

A RAPID TRANSIT FACILITY PLAN FOR THE MILWAUKEE NORTHWEST CORRIDOR



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**COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 150**

**A RAPID TRANSIT FACILITY PLAN
FOR THE MILWAUKEE NORTHWEST CORRIDOR**

Prepared by the
Southeastern Wisconsin Regional Planning Commission
P. O. Box 1607
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916 N. East Avenue
Waukesha, Wisconsin 53187-1607

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January 1988

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January 18, 1988

TO: The Honorable County Executive and
Members of the Milwaukee County Board of Supervisors

Ladies and Gentlemen:

In September 1984, the Southeastern Wisconsin Regional Planning Commission, at the request of the Milwaukee County Executive and the Milwaukee County Board, began a study of potential rapid transit improvements for northwestern Milwaukee County. The study was undertaken to specifically determine whether express bus or light rail transit improvements would best meet the community development, as well as transportation, needs of northwestern Milwaukee County. The work was to build upon a previously completed areawide transportation study which had concluded that express bus or light rail transit service were the most promising alternatives for addressing the transportation needs of the northwest corridor. The study was guided by an Advisory Committee appointed by the Milwaukee County Executive, and comprised of elected and appointed public officials, knowledgeable and concerned citizens, and representatives of the business and labor communities.

This report presents the findings and recommendations of the requested study. During the course of the study, a number of promising rapid transit alternatives using both express bus and light rail transit technologies were evaluated. The performance of each alternative was examined with regard to operating characteristics, ridership levels, capital and operating costs, cost-effectiveness, impacts on the environment, and community acceptance. Based upon the performance of the alternatives with respect to these considerations, a "best" express bus alternative and a "best" light rail alternative were selected by the Advisory Committee as the preferred rapid transit alternatives for the northwest corridor.

On October 1, 1987, the Milwaukee County Board adopted a resolution endorsing the recommendations of the Advisory Committee concerning the two preferred rapid transit alternatives. Importantly, the County Board also directed that work proceed on implementation of the express bus alternative.

The recommendations set forth in this report provide for the gradual, but effective, improvement of public transit services and facilities within the northwest corridor of Milwaukee County. While this rapid transit plan continues to place heavy reliance on the provision of high-speed rapid transit service by motor buses, the plan retains the option for implementation of light rail service. The plan thus constitutes a flexible, yet effective, approach to meeting the existing and probable future transit needs of northwestern Milwaukee County.

Sincerely,



Kurt W. Bauer
Executive Director

NOTE: Related works on aspects of this same general topic include HP / 2005 / .S6 / TM 0--17: The Milwaukee Northwest Corridor Rapid Transit Study (January 1988) and the accompanying portfolio of plans and elevations (HP / 2005 / .S6 / TM-P).

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Chapter I

INTRODUCTION

This planning report presents the findings and recommendations of a study of alternative rapid transit improvements for northwestern Milwaukee County. This planning report is one of two major reports prepared under the Milwaukee northwest corridor rapid transit study. The other is the environmental assessment report, which documents the findings of the assessment of the potential environmental impacts and the costs and benefits, broadly defined, of the alternatives considered.

The Milwaukee northwest corridor rapid transit study was undertaken by Milwaukee County to determine whether light rail or express bus transit improvements could better alleviate the transportation problems of, and help meet the transportation and community development and redevelopment needs within, northern Milwaukee County in lieu of completing once-planned freeway segments, and to identify the best location for such improvements. Previous areawide transit studies had concluded that express buses and light rail were the most promising alternatives for improving public transit service in Milwaukee County, and recommended further study to establish the relative costs and benefits of these two alternatives in the northern part of the County, particularly the intangible benefits such as the potential of light rail transit to promote land development and redevelopment.¹

