented with respect to public transit, bicycle and pedestrian, and arterial street and highway systems elements. In particular, the development of the year 2035 regional transportation system plan will address those year 2020 plan proposals which were considered in project planning and engineering, but could not be implemented at the project level. The development of the year 2035 regional transportation system plan will also consider the support and opposition which has been offered on the recommendations of the current adopted year 2020 regional transportation system plan. This includes comments received at the outset of this year 2035 planning process at the initial set of public meetings and during the initial comment period. During that initial comment period, the comments received in opposition to the year 2020 plan were directed at a limited number of specific surface arterial street widening and extension projects, and the proposed widening upon reconstruction of 127 miles of freeways within southeastern Wisconsin, and particularly 19 miles located within the City of Milwaukee.

Second, the new year 2035 regional transportation system plan will be designed to serve, and to be consistent with, the year 2035 regional land use plan. All future needs for transit, street and highway, and other transportation improvements considered in the regional transportation planning process will be derived from the future growth proposed in, and the projected travel derived from, the regional land use plan. In addition, the consistency of the regional transportation and land use plans will be evaluated by comparing the accessibility provided under the transportation plan and the location of improvements proposed under the transportation plan to the location of land use development and redevelopment proposed under the land use plan.

Third, the development of the year 2035 regional transportation plan will begin with consideration of the travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements of the plan. These four plan elements will be considered and developed and quantitatively tested and evaluated with respect to their travel impacts prior to any consideration given to arterial street and highway system improvement and expansion. At the conclusion of consideration and development of the travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements of the regional transportation plan, the effects on travel of a regional transportation plan alternative including these four combined plan elements will be tested and evaluated, and compared to that of a no-build plan which would propose to maintain the existing transportation system.

The fourth step in the year 2035 regional transportation system plan development process involves the consideration of arterial street and highway system improvement and expansion. Arterial street and highway improvement and expansion will be considered to address the residual highway traffic volume and traffic congestion which may not be expected to be alleviated by the plan's other elements of travel demand management, transportation systems management, bicycle and pedestrian actions, and public transit improvement

and expansion. As part of this consideration, a regional transportation plan alternative incorporating arterial street and highway system improvement and expansion, as well as travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements, will be compared and contrasted to a plan which only includes travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements, and a no-build transportation system plan. The results of this evaluation will lead to the development of preliminary recommended and final recommended regional transportation plans for the year 2035 as documented in Chapter IX of this report.

The next sections of this chapter present consideration and development of the travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements of the year 2035 plan. Following the consideration and development of each of those four elements is a presentation of the results of an evaluation of a year 2035 regional transportation plan alternative which would include only those four elements, and a comparison of that plan alternative to a no-build transportation plan alternative. The next section of the chapter considers arterial street and highway system improvement and expansion to address highway traffic and volume and congestion which may not be expected to be fully addressed by a plan solely comprised of travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements. A plan with all five elements, including arterial street and highway system improvement and expansion, is then quantitatively tested and evaluated and compared to a plan alternative which would not include highway improvement and expansion, and a no-build transportation system plan. This chapter concludes with a discussion of the results of this testing and evaluation and of a series of recommendations included in Chapter IX, which presents preliminary and final recommended regional transportation plans for the year 2035.

TRAVEL DEMAND MANAGEMENT

Travel demand management refers to a series of measures or strategies which are intended to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing capacity of the transportation system. The general intent of such measures, in combination with public transit, pedestrian and bicycle, and arterial street and highway improvements, is to reduce traffic volume and congestion, and attendant air pollutant emissions and fuel consumption. While improvements to the public transit, pedestrian and bicycle, and park-ride lot components of the regional transportation system plan are components of travel demand management, they will not be discussed in this section. Public transit, pedestrian and bicycle, and park-ride lot improvement and expansion are addressed as individual elements of the regional transportation system plan in later sections of this chapter.

The achievement of the regional transportation system development objectives through the use of demand management depends on four factors: 1) the degree to which the appropriate variables influencing travel demand are identified for management; 2) the degree to which travel demand management measures may be combined into coherent packages; 3) the degree to which travel demand management measures are integrated with public transit, pedestrian and bicycle, and arterial street and highway improvements; and 4) the extent to which demand management measures are practicable and implementable.

Many variables influence individual travel behavior, as described in detail in previous chapters of this report. These variables can generally be divided into three categories: the characteristics of the transportation system, the characteristics of the travelers, and the physical and temporal distribution of human activities as reflected in the land use pattern. In designing travel demand management measures it is essential that only those variables amenable to control, in the context of the Southeastern Wisconsin Region, be identified for management. Household income, for example, is a variable characteristic of travelers which influences individual travel behavior and demand. Household income, however, is not practicably amenable to control by measures that seek to change travel behavior. Measures that seek to manage other variables that influence travel demand, such as travel time or costs, may prove more practicable.

The second factor crucial to the successful design and implementation of travel demand management is the degree to which measures are combined into coherent, and possibly synergistic, packages. The impact on highway use and traffic congestion may be minimal, for instance, if only a single measure, such as congestion pricing, is implemented. Should such a single measure be advanced in the absence of complementary strategies, commuters may not make intended shifts to alternative modes but, instead, may simply select alternative highway routes, shifting congestion to other routes without impacting vehicle-miles traveled. Combining measures may enhance the chances of achieving intended results. The impact of travel demand management is enhanced when a variety of coordinated measures are considered.

The third factor to be considered in the design of travel demand management measures is the degree to which such measures are integrated with public transit, pedestrian and bicycle facilities, and arterial street and highway improvements. Because travel demand management consists largely of measures intended to affect individual travel behavior, alternative means of transportation should be available that can effectively and efficiently serve the altered behavioral patterns. Where such alternatives are not provided, demand management may be perceived simply as an attempt to restrict mobility.

Finally, the importance of setting must be understood. Any demand management measure proposed must be practicable, technically and politically, within the complex governmental setting presented by a large metropolitan region.

Year 2020 Plan Travel Demand Management
Element Recommendations and Implementation

In the year 2020 regional transportation plan, recommended travel demand management actions included:

- Areawide expansion of ramp-meters at freeway system on-ramps and provision of high occupancy vehicle preferential access at metered on-ramps.
- Enhancement of transit service through preferential treatment, including traffic signal priority and reserved surface arterial street lanes, and through reduced transit fare pricing structures including reduced price annual and monthly passes.
- Conduct of a regionwide travel demand management program to promote alternatives to drive alone automobile travel, including ridesharing, public transit, bicycling, walking, and telecommuting. This program was envisioned as an expansion of an existing ridesharing promotion and matching program, and would include a rideshare matching element.
- Conduct of a regionwide public transit marketing and public information and education program.
- Preparation and implementation by local units of government of detailed, site-specific neighborhood land use plans as recommended in the adopted regional land use plan, to provide within each neighborhood a full range of housing types and lot sizes; those public and semipublic facilities needed by the household in the vicinity of its dwelling, such as a public elementary school, local park, and local shopping facilities; convenient and reasonably direct access to the arterial street and public transit system as a means of access to those activities located outside the neighborhood unit; and convenient and reasonably direct pedestrian, bicycle, and vehicle access within the neighborhood. A purpose of this recommendation is to encourage some daily travel to occur entirely within a neighborhood, and to encourage such travel within and outside the neighborhood to occur by alternatives to automobile.

As discussed in Chapter II of this report, there has been some implementation of these travel demand management actions recommended in the year 2020 plan completed in 1997. With respect to freeway system high-occupancy vehicle preferential access, most freeway on-ramps in the Milwaukee area –120– are metered and 63 of these 120 metered on-ramps have high-occupancy vehicle preferential access. With respect to other public transit preferential treatment, one reserved bus lane of about 5.4 miles in length exists in Waukesha County on Bluemound Road. With respect to travel demand management promotion, the Wisconsin Department of

Transportation continues to operate a rideshare promotion and matching program, and the Wisconsin Partners for Clean Air and the Wisconsin Department of Natural Resources operate a program to promote alternatives to the automobile during the summer ozone season. Also, the Milwaukee County Transit System operates a vanpool program with about 20 vans. With respect to transit pricing strategies, Milwaukee County Transit System has implemented a pass system at four colleges and universities which provides for free transit use with a reduced fee included in student tuition and fees. Milwaukee County Transit System also works with 110 employers to offer Federal and state tax free purchase of weekly passes and fare tickets with joint transit system and employer discounts. With respect to public transit marketing information and education, the transit operators of the Region jointly conduct a program funded with Federal Highway Administration Congestion Mitigation and Air Quality Improvement Program funds. Lastly, with respect to neighborhood design planning and implementation, a small but increasing number of local units of government have prepared, or are preparing, neighborhood and other subarea land use plans.

Alternative Travel Demand Management Actions

Table 99 sets forth a description of the range of possible travel demand management measures and a qualitative assessment of the potential impacts of each measure on vehicle trips and vehicle-miles traveled, along with an assessment of the current potential for such measures to be implemented. Five categories of measures are considered including: pricing, parking control, land use, work-schedule changes, and other measures. Some of the travel demand management measures outlined in Table 99 have been implemented in southeastern Wisconsin. These implemented travel demand management measures serve as a foundation from which future travel demand management measure implementation can build upon. Any future travel demand management measure implementation should be complementary to, and supportive of, existing travel demand management measures. Travel demand management measures may have a greater impact on personal and vehicular travel if they are carried out as coordinated and combined efforts.

Pricing Measures

Potential pricing measures include "cash-out" of employer-paid parking, pay-as-you-drive automobile insurance, road pricing, area pricing, parking pricing, graduated registration fees, fuel taxes, and Employee Commute Option (ECO) pass programs. These measures—with exception of the ECO pass—would place more of the full costs of construction, maintenance, and operation of streets and highways directly on the user at the time of use and encourage the user to more closely evaluate travel choices and to adjust travel behavior. Road congestion pricing, for example, assigns costs to the users of congested highway facilities, encouraging use of alternative modes, routes, and travel during other times of the day.

Experience with congestion pricing in Europe and Asia has shown that reductions in vehicle-miles traveled, traffic congestion, and motor vehicle emissions may be effected. Technological advances have made congestion pricing feasible in the United States, and parts of the United States have begun implementing congestion pricing measures. Most congestion pricing in the United States involves electronic tolling of new freeway lanes.

Other measures that directly increase the cost of vehicle operation can affect travel behavior. Commission analysis of the utilization of park-ride parking and public transit ridership has indicated that both carpooling and transit use increased during the mid 1970s and late 1970s and early 1980s as motor fuel prices increased. Indeed, Commission findings indicated that the major factor contributing to the transit ridership increases of 1979 and 1980 was the increase in gasoline prices.[2] Conversely, the decline in gasoline prices following 1981 contributed to reductions in transit ridership. Since the cost of travel significantly influences travel behavior and is within the purview of governmental action to affect, the cost of travel constitutes a viable variable to consider.

[2] See SEWRPC Memorandum Report No. 7, *Public Transit Ridership Trends in Southeastern Wisconsin: 1975-1986,* May 1987.

Table 99

TRANSPORTATION SYSTEM DEMAND MANAGEMENT MEASURES POTENTIALLY APPLICABLE TO THE SOUTHEASTERN WISCONSIN REGION

Demand Management		Description	Potential Impact On Vehicle Trips and Vehicle-Miles Traveled	Probability of Implementation
Category	Specific Measure			
Pricing	Cash-out of employer-paid parking	Require employers providing free/subsidized parking to employees to charge their employees the market value of parking, offsetting the additional cost of parking through cash payment or salary increase to employees.	Potential reduction in vehicle trips through increased use of transit, ridesharing, walking, and bicycling, as some employees may "pocket" cash payment and use other mode of travel.	Minimal for government mandate and low for voluntary implementation by employers.
	Pay-as-you-drive auto insurance	Require paying portion of automobile insurance premiums by per-gallon insurance fee collected at the pump. Recognize that portion of risk is related to vehicle use.	Potential reduction in vehicle-miles of travel.	Low. High degree of resistance by insurance companies, retail fuel dealers, and the general public; potential to purchase cheaper fuel in nonparticipating adjacent jurisdictions.
	Public sector parking pricing	Local and county governments can alter the price of off-street parking to discourage long-term commuter-related parking and encourage use of other modes.	Limited potential reduction in single-occupancy work-related vehicle trips.	Low. Does not affect cost of parking provided in private sector; potential adverse effect on land use in higher density activity centers.
	Parking excise tax	A State or local parking excise tax would be imposed on all parking spaces. The tax could be increased incrementally and revenues could be used to defray the cost of transportation services.	Potential reduction in vehicle trips and vehicle-miles of travel if the parking excise tax is translated to fees charged for parking at the end of each vehicle trip.	Low. Potential high degree of resistance from the general public.
	Parking pricing	A charge would be levied through use of Intelligent Vehicle Highway System (IVHS)-related electronic "smartcards." Low-cost sensors which interact with in-vehicle smart cards would be installed on the public right-of-way which abuts driveways to shopping and other activity centers to enable the imposition of modest trip destination parking charges. Charges could vary depending on location and time of day.	Potential reduction in vehicle-miles of travel and nonwork vehicle trips.	Low. Potential high degree of resistance from the general public.
	Road pricing	Users of designated or all highway segments charged a fee; fees may vary according to time of day and congestion levels.	Potential reduction in vehicle-miles of travel if alternative routes are not attractive.	Low. High degree of resistance from general public; potential adverse effect of congestion pricing on land use in higher density activity centers.
	Area pricing	Personal vehicles entering designated areas would be required to purchase a permit. Permit fees may vary by time of day, ambient air quality conditions, and traffic congestion levels.	Potential for significant reductions in vehicle trips to and within designated areas.	Low. Enforcement difficulty; potential adverse effects on land use in higher density activity centers.

Table 99 (continued)

Demand Management		Description	Potential Impact On Vehicle Trips and Vehicle-Miles Traveled	Probability of Implementation
Category	Specific Measure			
Pricing (continued)	Graduated registration fees	A graduated registration fee related to annual miles traveled and vehicle emission production. This is an alternative user fee to the motor fuel tax or road pricing.	Potential reduction in trip-making and vehicle-miles of travel.	Low. This measure would require State legislative action to implement.
	Motor fuel tax	Per gallon tax. Increase would attempt to place more costs of transportation directly on the user.	Potential reduction in trip-making and vehicle-miles of travel.	Low. The measure would require Federal or State legislative action to implement.
	Employee commuter option (ECO) pass systems and other transit system pass programs	The ECO pass is a program allowing employers and institutions to offer low-cost annual bus passes as a benefit to their employees and students. The pass would also include a guaranteed ride home in the event an employee works late or encounters a personal emergency. The cost of the program varies by the employer's location, number of employees, and level of transit service. There are similar transit system pass programs in which employers offer free/subsidized weekly or monthly transit passes or certificates to employees.	Potential reduction in trip-making and vehicle-miles of travel as the cost of transit is reduced.	Medium. The Milwaukee County Transit System has implemented a pass system at four colleges and universities which provides for free transit use with a reduced fee included in student tuition and fees. Monthly and weekly transit system pass and certificate programs currently exist in the Region. There are approximately 110 employers participating in Milwaukee County Transit System's commuter value pass and/or commuter value certificate programs, three employers participating in a City of Racine Belle Urban System pass program, and five employers participating in a City of Waukesha Metro Transit pass program.
Parking Control Measures	Parking management; control of parking supply	The use of local zoning regulations to limit the number of parking spaces provided for new development; the number of spaces provided may be varied depending on the location of the development and alternative transportation options provided to the property.	Potential reduction in vehicle trips.	Low. Some municipal governments in southeastern Wisconsin have implemented local ordinances varying the number of parking spaces provided depending on alternative transportation options to the property and amount of employee carpools.
	Preferential parking for carpools and vanpools	Reservation of most convenient parking spaces for carpool and vanpool vehicles.	Potential reduction in vehicle trips by encouraging ridesharing.	Medium. Some employers within the region are providing preferential parking for carpools and vanpools.
Land Use Measures	Major activity center and neighborhood planning	Use of zoning, official mapping, subdivision control, site plan review, and permitting to achieve urban design that reduces dependence on automobile; provide good circulation systems for bicyclists and pedestrians and associated amenities, a mix of land use activities, higher residential densities, and public transit access.	Potential reduction in vehicle trips and vehicle-miles of travel.	Medium. Some municipal governments in southeastern Wisconsin have recognized in their planning and land use regulations the desirability of mixed land uses; the need for improved internal circulation; the desirability of higher development densities; and the need for improved transit access.
	Growth management	Land use regulations can be used to direct the extent, timing, rate, and location of new urban development in accord with the adopted regional land use plan.	Potential reduction in vehicle trips and vehicle-miles of travel.	Medium to High. Some municipal governments in southeastern Wisconsin have regulated land use in accord with the adopted regional land use plan.

Table 99 (continued)

Demand Management		Description	Potential Impact On Vehicle Trips and Vehicle-Miles Traveled	Probability of Implementation
Category	Specific Measure			
Work Schedule Changes	Telecommuting	Employees work at remote locations and avoid trip to central office. The telecommuting office could be at home, at a satellite work center, or a neighborhood work center.	Potential reduction in vehicle trips and vehicle-miles of travel.	Low. Some employers within the Region are providing telecommute options for their employees.
	Flextime and compressed work week	Flextime allows employees to set work starting and ending times to avoid peak-period congestion and to coordinate with transit scheduling. A compressed work week allows employees to work fewer days per week.	Potential reduction in vehicle trips made during peak hours; may increase off-peak vehicle trips and vehicle-miles of travel.	Low. Some employers within the Region allow employees to work flextime or compressed work week schedules.
Other	Trip-reduction ordinance	Regulations promoting employer efforts to reduce the number of single occupancy vehicle trips made by employees; ordinances may permit increased densities in return for measures to reduce vehicle tripmaking.	Potential reduction in tripmaking and vehicle-miles of travel.	Low. No trip-reduction ordinances currently exist in southeastern Wisconsin. Employer trip reduction programs were a requirement for severe and extreme ozone nonattainment areas for large employers as part of the Clean Air Act Amendments of 1990 (CAAA). The State of Wisconsin enacted Chapter NR 486, *Employee Commute Option Programs*, of the Wisconsin Administrative Code to implement these programs. However, the CAAA were amended in 1995 to make the employer trip reduction program requirement a voluntary option for states to adopt. In Wisconsin, the Governor suspended enforcement of NR 486 in 1996. The failure of mandatory employer trip reduction programs to be implemented as part of the CAAA is an indication of the lack of wide support for this type of measure.
	Areawide rideshare	Public coordination of private efforts to encourage ridesharing.	Limited potential reduction in vehicle trips and vehicle-miles of travel.	High. The Wisconsin Department of Transportation currently coordinates an areawide rideshare match program.
	Transportation management associations	Promotion of geographically related transportation demand management measures; associations may be policy- and/or service-oriented.	Limited potential reduction in vehicle trips and vehicle-miles of travel.	Medium. Transportation management associations currently exist within the Region.
	Education/ marketing/ promotion	Measures to heighten public interest and knowledge of the Region's transportation and air quality problems to promote responsible trip-making and reduce single occupancy travel. Possible measures include expanded driver education, increased driver license educational requirements, and regular public service announcements.	Limited potential to reduce vehicle trips and vehicle-miles of travel.	High. Various educational and marketing programs exist in the Region to make commuters aware of air quality conditions and to reduce single-occupancy vehicle travel.
	Advanced traveler information systems	Provide traveler information regarding transit departures, arrivals, ride-matching, and specialized services designed to help system users better structure their time and reduce waiting time.	Limited potential reduction in vehicle trips and vehicle-miles of travel.	High. There have been discussions about providing real-time transit departure and arrival time information at locations in the City of Milwaukee. Current real-time traffic congestion conditions on the regional freeway system can be viewed through the Wisconsin Department of Transportation web site.

Table 99 (continued)

Demand Management		Description	Potential Impact On Vehicle Trips and Vehicle-Miles Traveled	Probability of Implementation
Category	Specific Measure			
Other (continued)	Shower/Locker facilities	Provision of secure shower and locker facilities for each gender at employment sites.	Limited potential reduction in work related vehicle trips and vehicle-miles of travel through increased use of pedestrian and bicycle modes.	Low. Some employers provide shower/locker facilities for employee use. Impacts may be limited to seasonal use.
	Bicycle racks/lockers	Provision of bicycle racks and lockers for users to secure their bicycles in an enclosed facility.	Limited potential reduction in vehicle trips and vehicle-miles of travel through increased use of bicycle travel.	Medium. Bicycle racks/lockers are provided at various locations throughout the Region. Impacts may be limited to seasonal use.
	High-occupancy vehicle priority	Provision of priority systems to allow carpools, vanpools, and transit vehicles to bypass queues, specifically at single occupancy vehicle ramp-meter locations. Also, provision of priority systems to allow transit vehicles to extend the "green-time" of traffic signals to reduce transit travel times and to improve transit travel time reliability.	Limited potential reduction in single-occupancy vehicle trips.	High. Priority systems to allow high-occupancy vehicles to bypass queues at ramp-meter locations currently exist at 63 of the 120 ramp-meter locations in the region. Transit vehicle priority systems are being considered in southeastern Wisconsin as well.

Source: SEWRPC.

Parking Measures

Table 99 identifies three parking management measures: control of parking supply, preferential parking for high-occupancy vehicles, and central business district (CBD)-fringe park-ride facilities. Vehicle parking management has long been recognized by the Commission as a measure capable of reducing work related vehicle travel and increasing transit ridership. The second-generation regional transportation system plan adopted by the Commission in 1978 recommended that the City of Milwaukee evaluate the effects of changing the parking rate structure in the CBD to eliminate discounts for long-term parking. The parking measures listed in Table 99 focus on managing the amount of parking provided through the use of land use regulation and the provision of preferential parking for high-occupancy vehicles.

Land Use Measures

Table 99 identifies land use-related travel demand management measures intended to reduce vehicle-miles of travel, vehicle trips, and average trip lengths by reducing the need for vehicular travel and enhancing alternatives to the use of a personal vehicle. Since land use development practices influence travel behavior and fall within the legal purview of local government, land use development is a variable that should be managed to achieve transportation system development objectives.

The land use-related measures set forth in Table 99 are divided into two categories: growth management and land use site design. Growth management refers to the use of land use regulation to direct the type, extent, location, timing, and rate of urban development within the Region. In its most basic sense, within the context of the regional transportation planning effort, growth management constitutes a policy framework designed to facilitate the implementation of the adopted regional land use plan. Within the Region, appropriate growth management policy would encourage urban development to occur only in areas suitable and planned for such development, within sanitary sewer and public transit service areas in particular, and only when necessary supporting facilities and services were in place.

The second category, land use site design, emphasizes the enforcement of local land development regulations, within existing and planned public transit service areas in particular, to encourage mixed-use urban development, integrated pedestrian and bicycle circulation systems, and to promote residential densities that permit the efficient provision of urban services such as public transit. Such measures are intended to promote urban settlement patterns that are amenable to the provision of public transit service, especially within existing and planned transit corridors. Conventional land development practices and regulations within much of the Region have promoted large, single-use office parks, shopping centers, and residential subdivisions well served only by highway transportation. Personal travel to, and within, such development is, as a practical matter, largely limited to automobiles.

Work Schedule Changes

As shown in Table 99 some changes in work scheduling, such as telecommuting, flextime, and compressed work weeks, have limited potential for managing travel demand. Such changes are becoming more feasible with certain technological and organizational changes. Advances in telecommunications and computers, structural changes in the economy, and increasing employee demands for quality-of-life benefits are making the typical five-day-weekly commute unnecessary for some employees and are redefining managerial-employee relationships. Accordingly, changes in work schedules and in the travel behavior related to work scheduling may be expected to occur regardless of governmental action, and may be expected to impact travel demand. Reducing work tripmaking, however, does not necessarily result in a reduction in total tripmaking by an individual. Shifting to a four-day work week for example, will reduce by 20 percent the number of work trips. That reduction, however, may be more than offset by increased nonwork tripmaking on the "extra" day off.

Other Measures

The travel demand management measures listed in Table 99 under the heading "other" include: trip reduction ordinances, areawide rideshare programs, transportation management associations, education, marketing, and promotional campaigns, advanced traveler information systems, shower/locker facilities, bicycle racks/lockers, and high-occupancy vehicle priority.

Proposed Year 2035 Plan Travel Demand Management Element

The proposed year 2035 plan travel demand management element will continue to build upon the travel demand management actions recommended in the year 2020 plan which have been implemented to date, as discussed in Chapter II of this report. Six categories of travel demand management measures are proposed for consideration in the year 2035 plan: high-occupancy vehicle preferential treatment, transit pricing, personal vehicle pricing, travel demand management promotion, transit information and marketing, and detailed site-specific neighborhood and major activity center land use plans. The specific travel demand management measures within each of the six categories provide a proposed package of travel demand management measures which collectively may be expected to promote reduction of personal and vehicular travel. As well, the proposed measures may be considered to be feasible. The six categories of proposed travel demand management measures are described in further detail below, indicating the specific measures proposed to be included within each category.

High-Occupancy Vehicle Preferential Treatment

This group of proposed travel demand management measures would attempt to provide preferential treatment for transit vehicles, vanpools, and carpools along the existing surface arterial street and highway system. The proposed preferential treatment category consists of four specific travel demand management measures: the provision of high-occupancy vehicle (HOV) queue bypass lanes at metered freeway on-ramps; reserved bus lanes along congested surface arterial streets and highways; transit priority signal systems; and preferential carpool and vanpool parking.

The provision of HOV queue bypass lanes at metered freeway on-ramps currently exists at 63 of the 120 metered freeway on-ramp locations within the Milwaukee area. The existing HOV queue bypass lanes allow HOVs, currently defined as transit vehicles or passenger vehicles with a minimum of at least two occupants, to bypass single-occupancy vehicle queues at metered freeway on-ramps providing reduced travel time incentives to carpools, vanpools, and transit vehicles. The proposed travel demand measure recommends that consideration be

given to providing HOV bypass lanes at all existing metered freeway on-ramps within the Region, dependent upon right-of-way and on-ramp geometric design constraints, as well as consideration of HOV bypass lanes on all future ramp-meter locations throughout southeastern Wisconsin. For this measure to be truly effective, strict enforcement of HOV bypass lanes may be required.

Reserved bus lanes similar to those along Bluemound Road in Waukesha County allow transit vehicles to bypass vehicle queues attendant to traffic signals on congested arterial streets and highways. These reserved lanes may be expected to reduce transit travel times and improve transit travel time reliability during peak travel periods. This proposed travel demand management measure would expand the use of reserved bus lanes throughout the Region on the congested surface arterial streets and highways which currently, or may be expected in the future, to accommodate express and major local transit routes, and on the surface arterial portion of rapid transit routes. Provision of reserved bus lanes may be accomplished via auxiliary lanes as on Bluemound Road, or where right-of-way is constrained, through peak-period, peak-direction curb parking restrictions.

The third proposed travel demand management measure within the high-occupancy vehicle preferential treatment category is transit priority signal systems. Similar to reserved bus lanes, transit priority signal systems may be expected to allow for reduced transit travel times and improved transit travel time reliability. This proposed measure would allow transit vehicles to extend the end of the green phase of traffic signals as they approach a signalized intersection. This extension of the end of the green phase of the traffic signal may be expected to allow transit vehicles to approach and clear intersections without experiencing the additional travel time delay which would be accrued during the amber and red phases of traffic signal operation. Traffic signal controllers that provide preemption systems for emergency vehicles, railroad operations, or bridge opening operations, can also provide for transit vehicle priority. Transit vehicle priority must be subordinate to all traffic signal preemption, with the activation of emergency vehicle, railroad operation, or bridge opening operation traffic signal preemption system terminating the operation of transit vehicle priority, or preventing the activation of transit vehicle priority. While the functionality to accommodate both preemption systems and transit vehicle priority systems is typically built into state-of-the-art traffic signal controllers, implementation of transit vehicle priority systems would require the installation of the appropriate communications hardware on the transit vehicle and the traffic signal controller. Older traffic signal controllers may need new or upgraded software, or, in some instances, the controllers may need to be upgraded or replaced to accommodate both preemption systems and transit vehicle priority systems. This proposed measure would include transit priority signal systems along all express and major local transit routes, and the surface arterial portion of rapid transit routes within the Region. Transit priority signal systems may be expected to be even more effective when provided complementary to reserved bus lanes, and transit priority signal systems would be proposed along all transit routes providing reserved bus lanes.

The fourth proposed travel demand management measure within the high-occupancy vehicle preferential treatment category is preferential carpool and vanpool parking. This proposed measure would be voluntary and would propose that employers providing free/subsidized parking for their employees consider providing and enforcing preferential parking for those employees who carpool or vanpool to the employment site. This proposed measure may reduce vehicle trips by encouraging ridesharing.

Transit Pricing

This group of proposed travel demand management measures would build upon existing transit pricing programs conducted by the transit operators in the Region. The proposed transit pricing category consists of three specific travel demand management measures: annual transit pass programs, monthly or weekly pass programs, and vanpool programs.

The Milwaukee County Transit System has implemented a pass system at four colleges and universities which provides for free transit use with a reduced fee included in student tuition and fees. This annual transit pass program should be expanded to include the other local public transit operators in the Region and additional colleges and universities within the Region. This annual pass program should also be expanded to employers, with the Region's transit operators negotiating an annual fee with individual employers, which would allow those employers to provide each employee with an annual transit pass. The annual fee may be negotiated based upon

multiple factors, including employer location, number of employees, estimated use of transit, and estimated need to provide additional transit service. This proposed travel demand management measure may be expected to achieve a reduction in vehicle-trips and vehicle-miles of travel by reducing the cost of public transit for students and employees.

A variety of discount pass programs are currently offered by four of the Region's public transit operators—the Kenosha Transit System, the Milwaukee County Transit System, the Racine Belle Urban System, and the Waukesha Metro Transit System—including quarterly, monthly, or weekly passes. In addition to the student passes offered by each of the four transit systems, the Milwaukee County Transit System currently offers weekly passes to the general public and quarterly passes to employees of employers participating in the employee pass program. The Kenosha Transit System, the Belle Urban System, and the Waukesha Metro System currently offer monthly passes to adults. The Kenosha Transit System also currently offers monthly passes to elderly and disabled persons, and Racine's Belle Urban System also currently offers monthly passes to disabled persons.

This proposed quarterly, monthly, or weekly pass program would allow employers to offer their employees discounted passes. Under this proposed measure, the employer and the transit operator would negotiate an agreement in which they both subsidize a portion of the monthly or weekly pass. This proposed travel demand management measure may be expected to achieve a reduction in vehicle-trips and vehicle-miles of travel by reducing the cost of public transit for employees.

The third proposed travel demand management measure within the transit pricing category is expansion of existing vanpool programs. Currently, the Milwaukee County Transit System operates a vanpool program in which a group of employees who live in the same general area split the operation, maintenance, and a portion of the capital costs—currently 20 percent—of a van. Currently, the Milwaukee County Transit System vanpool program requires one end of the work trip to be in Kenosha, Milwaukee, Ozaukee, Racine, Washington, or Waukesha Counties, and that one end of the work trip is outside the regular Milwaukee County Transit System service area. This proposed travel demand management measure would expand the existing vanpool program to include Walworth County. Vanpool programs may be expected to reduce vehicle-trips and vehicle-miles of travel by reducing the cost of commuting to the worksite for those employees enrolled in the vanpool program.

Personal Vehicle Pricing

The proposed personal vehicle pricing group of travel demand management measures would attempt to allocate a larger percentage of the full costs of construction, maintenance, and operation of street and highway facilities and services directly on the users of the system. The proposed personal vehicle pricing category consists of two specific travel demand management measures—cash-out of employer-paid parking and auto pricing.

Cash-out of employee paid parking would propose that employers currently providing free/subsidized parking to employees begin charging their employees the market value of parking. Employers could offset the additional cost of parking through cash payment or salary increases to employees. This proposed measure would also allow employers to subsidize all, or a portion of, the parking costs for employees who carpool or vanpool to the employment site. This proposed measure would potentially reduce vehicle-trips and vehicle-miles of travel through the increased use of transit, ridesharing, walking, and bicycling, as some employees may "pocket" the cash payment and use other modes of travel. There are a number of potential issues associated with this potential travel demand measure that may result in low levels of voluntary implementation by employers. These issues include charging employees for something which had previously been provided at no cost; monitoring to ensure that only those who purchase parking are using the available parking; and the need to provide parking for employees who elect to participate in the cash out option, but then require a space occasionally.

The second proposed travel demand management measure within the personal vehicle pricing category encourages the continued use of user fees to pay the costs of construction, maintenance, and operation of street and highway facilities and services. Currently, user fees primarily include the Federal and State motor fuel tax and vehicle registration fees. These user fees currently fund 100 percent of the costs associated with State highways and about 20 to 25 percent of the costs associated with county and municipal streets and highways. There is

substantial and growing opposition to increases in motor fuel taxes; however, there is merit in having the users of the transportation system paying the actual costs of constructing, maintaining, and operating the transportation system. Travel behavior is affected by the cost of travel, and user fees can encourage the use of alternative modes of travel. In addition, there is the potential in the future for technological advances, such as increased fuel efficiency and alternative fuels, to render the current motor fuel tax obsolete. This proposed travel demand management measure supports the user fee concept including potential increases in motor fuel taxes and consideration of alternative user fees should the revenue generated by the motor fuel tax not cover the costs of constructing, maintaining, and operating a comprehensive, multi-modal, balanced, high quality transportation system in future years. It will be important, however, that these transportation user fees be limited to funding transportation purposes only.

Travel Demand Management Promotion

A regionwide program to aggressively promote transit use, bicycle use, ridesharing, pedestrian travel, telecommuting, and work-time rescheduling, including compressed work weeks continues to be proposed to encourage alternatives to drive alone personal vehicle travel. The program would include education, marketing, and promotion elements.

Transit Information and Marketing

The proposed transit information and marketing category could include a range of activities to be undertaken by the transit agencies in the Region to promote transit use and enhance the quality of transit service. These proposed activities would consist of three specific measures: transit marketing, areawide trip planning, and real-time information.

The transit marketing measure would include the continuation and expansion of the joint marketing efforts of the transit operators within southeastern Wisconsin. Additionally, this measure would propose that the transit agencies also conduct joint research involving emerging technologies which would enhance transit service including innovative fare payment systems which may facilitate intersystem transfers.

The second proposed transit information and marketing measure is areawide trip planning. This proposed measure would include information on a single website in which transit users could access all necessary information for each transit system in southeastern Wisconsin. This proposed measure includes providing such information to transit users as transit schedules and fares. This proposed system would also allow a potential transit user to enter such information as beginning and ending addresses of a desired trip within the Region, and then would display the most feasible transit routing of the desired trip including all fares, transfers, and schedules, even for those trips which may require transfers between two or more transit systems.

The third proposed transit information and marketing measure is real-time information. This proposed measure would utilize global positioning system (GPS) data to provide real-time transit information to transit riders at transit centers and transit stops. Such information may include transit vehicle arrival and departure times, and possible real-time maps, showing where on the route a transit vehicle is currently located.

Implementation of Regional Land Use Plan

Achieving full implementation of the adopted regional land use plan will assist in managing travel demand by directing growth to existing urban centers—particularly the central cities of Milwaukee, Racine, and Kenosha—as infill and redevelopment, and to planned urban growth areas adjacent to these urban centers, and having development occur predominantly at medium and high densities.

Detailed Site-Specific Neighborhood and Major Activity Center Land Use Plans

The preparation and implementation by local governmental units of detailed, site-specific neighborhood and major activity center plans to facilitate travel by transit, bicycle, and pedestrian movement is proposed, as recommended in the regional land use plan. Implementation of neighborhood plans can be achieved through zoning, official mapping, subdivision control, site plan review, and site permitting measures. Some municipal governments in Southeastern Wisconsin have recognized in their planning and land use regulations the

desirability of mixed land uses, the need for improved internal circulation, the desirability of higher development densities, and the need for improved transit access. This proposed measure would be directed at increasing that recognition in municipal planning and land use regulations throughout southeastern Wisconsin.

BICYCLE AND PEDESTRIAN SYSTEMS ELEMENT

The bicycle and pedestrian facilities plan element is intended to provide for safe accommodation of bicycle and pedestrian travel, encourage bicycle and pedestrian travel as an alternative to personal vehicle travel, and to provide modal choice. The year 2020 plan recommended that as the surface arterial street system of 3,300 miles in the Region was resurfaced and reconstructed segment-by-segment, bicycle accommodation should be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened shoulders, and separate bicycle paths. Additionally, the year 2020 plan also recommended development of a network of 575 miles of off-street bicycle and pedestrian paths. Although some existing off-street bicycle and pedestrian facilities are not currently maintained year around thereby limiting those facilities to seasonal use only, as a whole, the system of on-street and off-street bicycle and pedestrian facilities serve as an alternate mode of travel and are an integral part of the Region's multimodal, comprehensive transportation system.

As of 1995, the base year of the year 2020 plan, 134 miles of the planned 575 mile system of off-street paths existed. Since 1995, reasonable progress had been made to implement the planned network of off-street paths. With the 69 miles implemented since 1995, the total network of off-street paths is now 203 miles. The increase of off-street bicycle and pedestrian paths from 1995 to 2004 of approximately 69 miles is about 16 percent of the total planned increase in such off-street paths from 1995 to 2020 of 441 miles. Data does not exist to document the miles of surface arterial streets in 1995, which had bicycle accommodation through bicycle lanes, widened shoulders, widened outside travel lanes, or separate bicycle paths. As part of the year 2035 regional transportation planning effort, the Commission staff conducted an inventory to identify the existing bicycle accommodation on the surface arterial street and highway system of the Region. As of 2005, 633 miles of the 3,300 mile surface arterial street system of the Region provided bicycle accommodation through paved shoulders, bicycle lanes, or separate paths. Commission staff will maintain this inventory to permit assessment in the future of the extent of plan implementation.

Proposed Year 2035 Plan Bicycle and Pedestrian Element

The proposed year 2035 regional transportation plan element continues to include proposals for accommodation of bicycles on the surface arterial street and highway system, recommendations for an off-street bicycle path system, and recommended standards and guidelines for bicycle and pedestrian facilities.

Bicycle Accommodation on Arterial Streets and Highways

Bicyclists are permitted to operate on all streets and highways in the Region except freeways that have been posted with signs prohibiting bicycle use. The existing surface arterial street system provides the most extensive network of direct travel routes, and serves virtually all destinations. Land access and collector streets, because of low traffic volumes and speeds, are capable of accommodating bicycle travel with no improvements. Arterial streets and highways, particularly those with high-speed traffic or heavy volumes of truck or transit vehicle traffic, require improvements such as extra-wide outside travel lanes, paved shoulders, bicycle lanes, or a separate bicycle path in order to safely accommodate bicycle travel.

Accordingly, consideration should be given to providing extra-wide outside travel lanes, paved shoulders, bicycle lanes, or separate bicycle paths along all surface arterial streets and highways. Improvements to accommodate bicycle travel, if feasible, would be considered and made at the time a surface arterial street or highway is constructed, reconstructed, or resurfaced. In all, there are approximately 3,300 miles of surface arterial streets and highways in the Region.

Bicycle and pedestrian facilities should be considered an integral part of an arterial street and highway, and should be considered for provision at the time an arterial street or highway is constructed, reconstructed, or resurfaced. The unit of government or governmental agency, including the Wisconsin Department of Transportation,

responsible for constructing and maintaining the surface arterial street and highway should also have responsibility for constructing and maintaining the associated bicycle or pedestrian facility. This responsibility may be fulfilled by entering into construction, operations, and/or maintenance agreements with another unit of government or with private entities, but not by requiring another level of government to fund the construction and maintenance of the facility. The current practice of the Wisconsin Department of Transportation is to encourage development of bicycle and pedestrian facilities within the right-of-way of State trunk highways and connecting streets, but the Department does require the local unit of government—if the facility is a parallel off-street facility—to partially fund the construction of such facilities and to agree to maintain the facility.

A more detailed evaluation of the proposed accommodation of bicycles on surface arterial streets or highways should necessarily be conducted by the implementing agency before the bicycle accommodation is designed and constructed. Factors to be considered during the detailed evaluation include bicycle level of service; the availability of right-of-way; the number and type of structures and vegetation that may need to be removed or relocated to provide the bicycle facility; the effects on environmentally sensitive areas, including wetlands; the cost of providing the bicycle facility on a specific street or highway in relation to providing the bicycle-related improvement on a parallel street or off-street corridor; and the quality of the alternative locations and the likelihood that bicyclists would use those alternatives, including the potential for a recommended off-street bicycle path to serve as an alternative location. The location and design treatment of the proposed bicycle facility should also be coordinated with the location and design treatment of nearby bicycle facilities.

If the detailed evaluation process indicates that the recommended bicycle way location is not feasible due to site constraints, excessive costs, the traffic and operating characteristics of the roadway, or other factors, the implementing agency should identify an alternative location and evaluate the feasibility of the alternative route. The evaluation of the recommended bicycle accommodation, and, if necessary, the identification and evaluation of alternative locations, should be conducted during the preliminary engineering phase of project design. On all surface arterial streets and highways within the Region, preliminary engineering for rehabilitation, reconstruction, or new construction should consider the provision of the recommended bicycle accommodation, with the bicycle accommodation included as part of the project design, or a commitment to provide an alternative bicycle facility on a parallel street or off-street corridor.

The Regional Planning Commission will prepare, following the completion of the year 2035 plan, an assessment of the priority of need for bicycle accommodation on each segment of the surface arterial street and highway system considering bicycle level of service including factors of traffic volume, composition, speed, and congestion.

Off-Street Bicycle Paths Element

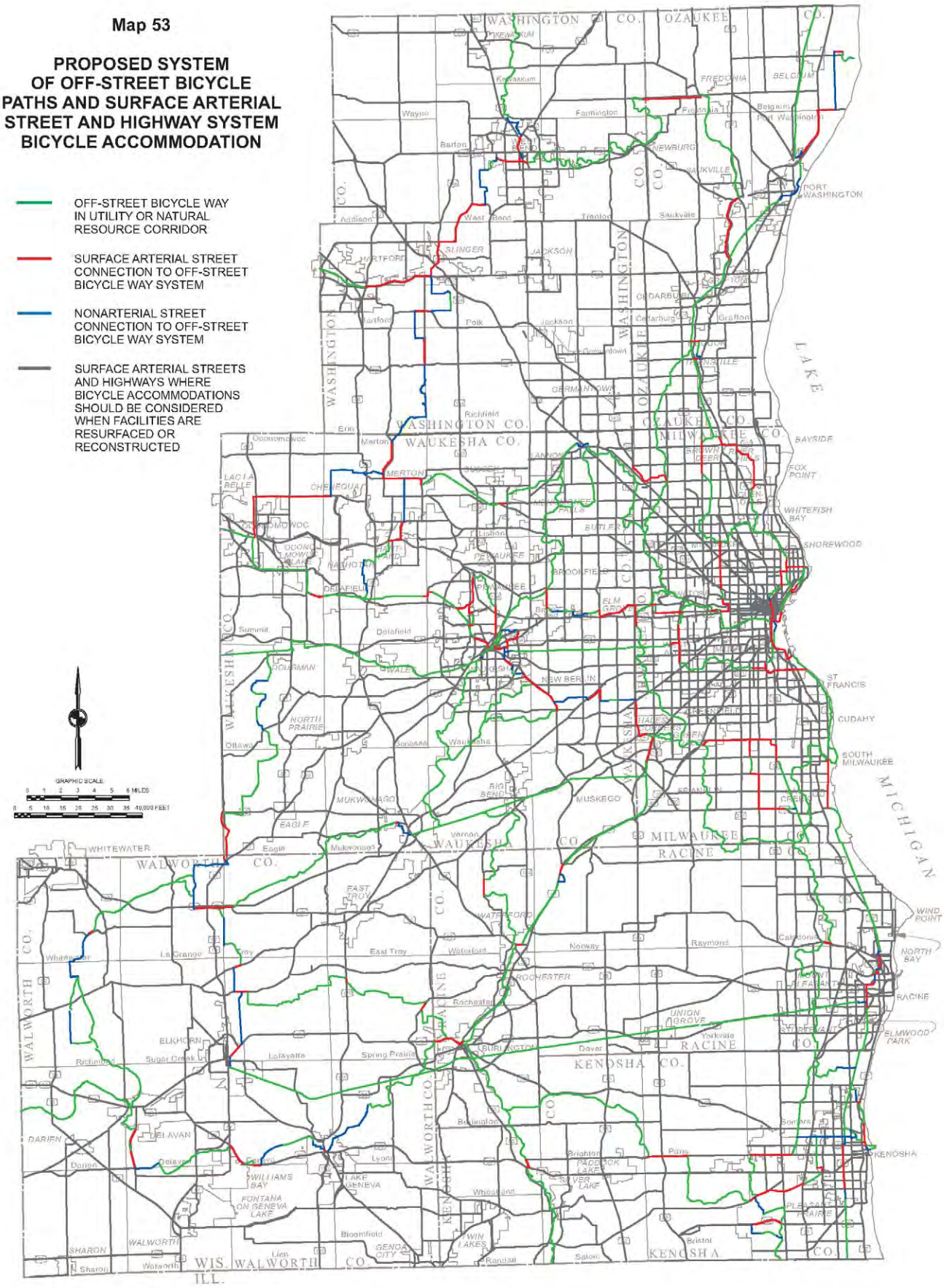
The year 2035 plan also proposes that a system of off-street bicycle paths be provided between the Kenosha, Milwaukee, and Racine urbanized areas and the cities and villages within the Region with a population of 5,000 or more located outside the three urbanized areas, such cities and villages being termed small urban areas. This system of off-street bicycle paths is also proposed under the adopted park and open space plans for each of the seven counties of the Region. These off-street bicycle paths would be located in natural resource and utility corridors and are intended to provide reasonably direct connections between the region's urbanized and small urban areas on safe and aesthetically attractive routes with separation from motor vehicle traffic.

Some on-street bicycle connections will be required to connect segments of this system of off-street paths. These connections if provided over surface arterials would include some type of bicycle accommodation—paved shoulder, extra-wide outside travel lanes, bicycle lanes, or separate parallel bicycle path—or if provided over a non-arterial collector or land access street would require no improvement.

The proposed system of bicycle facilities is shown on Map 53, and includes 575 miles of off-street bicycle paths with 147 miles of surface arterial and 83 miles of nonarterial connections. As noted earlier, 203 miles of the planned 575 miles of off-street bicycle paths currently exist. Also shown on Map 53 is the 3,153 mile surface arterial street and highway system within the Region proposed to be provided with bicycle accommodation.

Map 53

PROPOSED SYSTEM OF OFF-STREET BICYCLE PATHS AND SURFACE ARTERIAL STREET AND HIGHWAY SYSTEM BICYCLE ACCOMMODATION



Source: SEWRPC.

Pedestrian Facilities

The pedestrian facilities portion of the bicycle and pedestrian facilities plan element is a policy, rather than a system, plan. It proposes that the various units and agencies of government responsible for the construction and maintenance of pedestrian facilities in Southeastern Wisconsin adopt and follow recommended standards and guidelines with regard to the development of those facilities. The guidelines, together with the recommended standards for pedestrian facilities previously presented in Chapter VII of this report, are designed to facilitate safe and efficient pedestrian travel within the Region and are presented together in Appendix B of this report. Also presented in Appendix B are the recommended standards and guidelines for bicycle accommodation on arterial streets and for off-street bicycle paths.

The standards and guidelines for pedestrian facilities include recommendations that sidewalks be provided along streets and highways in areas of existing or planned urban development based upon identified criteria; that sidewalks be designed and constructed using widths and clearances appropriate for the levels of pedestrian and vehicular traffic in any given area; that landscaped terraces, curb lawns, or other buffer areas be provided between sidewalks and the roadways paralleling them to enhance the pedestrian environment; and that efforts be made to maximize pedestrian safety at street crossings, including the timing of the "walk" phases of traffic signals to provide for safe pedestrian crossings, and the provision of pedestrian "islands" and medians in wide, heavily traveled, or otherwise hazardous roadways. The plan also emphasizes that all pedestrian facilities must be designed and constructed in accordance with the requirements of the Federal Americans with Disabilities Act and its implementing regulations.

Community Bicycle and Pedestrian Plans

It is also proposed that local units of government prepare community bicycle and pedestrian plans to supplement the regional plan. The local plans should provide for facilities to accommodate bicycle and pedestrian travel within neighborhoods, providing for convenient travel between residential areas and shopping centers, schools, parks, and transit stops within or adjacent to the neighborhood. The standards, guidelines, and system plans set forth in the regional plan should be the basis for the preparation of community and neighborhood plans. It is also recommended that local units of government consider the preparation and implementation of land use plans that encourage more compact and dense development patterns, in order to facilitate pedestrian and bicycle travel.

PUBLIC TRANSIT

Public transit is essential in southeastern Wisconsin for many reasons: to provide an alternative travel mode in heavily traveled areas, to serve and to encourage higher density development, to contribute to transportation system efficiency, to contribute to the area quality of life and promote economic development, and to meet the needs of those without personal automobile transportation. Public transit is essential to provide an alternative mode of travel in heavily traveled corridors within and between the Region's urban areas, and in the Region's densely developed urban communities and activity centers. It is not desirable, and not possible, in the most heavily traveled corridors, dense urban areas, or the largest and densest activity centers to accommodate all travel by automobile with respect to both demand for street traffic carrying capacity and parking. Public transit also supports and encourages higher development density and more efficient land use development and redevelopment, as recommended in the regional land use plan. Public transit also contributes to efficiency in the transportation system, including reduced air pollution and energy consumption. Also, the provision of public transit to provide choice in transportation modes enhances the Region's quality of life and economy. A portion of a region's population and businesses would prefer to have public transit alternatives available and to travel by public transit. High quality public transit helps provide a high quality of life and contributes to the maintenance and enhancement of the Region's economy. Lastly, public transit is essential in the Region to meet the travel needs of persons unable to use personal automobile transportation. In the year 2000, approximately 80,000 households, or about 10.7 percent of the Region's households, did not have a personal vehicle available and were dependent upon public transit for travel. Forecasts indicate that in the year 2035 about 99,000 households, or 10.7 percent of the Region's households, will not have a personal vehicle available, and will be dependent upon public transit. The accessibility of this portion of the Region's population to the metropolitan area—jobs, health care, and education—is almost entirely dependent upon the extent to which public transit is available, and is reasonably fast, convenient, and affordable.

Year 2020 Plan Public Transit Element Recommendations and Implementation

The year 2020 regional transportation system plan called for the substantial improvement and expansion of transit service in the Region, including major increases in the levels of rapid and express transit service, as well as increases in the level of local transit service. The plan proposed the development of a true system of rapid and express transit service integrated with local transit service. In total, the plan proposed an approximately 70 percent increase in transit service as measured by daily vehicle-miles of bus service, from the 65,000 vehicle-miles of bus service provided on an average weekday in the plan base year of 1995 to 111,500 vehicle-miles in the plan design year 2020.

The proposed rapid transit service was to be provided by buses operating over freeways between the Milwaukee central business district and the outlying portion of the Milwaukee urbanized area and beyond, to the outlying urban communities of the Region. The proposed bus rapid transit service was to provide all day service in both directions, with intermediate stops spaced about three to five miles apart, and with convenient service frequencies. The proposed express transit service was to consist of a grid of 12 limited-stop (about every one-half mile) higher-speed bus routes primarily in Milwaukee County. The express transit was to include all day service in both directions with convenient service frequencies. The plan also recommended the expansion of local bus transit service over arterial and collector streets with frequent stops throughout the Kenosha, Milwaukee, and Racine urbanized areas, including expansion of service area, hours, and frequency of local transit service provided. The plan further recommended that rapid and express transit service initially be provided with buses, but that consideration be given through the conduct of detailed corridor transit alternatives analysis studies to upgrading bus service to commuter rail for rapid transit service and light rail or bus guideways for express transit service.

Significant implementation of the year 2020 plan transit element occurred primarily between 1997 and 2000, as transit service increased to about 81,000 average weekday vehicle-miles of service, an increase of 25 percent over the 1995 base year level of 65,000 vehicle-miles of service. Between 1995 and 2000, fixed route transit service expansion included new rapid transit services linking Milwaukee County with Ozaukee and Washington Counties, additional rapid transit service linking Milwaukee and Waukesha Counties, new weekday and Saturday evening service and Sunday service for the City of Racine Belle Urban System and the City of Waukesha Metro system local bus service, and new bus service and improvements in service frequency in Milwaukee County. Shared-ride taxicab service also expanded significantly between 1995 and 2000. In 1995, about 1,500 revenue vehicle-miles of taxi service were operated on an average weekday, but by 2000, about 5,600 revenue vehicle-miles of taxi service were operated on an average weekday. By 2000, shared-ride taxi service was operated in four smaller urban areas of the Region—Hartford, Port Washington, West Bend, and Whitewater—and countywide for two counties of the Region—Ozaukee and Washington Counties.

However, between 2000 and 2004, fixed route bus transit service in southeastern Wisconsin was significantly reduced from 80,000 vehicle-miles of bus service on an average weekday to 69,300 vehicle-miles of bus service. Shared-ride taxi service was reduced only slightly to 4,900 vehicle-miles of taxi service on an average weekday. The increase in transit service from 1995 through 2000 occurred with a strong and growing regional economy, and was influenced by increases in State transit funding (29 percent for the Milwaukee County Transit System and 70 percent in total for other transit systems in the Region from 1995 to 2000), Federal demonstration funding made available through the Federal Highway Administration (FHWA) Congestion Mitigation and Air Quality (CMAQ) program, and the Federal Transit Administration (FTA) Job Access Reverse Commute (JARC) program. The decreases in transit service which occurred from 2000 through 2004 coincided with the economic downturn following September 11, 2001, and the attendant and other State and local budget problems (State transit funding to the Milwaukee County Transit System is estimated to have increased by only 5 percent from 2000 to 2005 and by 12 percent in total for the other transit systems in the Region).[3] In addition, Federal Transit Administration

[3] *In comparison, local funding of public transit increased between 1995 and 2000 by 30 percent for the Milwaukee County Transit System and 62 percent for other transit systems in the Region, and increased between 2000 and 2005 by 20 percent for the Milwaukee County Transit System and 73 percent for other transit systems in the Region.*

funding of transit capital and operating costs in the Milwaukee urbanized area (Section 5307 Urbanized Area Formula Program funds) increased by 50 percent from $14.2 million in 1995 to $21.2 million in 2002 and then declined by 10 percent to $19.2 million in 2004.

In addition, corridor alternatives analysis studies were underway in 2005 considering implementation of an electric guided busway/bus lane system in central-Milwaukee County and a commuter rail line connecting the Cities of Milwaukee and Racine to the City of Kenosha and the Chicago area.

The public transit element of the year 2020 regional transportation plan was substantially embraced as evidenced through implementation particularly between 1995 and 2000. Since 2000, implementation efforts have reversed owing to inadequate funding brought about by an economic downturn beginning in 2001 and attendant State and local budget problems.

Year 2035 Plan Public Transit Element

The year 2020, and proposed year 2035, regional transportation plans propose substantial improvement and expansion of public transit. This improvement and expansion of public transit is essential to achieving the objectives and standards for public transit outlined in Chapter VII of this report. The improvement and expansion proposed for the year 2035 is essential to:

- Connecting and serving the medium and high density areas of the urban centers and communities of the Region, and the Region's major employment and activity centers;

- Providing convenient service at reasonable service frequencies and travel speeds capable of attracting travel in high density travel corridors and areas. It is not possible or desirable in these corridors and areas to accommodate all travel by automobile;

- Supporting and encouraging more efficient higher density development and redevelopment, as recommended in the regional land use plan;

- Contributing to transportation system efficiency including reduced air pollution and transportation system efficiency; and,

- Providing accessibility to the Region to, and meeting the travel needs of, those in the Region dependent on public transit, including those unable to use an automobile, and those not having an automobile available to them.

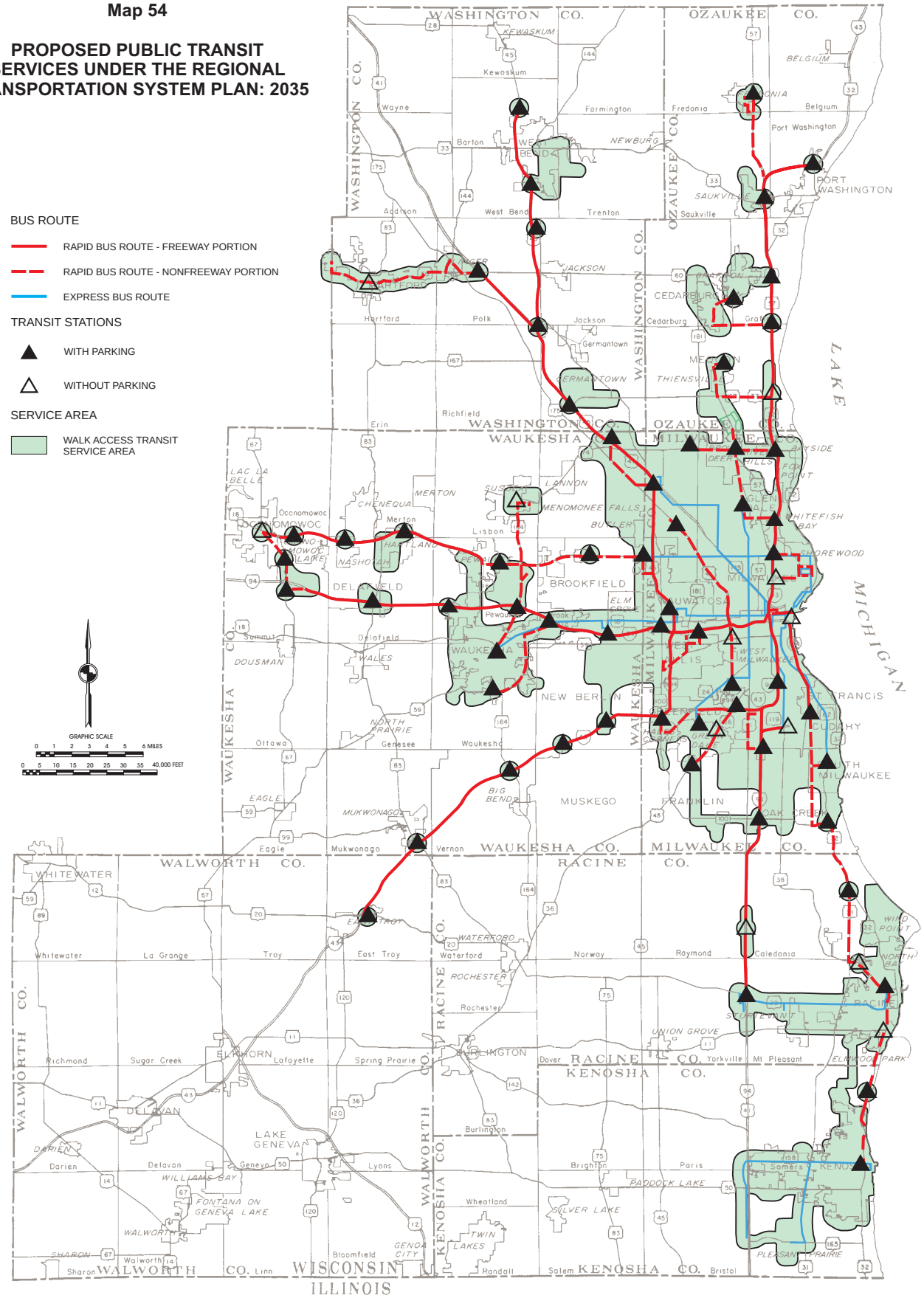
The proposed year 2035 regional transportation plan public transit element recommends significant improvement and expansion of public transit in southeastern Wisconsin, including development within the Region of a rapid transit system and express transit system, and improvement of existing local bus transit systems, and the integration of those local systems with the proposed express and rapid transit services. The rapid transit system would connect the outlying counties and urban centers of the Region to each other and to the Milwaukee area and central business district. The grid of express transit routes would connect Milwaukee area major employment centers and shopping areas, tourist attractions, entertainment centers, and higher density residential areas. Map 54 displays the transit system recommendations for each of the three transit system components. Altogether, service on the regional transit system would be increased from estimated service levels in 2005 by about 100 percent measured in terms of revenue transit vehicle-miles of service provided, from about 69,000 vehicle-miles of service on an average weekday in 2005 to 138,000 vehicle-miles of service on an average weekday in the year 2035 (see Table 100 and Figure 39).

Rapid Transit Service Component

The proposed rapid transit service would consist of buses operating over freeways between the Milwaukee central business district and the outlying portions of the Milwaukee urbanized area and beyond, connecting the urbanized

Map 54

PROPOSED PUBLIC TRANSIT SERVICES UNDER THE REGIONAL TRANSPORTATION SYSTEM PLAN: 2035



Source: SEWRPC.

Table 100

PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN

Average Weekday Transit Service Characteristics	Existing 2005[a]	Proposed 2035	Proposed Increment	
			Number	Percent Change
Revenue Vehicle-Miles				
Rapid	7,900[b]	24,000	16,100	203.8
Express	- -	17,000	17,000	- -
Local	61,100	97,000	35,900	58.8
Total	69,000	138,000	69,000	100.0
Revenue Vehicle-Hours				
Rapid	350[b]	1,100	750	214.3
Express	- -	1,100	1,100	- -
Local	4,750	8,900	4,150	87.4
Total	5,100	11,100	6,000	117.6

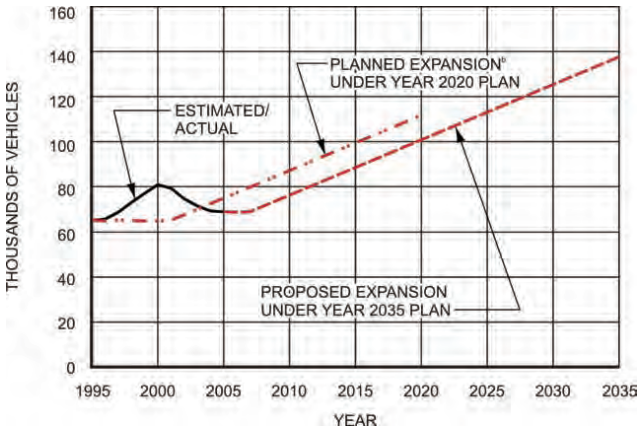
[a]*Estimated.*

[b]*Includes the existing commuter bus route operated in the Kenosha-Racine-Milwaukee corridor. While portions of this route operate with express stop spacing, the long trips served by, and average operating speeds of, this route are typical of those for rapid service.*

Source: SEWRPC.

Figure 39

HISTORIC AND PLANNED VEHICLE-MILES OF PUBLIC TRANSIT SERVICE ON AN AVERAGE WEEKDAY IN THE SOUTHEASTERN WISCONSIN REGION: 1995-2035[a]



[a]*Estimates of average weekday year 2004 and year 2005 transit vehicle-miles of transit service are preliminary and are based upon annual service data and budget information reported by the transit operators.*

[b]*The year 2020 plan assumed implementation would not be expected for several years following completion of the plan in 1997, as implementation of the plan would be dependent upon available funding, particularly a dedicated funding source.*

Source: SEWRPC.

areas and urban communities of the Region. Rapid transit bus service would be provided south to Racine and Kenosha, southwest to Mukwonago and East Troy, west to Waukesha and Oconomowoc, northwest to West Bend and Hartford, and north to Cedarburg, Grafton, Saukville, and Port Washington. The proposed rapid transit system would have the following characteristics:

- The bus rapid transit service would operate in both directions during all time periods of the day providing both traditional commuter and reverse-commute service.

- The rapid transit service would operate with some intermediate stops spaced about three to five miles apart to increase accessibility to employment centers and to increase accessibility for reverse-commute travel from residential areas within central Milwaukee County. The stops would provide connections with express transit service, local transit service, or shuttle bus or van service to nearby employment centers.

- The service would operate throughout the day. The frequency of service provided would be every 10 to 30 minutes in weekday peak travel periods, and every 30 to 60 minutes in weekday off-peak periods and on weekends.

An approximately 204 percent increase in rapid transit service is proposed as measured by daily vehicle-miles of bus service, from the 7,900[4] vehicle-miles of such service provided on an average weekday in the year 2005, to 24,000 vehicle-miles in the plan design year 2035.

Express Transit Service Component
The second component of the pubic transit element of the plan is an express transit system. The proposed express transit system would consist of a grid of eight limited-stop, higher-speed routes largely within Milwaukee County. The express routes would generally replace existing local routes. Stops would typically be spaced on the express routes about one-quarter mile apart. It is envisioned that this system of limited-stop routes may initially consist of buses operating over arterial streets in mixed traffic, and would be upgraded over time to buses operating on reserved street lanes with priority treatment at traffic signals.

As envisioned under the plan:

- The express service would operate in both directions during all periods of the day providing both traditional and reverse-commute service.

- The service would generally operate with a stop spacing of about one-quarter mile with one-half mile stop spacing in outlying portions of Milwaukee County and the Milwaukee urbanized area.

- The frequency of service provided would be about every 10 minutes during weekday peak periods, and about every 20 to 30 minutes during weekday off-peak periods and on weekends.

- The overall travel speed provided would be about 16 to 18 miles per hour, an improvement over the average 12 miles per hour speed provided by the existing local bus transit service.

No express transit service existed in the Region in 2005. As proposed, about 17,000 vehicle-miles of express transit service would be provided on an average weekday in the Region in the year 2035.

Local Transit Service Component
The improvement and expansion of local bus transit service over arterial and collector streets, with frequent stops throughout the Kenosha, Milwaukee, and Racine urbanized areas is also proposed. Service would be provided on weekdays, and during weekday evenings, Saturdays, and Sundays. An approximately 59 percent increase in local bus service is proposed from the 61,100 vehicle-miles of local bus service provided in 2005 on an average weekday to 97,000 vehicle-miles in the plan design year 2035. The service improvements and expansion proposed include expansion of service area and hours, and improvements in the frequency of local transit service provided, particularly on major local routes. The proposed frequency of local bus service is shown in Table 101. Over the plan design period, some local transit services may be restructured to provide for transit-center oriented local systems or route deviation or demand-responsive shared-ride taxi or van service systems to replace grid-route systems, or for electric streetcar technology to replace local bus service depending upon detailed local plan implementation studies.

[4] *Includes the existing commuter bus route operated in the Kenosha-Milwaukee-Racine corridor. While portions of this route operate with express stop spacing, the long trips served by, and average operating speeds of, this route are typical of those for rapid service.*

Table 101

PROPOSED FREQUENCY OF LOCAL BUS SERVICE IN THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN

Area	Average Weekday Headways on Local Bus Service (minutes)		
	Morning and Afternoon Peak Periods	Midday Off-peak Period	Evening Off-peak Period
Within Milwaukee County			
Central Milwaukee County	5-15	10-20	15-20
Remainder of Milwaukee County	15-20	20-30	20-60
Outside Milwaukee County	15-30	30-60	30-60

Source: SEWRPC.

Paratransit service is proposed to be provided consistent with the Federal Americans with Disabilities Act (ADA) of 1990. All transit vehicles that provide conventional fixed-route transit service must be accessible to persons with disabilities, including those persons using wheelchairs. This is reflected in the capital cost estimate for transit-vehicle-fleet replacement and expansion under the recommended plan. All public entities operating fixed-route transit systems must continue to provide comparable paratransit service to those disabled persons within local transit service areas who are unable to use fixed-route transit services consistent with federally specified ADA eligibility and service requirements. The complementary paratransit services must serve any person with a permanent or temporary disability who is unable independently to board, ride, or disembark from an accessible vehicle used to provide fixed-route transit service; who is capable of using an accessible vehicle, but one is not available for the desired trip; or who is unable to travel to or from the boarding or disembarking location of the fixed-route transit service. The planned paratransit service must be available during the same hours and on the same days as the fixed-route transit service, be provided to eligible persons on a "next-day" trip-reservation basis, and not limit service to eligible persons based on restrictions or priorities relative to trip purpose, and not be operated under capacity constraints which might limit the ability of eligible persons to receive service for a particular trip. The paratransit service fares must be no more than twice the applicable public transit fare per one-way trip for curb-to-curb service.

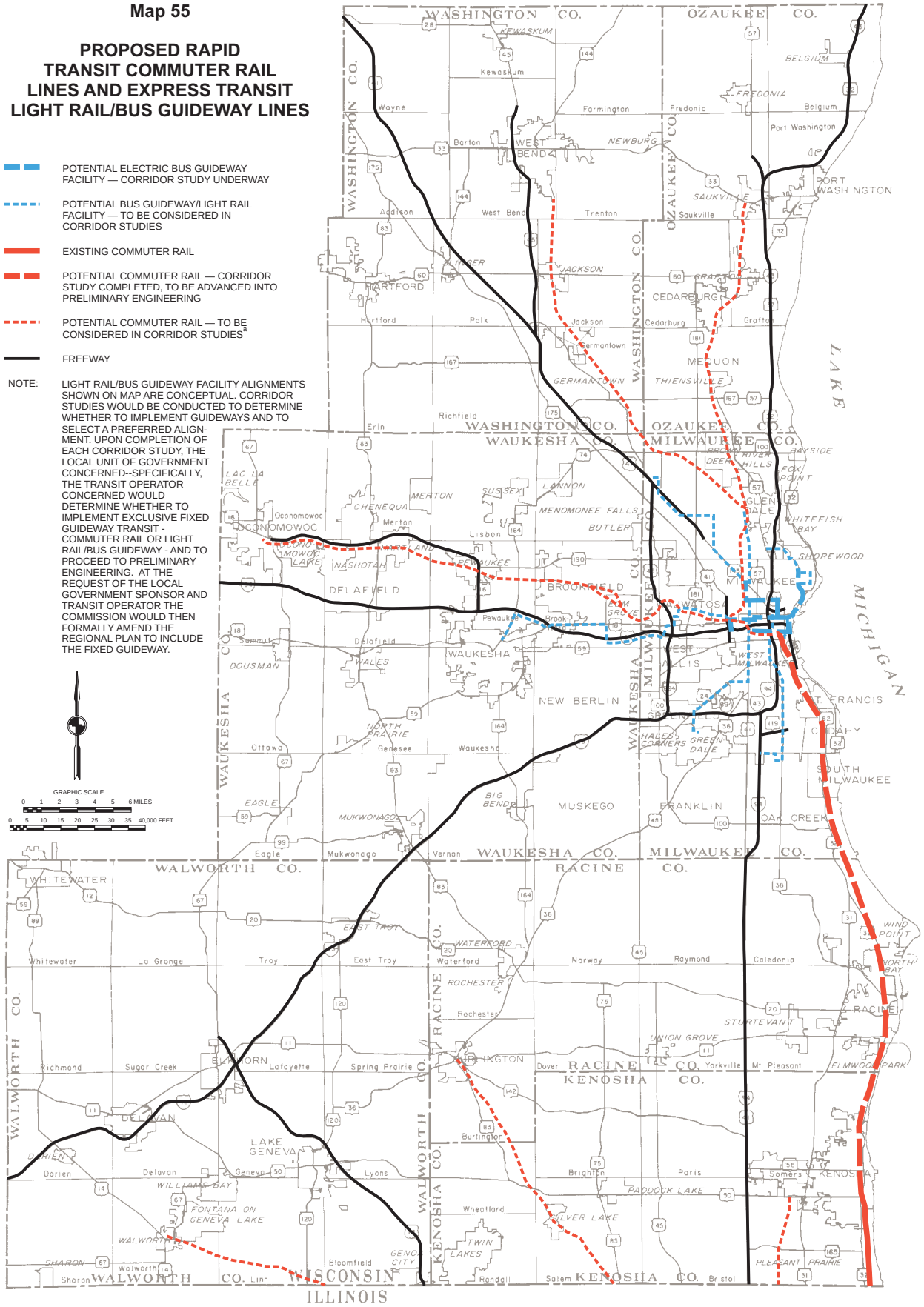
Upgrading to Rail Transit or Bus Guideways

The plan also proposes that rapid and express transit service initially be provided with buses, but that this bus service ultimately be upgraded to commuter rail for rapid transit service and light rail or bus guideways for express transit service. Map 55 displays four potential future commuter rail lines and six potential future light rail/bus guideway lines within southeastern Wisconsin. Upgrading rapid transit service to commuter rail and express transit service to light rail/bus guideways is essential to meeting the needs for public transit within southeastern Wisconsin. Public transit cannot offer convenient accessibility to the metropolitan area for those without an automobile, offer an attractive alternative in heavily traveled corridors and dense urban activity centers, or provide true choice for travel if it is caught in traffic congestion, and its travel times are not comparable to automobile travel. Upgrading to exclusive guideway transit unaffected by congestion like commuter rail and light rail or bus guideways is essential to meeting the basic needs for public transit in southeastern Wisconsin. Upgrading to exclusive guideway transit may also be expected to result in high density land development and redevelopment at the stations of the exclusive guideway transit service, promoting implementation of the regional land use plan.

Local governments, which are the sponsors and operators of transit systems, would determine whether to upgrade to commuter rail for rapid transit service, and to light rail/bus guideway for express transit service by conducting in each of the four potential commuter rail corridors and six potential light rail/bus guideway corridors a detailed

Map 55

PROPOSED RAPID TRANSIT COMMUTER RAIL LINES AND EXPRESS TRANSIT LIGHT RAIL/BUS GUIDEWAY LINES



[a]Corridor feasibility studies have been completed for the Chicago-based commuter rail extensions to the Village of Walworth in Walworth County and the City of Burlington in Racine County. The conclusion of the Walworth extension study was that it was potentially feasible and cost-effective, but should be deferred and considered again when a Metra extension from its current terminus in Fox Lake, Illinois is considered to Richmond, Illinois near the Wisconsin-Illinois Stateline. The conclusion of the Burlington extension study was that it was not feasible or cost-effective at that time, but could be considered again in the future.

Source: SEWRPC.

corridor transit alternatives analysis study. Such study is required by the U.S. Department of Transportation, Federal Transit Administration for the potential guideway to be eligible for Federal funding. At the conclusion of the corridor studies, decisions would be made by the concerned local government sponsors whether to provide rapid transit service through buses on existing freeways or through commuter rail, and whether to provide express transit service through buses on surface arterials, light rail, or exclusive bus guideways. If a local government sponsor does determine to implement exclusive fixed guideway transit—commuter rail or light rail/bus guideway—and proceeds to preliminary engineering, the Commission would formally amend the regional plan to include the fixed guideway at the request of the local governmental sponsor.

There are two efforts underway in southeastern Wisconsin considering upgrading to fixed guideway transit. Milwaukee County in cooperation with the City of Milwaukee and Wisconsin Center District is conducting the Milwaukee downtown connector study which is considering implementation of express transit electric bus guideway technology. Rapid transit commuter rail in the Milwaukee-Racine-Kenosha corridor was recommended for implementation at the conclusion of a corridor transit alternatives analysis study. The Counties and Cities of Milwaukee, Racine, and Kenosha are currently conducting further study addressing funding and refinement of the proposed commuter rail extension.

Summary and Conclusions—Public Transit

The proposed expansion of public transit in southeastern Wisconsin recommends a near doubling of transit service in southeastern Wisconsin by the year 2035. As shown in Figure 39, this would entail about a 2.5 percent annual increase in transit service to the year 2035, or about the same level of annual increase as proposed under the year 2020 plan. The attainment of this recommended public transit expansion will be dependent upon continued commitment by the State to be a partner in the maintenance, improvement and expansion, and attendant funding of public transit attainment of local dedicated funding for public transit; and development of a regional transit authority.

Implementation of this proposed expansion is dependent upon the continued commitment of the State to be a partner in the maintenance, improvement and expansion, and attendant funding of public transit. The State has historically funded 40 to 45 percent of transit operating costs, and has increased funding to address inflation in the cost of providing public transit, and to provide for transit improvement and expansion. State transit funding to the Milwaukee County Transit System increased by 29 percent from 1995 to 2000 and by 70 percent for all other transit systems in the Region, but only by 5 percent between 2000 and 2005 for the Milwaukee County Transit System and by 12 percent for all other transit systems.[5] The 2003-2005 State budget provided no funding increase for public transit Statewide and the 2005-2007 budget may only provide a 2 percent annual increase. An annual 4 to 5 percent increase may be essential to address rising costs, including inflation and real increases in fuel costs, and to support system improvement and expansion.

Implementation of the proposed expansion of public transit in southeastern Wisconsin will also be dependent upon attaining dedicated local funding for public transit. The local share of funding of public transit in southeastern Wisconsin is provided through a county's or municipality's overall annual budget, and represents about 15 percent of the total operating costs and 20 percent of total capital costs of public transit. Thus, the local share of funding public transit is largely provided by property taxes, and public transit must annually compete with mandated services and projects. Increasingly, due to the constraints in property tax based funding, counties and municipalities have found it difficult to provide funding to address inflation and expansion of transit, and to respond to shortages in Federal and State funding. Most public transit systems nationwide have dedicated local funding, typically a sales tax of 0.25 to 1.0 percent as shown in Table 102. A sales tax provides funding which should increase with inflation and area growth, thereby addressing funding needs attendant to inflation in the costs of providing public transit and transit system expansion.

[5] *In comparison, local funding of public transit increased between 1995 and 2000 by 30 percent for the Milwaukee County Transit System and by 62 percent for other transit systems in the Region, and increased between 2000 and 2005 by 20 percent for the Milwaukee County Transit System and 73 percent for other transit systems in the Region.*

Table 102

COMPARISON OF AVAILABILITY OF DEDICATED LOCAL FUNDING FOR PUBLIC TRANSIT SYSTEMS SERVING URBANIZED AREAS OF SIMILAR SIZE TO THE MILWAUKEE AREA

Urbanized Area		Transit System		Local Dedicated Funding	
Name	2000 Population (in millions)	Name	Service Area	Predominant Source	Rate
St. Louis, MO	2.08	Metro	200 municipalities in 2 states	Sales tax	0.25%
Denver, CO	1.98	Regional Transportation District	4 counties plus portions of 3 counties	Sales tax	0.6%
Cleveland, OH	1.79	Greater Cleveland Regional Transit Authority	City and surrounding county	Sales tax	1.0%
Pittsburgh, PA	1.75	Port Authority of Allegheny County	1 county plus portions of 4 other counties	State taxes and fees for tires, rental cars, vehicle leases, utility real estate, and general sales tax[a]	$1 per tire, $2 per rental, 3% of leases, 1.22% of State sales tax[b]
Portland, OR	1.58	Tri-Met	Defined district within 3 counties	Payroll tax (Also property and cigarette taxes)	.006218% payroll
Cincinnati, OH	1.50	Southwest Ohio Regional Transit Authority	City and surrounding county	City payroll tax	0.3% payroll
Norfolk, VA	1.39	Hampton Roads Transit	4 cities	None	- -
Sacramento, CA	1.39	Sacramento Regional Transit District	City and surrounding county	Local sales tax (Also State sales and gas tax, local developer fees)	0.5%
Kansas City, MO	1.36	Kansas City Area Transportation Authority	7 counties in 2 states	Sales tax	0.375%
San Antonio, TX	1.33	VIA Metropolitan Transit	18 municipalities plus specific unincorporated areas	Sales tax	0.5%
Las Vegas, NV	1.31	Citizens Area Transit	1 county	Sales tax	0.25%
Milwaukee, WI	1.31	Milwaukee County Transit System	1 county	None	- -
Indianapolis, IN	1.22	Indianapolis Public Transportation Corporation	1 county	Dedicated Property Tax	- -
Providence, RI	1.18	Rhode Island Public Transit Authority	Statewide	State gasoline tax	6.25 cents per gallon
Columbus, OH	1.13	Central Ohio Transit Authority	1 county plus portions of 2 other counties	Sales tax	0.25%
New Orleans, LA	1.01	New Orleans Regional Transit Authority	City and surrounding parish	Sales tax and hotel room tax	1.0% (sales) 0.6% (hotel)
Buffalo, NY	0.98	Niagara Frontier Transportation Authority	1 county	Sales tax and mortgage recording fees	0.125% (sales)
Memphis, TN	0.97	Memphis Area Transit Authority	6 cities in 2 states	None	- -
Austin, TX	0.90	Capital Metropolitan Transportation Authority	9 municipalities	Sales Tax	1.0%
Salt Lake City, UT	0.89	Utah Transit Authority	Defined district within 6 counties	Sales tax	0.4375% in Salt Lake Co. and 0.5% in 2 counties, 0.25% in 3 counties
Jacksonville, FL	0.88	Jacksonville Transportation Authority	1 county	Sales tax (Also gas tax and portion of State Transportation Fund)	1.0% (sales)
Louisville, KY	0.86	Transit Authority of River City	5 counties in 2 states	Payroll tax (Also sales tax)	0.2% payroll
Charlotte, NC	0.76	Charlotte Area Transit System	City and surrounding county	Sales tax	0.5%

[a] *Revenues from all sources are statewide and are shared among all transit systems in Pennsylvania.*

[b] *Sales tax revenue is capped at $75 million annually.*

Source: Transit system agencies and governing bodies, National Transit Database, and SEWRPC.

The development of a regional transit authority would also assist in implementing the proposed transit system expansion. A number of the proposed transit services extend across city and county boundaries. A regional transit authority would be expected to assist in the implementation of these proposed services.

TRANSPORTATION SYSTEMS MANAGEMENT ELEMENT

Transportation systems management refers to a series of measures which are intended to manage and operate existing transportation facilities to their maximum carrying capacity and travel efficiency.

Year 2020 Transportation Systems Management Element Recommendations and Implementation

In the year 2020 regional transportation plan, recommended transportation systems management measures included:

- Freeway traffic management – Implementation of a Milwaukee area freeway traffic management system, including areawide expansion of freeway ramp-meters and implementation of a ramp-meter operational control strategy to reduce freeway traffic flow breakdown and stop-and-go traffic. Buses and high-occupancy vehicles would receive preferential access at the metered ramps. The system would also include elements to provide freeway system advisory information and incident management.
- Arterial curb-lane parking restrictions – Implement curb-lane parking restrictions during peak periods along about 400 miles of existing and planned arterial streets and highways in order to reduce congestion and help provide good transit service. Local governmental units would consider the proposed curb-lane parking restrictions as traffic volume and congestion increase.
- Traffic engineering – Use of state-of-the-art traffic engineering practices to assist in achieving efficient traffic flow on surface arterial facilities.
- Traffic management technology – Apply advanced traffic management technology systems, collectively known as intelligent transportation systems (ITS), as such technology becomes practicable and available over the plan implementation period. This technology includes such systems as traveler information systems, incident detection systems, and traffic signal control systems, among others.

Progress has been made with respect to implementation of the year 2020 plan transportation system management recommendations, particularly with respect to the freeway traffic management system implemented and operated by the Wisconsin Department of Transportation in the Milwaukee area. This freeway traffic management system includes 120 freeway on-ramp-meter locations, 63 of which provide high-occupancy vehicle bypass. The freeway traffic management system also includes 83 closed-circuit television cameras on the freeway system, 21 variable message signs on the freeway system, highway advisory radio, freeway service patrols, crash investigation sites, enhanced reference markers, and the Traffic Incident Management Enhancement Program.

Proposed Year 2035 Plan Transportation Systems Management Element

The proposed year 2035 plan transportation systems management element will continue to build upon the transportation systems management actions recommended in the year 2020 plan. Three categories of transportation systems management measures are proposed for consideration in the year 2035 plan: freeway traffic management, surface arterial street and highway traffic management, and major activity center parking management and guidance. The specific transportation system management measures within each of the three categories collectively may be expected to lead toward a more efficient and safer transportation system.

In addition, improving the overall operation of the regional transportation system requires cooperation and coordination between the transportation agencies and operators in the Region, and coordination between the components of the regional transportation system. A regional intelligent transportation systems (ITS) architecture is essential to facilitate the institutional agreements and the technical integration required for such coordination of transportation system operators and operations. A regional architecture identifies each of the transportation operators in the Region including highway agencies, departments of public works, transit operators, and

emergency service providers, and describes the operations of the transportation system and the necessary and desirable information exchanges that should take place between different agencies in order to accomplish current and improved regional transportation system operation. A key objective of the regional architecture is to ensure interoperability between the hardware and software components employed by the various transportation operators in the Region.

Southeastern Wisconsin is located along the heavily traveled, multi-state IH 94 corridor. Efforts to improve the operation of the multi-state corridor have been underway since the U.S. Department of Transportation designated the Gary-Chicago-Milwaukee (GCM) Corridor as one of four ITS priority corridors in 1993. With this designation came dedicated Federal funding for ITS beginning with the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Since the GCM Corridor required an ITS architecture encompassing the interests of three states, the Wisconsin Department of Transportation (WisDOT) assumed the lead in the development of a regional ITS architecture which would serve both the Wisconsin portion of the GCM Corridor, and the Southeastern Wisconsin Region. The WisDOT, with support from other agencies including the Southeastern Wisconsin Regional Planning Commission (SEWRPC), developed and continues to maintain, review, and update a regional ITS architecture for southeastern Wisconsin. Given the multi-state GCM Corridor effort and the WisDOT's experience in developing and maintaining the existing regional ITS architecture, it remains appropriate for the WisDOT to continue to house and lead the regional ITS architecture maintenance, review, and update efforts. These efforts should ensure that the regional ITS architecture conform to the national ITS architecture and standards. The SEWRPC will continue to support the WisDOT with these efforts.

Freeway Traffic Management

This group of proposed transportation systems management measures would attempt to improve the operation and management of the regional freeway system. The proposed freeway traffic management measures may be grouped into three objectives, or categories of freeway traffic management measures:

- Operational control – measures to improve the operation of the freeway system on an average weekday and during minor and major incidents through control of entering freeway traffic volume.
- Advisory information – measures to provide real-time information about the operation of the freeway system, particularly delays and major incidents, to encourage more informed travel decisions, and a more efficient transportation system.
- Incident management – measures to detect, confirm, and remove as quickly as possible incidents on the freeway system, including on freeway system shoulders, including accidents, debris, and stopped vehicles.

The proposed freeway traffic management measures in each category are described in further detail below, including specific actions proposed to be included in the year 2035 regional transportation system plan. Some measures are applicable and necessary to each of the above objectives, or categories of measures, of freeway traffic management. One freeway traffic management measure that is essential to all three objectives is a traffic operations center. WisDOT has a traffic operations center (TOC) in the City of Milwaukee from which all freeway segments in the Milwaukee area are monitored, freeway operational control and advisory information is determined, and incident management detection and confirmation is conducted. The TOC is critical to the safe and efficient operation of the regional freeway system and is in operation from 6:00 a.m. to 12:00 midnight, 365 days a year and will be expanded to 24 hour operation in the summer of 2005.

Operational Control – Measures which have as their primary purpose the monitoring and control of freeway operating conditions include traffic detectors, freeway on-ramp-meters, and ramp-meter control strategy. Traffic detectors measure the speed, volume, and density of freeway traffic, and are used in operational control, as well as advisory information and incident management. Existing freeway system traffic detectors consist of detectors embedded in the pavement. Alternative technologies include video and microwave detection. In 2004, traffic detectors were located at one-half mile intervals on the freeways in Milwaukee County and on IH 94 in Waukesha County, and at about one to two mile intervals on IH 94 in Kenosha and Racine Counties. The data collected from

these traffic detectors is monitored by the WisDOT at the TOC for the purposes of detecting freeway system travel speed and time, traffic congestion, traffic flow breakdowns, and incidents. Freeway ramp meter traffic entry rates can be modified based upon the traffic volume and congestion indicated by the traffic detectors. Travel information on traffic congestion and delays can be provided to freeway system users through the WisDOT website and on variable message signs. Traffic speeds and congestion indicated by traffic detectors can instantaneously indicate the presence of a freeway incident. With respect to incident detection, technologies such as mobile phones—a technology which has evolved since the traffic detectors were first deployed—are becoming a primary source for rapid, real-time incident detection. Motorists are using mobile phones to immediately notify WisDOT and law enforcement agencies of incident occurrences and locations as they happen. While the role of traffic detectors may diminish as a critical element for incident detection, they may be expected to continue to provide data and information essential to operating ramp-meters, and monitoring and identifying travel time and congestion for the provision of advisory information to motorists. It is recommended that existing freeway system traffic detectors be maintained, and that traffic detectors be installed on the freeway system throughout the Region at one-half mile intervals unless a longer interval would support operational control and travel conditions and time monitoring, and assuming that traffic detectors would no longer be considered essential to incident detection. The only exceptions for installing detectors on freeway segments may be those segments with current and expected future traffic volumes which would be substantially less than freeway traffic carrying design capacity, including IH 43 north of STH 57 in Ozaukee County, USH 45 north of the Richfield Interchange, USH 41 north of STH 60 in Washington County, and IH 43 and USH 12 in Walworth County

Ramp-meters are traffic signals located on freeway entrance ramps or, in some cases, freeway-to-freeway entrance ramps, and are used to control the rate of entry of vehicles onto a freeway segment to achieve more efficient operation of the adjacent freeway segment and the downstream freeway system. To encourage ridesharing and transit use, preferential access for high-occupancy vehicles is provided at ramp-meter locations to allow the high-occupancy vehicles to bypass traffic waiting at a ramp-metering signal. There are 120 freeway on-ramps currently in the Milwaukee area equipped with ramp-meters. The metered on-ramps control vehicle access to the freeway system to reduce freeway traffic flow breakdown and stop-and-go traffic. Buses and high-occupancy vehicles currently receive preferential access at 63 of the 120 on-ramp-meter locations. It is recommended that ramp-meters be installed on all freeway on-ramps within the Region with the possible exception of those freeway segments identified above which may be expected to carry current and future traffic volumes well below their design capacity. Also, ramp-meters should not be provided at on-ramps which cannot store a queue of vehicles. High occupancy vehicle preferential access should be provided at all metered ramps, particularly those which would be used by existing and planned public transit. The only exception would be those ramps where substantial right-of-way acquisition may be required to provide a high occupancy vehicle bypass ramp.

Another element of freeway operational control is the strategy used in the operational control of ramp-meters. The existing ramp-meters on the southeastern Wisconsin freeway system are controlled in two ways. Some are controlled in a “pretimed” mode, operating during specified peak traffic hours of the weekday at specified release rates of vehicles. Others are controlled as well during specified peak traffic hours of the weekday, but the vehicle release rates are based upon adjacent freeway system traffic volume and congestion. Both existing ramp-meter operational control strategies are constrained by the vehicle queue storage available at each metered on-ramp, with vehicles being released more rapidly from ramp-meters to avoid the queue extending onto surface arterial streets. It is recommended that the strategy of controlling ramp-meters through consideration of adjacent congestion be expanded throughout the freeway system. It is also recommended that an operational control strategy be considered which would consider downstream freeway traffic congestion and seek to minimize total travel delay on the freeway system through ramp-meter control while providing for equitable average and maximum delays at each ramp-meter, and avoiding the extension of vehicle queues onto surface streets. It is also recommended that the need for expanded vehicle storage on freeway on-ramps be considered, and addressed, during the reconstruction of the regional freeway system.

It is also proposed that the WisDOT, in cooperation with the WisDNR, the Regional Planning Commission, and the seven counties of southeastern Wisconsin, conduct a study of managing speed on the freeway system,

attempting to achieve more uniform speed at the posted speed limits. The study would be intended to quantify and consider the potential benefits including reduced crashes and attendant reduced congestion, and reduced air pollutant emissions both due to reduced speeds and reduced crash-related congestion, and the costs of implementation, specifically, law enforcement.

Advisory Information Measures – Providing advisory information to motorists is an integral part of providing an efficient street and highway system. By providing information on current travel conditions, motorists can choose travel routes which are more efficient for their travel, and the result in total is a more efficient transportation system. Advisory information measures include variable message signs (VMS), highway advisory radio (HAR), the WisDOT website, and provision of information to the media. Variable message signs are permanent or portable devices which have the capability to display dynamic messages. The WisDOT uses the permanent VMS to provide real-time information to travelers about downstream freeway traffic conditions, such as current travel times to selected areas, information about lane and ramp closures, where travel delays begin and end, and in the event of child abduction, to display an "Amber alert." There are 21 permanent VMS located on the freeway system, primarily in the Milwaukee area, and 13 on surface arterials which connect with the freeway system primarily located in western Milwaukee County. The variable message signs can alert freeway bound traffic to congestion and delays, and encourage motorists to use less congested and faster surface arterial routes, and thus provide for a more efficient street and highway system. It is recommended that variable message signs be provided on the entire freeway system with the exception of the freeway segments identified earlier which currently carry, and may be expected in the future to carry, traffic volumes less than their design capacity. It is also recommended that variable message signs be provided on surface arterials leading to the most heavily used freeway system on-ramps.

The WisDOT also provides substantial information about current freeway system traffic conditions on a website using data collected from freeway system traffic detectors. The information includes color coded maps depicting the level of freeway traffic congestion. The maps also identify the locations of confirmed incidents. Also available on the website are the views of freeway system traffic available from the freeway system closed circuit television camera network. The WisDOT website also displays current travel times and delays on the major freeway segments in the Milwaukee area. The data provided on the website is valuable advisory information to motorists prior to their making a trip and should continue to be provided and improved. This data is also available to the media and used in daily radio and television broadcasts. The WisDOT also provides direct feeds of its closed circuit television network to the media.

Highway advisory radio is a system of low-power radio transmitters licensed for state use which transmit pre-recorded messages. Highway advisory radio (HAR) systems are generally very localized and directed to motorists at a specific location along a specific route. The only existing HAR system in the Region is located at Miller Park along IH 94, and is used to relay messages concerning ongoing highway construction projects, special events—such as Milwaukee Brewer game day traffic conditions—and "Amber alerts" in the event of a child abduction. An emerging advisory information vehicle radio-based technology is radio data systems (RDS). Radio data systems are separate radio signals within a station's frequency allocation which transmit digital and audio information simultaneously with a standard FM stereo or radio broadcast. In southeastern Wisconsin, RDS exists and is primarily used by radio stations to broadcast digital information, such as station call names and song titles and artists. In Europe, RDS has been used to also transmit audio information to motorists through their stereo or radio receiver, including local travel announcements regarding incidents and traffic conditions. The RDS will interrupt the playing of the radio or compact disc to alert the driver to the travel announcement. At the end of the announcement, the receiver returns to the previous radio station or compact disc. It is recommended that WisDOT monitor RDS technology for possible application in the future.

Incident Management Measures – Incident management measures have as their objective the timely detection, confirmation, and removal of freeway incidents. As noted earlier, the WisDOT freeway system TOC and freeway system traffic volume detectors are essential to incident management, as well as freeway operational control and advisory information. Other incident management measures include closed circuit television, enhanced freeway location reference markers, freeway service patrols, crash investigation sites, the Traffic Incident Management Enhancement Program, ramp closure devices, and alternate route designations.

Closed-circuit television (CCTV) cameras provide live video images to the WisDOT and the Milwaukee County Sheriff's Department which allow for the confirmation of congested areas and incident locations, as well as the identification of such areas and locations. The principal advantage of CCTV is that it enables camera operators to focus quickly on freeway segments where incidents have been detected or reported, and to rapidly confirm the presence of an incident, determine the appropriate response, and direct the proper equipment to be deployed in response to the incident. There are currently 83 closed-circuit television cameras on the southeastern Wisconsin freeway system, covering Milwaukee County freeways, IH 94 and USH 41/45 in eastern Waukesha County, and IH 94 in Kenosha and Racine Counties. It is recommended that the CCTV camera network be provided on the entire regional freeway system, with the exception of the freeway segments identified earlier which currently carry, and may be expected in the future to carry, traffic volumes less than their design capacity.

Enhanced reference markers assist motorists in identifying specific locations along a freeway segment when reporting incidents. These markers are typically small signs provided at one-tenth mile intervals along the freeway system which typically display the highway shield and mile marker. Enhanced reference markers are currently provided in Milwaukee County in the freeway median at each one-tenth mile on USH 45 from the Zoo Interchange to the Milwaukee-Waukesha County line, and on IH 94 from the Mitchell Interchange to the Illinois-Wisconsin State line, including the freeway segments of IH 94 in Kenosha and Racine Counties. It is recommended that enhanced reference markers be provided on the entire regional freeway system.

Freeway service patrols provide for rapid removal of disabled vehicles and initial response to clearing incidents. Freeway service patrols consist of specially equipped vehicles designed to assist disabled motorists and assist in clearance of incidents. Freeway service patrol vehicles may be equipped to provide limited towing assistance, as well as minor services such as fuel, oil, water, and minor mechanical repairs. Freeway service patrols currently operate on the Milwaukee County freeway system and on IH 94 in Kenosha, Racine, and Waukesha Counties. Freeway service patrol operation is limited to weekday peak traffic periods, except in Kenosha and Racine Counties which have weekend operation generally during daylight hours. One freeway service patrol vehicle is in operation in Milwaukee, Racine, and Kenosha Counties during these service hours, and two vehicles are in operation in Waukesha County. The freeway service patrol in Milwaukee County utilizes specially-equipped sport utility vehicles staffed by uniformed officers. The freeway service patrol in the other counties, known as the Gateway Patrol, uses tow trucks. Expansion of the freeway service patrol is recommended to serve the entire regional freeway system, and to provide greater coverage of the Milwaukee County freeway system.

Crash investigation sites are designated safe zones for distressed motorists to relocate to if they are involved in a crash or an incident on the freeway. These sites are used by freeway service patrols and law enforcement to clear vehicles which are disabled or involved in incidents which may be blocking freeway lanes or may be on freeway shoulders. There are 35 crash investigation sites on the southeastern Wisconsin freeway system, with the largest concentration—24 of the 35, or about 69 percent—located on the freeway system in Milwaukee County. These crash investigation sites are typically located in park-ride lots or on freeway exit ramps. It is recommended that the WisDOT evaluate the extent of use and attendant benefits of existing crash investigation sites, and consider expansion to serve the entire regional freeway system.

The Traffic Incident Management Enhancement (TIME) Program, sponsored by the WisDOT, has served to bring together, and coordinate, the transportation engineering, law enforcement, media, emergency responders, transit, tow and recovery, and other freeway system operational interests at monthly meetings. The goals of the TIME program are to improve and enhance freeway incident management, improve freeway safety, and enhance the quality and efficiency of freeway travel. The TIME program has served to propose measures to improve freeway system incident management, many of which have been implemented, and advance the implementation of freeway traffic management as recommended in the regional transportation plan. It is recommended that the TIME program continue to be operated and sponsored by WisDOT.

Ramp closure devices have been deployed on IH 94 in Kenosha, Racine, and Waukesha Counties, on IH 43 in Ozaukee County, and on USH 41 and USH 45 in Washington County. The ramp closure devices are either Type III barricades or swing arm gates. These ramp closure devices allow for the closure of freeway on-ramps during

planned and unplanned major incidents, such as special events and inclement weather. The ramp closure devices allow for law enforcement and public works vehicles to be deployed to incident locations as needed, without requiring the use of these vehicles to block access to freeway on-ramps. It is recommended that WisDOT evaluate the use and attendant benefits of existing ramp closures devices, and consider their application throughout the Region.

Alternate routes are designated, clearly marked and signed surface arterial street and highway routes which generally parallel freeway segments. These routes would be used by motorists during major freeway incidents and ramp closures and during particularly extreme congestion. Motorists would be directed through advisory information to these routes during major incidents and periods of particularly extreme congestion. It is recommended that WisDOT and the Regional Planning Commission, together with the concerned and affected local governments, examine the potential for the designation of alternate routes, possibly by first identifying and implementing a pilot alternate route.

In addition to these existing incident management measures in southeastern Wisconsin, the WisDOT should monitor the evolution of initiatives such as ITS America Vehicle Infrastructure Integration (VII). The VII Initiative is a cooperative effort between Federal and state departments of transportation and vehicle manufacturers to evaluate the feasibility of deploying a communications system which would support vehicle-to-vehicle and vehicle-to-infrastructure communication. The primary benefit of VII deployment would be roadway safety, including collision avoidance.

Surface Arterial Street and Highway Traffic Management

This group of proposed transportation system management measures would attempt to improve the operation and management of the regional surface arterial street and highway network. The proposed surface arterial street and highway traffic management measures are described in detail below, including specific actions proposed to be included in the year 2035 regional transportation system plan.

Coordinated traffic signal systems provide for the efficient progression of traffic along arterial streets and highways, allowing motorists to travel through multiple signalized intersections along an arterial route at the speed limit minimizing or eliminating the number of stops at signalized intersections. These systems may be coordinated via time-based coordination, interconnected pre-timed coordination, traffic responsive, and/or central computer control. Time-based coordination relies on devices within each traffic signal controller to accurately keep time and the signal coordination is based upon a prescribed signal timing plan programmed into each individual traffic signal controller. Interconnected pre-timed coordination may be based either upon the hard wiring or radio connection of each individual traffic signal controller into a master traffic signal controller. Traffic responsive systems are based upon an interconnected system of traffic signals which respond to information provided by traffic detectors to determine appropriate traffic signal cycle lengths and phasing. Central computer control systems are based upon a central computer facility which receives, analyzes, and develops appropriate signal cycle lengths, offsets, and phasing based upon information provided by traffic detectors and then communicates this information to the individual traffic signal controllers. In the Region, coordinated traffic signal systems currently range from systems comprising two traffic signals to systems comprising 100 traffic signals. Approximately 1,100 of the 1,700 traffic signals in the Region, or about 65 percent, are part of a coordinated signal system. This proposed measure recommends the preparation and implementation of coordinated traffic signal plans along all surface arterial street and highway routes in the Region with multiple traffic signals which are located at one-half mile or less spacing. This proposed measure also recommends that agencies coordinate their efforts so that motorists do not experience unnecessary stops or delays due to changes in individual traffic signal jurisdictional authority, with particular emphasis on those routes that may be designated as alternative routes to the freeway system. It is further recommended that Commission staff work with State and local government to document existing and planned arterial street and highway system traffic signals and traffic signal systems, and develop recommendations for improvement and expansion of signal systems, including identifying and addressing obstacles to traffic signal coordination and progression, such as changes in jurisdiction of traffic signal control.

It is recommended that State and local governments consider and implement individual arterial street and highway intersection improvements. These intersection improvements may include geometric improvements, such as adding right- and/or left-turn lanes; improvements in the type of traffic control deployed at the intersection, including two- or four-way stop control, roundabouts, or signalization; or improvements in signal timing at individual signalized intersections. This measure proposes the preparation, review, and updating every two to five years by the State, county, and municipal governmental units of a two to six year program of arterial street and highway intersection improvements under their jurisdiction. It is further recommended that the Commission staff work with State, county, and municipal governments at their request to prepare such programs for arterial street and highway intersections, identifying the need for improvement, and recommended improvements.

It is also recommended that arterial street and highway traffic flow and operation be improved through restricting curb-lane parking during peak traffic periods and operating these curb parking lanes as through traffic lanes. It is recommended that restriction of curb-lane parking as needed during peak periods be considered along about 527 miles, or about 15 percent, of the planned 3,600-mile arterial street and highway system in order to reduce traffic congestion and help to provide good transit service. Local governmental units would consider the proposed curb-lane parking restrictions as traffic volumes and congestion increase, and implement these restrictions rather than consider expansion of highway capacity through widening and new construction beyond that envisioned in the plan. The 527 miles proposed to be considered for curb-lane parking restrictions as needed during peak periods are shown by county on Map 56.

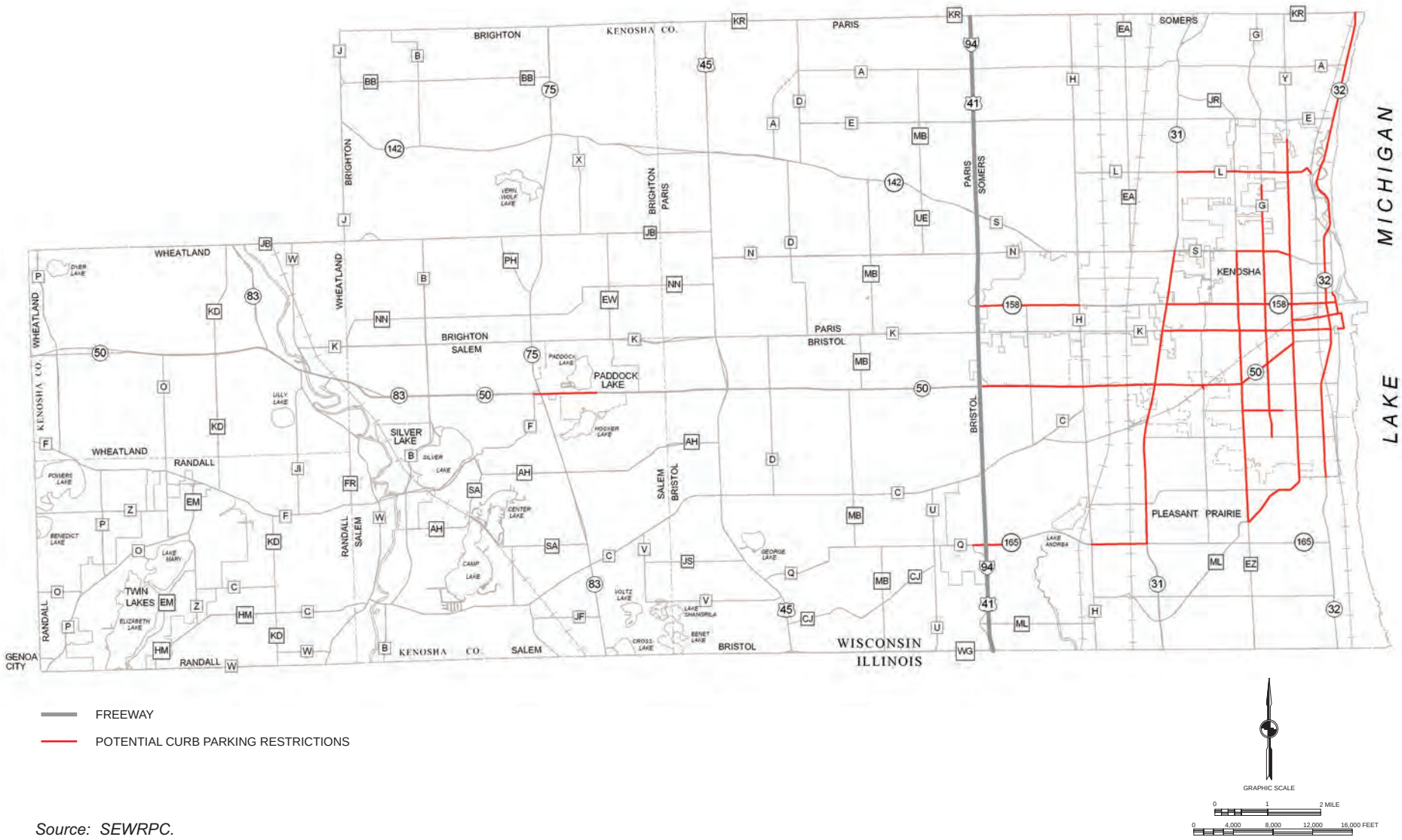
Access management has been, and will continue to be an important tool to improve transportation systems operations and provide for full use of roadway capacity. Access management involves identifying standards for the location, spacing, and operation of driveways—residential and commercial—median openings, and street connections, and recommending and implementing actions to achieve these standards. Failure to properly manage access to the arterial street and highway system may be associated with increased numbers of vehicle crashes, and increased travel times. Implementing sound access management may be expected to reduce both recurring and nonrecurring traffic congestion along the arterial route on which access management has been implemented. The objective of access management plans is to achieve a desirable spacing between adjacent access locations. The WisDOT is developing a state access management plan which will identify goals and standards for access for all state trunk highways and connecting streets, and will propose strategies to achieve those goals and standards. This proposed measure recommends that county and municipal governmental units with arterial street and highways under their jurisdiction also adopt access management standards, consider and implement these standards as development or redevelopment takes place along arterials under their jurisdiction, and prepare and implement access management plans along arterials which currently are developed and have access which violates these standards. A sample set of access management standards is provided in Appendix D of this report. Access management plans would be implemented over time and permit incremental improvements in access management as local units of government consider and approve development and redevelopment along an arterial street or highway. It is recommended that the Commission staff assist county and municipal governments in the preparation of access management plans, at their request.

Advisory information should also be provided to motorists concerning the surface arterial street and highway network in the Region. In addition to the variable message sign recommendation in the freeway traffic management section, it is recommended that the WisDOT improve and expand the data provided on its website (travel times, congestion maps, and camera images) concerning freeway travel to include surface arterial street and highway travel, with particular emphasis on those routes which may be designated as alternative routes to the freeway system as described in the freeway traffic management recommendations. This recommendation may require consideration be given to the installation of additional traffic detectors and/or other data collection devices along the alternative routes until other innovative techniques for data collection become feasible—such as collecting real-time global positioning data from the mobile phones or vehicles of system users.

Emergency vehicle preemption allows emergency vehicles to intervene in the normal operation of traffic signals through wireless technologies. The regular cycle of the traffic signal is interrupted to either change the traffic signal to the green phase or to hold the green phase for the approach from which the emergency vehicle is

Map 56

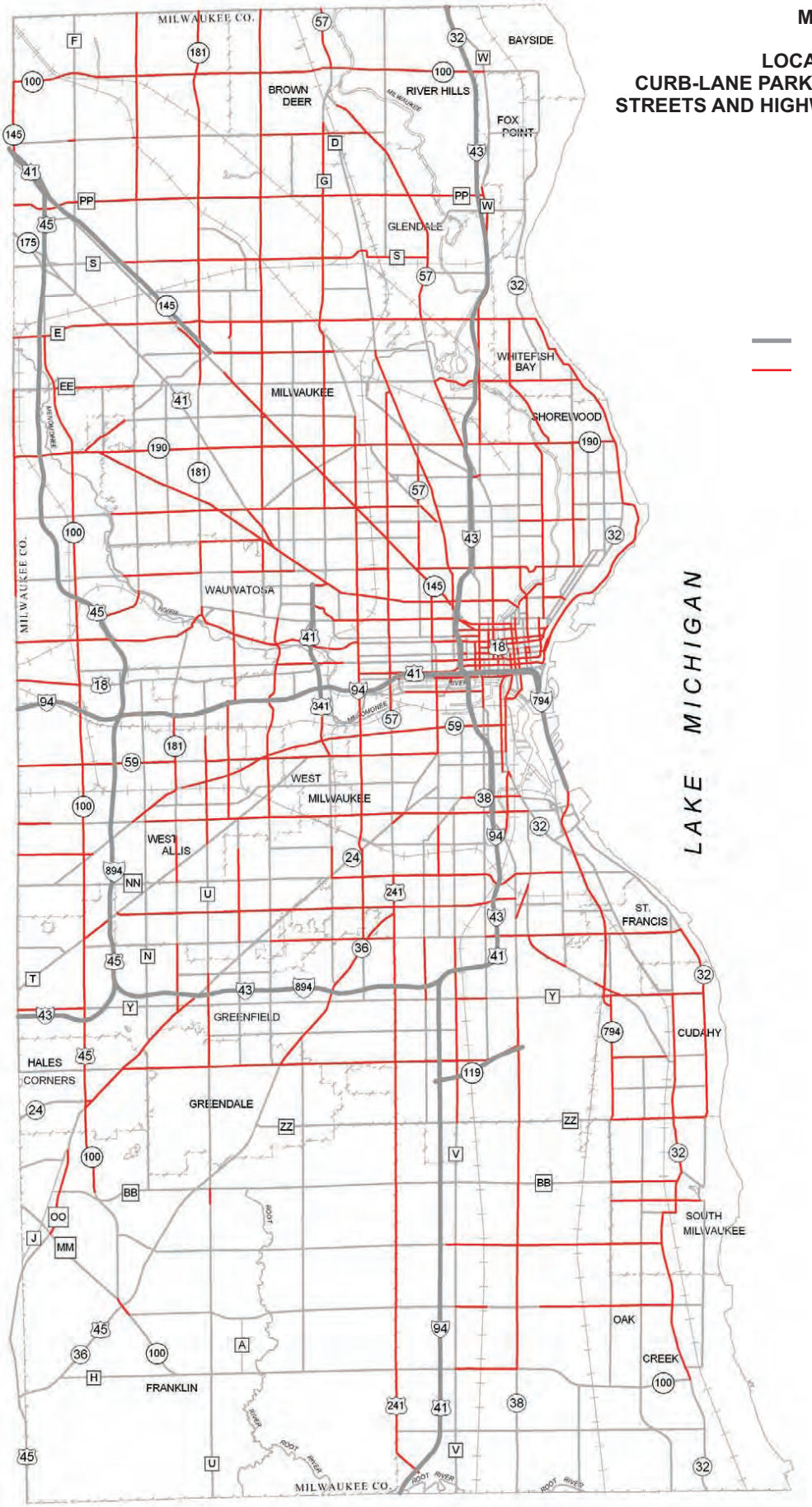
LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN KENOSHA COUNTY: 2035



Source: SEWRPC.

Map 56 (continued)

LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN MILWAUKEE COUNTY: 2035



FREEWAY

POTENTIAL CURB PARKING RESTRICTIONS

GRAPHIC SCALE

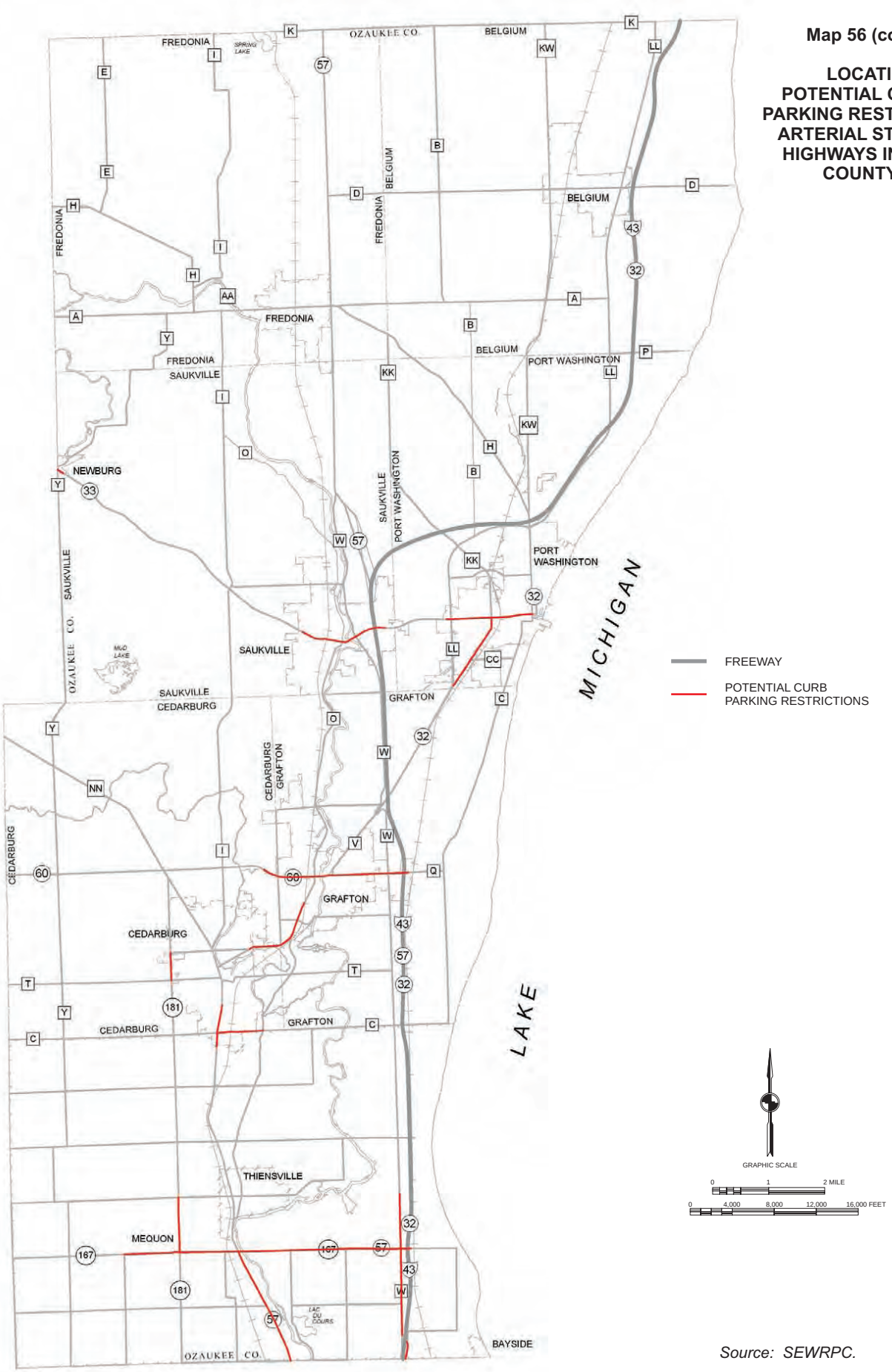
0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Source: SEWRPC.

Map 56 (continued)

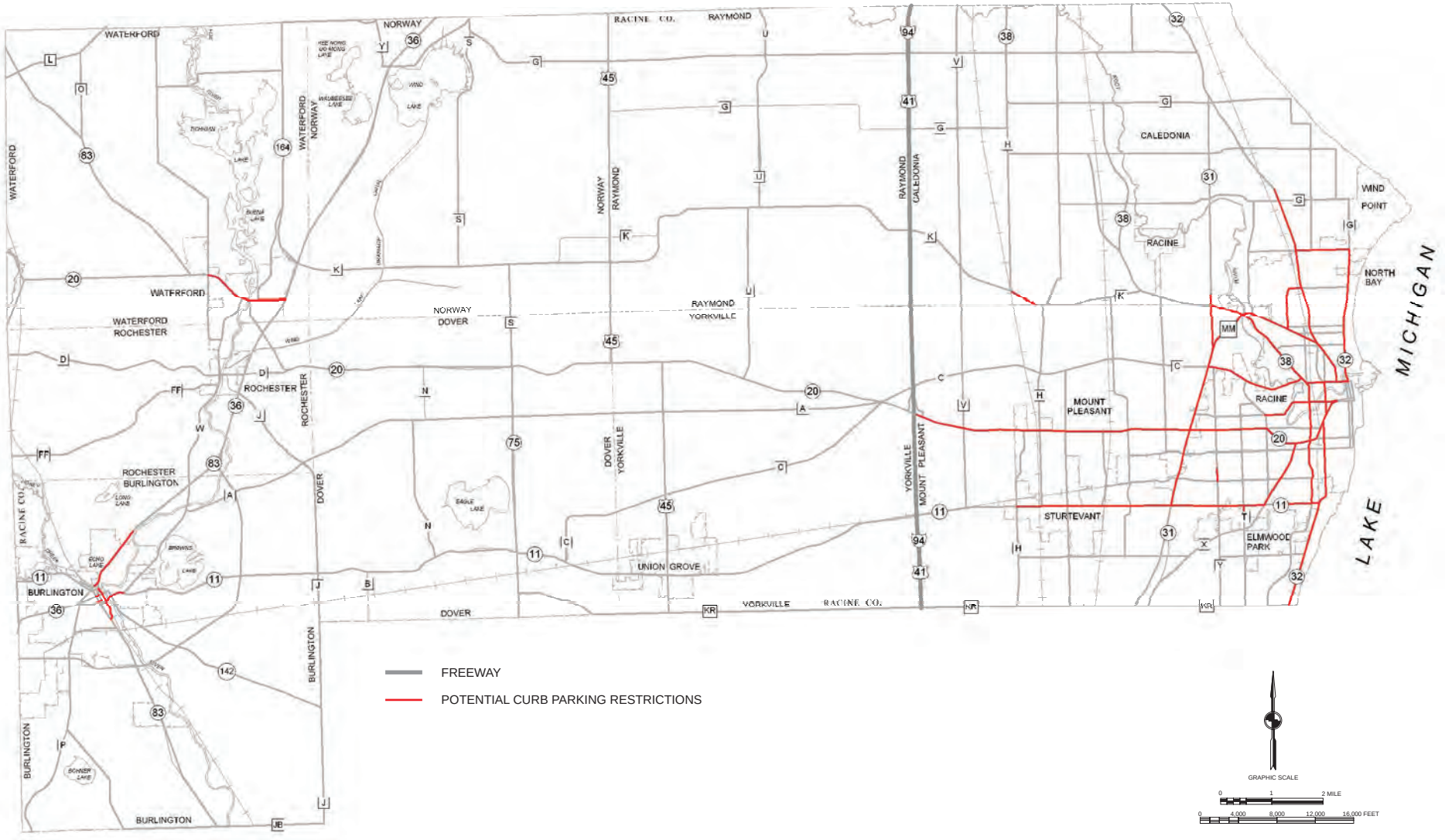
LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN OZAUKEE COUNTY: 2035



Source: SEWRPC.

Map 56 (continued)

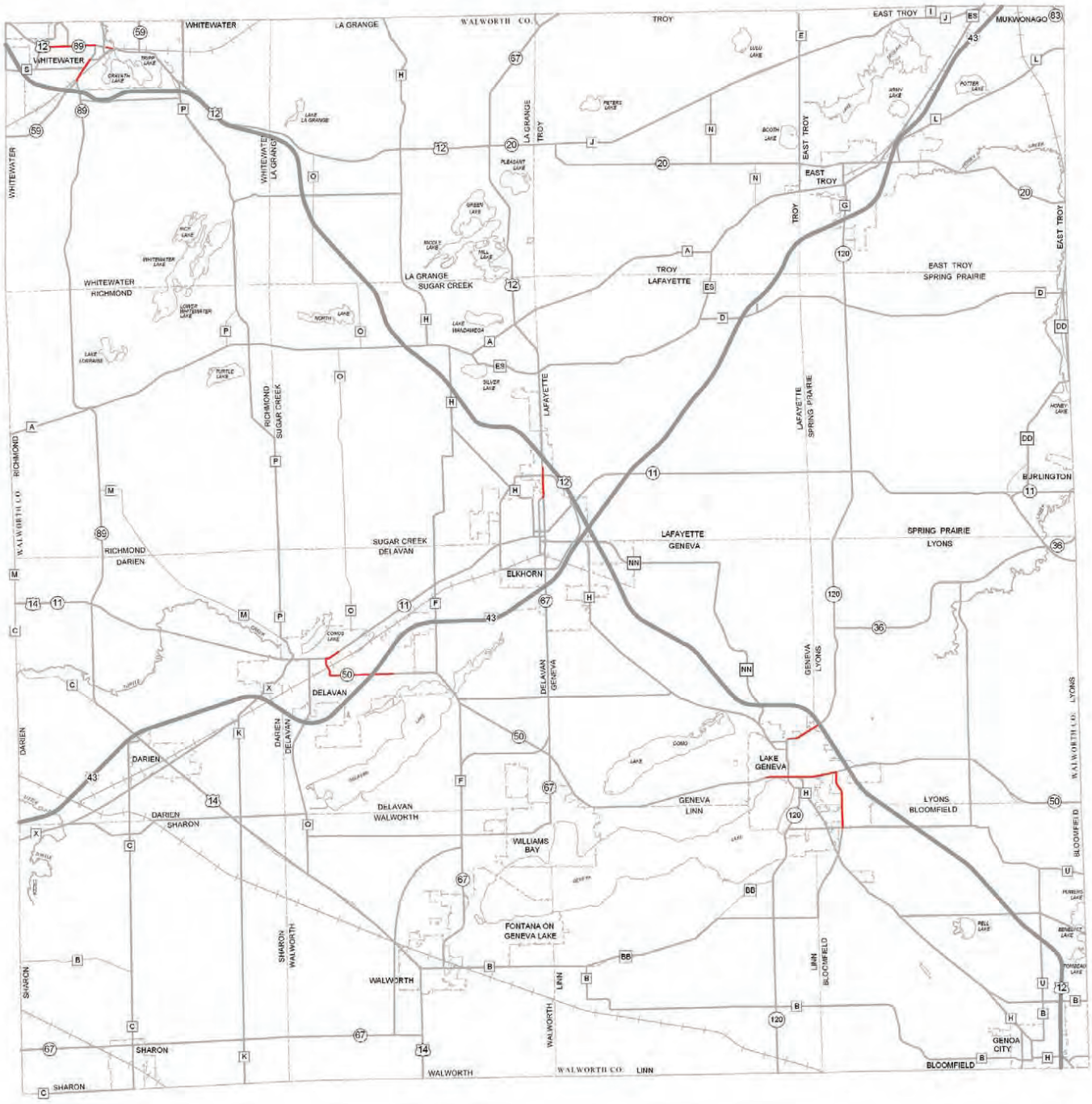
LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN RACINE COUNTY: 2035



Source: SEWRPC.

Map 56 (continued)

LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN WALWORTH COUNTY: 2035



Source: SEWRPC.

Map 56 (continued)

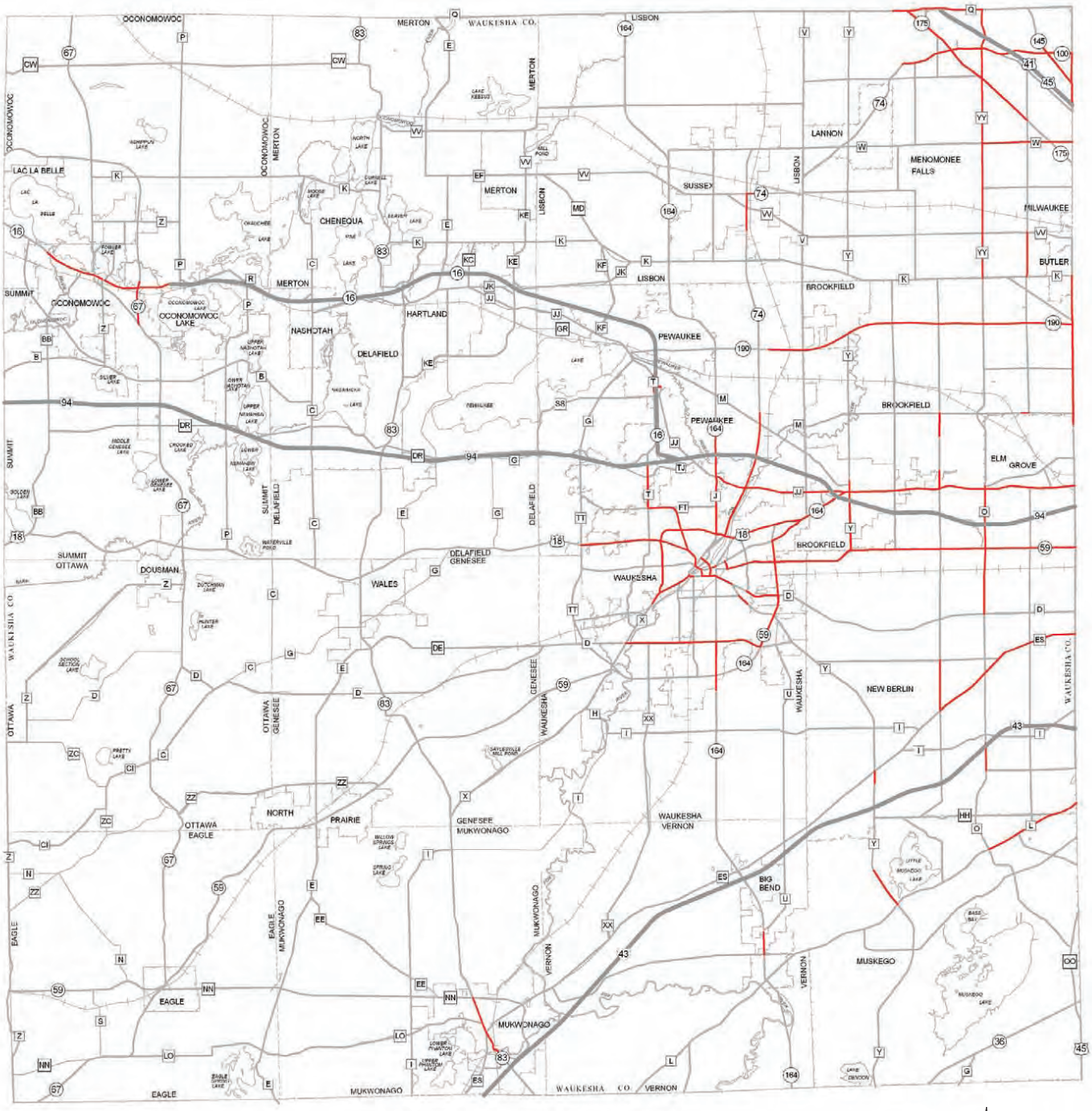
LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN WASHINGTON COUNTY: 2035



Source: SEWRPC.

Map 56 (continued)

LOCATION OF POTENTIAL CURB-LANE PARKING RESTRICTIONS ON ARTERIAL STREETS AND HIGHWAYS IN WAUKESHA COUNTY: 2035



FREEWAY

POTENTIAL CURB PARKING RESTRICTIONS

GRAPHIC SCALE

0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Source: SEWRPC.

oriented. Some governmental units in the Region have implemented emergency vehicle preemption on some or all of the traffic signals under their jurisdictional authority. Approximately 580 of the 1,700 traffic signals, about 34 percent, in the Region are equipped with emergency vehicle preemption capability. This proposed measure includes consideration by the State, county, and local governmental units of providing for emergency vehicle preemption at all of the traffic signals within their jurisdictional authority.

Closed-circuit television cameras provide live video images of traffic conditions. These cameras allow for the identification and confirmation of congested areas and incident locations. The WisDOT currently operates 13 closed-circuit television cameras on the surface arterial street and highway system in southeastern Wisconsin—primarily along the USH 18 corridor between CTH Y (Barker Road) and CTH O (Moorland Road) in Waukesha County, and on STH 100 between CTH E (W. Silver Spring Drive) and W. Lincoln Avenue in Milwaukee County. It is recommended that the surface arterial street and highway CCTV network be particularly considered for all routes which may be designated as alternative routes to the freeway system as described in the freeway traffic management recommendations.

Major Activity Center Parking Management and Guidance

This proposed transportation system management measure would attempt to improve traffic operating conditions in major activity centers by directing motorists to available parking. The City of Milwaukee currently has an initiative to construct a SummerFest shuttle bus parking management and guidance system. This initiative would provide static and dynamic signing indicating the location of parking structures and the availability of parking in those structures for a number of parking structures in the central business district (CBD) which are near SummerFest shuttle bus routes. This proposed measure supports the City of Milwaukee initiative and supports expansion of parking management and guidance systems to incorporate all of the Milwaukee CBD, as well as consideration of advanced parking management and guidance systems within other major activity centers in southeastern Wisconsin.

Regional Transportation Operations Program

In addition to the specific recommendations for transportation systems management categories—freeway traffic management, surface arterial street and highway traffic management, major activity center parking management and guidance—it is recommended that the SEWRPC in cooperation with the WisDOT work jointly to prepare a Regional Transportation Operations Program (RTOP), while seeking involvement and participation from all transportation system operators. It is envisioned that the RTOP would program short-range (three to five year) operational improvement projects for implementation, in part based upon the transportation systems management recommendations in the adopted regional transportation system plan. Additionally, because the focus of the RTOP will primarily be three to five years, and because transportation operations, particularly ITS, involve evolving technologies, the RTOP will provide a basis from which evolving technologies can be monitored and evaluated for implementation in southeastern Wisconsin. This monitoring and evaluation may be expected to lead to amendments of the transportation systems management element of the adopted regional transportation system plan, ensuring that those long-range recommendations remain valid and current, especially recommendations regarding specific technologies.

TESTING AND ASSESSMENT OF TRAVEL IMPLICATIONS OF ALTERNATIVE TRANSPORTATION PLAN INCLUDING ONLY PUBLIC TRANSIT, BICYCLE AND PEDESTRIAN, TRAVEL DEMAND MANAGEMENT, AND TRANSPORTATION SYSTEMS MANAGEMENT ELEMENTS

This section of the chapter provides an assessment of the consequences for travel and traffic of an alternative transportation plan for Southeastern Wisconsin for the year 2035 which would include no arterial street and highway system capacity expansion, and compares this alternative to a “no-build” alternative. This transportation plan alternative which does not include any arterial street and highway system capacity expansion—the transportation systems management or TSM plan alternative—does include improvement and expansion of all other potential transportation plan elements, including public transit, bicycle, and pedestrian facilities, travel

Table 103

SELECTED SOCIO-ECONOMIC AND TRANSPORTATION CHARACTERISTICS OF THE REGION: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a,b]

Characteristic	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan	Percent Change	TSM Plan	Percent Change
Population	1,938,500	2,276,000	17.4	2,276,000	17.4
Households	759,500	925,700	21.9	925,700	21.9
Employment	1,218,400	1,368,300	12.3	1,368,300	12.3
Personal Vehicles Available	1,292,900	1,514,100	17.1	1,483,700	14.8
Internal Person Trips	6,031,300	7,228,700	19.9	7,206,000	19.5
Persons per Vehicle	1.50	1.50	0.0	1.53	2.0
Vehicles per Household	1.70	1.64	-3.5	1.60	-5.9
Trips Per Capita	3.10	3.20	3.2	3.20	3.2
Trips per Household	7.90	7.80	-1.3	7.80	-1.3

[a] *The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion*.

[b] *Does not include group-quartered person trips or bicycle and pedestrian trips*.

Source: SEWRPC.

Table 104

DISTRIBUTION OF INTERNAL PERSON TRIPS WITHIN THE REGION BY TRIP PURPOSE: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a,b]

Mode of Travel	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan	Percent Change	TSM Plan	Percent Change
Home-Based Work	1,435,300	1,665,500	16.0	1,656,800	15.4
Home-Based Shopping	761,600	917,700	20.5	915,000	20.1
Home-based Other	1,926,500	2,340,400	21.5	2,334,200	21.2
NonHome-Based	1,215,000	1,460,100	20.2	1,454,900	19.7
Total	5,338,400	6,383,700	19.6	6,360,900	19.2

[a] *The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

[b] *Does not include group-quartered person trips or bicycle and pedestrian trips.*

Source: SEWRPC.

demand management, and transportation systems management. With respect to public transit, this alternative includes for the purpose of travel and traffic forecasting, the potential commuter rail system and bus guideway/light rail system identified as possible options to bus rapid transit and bus express transit system elements. The “no-build” alternative is a baseline alternative which assumes no improvement or expansion of the Region’s transportation system, and only provides for operating, maintaining, and reconstructing the existing year 2005 regional transportation system.

The forecast travel and traffic in the year 2035 under each of these two transportation plan alternatives is presented in Tables 103 through 108, and compared to base year 2001 travel. The forecast growth to the year 2035 of 17 percent in Region population, 22 percent in households, and 12 percent in employment may be expected to result in about a 19 percent increase in weekday trip-making by Region residents, a 23 percent increase in weekday vehicle trips within the Region, and a 36 percent increase in vehicle-miles of travel within

Table 105

DISTRIBUTION OF INTERNAL PERSON TRIPS WITHIN THE REGION BY MODE: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a,b]

Mode of Travel	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan	Percent Change	TSM Plan	Percent Change
Automobile Driver	4,523,100	5,558,500	22.9	5,491,900	21.4
Automobile Passenger	1,144,200	1,245,200	8.8	1,244,500	8.8
Transit Passenger	142,200	134,200	-5.6	178,800	25.7
School Bus Passenger	221,800	290,800	31.1	290,800	31.1
Total	6,031,300	7,228,700	19.9	7,206,000	19.5

[a] *The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

[b] *Does not include group-quartered person trips or bicycle and pedestrian trips.*

Source: SEWRPC.

Table 106

DISTRIBUTION OF VEHICLE TRIPS WITHIN THE REGION BY TRIP AND VEHICLE TYPE: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a]

Vehicle Class	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan	Percent Change	TSM Plan	Percent Change
Automobile					
Internal	4,523,100	5,558,500	22.9	5,491,900	21.4
External	290,900	495,300	70.3	495,300	70.3
Other	9,100	11,000	20.9	11,000	20.9
Subtotal	4,823,100	6,064,800	25.7	5,998,200	24.4
Commercial Truck					
Internal	582,500	645,300	10.8	645,300	10.8
External	66,600	95,400	43.2	95,400	43.2
Subtotal	649,100	740,700	14.1	740,700	14.1
Total	5,472,200	6,805,500	24.4	6,738,900	23.1

[a] *The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

Source: SEWRPC.

the Region on an average weekday. Compared to the "no-build" plan, the transportation plan alternative with public transit, bicycle and pedestrian, travel demand management, and transportation systems management expansion would be expected to result in substantially greater transit ridership (33 percent) and marginally less resident weekday trip-making (0.3 percent), weekday vehicle trips (1 percent), and weekday vehicle-miles of travel (1 percent).

Tables 109 and 110 and Maps 57 and 58 present existing year 2001 arterial street and highway system traffic congestion and forecast year 2035 arterial street and highway system traffic congestion and highway system traffic congestion under the TSM plan alternative proposing only public transit, bicycle and pedestrian, travel demand management, and transportation system management improvement and expansion. For the purposes of travel forecasting and identifying future traffic congestion and potential needed arterial street and highway capacity expansion, this TSM plan alternative included the potential commuter rail system and bus guideway/light rail system identified as potential options to bus rapid and express transit system elements. This was done so that

Table 107

VEHICLE-MILES OF TRAVEL ON THE ARTERIAL STREET AND HIGHWAY SYSTEM WITHIN THE REGION BY COUNTY: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a]

County	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan	Percent Change	TSM Plan	Percent Change
Kenosha	3,126,000	4,853,000	55.2	4,839,000	54.8
Milwaukee	16,377,000	18,999,000	16.0	18,662,000	14.0
Ozaukee	2,259,000	3,244,000	43.6	3,224,000	42.7
Racine	3,383,000	4,853,000	43.5	4,827,000	42.7
Walworth	2,335,000	4,372,000	87.2	4,371,000	87.2
Washington	3,095,000	4,908,000	58.6	4,896,000	58.2
Waukesha	9,107,000	12,990,000	42.6	12,894,000	41.6
Total	39,682,000	54,219,000	36.6	53,713,000	35.4

[a]*The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

Source: SEWRPC.

Table 108

TRANSIT SYSTEM PERFORMANCE IN THE REGION: 2001 AND 2035 NO-BUILD AND ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a]

Transit System Characteristics	Base Year 2001	Year 2035 Alternative Plans			
		No-Build Plan[b]		TSM Plan	
		Number	Percent Change	Number	Percent Change
Service Provided, Average Weekday					
Revenue Vehicle-Miles					
Rapid	8,300	7,900	-4.8	24,000	189.2
Express	2,300	- -	-100.0	17,000	639.1
Local	69,000	61,100	-11.4	97,000	40.5
Total	79,600	69,000	-13.3	138,000	73.4
Revenue Vehicle-Hours					
Rapid	380	50	-7.9	1,100	189.5
Express	160	- -	-100.0	1,100	587.5
Local	5,330	4,750	-10.9	8,900	67.0
Total	5,870	5,100	-13.1	11,100	89.1
Service Utilization					
Ridership					
Average Weekday Revenue Passengers	142,200	134,200	-5.6	178,800	25.7

[a]*The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

[b] *The no-build plan represents the existing year 2005 transit system of the Region.*

Source: SEWRPC.

the identification of needed arterial street and highway system capacity would be conservative, and represent what would be needed in the Region even if improvements and expansion were made in this Region with respect to travel demand management, bicycle and pedestrian facilities, and public transit, including development of a commuter rail rapid transit system and bus guideway/light rail express transit system. The TSM alternative plan proposing public transit, bicycle and pedestrian, travel demand management, and transportation systems

Table 109

AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION BY COUNTY: YEAR 2001 AND YEAR 2035 ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT PLAN[a,b]

	Existing Base Year 2001								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	303.2	95.5	9.9	3.1	1.5	0.5	3.0	0.9	317.6
Milwaukee	641.1	82.0	72.1	9.2	24.7	3.2	43.4	5.6	781.3
Ozaukee	244.2	97.4	4.3	1.7	1.5	0.6	0.8	0.3	250.8
Racine	341.3	96.8	9.4	2.7	0.5	0.1	1.4	0.4	352.6
Walworth	430.1	98.4	5.1	1.2	1.1	0.3	0.3	0.1	436.6
Washington	391.1	96.2	15.4	3.8	--	--	--	--	406.5
Waukesha	650.9	87.2	70.7	9.5	11.4	1.5	13.4	1.8	746.4
Region	3,001.9	91.2	186.9	5.7	40.7	1.2	62.3	1.9	3,291.8

	Year 2035 TSM Plan								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	298.9	83.7	44.7	12.5	3.3	0.9	10.2	2.9	357.1
Milwaukee	576.2	72.4	109.5	13.8	25.5	3.2	84.6	10.6	795.8
Ozaukee	264.8	87.6	31.8	10.5	2.2	0.7	3.7	1.2	302.5
Racine	379.2	90.4	36.1	8.6	0.7	0.2	3.3	0.8	419.3
Walworth	441.1	94.2	14.7	3.1	3.2	0.7	9.6	2.0	468.6
Washington	382.1	89.8	31.5	7.4	7.1	1.6	5.0	1.2	425.7
Waukesha	571.6	74.6	109.8	14.3	25.9	3.4	59.0	7.7	766.3
Region	2,913.9	82.4	378.1	10.7	67.9	1.9	175.4	5.0	3,535.3

[a]*The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

[b]*The level of congestion shown above is the congestion experienced during the morning and afternoon peak traffic hours and may be summarized by the following operating conditions.*

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Some restrictions on ability to maneuver and change lanes.
Moderate	D	1 to 2 mph below free-flow speed	Substantial restrictions on ability to maneuver and change lanes.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Surface Arterial			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	70 to 100 percent of free-flow speed	Ability to maneuver within traffic stream is impeded. Control delay at signalized intersections is minimal.
None	C	50 to 100 percent of free-flow speed	Restricted ability to maneuver and change lanes at mid-block locations.
Moderate	D	40 to 50 percent of free-flow speed	Restricted ability to maneuver and change lanes. Small increases in flow lead to substantial Increases in delay and decreases in travel speed.
Severe	E	33 to 40 percent of free-flow speed	Significant restrictions on lane changes. Traffic flow approaches instability.
Extreme	F	25 to 33 percent of free-flow speed	Flow at extremely low speeds. Intersection congestion with high delays, high volumes, and extensive queuing.

Source: SEWRPC.

Table 110

SOUTHEASTERN WISCONSIN FREEWAY SYSTEM TRAFFIC CONGESTION ON AN AVERAGE WEEKDAY: YEAR 2001 AND YEAR 2035 ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN[a,b]

ESTIMATED EXISTING YEAR 2001

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	24.4	9.0	1.4	3.3	4.4	9.1
Severe	19.8	7.3	--	1.5	2.5	4.0
Moderate	20.8	7.8	--	--	2.2	2.2
Total	65.0	24.1	--	--	--	--

FORECAST YEAR 2035 UNDER TSM PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	47.0	17.5	1.5	3.6	4.7	9.8
Severe	21.4	8.0	--	1.4	2.6	4.0
Moderate	56.4	21.0	--	0.2	1.5	1.7
Total	124.8	46.5	--	--	--	--

[a]*The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion.*

[b]*Congestion on freeways may be summarized by the following operating conditions:*

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Some restrictions on ability to maneuver and change lanes.
Moderate	D	1 to 2 mph below free-flow speed	Substantial restrictions on ability to maneuver and change lanes.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Source: SEWRPC.

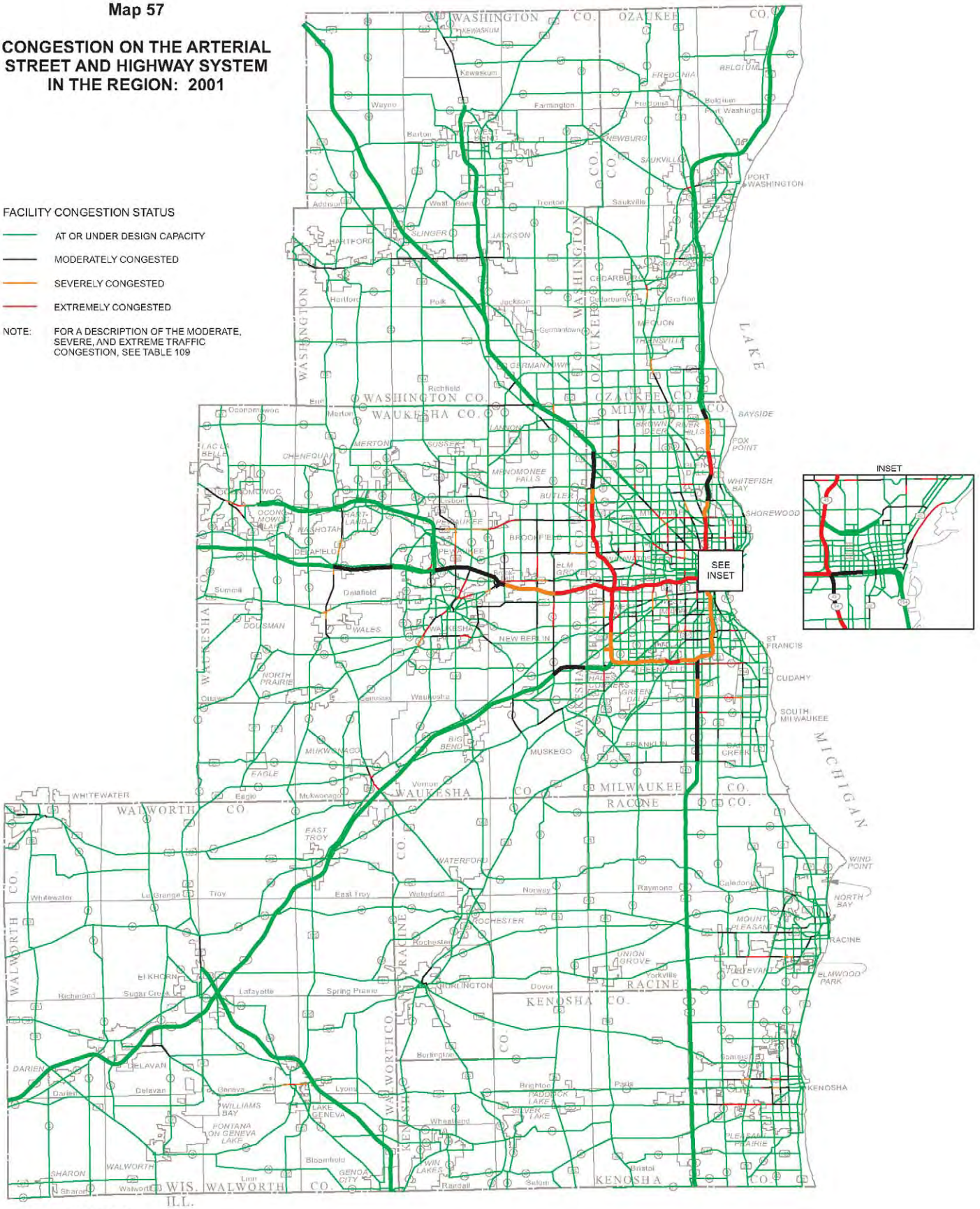
management expansion may be expected to result in about a doubling of traffic congestion in the year 2035 compared to existing levels of congestion, and representing only a modest reduction in future congestion compared to a “no-build” plan.

Therefore, a third plan alternative was developed—the TSM Plus Highway alternative—which included all recommendations of the TSM plan—improved and expanded public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management—and arterial street and highway capacity expansion to address the congestion that would remain even with full implementation of the TSM plan.

The next section of this chapter provides an assessment of the travel and traffic implications of this third regional transportation plan alternative, and compares it to the previous two alternatives. Also presented is an evaluation and comparison of the costs and benefits of those three transportation plan alternatives for the Region with respect to their broadly defined costs and benefits—specifically, the extent they attain the previously defined transportation system objectives.

Map 57

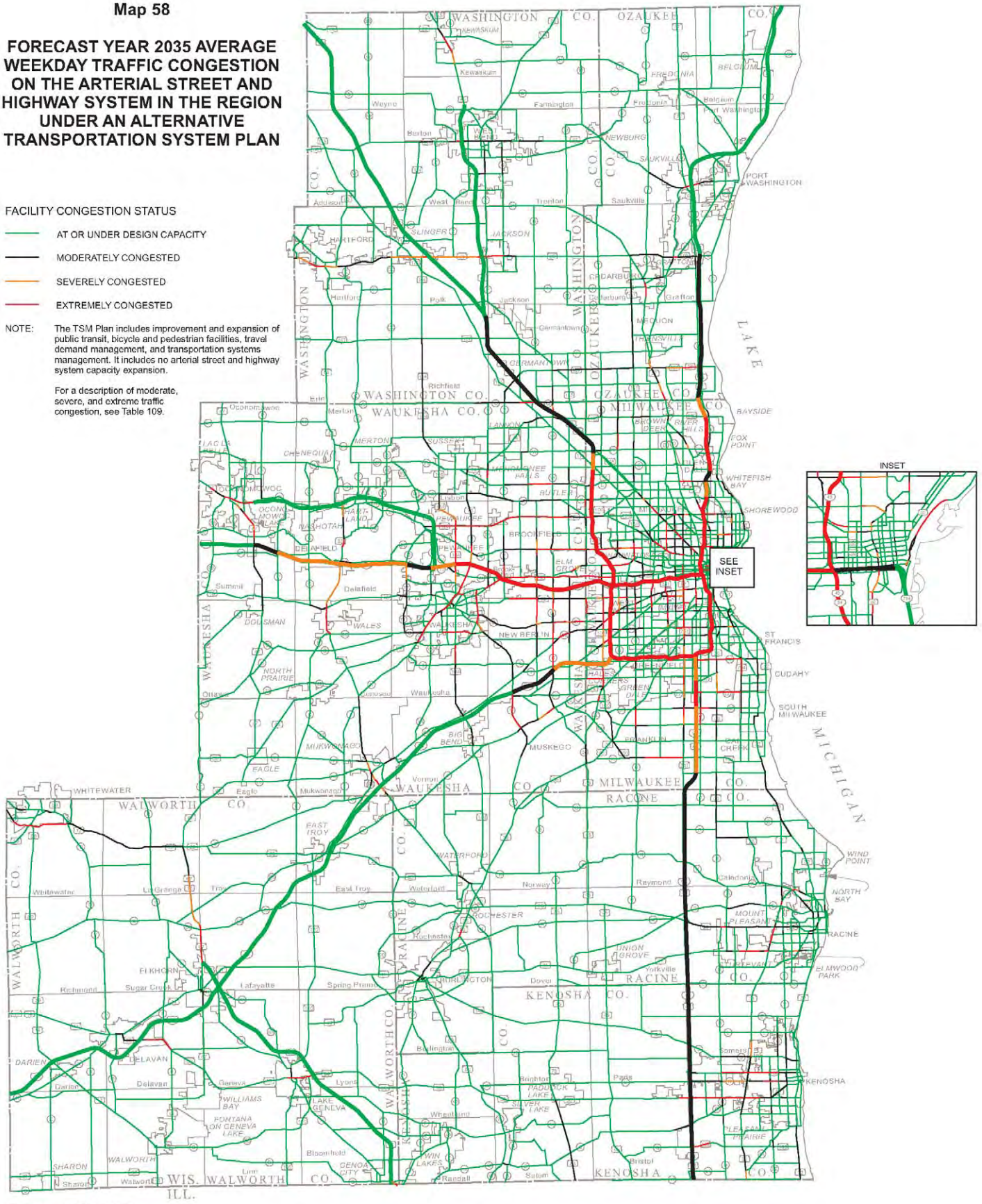
CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION: 2001



Source: SEWRPC.

Map 58

FORECAST YEAR 2035 AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION UNDER AN ALTERNATIVE TRANSPORTATION SYSTEM PLAN



Source: SEWRPC.

EVALUATION AND COMPARISON OF ALTERNATIVE REGIONAL TRANSPORTATION SYSTEM PLANS

This section of the chapter documents an evaluation and comparison of three alternative transportation system plans for the year 2035 for the seven county southeastern Wisconsin Region. The three alternative plans are:

- No-build plan—which would maintain the existing transportation system including continuing to operate the existing public transit system as it existed in the year 2005, to resurface and reconstruct without additional traffic lanes the existing arterial street and highway system, and operate and manage the transportation system as it was operated and managed in 2005;

- Transportation Systems Management Plan (TSM)—which would include all proposed improvements to the transportation system with the exception of arterial street and highway capacity expansion. This would include public transit, bicycle and pedestrian, transportation systems management, and travel demand management elements as outlined earlier in this chapter;

- Transportation systems management plus arterial street and highway capacity expansion (TSM Plus Highway)—which would include the elements of the TSM plan alternative plus the arterial street and highway capacity expansion outlined on Maps 59 through 65 necessary to address the congestion which would remain even with full implementation of the TSM plan. (Appendix E to this report documents the consideration of alternative new freeway interchanges, Appendix F documents consideration of alternative freeway system improvements, and Appendix G documents consideration of the provision of high occupancy vehicle, high occupancy vehicle and toll lanes, and truck only lanes for the proposed additional freeway lanes in southeastern Wisconsin.[6]) The arterial street and highway element of the TSM Plus Highway regional transportation plan alternative totals 3,627 route-miles. Approximately 88 percent, or 3,196 of these route-miles, are recommended to be resurfaced and reconstructed to their same capacity. Approximately 346 route-miles, or less than 10 percent of the year 2035 arterial street and highway system are recommended for widening to provide additional through traffic lanes, including 127 miles of freeways. The remaining 85 route-miles, or about 2 percent of the total arterial street mileage, are proposed new arterial facilities.

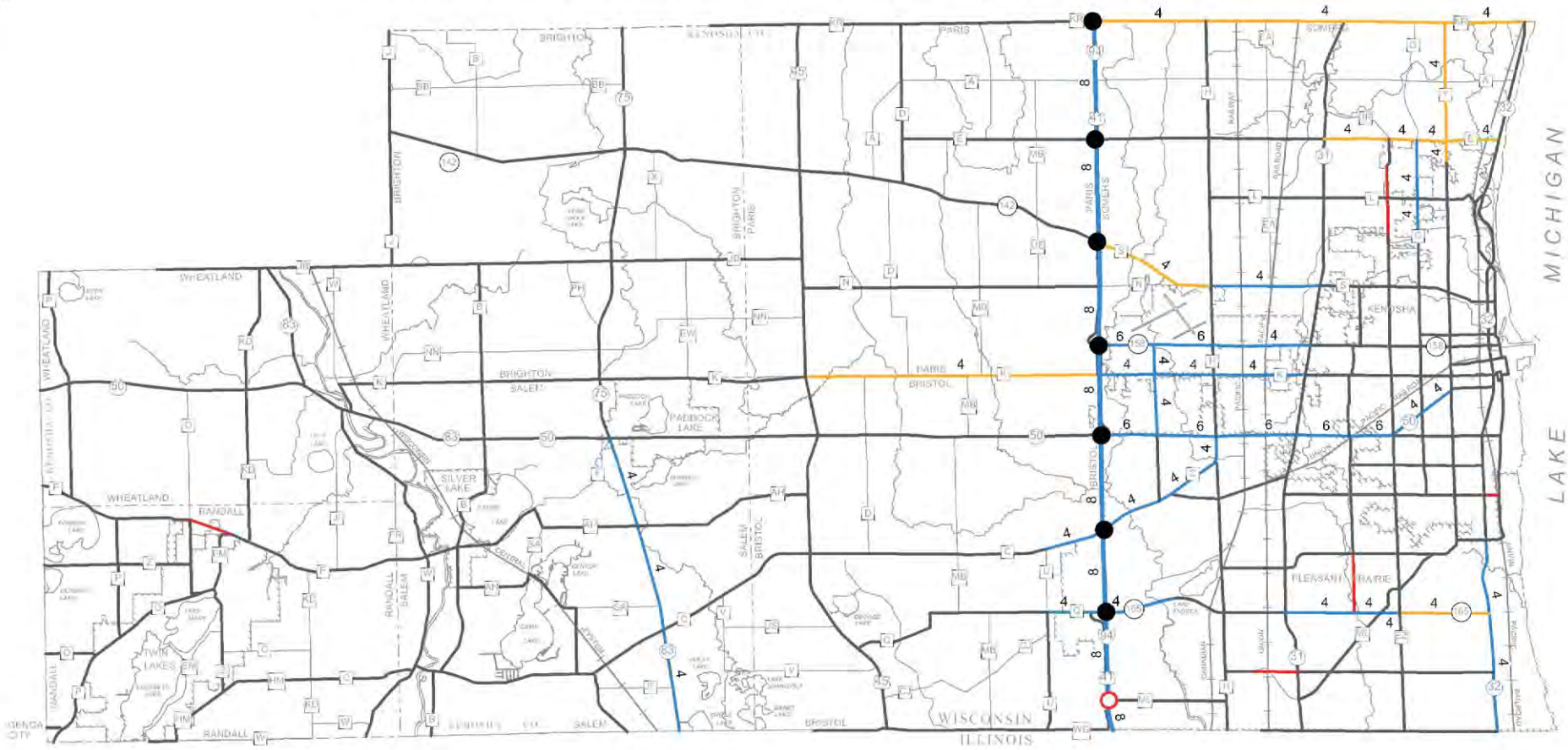
  The highway improvements included in this TSM Plus Highway plan alternative were recommended to address the residual congestion which may not be expected to be alleviated by proposed land use, systems management, demand management, bicycle and pedestrian facilities, and public transit measures proposed in the plan alternative. Each proposed arterial street and highway improvement, expansion, and preservation project would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a planned project will proceed to implementation will be made by the responsible State, county or municipal government at the conclusion of preliminary engineering.

  The 127 miles of freeway widening proposed in the plan alternative and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of the preliminary engineering would a determination be made as to how the freeway would be reconstructed.

[6] *The provision of high occupancy vehicle or high occupancy vehicle and toll lanes was considered for the proposed additional freeway lanes in Southeastern Wisconsin. Appendix G to this report documents the reasons for recommending these additional freeway lanes be provided as regular lanes.*

Map 59

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN KENOSHA COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- EXISTING

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

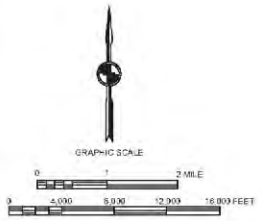
1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH K in Kenosha County including through the provision of collector-distributor roadways connecting CTH K and STH 158, and an additional potential new future freeway interchange at CTH ML with IH 94. Should the preliminary engineering study conclude with a recommendation to construct one or both of the interchanges, the Regional Planning Commission, upon request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

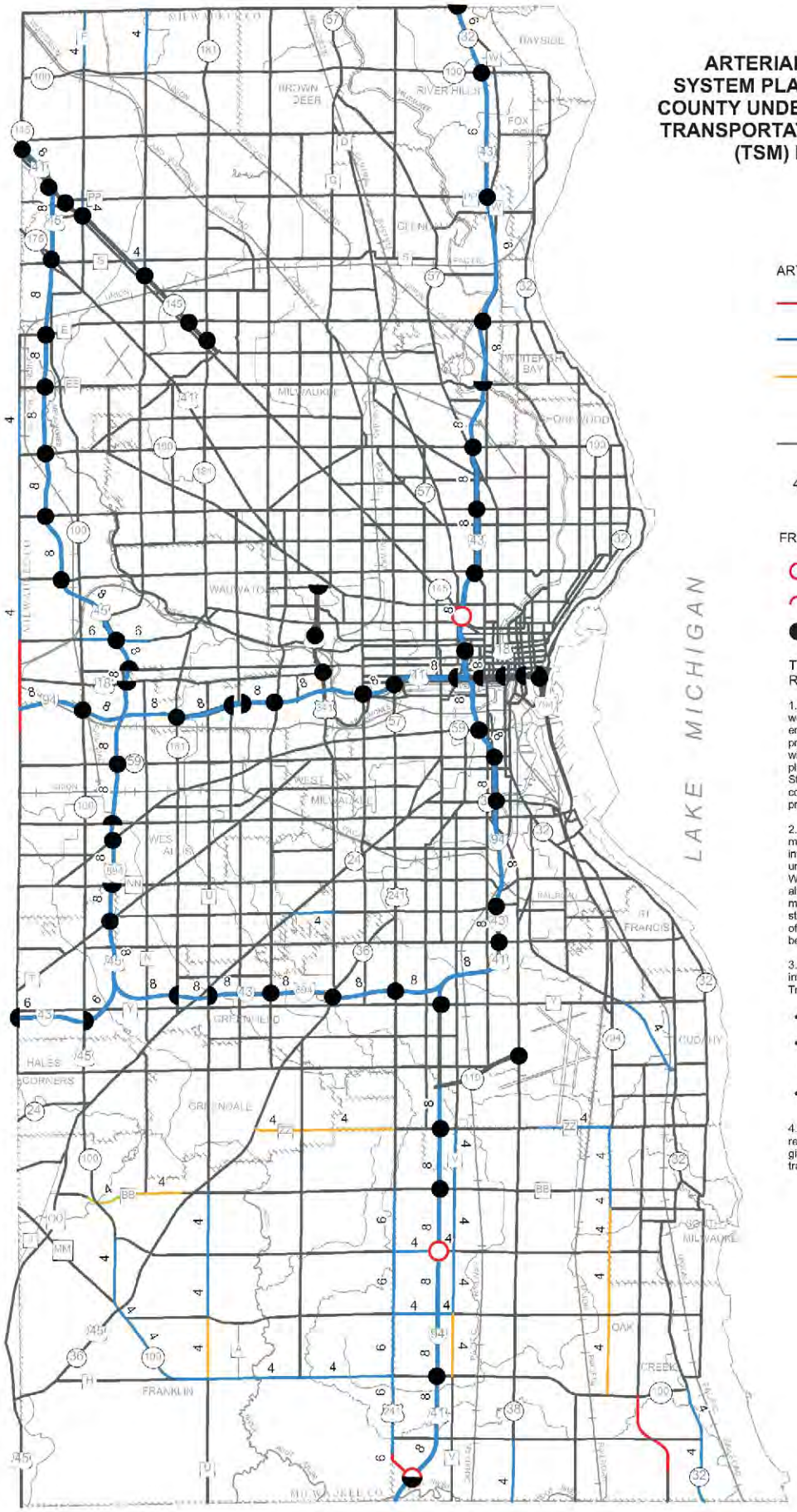
4. Sufficient right-ofway should be reserved along STH 158 from CTH H to STH 31 to accommodate its ultimate improvement to six travel lanes.

5. Sufficient right-of-way should be reserved along CTH K from IH 94 to STH 31 to accommodate its ultimate Improvement to six travel lanes.



Map 60

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN MILWAUKEE COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- NEW HALF
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the S. 27th Street with IH 94 interchange to a full interchange;
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

4. The plan also recommends that during preliminary engineering for the reconstruction of STH 100 from W. Forest Home Avenue to IH 43, consideration be given to alternatives without additional traffic lanes, alternatives with additional traffic lanes or auxiliary lanes, and alternatives with frontage roads.

GRAPHIC SCALE

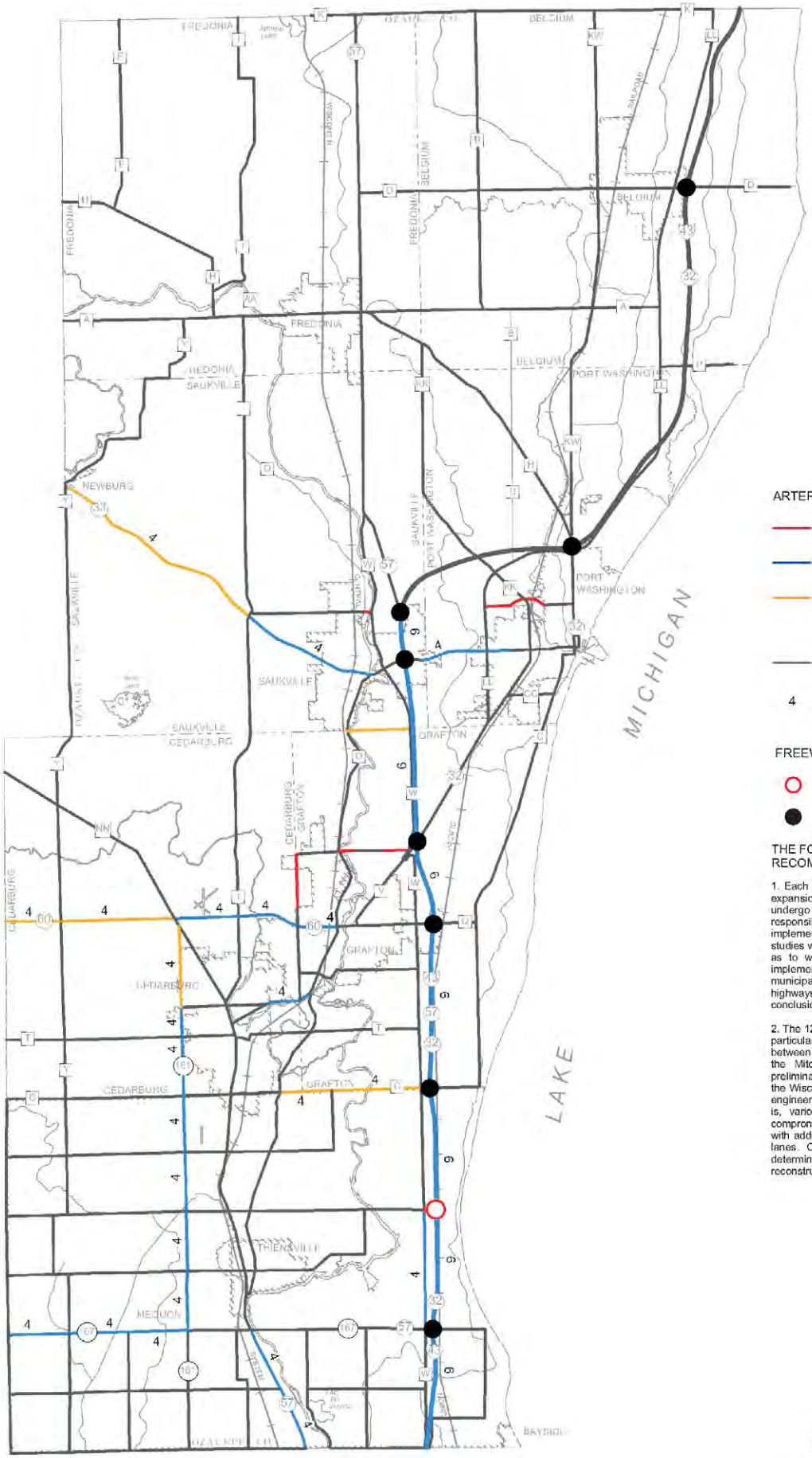
0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Source: SEWRPC.

Map 61

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN OZAUKEE COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

GRAPHIC SCALE

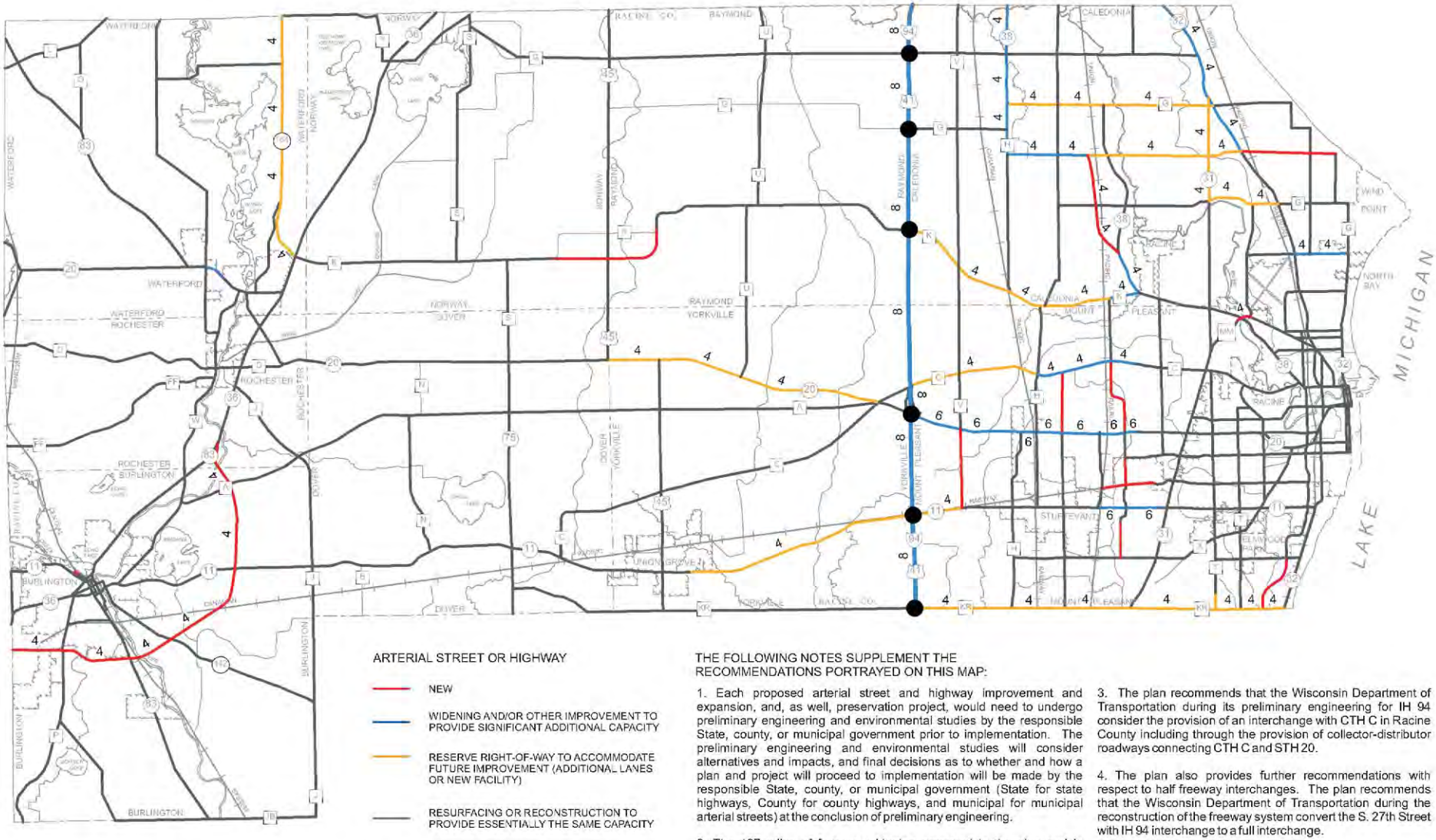
0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Source: SEWRPC.

Map 62

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN RACINE COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH C in Racine County including through the provision of collector-distributor roadways connecting CTH C and STH 20.

4. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system convert the S. 27th Street with IH 94 interchange to a full interchange.

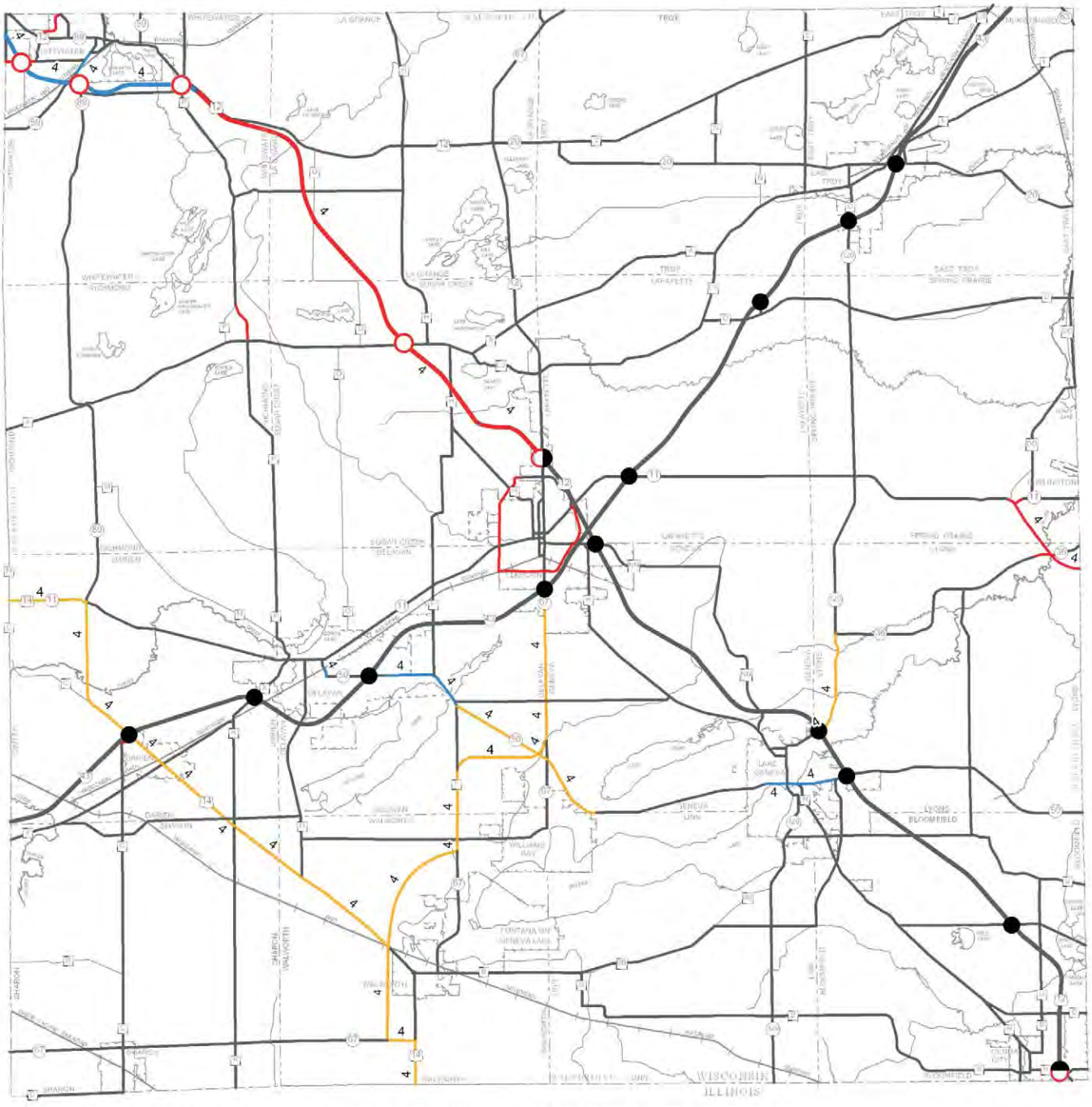
GRAPHIC SCALE

0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Map 63

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WALWORTH COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- NEW HALF
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The plan identifies additional potential new future freeway interchanges, and recommends that action be taken by the local governments to preserve the potential necessary right-of-way to assure that the future development of these interchanges is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange. These potential future new interchanges are CTH B and Bloomfield Road with USH 12 and CTH F with IH 43.

GRAPHIC SCALE

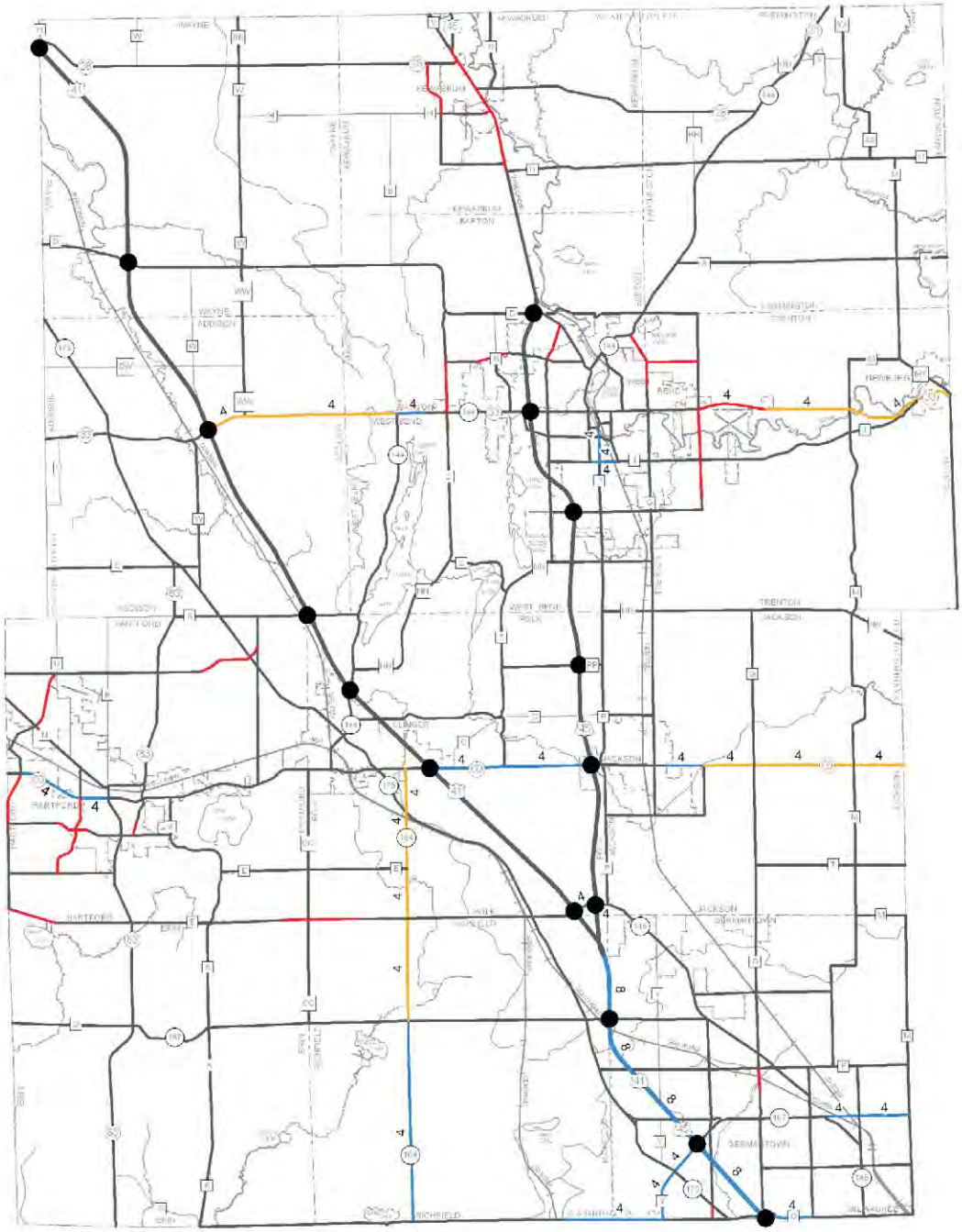
0 4,000 8,000 12,000 16,000 FEET

1 0 1 2 MILE

Source: SEWRPC.

Map 64

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WASHINGTON COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

GRAPHIC SCALE

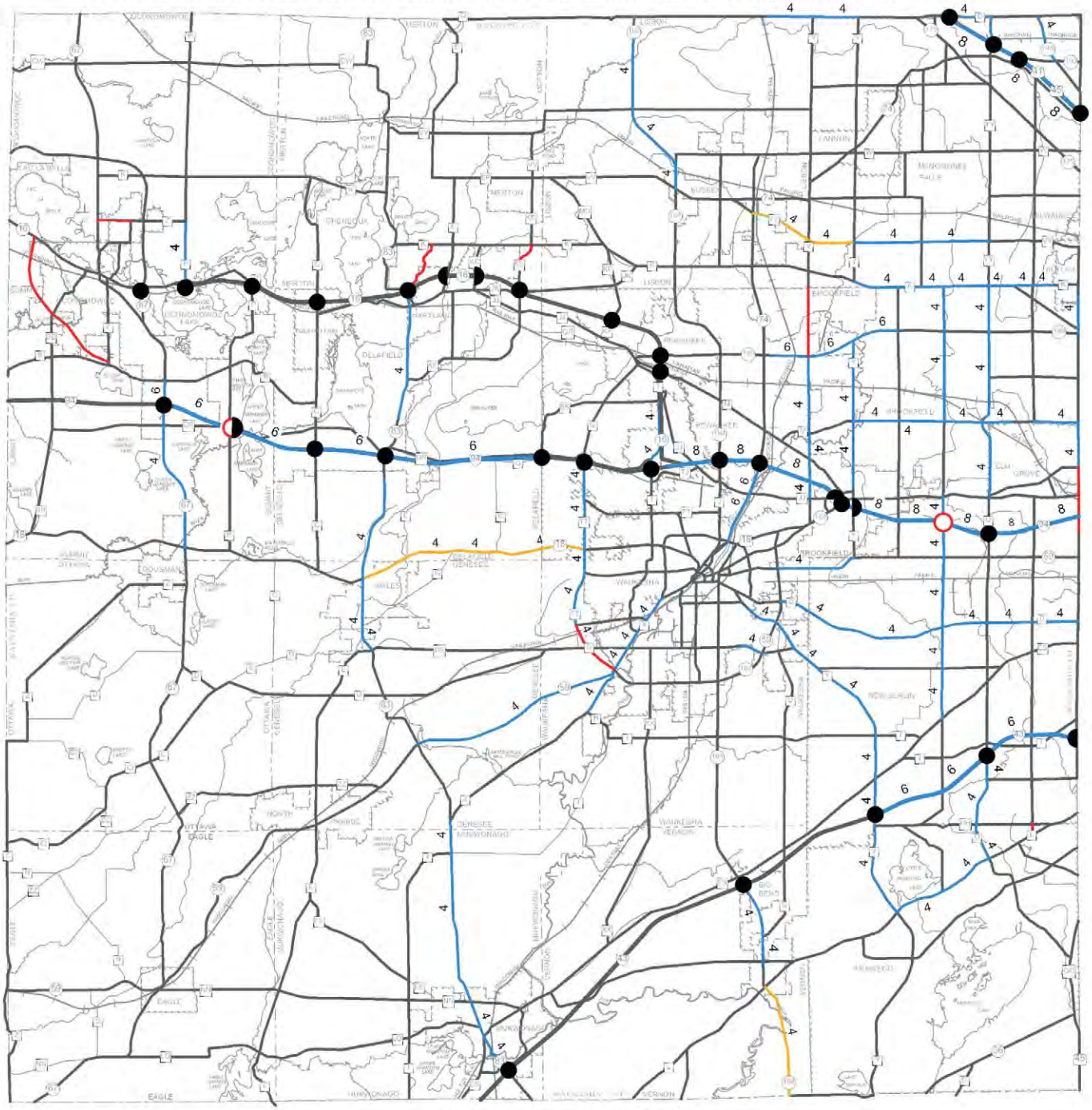
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 65

ARTERIAL STREET AND HIGHWAY SYSTEM PLAN ELEMENT IN WAUKESHA COUNTY UNDER THE 2035 YEAR REGIONAL TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLUS HIGHWAY PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- NEW HALF
- EXISTING

GRAPHIC SCALE

0 1 2 MILE

0 4,000 8,000 12,000 16,000 FEET

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the CTH P with IH 94 interchange to a full interchange.
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

The evaluation and comparison of these three alternative plans was conducted with respect to the transportation system objectives and standards as presented in Chapter VII of this report. The objectives and standards address transportation plan consistency with the regional land use plan, transportation plan capital and annual operating and maintenance costs, level of transportation service provided, the convenient and efficient movement of people and goods, impacts on the built and natural environment, travel safety, and energy consumption.

Consistency with Planned Regional Land Use Pattern

The year 2035 regional land use plan is shown on Map 66. Consistency with the regional land use plan is measured by the transportation plan providing a higher level of accessibility, and improvements in accessibility, to areas recommended for development and redevelopment, as compared to areas not recommended for development. The measure of accessibility used is the travel time from each subarea of the Region to all existing jobs in the Region, and mathematically is the summation of the inverse of travel time to each existing job in the Region. Thus, a higher level of accessibility indicates better access to jobs and activity within the Region. The level of accessibility for each Region subarea is a measure of location relative to jobs, as well as the relative convenience of travel provided by the transportation system to each job. Therefore, the area of the Region, along and close to, Lake Michigan is at a disadvantage with the respect to relative location of jobs and accessibility to jobs.

The levels of highway system accessibility within the Region under existing peak traffic period conditions are shown on Map 67. The highest levels of accessibility are generally provided within central and western Milwaukee County, followed by central and northern Milwaukee County and eastern Waukesha County, and then successively lower levels outward from this area. The levels of higher accessibility under existing conditions are generally consistent with planned development in the Milwaukee area and the regional land use plan. The levels of peak period highway accessibility in the year 2035 under the TSM plan are also shown on Map 67. Due to a forecast increase in traffic congestion, there is a general decline in highway accessibility anticipated under this plan. The levels of peak period highway accessibility under the TSM Plus Highway plan as shown on Map 67 provide a return of highway accessibility levels to existing conditions, which are generally consistent with planned development in the Milwaukee area and the regional land use plan.

The levels of accessibility provided by the public transit system under a No-Build plan or existing year 2005 conditions, and under the TSM and TSM Plus Highway plan alternatives, are shown on Map 68 for peak period year 2035 conditions and on Map 69 for midday off-peak period year 2035 conditions. Current (or No-Build plan) levels of transit accessibility are highest in central Milwaukee County and the public transit improvement and expansion proposed under the TSM and TSM Plus Highway alternative plans would provide substantially improved transit accessibility with the highest levels of accessibility in central Milwaukee County, consistent with the development and redevelopment proposed in the regional land use plan.

Transportation Capital and Annual Operating Costs

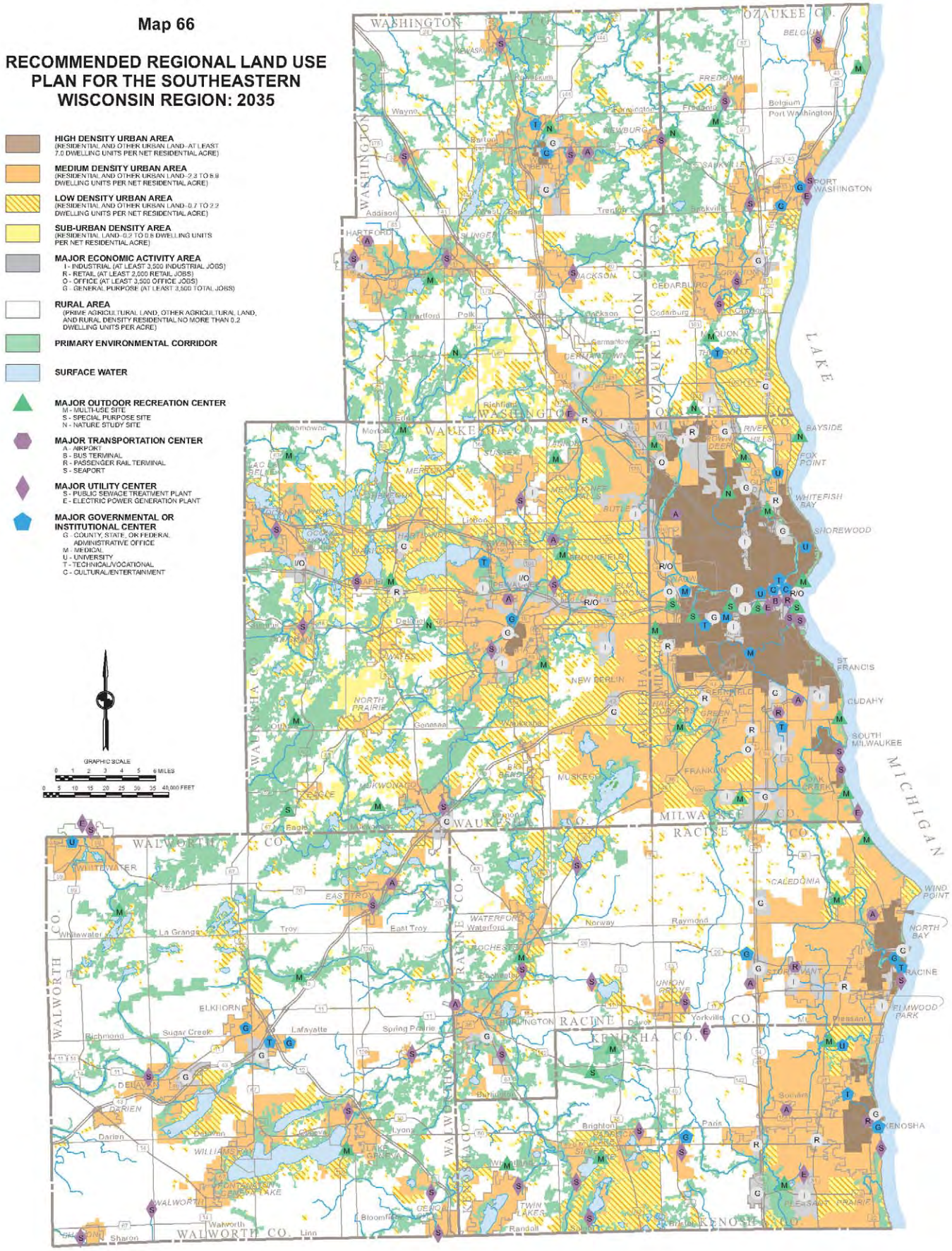
The estimated capital and annual operating costs of the No-Build, TSM, and TSM Plus Highway alternative regional transportation plans are presented in Table 111. The TSM plan represents an increase in costs over the No-Build plan, as it proposes to double transit service. The TSM Plus Highway plan represents an increase in cost compared to the TSM plan as it also includes improvement and expansion of the arterial street and highway system, including 346 miles of widening arterial streets and highways with additional traffic lanes (including 127 miles of freeways) and 85 miles of construction of new arterial streets and highways.

Level of Transportation Service

The level of public transit service can be assessed through a number of measures including service area, service hours and frequency, and service travel time. Maps 70 through 76 compare the public transit service area of the No-Build plan and the TSM and TSM Plus Highway alternative plans with respect to service provided to existing jobs in the Region, areas of planned year 2035 household and job densities considered sufficient to support public transit, major job centers (retail, office, and industrial), hospitals and medical centers, colleges and universities, parks and outdoor recreation areas, and intercity bus, rail, and air passenger terminals. The transit service area of the TSM and TSM Plus Highway plans is more extensive than the No-Build plan and better serves all of these centers and areas of the Region.

Map 66

RECOMMENDED REGIONAL LAND USE PLAN FOR THE SOUTHEASTERN WISCONSIN REGION: 2035



Source: SEWRPC.

Table 111

ESTIMATED AVERAGE ANNUAL TRANSPORTATION SYSTEM CAPITAL AND OPERATION AND MAINTENANCE COSTS IN THE REGION OVER THE PERIOD 2006-2035: NO-BUILD, TSM, AND TSM PLUS HIGHWAY PLANS

Cost Element	Average Annual Cost: 2006-2035[a]		
	No-Build Plan (millions of dollars)	TSM Plan (millions of dollars)	TSM Plus Highway Plan (millions of dollars)
System Element Costs			
Arterial Streets and Highways			
Construction	$322	$322	$379
Operation and Maintenance	58	65	67
Subtotal	380	387	446
Public Transit			
Construction and Equipment	19	32	32
Operation and Maintenance	119	197	197
Subtotal	138	229	229
Total	$518	$616	$675

[a]*Estimated costs are in year 2035 constant dollars.*

Source: SEWRPC.

Table 112 further compares the service areas of the No-Build plan and the TSM and TSM Plus Highway plans with respect to population and jobs served. With their larger transit service area, the TSM and TSM Plus Highway alternative plans serve a greater population and number of jobs than the No-Build plan.

Table 113 compares the transit service hours and frequency under the No-Build plan and the TSM and TSM Plus Highway alternative plans. The service hours and frequency are substantially improved and expanded under the TSM and TSM Plus Highway plans.

The estimated year 2035 transit travel times (as a ratio to estimated current automobile travel times) within Milwaukee County are presented in Map 77 and Table 114 for the No-Build plan (or existing year 2005 conditions) and Map 78 and Table 115 for the TSM and TSM Plus Highway plans. The transit travel times include not only time riding as a passenger on transit, but also time spent walking to, and waiting for, transit. A comparison of Maps 77 and 78 indicate that transit travel times will be significantly reduced under the TSM and TSM Plus Highway plans during both peak and off-peak travel periods.

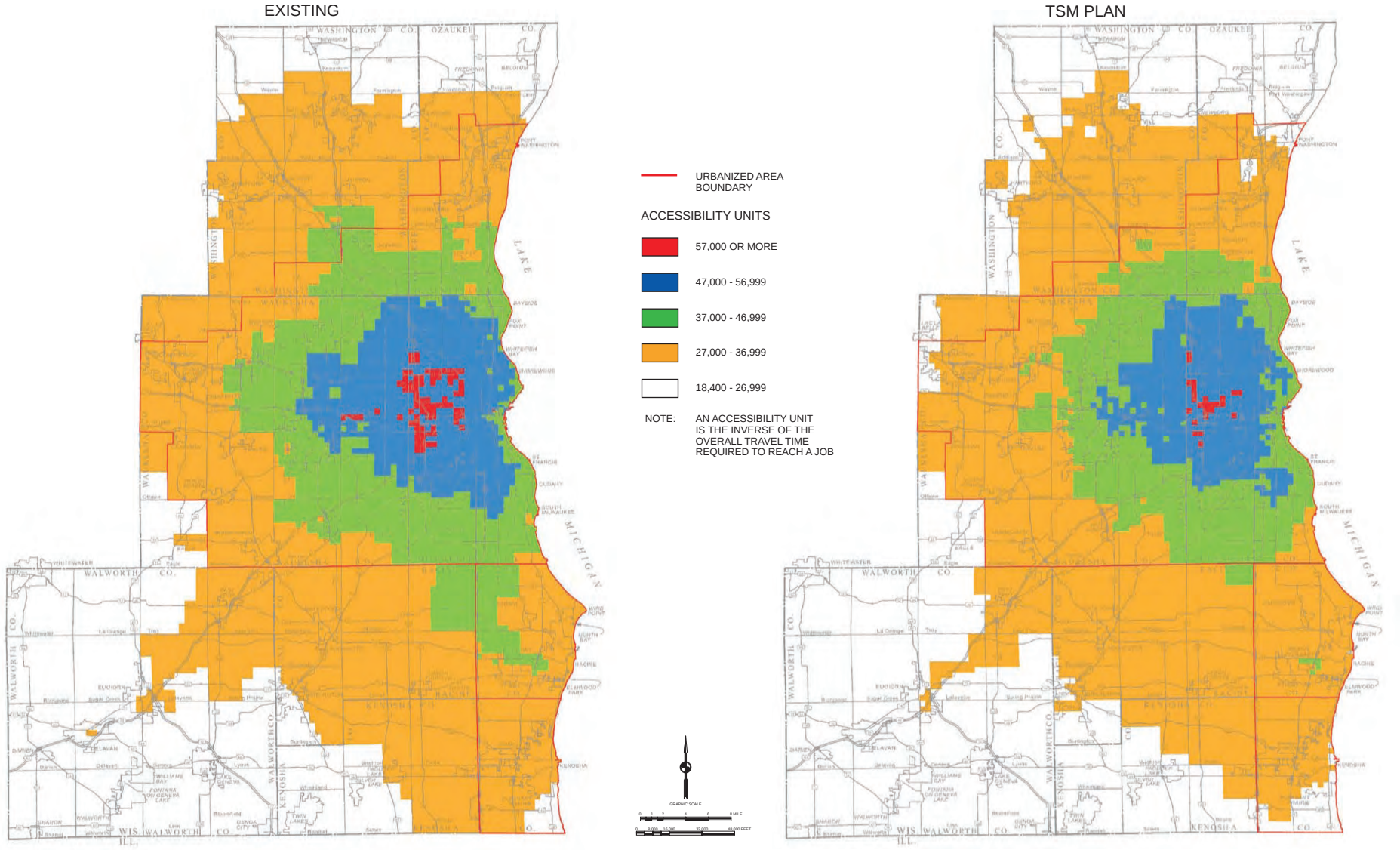
With respect to the arterial street and highway system, level of service can be measured by the extent and severity of congestion. Map 79 and Table 116 and 117 compare existing traffic congestion and forecast future traffic congestion under the No-Build plan and TSM and TSM Plus Highway alternative plans. The miles of congested arterials may be expected to double approximately over the next 30 years under the TSM plan, with arterial facilities experiencing extreme congestion nearly tripling. The TSM Plus Highway plan alternative may be expected to result in a significant reduction in congestion compared to the TSM plan, resulting in levels of congestion similar to, and somewhat less than, existing conditions.

Convenient and Efficient Travel

Overall measures of the convenience and efficiency of travel include average highway and transit travel time and speed. Table 118 compares the No-Build, TSM, and TSM Plus Highway alternatives with respect to average travel time and speed for transit and highway trips.

Map 67

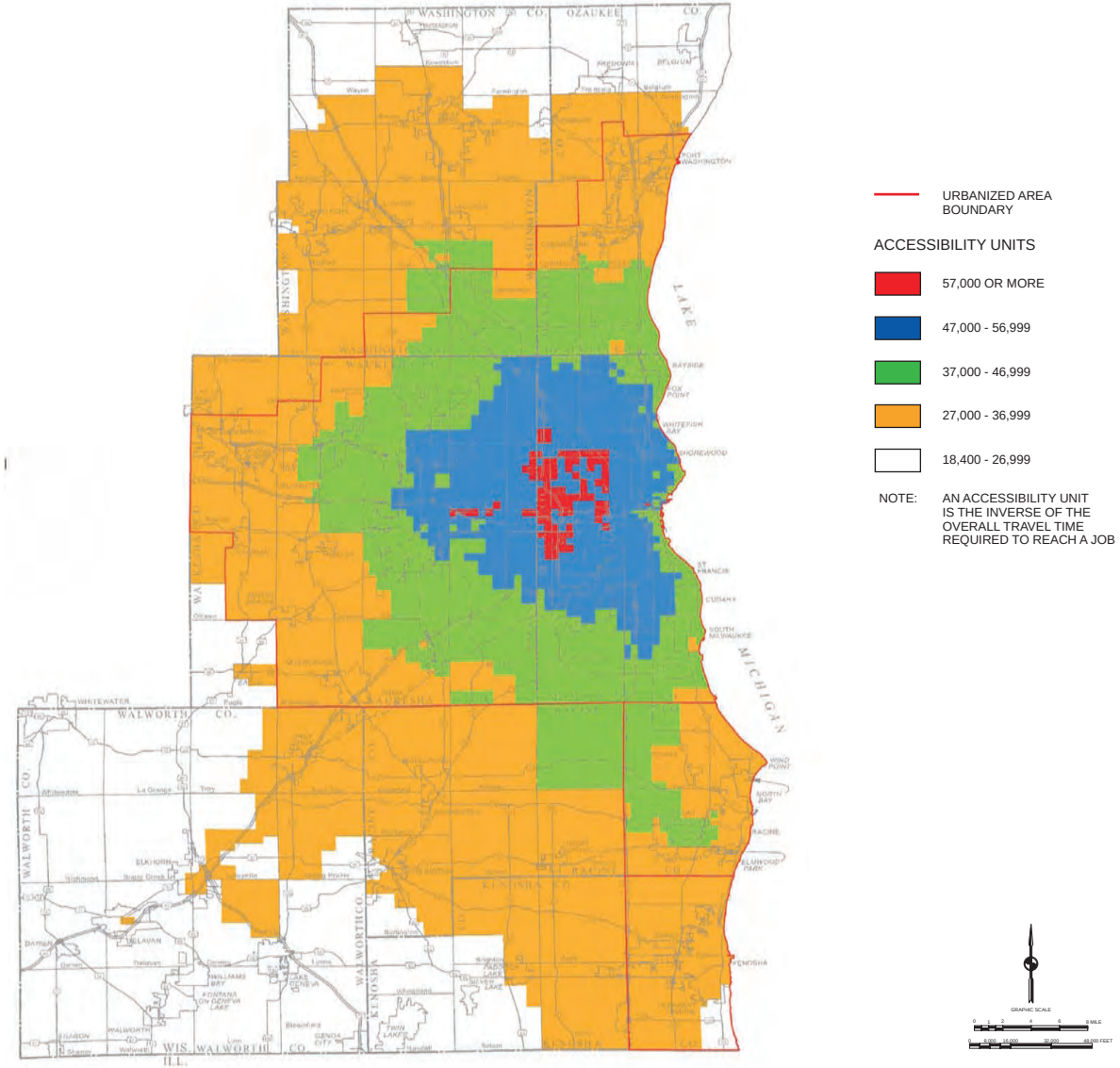
ACCESSIBILITY PROVIDED BY HIGHWAY TO JOBS IN THE REGION: EXISTING SYSTEM, TSM PLAN, AND TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Map 67 (continued)

TSM PLUS HIGHWAY PLAN



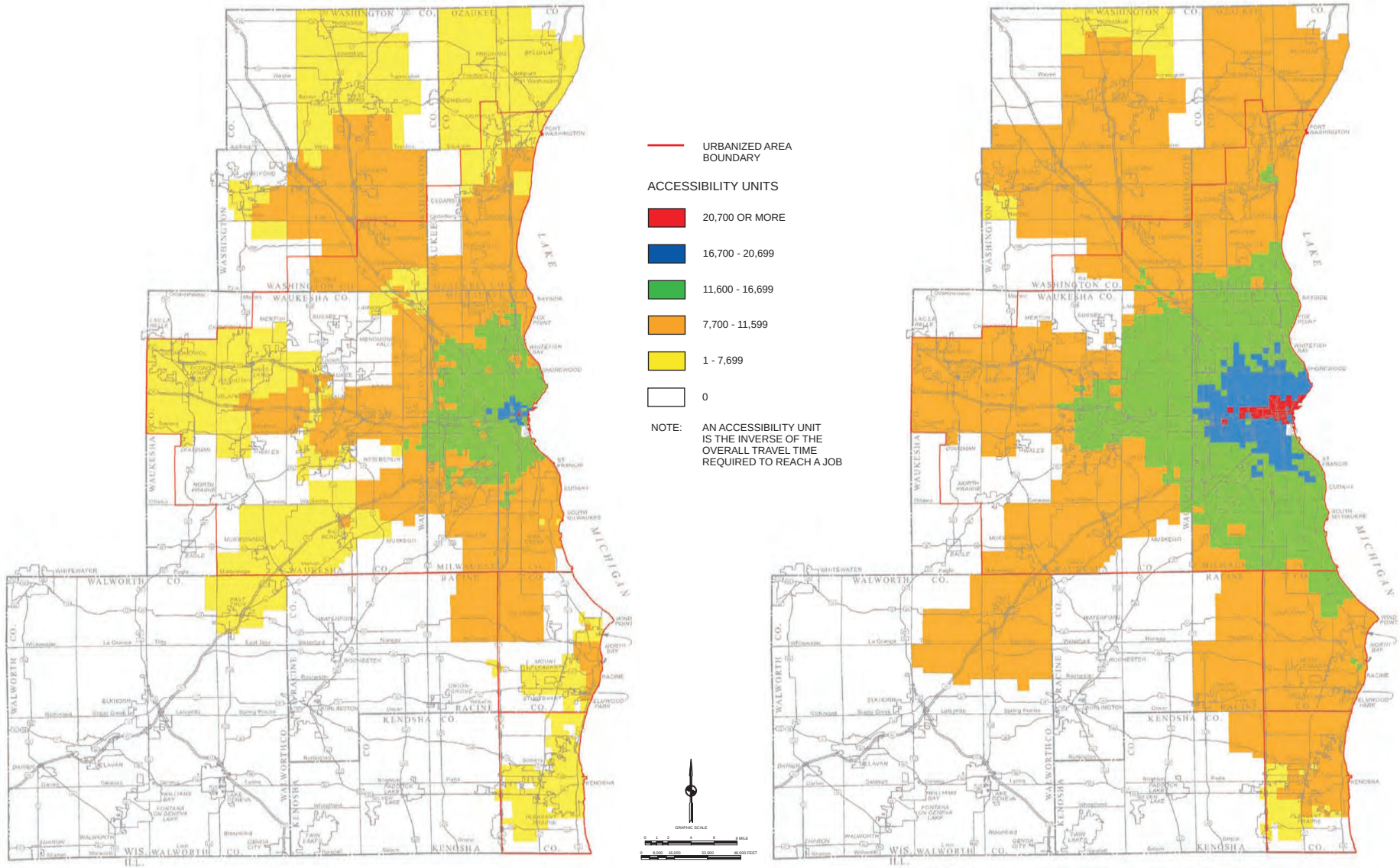
Source: SEWRPC.

Map 68

ACCESSIBILITY PROVIDED BY PUBLIC TRANSIT TO JOBS IN THE REGION DURING PEAK PERIODS OF THE DAY: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

NO BUILD PLAN

TSM/TSM PLUS HIGHWAY PLAN



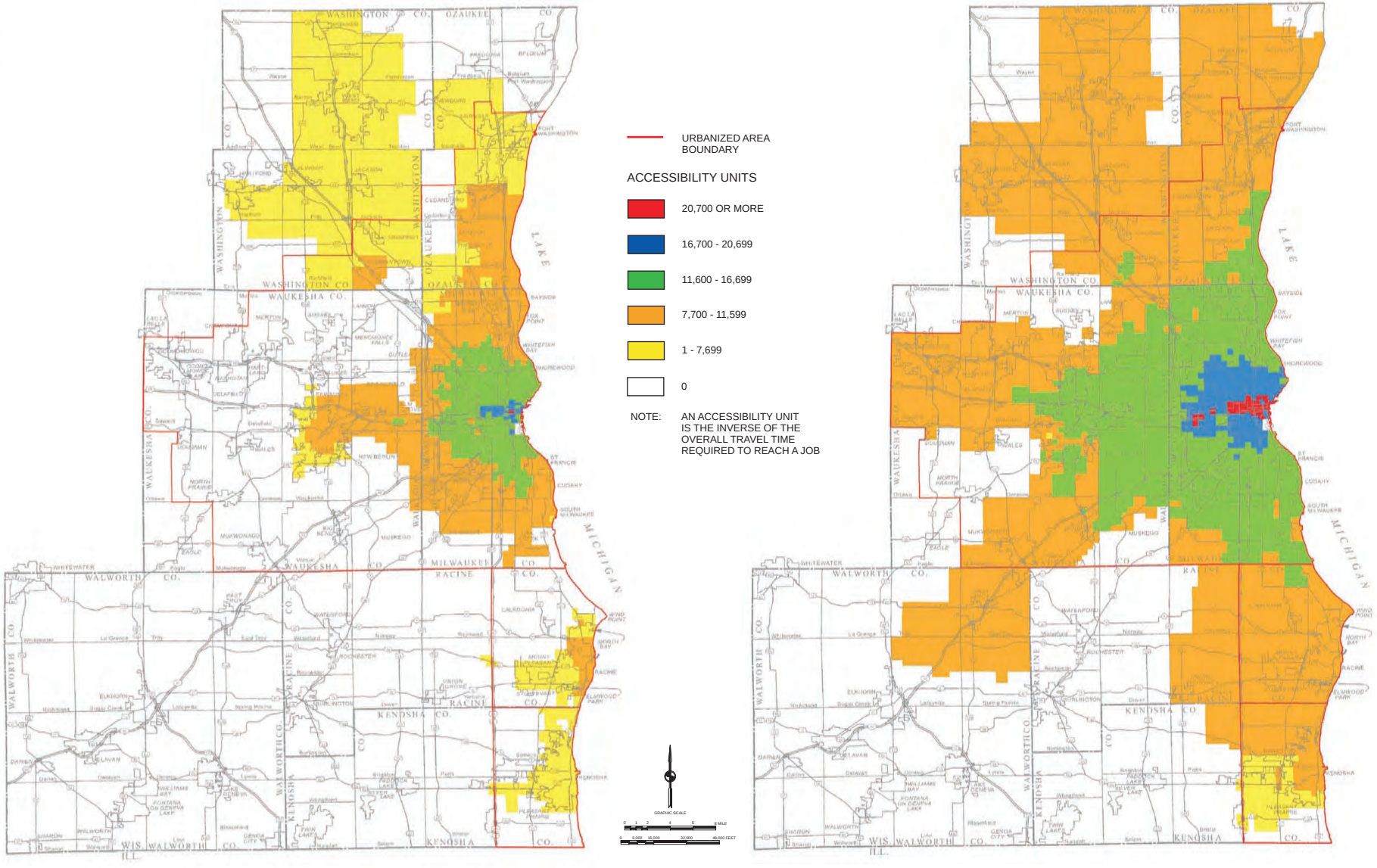
Source: SEWRPC.

Map 69

ACCESSIBILITY PROVIDED BY PUBLIC TRANSIT TO JOBS IN THE REGION DURING MIDDAY PERIODS OF THE DAY: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

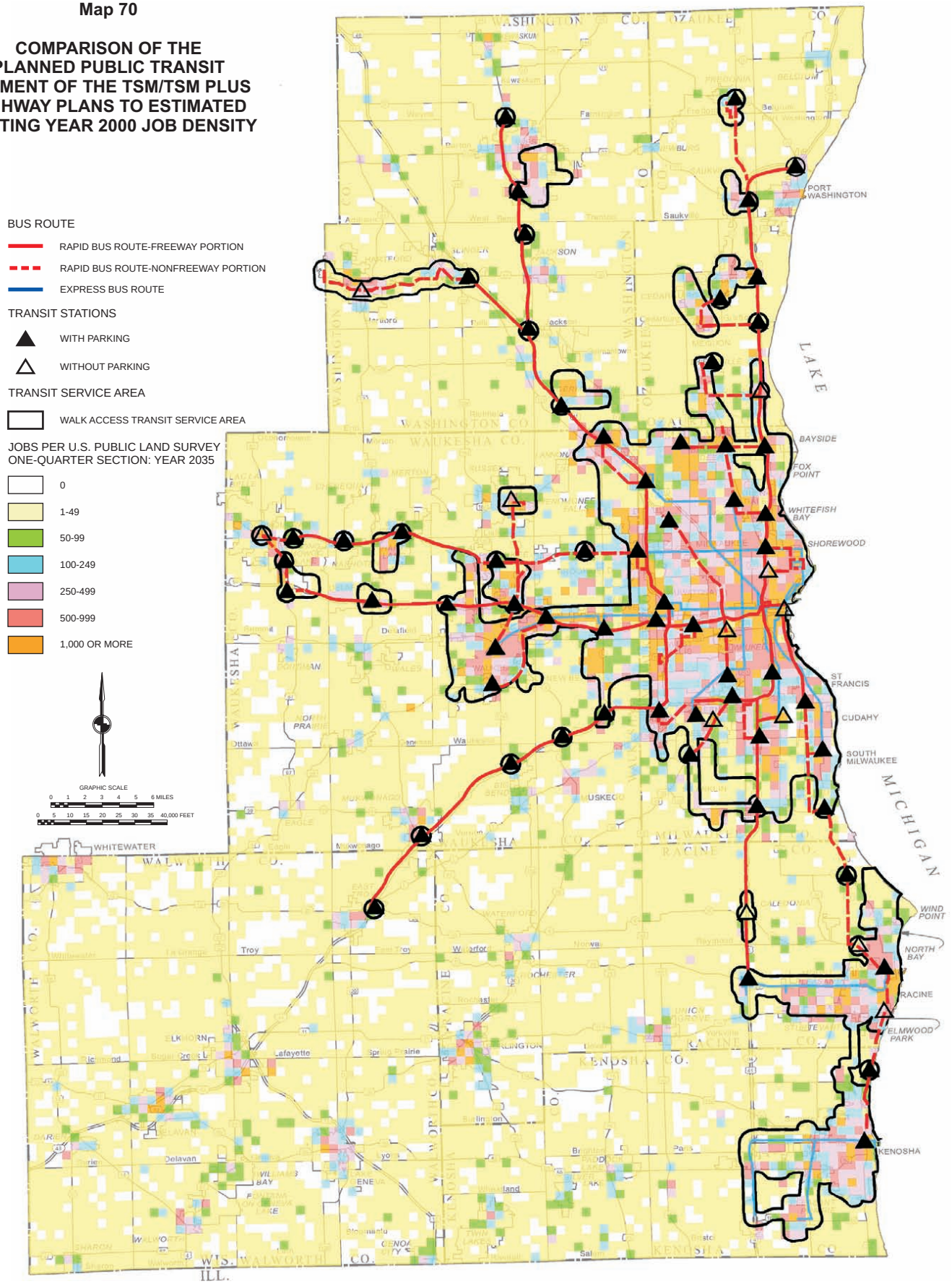
NO BUILD PLAN

TSM/TSM PLUS HIGHWAY PLAN



Map 70

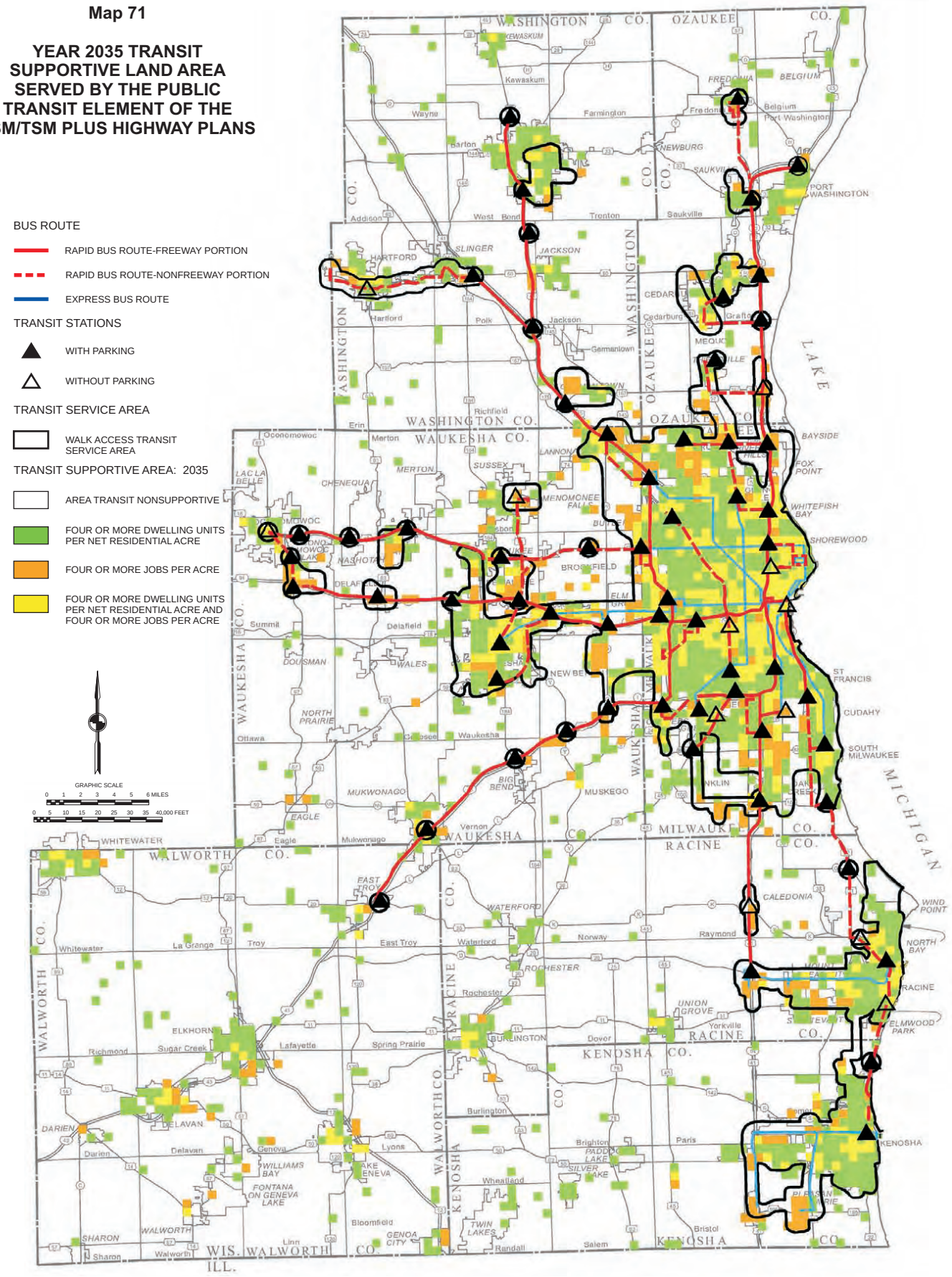
COMPARISON OF THE PLANNED PUBLIC TRANSIT ELEMENT OF THE TSM/TSM PLUS HIGHWAY PLANS TO ESTIMATED EXISTING YEAR 2000 JOB DENSITY



Source: SEWRPC.

Map 71

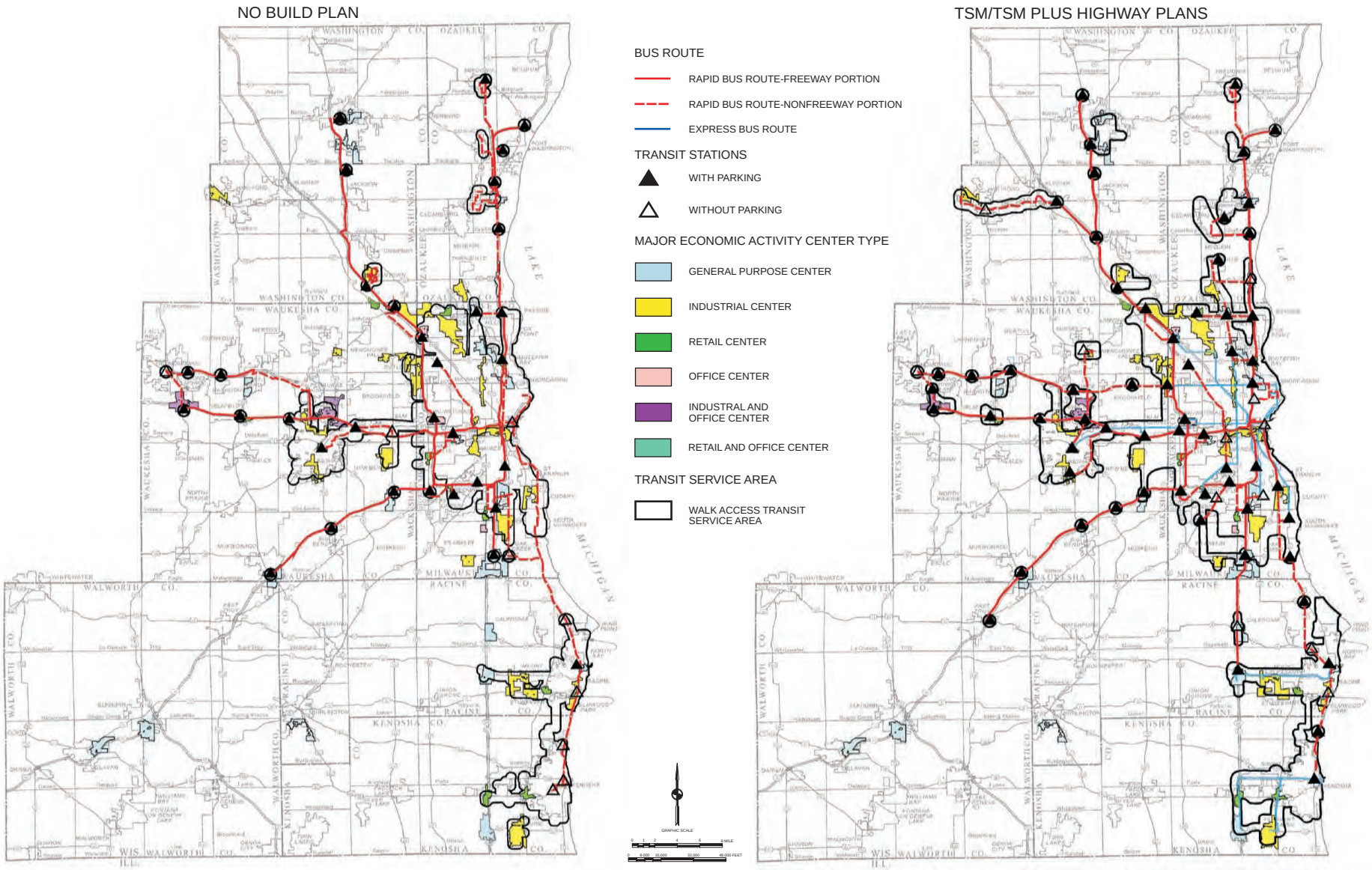
YEAR 2035 TRANSIT SUPPORTIVE LAND AREA SERVED BY THE PUBLIC TRANSIT ELEMENT OF THE TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 72

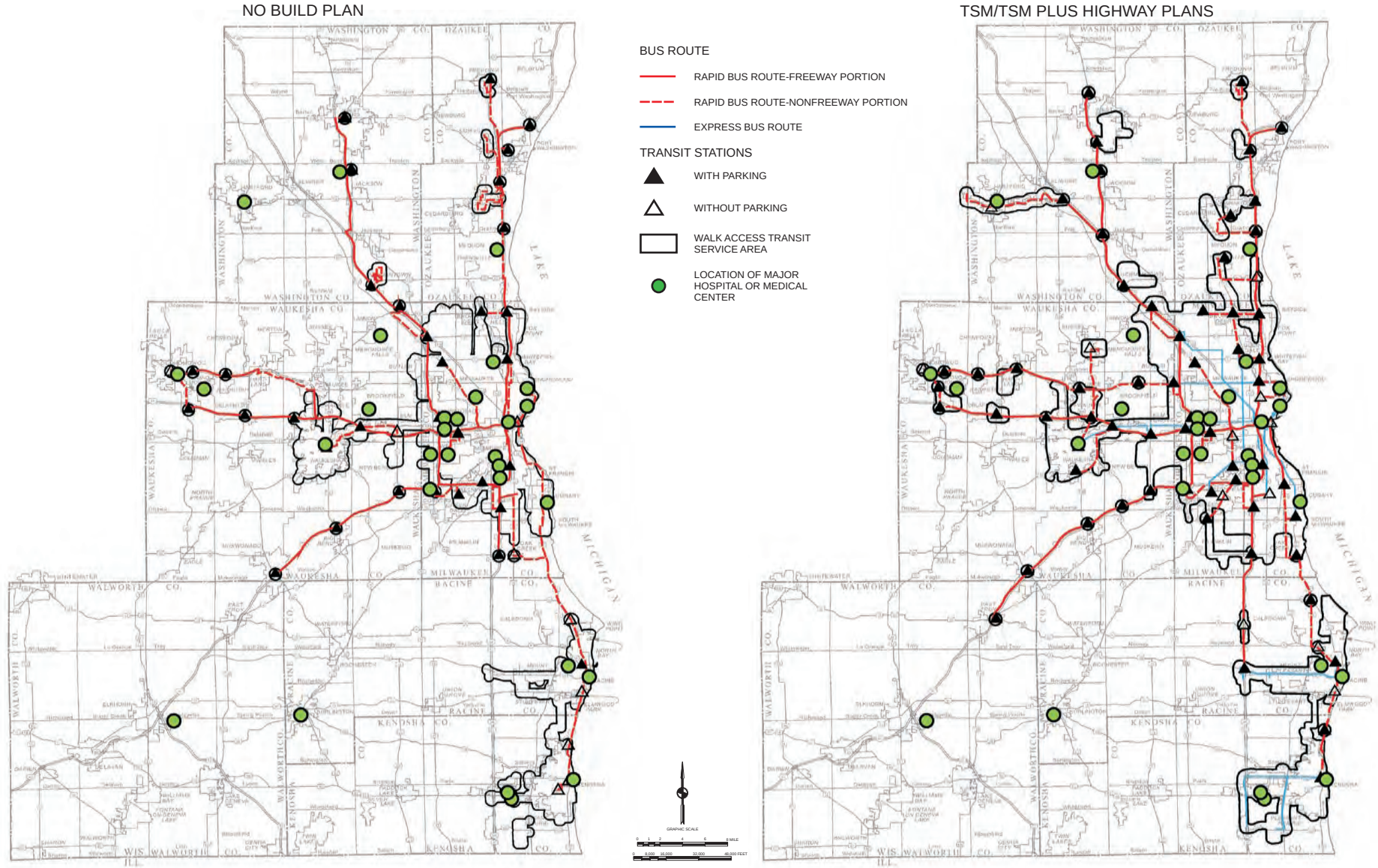
SERVICE TO MAJOR EMPLOYMENT CENTERS: TRANSIT ELEMENT OF THE NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 73

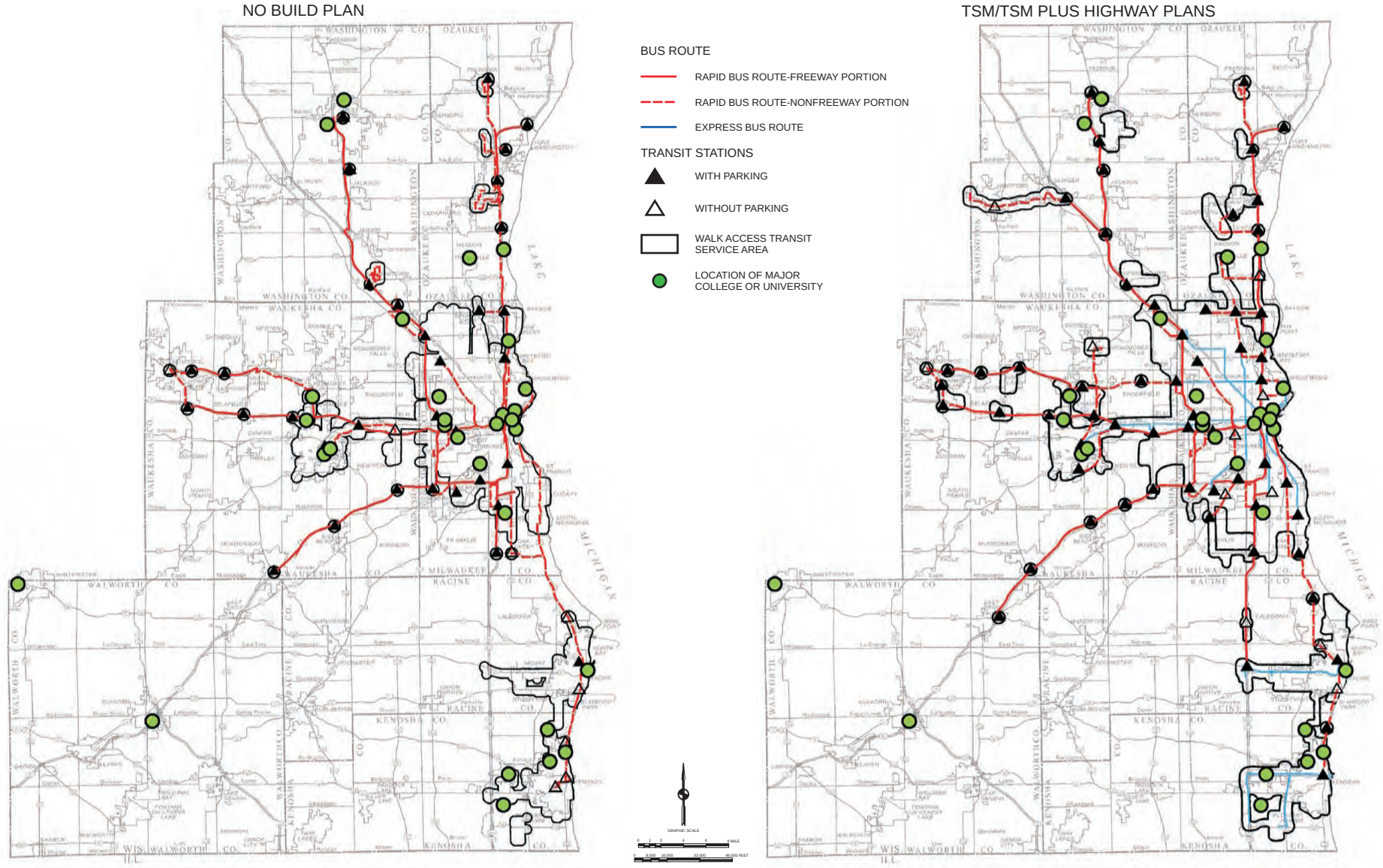
SERVICE TO HOSPITALS AND MEDICAL CENTERS: TRANSIT ELEMENT OF THE NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 74

SERVICE TO COLLEGES AND UNIVERSITIES: TRANSIT ELEMENT OF THE NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



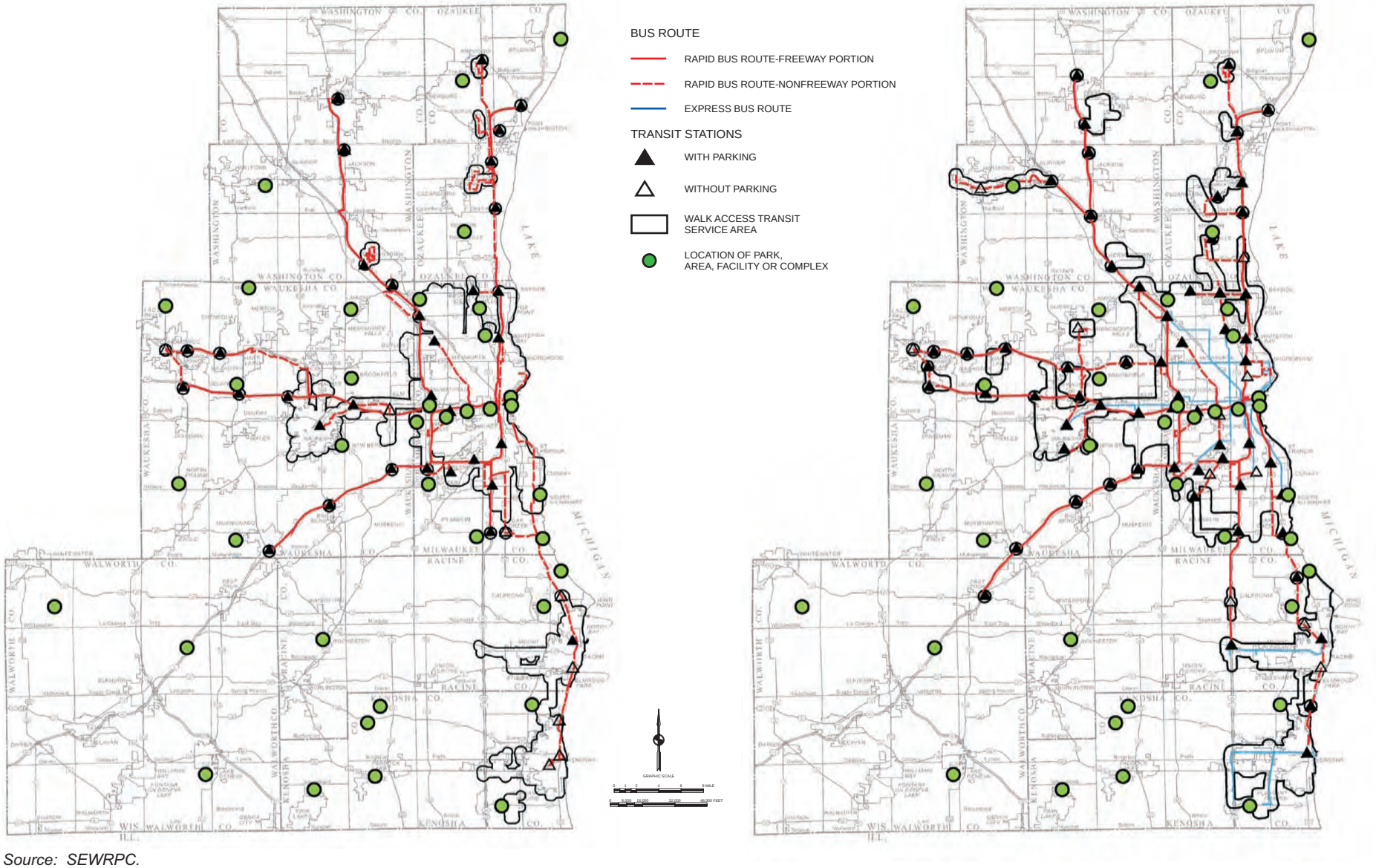
Source: SEWRPC.

Map 75

SERVICE TO MAJOR PARKS AND OUTDOOR RECREATION AREAS, RECREATIONAL FACILITIES AND COMPLEXES HOSTING HIGH ATTENDANCE EVENTS: TRANSIT ELEMENT OF THE NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

NO BUILD PLAN

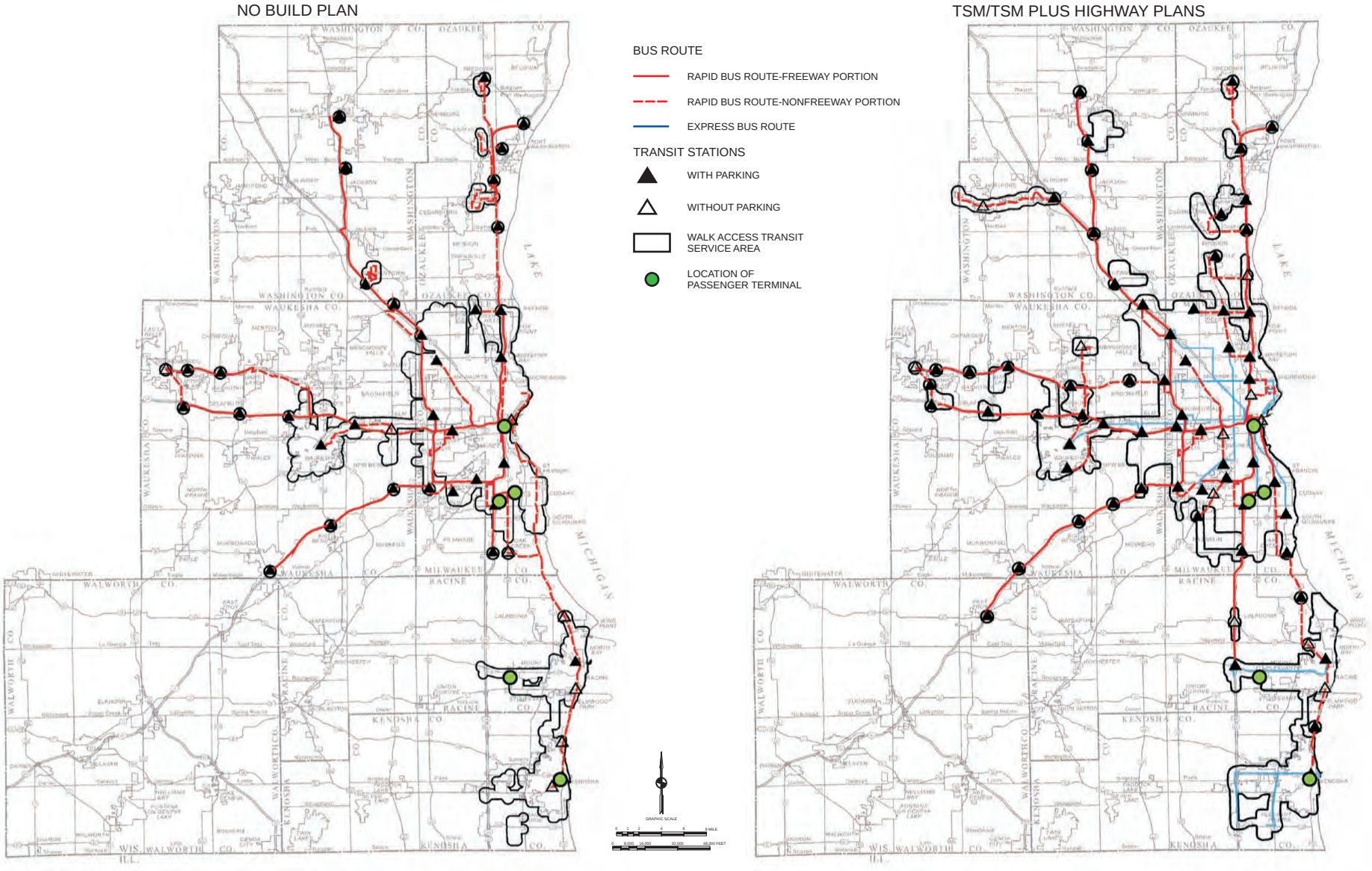
TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 76

SERVICE TO MAJOR PASSENGER TERMINALS: TRANSIT ELEMENT OF THE NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Table 112

YEAR 2035 POPULATION AND EMPLOYMENT SERVED BY PUBLIC TRANSIT IN THE REGION UNDER THE NO BUILD AND TSM/TSM PLUS HIGHWAY PLANS

Service Type	Existing System (No-Build Plan)		TSM/TSM Plus Highway Plans	
	Population Served	Employment Served	Population Served	Employment Served
Rapid and Express.....	384,300	219,700	779,700	644,900
Local	1,218,200	866,900	1,419,600	1,020,900
Total[a]	1,282,900	876,100	1,447,800	1,046,800

[a] *The total population and employment served does not equal the sum of the service area figures for rapid/express and local service as the service areas overlap. For the total service area figures, the population and employment in the overlapping areas was counted only once.*

Source: SEWRPC.

Convenience and efficiency of travel may also be measured by the ability to meet accessibility standards, that is, being able to travel within specified maximum travel times to an area's jobs, major retail centers, major hospitals, major parks and outdoor recreation areas, public universities and technical colleges, and General Mitchell International Airport. Maps 80 through 85 compare public transit service under the No-Build plan (or the existing year 2005 transit system) and under the TSM and TSM Plus Highway plans with respect to their ability to meet accessibility standards. Under the No-Build plan, generally only small areas within central Milwaukee County meet these standards, and under the TSM and TSM Plus Highway alternatives, larger areas also generally within central Milwaukee County meet these standards. Maps 86 through 91 compare the highway element of the TSM plan to that of the TSM Plus Highway plan with respect to meeting accessibility standards. Under both TSM and TSM Plus Highway plan alternatives, the accessibility standards for highway travel are generally met throughout the Milwaukee, Kenosha, and Racine urbanized areas.

Impact on Built and Natural Environment

The estimated impact of the TSM and TSM Plus Highway alternative plans on the built and natural environment is presented in Table 119. The estimated impacts presented include total land acquisition, and necessary acquisitions of residences; commercial and industrial buildings; governmental and institutional buildings; historic buildings and sites; park lands; primary and secondary environmental corridors and isolated natural resource areas; wetlands; natural areas; critical species habitat areas; geological and archeological areas; Wisconsin Department of Natural Resources managed lands and legacy locations; land trust and conservancy lands; and prime agricultural lands.

Table 120 presents the estimated transportation system air pollutant emissions on a hot summer average weekday including volatile organic compounds, nitrogen oxides, and carbon monoxide. Table 120 also presents the estimated energy consumption from operation of the transportation system—automobiles, trucks, and buses—under existing year 2001 and year 2035 conditions.

Lastly, the TSM Plus Highway plan may be expected to result in an increase of about one square mile, or 4 percent, in impervious area compared to the TSM and No-Build plans, based on the estimated area for additional traffic lanes and new arterial facilities.

Table 113

PROPOSED TRANSIT SERVICE HOURS AND FREQUENCY UNDER THE NO BUILD AND TSM/TSM PLUS HIGHWAY PLANS

	Existing Year 2005		TSM/TSM Plus Highway Plans	
Service Type	Service Hours	Service Headways	Service Hours	Service Headways
Rapid Transit Service				
Milwaukee County	Weekdays only 6:00 a.m.-8:30 a.m. 3:30 p.m.-6:00 p.m. (Peak direction service only)	15-30 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	10-30 minutes weekday peak period 30-60 minutes off-peak period and weekends
Waukesha County Waukesha	Weekdays Only 5:30 a.m.-8:30 p.m.	15-30 minutes peak period 60-90 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods
Oconomowoc, Mukwonago, Menomonee Falls	Weekdays Only Peak period and peak direction only service	30-40 minutes		60 minutes off-peak periods and weekends
Washington County	Weekdays Only Peak period and peak direction only service	30-40 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Ozaukee County	Weekdays Only 5:00 a.m.-11:00 p.m.	30-40 minutes peak periods 60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Kenosha-Racine-Milwaukee County	Weekdays Only 5:00 a.m.-10:00 p.m. Weekends 8:00 a.m.-10:00 p.m.	40 minutes peak periods 120 minutes off-peak periods Headways 60-120 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Express Transit Service	None	- -	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-15 minutes peak periods 10-20 minutes off-peak periods 10-20 minutes
Local Transit Service				
Central Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-20 minutes peak periods 10-30 minutes midday 15-30 minutes evening 15-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-10 minutes peak periods 10-15 minutes midday 10-20 minutes evening 10-20 minutes
Outlying Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	15-60 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	10-30 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes
Kenosha Area	Weekdays 6:00 a.m.-7:30 p.m.	30-40 minutes peak periods 40-60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday

Table 113 (continued)

Service Type	Existing Year 2005		TSM/TSM Plus Highway Plans	
	Service Hours	Service Headways	Service Hours	Service Headways
Local Transit Service (continued)				
Racine Area	Weekdays 5:30 a.m.-12:00 a.m. Saturdays 5:30 a.m.-10:00 p.m. Sundays 9:30 a.m.-7:00 p.m.	Weekdays 30-60 minutes peak periods 60 minutes off-peak periods Weekends 60 minutes	Daily 6:00 a.m.-10:00 p.m. Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday
Waukesha Area	Weekdays 5:30 a.m.-10:00 p.m Saturdays 8:00 a.m.-10:00 p.m. Sundays 9:00 a.m.-7:00 p.m.	Weekdays 35-70 minutes peak periods 30-60 minutes off-peak periods Weekends 30-60 minutes	Daily 6:00 a.m.-10:00 p.m.	Weekdays 20 minutes peak period 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 30-60 minutes Sunday

Source: SEWRPC.

Travel Safety

Table 121 presents the estimated property damage accidents, injuries, and fatalities based upon the amount of highway and transit travel and the degree of freeway traffic congestion under the No-Build, TSM, and TSM Plus Highway plans.

Summary and Conclusion

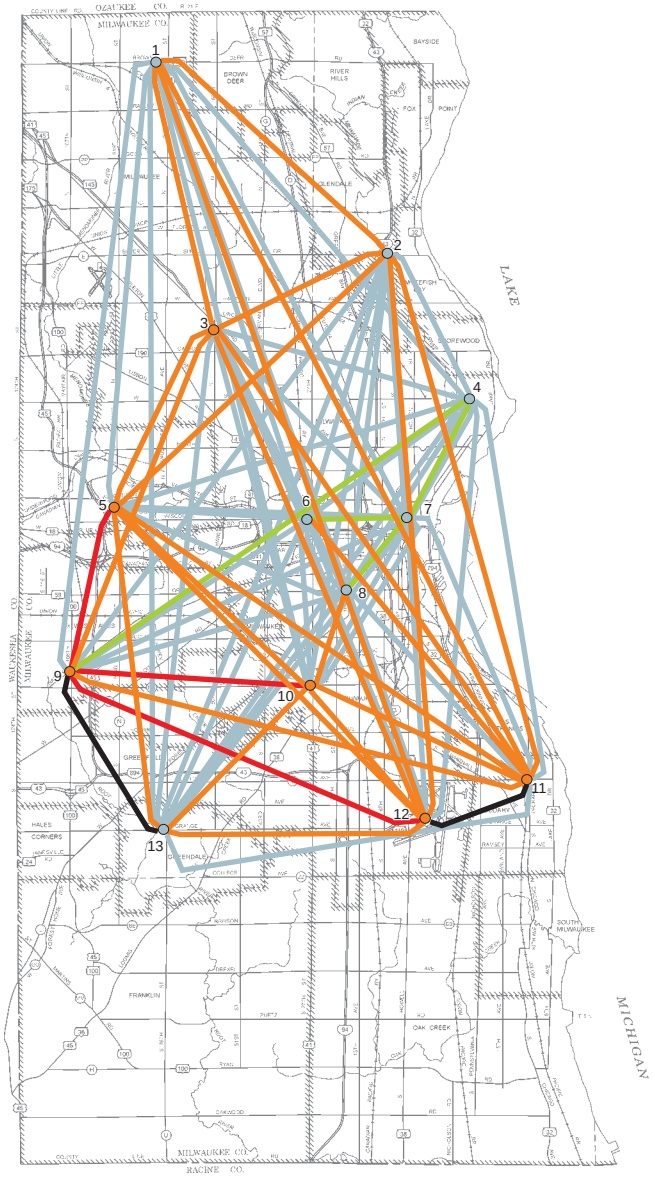
The transit element of the TSM and TSM Plus Highway alternatives provide a significant improvement in transit service. Service availability is significantly improved including service area and hours of service. Transit travel time is also significantly improved including both reduced wait times (due to major service frequency improvements) and reduced travel time on the bus. Without arterial highway capacity improvement and expansion as proposed in the TSM Plus Highway alternative plan, traffic congestion is forecast to double over the next 30 years, and arterials experiencing extreme traffic congestion are forecast to nearly triple, even with expanded public transit, bicycle and pedestrian facilities, and travel demand and transportation systems management. The transit and highway elements of the alternative plans represent only modest increases in capital and operating costs compared to the No-Build plan.

The Commission staff and Advisory Committee advanced as the preliminary recommended plan the TSM Plus Highway alternative plan. In doing so, the staff and Advisory Committee emphasized that each proposed arterial street and highway improvement and expansion, and, as well, preservation project would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will necessarily consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to

Map 77

RATIOS OF OVERALL TRANSIT TRAVEL TIMES UNDER THE YEAR 2035 NO-BUILD PLAN TO YEAR 2001 OVERALL AUTOMOBILE TRAVEL TIMES BETWEEN SELECTED LOCATIONS IN MILWAUKEE COUNTY DURING WEEKDAY PEAK AND OFF-PEAK PERIODS

MORNING PEAK PERIOD

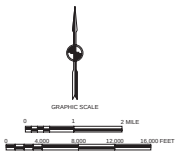


TRANSIT TO AUTOMOBILE TRAVEL TIME RATIO

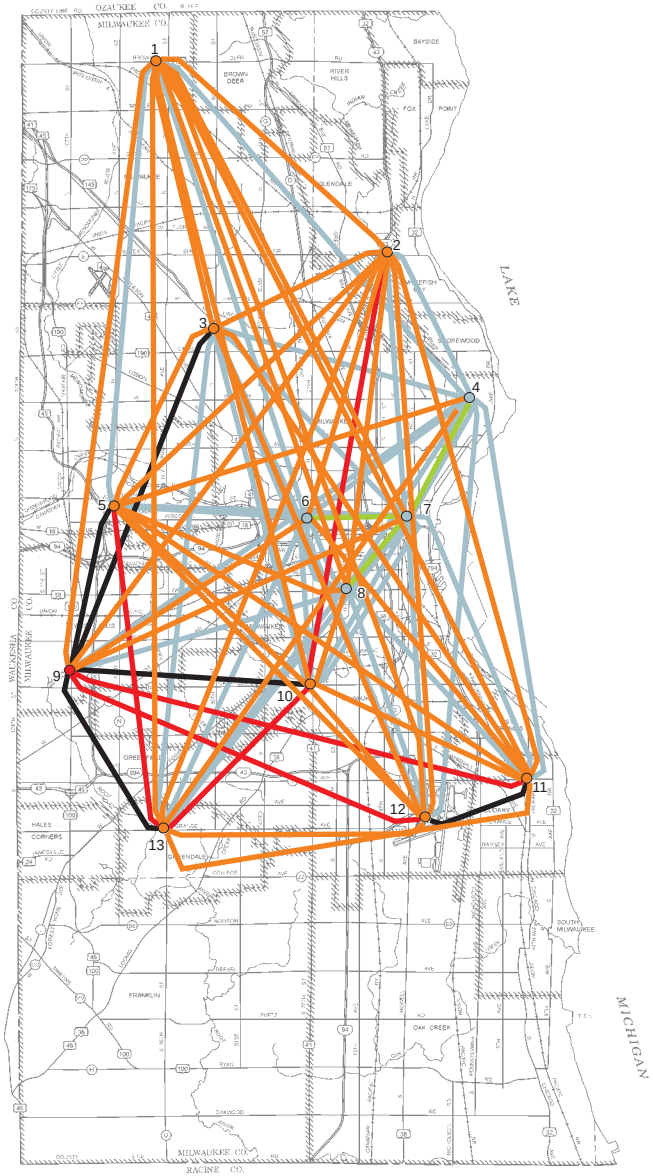
- 1.50 AND LESS
- 1.51 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 AND OVER

AVERAGE TRANSIT TO AUTOMOBILE TRAVEL TIME RATIO FOR SELECTED TRIPS FROM LOCATION

- 1.50 AND LESS
- 1.51 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 AND OVER



MIDDAY PERIOD



Source: SEWRPC.

Table 114

COMPARISON OF MORNING PEAK PERIOD AND MIDDAY PERIOD TRANSIT AND AUTOMOBILE OVERALL TRAVEL TIMES BETWEEN 13 SELECTED LOCATIONS IN MILWAUKEE COUNTY: 2001 EXISTING AND 2035 NO-BUILD PLAN

Year 2035 Total Overall[a] Transit Travel Time (In-Vehicle Transit Travel Time[b]) in Minutes for Morning Peak Period

From Location		To Location 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	60 (33)	52 (27)	82 (62)	66 (43)	85 (59)	78 (53)	95 (66)	95 (56)	108 (78)	138 (99)	125 (96)	102 (77)
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	58 (32)	- -	51 (20)	41 (23)	89 (73)	44 (21)	39 (22)	53 (23)	99 (62)	70 (38)	96 (69)	74 (46)	106 (71)
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	53 (26)	51 (21)	- -	52 (34)	53 (27)	48 (31)	53 (40)	58 (33)	87 (43)	70 (45)	101 (68)	87 (63)	79 (50)
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	81 (61)	40 (19)	49 (29)	- -	77 (59)	53 (41)	34 (23)	59 (39)	58 (33)	74 (52)	80 (49)	80 (59)	101 (72)
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	64 (41)	89 (73)	52 (27)	76 (60)	- -	35 (21)	51 (38)	56 (31)	52 (17)	62 (37)	99 (66)	85 (62)	68 (37)
6	Near West Side (N. 92nd Street and Connell Avenue)	82 (57)	68 (52)	46 (27)	54 (41)	33 (19)	- -	26 (17)	30 (9)	60 (30)	35 (16)	73 (43)	60 (41)	67 (42)
7	Downtown (E. Wisconsin Avenue and N. Water Street)	85 (62)	49 (34)	49 (36)	34 (24)	48 (36)	25 (17)	- -	30 (16)	68 (44)	52 (34)	51 (28)	51 (35)	78 (52)
8	Near South Side (S. 16th Street and National Avenue)	93 (62)	71 (48)	53 (31)	56 (38)	52 (31)	31 (14)	32 (19)	- -	53 (28)	39 (14)	63 (28)	51 (28)	67 (37)
9	West Central S. 108th Street and W. Cleveland Avenue)	87 (52)	83 (52)	68 (34)	64 (38)	47 (16)	56 (33)	51 (33)	57 (32)	- -	64 (26)	100 (61)	86 (58)	74 (38)
10	South Central (S. 27th Street and W. Oklahoma Avenue)	105 (69)	94 (69)	67 (44)	71 (53)	59 (36)	34 (17)	51 (35)	38 (15)	60 (22)	- -	60 (27)	50 (21)	55 (25)
11	Southeast (S. Packard Avenue and E. Layton Avenue)	130 (92)	92 (70)	94 (67)	74 (53)	93 (67)	70 (48)	49 (31)	58 (29)	96 (57)	56 (23)	- -	49 (17)	57 (34)
12	General Mitchell International Airport	126 (96)	98 (73)	86 (63)	78 (60)	86 (63)	63 (44)	54 (38)	54 (30)	92 (58)	51 (22)	50 (18)	- -	57 (29)
13	Southridge Shopping Center	106 (81)	81 (58)	78 (51)	59 (39)	67 (39)	64 (48)	44 (31)	53 (26)	78 (38)	56 (26)	57 (35)	44 (21)	- -

Year 2001 Total Overall[a] Automobile Travel Time in Minutes for Morning Peak Period

From Location		To Location 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	18	15	30	26	33	33	35	32	36	40	40	43
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	18	- -	17	15	28	21	21	23	35	27	28	28	34
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	15	17	- -	21	16	19	22	23	22	23	29	29	31
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	30	15	22	- -	31	22	20	25	38	29	29	31	37
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	26	31	16	31	- -	15	22	20	11	19	29	30	21
6	Near West Side (N. 92nd Street and Connell Avenue)	32	23	18	23	15	- -	14	12	23	16	21	22	26
7	Downtown (E. Wisconsin Avenue and N. Water Street)	35	23	23	20	22	15	- -	17	29	21	20	22	29
8	Near South Side (S. 16th Street and National Avenue)	37	26	23	26	20	13	17	- -	21	11	21	19	22
9	West Central S. 108th Street and W. Cleveland Avenue)	31	37	23	38	11	22	29	22	- -	15	27	22	12
10	South Central (S. 27th Street and W. Oklahoma Avenue)	36	29	23	30	19	15	21	11	15	- -	18	14	14
11	Southeast (S. Packard Avenue and E. Layton Avenue)	41	29	29	28	29	23	19	20	27	18	- -	9	21
12	General Mitchell International Airport	41	29	29	30	27	22	21	18	20	13	9	- -	14
13	Southridge Shopping Center	41	36	32	37	21	25	28	22	12	14	21	14	- -

Table 114 (continued)

Ratio of Year 2035 Total Overall[a] Transit Travel Time to Year 2001 Overall[a] Automobile Travel Time for Morning Peak Period															
		To Location													
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13	Average
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	3.3	3.5	2.7	2.5	2.6	2.4	2.7	3.0	3.0	3.5	3.1	2.4	2.9
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	3.2	- -	3.0	2.7	3.2	2.1	1.9	2.3	2.8	2.6	3.4	2.6	3.1	2.8
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	3.5	3.0	- -	2.5	3.3	2.5	2.4	2.5	4.0	3.0	3.5	3.0	2.5	3.0
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	2.7	2.7	2.2	- -	2.5	2.4	1.7	2.4	1.5	2.6	2.8	2.6	2.7	2.4
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	2.5	2.9	3.3	2.5	- -	2.3	2.3	2.8	4.7	3.3	3.4	2.8	3.2	3.0
6	Near West Side (N. 92nd Street and Connell Avenue)	2.6	3.0	2.6	2.3	2.2	- -	1.9	2.5	2.6	2.2	3.5	2.7	2.6	2.5
7	Downtown (E. Wisconsin Avenue and N. Water Street)	2.4	2.1	2.1	1.7	2.2	1.7	- -	1.8	2.3	2.5	2.6	2.3	2.7	2.2
8	Near South Side (S. 16th Street and National Avenue)	2.5	2.7	2.3	2.2	2.6	2.4	1.9	- -	2.5	3.5	3.0	2.7	3.0	2.6
9	West Central S. 108th Street and W. Cleveland Avenue)	2.8	2.2	3.0	1.7	4.3	2.5	1.8	2.6	- -	4.3	3.7	3.9	6.2	3.2
10	South Central (S. 27th Street and W. Oklahoma Avenue)	2.9	3.2	2.9	2.4	3.1	2.3	2.4	3.5	4.0	- -	3.3	3.6	3.9	3.1
11	Southeast (S. Packard Avenue and E. Layton Avenue)	3.2	3.2	3.2	2.6	3.2	3.0	2.6	2.9	3.6	3.1	- -	5.4	2.7	3.2
12	General Mitchell International Airport	3.1	3.4	3.0	2.6	3.2	2.9	2.6	3.0	4.6	3.9	5.6	- -	4.1	3.5
13	Southridge Shopping Center	2.6	2.3	2.4	1.6	3.2	2.6	1.6	2.4	6.5	4.0	2.7	3.1	- -	2.9

Year 2035 Total Overall[a] Transit Travel Time (In-Vehicle Transit Travel Time[b]) in Minutes for Midday Peak Period														
		To Location												
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	64 (31)	50 (25)	78 (54)	61 (38)	83 (52)	90 (61)	88 (59)	89 (51)	104 (93)	135 (97)	125 (89)	99 (74)
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	64 (31)	- -	54 (19)	42 (18)	85 (67)	68 (49)	50 (33)	72 (47)	90 (43)	93 (65)	86 (62)	96 (67)	107 (65)
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	51 (24)	54 (19)	- -	49 (29)	54 (24)	47 (28)	50 (36)	54 (30)	106 (52)	66 (40)	93 (63)	84 (59)	76 (47)
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	77 (53)	41 (17)	48 (28)	- -	77 (55)	51 (36)	33 (20)	55 (31)	52 (58)	69 (46)	74 (47)	75 (52)	101 (67)
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	61 (38)	84 (65)	54 (24)	75 (53)	- -	34 (17)	48 (33)	52 (27)	58 (14)	59 (33)	91 (60)	82 (56)	74 (38)
6	Near West Side (N. 92nd Street and Connell Avenue)	82 (51)	66 (48)	47 (28)	50 (35)	34 (17)	- -	25 (16)	29 (10)	58 (29)	33 (16)	68 (43)	59 (39)	70 (39)
7	Downtown (E. Wisconsin Avenue and N. Water Street)	88 (59)	48 (32)	48 (35)	32 (19)	48 (33)	25 (16)	- -	32 (18)	65 (41)	50 (32)	48 (27)	51 (34)	76 (51)
8	Near South Side (S. 16th Street and National Avenue)	101 (67)	69 (44)	53 (29)	53 (31)	53 (28)	34 (13)	34 (14)	- -	52 (27)	37 (13)	57 (26)	51 (27)	59 (36)
9	West Central S. 108th Street and W. Cleveland Avenue)	100 (51)	74 (42)	105 (72)	55 (32)	60 (16)	60 (29)	63 (39)	52 (27)	- -	70 (35)	95 (53)	89 (54)	80 (34)
10	South Central (S. 27th Street and W. Oklahoma Avenue)	104 (68)	91 (62)	65 (39)	67 (44)	59 (32)	33 (15)	50 (31)	38 (13)	70 (35)	- -	56 (21)	50 (20)	59 (24)
11	Southeast (S. Packard Avenue and E. Layton Avenue)	139 (97)	87 (62)	93 (62)	75 (47)	93 (61)	69 (44)	49 (28)	58 (26)	96 (54)	57 (21)	- -	50 (17)	56 (34)
12	General Mitchell International Airport	115 (83)	88 (65)	77 (57)	69 (52)	77 (56)	54 (39)	45 (34)	46 (27)	84 (54)	45 (20)	45 (17)	- -	52 (28)
13	Southridge Shopping Center	99 (74)	106 (74)	75 (9)	90 (63)	71 (37)	61 (34)	66 (45)	60 (30)	76 (34)	56 (25)	56 (34)	57 (28)	- -

Table 114 (continued)

Year 2001 Total Overall[a] Automobile Travel Time in Minutes for Midday Peak Period														
		To Location												
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	18	15	28	23	29	30	31	25	34	36	35	34
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	18	- -	15	14	22	17	18	19	23	23	25	23	27
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	15	16	- -	18	15	17	21	22	20	22	28	26	27
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	28	14	18	- -	24	20	19	22	26	25	27	26	30
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	21	23	15	25	- -	15	19	18	10	17	25	22	17
6	Near West Side (N. 92nd Street and Connell Avenue)	30	20	17	22	15	- -	14	12	16	15	22	20	24
7	Downtown (E. Wisconsin Avenue and N. Water Street)	31	20	22	19	20	15	- -	16	21	20	20	21	25
8	Near South Side (S. 16th Street and National Avenue)	32	21	22	23	17	12	16	- -	18	11	20	17	21
9	West Central S. 108th Street and W. Cleveland Avenue)	25	24	20	26	10	17	21	19	- -	14	22	18	12
10	South Central (S. 27th Street and W. Oklahoma Avenue)	33	23	22	25	17	14	20	11	14	- -	17	14	14
11	Southeast (S. Packard Avenue and E. Layton Avenue)	36	25	28	26	25	22	19	19	23	17	- -	8	18
12	General Mitchell International Airport	34	23	26	25	21	20	19	17	17	13	8	- -	14
13	Southridge Shopping Center	32	28	27	30	17	23	24	21	12	14	18	14	- -

Ratio of Year 2035 Total Overall[a] Transit Travel Time to Year 2001 Overall[a] Automobile Travel Time for Midday Peak Period															
		To Location													
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13	Average
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	3.6	3.3	2.8	2.7	2.9	3.0	2.8	3.6	3.1	3.8	3.6	2.9	3.2
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	3.6	- -	3.6	3.0	3.9	4.0	2.8	3.8	3.9	4.0	3.4	4.2	4.0	3.7
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	3.4	3.4	- -	2.7	3.6	2.8	2.4	2.5	5.3	3.0	3.3	3.2	2.8	3.2
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	2.8	2.9	2.7	- -	3.2	2.6	1.7	2.5	2.0	2.8	2.7	2.9	3.4	2.7
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	2.9	3.7	3.6	3.0	- -	2.3	2.5	2.9	5.8	3.5	3.6	3.7	4.4	3.5
6	Near West Side (N. 92nd Street and Connell Avenue)	2.7	3.3	2.8	2.3	2.3	- -	1.8	2.4	3.6	2.2	3.1	3.0	2.9	2.7
7	Downtown (E. Wisconsin Avenue and N. Water Street)	2.8	2.4	2.2	1.7	2.4	1.7	- -	2.0	3.1	2.5	2.4	2.4	3.0	2.4
8	Near South Side (S. 16th Street and National Avenue)	3.2	3.3	2.4	2.3	3.1	2.8	2.1	- -	2.9	3.4	2.9	3.0	2.8	2.8
9	West Central S. 108th Street and W. Cleveland Avenue)	4.0	3.1	5.3	2.1	6.0	3.5	3.0	2.7	- -	5.0	4.3	4.9	6.7	4.2
10	South Central (S. 27th Street and W. Oklahoma Avenue)	3.2	4.0	3.0	2.7	3.5	2.4	2.5	3.5	5.0	- -	3.3	3.6	4.2	3.4
11	Southeast (S. Packard Avenue and E. Layton Avenue)	3.9	3.5	3.3	2.9	3.7	3.1	2.6	3.1	4.2	3.4	- -	6.3	3.1	3.6
12	General Mitchell International Airport	3.4	3.8	3.0	2.8	3.7	2.7	2.4	2.7	4.9	3.5	5.6	- -	3.7	3.5
13	Southridge Shopping Center	3.1	3.8	2.8	3.0	4.2	2.7	2.8	2.9	6.3	4.0	3.1	4.1	- -	3.6

[a] *Overall travel time is defined as the total door-to-door time for traveling between a trip origin and destination. For transit travel, this time includes the time spent out of the transit vehicle in walking to a transit stop, waiting for the first transit vehicle, transferring between routes, including waiting for each subsequent vehicle needed, and walking to a trip destination, plus the over the road travel time in the transit vehicle. For this analysis, the transit travel times assumed that the waiting time for the first route used would not exceed 15 minutes, but the waiting time for subsequent routes transferred to would be equal to one-half the headway on the route being transferred to. Depending on the location, transferring between routes would also entail one to two minutes of time for walking to the boarding location for the transfer route.*

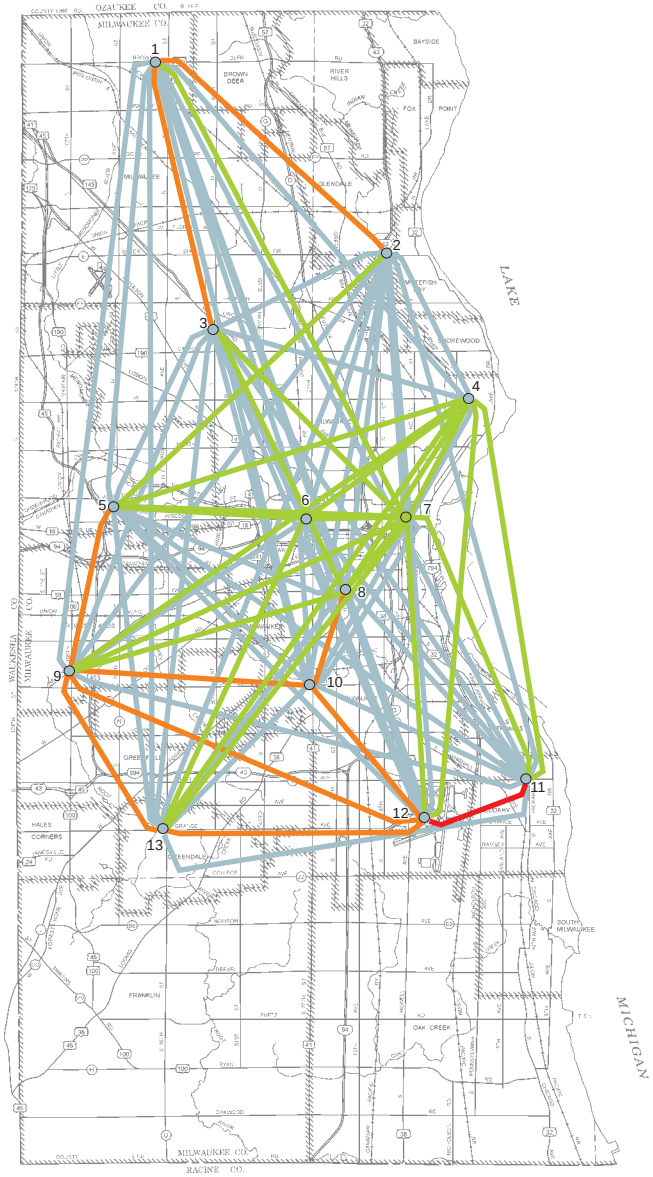
[b] *In-vehicle transit time is shown in parentheses below total time.*

Source: SEWRPC.

Map 78

RATIOS OF YEAR 2035 OVERALL TRANSIT TRAVEL TIMES UNDER THE TSM/TSM PLUS PLAN TO YEAR 2001 OVERALL AUTOMOBILE TRAVEL TIMES BETWEEN SELECTED LOCATIONS IN MILWAUKEE COUNTY DURING WEEKDAY PEAK AND OFF-PEAK PERIODS

MORNING PEAK PERIOD

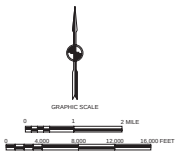


TRANSIT TO AUTOMOBILE TRAVEL TIME RATIO

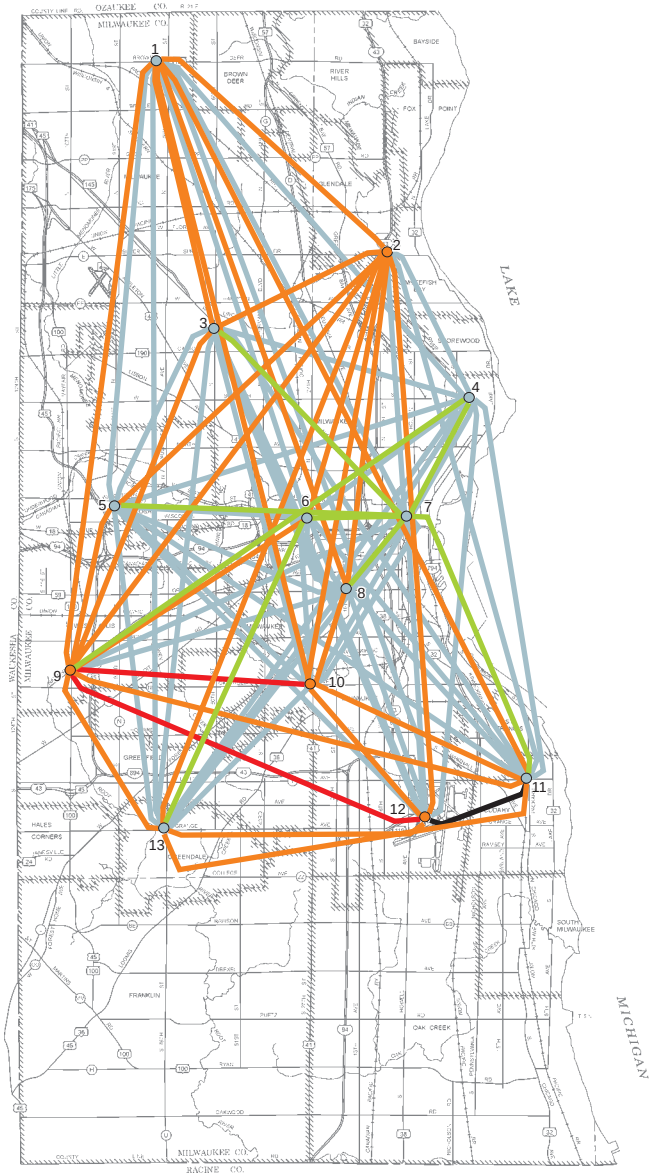
- 1.50 AND LESS
- 1.51 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 AND OVER

AVERAGE TRANSIT TO AUTOMOBILE TRAVEL TIME RATIO FOR SELECTED TRIPS FROM LOCATION

- 1.50 AND LESS
- 1.51 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 AND OVER



MIDDAY PERIOD



Source: SEWRPC.