The study was guided by a 25-member advisory committee appointed by the Milwaukee County Executive. The membership of the Committee included citizens, representatives from the business and labor communities, and elected and appointed officials of federal, state, and local units and agencies of government. The Committee acted unanimously to adopt this report on December 22, 1986, thereby identifying a "best" express bus alternative—an express bus line over Fond du Lac Avenue—and a "best" light rail alternative—a light rail line over the N. 33rd Street railway right-of-way. The Advisory Committee did not make a recommendation concerning which alternative

should be implemented, determining that such a decision should be made cooperatively by the elected officials of Milwaukee County, the City of Milwaukee, and the State of Wisconsin. On October 1, 1987, the Milwaukee County Board of Supervisors acted to approve this report; to endorse the Committee-recommended "best" express bus and light rail alternatives; and to further specifically endorse the first stage of the "best" express bus alternative for implementation, with the future implementation of the "best" light rail alternative not to be foreclosed, but to be postponed until events warrant its implementation.

NEED FOR ACTION

The northwest corridor study area, as shown on Map 1, is located within the Milwaukee urbanized area, which area comprises the urban heart of Wisconsin. The 78-square-mile corridor lies entirely within Milwaukee County, and largely within the City of Milwaukee. The City of Milwaukee portion of the study area represents 54 square miles, or 69 percent of the study area. The study area also includes portions of the Village of Brown Deer, the City of Glendale, the Village of River Hills, and the City of Wauwatosa.

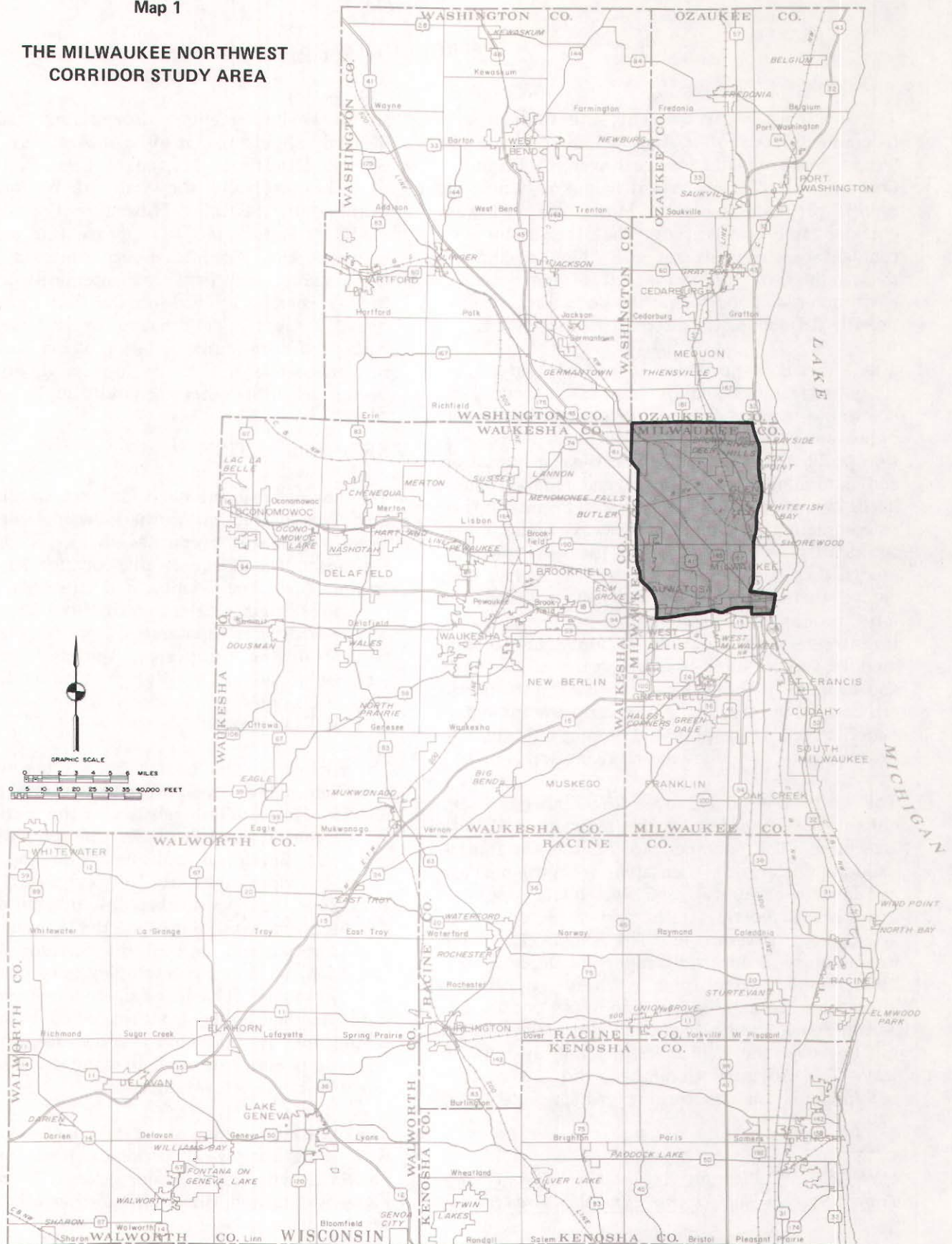
The northwest corridor is, at its southeastern end, anchored in the City of Milwaukee central business district. The southern portion of the corridor lies in the central portion of the City of Milwaukee, and was developed outward from the central business district in the late 1800's and early 1900's. It exhibits the highest urban development densities and highest transit ridership in the Milwaukee area. The northwestern end of the corridor lies in a still open, but rapidly developing, area of the City of Milwaukee. Residential, commercial, and industrial development are expected to continue in this area over the next two decades. The entire corridor is either devoted or committed to intensive urban land use development.