Table 115

COMPARISON OF MORNING PEAK PERIOD AND MIDDAY PERIOD TRANSIT AND AUTOMOBILE OVERALL TRAVEL TIMES BETWEEN 13 SELECTED LOCATIONS IN MILWAUKEE COUNTY: 2001 EXISTING AND 2035 TSM/TSM PLUS HIGHWAY PLANS

Year 2035 Total Overall[a] Transit Travel Time (In-Vehicle Transit Travel Time[b]) in Minutes for Morning Peak Period

From Location		To Location 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	59 (38)	45 (29)	80 (67)	62 (42)	62 (41)	57 (40)	68 (43)	87 (71)	88 (64)	88 (62)	82 (57)	92 (79)
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	58 (32)	- -	46 (24)	31 (18)	55 (33)	46 (21)	48 (36)	49 (23)	82 (58)	70 (38)	67 (40)	61 (36)	84 (65)
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	47 (28)	47 (27)	- -	45 (31)	44 (27)	39 (23)	39 (27)	44 (26)	61 (42)	56 (35)	69 (49)	64 (44)	66 (50)
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	79 (60)	31 (19)	47 (30)	- -	54 (43)	41 (29)	33 (24)	49 (33)	66 (39)	61 (42)	59 (40)	60 (43)	73 (59)
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	62 (41)	59 (36)	44 (26)	54 (44)	- -	26 (15)	35 (25)	41 (24)	37 (17)	47 (28)	66 (47)	60 (43)	50 (34)
6	Near West Side (N. 92nd Street and Connell Avenue)	74 (55)	47 (23)	38 (22)	39 (30)	26 (15)	- -	22 (13)	28 (12)	45 (28)	33 (16)	51 (33)	45 (28)	41 (30)
7	Downtown (E. Wisconsin Avenue and N. Water Street)	64 (42)	46 (41)	39 (27)	27 (19)	35 (25)	23 (14)	- -	28 (17)	53 (43)	42 (24)	36 (22)	38 (25)	53 (41)
8	Near South Side (S. 16th Street and National Avenue)	76 (47)	51 (39)	46 (26)	48 (34)	41 (24)	29 (13)	28 (17)	- -	39 (27)	32 (12)	50 (30)	40 (21)	43 (29)
9	West Central S. 108th Street and W. Cleveland Avenue)	87 (71)	69 (40)	63 (41)	59 (39)	38 (18)	46 (30)	45 (30)	41 (29)	- -	55 (35)	72 (53)	69 (51)	41 (25)
10	South Central (S. 27th Street and W. Oklahoma Avenue)	91 (64)	73 (48)	57 (35)	61 (44)	47 (28)	31 (15)	42 (25)	34 (13)	54 (34)	- -	47 (21)	43 (21)	32 (17)
11	Southeast (S. Packard Avenue and E. Layton Avenue)	83 (56)	59 (41)	57 (41)	41 (29)	53 (39)	39 (25)	30 (19)	46 (30)	72 (53)	47 (21)	- -	43 (21)	58 (41)
12	General Mitchell International Airport	90 (60)	65 (39)	64 (45)	60 (45)	60 (43)	46 (29)	39 (26)	40 (22)	67 (49)	42 (22)	42 (22)	- -	45 (24)
13	Southridge Shopping Center	99 (84)	85 (66)	69 (51)	61 (43)	51 (34)	42 (31)	45 (29)	45 (31)	41 (25)	33 (18)	58 (40)	45 (24)	- -

Year 2001 Total Overall[a] Automobile Travel Time in Minutes for Morning Peak Period

From Location		To Location 1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	18	15	30	26	33	33	35	32	36	40	40	43
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	18	- -	17	15	28	21	21	23	35	27	28	28	34
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	15	17	- -	21	16	19	22	23	22	23	29	29	31
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	30	15	22	- -	31	22	20	25	38	29	29	31	37
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	26	31	16	31	- -	15	22	20	11	19	29	30	21
6	Near West Side (N. 92nd Street and Connell Avenue)	32	23	18	23	15	- -	14	12	23	16	21	22	26
7	Downtown (E. Wisconsin Avenue and N. Water Street)	35	23	23	20	22	15	- -	17	29	21	20	22	29
8	Near South Side (S. 16th Street and National Avenue)	37	26	23	26	20	13	17	- -	21	11	21	19	22
9	West Central S. 108th Street and W. Cleveland Avenue)	31	37	23	38	11	22	29	22	- -	15	27	22	12
10	South Central (S. 27th Street and W. Oklahoma Avenue)	36	29	23	30	19	15	21	11	15	- -	18	14	14
11	Southeast (S. Packard Avenue and E. Layton Avenue)	41	29	29	28	29	23	19	20	27	18	- -	9	21
12	General Mitchell International Airport	41	29	29	30	27	22	21	18	20	13	9	- -	14
13	Southridge Shopping Center	41	36	32	37	21	25	28	22	12	14	21	14	- -

Table 115 (continued)

Ratio of Year 2035 Total Overall[a] Transit Travel Time to Year 2001 Overall[a] Automobile Travel Time for Morning Peak Period															
		To Location													
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13	Average
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	3.3	3.0	2.7	2.4	1.9	1.7	1.9	2.7	2.4	2.2	2.1	2.1	2.4
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	3.2	- -	2.7	2.1	2.0	2.2	2.3	2.1	2.3	2.6	2.4	2.2	2.5	2.4
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	3.1	2.8	- -	2.1	2.8	2.1	1.8	1.9	2.8	2.4	2.4	2.2	2.1	2.4
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	2.6	2.1	2.1	- -	1.7	1.9	1.7	2.0	1.7	2.1	2.0	1.9	2.0	2.0
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	2.4	1.9	2.8	1.7	- -	1.7	1.6	2.1	3.4	2.5	2.3	2.0	2.4	2.2
6	Near West Side (N. 92nd Street and Connell Avenue)	2.3	2.0	2.1	1.7	1.7	- -	1.6	2.3	2.0	2.1	2.4	2.0	1.6	2.0
7	Downtown (E. Wisconsin Avenue and N. Water Street)	1.8	2.0	1.7	1.4	1.6	1.5	- -	1.6	1.8	2.0	1.8	1.7	1.8	1.7
8	Near South Side (S. 16th Street and National Avenue)	2.1	2.0	2.0	1.8	2.1	2.2	1.6	- -	1.9	2.9	2.4	2.1	2.0	2.1
9	West Central S. 108th Street and W. Cleveland Avenue)	2.8	1.9	2.7	1.6	3.5	2.1	1.6	1.9	- -	3.7	27	3.1	3.4	2.6
10	South Central (S. 27th Street and W. Oklahoma Avenue)	2.5	2.5	2.5	2.0	2.5	2.1	2.0	3.1	3.6	- -	2.6	3.1	2.3	2.6
11	Southeast (S. Packard Avenue and E. Layton Avenue)	2.0	2.0	2.0	1.5	1.8	1.7	1.6	2.3	2.7	2.6	- -	4.8	2.8	2.3
12	General Mitchell International Airport	2.2	2.2	2.2	2.0	2.2	2.1	1.9	2.2	3.4	3.2	4.7	- -	3.2	2.6
13	Southridge Shopping Center	2.4	2.4	2.2	1.6	2.4	1.7	1.6	2.0	3.4	2.4	2.8	3.2	- -	2.3

Year 2035 Total Overall[a] Transit Travel Time (In-Vehicle Transit Travel Time[b]) in Minutes for Midday Peak Period														
		To Location												
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	63 (35)	47 (27)	54 (32)	59 (38)	75 (52)	56 (33)	92 (68)	89 (65)	101 (74)	118 (92)	81 (49)	90 (73)
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	63 (35)	- -	48 (22)	35 (17)	74 (52)	64 (44)	46 (32)	69 (47)	90 (43)	72 (43)	79 (53)	86 (65)	83 (59)
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	47 (27)	48 (22)	- -	47 (29)	43 (22)	42 (22)	40 (26)	47 (25)	65 (38)	57 (32)	73 (47)	66 (42)	67 (47)
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	79 (55)	35 (17)	47 (29)	- -	58 (43)	45 (30)	35 (21)	49 (31)	49 (29)	62 (41)	69 (42)	70 (44)	81 (64)
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	60 (38)	74 (52)	44 (18)	53 (41)	- -	30 (16)	35 (23)	42 (22)	39 (16)	49 (26)	68 (44)	61 (39)	49 (33)
6	Near West Side (N. 92nd Street and Connell Avenue)	75 (52)	63 (43)	40 (19)	40 (28)	30 (15)	- -	25 (15)	30 (13)	49 (28)	34 (16)	55 (32)	53 (36)	41 (29)
7	Downtown (E. Wisconsin Avenue and N. Water Street)	74 (52)	46 (32)	40 (26)	30 (19)	35 (23)	26 (16)	- -	29 (17)	54 (39)	45 (25)	39 (22)	39 (24)	55 (41)
8	Near South Side (S. 16th Street and National Avenue)	96 (72)	67 (45)	49 (27)	49 (31)	44 (24)	31 (13)	29 (17)	- -	42 (26)	37 (12)	51 (28)	48 (27)	47 (28)
9	West Central S. 108th Street and W. Cleveland Avenue)	91 (66)	74 (42)	65 (38)	49 (29)	40 (17)	49 (27)	53 (39)	42 (26)	- -	58 (32)	71 (46)	74 (53)	42 (23)
10	South Central (S. 27th Street and W. Oklahoma Avenue)	106 (79)	72 (43)	57 (32)	62 (41)	49 (26)	33 (15)	44 (25)	37 (12)	58 (32)	- -	57 (29)	48 (20)	32 (16)
11	Southeast (S. Packard Avenue and E. Layton Avenue)	98 (67)	65 (39)	64 (40)	48 (28)	60 (37)	47 (26)	36 (20)	51 (28)	71 (46)	56 (29)	- -	46 (21)	60 (40)
12	General Mitchell International Airport	100 (69)	86 (65)	66 (42)	62 (42)	61 (39)	54 (37)	39 (24)	49 (28)	75 (54)	45 (20)	46 (21)	- -	44 (22)
13	Southridge Shopping Center	94 (77)	83 (59)	66 (46)	72 (57)	50 (34)	41 (29)	54 (41)	47 (28)	42 (24)	32 (16)	60 (40)	43 (22)	- -

Table 115 (continued)

Year 2001 Total Overall[a] Automobile Travel Time in Minutes for Midday Peak Period														
		To Location												
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	18	15	28	23	29	30	31	25	34	36	35	34
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	18	- -	15	14	22	17	18	19	23	23	25	23	27
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	15	16	- -	18	15	17	21	22	20	22	28	26	27
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	28	14	18	- -	24	20	19	22	26	25	27	26	30
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	21	23	15	25	- -	15	19	18	10	17	25	22	17
6	Near West Side (N. 92nd Street and Connell Avenue)	30	20	17	22	15	- -	14	12	16	15	22	20	24
7	Downtown (E. Wisconsin Avenue and N. Water Street)	31	20	22	19	20	15	- -	16	21	20	20	21	25
8	Near South Side (S. 16th Street and National Avenue)	32	21	22	23	17	12	16	- -	18	11	20	17	21
9	West Central S. 108th Street and W. Cleveland Avenue)	25	24	20	26	10	17	21	19	- -	14	22	18	12
10	South Central (S. 27th Street and W. Oklahoma Avenue)	33	23	22	25	17	14	20	11	14	- -	17	14	14
11	Southeast (S. Packard Avenue and E. Layton Avenue)	36	25	28	26	25	22	19	19	23	17	- -	8	18
12	General Mitchell International Airport	34	23	26	25	21	20	19	17	17	13	8	- -	14
13	Southridge Shopping Center	32	28	27	30	17	23	24	21	12	14	18	14	- -

Ratio of Year 2035 Total Overall[a] Transit Travel Time to Year 2001 Overall[a] Automobile Travel Time for Midday Peak Period															
		To Location													
From Location		1	2	3	4	5	6	7	8	9	10	11	12	13	Average
1	Granville Station (N. Servite Drive and W. Brown Deer Road)	- -	3.5	3.1	1.9	2.6	2.6	1.9	3.0	3.6	3.0	3.3	2.3	2.6	2.8
2	Northeast (N. Port Washington Road and E. Silver Spring Drive)	3.5	- -	3.2	2.5	3.4	3.8	2.6	3.6	3.9	3.1	3.2	3.7	3.1	3.3
3	North Central (W. Fond du Lac Avenue and W. Congress Street)	3.1	3.0	- -	2.6	2.9	2.5	1.9	2.1	3.3	2.6	2.6	2.5	2.5	2.6
4	University of Wisconsin-Milwaukee (E. Kenwood Blvd. and N. Maryland Avenue)	2.8	2.5	2.6	- -	2.4	2.3	1.8	2.2	1.9	2.5	2.6	2.7	2.7	2.4
5	Milwaukee Regional Medical Center (N. 92 Street and Connell Avenue)	2.9	3.2	2.9	2.1	- -	2.0	1.8	2.3	3.9	2.9	2.7	2.8	2.9	2.7
6	Near West Side (N. 92nd Street and Connell Avenue)	2.5	3.2	2.4	1.8	2.0	- -	1.8	2.5	3.1	2.3	2.5	2.7	1.7	2.4
7	Downtown (E. Wisconsin Avenue and N. Water Street)	2.4	2.3	1.8	1.6	1.8	1.7	- -	1.8	2.6	2.3	2.0	1.9	2.2	2.0
8	Near South Side (S. 16th Street and National Avenue)	3.0	3.2	2.2	2.1	2.6	2.6	1.8	- -	2.3	3.4	2.6	2.8	2.2	2.6
9	West Central S. 108th Street and W. Cleveland Avenue)	3.6	3.1	3.3	1.9	4.0	2.9	2.5	2.2	- -	4.1	3.2	4.1	3.5	3.2
10	South Central (S. 27th Street and W. Oklahoma Avenue)	3.2	3.1	2.6	2.5	2.9	2.4	2.2	3.4	4.1	- -	3.4	3.4	2.3	3.0
11	Southeast (S. Packard Avenue and E. Layton Avenue)	2.7	2.6	2.3	1.8	2.4	2.1	1.9	2.7	3.1	3.3	- -	5.8	3.3	2.8
12	General Mitchell International Airport	2.9	3.7	2.5	2.5	2.9	2.7	2.1	2.9	4.4	3.5	5.8	- -	3.1	3.3
13	Southridge Shopping Center	2.9	3.0	2.4	2.4	2.9	1.8	2.3	2.2	3.5	2.3	3.3	3.1	- -	2.7

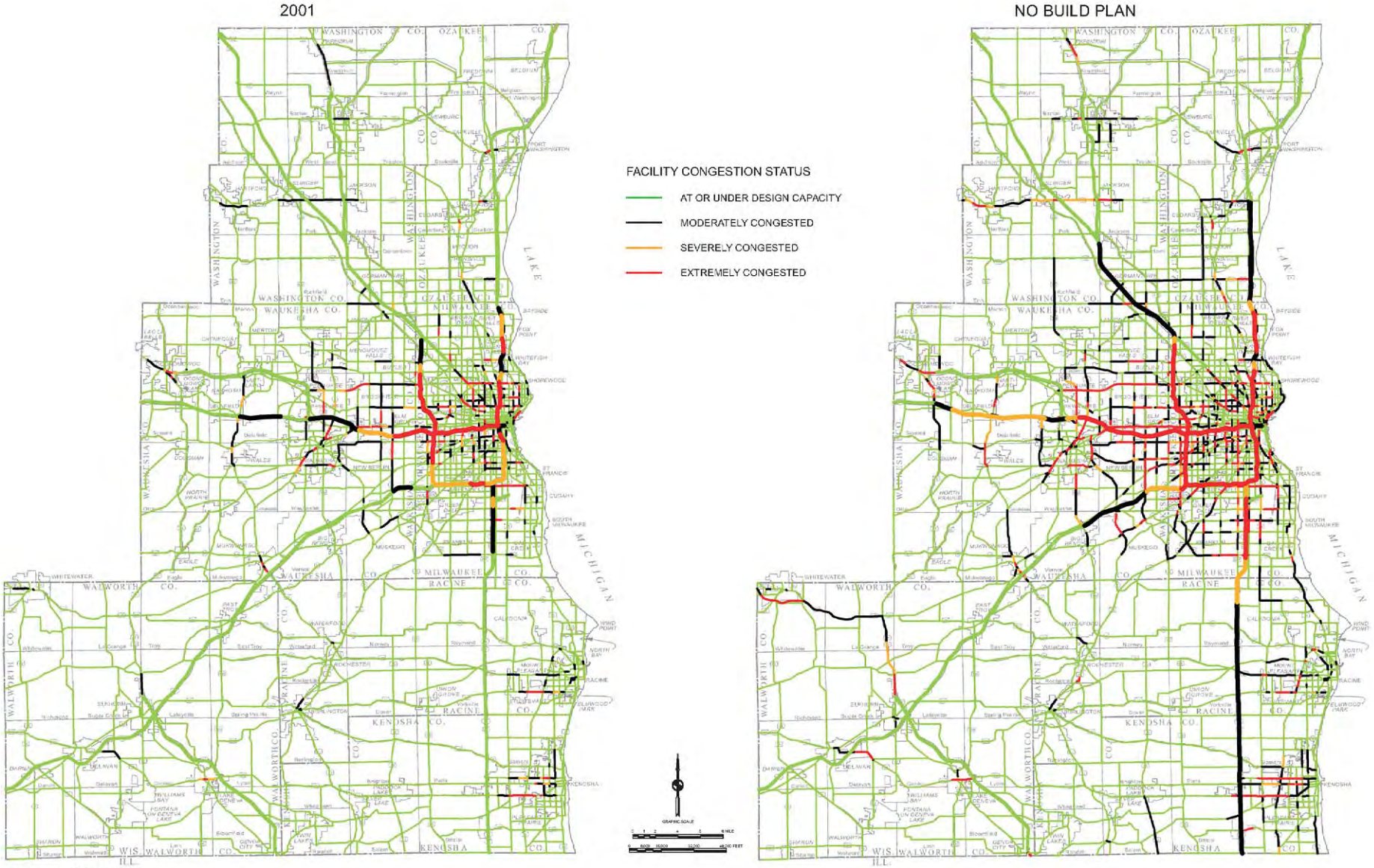
[a] *Overall travel time is defined as the total door-to-door time for traveling between a trip origin and destination. For transit travel, this time includes the time spent out of the transit vehicle in walking to a transit stop, waiting for the first transit vehicle, transferring between routes, including waiting for each subsequent vehicle needed, and walking to a trip destination, plus the over the road travel time in the transit vehicle. For this analysis, the transit travel times assumed that the waiting time for the first route used would not exceed 15 minutes, but the waiting time for subsequent routes transferred to would be equal to one-half the headway on the route being transferred to. Depending on the location, transferring between routes would also entail one to two minutes of time for walking to the boarding location for the transfer route.*

[b] *In-vehicle transit time is shown in parentheses below total time.*

Source: SEWRPC.

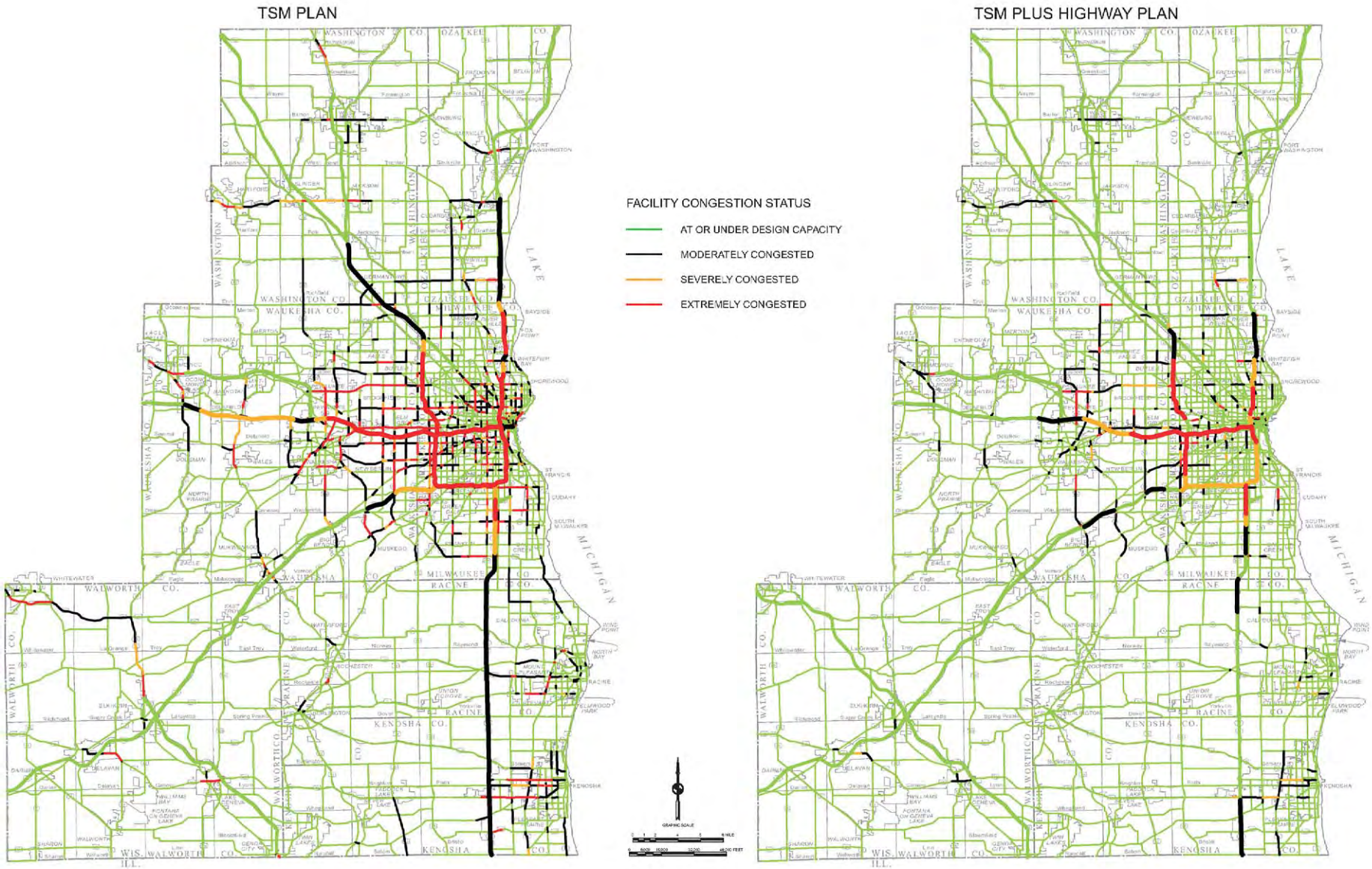
Map 79

COMPARISON OF EXISTING YEAR 2001 AND FORECAST FUTURE YEAR 2035 AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION UNDER THE NO-BUILD PLAN AND TSM AND TSM PLUS HIGHWAY ALTERNATIVE PLANS



Source: SEWRPC.

Map 79 (continued)



Source: SEWRPC.

Table 116

COMPARISON OF EXISTING YEAR 2001 AND FORECAST FUTURE YEAR 2035 AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE ARTERIAL STREET AND HIGHWAY SYSTEM IN THE REGION UNDER THE NO-BUILD PLAN AND TSM AND TSM PLUS HIGHWAY ALTERNATIVE PLANS

	Existing Base Year 2001								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	303.2	95.5	9.9	3.1	1.5	0.5	3.0	0.9	317.6
Milwaukee	641.1	82.0	72.1	9.2	24.7	3.2	43.4	5.6	781.3
Ozaukee	244.2	97.4	4.3	1.7	1.5	0.6	0.8	0.3	250.8
Racine	341.3	96.8	9.4	2.7	0.5	0.1	1.4	0.4	352.6
Walworth	430.1	98.4	5.1	1.2	1.1	0.3	0.3	0.1	436.6
Washington	391.1	96.2	15.4	3.8	- -	- -	- -	- -	406.5
Waukesha	650.9	87.2	70.7	9.5	11.4	1.5	13.4	1.8	746.4
Region	3,001.9	91.2	186.9	5.7	40.7	1.2	62.3	1.9	3,291.8

	Year 2035 No-Build Plan								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	298.9	83.7	44.7	12.5	3.3	0.9	10.2	2.9	357.1
Milwaukee	533.1	67.0	133.0	16.7	26.1	3.3	103.6	13.0	795.8
Ozaukee	265.2	87.7	31.4	10.4	2.2	0.7	3.7	1.2	302.5
Racine	379.2	90.4	33.9	8.1	2.9	0.7	3.3	0.8	419.3
Walworth	441.1	94.1	14.7	3.1	3.2	0.7	9.6	2.1	468.6
Washington	382.6	89.9	31.0	7.3	7.1	1.7	5.0	1.1	425.7
Waukesha	567.9	74.1	113.0	14.7	26.0	3.4	59.4	7.8	766.3
Region	2868.0	81.1	401.7	11.4	70.8	2.0	194.8	5.5	3,535.3

	Year 2035 TSM Plan								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	298.9	83.7	44.7	12.5	3.3	0.9	10.2	2.9	357.1
Milwaukee	573.9	72.1	110.5	13.9	24.7	3.1	86.7	10.9	795.8
Ozaukee	264.8	87.5	31.8	10.5	2.2	0.7	3.7	1.3	302.5
Racine	379.3	90.5	36.0	8.6	0.7	0.2	3.3	0.7	419.3
Walworth	441.1	94.1	14.7	3.1	3.2	0.7	9.6	2.1	468.6
Washington	382.6	89.9	31.0	7.3	7.1	1.7	5.0	1.1	425.7
Waukesha	571.5	74.6	109.4	14.3	26.0	3.4	59.4	7.7	766.3
Region	2,912.1	82.4	378.1	10.7	67.2	1.9	177.9	5.0	3,535.3

	Year 2035 TSM Plus Highway Plan								
	Under or At Design Capacity		Over Design Capacity						
			Moderate Congestion		Severe Congestion		Extreme Congestion		
County	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Mileage	Percent of Total	Total Mileage
Kenosha	339.0	94.6	15.4	4.3	3.9	1.1	- -	- -	358.3
Milwaukee	704.0	88.1	46.4	5.8	20.9	2.6	28.0	3.5	799.3
Ozaukee	305.8	98.2	2.8	0.9	2.1	0.7	0.6	0.2	311.3
Racine	431.5	97.8	8.7	2.0	0.9	0.2	- -	- -	441.1
Walworth	465.9	98.8	5.0	1.1	0.6	0.1	- -	- -	471.5
Washington	448.6	97.6	10.7	2.3	- -	- -	0.6	0.1	459.9
Waukesha	689.8	87.8	72.0	9.2	10.6	1.3	13.1	1.7	785.5
Region	3,384.6	93.3	161.0	4.4	39.0	1.1	42.3	1.2	3,626.9

Source: SEWRPC.

Table 117

SOUTHEASTERN WISCONSIN FREEWAY SYSTEM TRAFFIC CONGESTION ON AN AVERAGE WEEKDAY: YEAR 2001, YEAR 2035 ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN, AND YEAR 2035 TSM PLUS HIGHWAY PLAN[a,b]

ESTIMATED EXISTING YEAR 2001

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	24.4	9.0	1.4	3.3	4.4	9.1
Severe	19.8	7.3	--	1.5	2.5	4.0
Moderate	20.8	7.8	--	--	2.2	2.2
Total	65.0	24.1	--	--	--	--

FORECAST YEAR 2035 UNDER NO-BUILD PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	53.8	19.9	1.4	3.2	4.2	8.8
Severe	20.7	7.7	--	1.3	2.7	4.0
Moderate	53.5	19.8	--	--	2.8	2.8
Total	128.0	47.4	--	--	--	--

FORECAST YEAR 2035 UNDER TSM PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	48.2	17.9	1.4	3.3	4.3	9.0
Severe	24.2	9.0	--	1.4	2.6	4.0
Moderate	52.2	19.4	--	--	2.3	2.3
Total	124.6	46.3	--	--	--	--

FORECAST YEAR 2035 UNDER TSM PLUS HIGHWAY PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	25.7	9.0	1.1	2.5	3.5	7.1
Severe	20.6	7.2	--	1.5	2.5	4.0
Moderate	25.5	8.9	--	--	1.9	1.9
Total	71.8	25.1	--	--	--	--

[a]The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion. The TSM plus highway plan alternative includes the TSM plan plus 431 miles of arterial street and highway system capacity expansion.

[b]Congestion on freeways may be summarized by the following operating conditions:

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Some restrictions on ability to maneuver and change lanes.
Moderate	D	1 to 2 mph below free-flow speed	Substantial restrictions on ability to maneuver and change lanes.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Source: SEWRPC.

Table 118

COMPARISON OF TRANSIT SYSTEM AND ARTERIAL HIGHWAY SYSTEM AVERAGE TRAVEL TIME AND TRIP SPEED FOR THE NO BUILD PLAN, YEAR 2035 TRANSPORTATION SYSTEMS MANAGEMENT (TSM) PLAN, AND YEAR 2035 TSM PLUS HIGHWAY PLAN

Plan	Average Traveltime (minutes)		Average Travel Speed (miles per hour)	
	Transit[a]	Highway	Transit	Highway
No-Build Plan	17.5	14.3	14.7	34.1
TSM Plan	18.9	14.2	17.4	34.6
TSM Plus Highway Plan	18.9	13.2	17.4	38.0

[a]*Transit in-vehicle only.*

Source: SEWRPC.

implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges) will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of the preliminary engineering would a determination be made as to how the freeway would be reconstructed.

SUMMARY AND CONCLUSIONS

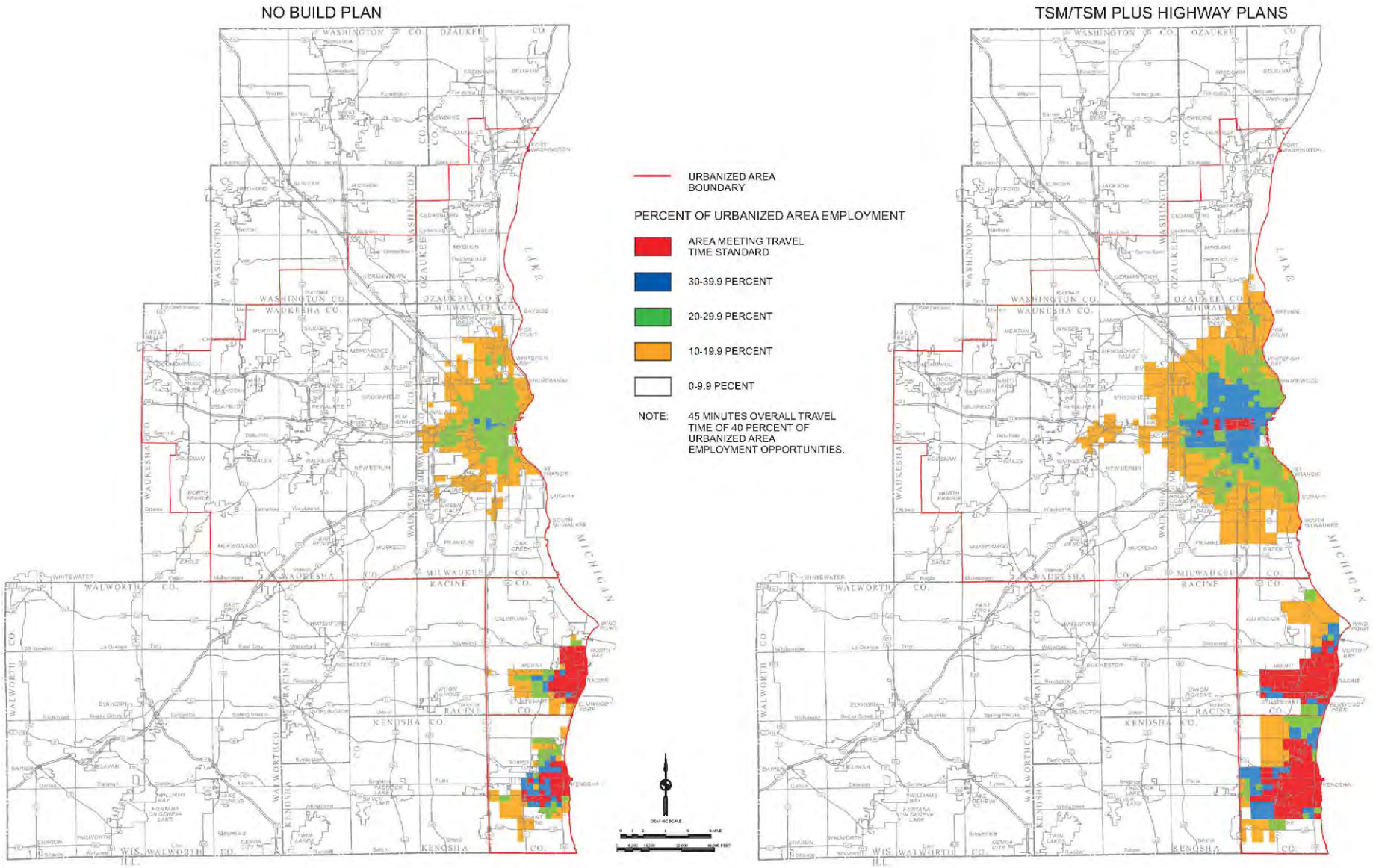
This chapter has described the development of three alternatives—a no-build alternative, a transportation systems management (TSM) alternative, and a TSM plus highway alternative—considered in the preparation of a preliminary new recommended year 2035 regional transportation system plan for southeastern Wisconsin. This chapter presents the results of an evaluation and comparison of these plans to each other and to the Commission's adopted transportation planning objectives set forth in Chapter VII.

The no-build plan alternative would maintain the existing transportation system including continuing to operate the public transit system as it existed in the year 2005, to resurface and reconstruct without additional traffic lanes the existing arterial street and highway system, and operate and manage the transportation system as it was operated and managed in 2005.

The TSM plan alternative proposed improvements to the public transit, bicycle and pedestrian facilities, transportation systems management, and travel demand management elements of the transportation system, but did not recommend any arterial street and highway capacity expansion. Under the public transit element of the TSM plan alternative, a near doubling of transit service in Southeastern Wisconsin from about 69,000 revenue vehicle-miles of service in 2005 to about 138,000 revenue vehicle-miles of service in 2035 was recommended. Under the bicycle and pedestrian element of the TSM plan alternative, the provision of accommodation for bicycle travel was recommended to be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened shoulders, or separate bicycle paths as the surface arterial street system of about 3,300 miles in the Region is resurfaced and reconstructed. It is also proposed that a system of off-street bicycle paths be provided between the Kenosha, Milwaukee, and Racine urbanized areas and the cities and villages within the Region with a population of 5,000 or more located outside these three urbanized areas. The pedestrian

Map 80

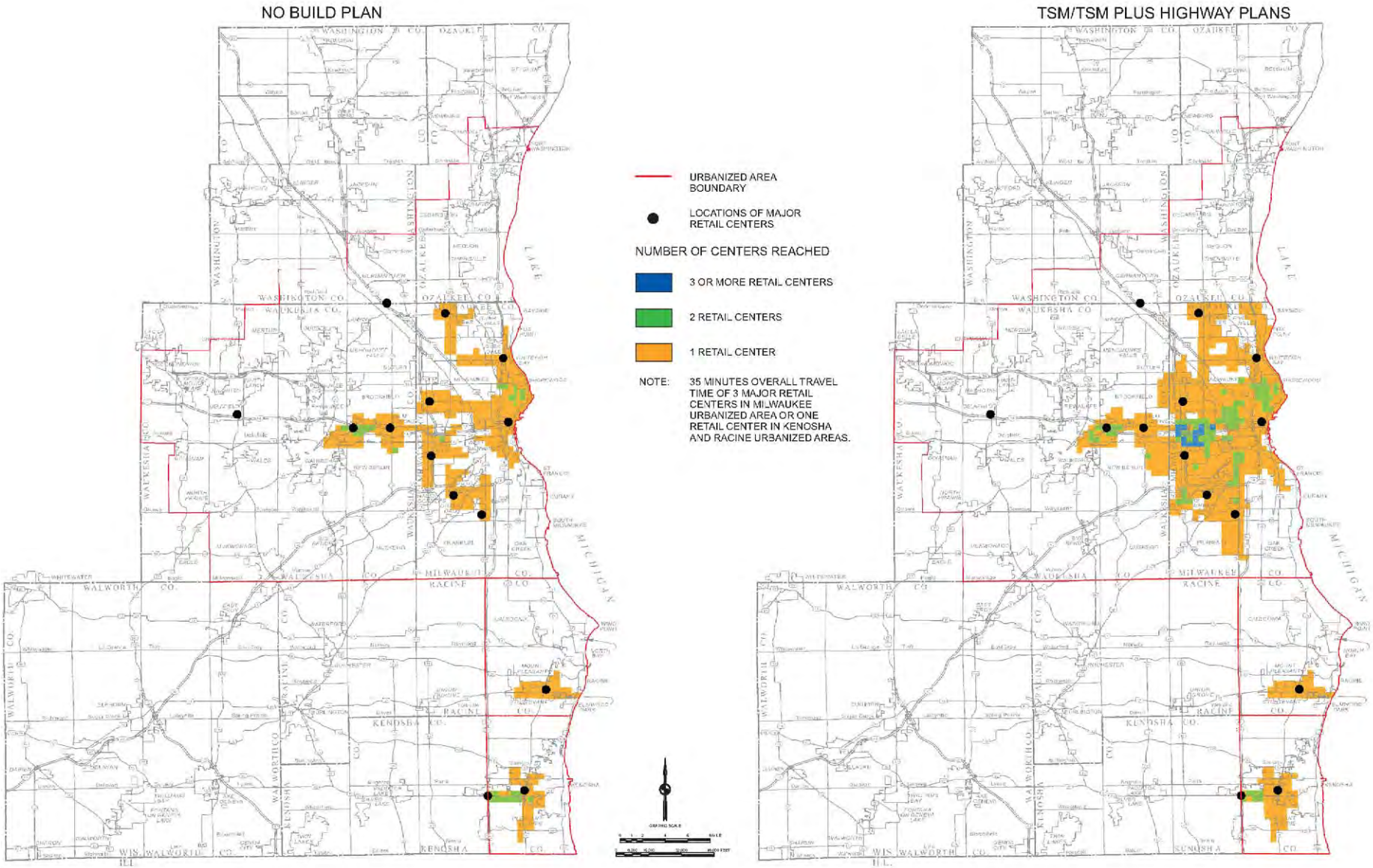
AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO JOBS BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 81

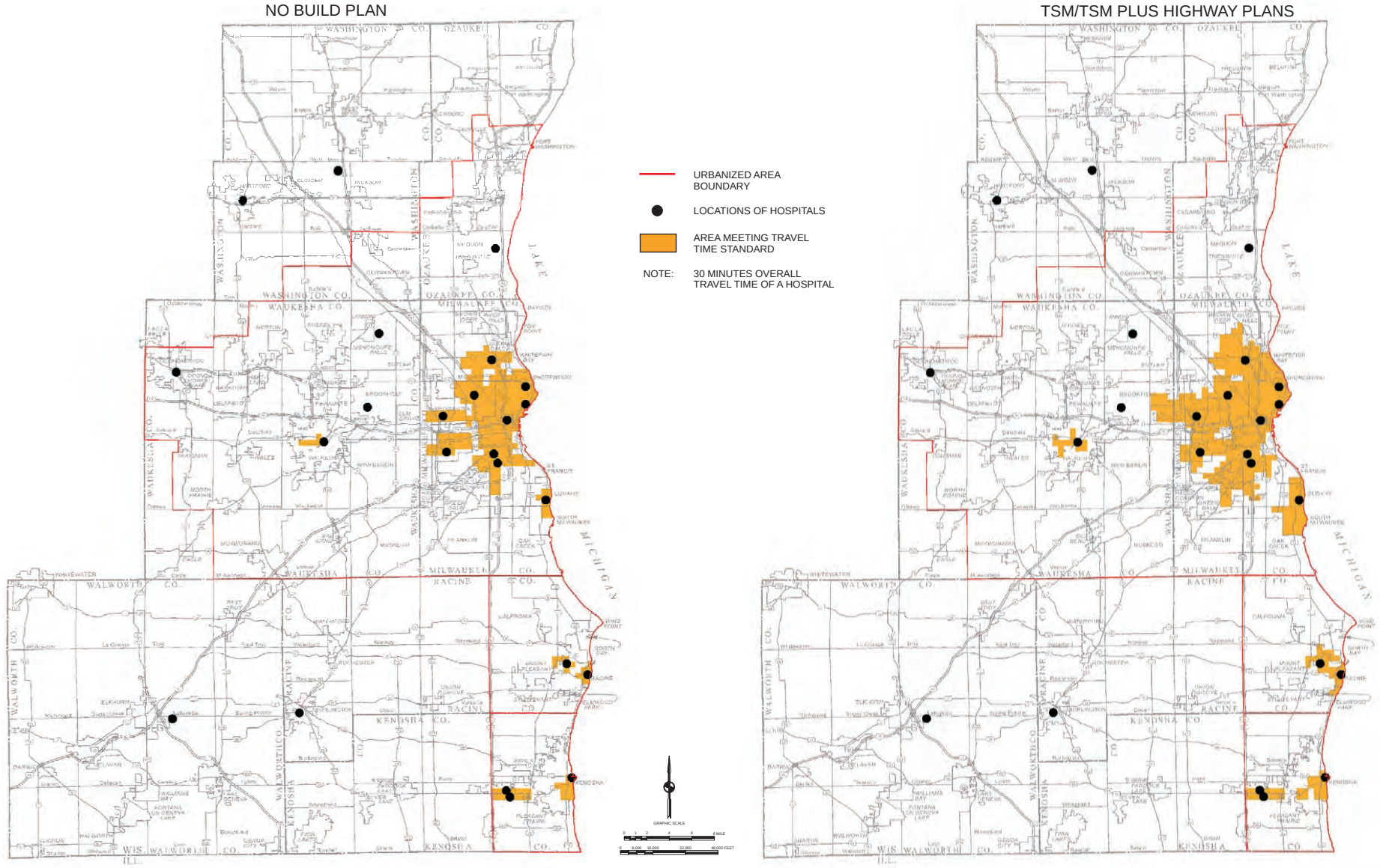
AREAS MEETING TRAVEL TIME STANDARD TO MAJOR RETAIL CENTERS BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 82

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO HOSPITALS BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS



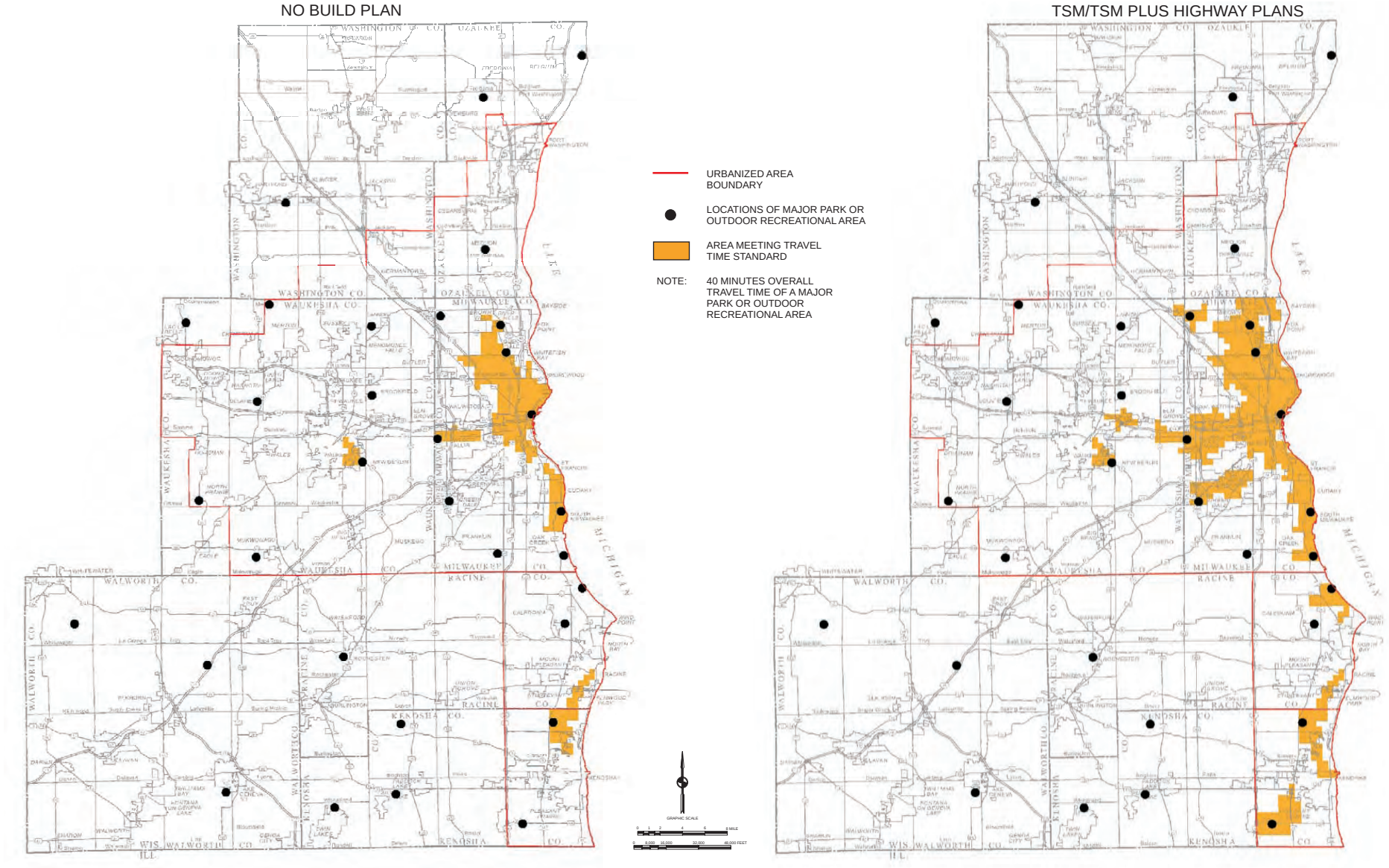
Source: SEWRPC.

Map 83

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO MAJOR PARK OR OUTDOOR RECREATIONAL AREA BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

NO BUILD PLAN

TSM/TSM PLUS HIGHWAY PLANS



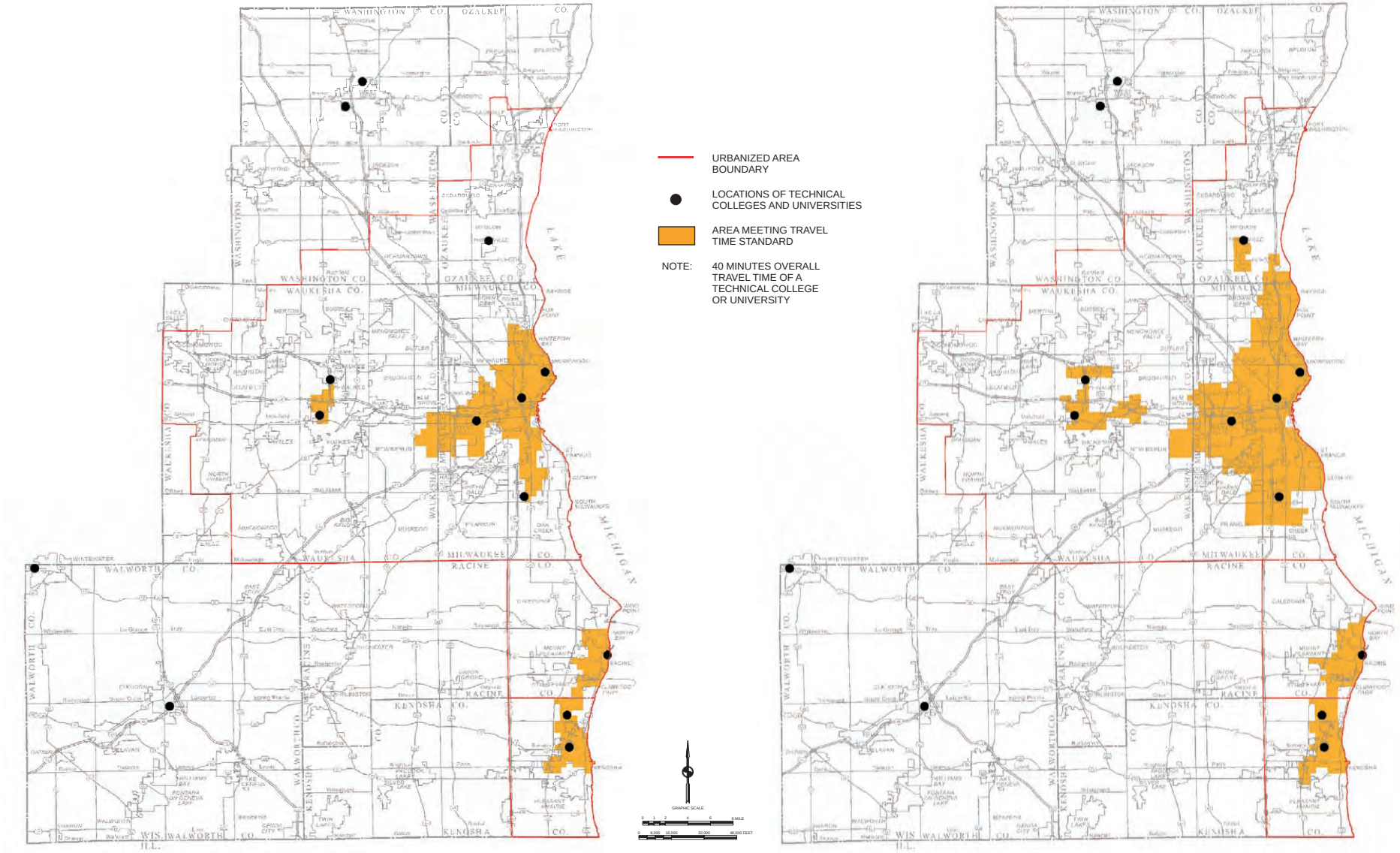
Source: SEWRPC.

Map 84

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO PUBLIC TECHNICAL COLLEGES AND UNIVERSITIES BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

NO BUILD PLAN

TSM/TSM PLUS HIGHWAY PLANS



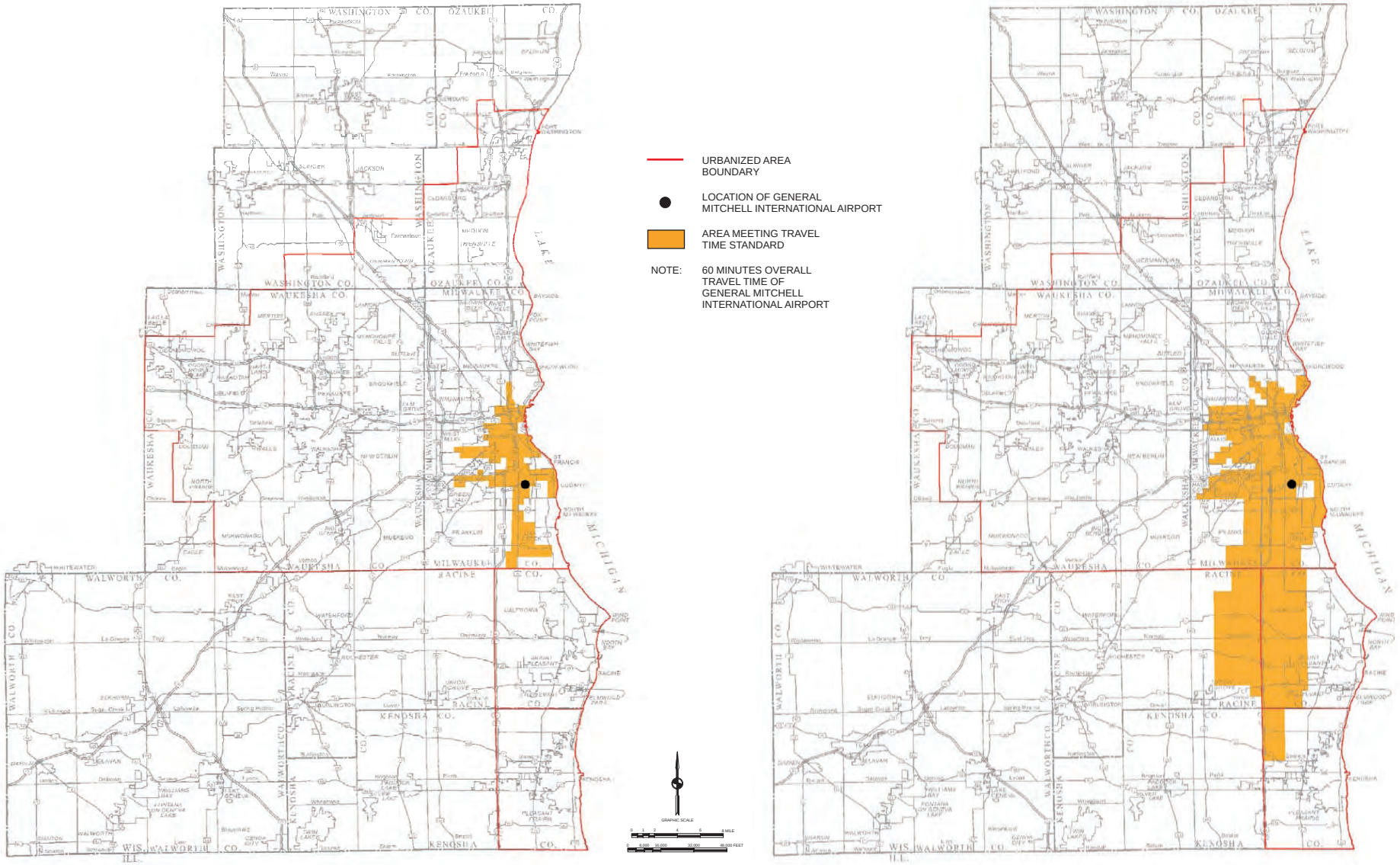
Source: SEWRPC.

Map 85

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO GENERAL MITCHELL INTERNATIONAL AIRPORT BY PUBLIC TRANSIT: NO BUILD PLAN AND TSM/TSM PLUS HIGHWAY PLANS

NO BUILD PLAN

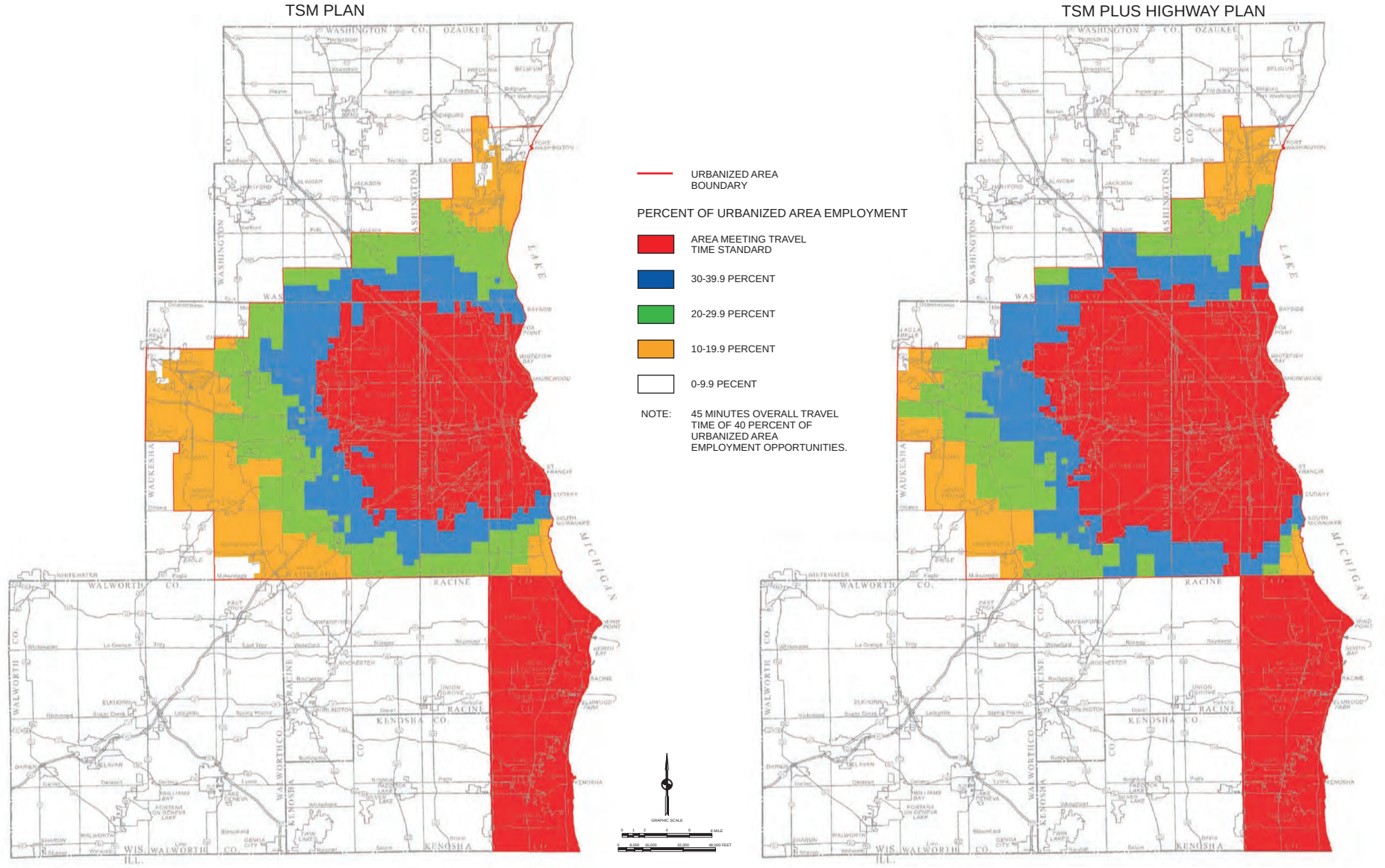
TSM/TSM PLUS HIGHWAY PLANS



Source: SEWRPC.

Map 86

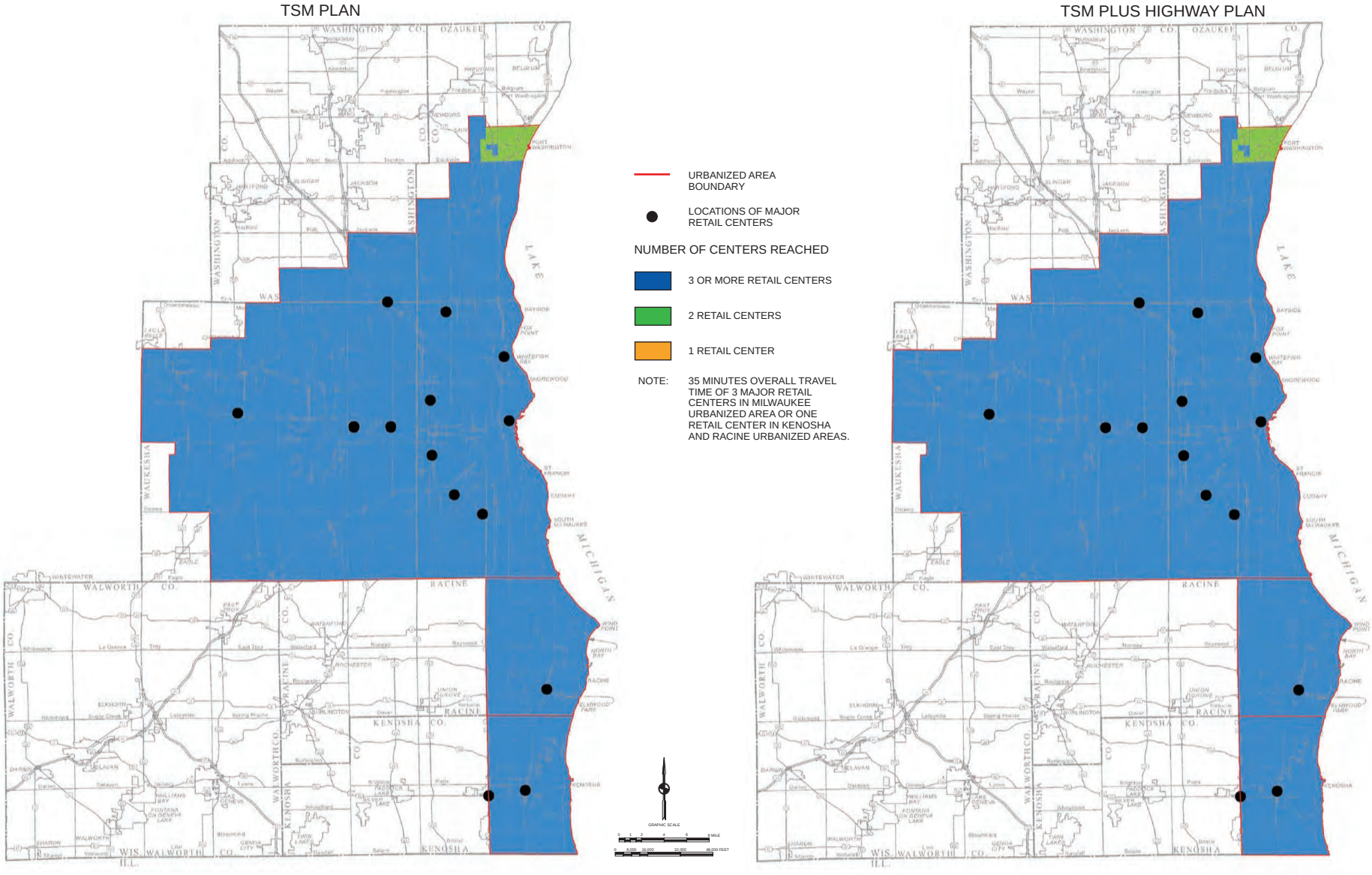
AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO JOBS BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Map 87

AREAS MEETING TRAVEL TIME STANDARD TO MAJOR RETAIL CENTERS BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN



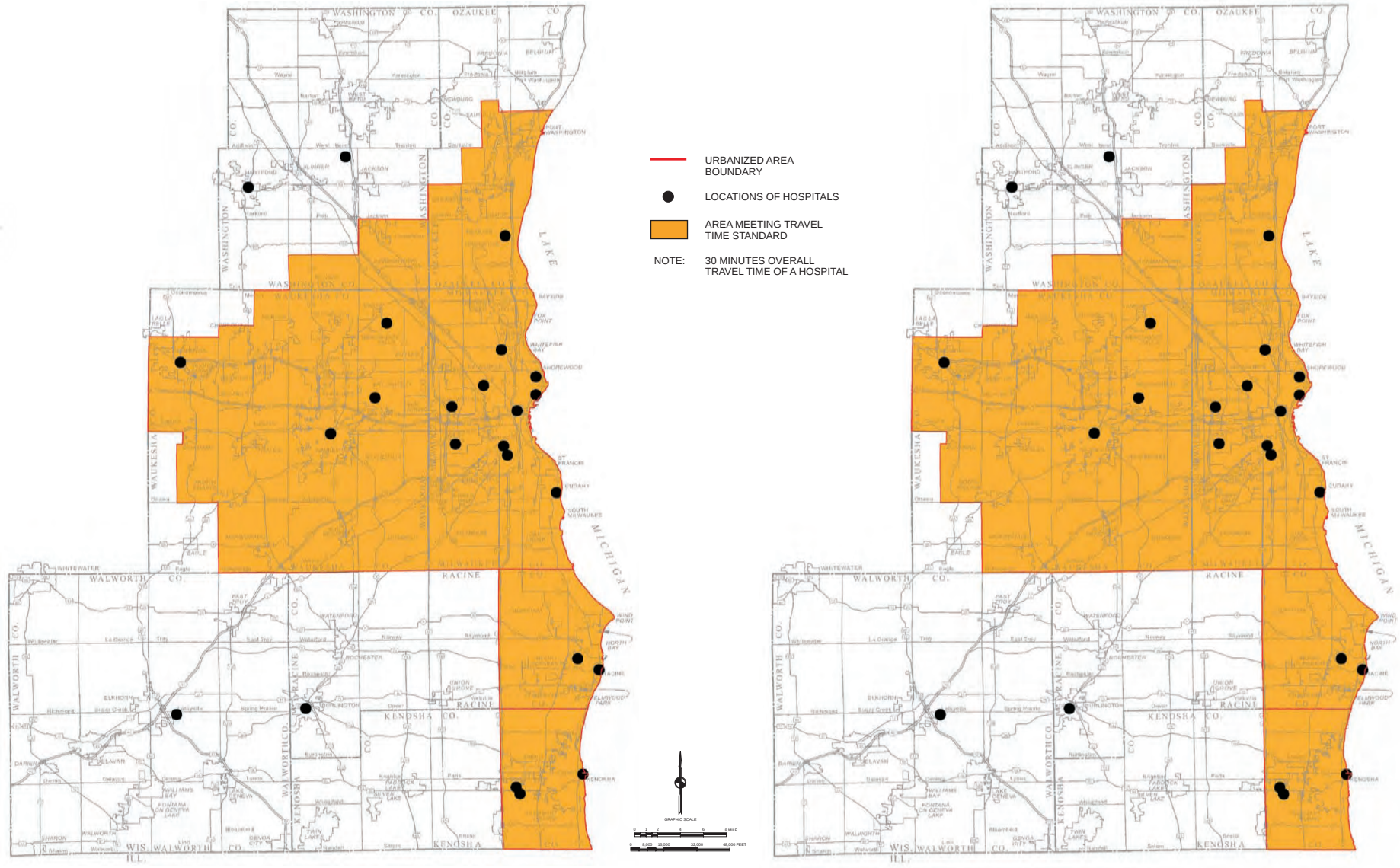
Source: SEWRPC.

Map 88

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO HOSPITALS BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN

TSM PLAN

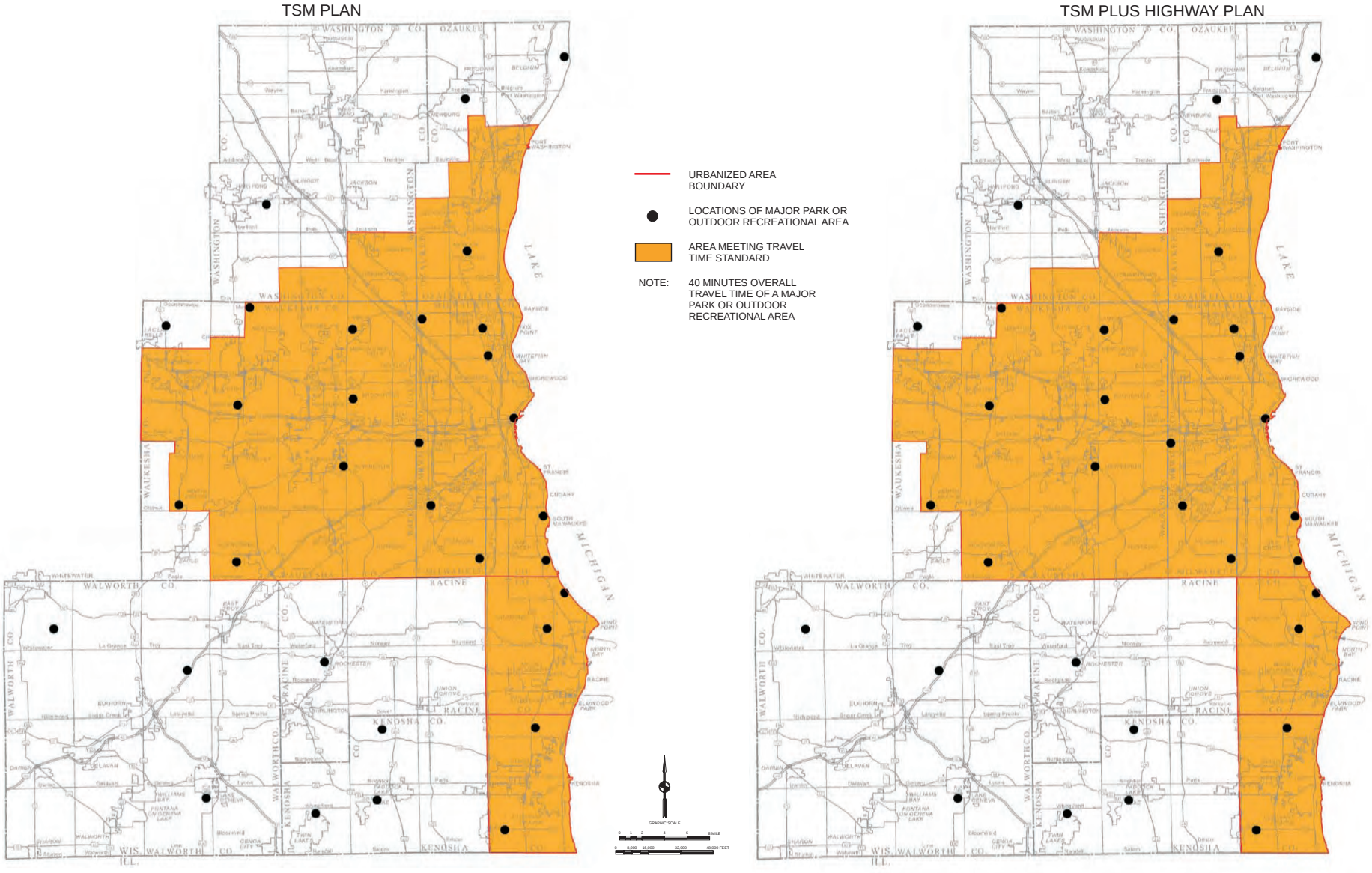
TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Map 89

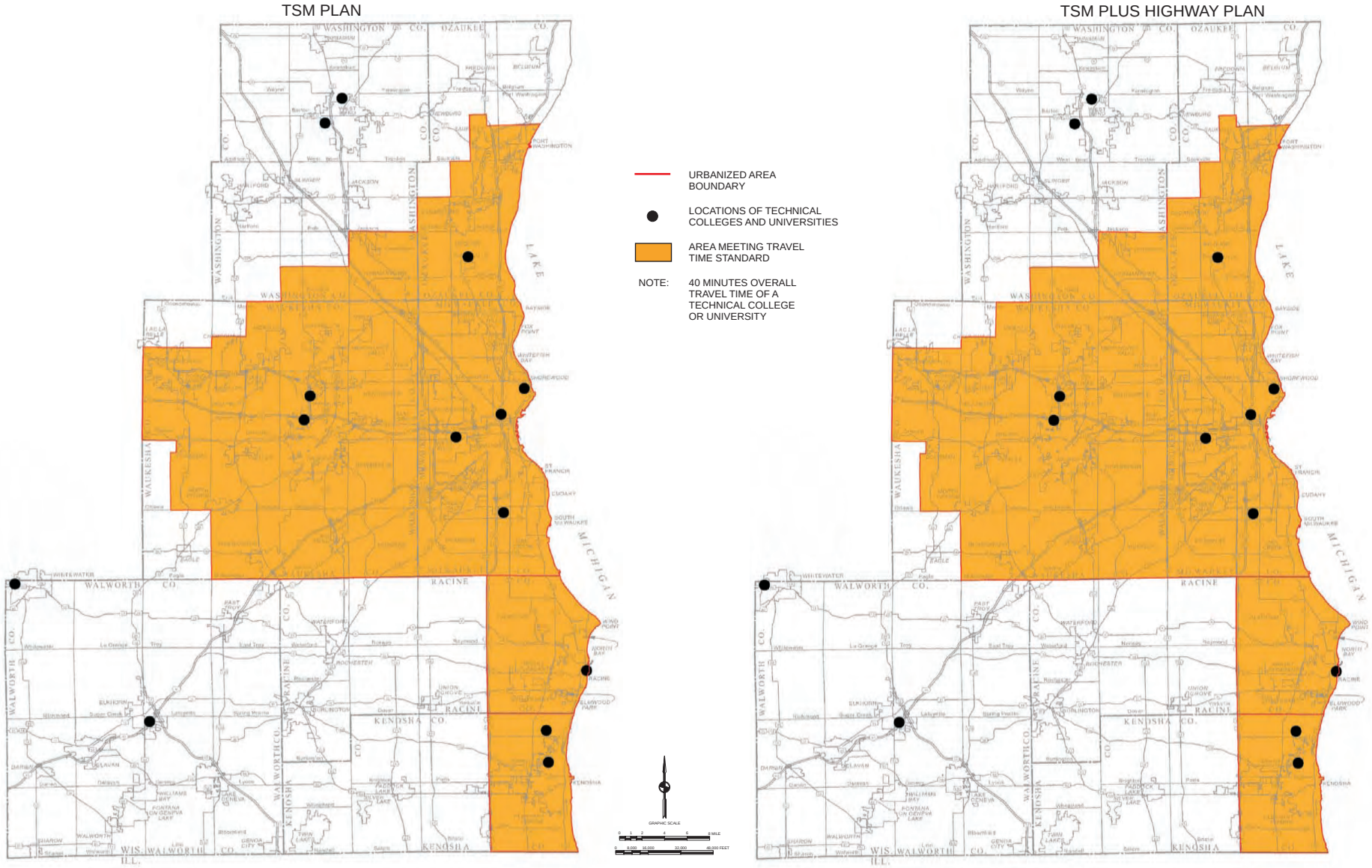
AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO MAJOR PARK OR OUTDOOR RECREATIONAL AREA BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Map 90

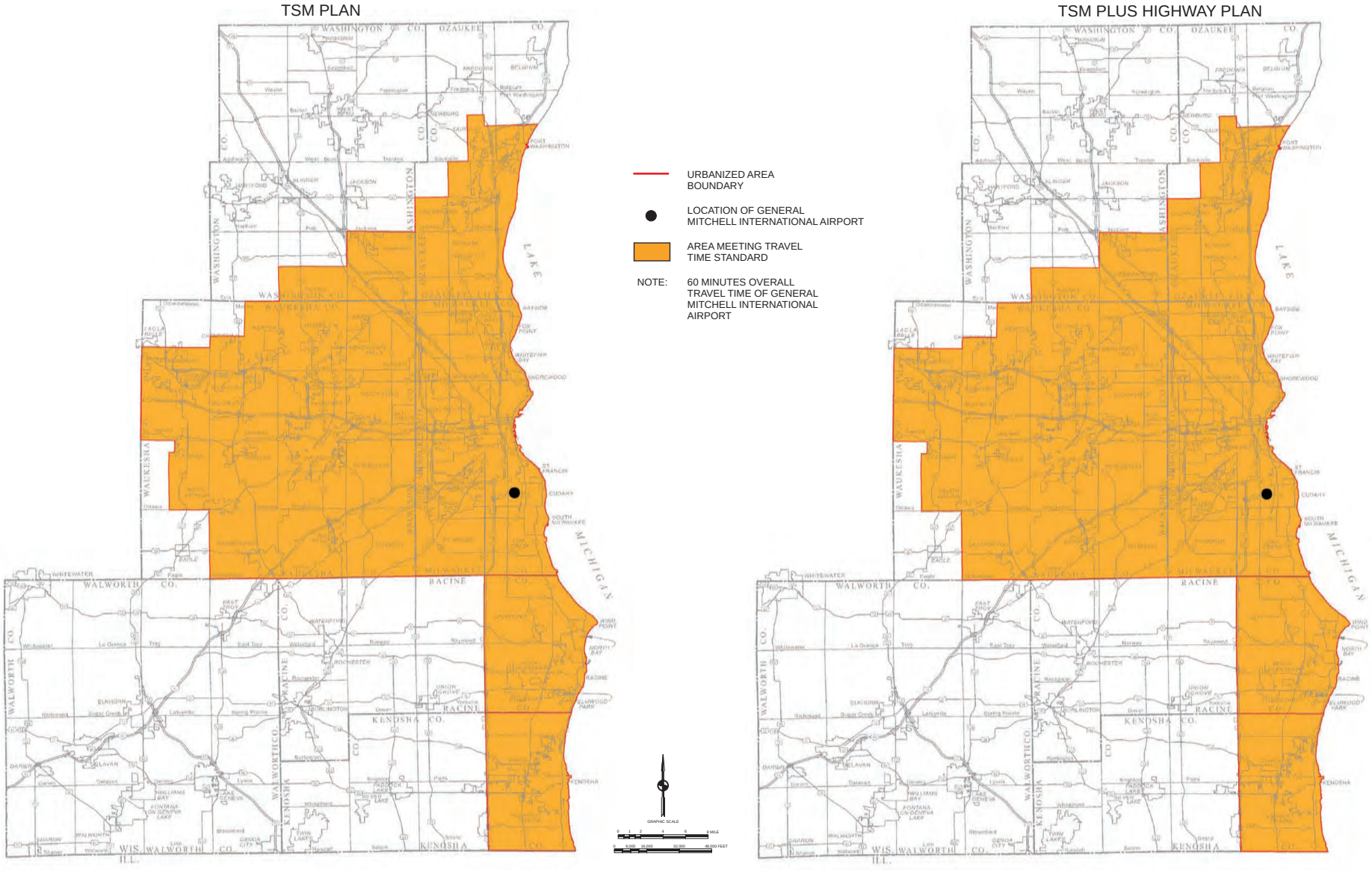
AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO PUBLIC TECHNICAL COLLEGES AND UNIVERSITIES BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Map 91

AREAS MEETING TRAVEL TIME STANDARD FOR TRAVEL TO GENERAL MITCHELL INTERNATIONAL AIRPORT BY HIGHWAY: TSM PLAN AND TSM PLUS HIGHWAY PLAN



Source: SEWRPC.

Table 119

ESTIMATED RIGHT-OF-WAY IMPACTS ATTENDANT TO THE IMPLEMENTATION OF THE TSM PLAN AND THE TSM PLUS HIGHWAY PLAN ALTERNATIVES

TSM PLAN

Category	Freeway System Total (Includes Design Improvements)	Region Arterial System Total
Estimated Right-of-Way Impacts (Acres)	560.4	560.4
Relocations		
Residential	151	151
NonResidential		
Commercial, Office and Industrial	18	18
Government/Institution	2	2
Historic Buildings and Sites		
Buildings	0	0
Sites	0	0
Park Lands (Acres) [a]		
State	0	0
County	13.8	13.8
Local	2.3	2.3
Environmental Corridors (Acres) [b]		
Primary	67.5	67.5
Secondary	1.2	1.2
Isolated Natural Resource Area	4.1	4.1
Other Sensitive Lands (Acres) [d]		
Wetland [c]	38.2	38.2
Natural Areas	3.9	3.9
Critical Species Habitat Areas	0	0
Geological Areas	0	0
Archeological Areas	0	0
DNR Managed Lands	0	0
DNR Land Legacy Report	26.3	26.3
Land Trust of Other Conservation Organization Lands	0	0
Prime Agricultural Lands (Class I or Class II)	26.4	26.4

TSM PLUS HIGHWAY PLAN

Category	Standard Arterial Improvement/ Expansion	Rebuild Freeway System to Modern Design Standards	Provide Additional Lanes on 127 miles of Freeway	Extend Freeway in Walworth County USH 12	Subtotal of Freeway System	Region Arterial System Total
Estimated Right-of-Way Impacts (Acres)	1,165.1	560.4	66.1	436.0	1,062.5	2,227.6
Relocations						
Residential	101	151	35	2	188	289
NonResidential						37
Commercial, Office and Industrial	14	18	5	0	23	3
Government/Institution	1	2	0	0	2	
Historic Buildings and Sites						
Buildings	0	0	0	0	0	0
Sites	0	0	0	0	0	0
Park Lands (Acres) [a]						
State	2.9	0	0	19.2	19.2	22.1
County	8.1	13.8	1.1	0	14.9	23.0
Local	1.2	2.3	0	0	2.3	3.5
Environmental Corridors (Acres) [b]						
Primary	102.3	67.5	6.8	27.1	101.4	203.7
Secondary	61.1	1.2	1.9	0	3.1	64.2
Isolated Natural Resource Area	29.2	4.1	0.6	17.7	22.4	51.6
Other Sensitive Lands (Acres) [d]						
Wetland [c]	104.9	38.2	5.4	8.3	51.9	156.8
Natural Areas	3.9	3.9	0	0	3.9	07.8
Critical Species Habitat Areas	0	0	0	0	0	0
Geological Areas	66.9	0	0	22.8	22.8	89.7
Archeological Areas	0	0	0	0	0	0
DNR Managed Lands	0.6	0	0	31.7	31.7	32.3
DNR Land Legacy Report	44.6	26.3	0	17.2	43.5	88.1
Land Trust of Other Conservation Organization Lands	1.1	0	0	0	0	1.1
Prime Agricultural Lands (Class I or Class II)	313.2	26.4	6.3	340.0	372.7	685.9

[a] *Existing State park lands in the Region total about 57,100 acres, existing county park lands total about 29,700 acres, and existing local park lands total about 18,000 acres.*

[b] *Existing primary environmental corridors in the Region total about 296,000 acres, existing secondary environmental corridors total about 48,000 acres, and existing isolated natural resource areas total about 40,000 acres.*

[c] *Existing wetlands in the Region total about 273,100 acres. Approximately 29 of the 38 acres of wetlands estimated to be impacted are located within primary or secondary environmental corridors, or an isolated natural resource area.*

[d] *Existing natural areas in the Region total about 57,600 acres, critical species habitat areas total about 14,700 acres, geological areas total about 101,200 acres, Wisconsin Department of Natural Resources managed lands total about 57,900 acres, Wisconsin Department of Natural Resources legacy lands total an estimated 137,800 acres, and land trust or conservation organization lands total about 6,900 acres. Existing prime agricultural lands in the Region total about 604,800 acres.*

Source: SEWRPC.

Table 120

EXISTING AND ALTERNATIVE FORECAST YEAR 2035 SOUTHEASTERN WISCONSIN REGION TRANSPORTATION SYSTEM AIR POLLUTANT EMISSIONS AND FUEL CONSUMPTION

Existing Year 2001 and Forecast Year 2035 Air Pollutant Emissions (Tons per Hot Summer Weekday)													Existing Year 2001 and Forecast Year 2035 Fuel Consumption (Gallons per Average Weekday)
Plan	Volatile Organic Compounds[a]	Nitrogen Oxides[a]	Carbon Monoxide	Carbon Dioxide	Fine Particulate Matter	Sulfur Dioxide	Ammonia	1,3 Butadiene	Acetaldehyde	Acrolein	Benzene	Formaldehyde	
2001	50.03	114.23	592.48	12,368.0	1.77	2.77	4.84	0.20	0.43	0.03	1.40	0.63	1,236,800
2035 TSM Alternative	13.49	12.99	257.87	12,702.0	0.78	0.57	6.41	0.05	0.11	0.01	0.36	0.17	1,270,200
2035 TSM Plus Highway Alternative	13.50	13.36	264.88	12,677.0	0.80	0.59	6.55	0.05	0.11	0.01	0.36	0.17	1,267,700

[a] *Estimated 1990 emissions were 154.6 tons of volatile organic compounds and 136.3 tons of nitrogen oxides. Estimated 1999 emissions were 61.3 tons of volatile organic compounds and 118.0 tons of nitrogen oxides.*

Source: SEWRPC.

facilities portion of the proposed bicycle and pedestrian facilities plan element is envisioned as a policy plan, rather than a system plan, proposing that a series of recommended standards and guidelines with regard to the development of pedestrian facilities, particularly within planned neighborhood units be adopted and followed by implementing agencies. These standards include the provision of sidewalks in the urban portions of the Region. The transportation systems management element of the TSM plan included measures intended to manage and operate existing transportation facilities to their maximum carrying capacity and travel efficiency, including: freeway traffic management, surface arterial street and highway traffic management, and major activity center parking management and guidance. The travel demand management measures included in the TSM plan alternative included measures intended to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing capacity of the transportation system. These measures, which are in addition to the public transit and pedestrian and bicycle plan elements previously described, fall into seven categories: high-occupancy vehicle preferential treatment, park-ride lots, transit pricing, personal vehicle pricing, travel demand management promotion, transit information and marketing, and detailed site-specific neighborhood and major activity center land use plans.

The TSM plus highway plan alternative included recommendations for arterial street and highway capacity expansion along with all the improvements recommended under the TSM plan alternative. The arterial street and highway element of the TSM plus highway plan alternative totals 3,627 route-miles. Approximately 88 percent, or 3,196 of these route-miles, are recommended to be resurfaced and reconstructed to their same capacity. Approximately 346 route-miles, or less than 10 percent of the total preliminary recommended year 2035 arterial street and highway system are recommended for widening to provide additional through traffic lanes, including 127 miles of freeways. The remaining 85 route-miles, or about 2 percent of the total arterial street mileage, are proposed new arterial facilities.

Evaluation and Comparison of Plan Alternatives

The public transit element of the TSM plan alternative represents a substantial improvement over the existing transit system of the Region—the no-build plan alternative—with respect to area of the Region served by public transit, days and hours of transit service, frequency of transit service, and speed of transit service. The recommended transit system plan element serves the areas within the Region with population and employment densities sufficient to support public transit use well. There is a significant increase in population and employment served by public transit, particularly by rapid and express transit services under the TSM plan compared to the no-build plan. The population and employment served by public transit under the no-build plan were 1,282,900 and

Table 121

COMPARISON OF TRAFFIC CRASH EXPERIENCE ON THE REGIONAL TRANSPORTATION SYSTEM UNDER THE NO-BUILD, TSM, AND TSM PLUS HIGHWAY ALTERNATIVE PLANS: 2035

Alternative	Crash Experience (Number per Year)		
	Property Damage Incidents	Injuries	Fatalities
No-Build Plan			
Highway Element	38,900	30,300	212
Transit Element	1,200	300	1
Total	40,100	30,600	213
TSM Plan			
Highway Element	37,800	29,600	207
Transit Element	2,400	500	2
Total	40,200	30,100	209
TSM Plus Highway Plan			
Highway Element	36,400	28,800	203
Transit Element	2,400	500	2
Total	38,800	29,300	205

Source: SEWRPC.

876,100, respectively, compared to 1,447,800 and 1,046,800 under the TSM plan. The population and employment served by the rapid and express transit services under the no-build plan were 384,300 and 219,700, respectively, compared to 779,700 and 644,900 under the TSM plan.

Also, under the public transit element of the TSM plan, public transit would also be significantly expanded in terms of days, hours, and frequency of service. Rapid transit service would be expanded from a weekday, peak period, peak direction service to a daily, all day and evening, bidirectional service with more attractive service frequency. An express transit service would be created which would be available daily throughout the day and evening at attractive service frequencies. Local transit service would be significantly improved with more frequent bus service throughout the Region, and initiation or expansion of weekend bus service in the Kenosha, Racine, and Waukesha areas. Public transit service would be much faster, overall, under the TSM plan due to the emphasis on rapid and express transit service, and proposed improved service frequencies.

Under the no-build plan alternative, no improvements are proposed to be made to the region's transportation system over the next 30 years and traffic congestion on an average weekday may be expected to double. Morever, if transportation improvements are limited to the public transit, bicycle and pedestrian, travel demand management, and transportation systems management elements as proposed under the TSM plan, only a modest reduction—about 10 percent—of this projected doubling of congestion may be expected. However, with the arterial street and highway system element of the TSM plus highway plan, the projected doubling of congestion over the next 30 years may be avoided and year 2035 congestion may be expected to be modestly less than current levels of weekday congestion.

Also, the TSM plus highway plan may also be expected to have travel safety benefits with more travel on public transit as opposed to automobile travel and more travel on freeways as opposed to surface arterials, and more travel on less congested freeways. The crash rates for surface arterials are about three times higher than those for freeways for total crashes and fatalities and injuries. The crash rates for extremely congested freeways are almost triple that for uncongested and moderately congested freeways, and for severely congested freeways are about 60 percent higher than uncongested and moderately congested freeways. Rear-end accident rates are 5 to 15 times higher on congested freeways with the most extremely congested freeways experiencing the highest accident rates.

The TSM plus highway plan represents about a 30 percent increase in cost compared to a "no-build" plan—$675 million annually compared to $518 million annually—and about a 10 percent increase in the current expenditures on transportation in the Region. The public transit element of the plan represents about 58 percent of the increase in transportation system costs attendant to the plan, and the highway element represents about 42 percent of the increase.

The estimated impact on the built and natural environment of the arterial street and highway element of the TSM plus highway plan over the next 30 years is relatively modest. For example, about 157 acres of wetlands may be affected, or about five acres per year over the next 30 years, representing in total an impact on about 0.05 percent of the 273,100 acres of existing wetlands in the Region. Also, for the potential 127 miles of freeway proposed to be widened to carry additional lanes, about 35 residences are estimated to be needed to be acquired, or about one per year over the next 30 years.

With respect to air pollutant emissions, transportation system air pollutant emissions have been declining even with increasing traffic, and are projected to continue to decline even with increasing traffic.

Preliminary Recommended Transportation System Plan

The Advisory Committee guiding this study determined that the TSM plus highway plan alternative should be advanced as the preliminary new recommended year 2035 regional transportation system plan for Southeastern Wisconsin. In doing so, the Advisory Committee emphasized that each proposed arterial street and highway improvement and expansion, and, as well, preservation project would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will necessarily consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette Interchanges and IH 43 between the Mitchell and Silver Spring Interchanges) will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of the preliminary engineering would a determination be made as to how the freeway would be reconstructed.

Chapter IX

RECOMMENDED REGIONAL TRANSPORTATION PLAN

INTRODUCTION

This chapter describes the comment received on the preliminary recommended plan, the response of the staff and Advisory Committee to the comments received, and the final recommended regional transportation plan.

COMMENT ON PRELIMINARY RECOMMENDED PLAN

The preliminary recommended regional transportation system plan was the subject of a series of public informational meetings and hearings held throughout the Region in April 2006, and meetings of the Commission's Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha County Advisory Committees on Jurisdictional Highway System Planning. Every local unit of government within a county, as well as the county government, is represented on the county jurisdictional highway planning committees.

For use in connection with the meetings and hearings, the Commission prepared and widely distributed a newsletter and brochure describing the preliminary recommended regional transportation plan. Together with three previous newsletters and series of meetings, information was provided on the regional land use and transportation system planning process, existing land use and the existing transportation system, descriptive and evaluative information on plan alternatives, and a description of the preliminary recommended plans.

Through the newsletters, the four series of public meetings, the study website, and the various Advisory Committee meetings, information on the findings of the inventories and analyses, on alternative plans, and on the preliminary plan was provided in considerable depth and detail to the appointed and elected officials of each county and local unit of government within the Region, as well as to officials of the State and Federal governments, representatives of business and industry, and interested citizens. The record of the public hearings, together with attendant correspondence and supporting materials, was published by the Commission and provided for review to each member of the Commission Advisory Committee on Regional Transportation System Planning and to each member of the Regional Planning Commission.

The following sections of this chapter summarize the public reaction to the preliminary recommended regional transportation system plan as expressed at the county jurisdictional highway system planning advisory committee meetings, and at the public hearings, including the written comments received by the Commission. In addition, the Advisory Committee response to the public reaction is documented.

County Jurisdictional Highway System Planning Advisory Committee Meetings

The Commission Advisory Committees on Jurisdictional Highway System Planning for Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties each met to consider, and each acted to approve the capacity expansions in the highway system element of the preliminary recommended regional transportation system plan.

Following the completion of the regional transportation plan, the Commission will be working with these County Jurisdictional Highway System Planning Advisory Committees to review, update, and extend to the year 2035 each county jurisdictional highway system plan. The primary focus of this effort will be to review, re-evaluate, update, and extend to the year 2035 the jurisdictional responsibility and transfer recommendations for the arterial street and highway system within each county.

Also addressed will be issues identified in the regional transportation plan warranting additional study including addressing existing and/or future traffic congestion problems on STH 33 in the Village of Saukville, CTH K in Franksville, STH 20/83 in the Village of Waterford, STH 50 in the City of Lake Geneva, STH 60 in the Village of Jackson, and STH 164 in the Village of Big Bend by considering alternatives including parking restrictions, widening with additional lanes, bypass construction, and improvement/construction of parallel arterials. The County Jurisdictional Highway Planning Advisory Committees also identified the following functional improvement issues to be considered during the county jurisdictional highway system planning:

Kenosha County

- Consider the need to recommend reservation of right-of-way to provide four traffic lanes on CTH E between IH 94 and STH 31 and on all state and county trunk highways between IH 94 and USH 45.

- Consider the need to widen CTH S to four traffic lanes between IH 94 and CTH H.

- Consider the need to widen to four lanes CTH U from the Wisconsin-Illinois State line to CTH C, CTH MB from the Wisconsin-Illinois State line to CTH CJ, CTH CJ from CTH MB to CTH U, and CTH C from CTH U to USH 45.

Milwaukee County

- Consider the need to widen W. College Avenue to four traffic lanes between Loomis Road and S. 27th Street.

- Consider the need to widen S. 92nd Street to four traffic lanes between W. Forest Home Avenue and W. Howard Avenue.

- Consider the need to widen S. 124th Street to four traffic lanes between W. Layton Avenue and W. Beloit Road.

Ozaukee County

- Consider the need to widen Port Washington Road to four traffic lanes between CTH V and Highland Road.

Racine County

- Consider the need to widen Six Mile Road to four traffic lanes between STH 31 and STH 38.

Walworth County

- Consider whether the extension of CTH C should be proposed over new alignment or existing Badger Parkway.

- Consider the need to widen to four traffic lanes USH 14 between IH 43 and the Walworth-Rock County line.

- Consider the addition of a ring road arterial in the Elkhorn area east of IH 43 between STH 11 and STH 67.

Washington County

- Consider the use of existing Creek Road as an arterial between River Road and Trenton Road, rather than a proposed new arterial.

- Consider the need to widen STH 33 to four traffic lanes between STH 144 and USH 41.

Waukesha County

- Consider the need to provide four traffic lanes on Springdale Road between CTH JJ and CTH K.

- Consider the classification of Hillside Road as an arterial between STH 164 and the Waukesha-Washington County line.

Two specific changes to the preliminary recommended regional transportation plan were made at this time at the request of the Racine County Jurisdictional Highway System Planning Advisory Committee on their approval of the preliminary recommended regional transportation plan:

- The widening to four traffic lanes of Four Mile Road between STH 32 and STH 31.

- The identification of CTH X as an arterial between Braun Road and STH 31 south of the Kenosha-Racine County line.

Public Hearing Comments and Correspondence

During the period of December 1, 2005, through April 20, 2006, about 40 comments were received regarding the review and update of the regional land use and transportation system plans and the preliminary recommended regional land use and transportation plans. The comments were provided on comment forms available at public information meetings, or to court reporters at those meetings, or via letter, electronic mail, fax, or through the Commission website (www.sewrpc.org).

A number of comments were made in support of the preliminary recommended regional transportation plan:

- One comment expressed support for the plan and its vision statement, and noted that to achieve overall public good, there may be some negative impacts that must be accepted.

- Six comments expressed support for the transit plan, particularly the rapid and express elements and the proposed potential rail and bus guideway rapid and express systems.

- One comment expressed support for the plan's transit and pedestrian elements, noting their importance for people with disabilities.

- One comment expressed support for the plan's bicycle and pedestrian facilities element.

- One comment each was made in support of three of the plan's arterial capacity expansion projects: the extension of CTH C over Badger Parkway in Walworth County, the construction of a Cedar Creek Road bridge in Ozaukee County, and the widening of STH 50 to provide four traffic lanes between IH 43 and CTH F.

A number of comments suggested minor changes to the preliminary recommended regional transportation plan:

- One comment proposed the addition of a park-ride lot at the interchange of IH 43 with STH 50 in Walworth County.

- One comment proposed relocation of the proposed park-ride lot in the Village of Grafton from Wisconsin Avenue and Chateau Drive to Washington Street and 10th Avenue.

- One comment proposed the addition of Hillside Road as an arterial between STH 164 and the Waukesha-Washington County line.

- One comment proposed utilizing CTH F and Townline Road rather than a new alignment for a realignment of STH 67 between CTH F and Townline Road in Walworth County.

- One comment opposed the widening of STH 100 to eight lanes between IH 43 and W. Forest Home Avenue. (The preliminary recommended plan no longer recommended widening, but recommended that during the preliminary engineering for reconstruction, that alternatives be considered including alternatives providing no additional lanes, alternatives providing additional traffic or auxiliary lanes, and alternatives proposing frontage roads.)

Response

- The suggested park-ride lot change and addition will be made in the final plan.

- The suggested changes to the arterial system and capacity improvements will be considered in subsequent county jurisdictional highway system planning over the next year.

A number of comments were made proposing the expansion of plan recommendations:

- One comment suggested a new freeway connecting IH 43 and USH 45 north of STH 60.

- One comment suggested extending paratransit service regionwide to serve elderly population travel needs.

Response

- A proposed freeway connecting IH 43 and USH 45 with alignments between W. Good Hope Road and Pioneer Road was examined and rejected for inclusion in the plan. The plan recommends either widening to four traffic lanes or reserving right-of-way for four traffic lanes on STH 60 between IH 43 and USH 45.

- Paratransit is available for the elderly population regionwide on a one to three day advance reservation for medical, nutritional, and shopping trips.

A number of comments were made in opposition to recommendations in the plan:

- Transportation System Management
  - One comment expressed opposition to existing and proposed freeway ramp-meters.

  Response

  - Ramp-meters provide freeway traffic safety and traffic flow benefits by breaking up platoons of merging traffic, and limiting entering traffic during a major incident. In addition, there is the potential for ramp-meters to be controlled systemwide to achieve systemwide objectives and benefits.

- Public Transit
  - One comment opposed the potential development of commuter rail to West Bend, and another comment opposed guided bus tram development to the northwest and the University of Wisconsin-Milwaukee.

  Response

  - The plan does not recommend implementation of guideways, but rather that the feasibility and costs and benefits of guideway transit be considered in corridor studies.

- Arterial Streets and Highways
  - Two comments opposed all arterial street and highway capacity expansion.

- Seven comments opposed the proposed widening to four lanes of STH 164 in Waukesha and Washington Counties, with some proposing construction of a new alternate route.

- Seven comments opposed the proposed new east-west arterial routes north and south of STH 60 in the Hartford and Slinger areas.

- Five comments opposed the widening of STH 33 to four lanes in Washington County.

- Three comments opposed the proposed widening to four lanes of Lannon Road (CTH Y) between the Waukesha-Washington County line and USH 41/45.

- Three comments opposed the proposed construction of the Waukesha West bypass between CTH X and CTH DE citing impacts on wetlands, and one comment suggested bridging the wetlands.

- One comment opposed the extension of Springdale Road from STH 190 to CTH K citing wetland impacts, and one comment suggested bridging the wetlands.

- One comment opposed the proposed Calhoun Road interchange on IH 94, and one comment opposed the proposed widening to four lanes of Calhoun Road between USH 18 and STH 59.

- One comment opposed the proposed extension of CTH Z north of STH 33 in Washington County.

- Two comments opposed the proposed widening of E. Oklahoma Avenue to four traffic lanes between S. Kinnickinnic Avenue and S. Clement Avenue.

- One comment questioned the design proposed for a widened STH 33 between the Village of Saukville and the City of Port Washington in Ozaukee County.

Response

- The following arterial capacity expansion has been considered and recommended in preliminary engineering or pre-preliminary engineering feasibility studies, or is being considered in such studies underway at this time, and as a result, will continue to be recommended in the regional transportation plan: the widening or reservation of right-of-way to provide four lanes on STH 164 in Waukesha and Washington Counties, the construction of the new east-west arterials in Washington County, the widening to four lanes of Lannon Road, the construction of a Calhoun Road interchange on IH 94, the widening of Calhoun Road between USH 18 and STH 59, the construction of the Waukesha West bypass between CTH X and CTH DE, and the widening to four lanes of STH 33 between the Village of Saukville and the City of Port Washington.

- Proposed to also remain in the plan is the widening of STH 33 as largely only right-of-way reservation to provide four lanes is recommended, the extension of CTH Z between STH 33 and Schuster Road as it would assist in providing a grid of arterial streets in the West Bend area consistent with long-range planned urban development, and the extension of Springdale Road as it replaces the extension of Barker Road which would have much greater impact on wetlands and primary environmental corridor.

- The widening of E. Oklahoma Avenue between S. Kinnickinnic Avenue and S. Clement Avenue is proposed to be removed from the plan, as it was considered as part of the preliminary engineering for the construction of the Lake Parkway and was not implemented.

Two comments were made with respect to the regional land use plan:

- One comment proposed that golf courses not be located in primary environmental corridors.

- One comment proposed that open lands along the Lake Michigan lakefront should be preserved.

Response

- The regional land use plan recommends that golf courses only be located in the upland portions of primary environmental corridors, and that less than 20 percent of the upland portion of the corridor be disturbed for the golf course.

- The regional land use plan generally recommends that open lands for a distance of 200 feet from the Lake Michigan lakefront bluff should be preserved.

Three comments identified the rising cost of motor fuel, anticipated substantial future increases in motor fuel cost, and attendant changes in travel behavior, and proposed that the transit element of the plan be accelerated and expanded and the arterial capacity expansion in the plan be limited or eliminated.

Response

- The transportation plan was based on a projected motor fuel cost of $2.30 per gallon in the year 2035 in 2005 constant dollars (higher than U.S. Department of Energy projections) which, assuming an annual rate of inflation (2.0 percent) typical of that over the last 10 years, would be approximately $4.20 per gallon in the year 2035. The transportation plan proposed a doubling of public transit service including development of true rapid and express transit systems and consideration of commuter rail rapid transit and bus guideway express transit systems. Less than a 5 percent expansion of arterial highway system lane-miles was proposed, with most occurring as the arterial facility was being reconstructed. Lastly, it must be recognized that part of the response to motor fuel price will be the purchase of more efficient vehicles, and ultimately, the development and widespread use of alternative fuel vehicles.

One comment questioned the need for a runway extension at West Bend Airport, and cited the attendant wetland impacts.

Response

- Airport improvements are part of a separate state and regional airport system plan. This project is now undergoing preliminary engineering and environmental impact statement preparation.

One comment requested that:

- detailed demographic data for minority and low income populations be used in regional transportation planning,

- analyses be conducted determining whether minority and low income populations benefit from proposed transportation improvements—particularly highway improvements as disproportionate numbers of minority and low income populations do not have a car,

- a “transit first” alternative be considered—implementing transit before highway improvements,

- consideration be given to the land use, housing, and employment patterns of minority and low income populations, and

- analyses be done of whether minority and low income populations bear a disproportionate burden of air pollutant emissions from transportation projects.

Response

- Detailed demographic data on minority and low income populations was developed and used throughout the transportation planning process to guide the design and evaluation of transportation alternatives. (See Appendix H)

- Analyses were conducted of the benefits of the transportation proposals to minority and low income populations. While disproportionate numbers of minority and low income populations do not own an automobile, from 70 to 88 percent of minority and low income population groups do own a car, and use it for travel.

- An alternative was fully examined and evaluated which proposed substantial improvement and expansion of public transit, and no arterial street and highway capacity expansion.

- The land use and housing patterns of minority and low income populations, and providing connection to jobs was considered in transportation plan design and evaluation.

- Even with increasing traffic, transportation-related air pollutant emissions may be expected to significantly decline due to cleaner, more efficient vehicles by about 80 percent for ozone-related emissions of volatile organic compounds and nitrogen oxides, 55 percent for fine particulates and carbon monoxide, and 70 percent for air toxics. The reductions in emissions generated on central Milwaukee County freeways may even be greater, as traffic increases on these freeways may be expected to be less than regionwide increases.

FINAL RECOMMENDED REGIONAL TRANSPORTATION PLAN

The development of the final recommended year 2035 regional transportation plan for southeastern Wisconsin was guided by the following vision for the transportation system of southeastern Wisconsin:

> *A multimodal transportation system with high quality public transit, bicycle and pedestrian, and arterial street and highway elements which add to the quality of life of Region residents and support and promote expansion of the Region's economy, by providing for convenient, efficient, and safe travel by each mode, while protecting the quality of the Region's natural environment, minimizing disruption of both the natural and manmade environment, and serving to support implementation of the regional land use plan, while minimizing the capital and annual operating costs of the transportation system*.

The development of each plan element of the final recommended regional transportation system plan for the year 2035—public transit, bicycle and pedestrian, travel demand management, transportation system management, and arterial streets and highways—builds upon the current adopted year 2020 regional transportation plan, recognizing the successful implementation of approximately 15 to 20 percent of each element of the year 2020 plan since 1997.

The final recommended year 2035 regional transportation system plan was designed to serve, and to be consistent with, the year 2035 regional land use plan. Future needs for public transit, street and highway, and other transportation improvements considered in the regional transportation planning process were derived from the projected travel based upon the regional land use plan. In addition, the consistency of the regional transportation and land use plans was evaluated by comparing the accessibility provided under the transportation plan and the location of improvements proposed under the transportation plan to the location of land use development and redevelopment proposed under the land use plan.

The process for the development of the final recommended year 2035 regional transportation plan began with consideration and development of the travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements of the plan. The effects on travel demand of a regional transportation

plan alternative including these four combined plan elements (a Transportation Systems Management, or TSM Plan alternative) were then tested and evaluated, and compared to those of a no-build plan which proposed to maintain the existing transportation system. Only subsequent to this testing and evaluation did the year 2035 regional transportation system plan development process consider arterial street and highway system improvement and expansion. Arterial street and highway improvement and expansion was then considered only to address the residual highway traffic volumes and attendant traffic congestion which may not be expected to be alleviated by travel demand management, transportation systems management, bicycle and pedestrian facilities, and public transit. A plan including arterial street and highway improvement and expansion (a TSM Plus Highway Plan) was then compared to a plan which only included travel demand management, transportation systems management, bicycle and pedestrian, and public transit elements, and to a "no-build" transportation system plan. The TSM Plus Highway Plan was the preliminary recommended plan advanced by the Commission staff and the Commission's Advisory Committee on Regional Transportation Planning. The Advisory Committee included representation from the local units of government of southeastern Wisconsin (on a population proportional basis), the Wisconsin Department of Transportation and Natural Resources, and the U.S. Department of Transportation and Environmental Protection Agency. Public comment was obtained on the preliminary plan, and considered by the staff and Advisory Committee in making the final recommended plan.

Presented in the following sections of this chapter are the public transit, bicycle and pedestrian facilities, transportation systems management, travel demand management, and arterial street and highway elements of the final recommended year 2035 regional transportation plan. All elements of the plan are considered to be of equal priority, and each element needs to be fully implemented to meet existing and forecast future year 2035 transportation needs and to provide a comprehensive, multi-modal, balanced, high quality transportation system in southeastern Wisconsin.

- Public Transit
- Bicycle and Pedestrian Facilities
- Transportation Systems Management
- Travel Demand Management
- Arterial Streets and Highways
    - Freeways
    - Surface Arterials

Over the past 30 years, significant progress was made with respect to implementation of previous regional plan recommendations. With respect to public transit, the overall improvement and expansion achieved from 58,000 bus-miles of service in 1975 to 69,000 bus-miles of service in 2005 has been limited by reductions in service which have occurred during periods of economic downturns and recessions, specifically during the early 1980's and the early 2000's. For example, between 1987 and 2000, public transit bus-miles of service expanded from about 61,000 to 81,000 bus-miles of service, about 33 percent, or about 2.3 percent annually, but with the economic downturn and attendant State and local budget problems since 2000, bus-miles of public transit service have declined by about 15 percent. To fully implement the regional plan, there will be a need to assure that during economic downturns, progress in plan implementation, particularly with respect to public transit, continues, and is not eroded through service reductions.

Public Transit Element

The public transit element of the final recommended plan envisions significant improvement and expansion of public transit in southeastern Wisconsin, including development within the Region of a rapid transit and express

transit system, improvement of existing local bus service, and the integration of local bus service with the proposed rapid and express transit services. Map 92 displays the transit system proposals for each of the three transit system components. Altogether, service on the regional transit system would be increased from service levels existing in 2005 by about 100 percent measured in terms of revenue transit vehicle-miles of service provided, from about 69,000 vehicle-miles of service on an average weekday in the year 2005 to 138,000 vehicle-miles of service in the year 2035 (see Table 122).

The proposed expansion of public transit is essential in southeastern Wisconsin for many reasons:

- Public transit is essential to provide an alternative mode of travel in heavily traveled corridors within and between the Region's urban areas, and in the Region's densely developed urban communities and activity centers. It is not desirable, and not possible, in the most heavily traveled corridors, dense urban areas, or the largest and densest activity centers of the Region to accommodate all travel by automobile with respect to both demand for street traffic carrying capacity and parking. To attract travel to public transit, service must be available throughout the day and evening at convenient service frequencies, and at competitive and attractive travel speeds.

- Public transit also supports and encourages higher development density and in-fill land use development and redevelopment, which results in efficiencies for the overall transportation system and other public infrastructure and services.

- Public transit also contributes to efficiency in the transportation system, including reduced air pollution and energy consumption.

- Public transit permits choice in transportation, enhancing the Region's quality of life and economy. A portion of the Region's population and businesses would prefer to have public transit alternatives available and to travel by public transit. High quality public transit helps provide a high quality of life and contributes to the maintenance and enhancement of the Region's economy.

- Public transit is essential in the Region to meet the travel needs of persons unable to use personal automobile transportation. In the year 2000, approximately 80,000 households, or 11 percent of the Region's households, did not have a personal vehicle available and were dependent upon public transit for travel. The accessibility of this portion of the Region's population to the metropolitan area jobs, health care, shopping and education is almost entirely dependent upon the extent to which public transit is available, and is reasonably fast, convenient, and affordable.

Rapid Transit Service

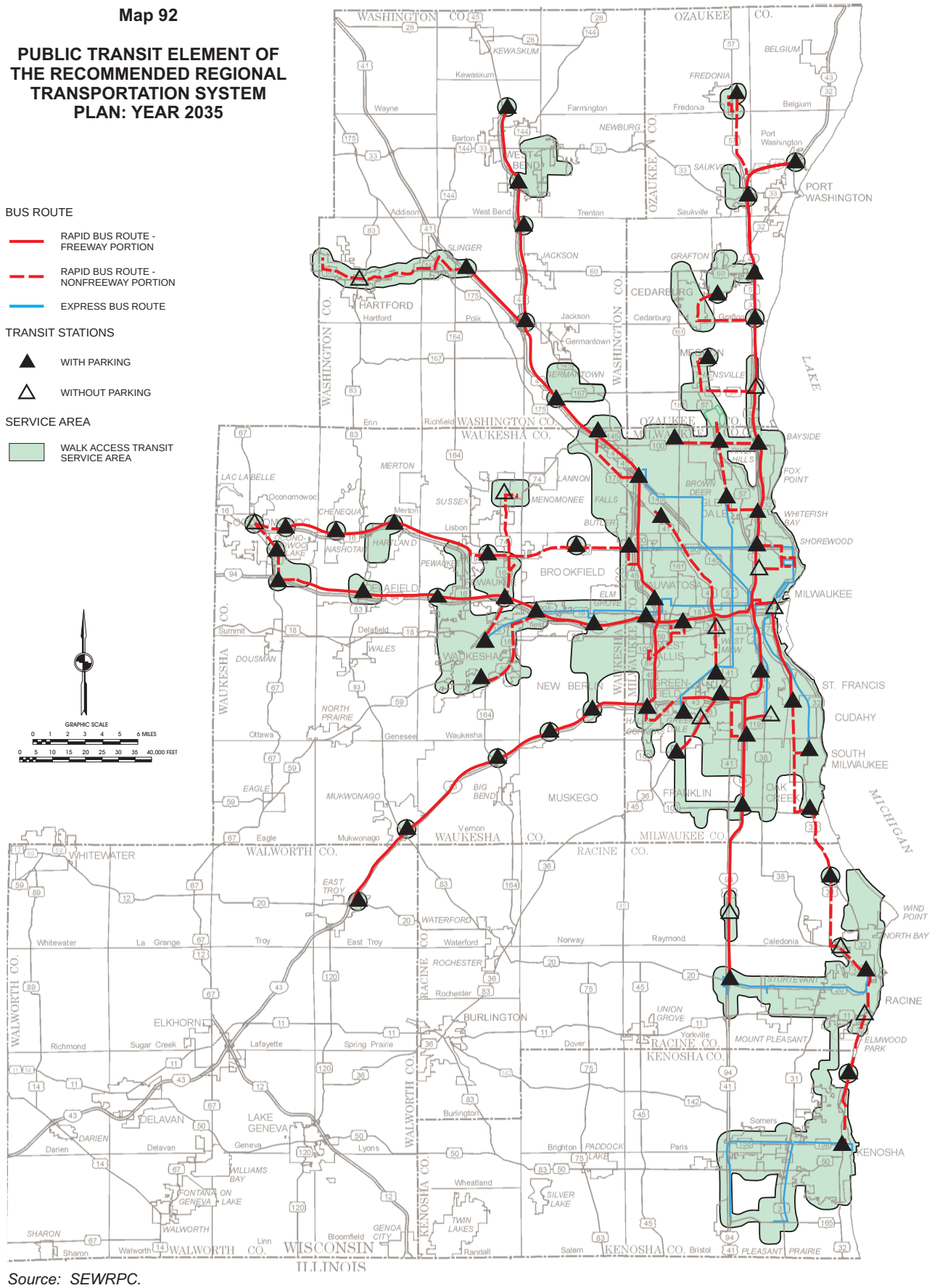
The proposed rapid transit service would consist of buses operating over freeways connecting the Milwaukee central business district, the urbanized areas of the Region, and the urban centers and outlying counties of the Region. Rapid transit bus service would be provided south to Racine and Kenosha, southwest to Mukwonago and East Troy, west to Waukesha and Oconomowoc, northwest to West Bend and Hartford, and north to Cedarburg, Grafton, Saukville, and Port Washington. The proposed rapid transit system would have the following characteristics:

- The bus rapid transit service would operate in both directions during all time periods of the day and evening providing both traditional commute and reverse-commute service.

- The rapid transit service would operate with some intermediate stops spaced about three to five miles apart to increase accessibility to employment centers and to increase accessibility for reverse-commute travel from residential areas within central Milwaukee County. The stops would provide connections with express transit service, local transit service, or shuttle bus or van service to nearby employment centers.

Map 92

PUBLIC TRANSIT ELEMENT OF THE RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN: YEAR 2035



Source: SEWRPC.

Table 122

PUBLIC TRANSIT ELEMENT OF FINAL RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION PLAN

Average Weekday Transit Service Characteristics	Existing 2005[a]	Recommended Plan 2035	Planned Increment	
			Number	Percent Change
Revenue Vehicle-Miles				
Rapid	7,900[b]	24,000	16,100	203.8
Express	- -	17,000	17,000	- -
Local	61,100	97,000	13,900	58.8
Total	69,000	138,000	69,000	100.0
Revenue Vehicle-Hours				
Rapid	350[b]	1,100	750	214.3
Express	- -	1,100	1,100	- -
Local	4,750	8,900	4,150	87.4
Total	5,100	11,100	6,000	117.6

[a]*Estimated.*

[b]*Includes the existing commuter bus route operated in the Kenosha-Milwaukee-Racine corridor. While portions of this route operate with express stop spacing, the long trips served by, and average operating speeds of, this route are typical of those for rapid service.*

Source: SEWRPC.

- The frequency of service provided would be every 10 to 30 minutes in weekday peak travel periods, and every 30 to 60 minutes in weekday off-peak periods and on weekends.

More than a 200 percent increase in rapid transit service is proposed as measured by daily vehicle-miles of bus service, from the 7,900 vehicle-miles of such service provided on an average weekday in the year 2005, to 24,000 vehicle-miles in the plan design year 2035. The existing bus rapid transit service operates principally during weekday peak periods in the peak direction only. The proposed service would operate throughout the day and evening in both directions at convenient service frequencies.

Express Transit Service

The proposed express transit service would consist of a grid of limited-stop, higher-speed routes located largely within Milwaukee County connecting major employment centers and shopping areas, other major activity centers such as General Mitchell International Airport, tourist attractions and entertainment centers, and residential areas. The express routes would replace existing major local bus routes. Stops would typically be spaced about one-quarter mile apart. It is envisioned that this system of limited-stop express service routes would initially consist of buses operating over arterial streets in mixed traffic, and would be upgraded over time to buses operating on reserved street lanes with priority treatment at traffic signals.

As envisioned under the plan:

- The express service would operate in both directions during all periods of the day and evening providing both traditional and reverse-commute service.

- The service would generally operate with a stop spacing of about one-quarter mile with one-half mile stop spacing in outlying portions of Milwaukee County and the Milwaukee urbanized area.

- The frequency of service provided would be about every 10 minutes during weekday peak periods, and about every 20 to 30 minutes during weekday off-peak periods and on weekends.

- The overall travel speed provided would be about 16 to 18 miles per hour, a significant improvement over the average 12 miles per hour speed provided by the existing local bus transit service.

- No express transit service existed in the Region in 2005. As proposed, about 17,000 vehicle-miles of express transit service would be provided on an average weekday in the Region in the year 2035.

Local Transit Service

The improvement and expansion of local bus transit service over arterial and collector streets, with frequent stops throughout the Kenosha, Milwaukee, and Racine urbanized areas is also proposed. Service would be provided on weekdays, and during weekday evenings, Saturdays, and Sundays. An approximately 59 percent increase in local bus service is proposed from the 61,100 vehicle-miles of local bus service provided in 2005 on an average weekday to 97,000 vehicle-miles in the plan design year 2035. The service improvements and expansion proposed include expansion of service area and hours, and significant improvements in the frequency of local transit service provided, particularly on major local routes. The proposed frequency of local bus service is shown in Table 123. Over the design period, some local transit services may be restructured to provide for transit-center-oriented local systems or route deviation or demand-responsive systems to replace grid-route systems, or for electric streetcar technology to replace local bus service depending upon detailed local plan implementation studies. The City of Kenosha is currently considering an expansion of their electric streetcar system.

Paratransit Service

Paratransit service is recommended to be provided consistent with the Federal Americans with Disabilities Act (ADA) of 1990. Under the provisions of this Act, all transit vehicles that provide conventional fixed-route transit service must be accessible to persons with disabilities, including those persons using wheelchairs. All public entities operating fixed-route transit systems must also continue to provide paratransit service to those disabled persons within local transit service areas who are unable to use fixed-route transit services consistent with federally specified eligibility and service requirements. The complementary paratransit services must serve any person with a permanent or temporary disability who is unable independently to board, ride, or disembark from an accessible vehicle used to provide fixed-route transit service; who is capable of using an accessible vehicle, but one is not available for the desired trip; or who is unable to travel to or from the boarding or disembarking location of the fixed-route transit service. The planned paratransit service must be available during the same hours and on the same days as the fixed-route transit service, be provided to eligible persons on a "next day" trip-reservation basis, and not limit service to eligible persons based on restrictions or priorities to trip purpose, and not be operated under capacity constraints which might limit the ability of eligible persons to receive service for a particular trip. The paratransit service fares must be no more than twice the applicable public transit fare per one-way trip for curb-to-curb service.

Upgrading to Rail Transit or Bus Guideways

Rapid and express transit service is proposed to initially be provided with buses. This bus service is proposed to be considered for ultimate upgrading to commuter rail for rapid transit service and to bus guideway or light rail for express transit service. Map 93 displays seven potential future commuter rail lines and six potential future bus guideway/light rail lines within southeastern Wisconsin. Public transit cannot offer convenient accessibility to metropolitan area services for those without an automobile, offer an attractive alternative in heavily traveled corridors and dense urban activity centers, or provide a true choice for travel if it is caught in traffic congestion, and its travel times are not comparable to those of automobile travel. Upgrading to exclusive guideway transit may also be expected to promote higher density land development and redevelopment at and around the stations of the exclusive guideway transit facilities, promoting implementation of the regional land use plan. The plan recommends that corridor studies be conducted for each potential rapid and express transit guideway corridor. The corridor studies would be conducted by the transit operator concerned, or jointly by the multiple transit operators concerned, to determine whether to implement a fixed guideway transit alternative in each corridor, and to refine the conceptual guideway alignments shown in the regional plan. At the conclusion of each corridor study, the transit operator would determine whether to implement fixed guideway transit, and identify the preferred alignment within the corridor that should proceed into preliminary engineering. The Commission would then, at the request of the transit operator(s), revise and amend the regional plan to include the fixed guideway.

Table 123

PROPOSED TRANSIT SERVICE HOURS AND FREQUENCY UNDER THE RECOMMENDED TRANSPORTATION PLAN: YEAR 2035

	Existing Year 2005		Recommended Plan	
Service Type	Service Hours	Service Headways	Service Hours	Service Headways
Rapid Transit Service				
Milwaukee County	Weekdays only 6:00 a.m.-8:30 a.m. 3:30 p.m.-6:00 p.m. (Peak direction service only)	15-30 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	10-30 minutes weekday peak period 30-60 minutes off-peak period and weekends
Waukesha County Waukesha	Weekdays Only 5:30 a.m.-8:30 p.m.	15-30 minutes peak period 60-90 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods
Oconomowoc, Mukwonago, Menomonee Falls	Weekdays Only Peak period and peak direction only service	30-40 minutes		60 minutes off-peak periods and weekends
Washington County	Weekdays Only Peak period and peak direction only service	30-40 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Ozaukee County	Weekdays Only 5:00 a.m.-11:00 p.m.	30-40 minutes peak periods 60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Kenosha-Racine- Milwaukee County	Weekdays Only 5:00 a.m.-10:00 p.m. Weekends 8:00 a.m.-10:00 p.m.	40 minutes peak periods 120 minutes off-peak periods Headways 60-120 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Express Transit Service	None	- -	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-15 minutes peak periods 10-20 minutes off-peak periods 10-20 minutes
Local Transit Service				
Central Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-20 minutes peak periods 10-30 minutes midday 15-30 minutes evening 15-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-10 minutes peak periods 10-15 minutes midday 10-20 minutes evening 10-20 minutes
Outlying Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	15-60 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	10-30 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes
Kenosha Area	Weekdays 6:00 a.m.-7:30 p.m.	30-40 minutes peak periods 40-60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday

Table 123 (continued)

Service Type	Existing Year 2005		Recommended Plan	
	Service Hours	Service Headways	Service Hours	Service Headways
Local Transit Service (continued)				
Racine Area	Weekdays 5:30 a.m.-12:00 a.m. Saturdays 5:30 a.m.-10:00 p.m. Sundays 9:30 a.m.-7:00 p.m.	Weekdays 30-60 minutes peak periods 60 minutes off-peak periods Weekends 60 minutes	Daily 6:00 a.m.-10:00 p.m. Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday
Waukesha Area	Weekdays 5:30 a.m.-10:00 p.m Saturdays 8:00 a.m.-10:00 p.m. Sundays 9:00 a.m.-7:00 p.m.	Weekdays 35-70 minutes peak periods 30-60 minutes off-peak periods Weekends 30-60 minutes	Daily 6:00 a.m.-10:00 p.m.	Weekdays 20 minutes peak period 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 30-60 minutes Sunday

Source: SEWRPC.

There are two efforts currently underway in southeastern Wisconsin considering upgrading to fixed guideway transit. Milwaukee County, in cooperation with the City of Milwaukee and Wisconsin Center District, is conducting the Milwaukee downtown connector study which is considering implementation of express transit electric bus guideway technology and buses operating in reserved street lanes. Rapid transit commuter rail in the Milwaukee-Racine-Kenosha corridor was recommended for implementation at the conclusion of a corridor transit alternatives analysis study. The Counties and Cities of Milwaukee, Racine, and Kenosha are currently conducting further study addressing funding and refinement of the proposed commuter rail extension. The 2005-2007 State budget created a three-county regional transit authority for Kenosha, Milwaukee, and Racine Counties, which would be the operator of the proposed commuter rail service.

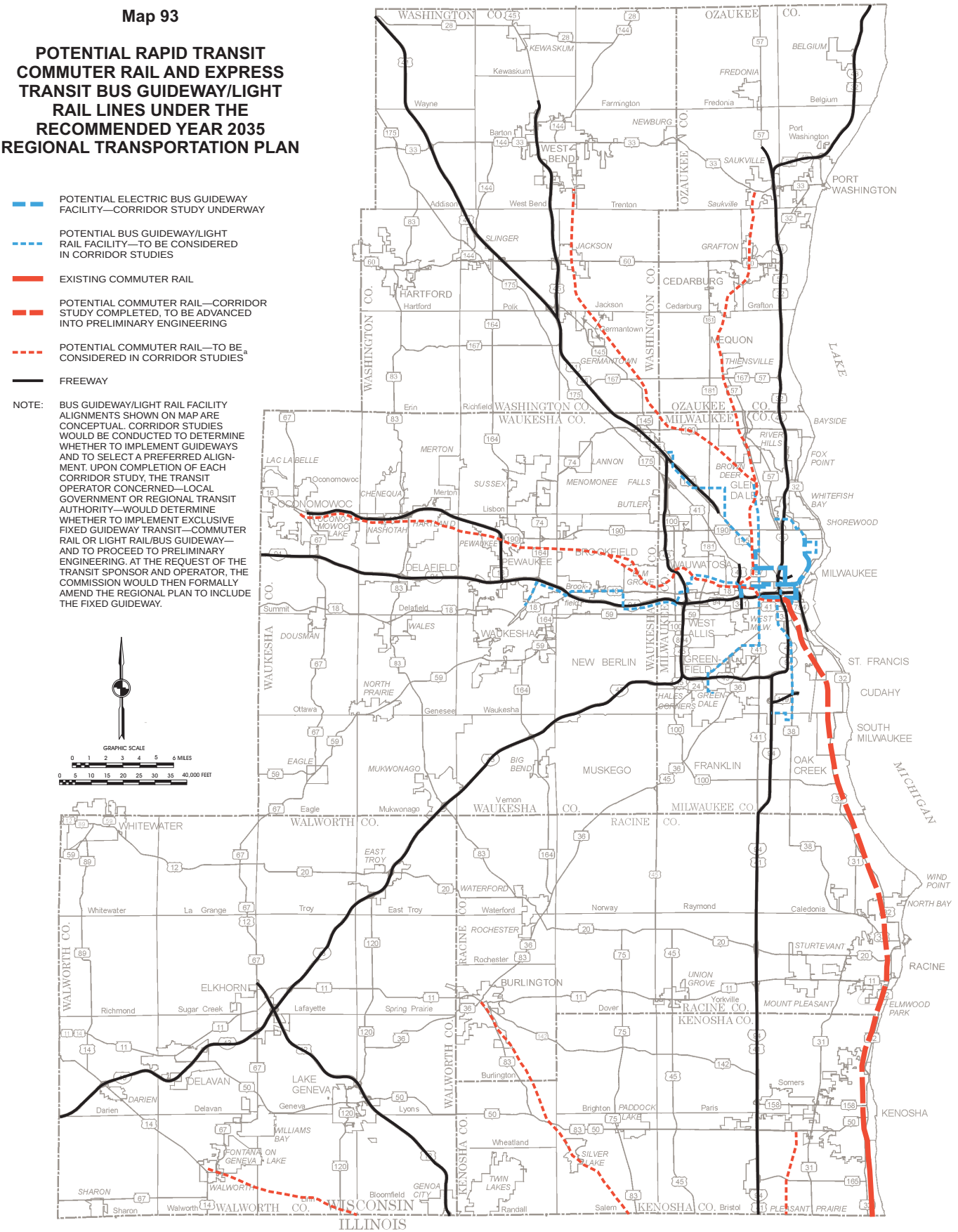
Summary and Conclusions—Public Transit

The proposed expansion of public transit in southeastern Wisconsin would represent a near doubling of transit service in southeastern Wisconsin by the year 2035. As shown in Figure 40, this would entail about a 2.5 percent annual increase in transit service to the year 2035, less than the level of annual increase which occurred between 1995 and 2000. Significant implementation of the year 2020 plan occurred between 1997 and 2000 as transit service expanded by over 25 percent. However due to State and local budget problems, transit service was significantly reduced between the years 2000 and 2005.

Implementation of this proposed expansion will be dependent upon the continued State funding of the maintenance, improvement and expansion of public transit. The State has historically funded 40 to 45 percent of transit operating costs, and has increased funding to address inflation in the cost of providing public transit, and to provide for transit improvement and expansion. State transit funding to the Milwaukee County Transit System

Map 93

POTENTIAL RAPID TRANSIT COMMUTER RAIL AND EXPRESS TRANSIT BUS GUIDEWAY/LIGHT RAIL LINES UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION PLAN

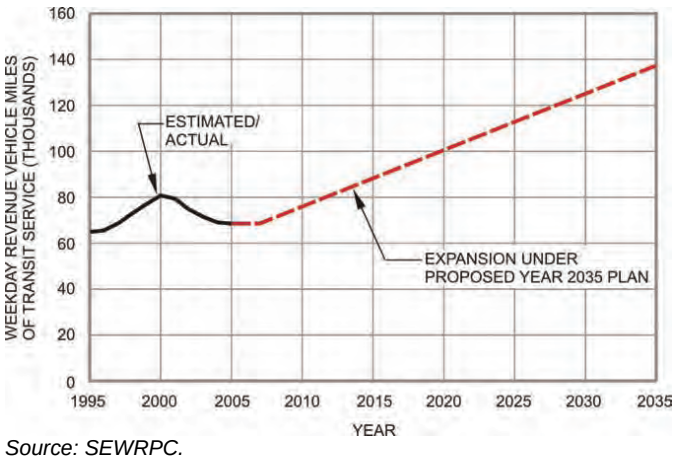


[a]Corridor feasibility studies have been completed for the Chicago-based commuter rail extensions to the Village of Walworth in Walworth County and the City of Burlington in Racine County. The conclusion of the Walworth extension study was that it was potentially feasible and cost-effective, but should be deferred and considered again when a Metra extension from its current terminus in Fox Lake, Illinois is considered to Richmond, Illinois near the Wisconsin-Illinois Stateline. The conclusion of the Burlington extension study was that it was not feasible or cost-effective at that time, but could be considered again in the future.

Source: SEWRPC.

Figure 40

HISTORIC AND PLANNED VEHICLE-MILES OF PUBLIC TRANSIT SERVICE ON AN AVERAGE WEEKDAY IN THE SOUTHEASTERN WISCONSIN REGION: 1995-2035



Source: SEWRPC.

increased by 29 percent from 1995 to 2000 and by 70 percent for all other transit systems in the Region, but only by 5 percent between 2000 and 2005 for the Milwaukee County Transit System and by 12 percent for all other transit systems. In comparison, local funding of public transit increased between 1995 and 2000 by 30 percent for the Milwaukee County Transit System and by 62 percent for other transit systems in the Region, and increased between 2000 and 2005 by 20 percent for the Milwaukee County Transit System and 73 percent for other transit systems in the Region. The 2003-2005 State budget provided no funding increase for public transit and the 2005-2007 budget only provided a 2 percent annual increase. An annual 4 to 5 percent increase may be essential to address rising costs, including inflation and real increases in fuel costs, and to support system improvement and expansion.

Implementation of the proposed expansion of public transit in southeastern Wisconsin may also be dependent upon attaining dedicated local funding for public transit. The local share of funding of public transit in southeastern Wisconsin is provided through county or municipal budgets, and represents about 15 percent of the total operating costs and 20 percent of total capital costs of public transit. Thus, the local share of funding public transit is largely provided by property taxes, and public transit must annually compete with mandated services and projects. Increasingly, due to the constraints in property tax based funding, counties and municipalities have found it difficult to provide funding to address transit needs, and to respond to shortages in Federal and State funding. Most public transit systems nationwide have dedicated local funding, typically a sales tax of 0.25 to 1.0 percent. A sales tax provides funding which should increase with inflation and area growth, thereby addressing funding needs attendant to inflation in the costs of providing public transit and to transit system expansion.

A regional transit authority could also assist in implementing the proposed transit system expansion. A number of the proposed transit services extend across city and county boundaries. A regional transit authority could assist in the implementation of these proposed services. The regional transit authority recently created for Kenosha, Milwaukee, and Racine Counties will be considering recommending local dedicated funding for public transit.

It is recommended that to assure implementation of the transit element of the regional transportation plan that State funding of 40 to 45 percent of transit operating costs continue with attendant annual increases in State funding of approximately 4 percent; that local dedicated funding be obtained to replace current property tax funding and be sufficient to address cost inflation and system improvement and expansion over the plan design period; and that the regional transit authority recently created be made a permanent authority by the State Legislature and Governor, and that expansion of the current regional transit authority be considered over the plan design period.

Bicycle and Pedestrian Facility Element

The bicycle and pedestrian facility element of the final recommended plan is intended to promote safe accommodation of bicycle and pedestrian travel, and encourage bicycle and pedestrian travel as an alternative to personal vehicle travel.

Bicycle Accommodation on Arterial Streets and Highways

The plan recommends that as the surface arterial street system of about 3,300 miles in the Region is resurfaced and reconstructed segment-by-segment, the provision of accommodation for bicycle travel should be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened and paved shoulders, or separate bicycle paths. The surface arterial street system of the Region provides a network of direct travel routes serving virtually all travel origins and destinations within southeastern Wisconsin. Arterial streets and highways, particularly those with high-speed traffic or heavy volumes of truck or transit vehicle traffic, require improvements such as extra-wide outside travel lanes, paved shoulders, bicycle lanes, or a separate bicycle path in order to safely accommodate bicycle travel. Land access and collector streets, because of low traffic volumes and speeds, are capable of accommodating bicycle travel with no special accommodation for bicycle travel.

The level and unit of government responsible for constructing and maintaining the surface arterial street or highway should also have responsibility for constructing and maintaining the associated bicycle or pedestrian facility, or for entering into construction, operations, and/or maintenance agreements with local units or agencies of government. Accordingly, the Wisconsin Department of Transportation should assume responsibility for bicycle and pedestrian facilities within the right-of-way of State trunk highways and connecting streets; the respective county highway, transportation, or public works departments should assume responsibility for bicycle and pedestrian facilities located within the right-of-way of county trunk highways; and the various cities, villages, and towns should assume responsibility for bicycle and pedestrian facilities located within the right-of-way of streets and highways under their jurisdiction. Bicycle and pedestrian facilities should be considered for provision at the time a street or highway is constructed, reconstructed, or resurfaced.

A more detailed evaluation of the proposed accommodation of bicycles on surface arterial streets or highways should necessarily be conducted by the implementing agency as part of the engineering for the resurfacing, reconstruction, and new construction of each segment of surface arterial. Factors to be considered during the detailed evaluation include the availability of right-of-way; the number and type of structures and vegetation that may need to be removed or relocated to provide the bicycle facility; the effects on environmentally sensitive areas, including wetlands; the cost of providing the bicycle facility on a specific street or highway in relation to providing the bicycle-related improvement on a parallel street or off-street corridor; and the quality of the alternative locations and the likelihood that bicyclists would use those alternatives, including the potential for a recommended off-street bicycle path to serve as an alternative location. The location and design treatment of the proposed bicycle facility should also be coordinated with the location and design treatment of nearby bicycle facilities.

If the detailed evaluation process indicates that the recommended bicycle way location is not feasible due to site constraints, excessive costs, the traffic and operating characteristics of the roadway, or other factors, the implementing agency should identify an alternative location and evaluate the feasibility of the alternative route. The evaluation of the recommended bicycle accommodation, and, if necessary, the identification and evaluation of alternative locations, should be conducted during the preliminary engineering phase of project design. On all surface arterial streets and highways within the Region, preliminary engineering for rehabilitation, reconstruction, or new construction should consider the provision of the recommended bicycle accommodation, with the bicycle accommodation included as part of the project design, or a commitment to provide an alternative bicycle facility on a parallel street or off-street corridor.

The Regional Planning Commission will prepare, following the completion of the year 2035 plan, an assessment of the priority of need for bicycle accommodation on each segment of the surface arterial street and highway system considering factors including traffic volume, composition, speed, and congestion.

Off-Street Bicycle Paths Element

The year 2035 plan also proposes that a system of off-street bicycle paths be provided between the Kenosha, Milwaukee, and Racine urbanized areas and the cities and villages within the Region with a population of 5,000 or more located outside the three urbanized areas, such cities and villages being termed small urban areas. This system of off-street bicycle paths is also proposed under the adopted park and open space plans for each of the

seven counties of the Region. These off-street bicycle paths would be located in natural resource and utility corridors and are intended to provide reasonably direct connections between the region's urbanized and small urban areas on safe and aesthetically attractive routes with separation from motor vehicle traffic.

Some on-street bicycle connections will be required to connect segments of this system of off-street paths. These connections if provided over surface arterials would include some type of bicycle accommodation—paved shoulder, extra-wide outside travel lanes, bicycle lanes, or separate parallel bicycle path—or if provided over a nonarterial collector or land access street would require no improvement.

The proposed system of bicycle facilities is shown on Map 94, and includes 575 miles of off-street bicycle paths with 147 miles of surface arterial and 83 miles of nonarterial connections. Approximately 203 miles of the planned 575 miles of off-street bicycle paths currently exist. Also shown on Map 94 is the 3,300 mile surface arterial street and highway system within the Region proposed to be provided with bicycle accommodation.

Pedestrian Facilities

The pedestrian facilities portion of the bicycle and pedestrian facilities plan element is a policy, rather than a system, plan. It recommends that the various units and agencies of government responsible for the construction and maintenance of pedestrian facilities in Southeastern Wisconsin adopt and follow recommended standards and guidelines with regard to the development of those facilities. The guidelines, together with the recommended standards for pedestrian facilities previously presented in Chapter VII of this report, are designed to facilitate safe and efficient pedestrian travel within the Region and are presented together in Appendix B of this report. Also presented in Appendix B are the recommended standards and guidelines for bicycle accommodation on arterial streets and for off-street bicycle paths.

The standards and guidelines for pedestrian facilities include recommendations that sidewalks be provided along streets and highways in areas of existing or planned urban development based upon identified criteria; that sidewalks be designed and constructed using widths and clearances appropriate for the levels of pedestrian and vehicular traffic in any given area; that landscaped terraces, curb lawns, or other buffer areas be provided between sidewalks and the roadways paralleling them to enhance the pedestrian environment; and that efforts be made to maximize pedestrian safety at street crossings, including the timing of the "walk" phases of traffic signals to provide for safe pedestrian crossings, and the provision of pedestrian "islands" and medians in wide, heavily traveled, or otherwise hazardous roadways. The plan also emphasizes that all pedestrian facilities must be designed and constructed in accordance with the requirements of the Federal Americans with Disabilities Act and its implementing regulations.

Community Bicycle and Pedestrian Plans

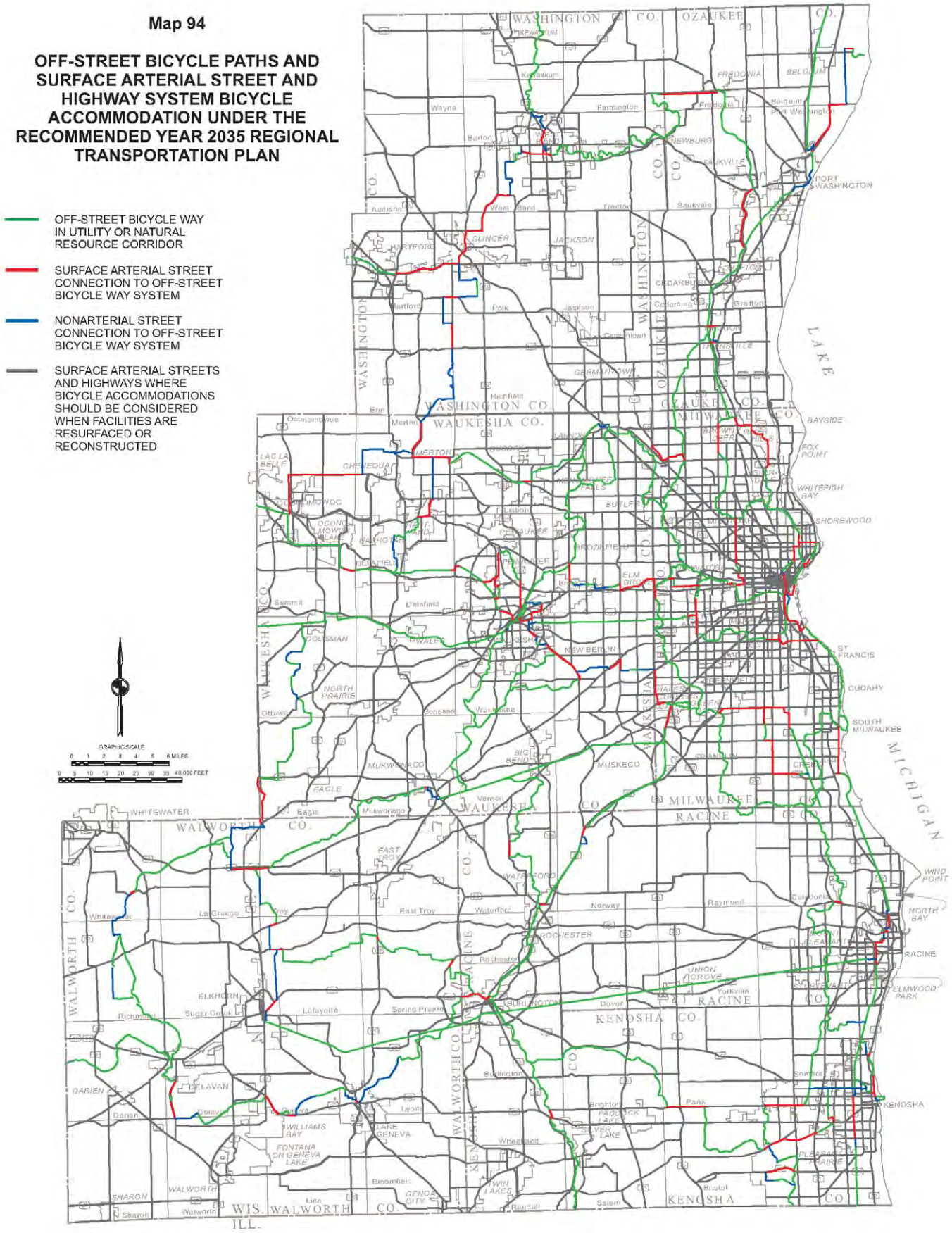
It is also proposed that local units of government prepare community bicycle and pedestrian plans to supplement the regional plan. The local plans should provide for facilities to accommodate bicycle and pedestrian travel within neighborhoods, providing for convenient travel between residential areas and shopping centers, schools, parks, and transit stops within or adjacent to the neighborhood. The standards, guidelines, and system plans set forth in the regional plan should be the basis for the preparation of community and neighborhood plans. It is also recommended that local units of government consider the preparation and implementation of land use plans that encourage more compact and dense development patterns, in order to facilitate pedestrian and bicycle travel.

Transportation Systems Management

The transportation systems management element of the final recommended year 2035 regional transportation plan includes measures intended to manage and operate existing transportation facilities to their maximum carrying capacity and travel efficiency, including: freeway traffic management, surface arterial street and highway traffic management, and major activity center parking management and guidance. In addition, improving the overall operation of the regional transportation system requires cooperation and coordination between the transportation agencies and operators in the Region, and coordination between the components of the regional transportation system. A regional intelligent transportation systems (ITS) architecture is essential to facilitate the institutional agreements and the technical integration required for such coordination of transportation operators in the Region

Map 94

OFF-STREET BICYCLE PATHS AND SURFACE ARTERIAL STREET AND HIGHWAY SYSTEM BICYCLE ACCOMMODATION UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION PLAN



Source: SEWRPC.

including highway agencies, departments of public works, transit operators, and emergency service providers, and describes the operations of the transportation system and the necessary and desirable information exchanges that should take place between different agencies in order to accomplish current and improved regional transportation system operation. A key objective of the regional architecture is to ensure interoperability between the hardware and software components employed by the various transportation operators in the Region.

Southeastern Wisconsin is located along the heavily traveled, multi-state IH 94 corridor. Efforts to improve the operation of the multi-state corridor have been underway since the U.S. Department of Transportation designated the Gary-Chicago-Milwaukee (GCM) Corridor as one of four ITS priority corridors in 1993. With this designation came dedicated Federal funding for ITS beginning with the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Since the GCM Corridor required an ITS architecture encompassing the interests of three states, the Wisconsin Department of Transportation (WisDOT) assumed the lead in the development of a regional ITS architecture which would serve both the Wisconsin portion of the GCM Corridor, and the southeastern Wisconsin Region. The WisDOT, with support from other agencies including the Southeastern Wisconsin Regional Planning Commission, developed and continues to maintain, review, and update a regional ITS architecture for southeastern Wisconsin. Given the multi-state GCM Corridor effort and the WisDOT's experience in developing and maintaining the existing regional ITS architecture, it remains appropriate for the WisDOT to continue to house and lead the regional ITS architecture maintenance, review, and update efforts. These efforts should ensure that the regional ITS architecture conform to the national ITS architecture and standards. The Regional Planning Commission will continue to support the WisDOT with these efforts.

Freeway Traffic Management

Proposed measures to improve the operation and management of the regional freeway system include operational control, advisory information, and incident management measures, as well as a traffic operations center supporting these measures. Essential to achieving freeway operational control, advisory information, and incident management is the WisDOT traffic operations center (TOC) in the City of Milwaukee. At the TOC all freeway segments in the Milwaukee area are monitored, freeway operational control and advisory information is determined, and incident management detection and confirmation is conducted. The TOC is important to the safe and efficient operation of the regional freeway system and is in operation 365 days a year, 24 hours a day.

Operational Control

Measures to improve freeway operation during average weekday peak traffic periods and during minor and major incidents through monitoring of freeway operating conditions and control of entering freeway traffic include traffic detectors, freeway on-ramp-meters, and ramp-meter control strategy. Traffic detectors measure the speed, volume, and density of freeway traffic, and are used in operational control, as well as advisory information and incident management. Existing freeway system traffic detectors consist of detectors embedded in the pavement at one-half mile intervals on the freeways in Milwaukee County and on IH 94 in Waukesha County, and at about one to two mile intervals on IH 94 in Kenosha and Racine Counties. The data collected from these traffic detectors is monitored by the WisDOT at the TOC for the purposes of detecting freeway system travel speed and time, traffic congestion, traffic flow breakdowns, and incidents. Freeway ramp meter traffic entry rates can be modified based upon the traffic volume and congestion indicated by the traffic detectors. Travel information on traffic congestion and delays can be provided to freeway system users through the WisDOT website and on variable message signs. Traffic speeds and congestion indicated by traffic detectors can instantaneously identify the presence of a freeway incident. It is proposed that existing freeway system traffic detectors be maintained, and that traffic detectors be installed on the freeway system throughout the Region at one-half mile intervals. The only exceptions for installing detectors on freeway segments may be those segments with current and expected future traffic volumes which would be substantially less than freeway traffic carrying design capacity, including IH 43 north of STH 57 in Ozaukee County, USH 45 north of the Richfield Interchange, USH 41 north of STH 60 in Washington County, and IH 43 and USH 12 in Walworth County.

Ramp-meters are traffic signals located on freeway entrance ramps or, in some cases, freeway-to-freeway entrance ramps, and are used to control the rate of entry of vehicles onto a freeway segment to achieve more efficient operation of the adjacent freeway segment and the downstream freeway system. To encourage

ridesharing and transit use, preferential access for high-occupancy vehicles is provided at ramp-meter locations to allow the high-occupancy vehicles to bypass traffic waiting at a ramp-metering signal. There are 120 freeway on-ramps currently in the Milwaukee area equipped with ramp-meters. Buses and high-occupancy vehicles currently receive preferential access at 63 of the 120 on-ramp-meter locations. It is proposed that ramp-meters be installed on all freeway on-ramps within the Region, with high-occupancy vehicle preferential access provided at all metered ramps, particularly those which would be used by existing and planned public transit. The only exception for ramp-meter installation may be those freeway segments identified above which would be expected to carry current and future traffic volumes below their design capacity.

Another element of freeway operational control is the strategy used in the operational control of ramp-meters. The existing ramp-meters on the southeastern Wisconsin freeway system are controlled in two ways. Some are controlled in a "pre-timed" mode, operating during specified peak traffic hours of the weekday at specified release rates of vehicles. Others are controlled as well during specified peak traffic hours of the weekday, but the vehicle release rates are based upon adjacent freeway system traffic volume and congestion. It is proposed that the strategy of controlling ramp-meters through consideration of adjacent congestion be expanded throughout the freeway system, and that an operational control strategy be developed which would consider downstream freeway traffic congestion and seek to minimize total travel delay on the freeway system while providing for equitable average and maximum delays at each ramp-meter, and avoiding the extension of vehicle queues onto surface streets. It is also proposed that the need for expanded vehicle storage on freeway on-ramps be considered, and addressed, during the reconstruction of the regional freeway system. It is also proposed that the WisDOT, in cooperation with the WisDNR, the Regional Planning Commission, and the seven counties of southeastern Wisconsin, conduct a study of managing speed on the freeway system, attempting to achieve more uniform speed at the posted speed limits. The study would be intended to quantify and consider the potential benefits including reduced crashes and attendant reduced congestion, and reduced air pollutant emissions both due to reduced speeds and reduced crash-related congestion, and the costs of implementation, specifically, law enforcement.

Advisory Information Measures

Providing advisory information to motorists is an integral part of providing an efficient street and highway system. By providing information on current travel conditions, motorists can choose travel routes which are more efficient for their travel, and the result is a more efficient transportation system. Advisory information measures include permanent variable message signs (VMS), the WisDOT website, and provision of information to the media. The WisDOT uses the permanent VMS to provide real time information to travelers about downstream freeway traffic conditions, such as current travel times to selected areas, information about lane and ramp closures, and where travel delays begin and end. There are 23 permanent VMS located on the freeway system, primarily in the Milwaukee area, and 13 on surface arterials which connect with the freeway system primarily located in western Milwaukee County. It is proposed that variable message signs be provided on the entire freeway system, and on surface arterials leading to the most heavily used freeway system on-ramps.

The WisDOT also provides substantial information about current freeway system traffic conditions on a website using data collected from freeway system traffic detectors. The information includes maps depicting the current level of freeway traffic congestion and the locations of confirmed incidents, views of freeway system traffic available from the freeway system closed circuit television camera network, and current travel times and delays on the major freeway segments in the Milwaukee area. The data on the website is also available to the media and used in daily radio and television broadcasts. It is proposed that WisDOT continue to enhance and expand the information provided on its website and to the media, and consider deployment of a regional 511 traveler information system which would allow the public to dial "511" and receive automated messages about current travel conditions along their desired route through a series of predetermined automated menus. Highway advisory radio is a system of low-power radio transmitters licensed for state use which transmit pre-recorded messages. Highway advisory radio (HAR) systems are generally very localized and directed to motorists at a specific location along a specific route. The only existing HAR system in the Region is located at Miller Park along IH 94, and is used to relay messages concerning ongoing highway construction projects, special events—such as Milwaukee Brewer game day traffic conditions—and "Amber alerts" in the event of a child abduction. An emerging advisory information vehicle radio-based technology is radio data systems (RDS). Radio data systems

are separate radio signals within a station's frequency allocation which transmit digital and audio information simultaneously with a standard FM stereo or radio broadcast. In southeastern Wisconsin, RDS exists and is primarily used by radio stations to broadcast digital information, such as station call names and song titles and artists. In Europe, RDS has been used to also transmit audio information to motorists through their stereo or radio receiver, including local travel announcements regarding incidents and traffic conditions. The RDS will interrupt the playing of the radio or compact disc to alert the driver to the travel announcement. At the end of the announcement, the receiver returns to the previous radio station or compact disc. It is recommended that WisDOT monitor RDS technology for possible application in the future.

Incident Management Measures

Incident management measures have as their objective the timely detection, confirmation, and removal of freeway incidents. As noted earlier, the WisDOT freeway system TOC and freeway system traffic volume detectors are essential to incident management, as well as freeway operational control and advisory information. Other incident management measures include closed circuit television, enhanced freeway location reference markers, freeway service patrols, crash investigation sites, the Traffic Incident Management Enhancement Program, ramp closure devices, and alternate route designations.

Closed-circuit television (CCTV) cameras provide live video images to the WisDOT and the Milwaukee County Sheriff's Department which allow for the rapid confirmation of congested areas and the presence of an incident, and immediate determination of the appropriate response to the incident and direction of the proper equipment to be deployed in response to the incident. There are currently 83 closed-circuit television cameras on the southeastern Wisconsin freeway system, covering Milwaukee County freeways, IH 94 and USH 41/45 in eastern Waukesha County, and IH 94 in Kenosha and Racine Counties. It is proposed that the CCTV camera network be provided on the entire regional freeway system with the possible exception of the freeway segments identified earlier which carry existing and future traffic volumes well below their design capacity.

Enhanced reference markers assist motorists in identifying specific locations along a freeway segment when reporting incidents. These markers are typically small signs provided at one-tenth mile intervals along the freeway system which typically display the highway shield and mile marker. Enhanced reference markers are currently provided in Milwaukee County in the freeway median at each one-tenth mile on USH 45 from the Zoo Interchange to the Milwaukee-Waukesha County line, and on IH 94 from the Mitchell Interchange to the Illinois-Wisconsin State line, including the freeway segments of IH 94 in Kenosha and Racine Counties. It is proposed that enhanced reference markers be provided on the entire regional freeway system.

Freeway service patrols provide for rapid removal of disabled vehicles and initial response to clearing incidents. Freeway service patrols consist of specially equipped vehicles designed to assist disabled motorists and assist in clearance of incidents. Freeway service patrol vehicles may be equipped to provide limited towing assistance, as well as minor services such as fuel, oil, water, and minor mechanical repairs. Freeway service patrols currently operate in a limited role on the Milwaukee County freeway system and on IH 94 in Kenosha, Racine, and Waukesha Counties. In each of these four counties, service patrols operate during weekday peak traffic periods. In Milwaukee County service patrols also operate all day during weekdays, and in Kenosha and Racine Counties, service patrols also operate all day during weekends. In Kenosha, Racine, and Waukesha Counties, one service patrol vehicle serves 12 to 15 miles of freeways, and in Milwaukee County one service patrol vehicle serves 70 miles of freeways. Expansion of the freeway service patrol is recommended to serve the entire regional freeway system, and to provide greater coverage including all day weekday and weekend service, evening service, and increased vehicle coverage of one vehicle per 12 to 15 miles of freeway.

Crash investigation sites are designated safe zones for distressed motorists to relocate to if they are involved in a crash or an incident on the freeway. There are 35 crash investigation sites on the southeastern Wisconsin freeway system, with the largest concentration—24 of the 35, or about 69 percent—located on the system in Milwaukee County. It is proposed that the WisDOT evaluate the extent of use and attendant benefits of existing crash investigation sites, and consider expansion as needed to serve the entire regional freeway system.

The Traffic Incident Management Enhancement (TIME) Program, sponsored by the WisDOT, has served to bring together, and coordinate, the transportation engineering, law enforcement, media, emergency responders, transit, tow and recovery, and other freeway system operational interests at monthly meetings. The goals of the TIME program are to improve and enhance freeway incident management, improve freeway safety, and enhance the quality and efficiency of freeway travel. It is proposed that the TIME program continue to be operated and sponsored by WisDOT.

Ramp closure devices have been deployed on IH 94 in Kenosha, Racine, and Waukesha Counties. The ramp closure devices are either Type III barricades or swing arm gates. These ramp closure devices allow for the closure of freeway on-ramps during planned and unplanned major incidents, such as special events and severe inclement weather. It is proposed that WisDOT evaluate the use and attendant benefits of existing ramp closure devices, and consider their application throughout the Region.

Alternate routes are designated, clearly marked and signed surface arterial street and highway routes which generally parallel freeway segments. These routes would be intended to be used by motorists during major freeway incidents and ramp closures and during particularly extreme congestion. Motorists would be directed through advisory information to these routes during major incidents and periods of particularly extreme congestion. It is proposed that WisDOT and the Regional Planning Commission, together with the concerned and affected local governments, examine the potential for the designation of alternative routes, and consider implementation of a pilot effort in a designated corridor.

In addition to these existing incident management measures in southeastern Wisconsin, the WisDOT should monitor the evolution of initiatives such as ITS America Vehicle Infrastructure Integration (VII). The VII Initiative is a cooperative effort between Federal and state departments of transportation and vehicle manufacturers to evaluate the feasibility of deploying a communications system which would support vehicle-to-vehicle and vehicle-to-infrastructure communication. The primary benefit of VII deployment would be roadway safety, including collision avoidance.

Surface Arterial Street and Highway Traffic Management

This group of proposed transportation system management measures would attempt to improve the operation and management of the regional surface arterial street and highway network, and include improved traffic signal coordination, intersection traffic engineering improvements, curb lane parking restrictions, access management, and advisory information.

Coordinated traffic signal systems provide for the efficient progression of traffic along arterial streets and highways, allowing motorists to travel through multiple signalized intersections along an arterial route at the speed limit minimizing or eliminating the number of stops at signalized intersections. These systems may be coordinated via time-based coordination, interconnected pre-timed coordination, traffic responsive, and/or central computer control. Time-based coordination relies on devices within each traffic signal controller to accurately keep time and the signal coordination is based upon a prescribed signal timing plan programmed into each individual traffic signal controller. Interconnected pre-timed coordination is based upon the hard wiring of each individual traffic signal controller into a master traffic signal controller. Traffic responsive systems are based upon an interconnected system of traffic signals which respond to information provided by traffic detectors to determine appropriate traffic signal cycle lengths and phasing. Central computer control systems are based upon a central computer facility which receives, analyzes, and develops appropriate signal cycle lengths, offsets, and phasing based upon information provided by traffic detectors and then communicates this information to the individual traffic signal controllers. In the Region, coordinated traffic signal systems currently range from systems comprising two traffic signals to systems comprising 100 traffic signals. Approximately 1,100 of the 1,700 traffic signals in the Region, or about 65 percent, are part of a coordinated signal system. This proposed measure recommends the preparation and implementation of coordinated traffic signal plans along all surface arterial street and highway routes in the Region with multiple traffic signals which are located at one-half mile or less spacing. This proposed measure also recommends that agencies coordinate their efforts so that motorists do not experience unnecessary stops or delays due to changes in individual traffic signal jurisdictional authority, with particular emphasis on those routes that may be designated as alternative routes to the freeway system. It is further

recommended that Commission staff work with State and local government to document existing and planned arterial street and highway system traffic signals and traffic signal systems, and develop recommendations for improvement and expansion of signal systems, including identifying and addressing obstacles to traffic signal coordination and progression, such as changes in jurisdiction of traffic signal control.

It is recommended that State and local governments aggressively consider and implement individual arterial street and highway intersection improvements. These intersection improvements may include geometric improvements, such as adding right- and/or left-turn lanes; improvements in the type of traffic control deployed at the intersection, including two- or four-way stop control, roundabouts, or signalization; or improvements in signal timing at individual signalized intersections. This proposed measure also recommends the preparation, review, and updating by the State, county, and municipal governmental units of a prioritized short-range (two to six year) program of arterial street and highway intersection improvements under their jurisdiction. It is further recommended that the Commission staff work with State, county, and municipal governments at their request to prepare such programs for arterial street and highway intersections, identifying the need for improvement, and recommended improvements.

It is also recommended that arterial street and highway traffic flow and operation be improved through restricting curb-lane parking during peak traffic periods and operating these curb parking lanes as through traffic lanes. It is recommended that restriction of curb-lane parking as needed during peak periods be considered along the arterial street and highway system in order to reduce traffic congestion and help to provide good transit service. Local governmental units would consider the proposed curb-lane parking restrictions as traffic volumes and congestion increase, and implement these restrictions rather than consider expansion of highway capacity through widening and new construction beyond that envisioned in the plan.

Access management has been, and will continue to be an important tool to improve transportation systems operations and provide for full use of roadway capacity. Access management involves identifying standards for the location, spacing, and operation of driveways—residential and commercial—median openings, and street connections, and recommending and implementing actions to achieve these standards. Failure to properly manage access to the arterial street and highway system may be associated with increased numbers of vehicle crashes, and increased travel times. Implementing sound access management may be expected to reduce both recurring and nonrecurring traffic congestion along the arterial route on which access management has been implemented. The objective of access management plans is to achieve a desirable spacing between adjacent access locations. This proposed measure recommends that State, county, and municipal governmental units with arterial streets and highways under their jurisdiction adopt access management standards, consider and implement these standards as development takes place along arterials under their jurisdiction, and prepare and implement access management plans along arterials which currently are developed and have access which violates these standards. A sample set of access management standards is provided in Appendix D of this report. Access management plans would be implemented over time and permit incremental improvements in access management as local units of government consider and approve development and redevelopment along an arterial street or highway. It is recommended that the Commission staff assist State, county, and municipal governments in the preparation of access management plans, at their request.

Advisory information should also be provided to motorists concerning the surface arterial street and highway network in the Region. In addition to the variable message sign recommendation in the freeway traffic management section, it is recommended that the WisDOT improve and expand the data provided on its website (travel times, congestion maps, and camera images) concerning freeway travel to include surface arterial street and highway travel, beginning with the pilot route designated as an alternative route to the freeway system. This recommendation may require consideration be given to the installation of additional traffic detectors and/or other data collection devices along the alternative routes until other innovative techniques for data collection become feasible—such as collecting real-time global positioning data from the mobile phones or vehicles of system users.

Emergency vehicle preemption allows emergency vehicles to intervene in the normal operation of traffic signals through wireless technologies. The regular cycle of the traffic signal is interrupted to either change the traffic

signal to the green phase or to hold the green phase for the approach from which the emergency vehicle is oriented. Some governmental units in the Region have implemented emergency vehicle preemption on some or all of the traffic signals under their jurisdictional authority. This proposed measure includes consideration by State, county, and local governmental units to provide emergency vehicle preemption at all traffic signals within their jurisdictional authority.

Closed–circuit television cameras provide live video images of traffic conditions. These cameras allow for the identification and confirmation of congested areas and incident locations. The WisDOT currently operates 13 closed-circuit television cameras on the surface arterial street and highway system in southeastern Wisconsin—primarily along the USH 18 corridor between CTH Y (Barker Road) and CTH O (Moorland Road in Waukesha County, and on STH 100 between CTH E (W. Silver Spring Drive) and W. Lincoln Avenue in Milwaukee County. It is recommended that the surface arterial street and highway CCTV network be provided along all routes which have been designated as alternative routes to the freeway system as described in the freeway traffic management recommendations.

Major Activity Center Parking Management and Guidance

Another proposed transportation system management measure would attempt to improve traffic operation conditions by reducing the traffic circulation of motorists seeking parking in major activity centers. The City of Milwaukee currently has an initiative to construct a SummerFest shuttle bus parking management and guidance system. This initiative would provide static and dynamic signing indicating the location of parking structures and the availability of parking in those structures for a number of parking structures in the central business district (CBD) which are near SummerFest shuttle bus routes. This proposed measure supports the City of Milwaukee initiative and proposes expansion of parking management and guidance systems to incorporate all of the Milwaukee CBD at all times of the year.

Regional Transportation Operations Program

In addition to the specific recommendations for transportation systems management categories—freeway traffic management, surface arterial street and highway traffic management, major activity center parking management and guidance—it is recommended that the Commission in cooperation with the WisDOT work jointly to prepare a Regional Transportation Operations Program (RTOP), while seeking involvement and participation from all transportation system operators. It is envisioned that the RTOP would program short-range (three to five year) operational improvement projects for implementation, in part based upon the transportation systems management recommendations in the adopted regional transportation system plan. Additionally, because the focus of the RTOP will primarily be three to five years, and because transportation operations, particularly ITS, involve evolving technologies, the RTOP will provide a basis from which evolving technologies can be monitored and evaluated for implementation in southeastern Wisconsin. This monitoring and evaluation may be expected to lead to amendments of the transportation systems management element of the adopted regional transportation system plan, ensuring that those long-range recommendations remain valid and current, especially recommendations regarding specific technologies.

Travel Demand Management Element

The travel demand management measures included in the final recommended year 2035 regional transportation plan include measures intended to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing capacity of the transportation system. These measures are in addition to the public transit and pedestrian and bicycle plan elements previously described.

Seven categories of travel demand management measures are recommended in the year 2035 plan: high-occupancy vehicle preferential treatment, park-ride lots, transit pricing, personal vehicle pricing, travel demand management promotion, transit information and marketing, and detailed site-specific neighborhood and major activity center land use plans.

High-Occupancy Vehicle Preferential Treatment

This group of proposed travel demand management measures would attempt to provide preferential treatment for transit vehicles, vanpools, and carpools on the existing arterial street and highway system. The proposed preferential treatment category consists of four specific travel demand management measures: the provision of high-occupancy vehicle (HOV) queue bypass lanes at metered freeway on-ramps; reserved bus lanes along congested surface arterial streets and highways; transit priority signal systems; and preferential carpool and vanpool parking.

The provision of HOV queue bypass lanes at metered freeway on-ramps currently exists at 63 of the 120 metered freeway on-ramp locations within the Milwaukee area. The proposed travel demand measure recommends that consideration be given to providing HOV bypass lanes at all metered freeway on-ramps within the Region, dependent upon right-of-way and on-ramp geometric design constraints. For this measure to be truly effective, strict enforcement of HOV bypass lanes will be required.

Reserved bus lanes similar to those along Blue Mound Road in Waukesha County allow transit vehicles to bypass vehicle queues attendant to traffic signals on congested arterial streets and highways. These reserved lanes may be expected to reduce transit travel times and improve transit travel time reliability during peak travel periods. This proposed travel demand management measure would expand the use of reserved bus lanes throughout the Region on the congested surface arterial streets and highways which currently, or may be expected in the future, to accommodate express and major local transit routes, and on the surface arterial portion of rapid transit routes.

The third proposed travel demand management measure within the high-occupancy vehicle preferential treatment category is transit priority signal systems. This proposed measure would allow transit vehicles to extend the end of the green phase of traffic signals as they approach a signalized intersection. This extension of the end of the green phase of the traffic signal may be expected to allow transit vehicles to approach and clear intersections without experiencing the additional travel time delay which would be accrued during the amber and red phases of traffic signal operation. These transit priority signal systems only allow the transit vehicles to extend the end of the green phase of traffic signals; they would not allow transit vehicles to initiate a green phase should the transit vehicle approach a traffic signal during the amber or red phase. Implementation of transit priority signal systems would require the installation of the appropriate hardware on the transit vehicle and traffic signal controller, as well as either new or upgraded software for the traffic signal controller. In some instances, due to age and compatibility issues, new signal controllers may be required to accommodate transit priority. This proposed measure would include transit priority signal systems along all express and major local transit routes, and the surface arterial portion of rapid transit routes within the Region. Transit priority signal systems may be expected to be even more effective when provided complementary to reserved bus lanes, and transit priority signal systems would be proposed along all transit routes providing reserved bus lanes.

The fourth proposed travel demand management measure within the high-occupancy vehicle preferential treatment category is preferential carpool and vanpool parking. This proposed measure would be voluntary and would propose that employers providing free/subsidized parking for their employees consider providing and enforcing preferential parking for those employees who carpool or vanpool to the employment site. This proposed measure may reduce vehicle trips by encouraging ridesharing.

Park-Ride Lots

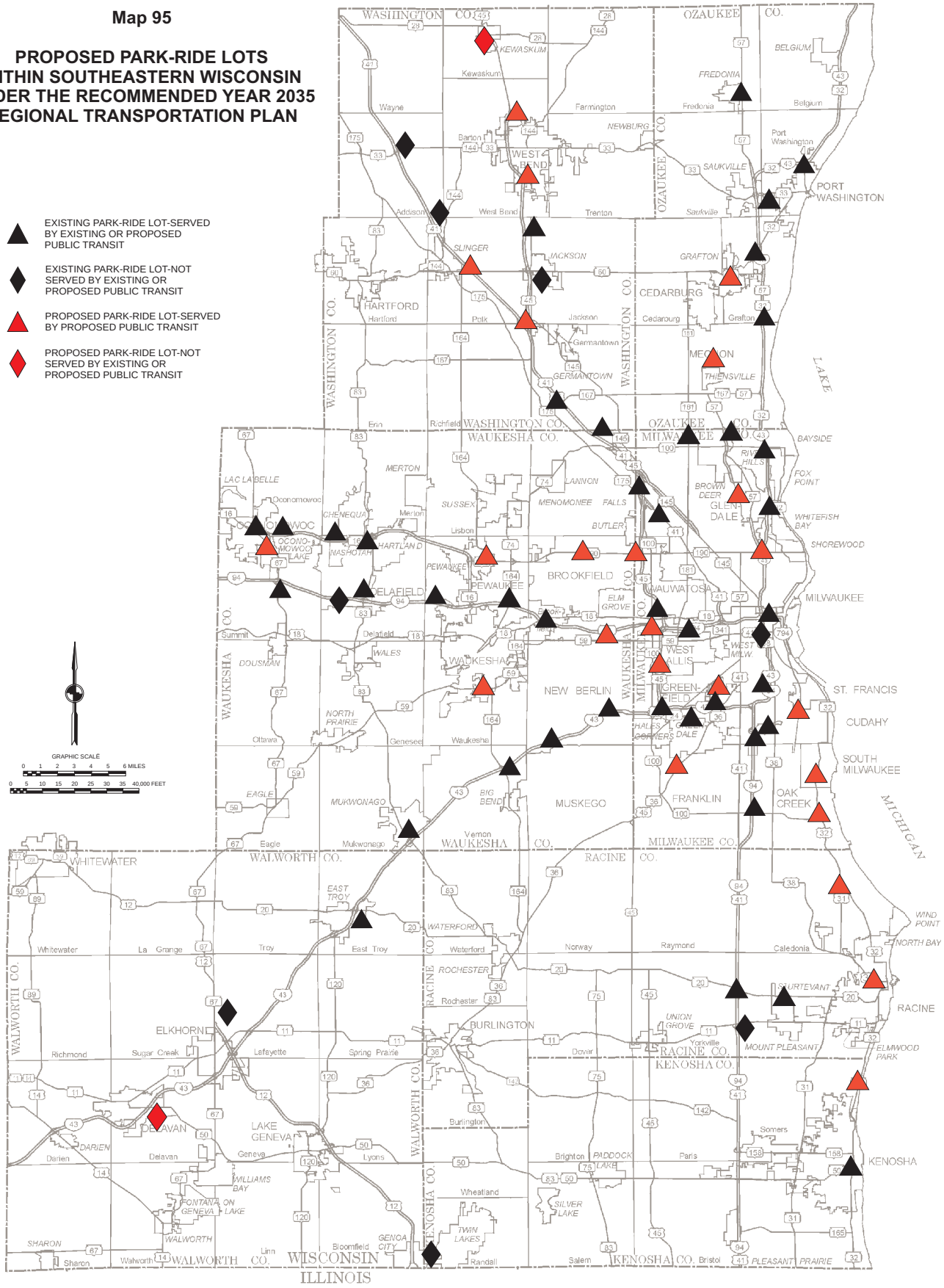
To promote carpooling and the resultant more efficient use of the Region's transportation system, a network of park-ride lots are proposed to facilitate carpooling. Map 95 shows the proposed system of 75 park-ride lots including 49 existing park-ride lots and those proposed to be served by public transit. Park-ride lots are proposed along all major routes at their major intersections and interchanges where sufficient demand may be expected to warrant provision of an off-street parking facility. The proposed system of park-ride lots shown on Map 95 is not intended to be prescriptive; other park-ride lots could be added if warranted by demand.

Transit Pricing

This group of proposed travel demand management measures would build upon existing transit pricing programs conducted by the transit operators in the Region. The proposed transit pricing category consists of three specific

Map 95

PROPOSED PARK-RIDE LOTS WITHIN SOUTHEASTERN WISCONSIN UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION PLAN



Source: SEWRPC.

travel demand management measures: annual transit pass programs, monthly or weekly pass programs, and vanpool programs.

The Milwaukee County Transit System has implemented a pass system at four colleges and universities which provides for free transit use with a reduced fee included in student tuition and fees. This annual transit pass program should be expanded to include the other local public transit operators in the Region and additional colleges and universities within the Region. This annual pass program should also be expanded to employers, with the Region's transit operators negotiating an annual fee with individual employers, which would allow those employers to provide each employee with an annual transit pass.

Monthly or weekly discount pass programs currently exist for three of the Region's public transit operators—the Milwaukee County Transit System, the Racine Belle Urban System, and the Waukesha Metro Transit System. This proposed monthly or weekly pass program would allow employers to offer their employees discounted monthly or weekly passes, where the employer and the transit operator have negotiated an agreement in which they both agree to subsidize a portion of the monthly or weekly pass.

The third proposed travel demand management measure within the transit pricing category is expansion of existing vanpool programs. Currently, the Milwaukee County Transit System operates a vanpool program with about 20 vanpools in which a group of employees who live in the same general area split the operation, maintenance, and a portion of the capital costs—currently 20 percent—of a van. Currently, the Milwaukee County Transit System vanpool program requires one end of the work trip to be in Kenosha, Milwaukee, Ozaukee, Racine, Washington, or Waukesha Counties, and that one end of the work trip is outside the regular Milwaukee County Transit System service area.

Personal Vehicle Pricing

The proposed personal vehicle pricing group of travel demand management measures would propose to allocate a larger percentage of the full costs of construction, maintenance, and operation of street and highway facilities and services directly on the users of the system. The proposed personal vehicle pricing category consists of two specific travel demand management measures—cash-out of employer-paid parking and auto pricing.

Cash-out of employee paid parking would propose that employers currently providing free/subsidized parking to employees would voluntarily begin charging their employees the market value of parking. Employers could offset the additional cost of parking through cash payment or salary increases to employees. This proposed measure would potentially reduce vehicle-trips and vehicle-miles of travel through the increased use of transit, ridesharing, walking, and bicycling, as some employees may "pocket" the cash payment and use other modes of travel.

The second proposed travel demand management measure within the personal vehicle pricing category encourages the continued and expanded use of user fees to pay the costs of construction, maintenance, and operation of street and highway facilities and services. Currently, user fees primarily include the Federal and State motor fuel tax and vehicle registration fees. These user fees currently fund 100 percent of the costs associated with State highways and about 20 to 25 percent of the costs associated with county and municipal streets and highways. There is substantial and growing opposition to increases in motor fuel taxes. In addition, there is the potential in the future for technological advances, such as increased fuel efficiency and alternative fuels, to render the current motor fuel tax obsolete. However, there is merit in having the users of the transportation system pay the actual costs of constructing, maintaining, and operating the transportation system. Travel behavior is affected by the cost of travel, and user fees can encourage more efficient travel.

Travel Demand Management Promotion

A regionwide program to aggressively promote transit use, bicycle use, ridesharing, pedestrian travel, telecommuting, and work-time rescheduling, including compressed work weeks is proposed to encourage alternatives to drive alone personal vehicle travel. The program would include education, marketing, and promotion elements.

Transit Information and Marketing
Proposed transit information and marketing measures would include the continuation and expansion of the joint marketing efforts of the transit operators within southeastern Wisconsin. It is also proposed that a single website be developed in which transit users could access all necessary information for each transit system in southeastern Wisconsin. This proposed website would allow a potential transit user to enter such information as beginning and ending addresses of a desired trip within the Region, and then would display the most feasible transit routing of the desired trip including all fares, transfers, and schedules.

The third proposed transit information and marketing measure is real-time travel information. This proposed measure would utilize global positioning system (GPS) data to provide real-time transit information to transit riders at transit centers and transit stops, including transit vehicle arrival times, and real-time maps, showing where on the route a transit vehicle is currently located.

Detailed Site-Specific Neighborhood and Major Activity Center Land Use Plans
The preparation and implementation by local governmental units of detailed, site-specific neighborhood and major activity center plans to facilitate travel by transit, bicycle, and pedestrian movement and reduce dependence on automobile travel is proposed, as recommended in the regional land use plan.

Arterial Street and Highway Element
The arterial street and highway element of the recommended year 2035 regional transportation plan totals 3,637 route-miles. Approximately 88 percent, or 3,191 of these route-miles, are recommended to be resurfaced and reconstructed to their same capacity. Approximately 358 route-miles, or less than 10 percent of the total preliminary recommended year 2035 arterial street and highway system are recommended for widening to provide additional through traffic lanes, including 127 miles of freeways. The remaining 88 route-miles, or about 2 percent of the total arterial street mileage, are proposed new arterial facilities.

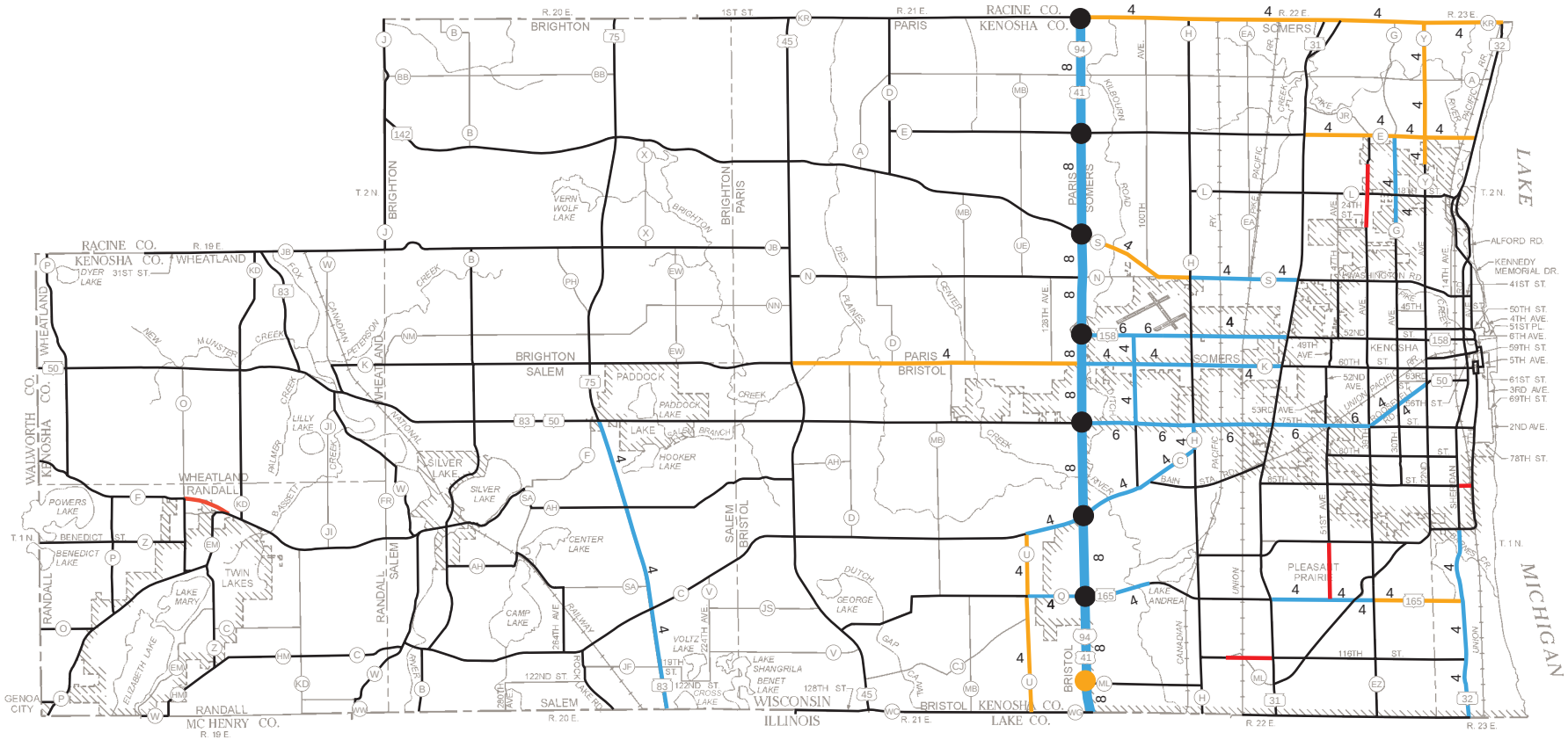
Maps 96 through 102 and Table 124 display the recommended year 2035 regional transportation plan arterial street preservation, improvement, and expansion by county. Highway improvements were recommended to address the residual congestion which may not be expected to be alleviated by proposed land use, systems management, demand management, bicycle and pedestrian facilities, and public transit measures proposed in the recommended plan. Each proposed arterial street and highway improvement, expansion, and preservation project would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternative alignments and impacts, including a no-build option, and final decisions as to whether and how a planned project will proceed to implementation will be made by the responsible State, county, or municipal government at the conclusion of preliminary engineering.

The 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette Interchanges and IH 43 between the Mitchell and Silver Spring Interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of the preliminary engineering would a determination be made as to how the freeway would be reconstructed.

On the existing freeway system three new freeway interchanges (IH 94 with Calhoun Road, IH 94 with Drexel Avenue, and IH 43 with Highland Road) are recommended in the plan, and the conversion of two half interchanges to full interchanges (IH 94 with S. 27th Street and IH 94 with CTH P) are recommended. The plan also recommends that the Wisconsin Department of Transportation in the preliminary engineering now underway for the reconstruction of IH 94 between the Wisconsin-Illinois State line and the Mitchell Interchange consider the provision of collector-distributor roadways connecting CTH K with the existing interchanges at STH 50 and STH 158 in Kenosha County, provision of an interchange at CTH C in Racine County through provision of a split interchange with collector-distributor roadways connecting CTH C and STH 20, and the construction of a new

Map 96

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN KENOSHA COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (POTENTIAL NEW INTERCHANGE)

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

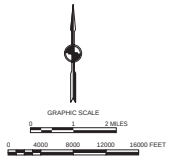
1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH K in Kenosha County including through the provision of collector-distributor roadways connecting CTH K, STH 50, and STH 158, and an additional potential new future freeway interchange at CTH ML with IH 94. Should the preliminary engineering study conclude with a recommendation to construct one or both of the interchanges, the Regional Planning Commission, upon request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

4. Sufficient right-ofway should be reserved along STH 158 from CTH H to STH 31 to accommodate its ultimate improvement to six travel lanes.

5. Sufficient right-of-way should be reserved along CTH K from IH 94 to STH 31 to accommodate its ultimate Improvement to six travel lanes.



Map 97

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN MILWAUKEE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OF NEW FACILITY)
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- HALF NEW
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the S. 27th Street with IH 94 interchange to a full interchange;
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

4. The plan also recommends that during preliminary engineering for the reconstruction of STH 100 from W. Forest Home Avenue to IH 43, consideration be given to alternatives without additional traffic lanes, alternatives with additional traffic lanes or auxiliary lanes, and alternatives with frontage roads.

GRAPHIC SCALE

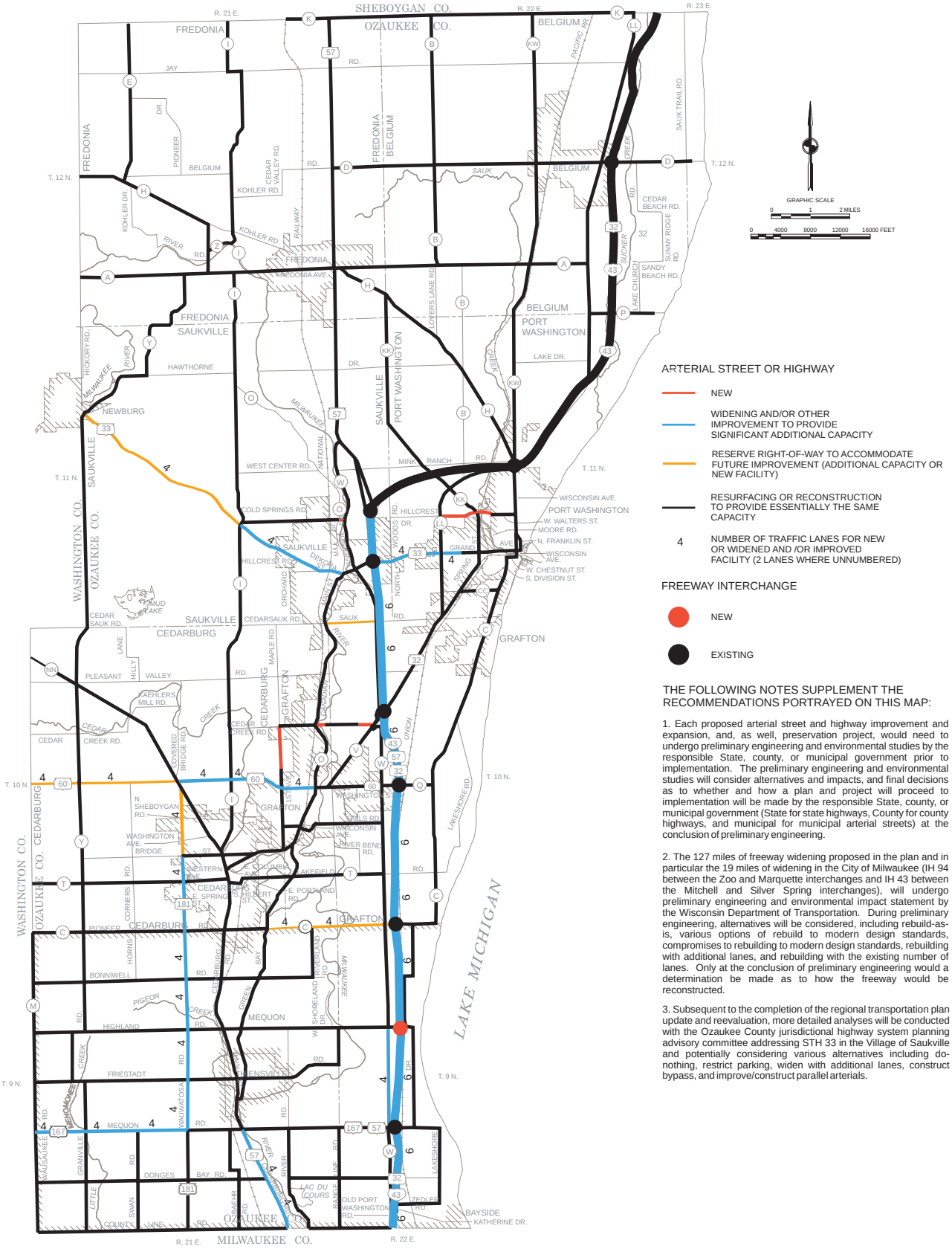
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 98

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN OZAUKEE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

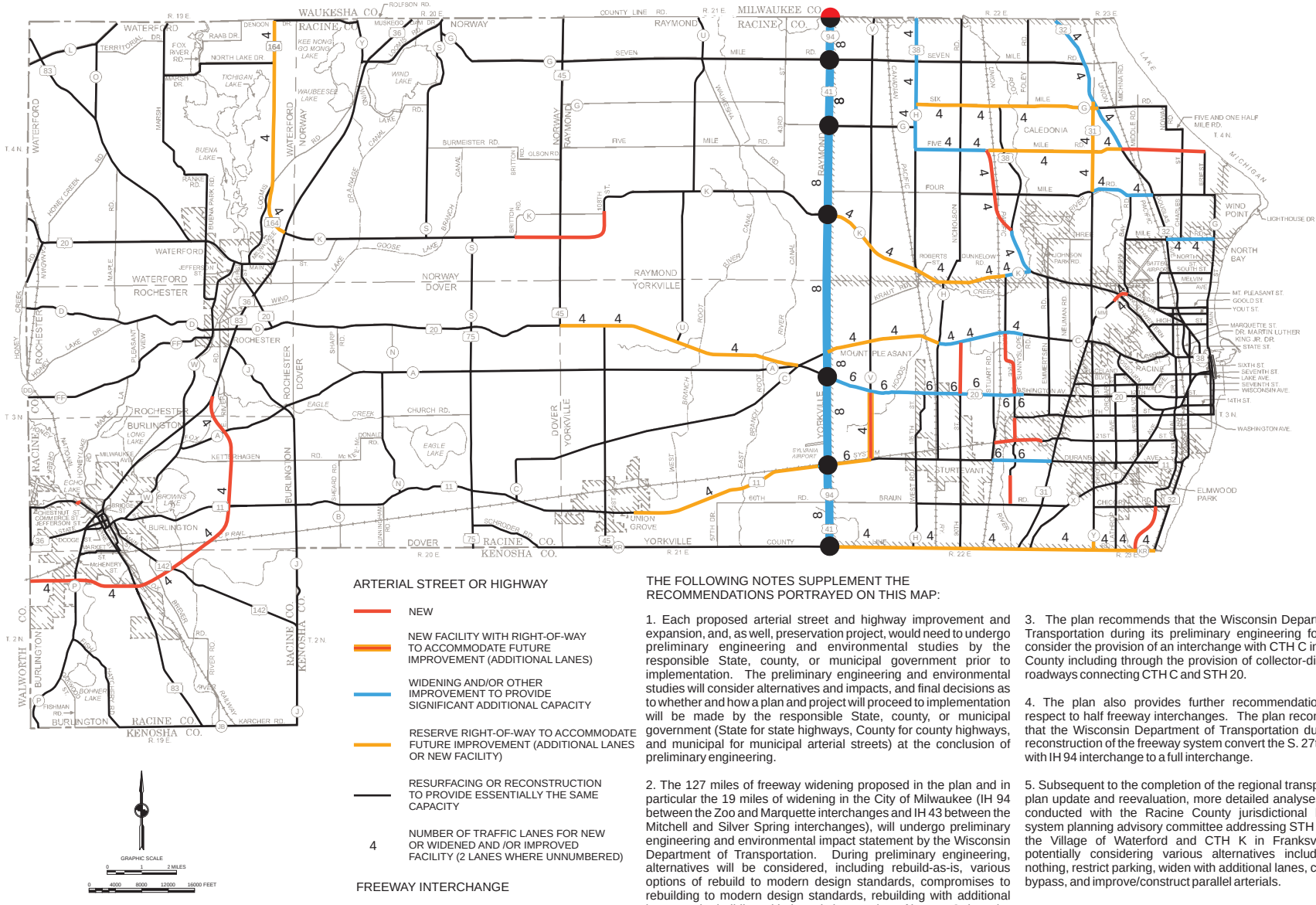
2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Ozaukee County jurisdictional highway system planning advisory committee addressing STH 33 in the Village of Saukville and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Source: SEWRPC.

Map 99

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN RACINE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- NEW FACILITY WITH RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES)
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- HALF NEW
- EXISTING

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

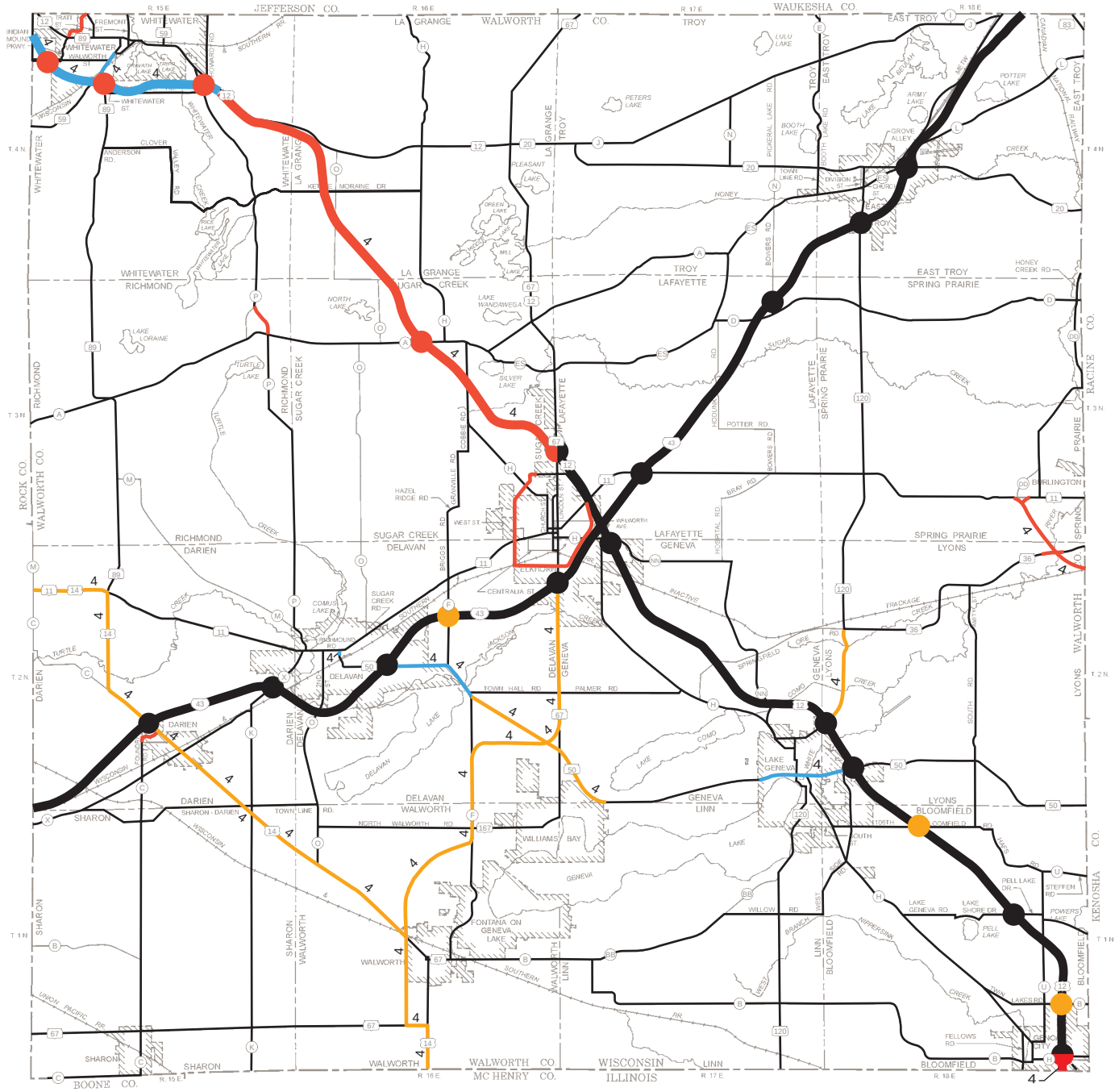
3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH C in Racine County including through the provision of collector-distributor roadways connecting CTH C and STH 20.

4. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system convert the S. 27th Street with IH 94 interchange to a full interchange.

5. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Racine County jurisdictional highway system planning advisory committee addressing STH 20/83 in the Village of Waterford and CTH K in Franksville and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Map 100

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WALWORTH COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OFWAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- HALF NEW
- EXISTING
- RESERVE RIGHT-OFWAY TO ACCOMMODATE FUTURE IMPROVEMENT (POTENTIAL NEW INTERCHANGE)

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The plan identifies additional potential new future freeway interchanges, and recommends that action be taken by the local governments to preserve the potential necessary right-of-way to assure that the future development of these interchanges is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange. These potential future new interchanges are CTH B and Bloomfield Road with USH 12 and CTH F with IH 43.

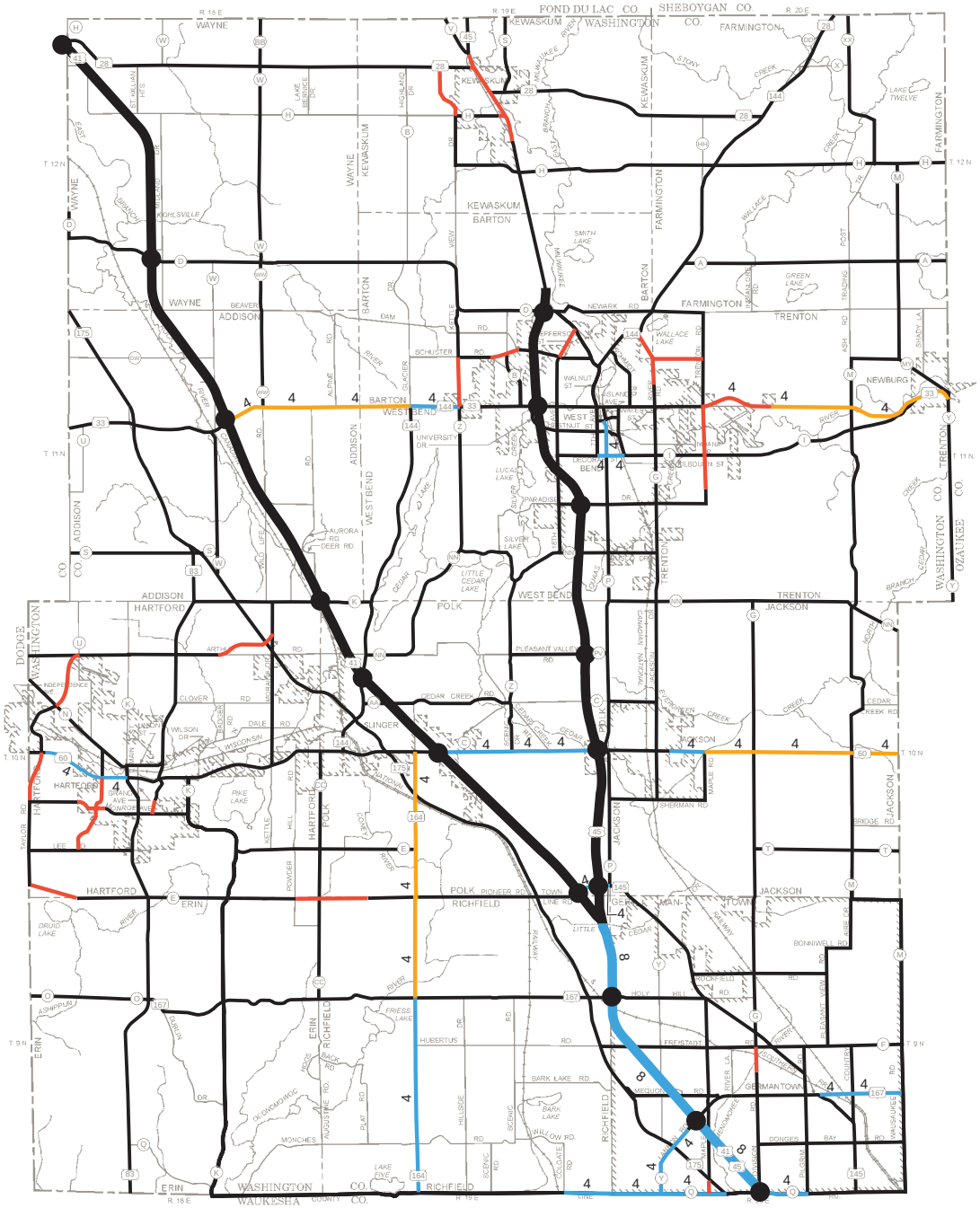
3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Walworth County jurisdictional highway system planning advisory committee addressing STH 50 in the City of Lake Geneva and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 101

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WASHINGTON COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

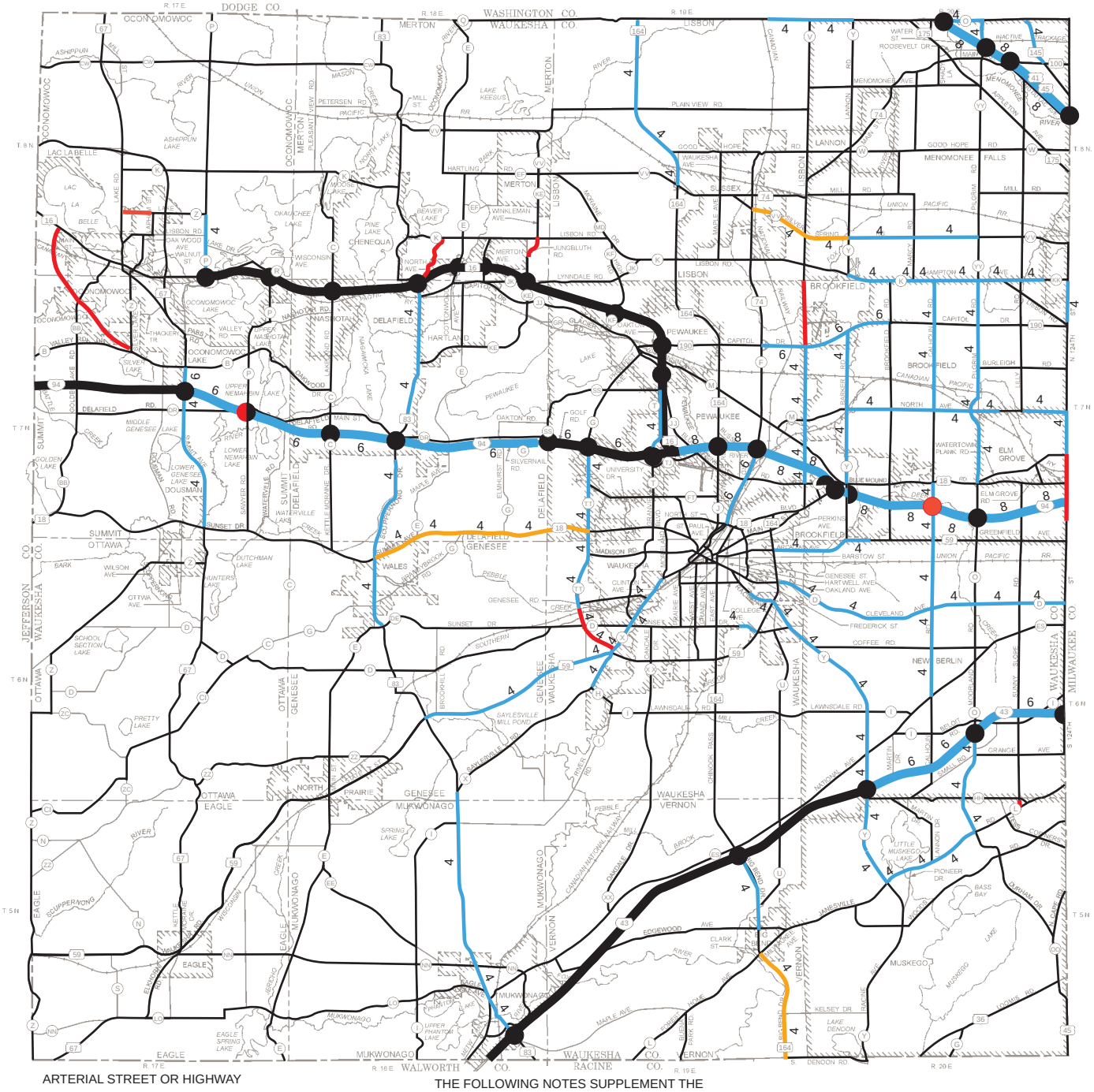
3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Washington County jurisdictional highway system planning advisory committee addressing STH 60 in the Village of Jackson and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 102

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WAUKESHA COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- NEW HALF
- EXISTING

GRAPHIC SCALE

0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the CTH P with IH 94 interchange to a full interchange.
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

4. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Waukesha County jurisdictional highway system planning advisory committee addressing STH 164 in the Village of Big Bend and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Table 124

ARTERIAL STREET AND HIGHWAY SYSTEM PRESERVATION, IMPROVEMENT, AND EXPANSION BY ARTERIAL FACILITY TYPE BY COUNTY: YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN

County	System Preservation (miles)	System Improvement (miles)	System Expansion (miles)	Total Miles
Kenosha				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	311.8	33.7	3.8	349.3
Subtotal	311.8	45.7	3.8	361.3
Milwaukee				
Freeway	11.6	54.8	0.0	66.4
Standard Arterial	702.3	29.7	1.4	733.4
Subtotal	713.9	84.5	1.4	799.8
Ozaukee				
Freeway	12.1	15.3	0.0	27.4
Standard Arterial	260.1	20.8	3.0	283.9
Subtotal	272.2	36.1	3.0	311.3
Racine				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	389.3	20.1	23.7	433.1
Subtotal	389.3	32.1	23.7	445.1
Walworth				
Freeway	50.4	4.5[a]	12.7	67.6[a]
Standard Arterial	387.7	5.0	11.5	404.2
Subtotal	438.1	9.5	24.2	471.8
Washington				
Freeway	36.2	6.5	0.0	42.7
Standard Arterial	379.6	16.7	21.0	417.3
Subtotal	415.8	23.2	21.0	460.0
Waukesha				
Freeway	32.2	26.5	0.0	58.7
Standard Arterial	617.9	100.1	10.6	728.6
Subtotal	650.1	126.6	10.6	787.3
Region				
Freeway	142.5	131.6[b]	12.7	286.8[b]
Standard Arterial	3,048.7	226.1	75.0	3,349.8
Total	3,191.2	357.7	87.7	3,636.6

[a] *Includes the planned conversion of approximately 4.5 miles of the USH 12 Whitewater bypass, currently a two traffic lane surface arterial to a four traffic lane freeway.*

[b] *Includes the planned widening of approximately 127.0 miles of the existing 2005 regional freeway system, and the planned conversion of about 4.5 miles of the USH 12 Whitewater bypass, currently a two traffic lane surface arterial to a four traffic lane freeway.*

Source: SEWRPC.

interchange at CTH ML. With respect to half interchanges, it is recommended that the Wisconsin Department of Transportation during the preliminary engineering of the reconstruction of the freeway system consider conversion of selected interchanges from half to full interchanges where interchange spacing and other conditions permit, consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange, and retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges. The plan also identifies four potential new future interchanges for consideration (CTH ML with IH 94, CTH B with USH 12, Bloomfield Road with USH 12, and CTH F with IH 43) and recommends that action be taken by local governments to preserve the potential necessary right-of-way to assure that the future development of these interchanges is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the

concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange. (The potential interchange of CTH ML with IH 94 will be considered during the preliminary engineering now underway for the reconstruction of IH 94 between the Wisconsin-Illinois State line and the Mitchell Interchange.)

Avoidance, Minimization, and Mitigation of Environmental Impacts

Arterial street and highway capacity expansion has been developed through the regional transportation planning process to avoid, if at all possible, impacts to environmentally sensitive resources. The regional transportation planning process first considers land use and transportation alternatives other than arterial street and highway improvements. Arterial street and highway capacity expansion is then considered only to address the residual traffic volume and congestion which would not be addressed by these other land use and transportation measures such as expanded public transit. Also, the Commission has developed and maintains extensive data bases of the location and quality of environmentally sensitive resources in the Region. During the plan development process, efforts are made by the Commission to consider arterial improvements and conceptual alignments which avoid, to the extent possible, impacts on environmentally sensitive resources.

During preliminary engineering and environmental studies of arterial street and highway projects with possible unavoidable impacts on environmentally sensitive resources, it is expected that efforts to minimize or eliminate any adverse impacts through consideration of design alternatives will be exhausted. The scope of the necessary preliminary engineering and environmental studies would include the consideration of alternate alignments and cross-sections designed specifically to minimize the attendant impacts on environmentally sensitive resources. To further minimize impacts, consideration should be given to the use of alternative design features such as construction of a bridge over wetlands rather than a roadway on fill even if they significantly increase project costs. Another technique which should be considered to minimize impacts would be to seek exceptions to design standards which would reduce the roadway cross-section through the impacted area.

Where environmentally sensitive resources will be unavoidably impacted, and for which mitigation is compensatory, efforts should focus on the preferred means of mitigation as identified by the regulatory agencies. Types of mitigation typically considered include enhancement of the remaining adjacent environmentally sensitive resources which will not be impacted as part of the arterial street and highway project, re-creation of the impacted environmentally sensitive resources, creation of new environmentally sensitive resources, or the acquisition and utilization of mitigation bank credits. Potential mitigation sites could include areas within or adjacent to primary environmental corridors, secondary environmental corridors, and isolated natural resource areas, mitigation bank sites, and areas identified in SEWRPC Planning Report No. 42, *A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin.*

Established Federal and/or State policy and guidelines exist with respect to compensatory mitigation of certain environmentally sensitive resources. With respect to wetlands, all wetland compensatory mitigation efforts must meet the requirements of Section 404 of the Clean Water Act, Section 10 of the Rivers and Harbors Act, Section 281.37 of the Wisconsin State Statutes, Chapters NR 103 and NR 350 of the Wisconsin Administrative Code, and for Wisconsin Department of Transportation projects compensatory mitigation efforts must meet the requirements of the cooperative agreement between the Wisconsin Departments of Natural Resources and Transportation. The Wisconsin Department of Natural Resources, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service have jointly developed specific guidelines for required compensatory mitigation for permitted wetland loss in Wisconsin. The document, dated February 2002, is entitled, *Guidelines for Wetland Compensatory Mitigation in Wisconsin*.

Comparison of Recommended Plan Costs with Available Revenue

The average annual cost of the recommended year 2035 regional transportation plan over the plan design period is $675 million, and includes preservation of the existing transportation system, necessary operations and maintenance, and recommended system improvement and expansion. The estimated average annual cost of the recommended plan is about 30 percent greater than the cost of a no-build plan. A comparison of the recommended plan costs to estimated available revenue as shown in Table 125 indicates that estimated available revenues are approximately equal to estimated plan costs, that is, within 10 percent. Estimated available revenues are largely based on historic State and local expenditures and potential use of Federal funding programs.

Table 125

AVERAGE ANNUAL COSTS AND REVENUES ASSOCIATED WITH THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN: 2006 THROUGH 2035[a]

Cost or Revenue Item	2035 Plan
Transportation System Cost (average annual 2006-2035 expressed as millions of dollars)[c]	
Arterial Street and Highway System	
Capital	$379
Operating	67
Subtotal	$446
Transit System	
Capital	$32
Operating[b]	197
Subtotal	$229
Total	$675
Transportation System Revenues (average annual 2006-2035 expressed as millions of dollars)	
Highway Capital	
Federal/State/Local	$370
Highway Operating	
State/Local	$60
Transit Capital	
Federal	$20
Local	5
Subtotal	$25
Transit Operating	
Federal	$25
State	100
Local	30
Subtotal	$155
Total	$610
Cost Revenue Comparison	$65
Average Annual Difference between Cost and Revenue (millions of dollars)	10 percent

[a] *All cost and revenue figures in this table are expressed in constant 2005 dollars.*

[b] *Net operating cost (total operating costs less fare-box revenue).*

[c] *All cost and revenue figures are expressed in constant 2005 dollars. Highway Federal, state, and local capital and operating revenues are based on estimated Federal, state, and local expenditures over the last several years. Transit Federal capital and operating revenues are based on historic expenditures over the last several years, and assessment of available Federal formula and program funds. State transit revenues are based on the State continuing its program of funding approximately 40 percent of transit operating costs. Transit local capital and operating revenues are based upon historic expenditures over the last several years.*

The estimated arterial street and highway system and transit system costs include all capital costs and operating and maintenance costs. The estimated costs include the necessary costs to preserve the existing transportation system such as arterial street resurfacing and reconstruction and transit system bus replacement, and the estimated costs of the transportation system improvement and expansion recommended under the plan. Freeway system capital costs include the estimated cost to rebuild the existing freeway system to modern design standards estimated at $5.53 billion or $184 million per year, the estimated incremental cost to rebuild 127 miles of the freeway system with additional lanes at $750 million or $25 million per year, the estimated cost of three new freeway interchanges and the conversion of two half interchanges to full interchanges at $100 million, and the estimated cost of the extension of the USH 12 freeway from Elkhorn to Whitewater at $180 million. Surface arterial capital costs include the costs of the estimated necessary resurfacing and reconstruction of the 3,049 miles of surface arterials which will require preservation of capacity over the plan design period, the estimated costs of reconstruction and widening with additional traffic lanes of about 226 miles of surface arterials, and the estimated costs of new construction of 75 miles of surface arterials. The estimated costs of resurfacing and reconstruction are based on the estimated lifecycle of existing surface arterials, and includes reconstruction of about 30 percent of surface arterials, two resurfacings of about 25 percent of surface arterials, and one resurfacing of about 45 percent of surface arterials. Unit costs for surface arterial resurfacing, reconstruction, widening, and new construction vary by cross-section from $0.3 to $8 million per mile (rural or urban, divided or undivided, and number of traffic lanes) and are based upon actual project costs over the past several years. The estimated cost of preservation of surface arterials is $129 million per year and of planned widening and new construction of 301 miles of surface arterials is about $30 million per year. Transit system capital costs include preservation of the existing transit system including bus replacement on a 12 to 15 year schedule and replacement of fixed facilities, and costs of system improvement and expansion including needed additional buses and facility expansion.

Source: SEWRPC.

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Chapter X

PLAN IMPLEMENTATION

INTRODUCTION

This chapter attempts to identify the actions required to implement the recommended regional transportation system plan. The various units and agencies of government which have plan adoption, endorsement, and implementation responsibilities are specified, and necessary plan adoption, endorsement, and implementation actions are listed.

PLAN IMPLEMENTATION ORGANIZATIONS

Because the Regional Planning Commission is an advisory agency, implementation of the recommended plans will be entirely dependent upon the actions taken by local, county, areawide, State, and Federal agencies of government. The agencies whose actions will affect the implementation of the recommended regional transportation system plan and whose full cooperation in plan implementation will be essential are listed below.

Local-Level Agencies

Local Plan Commissions

Sections 62.23, 61.35, and 60.10(2)(c) of the Wisconsin Statutes permit municipalities to create plan commissions. Plan commissions, among other functions, are charged with the responsibility of making and adopting a master plan for the physical development of the community, including recommendations relating to streets and highways, routes for railways and buses, and terminals. Moreover, the location, extension, alteration, and acquisition of land for any street or other public way must be referred to the plan commission for recommendation prior to any action by the municipal governing body.

Boards of Public Works

Sections 62.14, 61.35, and 60.10(2)(c) of the Wisconsin Statutes permit municipalities, under the direction of the common council, village board, or town board, to form boards of public works to direct the construction and maintenance of all public works. Such boards have primary responsibility for local arterial streets and highways and are able to take on public transit responsibilities as well.

Committees of the County Boards: Highway, Transit, and Public Works

Certain county board committees are responsible for the administration and expenditure of county funds for highway construction and maintenance and public transit operation and development. They are empowered to establish and change the county trunk highway systems, subject to the approval of the Wisconsin Department of Transportation; to acquire land for county highway purposes by purchase or condemnation; and to give direction to the operation and maintenance of public transit systems. All seven counties within the Southeastern Wisconsin Region have established such committees: in Kenosha County, a Highway and Parks Committee; in Milwaukee

County, a Transportation, Public Works, and Transit Committee; in Ozaukee County, a Public Works Committee; in Racine County, a Public Works Committee; in Walworth County, a Public Works Committee; in Washington County, a Highway Committee; and in Waukesha County, a Public Works Committee.

Transit Commissions and Boards

Transit commissions can be established by cities and are empowered to establish, maintain, and operate a public transportation system, the major portions of which are located within the city. The Cities of Kenosha, Racine, and Waukesha have created such governmental bodies to provide urban public transit services. Transit boards may be established by counties and are empowered to create, maintain, and operate a public transportation system within the county involved and any contiguous or cornering counties. There currently are no county transit boards in the Region.

Areawide Agencies

Cooperative Contract Commissions

Section 66.30 of the Wisconsin Statutes provides that municipalities[1] may contract with each other to provide jointly any services or exercise jointly any powers that such municipalities may be authorized to provide or exercise separately. While no transportation related cooperative contract commissions currently exist within the Region, there is potential to achieve significant economies through providing transportation services and facilities on a cooperative, areawide basis. Moreover, the nature of certain transportation problems often requires that solutions be approached on an areawide basis.

Regional Transportation Authority

The Southeastern Wisconsin Regional Transit Authority (RTA) was created by the Wisconsin State Legislature and Governor in July 2005 to serve the counties of Kenosha, Milwaukee, and Racine. Pursuant to Section 59.58(6) of the Wisconsin State Statutes the RTA has the responsibility to provide the following recommendations to the State Legislature and Governor:

- A proposal that specifically identifies a permanent regional funding source to provide local funds for the portion of operating and capital costs of commuter rail and public transit that are not covered by passenger fares and that considers all potential funding sources.

- A recommendation as to whether the responsibilities of the authority should be limited to collection and distribution of regional transit funding or should also include operation of transit service.

- A plan for the distribution among the mass transit operators in the region of any permanent regional funding specified.

- A plan to improve the coordination of expanded mass transit, commuter rail, and passenger rail in the region.

- A recommendation on the use of bonding for commuter rail and public transit in the region, and the role of the authority in such bonding.

- A recommendation on whether the authority should continue in existence after September 30, 2009.

These recommendations are to be documented in a report provided by November 15, 2008, to the State Legislature and Governor, which would also summarize all activities of the RTA.

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

Regional Planning Commission

Although not a direct plan implementation agency, one other areawide agency warrants description herein: the Regional Planning Commission. The Commission, created under Section 66.945 of the Wisconsin Statutes, is empowered to prepare and adopt a master plan, of which the transportation system plan is a part, for the physical development of the Region. It has no statutory plan implementation powers. A special designation assigned to the Regional Planning Commission under Federal law is that of "metropolitan planning organization." This designation means that the Commission provides a forum for cooperative decision making concerning the preparation and adoption of transportation system plans and improvement programs.

State-Level Agencies

Wisconsin Department of Transportation

The Wisconsin Department of Transportation is to provide the State with an integrated and intermodal transportation system and to administer State and Federal aids for highway and transit improvements. The Department is also responsible for planning, designing, constructing, and maintaining all State trunk highways and for planning, laying out, revising, constructing, reconstructing, and maintaining the Interstate highway system, subject to Federal review and regulation.

Wisconsin Department of Natural Resources

Pursuant to the provisions of the Federal Clean Air Act, the Wisconsin Department of Natural Resources must prepare a State Implementation Plan for the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). Under the Clean Air Act Amendments of 1990, a six-county moderate nonattainment area—Kenosha, Milwaukee, Ozaukee, Racine, Washington, and Waukesha Counties—has been designated with respect to the 8-hour ozone NAAQS. Therefore, the recommended regional transportation system plan, together with subsequently prepared transportation improvement programs, must be found to conform to the State Implementation Plan for Air Quality. If a conformity finding cannot be made, then the plan must be revised until a conformity finding can be made. These requirements have made close cooperation between the Regional Planning Commission and the Wisconsin Department of Natural Resources essential both in the preparation and implementation of the plan.

University of Wisconsin-Extension

As a part of the University of Wisconsin System, the University of Wisconsin-Extension is the institution principally charged with implementing the "Wisconsin Idea" of extending the knowledge and resources of the University of Wisconsin System to the citizens of the State, thereby helping them to make more informed decisions. The Regional Planning Commission and the University of Wisconsin-Extension have entered into a contractual agreement for the provision of educational services, focused upon transportation, land use, and environmental protection planning and plan implementation issues. Each county in the Region has a University of Wisconsin-Extension office that can be used to expand the network of education related to plan implementation. It is recognized that educating public officials and the citizens at large in the Region about the plan findings and recommendations will contribute significantly to, and indeed is a necessary element of, plan implementation.

Federal-Level Agencies

U.S. Department of Transportation

The U.S. Department of Transportation, in cooperation with the Regional Planning Commission as the metropolitan planning organization for the Southeastern Wisconsin Region, must make the necessary determinations to ensure that the recommended regional transportation system plan and subsequently prepared improvement programs conform with the State Implementation Plan for Air Quality. When making the conformity determinations, the Federal Highway and Federal Transit Administrations will require certain federally specified technical work to be completed by the Commission in order to demonstrate that the conformity criteria are met. Importantly, the plan implementation responsibilities of the two Federal agencies also extend to the funding of transportation improvement projects.

Federal Highway Administration

The Federal Highway Administration administers all Federal highway aid programs, working through the Wisconsin Department of Transportation. The Federal Highway Administration must approve all changes in the

National Highway System and Interstate highway system and will, in this respect, have an important role in implementation of the highway element of the recommended transportation system plan for the Region.

Federal Transit Administration
The Federal Transit Administration administers a comprehensive set of programs offering Federal funds to eligible local recipients in partial support of the preservation, improvement, and expansion of public transit service. Federal funds made available for transit projects under the Surface Transportation Program and the Congestion Mitigation and Air Quality Improvement Program are transferred from the Federal Highway Administration to the Federal Transit Administration and thus become subject to the administrative requirements of the Federal Transit Administration.

U.S. Environmental Protection Agency
The U.S. Environmental Protection Agency (EPA) is responsible for approving the State Implementation Plan for Air Quality and for imposing sanctions on a state for failing to meet certain requirements of the Clean Air Act Amendments of 1990. If the EPA finds a failure on the part of the state to submit a State Implementation Plan for Air Quality or a portion thereof, to implement the provisions of such an approved plan, or to conform to any other provision required by the Federal Clean Air Act, it must, after a period of grace during which the deficiency can be corrected, impose mandated sanctions.

PLAN ADOPTION, ENDORSEMENT, AND INTEGRATION

Upon adoption of the new regional transportation system plan by formal resolution of the Southeastern Wisconsin Regional Planning Commission, in accordance with Section 66.945(10) of the Wisconsin Statutes, the Commission will transmit a certified copy of the resolution and adopted plan to all local legislative bodies within the Region and to all of the aforementioned existing local, county, areawide, State, and Federal agencies. Endorsement, adoption, or formal acknowledgment and integration of these plans by the local legislative bodies and the existing local, county, areawide, State, and Federal agencies involved is highly desirable, and in some cases necessary, to assure a common understanding among the several governmental levels and to encourage their staffs to program the necessary implementation work. Endorsement of the new year 2035 regional transportation system plan by units and agencies of government that have previously endorsed the design year 2020 regional transportation plan will serve to substitute the new plan for the old.

Endorsement of the recommended plan by any unit or agency of government pertains only to the statutory duties and functions of the endorsing unit or agency. Such endorsement does not and cannot in any way preempt action by another unit or agency of government within its jurisdiction. Thus, endorsement of the regional transportation system plan by a county would make the plan applicable as a guide, for example, to county highway development but not to municipal street development. The plan would have to be endorsed by the municipality concerned to make it applicable as a guide to municipal street development.

While the adoption and endorsement of the recommended regional transportation system plan is important, the need to also adopt or endorse the companion year 2035 regional land use plan cannot be overlooked. The successful implementation of the regional transportation system plan is related to the successful implementation of the regional land use plan. The development of the transportation system in accord with the recommended regional transportation plan may not be sufficient to provide a high level of transportation service throughout the Region should urban development occur in a manner significantly contrary to the recommendations of the regional land use plan. Plan adoption, endorsement, and integration recommendations are listed below.

Local Agencies

- It is recommended that the cities, villages, and towns in the Region, upon recommendation of their plan commissions and boards of public works, endorse the recommended regional transportation system plan and integrate the plan into their comprehensive plans and capital improvement programs.

- It is recommended that the seven county boards in the Region, upon recommendation of their highway, transit, and/or public works committees, formally endorse the recommended regional transportation system plan and integrate the plan into their comprehensive plans and capital improvement programs.

- It is recommended that the Cities of Kenosha, Racine, and Waukesha, as well as any local unit of government that may in the future begin to operate public transit service, endorse the recommended transportation system plan as a guide to future transit system development and integrate the plan into their transit development programs.

Areawide Agencies

- It is recommended that any transportation-related cooperative contract commission subsequently created formally acknowledge the recommended transportation system plan in regard to the exercise of its specific powers and duties.

- It is recommended that the Southeastern Wisconsin Regional Transit Authority adopt the recommended regional transportation system plan as a guide and vision for future transit needs in the Southeastern Wisconsin Region.

State Agencies

- It is recommended that the Wisconsin Department of Transportation endorse the recommended regional transportation system plan. It is further recommended that the Department integrate the plan recommendations into the State long-range transportation plan, as authorized by Sections 84.01, 84.02, and 84.025 of the Wisconsin Statutes, as a functional guide to highway and transit system development within the Region.

- It is recommended that the Wisconsin Department of Natural Resources continue to participate with the Regional Planning Commission to ensure transportation programs and plans conform with the State Implementation Plan for Air Quality.

- It is recommended that the University of Wisconsin-Extension acknowledge the recommended regional transportation system plan and promote implementation of the plan through its educational programming.

Federal Agencies

- It is recommended that the U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration, endorse the recommended regional transportation system plan and find it to conform with the State Implementation Plan for Air Quality and to have been prepared in a manner consistent with the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users of 2005.

- It is recommended that the U.S. Environmental Protection Agency endorse the recommended regional transportation system plan.

Subsequent Adjustment of the Plan

No plan can be permanent in all its aspects or precise in all its elements. The very definition and characteristics of "regional planning" suggest that a regional plan, to be viable and useful to local, State, and Federal units and agencies of government, be continually adjusted through formal amendments, extensions, additions, and refinements to reflect changing conditions. The Wisconsin Legislature foresaw this when it gave to regional planning commissions the power to "amend, extend or add to the master plan or carry any part or subject matter into greater detail" under Section 66.945(9) of the Wisconsin Statutes.

Amendments, extensions, and additions to the regional transportation system plan will be forthcoming, not only from the work of the Commission under the continuing regional planning program, but also from statewide plans and from Federal agencies as national policies are established or modified, new programs created, or existing programs expanded or curtailed. Adjustments may come from State, subregional, district, and county and local planning programs which, of necessity, must be prepared in greater detail and may result in refinement and adjustment of the regional plan. All refinements and adjustments will require cooperation between local, areawide, State, and Federal agencies, as well as coordination by the Southeastern Wisconsin Regional Planning Commission, which is empowered under Section 66.945(8) of the Wisconsin Statutes to act as a coordinating agency for programs and activities of the county and local units of government concerned. To achieve this coordination among local, areawide, State, and Federal programs most effectively and efficiently and, therefore, assure the timely adjustment of the regional transportation system plan, it is recommended that all the aforementioned agencies having various plan and plan implementation powers transmit all subsequently prepared planning studies, plan proposals and amendments, and plan implementation devices to the Southeastern Wisconsin Regional Planning Commission for consideration regarding integration into the adopted regional plan.

PLAN IMPLEMENTATION RECOMMENDATIONS

The recommended year 2035 regional transportation system plan has five major elements: transportation system management, and demand management, public transit system maintenance and improvement, bicycle and pedestrian facilities maintenance and improvement, and arterial street and highway system maintenance and improvement. The specific actions and the agencies responsible for those actions required to implement each of these elements are described in the following sections of this chapter.

Transportation System Management and Travel Demand Management

The transportation system management and travel demand management elements include measures intended to manage and operate existing transportation facilities to their maximum carrying capacity and travel efficiency, and measures intended to reduce personal and vehicular travel or to shift such travel to alternative times and routes allowing for more efficient use of the existing capacity of the transportation system. The following are specific implementation responsibilities with respect to these measures:

1. It is recommended that the Wisconsin Department of Transportation continue to house and take the lead in the regional Intelligent Transportation System (ITS) architecture maintenance, review, and update efforts, and ensure that the regional ITS architecture conform to the national ITS architecture and standards. The plan recognizes that a regional ITS architecture is essential to facilitate the institutional agreement and the technical integration required for coordination of transportation operators in the Region and will ensure the interoperability between the hardware and software components employed by the various transportation operators in the Region. It is also recommended that the Regional Planning Commission continue to support WisDOT in these efforts.

2. It is recommended that the Wisconsin Department of Transportation continue to operate, enhance, and expand the freeway traffic management system in southeastern Wisconsin. The completed freeway management system should include systemwide installation of freeway system traffic detectors and ramp-meters; the provision of preferential access by high occupancy vehicles at freeway system on-ramps; provision of variable message signs throughout the freeway system and on major surface arterials leading to the most heavily used freeway system on-ramps; the expansion of website and media access to information related to freeway conditions; deployment of a “511” traveler information system throughout the Southeastern Wisconsin Region; systemwide expansion of the closed-circuit television freeway monitoring system; systemwide implementation of enhanced freeway location reference markers; expansion of freeway service patrols; consideration of the expansion of the number of crash investigation sites; continued sponsorship of the Traffic Incident Management Enhancement program; systemwide expansion of ramp closure devices; and, pilot study of alternative surface arterial routes.

3. It is recommended that the Wisconsin Department of Transportation and local governments prepare and implement coordinated traffic signal plans along all surface arterial streets and highways where the signal spacing is one-half mile or less. Agencies should coordinate their efforts so that motorists do not experience any unnecessary stops or delays due to changes in individual traffic signal jurisdictional authority. Particular emphasis should be placed on those routes that may be designated as alternative routes to the freeway system. The Commission staff should work with the Wisconsin Department of Transportation and local governments to document existing and planned arterial street and highway traffic signal systems, and develop recommendations for improvement and expansion of signal systems, including identifying and addressing obstacles to traffic signal coordination and progression, such as changes in jurisdiction of traffic signal control.

4. It is recommended that the Wisconsin Department of Transportation and local governments aggressively consider and implement individual arterial street and highway intersection improvements. These intersection improvements may include geometric improvements, such as adding right- and/or left-turn lanes; improvements in the type of traffic control deployed at the intersection, including two- or four-way stop control, roundabouts, or signalization; or improvements in signal timing at individual intersections. It is recommended that each unit of government prepare a prioritized short-range (two to six year) program of arterial street and highway intersection improvements under their jurisdiction. The Commission staff will, at their request, work with the Wisconsin Department of Transportation and local governments in the preparation of such programs, identifying the need for improvement, and recommended improvements.

5. It is recommended that local governments consider the restriction of curb-lane parking and operation of the curb parking lanes as through traffic lanes as needed during peak periods in order to reduce traffic congestion and help to provide good transit service. Local governments should consider the proposed curb-lane parking restrictions as traffic volumes and congestion increase, and implement these restrictions rather than consider expansion of highway capacity through widening and new construction beyond that envisioned in the plan.

6. It is recommended that State, county, and local governments with arterial streets and highways under their jurisdiction, adopt access management standards and implement these standards as development or redevelopment takes place along arterials under their jurisdiction, and prepare and implement access management plans along arterials which currently are developed and have access which violates these standards. A sample set of access management standards is provided in Appendix G of this report. Access management plans would be implemented over time and permit incremental improvements in access management as local units of government consider and approve development and redevelopment along an arterial street or highway. The Commission staff will assist State, county, and local governments in the preparation of access management plans, at their request.

7. The Wisconsin Department of Transportation should also provide advisory information to motorists concerning the surface arterial street and highway network in the Region. The Wisconsin Department of Transportation should improve and expand the data provided on its website concerning freeway travel to include surface arterial street and highway travel beginning with pilot routes designated as alternative routes to the freeway system. This recommendation may require that consideration be given to the installation of additional traffic detectors and/or other data collection devices along the alternative routes until other innovative techniques for data collection become feasible.

8. It is recommended that the City of Milwaukee expand its current initiative to construct a SummerFest shuttle bus parking management and guidance system to include all of the Milwaukee CBD at all times of the year.

9. It is recommended that the Wisconsin Department of Transportation in cooperation with SEWRPC and all transportation system operators in the Region work to prepare, maintain, and update as needed a Regional

Transportation Operation Program—a program of high priority short-range (proposed to be three to five year) operational improvement projects for implementation—based on the programs prepared by each unit of government.

10. It is recommended that the Wisconsin Department of Transportation and local governments provide preferential treatment for high-occupancy vehicles on the existing arterial street and highway system. This recommendation should be implemented through the provision of four specific travel demand measures: high-occupancy vehicle queue bypass lanes at metered freeway on-ramps; reserved bus lanes along express transit routes and major local routes; transit priority signal systems; and, high-occupancy vehicle parking.

11. It is recommended that the Wisconsin Department of Transportation continue to promote carpooling and the efficient use of the Region's transportation system through the proposed expansion of the existing network of park-ride lots to include locations along all major routes at their major intersections and interchanges where sufficient demand may be expected to warrant provision of an off-street parking facility.

12. It is recommended that transit operators in the region build upon and expand existing transit pricing programs. It is recommended that the existing annual pass program, implemented by the Milwaukee County Transit System at four colleges and universities, be expanded to include the other local transit operators in the Region and additional colleges and universities within the Region. This annual pass program should also be expanded to employers, with the Region's transit operators negotiating an annual fee which would allow those employers to provide each employee with an annual transit pass. Transit operators should also expand monthly or weekly pass programs, working with employers to offer employees discounted monthly or weekly passes. The Milwaukee County Transit System should expand its existing vanpool program to include all of the Southeastern Wisconsin Region, and remove the service area restrictions regionwide.

13. It is recommended that the Wisconsin Department of Transportation implement a program to aggressively promote transit use, bicycle use, ridesharing, pedestrian travel, telecommuting, and work-time rescheduling, including compressed work weeks in an effort to encourage alternatives to drive alone personal vehicle travel. The program would include education, marketing, and promotion elements.

14. It is recommended that the transit operators expand and enhance transit information and marketing in the Southeastern Wisconsin Region. The plan recommends the implementation of three measures: continuation and expansion of current joint marketing efforts; development of a single website where transit users could access all of the necessary information for each transit system in the Region and would provide potential transit users the most feasible transit route within the region including all the required fares, transfers, and schedules; and, provision of real-time transit information, such as vehicle arrival times, and real-time vehicle location maps, at transit centers and stops.

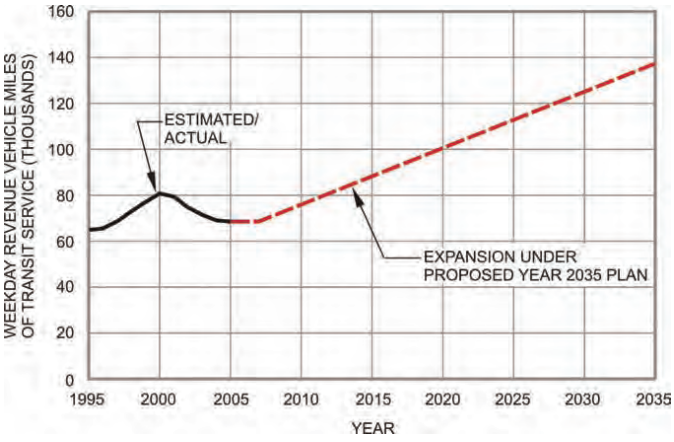
15. It is recommended that local units of government, upon adoption of the regional land use plan, prepare and implement detailed, site-specific neighborhood and major activity center plans to facilitate travel by transit, bicycle, and pedestrian movement and reduce dependence on automobile travel.

Public Transit System Maintenance and Improvement

The public transit element of the final recommended plan envisions significant improvement and expansion of public transit in southeastern Wisconsin. The recommended service expansion includes the development of a regional rapid transit system that would connect the outlying counties and urban centers of the Region to each other and to the Milwaukee area and central business district; the development of an express transit system that would provide a grid of express transit routes connecting Milwaukee area major employment centers and shopping areas, tourist attractions, entertainment centers, and higher density residential areas; and significant improvement of the existing local bus transit systems and the integration of those local systems with the proposed rapid and express transit services. Altogether, service on the regional transit system would be doubled from existing service levels measured in terms of revenue transit vehicle-miles of service provided, from about 69,000

Figure 41

HISTORIC AND PLANNED VEHICLE-MILES OF PUBLIC TRANSIT SERVICE ON AN AVERAGE WEEKDAY IN THE SOUTHEASTERN WISCONSIN REGION: 1995-2035



Source: SEWRPC.

vehicle-miles of service on an average weekday in the year 2005 to 138,000 vehicle-miles of service in the year 2035. A suggested schedule of the expansion of transit service is set forth in Figure 41.

Implementation of this proposed expansion will be dependent upon the continued State funding of the maintenance, improvement and expansion of public transit and the development of a dedicated source of local funding for public transit. The State has historically funded 40 to 45 percent of transit operating costs, and has increased funding to address inflation in the cost of providing public transit, and to provide for transit improvement and expansion. It is recommended that to assure implementation of the transit element of the regional transportation plan that State funding of transit operating costs continue at the existing level with attendant annual increases of approximately 4 percent to address rising costs, including inflation and real increases in fuel costs, and to support system improvement and expansion. The local share of funding of public transit in southeastern Wisconsin, representing about 15 percent of the total operating costs and 20 percent of total capital costs of public transit, is largely provided by property taxes, and public transit must annually compete with mandated services and projects for its share of these taxes. Most public transit systems nationwide have dedicated local funding, typically a sales tax of 0.25 to 1.0 percent. The plan recommends that local dedicated funding be obtained for the transit systems in the Region to replace current property tax funding and be sufficient to address cost inflation and system improvement and expansion over the plan design period. A sales tax would provide funding which should increase with inflation and area growth, thereby addressing funding needs attendant to inflation in the costs of providing public transit and to transit system expansion. The regional transit authority recently created for Kenosha, Milwaukee, and Racine Counties could assist in implementing this plan recommendation as it will be considering recommending local dedicated funding for public transit.

The current operators of public fixed-route transit services in the Region—Ozaukee, Milwaukee, Washington, and Waukesha Counties and the Cities of Kenosha, Racine and Waukesha—are capable of implementing the plan recommendations for expansion of transit services. The transit operators have demonstrated this in the past by implementing transit service improvements that expanded service within each county or extended service across county or municipal boundaries to serve areas outside their primary service area. The recently created regional transit authority for Kenosha, Milwaukee, and Racine Counties could also be of assistance with implementing recommended transit service improvements that would extend across city and county boundaries.

The plan identifies potential corridors for rapid and express fixed guideway transit services and recommends that more detailed planning be conducted through corridor studies for each corridor. The studies would be conducted by the transit operator concerned, or jointly by the multiple transit operators concerned, to determine whether to implement a fixed guideway transit alternative in each corridor and to refine the conceptual guideway alignments shown in the regional plan. At the conclusion of each corridor study, the transit operator(s) would determine whether to implement fixed guideway transit and identify the preferred alignment within the corridor that should proceed into preliminary engineering. The Commission would then, at the request of the transit operator(s), revise and amend the regional plan to include the fixed guideway.

Bicycle and Pedestrian Facility Element

The bicycle and pedestrian facility element of the final recommended plan is intended to promote safe accommodation of bicycle and pedestrian travel, and encourage bicycle and pedestrian travel as an alternative to

personal vehicle travel. The regional plan recommends that as the surface arterial street system of about 3,300 miles in the Region is resurfaced and reconstructed segment-by-segment, the provision of accommodation for bicycle travel should be considered and implemented, if feasible, through bicycle lanes, widened outside travel lanes, widened and paved shoulders, or separate bicycle paths; that a system of approximately 575 miles of off-street bicycle paths be provided between the Kenosha, Milwaukee, and Racine urbanized areas and the cities and villages within the Region with a population of 5,000 or more located outside the three urbanized areas, such cities and villages being termed small urban areas; and that the various units and agencies of government responsible for the construction and maintenance of pedestrian facilities in Southeastern Wisconsin adopt and follow recommended standards and guidelines with regard to the development of pedestrian facilities, providing such facilities along streets and highways in areas of existing or planned urban development. A set of recommended standards and guidelines for bicycle and pedestrian facilities is provided in Appendix B.

It is also recommended that local units of government prepare community bicycle and pedestrian plans to supplement the regional plan. The local plans should provide for facilities to accommodate bicycle and pedestrian travel within neighborhoods, providing for convenient travel between residential areas and shopping centers, schools, parks, and transit stops within or adjacent to the neighborhood. The standards, guidelines, and system plans set forth in the regional plan should be the basis for the preparation of community and neighborhood plans. It is also recommended that local units of government consider the preparation and implementation of land use plans that encourage more compact and dense development patterns, in order to facilitate pedestrian and bicycle travel. The Regional Planning Commission, by request, will work with each local government to prepare community bicycle and pedestrian plans.

The level and unit of government responsible for constructing and maintaining the surface arterial street or highway should also have responsibility for constructing and maintaining the associated bicycle or pedestrian facility, or for entering into construction, operations, and/or maintenance agreements with local units or agencies of government. Accordingly, the Wisconsin Department of Transportation should assume responsibility for bicycle and pedestrian facilities within the right-of-way of State trunk highways and connecting streets; the respective county highway, transportation, or public works departments should assume responsibility for bicycle and pedestrian facilities located within the right-of-way of county trunk highways; and the various cities, villages, and towns should assume responsibility for bicycle and pedestrian facilities located within the right-of-way of streets and highways under their jurisdiction. Bicycle and pedestrian facilities should be considered for provision at the time a street or highway is constructed, reconstructed, or resurfaced.

A more detailed evaluation of the proposed accommodation of bicycles on surface arterial streets or highways should necessarily be conducted by the implementing agency as part of the engineering for the resurfacing, reconstruction, and new construction of each segment of surface arterial. Factors to be considered during the detailed evaluation include the availability of right-of-way; the number and type of structures and vegetation that may need to be removed or relocated to provide the bicycle facility; the effects on environmentally sensitive areas, including wetlands; the cost of providing the bicycle facility on a specific street or highway in relation to providing the bicycle-related improvement on a parallel street or off-street corridor; and the quality of the alternative locations and the likelihood that bicyclists would use those alternatives, including the potential for a recommended off-street bicycle path to serve as an alternative location. The location and design treatment of the proposed bicycle facility should also be coordinated with the location and design treatment of nearby bicycle facilities.

If the detailed evaluation process indicates that the recommended bicycle way location is not feasible due to site constraints, excessive costs, the traffic and operating characteristics of the roadway, or other factors, the implementing agency should identify an alternative location and evaluate the feasibility of the alternative route. The evaluation of the recommended bicycle accommodation, and, if necessary, the identification and evaluation of alternative locations, should be conducted during the preliminary engineering phase of project design. On all surface arterial streets and highways within the Region, preliminary engineering for rehabilitation, reconstruction, or new construction should consider the provision of the recommended bicycle accommodation, with the bicycle accommodation included as part of the project design, or a commitment to provide an alternative bicycle facility on a parallel street or off-street corridor.

The level and unit of government responsible for constructing and maintaining the off-street bicycle facilities are shown on Map 103 and summarized in Table 126. The recommended year 2035 off-street bicycle path jurisdiction is based on extending to the design year 2035 the year 2020 bicycle and pedestrian facilities system plan for the Southeastern Wisconsin Region.

Subsequent to the completion of the year 2035 plan, the Regional Planning Commission will review and update the jurisdictional responsibility of the off-street bicycle facilities as well as conduct an assessment of the priority of need for bicycle accommodation on each segment of the surface arterial street and highway system considering factors including traffic volume, composition, speed, and congestion.

Arterial Streets and Highway System Maintenance and Improvement

The arterial street and highway system envisioned in the recommended plan would consist of 3,637 route-miles of facilities. The plan recommends the construction of 88 route-miles of new facilities within the Region. The plan also recommends the widening with additional traffic lanes of 358 route-miles of arterials, including 127 miles of freeways. The plan also calls for pavement resurfacing and reconstruction as necessary to maintain the remaining 3,191 route-miles of planned arterial facilities, including rebuilding the regional freeway system to modern design standards as it is reconstructed.

Functional Improvement Recommendations

The plan provides for three types of functional improvement: system expansion, or the construction of new arterial facilities; system improvement, or the widening of facilities with additional traffic lanes to provide significant additional capacity; and system preservation, or the resurfacing and reconstruction necessary to properly maintain and modernize existing arterial facilities. As previously indicated, the plan would provide for the construction of 88 route-miles of new facilities within the Region and the widening with additional traffic lanes of 358 route-miles of existing arterial facilities. The plan also calls for pavement resurfacing and reconstruction as necessary to maintain the remaining 3,191 route-miles of planned arterial facilities including, reconstructing the freeway to modern design standards. The planned functional improvements to the regional arterial street and highway system are shown on a county-by-county basis on Maps 104 through 110 and are summarized in Table 127.

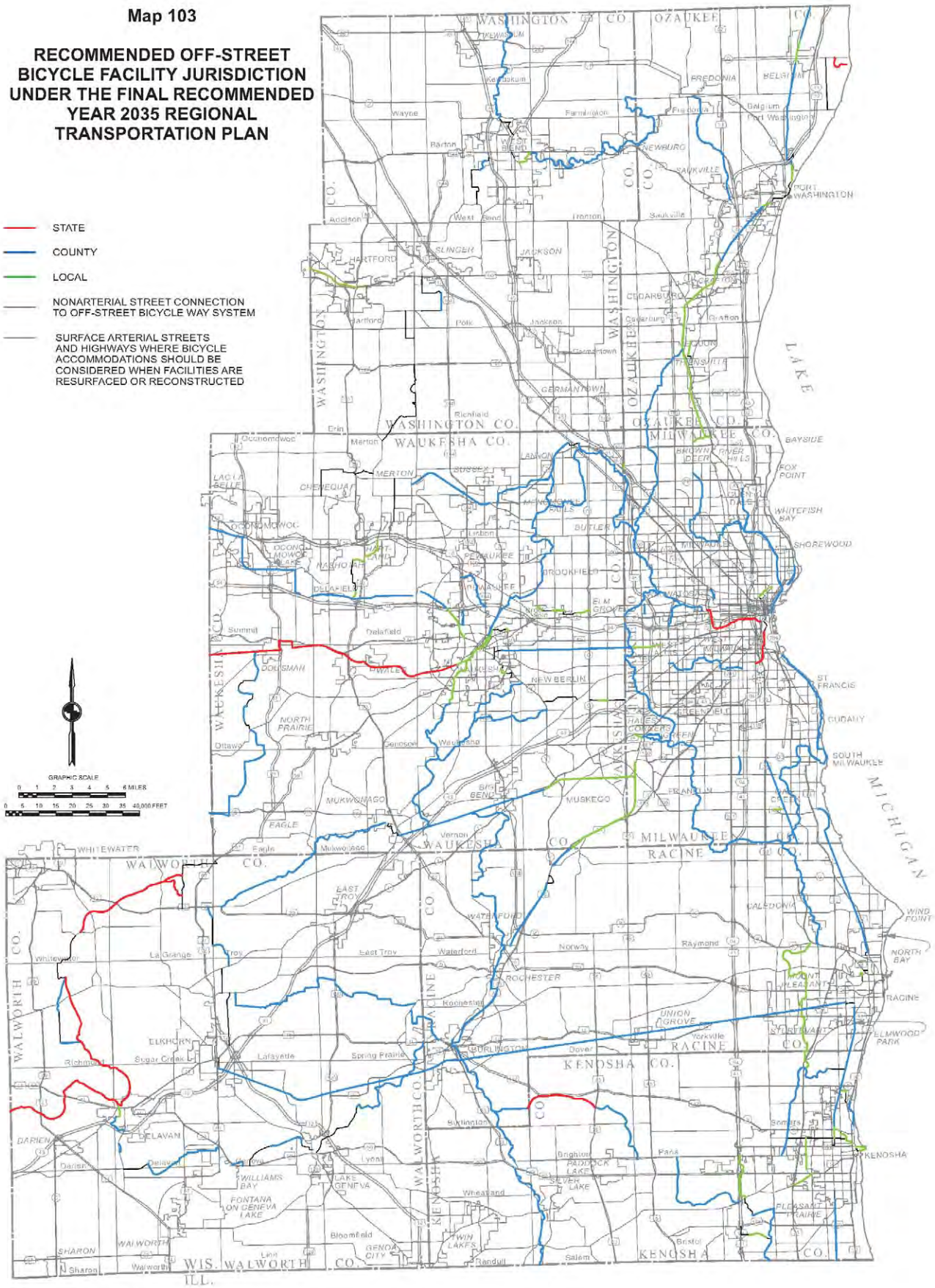
It is recommended that the Wisconsin Department of Transportation act to expand, improve, and maintain, in accordance with the plan recommendations, the arterial street and highway facilities under State jurisdiction. It is also recommended that the county boards of the seven constituent counties in the Region, upon recommendation of their respective county public works, highway, and transportation committees, act to expand, improve, and maintain, in accordance with the plan recommendations, the arterial street and highway facilities under county jurisdiction. It is further recommended that the common councils, village boards, and town boards within the Region, upon recommendation of their respective plan commissions and boards of public works, act to expand, improve, and maintain, in accordance with the plan recommendations, the arterial street and highway facilities under local jurisdiction. Table 128 and Figure 42 show the anticipated schedule for completion of these improvements.

Each proposed arterial street and highway improvement, expansion, and preservation project would need to undergo preliminary engineering and environmental studies by responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternative alignments and impacts, including a no-build option, and final decisions as to whether to implement and how a planned project will proceed to implementation will be made by the responsible State, county, or municipal unit of government at the conclusion of preliminary engineering.

The 127 miles of freeway widening proposed in this plan, and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact studies by the Wisconsin

Map 103

RECOMMENDED OFF-STREET BICYCLE FACILITY JURISDICTION UNDER THE FINAL RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION PLAN



Source: SEWRPC.

Table 126

DISTRIBUTION OF OFF-STREET BICYCLE FACILITY MILEAGE WITHIN THE REGION BY COUNTY AND JURISDICTIONAL CLASSIFICATION: 2035 RECOMMENDED PLAN

	State		County		Local		Total	
County	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total
Kenosha	4	7.5	43	9.7	12	15.0	59	10.3
Milwaukee	4	7.5	98	22.2	10	12.5	112	19.5
Ozaukee	1	1.9	27	6.1	15	18.7	43	7.5
Racine	0	0.0	73	16.5	14	17.5	87	15.1
Walworth	28	52.9	58	13.1	1	1.3	87	15.1
Washington	0	0.0	22	5.0	4	5.0	26	4.5
Waukesha	16	30.2	121	27.4	24	30.0	161	28.0
Total	53	100.0	442	100.0	80	100.0	575	100.0

Source: SEWRPC.

Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various design options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

Jurisdictional Recommendations

Jurisdictional classification establishes which level of government—State, county, or local—has or should have, responsibility for the design, construction, maintenance, and operation of each segment of the total street and highway system. Jurisdictional classification is intended to group all streets and highways logically into subsystems under the jurisdiction of a given level of government.

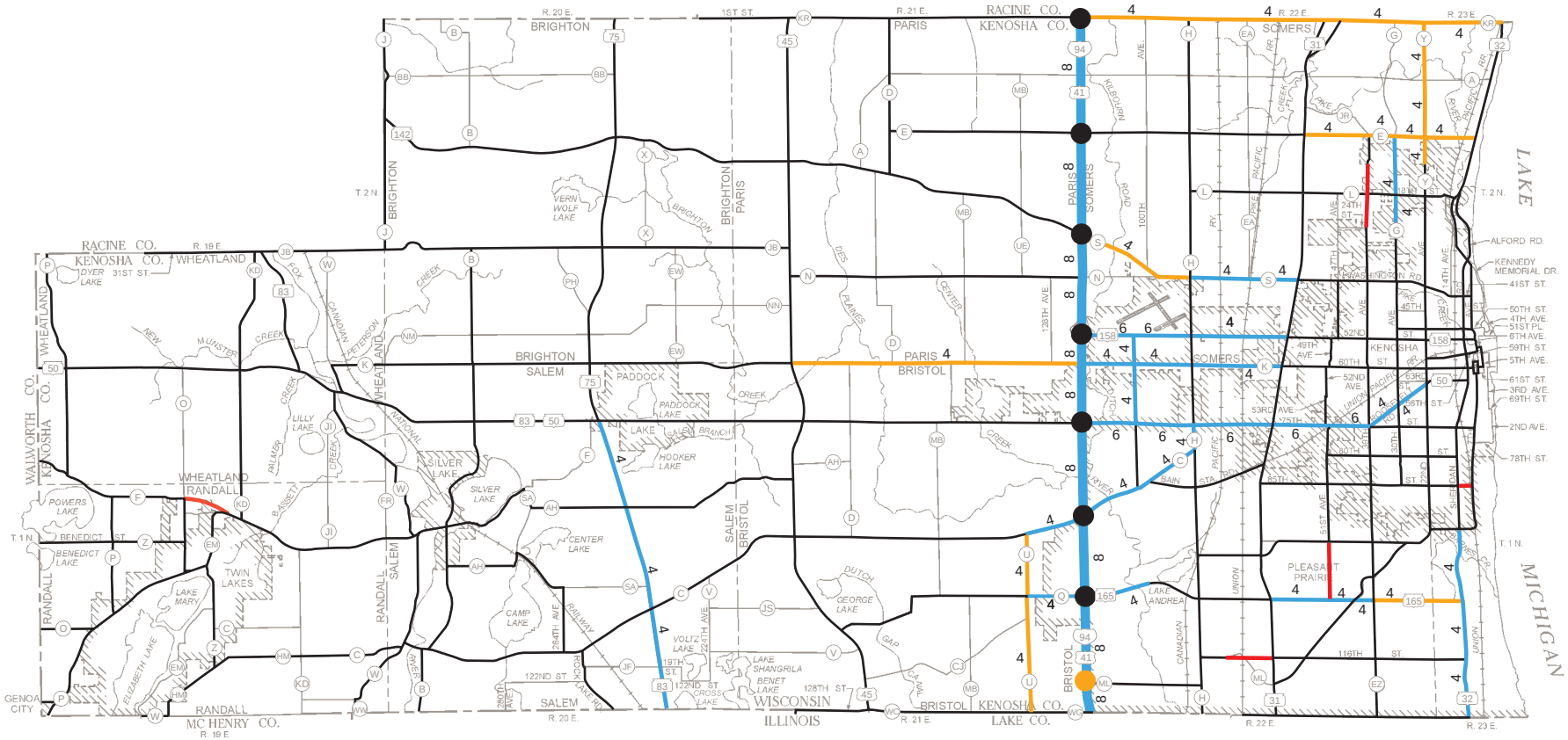
Upon completion of the initial regional transportation system plan in 1966, detailed county jurisdictional highway system plans were prepared. These plans were extended in design year and updated as part of the year 2000 regional transportation system plan completed in 1978, the year 2010 plan completed in 1994, and the year 2020 plan completed in 1997. The recommended jurisdictional arterial street and highway systems for the seven counties for the year 2035, based upon the extension of the year 2020 plan to the year 2035, are shown on Maps 111 through 117.

Table 129 sets forth the distribution of planned arterial street and highway mileage among each jurisdictional subsystem within the Region and within each county of the Region. By the year 2035, about 1,176 miles, or about 32 percent of the planned arterial system, are recommended to be classified as State trunk highways, including connecting streets; about 1,552 miles, or 43 percent, are recommended to be classified as county trunk highways; and the remaining 909 miles, or about 25 percent, are recommended to be classified as local arterials.

The year 2035 recommended jurisdictional highway system plan is based on extending to the design year 2035 the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the county jurisdictional highway system planning committees in each county, subsequent to Commission adoption of the year 2035 regional plan, to conduct a major review and reevaluation of the jurisdictional transfer recommendations in the year 2035 regional transportation system plan. This will be an extensive effort that will involve the review and redefinition of the functional criteria used for jurisdictional classification of arterial streets and highways, and the application of those criteria to the arterial

Map 104

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN KENOSHA COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND/OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (POTENTIAL NEW INTERCHANGE)

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH K in Kenosha County including through the provision of collector-distributor roadways connecting CTH K, STH 50, and STH 158, and an additional potential new future freeway interchange at CTH ML with IH 94. Should the preliminary engineering study conclude with a recommendation to construct one or both of the interchanges, the Regional Planning Commission, upon request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

4. Sufficient right-ofway should be reserved along STH 158 from CTH H to STH 31 to accommodate its ultimate improvement to six travel lanes.

5. Sufficient right-of-way should be reserved along CTH K from IH 94 to STH 31 to accommodate its ultimate Improvement to six travel lanes.



Map 105

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN MILWAUKEE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN

ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OF NEW FACILITY)
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- HALF NEW
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the S. 27th Street with IH 94 interchange to a full interchange;
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

4. The plan also recommends that during preliminary engineering for the reconstruction of STH 100 from W. Forest Home Avenue to IH 43, consideration be given to alternatives without additional traffic lanes, alternatives with additional traffic lanes or auxiliary lanes, and alternatives with frontage roads.

GRAPHIC SCALE

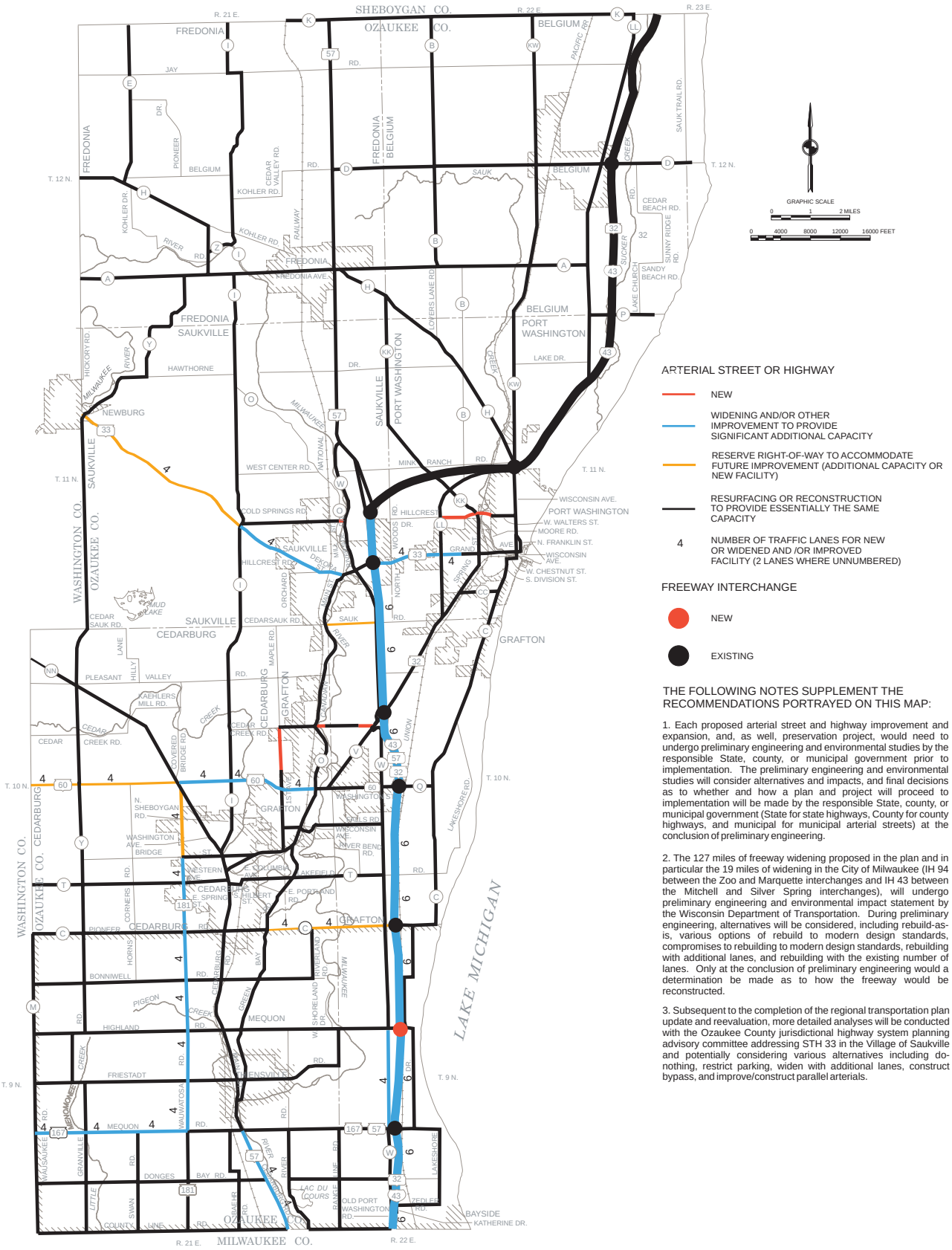
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 106

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN OZAUKEE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

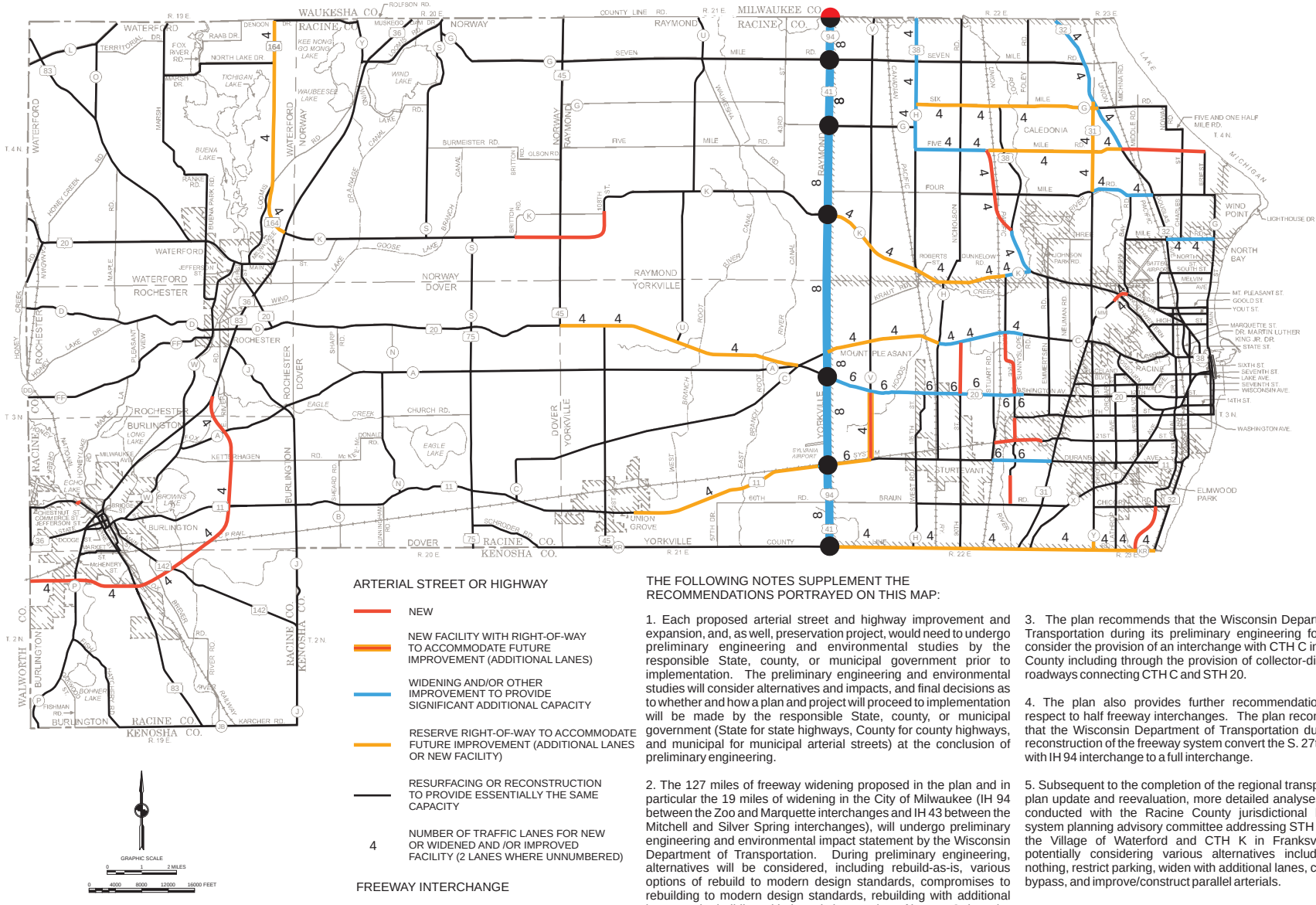
2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Ozaukee County jurisdictional highway system planning advisory committee addressing STH 33 in the Village of Saukville and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Source: SEWRPC.

Map 107

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN RACINE COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- NEW FACILITY WITH RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES)
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- HALF NEW
- EXISTING

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

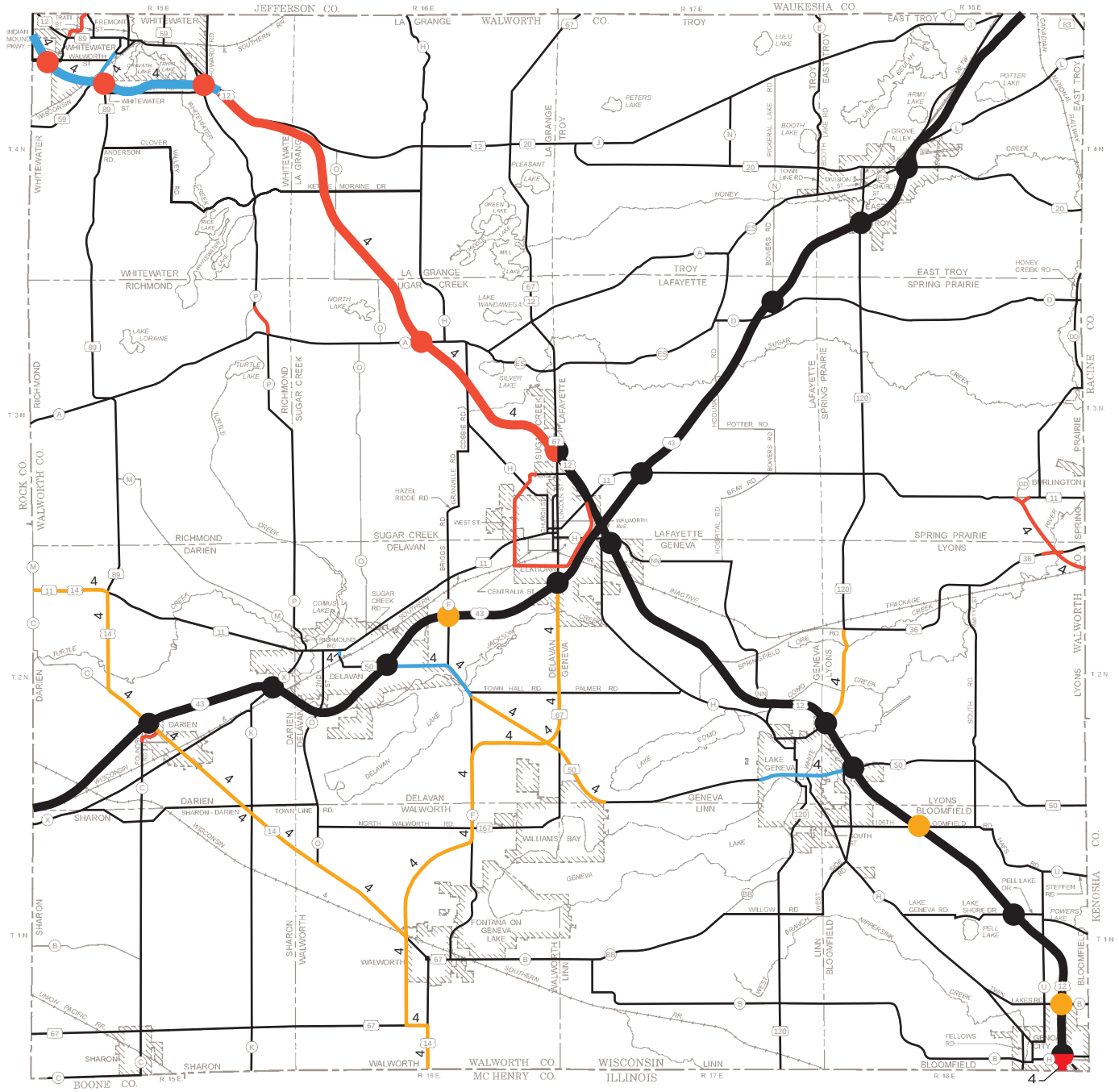
3. The plan recommends that the Wisconsin Department of Transportation during its preliminary engineering for IH 94 consider the provision of an interchange with CTH C in Racine County including through the provision of collector-distributor roadways connecting CTH C and STH 20.

4. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system convert the S. 27th Street with IH 94 interchange to a full interchange.

5. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Racine County jurisdictional highway system planning advisory committee addressing STH 20/83 in the Village of Waterford and CTH K in Franksville and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Map 108

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WALWORTH COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OFWAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- HALF NEW
- EXISTING
- RESERVE RIGHT-OFWAY TO ACCOMMODATE FUTURE IMPROVEMENT (POTENTIAL NEW INTERCHANGE)

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The plan identifies additional potential new future freeway interchanges, and recommends that action be taken by the local governments to preserve the potential necessary right-of-way to assure that the future development of these interchanges is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange. These potential future new interchanges are CTH B and Bloomfield Road with USH 12 and CTH F with IH 43.

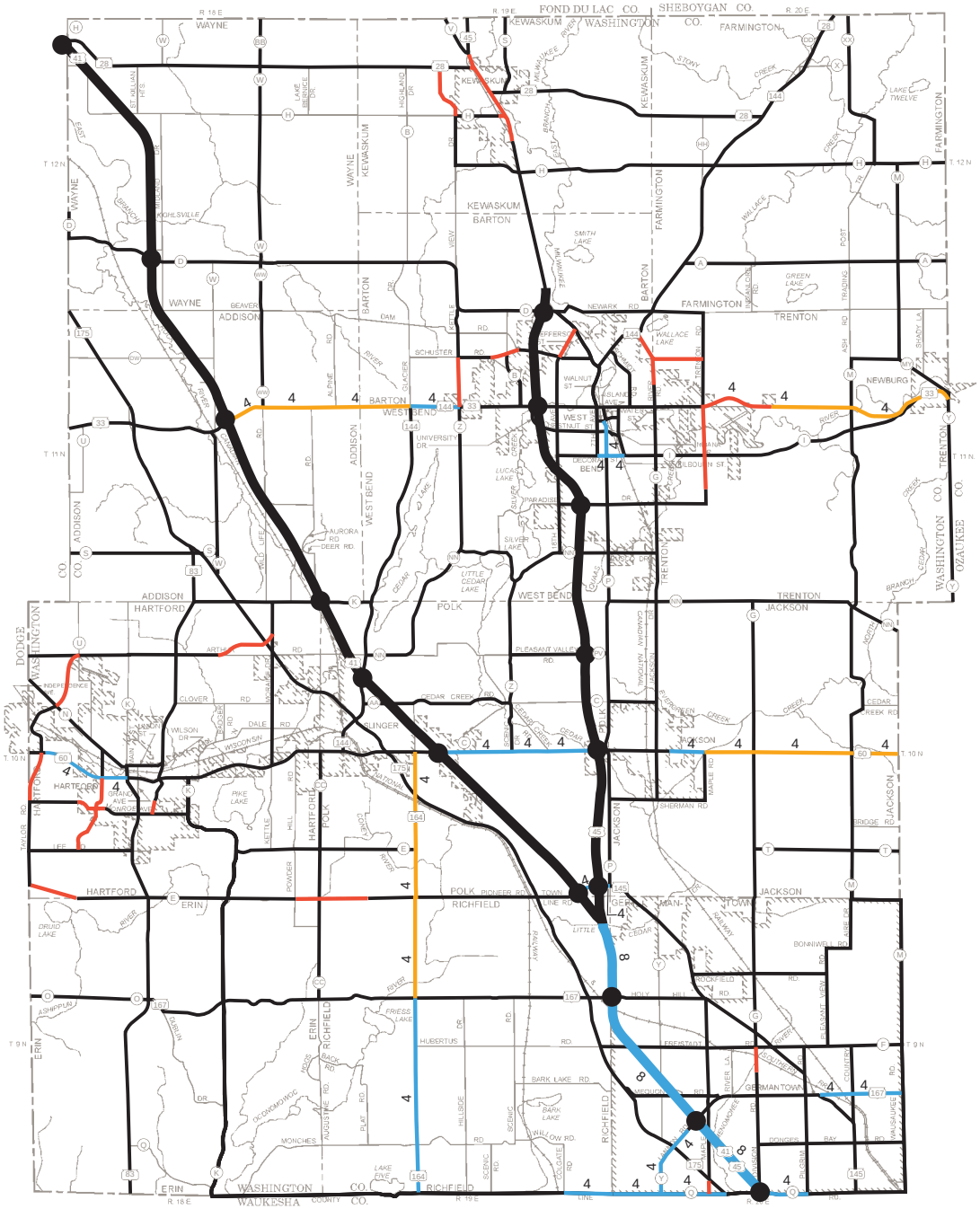
3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Walworth County jurisdictional highway system planning advisory committee addressing STH 50 in the City of Lake Geneva and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 109

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WASHINGTON COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL LANES OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- EXISTING

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Washington County jurisdictional highway system planning advisory committee addressing STH 60 in the Village of Jackson and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

GRAPHIC SCALE

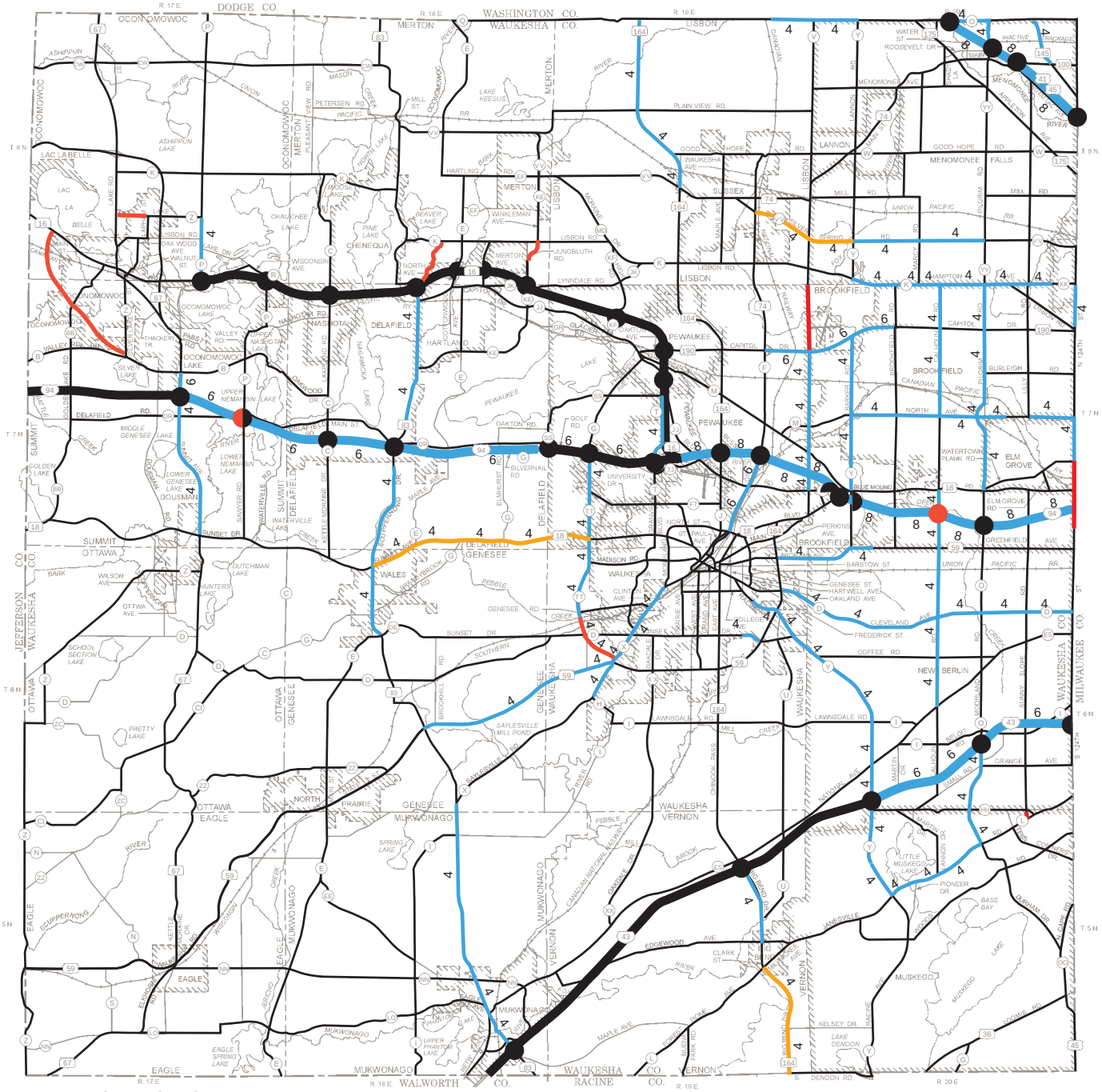
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 110

FUNCTIONAL IMPROVEMENTS TO THE ARTERIAL STREET AND HIGHWAY SYSTEM IN WAUKESHA COUNTY: 2035 RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN



ARTERIAL STREET OR HIGHWAY

- NEW
- WIDENING AND/OR OTHER IMPROVEMENT TO PROVIDE SIGNIFICANT ADDITIONAL CAPACITY
- RESERVE RIGHT-OF-WAY TO ACCOMMODATE FUTURE IMPROVEMENT (ADDITIONAL CAPACITY OR NEW FACILITY)
- RESURFACING OR RECONSTRUCTION TO PROVIDE ESSENTIALLY THE SAME CAPACITY
- 4 — NUMBER OF TRAFFIC LANES FOR NEW OR WIDENED AND /OR IMPROVED FACILITY (2 LANES WHERE UNNUMBERED)

FREEWAY INTERCHANGE

- NEW
- NEW HALF
- EXISTING

GRAPHIC SCALE

0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

THE FOLLOWING NOTES SUPPLEMENT THE RECOMMENDATIONS PORTRAYED ON THIS MAP:

1. Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering.

2. The 127 miles of freeway widening proposed in the plan and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette interchanges and IH 43 between the Mitchell and Silver Spring interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

3. The plan also provides further recommendations with respect to half freeway interchanges. The plan recommends that the Wisconsin Department of Transportation during the reconstruction of the freeway system:

- Convert the CTH P with IH 94 interchange to a full interchange.
- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange - for example, STH 100 and S. 124th Street with IH 43; and
- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

4. Subsequent to the completion of the regional transportation plan update and reevaluation, more detailed analyses will be conducted with the Waukesha County jurisdictional highway system planning advisory committee addressing STH 164 in the Village of Big Bend and potentially considering various alternatives including do-nothing, restrict parking, widen with additional lanes, construct bypass, and improve/construct parallel arterials.

Table 127

ARTERIAL STREET AND HIGHWAY SYSTEM PRESERVATION, IMPROVEMENT, AND EXPANSION BY ARTERIAL FACILITY TYPE BY COUNTY: YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN

County	System Preservation (miles)	System Improvement (miles)	System Expansion (miles)	Total Miles
Kenosha				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	311.8	33.7	3.8	349.3
Subtotal	311.8	45.7	3.8	361.3
Milwaukee				
Freeway	11.6	54.8	0.0	66.4
Standard Arterial	702.3	29.7	1.4	733.4
Subtotal	713.9	84.5	1.4	799.8
Ozaukee				
Freeway	12.1	15.3	0.0	27.4
Standard Arterial	260.1	20.8	3.0	283.9
Subtotal	272.2	36.1	3.0	311.3
Racine				
Freeway	0.0	12.0	0.0	12.0
Standard Arterial	389.3	20.1	23.7	433.1
Subtotal	389.3	32.1	23.7	445.1
Walworth				
Freeway	50.4	4.5 [a]	12.7	67.6 [a]
Standard Arterial	387.7	5.0	11.5	404.2
Subtotal	438.1	9.5	24.2	471.8
Washington				
Freeway	36.2	6.5	0.0	42.7
Standard Arterial	379.6	16.7	21.0	417.3
Subtotal	415.8	23.2	21.0	460.0
Waukesha				
Freeway	32.2	26.5	0.0	58.7
Standard Arterial	617.9	100.1	10.6	728.6
Subtotal	650.1	126.6	10.6	787.3
Region				
Freeway	142.5	131.6 [b]	12.7	286.8 [b]
Standard Arterial	3,048.7	226.1	75.0	3,349.8
Total	3,191.2	357.7	87.7	3,636.6

[a] *Includes the planned conversion of approximately 4.5 miles of the USH 12 Whitewater bypass, currently a two traffic lane surface arterial to a four traffic lane freeway.*

[b] *Includes the planned widening of approximately 127.0 miles of the existing 2005 regional freeway system, and the planned conversion of about 4.5 miles of the USH 12 Whitewater bypass, currently a two traffic lane surface arterial to a four traffic lane freeway.*

Source: SEWRPC.

street and highway system. This effort may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, public review, and subsequent adoption of the jurisdictional highway system plans by the Commission, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

Table 128

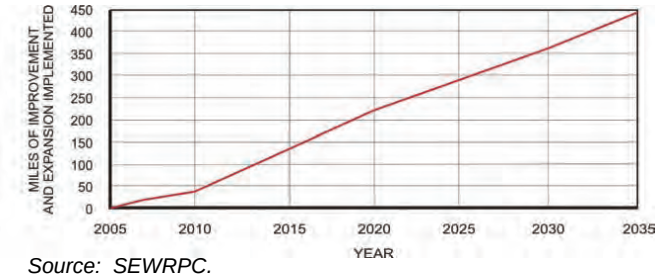
IMPLEMENTATION SCHEDULE FOR ARTERIAL STREET SYSTEM PLAN ELEMENT CAPACITY IMPROVEMENT AND EXPANSION: 2007, 2010, 2020, 2030, AND 2035

Southeastern Wisconsin Region	Proposed Incremental Arterial System Improvement and Expansion Route Miles					
	2007	2010	2020	2030	2035	Total
State Trunk Highway	13	8	113	89	62	285
County and Local Trunk Highway	6	11	71	51	21	160
Total Regional Arterial System	19	19	184	140	83	445

Source: SEWRPC.

Figure 42

CUMULATIVE MILES OF PLANNED ARTERIAL STREET AND HIGHWAY SYSTEM CAPACITY IMPROVEMENT AND EXPANSION: 2005-2035



Source: SEWRPC.

DETAILED IMPLEMENTATION PLANNING

More detailed planning will be required prior to the programming of certain elements of the recommended regional transportation system plan. This includes more detailed State, county, and local planning efforts required to refine the basic transit and highway improvement recommendations contained in the plan.

Transit Development Planning

It is recommended that each of the public transit operators in the Region, with the assistance of the Regional Planning Commission, undertake the preparation of transit development plans and programs as a basis for refining and detailing the recommendations of the regional plan and for programming projects to implement that plan. Typically, such plans and programs are prepared with a relatively short-term, five-year time horizon. These plans and programs provide the basis for day-to-day decision making on initiation of new transit service and on modifications to existing transit services. These plans provide the basis for the programming of transit projects by each operator in their individual agency budgets.