The existing arterial street and highway system within the northwest corridor consists of a grid network, with most major arterial streets and highways located on either north-south or east-

¹ See *SEWRPC Planning Report No. 33, A Primary Transit System Plan for the Milwaukee Area*.

Map 1

**THE MILWAUKEE NORTHWEST
CORRIDOR STUDY AREA**



Source: SEWRPC.

ILLINOIS

west alignments. A limited number of arterial streets and highways on diagonal alignments emanate from the Milwaukee central business district. Many of the arterial facilities, particularly in the southern portion of the corridor, carry traffic volumes exceeding their design capacities, and experience weekday peak-period traffic congestion. Many of these arterial streets are built to minimum four-lane, undivided cross-sections, and are fronted by intensively developed urban land uses. Few opportunities exist for right-of-way or facility expansion without significant urban disruption. The existing traffic problems on these arterial streets and highways may be expected to increase, since the addition of significantly more roadway capacity is politically infeasible, and since significantly more traffic may be expected with growth in the central business district and far northwest side.

Conspicuous by its absence within the study area is a well-developed freeway system. Transportation plans had once proposed certain key freeway links within the corridor to close critical gaps in the area transportation system, as shown on Map 2. In 1977, however, two planned freeway segments—the Park Freeway-West and the Stadium Freeway-North—were removed from the regional transportation system plan as a result of the sharp division of public opinion regarding the desirability of completing these planned freeway facilities.

The need for major urban transit improvement within the Milwaukee northwest corridor can be summarized as follows:

1. Need for Increased Transportation System Capacity Within the Northwest Corridor

Additional transportation system capacity is necessary to replace that which was to be provided by the Park Freeway-West and the Stadium Freeway-North. These two freeway segments were to serve the existing travel within the corridor, and the increased travel anticipated to occur over the next two decades. In addition, these freeway segments were to incorporate exclusive lanes for the use of diesel motor coaches in the provision of high-speed rapid transit service to the Milwaukee northwest side. The replacement of this long-planned freeway capacity through the construction of new arterial streets or the widening of existing arterial streets is not proposed, as substantial property taking would be entailed. Rather, it is proposed

that additional transportation capacity for the area be provided by improved public transit services and facilities, including expanded local and express bus service throughout the northwest area and the implementation of a major rapid transit improvement sufficiently attractive to encourage transit use over automobile use.