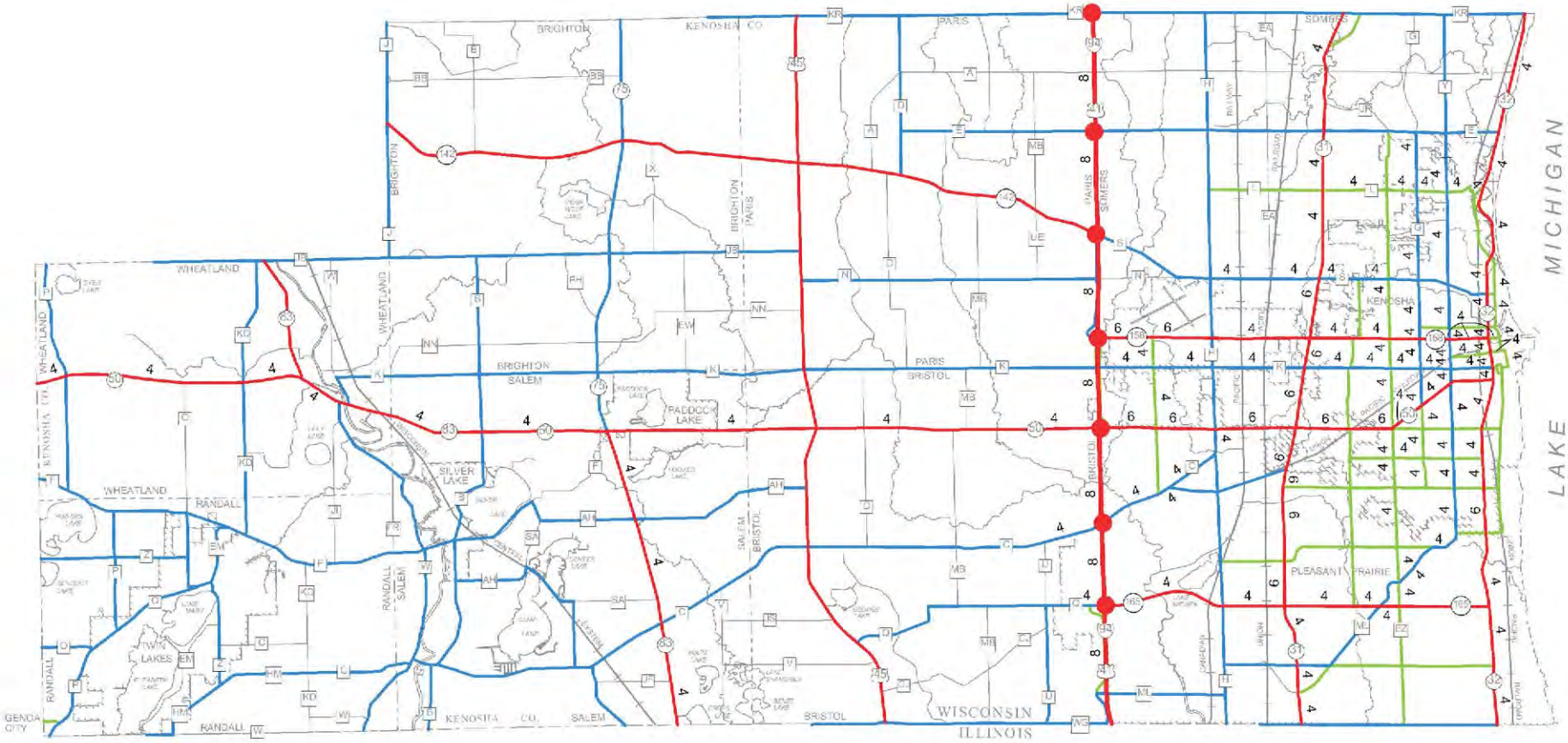
Arterial Street and Highway Planning

County and local public works agencies may also undertake detailed implementation planning attendant to the recommended regional arterial street and highway system. Such planning can serve as a basis for amendment of the regional transportation system plan, and provide for refining and detailing that plan, including identifying recommended arterial street and highway cross sections and right of way requirements for each segment of arterial street. This work can be accomplished as part of jurisdictional highway system planning to be conducted subsequent to the Commission's adoption of the year 2035 regional transportation system plan.

Upon completion of county jurisdictional highway system plans, or other detailing and refinement of the arterial street and highway element of the system plan, including preliminary engineering studies, it is recommended that, as appropriate, the Wisconsin Department of Transportation, each county highway and public works agency, and each local public works agency take steps to reserve the required future rights of way by means of official mapping, building-setback-line ordinances, land division ordinances, and private deed restrictions. Such prior reservation of right of way serves as an expression of governmental intent to acquire land for highway purposes in advance of actual facility construction and thereby not only achieves economies in right-of way acquisition, but also permits land adjacent to the right of way to be privately purchased and developed or redeveloped with full knowledge of the future highway development proposals. The most effective and efficient means of prior reservation of right of way is the use of official mapping powers granted to the Wisconsin Department of Transportation, as well as to counties, cities, villages, and towns in Wisconsin.

Map 111

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR KENOSHA COUNTY: 2035



FREEWAY

- STATE TRUNK HIGHWAY
- INTERCHANGE

STANDARD ARTERIAL

- STATE TRUNK HIGHWAY
- COUNTY TRUNK HIGHWAY
- LOCAL TRUNK HIGHWAY
- 4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

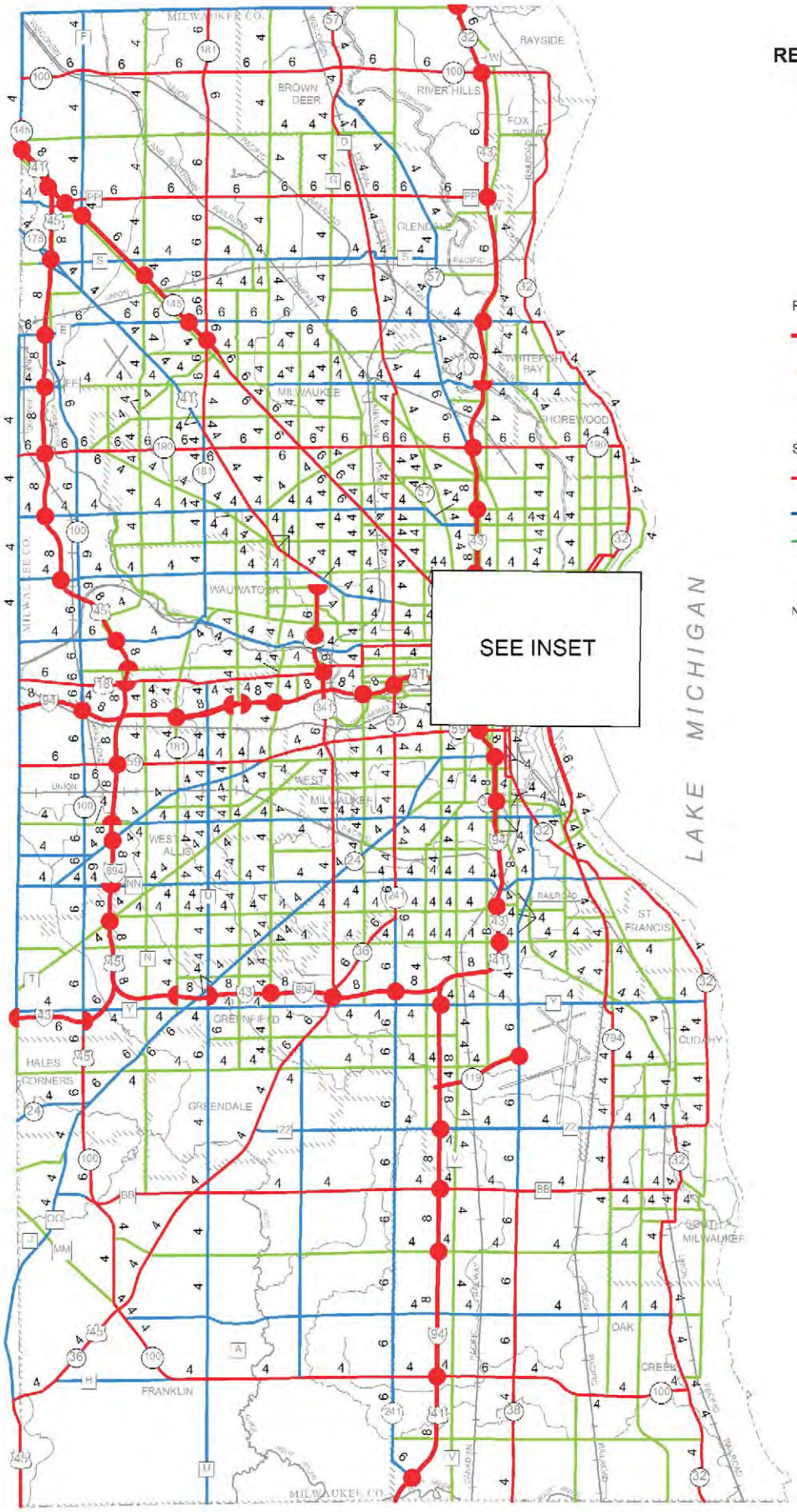
NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Kenosha County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

GRAPHIC SCALE
0 1 2 MILES
0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 112

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR MILWAUKEE COUNTY: 2035



FREEWAY

- STATE TRUNK HIGHWAY
- INTERCHANGE
- HALF INTERCHANGE

STANDARD ARTERIAL

- STATE TRUNK HIGHWAY
- COUNTY TRUNK HIGHWAY
- LOCAL TRUNK HIGHWAY
- 4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Milwaukee County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

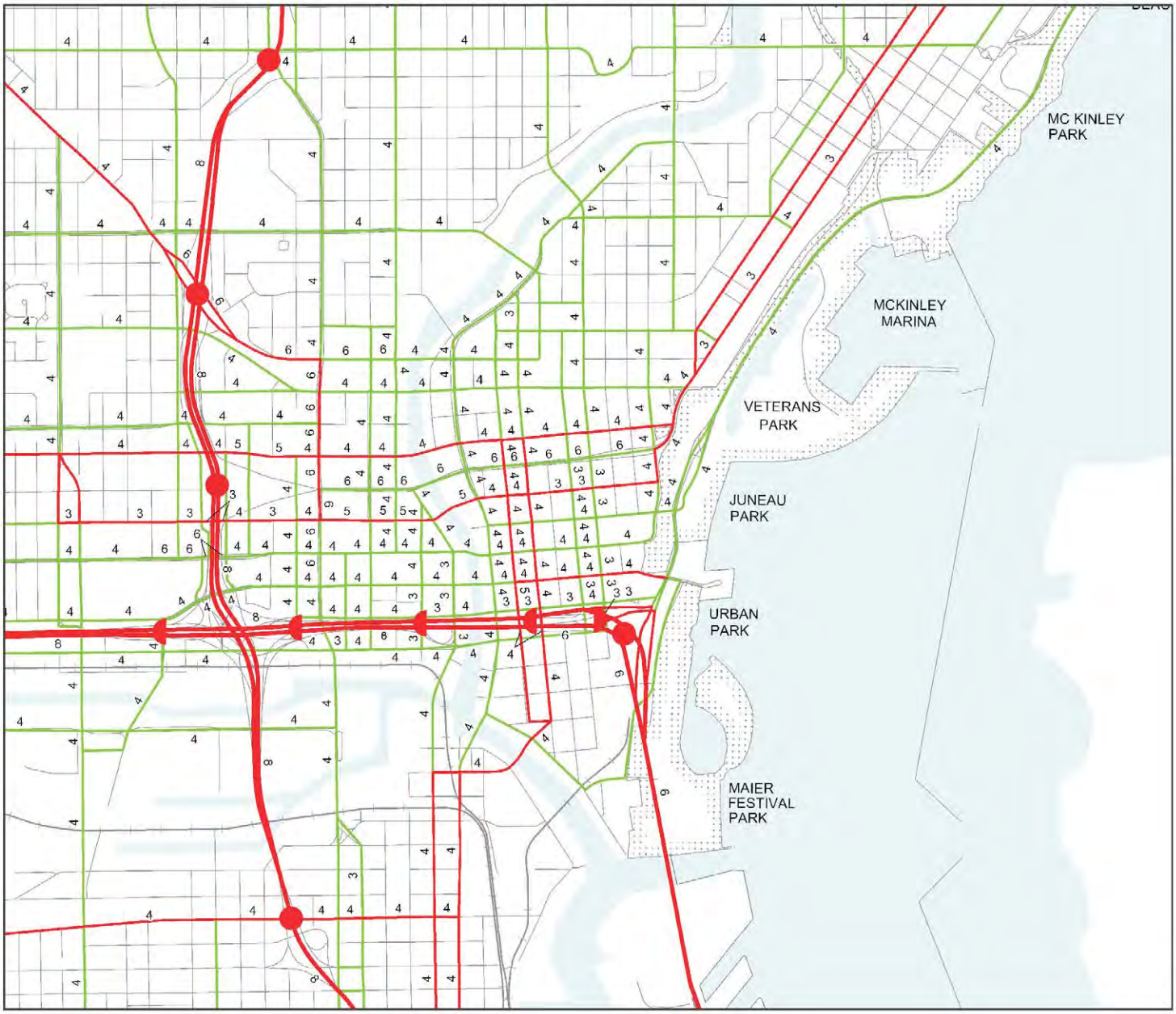
GRAPHIC SCALE

0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 112 (inset)

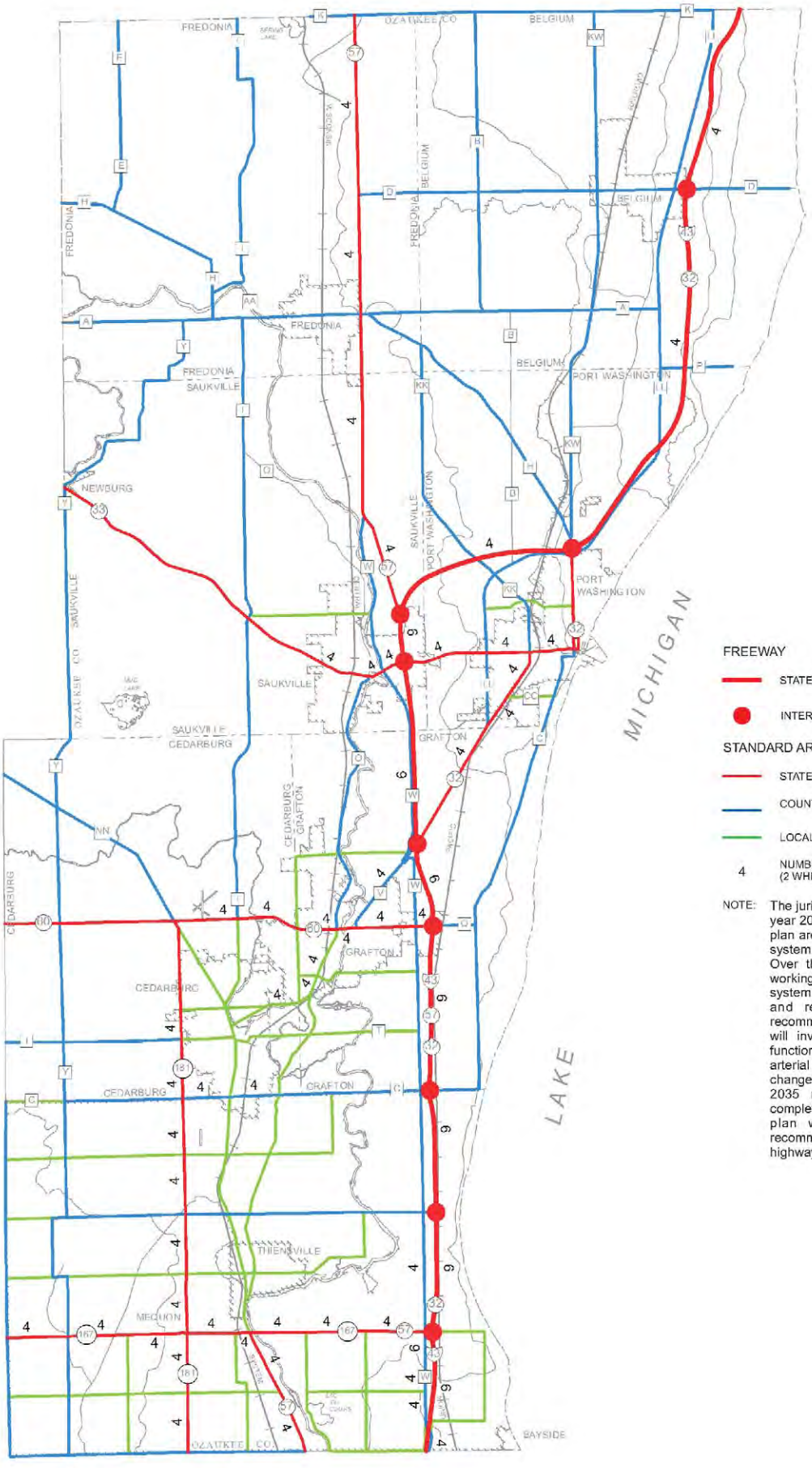


NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Milwaukee County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

Source: SEWRPC.

Map 113

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR OZAUKEE COUNTY: 2035



FREEWAY

STATE TRUNK HIGHWAY

INTERCHANGE

STANDARD ARTERIAL

STATE TRUNK HIGHWAY

COUNTY TRUNK HIGHWAY

LOCAL TRUNK HIGHWAY

4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Ozaukee County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

GRAPHIC SCALE

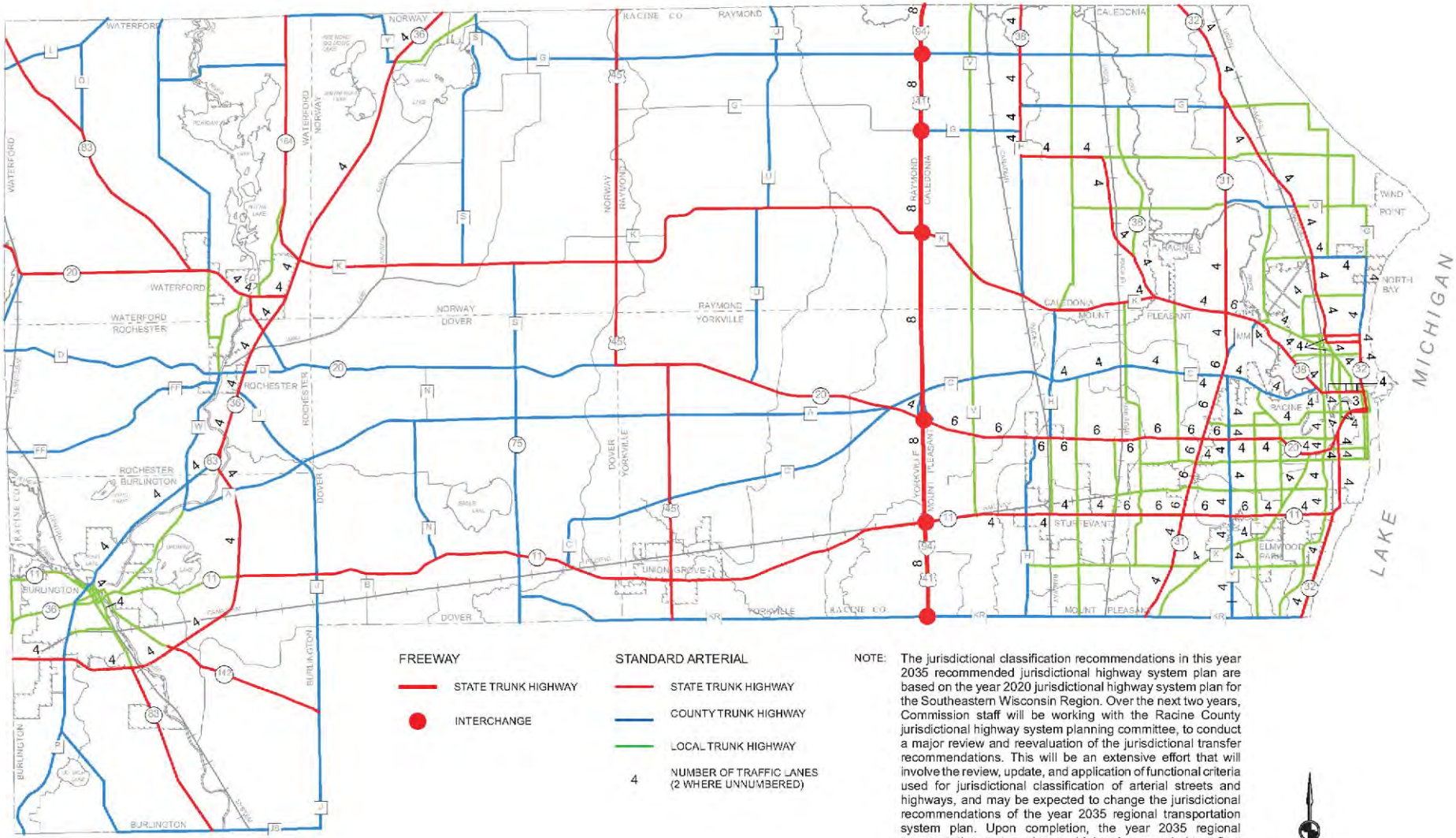
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 114

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR RACINE COUNTY: 2035

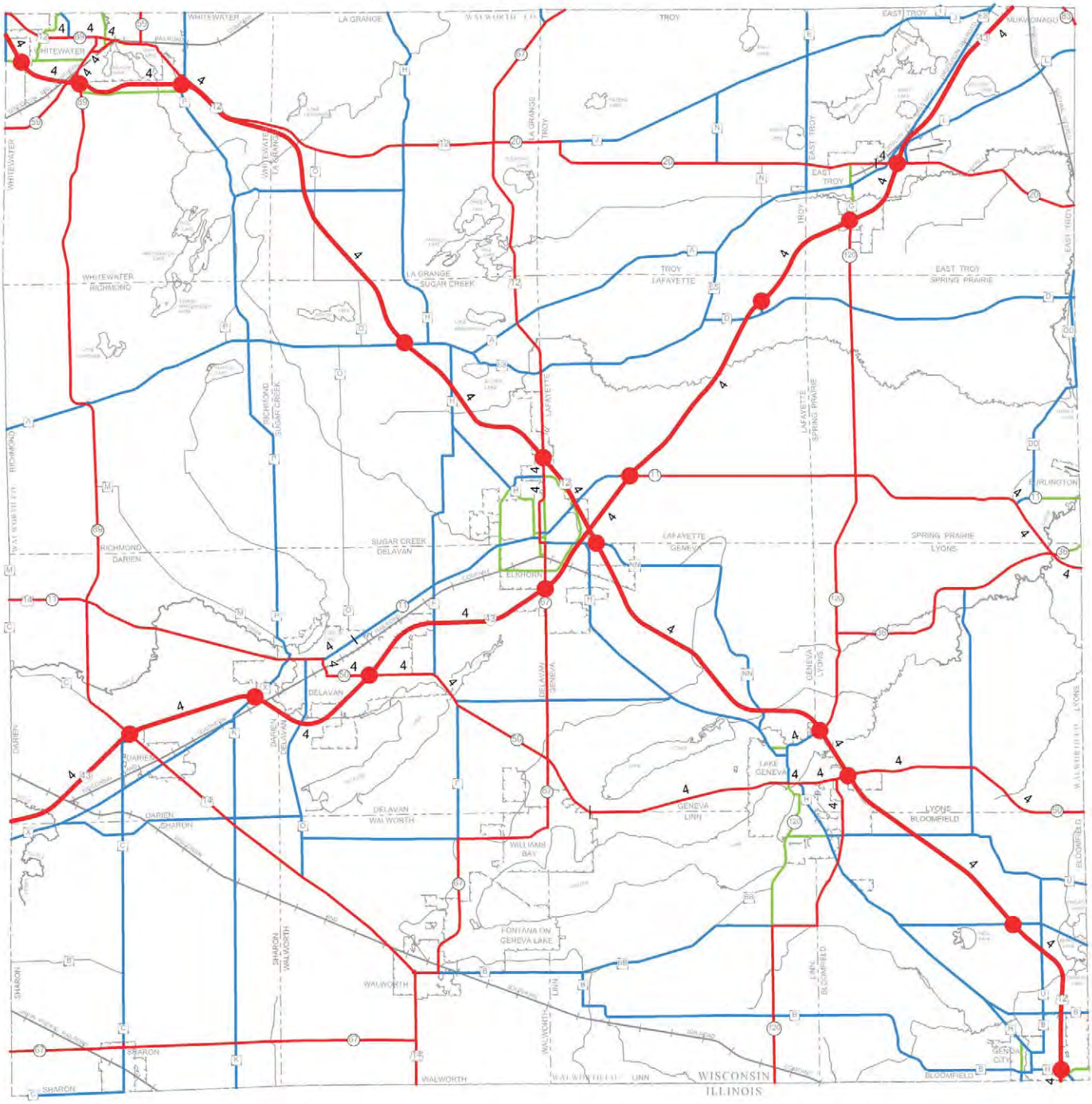


NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Racine County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

Source: SEWRPC.

Map 115

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR WALWORTH COUNTY: 2035



FREEWAY

STATE TRUNK HIGHWAY

INTERCHANGE

STANDARD ARTERIAL

STATE TRUNK HIGHWAY

COUNTY TRUNK HIGHWAY

LOCAL TRUNK HIGHWAY

4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Walworth County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

GRAPHIC SCALE

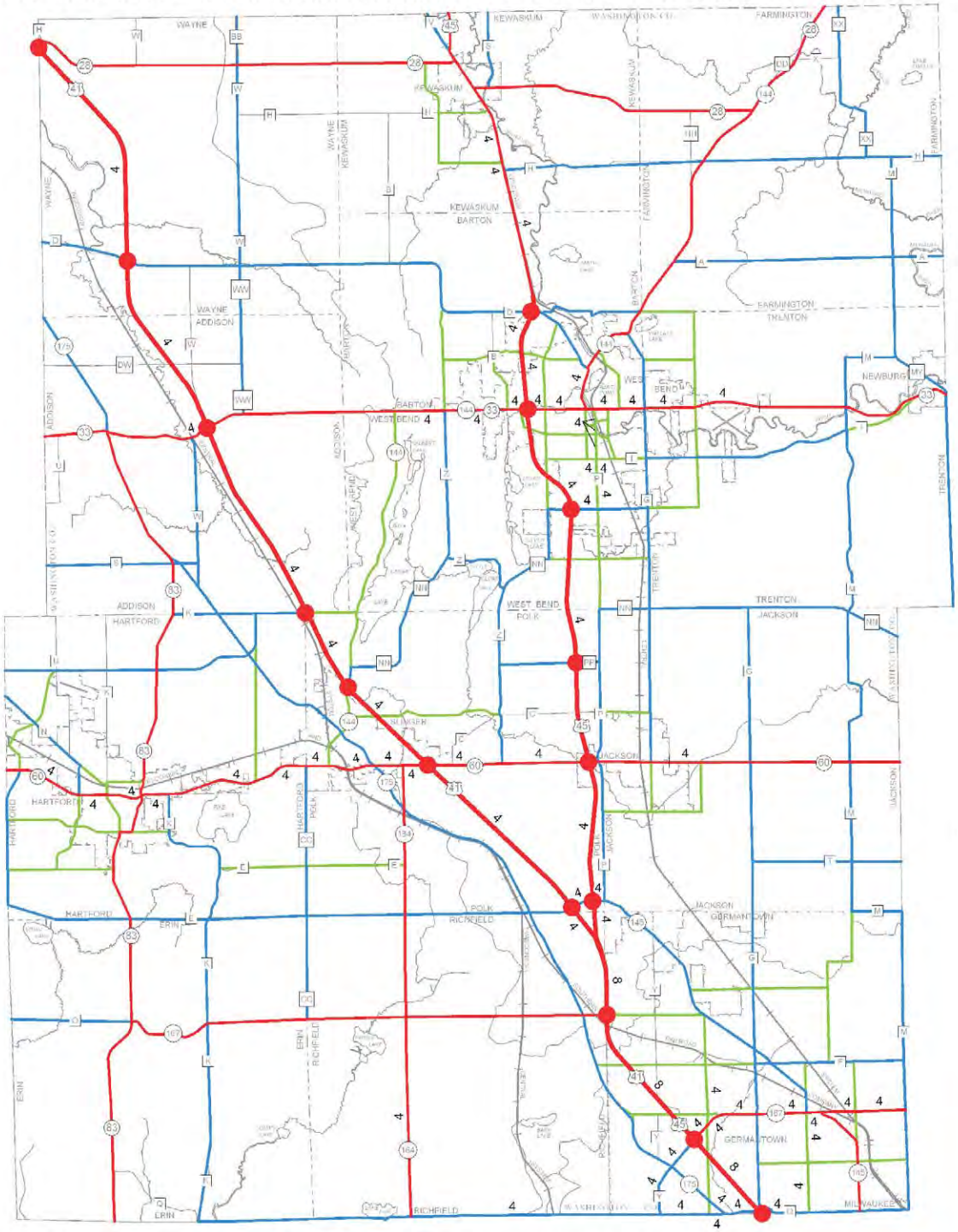
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 116

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR WASHINGTON COUNTY: 2035



FREEWAY

STATE TRUNK HIGHWAY

INTERCHANGE

STANDARD ARTERIAL

STATE TRUNK HIGHWAY

COUNTY TRUNK HIGHWAY

LOCAL TRUNK HIGHWAY

4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Washington County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

GRAPHIC SCALE

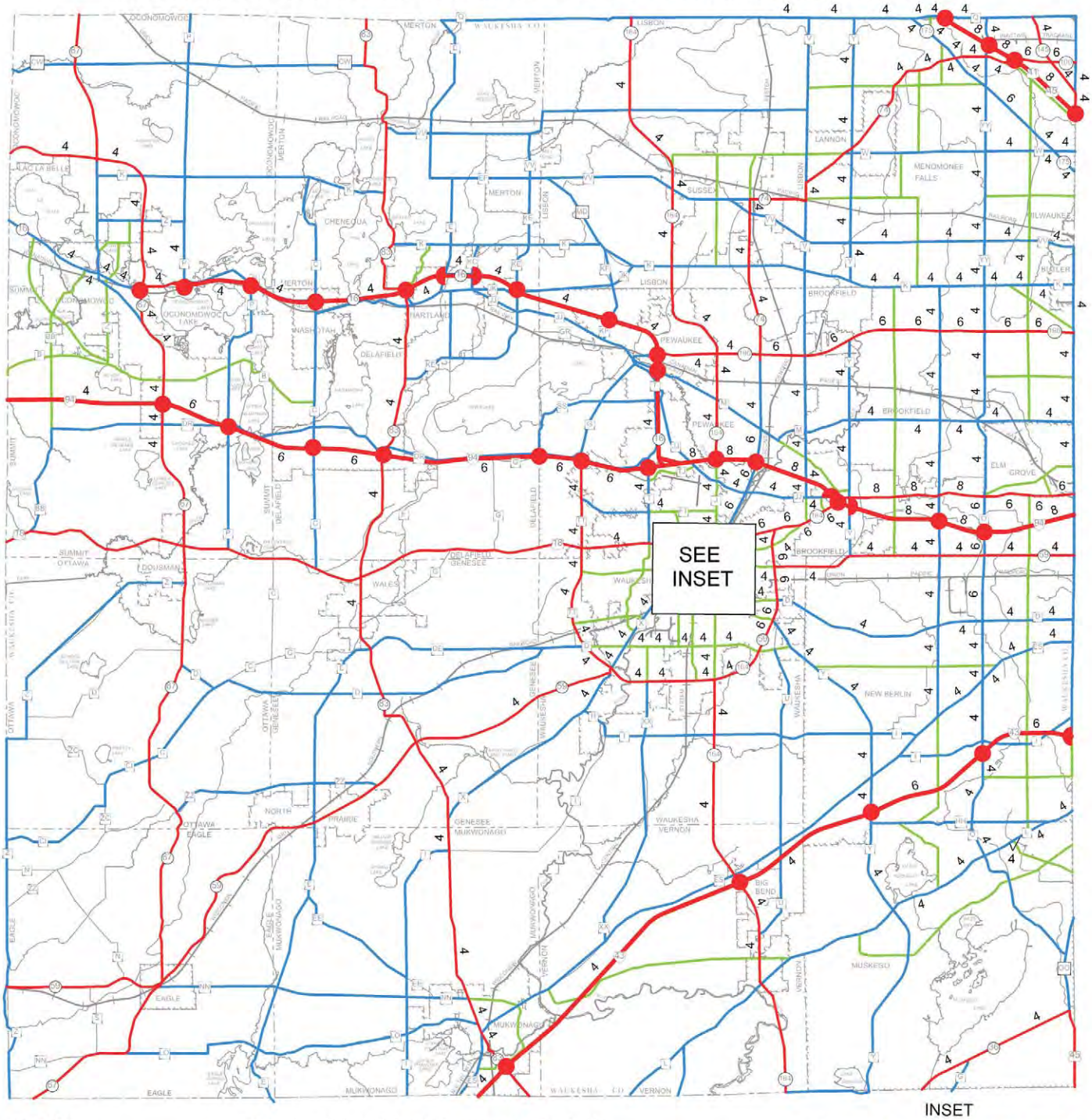
0 1 2 MILES

0 4000 8000 12000 16000 FEET

Source: SEWRPC.

Map 117

RECOMMENDED JURISDICTIONAL HIGHWAY SYSTEM PLAN FOR WAUKESHA COUNTY: 2035



FREEWAY

STATE TRUNK HIGHWAY

INTERCHANGE

HALF INTERCHANGE

STANDARD ARTERIAL

STATE TRUNK HIGHWAY

COUNTY TRUNK HIGHWAY

LOCAL TRUNK HIGHWAY

4 NUMBER OF TRAFFIC LANES (2 WHERE UNNUMBERED)

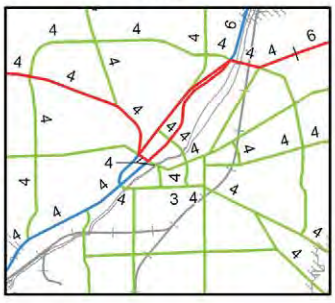
NOTE: The jurisdictional classification recommendations in this year 2035 recommended jurisdictional highway system plan are based on the year 2020 jurisdictional highway system plan for the Southeastern Wisconsin Region. Over the next two years, Commission staff will be working with the Waukesha County jurisdictional highway system planning committee, to conduct a major review and reevaluation of the jurisdictional transfer recommendations. This will be an extensive effort that will involve the review, update, and application of functional criteria used for jurisdictional classification of arterial streets and highways, and may be expected to change the jurisdictional recommendations of the year 2035 regional transportation system plan. Upon completion, the year 2035 regional transportation system plan would then be amended to reflect the recommendations made in each county jurisdictional highway system plan.

GRAPHIC SCALE

0 1 2 MILES

0 4000 8000 12000 16000 FEET

INSET



Source: SEWRPC.

Table 129

DISTRIBUTION OF ARTERIAL STREET AND HIGHWAY MILEAGE WITHIN THE REGION BY COUNTY AND JURISDICTIONAL CLASSIFICATION: 2035 RECOMMENDED PLAN

County	State		County		Local		Total	
	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total	Miles	Percent of Total
Kenosha	108	9.2	200	12.9	54	5.9	362	10.0
Milwaukee	228	19.4	176	11.3	396	43.6	800	22.0
Ozaukee	79	6.7	163	10.5	69	7.6	311	8.6
Racine	160	13.6	157	10.1	128	14.1	445	12.2
Walworth	220	18.7	228	14.7	24	2.6	472	13.0
Washington	152	12.9	212	13.7	96	10.6	460	12.6
Waukesha	229	19.5	416	26.8	142	15.6	787	21.6
Total	1,176	100.0	1,552	100.0	909	100.0	3,637	100.0

Source: SEWRPC.

SUMMARY AND CONCLUSIONS

This chapter has described the various means available, and has recommended specific procedures, for implementation of the recommended regional transportation system plan. The recommended plan implementation actions are summarized in the following paragraphs by level of government and responsible agency or unit of government.

Local Level

County Boards of Supervisors

It is recommended that the county boards of the seven counties comprising the Region, upon recommendation of the appropriate highway, transit, and/or public works committees, do the following:

1. Endorse the recommended regional transportation system plan as that plan affects each respective county.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the Wisconsin Department of Transportation and the cities, villages, and towns in the county in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for county jurisdiction, including undertaking, as may be appropriate, detailed planning, preliminary engineering, environmental studies, and official mapping work efforts.

5. Cooperate with the Wisconsin Department of Transportation, the Regional Planning Commission, and adjoining counties as necessary to conduct the corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan, and carry out, as appropriate, detailed countywide transit planning programs to refine and detail the transit element of the regional transportation plan.

6. As appropriate to each county, provide public transit services in accordance with the recommendations set forth in the transit element of the plan.

7. Act to consider and implement where feasible the accommodation for bicycle travel on the county trunk arterial system as that system is resurfaced and reconstructed on a segment-by-segment basis.

8. As appropriate to each county, provide a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

9. Continue to operate, enhance, and expand traffic management systems so as to achieve the highest possible level of service on the existing county trunk arterial systems.

City Common Councils, Village Boards, and Town Boards

It is recommended that the city common councils, village boards, and town boards in the Region, upon recommendations, as appropriate, of their plan commissions, boards of public works, and transit commissions, do the following:

1. Endorse the recommended regional transportation system plan as that plan affects each respective civil division.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the Wisconsin Department of Transportation and their respective counties in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for local jurisdiction, including undertaking, as may be appropriate, detailed planning, preliminary engineering, environmental studies, and official mapping work efforts.

5. As appropriate, and upon consideration by and recommendation of the local plan commissions, integrate into the local planning and development practices and ordinances transit- and pedestrian-friendly land use development concepts.

6. As appropriate, cooperate with the Wisconsin Department of Transportation, the Regional Planning Commission, and any concerned counties in conducting corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

7. As appropriate, provide public transit services in accordance with the recommendation of the transit element of the regional transportation plan.

8. Act to consider and implement where feasible the accommodation for bicycle travel on the local arterial streets as they are resurfaced and reconstructed on a segment-by-segment basis.

9. Adopt a local bicycle and pedestrian facility plan which is consistent with the regional transportation plan and where appropriate, work with adjacent units of government and the County in providing a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

10. Continue to operate, enhance, and expand traffic management systems so as to achieve the highest possible level of service on the existing local arterial streets.

Areawide Level

Regional Planning Commission

It is recommended that the Southeastern Wisconsin Regional Planning Commission do the following:

1. Adopt the recommended regional transportation system plan, the Commission thus acting not only in its capacity as a regional planning agency but also as the federally recognized metropolitan planning organization for the Kenosha, Milwaukee, Racine, and Round Lake Beach urbanized areas.

2. Conduct a continuing regional transportation planning program to review, revise and amend, and update and extend the adopted regional transportation system plan from time to time. Work with the Wisconsin Department of Transportation, counties, and local governments to complete major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the county and local governments concerned, the Wisconsin Department of Transportation and the U.S. Department of Transportation, Federal Highway and Transit Administrations, in conducting the corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

4. Cooperate with the Wisconsin Department of Natural Resources in assuring the continued conformity of the regional transportation system plan to the State Implementation Plan for Air Quality.

5. Provide assistance, upon requests, to county and local governments in conducting highway and transit plan implementation efforts, including the preparation of detailed county and local highway and transit development plans and such implementation devices as official mapping.

6. Provide assistance, upon request, to the Wisconsin Department of Transportation and county and local governments in carrying out cooperative efforts to effect changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the plan.

Regional Transit Authority

It is recommended that the Southeastern Wisconsin Regional Transit Authority do the following:

1. Identify a permanent regional funding source to provide local funds for the portion of operating and capital costs of commuter rail and public transit that are not covered by passenger fares and that considers all potential funding sources.

State Level

Wisconsin Department of Transportation

It is recommended that the Wisconsin Department of Transportation do the following:

1. Endorse the recommended regional transportation system plan and integrate that plan into the Wisconsin intermodal transportation plan as a functional and jurisdictional guide to transit and highway system development within the Region.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the counties, cities, villages, and towns in the Region in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for State jurisdiction, including undertaking necessary preliminary engineering, environmental studies, and official mapping efforts.

5. Cooperate with the Regional Planning Commission and the concerned counties and local governments in the Region in conducting the corridor studies related to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

6. Continue to operate, enhance, and expand the freeway traffic management system so as to achieve the highest possible level of service on the freeways and help encourage travel and transit and carpools and vanpools.

7. Implement a travel demand management program, including ridesharing promotion, assistance to transportation management associations, promotion of employee-based travel demand management strategies, promotion of travel by bicycle and walking, and construction of carpool lots.

8. Act to consider and implement where feasible the accommodation for bicycle travel on state trunk highways as they are resurfaced and reconstructed on a segment-by-segment basis.

9. As appropriate, work with municipal and county units of government in providing a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

Wisconsin Department of Natural Resources
It is recommended that the Wisconsin Department of Natural Resources update the State Implementation Plan for Air Quality and ensure that the regional transportation plan conforms to it.

University of Wisconsin-Extension
It is recommended that the University of Wisconsin-Extension acknowledge the regional transportation system plan and promote implementation of the plan in its ongoing educational programs.

Federal Level
U.S. Department of Transportation, Federal Highway Administration
It is recommended that the Federal Highway Administration endorse the regional transportation plan, and use the plan in the administration of its various Federal grant programs.

U.S. Department of Transportation, Federal Transit Administration
It is recommended that the Federal Transit Administration endorse the regional transportation plan, and use the plan in the administration of its various Federal grant programs.

U.S. Environmental Protection Agency
It is recommended that the U.S. Environmental Protection Agency endorse the regional transportation plan and use the plan as it carries out its day-to-day regulatory activities.

General Considerations
Several particularly significant aspects of regional transportation system plan implementation warrant restatement here in summary form. First, the recommended regional transportation plan presented in this report, like the companion recommended regional land use plan documented in a separate report, is intended to comprise a guide to certain important aspects of the sound physical development of the Region. As such, the plan is advisory to the local, State, and Federal units and agencies of government concerned as these public bodies consider

transportation facility development matters in the Region. The regional transportation system plan is not to be considered as an inflexible mold to which all future transportation system development within the Region must precisely conform. Rather, the regional transportation system plan is to be regarded as a point of departure against which transportation system development proposals can be evaluated as they arise and in the light of which better development decisions can be made by all parties concerned. The regional plan is intended to be used as a framework for more detailed county and local planning. As such, the plan is subject to refinement, detailing, and amendment as plan implementation proceeds, over time, within the Region.

Second, endorsement or acknowledgement of the recommended regional transportation plan as a guide to the sound development of the Region by the local units of government and the various State and Federal agencies concerned is highly desirable. Indeed, in some cases, that endorsement or acknowledgement is essential in order to ensure a common understanding of the areawide development objectives and to permit the necessary plan implementation work to be cooperatively programmed and jointly executed.

Third, the importance of close coordination and cooperation between the local units of government and between those units of government and the State and Federal agencies concerned in plan implementation cannot be overemphasized. Responsibilities for achieving such coordination and cooperation on a voluntary basis within the traditional framework of government in Wisconsin have been assigned to the Commission by the State Legislature through the regional planning enabling act. In addition, the Federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users provides a further basis for coordinating planning and plan implementation efforts by the Commission as the designated metropolitan planning organization. In its capacity as the coordinating agency under both State and Federal law, advisory review of proposed transportation facilities by the Commission is essential for the effective development over time of the regional transportation system. The proper vehicle for the review of proposed transportation facilities is the regional transportation improvement program compiled by the Commission in accordance with the requirements of Federal transportation legislation.

Fourth, implementation of the regional transportation plan will not be brought about by a single massive action on the part of one unit or agency of government. Rather, implementation of that plan will be brought about through many individual development decisions made on a day- to-day basis over a period of many years by public administrators and elected officials operating at the local, areawide, State, and Federal levels of government. It is extremely important that the individuals and agencies making these decisions be aware of and understand the development proposals set forth in the recommended regional transportation plan so that those proposals receive proper consideration as development decisions are made.

Finally, regional transportation plan implementation can only be achieved within the context of a continuing, comprehensive areawide planning effort wherein the planning inventories and forecasts on which the regional plans are based are updated, monitored, and revised; in which the plans are reappraised and, as necessary, revised to accommodate changing conditions; and through which the plans are interpreted on a day-to-day basis to the local, State, and Federal units and agencies of government concerned as the need to make development decisions arises. In this respect, planning does not and cannot concern itself with future decisions; that is, with “things that should be done in the future.” Rather, it must be recognized that decisions exist only in the present and that planning is necessary just because decisions can be made only in the present, yet cannot be made for the present alone. The question, therefore, that faces elected officials and concerned citizens throughout the Region concerning implementation of the recommended regional transportation system plan is not what should be done tomorrow to bring about that plan, but, rather, what must be done today in light of the plan to be prepared for tomorrow.

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Chapter XI

SUMMARY AND CONCLUSIONS

INTRODUCTION

This report documents the fifth generation regional transportation system plan for the Southeastern Wisconsin Region, as well as the process used to arrive at that plan. The new plan is for the design year 2035. The Commission's land use and transportation planning is based on eight basic principles: 1) land use and transportation system planning must be regional in scope; 2) transportation system planning must be conducted concurrently with, and cannot be separated from, land use planning; 3) land use and transportation system planning must recognize the existence of a limited natural resource base to which urban and rural development must be properly adjusted to ensure the overall environmental quality of the Region; 4) the regional land use and transportation planning process is cyclical in nature, alternating between areawide system planning and local project planning; 5) highway facilities, transit facilities, bicycle and pedestrian facilities, and travel demand and transportation systems management measures should be planned together; 6) highway facilities should be planned as an integrated system, as should transit facilities; 7) transportation system planning must recognize the role of transportation in the achievement of personal and community goals; and 8) transportation systems planning must recognize the importance of properly relating the regional transportation system to the State and national systems.

The new regional transportation system plan was designed to serve and implement a new companion regional land use plan. That plan is set forth in SEWRPC Planning Report No. 48, *A Regional Land Use Plan for Southeastern Wisconsin: 2035*.

This report describes the findings and recommendations coming out of the fifth generation regional transportation planning process. That process was guided by an Advisory Committee on Regional Transportation Planning. The report presents the results of re-inventories of the factors influencing sound long-range, areawide transportation system planning and development in southeastern Wisconsin, including information on the implementation status of the fourth generation transportation plan, on existing transportation facilities and services, and on travel habits and patterns. This report also presents a set of revised regional transportation system development objectives, principles, and standards formulated as a part of the plan reevaluation effort; summarizes the forecasts of future growth and change in the Region in terms of resident population, household, and economic activity levels; presents the results of the evaluation of alternative regional transportation system plans; and presents a recommended regional transportation system plan for a new plan design year 2035, together with specific plan implementation recommendations.

REVIEW OF THE YEAR 2020 REGIONAL TRANSPORTATION SYSTEM PLAN

In the process of preparing the fifth generation regional transportation system plan, a review of the fourth generation regional transportation plan and the implementation status of that plan was undertaken. The following

briefly identifies and summarizes the findings and conclusions from the inventory efforts related to the status of implementation of the fourth generation regional transportation system plan, which had a design year of 2020:

- Transportation systems management element – The transportation systems management element of the plan was intended to encourage more efficient use of the existing transportation system. This element included travel demand management measures to encourage carpooling and transit travel. It also included traffic management measures which sought to obtain the maximum vehicular capacity practicable from existing arterial street and highway facilities. With respect to implementation, the Wisconsin Department of Transportation has implemented a regional freeway traffic management system which provides monitoring and management of freeway traffic, as well as freeway traffic advisory information. Additionally, improvements have been made with respect to advancing traffic engineering and traffic management technology throughout the Region, including state-of-the-art intersection designs and traffic control at intersections. The Wisconsin Department of Transportation has continued to promote carpooling in southeastern Wisconsin, operating a program which matches travelers interested in carpooling. The Department also continued to support carpooling by maintaining and expanding the system of park-ride lots in the Region from 38 park-ride lots in 1995 to 46 park-ride lots in 2003. Innovative fare methods for transit services have been implemented in the Milwaukee area including UPASS, commuter value pass, and commuter value certificate programs. The Wisconsin Department of Transportation has purchased and is renovating the Milwaukee intermodal terminal which will serve Amtrak, intercity bus, commuter bus, and the Milwaukee County Transit System. Additionally, the Department recently constructed a new passenger rail station at General Mitchell International Airport.

- Bicycle and pedestrian facilities – The plan recommended a network of 575 miles of off-street bicycle and pedestrian paths. As of 1995, the base year of the 2020 plan, 134 miles of the planned 575 miles of the system existed. Since 1995, an additional 69 miles have been implemented for a total network of off-street paths of 203 miles.

- Public transit element – The plan recommended about a 70 percent increase in transit service in terms of weekday revenue vehicle-miles of service from about 65,000 in 1995 to about 111,500 in the year 2020. Transit vehicle-miles of service on an average weekday increased to about 71,900 vehicle-miles on an average weekday in 2003, representing an increase of about 6,900 vehicle-miles of service or about 15 percent of the planned increase in transit service of 46,500 vehicle-miles. The period of 1995 through 2003 was marked by an increase in transit service from 1995 through 2000, followed by a decrease from 2001 to 2003. Transit service increased by almost 25 percent between 1995 and 2000, from 65,000 to 81,000 average weekday vehicle-miles of service, and then declined by about 11 percent between 2000 and 2003. Since 1995, numerous transit service expansions recommended and implemented continue to be operated, including rapid transit services linking Milwaukee County with Ozaukee and Washington Counties; weekday Saturday evening service, and Sunday service for the City of Racine Belle Urban System and the City of Waukesha Metro system; and transit service expansions to serve outlying employment centers in the Milwaukee area.

- Arterial street and highway element – The plan recommended 532 miles of arterial street and highway widening for additional capacity and construction of 124 miles of new arterial roadway. As of 2004, 81 miles, or 15 percent, of the planned arterial widening had been implemented, or was under construction, as had 29 miles, or 23 percent, of the planned new arterial facilities. With respect to jurisdictional realignments, of the 71 miles to be transferred to the State trunk system, 26 miles, or 37 percent, had been implemented; of the approximately 424 miles to be transferred to the County trunk systems, 18 miles, or 4 percent, had been completed; and of the 106 miles to be transferred to the local arterial systems, 21 miles, or 20 percent, had been completed.

Under the year 2020 regional transportation and land use plans, projections of future population, household, and employment levels were prepared. With respect to population, the estimated population of the Region in

2003 was about 1,959,800 persons, or about 21,100 persons, or 1 percent, less than the 2003 forecast population under the year 2020 plans. The estimated number of households in the Region in 2003 was about 770,900 households which was about 12,100 households, or 2 percent, greater than the 2003 forecast households under the year 2020 plans. The estimated number of jobs in the Region in 2003 was about 1,179,000 jobs which was about 7,900 jobs, or 1 percent, less than the 2003 forecast level of employment under the year 2020 plans.

The year 2020 regional transportation plan also included forecasts of the number of personal-use vehicles available in the Region, the number of person-trips within the Region, the number of vehicle-trips within the Region, the number of vehicle-miles of travel in the Region, and public transit ridership in the Region. The estimated number of personal-use vehicles available to Region residents in 2003 was 1,320,900, which was about 96,300 vehicles, or 6 percent, greater than the 2003 forecast of personal-use vehicles. The estimated number of person trips within the Region made by residents of the Region on an average weekday in 2001 was 6.1 million, identical to the 2001 forecast. The estimated number of vehicle-trips within the Region made by residents of the Region in 2001 was 4.53 million, which was about 0.04 million, or less than 1 percent, less than the forecast of 4.57 million. The estimated number of vehicle-miles of travel in the Region on an average weekday in 2001 was about 39.98 million vehicle-miles, which was about 0.37 million, or about 1 percent, less than the forecast of 40.35 million vehicle-miles. The average weekday public transit ridership in the Region was about 142,200 trips per weekday, or about 4 percent, lower than the 148,200 trips per weekday forecast for 2001.

INVENTORY OF TRANSPORTATION FACILITIES AND SERVICES

As of 2001, there were approximately 11,937 miles of streets and highways—land access, collector, and arterial—within the Region. Only 27.5 percent, or 3,292 miles, of the street and highway system were arterials with the principal function of moving traffic. The miles of arterials within the Region increased from 3,188 in 1963 to 3,292 in 2001, an increase of about 100 miles, or 3 percent. The freeway system in 2001 of 270 miles accounted for 8 percent of the total arterial street and highway system and 2 percent of the total street and highway system.

In 2001, approximately 40.0 million vehicle-miles of travel were estimated to occur on the arterial street and highway system on an average weekday within the Region. The arterial street and highway system accounted for about 28 percent of the total miles of streets and highways within the Region, and 90 percent of the total average weekday traffic within the Region. Freeways within the Region constituted about 270 miles and 8 percent of the total arterial system, but carried 37 percent of total arterial system vehicle-miles of travel on an average weekday in 2001. Between 1963 and 2001, average weekday vehicle-miles of travel on the arterial street and highway system increased by over 200 percent, while the miles of arterial streets and highway increased by only about 3 percent. The growth in vehicle-miles of travel, which has slowed in the rate of growth each decade—from 5 percent in the 1960's to 2 percent in the 1990's—is principally a result of growth in average weekday trips made by Region residents due to increases in households and jobs; increases in the proportion of drive-alone trips due to increases in vehicle ownership and changes in population lifestyles, including declines in household size; and increases in trip length.

The miles of arterials carrying traffic volumes exceeding design capacity and experiencing traffic congestion declined from 217 miles in 1963 to 160 miles in 1972, even though traffic grew during that period by over 50 percent. The decline in traffic congestion may be attributed to the completion of the freeway system during that period. Between 1972 and 1991, the miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased from 160 miles to 273 miles, as traffic grew during that period by nearly 65 percent, as regional employment and households increased by about 30 percent, and vehicle occupancy and carpooling significantly declined. The decline in vehicle occupancy from an average of 1.39 persons per vehicle to 1.22 persons per vehicle alone is estimated to have resulted in nearly a 15 percent increase in vehicle traffic. As well, limited transportation system improvement

and expansion was completed between 1972 and 1991 in southeastern Wisconsin. The miles of arterials carrying traffic volumes exceeding their design capacity and experiencing traffic congestion is estimated to have increased modestly from 273 miles in 1991 to 290 miles in 2001. During that period, traffic is estimated to have increased by about 21 percent. The modest increase in traffic congestion from 1991 to 2001 may be attributed to the implementation of an extensive number of significant arterial street and highway widening and new construction projects between 1991 and 2001. The estimated modest increase in congestion between 1991 and 2001 is not uniform systemwide, as for example, the extent and severity of congestion on the Milwaukee area freeway system is estimated to have substantially increased by about 40 percent between 1991 and 2001.

Review of a three year history—1996, 1997, and 1998—of traffic crashes on the regional freeway system determined that the average crash rate was 77 crashes per 100 million vehicle-miles of travel. Countywide freeway system crash rates ranged from a low of 40 to a high of 106 crashes per 100 million vehicle-miles of travel for the seven counties in southeastern Wisconsin. During that period, only Milwaukee County's crash rate exceeded the regional average crash rate. Analyses of selected crash types determined that the rear end crash rate on the freeway system was five to 15 times higher on congested freeway segments than on uncongested freeway segments, with the highest rear end crash rates on the most extremely congested freeway segments.

The extent of fixed route public transit in southeastern Wisconsin significantly increased from 1991 to 2001 from 63,300 vehicle-miles of service on an average weekday to 79,600 vehicle-miles of service, an increase of 26 percent. The extent of fixed route service provided in 2001 was also 24 percent greater than that provided in 1972 and only 6 percent less than that provided in 1963. Demand-responsive transit service in the Region also significantly increased from 1991 to 2001, from 1,800 vehicle-miles of service on an average weekday to 7,700 vehicle-miles of service. However, since 2001, the extent of fixed route transit service has significantly declined by about 10 percent to 71,900 vehicle-miles of service on an average weekday in 2003 due to the economic downturn following September 11, 2001, reduced Federal funds, and State and local budget problems.

Public transit ridership measured in terms of transit passenger trips made from origin to destination on an average weekday has declined from 325,000 trips, representing 8 percent of regional internal personal travel in 1963, to 184,200 trips and 4 percent of travel in 1972, to 172,200 trips and 3 percent in 1991, and to 142,200 trips and 2 percent in 2001.

Between 1963 and 2001, the amount of commercial air passenger service and passengers traveling to and from southeastern Wisconsin has significantly increased, while significant declines in service and in passengers have occurred on other intercity modes of passenger travel, including rail, bus, and ferry. Commercial air carrier passengers represented only 27 percent of intercity transit passenger travel in southeastern Wisconsin in 1963, and represented over 84 percent of intercity transit passenger travel to, from, and through southeastern Wisconsin in 2001. During this period from 1963 to 2001, passenger travel measured in average weekday passenger trips on intercity transit modes to and from southeastern Wisconsin increased by about 100 percent. Over that same period, intercity personal vehicle travel to, from, and through southeastern Wisconsin also experienced about a 100 percent increase. Of total intercity or interregional travel over the past 40 years to and from southeastern Wisconsin, personal vehicle travel has consistently accounted for 95 percent of total travel, and intercity transit modes for 5 percent of total travel.

The number of park-ride lots enabling the transfer of mode between private vehicles and public transit and from solo driver private vehicles to carpools has increased from eight in 1972, to 37 in 1991, and to 48 in 2004. Of the 48 park-ride lots in 2004, 35 were provided with transit service. On an average weekday in 2004, about 41 percent of the approximately 6,300 spaces at the 48 park-ride lots were estimated to be in use.

Of the Region's 3,020 miles of surface arterial streets and highways, it is estimated that 534 miles accommodate bicycles through paved shoulders, 55 miles through exclusive bicycle lanes, and 44 miles

through physically separate parallel off-street paths. Also, 203 miles of regional off-street bicycle paths exist on former railway rights-of-way and in parkways. These off-street paths provide particularly safe and aesthetically attractive routes separate from motor vehicle traffic which connect the Region's urban centers and communities.

Transportation management and operations systems on the transportation system of southeastern Wisconsin include an extensive freeway traffic management system, including monitoring, metering, advisory information, and incident management elements; coordinated standard arterial traffic signal systems; and public transit computer aided dispatch and automated vehicle location systems.

TRAVEL HABITS AND PATTERNS

The Commission's comprehensive inventories of travel conducted in 1963, 1972, 1991, and 2001 describe in detail the total travel pattern of the Region and each of its component parts and permit assessment of stability, and changes, in travel habits and patterns within the Region over time.

On an average weekday in 2001, about 6.8 million person trips were made within the Region. This represents an increase from 1963 of 2.6 million person trips, or 63 percent. The increase in regional tripmaking reflects the increases in the number of households within the Region of 58 percent from 1963 to 2001, as well as the increase in employment of 71 percent from 1963 to 2001. The increases in person trips in the Region were substantially greater than the increase in the resident population of the Region of 15 percent from 1963 to 2001. Future levels of households and employment, rather than resident population, should be considered key indicators of potential future tripmaking growth.

The number of internal person trips per resident household of the Region has remained stable, at about eight trips per household. The stability in the household trip rate occurred even with the substantial socio-economic, land use, and transportation changes that have occurred within the Region over the last 40 years, including the change from a manufacturing to a service economy, the increase in labor force participation among women, the change in age composition of the Region, the change in average household size in the Region, the increase in vehicle ownership, the change in land use density of the Region, and the construction of the freeway system.

On an average weekday in 2001, 40.0 million vehicle-miles of travel occurred within the Region as a result of 5.5 million vehicle trips. The historic increases in average weekday vehicle-miles of travel from 13.1 million in 1963, to 20.1 million in 1972, to 33.1 million in 1991, and to 40.0 million in 2001—a total of 205 percent—have been more rapid than the corresponding historic increases in total person tripmaking and vehicle tripmaking. The principal contributing factor to the more substantial increase in vehicle-miles of travel has been an increase in the average length of internal person trips from 4.7 miles in 1963, to 5.4 miles in 1972, to 6.3 miles in 1991, to 6.9 miles in 2001, for an increase of about 47 percent from 1963 to 2001. Thus, the 205 percent increase in highway traffic in the Region from 1963 to 2001 has been the result only in part of demographic and economic growth and change and related person tripmaking. Only about 50 percent of the growth in highway traffic over the past 40 years may be attributed to increased tripmaking as a result of demographic and economic growth and change. The remaining 50 percent may be attributed to the decline in vehicle occupancy and carpooling and the increase in trip length.

About 90 percent in 2001 and in each survey year of the person and vehicle trips made within the Region on an average weekday were made by residents of the Region. Therefore, the location and capacity of future transportation facilities will largely be based upon the patterns of travel of the regional residents.

The number of personal vehicles—automobiles, vans, sport utility vehicles, and pick up trucks—available to residents of the Region increased from about 527,000 in 1963, to 705,000 in 1972, to 1,142,500 in 1991, and to 1,313,900 in 2001, an increase of 149 percent from 1963 to 2001. The percentage of total households in the Region having two or more personal vehicles available increased from 24 percent in 1963 to 34 percent in

1972, and to 56 percent in 1991 and 2001, while the percentage of total households having no personal vehicle available decreased from 17 percent in 1963, to 16 percent in 1972, and to 9 percent in 1991 and 2001. In addition, while automobile travel increased from about 80 percent of all internal person travel in the Region in 1963, to 84 percent in 1972, and to 89 percent in 1991 and 2001, public transit travel decreased from 8 percent of total internal person travel in 1963, to 4 percent in 1972, to 3 percent in 1991, and to 2 percent in 2001. Average weekday public transit travel decreased sharply within the Region, from 320,500 trips in 1963, to 184,200 trips in 1972, to 172,200 trips in 1991, and to 142,200 trips in 2001.

In each of the survey years, approximately 89 percent of total internal vehicle trips were made by personal vehicle and about 11 percent were made by commercial truck. These findings indicate that with respect to highway facilities, the principal contributor to the transportation problem within the Region is the movement of people rather than goods, particularly since personal vehicle trips display sharp concentrations during peak traffic periods, while commercial truck trips do not.

The percentage distribution of internal person trips by trip purpose have remained very stable over the past 40 years, with trips between home and work accounting for 23 to 25 percent of all internal person trips, trips between home and shopping accounting for 13 to 15 percent of trips, school trips for 9 to 11 percent of all trips, trips between home and other destinations for social, recreation, and personal business purposes for 31 to 34 percent of all trips, and trips between nonhome origin and destinations for about 18 to 20 percent of all trips.

ANTICIPATED REGIONAL GROWTH AND CHANGE

The year 2035 regional transportation plan was designed to serve the year 2035 regional land use plan, which in turn was designed to accommodate the most likely, intermediate projection to the year 2035 of population, household, and employment levels for the Region. Under the plan, the resident population of the Region would increase by 344,800 persons, or 18 percent, from 1,931,200 persons in 2000 to 2,276,000 persons in 2035. The number of households in the Region would increase by 176,700, or 24 percent, from 749,000 households in 2000 to 925,700 households in 2035. Households would continue to increase at a faster relative rate than the regional population, with average household sizes continuing to decline from 2.5 in 2000 to 2.4 persons per household in 2035. Under the regional plan, total employment in the Region would increase by 145,500 jobs, or 12 percent, from 1,222,800 in 2000 to 1,368,300 jobs in 2035, with job types changing as the Region continues to experience a shift from a manufacturing-based to a service-based economy.

The regional land use plan embodies the following vision for the Region over the course of the next three decades:

- Development would be directed to occur in urban service areas that are served by basic urban services and facilities, including public sanitary sewer, public water supply, and other urban facilities and services. New urban development would be accommodated through the infilling and renewal of existing urban service areas as well as through the orderly expansion of existing urban service areas, resulting in a relatively compact and efficient overall settlement pattern.

- Urban residential development would occur primarily at medium and high densities in residential neighborhoods as well as in more mixed-use settings. Residential neighborhoods would be designed as cohesive units, properly related to the larger community of which they are a part, and served by an interconnected internal street, bicycle-way, and pedestrian system and by a neighborhood school, park, and shopping area. In addition to neighborhood development, other residential development would occur in settings having an even greater mixture of land uses. Examples of such mixed-use settings include dwellings above the ground floor of commercial uses and residential structures intermixed with, or located adjacent to, compatible commercial, institutional, or civic uses. The bulk of residential development would occur at medium or higher densities, facilitating the efficient provision of public utilities and services and moderating the amount of open space required to be converted to urban use.

- Lands beyond planned urban service areas would be retained in essentially rural use, with highly productive farmlands preserved and with development limited to overall densities, and accommodated through designs that are consistent with the maintenance of rural character and consistent as well with the capacities of existing street and other public facility and service systems in those areas.

- The land development needs of the Region would be met while preserving the best remaining elements of the natural resource base—most of which are located within environmental corridors and isolated natural resource areas—and preserving productive farmland, resulting in an interconnected, integrated system of open space lands within the Region.

TRAVEL SIMULATION MODELS

Travel simulation models and the relationships and techniques incorporated in those models are important because they provide the technical basis for the design of a regional transportation system plan which is properly related to the travel patterns that the planned system must serve. Moreover, they provide the necessary link between land use and transportation system planning.

The Commission has over 40 years of experience in travel simulation modeling. The initial travel simulation models were developed in 1963, utilizing the findings of comprehensive travel survey and applied in the initial regional land use-transportation study. The initial models were validated in 1972, utilizing the results of a second full-scale travel survey and demonstrated to simulate accurately 1972 travel patterns, arterial street and highway traffic volumes, and transit ridership. Some refinements were made to the models in 1972 before their application in the second-generation transportation study. The refined set of models were revalidated in 1991, utilizing the findings of a third comprehensive travel survey. The models developed in 1972 were demonstrated to accurately simulate 1991 conditions. Again, some refinements were made to produce a third-generation set of travel models. The third-generation models developed with 1991 data were demonstrated to accurately simulate 2001 travel. The Commission's third-generation travel demand models were compared to the travel simulation models of 10 metropolitan planning organizations (MPOs) throughout the United States. This peer review determined that the Commission's third-generation travel demand models were consistent with current travel simulation modeling state-of-the-practice. Based on the review of the current state-of-the-practice of the 10 peer MPOs, refinements were recommended to the third-generation travel simulation models regarding stratification of nonhome-based trips into work and nonwork related trips, consideration of destination choice models under the trip distribution step, and consideration of the development of nested and/or multinomial logit models under the mode choice step, which would include choice between auto and transit, and multiple levels of auto occupancy. These and other refinements were made in the development of a fourth-generation of travel models with 2001 data. The fourth-generation travel simulation models were validated by comparing the model-estimated travel and traffic to survey-estimated travel and actual measured traffic counts.

OBJECTIVES, PRINCIPLES, AND STANDARDS

In preparing the fifth-generation regional transportation system plan, the Advisory Committee reviewed and refined a set of transportation system development objectives, principles, and standards that had been formulated and modified in prior regional transportation system planning efforts. A total of eight transportation system development objectives were recommended by the Advisory Committee to guide the design of the year 2035 regional transportation system plan. These objectives and their supporting planning principles and sets of design standards are set forth in Chapter VII and advocate provision of a flexible, multi-modal regional transportation system, alleviating traffic congestion, reducing travel time and crash exposure, and minimizing costs and disruptive effects upon communities and the natural environment. The objectives and standards were used both to identify problems and to evaluate alternative plans proposed to resolve those problems, providing the basis for the selection of a recommended plan that best achieved the specific objectives. An overriding consideration was developed to guide the design of the year 2035 regional transportation system plan to ensure that minority and low-income populations within southeastern Wisconsin do not receive a disproportionate share of the estimated

impacts of the regional transportation system plan. An appendix to this report comprehensively evaluates the impact of the year 2035 regional transportation system plan on minority and low-income populations in southeastern Wisconsin.

REGIONAL TRANSPORTATION PLAN DEVELOPMENT AND EVALUATION

Given the regional land use plan and the underlying forecasts of population, households, and economic activity, as well as the set of transportation system development objectives and supporting design standards, alternative regional transportation system plans were designed, tested, and evaluated. This involved the application of the full battery of Commission travel simulation models to estimate the magnitude and pattern of future travel and traffic.

The methodology used to design alternative regional transportation system plans was explicitly structured to ensure that before any proposal was brought forward to widen existing arterial streets and highways or to build new arterial streets and highways, full and adequate consideration was given to resolving existing and anticipated future transportation problems through land use, public transit, bicycle and pedestrian facilities, transportation systems management, and travel demand management measures. More specifically, the approach to designing alternative regional transportation system plans consisted of the following steps:

1. Definition of a "no-build" highway and transit transportation system and the assignment of forecast future travel demand to that system in order to identify potential problems and deficiencies under a scenario where no additional capital or operating investment would be made in new and improved transportation facilities. The no-build alternative plan consisted of maintaining the existing transportation system including continuing to operate the existing public transit system as it existed in the year 2005, to resurface and reconstruct without additional traffic lanes the existing arterial street and highway system, and operate and manage the transportation system as it was operated and managed in 2005.

2. Development of a transportation systems management, or TSM, plan alternative that included only actions that were of a transportation system management nature. These actions included substantial proposed improvement and expansion of public transit, bicycle and pedestrian facilities, transportation systems management, and travel demand management, as outlined in Chapter VIII.

3. Assignment of forecast future travel demand to the TSM plan alternative in order to ascertain the extent to which such actions would meet current and future transportation needs, and alone resolve traffic congestion problems. Without arterial street and highway capacity improvement and expansion, traffic congestion is forecast to double over the next 30 years, even with significantly expanded public transit, bicycle and pedestrian facilities, and travel demand and transportation systems management as proposed under the TSM Plan. This is documented in Chapter VIII.

4. Based upon the findings of the analyses conducted under the third step, the identification of arterial street and highway improvements to resolve, to the extent considered possible, the transportation system deficiencies remaining under the TSM alternative plan. A third plan alternative was then developed, tested, evaluated, and compared to the no-build and TSM plans. This third plan alternative was termed the TSM Plus Highway Plan, and included all improvements proposed under the TSM plan, and arterial street and highway improvements proposed to address the congestion which would be expected to remain under the TSM plan.

PRELIMINARY AND FINAL RECOMMENDED PLANS AND PUBLIC PARTICIPATION

Based upon the performance evaluations and comparison of the alternative plans considered—No-Build, TSM and TSM Plus Highway plans—the TSM Plus Highway plan alternative was recommended by the Advisory Committee to be taken to public hearing as the preliminary recommended year 2035 regional transportation system plan. The preliminary recommended plan was fully evaluated in terms of its performance relative to the

transportation system development objectives and standards. The preliminary recommended plan is fully described in Chapter VIII, and includes five basic elements: 1) public transit; 2) bicycle and pedestrian facilities; 3) transportation systems management; 4) travel demand management; and 5) arterial streets and highways.

The following efforts were made to secure effective public participation in the review of, and comment on, the preliminary recommended plan;

1. The preliminary plan was described in an issue of the widely distributed Commission *Newsletter*. This issue, together with three previous issues, present the results of the inventory findings and the description and evaluation of alternatives plans, provided in-depth descriptions of the plan and the alternatives thereto for consideration by all who seriously desired to learn about and react to the preliminary plan.

2. All draft chapters, Advisory Committee agendas and meeting minutes, and Commission *Newsletters* prepared for the year 2035 regional transportation plan were available for review on the Commission website.

3. The preliminary plan was presented to the seven county jurisdictional highway system planning committees and to other interested groups and communities per their request.

4. Nine formal public hearings were held on the preliminary plan, one each in Kenosha, Ozaukee, Racine, Walworth, Washington, and Waukesha Counties, and three in Milwaukee County. Each public hearing was preceded by a staffed "open house" at which individuals could examine and discuss the preliminary recommended plan with Commission staff and submit comments without attending the formal hearings.

5. Throughout the planning process, and particularly during the evaluation of alternative and preliminary recommended plans, the Commission conducted outreach to minority and low-income populations, identifying concerns, needs, and reaction to the preliminary recommended and alternative plans.

Full documentation of the public comment on the preliminary recommended plan was published and a summary is included in Chapter IX, along with responses to the comments received. Following the intensive period of public participation on the preliminary plan, the Advisory Committee reviewed the comment on the preliminary plan, and adopted a final recommended year 2035 regional transportation system plan, making a number of changes to the preliminary plan. In adopting a final plan, the Advisory Committee emphasized that all elements of the plan are considered to be of equal priority, and <u>each</u> element needs to be fully implemented to meet existing and forecast future year 2035 transportation needs and to provide a comprehensive, multi-modal, balanced, high quality transportation system in southeastern Wisconsin:

- Public Transit
- Bicycle and Pedestrian Facilities
- Transportation Systems Management
- Travel Demand Management
- Arterial Streets and Highways
    - Freeways
    - Surface Arterials

Over the past 30 years, significant progress has been made with respect to implementation of previous regional plan recommendations. With respect to public transit, the overall improvement and expansion achieved from 58,000 bus-miles of service in 1975 to 69,000 bus-miles of service in 2005 has been limited by reductions in service which have occurred during periods of economic downturns and recessions, specifically during the early 1980's and the early 2000's. For example, between 1987 and 2000, public transit bus-miles of service expanded

from about 61,000 to 81,000 bus-miles of service, or about 33 percent or about 2.3 percent annually, but with the economic downturn and attendant State and local budget problems since 2000, bus-miles of public transit service have declined by about 15 percent. To fully implement the regional plan, there will be a need to assure that during economic downturns, progress in plan implementation, particularly with respect to public transit, continues, and is not eroded through service reductions.

The final year 2035 regional transportation system plan recommends about a 100 percent increase in revenue transit vehicle-miles of travel as compared to year 2005 levels, from about 69,000 vehicle-miles of service on an average weekday in the year 2005 to 138,000 vehicle-miles of service in the year 2035, including the development of rapid and express transit service. The final plan also recommends that as the surface arterial street system of about 3,300 miles in the Region is resurfaced and reconstructed segment-by-segment, the provision of accommodation for bicycle travel would be considered and implemented, if feasible, through bicycle lanes, widened shoulders, widened lanes or separate bicycle paths. Also, a system of 575 miles of off-street bicycle paths located primarily within natural resource and utility corridors is recommended to provide reasonably direct connections between the Region's urbanized and small urban areas. The final plan also recommends the expansion of transportation systems management including the improvement and expansion of measures to improve the operation and management of the regional freeway system including operational control, advisory information, and incident management measures, as well as a traffic operations center supporting these measures; measures to improve the operation and management of the regional surface arterial street and highway network including improved traffic signal coordination, intersection traffic engineering improvements, curb lane parking restrictions, access management, and advisory information; major activity center parking management and guidance to reduce traffic circulation of motorists seeking parking in major activity centers; and the preparation of a Regional Transportation Operations Program which would program high priority, short-range operational improvement projects for implementation. The final plan also recommends the implementation of travel demand management measures intended to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing capacity of the transportation system including high-occupancy vehicle preferential treatment, a network of park-ride lots, transit pricing measures, personal vehicle pricing measures, travel demand management promotion, transit information and marketing, and detailed site-specific neighborhood and major activity center land use plans. Also, the final plan recommends a 3,637 route-mile arterial street and highway system which includes about 358 route-miles recommended for widening to provide additional through traffic lanes including 127 miles of freeways, and about 88 route-miles of proposed new arterial facilities.

Each proposed arterial street and highway improvement and expansion, and, as well, preservation project, would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a plan and project will proceed to implementation will be made by the responsible State, county, or municipal government (State for state highways, County for county highways, and municipal for municipal arterial streets) at the conclusion of preliminary engineering. The 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (IH 94 between the Zoo and Marquette Interchanges and IH 43 between the Mitchell and Silver Spring Interchanges), will undergo preliminary engineering and environmental impact statement by the Wisconsin Department of Transportation. During preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuild to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. Only at the conclusion of preliminary engineering would a determination be made as to how the freeway would be reconstructed.

The final recommended plan represents about a 30 percent increase in annual capital and operating costs over a no-build plan (about two-thirds of the increase in costs is attributable to the plan's public transit recommendations and one-third to the arterial street and highway recommendations), but would provide substantially expanded transit accessibility and improved transit service speed, and would permit avoiding a doubling of regional traffic congestion over the next 30 years.

PLAN IMPLEMENTATION

Specific plan implementation recommendations directed at the concerned Federal, State, county, and local units and agencies of government operating within the Region are set forth in Chapter X. The following summarizes the major implementation recommendations made:

Local Level

County Boards of Supervisors

It is recommended that the county boards of the seven counties comprising the Region, upon recommendation of the appropriate highway, transit, and/or public works committees, do the following:

1. Endorse the recommended regional transportation system plan as that plan affects each respective county.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the Wisconsin Department of Transportation and the cities, villages, and towns in the county in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for county jurisdiction, including undertaking, as may be appropriate, detailed planning, preliminary engineering, environmental studies, and official mapping work efforts.

5. Cooperate with the Wisconsin Department of Transportation, the Regional Planning Commission, and adjoining counties as necessary to conduct the corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan, and carry out, as appropriate, detailed county-wide transit planning programs to refine and detail the transit element of the regional transportation plan.

6. As appropriate to each county, provide public transit services in accordance with the recommendations set forth in the transit element of the plan.

7. Act to consider and implement where feasible the accommodation for bicycle travel on the county trunk arterial system as that system is resurfaced and reconstructed on a segment-by-segment basis.

8. As appropriate to each county, provide a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

9. Continue to operate, enhance, and expand traffic management systems so as to achieve the highest possible level of service on the existing county trunk arterial systems.

City Common Councils, Village Boards, and Town Boards

It is recommended that the city common councils, village boards, and town boards in the Region, upon recommendations, as appropriate, of their plan commissions, boards of public works, and transit commissions, do the following:

1. Endorse the recommended regional transportation system plan as that plan affects each respective civil division.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the Wisconsin Department of Transportation and their respective counties in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for local jurisdiction, including undertaking, as may be appropriate, detailed planning, preliminary engineering, environmental studies, and official mapping work efforts.

5. As appropriate, and upon consideration by and recommendation of the local plan commissions, integrate into the local planning and development practices and ordinances transit- and pedestrian-friendly land use development concepts.

6. As appropriate, cooperate with the Wisconsin Department of Transportation, the Regional Planning Commission, and any concerned counties in conducting corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

7. As appropriate, provide public transit services in accordance with the recommendation of the transit element of the regional transportation plan.

8. Act to consider and implement where feasible the accommodation for bicycle travel on the local arterial streets as they are resurfaced and reconstructed on a segment-by-segment basis.

9. Adopt a local bicycle and pedestrian facility plan which is consistent with the regional transportation plan and where appropriate, work with adjacent units of government and the County in providing a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

10. Continue to operate, enhance, and expand traffic management systems so as to achieve the highest possible level of service on the existing local arterial streets.

Areawide Level

Regional Planning Commission

It is recommended that the Southeastern Wisconsin Regional Planning Commission do the following:

1. Adopt the recommended regional transportation system plan, the Commission thus acting not only in its capacity as a regional planning agency but also as the federally recognized metropolitan planning organization for the Kenosha, Milwaukee, Racine, and Round Lake Beach urbanized areas.

2. Conduct a continuing regional transportation planning program to review, revise and amend, and update and extend the adopted regional transportation system plan from time to time. Work with the Wisconsin Department of Transportation, counties, and local governments to complete major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the county and local governments concerned, the Wisconsin Department of Transportation and the U. S. Department of Transportation, Federal Highway and Transit Administrations, in conducting the corridor studies attendant to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

4. Cooperate with the Wisconsin Department of Natural Resources in assuring the continued conformity of the regional transportation system plan to the State Implementation Plan for Air Quality.

5. Provide assistance, upon request, to county and local governments in conducting highway and transit plan implementation efforts, including the preparation of detailed county and local highway and transit development plans and such implementation devices as official mapping.

6. Provide assistance, upon request, to the Wisconsin Department of Transportation and county and local governments in carrying out cooperative efforts to effect changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the plan.

Regional Transit Authority

It is recommended that the Southeastern Wisconsin Regional Transit Authority do the following:

1. Identify a permanent regional funding source to provide local funds for the portion of operating and capital costs of commuter rail and public transit that are not covered by passenger fares and that considers all potential funding sources.

State Level

Wisconsin Department of Transportation

It is recommended that the Wisconsin Department of Transportation do the following:

1. Endorse the recommended regional transportation system plan and integrate that plan into the Wisconsin intermodal transportation plan as a functional and jurisdictional guide to transit and highway system development within the Region.

2. Work with the Regional Planning Commission in the major review and reevaluation of the county jurisdictional highway system plans.

3. Work cooperatively with the counties, cities, villages, and towns in the Region in effecting recommended changes in jurisdictional responsibility for portions of the arterial street and highway system as recommended in the county jurisdictional highway system plans.

4. Act to consider the recommended expansion, improvement, and maintenance of the arterial street and highway facilities designated in the plan for State jurisdiction, including undertaking necessary preliminary engineering, environmental studies, and official mapping efforts.

5. Cooperate with the Regional Planning Commission and the concerned counties and local governments in the Region in conducting the corridor studies related to rapid transit commuter rail and express transit bus-guideway or light rail transit facilities identified in the plan.

6. Continue to operate, enhance, and expand the freeway traffic management system so as to achieve the highest possible level of service on the freeways and help encourage travel and transit and carpools and vanpools.

7. Implement a travel demand management program, including ridesharing promotion, assistance to transportation management associations, promotion of employee-based travel demand management strategies, promotion of travel by bicycle and walking, and construction of carpool lots.

8. Act to consider and implement where feasible the accommodation for bicycle travel on state trunk highways as they are resurfaced and reconstructed on a segment-by-segment basis.

9. As appropriate, work with municipal and county units of government in providing a system of off-street bicycle paths located primarily within natural resource and utility corridors to provide reasonably direct connections between the Region's urbanized and small urban areas.

Wisconsin Department of Natural Resources

It is recommended that the Wisconsin Department of Natural Resources update the State Implementation Plan for Air Quality and ensure that the regional transportation plan conforms to it.

University of Wisconsin-Extension

It is recommended that the University of Wisconsin-Extension acknowledge the regional transportation system plan and promote implementation of the plan in its ongoing educational programs.

Federal Level

U. S. Department of Transportation, Federal Highway Administration

It is recommended that the Federal Highway Administration endorse the regional transportation plan, and use the plan in the administration of its various Federal grant programs.

U. S. Department of Transportation, Federal Transit Administration

It is recommended that the Federal Transit Administration endorse the regional transportation plan, and use the plan in the administration of its various Federal grant programs.

U. S. Environmental Protection Agency

It is recommended that the U. S. Environmental Protection Agency endorse the regional transportation plan and use the plan as it carries out its day-to-day regulatory activities.

General Considerations

Several particularly significant aspects of regional transportation system plan implementation warrant restatement here in summary form. First, the recommended regional transportation plan presented in this report, like the companion recommended regional land use plan documented in a separate report, is intended to comprise a guide to certain important aspects of the sound physical development of the Region. As such, the plan is advisory to the local, State, and Federal units and agencies of government concerned as these public bodies consider transportation facility development matters in the Region. The regional transportation system plan is not to be considered as an inflexible mold to which all future transportation system development within the Region must precisely conform. Rather, the regional transportation system plan is to be regarded as a point of departure against which transportation system development proposals can be evaluated as they arise and in the light of which better development decisions can be made by all parties concerned. The regional plan is intended to be used as a framework for more detailed county and local planning. As such, the plan is subject to refinement, detailing, and amendment as plan implementation proceeds, over time, within the Region.

Second, the endorsement or acknowledgement of the recommended regional transportation plan as a guide to the sound development of the Region by the local units of government and the various State and Federal agencies concerned is highly desirable. Indeed, in some cases, that endorsement or acknowledgement is essential in order to ensure a common understanding of the areawide development objectives and to permit the necessary plan implementation work to be cooperatively programmed and jointly executed.

Third, the importance of close coordination and cooperation between the local units of government and between those units of government and the State and Federal agencies concerned in plan implementation cannot be overemphasized. Responsibilities for achieving such coordination and cooperation on a voluntary basis within the traditional framework of government in Wisconsin have been assigned to the Commission by the State Legislature through the regional planning enabling act. In addition, the Federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users provides a further basis for coordinating planning and plan implementation efforts by the Commission as the designated metropolitan planning organization. In its capacity as the coordinating agency under both State and Federal law, advisory review of proposed transportation facilities by the Commission is essential for the effective development over time of the regional transportation system. The proper vehicle for the review of proposed transportation facilities is the regional transportation improvement program compiled by the Commission in accordance with the requirements of Federal transportation legislation.

Fourth, implementation of the regional transportation plan will not be brought about by a single massive action on the part of one unit or agency of government. Rather, implementation of that plan will be brought about through many individual development decisions made on a day- to-day basis over a period of many years by public administrators and elected officials operating at the local, areawide, State, and Federal levels of government. It is extremely important that the individuals and agencies making these decisions be aware of and understand the development proposals set forth in the recommended regional transportation plan so that those proposals receive proper consideration as development decisions are made.

Finally, regional transportation plan implementation can only be achieved within the context of a continuing, comprehensive areawide planning effort wherein the planning inventories and forecasts on which the regional plans are based are updated, monitored, and revised; in which the plans are reappraised and, as necessary, revised to accommodate changing conditions; and through which the plans are interpreted on a day-to-day basis to the local, State, and Federal units and agencies of government concerned as the need to make development decisions arises. In this respect, planning does not and cannot concern itself with future decisions, that is, with "things that should be done in the future." Rather, it must be recognized that decisions exist only in the present and that planning is necessary just because decisions can be made only in the present, yet cannot be made for the present alone. The question, therefore, that faces elected officials and concerned citizens throughout the Region concerning implementation of the recommended regional transportation system plan is not what should be done tomorrow to bring about that plan, but, rather, what must be done today in light of the plan to be prepared for tomorrow.

CONCLUSION

This report has described the recommended regional transportation system plan for the year 2035 and its development. The plan has been carefully crafted to meet the transportation needs of the Region over approximately the next three decades. It is anticipated that person-trip generation within the Region will increase over this time by about 20 percent; that internal vehicle-trip generation will increase by about 21 percent; and that vehicle-miles of travel will increase by about 35 percent. During this period of time, transit ridership may be expected to increase by about 25 percent if the recommended extent and frequency of service is provided, although the share of travel by transit, about 2 percent, is not expected to change significantly. If implemented, the plan would permit avoiding a doubling of traffic congestion on the arterial street and highway system, principally as a result of the arterial street and highway capacity expansion recommendations in the plan.

To meet the future travel and transportation demands, the plan seeks to expand arterial street and highway system capacity, as measured in newly constructed arterial lane-miles, by about 4 percent. The plan's proposed expansion of the transit system, as measured by vehicle-miles of revenue service, is about 100 percent. To accomplish these improvements to the transportation system will require about a 30 percent increase in transportation expenditure over a no-build plan. The cost of the proposed plan is estimated to be within about 10 percent of existing and available transportation resources. About 33 percent of the plan resources would be allocated to transit, with the remaining 67 percent allocated to arterial streets and highways.

Implementation of the recommended plan may be expected to provide the Region with an integrated transportation system that will effectively serve and promote a desirable land use pattern, meeting anticipated future travel demand at an adequate level of service through transportation systems and travel demand management measures and transit, bicycle and pedestrian, and arterial street and highway improvements. In terms of modes, the plan is as balanced as practicable, with appropriate types of transit, bicycle and pedestrian, and arterial facilities provided for the various subareas of the Region. Implementation of the plan would abate traffic congestion, reduce travel time and costs, and reduce crash exposure. As such, implementation of, or the failure to implement, the recommended plan will affect not only the efficiency of the regional transportation system, and thereby directly affect the cost of living and doing business in the Region, but will also affect the overall quality of life in the Region for many years. It is critical, therefore, that government, business and industry, labor, and concerned citizens in the Region take an active interest in securing implementation of the plan recommendations.

Planning is, by definition, expected to deal with an uncertain future. As the governmental agencies concerned consider the recommended plan and its implementation, however, a number of these uncertainties need to be kept specifically in mind. There is uncertainty over the future levels of population and economic activity within the Region. A more vigorous economy could lead to greater than anticipated levels of growth and change in the Region. Alternatively, a less vigorous economy could return the Region to periods of modest changes in population and employment levels. The variables which relate to this uncertainty need to be closely monitored as plan implementation proceeds.

In addition, there is an uncertainty with respect to the degree to which county and local governments in the Region will take appropriate and effective steps to implement the regional land use plan. Significant deviations from the recommended land use pattern, however, could prove to be problematic. Accordingly, this is another variable which bears close scrutiny as plan implementation proceeds.

All uncertainties need to be taken into account in a continuing regional land use-transportation planning program. As the Federally recognized Metropolitan Planning Organization, and as the regional planning agency for southeastern Wisconsin, the Regional Planning Commission bears the responsibility for conducting that planning process. The process must include efforts to monitor all the foregoing uncertainties, and others as well. The process must continually survey and monitor many factors, must provide for amendment of the regional plan over time, and must provide for the extension of the plan to provide a continued 20-year planning horizon. Consequently, it should be anticipated that the Commission will work collaboratively with the Federal, State, county, and local units and agencies of government concerned and move forward with a work program designed to discharge its continuing planning responsibilities properly.

APPENDICES

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Appendix A

ACCURACY CHECKS OF THE YEAR 2001 TRAVEL SURVEYS

INTRODUCTION

The accuracy and completeness of data obtained in the travel surveys was reviewed by comparing the survey data on Regional population socio-economic characteristics to data from the 2000 Federal Census and other independent sources, and comparing survey data on Regional travel and traffic to data from the 2000 Federal Census and vehicle traffic counts.

SOCIO-ECONOMIC ACCURACY CHECKS

The socio-economic data from the 2001 household travel survey was compared to data from the 2000 Federal Census and other sources. The data comparisons included the distribution of households by household size, vehicles available, income, lifestyle[1], and gender, and estimated total Regional personal vehicle and commercial truck availability.

The percentage distribution of households by household size as established by the survey was essentially the same as that identified by the 2000 Federal Census at county and Regional levels. Table A-1 provides a comparison of the distribution of households by household size within each county as measured by the 2000 Federal Census and as derived from the year 2001 resident household survey. The county-level survey data on household size are within 0.2 percent of corresponding 2000 Federal Census data in almost all categories. The largest difference between county-level survey data and corresponding 2000 Federal Census data was in the category of two-person households in Ozaukee County. In this category the difference is 0.3 percent. At the regional level, all differences between Census and survey data were 0.1 percent or less.

The next socio-economic accuracy check compared vehicle availability as measured by the 2000 Federal Census and as estimated by the 2001 resident household survey. Table A-2 compares estimates of the total number of vehicles available to households in the Region from the travel survey to those of the 2000 Federal Census. The total vehicles available were accurately estimated by the survey, varying from Federal Census estimates by 1.0 percent to 2.1 percent at the Regional and county levels. Table A-3 compares the distribution of households by vehicles available, and indicates that the distribution of households by vehicle availability is accurately estimated by the travel survey as compared to the 2000 Federal Census.

The distribution of annual household income as estimated from the travel survey was also compared with similar data estimated from the 2000 Federal Census as shown in Table A-4. The estimated household income based upon the travel survey data by county varied by 0.1 to 6.4 percent from Census derived distributions, and at the Regional level, the percentage of households in any given income range based on the 2001 resident household survey did not differ from the corresponding percentage of households based on 2000 Federal Census data by more or less than 5.1 percent.

The distribution of households based on household lifestyle from the travel survey was compared to the distribution obtained from the 2000 Federal Census and is set forth in Table A-5. As shown in Table A-5, the comparison indicated that the distribution of households was accurately estimated by the 2001 resident household survey, varying from the 2000 Federal Census by 0.1 to 3.3 percent at the county level, and 0.8 to 2.0 percent for the Region.

[1]*The lifestyle of a household is defined by whether a household is a retired or working household, determined by whether age of head of household is less than or greater than 65 respectively, and whether the working household has children or not.*

Table A-1

COMPARISON OF THE ESTIMATED DISTRIBUTION OF HOUSEHOLDS BY HOUSEHOLD SIZE WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 RESIDENT HOUSEHOLD SURVEY

	Kenosha County					Milwaukee County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Household Size	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
One Person	14,269	25.5	14,582	25.4	-0.1	124,613	33.0	125,584	33.1	0.1
Two Persons	17,878	31.9	18,216	31.7	-0.2	115,627	30.6	115,398	30.4	-0.2
Three Persons	9,351	16.7	9,515	16.6	-0.1	56,489	15.0	56,494	14.9	-0.1
Four Persons	8,645	15.4	8,948	15.6	0.2	44,143	11.7	44,501	11.7	- -
Five or More Persons	5,914	10.5	6,122	10.7	0.2	36,857	9.7	37,152	9.9	0.2
Total	56,057	100.0	57,383	100.0	- -	377,729	100.0	379,129	100.0	- -

	Ozaukee County					Racine County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Household Size	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
One Person	6,601	21.4	6,759	21.3	-0.1	17,349	24.5	17,531	24.4	-0.1
Two Persons	11,128	36.1	11,341	35.8	-0.3	23,771	33.6	24,113	33.6	- -
Three Persons	4,948	16.0	5,099	16.1	0.1	11,688	16.5	11,822	16.5	- -
Four Persons	5,162	16.7	5,353	16.9	0.2	10,703	15.1	10,868	15.1	- -
Five or More Persons	3,018	9.8	3,127	9.9	0.1	7,308	10.3	7,420	10.4	0.1
Total	30,857	100.0	31,679	100.0	- -	70,819	100.0	71,754	100.0	- -

	Walworth County					Washington County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Household Size	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
One Person	8,522	24.7	8,821	24.8	0.1	8,903	20.3	9,088	20.1	-0.2
Two Persons	12,165	35.2	12,497	35.1	-0.1	15,539	35.4	15,944	35.3	-0.1
Three Persons	5,354	15.5	5,459	15.3	-0.2	7,425	16.9	7,597	16.8	-0.1
Four Persons	4,840	14.0	5,040	14.2	0.2	7,570	17.3	7,918	17.5	0.2
Five or More Persons	3,641	10.6	3,790	10.6	- -	4,405	10.1	4,609	10.3	0.2
Total	34,522	100.0	35,607	100.0	- -	43,842	100.0	45,156	100.0	- -

	Waukesha County					Region				
	Federal Census		Household Survey			Federal Census		Household Survey		
Household Size	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
One Person	28,289	20.9	28,775	20.7	-0.2	208,546	27.8	211,140	27.8	- -
Two Persons	48,488	35.9	49,773	35.8	-0.1	244,596	32.7	247,282	32.6	-0.1
Three Persons	22,410	16.6	22,959	16.5	-0.1	117,665	15.7	118,945	15.7	- -
Four Persons	22,921	16.9	23,741	17.1	0.2	103,984	13.9	106,369	14.0	0.1
Five or More Persons	13,121	9.7	13,589	9.9	0.2	74,264	9.9	75,809	9.9	- -
Total	135,229	100.0	138,837	100.0	- -	749,055	100.0	759,545	100.0	- -

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

Table A-2

COMPARISON OF THE ESTIMATED NUMBER OF VEHICLES AVAILABLE IN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 RESIDENT HOUSEHOLD SURVEY

	2001 Estimate Based on 2000 Federal Census		2001 Resident Household Survey		Difference	
County	Number of Vehicles	Percent of Total	Number of Vehicles	Percent of Total	Number	Percent
Kenosha	101,753	8.1	103,234	8.1	1,481	1.5
Milwaukee	531,428	42.4	536,968	42.3	5,540	1.0
Ozaukee	62,019	4.9	63,193	5.0	1,174	1.9
Racine	126,465	10.1	129,062	10.2	2,597	2.1
Walworth	68,533	5.5	69,617	5.5	1,084	1.6
Washington	88,578	7.1	89,783	7.1	1,205	1.4
Waukesha	274,248	21.9	277,065	21.8	2,817	1.0
Region	1,253,024	100.0	1,268,922	100.0	15,898	1.3

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

Table A-3

COMPARISON OF THE DISTRIBUTION OF HOUSEHOLDS BY VEHICLE AVAILABILITY IN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 RESIDENT HOUSEHOLD SURVEY

	Kenosha County					Milwaukee County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Vehicle Availability	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
No Vehicles	3,824	6.8	2,174	3.8	-3.0	61,631	16.3	53,328	14.1	-2.2
One Vehicle	19,235	34.3	20,422	35.6	1.3	156,663	41.5	161,669	42.6	1.1
Two Vehicles	23,116	41.2	24,608	42.9	1.7	122,283	32.4	127,493	33.6	1.2
Three Vehicles	7,358	13.1	7,648	13.3	0.2	28,131	7.4	28,722	7.6	0.2
Four Vehicles	1,767	3.2	2,201	3.8	0.6	6,635	1.8	6,321	1.7	-0.1
Five or More Vehicles	757	1.4	330	0.6	-0.8	2,386	0.6	1,596	0.4	-0.2
Total	56,057	100.0	57,383	100.0	- -	377,729	100.0	379,129	100.0	- -

	Ozaukee County					Racine County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Vehicle Availability	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
No Vehicles	1,039	3.4	127	0.4	-3.0	5,759	8.1	4,067	5.7	-2.4
One Vehicle	8,129	26.3	9,045	28.6	2.3	22,888	32.3	22,721	31.7	-0.6
Two Vehicles	15,097	48.9	15,732	49.7	0.8	29,962	42.3	32,558	45.4	3.1
Three Vehicles	4,970	16.1	5,124	16.2	0.1	9,075	12.8	9,194	12.8	- -
Four Vehicles	1,238	4.0	1,202	3.8	-0.2	2,346	3.3	2,571	3.6	0.3
Five or More Vehicles	384	1.3	449	1.3	- -	789	1.2	643	0.8	-0.4
Total	30,857	100.0	31,679	100.0	- -	70,819	100.0	71,754	100.0	- -

	Walworth County					Washington County				
	Federal Census		Household Survey			Federal Census		Household Survey		
Vehicle Availability	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
No Vehicles	1,663	4.8	683	1.9	-2.9	1,720	3.9	1,188	2.6	-1.3
One Vehicle	10,778	31.2	11,414	32.1	0.9	11,795	26.9	12,397	27.5	0.6
Two Vehicles	14,593	42.3	15,726	44.2	1.9	20,491	46.7	21,272	47.1	0.4
Three Vehicles	5,319	15.4	5,530	15.5	0.1	7,021	16.0	7,332	16.2	0.2
Four Vehicles	1,576	4.6	1,727	4.9	0.3	2,062	4.7	2,159	4.8	0.1
Five or More Vehicles	593	1.7	527	1.4	-0.3	753	1.8	808	1.8	- -
Total	34,522	100.0	35,607	100.0	- -	43,842	100.0	45,156	100.0	- -

	Waukesha County					Region				
	Federal Census		Household Survey			Federal Census		Household Survey		
Vehicle Availability	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent	Number of Households	Percent Distribution	Number of Households	Percent Distribution	Difference in Percent
No Vehicles	5,689	4.2	2,882	2.1	-2.1	81,325	10.9	64,449	8.5	-2.4
One Vehicle	33,831	25.0	35,236	25.4	0.4	263,319	35.2	272,904	35.9	0.7
Two Vehicles	65,838	48.7	70,189	50.6	1.9	291,380	38.9	307,578	40.5	1.6
Three Vehicles	22,616	16.7	23,133	16.7	- -	84,490	11.3	86,683	11.4	0.1
Four Vehicles	5,489	4.1	5,501	4.0	-0.1	21,113	2.8	21,682	2.9	0.1
Five or More Vehicles	1,766	1.3	1,896	1.2	-0.1	7,428	0.9	6,249	0.8	-0.1
Total	135,229	100.0	138,837	100.0	- -	749,055	100.0	759,545	100.0	- -

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

Table A-6 provides comparisons of data on the distribution of Regional and county population by gender from the 2000 Federal Census data and from the 2001 household travel survey. The comparison indicated that the distribution of population by gender by county was accurately estimated by the survey, with a difference no greater or less than 2.1 percent from Federal Census estimates.

Lastly, estimates of commercial truck availability, including estimates by type, as determined by the 2001 travel survey, were compared with corresponding estimates as derived from 2002 Wisconsin Department of Transportation, Division of Motor Vehicles, registration records. This comparison, shown in Table A-7, indicates a high degree of accuracy for the commercial truck data derived from the survey, both within the Region and within its counties.

Table A-4

COMPARISON OF THE DISTRIBUTION OF THE PERCENTAGE OF HOUSEHOLDS BY INCOME WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 RESIDENT HOUSEHOLD SURVEY

Household Income (in dollars)	Kenosha County			Milwaukee County			Ozaukee County			Racine County		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Under 19,999.....	17.5	11.1	-6.4	24.4	18.9	-5.5	9.1	4.2	-4.9	17.3	12.2	-5.1
20,000 to 39,999	24.5	27.3	2.8	27.9	29.5	1.6	18.5	19.2	0.7	23.0	25.7	2.7
40,000 to 49,999	10.8	13.4	2.6	11.1	13.0	1.9	9.3	11.5	2.2	11.5	13.6	2.1
50,000 to 74,999	23.1	24.6	1.5	19.2	21.2	2.0	23.7	24.9	1.2	24.3	25.4	1.1
75,000 to 99,999	13.3	13.5	0.2	9.5	10.2	0.7	15.5	18.6	3.1	12.9	12.2	-0.7
100,000 or Over	10.8	10.1	-0.7	7.9	7.2	-0.7	23.9	21.6	-2.3	11.0	10.9	-0.1
Total	100.0	100.0	- -	100.0	100.0	- -	100.0	100.0	- -	100.0	100.0	- -

Household Income (in dollars)	Walworth County			Washington County			Waukesha County			Region		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Under 19,000.....	17.3	11.6	-5.7	10.6	8.2	-2.4	9.4	5.3	-4.1	18.7	13.6	-5.1
20,000 to 39,999	24.8	26.2	1.4	19.6	20.7	1.1	17.2	17.1	-0.1	24.2	25.6	1.4
40,000 to 49,999	12.2	14.3	2.1	11.6	13.8	2.2	9.9	10.9	1.0	10.9	12.8	1.9
50,000 to 74,999	24.1	26.2	2.1	27.9	30.0	2.1	24.7	27.5	2.8	21.9	23.9	2.0
75,000 to 99,999	11.6	13.4	1.8	15.5	15.8	0.3	17.2	19.3	2.1	12.2	13.1	0.9
100,000 or Over	10.0	8.3	-1.7	14.8	11.5	-3.3	21.6	19.9	-1.7	12.1	11.0	-1.1
Total	100.0	100.0	- -	100.0	100.0	- -	100.0	100.0	- -	100.0	100.0	- -

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

The results of the accuracy checks of the household and truck travel survey with respect to socio-economic characteristics and vehicle availability data indicate that the survey data demonstrates a high degree of accuracy and completeness, particularly considering the surveys and Census were conducted in different years, the Census includes the Region's group quartered population and the household travel survey does not and with respect to certain socio-economic characteristics, both the travel survey and Census are sample surveys.

Travel Accuracy Checks

The travel accuracy checks included comparisons of travel to work characteristics as obtained from the 2000 Federal Census and from the 2001 travel survey. The comparisons included mode of travel to work and work purpose travel between the counties of the Region. In considering these comparisons, it must be recognized that the Census data and travel survey data are both from sample surveys, and that the Census data is not the same as the travel survey data. The Census data represents the "usual" mode and location of work travel over the prior week, and the Commission travel survey data represents travel on a specific assigned survey day. Therefore, some difference between the travel survey and Census data should be expected.

Table A-8 provides comparisons of the distribution of mode of travel to work by county as obtained from the 2000 Federal Census data and from the 2001 travel survey. Table A-9 compares county to county travel within the Region from place of residence to place of employment. The data from the two sources closely compare, particularly when the differences between the two surveys are considered.

To verify that travel into and out of the Region was adequately represented by the 2001 travel inventory, travel accuracy checks were conducted at the boundaries of the Region along a defined cordon line as shown on Map A-1.[2] The findings shown in Table A-10 indicated that the travel survey data accurately represented external travel affecting the Southeastern Wisconsin Region.

[2] *A cordon line is an imaginary line extending around a selected geographic area for the purpose of comparing and analyzing external travel data.*

Table A-5

COMPARISON OF THE DISTRIBUTION OF HOUSEHOLDS BY LIFESTYLE WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 RESIDENT HOUSEHOLD SURVEY

Age of Head of Household	Kenosha County					Milwaukee County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent
65 or Older	10,948	19.5	11,853	20.6	1.1	79,979	21.2	67,730	17.9	-3.3
Under 65 without Children	25,610	45.7	25,052	43.7	-2.0	186,561	49.4	194,455	51.3	1.9
with Children	19,499	34.8	20,478	35.7	0.9	111,189	29.4	116,944	30.8	1.4
Total	56,057	100.0	57,383	100.0	- -	377,729	100.0	379,129	100.0	- -

Age of Head of Household	Ozaukee County					Racine County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent
65 or Older	6,491	21.0	5,920	18.7	-2.3	14,739	20.8	14,482	20.2	-0.6
Under 65 without Children	13,275	43.0	14,318	45.2	2.2	31,682	44.7	32,190	44.9	0.2
with Children	11,091	36.0	11,441	36.1	0.1	24,398	34.5	25,082	34.9	0.4
Total	30,857	100.0	31,679	100.0	- -	70,819	100.0	71,754	100.0	- -

Age of Head of Household	Walworth County					Washington County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent
65 or Older	7,314	21.2	6,743	18.9	-2.3	8,121	18.5	8,123	18.0	-0.5
Under 65 without Children	16,239	47.0	16,814	47.2	0.2	19,763	45.1	20,199	44.7	-0.4
with Children	10,969	31.8	12,050	33.9	2.1	15,958	36.4	16,834	37.3	0.9
Total	34,522	100.0	35,607	100.0	- -	43,842	100.0	45,156	100.0	- -

Age of Head of Household	Waukesha County					Region				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent	Number	Percent Distribution	Number	Percent Distribution	Difference in Percent
65 or Older	26,763	19.8	26,076	18.8	-1.0	154,355	20.6	140,927	18.6	-2.0
Under 65 without Children	60,618	44.8	61,744	44.5	-0.3	353,748	47.2	364,772	48.0	0.8
with Children	47,848	35.4	51,017	36.7	1.3	240,952	32.2	253,846	33.4	1.2
Total	135,229	100.0	138,837	100.0	- -	749,055	100.0	759,545	100.0	- -

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

Another set of travel accuracy checks included comparisons of the travel survey data with traffic counts of vehicle crossings at selected east-west screenlines within the Region.[3] Three screenlines, as shown on Map A-1, were defined in the Milwaukee, Racine and Kenosha urbanized areas which paralleled natural or manmade barriers to minimize undetected crossings. The Milwaukee screenline, which roughly paralleled IH 94, extended across the Region from the Waukesha-Jefferson County line on the west to Lake Michigan on the east. The results of the

[3] *A screenline is an imaginary line extending through a selected portion of a geographic area along natural or built barriers providing a limited number of crossing points established for the purpose of comparing and analyzing travel data as estimated from traffic counts with data derived from travel surveys.*

Table A-6

COMPARISON OF THE DISTRIBUTION OF POPULATION BY GENDER WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND THE 2001 RESIDENT HOUSEHOLD SURVEY

	Kenosha County					Milwaukee County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
Gender	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent
Male	74,200	49.6	72,400	49.0	-0.6	450,600	47.9	423,600	46.8	-1.1
Female	75,400	50.4	75,500	51.0	0.6	489,600	52.1	481,600	53.2	1.1
Total	149,600	100.0	147,900	100.0	- -	940,200	100.0	905,200	100.0	- -

	Ozaukee County					Racine County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
Gender	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent
Male	40,600	49.3	40,700	49.3	- -	93,400	49.5	87,300	47.4	-2.1
Female	41,700	50.7	41,800	50.7	- -	95,400	50.5	96,800	52.6	2.1
Total	82,300	100.0	82,500	100.0	- -	188,800	100.0	184,100	100.0	- -

	Walworth County					Washington County				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
Gender	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent
Male	46,600	49.7	45,100	49.3	-0.3	58,600	49.9	58,600	48.8	-1.2
Female	47,100	50.3	46,300	50.7	0.3	58,900	50.1	61,600	51.2	1.2
Total	93,700	100.0	91,400	100.0	- -	117,500	100.0	120,200	100.0	- -

	Waukesha County					Region				
	2000 Federal Census		2001 Resident Household Survey			2000 Federal Census		2001 Resident Household Survey		
Gender	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent	Population	Percent Distribution	Population	Percent Distribution	Difference in Percent
Male	177,500	49.2	176,200	48.4	-0.8	941,500	48.7	903,900	47.7	-1.0
Female	183,300	50.8	187,500	51.6	0.8	991,400	51.3	991,100	52.3	1.0
Total	360,800	100.0	363,700	100.0	- -	1,932,900	100.0	1,895,000	100.0	- -

Note: Differences in population between the 2000 Federal Census and the 2001 resident household survey are attributable to sampling error. The 2000 Federal Census is a 100 percent sample, while the estimate of population from the 2001 resident household survey is based on a 2 percent sample of households in the Region. In addition, the 2000 Federal Census estimate of population includes group quartered residents, while the estimate of population does not.

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

Table A-7

COMPARISON OF SOUTHEASTERN WISCONSIN TRUCK REGISTRATIONS AND TRUCK AVAILABILITY AS DETERMINED BY THE 2001 TRUCK TRAVEL SURVEY

	2002 Truck Registrations		2001 Truck Survey		Difference	
Truck Classification	Number	Percent Distribution	Number	Percent Distribution	Number	Percent
Light	84,800	66.3	79,600	61.5	-5,200	-6.1
Medium and Heavy	34,600	27.1	42,200	32.6	7,600	22.0
Municipal	8,500	6.6	7,700	5.9	-800	-9.4
Total	127,900	100.0	129,500	100.0	1,600	1.3

Source: Wisconsin Department of Transportation and SEWRPC.

Table A-8

COMPARISON OF MODE SHARE FOR TRAVEL TO WORK WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 TRAVEL SURVEY

Mode	Kenosha County			Milwaukee County		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Drive Alone	85.3	89.0	3.7	76.9	81.0	4.1
Carpool	11.0	8.3	-2.7	11.8	8.4	-3.4
Public Transit	1.1	0.8	-0.3	6.9	6.3	-0.6
Taxi	0.1	0.0	-0.1	0.1	0.0	-0.1
Motorcycle	0.1	0.1	0.0	0.1	0.4	0.3
Bicycle/Walk	2.4	1.8	-0.6	4.2	3.9	-0.3
Total	100.0	100.0	--	100.0	100.0	--

Mode	Ozaukee County			Racine County		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Drive Alone	88.3	90.1	1.8	85.9	92.7	6.8
Carpool	8.1	7.8	-0.3	10.1	3.8	-6.3
Public Transit	0.4	0.3	-0.1	1.6	1.1	-0.5
Taxi	0.1	0.5	0.4	0.0	0.1	0.1
Motorcycle	0.1	0.8	0.7	0.1	0.2	0.1
Bicycle/Walk	3.0	0.5	-2.5	2.3	2.1	-0.2
Total	100.0	100.0	--	100.0	100.0	--

Mode	Walworth County			Washington County		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Drive Alone	84.2	90.5	6.3	88.8	92.5	3.7
Carpool	9.7	6.8	-2.9	8.9	5.5	-3.4
Public Transit	0.8	0.0	-0.8	0.4	0.1	-0.3
Taxi	0.0	0.3	0.3	0.3	0.2	-0.1
Motorcycle	0.1	0.2	0.1	0.2	0.1	-0.1
Bicycle/Walk	5.2	2.2	-3.0	1.4	1.6	0.2
Total	100.0	100.0	--	100.0	100.0	--

Mode	Waukesha County			Region		
	2000 Federal Census	2001 Resident Household Survey	Difference in Percent	2000 Federal Census	2001 Resident Household Survey	Difference in Percent
Drive Alone	90.2	94.2	4.0	82.8	86.9	4.1
Carpool	7.4	4.4	-3.0	10.2	6.8	-3.4
Public Transit	0.7	0.3	-0.4	3.6	3.3	-0.2
Taxi	0.0	0.0	0.0	0.1	0.1	0.0
Motorcycle	0.0	0.3	0.3	0.1	0.3	0.2
Bicycle/Walk	1.7	0.8	-0.9	3.2	2.6	-0.6
Total	100.0	100.0	--	100.0	100.0	--

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

Table A-9

COMPARISON OF THE DISTRIBUTION OF COUNTY TO COUNTY WORK TRAVEL WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM THE 2000 FEDERAL CENSUS AND 2001 TRAVEL SURVEY

County of Residence		County of Employment							Total
		Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	
Kenosha	2000 Federal Census	79.8	4.5	0.2	12.9	1.2	0.0	1.4	100.0
	2001 Resident Household Survey	78.1	5.2	0.1	13.1	1.7	0.2	1.6	100.0
	Difference in Percent	-1.7	0.7	-0.1	0.3	0.5	0.2	0.2	- -
Milwaukee	2000 Federal Census	0.4	81.9	1.8	1.2	0.2	1.0	13.5	100.0
	2001 Resident Household Survey	0.4	82.2	1.6	1.2	0.2	1.0	13.4	100.0
	Difference in Percent	0.0	0.3	-0.2	0.0	0.0	0.0	-0.1	- -
Ozaukee	2000 Federal Census	0.1	35.9	53.5	0.2	0.2	4.6	5.5	100.0
	2001 Resident Household Survey	0.0	35.3	51.8	0.3	0.0	4.5	8.1	100.0
	Difference in Percent	-0.1	-0.6	-1.7	0.1	-0.2	-0.1	2.6	- -
Racine	2000 Federal Census	6.8	15.0	0.5	70.8	1.9	0.2	4.8	100.0
	2001 Resident Household Survey	7.2	14.2	0.4	70.6	2.0	0.3	5.3	100.0
	Difference in Percent	0.4	-0.8	-0.1	-0.2	0.1	0.1	0.5	- -
Walworth	2000 Federal Census	2.2	5.8	0.1	5.7	77.9	0.4	7.9	100.0
	2001 Resident Household Survey	1.6	7.9	0.0	6.0	74.2	0.6	9.7	100.0
	Difference in Percent	-0.6	2.1	-0.1	0.3	-3.7	0.2	1.8	- -
Washington	2000 Federal Census	0.1	23.4	7.4	0.1	0.1	52.5	16.4	100.0
	2001 Resident Household Survey	0.1	22.8	6.4	0.1	0.0	50.6	20.0	100.0
	Difference in Percent	0.0	-0.6	-1.0	0.0	-0.1	-1.9	3.6	- -
Waukesha	2000 Federal Census	0.2	32.5	0.7	0.7	0.7	1.6	63.6	100.0
	2001 Resident Household Survey	0.3	35.2	1.0	0.8	0.7	2.1	59.9	100.0
	Difference in Percent	0.1	2.7	0.3	0.1	0.0	0.5	-3.7	- -

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

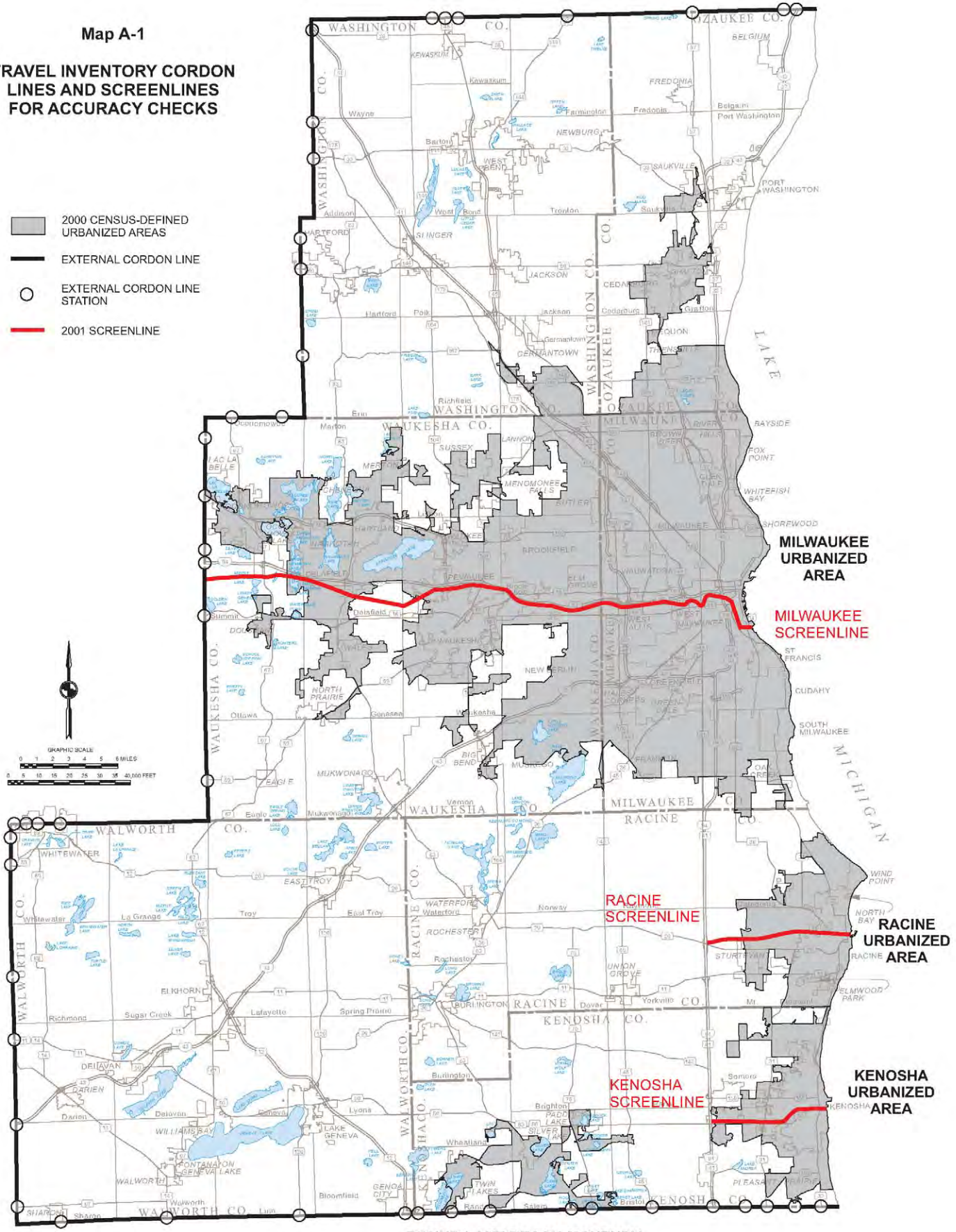
screenline accuracy checks on the travel survey data, as shown in Table A-11, indicated that the simulated traffic volumes from the travel survey data accurately represented actual traffic counts in 2001, accounting for 98.6 percent of the traffic volumes crossing the screenlines in Kenosha, 101.1 percent in Milwaukee, and 106.9 percent in Racine.

The final major travel accuracy check compared simulated vehicle-miles of travel by county and for the Region as derived from the travel surveys and estimated actual vehicle miles based upon traffic counts. As shown in Table A-12, vehicle miles of travel as derived from the 2001 travel inventory, varied by 4.8 to 14.4 percent from estimated actual vehicle miles of travel at the county level. At the Regional level, simulated vehicle-miles of travel represented 102.6 percent of total vehicle-miles of travel estimated from traffic counts, indicating that the simulated travel from travel survey data accurately replicates travel in the Region.

The results of socio-economic and travel accuracy checks on the travel inventory data indicate that the 2001 travel surveys are able to replicate regional socio-economic characteristics and travel with a high degree of accuracy and completeness.

Map A-1

TRAVEL INVENTORY CORDON LINES AND SCREENLINES FOR ACCURACY CHECKS



ROUND LAKE BEACH-MCHENRY-GRAYSLAKE, IL–WI URBANIZED AREA (WISCONSIN PORTION)

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

Table A-10

COMPARISON OF ESTIMATED AVERAGE WEEKDAY TRAFFIC VOLUMES CROSSING THE SOUTHEASTERN WISCONSIN REGION BOUNDARY IN 2001 FROM TRAFFIC COUNTS AND FROM THE TRAVEL SURVEY

Region Boundary Cordon Line Segment	Total Vehicle Traffic			
	Estimated Average Weekday Traffic Volumes		Difference in Volumes	Percent Difference
	Traffic Counts	Travel Survey Data		
Northern	48,500	44,400	-4,100	-8.5
Western	165,700	178,600	12,900	7.8
Southern	161,000	153,800	-7,200	-4.5
Total	375,200	376,800	1,600	0.4

Source: Wisconsin Department of Transportation and SEWRPC.

Table A-11

COMPARISON OF ESTIMATED AVERAGE WEEKDAY VEHICULAR TRAFFIC CROSSING THE KENOSHA, MILWAUKEE, AND RACINE SCREENLINES FROM TRAFFIC COUNTS AND FROM THE TRAVEL SURVEY

Screenline	Total Vehicle Traffic			
	Estimated Average Weekday Traffic Volumes		Difference in Volumes	Percent Difference
	Traffic Counts	Travel Survey Data		
Kenosha	210,500	207,600	-2,900	-1.4
Milwaukee	930,400	940,300	9,900	1.1
Racine	188,200	201,100	12,900	6.9

Source: Wisconsin Department of Transportation and SEWRPC.

Table A-12

COMPARISON OF THE ESTIMATED ARTERIAL VEHICLE MILES OF TRAVEL ON AN AVERAGE WEEKDAY WITHIN THE SOUTHEASTERN WISCONSIN REGION FROM TRAFFIC COUNTS AND FROM THE TRAVEL SURVEY

County	Estimated Average Weekday Vehicle Miles of Travel from Traffic Counts (in Thousands)	Simulated Average Weekday Vehicle Miles of Travel from Travel Survey Data (in Thousands)	Difference	
			Number	Percent
Kenosha	3,126	2,977	-149	-4.8
Milwaukee	16,377	15,568	-809	-4.9
Ozaukee	2,259	2,415	156	6.9
Racine	3,383	3,611	228	6.7
Walworth	2,335	2,484	149	6.4
Washington	3,095	3,540	445	14.4
Waukesha	9,107	10,137	1030	11.3
Region	39,682	40,732	1050	2.6

Source: Wisconsin Department of Transportation and SEWRPC.

Appendix B

REGIONAL BICYCLE AND PEDESTRIAN PLAN ELEMENT FACILITY STANDARDS AND DESIGN GUIDELINES

BICYCLE AND PEDESTRIAN FACILITY STANDARDS

The standards for bicycle and pedestrian facilities presented in Chapter VII, "Objectives, Principles and Standards", of this report are repeated below:

- All arterial streets and highways (including their bridge and underpass facilities) except freeways should provide accommodation for bicyclists upon construction or reconstruction, or—for arterial facilities having a rural cross-section—if possible, when resurfaced. On two-lane streets and highways having a rural cross-section, a four feet paved shoulder with a six feet graded shoulder is desirable, and on four lane rural highways an eight feet paved shoulder is desirable. On streets and highways having an urban cross-section, accommodation may be provided through bicycle lanes of five to six feet in width, or through provision of widened outside travel lanes. The outside travel lane should have a minimum usable width of 14 feet. On streets and highways without parking lanes, the usable lane width should be measured from the inside edge of the lane to the edge of the gutter section. The provision of a physically separate bicycle path (one-way width of five to six feet and two-way width of eight to 12 feet with separation from highway of 10 feet) should be considered if the above accommodation cannot be provided and/or the following criteria are generally met:

    1. More than four travel lanes for motor vehicles;
    2. Average weekday motor-vehicle traffic includes more than 10 percent heavy trucks and buses;
    3. Grades in excess of 5 percent for segments of more than 500 feet in length;
    4. More than 30 public street intersections or commercial driveways per mile;
    5. Motor-vehicle operating speeds exceed 35 miles per hour;
    6. Average weekday traffic volumes exceed arterial design capacity, and result in traffic congestion.

    As an alternative, the designation of bicycle routes on parallel collector or land access streets may be considered. Bicyclists should be accommodated either on-street or on a parallel collector or land access street, particularly if there are 30 or more street intersections or commercial driveways per mile.

- A regional system of off-street bicycle paths should be provided in accordance with the recommendations set forth in the adopted park and open space plans for each of the seven counties in the Region. These off-street bicycle paths should provide reasonably direct connections between the urban areas and communities of the Region on safe and aesthetically attractive routes with separation from motor vehicle traffic. Support facilities such as restrooms, drinking fountains, and information kiosks should be provided along off-street bicycle paths and hiking trails at intervals of no more than 15 miles.

- Sidewalks should be provided in areas of urban development of the Region as follows:

Roadway Functional Classification	Land Use	New Streets	Existing Streets
Arterial Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential	Both Sides	Both Sides
Collector Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential	Both Sides	At least one side
Land Access Streets	Industrial	Both Sides	Both Sides
	Commercial	Both Sides	Both Sides
	Residential (medium-and high-density)	Both Sides	At least one side
	Residential (low density)	At least one side	At least one side

  - Sidewalks may be omitted on one side of streets where there are no existing or anticipated uses that would generate pedestrian trips on that side.
  - Where there are marginal access control or service roads, the sidewalk along the main road may be eliminated and replaced by a sidewalk along the service road on the side away from the main road.
  - Sidewalks need not be provided along court and cul-de-sac streets less than 600 feet in length, unless such streets serve multi-family development; or along streets served by parallel off-street walkways.
  - In low density residential cluster developments, sidewalks could be replaced by perimeter and interior pathway systems.

- All transit stations should be readily accessible by bicyclists and pedestrians. All transit stops should be served by sidewalks or walkways.

- Secure bicycle parking should be provided at all park-ride lots and where off-street parking is provided or where parking demand is met by on-street parking. Bicycle parking should be provided at the entrance to buildings.

- Provision for transporting bicycles on transit vehicles should be considered.

DESIGN GUIDELINES

These design guidelines are intended to provide guidance to State, county, and local officials for the location, design, and maintenance of bicycle, pedestrian, and shared bicycle and pedestrian facilities. Because the level of bicycle and pedestrian activity is dependent in part on the density and design of land use and transportation facilities, this chapter also sets forth guidelines related to the design of streets, residential areas, and activity centers which may be expected to enhance opportunities for bicycle and pedestrian travel.

Planning Guidelines for Bicycle Facilities[1]

Introduction

The type of bicycle facility that should be provided in a specific location is dependent upon a number of factors. For bicycle ways proposed to be located within a street or highway right-of-way, factors that should be considered include motor-vehicle speeds and volumes; the number of trucks and buses using the roadway; the presence and duration of on-street parking; the number of intersections and commercial driveways; pavement and right-of-way width; and shoulder width and surfacing. Bicycle level of service should be used to evaluate the type of bicycle facility to be provided. The type of facility that should be provided will also depend on the type of roadway cross-section. Shared roadways, wide outside travel lanes, and bicycle lanes are generally appropriate for roadways with curb and gutter, while shoulder bicycle ways are appropriate for roadways without curb and gutter. It is also important to provide continuity and consistency in the type of bicycle way provided.

Arterial Streets and Highways

Arterial streets are designed to carry high volumes of through traffic at relatively high speeds. Arterial streets are attractive for use by longer-distance utilitarian bicyclists because they are continuous, generally direct in alignment, and allow the bicyclist to maintain momentum because traffic control devices generally give priority to the arterial street over intersecting streets. In addition, activity centers such as shopping and office centers are often located on arterial streets.

Because of the high volumes and speeds of motor vehicles operating on arterial streets and highways, it will generally be necessary to provide a wide outside travel lane, a bicycle lane, or a paved shoulder to accommodate bicyclists on arterial facilities. In some cases, a separate bicycle path within a highway right-of-way may be needed to safely accommodate bicyclists.

Land Access and Collector Streets

Land access streets are intended to provide access to individual building sites. Land access streets generally have low traffic volumes and operating speeds, and can safely accommodate bicyclists of all ages and skill levels, except young children, without widening of the roadway. Such streets may provide an alternative to bicycle travel on nearby arterial streets, particularly for children and adult bicyclists who are uncomfortable operating on busy streets.

Collector streets connect to arterial streets, serving to collect traffic from and distribute traffic to land access streets. Such streets are not intended to serve high-speed or long-distance through traffic and can generally accommodate bicycle travel without special roadway geometrics.

Bicycle Access within and between Neighborhoods

Land access and collector streets without bicycle lanes or wide outside travel lanes are generally adequate to accommodate bicycle travel within residential neighborhoods and major activity centers. Off-street bicycle ways should be provided to connect adjacent subdivisions that lack direct street access, or to connect cul-de-sac streets within a subdivision. Off-street bicycle ways within a neighborhood should also be considered to provide access from residences to a school, park, or neighborhood shopping center.

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[1]*The design guidelines set forth in this chapter are not intended to serve as a comprehensive guide to the design of streets and highways to accommodate bicycles, but are intended to suggest the general type of design treatments that may be appropriate in certain situations. Design specifications should be determined during engineering studies for specific street and highway projects, and should be based upon recommendations contained in the* Guide for the Development of Bicycle Facilities*, published by the American Association of State Highway and Transportation Officials (AASHTO) and referred to hereafter in this chapter as the "AASHTO Bicycle Guide."*

Safe bicycle access should be provided between residential neighborhoods, between residential neighborhoods and major activity centers, and across barriers such as arterial streets, streams, and railway rights-of-way. Such access may require the provision of crosswalks or traffic control devices or the construction of bicycle underpasses or overpasses.

Bicycle-Way Types and Roadway Improvements to Accommodate Bicycle Travel

Shared Roadways

On a shared roadway, bicyclists and motorists share a travel lane. Standard travel lane widths of 10 to 12 feet on arterial streets are generally inadequate to accommodate bicycles and motor vehicles side by side in the same lane, and motor vehicles must cross the centerline or move into another travel lane to safely pass a bicyclist. Shared lanes are generally adequate to accommodate bicyclists on streets with low motor-vehicle traffic volumes and speeds and little truck traffic, such as collector and land access streets. On streets with higher volumes of motor-vehicle traffic, such as arterial streets, or with significant truck traffic, shared-lane bicycle travel may decrease the capacity of the roadway and create a hazardous situation for bicyclists.

Outside travel lanes wider than the standard 10 to 12 feet are desirable to accommodate bicyclists on arterial streets. Wider lanes allow a motorist overtaking a bicyclist to pass the bicyclist without changing lanes or encroaching into an adjacent motor-vehicle lane. Wider lanes also accommodate shared bicycle and motor-vehicle use without reducing the roadway capacity for motor-vehicle traffic.

Outside travel lanes should provide a minimum usable width of 14 feet, with usable width measured from the inside edge of the travel lane to the longitudinal joint between the pavement and gutter section on streets without on-street parking. On streets that allow parking, an outside travel lane of at least 14 feet should be provided. The parking lane should be striped to ensure that parked vehicles do not encroach into the bicycle travel path.

Lane widths of more than 16 feet should be used with caution because they may encourage the unsafe operation of two motor vehicles in one lane. If lanes wider than 16 feet from lane stripe to curb face are provided, a bicycle lane or an edge stripe should be provided. Desirable cross-sections for roadways having wide outside travel or curb lanes are shown in Figure B-1.

Bicycle Lanes

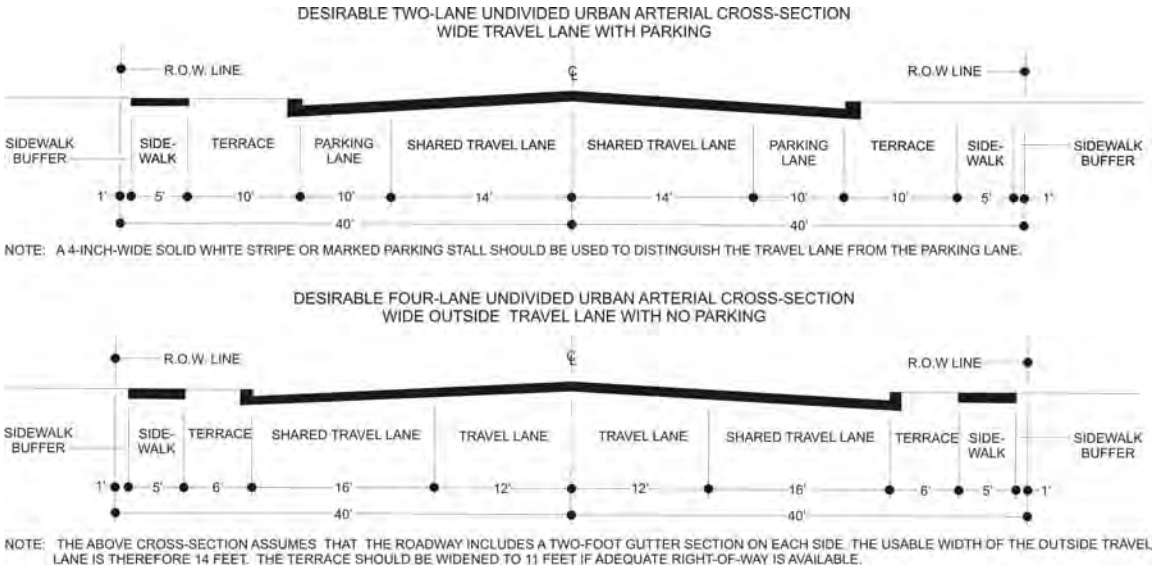
A bicycle lane is a portion of a roadway designated for the exclusive or preferential use of bicyclists by signing and pavement markings. Recommendations for signing and pavement markings for bicycle lanes are set forth in the *Manual on Uniform Traffic Control Devices*. Bicycle lanes should always be one-way facilities carrying traffic in the same direction as adjacent motor-vehicle traffic. Desirable cross-sections for streets and highways with bicycle lanes are shown in Figure B-2.

On streets where parking is prohibited, a minimum bicycle-lane width of five feet should be provided, with at least four feet located to the left of the longitudinal joint between the pavement and gutter section. The width of the bicycle lane should be increased to six feet on streets where motor-vehicle operating speeds exceed 35 miles per hour and on streets carrying significant numbers of transit vehicles or trucks. A pavement stripe is generally not necessary on the curb side of the bicycle lane if street parking is not permitted.

On streets where parking is permitted, bicycle lanes should be located between the outside motor-vehicle travel lane and the parking lane. Both sides of the bicycle lane should be marked. A left-hand pavement stripe should be used to differentiate the motor-vehicle travel lane from the bicycle lane and a right-hand pavement stripe should be used to separate the bicycle lane from the parking lane. A minimum bicycle-way width of five feet should be provided; however, a bicycle-lane width of six feet is recommended in order to provide bicyclists with additional separation from parked motor vehicles and the danger presented by opening vehicle doors. Bicycle lanes should not be located between the curb and the parking lane. Such a location reduces the visibility of bicyclists at intersections and increases the potential for bicycle-motor vehicle conflicts and collisions.

Figure B-1

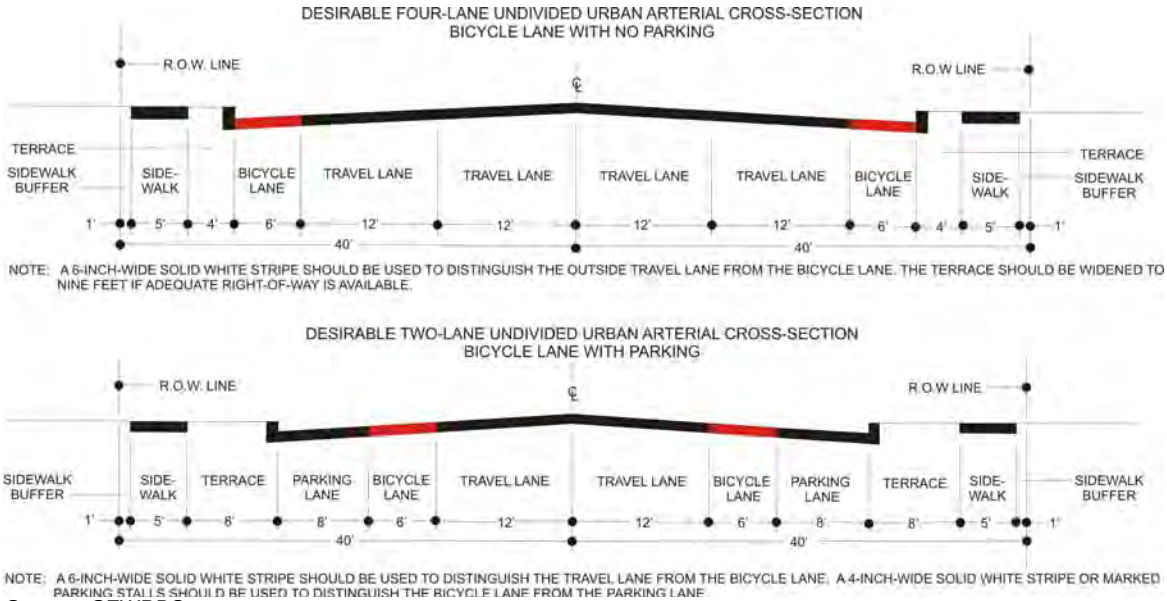
DESIRABLE CROSS-SECTIONS FOR ROADWAYS WITH WIDE OUTSIDE TRAVEL OR CURB LANES



Source: SEWRPC.

Figure B-2

DESIRABLE CROSS-SECTIONS FOR STREETS AND HIGHWAYS WITH BICYCLE LANES

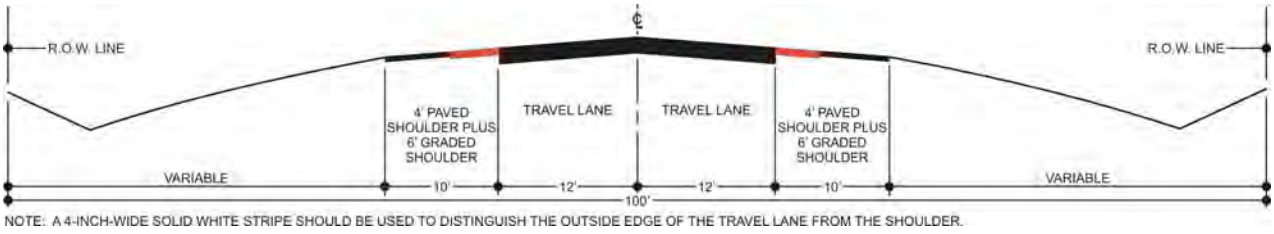


Source: SEWRPC.

Bicycle lanes should not be separated from motor-vehicle travel lanes by curbing or other barriers. Such barriers prevent motor-vehicle drivers and bicyclists from executing proper merging maneuvers in advance of intersections and limit the ability of bicyclists to take evasive action at driveways. The construction of lane barriers along arterial streets would, moreover, create significant operational problems relating to snow removal, street maintenance, and utility construction and maintenance.

Figure B-3

DESIRABLE TWO-LANE RURAL ARTERIAL CROSS-SECTION: SHOULDER BICYCLE WAY



NOTE: A 4-INCH-WIDE SOLID WHITE STRIPE SHOULD BE USED TO DISTINGUISH THE OUTSIDE EDGE OF THE TRAVEL LANE FROM THE SHOULDER.

Source: SEWRPC.

Recent changes in State law facilitate the maneuvers of bicyclists turning left from a bicycle lane and motorists turning right from the left of the bicycle lane by allowing motorists to enter the bike lane to turn right, and allowing the bicyclist to turn left from the appropriate traffic lane. This revision makes these maneuvers consistent with generally accepted rules of the road. Design guidelines for intersection treatments intended to encourage proper merging maneuvers are included in a later section of this appendix.

Transit/Bicycle Lanes

A travel lane on an arterial street or highway intended to be shared by bicycles and transit vehicles should be 16 feet wide. Where bicycle traffic is significant, consideration should be given to delineating a 12-foot lane for transit vehicles adjacent to the curb and a four-foot lane for bicycles between the transit-vehicle lane and the motor-vehicle travel lane. The bicycle lane should not be placed between the transit-vehicle lane and the curb because doing so puts embarking and disembarking transit passengers at risk of being hit by a bicyclist and puts bicyclists at risk of being caught between the curb and a transit vehicle pulling over to a bus stop.

Shoulder Bicycle Ways

A shoulder is that portion of a roadway contiguous to the traveled way on streets and highways. Shoulders are generally constructed on streets and highways without curbs and gutters. The shoulder is intended for emergency use and also provides support for the traveled portion of the roadway.

Adding or improving shoulders can be a cost-effective way to accommodate bicyclists on streets and highways having a rural cross-section. In such cases, shoulders should be paved to a minimum width of four feet on two-lane streets and highways and eight feet on four-or-more-lane streets and highways. If shoulders wider than eight feet are needed, the additional area should not be paved. This is to discourage motor-vehicle operators from using the shoulders for passing. A pavement stripe should be used to visually separate the motor-vehicle travel way from the shoulder. Figure B-3 shows a desirable cross-section for a shoulder bicycle way on a two-lane rural arterial.

Bicycle Paths

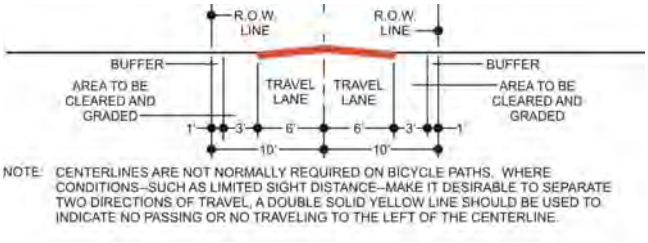
A bicycle path is a bicycle way that is physically separated from motor-vehicle traffic by distance or a barrier. A bicycle path may be located within a highway right-of-way or within a separate corridor such as a parkway, an abandoned railway corridor, or a utility right-of-way. Bicycle paths are normally two-way facilities, and often accommodate pedestrians as well as bicyclists.

Bicycle paths should not be located immediately adjacent to a roadway. The AASHTO Bicycle Guide lists the following problems commonly encountered with such a location:

- Unless paired, bicycle paths require one direction of bicycle traffic to ride against motor-vehicle traffic, contrary to the rules of the road.

Figure B-4

DESIRABLE TWO-WAY BICYCLE-PATH CROSS-SECTION PAVED SURFACE OUTSIDE STREET RIGHT-OF-WAY



Source: SEWRPC.

- When the bicycle path ends, bicyclists going against traffic will tend to continue traveling on the wrong side of the street. Likewise, bicyclists approaching a bicycle path often travel on the wrong side of the street to access the path. Wrong-way travel by bicyclists is a major cause of bicycle-motor vehicle accidents and should be discouraged at every opportunity.

- At intersections, motorists entering or crossing the roadway often will not notice bicyclists coming from their right, as they are not expecting contraflow vehicles.

- Many bicyclists will use the roadway instead of the bicycle path because they find the roadway to be safer, more convenient, or better maintained. Bicyclists using the roadway are often harassed by motorists who feel that bicyclists should be using the path.

- Bicyclists using the bicycle path generally are required to stop or yield at all cross-streets and driveways, while bicyclists using the roadway usually have priority over cross-traffic, because they have the same right-of-way as motorists.

- Because of the proximity of motor-vehicle traffic to opposing bicycle traffic, barriers are often necessary to keep motor vehicles out of bicycle paths and bicyclists out of traffic lanes. These barriers can represent an obstruction to bicyclists and motorists, and complicate maintenance of the bicycle path.

The construction of bicycle paths as parallel facilities to serve freeway or other arterial corridors should be considered where it is not feasible to locate a bicycle way on the arterial due to high posted motor-vehicle speeds or high volumes. Generally, bicycle ways should not be provided on streets and highways with vehicle operating speeds of more than 35 miles per hour or with traffic volumes in excess of those set forth in Standard No. 4 under Objective No. 1. Bicycle paths can be a valuable addition to the bicycle-way system in situations where the bicycle path offers good separation between bicycles and motor vehicles and where there are few at-grade intersections. Bicycle paths can also serve as important links between cul-de-sac streets or subdivisions.

Bicycle paths are commonly used to provide recreational opportunities through parks and natural resource corridors. Bicycle paths can also serve utilitarian bicyclists if they offer a more pleasant route than on-street bicycle ways without compromising speed, directness, or safety.

Figure B-4 shows a desirable cross-section for bicycle paths in rights-of-way independent from street and highway rights-of-way. A one-way bicycle path should be a minimum of five feet wide if built of concrete and six feet wide if built of asphalt concrete. The minimum six-foot-width requirement for an asphalt concrete path is based on the economics of paving. The smallest width a standard asphalt paving machine can pave is six feet. A path smaller in size is more expensive to build due to equipment and labor costs. With either a concrete or asphalt path, a stone base with a minimum width of 10 feet should be provided. The 10-foot width is necessary to accommodate and prevent damage due to construction equipment and maintenance vehicles.

Two-way bicycle paths should be a minimum of 10 feet wide with a minimum two-foot clearance on each side; however, a minimum width of eight feet may be adequate when the amount of bicycle and pedestrian traffic is expected to be low, there will be good horizontal and vertical alignment providing safe and frequent passing opportunities, and the path will not be subjected to maintenance-vehicle loading conditions that would cause pavement edge damage. In areas where higher volumes of pedestrian and bicycle use are anticipated—generally

more than 25 pedestrians and 25 bicyclists per peak hour—consideration should be given to providing a 12-foot-wide path or separate paths for pedestrians and bicyclists. A centerline stripe and stripes indicating areas intended for bicyclists and those intended for pedestrians should be used to keep bicycles from straying outside the proper lane on sharp curves or in other areas with poor sight distance where it is not possible to reconstruct the curve or improve sight distance.

Desirable cross-sections for bicycle paths located within a street or highway right-of-way are shown in Figure B-5. A minimum separation of five feet is recommended between the bicycle path and the edge of the pavement in such situations. Use of a fence or concrete divider should be considered to offer additional protection to bicyclists from motor-vehicle traffic. The barrier should be no less than 4.5 feet in height to avoid the possibility of bicyclists falling over the barrier and into motor-vehicle traffic.

A barrier should be provided wherever a bicycle path intersects a roadway and less restrictive measures such as signing and enforcement have failed to prevent unauthorized motor-vehicle use of the path. A removable post that prevents unauthorized entry but allows access by maintenance and emergency vehicles is commonly used. The post should be brightly painted to improve its visibility for both motorists and bicyclists. Separating the path at the street intersection and installing low landscaping that can be crossed by maintenance and emergency vehicles also serve to discourage motor-vehicle use of the bicycle path.

Intersections

Introduction

A high percentage of bicycle-motor vehicle collisions occur at intersections. The presence of bicycle lanes and shoulder bicycle ways tends to further complicate turning movements at intersections because the bicycle ways separate bicycle and motor-vehicle traffic and tend to discourage merging and lane changes that should occur in advance of the intersection. Proper bicycle turning maneuvers are illustrated in Figure B-6. Wisconsin law provides bicyclists with the option of making either a pedestrian-style or a vehicle-style left turn, both of which are illustrated in Figure B-6.

Signing and Pavement Markings

The AASHTO Bicycle Guide recommends that signing and striping configurations, in accordance with recommendations contained in the *Manual on Uniform Traffic Control Devices,* be used to encourage and guide bicycle and motor-vehicle crossings in advance of an intersection. The clear demarcation of lanes and lane destinations can assist both bicyclists and motorists in choosing the proper lane

.

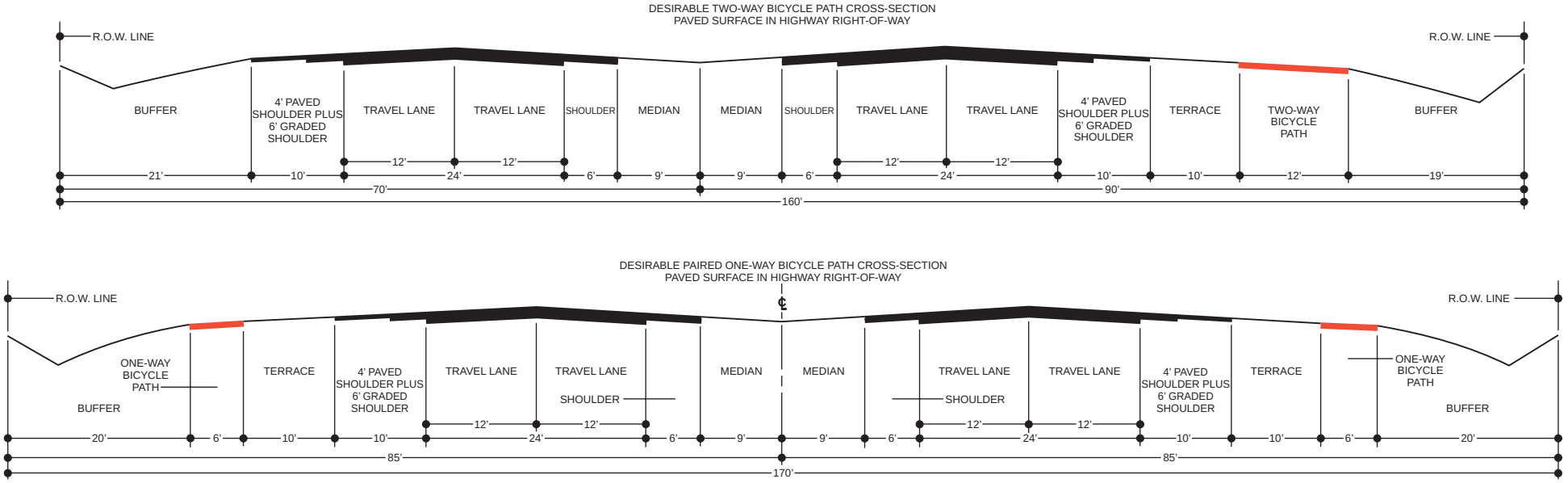
Figure B-7 illustrates typical pavement markings at intersections on streets having bicycle lanes but no exclusive turning lanes. The *Manual on Uniform Traffic Control Devices* recommends that the solid stripes delineating the bicycle lane end at least 50 feet before the intersection. Dashed lines that delineate the bicycle lane for through bicyclists, but allow turning motor vehicles to merge across the bicycle lane, may be provided across the intersection. Another accepted option is to discontinue all bicycle-lane markings in the vicinity of the intersection.

Intersections Involving Exclusive Right-Turn Lanes

On a street having both a bicycle lane and an exclusive right-turn lane, care must be taken to channelize through bicycle traffic to the left of the right-turn lane. The bicycle-lane stripe should be dashed or ended before the intersection to allow motor-vehicle and bicycle traffic to cross paths prior to the intersection. The striped bicycle lane may be resumed to the left of the right-turn lane at the intersection. In cases where an optional right-turn/through lane is provided, a bicyclist traveling straight ahead must be positioned in the center of the lane to avoid colliding with motorists turning right. Figure B-8 presents examples of pavement markings for bicycle lanes approaching motorist right-turn-only lanes.

Figure B-5

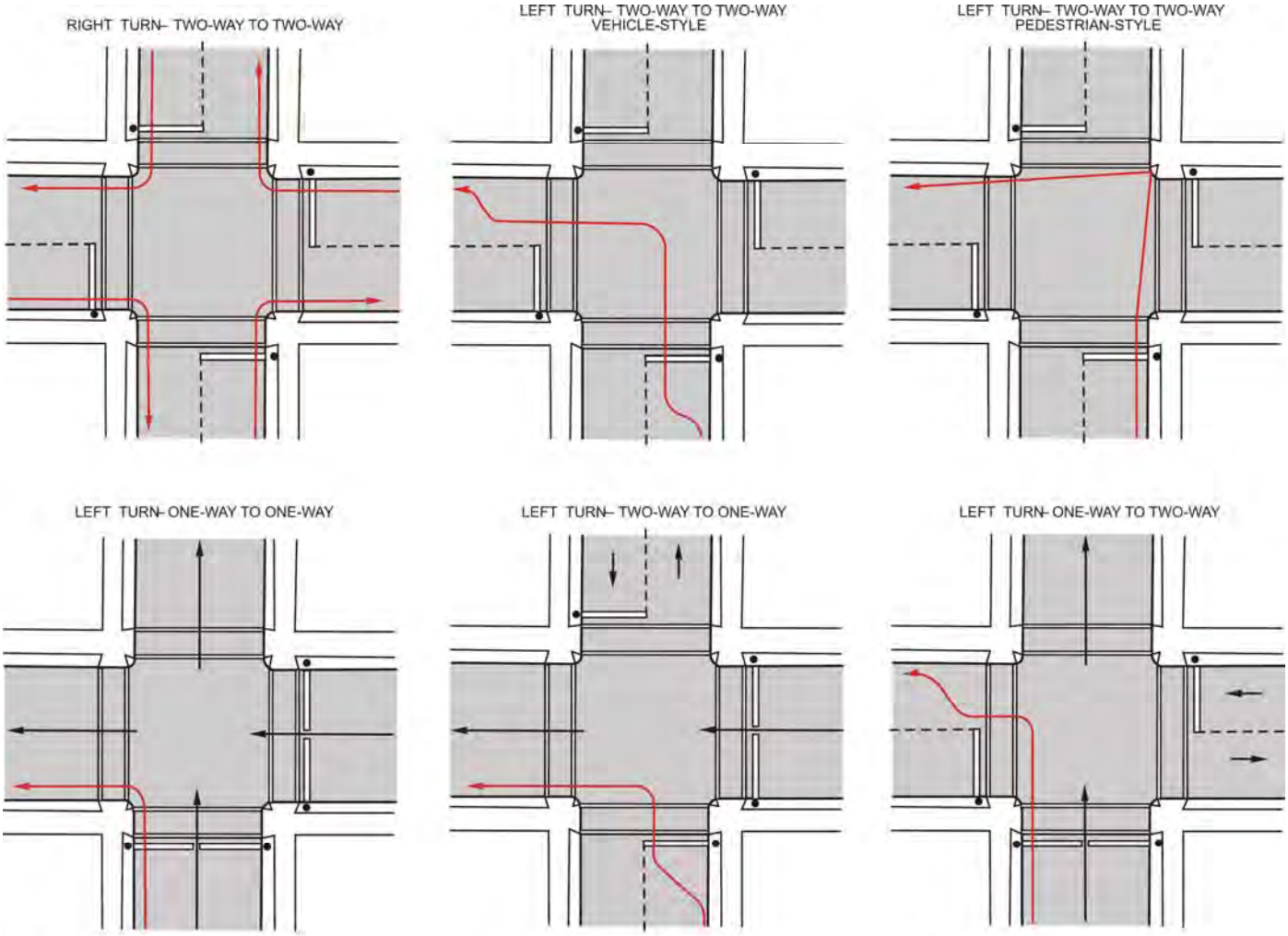
DESIRABLE CROSS-SECTIONS FOR BICYCLE PATHS LOCATED WITHIN A STREET OR HIGHWAY RIGHT-OF-WAY



Source: SEWRPC.

Figure B-6

BICYCLE TURNING MOVEMENTS



NOTE: Bicyclist should use proper hand signals to indicate their intended direction of travel to motorists, other bicyclists, and pedestrians.

Source: Wisconsin Department of Transportation and SEWRPC.

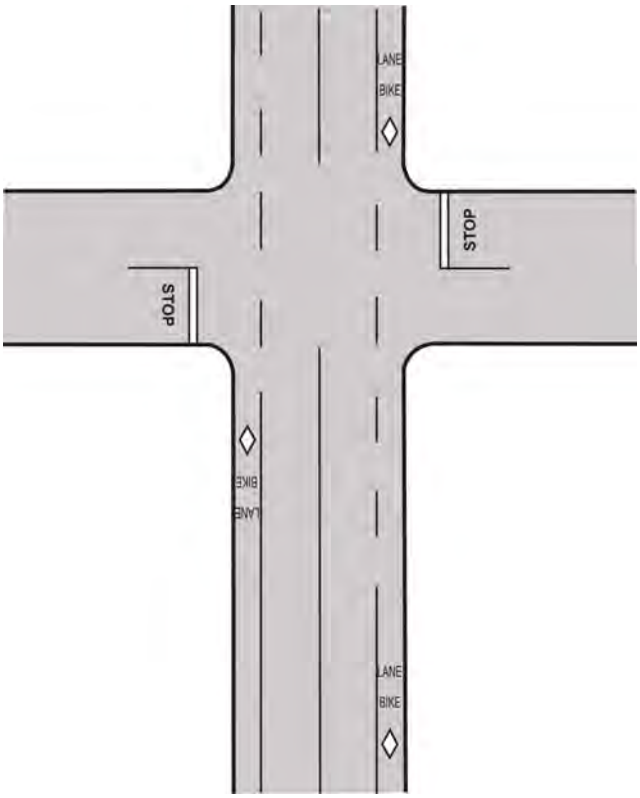
On streets having exclusive right-turn lanes and no bicycle lanes, efforts should be made to encourage bicyclists traveling straight through an intersection to position themselves in a through travel lane, rather than remaining on the right side of an exclusive right-turn lane. If possible, the right-turn lane should be designed so that the through bicyclist continues straight ahead, and the motorist turning right must merge to the right.

Bicycle-Path-and-Roadway Intersections

Bicycle-path intersections and approaches should be on relatively flat grades. Stopping sight distances should be adequate to allow bicyclists to stop before reaching the intersection. Formulas for calculating stopping sight distances are provided in the most recent edition of the AASHTO Bicycle Guide. Traffic control devices, including signage on both the roadway and the bicycle path, should be provided in accordance with the *Manual on Uniform Traffic Control Devices.* Where a bicycle path crosses a high-volume, multi-lane arterial and signals or grade separations are not warranted, consideration should be given to providing a median refuge area for bicyclists. Such areas should have a minimum width of 10 feet.

Figure B-7

TYPICAL PAVEMENT MARKINGS FOR STREETS HAVING BICYCLE LANES AND NO TURNING LANES



Source: U.S. Department of Transportation and SEWRPC.

Signal Timing

Signalized intersections should provide an adequate green phase and/or a longer all-red phase to allow bicyclists sufficient time to clear the intersection. To check the clearance interval, the most current (1991) edition of the AASHTO Bicycle Guide recommends that a bicyclist speed of 10 miles per hour and a perception-reaction-braking time of 2.5 seconds be used.

Traffic Detectors

Both bicycle-sensitive loop detectors and push-button controls that can be accessed by bicyclists without their having to dismount or make unsafe maneuvers should be provided at signal-light intersections located on bicycle ways. The detector should be located in the expected bicycle travel path. In some cases, it may be necessary to provide a mark on the pavement to indicate the area where the bicyclist must be positioned to trip the signal.

Surfacing

Pavement Surface

Bicycle-way pavement surfaces should be maintained in good condition. Pavement irregularities such as cracks, holes, or bumps can cause a bicyclist to lose control of the bicycle and either fall or swerve into motor-vehicle traffic. Cracks and holes should be filled promptly and utility manhole and handhole covers should be maintained flush with the pavement surface.

Drainage Grates and Utility Covers

Wherever possible, drainage grates and utility manhole and handhole covers should be located outside the travel path of bicyclists. Grates and utility covers should be flush with the pavement surface. Bicycle-safe drainage grates should be used on all streets and highways where bicycles are legally permitted to operate.

Rumble Strips

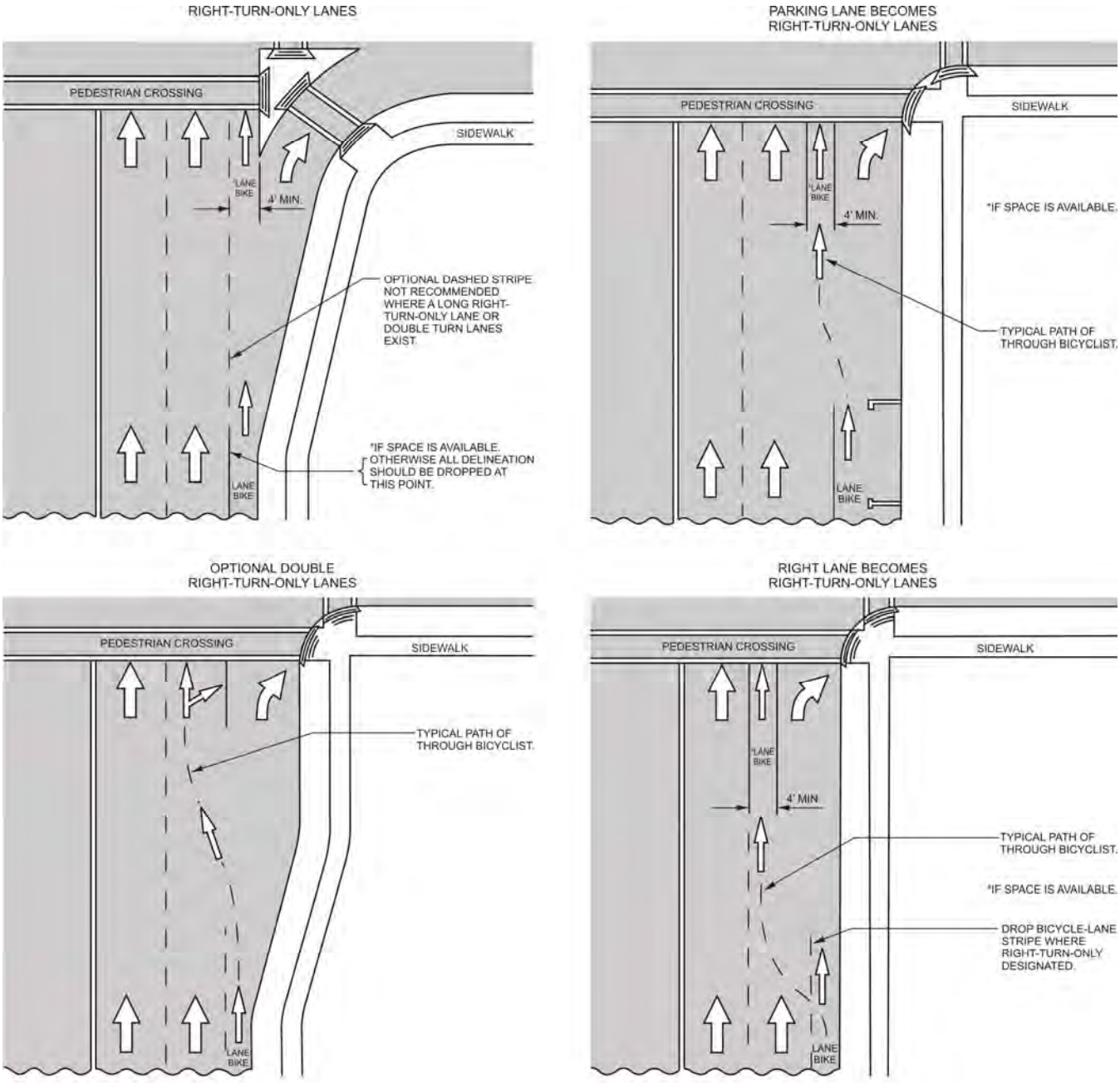
Rumble strips present a hazard to bicyclists. As such, they should be used only as a specific counter measure to an identified safety problem. If rumble strips are needed, they should either be located outside the travel path of bicyclists, or perpendicular openings wide enough for bicycles to pass through should be provided. Rumble strips should not be located near intersections or driveways, because bicyclists may need to merge into the motor-vehicle travel lanes at these locations to begin their turning movements.

Raised Pavement Markings

Pavement reflectors or other raised pavement markings present a hazard to bicyclists because they can deflect a wheel and cause a fall or a turn into motor-vehicle traffic or another obstacle. Raised pavement markings should be avoided as much as possible. In cases where they must be used, they should be located outside the travel path of bicyclists.

Figure B-8

TYPICAL PAVEMENT MARKINGS FOR STREET HAVING BICYCLE LANES AND RIGHT-TURN LANES



Source: American Association of State Highway and Transportation Officials and SEWRPC.

Bicycle-Path Surfacing

A smooth riding surface should be constructed and maintained on bicycle-path surfaces. The type of surface should be chosen based on the anticipated number and type of users. Bituminous or portland cement concrete surfaces provide a higher level of service than crushed-rock surfaces, and are, therefore, more appropriate for bicycle paths expected to receive heavy use or use by utilitarian bicyclists. Bicycle-path surfaces and structures should be of adequate width and strength to support emergency, patrol, maintenance, and other motor vehicles that may be expected to use or cross the path.

Design Guidelines

Design Speed
Bicycle facilities should be designed to accommodate speeds attained by experienced bicyclists. In level or gently rolling terrain, a design speed of at least 20 miles per hour should be used. The design speed should be increased to 30 miles per hour when a descending grade exceeds 3 percent for a distance of 500 feet or more.

Grade
Grades on bicycle facilities should be kept to a minimum. The maximum desirable grade should be 5 percent on paved surfaces and 3 percent on crushed-stone surfaces. Steeper grades are acceptable for short distances; however, grades should not exceed 5 percent for more than 500 feet. The width of the bicycle facility should be increased on steep slopes to compensate for bicycle sway on the uphill side and to accommodate faster speeds on the downhill side.

Sight Distance
Bicycle facilities must be designed to provide adequate sight distance for bicyclists to avoid striking an unexpected object or person in their travel path. Formulas for calculating stopping sight distances for horizontal and vertical curves for various design speeds are provided in the AASHTO Bicycle Guide.

Horizontal and Vertical Clearances
Guardrails, signposts, utility posts, and similar obstructions should be set back a minimum of two feet, and preferably three feet, from the edge of a bicycle way to allow a clear zone for bicyclists. Clearance to overhead obstructions should be a minimum of eight feet, with 10 feet preferred.

Tree and shrub trimming should provide a minimum vertical clearance of eight feet and a minimum horizontal clearance of two feet on both sides of a bicycle way at all times. Additional horizontal clearances should be provided in secluded areas to minimize places where would-be attackers could conceal themselves.

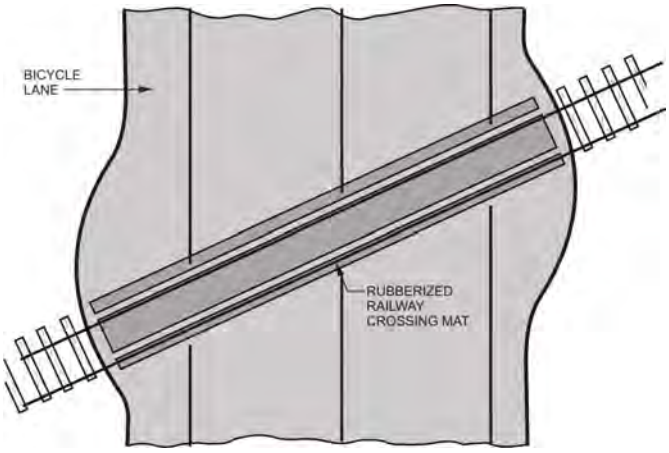
Horizontal Curves
Radii of horizontal curvature for streets with bicycle ways, which streets are designed for higher-speed motor vehicles, may be expected to be adequate for bicycles. The AASHTO Bicycle Guide provides a formula for determining minimum radii of horizontal curvature on bicycle paths on the basis of design speed and other factors. Where existing substandard-radius curves cannot be reconstructed because of right-of-way or other factors, curve-warning signs and pavement markings, including a centerline stripe, should be used. The width of the bicycle path should be increased through the curve.

Horizontal Alignment
The AASHTO Bicycle Guide provides a formula for determining superelevations on bicycle paths on the basis of design speed and other factors. A 2 percent cross-slope is recommended on tangent sections.

Bridges
Bridges often present obstacles to bicyclists because of high traffic volumes, narrow widths, open grate decking, and expansion joints. It is often necessary to accommodate bicycles on such structures to provide access across major barriers and to assure bicycle-way continuity. When designing or retrofitting bridges and similar structures for bicycle use, bicycle-safe decking and expansion joints should be used. In some cases, it may be necessary to direct bicycle traffic to use sidewalks when crossing the bridge. In such cases, the sidewalk should be widened to a minimum of eight feet, with 10 feet preferred, to accommodate joint bicycle and pedestrian use. A wider bicycle-pedestrian way should be provided if the bridge or its approaches have a gradient of 6 percent or more for more than 500 feet, if needed to match the width of the bicycle way providing access to the bridge, or if bicycle and pedestrian use is expected to be high. Railings or other barriers with a minimum height of 4.5 feet should be provided on the outside of the bicycle way. If a separate bicycle path or sidewalk bicycle way is provided, a minimum 4.5-foot-high barrier should be provided to separate motor-vehicle and bicycle traffic.

Figure B-9

WIDENING OF SHOULDERS TO ACCOMMODATE RIGHT-ANGLE CROSSING OF RAILWAY TRACKS



Source: Wisconsin Department of Transportation and SEWRPC.

Bicycle Bridges

Where separate bicycle or bicycle-pedestrian bridges are provided, the bridge should be at least as wide as the approaching bicycle way, but no less than eight feet wide, with an additional minimum two-foot clear zone on each side. Ramp grades should not exceed a rise-to-run ratio of 1:12. A railing or fence with a minimum height of 4.5 feet should be provided along both sides of the bridge. A smooth rub rail should also be provided at handlebar height (3.5 feet).

At-Grade Railway Crossings

Where possible, a bicycle way should cross railway tracks at or near a right angle to minimize the potential for a bicyclist's front wheel becoming trapped in the flangeway and causing loss of steering control. If the crossing angle is less than approximately 45 degrees, consideration should be given to widening the outside lane, shoulder, or bicycle lane to improve the angle of approach, as illustrated in Figure B-9. It is also important that the roadway surface be at the same elevation as the rails. Rubberized railway crossing mats, which offer a good combination of smoothness and traction, should be used where bicycle ways cross railway tracks.

Lighting

The needs of bicyclists should be considered when designing lighting for streets and highways. Adequate lighting should be provided for on-street bicycle ways, bicycle paths, and at bicycle-path-and-street intersections.

Overpasses

Bicycle-way overpasses are preferred to underpasses where personal security may be a concern. The greater visibility provided by an overpass will offer better security to bicyclists than underpasses. Where underpasses must be used, they should be well lit and designed so bicyclists can see potential hazards before entering the underpass.

Driveway Approaches

Where possible, gravel driveway approaches should be paved a distance of 10 feet back from the edge of the pavement to decrease the amount of loose gravel that migrates into the bicyclists' travel path.

Signing and Marking

Bicycle ways should be signed and marked in accordance with the *Manual on Uniform Traffic Control Devices*.

Bicycle-Way Identification

Signs spaced at appropriate intervals should be used to identify bicycle routes, lanes, and paths.

Maintenance

Pavement Surfaces

Street and bicycle-way surfaces should be smooth and free from irregularities. Cracks and potholes, particularly in the bicycle travel path, should be promptly repaired.

Removal of Debris

Routine maintenance programs should be established to remove sand, gravel, glass, and other debris from streets and bicycle ways. Particular attention should be given to sweeping and maintaining streets signed as bicycle ways.

Snow and Ice Removal
Bicycle ways intended to serve primarily utilitarian travel should be kept clear of snow and ice.

Bicycle Parking

Location
Bicycle parking areas should be located close to bicyclists' destinations. Where possible, bicycle parking areas should be located near building entrances. In addition to offering convenience, such a location provides added security due to higher visibility.

Accessibility
Bicycle parking and storage areas should be accessible from driveways or ramps designed to accommodate bicycle travel.

Security
Bicycle parking devices should be designed so that bicyclists can lock the frame and front wheel, at a minimum, to a stable, upright structure that does not damage the bicycle frame, components, or finish; and designed so that the bicycle cannot twist or be knocked over.

Bicycle Lockers
Both bicycle racks and bicycle lockers should be provided at places where long-term, secure bicycle parking is needed, such as major employment centers, transit stations, and park-and-pool lots.

Usability
Bicycle parking devices should accommodate all types of bicycle frames and bicycle locks, including the high-security "U" locks.

Ease of Operation
Bicycle parking devices should be easy to operate and understandable to both children and adults. Bicycle parking devices should be spaced so that bicycles can be easily secured.

Protection from Motor Vehicles
Bicycle and motor-vehicle parking areas should be separated by distance or by a physical barrier to prevent bicycles from being damaged by motor vehicles.

Lighting
Bicycle parking areas should be well lit for security and safety purposes.

Guidelines for Pedestrian Facilities

The Americans with Disabilities Act
Facilities intended to facilitate the access of disabled persons to public and commercial buildings and services are required as part of the Federal Americans with Disabilities Act of 1990. The Act requires commercial and public buildings, such as office buildings, passenger terminals and stations, stores, and restaurants to be accessible by persons with disabilities. This necessitates that exterior routes leading from streets, transit stops, and accessible parking areas to such buildings be designed and constructed to accommodate persons with disabilities.

The U.S. Department of Justice promulgated regulations in July 1991 to implement those portions of the Act that apply to public and commercial buildings and sites. Regulations implementing requirements related to transportation facilities were promulgated in September 1991. Regulations are pending which would set forth requirements related to public rights-of-way, such as the use of audible pedestrian crossing signals and requirements for the construction and location of sidewalks.

Americans with Disabilities Act requirements are referenced or included in the following guidelines where appropriate. Due to the extent of the regulations, it is not possible to include all relevant requirements in this appendix. The Americans with Disabilities Act regulations should be consulted before designing or reconstructing public or commercial facilities.

Sidewalk Installation Guidelines
Sidewalks should be provided in areas of existing or planned urban industrial, commercial, and residential development in accordance with the pedestrian facility standards set forth earlier in this appendix.

Width
The width of sidewalks along streets in a central business district should be based upon pedestrian volumes and the desired level of service in accordance with the procedures set forth in the most recent edition of the Transportation Research Board's *Highway Capacity Manual.* Sidewalks should be a minimum of five feet in width along all streets in commercial and industrial areas outside the central business district, and along arterial and collector streets in residential areas. Sidewalks along land access streets should be a minimum of five feet in width in all areas of residential development.

An unobstructed sidewalk width of no less than four feet should be provided. The Americans with Disabilities Act requires that passing areas at least five feet in width and five feet in length be provided at intervals of no more than 200 feet where sidewalks are less than five feet in width

Separation from Motor-Vehicle Traffic
Sidewalks located immediately adjacent to motor-vehicle travel lanes discourage pedestrian travel because of noise and the perception of hazard. A landscaped or surfaced area, referred to as a "terrace" in this appendix, should be provided between the curb or edge of pavement and the inside edge of the sidewalk to provide additional separation between motor-vehicle and pedestrian traffic. Terraces provide a more pleasant pedestrian environment by providing an area off the sidewalk for signposts, streetlights, utility poles, trash cans, and other street furniture; provide an area for street trees and other landscaping; allow driveway aprons to be located outside of the sidewalk area; provide additional area for snow storage; and reduce splashing of pedestrians by passing motor vehicles operating on wet pavements. A desirable terrace width of 10 feet is recommended in commercial and industrial areas, and of six to nine feet in residential areas.

Curb Ramps
Curb ramps should be provided in accordance with the requirements of the Americans with Disabilities Act and with Section 66.616 of the Wisconsin Statutes.

Surfacing
Walking surfaces should be skid-resistant, sloped for proper drainage, and offer a level and mud-free surface.

Longitudinal Slope and Cross-Slope
The longitudinal slope of a sidewalk should not exceed the grade of the adjacent street. The grade of a pedestrian way outside a street right-of-way should not exceed 12 percent unless steps are provided. The cross-slope of sidewalks and other pedestrian ways should not exceed 2 percent.

The maximum longitudinal slope and cross-slope of an accessible route permitted by the Americans with Disabilities Act are 5 percent and 2 percent, respectively. An accessible route with a longitudinal slope greater than 5 percent is considered a ramp. The longitudinal slope of the ramp must not exceed a rise-to-run ratio of 1:12, and the maximum permitted rise between landings is 30 inches. Landings must be provided at the bottom and top of each ramp. The landing must be at least as wide as the ramp leading to it, but no less than three feet in width, and a minimum of five feet in length. Handrails must be provided along both sides of any ramp which rises more than 0.5 feet or runs more than six feet.

Horizontal and Vertical Clearances
Signs, utility posts, and similar obstructions should be set back a minimum of two feet from the edge of a pedestrian way. Clearance to overhead obstructions should be a minimum of seven feet. Tree and shrub trimming should also provide a minimum vertical clearance of seven feet and a minimum horizontal clearance of two feet. Additional horizontal clearances should be provided in secluded areas to minimize places where would-be attackers could conceal themselves.

Amenities
Street trees and other landscaping should be provided in street rights-of-way to enhance the pedestrian environment. Street furniture and other amenities such as benches, waste receptacles, and drinking fountains should be provided in terraces adjacent to sidewalks in commercial areas to serve pedestrian needs and add visual interest. Street vending machines and mailboxes should be placed in the terrace or in another location that does not interfere with pedestrian movement along the sidewalk.

Lighting
The needs of pedestrians should be considered when designing lighting for streets and highways. Adequate lighting should be provided for sidewalks and other pedestrian ways, and at street intersections.

Street Crossings

Signal Timing
The timing of pedestrian phases for traffic signals should incorporate safe crossing intervals based upon an average walking speed of four feet per second. This speed may need to be modified at busy intersections where pedestrian crowding and vehicle turning movements may lengthen crossing time, and at crossings commonly used by elderly or disabled pedestrians who may require additional time to cross the street.

Crossing Orientation
Pedestrian ways should be oriented toward intersection crossings rather than mid-block crossings.

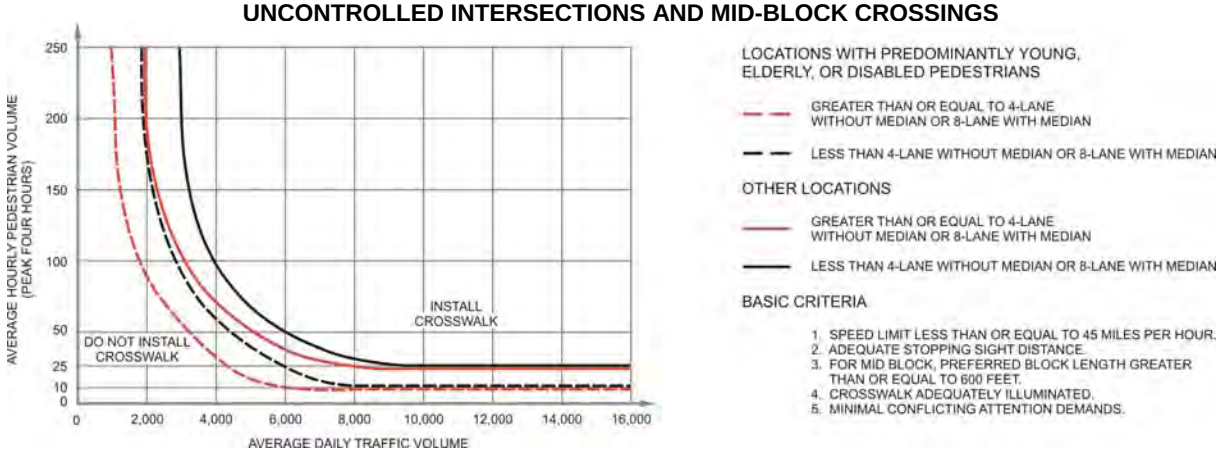
Right Turns on Red
Although the right-turn-on-red rule has generally resulted in time and fuel savings for motorists, it presents a hazard to pedestrians due to motorists who fail to notice or yield the right-of-way to pedestrians crossing the street in front of them. It may be necessary to prohibit right turns on red at intersections that present substantial conflicts between pedestrians and right-turning motorists, or to prohibit right turns on red during those times of the day when large numbers of schoolchildren or other pedestrians are present.

Refuge Islands and Medians
A raised refuge island or median should be provided where the roadway to be crossed is 65 feet or more in width or has five or more traffic lanes; at signalized intersections where the street cannot be crossed within the walk cycle using a walking speed of four feet per second and the signal timing cannot be lengthened; and at complex or irregularly shaped intersections where pedestrians may need a safe place to stop and orient themselves. A raised refuge island or median should also be provided in roadways having four traffic lanes where such roadways are located adjacent to or near activity centers or in areas frequented by elderly, disabled, or child pedestrians. Refuge islands should be a minimum of six feet wide and 12 feet long, and easily recognizable by motorists to minimize the hazard to both motorists and pedestrians. Design criteria for refuge islands are contained in the American Association of State Highway and Transportation Officials' *Policy on Geometric Design of Highways and Streets*.

Raised median islands should have curb ramps at both sides leading to a level area at least four feet long. A level area is needed to provide a safe place for wheelchair users to wait for traffic to clear without fear of rolling down into the traffic lane. If the refuge island is too narrow to provide a four-foot-long level area, the crosswalk should continue through the island at street level.

Figure B-10

GUILDELINES FOR CROSSWALK INSTALLATION AT UNCONTROLLED INTERSECTIONS AND MID-BLOCK CROSSINGS



Source: Federal Highway Administration.

Pedestrian-Actuated Controls

Pedestrian-actuated controls to activate "walk" signals—generally push buttons—should be located in areas that can be conveniently accessed by pedestrians, and such areas should be kept clear of snow and stormwater. Push-button controls should be easy to understand and use. Where two crosswalks, oriented in different directions, end at or near the same location, push buttons should be positioned to clearly indicate which crosswalk signal is actuated by each push button. Additional push-button activators may be required on islands or medians where a pedestrian might become stranded, and should always be provided when a street cannot be crossed within one walk cycle based on an average walking speed of four feet per second. The provision of push-button activators to extend the crossing interval should be considered at intersections which are frequently used by pedestrians with slower-than-average walking speeds.

Crosswalks

Marked crosswalks are intended to alert motorists to the possible presence of pedestrians and to mark a preferred location for pedestrians to cross the street. However, unwarranted marked crosswalks and advance pedestrian crossing signs may increase motorist noncompliance with these traffic control devices. Marked crosswalks may also give pedestrians a false sense of security, particularly when they are provided at unsignalized crossings. Marked crosswalks should therefore be used judiciously.

Crosswalk markings should be installed at all signalized intersections with pedestrian signal indicators; where needed to delineate the preferred crossing location at a confusing intersection or to channelize multiple crossings; at all locations where a school crossing guard is normally stationed; and at intersections and mid-block crossings meeting the minimum pedestrian and motor-vehicle volume criteria shown in Figure B-10.

Crosswalk Width

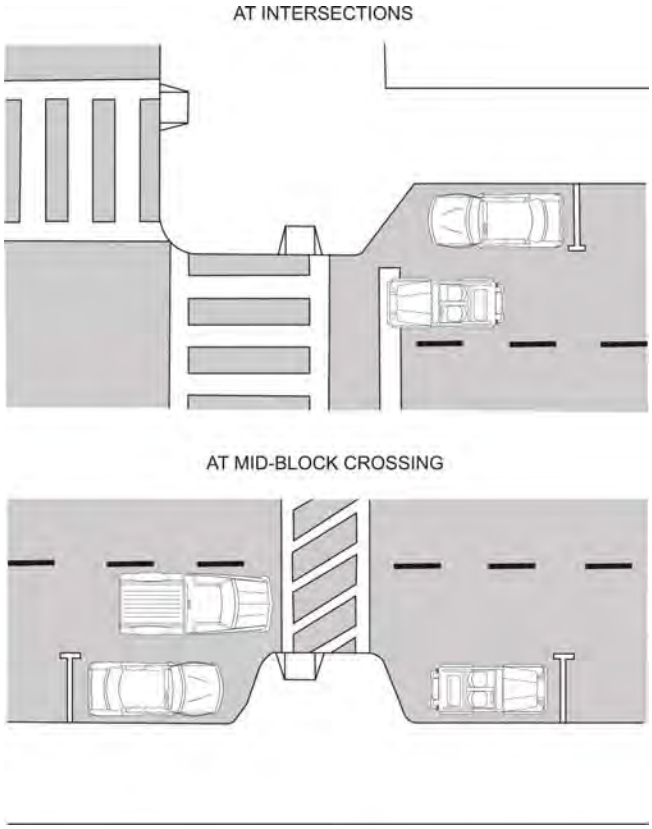
Crosswalks should be a minimum of six feet in width, with eight feet desirable. The width of the crosswalk should be increased beyond eight feet if necessary to equal that of the approaching sidewalk or walkway; or if needed to provide an acceptable level of service in accordance with the procedures set forth in the most recent edition of the Transportation Research Board's *Highway Capacity Manual*.

Crosswalk Markings

Crosswalk markings should be provided in accordance with the recommendations set forth in the *Manual on Uniform Traffic Control Devices.*

Figure B-11

EXAMPLES OF SIDEWALK EXTENSIONS TO IMPROVE PEDESTRIAN VISIBILITY



Source: Federal Highway Administration.

Sight Distance

Crosswalks should be located where they are in clear view of approaching motorists and where motorists have adequate stopping sight distance. Visual obstructions such as vegetation and street furniture between motorists and pedestrians using or entering the crosswalk should be removed or relocated. Curb parking should be prohibited near the crosswalk to provide adequate sight distance for pedestrians using the crosswalk and for motorists approaching the crosswalk, with parking prohibited within a minimum of 15 feet of a crosswalk. Extending the sidewalk at crosswalk locations, as illustrated in Figure B-11, can improve pedestrian visibility and prevent parked vehicles from blocking the crosswalk.

Stop Lines

The installation of stop lines at crosswalk locations controlled by signals or stop signs is effective in reducing vehicle encroachment into the crosswalk. Such encroachments may create a physical barrier for pedestrians and reduce the ability of adjacent motor-vehicle operators to see crossing pedestrians. Stop lines should be placed four feet in advance of and parallel to the crosswalk.

Mid-Block Crossings

Proper design of mid-block crossings requires that special consideration be given to providing adequate sight distance for both pedestrians and motorists and providing advance notice to motorists of the presence of a mid-block crossing. Advance crossing signs should be provided as set forth in the *Manual on Uniform Traffic Control Devices.* The width of the crosswalk lines may be increased up to two feet and the area within the crosswalk may be painted with diagonal or longitudinal lines on streets and highways with vehicle operating speeds of 35 miles per hour or more or where safety concerns warrant the added visibility.

Traffic Control Devices

Traffic control devices such as traffic signals, signs, and pavement markings have been designed to enhance the safety and mobility of both pedestrians and motorists. Such devices should be provided in accordance with the recommendations set forth in the *Manual on Uniform Traffic Control Devices*.

Traffic Controls for School Areas

Traffic controls for school areas should be provided in accordance with the recommendations set forth in the most recent edition of the *Manual on Uniform Traffic Control Devices*. The development of a school route plan for each school serving elementary-school and kindergarten students is useful for identifying and evaluating safe walking routes to school and safe and effective traffic control in school areas. The publication entitled *School Trip Safety Program Guidelines*, published by the Institute of Traffic Engineers (ITE) in 1984, sets forth a process for identifying safe school routes and related traffic control measures. The process relies on a committee of parents, schoolteachers and school administrators, traffic engineers, and police officers to prepare and distribute maps showing recommended school routes and school crossings. The committee also identifies areas and issues of concern and evaluates potential corrective measures. The planning process facilitates the orderly review of

school-area traffic needs and provides a means of coordinating school pedestrian-safety education with engineering studies and improvements. It is recommended that the ITE process or a similar process be instituted in locations where safe routes to school are a concern.

Maintenance

Well-maintained pedestrian facilities encourage pedestrian use, reduce the potential for injury, enjoy prolonged facility life-spans, and enhance community image. Special attention should be given to keeping pedestrian facilities free of snow, ice, mud, and water; repairing cracks in sidewalks and other pedestrian ways; and maintaining signs, pavement markings, and other traffic control devices intended to assist pedestrians.

Guidelines for Shared Bicycle and Pedestrian Facilities

Joint Sidewalk Use

Sidewalks generally should not be designated as bicycle ways due to the potential for conflicts between bicyclists and pedestrians. The conflicts can be attributed primarily to the difference in speed between the two modes. The average pedestrian may be expected to travel at approximately three miles per hour, while average and experienced adult bicyclists may be expected to travel at approximately 10 and 20 miles per hour, respectively. The difference in travel speeds can lead to bicycle-pedestrian collisions. Pedestrians may also misjudge a bicyclist's speed and braking or maneuvering ability, increasing the potential for collisions. Providing wider sidewalks with the intention of decreasing pedestrian-bicycle conflicts may encourage bicyclists to increase their travel speed and inadvertently lead to more serious conflicts than those that existed prior to the sidewalk widening.

In addition to pedestrian-bicycle conflicts, sidewalks designated as bicycle ways may present bicyclists with danger related to fixed objects such as signposts, fire hydrants, and mailboxes located on or along the sidewalk, and with motor-vehicle operators who may not expect to encounter a relatively fast-moving bicyclist at driveways and intersections. Sight distances along the sidewalk may be inadequate to allow the bicyclist adequate time to stop before encountering a motor vehicle or other hazard.

In spite of the potential for conflicts inherent with bicycle use of sidewalks, there may be certain situations, such as bridge crossings or narrow street rights-of-way, where there is no reasonable alternative to routing bicycle traffic onto a sidewalk. In such situations, use of signs and pavement markings should be considered to warn bicyclists and pedestrians that the facility is open to both types of users, and to direct bicyclists to yield to pedestrians. Provision must also be made at each end of the sidewalk to safely route bicycle traffic to and from the sidewalk.

Although sidewalk bicycling by adults should be strongly discouraged, young children should be allowed to bicycle on the sidewalks near their homes until they develop the knowledge and skills needed to operate on the street.

Shared Use of Bicycle and Pedestrian Paths

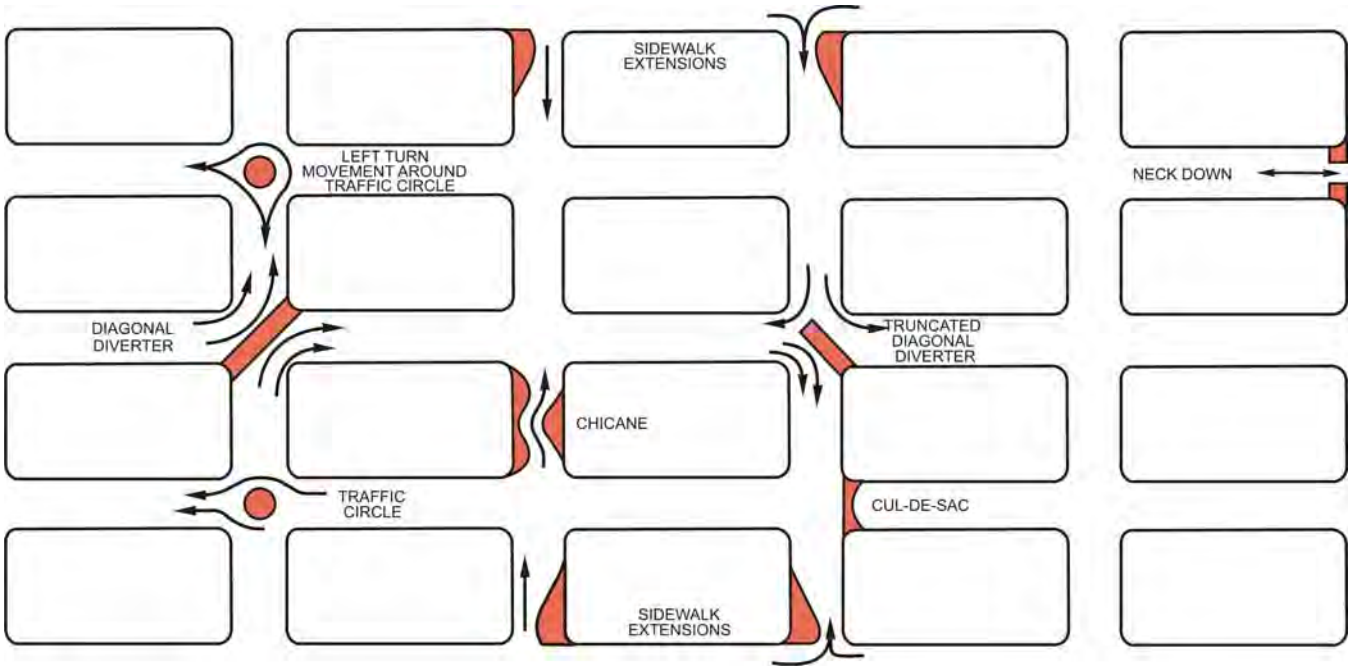
Some off-street bicycle and pedestrian paths within the Region have been designed for shared use by bicyclists and pedestrians. Other users, such as joggers and in-line skaters, may also use off-street bicycle and pedestrian paths, although such uses may not have been anticipated at the time the path was designed and constructed. Shared use may be acceptable provided the path is wide enough to safely accommodate all users.

Bicycle and pedestrian paths intended for shared use should be a minimum of 12 feet in width if more than 50 users are expected during the peak-use hour. A minimum 10-foot-wide path should be provided for shared use where fewer users are anticipated. A right-of-way width of 20 feet is recommended for off-street bicycle and pedestrian paths.

Consideration should be given to providing separate bicycle and pedestrian paths in areas that receive heavy use by both bicyclists and pedestrians. If separate paths cannot be provided, existing shared facilities could be striped

Figure B-12

SELECTED TRAFFIC-CALMING TECHNIQUES



Source: Federal Highway Administration and SEWRPC.

to delineate separate areas for pedestrians and bicyclists. Where separate paths are provided, activities with comparable speeds and maneuverabilities should be combined, such as in-line skating with bicycling and jogging with walking. Equestrians and bicyclists should not be accommodated on the same facility.

Off-street paths intended to accommodate bicycle travel should be developed in accordance with the most recent edition of the AASHTO Bicycle Guide and the WisDOT *Wisconsin Bicycle Facility Design Handbook*. Facilities that do not meet these guidelines should be signed as recreational trails rather than as bicycle paths.

Guidelines for Street and Site Design Measures to Facilitate Bicycle and Pedestrian Travel

Street Design

Many bicyclists and pedestrians choose to travel on nonarterial streets because it is more convenient or more pleasant than travel along arterial streets. In some cases, a bicycle way may be designated on a nonarterial street paralleling an arterial street where right-of-way or other limitations or conditions make it impractical to provide a bicycle way on the arterial street. On nonarterial streets which carry through traffic, conditions may be improved for bicyclists and pedestrians and as well for local motor vehicle traffic by slowing motor-vehicle traffic and discouraging such streets from being used by through motor-vehicle traffic.

The term “traffic-calming” has been applied to a variety of measures intended to slow motor-vehicle speeds, to discourage through motor-vehicle traffic on nonarterial streets, and to make such streets more pleasant for both motorized and nonmotorized travel. Traffic-calming measures include the use of median strips, traffic diverters or semi-diverters, widened sidewalks at intersections, textured pavements, reduced speed limits, narrowed traffic lanes, limitation of vehicle turning movements, traffic circles, cul-de-sacs, and street closings. Selected traffic-calming techniques are illustrated in Figure B-12. Implementation of such measures requires the preparation of a traffic engineering study to identify traffic problems and evaluate the effectiveness of potential traffic control measures, as well as the potential effects on other streets in the area, the effect on bicycle and pedestrian travel, the potential increase in circuitous travel, and the implications for the provision of emergency and maintenance services.

Site Design
Typical routes in residential neighborhoods often require a bicyclist or pedestrian to travel along the arterial street system or to follow a circuitous route to reach a desired destination. Bicycle and pedestrian access through residential blocks and across subdivision boundaries can provide more direct connections between homes and activity centers, and may encourage more people to bicycle or walk by decreasing distances and providing a longer portion of the trip along quieter nonarterial streets or off-street bicycle and pedestrian ways. Off-street bicycle and pedestrian ways should be provided to connect cul-de-sac streets and adjacent streets across blocks of 900 feet or longer, and should be provided to connect adjacent subdivisions and subdivisions and activity centers where alternative on-street routes are unduly circuitous.

Compact and mixed-use forms of development serve to encourage bicycle and pedestrian travel by decreasing the distance between residential areas, employment centers, and other activity centers. For example, restaurants, banks, and convenience shopping centers should be located on a common site or within walking distance of major employment centers, and bicycle and pedestrian facilities should be provided to accommodate bicycling and walking trips between activity and employment centers. Local governments should promote a neighborhood unit concept of development where homes are located within bicycling or walking distance of such facilities as schools, parks, shopping centers, and transit stops, and should encourage the location of high-density residential areas near activity centers and transit stops and stations. Activity centers should be designed to encourage bicycle and pedestrian travel within and to the center. Internal circulation and design should maintain ease of access for bicyclists and pedestrians from adjoining streets and transit stops. Where possible, buildings should be located close to the street with automobile parking lots located behind the buildings. Where this is not possible, designated bicycle and pedestrian routes should be provided between buildings and adjoining streets.

Openings should be provided in walls, berms, and landscaping around subdivisions and activity centers to provide convenient bicycle and pedestrian access to adjacent streets and transit stops.

Examples of site designs which facilitate bicycle and pedestrian travel are illustrated in Figure B-13.

Guidelines for Bicycle and Pedestrian Access to Public Transit

Pedestrian Access to Transit
Sidewalks should be constructed on both sides of streets within 0.25 mile of existing or planned transit routes, and along at least one side of streets within 0.50 mile of existing or planned transit routes.

Bicycle Access to Transit
Bicycle accommodation should be provided on streets within one mile of existing or planned transit routes. The provision of bicycle parking facilities at transit stops should be considered where the stop has a boarding-passenger volume of 50 or more passengers per day or where the stop is a major passenger transfer point between transit routes. Bicycle parking facilities should also be considered adjacent to transit-passenger shelters.

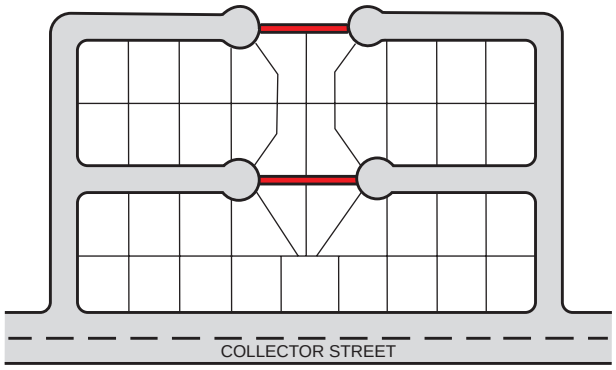
Building Location and Orientation
Buildings should be clustered around and entrances oriented toward existing or planned transit stops, and building entrances should be located to minimize the distance between the entrance and a transit stop. Automobile parking lots should not be located between building entrances and transit stops. In keeping with the requirements of the Americans with Disabilities Act, at least one accessible route must be provided between a building entrance and a transit stop on an adjoining street.

Passenger Shelters
The construction of passenger shelters at transit stops should be considered where one or more of the following conditions exist: the stop is designed specifically for the use of, or is frequently used by, elderly or disabled persons; the stop has a boarding-passenger volume of 50 or more passengers per day; the stop is a major passenger transfer point between transit routes; or the location of the stop affords no protection to waiting passengers from harsh weather conditions.

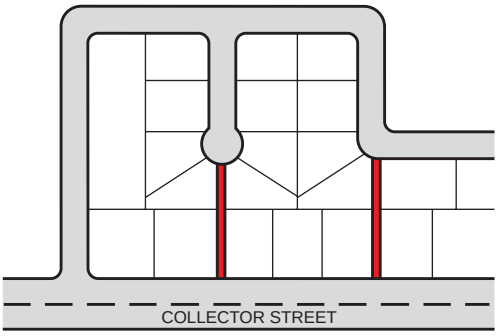
Figure B-13

EXAMPLES OF SITE DESIGNS WHICH FACILITATE BICYCLE AND PEDESTRIAN TRAVEL

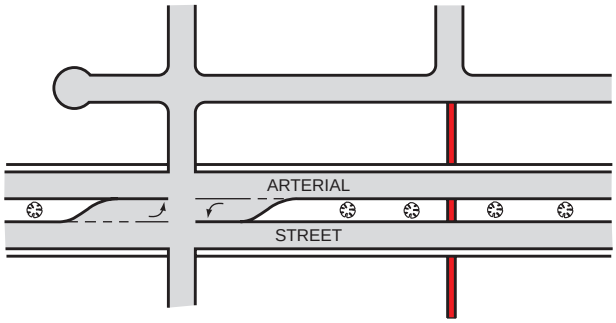
BICYCLE AND PEDESTRIAN CONNECTIONS BETWEEN CUL-de-SAC STREETS



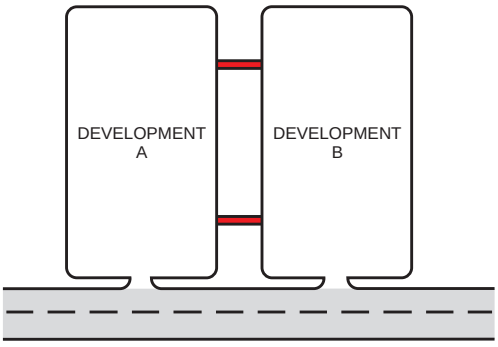
BICYCLE AND PEDESTRIAN CONNECTIONS ACROSS BLOCKS



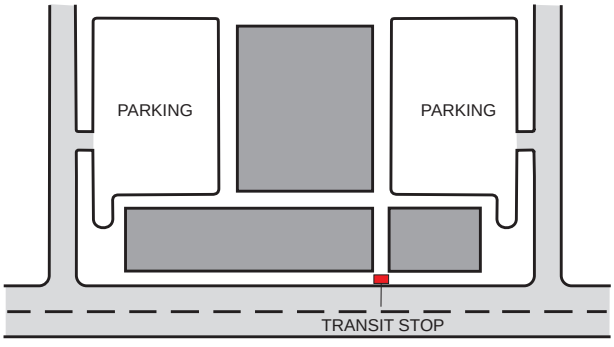
BICYCLE AND PEDESTRIAN CONNECTIONS ACROSS BLOCKS AND MEDIANS



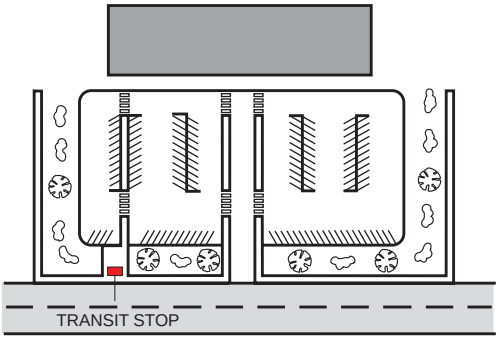
BICYCLE AND PEDESTRIAN CONNECTIONS BETWEEN ADJACENT DEVELOPMENTS



SITE DESIGN TO FACILITATE PEDESTRIAN ACCESS TO TRANSIT BY SHORTENING DISTANCE BETWEEN TRANSIT STOP AND DESTINATION



DESIGN OF PARKING LOT TO FACILITATE BICYCLE AND PEDESTRIAN ACCESS (WHERE PARKING CANNOT BE LOCATED TO REAR OF BUILDING)



Source: Oregon Department of Transportation and SEWRPC.

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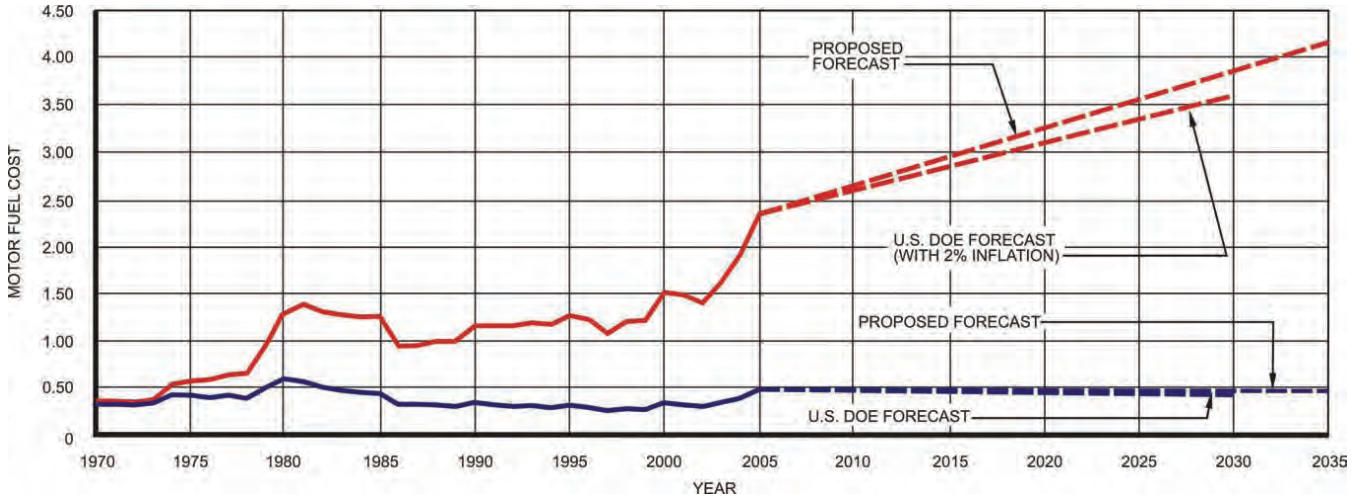
Appendix C

FORECAST YEAR 2035 MOTOR FUEL COST AND MOTOR VEHICLE EFFICIENCY

This appendix documents the existing year 2005 and plan year 2035 forecast motor fuel cost and motor vehicle efficiency. The year 2035 plan forecast of $2.30 per gallon (in year 2005 dollars) for motor fuel cost was based upon the U.S. Department of Energy forecast of motor fuel cost—$2.19 in the year 2030 in 2004 dollars—released in mid-December of 2005. The forecast price per gallon of motor fuel in the year 2035 would be approximately $4.20, assuming an annual inflation rate typical of that observed from 1995 to 2005—about 2 percent. The total cost of motor fuel per gallon, the motor vehicle fuel efficiency, and the cost of motor fuel per gallon are displayed graphically in Figures C-1 through C-4.

Figure C-1

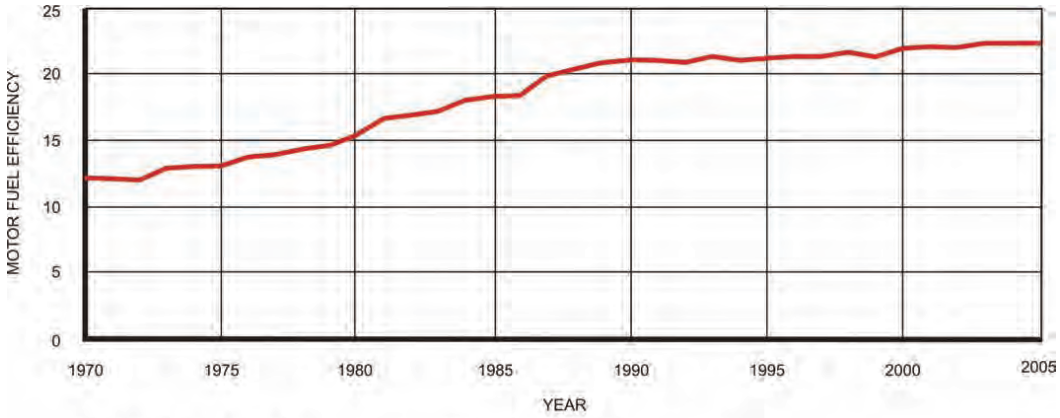
TOTAL COST OF MOTOR FUEL PER GALLON EXPRESSED IN ACTUAL DOLLARS AND IN CONSTANT 1970 DOLLARS: 1970-2035



Source: U.S. Department of Energy and SEWRPC.

Figure C-2

MOTOR VEHICLE FUEL EFFICIENCY IN MILES PER GALLON: 1970-2005

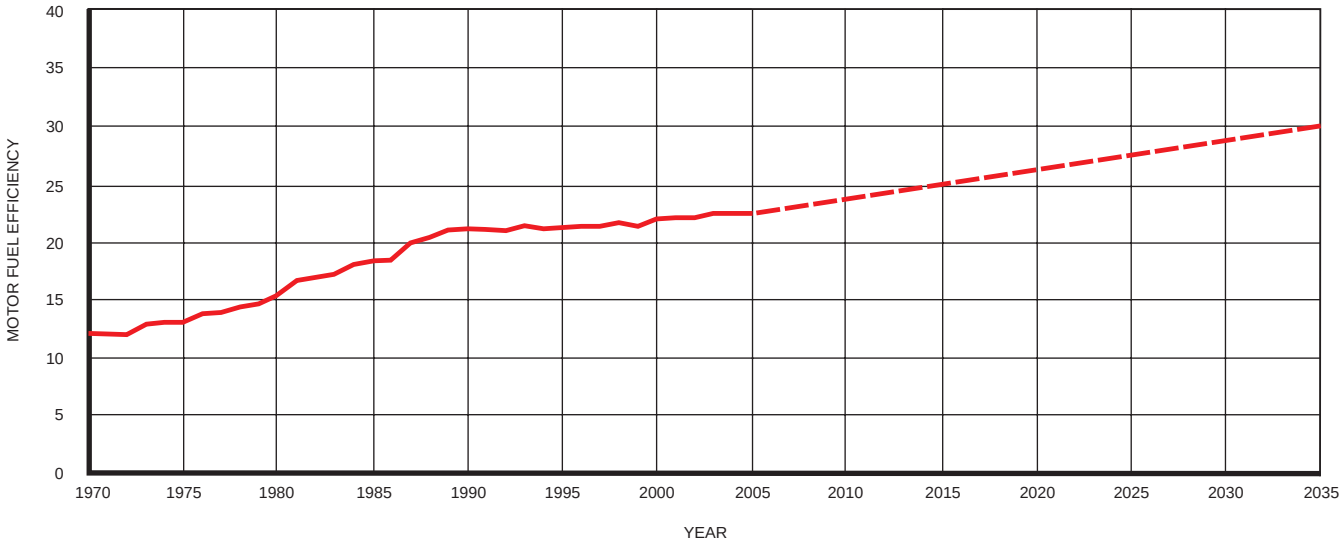


Motor vehicle fuel efficiency has increased in response to motor vehicle fuel price increases.
1970 - 12.1 mpg
1980 - 15.1 mpg
1990 - 21.0 mpg
2000 - 21.9 mpg
2005 - 22.3 mpg (estimate)*
*2004 and 2005 data were not available, but assumed to be the same as 2003.

Source: SEWRPC.

Figure C-3

MOTOR VEHICLE EFFICIENCY IN MILES PER GALLON: 1970-2035

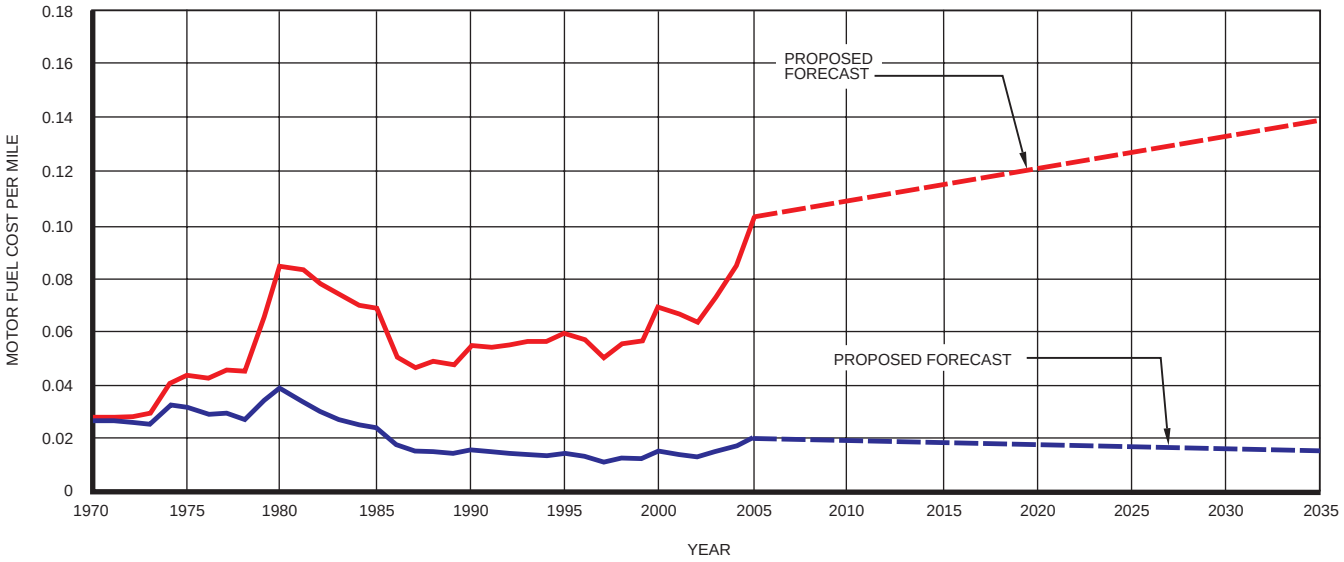


2005 - 23.3 mpg (estimate)
2035 - 30.0 mpg (forecast)

Source: SEWRPC.

Figure C-4

COST OF MOTOR FUEL PER MILE EXPRESSED IN ACTUAL DOLLARS AND IN CONSTANT 1970 DOLLARS: 1970-2035



Proposed Forecast in 2005 dollars
$2.30 per gallon/30 mpg = 7.7 cents per mile

Source: SEWRPC.

Appendix D

ACCESS MANAGEMENT STANDARDS

This appendix provides a set of access management standards intended to control marginal access—both intersecting streets and driveways to abutting properties—to the arterial street and highway system. Since arterial streets are intended to carry high volumes of traffic at relatively high speeds, access, especially driveway access, to arterial streets is of particular concern. Access management standards are intended to provide for safe entrance to and departure from an arterial and are directed at preservation of roadway capacity, traffic safety, and right-of-way reservation.

Each unit of government has the authority to regulate access to and from the arterial streets and highways under its jurisdiction—the Wisconsin Department of Transportation (WisDOT) for state trunk highways, the counties for county trunk highways, and cities, villages, and towns for local trunk highways. The degree of access control ranges from full control which gives preference to through traffic on the arterial by providing access connections only at selected public roads via grade separated interchanges to minimum control under which direct access to the arterial is permitted from each abutting parcel with access generally regulated only as necessary for safety. Full access control is employed on freeways, minimum control to regulate the placement and geometrics of direct access points is typically employed on surface arterials.

Table D-1 provides a sample list of access standards which may be employed to evaluate proposed new access to surface arterials which are intended to provide for safe entrance to and departure from an arterial and are directed at preservation of roadway capacity, traffic safety, and right-of-way reservation.

Table D-1

ACCESS STANDARDS TO PRESERVE ARTERIAL STREET CAPACITY AND ENHANCE TRAFFIC SAFETY

Access Elements	Criteria
NonResidential Access Considerations	Require the provision of left and right turn lanes on the arterial street at new intersecting collector and land access streets and major driveways. • Consider requiring left and right turn lanes on the arterial street at other driveways if a proposed development may be expected to generate substantial turning movement volumes during peak travel periods. • Left turns from a driveway within 200 feet of a major intersection should be prohibited. • Access should be consolidated whenever separate parcels are assembled under one purpose, plan, entity, or use to increase the average spacing between adjacent driveways. • Access to existing development can be consolidated if adjacent property owners can be persuaded to share joint-use driveways in lieu of separate driveways. The joint-use driveway should be located on the centerline between adjacent properties. • Optimize driveway spacing between intersections or existing driveways; that is, driveway spacing should be as uniform as possible while meeting the spacing and number of driveways per property constraints identified below. • Access should not be permitted across the entire lot frontage but should be restricted to a clearly defined driveway or driveways. • Designate the number of driveways to existing properties and deny additional driveways regardless of future subdivision of the property. • Require access on an intersecting street (when available) in lieu of an additional driveway on the arterial or primary street. • Properties should be permitted a maximum of one driveway per property from each abutting street, except one additional driveway may be permitted for properties if the continuous frontage on one abutting street exceeds 300 feet; or two additional driveways if the continuous frontage on one abutting street exceeds 600 feet.

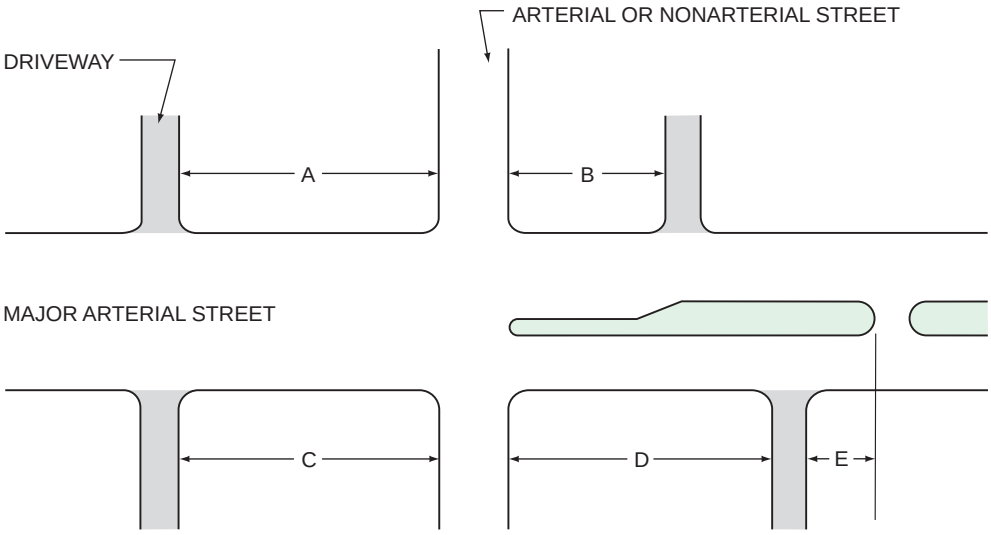
Table D-1 (continued)

Access Elements	Criteria
Residential Access Considerations	• Designate the number of driveways to existing properties and deny additional driveways regardless of future subdivision of the property. • In rural areas, direct access should be permitted only for 5 acre minimum size parcels with a minimum frontage of 300 feet. • Access for other new residential development should be via a land access street or land access and collector street system.
Driveway Location/Spacing	• Spacing is variable, dependent upon speed limit. Highway Speed / Minimum Centerline Driveway Spacing 20 mph — 85 feet 25 mph — 105 feet 30 mph — 125 feet 35 mph — 150 feet 40 mph — 185 feet 45 mph — 230 feet 50 mph — 275 feet • Locate driveways at median openings or offset from median opening by a minimum of 150 feet. • The centerline of a single driveway shared by two adjacent properties should be located on the joint property line. • Spacing near an intersection should be as shown in Figure D-1. • The centerline of a new driveway should be directly aligned with an existing driveway on the opposite side of the street.
Driveway Design	• The width of a driveway without a channelizing island to separate ingress and egress should be a maximum of 30 feet at the right-of-way line. • The width of a driveway with a channelizing island to separate ingress and egress should range from 16 to 24 feet for both ingress and egress lanes separated by a channelizing island 4 to 10 feet in width at the right-of-way line. • Driveway design should provide a throat with a minimum of 50 feet for vehicular storage in which no conflicting maneuvers are possible.

Source: Federal Highway Administration and SEWRPC.

Figure D-1

DESIRABLE MINIMUM CORNER CLEARANCES AT SIGNALIZED AND UNSIGNALIZED STREET INTERSECTIONS



INTERSECTION OF MAJOR ARTERIAL AND ARTERIAL/NONARTERIAL STREET CONTROLLED BY TRAFFIC SIGNAL

Key	Corner Clearance (feet)
A	230
B	115
C	230
D	230
E	150

INTERSECTION OF MAJOR ARTERIAL AND ARTERIAL/NONARTERIAL STREET CONTROLLED BY STOP SIGNS ON ARTERIAL/NONARTERIAL STREET

Key	Corner Clearance (feet)
A	115
B	85
C	115
D	115
E	150

Source: Institute of Transportation Engineers and SEWRPC.

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Appendix E

EVALUATION AND RECOMMENDATION OF FREEWAY INTERCHANGES

This appendix documents an evaluation and recommendation for each new freeway interchange proposed in the current regional transportation plan and proposed during this update and reevaluation of the regional transportation plan.

With respect to half interchanges, it is recommended that consideration be given to not constructing any half interchanges in the future, and that the Wisconsin Department of Transportation during the preliminary engineering of the reconstruction of the freeway system:

- Consider conversion of selected interchanges from half to full interchanges where interchange spacing and other conditions permit—for example, S. 27th Street with IH 94, and CTH P with IH 94;

- Consider as an alternative where conditions permit the combination of selected half interchanges into one full interchange—for example, STH 100 and S. 124th Street with IH 43; and

- Retain all other existing half interchanges and examine during preliminary engineering the improvement of connection between adjacent interchanges.

The remainder of this appendix presents an analysis and recommendation for each proposed new freeway interchange.

Analysis of Proposed Interchange – USH 12 at CTH B – Bloomfield/Genoa City – Walworth County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for planned urban development in the area.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: USH 12/CTH H – 1.25 miles south of CTH B
(0.9 mile gore spacing)

Pell Lake Drive – 2.45 miles north of CTH B
(2.1 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at CTH H and Pell Lake Drive should have adequate capacity with minor improvements (including turn lanes and traffic signalization) to carry existing and future traffic.

  - The existing connecting arterial streets with the extension of the USH 12 freeway into Illinois may be expected to have adequate capacity to carry existing and future traffic. If the USH 12 freeway is not extended into Illinois, the stretch of USH 12 south of its interchange with CTH H may be expected to experience future extreme traffic congestion. The current traffic volumes on this stretch of USH 12 are approaching its design capacity. The proposed interchange would be expected to provide some relief to this stretch of USH 12.

  - Access to the Village of Genoa City and the planned major employment center via the Pell Lake Drive interchange would involve multiple turning movements, and use of the Pell Lake Drive interchange lying at the fringe of the planned Pell Lake urban area.

Existing Interchanges – USH 12	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
at CTH H	5,200	5,000	3,300	3,000	NA[a]	NA[a]	4,200	4,000
at Pell Lake Drive	1,400	1,600	2,300	2,600	800	800	1,100	1,100

[a] *USH 12 freeway currently terminates at CTH H in the Village of Genoa City. The year 2035 forecast future traffic volumes were prepared under the assumption that the USH 12 freeway would be extended south into Illinois. A feasibility study for a USH 12 bypass of Richmond, Illinois was initiated in May 2000 and is nearing completion. A preferred alignment has been identified, and following one additional public hearing, the final chapter of the feasibility study report will be prepared and the report will be published.*

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	East of USH 12	West of USH 12	East of USH 12	West of USH 12	East of USH 12	West of USH 12	East of USH 12	West of USH 12
CTH H	12,200	5,200	14,000[b]	14,000	5,600	11,000	14,000[b]	14,000
Pell Lake Drive	2,800	3,200	14,000	14,000	5,600	4,000	14,000	14,000

[b] *Within the interchange itself, CTH H/USH 12 is a four-lane divided facility from a point approximately 1,500 feet east of the northbound on-ramp through the partial interchange to a point approximately 900 feet west of the southbound off-ramp having a design capacity of 27,000 vehicles per average weekday.*

Estimated Cost and Environmental Impacts

Impact	Alternative 1[c]	Alternative 2[d]	Alternative 3[e]
Construction Cost Including Right-of-Way (Millions)	$20.9	$20.6	$17.9
Right-of-Way Acquisition[f]			
▪ Residential Units	1	1	2
▪ Businesses	- -	- -	- -
▪ Other Buildings	1	1	7
▪ Acres	12.6	31.7	28.0
Primary Environmental Corridor (acres)	- -	3.3	1.3
Secondary Environmental Corridor (acres)	- -	- -	- -
Critical Species Habitat and Natural Area (acres)	- -	- -	- -
Farmland (acres)	- -	6.4	15.0
Prime Farmland (Class I and II Soils) (acres)	- -	2.2	15.0

[c]*Alternative 1 includes the construction of a new interchange at USH 12 and CTH B with the existing Wisconsin Department of Tourism Visitor Center remaining at its current location. Access to and from the Visitor Center would be via a new collector/distributor roadway.*

[d]*Alternative 2 includes the construction of a new interchange at USH 12 and CTH B with the existing Wisconsin Department of Tourism Visitor Center relocated to the northeast quadrant of the new interchange. Access to and from the Visitor Center would be via new collector/distributor roadway.*

[e]*Alternative 3 includes the construction of a new interchange at USH 12 and CTH B with the existing Wisconsin Department of Tourism Visitor Center relocated east of and adjacent to USH 12 and south of Town Line Road. Access to and from the Visitor Center would be via on- and off-ramps connected directly to USH 12.*

[f]*Alternatives 1, 2, and 3 are estimated to require acquisition of one residential unit in the southwest quadrant of the proposed interchange and one farm building in the northeast quadrant of the proposed interchange. Alternative 3 is also estimated to require acquisition of an additional residence and six additional farm buildings near Town Line Road to relocate the Visitor Center.*

▪ Effects on Freeway Mainline and Adjacent Freeway Interchanges

- Under all three alternatives, the year 2035 average weekday traffic volume forecasts on the USH 12 freeway between Pell Lake Drive and the Wisconsin-Illinois State line may be expected to be about 50 percent of the design capacity of the freeway. Existing traffic volumes are less than 20 percent of freeway traffic carrying design capacity. Therefore, each alternative may be expected to have minimal effect on the operation of the mainline freeway. In addition, each alternative would remove the existing ramps to and from the Tourism Visitor Center which are located only 0.7 miles north of the CTH H interchange.

▪ Consistency with Regional and Local Land Use Plans

- The interchange would directly serve the planned Village of Genoa City urban area and a potential future major employment center.

▪ Recommendation

The proposed interchange would meet urban spacing standards and may not be expected to result in any operational problems on USH 12. The proposed interchange, however, may not be expected to be necessary to relieve congestion at existing freeway interchanges or on connecting surface arterial streets as no congestion is expected if USH 12 is extended as a freeway south into Illinois. However, the proposed interchange would provide for more direct travel to and from the Village of Genoa City urban area, eliminate the need for traffic to travel with multiple turning movements through a rural area on rural county trunk highways, support a planned potential future major employment center which may be expected to attract jobs which would otherwise be located in the State of Illinois, and provide relief to USH 12 south of the CTH H interchange should it not be

extended into Illinois. Therefore, it is proposed that the regional transportation plan identify a potential future interchange at CTH B with USH 12, and recommend that action be taken by the concerned local governments to preserve the potential necessary right-of-way to assure that the future development of the interchange is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

Analysis of Proposed Interchange – USH 12 at Bloomfield Road – Town of Bloomfield – Walworth County

- **Interchange Spacing**

  - Meets urban spacing standards which may be appropriate in the future for this area.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: USH 12/STH 50 – 2.00 miles north of Bloomfield Road (1.6 mile gore spacing)

Pell Lake Drive – 3.00 miles south of Bloomfield Road (2.7 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 50 and Pell Lake Drive should have adequate capacity to carry existing and future traffic.

  - Pell Lake Drive may be expected to have adequate traffic carrying capacity to carry existing and future traffic; however, STH 50 west of USH 12 may be expected in the future to experience traffic congestion—between USH 12 and STH 120 and also west of STH 120.

Existing Interchanges – USH 12	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
at STH 50	6,000	5,900	9,800	9,700	2,400	2,300	3,900	3,800
at Pell Lake Drive	1,400	1,600	2,300	2,600	800	800	1,100	1,100

	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
Connecting Street	East of USH 12	West of USH 12	East of USH 12	West of USH 12	East of USH 12	West of USH 12	East of USH 12	West of USH 12
STH 50	12,500	19,800	27,000	32,000[a]	21,700	33,500	27,000	32,000[a]
Pell Lake Drive	2,800	3,200	14,000	14,000	5,600	4,000	14,000	14,000

[a]*STH 50 is a four-lane divided facility west of the USH 12/STH 50 interchange to STH 120 (0.18 mile) with a double left-turn lane in the westbound direction at STH 120. One of the two left-turn lanes specifically accommodates southbound STH 120 traffic which traverses STH 50 for a distance of 0.18 miles from the USH 12/STH 120 southbound off-ramp to STH 120 (Edwards Boulevard). West of STH 120, STH 50 is a two-lane facility carrying traffic volumes of 17,400 vehicles per average weekday which exceeds its design capacity of 14,000 vehicles per average weekday.*

- **Estimated Cost and Environmental Impacts**

Impact	Diamond Interchange
Construction Cost Including Right-of-Way (Millions)	$21.2
Right-of-Way Acquisition	
▪ Residential Units	3
▪ Businesses	- -
▪ Other Buildings	- -
▪ Acres	18.0
Primary Environmental Corridor (acres)	2.8
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	1.5
Farmland (acres)	7.3
Prime Farmland (Class I and II Soils) (acres)	1.0

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecasts on the USH 12 freeway between Pell Lake Drive and STH 50 may be expected to be about 45 percent of the design capacity of the freeway. Existing traffic volumes are less than 20 percent of freeway traffic carrying design capacity. Therefore, the proposed interchange may be expected to have minimal effect on the operation of the mainline freeway.

- **Consistency with Regional and Local Land Use Plans**

  - The interchange would serve the planned future City of Lake Geneva urban area; however, even under the planned year 2035 conditions, the City of Lake Geneva urban area would be about 1.0 mile from the interchange.

- **Recommendation**

The proposed interchange would meet urban spacing standards which may be appropriate on this segment of freeway in the future, and may not be expected to result in any operational problems on USH 12. The proposed interchange may not be expected to be necessary to relieve congestion at existing freeway interchanges. However, it may in the future provide some relief to STH 50. Therefore, it is proposed that the regional transportation plan identify a potential future interchange at Bloomfield Road with USH 12, and recommend that action be taken by the concerned local governments to preserve the potential necessary right-of-way to assure that the future development of the interchange is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of a preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

Analysis of Proposed Interchange – IH 43 at CTH F – Delavan – Walworth County

- **Interchange Spacing**

  - Meets urban spacing standards which may be appropriate for planned development in the area.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 43/STH 67 – 2.70 miles north of CTH F
(2.2 mile gore spacing)

STH 50 – 1.94 miles south of CTH F
(1.4 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 67 and STH 50 should have adequate capacity to carry existing and future traffic.

  - The existing connecting arterial streets have adequate capacity to carry existing traffic, but even with planned improvements to STH 50, STH 50 may be expected to carry future traffic volumes approaching its design capacity.

Existing Interchanges – IH 43	Average Weekday Ramp Volumes							
	To/From the North/East				To/From the South/West			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
STH 67	2,200	2,400	5,100	4,900	1,600	1,700	3,200	3,400
STH 50	2,900	3,100	6,000	5,700	2,500	2,200	4,100	3,600

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43
STH 67	10,300	12,300	14,000	14,000	14,900	18,100	27,000	27,000
STH 50	16,600	19,100	27,000	27,000	25,500	26,000	27,000	27,000

- **Estimated Cost and Environmental Impacts**

Impact	Diamond Interchange
Construction Cost Including Right-of-Way (Millions)	$18.4
Right-of-Way Acquisition ▪ Residential Units ▪ Businesses ▪ Other Buildings ▪ Acres	 1 - - 7 24.9
Primary Environmental Corridor (acres)	- -
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	24.9
Prime Farmland (Class I and II Soils) (acres)	24.9

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecast on IH 43 between STH 67 and STH 50 may be expected to be about 50 percent of the design capacity of the freeway. Existing traffic volumes are less than 35 percent of the freeway traffic carrying design capacity. Therefore, the proposed interchange may be expected to have minimal effect on the operation of the mainline freeway.

- **Consistency with Regional and Local Land Use Plans**

  - The interchange would directly serve the planned City of Delavan urban area and a planned future major employment center.

- **Recommendation**

The proposed interchange would meet urban spacing standards and may be expected to relieve some future congestion on STH 50. The proposed interchange would provide for more direct travel to and from the planned future major employment center in the City of Delavan. Therefore, it is proposed that the regional transportation plan identify a potential future interchange at CTH F with IH 43 and recommend that action be taken by the concerned local governments to preserve the potential necessary right-of-way to assure that the future development of the interchange is not precluded. Should the concerned local governments take the next step of participating with the Wisconsin Department of Transportation in the conduct of preliminary engineering study of the interchange, and the preliminary engineering conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange.

Analysis of Proposed Interchange – IH 43 at CTH O – Delavan – Walworth County

- **Interchange Spacing**

  - Meets urban spacing standards which may be appropriate for planned development in the area.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: STH 50 – 2.02 miles north of CTH O
(1.5 mile gore spacing)

CTH X – 1.18 miles south of CTH O
(1.0 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 50 and CTH X should have adequate capacity to carry existing and future traffic.

  - The existing connecting arterial streets with the planned improvements to STH 50 may be expected to have adequate capacity to carry existing and future traffic, although future traffic volumes on STH 50 would approach its design capacity.

Existing Interchanges – IH 43	Average Weekday Ramp Volumes							
	To/From the North/East				To/From the South/West			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
STH 50	2,900	3,100	6,000	5,700	2,500	2,200	4,100	3,600
CTH X	1,400	1,300	3,900	4,000	480	490	800	800

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43	North/East of IH 43	South/West of IH 43
STH 50	16,600	19,100	27,000	27,000	25,500	26,000	27,000	27,000
CTH X	3,800	3,000	14,000[1]	14,000[1]	6,600	9,800	14,000[a]	14,000[a]

[a]*CTH X is a four lane divided facility with a design capacity of 27,000 vehicles per average weekday immediately adjacent to and through its interchange with IH 43.*

Estimated Cost and Environmental Impacts

Impact	Alternative 1
Construction Cost Including Right-of-Way (Millions)	$18.1
Right-of-Way Acquisition	
▪ Residential Units	2
▪ Businesses	- -
▪ Other Buildings	- -
▪ Acres	34.5
Primary Environmental Corridor (acres)	- -
Secondary Environmental Corridor (acres)	1.1
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	34.5
Prime Farmland (Class I and II Soils) (acres)	34.5

▪ **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

- The year 2035 average weekday traffic volume forecasts on IH 43 between STH 50 and CTH X may be expected to be about 45 percent of the design capacity of the freeway. Existing traffic volumes are less than 30 percent of the freeway traffic carrying design capacity. Therefore, the proposed interchange may be expected to have minimal effect on the operation of the mainline freeway.

▪ **Consistency with Regional and Local Land Use Plans**

- The interchange would directly serve the planned City of Delavan urban area.

▪ **Recommendation**

The proposed interchange would meet urban spacing standards and may not be expected to result in any operational problems on IH 43. The proposed interchange, however, may not be expected to be necessary to relieve congestion at existing freeway interchanges on connecting surface arterial streets. Therefore, it is proposed that the regional transportation plan not identify a potential future interchange at CTH O with IH 43, and that an interchange which more directly serves the planned future major employment center near CTH F be considered.

Analysis of Proposed Interchange – Drexel Avenue at IH 94 – City of Oak Creek – Milwaukee County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for the City of Franklin and City of Oak Creek urban areas.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 94/CTH BB/W. Rawson Avenue – 1.00 miles North of W. Drexel Avenue (0.5 mile gore spacing)

STH 100/W. Ryan Road – 2.00 miles south of W. Drexel Avenue (1.5 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 100 and CTH BB are heavily used and experience congestion during peak periods.

  - The existing connecting arterial streets are carrying traffic volumes which are approaching their design capacity and may be expected to experience future moderate traffic congestion. Also, S. 27th Street south of CTH BB would be expected to carry traffic volumes approaching its design capacity. The proposed interchange would be expected to provide relief to CTH BB between S. 27th Street and IH 94, and to S. 27th Street between CTH BB/W. Rawson Avenue and W. Drexel Avenue.

  - Access to the existing and planned major activity centers along S. 27th Street would be improved.

Existing Interchanges – IH 94	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
CTH BB/W. Rawson Avenue	11,700	14,500	15,800	18,500	2,800	3,900	4,600	5,700
STH 100/W. Ryan Road	14,600	15,100	16,800	17,400	4,600	3,500	6,000	5,200

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94
CTH BB/W. Rawson Avenue	38,100	21,800	38,000	38,000	41,600	27,200	38,000	38,000
STH 100/W. Ryan Road	31,300	20,200	38,000	38,000	37,800	27,900	38,000	38,000

- **Estimated Cost and Environmental Impacts**

Impact	Alternative 1
Construction Cost Including Right-of-Way (Millions)	$19.9
Right-of-Way Acquisition ▪ Residential Units ▪ Businesses ▪ Other Buildings ▪ Acres	 4 - - - - 36.9
Primary Environmental Corridor (acres)	- -
Secondary Environmental Corridor (acres)	4.5
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	12.5
Prime Farmland (Class I and II Soils) (acres)	- -

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecast on IH 94 between STH 100 and CTH BB may be expected to exceed the planned design capacity of the freeway. Existing traffic volumes on this segment of freeway currently exceed its design capacity and the facility experiences some moderate traffic congestion.

- **Consistency with Regional and Local Land Use Plans**

  - The proposed interchange would directly serve the City of Franklin and City of Oak Creek urban areas.

- **Recommendation**

The proposed interchange would meet urban spacing standards. The proposed interchange may be expected to be necessary to relieve congestion at existing freeway interchanges and on connecting surface arterial streets as those facilities are currently approaching their design capacity. Therefore, it is proposed that the regional transportation plan recommend a future interchange at W. Drexel Avenue with IH 94 and that the Wisconsin Department of Transportation during the conduct of the preliminary engineering studies of reconstructing IH 94 between the Illinois-Wisconsin State line and the Mitchell Interchange include as part of those the necessary preliminary engineering—including interchange and operational analyses—of constructing a new interchange at W. Drexel Avenue with IH 94.

Analysis of Proposed Interchange – CTH ML at IH 94 – Bristol/Pleasant Prairie – Kenosha County

- **Interchange Spacing**

  - Meets urban spacing standards between arterial street and highway service interchanges which should be appropriate for the planned Village of Pleasant Prairie urban area. However, there is a vehicular safety and weight enforcement facility (SWEF) located adjacent to and east of IH 94, and adjacent to and south of CTH ML. The SWEF is served by an off- and an on-ramp for northbound IH 94 traffic. Distances between the SWEF ramps and ramps serving the proposed new interchange between IH 94 and CTH ML would violate urban ramp spacing standards. Accordingly, the provision of a new interchange at CTH ML may be expected to require a system of collector–distributor roadways to accommodate both northbound traffic exiting IH 94 to access the SWEF or CTH ML and northbound traffic entering IH 94 from either the SWEF or CTH ML.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 94/STH 165/CTH Q – 1.50 miles north of CTH ML (0.9 mile gore spacing)

Russell Road – 1.06 miles south of CTH ML (0.6 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 165/CTH Q and Russell Road (Illinois) should have adequate capacity to carry existing and future traffic.

  - The existing connecting arterial streets may be expected to have adequate capacity to carry existing and future traffic.

  - Access to the planned Village of Pleasant Prairie urban area and the major employment center located both east and west of IH 94 and north of CTH ML would be improved.

Existing Interchanges – IH 94	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
STH 165/CTH Q	4,600	3,200	6,800	4,700	4,000	5,800	8,500	12,300
Russell Road (Illinois)	- -[a]	- -[a]	- -[b]	- -[b]	- -[a]	- -[a]	- -[b]	- -[b]

[a] *Existing counts on the Russell Road on- and off-ramps are not available.*
[b] *SEWRPC does not prepare traffic forecasts for facilities outside of the Region.*

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94
STH 165/CTH Q	13,000	2,700	27,000	14,000	23,000	4,700	27,000	14,000
Russell Road (Illinois)	1,900[c]	1,900[c]	14,000	14,000	- -[d]	- -[d]	14,000	14,000

[c] *Existing count on Russell Road is from the Illinois Department of Transportation and is for the year 2004.*
[d] *SEWRPC does not prepare traffic forecasts for facilities outside of the Region.*

Estimated Cost and Environmental Impacts

Impact	Diamond Interchange
Construction Cost Including Right-of-Way (Millions)	$27.0
Right-of-Way Acquisition ▪ Residential Units ▪ Businesses ▪ Other Buildings ▪ Acres	 1 1 2 46.5
Primary Environmental Corridor (acres)	8.9
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	25.9
Prime Farmland (Class I and II Soils) (acres)	3.5

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecast on IH 94 between STH 165/CTH Q and Russell Road (Illinois) may be expected to approach the planned design capacity of the freeway. Existing traffic volumes on this segment of freeway are at about 90 percent of its design capacity.

- **Consistency with Regional and Local Land Use Plans**

  - The proposed interchange would directly serve the planned Village of Pleasant Prairie urban area and an existing and planned major employment center.

- **Recommendation**

  The proposed interchange would meet urban spacing standards. The proposed interchange may not be expected to be necessary to relieve congestion at existing freeway interchanges or on connecting surface arterial streets until after the year 2035. CTH ML would directly serve the Region and State's largest industrial center. Therefore, it is recommended that the regional transportation plan identify a potential future interchange at CTH ML with IH 94 so that construction of an interchange is not precluded and that the Wisconsin Department of Transportation during the conduct of the preliminary engineering studies of reconstructing IH 94 between the Illinois-Wisconsin State line and the Mitchell Interchange include as part of those studies a more detailed analysis of constructing a new interchange at CTH ML with IH 94. Should the preliminary engineering studies of the interchange conclude with a recommendation to construct the interchange, the Regional Planning Commission, upon the request of the concerned local governments and the Wisconsin Department of Transportation, would take action to amend the regional plan to recommend the construction of the interchange. In any case, local governments should act to preserve the potential necessary right-of-way to assure that the future development of the interchange is not precluded.

Analysis of Proposed Interchange – Edgewood Avenue at IH 43 – Town of Vernon – Waukesha County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for planned development in the area

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 43/STH 164 – 4.58 miles north of Edgewood Avenue
(4.2 mile gore spacing)

STH 83 – 2.36 miles south of Edgewood Avenue
(1.9 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at STH 164 and STH 83 should have adequate capacity to carry existing and future traffic.

  - The existing connecting arterial streets are carrying traffic volumes which are below their design capacity, but may be expected in the future to carry traffic volumes which approach or exceed their design capacity.

  - Access to the planned Village of Mukwonago urban area would be improved.

Existing Interchanges – IH 43	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
STH 164	8,000	7,800	10,300	10,100	2,800	2,600	6,100	5,600
STH 83	6,600	6,400	10,700	10,400	2,100	1,900	4,800	4,400

	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2003				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
Connecting Street	North of IH 43	South of IH 43	North of IH 43	South of IH 43	North of IH 43	South of IH 43	North of IH 43	South of IH 43
STH 164	16,800	11,600	27,000	14,000[1]	25,900	15,000	27,000	14,000[a]
STH 83	20,200	8,700	27,000	14,000[1]	31,500	14,300	27,000	14,000[a]

[a]*Although these facilities are four-lane divided arterials immediately south of IH 43, they quickly transition to two lane arterials so that their effective capacity south of IH 43 is that of a two-lane arterial facility.*

Estimated Cost and Environmental Impacts

Impact	Diamond Interchange
Construction Cost Including Right-of-Way (Millions)	$23.0
Right-of-Way Acquisition	
▪ Residential Units	1
▪ Businesses	- -
▪ Other Buildings	- -
▪ Acres	20.4
Primary Environmental Corridor (acres)	10.0
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	- -
Prime Farmland (Class I and II Soils) (acres)	- -

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volumes on IH 43 between STH 164 and STH 83 may be expected to approach the design capacity of the freeway. Existing traffic volumes are less than 55 percent of the freeway traffic carrying capacity. Therefore, because of the distance to adjacent interchanges and the level of forecast future year traffic does not exceed the freeway's design capacity, the proposed interchange may be expected to have minimal effect on the operation of the mainline freeway.

- **Consistency with Regional and Local Land Use Plans**

  - The interchange would directly serve the planned Village of Mukwonago urban area.

- **Recommendation**

The proposed interchange would meet urban spacing standards and may not be expected to result in any operational problems on IH 43. The proposed interchange may not be expected to be necessary to relieve congestion at existing freeway interchanges. The proposed interchange would not be expected to remove any substantial traffic from STH 164 but would be expected to remove traffic from STH 83. However, the reduction in traffic would not be sufficient to eliminate the need for STH 83 to carry four traffic lanes through the Village of Mukwonago. The proposed interchange may also be expected to remove some traffic from CTH ES, but existing and forecast future traffic volumes on CTH ES do not warrant widening to four traffic lanes. Additionally, the Waukesha County jurisdictional highway system plan recommends that freeway service interchanges be served by state or county trunk facilities. Edgewood Avenue is currently and is planned to remain a local trunk arterial and thus the proposed interchange would not be served by either a county or state trunk highway. The character of Edgewood Avenue would change with the addition of an interchange. Therefore, it is proposed that the regional transportation plan not identify a future interchange at Edgewood Avenue with IH 43.

Analysis of Proposed Interchange – Highland Road at IH 43 – City of Mequon – Ozaukee County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for planned development in the City of Mequon urban area.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 43/CTH C/Pioneer Road – 2.07 miles north of Highland Road (1.7 mile gore spacing)

STH 167/Mequon Road – 1.98 miles south of Highland Road (1.6 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at CTH C and STH 167 should have adequate capacity to carry existing and future traffic.

  - The existing connecting arterial streets may be expected to continue to experience traffic congestion. The current traffic volumes on STH 167 exceed its design capacity.

  - Access to the City of Mequon would be improved, including St. Mary's Hospital, Concordia University, and Milwaukee Area Technical College-North Campus.

Existing Interchanges – IH 43	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
CTH C/ Pioneer Rd.	2,500	2,400	3,600	3,600	6,000	5,600	8,700	8,300
STH 167/Mequon Rd.	5,200	5,100	7,500	7,500	9,700	10,300	12,300	13,000

	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2001				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
Connecting Street	East of IH 43	West of IH 43	East of IH 43	West of IH 43	East of IH 43	West of IH 43	East of IH 43	West of IH 43
CTH C/ Pioneer Rd.	2,100	16,800	14,000	27,000	2,300	20,600	14,000	27,000
STH 167/ Mequon Rd.	4,600	29,000	14,000	27,000	5,700	33,000	14,000	27,000

Estimated Cost and Environmental Impacts

Impact	Alternative 1
Construction Cost Including Right-of-Way (Millions)	$27.2
Right-of-Way Acquisition	
▪ Residential Units	- -
▪ Businesses	- -
▪ Other Buildings	- -
▪ Acres	10.7
Primary Environmental Corridor (acres)	- -
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	- -
Prime Farmland (Class I and II Soils) (acres)	- -

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecasts on IH 43 between STH 167 and CTH C may be expected to be about 80 percent of the planned design capacity of the freeway with widening to six traffic lanes. Existing traffic volumes are at about 90 percent of the freeway traffic carrying design capacity.

- **Consistency with Regional and Local Land Use Plans**

  - The interchange would directly serve the planned City of Mequon urban area.

- **Recommendation**

The proposed interchange would meet urban spacing standards. The proposed interchange may be expected to be necessary to relieve congestion on connecting surface arterials such as STH 167 between IH 43 and Port Washington Road and on Port Washington Road between STH 167 and Highland Road. The proposed interchange would provide for more direct travel to and from the City of Mequon urban area. Therefore, it is recommended that the regional transportation plan identify a future interchange at Highland Road with IH 43.

Analysis of Proposed Interchange – Calhoun Road at IH 94 – Brookfield – Waukesha County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for existing and planned development in thearea.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 94/USH 18/CTH Y – 2.06 miles west of Calhoun Road (1.7 mile gore spacing)

CTH O/Moorland Road – 1.04 miles east of Calhoun Road (0.6 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchanges at USH 18/CTH Y and CTH O/Moorland Road are heavily used and experience traffic congestion during peak periods.

  - The existing connecting arterial streets are carrying traffic volumes which are approaching their design capacities. CTH O/Moorland Road may be expected in the future to experience moderate to extreme traffic congestion. USH 18/Bluemound Road may be expected in the future to experience moderate to severe traffic congestion between CTH Y/Barker Road and CTH O/Moorland Road. The proposed interchange would be expected to provide relief to CTH O/Moorland Road and USH 18/Bluemound Road.

  - Access to the existing and planned major activity center along Bluemound Road would be improved.

Existing Interchanges – IH 94	Average Weekday Ramp Volumes							
	To/From the East				To/From the West			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
USH 18/CTH Y	20,600	20,400	28,000	28,000	12,200	11,900	20,000	20,000
CTH O/Moorland Road	18,600	19,000	25,000	24,000	11,800	13,300	14,000	15,000

	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2003				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
Connecting Street	North of IH 94	South of IH 94	North of IH 94	South of IH 94	North of IH 94	South of IH 94	North of IH 94	South of IH 94
CTH Y	23,100	16,000	27,000	27,000	33,000	23,000	27,000	27,000
CTH O/Moorland Road	31,700	37,300	38,000	38,000	44,000	54,000	38,000	38,000

Estimated Cost and Environmental Impacts

Impact	Diamond Interchange
Construction Cost Including Right-of-Way (Millions)	$20.6
Right-of-Way Acquisition ▪ Residential Units ▪ Businesses ▪ Other Buildings ▪ Acres	 1 - - - - 10.2
Primary Environmental Corridor (acres)	6.5
Secondary Environmental Corridor (acres)	- -
Critical Species Habitat and Natural Area (acres)	- -
Farmland (acres)	- -
Prime Farmland (Class I and II Soils) (acres)	- -

- **Effects on Freeway Mainline and Adjacent Freeway Interchanges**

  - The year 2035 average weekday traffic volume forecast on IH 94 between CTH O/Moorland Road and USH 18/CTH Y may be expected to exceed its planned design capacity as an eight lane freeway. Existing traffic volumes on this segment of freeway currently exceed its design capacity, and the facility experiences extreme traffic congestion during peak periods.

- **Consistency with Regional and Local Land Use Plans**

  - The proposed interchange would directly serve the existing and planned City of Brookfield urban area and the major economic activity center along USH 18/Blue mound Road.

- **Recommendation**

The proposed interchange would meet urban spacing standards. The proposed interchange may be expected to be necessary to relieve congestion at existing freeway interchanges and on connecting surface arterial streets as those facilities are currently approaching their design capacity and are forecast to experience traffic congestion in the future, particularly USH 18/Bluemound Road and CTH O/Moorland Road. Therefore, it is proposed that the regional transportation plan recommend a future interchange at Calhoun Road with IH 94.

Analysis of Proposed Interchange – STH 241/27th Street at IH 94 – Franklin/Oak Creek – Milwaukee County

- **Interchange Spacing**

  - Meets urban spacing standards which should be appropriate for the City of Franklin and City of Oak Creek urban areas.

AASHTO Spacing Standards: Urban – 1.0 mile
Rural – 3.0 miles

WisDOT Spacing Standards: Rural – 2.0 miles between gores of adjacent interchanges.

Proposed Spacing: IH 94/STH 100/W. Ryan Road – 1.65 miles north of S. 27th Street (1.2 mile gore spacing)

CTH G/Seven Mile Road – 1.60 miles south of S. 27th Street (1.0 mile gore spacing)

- **Deficiencies of Existing Interchanges and/or Connecting Streets in Providing Access or Adequate Traffic Carrying Capacity**

  - The existing interchange at STH 100/W. Ryan Road is heavily used and experiences congestion during peak periods.

  - STH 100 is carrying traffic volumes which are approaching its design capacity and may be expected to experience future moderate traffic congestion.

  - Access to the existing and planned major economic activity centers along S. 27th Street would be improved.

Existing Interchanges – IH 94	Average Weekday Ramp Volumes							
	To/From the North				To/From the South			
	Existing Year 2003		Future Year 2035		Existing Year 2003		Future Year 2035	
	On	Off	On	Off	On	Off	On	Off
STH 100/W. Ryan Road	14,600	15,100	16,500	17,400	4,600	3,500	5,500	4,500
CTH G/Seven Mile Road	2,400	2,300	3,500	3,500	1,100	1,200	2,000	2,000

Connecting Street	Connecting Streets, Traffic Volume/Design Capacity							
	Existing Year 2002				Future Year 2035			
	Average Weekday Volume		Design Capacity		Average Weekday Volume		Design Capacity	
	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94	East of IH 94	West of IH 94
STH 100/W. Ryan Road	31,300	20,200	38,000	38,000	37,800	27,900	38,000	38,000
CTH G/Seven Mile Road	2,700	1,400	14,000	14,000	7,000	3,000	14,000	14,000

Estimated Cost and Environmental Impacts

Impact	Alternative 1[a]	Alternative 2[b]
Construction Cost Including Right-of-Way (Millions)	$28.9	$32.2
Right-of-Way Acquisition		
▪ Residential Units	- -	- -
▪ Businesses	- -	- -
▪ Other Buildings	- -	- -
▪ Acres	61.5	71.5
Primary Environmental Corridor (acres)	- -	- -
Secondary Environmental Corridor (acres)	- -	- -
Critical Species Habitat and Natural Area (acres)	- -	- -
Farmland (acres)	60.5	70.5
Prime Farmland (Class I and II Soils) (acres)	- -	- -

[a]Alternative 1 includes the construction of a new S. 27th Street interchange about 0.60 miles north of the existing one-half interchange on IH 94, including a new four-lane arterial between the new interchange and S. 27th Street. The existing one-half interchange would be removed.

[b]Alternative 2 includes the construction of a new S. 27th Street interchange about 0.6 miles north of the existing one-half interchange on IH 94 including a new four-lane arterial through the new interchange between S. 27th Street and S. 13th Street. The existing one-half interchange would be removed.

▪ Effects on Freeway Mainline and Adjacent Freeway Interchanges

- The year 2035 average weekday traffic volume forecast on IH 94 between CTH G and STH 100 may be expected to be about 80 percent of its planned design capacity as an eight lane freeway. Existing traffic volumes on this segment of freeway are about 90 percent of its design capacity.

▪ Consistency with Regional and Local Land Use Plans

- The proposed interchange would directly serve the City of Franklin and the City of Oak Creek urban areas.

▪ Recommendation

The proposed new interchange would meet urban spacing standards and improve the spacing of interchanges along this segment of IH 94. The proposed interchange may not be expected to be necessary to relieve congestion on existing surface arterial streets until after the year 2035. The proposed improvement would convert an existing half interchange to a full interchange. Therefore, it is recommended that the regional transportation plan recommend a conversion of the existing half interchange on S. 27th Street with IH 94 to a full interchange. The Wisconsin Department of Transportation during the conduct of preliminary engineering studies of reconstructing IH 94 between the Illinois-Wisconsin State line and the Mitchell Interchange should include as part of those studies a more detailed analysis of conversion of this interchange at S. 27th Street with IH 94.

Appendix F

EVALUATION OF ALTERNATIVE FREEWAY SYSTEM IMPROVEMENTS

INTRODUCTION

The Advisory Committee requested that three alternative freeway system improvements be examined. City of Milwaukee representatives requested that the current plan recommendation to widen from six to eight lanes 19 miles of freeway within the City of Milwaukee be re-examined—IH 94 between the Marquette and Zoo Interchanges and IH 43 between the Mitchell Interchange and Silver Spring Drive. City of Milwaukee representatives also requested that the implications of building a new freeway connecting IH 43 and USH 45 near the Milwaukee County-Ozaukee County line be examined. The third alternative freeway system improvement requested by the Advisory Committee to be examined was a new freeway connecting IH 94 in Kenosha or Racine County and IH 94 in western Waukesha County.

WIDENING FROM SIX TO EIGHT TRAFFIC LANES OF IH 94 BETWEEN THE ZOO AND MARQUETTE INTERCHANGES AND IH 43 BETWEEN THE MITCHELL INTERCHANGE AND SILVER SPRING DRIVE

The widening upon reconstruction from six to eight lanes of these 19 miles of freeway in the City of Milwaukee was the most controversial recommendation of the regional freeway system reconstruction plan completed in the year 2003. The City of Milwaukee Common Council and Mayor by resolution formally opposed the widening from six to eight traffic lanes of these 19 miles of freeway while indicating support for rebuilding the freeway system to modern design standards upon its reconstruction and providing additional traffic lanes on the other 108 miles of freeway proposed to be widened. With respect to Milwaukee County, no official position on the regional freeway system reconstruction plan recommendations was provided since the legislative and executive branches of County government could not reach agreement. However, the actions of the Milwaukee County Board of Supervisors and the Milwaukee County Executive may be interpreted to indicate agreement also on rebuilding the freeway system to modern design standards and providing additional traffic lanes on 108 of the 127 miles of freeway proposed for widening, and opposition by the County Board to the proposed widening of the 19 miles of freeway including IH 94 from the Marquette to the Zoo Interchange and IH 43 from the Mitchell Interchange to Silver Spring Drive.

The Regional Planning Commission staff recommendation to the Advisory Committee for the final regional freeway system reconstruction plan was that these 19 miles of freeway widening not be included in the final plan, but rather be addressed as an alternative as the Wisconsin Department of Transportation conducts preliminary engineering and environmental assessments attendant to the reconstruction of these 19 miles of freeway. Should the final recommendation from the preliminary engineering and environmental assessment include the widening of some or all of these 19 miles of freeway from six to eight traffic lanes, the regional transportation plan would be amended by the Commission at that time. The Commission staff made this recommendation given the opposition by the City of Milwaukee and the Milwaukee County Board, and further given that traffic analyses indicated that operations on the remainder of the freeway system would not be significantly affected by not widening these 19 miles of freeway. Finally, the Commission staff recommendation recognized that the widening could still be considered as an alternative in preliminary engineering, where the impacts could be reviewed in greater detail. On a split vote, the Advisory Committee for the regional freeway system reconstruction study—an Advisory Committee which largely consisted of the Region's elected officials appointed on a population proportional basis—rejected the Commission staff recommendation and determined to place the 19 miles of freeway widening in the final recommendations of the regional freeway reconstruction plan along with the almost unanimously supported rebuilding of the freeway system to modern design standards and the rebuilding of 108 miles of freeway with additional lanes upon their reconstruction. The Regional Planning Commission accepted that Advisory Committee's recommendation.

Table F-1 summarizes the costs and benefits broadly defined of widening upon reconstruction of the 19 miles of freeway in the City of Milwaukee from six to eight traffic lanes, specifically on IH 94 between the Marquette and the Zoo Interchanges and on IH 43 between the Mitchell Interchange and Silver Spring Drive. The data presented in Table F-1 indicates that the cost of constructing the additional lanes represents an estimated 20 percent increase in the cost of reconstructing these 19 miles of freeway, and the additional lanes can largely be built within the existing right-of-way. The additional lanes would provide a 33 percent increase in traffic carrying capacity, and would reduce traffic congestion and the attendant diversion of freeway traffic to surface arterial streets and congestion on those surface streets. Also, traffic safety would be improved on these 19 miles of freeway.

The 19 miles of freeway are relatively unique among the 270 miles of freeways in the Region and the 127 total miles proposed for widening in the regional freeway reconstruction plan in that along much of these 19 miles, densely populated residential neighborhoods are located immediately adjacent to the freeways. The concern and opposition to these 19 miles of freeway widening is attendant to the perceived negative impacts on the neighborhoods immediately adjacent to the freeways. The Commission staff proposal to the regional freeway system plan Advisory Committee was one of recognizing the strong opposition from the City of Milwaukee and the strongly split opinion within Milwaukee County, and was based on a recognition that the decision of whether to include the widening in the regional plan could be made after the completion of more detailed preliminary engineering and environmental assessment studies which would more precisely define the impacts on the neighborhoods adjacent to the 19 miles of freeway.

CONSIDERATION OF POSSIBLE NEW FREEWAY SEGMENT CONNECTING IH 43 AND USH 45 IN NORTHERN MILWAUKEE COUNTY/SOUTHERN OZAUKEE COUNTY

At the request of the City of Milwaukee, consideration was given to construction of a new segment of freeway connecting IH 43 and USH 45 in a corridor located from three to six miles north or south of the Milwaukee County/Ozaukee County line. A traffic impact analysis was conducted of the potential new freeway with respect to the existing freeway system and the surface arterial system. The intent of this analysis was to assess whether the proposed new freeway would have a significant impact on reducing traffic volumes and congestion, and the need to consider widening of 19 miles of existing freeway in the City of Milwaukee—IH 94 between the Marquette and Zoo Interchanges and IH 43 between the Mitchell Interchange and Silver Spring Drive. Three alternative conceptual locations for the freeway were identified for analysis of traffic impacts: one near Good Hope Road, one near County Line Road, and one near Pioneer Road. The forecast year 2035 average weekday traffic on these three possible alternative freeway alignments is as follows:

- Good Hope Road Alternative—70,000 to 75,000 vehicles per average weekday
- County Line Road Alternative—45,000 to 55,000 vehicles per average weekday
- Pioneer Road alternative—25,000 to 30,000 vehicles per average weekday

With respect to the traffic impact on the surface arterial street system, each alternative may be expected to result in a significant reduction of traffic on parallel surface arterial streets, providing a higher level of service to traffic (faster speeds and increased safety) and a reduction in congestion on certain segments of those streets. Selected forecast reductions in year 2035 average weekday traffic on surface arterial streets under each possible freeway alternative are listed below:

- Good Hope Road Alternative
    - Good Hope Road—10,000 to 16,000 vehicles per average weekday
    - Silver Spring Road—4,000 to 9,000 vehicles per average weekday

Table F-1

COSTS AND BENEFITS OF WIDENING 19 MILES OF FREEWAY FROM SIX TO EIGHT LANES—IH 94 BETWEEN MARQUETTE AND ZOO INTERCHANGES AND IH 43 BETWEEN MITCHELL INTERCHANGE AND SILVER SPRING DRIVE

Construction Cost

Additional cost of $268 million for widening. (Represents 20 percent increase in estimated cost of reconstruction of these 19 miles of freeway to modern design standards without widening.)

Right-of-Way Acquisition[a]

21 residences
3 commercial buildings
(Additional lanes can largely be built within the existing right-of-way.)

Traffic Carrying Capacity

Widening IH 94 and IH 43 from six to eight lanes will expand traffic carrying capacity by 33 percent.

Traffic Congestion[b]

IH 94 between Marquette and Zoo Interchanges
Year 2035 Average Weekday Hours of Congestion

	Total	Extreme	Severe	Moderate
With No Added Lanes	16	4	5	7
With Added Lanes	13	2	5	6

IH 43 between Mitchell and Marquette Interchanges
Year 2035 Average Weekday Hours of Congestion

	Total	Extreme	Severe	Moderate
With No Added Lanes	13	2	5	6
With Added Lanes	4	--	2	2

IH 94 between Marquette and Silver Spring Drive
Year 2035 Average Weekday Hours of Congestion

	Total	Extreme	Severe	Moderate
With No Added Lanes	8	2	4	5
With Added Lanes	4	--	2	2

Table F-1 (continued)

Travel Times

Year 2035 Peak Hour Travel Time (minutes)

	With Added Lanes	Without Added Lanes
IH 94 – between Marquette and Zoo Interchanges (Free flow travel time of 6 minutes)	14	19
IH 43 – between Mitchell and Marquette Interchanges (Free flow travel time of 6 minutes)	9	14
IH 43 – between Marquette Interchange and Silver Spring Drive (Free flow travel time of 6 minutes)	10	13

Additional Traffic on Surface Streets[c]

- Wisconsin Avenue – 1,000 to 5,000 vehicles per weekday
- Greenfield Avenue – 1,000 to 3,000 vehicles per weekday
- St. Paul Avenue – 200 to 1,000 vehicles per weekday
- Lisbon Avenue – 200 to 2,000 vehicles per weekday
- 27th Street – 1,000 to 4,000 vehicles per weekday
- Fond du Lac Avenue – 2,000 to 4,000 per weekday
- Capitol Drive – 1,000 to 4,000 vehicles per weekday
- National Avenue – 2,000 to 3,500 vehicles per weekday
- Forest Home Avenue – 1,000 to 3,000 vehicles per weekday
- Howell Avenue – 1,000 to 2,000 vehicles per weekday
- Lincoln Memorial Drive – 1,000 to 3,000 vehicles per weekday
- Port Washington Road – 1,000 to 3,000 vehicles per weekday
- 43rd Street – 1,000 to 3,000 vehicles per weekday
- Bluemound Road – 1,000 to 3,000 vehicles per weekday
- North Avenue – 1,000 to 2,000 vehicles per weekday

Traffic Safety

The widening of IH 94 and IH 43 from six to eight lanes as part of freeway reconstruction will provide traffic safety improvement by reducing traffic congestion. Rear-end accident rates are five to 15 times higher on congested freeways, as compared to uncongested freeways. The most extremely congested freeways experience the highest rear-end crash rates. On these freeway segments, rear-end accidents represent 70 percent of all accidents.

Air Pollutant Emissions and Motor Fuel Consumption and Impacts on Air Quality

Almost no difference between alternatives. Similar levels of vehicle traffic expected with or without additional lanes—more will be on freeways with added lanes and more will be on parallel surface arterials without new lanes. Transportation generated ozone-related air pollutant emissions have been declining, and are projected to continue to decline by the year 2035 by about 70 percent (along with most other pollutant emissions), even with increasing traffic, due primarily to more stringent standards for new motor vehicles.

Table F-1 (continued)

Land Use Impacts No major impact on land use decentralization or centralization expected, as future year 2020 traffic congestion with additional lanes will only be modestly less than current traffic congestion, and transportation is one of many possible causes, and is not considered a principal or significant cause of land use decentralization. Induced Travel No significant additional travel is expected to be induced by additional freeway lanes, as future year traffic congestion with additional lanes may be expected to be only modestly less than current levels of traffic congestion.

[a]*The widening of IH 94 to eight lanes between Mitchell Boulevard and Hawley Road—where Wood National Cemetery and other cemeteries are located adjacent to the freeway—will not require the acquisition of any new right-of-way nor the relocation or disturbance of any graves. The land dedicated to freeways and streets within Wood National Cemetery may decrease, as the proposed design for this freeway segment includes the construction of a structure between Mitchell Boulevard and Hawley Road to elevate the westbound IH 94 freeway lanes. The elevated westbound lanes would overlap the eastbound lanes and potentially the adjacent cemeteries. Construction of the proposed structure would require the acquisition of air rights and permanent easements for maintenance should any portion of the structure overhang the cemeteries. This freeway redesign may be considered whether additional lanes are provided on IH 94, or it is rebuilt with design improvements only.*

[b]*Extreme traffic congestion is characterized by stop-and-go bumper-to-bumper traffic operating at speeds of 20 to 30 miles per hour or less. Severe congestion is characterized by traffic operating at speeds of 5 to 15 miles per hour below free-flow speed and no gaps in traffic for lane changing. Moderate traffic congestion is characterized by traffic operating at speeds of 1 to 5 miles per hour below free-flow speed and substantial restrictions on ability to change lanes.*

[c]*The forecast additional traffic on surface streets would be expected during periods of extreme and severe congestion on the freeway system.*

Source: SEWRPC.

- Good Hope Road Alternative (continued)
    - Capitol Drive—2,000 to 3,000 vehicles per average weekday
    - Hampton Avenue—2,000 to 3,000 vehicles per average weekday
    - Brown Deer Road—5,000 to 14,000 vehicles per average weekday
    - Bradley Road—1,000 to 6,000 vehicles per average weekday
    - County Line Road—1,000 to 3,000 vehicles per average weekday
    - Mequon Road—2,000 to 5,000 vehicles per average weekday
    - Fond du Lac Avenue—4,000 to 11,000 vehicles per average weekday

- County Line Road Alternative
    - STH 60—1,000 vehicles per average weekday
    - Pioneer Road—1,000 to 3,000 vehicles per average weekday
    - Highland Road—2,000 to 4,000 vehicles per average weekday
    - Mequon Road—6,000 to 13,000 vehicles per average weekday
    - County Line Road—1,000 to 3,000 vehicles per average weekday
    - Brown Deer Road—4,000 to 14,000 vehicles per average weekday
    - Bradley Road—1,000 to 2,000 vehicles per average weekday
    - Good Hope Road—2,000 to 3,000 vehicles per average weekday
    - Silver Spring Road—1,000 to 3,000 vehicles per average weekday
    - Hampton Avenue—1,000 to 2,000 vehicles per average weekday
    - Fond du Lac Avenue—2,000 to 4,000 vehicles per average weekday

- Pioneer Road Alternative
    - STH 60—1,000 to 3,000 vehicles per average weekday
    - Pioneer Road—1,000 to 4,000 vehicles per average weekday
    - Highland Road—1,000 to 3,000 vehicles per average weekday
    - Mequon Road—2,000 to 4,000 vehicles per average weekday
    - County Line Road—1,000 to 2,000 vehicles per average weekday
    - Brown Deer Road—1,000 to 2,000 vehicles per average weekday
    - Good Hope Road—1,000 to 2,000 vehicles per average weekday

With respect to the impacts of the possible new freeway on the existing freeway system, the proposed new freeway may be expected to modify the routing of traffic, or traffic patterns, on the existing freeway system; however, the net impact on reducing or increasing freeway traffic volume may be expected to be modest, as shown in Table F-2.

Because the possible new freeway connecting IH 43 and USH 45 in northern Milwaukee County and southern Ozaukee County would have little impact on reducing or increasing freeway traffic volume on any segment of the existing freeway system, it would also have little impact on the need to address existing freeway system design, safety, and congestion problems. All three alternatives of the proposed new freeway connection may be expected to reduce average weekday traffic on selected parallel surface arterials, as previously noted.

Construction of any of the alternative freeway connections would likely require the acquisition of a right-of-way corridor generally 240 feet to 300 feet or more in width. Additional right-of-way would be required at both USH 45 and IH 43 to provide system interchanges and at selected surface arterial streets to provide service interchanges. Accordingly, because the proposed freeway connection would have minimal impact on the existing freeway system, and require acquisition of a new right-of-way corridor, further consideration of the proposed freeway connection is not recommended.

Table F-2

PROJECTED CHANGE IN YEAR 2035 AVERAGE WEEKDAY TRAFFIC VOLUMES ATTENDANT TO POSSIBLE NEW FREEWAY CONNECTING IH 43 AND USH 45 IN NORTHERN MILWAUKEE COUNTY/SOUTHERN OZAUKEE COUNTY

Existing Freeways	Amount of Change in Year 2035 Average Weekday Traffic	Percent of Total Year 2035 Average Weekday Traffic
IH 94—Marquette Interchange to Zoo Interchange	- -	- -
IH 94—Marquette Interchange to Mitchell Interchange	-3,600 to -8,000	2.5 to 5 percent
IH 894—Mitchell Interchange to Hale Interchange	-6,500 to -7,500	4 to 4.5 percent
IH 894—Hale Interchange to Zoo Interchange	-300 to 2,400	less than 1 percent to 1 percent
USH 45—Zoo Interchange to Capitol Drive	5,600 to 11,000	4 percent to 5.5 percent
IH 43—Marquette Interchange to Capitol Drive	3,800 to 6,000	2.5 to 4 percent

Source: SEWRPC.

CONSIDERATION OF POSSIBLE NEW FREEWAY SEGMENT CONNECTING IH 94 IN KENOSHA COUNTY WITH IH 94 IN WESTERN WAUKESHA COUNTY

Also, at the request of the Advisory Committee, consideration was given to a new segment of freeway connecting IH 94 in Kenosha County with IH 94 in western Waukesha County. The conceptual location identified would connect with IH 94 in central Kenosha County and extend through western Kenosha and Racine Counties, northeastern Walworth County, western Waukesha County, and eastern Jefferson County. A traffic impact analysis was conducted of the potential new freeway with respect to the existing freeway and surface arterial system. The intent of this analysis was to assess whether the proposed new freeway would have a significant impact on reducing traffic volumes and congestion on the existing freeways and surface arterial system, and thereby, potentially affect the need for reconstruction and capacity improvements on the arterial street and highway system and in particular the existing freeway system. The forecast year 2035 average weekday traffic on this potential alternative freeway alignment is 11,000 to 20,000 vehicles per average weekday.

With respect to the traffic impact on the surface arterial street system, the potential new freeway may be expected to result in reduction of traffic on parallel surface arterial streets, thereby providing a higher level of service to traffic. Selected forecast reductions in year 2035 average weekday traffic on surface arterial streets are listed below:

- STH 50—1,000 to 3,000 vehicles per average weekday
- CTH K—1,500 vehicles per average weekday
- STH 142—4,500 to 5,500 vehicles per average weekday
- USH 12/STH 67—500 vehicles per average weekday
- STH 67—500 to 2,000 vehicles per average weekday

With respect to the impacts of the possible new freeway on the existing freeway system, the effects of the proposed new freeway on reducing or increasing traffic volumes on the existing freeway system are shown in Table F-3.

Table F-3

PROJECTED CHANGE IN YEAR 2035 AVERAGE WEEKDAY TRAFFIC VOLUMES ATTENDANT TO POSSIBLE NEW FREEWAY CONNECTING IH 94 IN KENOSHA COUNTY AND IH 94 IN JEFFERSON COUNTY

Existing Freeways	Amount of Change in Year 2035 Average Weekday Traffic	Percent of Total Year 2035 Average Weekday Traffic
IH 94—STH 158 to Mitchell Interchange	-2,000 to -7,000	1.0 to 6.5 percent
IH 94—Marquette Interchange to Mitchell Interchange	- -	- -
IH 94—Marquette Interchange to Zoo Interchange	- -	- -
IH 94—Zoo Interchange to Jefferson County line	-1,000 to -2,000	0.7 to 2.3 percent
IH 894—Mitchell Interchange to Hale Interchange	-2,000 to -2,500	1.1 to 1.5 percent
IH 894—Hale Interchange to Zoo Interchange	-1,000	0.04 to 0.07 percent
USH 12—State line to STH 50	-3,700	12.0 percent
USH 12—STH 50 to Jefferson County line	-6,700 to 8,500	26.0 to 32.0 percent

Source: SEWRPC.

Because the possible new freeway connecting IH 94 in Kenosha County and IH 94 in Jefferson County would have little impact on reducing or increasing freeway traffic volume on any segment of the existing freeway system, it would also have little impact on the need to address existing freeway system design, safety, and congestion problems. The proposed new freeway connection may be expected to reduce average weekday traffic on selected parallel surface arterials and provide a higher level of service—speed and safety.

Construction of the proposed freeway connection would likely require the acquisition of a right-of-way corridor generally 240 feet to 300 feet or more in width. Additional right-of-way would be required at IH 94 at both ends of the proposed freeway to provide system interchanges and at selected surface arterial streets to provide service interchanges. Accordingly, because the proposed freeway connection would have minimal impact on the existing freeway system and because the surface arterials from which traffic would likely be diverted are expected to operate with minimal, if any, congestion in the forecast year 2035; further consideration of the proposed freeway connection is not recommended.