2. Need for Improved Level of Transportation Service Within the Northwest Corridor

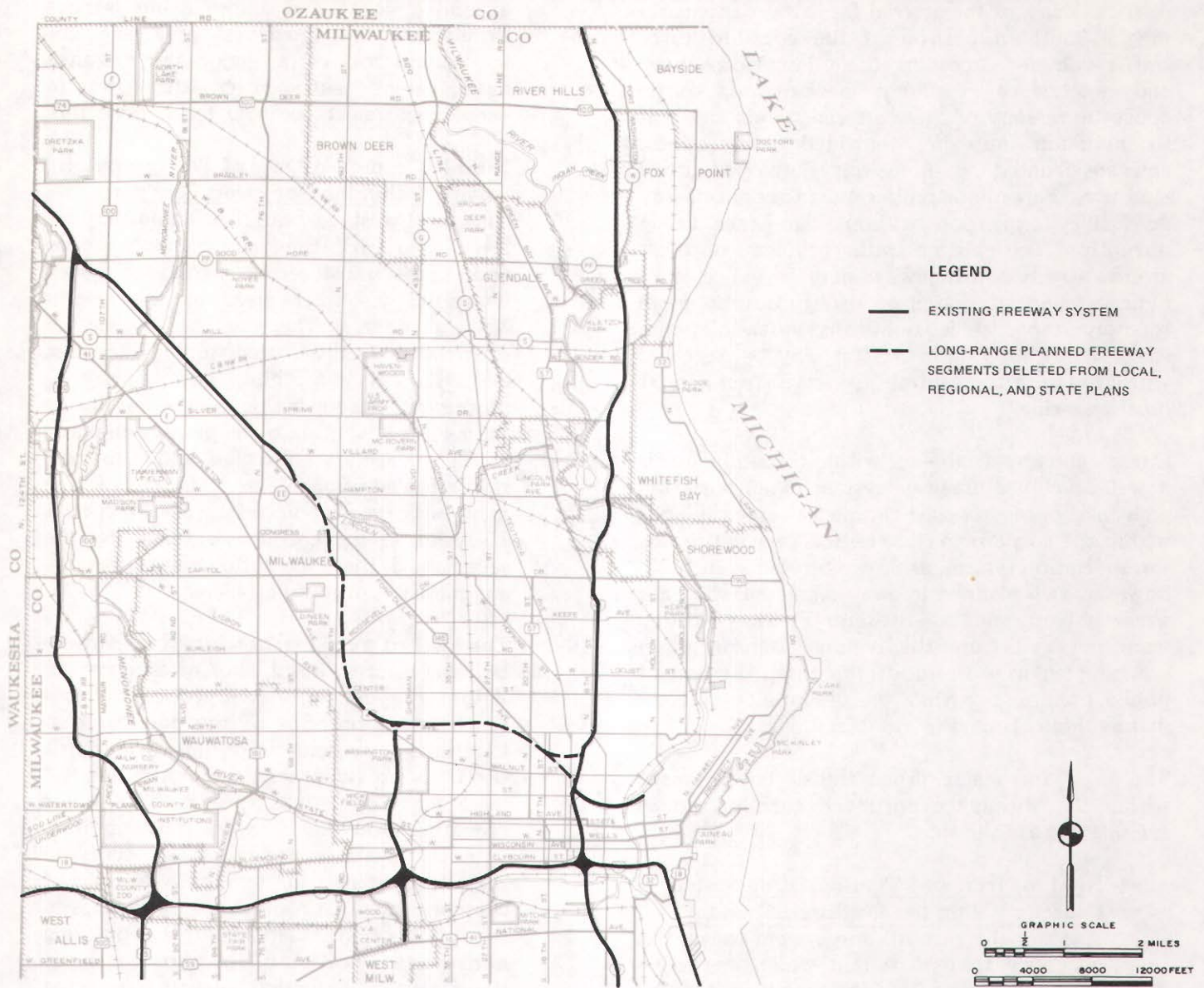
The northwest corridor has an inadequate level of arterial street and highway service and express transit service, particularly when compared to other areas of the greater Milwaukee area. There are no freeway or expressway facilities that provide for fast and efficient automobile and motor bus movement. Severe traffic congestion occurs during weekday peak travel periods on many of the surface arterial streets within the corridor. The additional increase in travel which may be expected to occur over the next 15 years in the corridor will increase the severity of these conditions and preclude any increases in travel efficiency.