Appendix G

CONSIDERATION OF PROVISION OF PROPOSED ADDITIONAL FREEWAY LANES AS HIGH OCCUPANCY VEHICLE (HOV) LANES OR HIGH OCCUPANCY VEHICLE AND/OR TOLL (HOT) LANES

During the plan design process, consideration was given to the provision of the proposed additional freeway lanes as HOV or HOT lanes[1]. The proposed additional freeway lanes were recommended to be provided as regular traffic lanes for the following reasons:

- Barrier separated HOV or HOT lanes in Milwaukee County may be expected to require significant additional acquisition of residential and commercial properties, and therefore were concluded not to be feasible. The need for additional lanes is the greatest within Milwaukee County;

- Safety concerns exist with buffer separated lanes, with high-speed HOV and HOT lane traffic separated from stop-and-go regular traffic only by a buffer typically consisting of embedded cones. In addition, no left-hand shoulder would be provided for the regular freeway lanes. This design was not considered appropriate for the reconstruction of the regional freeway system;

- Another problem with both barrier and buffer separated lanes would be providing those lanes through major freeway-to-freeway interchanges—the Zoo, Mitchell, Marquette, and Hale interchanges. At these major interchanges, only about one-half or less of the total traffic typically travels directly through the interchange. HOV and HOT lanes would be limited to serving only this portion of total traffic traveling directly through the interchange; or would require exclusive elevated guideways to carry the HOV and HOT lanes to the other connecting freeways with attendant right-of-way impacts and costs; or would require providing movement between the HOV/HOT lanes and the regular freeway lanes prior to, and following, these freeway-to-freeway interchanges, with attendant weaving and negative impacts on freeway operations which would not be considered an appropriate design for freeway system reconstruction;

- Another concern with buffer separated lanes is that existing and future truck traffic would likely be limited to the regular lanes;

- The provision for HOV or HOT lanes is not being accommodated in the Marquette Interchange project, which is currently under construction;

- The tolling of freeway facilities should be a statewide policy decision, and considered and implemented statewide.

[1] *For a number of these same reasons, exclusive truck only lanes were also concluded not to be feasible.*

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Appendix H

EVALUATION OF THE IMPACTS OF THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN ON MINORITY AND LOW-INCOME POPULATIONS IN SOUTHEASTERN WISCONSIN

INTRODUCTION

The regional transportation plan provides advisory recommendations with respect to public transit, transportation systems and demand management, bicycle and pedestrian facilities, and arterial streets and highways. Each plan recommendation will undergo further detailed consideration and study by the responsible level and unit of government—State, county, or municipal—in preliminary engineering and environmental studies for each arterial street and highway project, and in short-range planning and programming for each public transit recommendation for improvement and expansion. Ultimately, the responsible level and unit of government—State, county, or municipal—will determine whether and when each plan recommendation may proceed to implementation.

This appendix to this report provides an evaluation of whether the minority and low-income populations within Southeastern Wisconsin receive a disproportionate share of the estimated impacts—both costs and benefits—of the recommended regional transportation system plan. The recommended plan includes improvement to the public transit, bicycle and pedestrian, transportation systems management, and travel demand management elements of the regional transportation plan plus arterial street and highway capacity expansion. Estimates of the magnitude and location of the minority and low-income populations are obtained from data available in the decennial U.S. Census of Population, and are shown on Maps H-1 through H-7 and in Tables H-1 through H-3. The low-income population was defined as families with income below federally-defined poverty levels.

Table H-4 presents the work commuting patterns in the year 2000 from county of residence to county of work for the minority population of the Region and compares these patterns to those of the white population. The commuting patterns of the minority and white populations are very similar, with few exceptions. With respect to mode of travel to and from work, the minority population utilized carpooling and public transit more than the white population (See Table H-5). However, driving alone, and automobile travel including both driving alone and carpooling, were the predominant modes of travel for work travel for both white and minority populations of the Region.

ARTERIAL STREET AND HIGHWAY ELEMENT OF THE RECOMMENDED REGIONAL TRANSPORTATION SYSTEM PLAN

The planned arterial street and highway system under the recommended regional transportation system plan totals 3,637 route-miles. Approximately 88 percent, or 3,191 of these route-miles, are recommended to be resurfaced and reconstructed to their same capacity. Approximately 358 route-miles of the total year 2035 arterial street and highway system are recommended for widening to provide additional through traffic lanes, including 127 miles of freeways. The remaining 88 route-miles, or about 2 percent of the total arterial system mileage, are proposed new arterial facilities.

Each proposed arterial street and highway improvement, expansion, and preservation project would need to undergo preliminary engineering and environmental studies by the responsible State, county, or municipal government prior to implementation. The preliminary engineering and environmental studies will consider alternatives and impacts, and final decisions as to whether and how a planned project will proceed to implementation will be made by the responsible State, county, or municipal government at the conclusion of preliminary engineering.

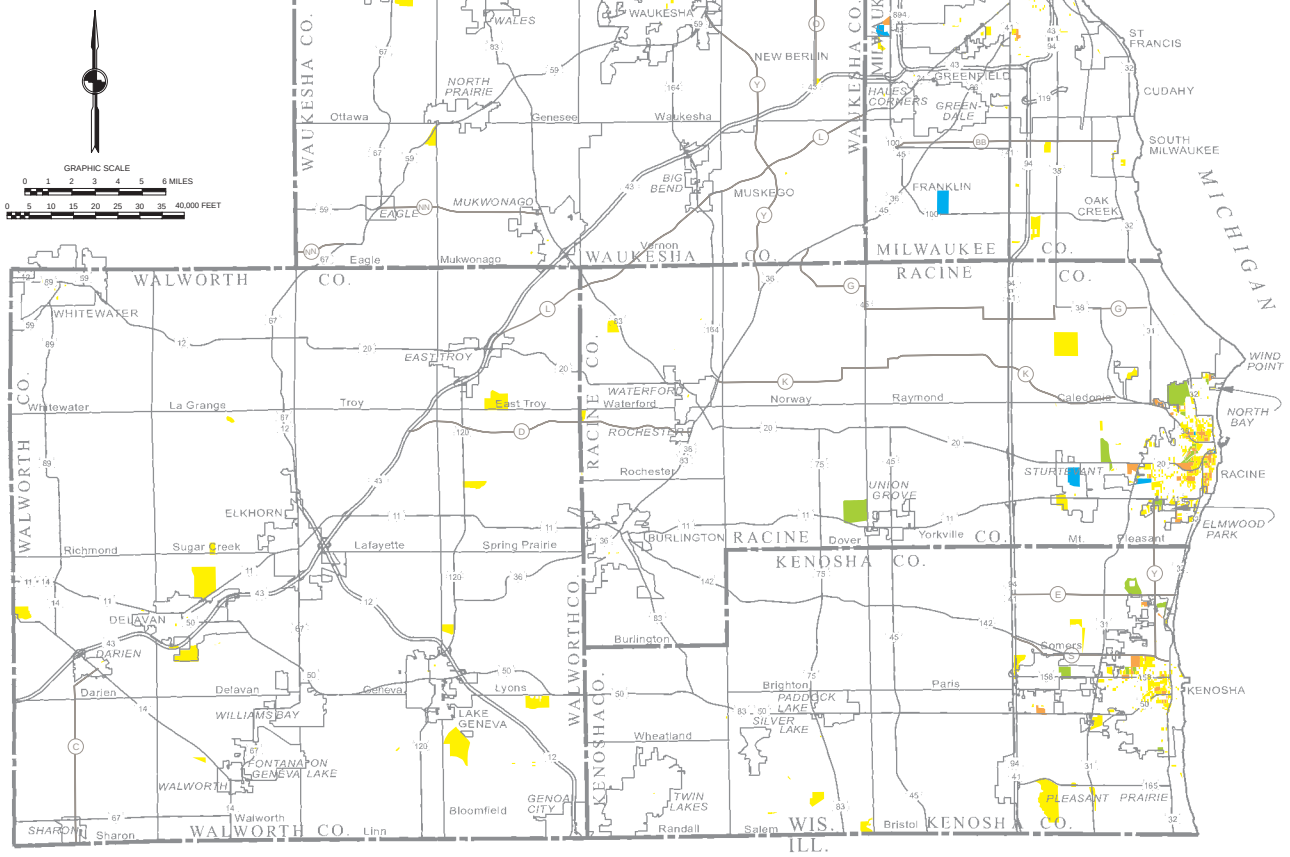
Map H-1

CONCENTRATIONS OF BLACK/AFRICAN AMERICAN PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000

CENSUS BLOCKS WHEREIN BLACK/AFRICAN AMERICAN POPULATION EXCEEDS THE AVERAGE REGIONAL PERCENTAGE OF 14.3 PERCENT

- 200 OR MORE BLACK/AFRICAN AMERICAN PERSONS
- 100 TO 199 BLACK/AFRICAN AMERICAN PERSONS
- 50 TO 99 BLACK/AFRICAN AMERICAN PERSONS
- FEWER THAN 50 BLACK/AFRICAN AMERICAN PERSONS

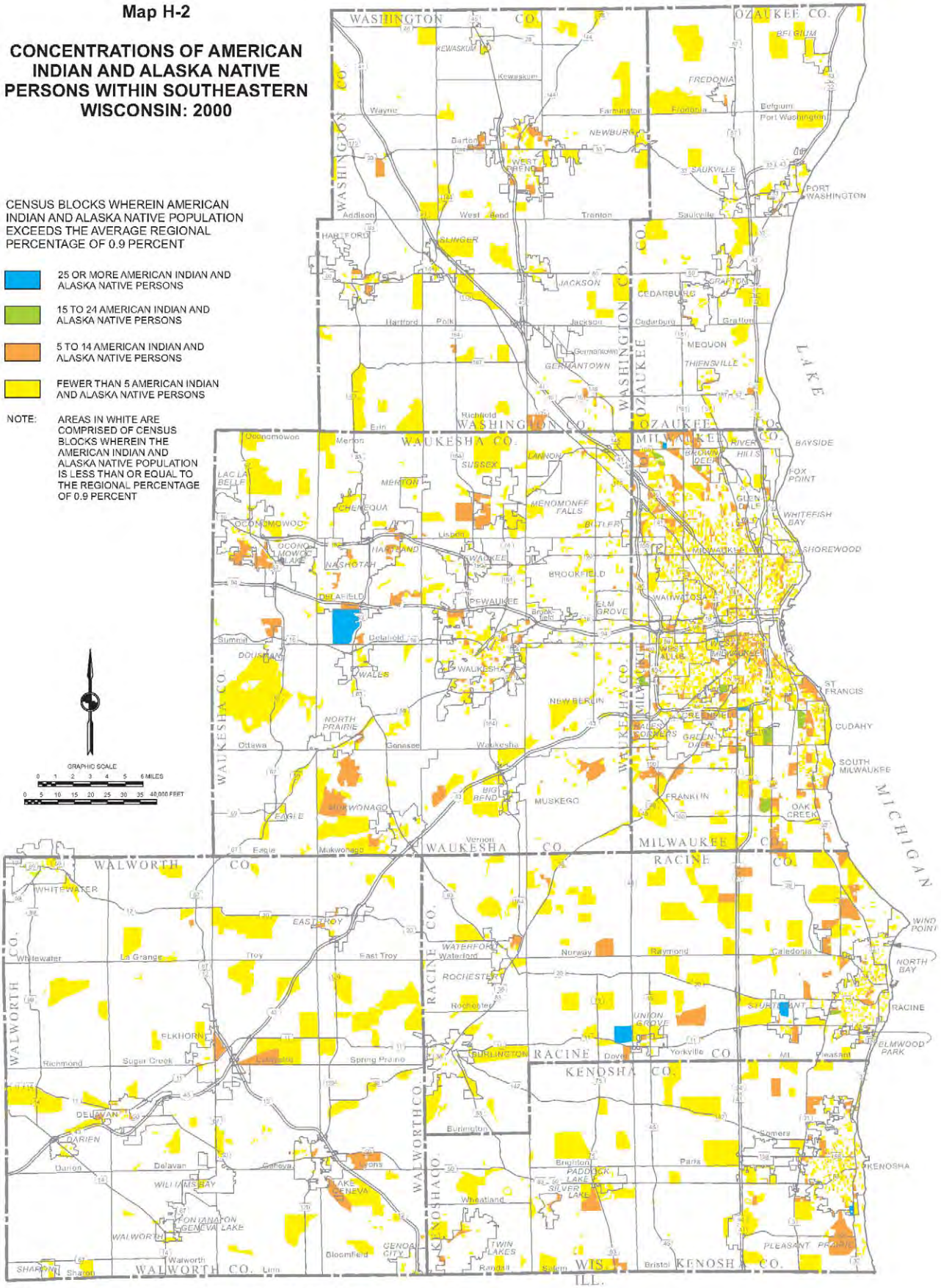
NOTE: AREAS IN WHITE ARE COMPRISED OF CENSUS BLOCKS WHEREIN THE BLACK/AFRICAN AMERICAN POPULATION IS LESS THAN OR EQUAL TO THE REGIONAL PERCENTAGE OF 14.3 PERCENT.



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

Map H-2

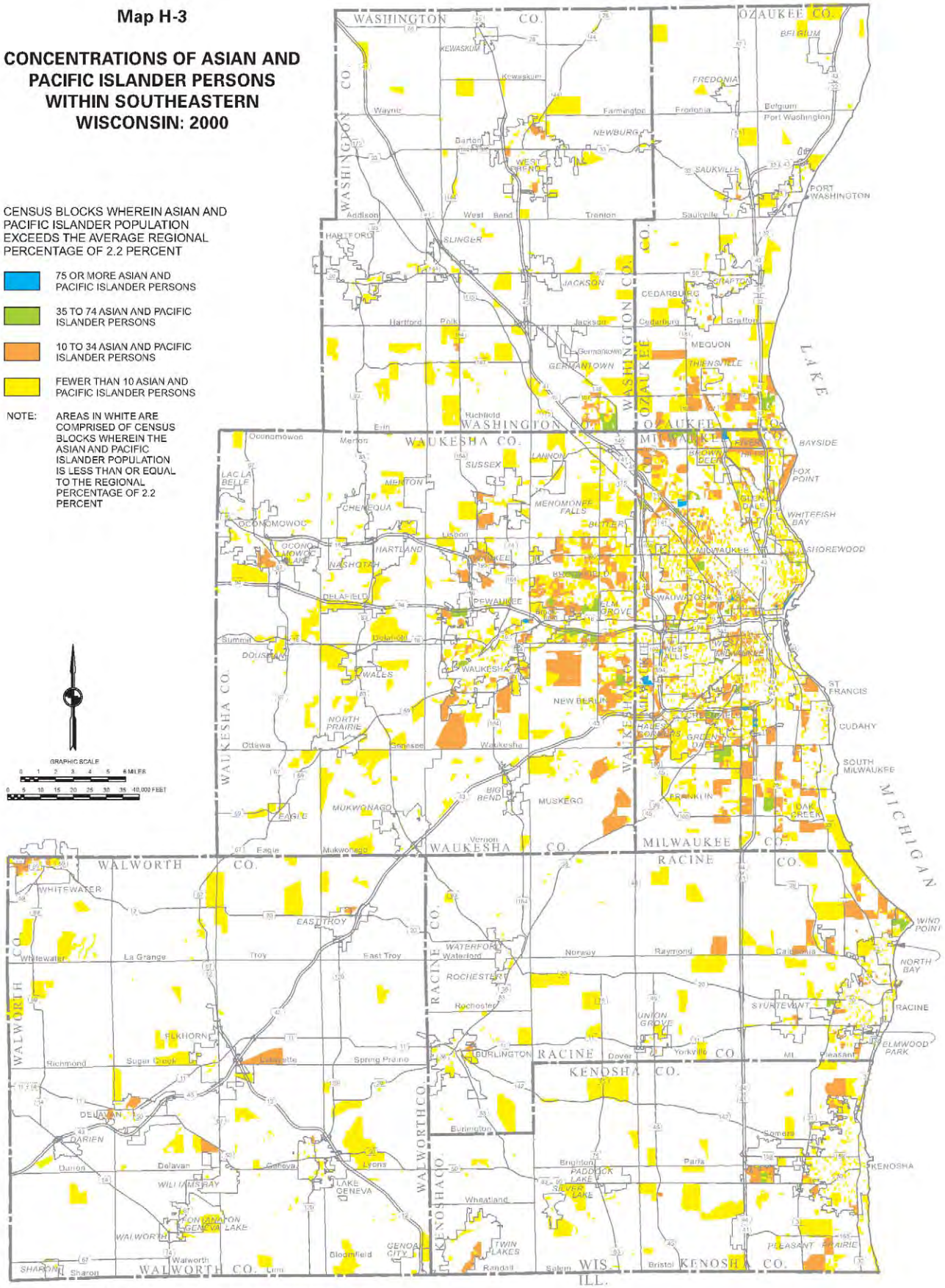
CONCENTRATIONS OF AMERICAN INDIAN AND ALASKA NATIVE PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000



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

Map H-3

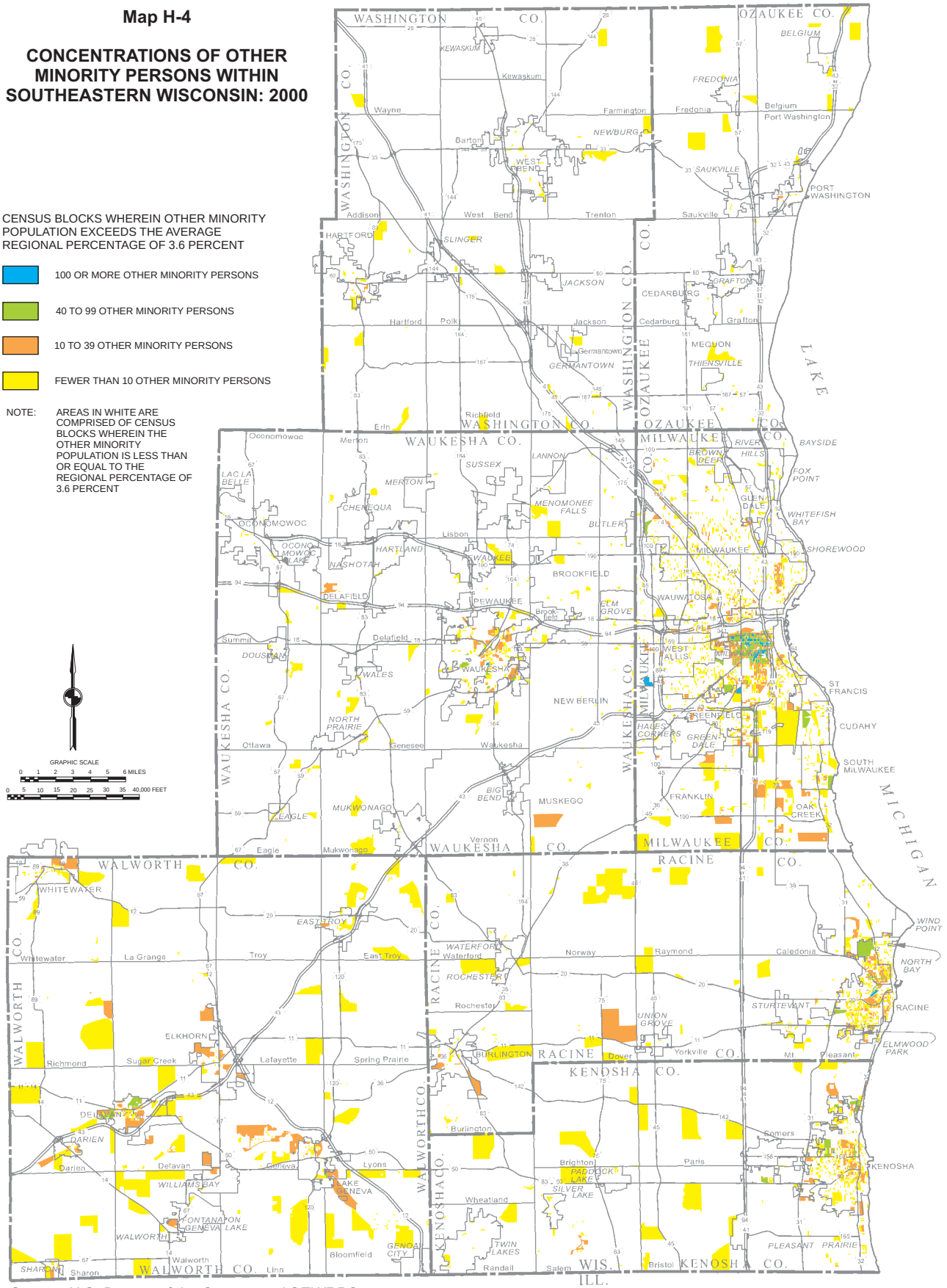
CONCENTRATIONS OF ASIAN AND PACIFIC ISLANDER PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000



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

Map H-4

CONCENTRATIONS OF OTHER MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000



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

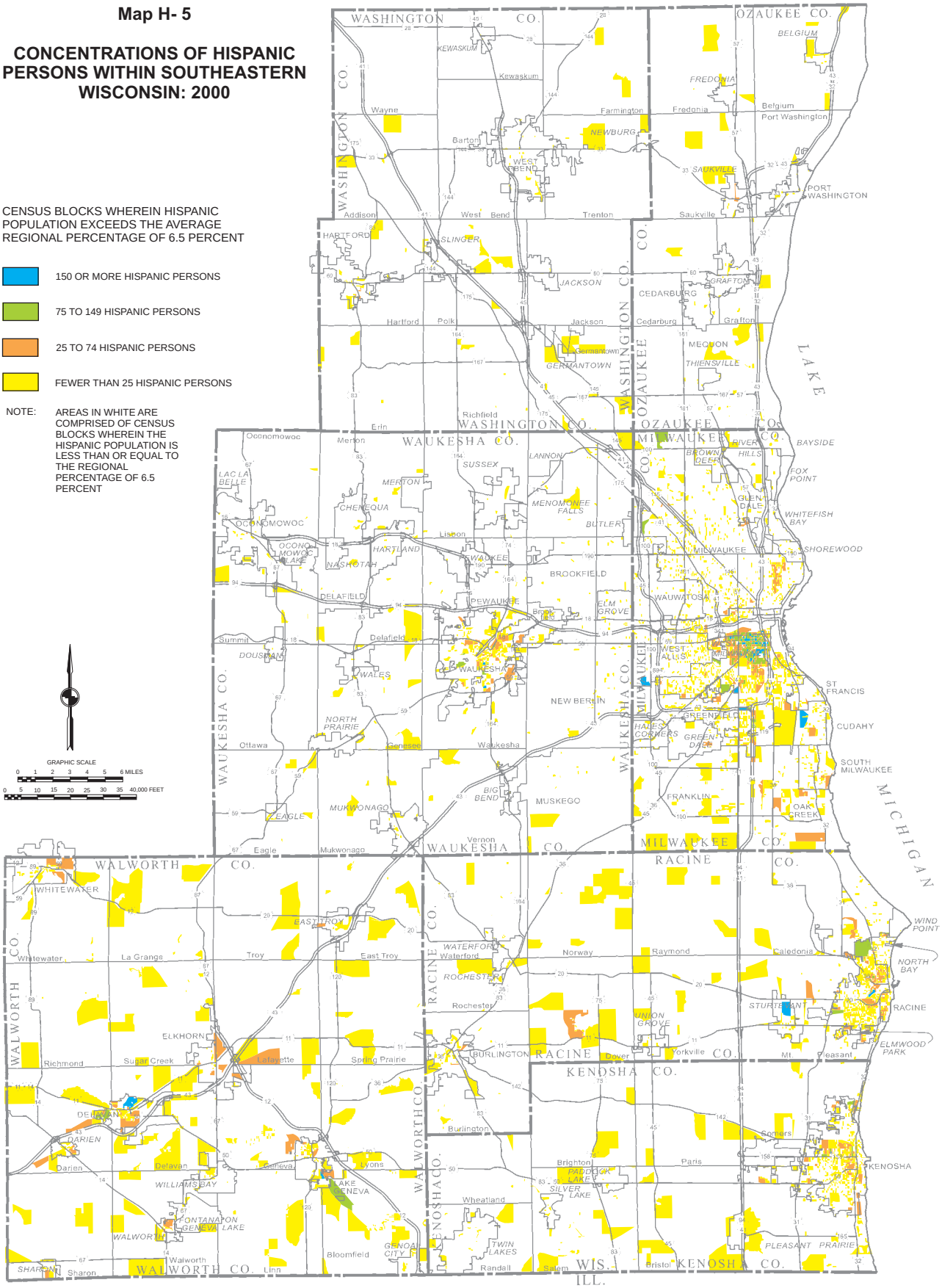
Map H- 5

CONCENTRATIONS OF HISPANIC PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000

CENSUS BLOCKS WHEREIN HISPANIC POPULATION EXCEEDS THE AVERAGE REGIONAL PERCENTAGE OF 6.5 PERCENT

- 150 OR MORE HISPANIC PERSONS
- 75 TO 149 HISPANIC PERSONS
- 25 TO 74 HISPANIC PERSONS
- FEWER THAN 25 HISPANIC PERSONS

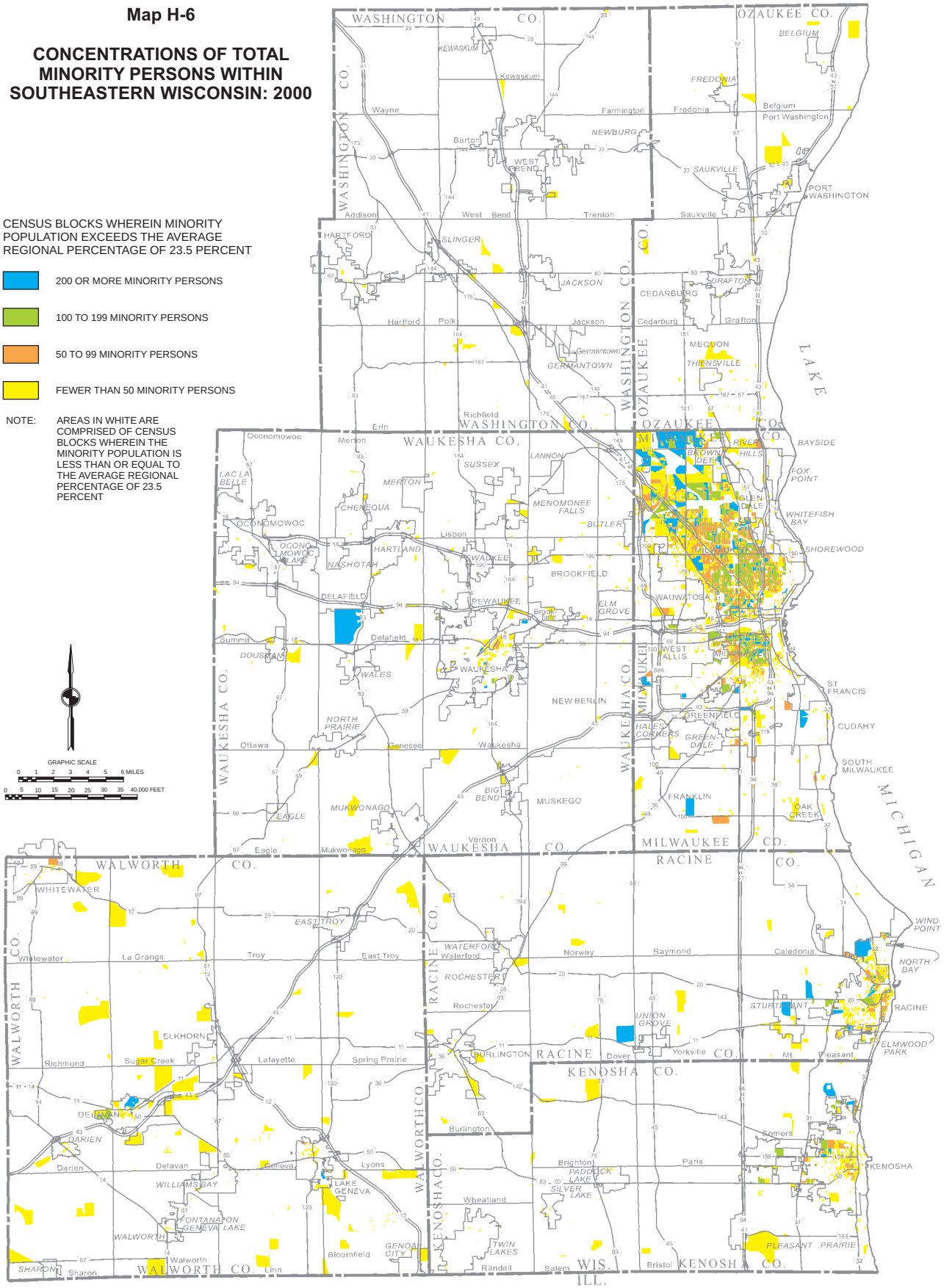
NOTE: AREAS IN WHITE ARE COMPRISED OF CENSUS BLOCKS WHEREIN THE HISPANIC POPULATION IS LESS THAN OR EQUAL TO THE REGIONAL PERCENTAGE OF 6.5 PERCENT



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

Map H-6

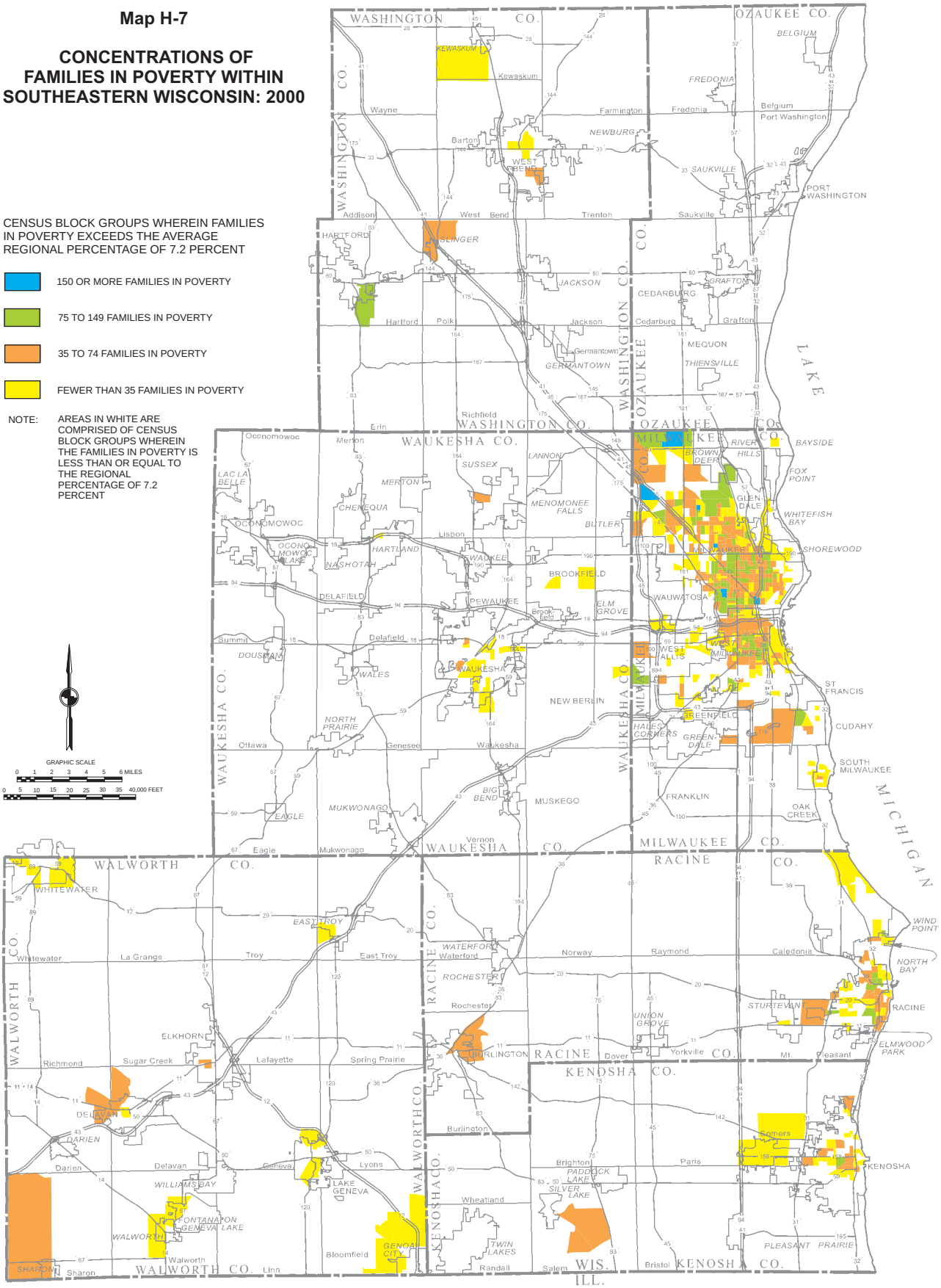
CONCENTRATIONS OF TOTAL MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN: 2000



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

Map H-7

CONCENTRATIONS OF FAMILIES IN POVERTY WITHIN SOUTHEASTERN WISCONSIN: 2000



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

Table H-1

POPULATION BY RACE IN THE REGION BY COUNTY: 2000

County	White		Nonwhite								Total Population
			Black/African American		American Indian and Alaska Native		Asian and Pacific Islander		Other Race		
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	
Kenosha	134,737	90.1	8,629	5.8	1,314	0.9	1,930	1.3	5,990	4.0	149,577
Milwaukee	633,446	67.4	240,113	25.5	11,907	1.3	28,930	3.1	48,227	5.1	940,164
Ozaukee	80,186	97.4	917	1.1	335	0.4	1,131	1.4	382	0.5	82,317
Racine	159,582	84.5	21,100	11.2	1,448	0.8	1,885	1.0	8,168	4.3	188,831
Walworth	89,584	95.5	983	1.0	495	0.5	859	0.9	2,946	3.1	93,759
Washington	115,491	98.3	641	0.5	587	0.5	938	0.8	659	0.6	117,493
Waukesha	348,496	96.6	3,480	1.0	1,733	0.5	6,497	1.8	4,013	1.1	360,767
Region	1,561,522	80.8	275,863	14.3	17,819	0.9	42,170	2.2	70,385	3.6	1,932,908

NOTE: As part of the 2000 Federal census, individuals could be reported as being of more than one race. The figures on this table indicate the number of persons reported as being of a given race (as indicated by the column heading), including those who were reported as that race exclusively and those who were reported as that race and one or more other races. Accordingly, the population figures by race sum to more than the total population for each area.

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

Table H-2

HISPANIC POPULATION IN THE REGION BY COUNTY: 2000

County	Total Population	Hispanic Population	
		Number	Percent of Total Population
Kenosha	149,577	10,757	7.2
Milwaukee	940,164	82,406	8.8
Ozaukee	82,317	1,073	1.3
Racine	188,831	14,990	7.9
Walworth	93,759	6,136	6.5
Washington	117,493	1,529	1.3
Waukesha	360,767	9,503	2.6
Region	1,932,908	126,394	6.5

NOTE: Persons of Hispanic origin may be of any race.

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

Potential Adverse Impacts

Automobile and truck traffic on arterial streets and highways emit air pollutants and noise. Transportation system air pollutant emissions have been declining even with increasing traffic, and are projected to continue to decline even with the projected 40 percent regionwide increase in traffic under the plan. As shown in Table H-6, Ozone – related emissions are projected to decline by over 70 percent, fine particulates and carbon monoxide by over 50 percent, and air toxics by 70 percent. The proposed arterial street and highway capacity improvements under the recommended regional transportation system plan are shown on Map H-8. An assessment was conducted to determine whether the arterial street and highway capacity improvements under the recommended plan were disproportionately located in areas of the Region with concentrations of minority and low-income populations. Maps H-9 through H-15 compare the location of the recommended plan proposed arterial capacity expansion projects to the location of minority and low-income populations. This comparison indicates that no area of the Region, or minority or low-income community, disproportionately bears the impact of the recommended plan arterial street and highway capacity improvements.

Table H-3

FAMILIES WITH INCOME BELOW THE POVERTY LEVEL IN THE REGION BY COUNTY: 2000

County	Total Families	Families With Income Below the Poverty Level	
		Number	Percent of Total Families
Kenosha	38,671	2,094	5.4
Milwaukee	226,685	26,454	11.7
Ozaukee	23,153	391	1.7
Racine	50,052	2,908	5.8
Walworth	23,388	1,078	4.6
Washington	32,953	867	2.6
Waukesha	101,008	1,674	1.7
Region	495,910	35,466	7.2

NOTE: The U.S. Bureau of the Census uses a set of money income thresholds that vary by family size and composition to determine poverty status. If a family's total income is less than that family's threshold, then that family, and every individual in it, is considered to be below poverty. Poverty is not defined for people in military barracks, institutional group quarters, or for unrelated individuals under age 15, such as foster children.

POVERTY THRESHOLDS BY SIZE OF FAMILY AND NUMBER OF RELATED CHILDREN UNDER 18 YEARS OF AGE FOR PURPOSES OF THE 2000 CENSUS

Size of family unit	Weighted Average Thresholds	Related Children Under 18 Years								
		None	One	Two	Three	Four	Five	Six	Seven	Eight or more
One person (unrelated individual)	$8,501	--	--	--	--	--	--	--	--	--
Under 65 years	8,667	$8,667	--	--	--	--	--	--	--	--
65 years and over	7,990	7,990	--	--	--	--	--	--	--	--
Two persons	10,869	--	--	--	--	--	--	--	--	--
Householder under 65 years	11,214	11,156	$11,483	--	--	--	--	--	--	--
Householder 65 years and over	10,075	10,070	11,440	--	--	--	--	--	--	--
Three persons	13,290	13,032	13,410	$13,423	--	--	--	--	--	--
Four persons	17,029	17,184	17,465	16,895	$16,954	--	--	--	--	--
Five persons	20,127	20,723	21,024	20,380	19,882	$19,578	--	--	--	--
Six persons	22,727	23,835	23,930	23,436	22,964	22,261	$21,845	--	--	--
Seven persons	25,912	27,425	27,596	27,006	26,595	25,828	24,934	$23,953	--	--
Eight persons	28,967	30,673	30,944	30,387	29,899	29,206	28,327	27,412	$27,180	--
Nine persons or more	34,417	36,897	37,076	36,583	36,169	35,489	34,554	33,708	33,499	$32,208

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

A more detailed evaluation of the potential for disproportionate adverse impacts due to the reconstruction of the freeway system was conducted with respect to minority and low-income populations. The locations of concentrations of minority and low-income populations within the Region were compared to the locations of existing freeway segments proposed to be widened under the recommended year 2035 regional transportation system plan. Also, the location and amount of estimated right-of-way acquisition under the recommended plan within areas with above average concentrations of minority and low-income populations was determined.

Table H-4

PERCENTAGE DISTRIBUTION OF EMPLOYED REGION RESIDENTS BY COUNTY OF RESIDENCE, COUNTY OF WORK, AND RACE: YEAR 2000

Race	County of Residence	County of Work								Total
		Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha	Other	
Total Minority	Kenosha	80.6	6.5	--	11.3	--	--	1.6	--	100.0
	Milwaukee	0.3	85.5	1.8	0.6	0.3	1.1	9.9	0.5	100.0
	Ozaukee	--	35.7	50.0	--	--	7.1	7.1	0.1	100.0
	Racine	5.9	7.6	0.8	82.4	0.8	--	1.7	0.8	100.0
	Walworth	--	3.6	--	3.6	82.1	--	3.6	7.1	100.0
	Washington	--	23.5	5.9	--	--	47.1	17.6	5.9	100.0
	Waukesha	--	30.8	--	1.1	--	1.1	65.9	1.1	100.0
White	Kenosha	79.2	4.2	0.2	12.9	1.3	--	1.6	0.6	100.0
	Milwaukee	0.4	79.7	1.7	1.4	0.2	1.0	14.9	0.7	100.0
	Ozaukee	--	34.7	52.2	0.2	0.2	4.5	5.5	2.7	100.0
	Racine	6.8	16.1	0.5	68.7	2.1	0.3	5.2	0.3	100.0
	Walworth	2.0	5.6	--	5.6	71.6	0.3	7.6	7.3	100.0
	Washington	0.2	22.6	7.3	0.2	0.2	50.8	15.6	3.1	100.0
	Waukesha	0.2	32.0	0.7	0.7	0.7	1.6	62.4	1.7	100.0

Source: U.S. Census Transportation Planning Package and SEWRPC.

Automobile and truck traffic on arterial streets and highways emit air pollutants and noise. To evaluate whether the Region's minority and low-income populations are disproportionately represented in areas in proximity to proposed widened freeways, the proportion of each county's and the Region's total population that is a member of a minority population or is low-income was compared to the proportion of each county's and the Region's population that resides in areas located in proximity to the freeways proposed to be widened under the recommended plan. For this analysis, the Region was divided into census blocks. Those census blocks, as shown on Map H-16, located within one-half to three-fourths of a mile adjacent to the freeway system, or bisected by a freeway segment, were considered as located in proximity to the freeway system. For analysis of the low-income population, census block data is not available, so census block group data was used.

The results of this analysis, as presented in Table H-7, indicate that within each county the percentage of the total population located in proximity to the freeways proposed to be widened under the regional plan that is of a minority population—Black/African American, American Indian or Alaskan Native, Asian or Pacific Islander, Other Minority, Hispanic, and total minority population—or of low-income is generally similar (equal or only a few percent lower or higher) to the percentage of the total population of each county which is of a minority or low-income population. On a regional level, the percentage of the total population located in proximity to proposed widened freeways that is of each minority group population or of low-income is a few percent higher—between 0.2 and 3.8 percent higher—than the percentage of the total population in the seven-county Region that is of a minority population. For example, about 18.1 percent of the population adjacent to proposed widened freeways are Black/African American, and about 14.3 percent of the total Region population is Black/African American. Also, on a regional level, about 30.7 percent of the population that is located in proximity to freeways are minorities, as compared to about 23.7 percent of the total Region population that are minorities. Thus, this analysis would appear to indicate that there is not a significant over-representation of minority and low-income populations in areas located in proximity to the freeways proposed to be widened within each county. With respect to the Region as a whole, there is a greater minority and low-income population in areas adjacent to freeways proposed to be widened.

Table H-5

DISTRIBUTION OF EMPLOYED PERSONS BY COUNTY OF WORK, RACE, AND MODE OF TRAVEL: YEAR 2000

Race	Mode of Travel	County of Work						
		Kenosha	Milwaukee	Ozaukee	Racine	Walworth	Washington	Waukesha
White alone, NonHispanic	Drive alone	83.2	82.0	83.5	85.6	79.6	82.8	86.9
	Carpool	9.3	8.8	8.1	8.1	8.6	9.5	7.5
	Bus	0.6	3.1	0.1	0.7	0.3	0.5	0.5
	Other	3.6	4.2	3.9	2.7	6.3	2.7	1.9
	Worked at Home	3.3	1.9	4.4	2.9	5.2	4.5	3.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Black or African American alone	Drive alone	65.6	59.0	64.9	63.9	66.8	60.1	75.2
	Carpool	17.8	15.5	26.3	17.9	9.7	25.0	13.0
	Bus	5.2	19.5	7.7	9.8	13.6	13.5	9.7
	Other	9.8	3.8	0.8	6.7	9.9	1.4	1.9
	Worked at Home	1.6	2.2	0.3	1.7	0.0	0.0	0.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Asian alone	Drive alone	78.1	69.2	67.8	74.1	65.1	86.0	80.8
	Carpool	14.9	14.0	27.8	23.3	20.4	9.2	13.4
	Bus	0.0	5.6	0.0	0.0	0.0	0.0	0.4
	Other	4.4	9.4	0.7	1.9	13.0	4.8	2.5
	Worked at Home	2.6	1.8	3.7	0.7	1.5	0.0	2.9
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Other Race alone or Two or More Races[a]	Drive alone	73.9	68.2	69.8	83.4	70.7	76.6	80.8
	Carpool	10.8	16.2	15.9	12.0	25.4	13.0	12.2
	Bus	0.0	8.8	0.0	2.6	0.0	0.0	3.0
	Other	9.6	5.3	7.9	1.6	2.8	0.9	2.9
	Worked at Home	5.7	1.5	6.4	0.4	1.1	9.5	1.1
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Hispanic	Drive alone	65.6	60.2	57.1	69.9	62.1	61.2	67.6
	Carpool	24.9	21.7	34.1	20.1	25.3	33.7	24.0
	Bus	1.0	11.1	1.8	4.4	1.3	1.0	2.4
	Other	6.9	6.0	5.1	4.7	9.0	3.1	4.8
	Worked at Home	1.6	1.0	1.9	0.9	2.3	1.0	1.2
	Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NOTE: Includes travel from outside the seven-county Southeastern Wisconsin Regional Planning Commission Region.

[a]*Includes persons identifying themselves as two or more races, Native Hawaiian or Pacific Islander, American Indian or Alaska Native, or other race.*

Source: U.S. Census Transportation Planning Package and SEWRPC.

Table H-6

EXISTING AND RECOMMENDED YEAR 2035 TRANSPORTATION SYSTEM PLAN AIR POLLUTANT EMISSIONS AND FUEL CONSUMPTION

Existing Year 2001 and Forecast Year 2035 Air Pollutant Emissions (Tons per Hot Summer Weekday)												
	Volatile Organic Compounds[a]	Nitrogen Oxides[a]	Carbon Monoxide	Carbon Dioxide	Fine Particulate Matter	Sulfur Dioxide	Ammonia	1,3 Butadiene	Acetaldehyde	Acrolein	Benzene	Formaldehyde
Existing 2001	50.03	114.23	592.48	12,368.0	1.77	2.77	4.84	0.20	0.43	0.03	1.40	0.63
2035 Recommended Plan	13.50	13.36	264.88	12,677.0	0.80	0.59	6.55	0.05	0.11	0.01	0.36	0.17

[a] *Estimated 1990 emissions were 154.6 tons of volatile organic compounds and 136.3 tons of nitrogen oxides. Estimated 1999 emissions were 61.3 tons of volatile organic compounds and 118.0 tons of nitrogen oxides.*

Source: SEWRPC.

Map H-8

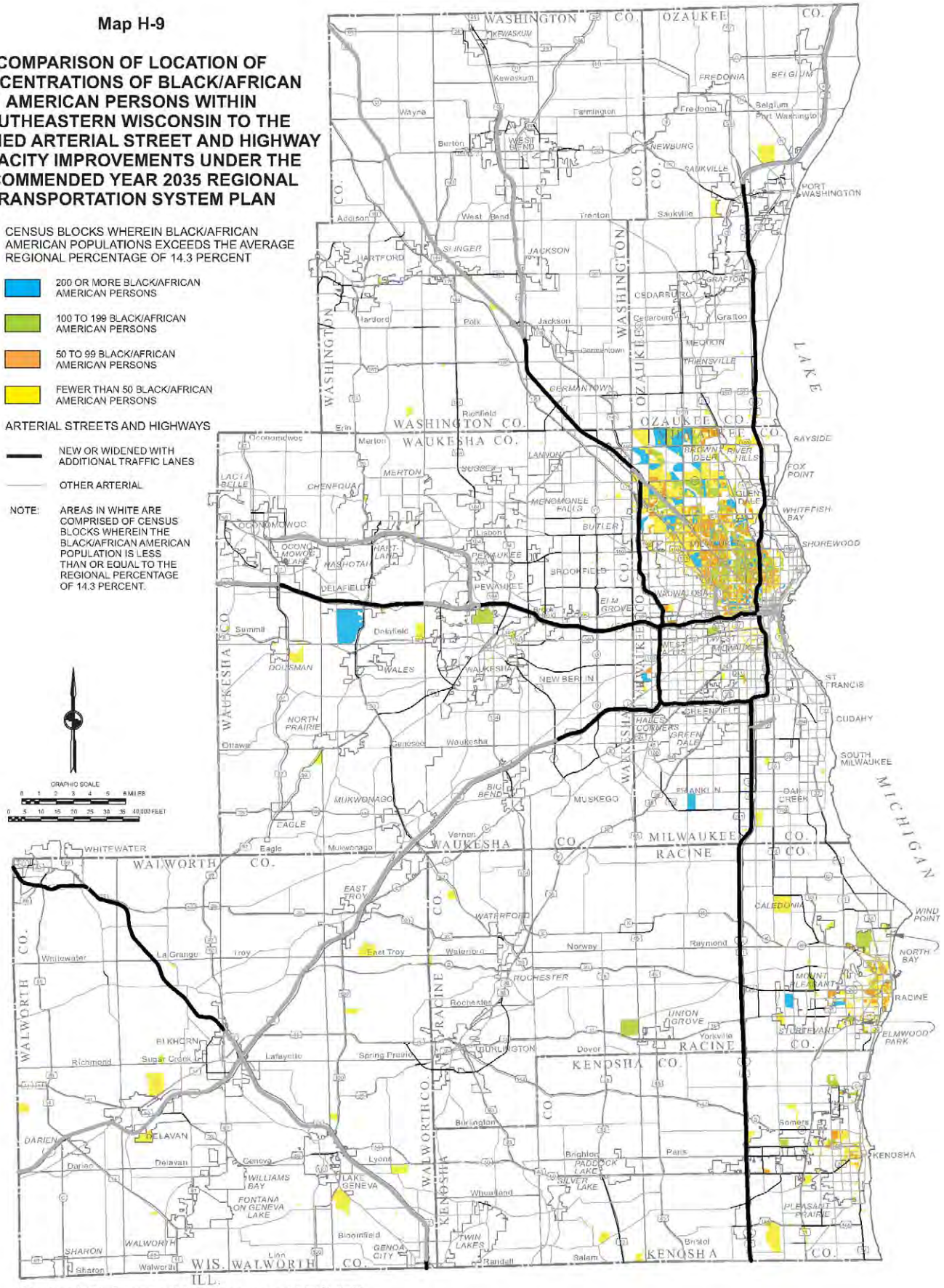
PROPOSED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



Source: SEWRPC.

Map H-9

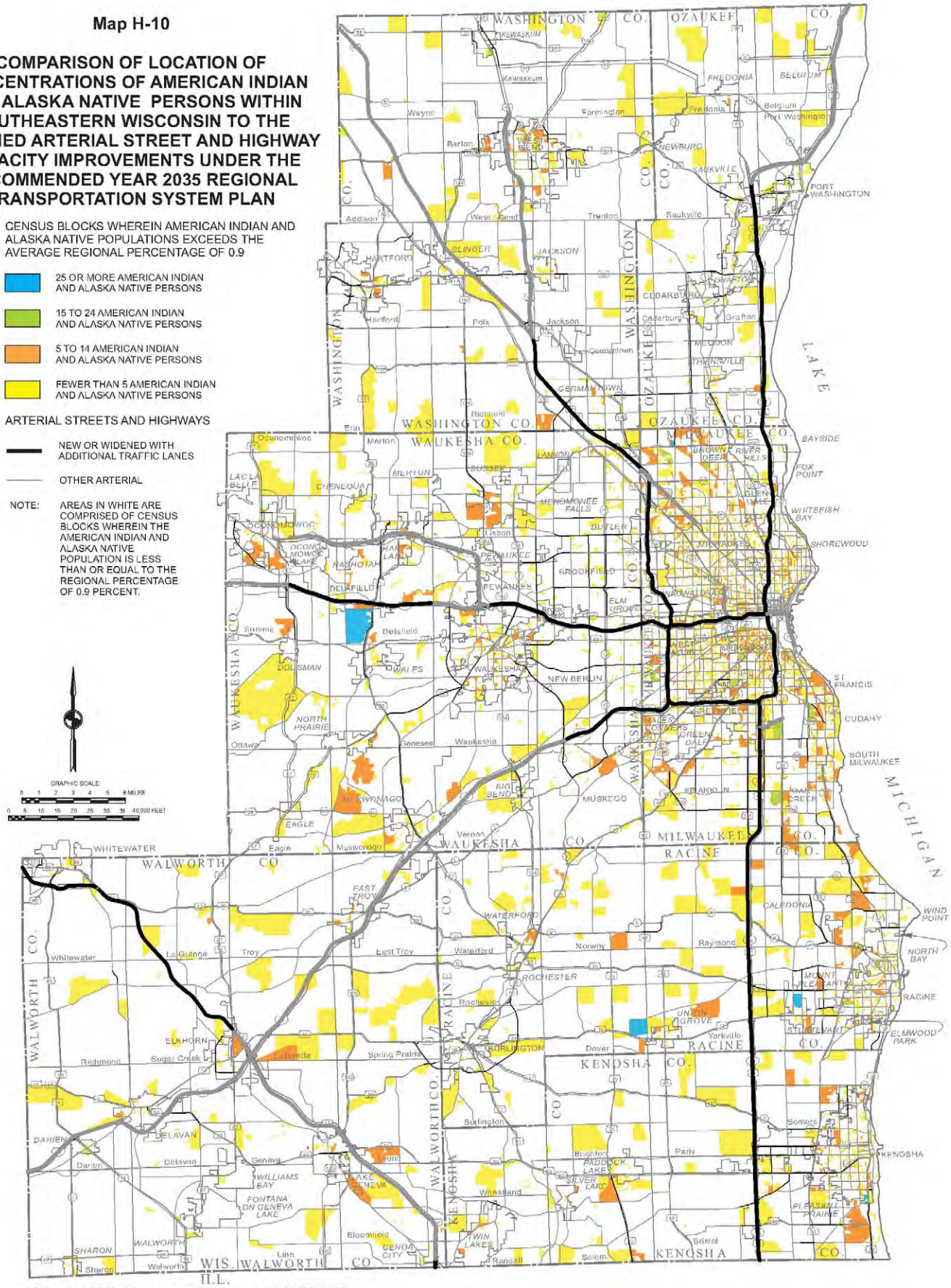
COMPARISON OF LOCATION OF CONCENTRATIONS OF BLACK/AFRICAN AMERICAN PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-10

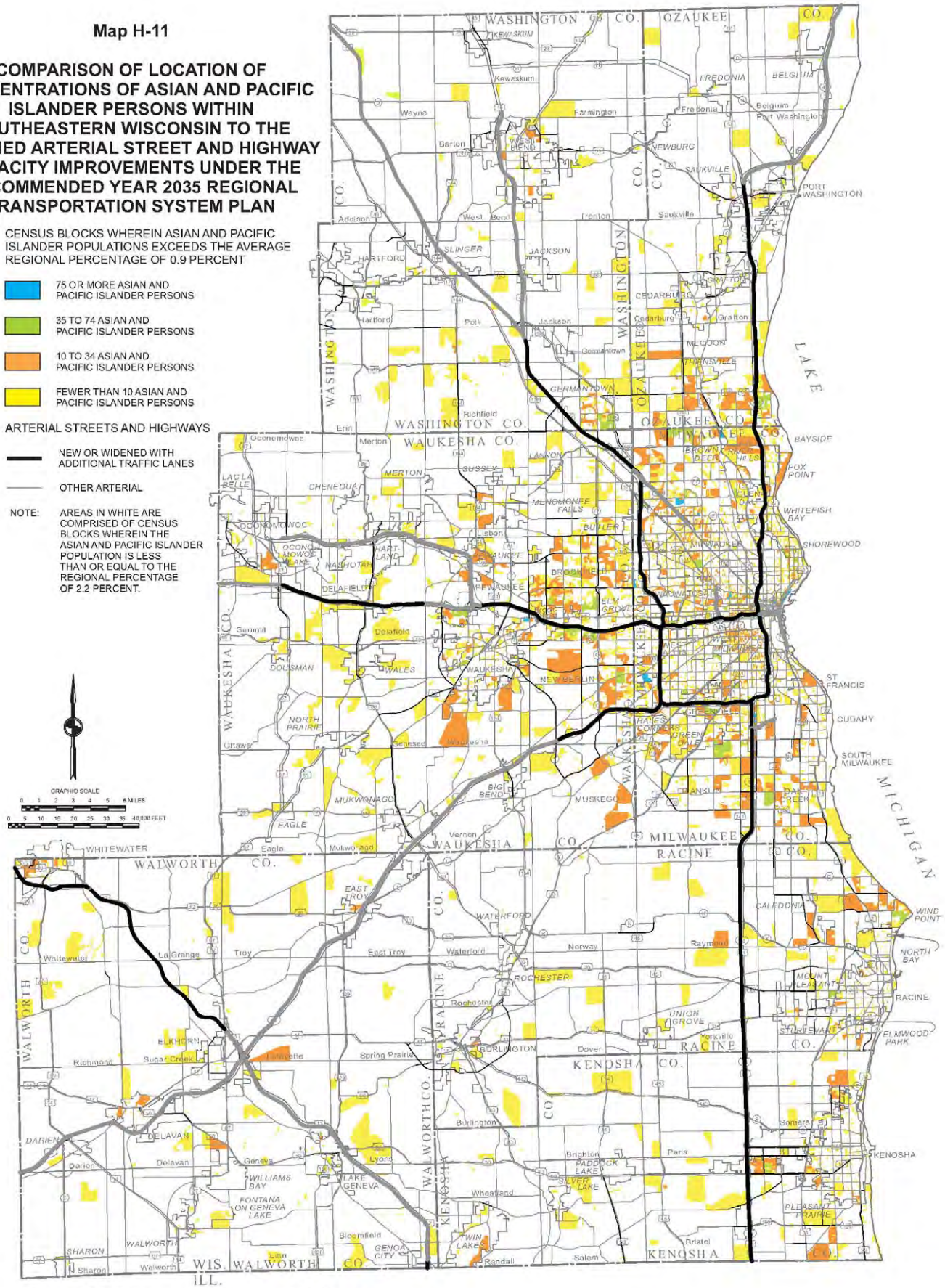
COMPARISON OF LOCATION OF CONCENTRATIONS OF AMERICAN INDIAN AND ALASKA NATIVE PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-11

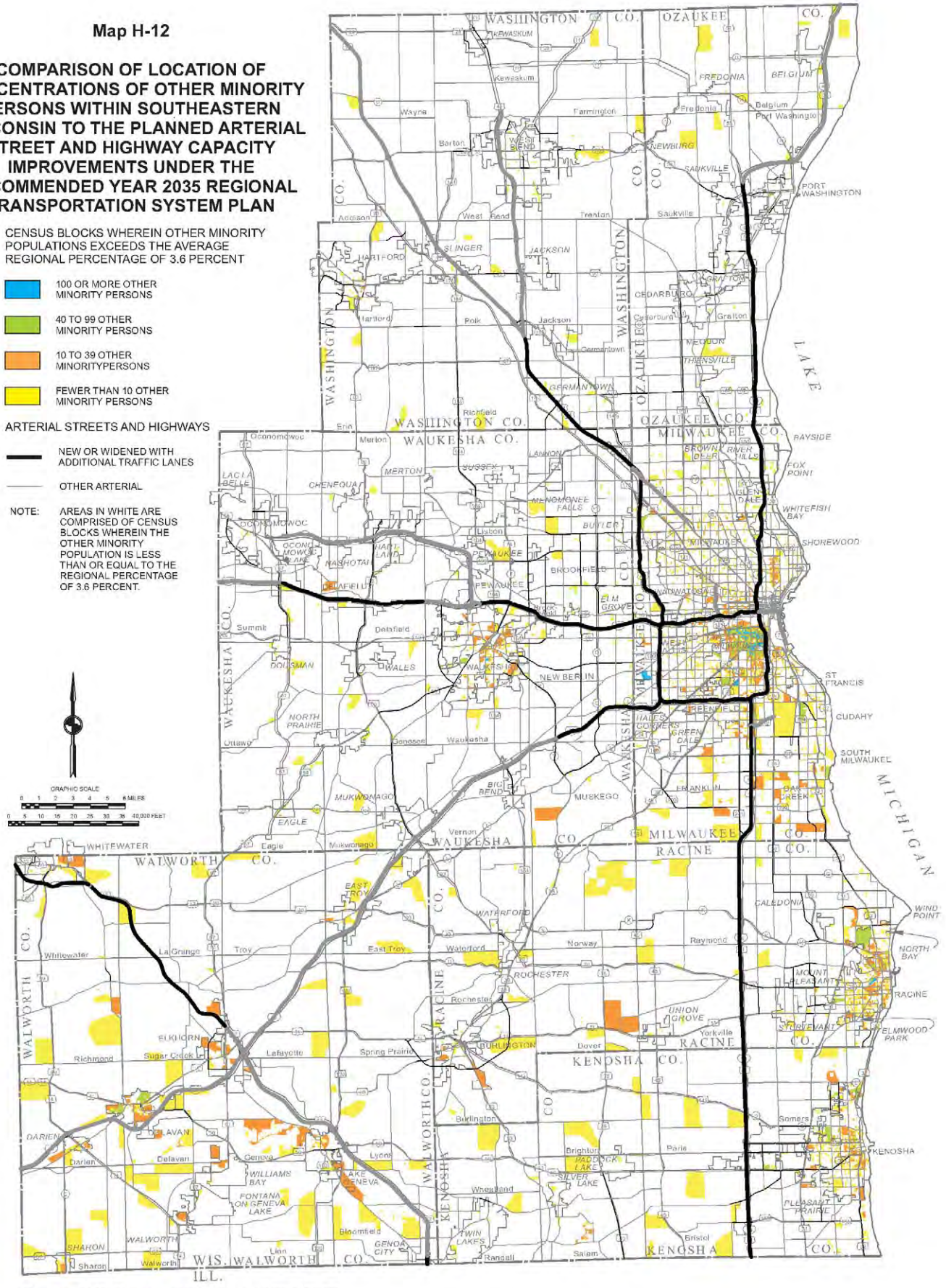
COMPARISON OF LOCATION OF CONCENTRATIONS OF ASIAN AND PACIFIC ISLANDER PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-12

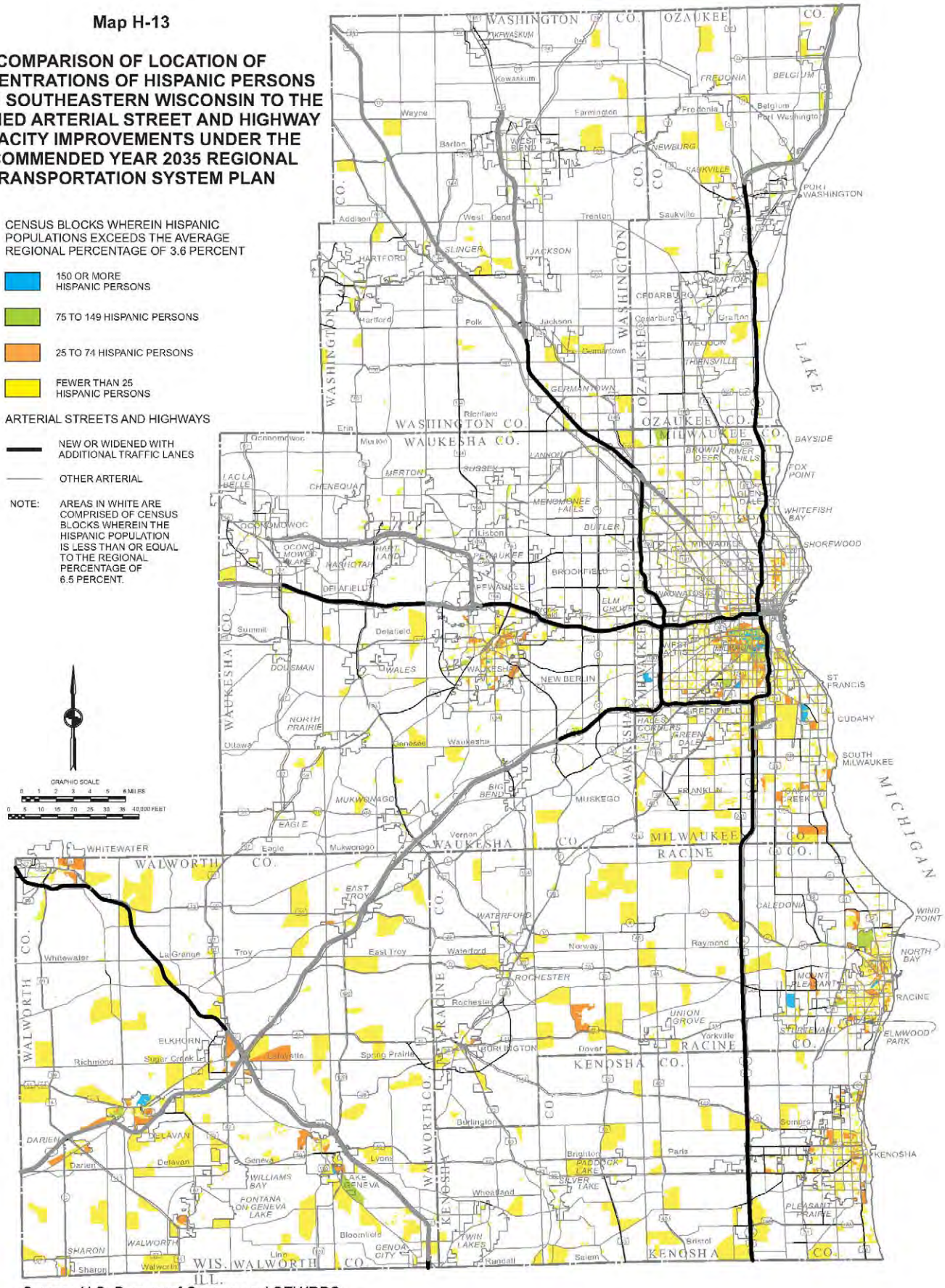
COMPARISON OF LOCATION OF CONCENTRATIONS OF OTHER MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-13

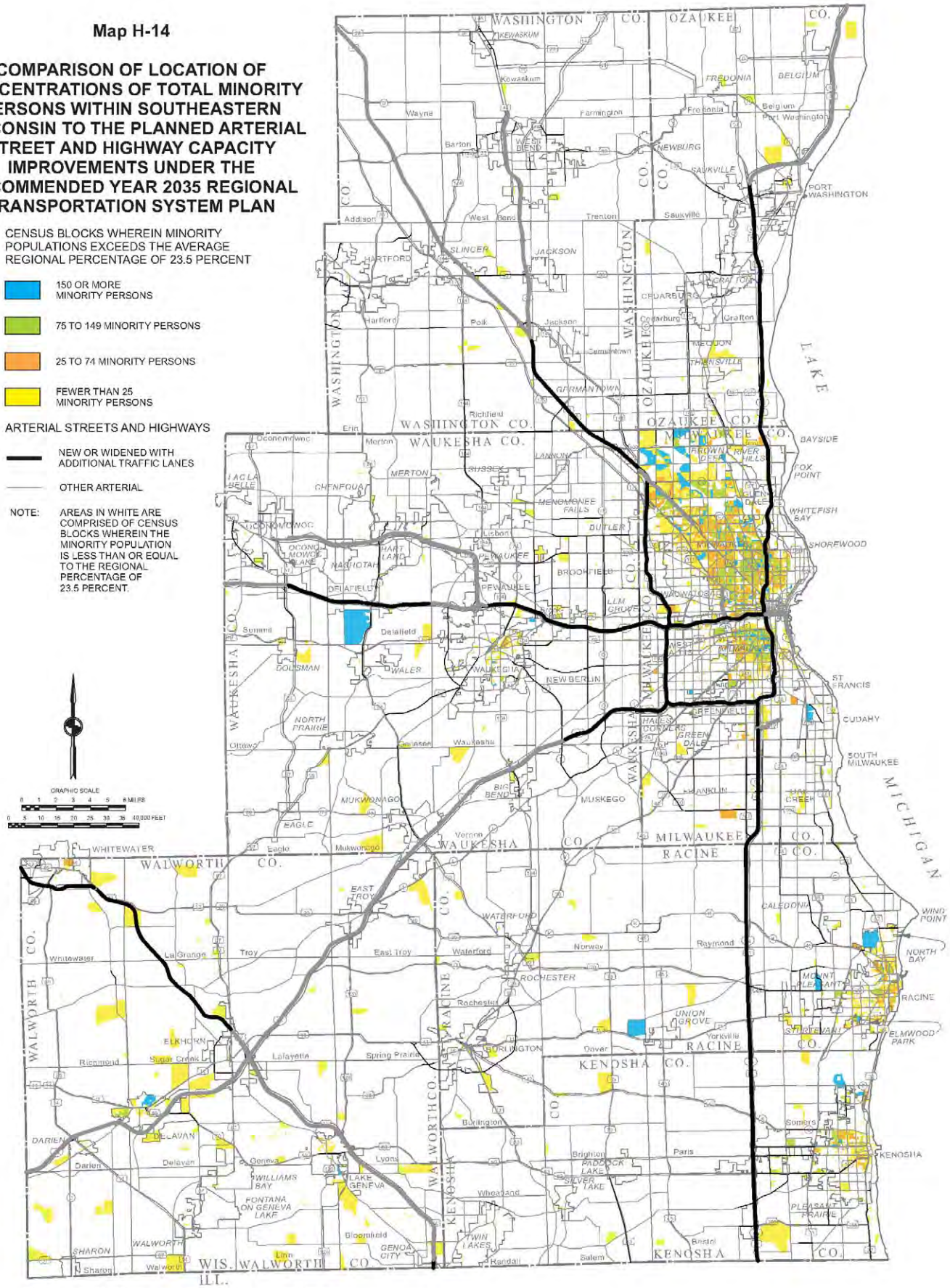
COMPARISON OF LOCATION OF CONCENTRATIONS OF HISPANIC PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-14

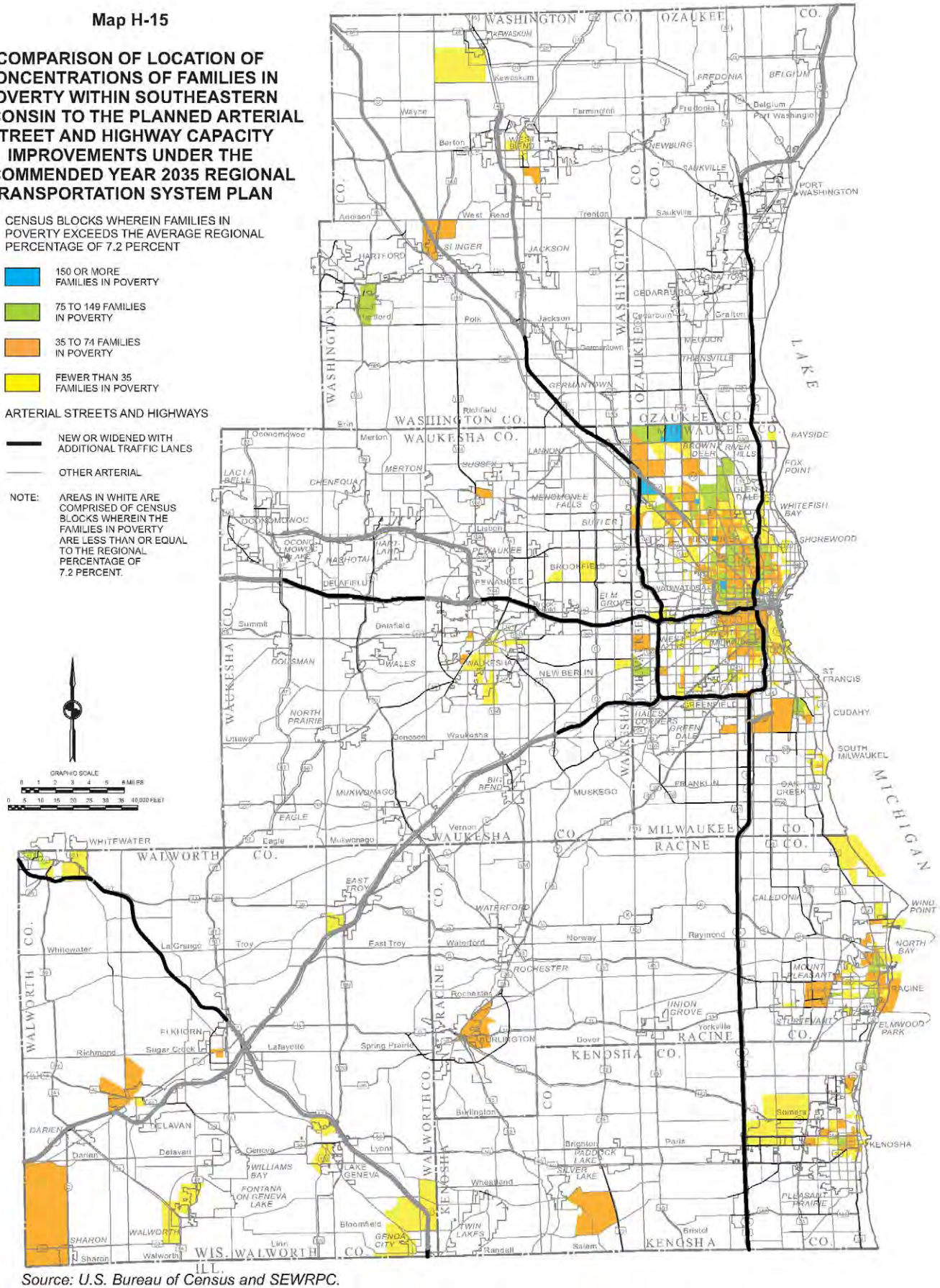
COMPARISON OF LOCATION OF CONCENTRATIONS OF TOTAL MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-15

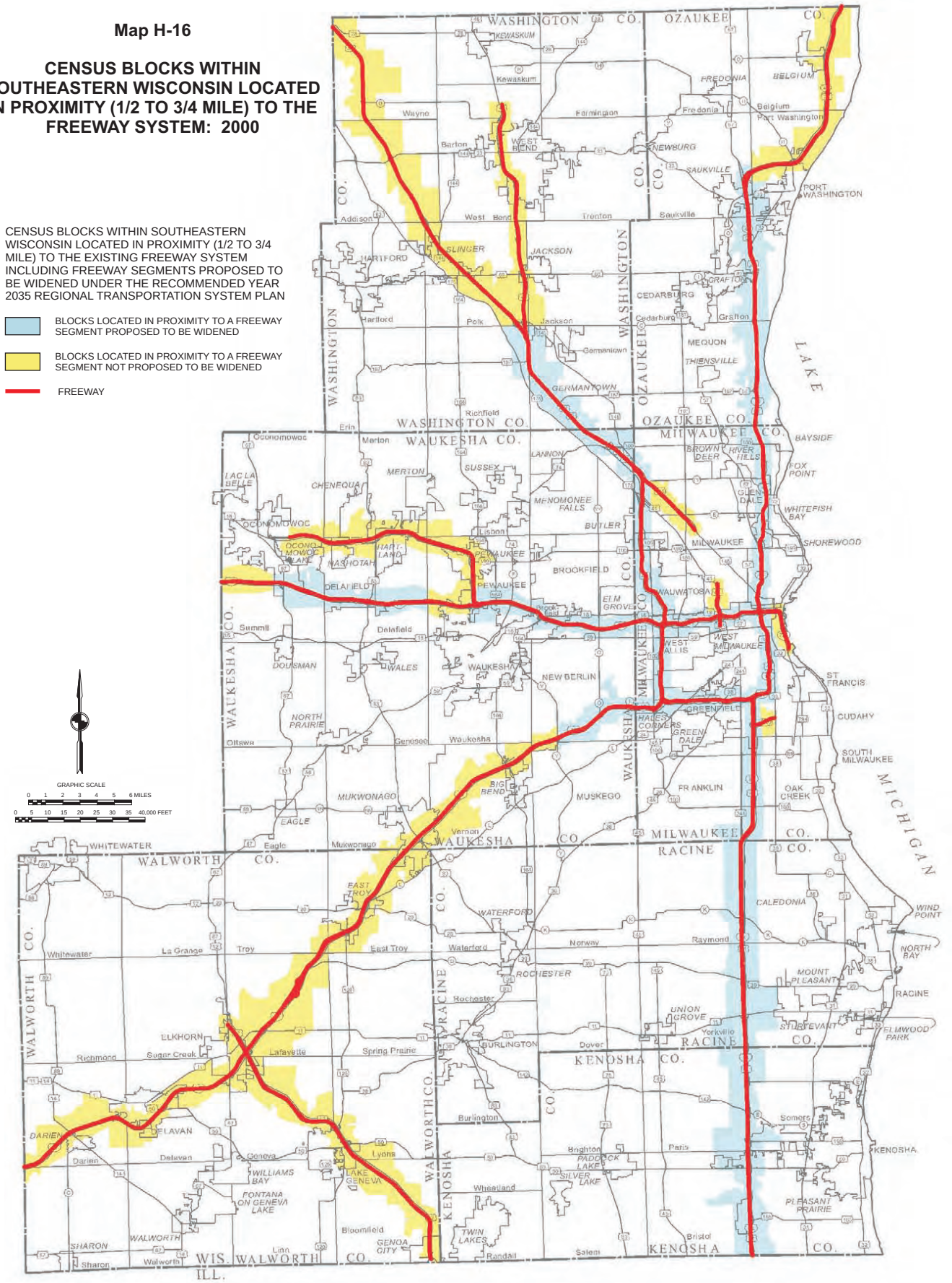
COMPARISON OF LOCATION OF CONCENTRATIONS OF FAMILIES IN POVERTY WITHIN SOUTHEASTERN WISCONSIN TO THE PLANNED ARTERIAL STREET AND HIGHWAY CAPACITY IMPROVEMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-16

CENSUS BLOCKS WITHIN SOUTHEASTERN WISCONSIN LOCATED IN PROXIMITY (1/2 TO 3/4 MILE) TO THE FREEWAY SYSTEM: 2000



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

Table H-7

COMPARISON OF TOTAL MINORITY POPULATIONS AND FAMILIES IN POVERTY WITHIN SOUTHEASTERN WISCONSIN AND THE MINORITY POPULATIONS AND FAMILIES IN POVERTY THAT RESIDE IN AREAS LOCATED IN PROXIMITY TO FREEWAYS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN[a]

KENOSHA COUNTY

	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
Minority Group	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	149,577	8,629	5.8	3,190	80	2.5	3,190	80	2.5
American Indian and Alaskan Native Persons	149,577	1,314	0.9	3,190	30	0.9	3,190	30	0.9
Asian and Pacific Islander Persons	149,577	1,930	1.3	3,190	70	2.2	3,190	70	2.2
Other Minority Persons	149,577	5,990	4.0	3,190	40	1.3	3,190	40	1.3
Hispanic Persons	149,577	10,757	7.2	3,190	110	3.4	3,190	110	3.4
Total Minority Persons[b]	149,577	22,290	14.9	3,190	290	9.1	3,190	290	9.1
Families in Poverty	38,671	2,094	5.4	3,690	90	2.4	3,690	90	2.4

MILWAUKEE COUNTY

	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
Minority Group	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	940,164	240,113	25.5	244,260	65,170	26.9	203,510	45,510	22.4
American Indian and Alaskan Native Persons	940,164	11,907	1.3	244,260	3,120	1.3	203,510	2,530	1.2
Asian and Pacific Islander Persons	940,164	28,930	3.1	244,260	8,000	3.3	203,510	5,970	2.9
Other Minority Persons	940,164	48,227	5.1	244,260	12,980	5.3	203,510	12,210	6.0
Hispanic Persons	940,164	82,406	8.8	244,260	24,170	9.9	203,510	22,710	11.2
Total Minority Persons[b]	940,164	356,683	37.9	244,260	99,130	40.6	203,510	75,320	37.0
Families in Poverty	226,685	26,454	11.7	63,900	7,950	12.4	54,490	6,470	11.9

OZAUKEE COUNTY

	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
Minority Group	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	82,317	917	1.1	11,630	230	2.0	8,170	200	2.4
American Indian and Alaskan Native Persons	82,317	335	0.4	11,630	50	0.4	8,170	30	0.4
Asian and Pacific Islander Persons	82,317	1,131	1.4	11,630	230	2.0	8,170	200	2.4
Other Minority Persons	82,317	382	0.5	11,630	80	0.7	8,170	40	0.5
Hispanic Persons	82,317	1,073	1.3	11,630	180	1.5	8,170	110	1.3
Total Minority Persons[b]	82,317	3,423	4.2	11,630	700	6.0	8,170	540	6.6
Families in Poverty	23,153	391	1.7	7,790	120	1.5	5,800	80	1.4

RACINE COUNTY

	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
Minority Group	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	188,831	21,100	11.2	2,460	10	0.4	2,460	10	0.4
American Indian and Alaskan Native Persons	188,831	1,448	0.8	2,460	20	0.8	2,460	20	0.8
Asian and Pacific Islander Persons	188,831	1,885	1.0	2,460	10	0.4	2,460	10	0.4
Other Minority Persons	188,831	8,168	4.3	2,460	20	0.8	2,460	20	0.8
Hispanic Persons	188,831	14,990	7.9	2,460	50	2.0	2,460	50	2.0
Total Minority Persons[b]	188,831	38,593	20.4	2,460	90	3.7	2,460	90	3.7
Families in Poverty	50,052	2,908	5.8	2,230	50	2.2	2,230	50	2.2

Table H-7 (continued)

WALWORTH COUNTY

Minority Group	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	93,759	983	1.0	16,200	190	1.2	- -	- -	- -
American Indian and Alaskan Native Persons	93,759	495	0.5	16,200	110	0.7	- -	- -	- -
Asian and Pacific Islander Persons	93,759	859	0.9	16,200	170	1.0	- -	- -	- -
Other Minority Persons	93,759	2,946	3.1	16,200	500	3.1	- -	- -	- -
Hispanic Persons	93,759	6,136	6.5	16,200	1,110	6.9	- -	- -	- -
Total Minority Persons[b]	93,759	8,331	8.9	16,200	1,560	9.6	- -	- -	- -
Families in Poverty	23,388	1,078	4.6	8,830	390	4.4	- -	- -	- -

WASHINGTON COUNTY

Minority Group	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	117,493	641	0.5	17,470	100	0.6	5,190	70	1.3
American Indian and Alaskan Native Persons	117,493	587	0.5	17,470	60	0.3	5,190	10	0.2
Asian and Pacific Islander Persons	117,493	938	0.8	17,470	110	0.6	5,190	50	1.0
Other Minority Persons	117,493	659	0.6	17,470	90	0.5	5,190	20	0.4
Hispanic Persons	117,493	1,529	1.3	17,470	210	1.2	5,190	50	1.0
Total Minority Persons[b]	117,493	3,623	3.1	17,470	490	2.8	5,190	190	3.7
Families in Poverty	32,953	867	2.6	12,650	270	2.1	2,970	30	1.0

WAUKESHA COUNTY

Minority Group	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	360,767	3,480	1.0	59,670	600	1.0	33,670	440	1.3
American Indian and Alaskan Native Persons	360,767	1,733	0.5	59,670	280	0.5	33,670	120	0.4
Asian and Pacific Islander Persons	360,767	6,497	1.8	59,670	1330	2.2	33,670	1,030	3.0
Other Minority Persons	360,767	4,013	1.1	59,670	310	0.5	33,670	210	0.6
Hispanic Persons	360,767	9,503	2.6	59,670	900	1.5	33,670	550	1.6
Total Minority Persons[b]	360,767	20,862	5.8	59,670	3,090	5.2	33,670	2,120	6.3
Families in Poverty	101,008	1,674	1.7	25,500	400	1.6	14,680	260	1.8

REGION

Minority Group	Total and Minority Populations			Population in Areas Located in Proximity to Freeways			Population in Areas Located in Proximity to Freeways Proposed to be Widened		
	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Total Population that is Minority Group Population	Total Population	Minority Group Population	Percent of Affected Population that is Minority Group Population
Black/ African American Persons	1,932,908	275,863	14.3	354,870	66,920	18.9	256,170	46,310	18.1
American Indian and Alaskan Native Persons	1,932,908	17,819	0.9	354,870	3,680	1.0	256,170	2,740	1.1
Asian and Pacific Islander Persons	1,932,908	42,170	2.2	354,870	9,930	2.8	256,170	7,330	2.9
Other Minority Persons	1,932,908	70,385	3.6	354,870	14,020	4.0	256,170	12,540	4.9
Hispanic Persons	1,932,908	126,394	6.5	354,870	26,740	7.5	256,170	23,580	9.2
Total Minority Persons[b]	1,932,908	453,805	23.5	354,870	105,370	29.7	256,170	78,560	30.7
Families in Poverty	495,910	35,466	7.2	124,590	9,270	7.4	83,860	6,980	8.3

[a]*The information regarding racial and ethnic populations in affected areas is year 2000 Census data for the Census blocks located in proximity (1/2 to 3/4 mile) to a freeway proposed to be widened under the recommended plan. The information regarding families in poverty is year 2000 Census data for the Census block groups located in proximity to a freeway proposed to be widened under the recommended plan.*

[b]*As part of the 2000 Federal Census, individuals could be reported as being of more than one race. The figures in this table indicate the number of persons reported as being of a given race (as indicated by the row heading), including those who were reported as that race exclusively and those who were reported as that race and one or more other races. Accordingly, the minority group figures sum to more than the total minority persons for each area.*

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

Maps H-17 through H-21 present information for each minority population which compares the location of freeways, including those proposed to be widened under the recommended plan, to the locations of areas with concentrations of minority populations, specifically, census blocks which exceed the seven county regional average of percentage of total population that is of a specific minority population or is low-income. The American Indian and Alaska Native and Asian and Pacific Islander populations are located throughout the Region. The Hispanic and Other Minority populations have concentrations in the near south side of Milwaukee, and the Cities of Kenosha, Racine, and Waukesha, and as well, are located throughout the Region. The Black/African American population is primarily located in northern and northwestern Milwaukee County and in eastern Kenosha and Racine Counties. Map H-22 shows the location of concentrations of combined minority populations—Black/African American, American Indian and Alaska Native, Asian and Pacific Islander, Hispanic, and Other Minority—specifically, census blocks which exceed the regional average of percentage of the total population that is minority population. Map H-23 shows the location of concentrations of low-income families within southeastern Wisconsin in comparison to the freeway system, including the segments of the freeway system proposed to be widened. While some segments of the freeway system, including those proposed to be widened, are located adjacent to individual and combined total minority and low-income populations, the vast majority of the freeway system and the freeway segments proposed to be widened are not located adjacent to minority populations, and the vast majority of census blocks identified as having an above average concentration of a minority population are not located adjacent to a freeway or a freeway proposed to be widened under the recommended plan. Table H-8 displays the total number of census blocks within the Region and each county, and, as well, the number and percent of census blocks in each county and Region which have above regional average concentrations of minority populations. Table H-9 displays the number of census blocks adjacent to, or traversed by, the freeway system in southeastern Wisconsin, along with the number and percent of those census blocks which have above regional average concentrations of minority populations. Comparison of Tables H-8 and H-9 indicates that the percentage of census blocks adjacent to the freeway system, including segments proposed to be widened, which have above regional average concentrations of minorities is, in almost all cases, less than the percentage of census blocks in each county and the Region which have above regional average concentrations of minorities. This analysis indicates there is not an over-population of minority populations in each county or the Region in areas adjacent to the freeway, or adjacent to the freeways proposed to be widened under the recommended plan.

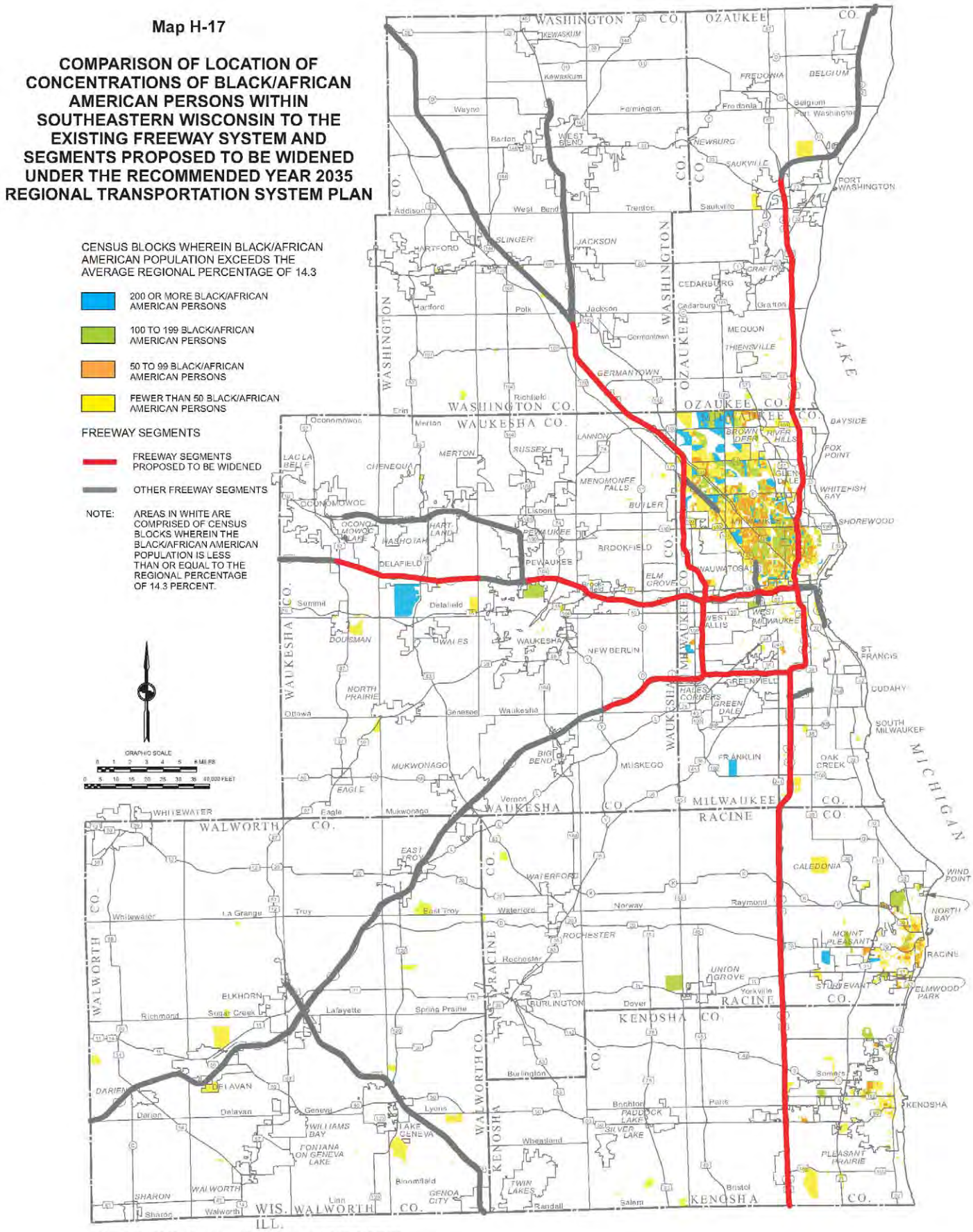
An analysis was conducted to determine by county, and for the Region, the extent to which the estimated right-of-way acquisition impacts of the recommended plan were located in areas with minority and low-income population concentrations. An estimate was prepared of the potential right-of-way acquisition associated with rebuilding the freeway system to modern design standards as recommended under the recommended plan, and also rebuilding the freeway system with 127 miles of additional lanes as is also recommended under the recommended plan. The estimated right-of-way requirements associated with rebuilding to modern design standards are substantially greater than the estimated right-of-way requirements associated with the 127 miles of additional lanes included in the recommended plan. The incremental right-of-way acquisition needs attendant to rebuilding the freeway system with 127 miles of additional lanes is an estimated 66 acres, 35 residences, and five commercial/industrial buildings. The estimated right-of-way requirements associated with rebuilding the freeway system to modern design standards is 561 acres of land, 151 residences, 18 commercial/industrial buildings, and two governmental/institutional buildings.

An analysis was conducted to determine by county, and for the Region, the extent to which the estimated residential and commercial/industrial right-of-way acquisition impacts were located in areas with above average concentrations of minority and low-income populations. Tables H-10 through H-16 present the estimated residential and commercial/industrial right-of-way requirements by county for the five minority populations and the low-income population.

The percentage of residences within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 14.3 percent of the total population) of Black/African American persons is 14.5 percent. This percentage is about the same as the percentage of census

Map H-17

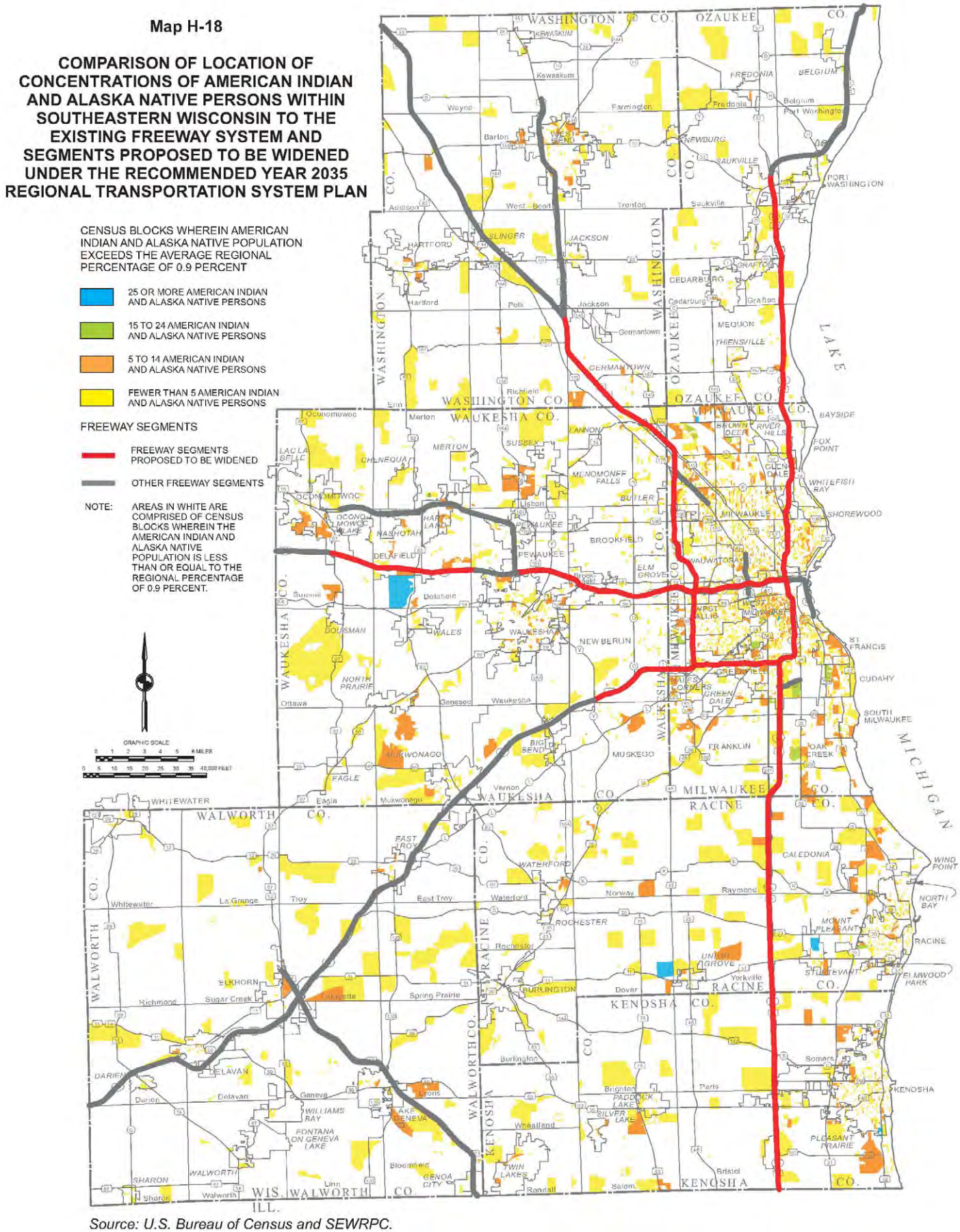
COMPARISON OF LOCATION OF CONCENTRATIONS OF BLACK/AFRICAN AMERICAN PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-18

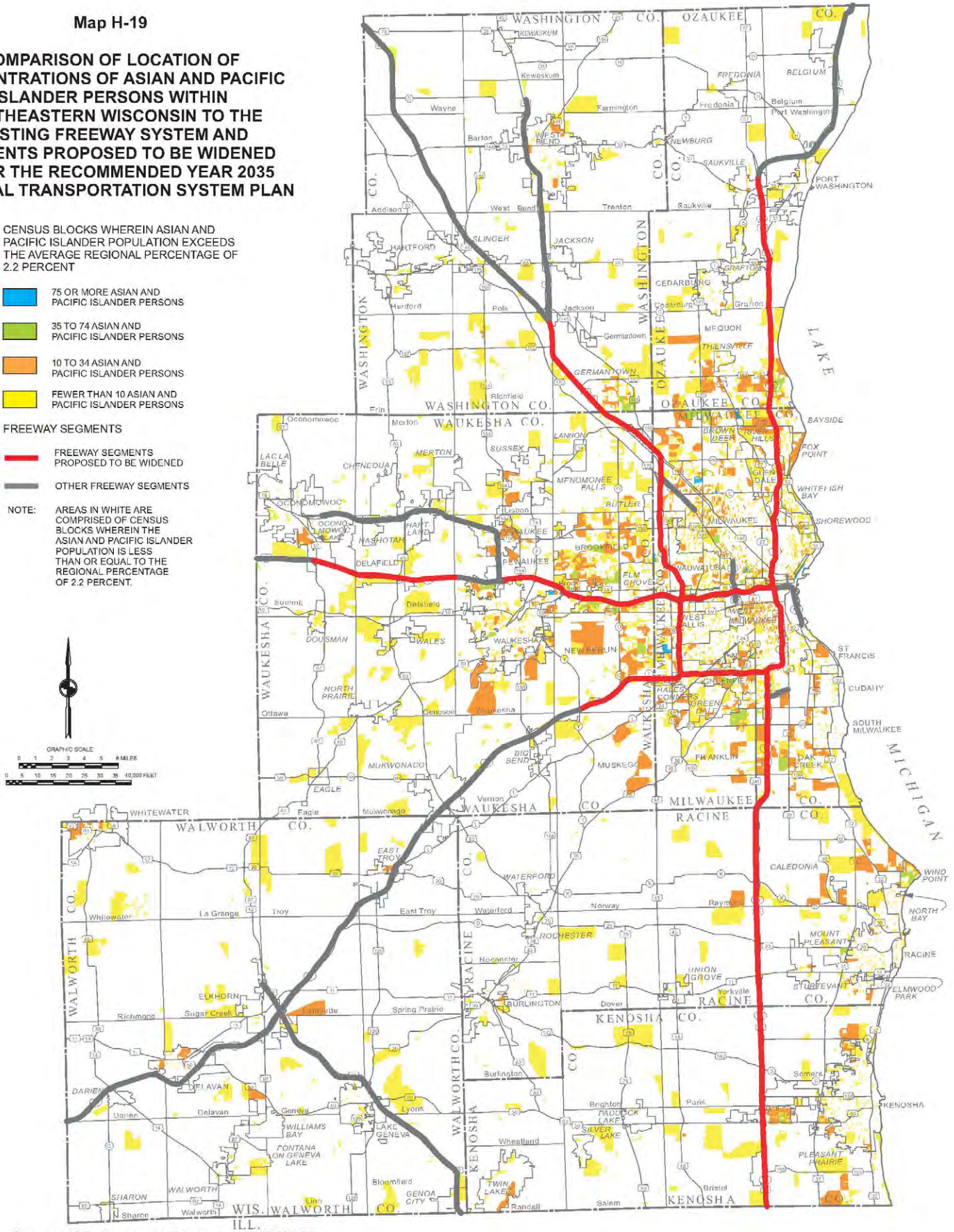
COMPARISON OF LOCATION OF CONCENTRATIONS OF AMERICAN INDIAN AND ALASKA NATIVE PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-19

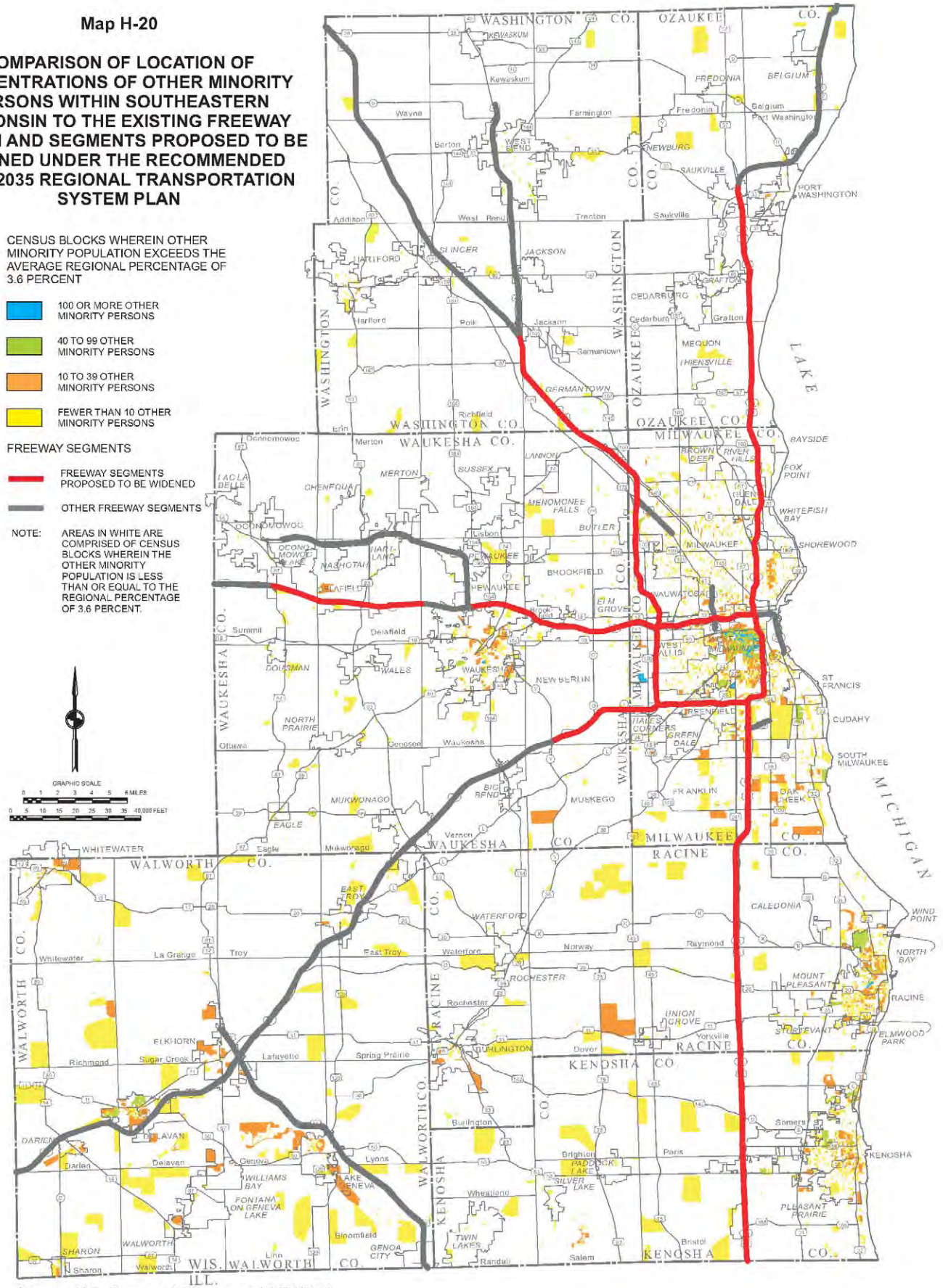
COMPARISON OF LOCATION OF CONCENTRATIONS OF ASIAN AND PACIFIC ISLANDER PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-20

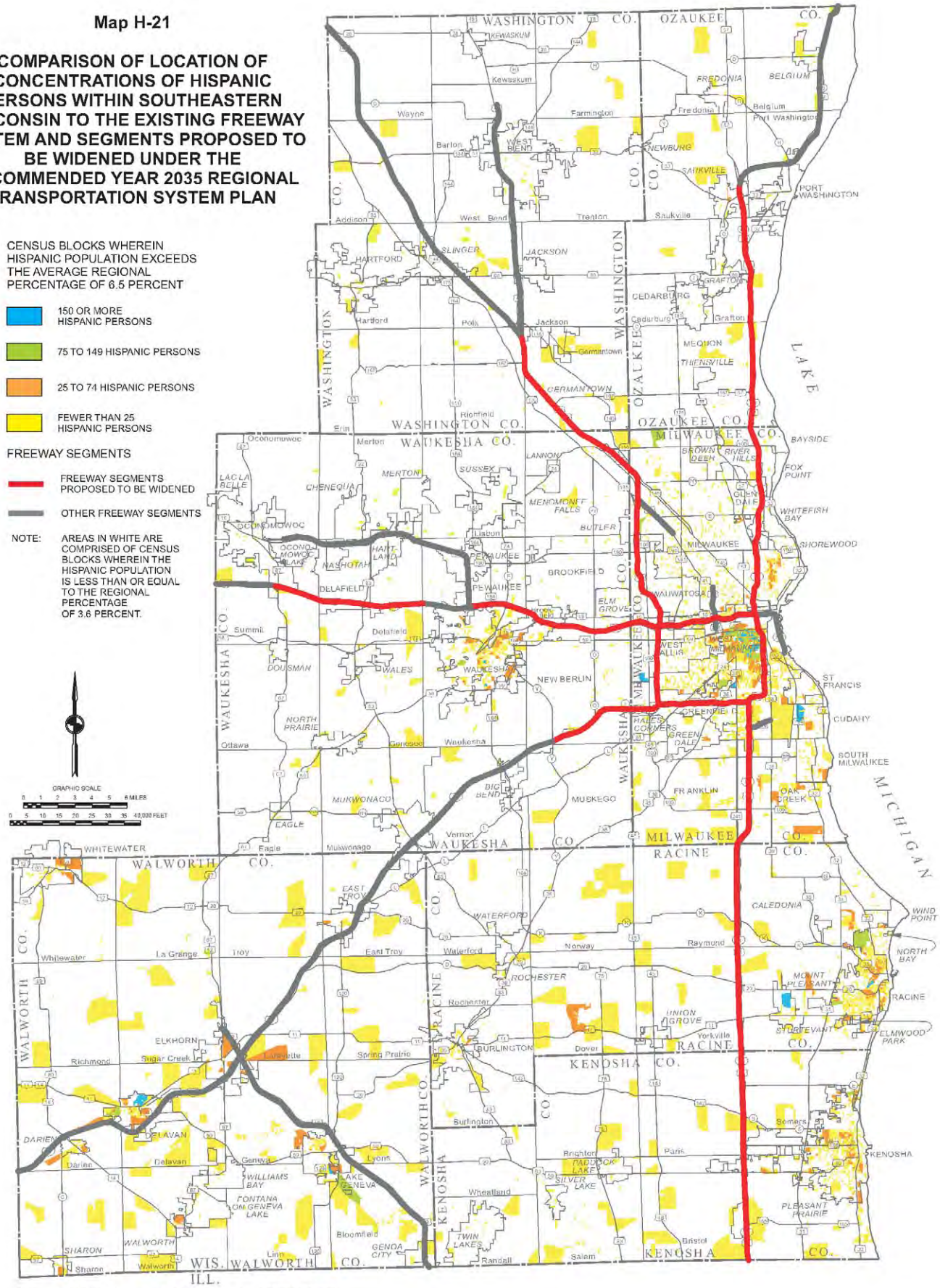
COMPARISON OF LOCATION OF CONCENTRATIONS OF OTHER MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-21

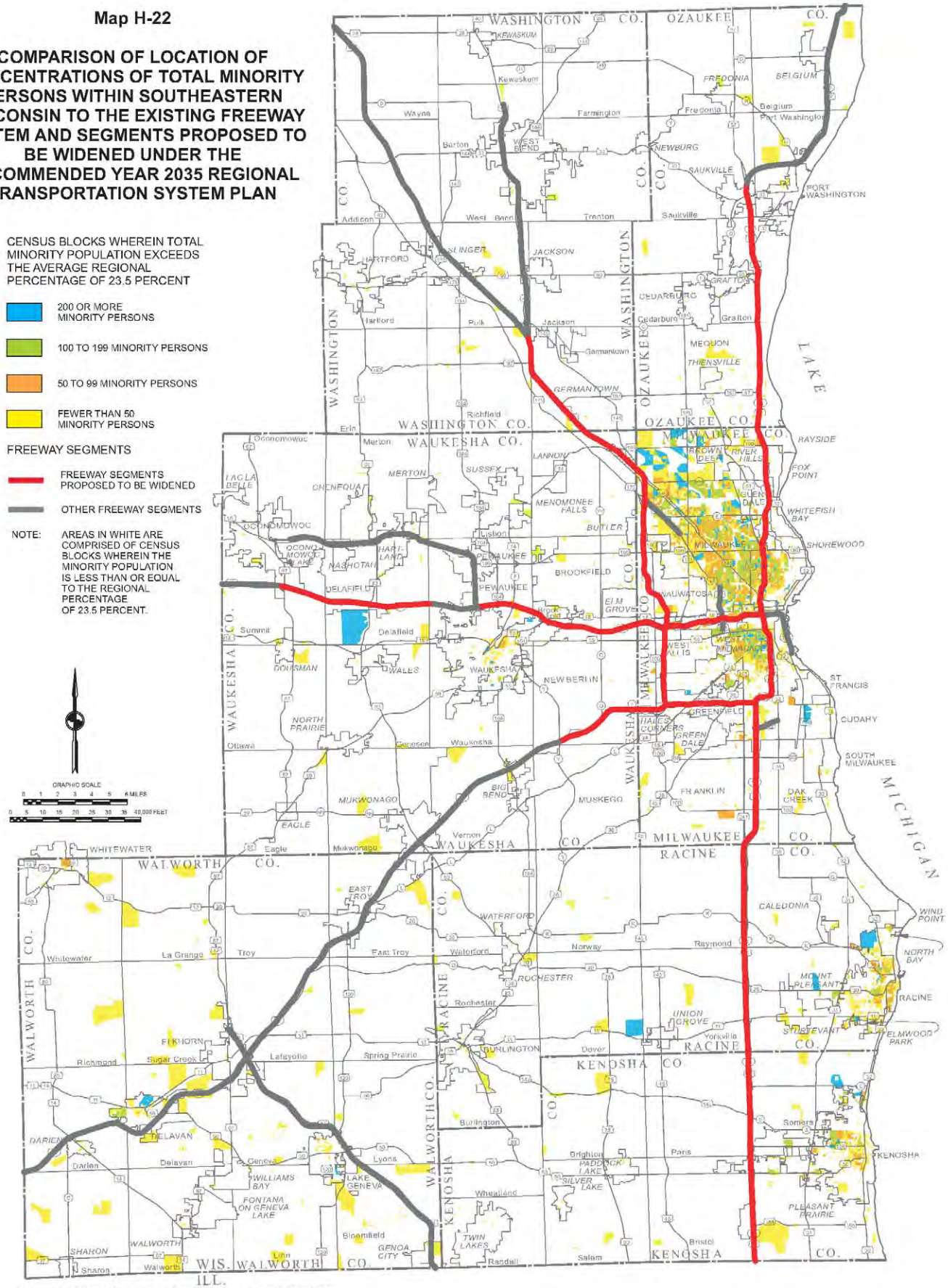
COMPARISON OF LOCATION OF CONCENTRATIONS OF HISPANIC PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-22

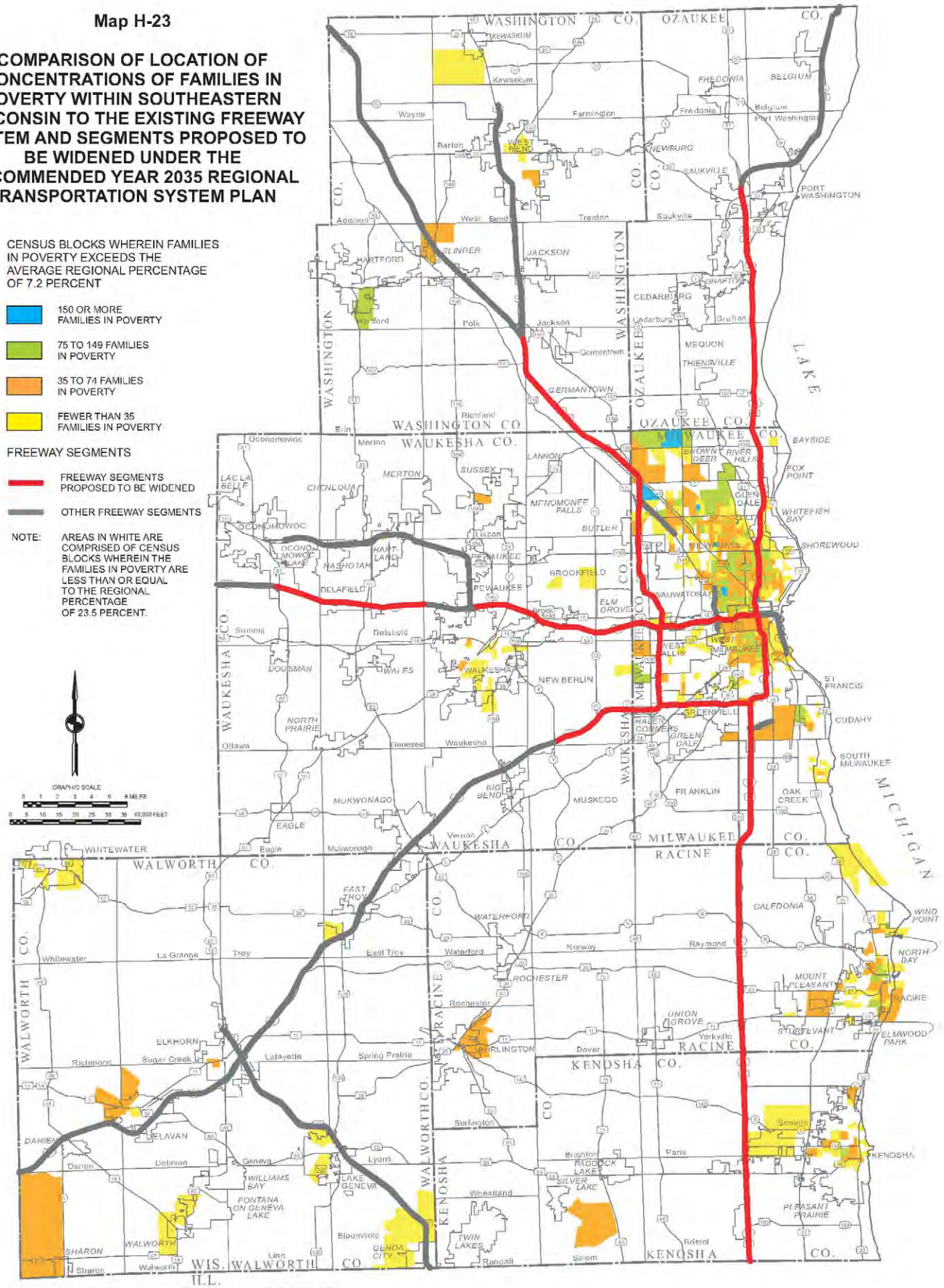
COMPARISON OF LOCATION OF CONCENTRATIONS OF TOTAL MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-23

COMPARISON OF LOCATION OF CONCENTRATIONS OF FAMILIES IN POVERTY WITHIN SOUTHEASTERN WISCONSIN TO THE EXISTING FREEWAY SYSTEM AND SEGMENTS PROPOSED TO BE WIDENED UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Table H-8

NUMBER AND PERCENT OF CENSUS BLOCKS/ BLOCK GROUPS WITHIN THE SOUTHEASTERN WISCONSIN REGION WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF MINORITY POPULATIONS

County	Total Number of Census Blocks	Census Blocks with Above Regional Average Concentrations of Minority Populations: 2000												Total Number of Census Block Groups: 2000	Census Block Groups with Above Average Concentration of Families in Poverty: 2000	
		Black/African American		American Indian and Alaskan Native		Asian and Pacific Islander		Other Minority		Hispanic		Total Minority Populations				
		Number	Percent of County/ Region Total	Number	Percent of County/ Region Total	Number	Percent of County/ Region Total	Number	Percent of County/ Region Total	Number	Percent of County/ Region Total	Number	Percent of County/ Region Total		Number	Percent of County/ Region Total
Kenosha	3,123	229	7.3	433	13.9	313	10.0	545	17.5	684	21.9	423	13.5	127	33	26.0
Milwaukee	12,447	3,226	25.9	3,039	24.4	2,844	22.8	2,283	18.3	2,503	20.1	4,117	33.1	880	435	49.4
Ozaukee	1,832	24	1.3	124	6.8	193	10.5	49	2.7	74	4.0	57	3.1	58	- -	- -
Racine	3,516	498	14.2	488	13.9	310	8.8	722	20.5	878	25.0	667	19.0	167	50	30.0
Walworth	3,445	42	1.2	184	5.3	163	4.7	327	9.5	465	13.5	254	7.4	86	17	19.8
Washington	2,376	11	0.5	204	8.6	156	6.6	72	3.0	95	4.0	35	1.5	79	7	8.9
Waukesha	6,663	45	0.7	557	8.4	893	13.4	316	4.7	483	7.2	219	3.3	254	16	6.3
Region	33,402	4,075	12.2	5,029	15.1	4,872	14.6	4,314	12.9	5,182	15.5	5,772	17.3	1,651	558	33.8

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

blocks in the Region—12.2 percent—which have above average concentrations of Black/African American persons (see Table H-8). There are no businesses within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations of Black/African American persons.

The percentage of residences and businesses within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 0.9 percent of total population) of American Indian and Alaska Native persons is 33.9 percent and 21.7 percent, respectively. These percentages are greater than the percentage of census blocks in the Region—15.1 percent—with above regional average concentrations of American Indian and Alaska Native persons, that is, more than 0.9 percent of the total population in the census block were American Indian or Alaskan Native persons. However, of the 63 residences estimated to need to be acquired under the recommended plan within census blocks with above regional average (0.9 percent of total population) concentrations of American Indian and Alaska Native persons, 45 residences or 71 percent would be located within census blocks with less than 3.0 percent American Indian or Alaska Native populations, 15 residences, or 24 percent, would be located within census blocks with between 3.0 and 6.1 percent American Indian and Alaska Native population, and three residences, or 5 percent, would be located within census blocks with 13.1 percent American Indian and Alaska Native persons. Also, of the 63 residences estimated to need to be acquired under the recommended plan with above regional average concentrations (more than 0.9 percent to total population) of American Indian and Alaska Native populations, 56, or 89 percent, are attendant to rebuilding the freeway system to modern design standards and only seven, or 11 percent, are attendant to additional lanes.

With respect to the five businesses estimated to need to be acquired under the recommended plan in census blocks with above regional average concentrations (more than 0.9 percent of total population) of American Indian and Alaska Native persons, all of the five businesses would need to be acquired due to rebuilding the freeway system to modern design standards, and none are attributable to rebuilding the freeway system with additional lanes. All of the five businesses would be located within census blocks with between 2.0 and 4.0 percent American Indian and Alaska Native population.

Table H-9

COMPARISON OF TOTAL CENSUS BLOCKS AND CENSUS BLOCKS ADJACENT TO OR TRAVERSED BY A FREEWAY SEGMENT WITH ABOVE AVERAGE CONCENTRATIONS OF MINORITY GROUPS: 2000

BLACK/AFRICAN AMERICAN PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of Black/African American Persons and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	1	1.2	- -	- -	1	1.2
Milwaukee	12,447	755	148	903	80	10.6	43	29.1	123	13.6
Ozaukee	1,832	81	54	135	4	4.9	1	1.9	5	3.7
Racine	3,516	78	- -	78	- -	- -	- -	- -	- -	- -
Walworth	3,445	- -	226	226	- -	- -	1	0.4	1	0.4
Washington	2,376	43	149	192	1	2.3	3	2.0	4	2.1
Waukesha	6,663	212	184	396	1	0.5	- -	- -	1	0.3
Region Total	33,402	1,254	761	2,015	87	6.9	48	6.3	135	6.7

AMERICAN INDIAN AND ALASKA NATIVE PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of American Indian and Alaska Native Persons and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	4	4.7	- -	- -	4	4.7
Milwaukee	12,447	755	148	903	114	15.1	22	14.9	136	15.1
Ozaukee	1,832	81	54	135	5	6.2	1	1.9	6	4.4
Racine	3,516	78	- -	78	7	9.0	- -	- -	7	9.0
Walworth	3,445	- -	226	226	- -	- -	9	4.0	9	4.0
Washington	2,376	43	149	192	- -	- -	11	7.4	11	5.7
Waukesha	6,663	212	184	396	12	5.7	7	3.8	19	4.8
Region Total	33,402	1,254	761	2,015	142	11.3	50	6.6	192	9.5

ASIAN AND PACIFIC ISLANDER PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of Asian and Pacific Islander Persons and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	2	2.4	- -	- -	2	2.4
Milwaukee	12,447	755	148	903	113	15.0	17	11.5	130	14.4
Ozaukee	1,832	81	54	135	4	4.9	1	1.9	5	3.7
Racine	3,516	78	- -	78	1	1.3	- -	- -	1	1.3
Walworth	3,445	- -	226	226	- -	- -	3	1.3	3	1.3
Washington	2,376	43	149	192	2	4.7	5	3.4	7	3.6
Waukesha	6,663	212	184	396	25	11.8	11	6.0	36	9.1
Region Total	33,402	1,254	761	2,015	147	11.7	37	4.9	184	9.1

OTHER MINORITY PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of Other Minority Persons and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	1	1.2	- -	- -	1	1.2
Milwaukee	12,447	755	148	903	89	11.8	12	8.1	101	11.2
Ozaukee	1,832	81	54	135	1	1.2	4	7.4	5	3.7
Racine	3,516	78	- -	78	2	2.6	- -	- -	2	2.6
Walworth	3,445	- -	226	226	- -	- -	10	4.4	10	4.4
Washington	2,376	43	149	192	- -	- -	3	2.0	3	1.6
Waukesha	6,663	212	184	396	5	2.4	- -	- -	5	1.3
Region Total	33,402	1,254	761	2,015	98	7.8	29	3.8	127	6.3

Table H-9 (continued)

HISPANIC PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of Hispanic Persons and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	5	5.9	- -	- -	5	5.9
Milwaukee	12,447	755	148	903	105	13.9	12	8.1	117	13.0
Ozaukee	1,832	81	54	135	2	2.5	3	5.6	5	3.7
Racine	3,516	78	- -	78	3	3.8	- -	- -	3	3.8
Walworth	3,445	- -	226	226	- -	- -	11	4.9	11	4.9
Washington	2,376	43	149	192	- -	- -	2	1.3	2	1.0
Waukesha	6,663	212	184	396	7	3.3	2	1.1	9	2.3
Region Total	33,402	1,254	761	2,015	122	9.7	30	3.9	152	7.5

TOTAL MINORITY PERSONS

County	Total Number of Census Blocks	Total Census Blocks Adjacent to or Traversed by a Freeway Segment			Census Blocks With Above Regional Average Concentration of Total Minority Persons[a] and Adjacent to or Traversed by a Freeway Segment					
					Freeway Segment Proposed to be Widened		Other Freeway Segment		Total	
		Freeway Segment Proposed to be Widened	Other Freeway Segment	Total	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks	Number	Percent of All Adjacent and Traversed Census Blocks
Kenosha	3,123	85	- -	85	2	2.4	- -	- -	2	2.4
Milwaukee	12,447	755	148	903	131	17.4	42	28.4	173	19.2
Ozaukee	1,832	81	54	135	4	4.9	1	1.9	5	3.7
Racine	3,516	78	- -	78	- -	- -	- -	- -	- -	- -
Walworth	3,445	- -	226	226	- -	- -	2	0.9	2	0.9
Washington	2,376	43	149	192	1	2.3	3	2.0	4	2.1
Waukesha	6,663	212	184	396	4	1.9	2	1.1	6	1.5
Region Total	33,402	1,254	761	2,015	142	11.3	50	6.6	192	9.5

[a] *The total minority population represents all persons identified as a member of a racial minority group-Black/African American persons, American Indian and Alaska Native persons, Asian and Pacific Islander persons, and other minority persons-and Hispanic persons not identified as members of a racial minority group.*

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

The percentage of residences and businesses within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 2.2 percent of the total population) of Asian and Pacific Islander persons is 37.1 percent and 21.7 percent, respectively. The percentage of blocks within the Region with above regional average concentrations of Asian and Pacific Islander persons is 14.6 percent. The percentages—37.1 percent—of residences and 21.7 percent of businesses to be acquired under the recommended plan within census blocks with above regional average concentrations of Asian and Pacific Islander persons exceeds the percentage—14.6 percent—of census blocks within the Region with above regional average concentrations of Asian and Pacific Islander persons. With respect to the estimated 69 residences to be acquired under the recommended plan within census blocks with above regional average concentrations of Asian and Pacific Islander persons, 36, or 52 percent, would be located within census blocks with between 2.2 to 5.9 percent Asian and Pacific Islander population, 21, or 31 percent, would be located within census blocks with between 6.0 and 9.0 percent Asian and Pacific Islander population, and 12, or 17 percent, would be located within census blocks with between 10.0 and 14.0 percent Asian and Pacific Islander population. Also, of the 69 residences and five businesses estimated to need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 2.2 percent of total population) of Asian and Pacific Islander persons, 54, or 78 percent, of the residences and four, or 80 percent of the businesses would be needed to rebuild the freeway system to modern design standards, and are not attributable to the proposed additional lanes on the freeway system under the recommended plan.

Table H-10

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF BLACK/AFRICAN AMERICAN PERSONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	- -	- -	- -	- -	- -	14	- -	- -
Milwaukee	116	21	18.1	31	5	16.1	147	26	17.7
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	- -	- -	- -	- -	- -	10	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	1	100.0	2	1	50.0
Waukesha	10	- -	- -	3	- -	- -	13	- -	- -
Region	151	21	13.9	35	6	17.1	186	27	14.5

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Black/African American Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	- -	- -	- -	- -	- -	5	- -	- -
Milwaukee	7	- -	- -	5	- -	- -	12	- -	- -
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	- -	- -	- -	- -	- -	4	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	- -	- -	- -	- -	- -	1	- -	- -
Region	18	- -	- -	5	- -	- -	23	- -	- -

[a]In 2000, 14.3 percent of the Region's total population was Black/African American persons. (Black/African American persons represented the following portions of each county's total population: Kenosha County, 5.7 percent; Milwaukee County 25.5 percent; Ozaukee County 1.1 percent; Racine County, 11.2 percent; Walworth County, 1.1 percent; Washington County 0.5 percent; and Waukesha County, 1.0 percent.)

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

The percentage of residences and businesses within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 3.6 percent of the total population) of Other Minority persons is 13.8 percent and 8.7 percent, respectively. The percentage of blocks within the Region with above regional average concentrations of Other Minority persons is 12.9 percent. Thus, the percentage of residences—13.8 percent—and businesses—8.7 percent—to be acquired under the recommended plan within census blocks with above regional average concentrations of Other Minority persons is

Table H-11

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF AMERICAN INDIAN AND ALASKAN NATIVE PERSONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations			Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations			Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	4	28.6	- -	- -	- -	14	4	- -
Milwaukee	116	49	42.2	31	7	22.6	147	56	38.1
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	3	30.0	- -	- -	- -	10	3	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	- -	- -	2	- -	- -
Waukesha	10	- -	- -	3	- -	- -	13	- -	- -
Region	151	56	37.1	35	7	20.0	186	63	33.9

	Estimated Commercial/Industrial Residential Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations			Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations			Relocations in Census Blocks with Above Regional Average Concentration of American Indian and Alaskan Native Populations	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	2	40.0	- -	- -	- -	5	2	40.0
Milwaukee	7	2	28.6	5	- -	- -	12	2	16.7
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	1	25.0	- -	- -	- -	4	1	25.0
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	- -	- -	- -	- -	- -	1	- -	- -
Region	18	5	27.8	5	- -	- -	23	5	21.7

[a] *In 2000, American Indian and Alaskan Native Persons represented 0.9 percent of the Region's total population. American Indian and Alaskan Native Persons represented the following portions of each county's total population: Kenosha County, 0.9 percent; Milwaukee County 1.3 percent; Ozaukee County 0.4 percent; Racine County, 0.8 percent; Walworth County, 0.5 percent; Washington County 0.5 percent; and Waukesha County, 0.5 percent.*

[b] *A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.*

Source: HNTB and SEWRPC.

about the same as the percentage of census blocks within the Region with above regional average concentrations of Other Minority persons—12.9 percent. Of the 26 residences and two businesses estimated to need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 3.6 percent of total population) of Other Minority persons, 17, or 65 percent, of the residences and both of the businesses would be needed to rebuild the freeway system to modern design standards, and are not attributable to the proposed additional lanes on the freeway system under the recommended plan.

Table H-12

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTAITON SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF ASIAN AND PACIFIC ISLANDER PERSONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	- -	- -	- -	- -	- -	14	- -	- -
Milwaukee	116	42	36.2	31	12	38.7	147	54	36.7
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	3	30.0	- -	- -	- -	10	3	30.0
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	- -	- -	2	- -	- -
Waukesha	10	9	90.0	3	3	100.0	13	12	92.3
Region	151	54	35.8	35	15	42.8	186	69	37.1

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Asian and Pacific Islander Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	- -	- -	- -	- -	- -	5	- -	- -
Milwaukee	7	3	42.8	5	1	20.0	12	4	33.3
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	- -	- -	- -	- -	- -	4	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	1	100.0	- -	- -	- -	1	1	- -
Region	18	4	22.2	5	1	20.0	23	5	21.7

[a]In 2000, Asian and Pacific Islander persons represented 2.2 percent of the Region's total population. Asian and Pacific Islander persons represented the following portions of each county's total population: Kenosha County, 1.3 percent; Milwaukee County 3.1 percent; Ozaukee County 1.3 percent; Racine County, 1.0 percent; Walworth County, 1.0 percent; Washington County 0.8 percent; and Waukesha County, 1.8 percent.

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

Source: HNTB and SEWRPC.

The percentage of residences and businesses within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 6.5 percent of total population) of Hispanic persons is 11.6 percent and 30.4 percent, respectively. The percentage of census blocks within the Region with above regional average concentrations of Hispanic persons is 15.5 percent. Thus, the percentage—11.6 percent—of residences to be acquired under the recommended plan within census blocks with above regional average concentrations of Hispanic persons is about the same as the percentage—15.5

Table H-13

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF OTHER MINORITY PERSONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	- -	- -	- -	- -	- -	14	- -	- -
Milwaukee	116	16	13.8	31	9	29.0	147	25	17.0
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	- -	- -	- -	- -	- -	10	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	- -	- -	2	- -	- -
Waukesha	10	1	10.0	3	- -	- -	13	1	7.7
Region	151	17	11.2	35	9	25.7	189	26	13.8

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Other Minority Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	1	20.0	- -	- -	- -	5	1	20.0
Milwaukee	7	- -	- -	5	- -	- -	12	- -	- -
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	- -	- -	- -	- -	- -	4	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	1	100.0	- -	- -	- -	1	1	100.0
Region	18	2	11.1	5	- -	- -	23	2	8.7

[a]In 2000, Other Minority persons represented 3.6 percent of the Region's total population. Other Minority persons represented the following portions of each county's total population: Kenosha County, 4.0 percent; Milwaukee County 5.1 percent; Ozaukee County 0.5 percent; Racine County, 4.3 percent; Walworth County, 3.1 percent; Washington County 0.6 percent; and Waukesha County, 1.1 percent.

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

Source: HNTB and SEWRPC.

percent—of census blocks within the Region with above regional average concentrations of Hispanic persons, while the percentage—30.4 percent—of businesses to be acquired under the recommended plan within census blocks with above regional average concentration of Hispanic persons exceeds the percentage—15.5 percent—of census blocks within the Region with above regional average concentrations of Hispanic persons. With respect to the estimated seven businesses to be acquired under the recommended plan within census blocks with above regional average concentrations of Hispanic persons (more than 6.5 percent of total population), six, or 86 percent, would be located within census blocks with between 6.5 to 8.5 percent Hispanic population, and one, or

Table H-14

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF HISPANIC PERSONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	2	14.3	- -	- -	- -	14	2	14.3
Milwaukee	116	9	7.8	31	9	29.0	147	18	12.2
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	2	20.0	- -	- -	- -	10	2	20.0
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	- -	- -	2	- -	- -
Waukesha	10	- -	- -	3	- -	- -	13	- -	- -
Region	151	13	8.6	35	9	25.7	189	22	11.6

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons			Relocations in Census Blocks with Above Regional Average Concentrations of Hispanic Persons	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	3	60.0	- -	- -	- -	5	3	60.0
Milwaukee	7	2	28.6	5	- -	- -	12	2	16.7
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	2	50.0	- -	- -	- -	4	2	50.0
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	- -	- -	- -	- -	- -	1	- -	- -
Region	18	7	38.9	5	- -	- -	23	7	30.4

[a]In 2000, Hispanic persons represented 6.5 percent of the Region's total persons. Hispanic persons represented the following portions of each county's total population: Kenosha County, 7.2 percent; Milwaukee County 8.8 percent; Ozaukee County 1.3 percent; Racine County, 8.2 percent; Walworth County, 6.5 percent; Washington County 1.3 percent; and Waukesha County, 2.6 percent.

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

Source: HNTB and SEWRPC.

14 percent would be located within census blocks with between 8.5 and 14.0 percent Hispanic population. Also, of the 22 residences and seven businesses estimated to need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 6.5 percent of total population) of Hispanic persons, 13, or 59, percent of the residences and all seven, or 100 percent, of the businesses would be needed to rebuild the freeway system to modern design standards, and are not attributable to the proposed additional lanes on the freeway system under the recommended plan.

Table H-15

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF TOTAL MINORITY POPULATIONS[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations			Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations			Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	- -	- -	- -	- -	- -	14	- -	- -
Milwaukee	116	31	26.7	31	8	25.8	147	39	26.5
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	- -	- -	- -	- -	- -	10	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	1	- -	- -	2	- -	- -
Waukesha	10	- -	- -	3	- -	- -	13	- -	- -
Region	151	31	20.5	35	8	22.8	189	39	20.6

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations			Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations			Relocations in Census Blocks with Above Regional Average Concentrations of Total Minority Populations	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	- -	- -	- -	- -	- -	5	- -	- -
Milwaukee	7	- -	- -	5	- -	- -	12	- -	- -
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	- -	- -	- -	- -	- -	4	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	- -	- -	- -	- -	- -	1	- -	- -
Waukesha	1	- -	- -	- -	- -	- -	1	- -	- -
Region	18	- -	- -	5	- -	- -	23	- -	- -

[a]Persons defined as being a member of a minority group were Black/African American persons; American Indian and Alaskan Native persons; Asian and Pacific Islander persons, Other Minority persons; and/or Hispanic persons. In 2000, 23.5 percent of the Region's total population was of a minority population. The total minority populations represented the following portions of each county's total population: Kenosha County, 14.9 percent; Milwaukee County 37.9 percent; Ozaukee County 4.2 percent; Racine County, 20.4 percent; Walworth County, 8.9 percent; Washington County 3.1 percent; and Waukesha County, 5.8 percent.

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

Source: HNTB and SEWRPC.

The percentage of residences within the Region which will need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 23.5 percent of the total population) of minority persons (Black/African American, Asian and Pacific Islander, American Indian and Alaska Native, Other Minority, and Hispanic) is 20.6 percent (see Table H-15). The percentage of blocks within the Region with above regional average concentrations of the total combined minority population is 17.3 percent. The

Table H-16

ESTIMATED RIGHT-OF-WAY REQUIREMENTS UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN LOCATED IN AREAS WITH ABOVE REGIONAL AVERAGE CONCENTRATIONS OF FAMILIES IN POVERTY[a] WITH RESPECT TO THE EXISTING REGIONAL FREEWAY SYSTEM

	Estimated Residential Relocations[b]								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty			Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty			Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	14	- -	- -	- -	- -	- -	14	- -	- -
Milwaukee	116	38	32.7	31	3	9.7	147	41	27.9
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	10	- -	- -	- -	- -	- -	10	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	1	100.0	1	- -	- -	2	1	50.0
Waukesha	10	- -	- -	3	- -	- -	13	- -	- -
Region	151	39	25.8	35	3	8.6	189	42	22.2

	Estimated Commercial/Industrial Relocations								
	Relocations Due to Design and Design-Related Safety Improvements			Relocations Due to Additional Lanes			Total Relocations Under the Recommended Plan		
		Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty			Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty			Relocations in Census Block Groups with Above Regional Average Concentrations of Families in Poverty	
County	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations	Total	Number	Percent of All Relocations
Kenosha	5	- -	- -	- -	- -	- -	5	- -	- -
Milwaukee	7	3	42.8	5	5	100.0	12	8	66.7
Ozaukee	- -	- -	- -	- -	- -	- -	- -	- -	- -
Racine	4	- -	- -	- -	- -	- -	4	- -	- -
Walworth	- -	- -	- -	- -	- -	- -	- -	- -	- -
Washington	1	1	100.0	- -	- -	- -	1	1	100.0
Waukesha	1	- -	- -	- -	- -	- -	1	- -	- -
Region	18	4	22.2	5	5	100.0	23	9	39.1

[a]Families with incomes below the federally-defined poverty level were defined as families in poverty and of low income. In 2000, 7.2 percent of the Region's total families were families with income below the federally-defined poverty level. Families in poverty represented the following portions of each county's total families: Kenosha County, 5.4 percent; Milwaukee County 11.7 percent; Ozaukee County 1.7 percent; Racine County, 5.8 percent; Walworth County 4.6 percent; Washington County 2.6 percent; and Waukesha County, 1.7 percent.

[b]A residential relocation represents the acquisition of a single-family dwelling, an individual apartment unit, or an individual condominium unit.

Source: HNTB and SEWRPC.

percentage—20.6 percent—of residences to be acquired under the recommended plan within census blocks with above regional average concentrations of minority persons is about the same percentage—17.3 percent—of census blocks within the Region with above regional average concentrations of minority persons. There are no businesses within the Region which will need to be acquired under the recommended plan within census blocks

with above regional average concentrations of minority persons. Also, of the 39 residences estimated to need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 23.5 percent of total population) of minority persons, 31, or 79 percent, of the residences would be needed to rebuild the freeway system to modern design standards, and are not attributable to the proposed additional lanes on the freeway system under the recommended plan.

The percentage of residences and business within the Region which will need to be acquired under the recommended plan within census block groups with above regional average concentrations (more than 7.2 percent of total families) of low-income families is 22.2 percent and 39.1 percent, respectively (see Table H-16). The percentage of census block groups within the Region with above regional average concentrations of low-income families is 33.8 percent. Thus, the percentage—22.2 percent—of residences to be acquired under the recommended plan within census block groups with above regional average concentrations of low-income families is less than the percentage—33.8 percent—of census block groups within the Region with above regional average concentrations of low-income families, while the percentage—39.1 percent—of businesses to be acquired under the recommended plan within census blocks with above regional average concentrations of low-income families exceeds the percentage—33.8 percent—of census block groups within the Region with above regional average concentrations of low-income families. Of the 42 residences and 9 businesses estimated to need to be acquired under the recommended plan within census blocks with above regional average concentrations (more than 7.2 percent of total families) of low-income families, 39, or 93 percent, of the residences and four, or 44 percent, of the businesses would be needed to rebuild the freeway system to modern design standards, and are not attributable to the proposed additional lanes on the freeway system under the recommended plan.

Conclusions

In conclusion, the analysis of potential adverse impacts of the reconstruction of the existing freeway system, including the proposed widenings under the year 2035 regional transportation plan, indicates the following:

- While some segments of the freeway system, including those proposed to be widened, are located adjacent to concentrations of minority and low income populations, the vast majority of the freeway system and the freeway segments proposed to be widened are not adjacent to such concentrations. Also, the vast majority of census blocks having an above average concentration of a minority population are not located adjacent or in proximity to the freeway system, or to freeway segments proposed to be widened under the recommended plan.

- The residences and businesses which are estimated to need to be acquired under the recommended plan—particularly those required for additional lanes—are not disproportionately located in areas with above county or regional averages of minority or low income populations.

- There is not a significant over-representation of minority and low income populations in areas located in proximity to freeways proposed to be widened within each county. With respect to the Region as a whole, there is a greater minority and low income population in areas adjacent to freeways proposed to be widened. However, as noted above, the residences and businesses which are estimated to be needed to be acquired to provide additional lanes on the freeway are not disproportionately located in areas with above county or regional averages of minority or low income populations. There is not an expected disproportionate impact on minority and low income populations with respect to transportation-related air pollution. Transportation-related air pollutant emissions, even with an anticipated 40 percent increase in traffic regionwide, may be expected to significantly decline due to cleaner, more efficient vehicles by about 80 percent regionwide for ozone-related emissions of volatile organic compounds and nitrogen oxides, 55 percent regionwide for fine particulates and carbon monoxide, and 70 percent regionwide for air toxic substances. The reductions in emissions generated on central Milwaukee County freeways adjacent to minority and low income populations may be expected to be even greater, as traffic increases on these freeways may be expected to be less than regionwide increases.

Potential Benefits

The expected benefits in terms of arterial street and highway accessibility to employment is shown on Map H-24 for the existing system, a TSM plan alternative (which includes no arterial street and highway system capacity expansion, but does include expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management plan elements), and the recommended plan (includes the TSM plan alternative plus arterial street and highway capacity improvements). Comparing the existing arterial street and highway accessibility to that of the TSM plan alternative indicates that as traffic volume and congestion levels grow to the plan design year 2035 and without providing additional arterial street and highway system capacity, the accessibility to employment opportunities may be expected to decline significantly, including with respect to central Milwaukee County and other urbanized areas of the Region including minority and low-income population areas.

The arterial street and highway system accessibility to employment under the recommended year 2035 regional transportation system plan may be expected to be about the same as that under the existing system. Thus, the recommended plan may be expected to avoid the decline in accessibility to employment opportunities, particularly with respect to central Milwaukee County and the other urbanized areas of the Region including minority and low-income population areas.

Additionally, there is a safety component attendant to providing additional traffic carrying capacity, particularly with respect to freeways. Maps H-25 through H-27 and Table H-17 indicate the expected levels of traffic congestion on the freeway system under existing conditions as well as the TSM plan alternative and the recommended plan. Rear-end collision crash rates are five to 15 times higher on congested freeway segments as compared to uncongested freeway segments, with the highest rear-end crash rates on the most extremely congested freeway segments. Some of the reduction in congestion and attendant rear-end collision rates occur on freeway segments directly serving minority and low-income populations.

PUBLIC TRANSIT ELEMENT OF THE REGIONAL TRANSPORTATION PLAN

The year 2035 regional transportation plan recommends significant improvement and expansion of public transit within Southeastern Wisconsin, specifically an expansion of about 100 percent from existing year 2005 transit service levels. In the year 2005, approximately 69,000 vehicle-miles of transit were operated on an average weekday, and the recommended transit plan recommends expansion of service to 138,000 vehicle-miles of transit service. The expansion of transit service would include the development of an express transit system within the Milwaukee area, the significant expansion of rapid transit bus service within Milwaukee County and connecting to the other counties of the Region and, as well, the expansion of local bus service with respect to service availability and service frequency.

- Rapid Transit Service
  Bus rapid transit service would serve Milwaukee County and connect Milwaukee County with the other six counties of the Region. The planned bus rapid transit service would provide for travel in both directions at all times, that is, to and from Milwaukee County, as well as within Milwaukee County. Service would be provided not just during peak periods, but during the midday and evenings as well. Stops on bus rapid transit service would be spaced about every three to five miles to provide service not just to and from the Milwaukee central business district, but to other major job and activity centers within Milwaukee County and within the other Counties of the Region. Bus rapid transit would be increased by approximately 204 percent under the recommended plan, from 7,900 vehicle-miles of rapid transit service in 2005 to 24,000 vehicle-miles in the plan design year 2035.

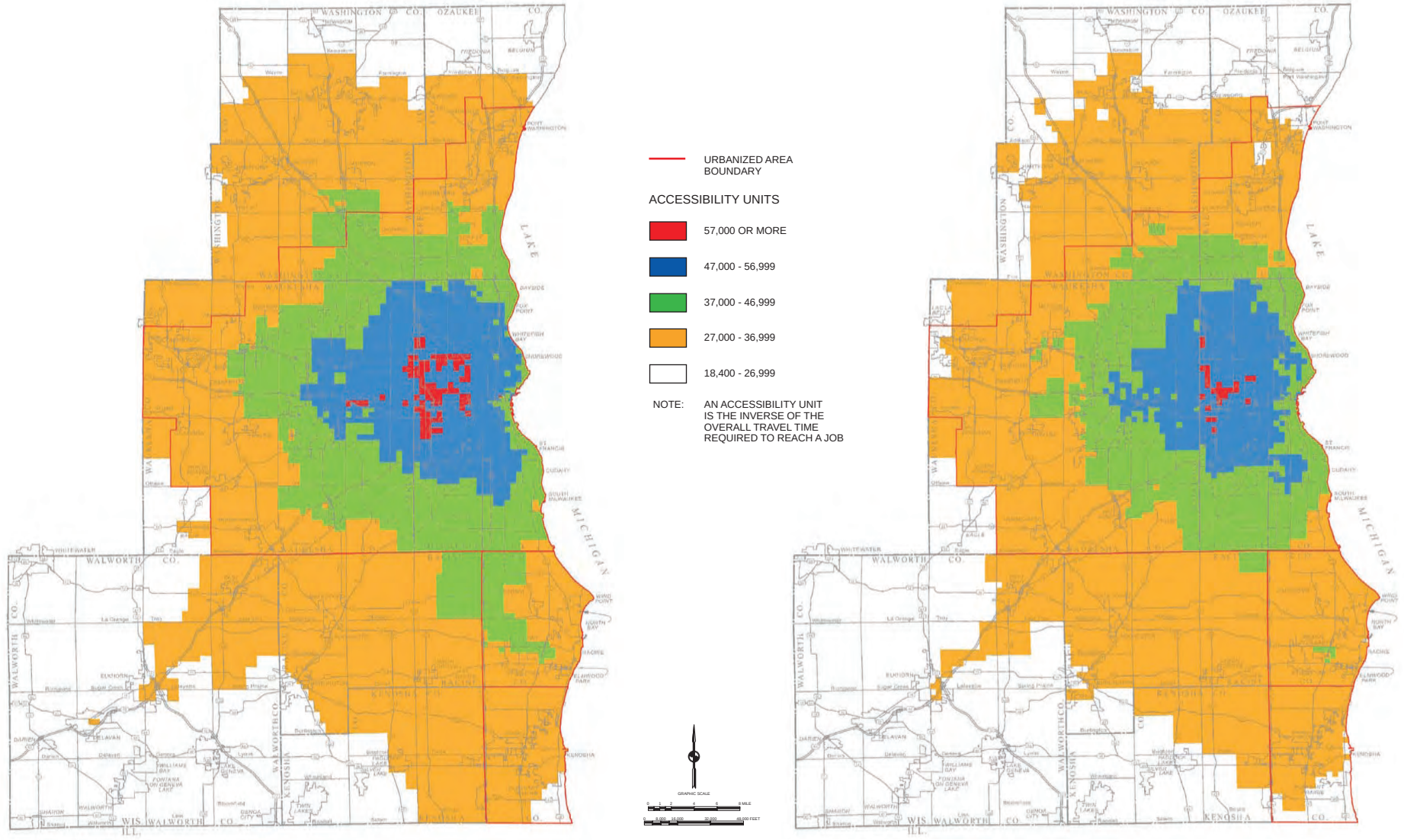
- Express Transit Service
  The plan recommends the development of a grid of eight express bus transit routes largely within Milwaukee County, connecting major employment centers and shopping areas, other major activity centers such as General Mitchell International Airport, tourist attractions, entertainment centers, and

Map H-24

ACCESSIBILITY PROVIDED BY HIGHWAY TO JOBS IN THE REGION: EXISTING SYSTEM, TSM PLAN, AND TSM PLUS HIGHWAY PLAN

EXISTING

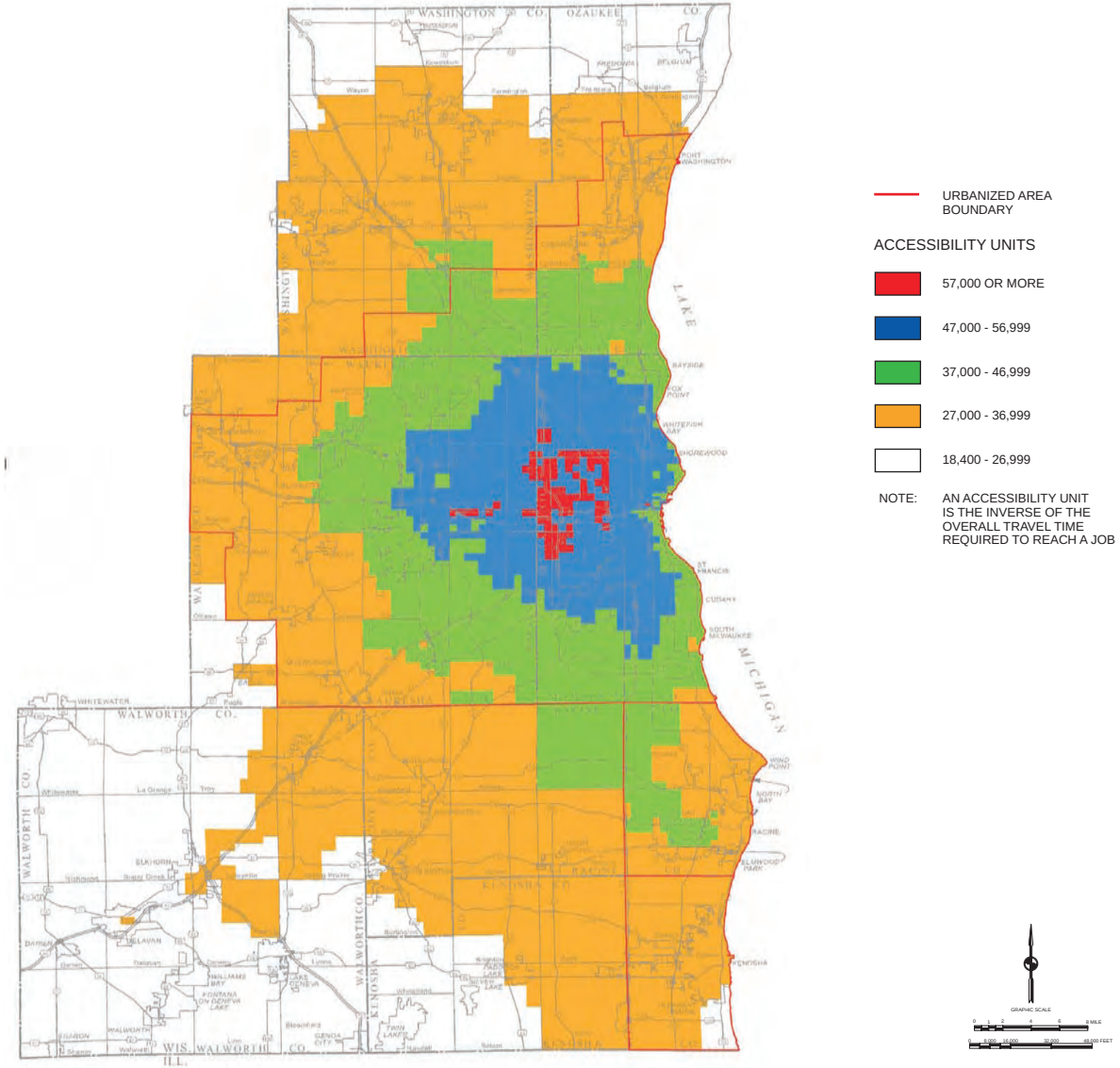
YEAR 2035 TSM PLAN ALTERNATIVE



Source: SEWRPC.

Map H-24 (continued)

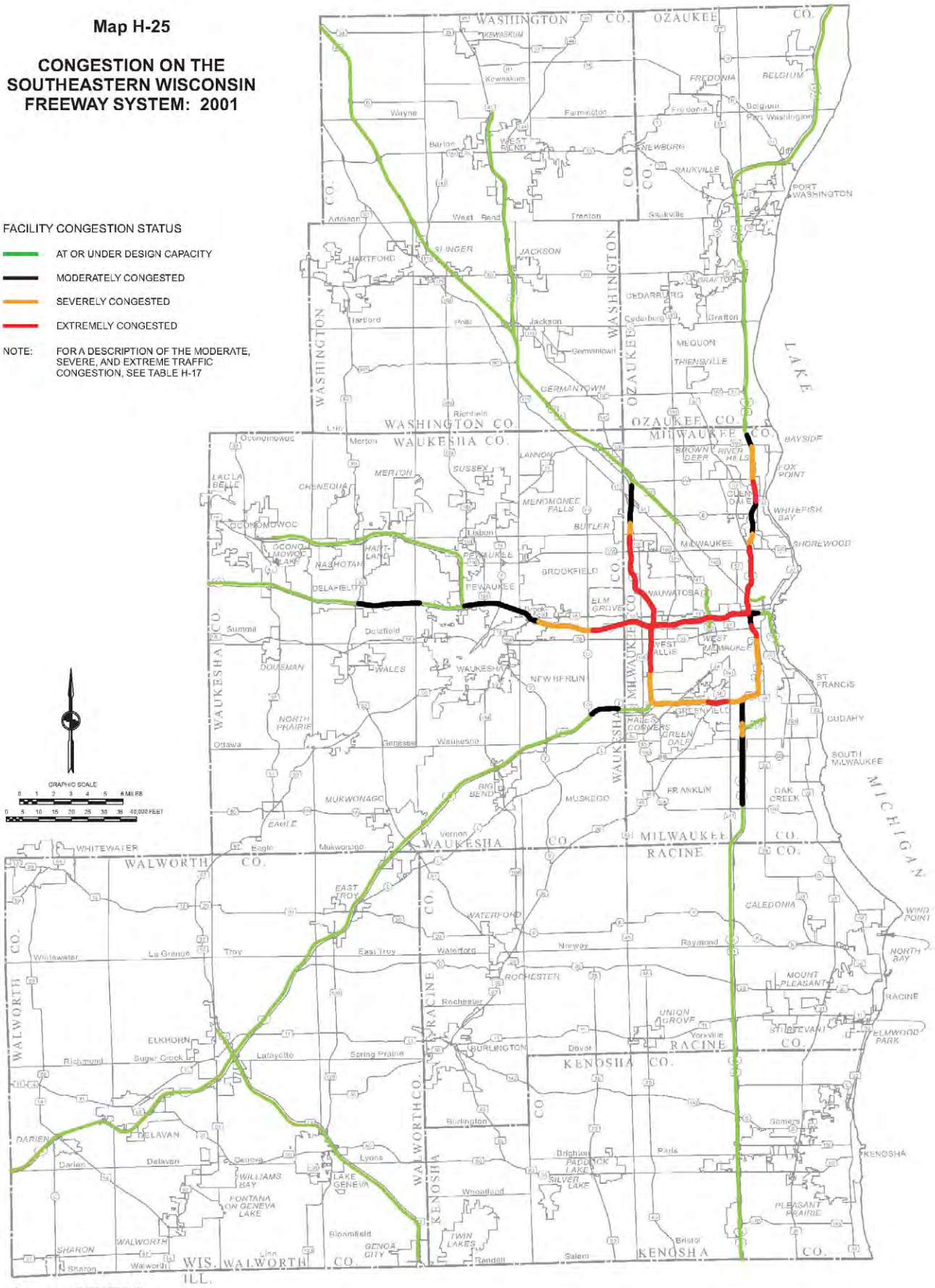
RECOMMENDED YEAR 2035 REGIONAL
TRANSPORTATION SYSTEM PLAN



Source: SEWRPC.

Map H-25

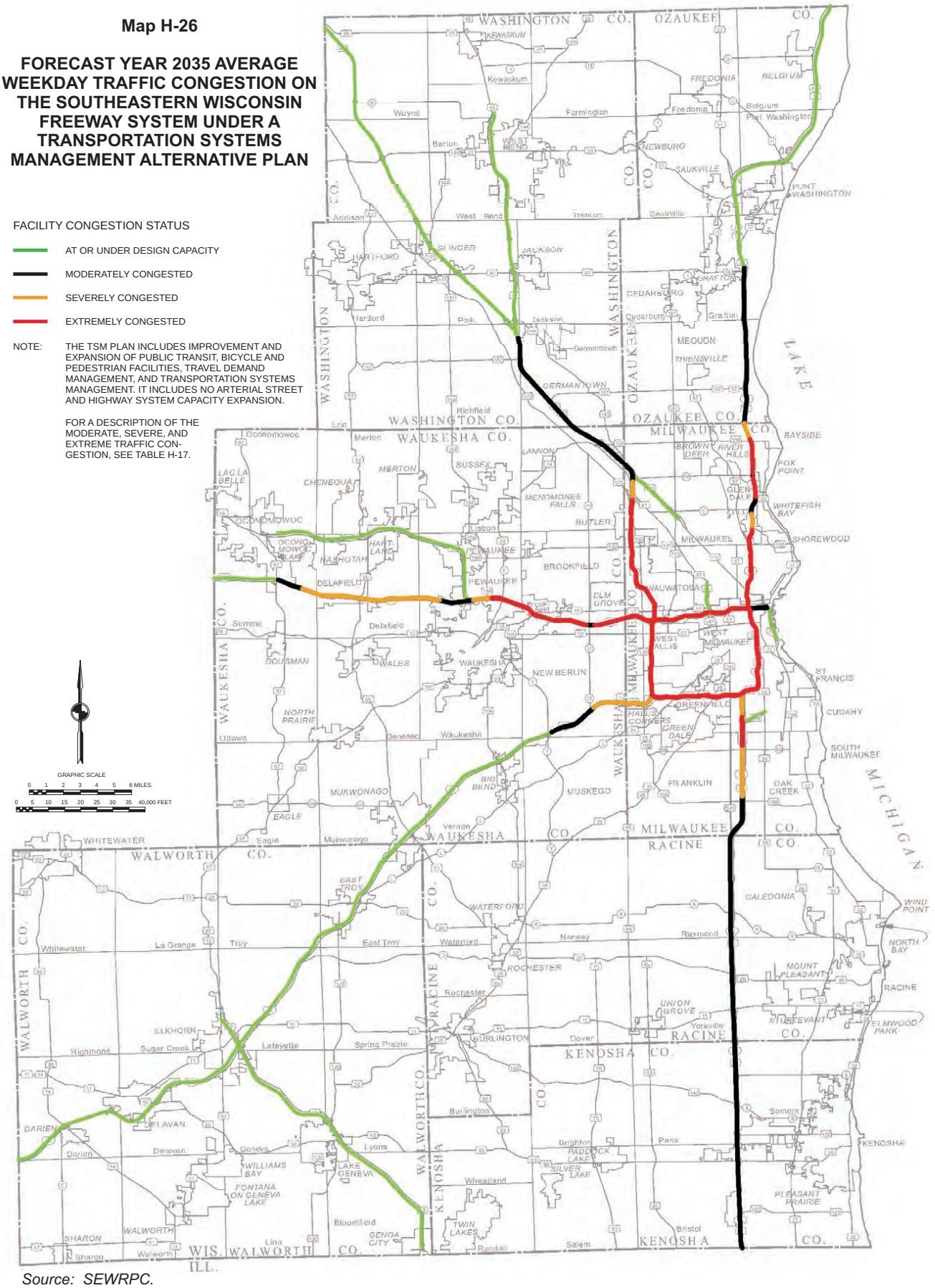
CONGESTION ON THE SOUTHEASTERN WISCONSIN FREEWAY SYSTEM: 2001



Source: SEWRPC.

Map H-26

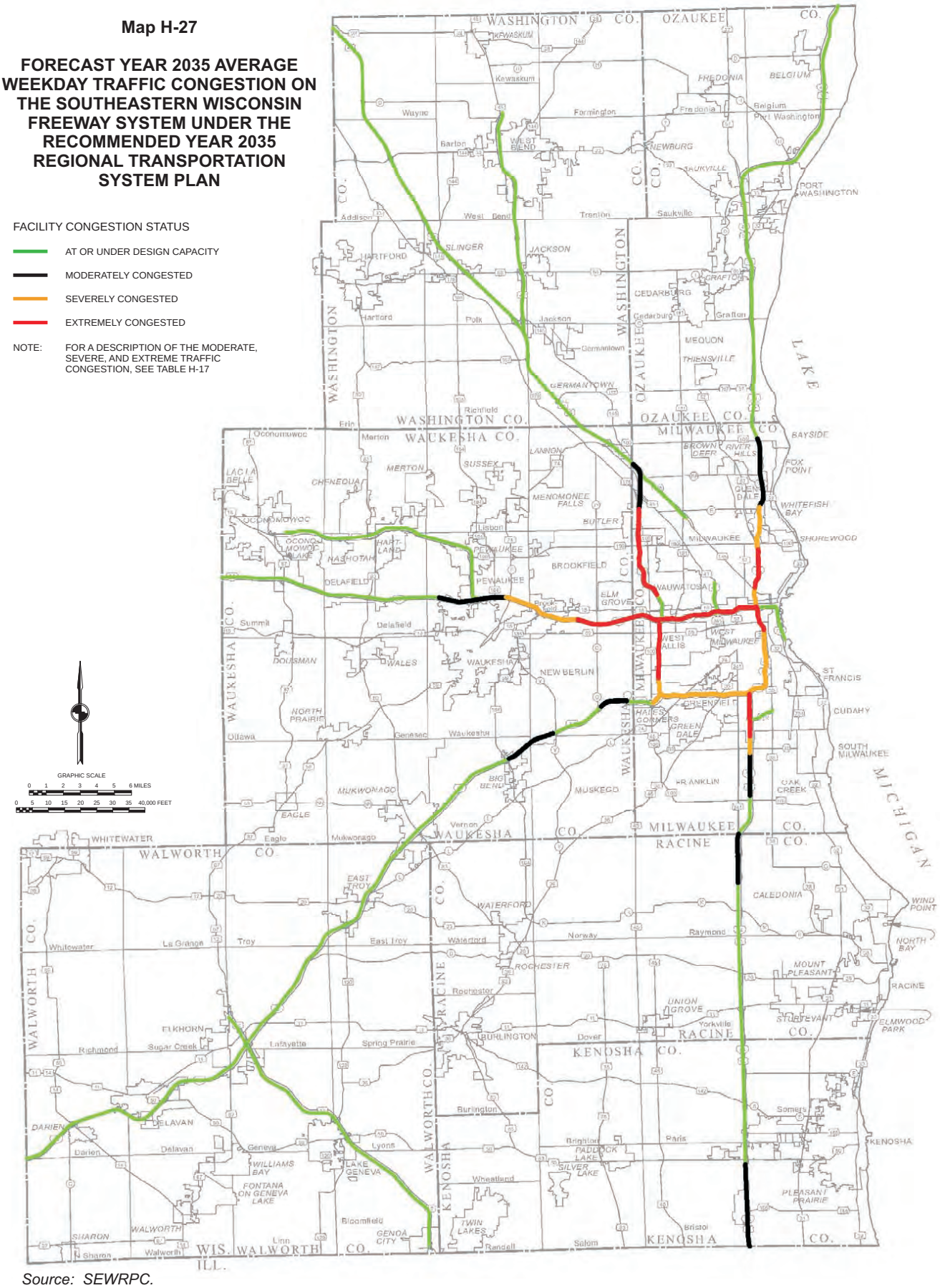
FORECAST YEAR 2035 AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE SOUTHEASTERN WISCONSIN FREEWAY SYSTEM UNDER A TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE PLAN



Source: SEWRPC.

Map H-27

FORECAST YEAR 2035 AVERAGE WEEKDAY TRAFFIC CONGESTION ON THE SOUTHEASTERN WISCONSIN FREEWAY SYSTEM UNDER THE RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



Source: SEWRPC.

Table H-17

SOUTHEASTERN WISCONSIN FREEWAY SYSTEM TRAFFIC CONGESTION ON AN AVERAGE WEEKDAY: YEAR 2001, YEAR 2035 ALTERNATIVE TRANSPORTATION SYSTEM MANAGEMENT (TSM) PLAN, AND RECOMMENDED YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN[a,b]

ESTIMATED EXISTING YEAR 2001

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
	24.4	9.0	1.4	3.3	4.4	9.1
Severe	19.8	7.3	--	1.5	2.5	4.0
Moderate	20.8	7.8	--	--	2.2	2.2
Total	65.0	24.1	--	--	--	--

FORECAST YEAR 2035 UNDER TSM PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	47.0	17.5	1.5	3.6	4.7	9.8
Severe	21.4	8.0	--	1.4	2.6	4.0
Moderate	56.4	21.0	--	--	1.7	1.7
Total	124.8	46.5	--	--	--	--

FORECAST YEAR 2035 UNDER RECOMMENDED PLAN

Highest Level of Hourly Congestion Experienced	Miles of Congested Freeways		Average Hours of Congestion on an Average Weekday			
	Number	Percent of Freeway System	Extreme	Severe	Moderate	Total
Extreme	19.8	6.9	1.1	2.5	3.5	7.1
Severe	21.3	7.4	--	1.5	2.5	4.0
Moderate	25.7	9.0	--	--	1.9	1.9
Total	66.8	23.3	--	--	--	--

[a]*The TSM Plan includes improvement and expansion of public transit, bicycle and pedestrian facilities, travel demand management, and transportation systems management. It includes no arterial and street and highway system capacity expansion. The recommended plan includes the TSM plan plus 431 miles of arterial street and highway system capacity expansion.*

[b]*Congestion on freeways may be summarized by the following operating conditions:*

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes.
None	C	Freeway free-flow speed	Some restrictions on ability to maneuver and change lanes.
Moderate	D	1 to 2 mph below free-flow speed	Substantial restrictions on ability to maneuver and change lanes.
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing.
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic.

Source: SEWRPC.

residential areas. Express routes would be higher speed than local routes as express stops would typically be spaced about one-quarter mile apart. Service would be provided at attractive frequencies of service throughout the day and evening. It is envisioned that this system of limited-stop express service routes would initially consist of buses operating over arterial streets in mixed traffic, and would be upgraded over time to buses operating on reserved street lanes with priority treatment at traffic signals. No express transit service existed in the Region in 2005. As proposed, about 17,000 vehicle-miles of express service would be operated on an average weekday in the Region in the year 2035.

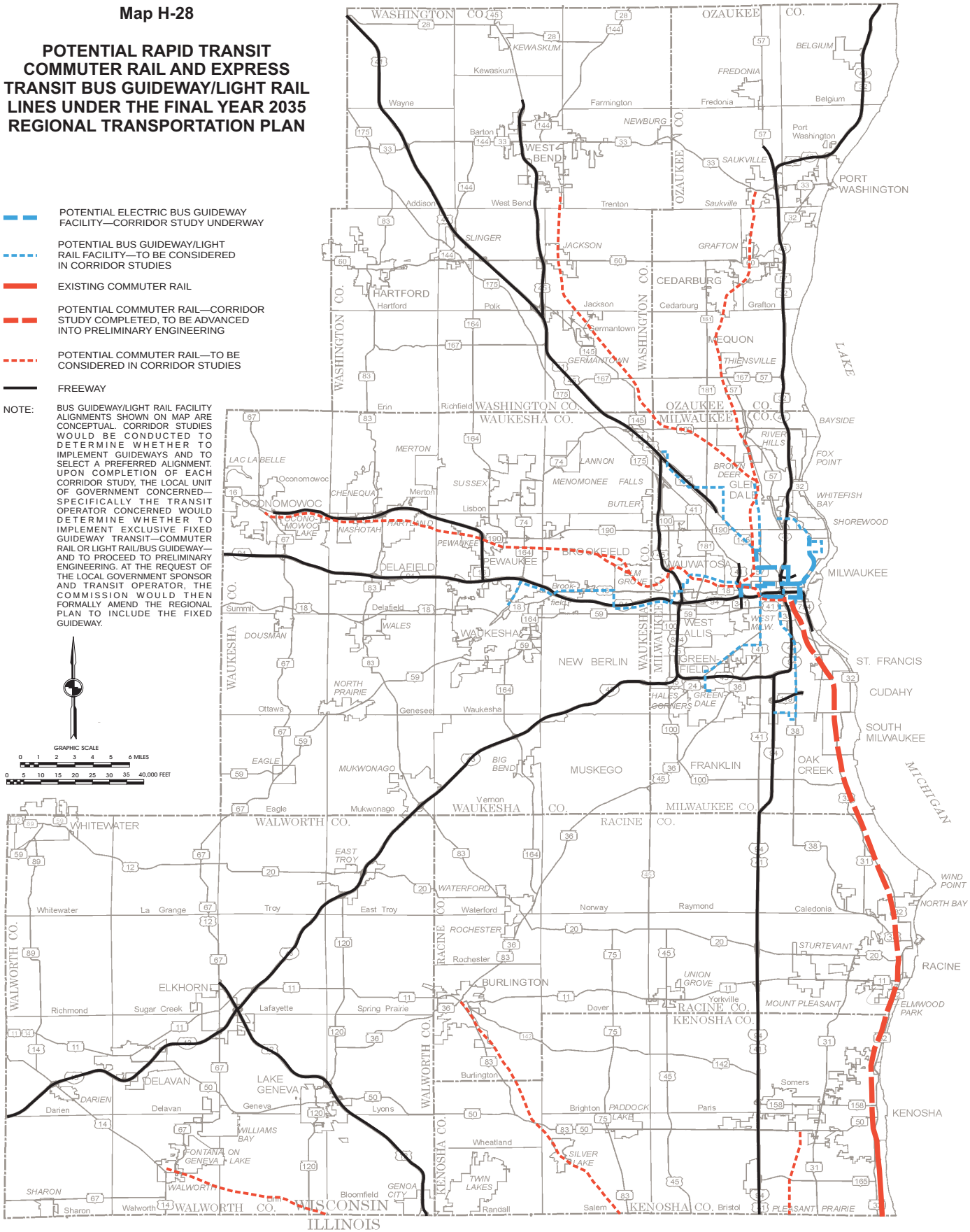
- Local Transit Service
  The plan also recommends the expansion of local transit service of about 59 percent from the 61,100 vehicle-miles of local bus service provided in 2005 on an average weekday to 97,000 vehicle-miles in the plan design year 2035. Service improvements and expansion proposed include expansion of service area and hours, and substantial improvements in the frequency of local transit provided, particularly on major local routes.

- Paratransit Service
  Paratransit service is proposed to be provided consistent with the Federal Americans with Disabilities Act (ADA) of 1990. Under the provisions of this Act, all transit vehicles that provide conventional fixed-route transit service must be accessible to persons with disabilities, including those persons using wheelchairs. All public entities operating fixed-route transit systems must also continue to provide paratransit service to those disabled persons within local transit service areas who are unable to use fixed-route transit services consistent with federally specified eligibility and service requirements. The complementary paratransit services must serve any person with a permanent or temporary disability who is unable independently to board, ride, or disembark from an accessible vehicle used to provide fixed-route transit service; who is capable of using an accessible vehicle, but one is not available for the desired trip; or who is unable to travel to or from the boarding or disembarking location of the fixed-route transit service. The planned paratransit service must be available during the same hours and on the same days as the fixed-route transit service, be provided to eligible persons on a “next day” trip-reservations basis, and not limit service to eligible persons based on restrictions or priorities to trip purpose, and not be operated under capacity constraints which might limit the ability of eligible persons to receive service for a particular trip. The paratransit service fares must be no more than twice the applicable public transit fare per one-way trip for curb-to-curb service.

- Upgrading to Rail or Bus Guideway Transit
  Rapid and express transit service is proposed to initially be provided with buses. This bus service would ultimately be upgraded to commuter rail for rapid transit service and to bus guideway or light rail for express transit service. Map H-28 displays potential future commuter rail lines and potential future bus guideway/light rail lines within southeastern Wisconsin. Local governments, which are the sponsors and operators of transit systems, would determine whether to upgrade to commuter rail for rapid transit service, and to bus guideway/light rail for express transit service by conducting in each of the four potential commuter rail corridors and six potential bus guideway/light rail corridors detailed corridor transit alternative analysis studies. Such studies are required by the U.S. Department of Transportation, Federal Transit Administration for potential guideway development to be eligible for Federal funding. At the conclusion of the corridor studies, decisions would be made by the concerned local government sponsors whether to provide rapid transit service through buses operating over existing freeways or through commuter rail, and whether to provide express transit service through buses operating over reserved lanes on surface arterials, exclusive bus guideways, or light rail. If a local government sponsor does determine to implement exclusive fixed guideway transit commuter rail or light rail/bus guideway and proceeds to preliminary engineering, the Commission would formally amend the regional plan to include the fixed guideway at the request of the local governmental sponsor.

Map H-28

POTENTIAL RAPID TRANSIT COMMUTER RAIL AND EXPRESS TRANSIT BUS GUIDEWAY/LIGHT RAIL LINES UNDER THE FINAL YEAR 2035 REGIONAL TRANSPORTATION PLAN



Source: SEWRPC.

There are two efforts currently underway in southeastern Wisconsin considering upgrading to fixed guideway transit. Milwaukee County in cooperation with the City of Milwaukee and Wisconsin Center District is conducting the Milwaukee downtown connector study which is considering implementation of express transit electric bus guideway technology and buses operating in reserved street lanes. Rapid transit commuter rail in the Milwaukee-Racine-Kenosha corridor was recommended for implementation at the conclusion of a corridor transit alternatives analysis study. The Counties and cities of Milwaukee, Racine, and Kenosha are currently conducting further study addressing funding and refinement of the proposed commuter rail extension. The 2005-2007 State budget included legislation creating a three County regional transit authority for Kenosha, Milwaukee, and Racine Counties, which would be the operator or the proposed commuter rail service.

Potential Benefits

The public transit recommendations of the regional transportation plan would, in particular, serve minority and low-income populations within Southeastern Wisconsin. As shown in Table H-18, low-income households and a number of minority populations are particularly dependent upon public transit, as a significant proportion of those populations have no private vehicle available for travel. Driver's license data indicate a similar conclusion. Only about 68 percent of Milwaukee County Black/African American households indicate they have an automobile available for travel, and only an estimated 60 percent of Black/African American adults have a driver's license. Only about 80 percent of Milwaukee County Hispanic households indicate they have an automobile available for travel, and only an estimated 50 percent of Hispanic adults have a driver's license. As shown on Maps H-29 through H-35, the transit service recommendations of the plan would be particularly directed to serving minority and low-income populations.

As shown on Map H-36, those areas of the Region with the highest job densities would be directly served by the recommended public transit plan. Map H-37 shows that almost all of the major economic activity centers in the Region, which are defined as those areas containing a concentration of commercial and/or industrial land having at least 3,500 total jobs or 2,000 retail jobs, would be served by the public transit recommendations of the regional transportation plan. Thus, the transit element of the regional transportation plan would in particular connect minority and low-income populations with jobs. Also, the public transit recommendations of the regional transportation plan are directed towards improving transit service in central Milwaukee County and those areas with minority and low-income populations.

- Rapid Transit Service

  The existing bus rapid transit routes serving central Milwaukee County typically operate only during the peak periods in the peak direction with headways ranging from 10 to 30 minutes. The public transit recommendations of the year 2035 regional transportation plan include bus rapid transit routes providing service in both directions during all periods of the day. Thus, the recommended rapid transit would provide better connectivity between central Milwaukee County residents, including minority and low-income populations, and employment and other opportunities in the outlying communities within the Region.

- Express Transit Service

  Currently, there is no express bus transit service provided in the Region. The recommended transit plan includes 17,000 revenue vehicle-hours of express transit service operating in both directions during all periods of the day and evening with service frequencies of about 10 minutes during the peak periods, and about 20 to 30 minutes during weekday off-peak periods and on weekends. Thus, the recommended express transit would provide better connectivity between central Milwaukee County residents, including minority and low-income populations, and employment and other opportunities within Milwaukee and Waukesha Counties.

Table H-18

HOUSEHOLDS BY NUMBER OF VEHICLES AVAILABLE AND RACE OF HOUSEHOLDER: 2000

KENOSHA COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	56,057	2,249	4.0	475	1,774	21.1
American Indian and Alaskan Native Households	56,057	587	1.0	65	522	11.1
Asian and Pacific Islander Households	56,057	446	0.8	42	404	9.4
Other Minority Households	56,057	1,392	2.5	177	1,215	12.7
Hispanic Households	56,057	2,541	4.5	227	2,314	8.9
Total Minority Households[a]	56,057	5,763	10.3	793	4,970	13.8

Note: Of the 56,057 households in Kenosha County, 3,824 of those households, or 6.8 percent, have no private vehicle available for travel.

MILWAUKEE COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	377,729	79,494	21.0	25,093	54,401	31.6
American Indian and Alaskan Native Households	377,729	4,432	1.2	877	3,555	19.8
Asian and Pacific Islander Households	377,729	7,419	2.0	1,033	6,386	13.9
Other Minority Households	377,729	12,648	3.3	2,618	10,030	20.7
Hispanic Households	377,729	21,507	5.7	4,257	17,250	19.8
Total Minority Households[a]	377,729	111,711	29.6	30,926	80,785	27.7

Note: Of the 377,729 households in Milwaukee County, 61,631 of those households, or 16.3 percent, have no private vehicle available for travel.

OZAUKEE COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	30,857	224	0.7	29	195	12.9
American Indian and Alaskan Native Households	30,857	160	0.5	0	160	0.0
Asian and Pacific Islander Households	30,857	218	0.7	8	210	3.7
Other Minority Households	30,857	157	0.5	14	143	8.9
Hispanic Households	30,857	314	1.0	21	293	6.7
Total Minority Households[a]	30,857	926	3.0	58	868	6.3

Note: Of the 30,857 households in Ozaukee County, 1,039 of those households, or 3.4 percent, have no private vehicle available for travel.

RACINE COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	70,819	6,502	9.2	1,658	4,844	25.5
American Indian and Alaskan Native Households	70,819	401	0.6	42	359	10.5
Asian and Pacific Islander Households	70,819	430	0.6	35	395	8.1
Other Minority Households	70,819	2,121	3.0	286	1,835	13.5
Hispanic Households	70,819	3,744	5.3	455	3,289	12.2
Total Minority Households[a]	70,819	10,858	15.3	2,163	8,695	19.9

Note: Of the 70,819 households in Racine County, 5,759 of those households, or 8.1 percent, have no private vehicle available for travel.

Table H-18 (continued)

WALWORTH COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	34,522	235	0.7	24	211	10.2
American Indian and Alaskan Native Households	34,522	172	0.5	15	157	8.7
Asian and Pacific Islander Households	34,522	233	0.7	23	210	9.9
Other Minority Households	34,522	685	2.0	41	644	6.0
Hispanic Households	34,522	1,329	3.8	86	1,243	6.5
Total Minority Households[a]	34,522	1,912	5.5	137	1,775	7.2

Note: Of the 34,522 households in Walworth County, 1,663 of those households, or 4.8 percent, have no private vehicle available for travel.

WASHINGTON COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	43,842	172	0.4	2	170	1.2
American Indian and Alaskan Native Households	43,842	182	0.4	9	173	4.9
Asian and Pacific Islander Households	43,842	150	0.3	14	136	9.3
Other Minority Households	43,842	159	0.4	0	159	0.0
Hispanic Households	43,842	336	0.8	7	329	2.1
Total Minority Households[a]	43,842	843	1.9	32	811	3.8

Note: Of the 43,842 households in Washington County, 1,720 of those households, or 3.9 percent, have no private vehicle available for travel.

WAUKESHA COUNTY

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	135,229	756	0.6	98	658	13.0
American Indian and Alaskan Native Households	135,229	679	0.5	25	654	3.7
Asian and Pacific Islander Households	135,229	1,707	1.3	54	1,653	3.2
Other Minority Households	135,229	1,025	0.8	113	912	11.0
Hispanic Households	135,229	2,367	1.8	178	2,189	7.5
Total Minority Households[a]	135,229	5,518	4.1	386	5,132	7.0

Note: Of the 135,229 households in Waukesha County, 5,689 of those households, or 4.2 percent, have no private vehicle available for travel.

REGION

Minority Group	Total and Minority Households			Minority Group Household Vehicle Availability		
	Total Households	Minority Group Households	Percent of Total Households that is Minority Group Households	No Vehicle Available	One or More Vehicles Available	Percent with No Vehicle Available
Black/ African American Households	749,055	89,632	12.0	27,379	62,253	30.5
American Indian and Alaskan Native Households	749,055	6,613	0.9	1,033	5,580	15.6
Asian and Pacific Islander Households	749,055	10,603	1.4	1,209	9,394	11.4
Other Minority Households	749,055	18,187	2.4	3,249	14,938	17.9
Hispanic Households	749,055	32,138	4.3	5,231	26,907	16.3
Total Minority Households[a]	749,055	137,531	18.4	34,495	103,036	25.1

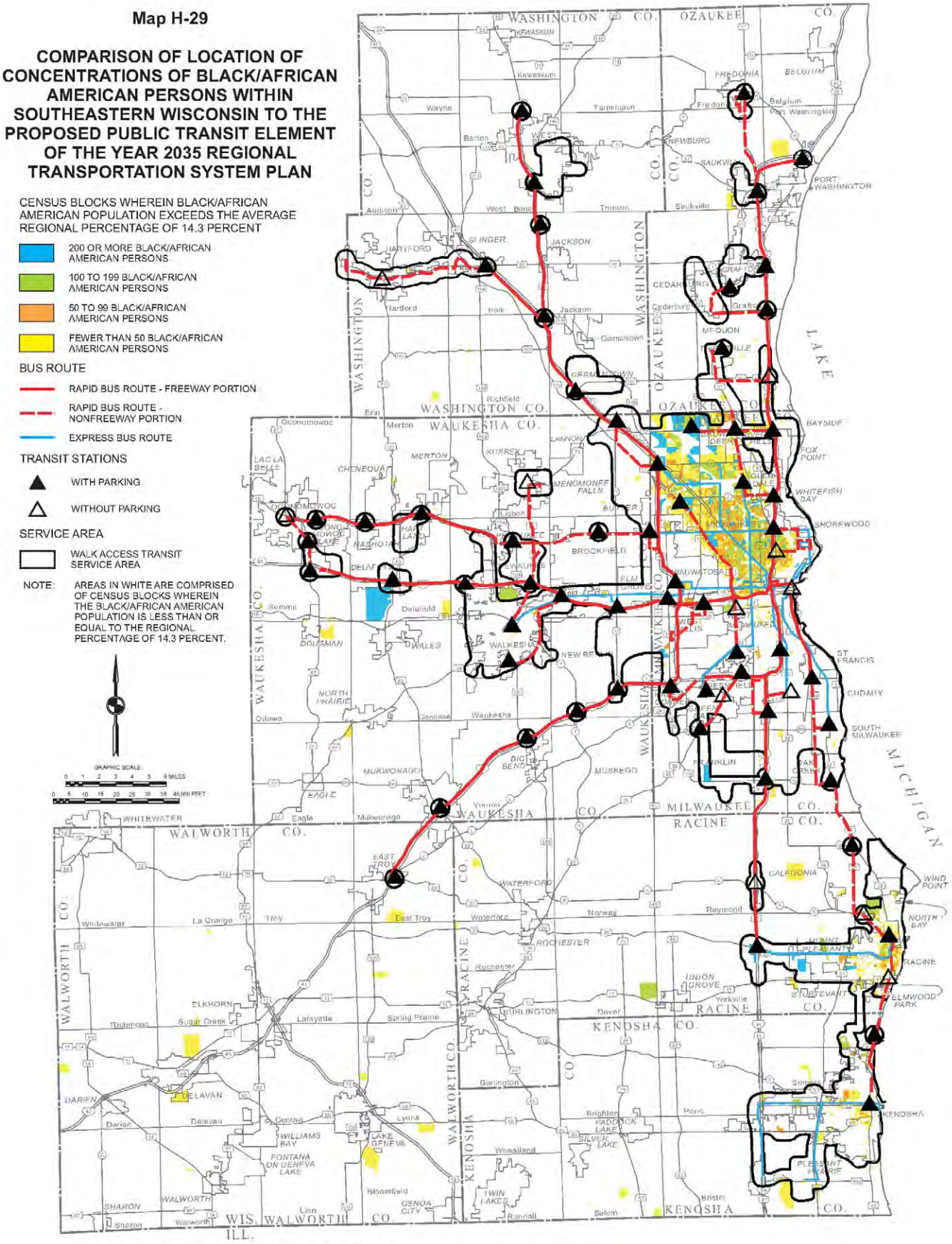
Note: Of the 749,055 households in the Region, 81,325 of those households, or 10.9 percent, have no private vehicle available for travel.

[a]*As part of the 2000 Federal Census, individuals could be reported as being of more than one race. The figures in this table indicate the number of households reported as being of a given race (as indicated by the row heading), including those who were reported as that race exclusively and those who were reported as that race and one or more other races. Accordingly, the minority group figures sum to more than the total minority households for each area.*

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

Map H-29

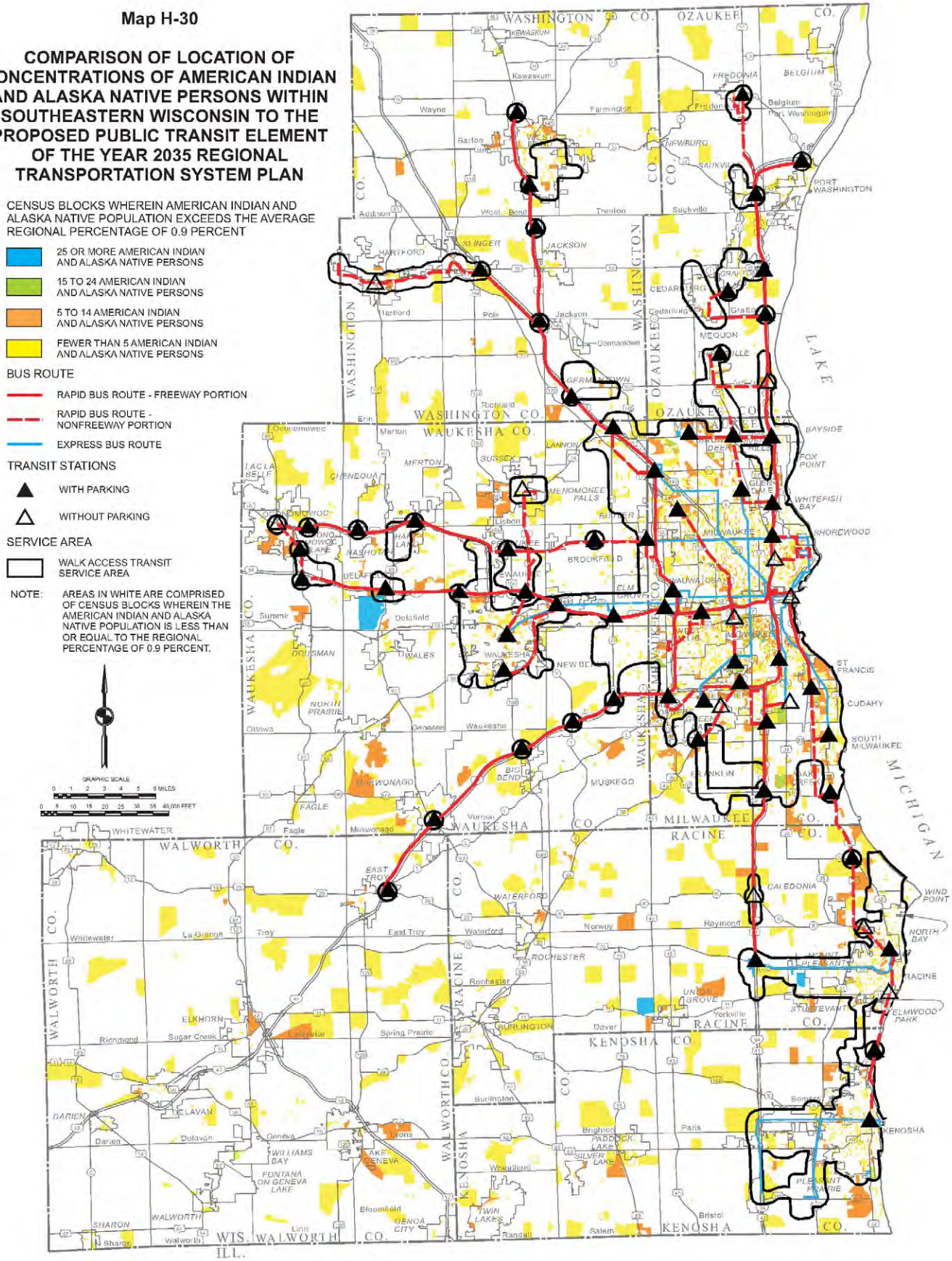
COMPARISON OF LOCATION OF CONCENTRATIONS OF BLACK/AFRICAN AMERICAN PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-30

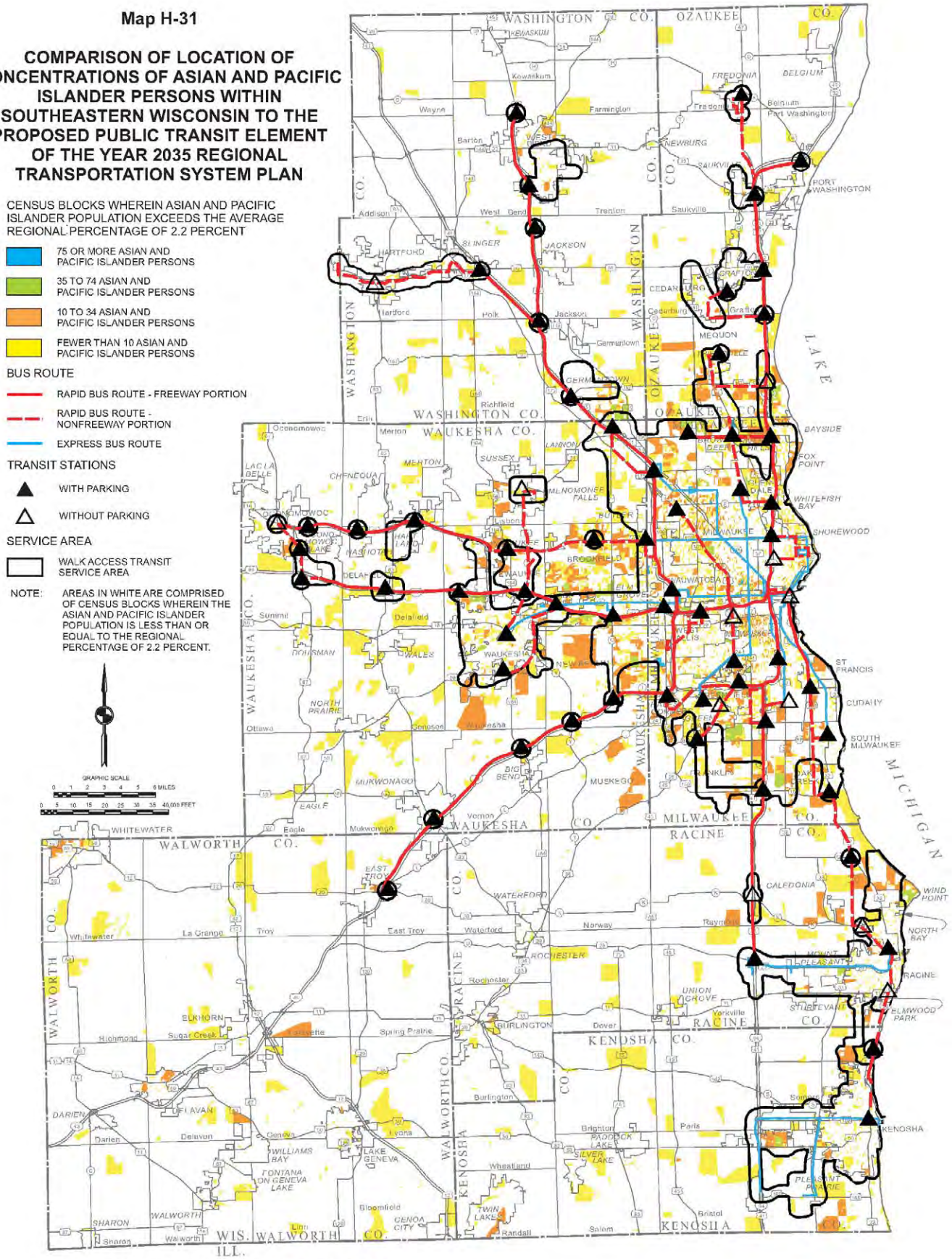
COMPARISON OF LOCATION OF CONCENTRATIONS OF AMERICAN INDIAN AND ALASKA NATIVE PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-31

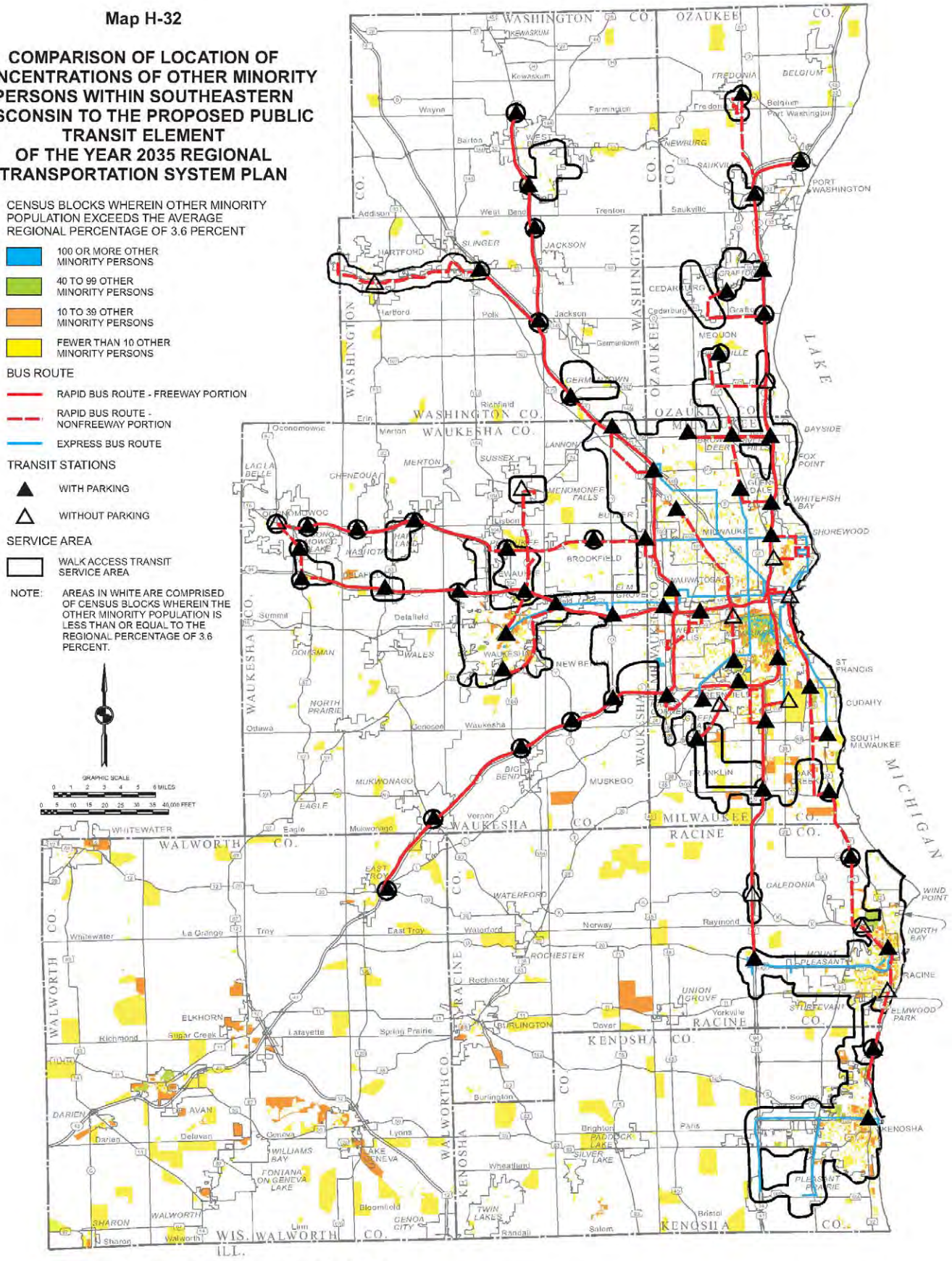
COMPARISON OF LOCATION OF CONCENTRATIONS OF ASIAN AND PACIFIC ISLANDER PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-32

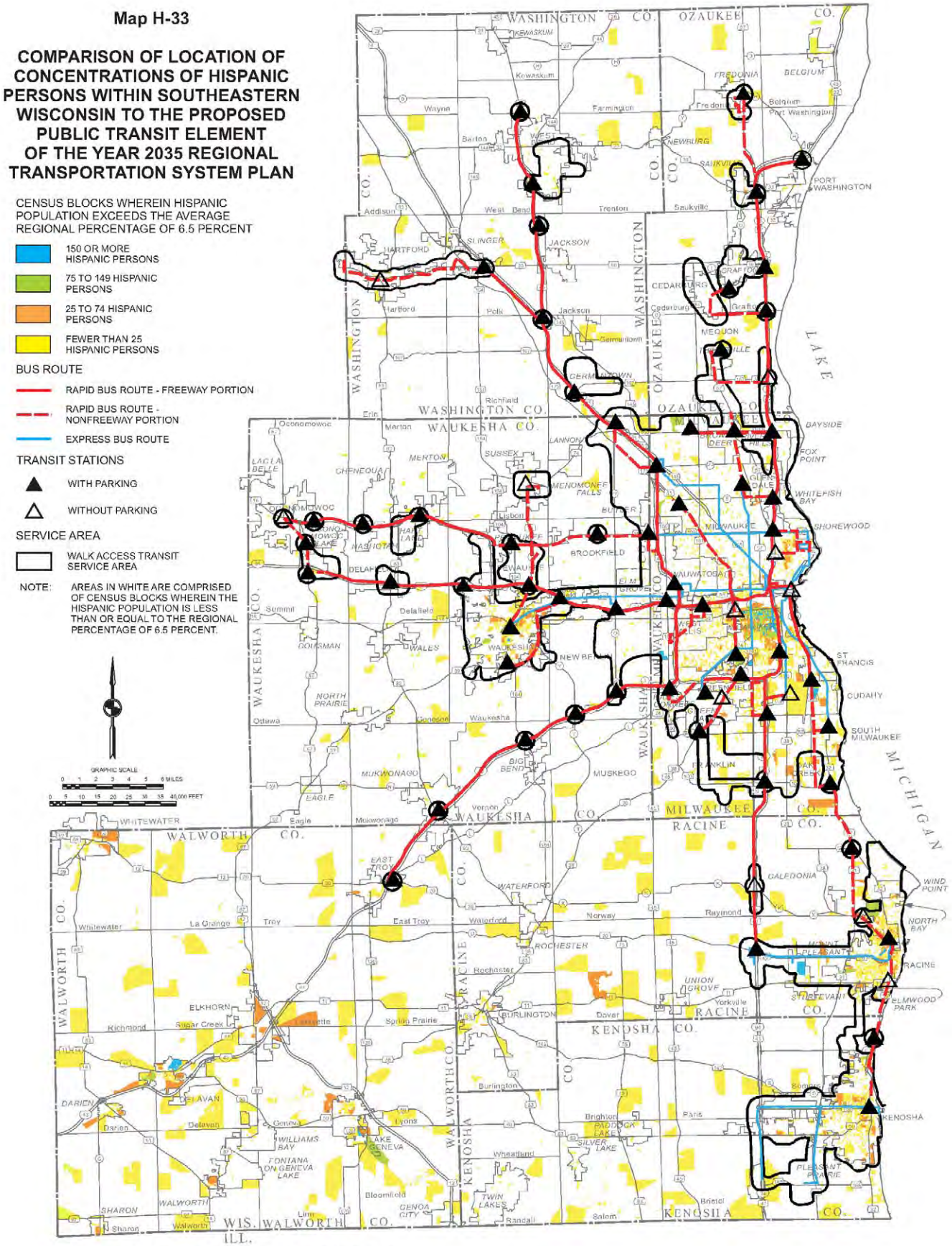
COMPARISON OF LOCATION OF CONCENTRATIONS OF OTHER MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-33

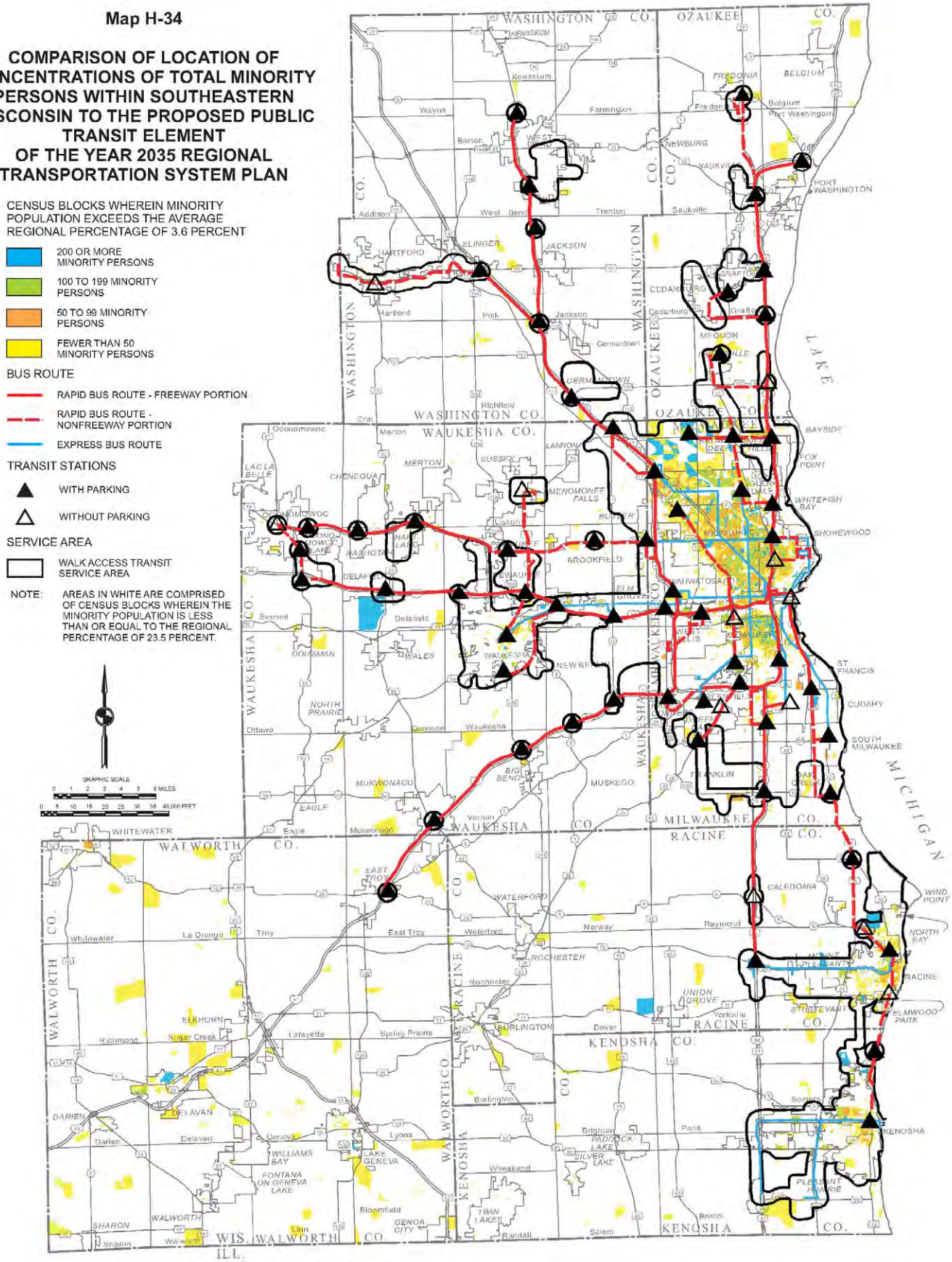
COMPARISON OF LOCATION OF CONCENTRATIONS OF HISPANIC PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-34

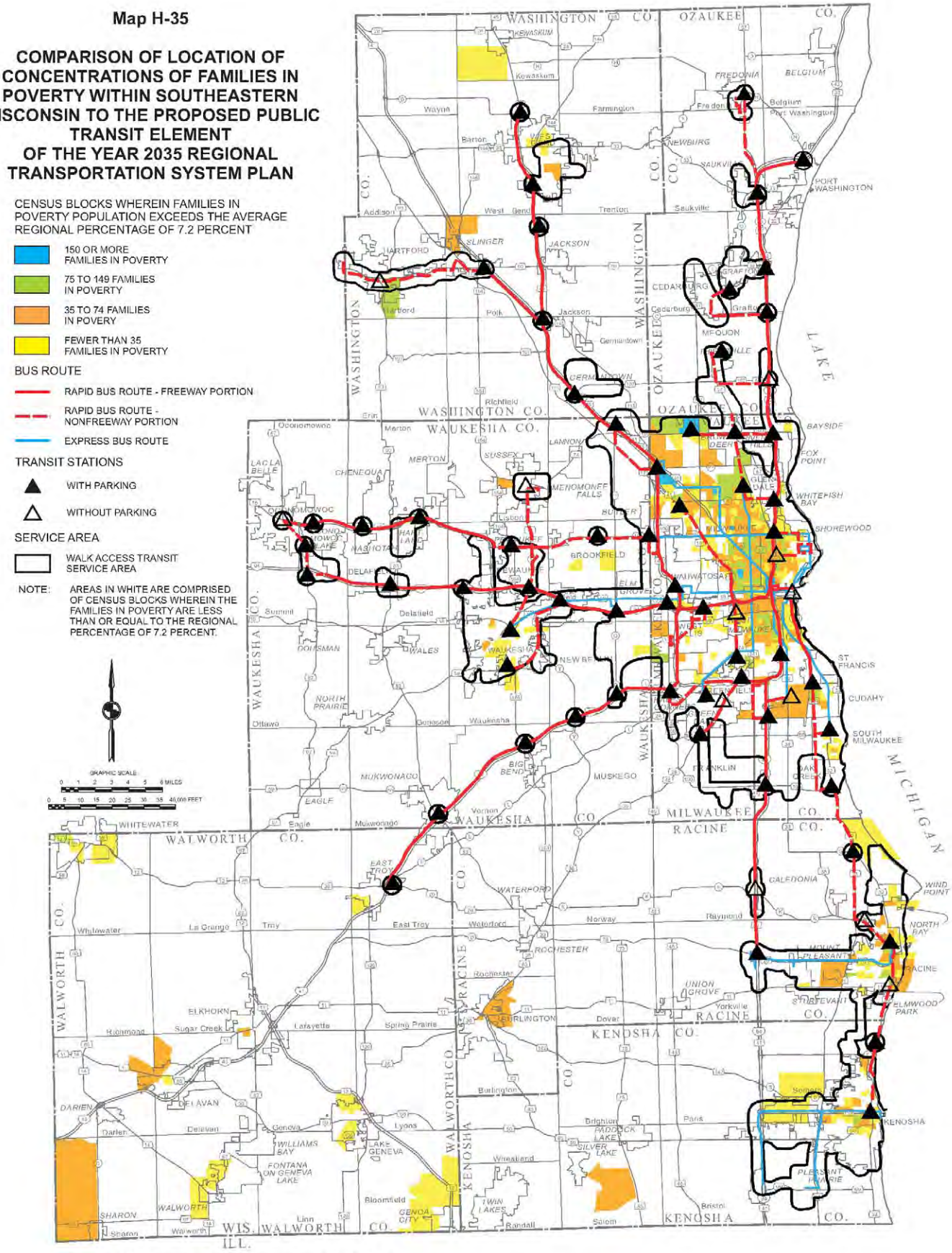
COMPARISON OF LOCATION OF CONCENTRATIONS OF TOTAL MINORITY PERSONS WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-35

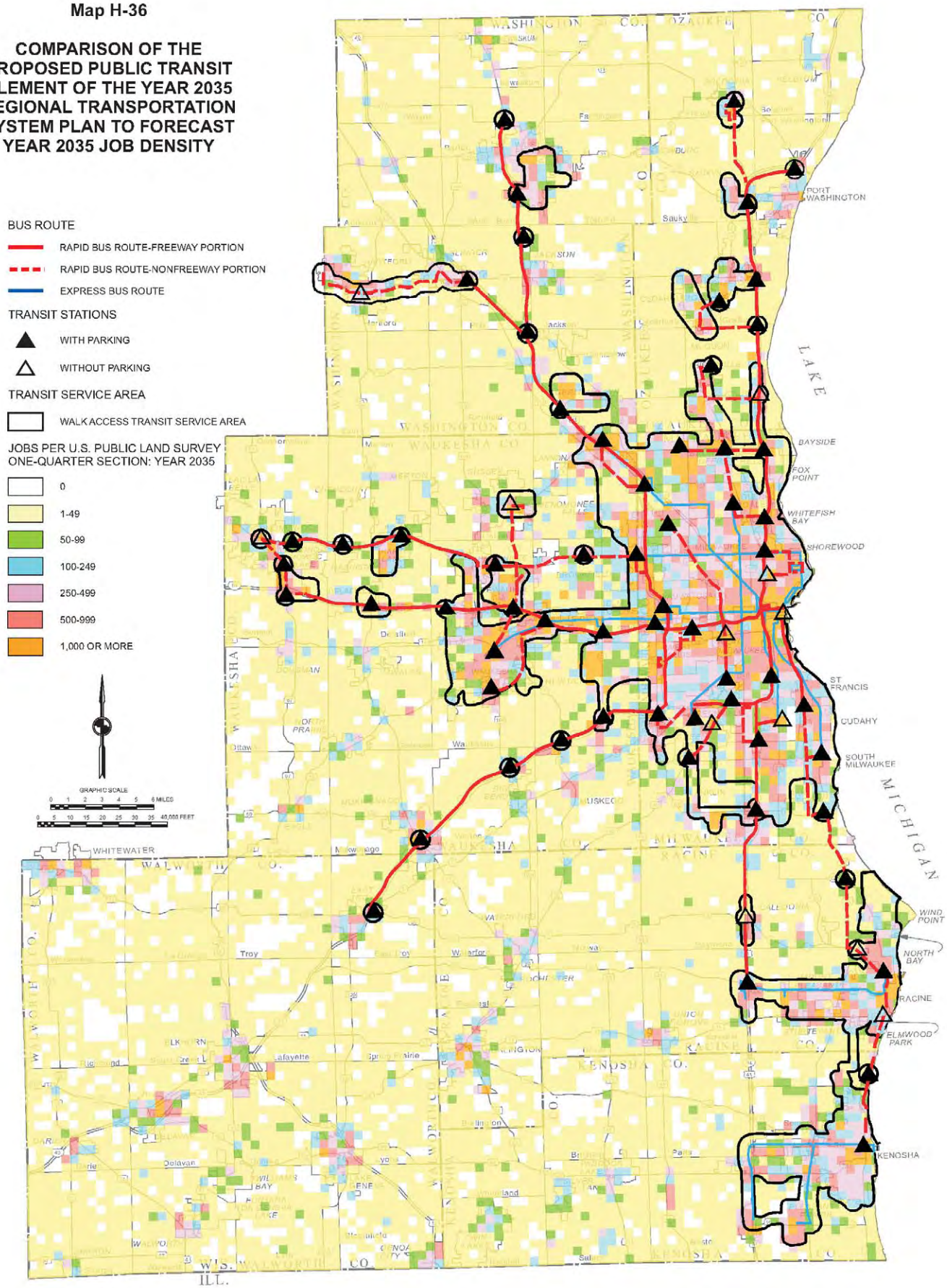
COMPARISON OF LOCATION OF CONCENTRATIONS OF FAMILIES IN POVERTY WITHIN SOUTHEASTERN WISCONSIN TO THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN



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

Map H-36

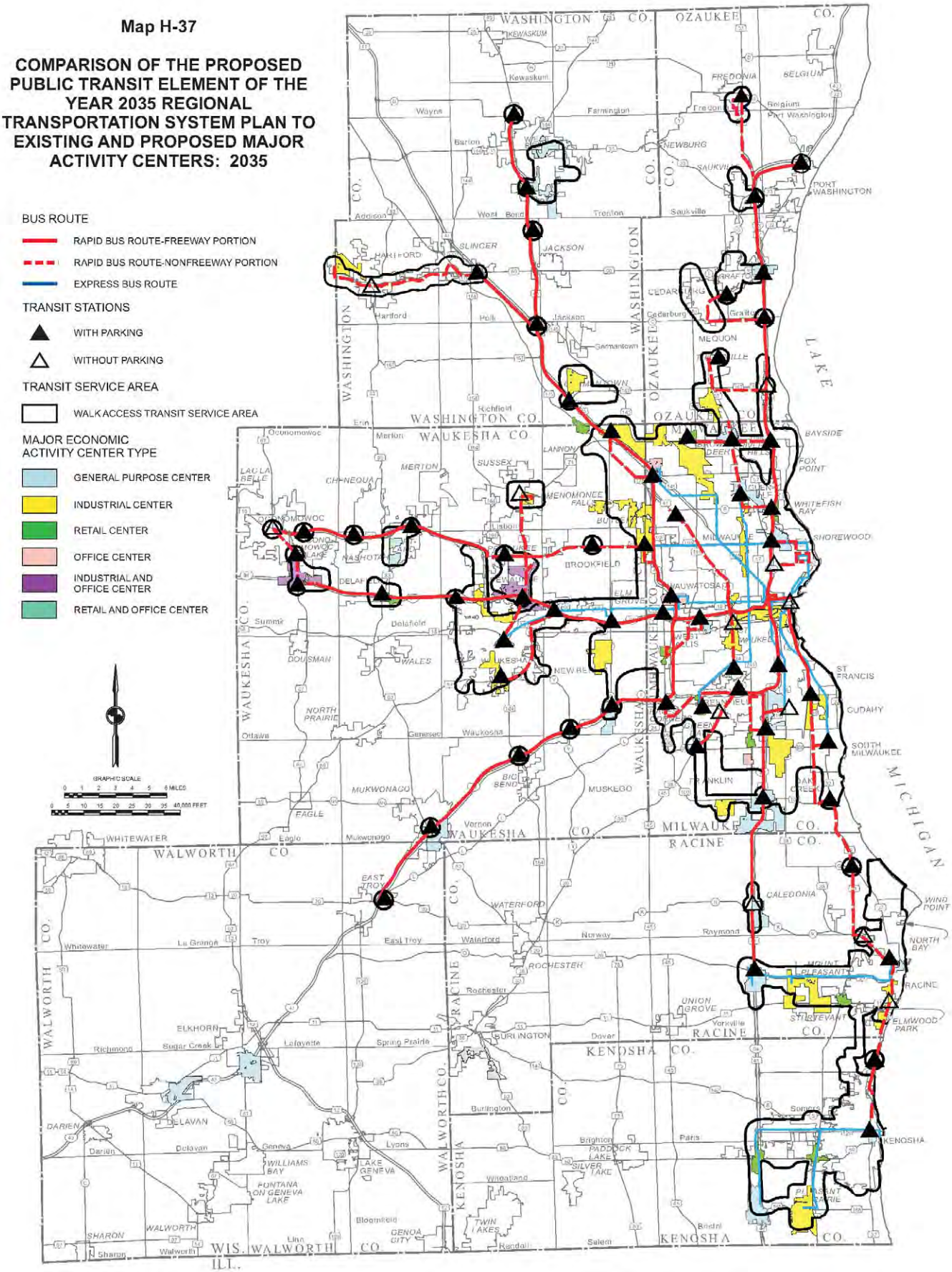
COMPARISON OF THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN TO FORECAST YEAR 2035 JOB DENSITY



Source: SEWRPC.

Map H-37

COMPARISON OF THE PROPOSED PUBLIC TRANSIT ELEMENT OF THE YEAR 2035 REGIONAL TRANSPORTATION SYSTEM PLAN TO EXISTING AND PROPOSED MAJOR ACTIVITY CENTERS: 2035



Source: SEWRPC.

- Local Transit Service
  The existing local transit service serving central Milwaukee County generally provides service frequencies between 5 and 20 minutes during peak periods, between 10 and 30 minutes during the midday period, and between 15 and 30 minutes during the evening period prior to 10:00 p.m. and on weekends. The recommended local transit service would improve the frequency of service for those central Milwaukee County residents, including minority and low-income populations, to 5 to 15 minutes during peak periods, 10 to 20 minutes during the midday period, and 15 to 20 minutes during the evening period and on weekends. The recommended local transit service also includes expansion of the existing transit service area.

Maps H-38 and H-39 measure the accessibility provided by public transit under the existing public transit system and the recommended public transit plan during peak and midday periods. As is shown on the maps, the preliminary recommended transit plan provides substantially better accessibility during peak and midday periods for central Milwaukee County residents, including minority and low-income populations, than does the existing system. Moreover, a comparison of the improvements in accessibility under the transit element of the plan (see Maps H-38 and H-39) to the improvements in accessibility under the highway element of the plan (see Map H-24) clearly indicates that the transit element of the plan may be expected to result in substantial increases in transit accessibility to jobs, and the highway element of the plan may be expected to result in only modest increases in highway accessibility to jobs.

Rapid transit service would be significantly expanded from a largely peak-period, peak direction, weekday service to an all day and evening, bi-direction, weekday and weekend service. The proposed express and local transit service would also be expanded to all day and evening, bi-direction, weekday and weekend service. Table H-19 illustrates the proposed expansion of transit service hours under the regional plan.

The transit element of the plan would provide a substantial increase in transit service and accessibility by expanding service coverage, expanding service hours, increasing service frequency, and reducing service travel time by expanding rapid and express transit service (See Maps H-40 through H-43). A doubling of transit service overall is recommended with rapid transit to more than triple and express transit to be initiated. Accessibility would be improved not only to hospitals, colleges and universities, recreational facilities, major passenger terminals, retail centers, and parks, but to most activity locations and centers including jobs and employment centers, medical offices and centers, and schools as shown in Maps H-44 through H-48.

The plan also includes a number of recommendations beyond service improvement and expansion to further enhance public transit service and ridership. These recommendations include provision of reserved surface street lanes for express bus routes, provision of bus bypass lanes at metered freeway on-ramps, provision of priority traffic signal systems for express and major local routes and the surface arterial portion of rapid transit routes, expansion of the regional network of park-ride lots from 49 to 74, development of a single website for all public transit information within southeastern Wisconsin, and the expansion of annual transit pass programs to additional colleges and universities and employers throughout the Region.

PLAN IMPLEMENTATION

All elements of the year 2035 regional transportation plan are considered to be of equal priority, and each element needs to be fully implemented to meet existing and forecast future year 2035 transportation needs and to provide a comprehensive, multi-modal, balanced, high quality transportation system in southeastern Wisconsin.

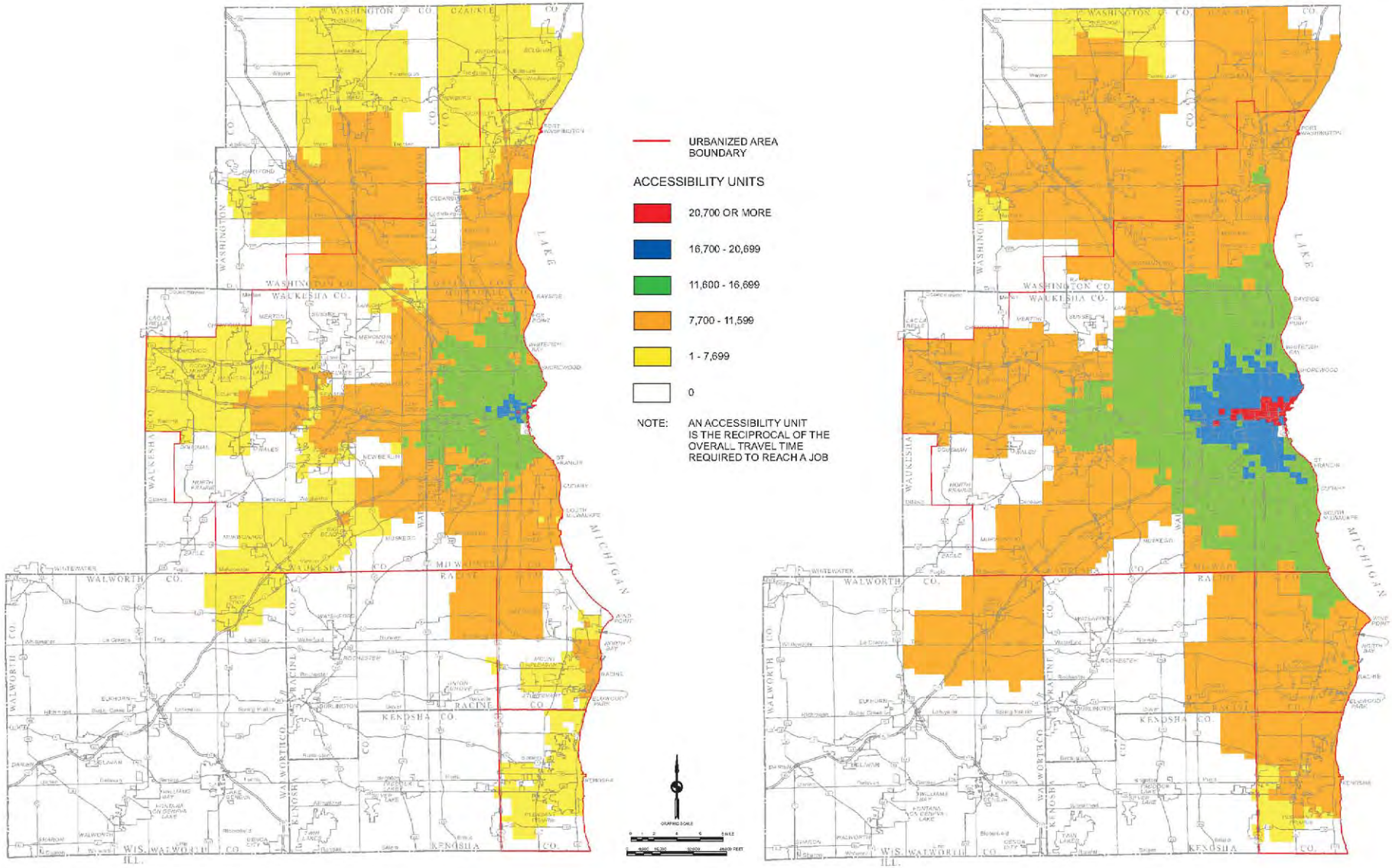
- Public Transit
- Bicycle and Pedestrian Facilities
- Transportation Systems Management
- Travel Demand Management
- Arterial Streets and Highways
  - Freeways
  - Surface Arterials

Map H-38

ACCESSIBILITY PROVIDED BY PUBLIC TRANSIT TO JOBS IN THE REGION DURING PEAK PERIODS OF THE DAY: EXISTING SYSTEM AND PROPOSED YEAR 2035 PUBLIC TRANSIT SYSTEM

EXISTING

PROPOSED YEAR 2035 PUBLIC TRANSIT SYSTEM



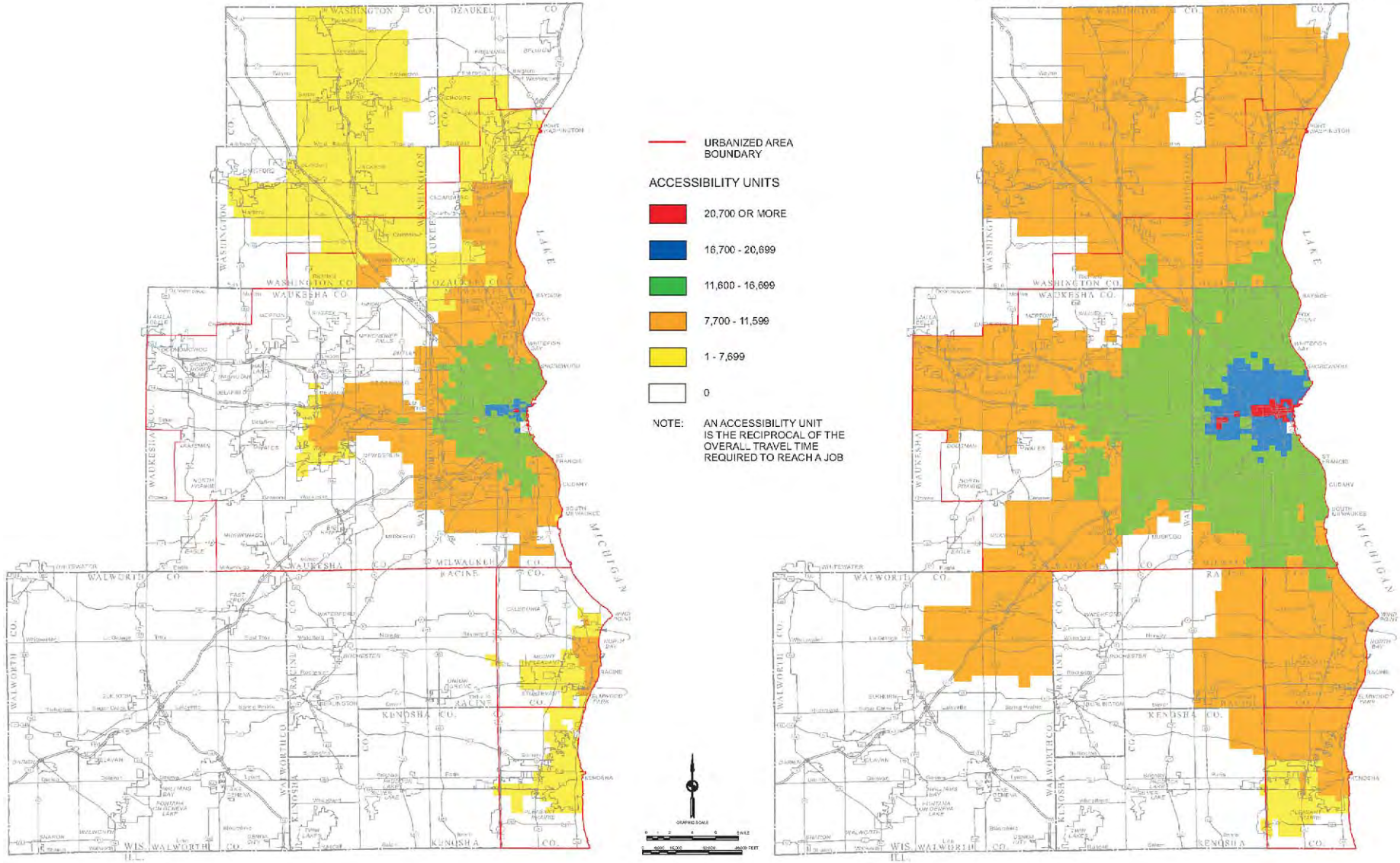
Source: SEWRPC.

Map H-39

ACCESSIBILITY PROVIDED BY PUBLIC TRANSIT TO JOBS IN THE REGION DURING MIDDAY PERIODS OF THE DAY: EXISTING SYSTEM AND PROPOSED YEAR 2035 PUBLIC TRANSIT SYSTEM

EXISTING

PROPOSED YEAR 2035 PUBLIC TRANSIT SYSTEM



Source: SEWRPC.

Table H-19

PROPOSED TRANSIT SERVICE HOURS AND FREQUENCY UNDER THE RECOMMENDED TRANSPORTATION PLAN: YEAR 2035

	Existing Year 2005		Recommended Plan	
Service Type	Service Hours	Service Headways	Service Hours	Service Headways
Rapid Transit Service				
Milwaukee County	Weekdays only 6:00 a.m.-8:30 a.m. 3:30 p.m.-6:00 p.m. (Peak direction service only)	15-30 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	10-30 minutes weekday peak period 30-60 minutes off-peak period and weekends
Waukesha County Waukesha	Weekdays Only 5:30 a.m.-8:30 p.m.	15-30 minutes peak period 60-90 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods
Oconomowoc, Mukwonago, Menomonee Falls	Weekdays Only Peak period and peak direction only service	30-40 minutes		60 minutes off-peak periods and weekends
Washington County	Weekdays Only Peak period and peak direction only service	30-40 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Ozaukee County	Weekdays Only 5:00 a.m.-11:00 p.m.	30-40 minutes peak periods 60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Kenosha-Racine- Milwaukee County	Weekdays Only 5:00 a.m.-10:00 p.m. Weekends 8:00 a.m.-10:00 p.m.	40 minutes peak periods 120 minutes off-peak periods Headways 60-120 minutes	Daily 6:00 a.m.-10:00 p.m. (both directions)	20-30 minutes weekday peak periods 60 minutes off-peak periods and weekends
Express Transit Service	None	- -	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-15 minutes peak periods 10-20 minutes off-peak periods 10-20 minutes
Local Transit Service				
Central Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-20 minutes peak periods 10-30 minutes midday 15-30 minutes evening 15-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	5-10 minutes peak periods 10-15 minutes midday 10-20 minutes evening 10-20 minutes
Outlying Milwaukee County	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	15-60 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes	Weekdays 5:00 a.m.-1:00 a.m. Weekends 5:00 a.m.-1:00 a.m.	10-30 minutes peak periods 20-60 minutes off-peak periods 20-60 minutes
Kenosha Area	Weekdays 6:00 a.m.-7:30 p.m.	30-40 minutes peak periods 40-60 minutes off-peak periods	Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday

Table H-19 (continued)

Service Type	Existing Year 2005		Recommended Plan	
	Service Hours	Service Headways	Service Hours	Service Headways
Local Transit Service (continued)				
Racine Area	Weekdays 5:30 a.m.-12:00 a.m. Saturdays 5:30 a.m.-10:00 p.m. Sundays 9:30 a.m.-7:00 p.m.	Weekdays 30-60 minutes peak periods 60 minutes off-peak periods Weekends 60 minutes	Daily 6:00 a.m.-10:00 p.m. Daily 6:00 a.m.-10:00 p.m.	Weekdays 15-30 minutes peak periods 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 60 minutes Sunday
Waukesha Area	Weekdays 5:30 a.m.-10:00 p.m Saturdays 8:00 a.m.-10:00 p.m. Sundays 9:00 a.m.-7:00 p.m.	Weekdays 35-70 minutes peak periods 30-60 minutes off-peak periods Weekends 30-60 minutes	Daily 6:00 a.m.-10:00 p.m.	Weekdays 20 minutes peak period 30 minutes midday 60 minutes evening Weekends 30-60 minutes Saturday 30-60 minutes Sunday

Source: SEWRPC.

The plan recommends about a 100 percent expansion of public transit and, with respect to arterial streets and highways, about a 12 percent expansion of capacity in terms of route-miles and 4 percent in terms of lane-miles. A review conducted as part of this year 2035 planning effort of the implementation to date of the previous year 2020 plan concluded that about 15 to 20 percent of the recommendations of each element of the plan had been implemented—public transit expansion, arterial street and highway capacity expansion, and off-street bicycle and pedestrian facilities.

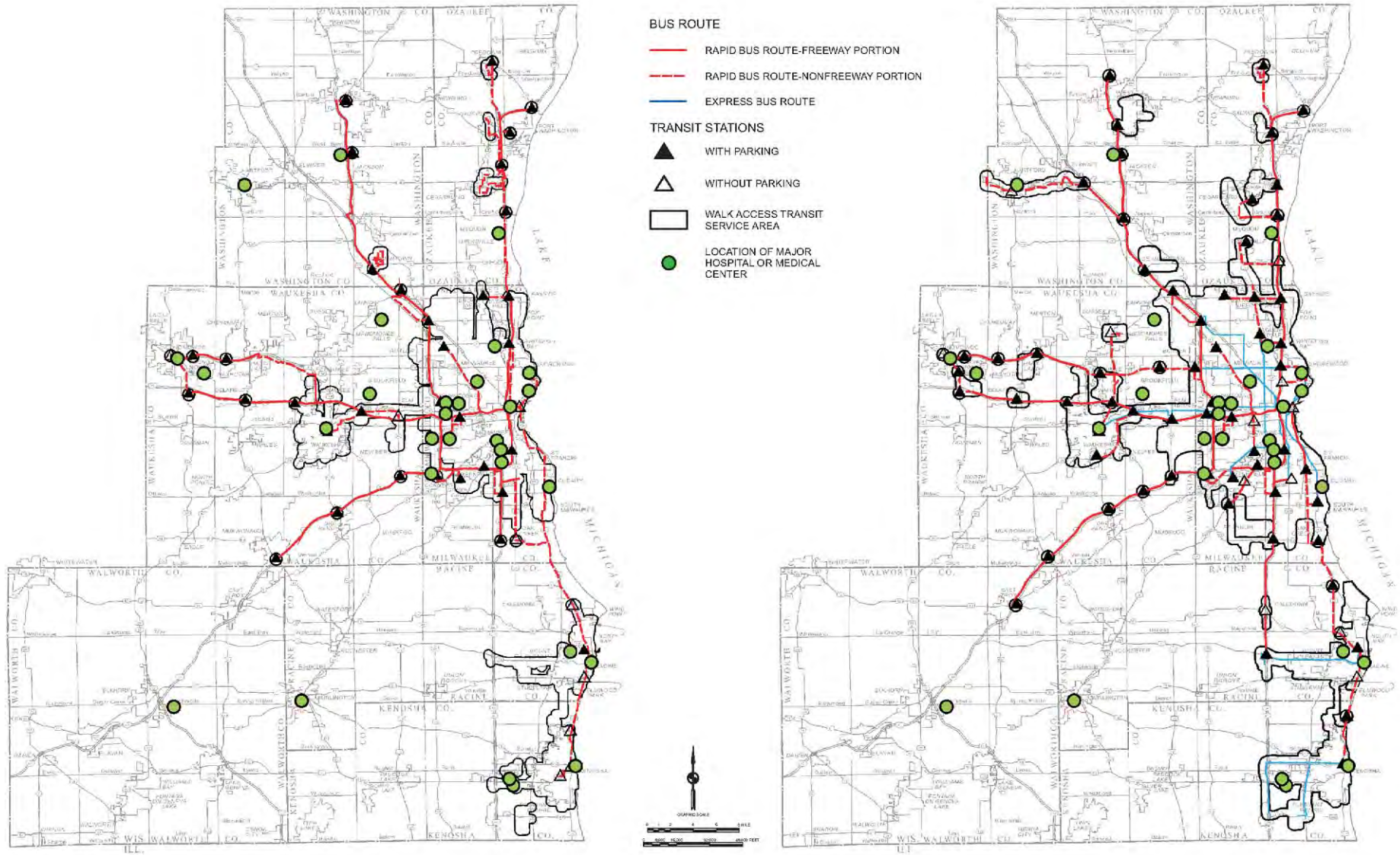
Looking over the past 30 years, significant progress has been made with respect to implementation of previous regional plan recommendations. With respect to public transit, the overall improvement and expansion achieved from 58,000 bus-miles of service in 1975 to 69,000 bus-miles of service in 2005 has been limited by reductions in service which have occurred during periods of economic downturns and recessions, specifically during the early 1980's and the early 2000's. For example, between 1987 and 2000, public transit bus-miles of service expanded from about 61,000 to 81,000 bus-miles of service, about 33 percent or about 2.3 percent annually. But with the economic downturn and attendant State and local budget problems since 2000, bus-miles of public transit service have declined by about 15 percent. To fully implement the regional plan, there will be a need to assure that progress in plan implementation particularly with respect to public transit continues during economic downturns, and is not eroded through service reductions. As minority and low income populations disproportionately use and are dependent upon, public transit, these populations are disproportionately impacted by reductions in transit service. The Commission will monitor and report on progress in plan implementation as part of plan review conducted every four years.

Map H-40

SERVICE TO HOSPITALS AND MEDICAL CENTERS: TRANSIT ELEMENT OF THE EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



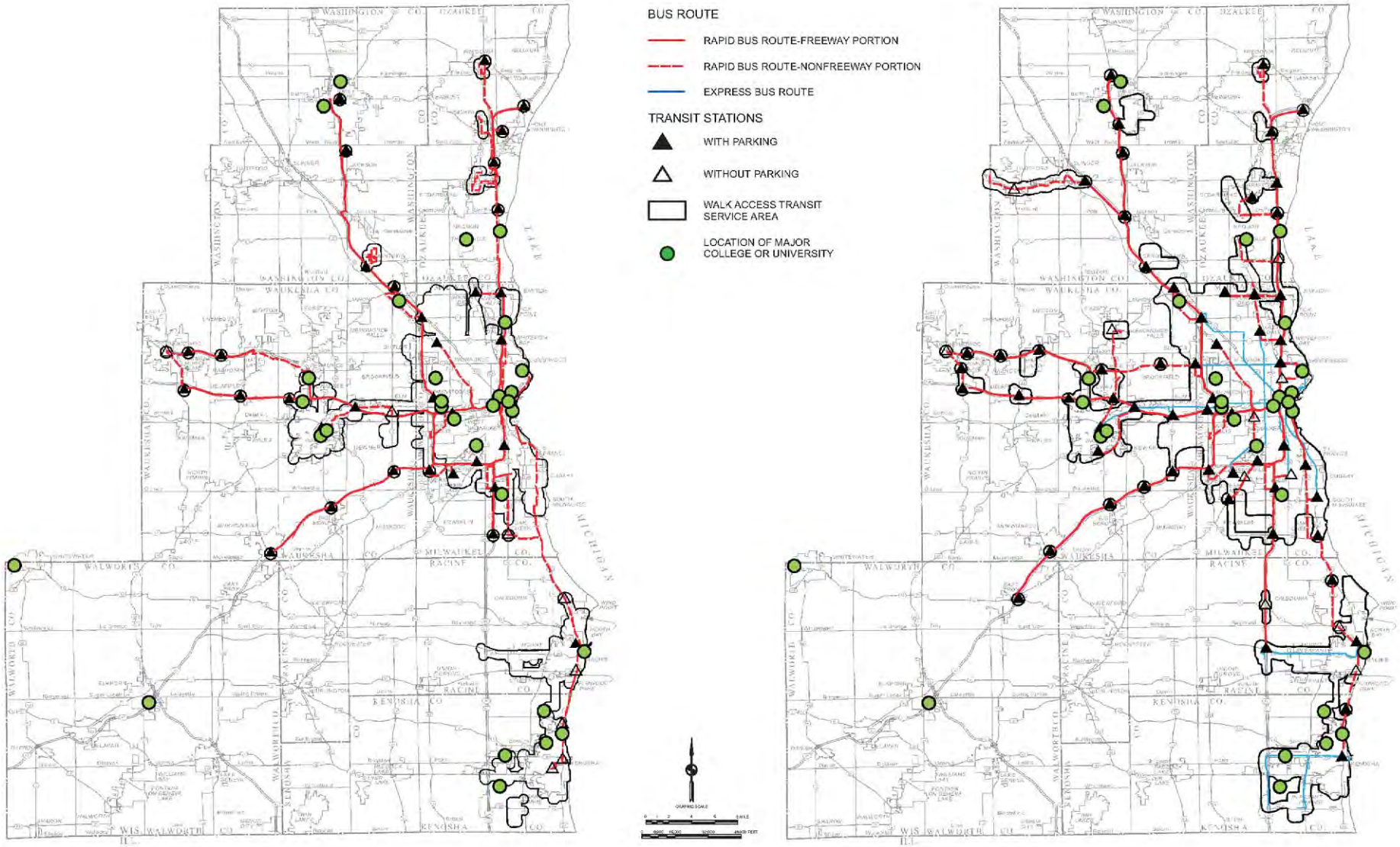
Source: SEWRPC.

Map H-41

SERVICE TO COLLEGES AND UNIVERSITIES: TRANSIT ELEMENT OF THE EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



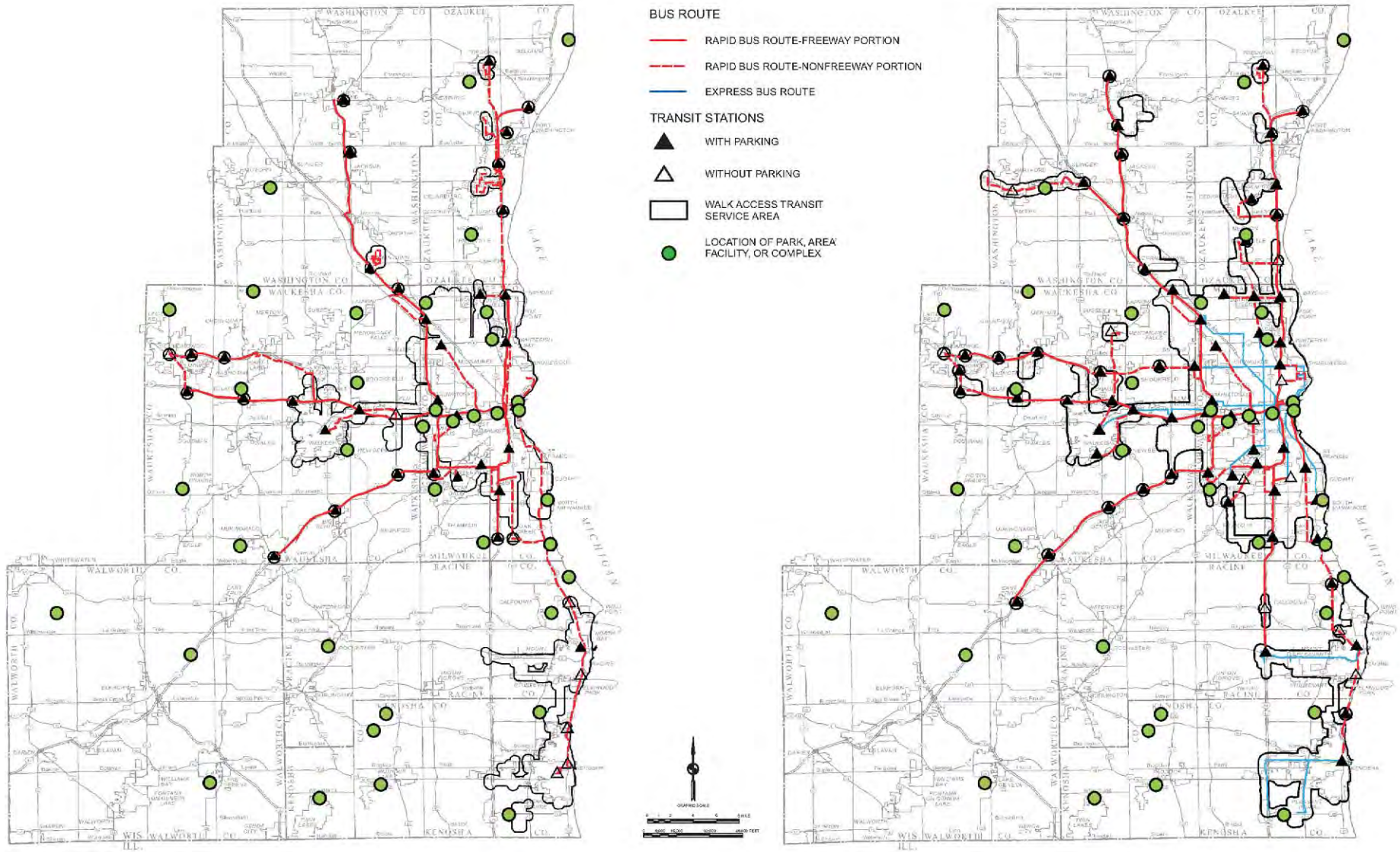
Source: SEWRPC.

Map H-42

SERVICE TO MAJOR PARKS AND OUTDOOR RECREATION AREAS, RECREATIONAL FACILITIES AND COMPLEXES HOSTING HIGH-ATTENDANCE EVENTS: TRANSIT ELEMENT OF THE EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



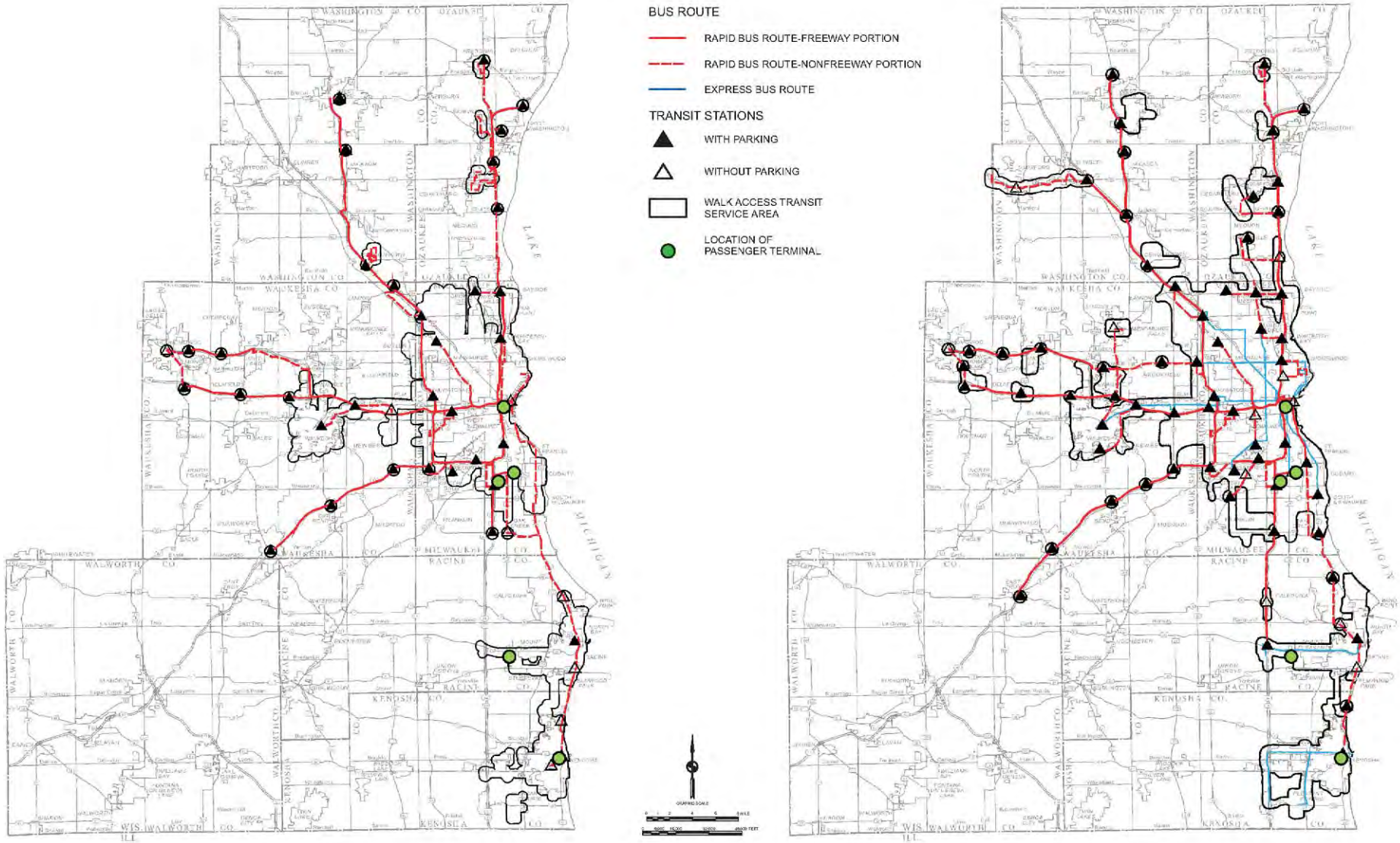
Source: SEWRPC.

Map H-43

SERVICE TO MAJOR PASSENGER TERMINALS: TRANSIT ELEMENT OF THE EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

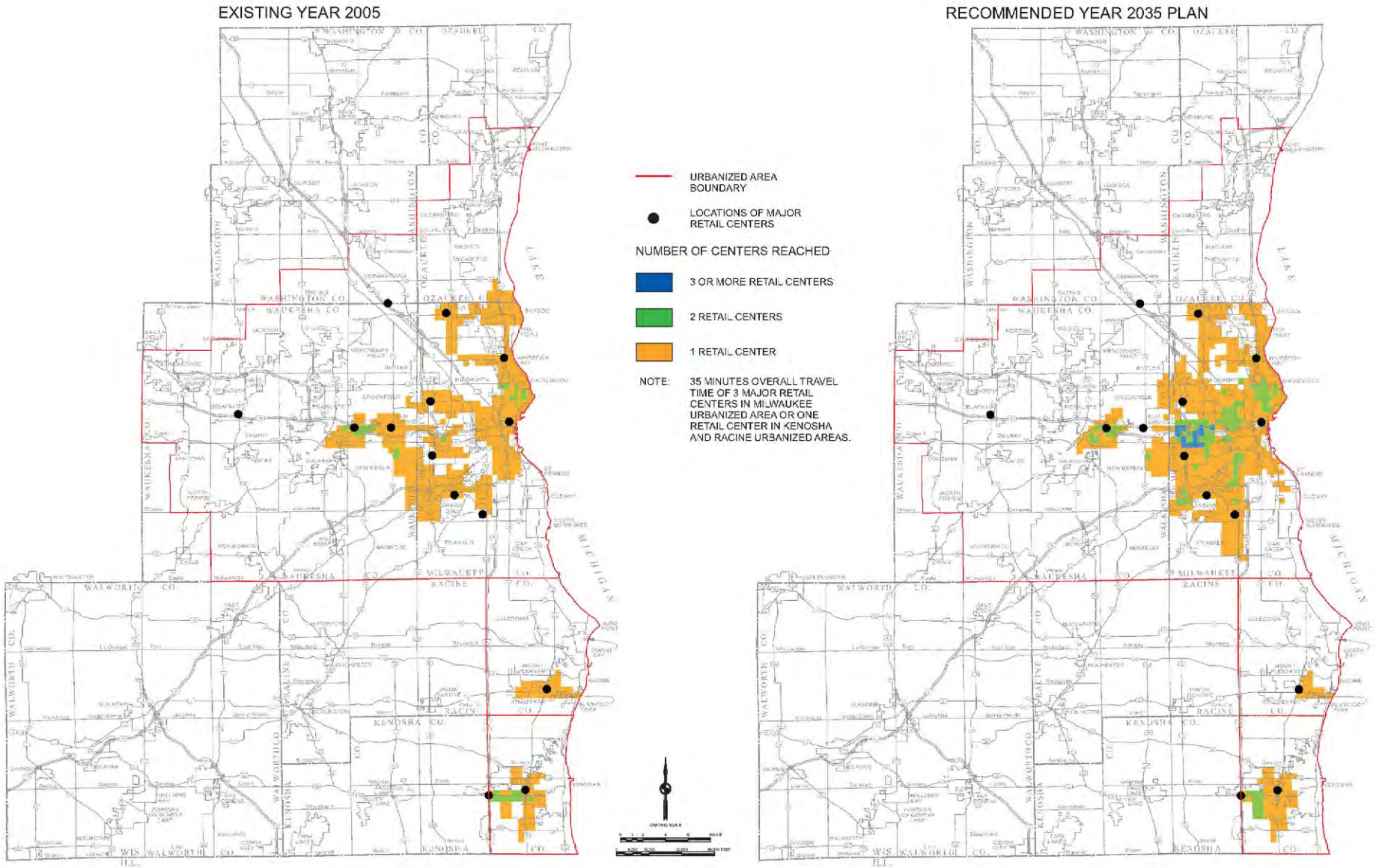
RECOMMENDED YEAR 2035 PLAN



Source: SEWRPC.

Map H-44

AREAS MEETING TRAVEL TIME STANDARD TO MAJOR RETAIL CENTERS BY PUBLIC TRANSIT: EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN



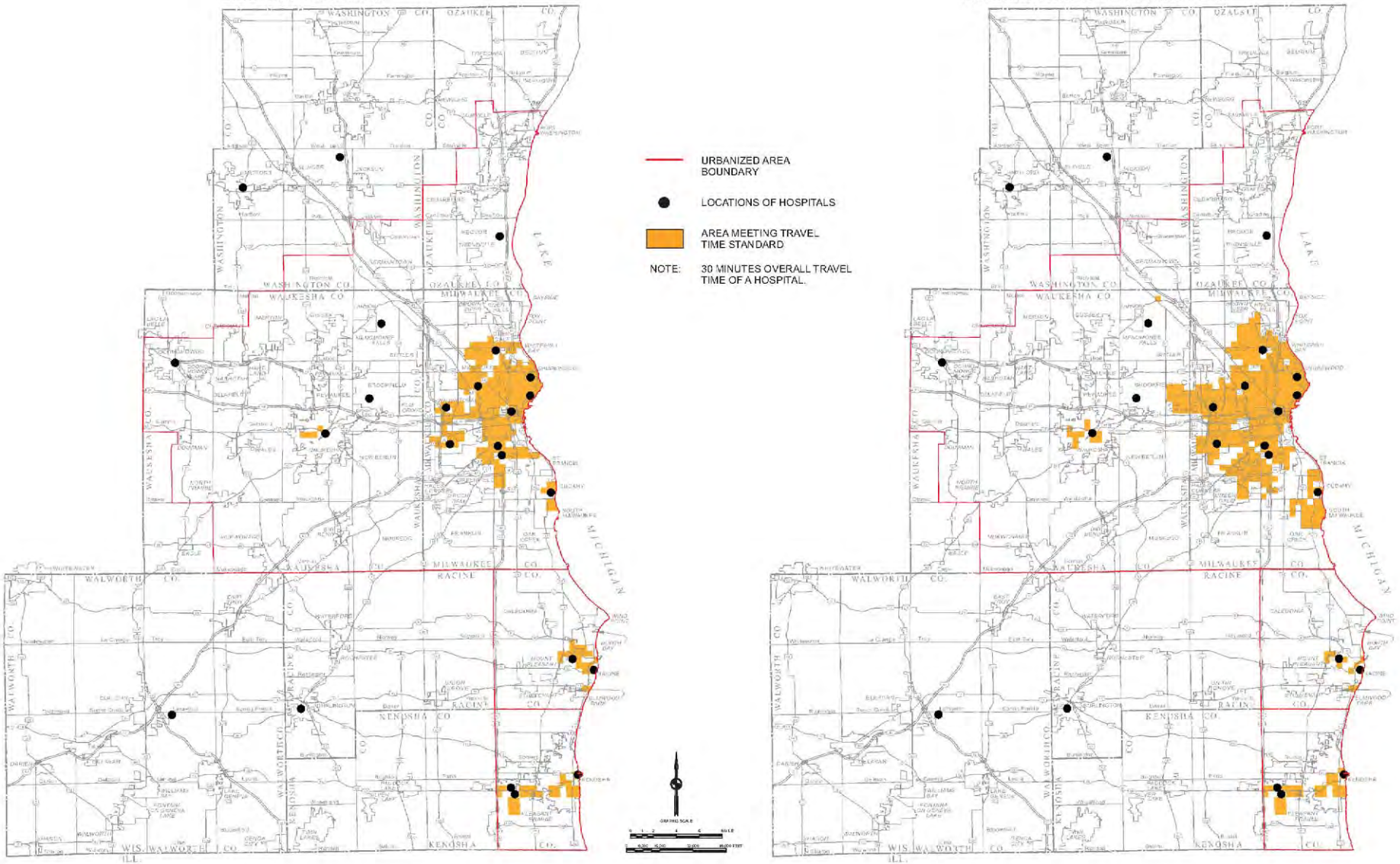
Source: SEWRPC.

Map H-45

AREAS MEETING TRAVEL TIME STANDARD TO HOSPITALS BY PUBLIC TRANSIT: EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



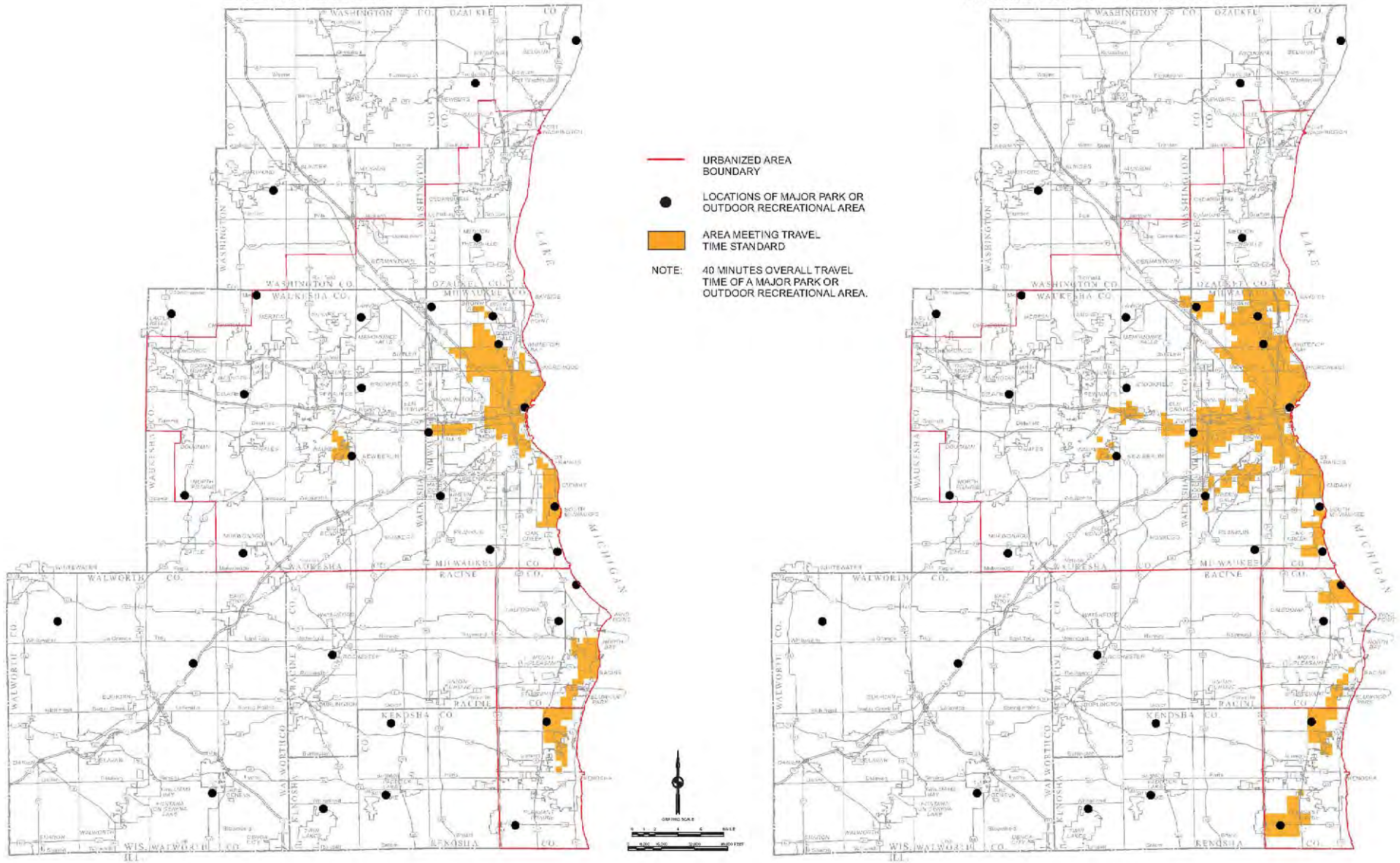
Source: SEWRPC.

Map H-46

AREAS MEETING TRAVEL TIME STANDARD TO MAJOR PARK OR OUTDOOR RECREATIONAL AREA BY PUBLIC TRANSIT: EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



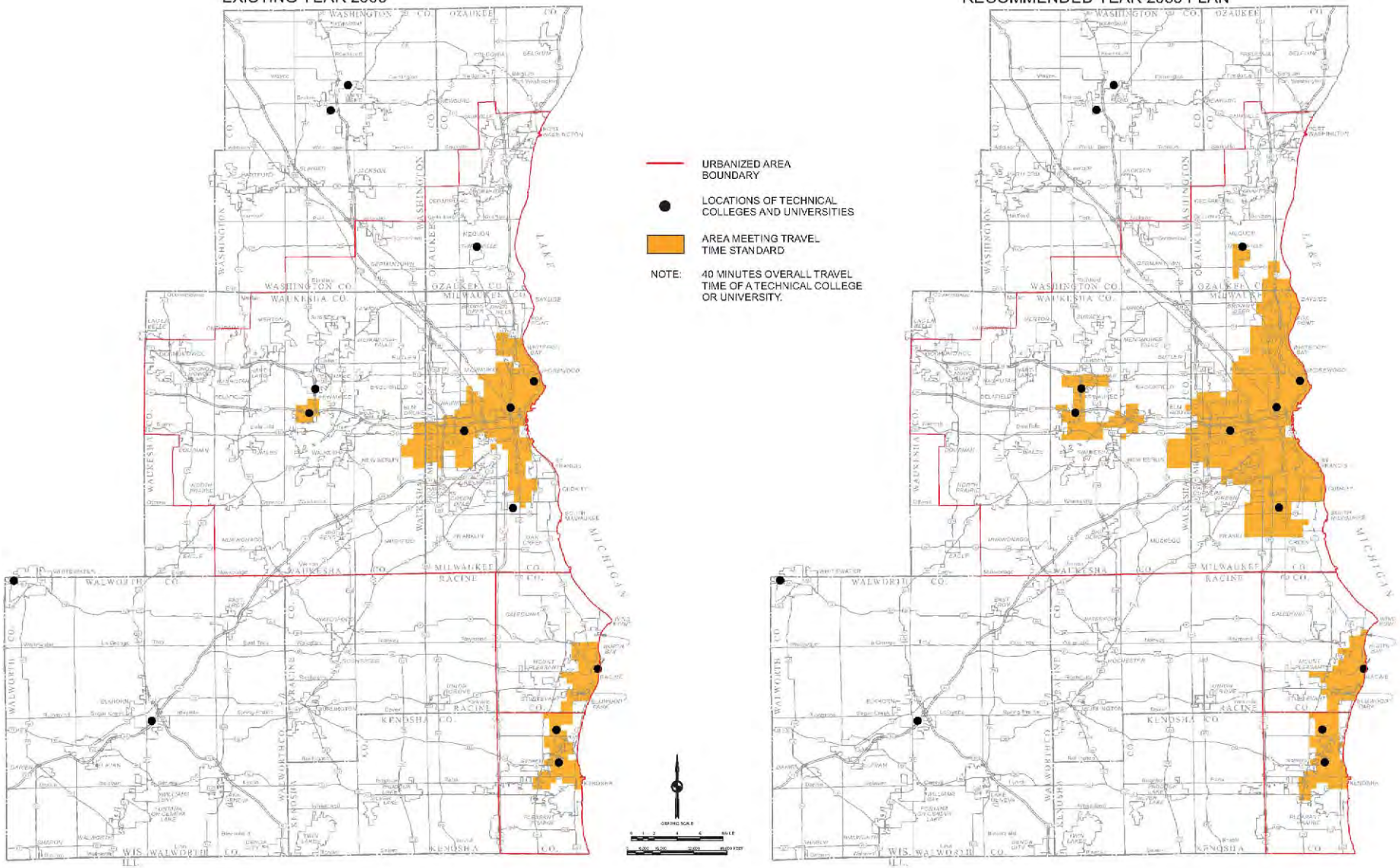
Source: SEWRPC.

Map H-47

AREAS MEETING TRAVEL TIME STANDARD TO PUBLIC TECHNICAL COLLEGES AND UNIVERSITIES BY PUBLIC TRANSIT: EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



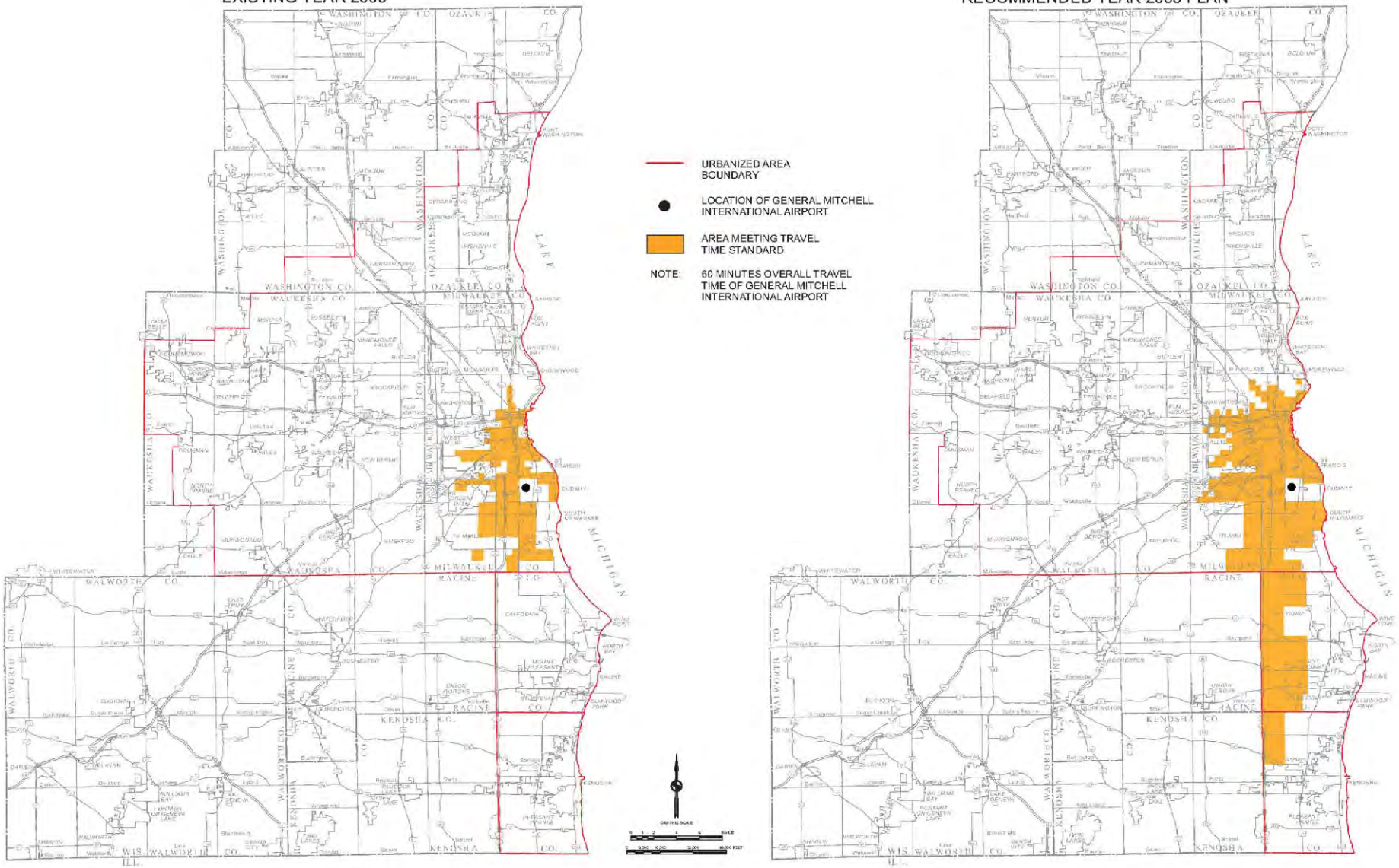
Source: SEWRPC.

Map H-48

AREAS MEETING TRAVEL TIME STANDARD TO GENERAL MITCHELL INTERNATIONAL AIRPORT BY PUBLIC TRANSIT: EXISTING YEAR 2005 AND RECOMMENDED YEAR 2035 PLAN

EXISTING YEAR 2005

RECOMMENDED YEAR 2035 PLAN



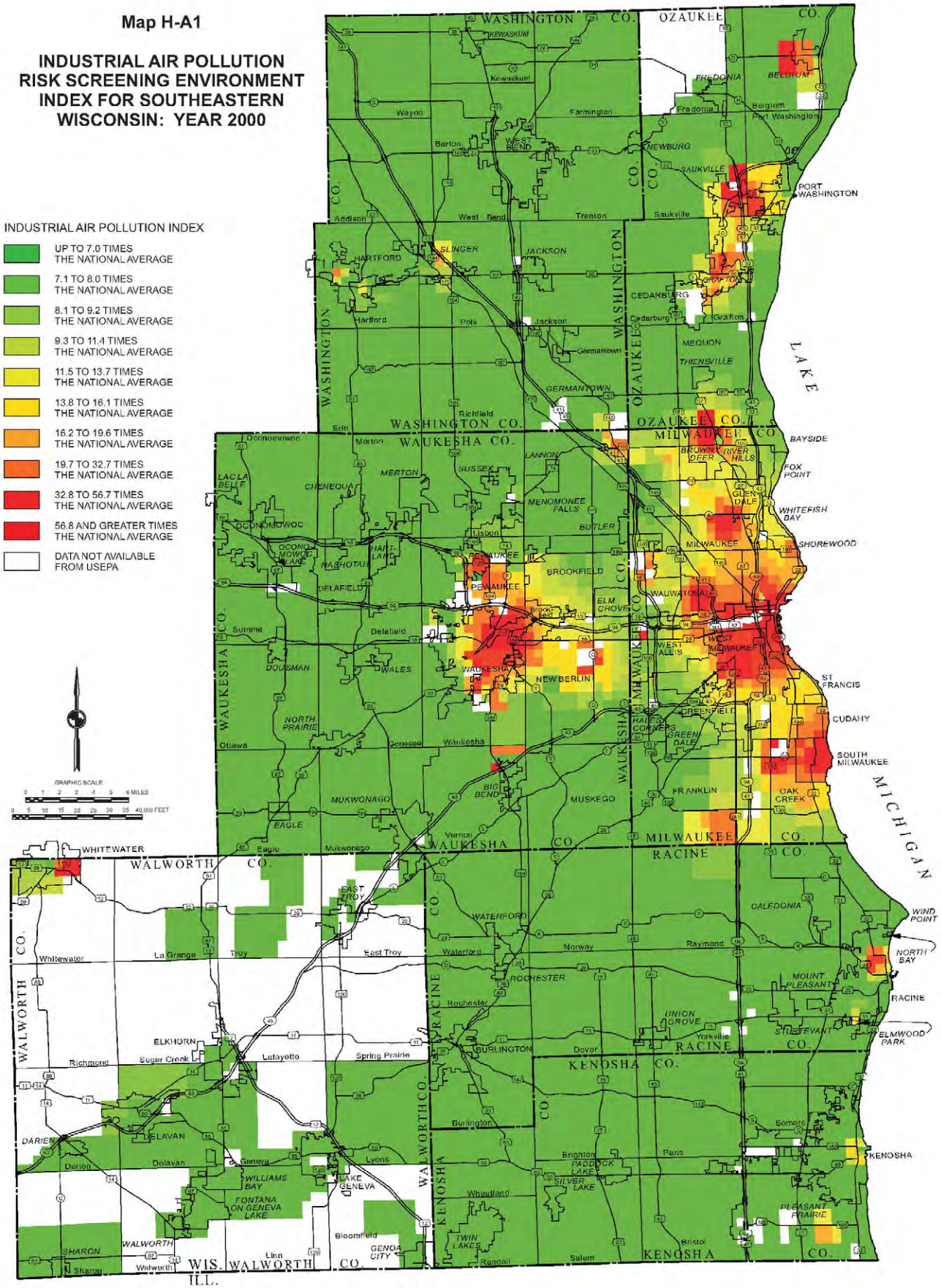
Source: SEWRPC.

ATTACHMENT TO APPENDIX H

Transportation-related air pollutants represent only a portion of total air pollutants; for example, about 20 percent of ozone-related volatile organic compound emissions and 40 percent of nitrogen oxide emissions are from transportation sources. Map H-A1 presents U.S. Environmental Protection Agency data on toxic chemical emissions by industries. It is intended to provide a relative comparison of industrial toxic emissions throughout a region and the nation. Comparison of the location of industrial air pollution with the location of industrial jobs indicates a general correlation between manufacturing activity and industrial air pollution (see Map H-A2). Some of the highest levels of industrial air pollution occur in areas with concentrations of minority and low income populations, and also in areas with little to no minority or low income population.

Map H-A1

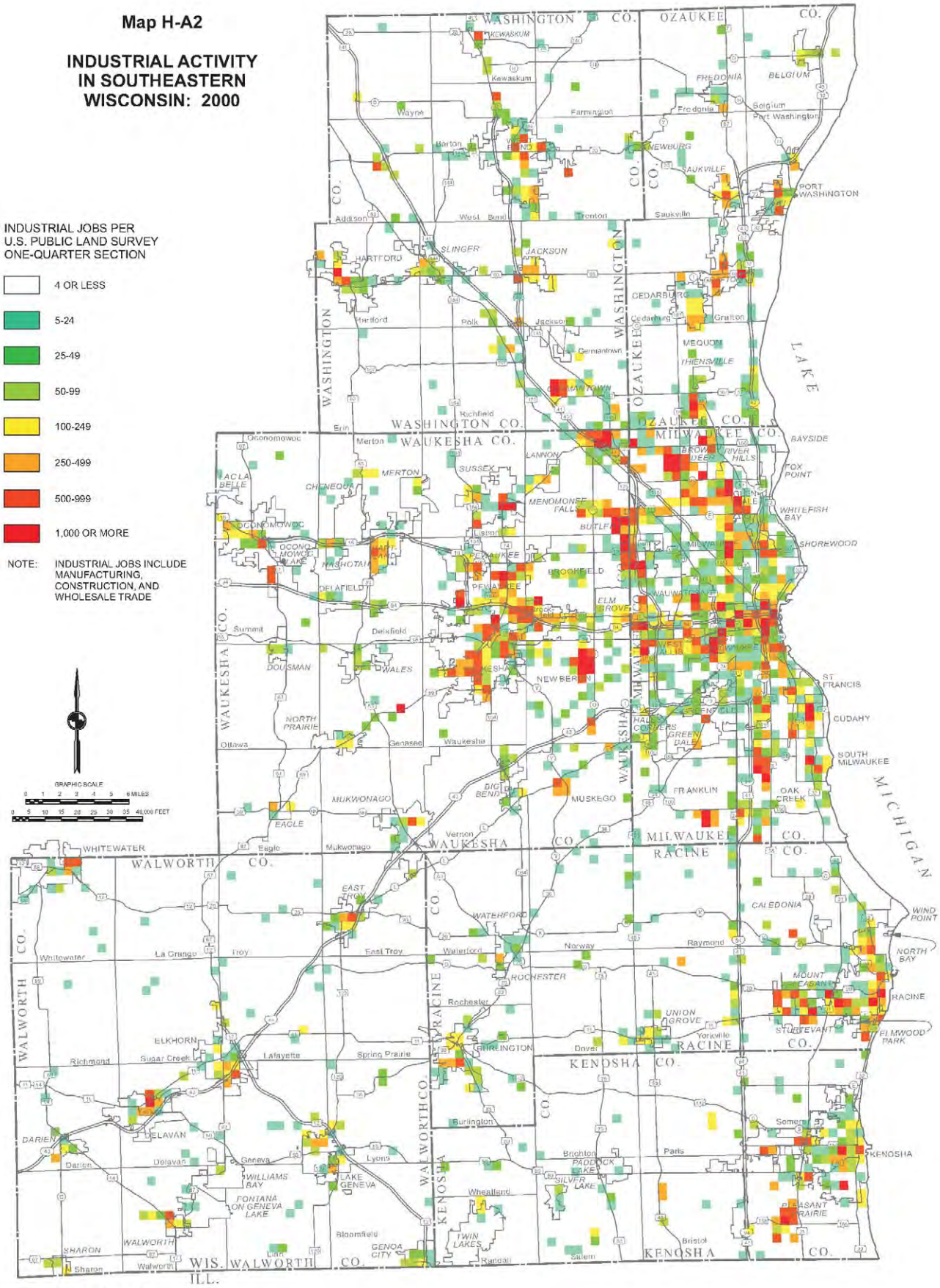
INDUSTRIAL AIR POLLUTION RISK SCREENING ENVIRONMENT INDEX FOR SOUTHEASTERN WISCONSIN: YEAR 2000



Source: U.S. Environmental Protection Agency and SEWRPC.

Map H-A2

INDUSTRIAL ACTIVITY IN SOUTHEASTERN WISCONSIN: 2000



Source: SEWRPC.