The level of public transit service is particularly deficient within the northwest corridor. Within the densely developed central and southeastern portions of the corridor that have high transit ridership, only local transit service is provided, with frequent stops and inefficient operating speeds. The buses operating over these routes must contend with the traffic congestion that occurs on the arterial streets through those portions of the corridor. There are also inadequacies in the public transit service in the outlying northwestern portion of the corridor. Rapid transit service is limited to service provided from outlying park-ride lots into the central business district. Limited local transit service serves the northern portion of the corridor.

A major rapid transit improvement is required to significantly improve the level of public transit service available in the northwest corridor. Such an improvement would help decrease total transit travel times and costs by providing a high-quality, high-speed service in an area served almost entirely by local routes, many of which carry high volumes of passengers. Such an improvement would provide an attractive alternative for those

Map 2

ORIGINAL FREEWAY SYSTEM PLAN FOR THE NORTHWEST SIDE OF MILWAUKEE COUNTY



Source: SEWRPC.

who use private automobiles for transportation in a highly developed urban area where the ability to improve the arterial street and highway system is limited; and would help to reduce parking needs in the central business district.

3. Need for Increased Public Transit System Efficiency Within the Northwest Corridor

The existing Milwaukee County transit system consists basically of a grid of local bus routes. Although high-speed, nonstop

rapid transit service is provided by buses operating between the Milwaukee central business district and a number of outlying park-ride lots, all other transit users with destinations short of the park-ride lots must rely on the local bus service. In high travel volume corridors, such as the northwest corridor of Milwaukee County, a major urban transit improvement offers the opportunity to shift existing riders from local bus routes to the rapid transit service. This type of shift increases average trip speeds, short-

Table 1

**SUMMARY OF EMPLOYMENT, HOUSEHOLDS, AND POPULATION WITHIN THE MILWAUKEE
NORTHWEST CORRIDOR, MILWAUKEE COUNTY, AND THE REGION: 1970, 1980, AND 2000**

Area	Employment				Households				Population			
	Existing 1972	Existing 1980	Forecast 2000		Existing 1970	Existing 1980	Forecast 2000		Existing 1970	Existing 1980	Forecast 2000	
			Optimistic Future	Pessimistic Future			Optimistic Future	Pessimistic Future			Optimistic Future	Pessimistic Future
Milwaukee Northwest Corridor												
Central Business District ^a	97,100	81,500	102,300	82,900	4,400	3,600	4,200	3,200	8,200	4,600	5,100	5,600
Near North Side ^b	67,000	53,200	72,100	63,700	52,300	44,700	52,400	36,800	162,600	130,800	126,400	86,400
North Central ^b	67,300	65,900	72,400	65,400	71,900	72,900	72,500	56,400	216,300	191,700	195,800	125,700
Northwest Suburbs ^b	18,000	21,900	21,000	19,500	6,600	8,600	10,200	7,500	24,300	25,300	31,400	19,300
Northwest (old Town of Granville) ^b	13,300	27,900	44,500	25,900	9,700	18,500	20,900	22,100	38,000	52,500	64,200	61,900
Total	262,700	250,400	312,300	257,400	144,900	148,300	160,200	126,000	449,400	404,900	422,900	298,900
Milwaukee County	505,000	547,900	593,600	517,200	338,600	363,700	392,700	300,700	1,054,300	965,000	1,049,600	700,000
Region	744,600	884,200	1,015,900	886,900	536,500	627,900	739,400	673,600	1,756,100	1,764,800	2,219,300	1,688,400

^aIncludes area bounded by the North-South Freeway (IH 43) on the west, the Park-West Freeway and Juneau Avenue on the north, Lake Michigan on the east, and the Menomonee River on the south.

^bBoundaries of each area are displayed on Map 3.

Source: SEWRPC.

ens trip times, and lowers operating costs per passenger for the affected trips. This, in turn, improves the operating efficiency of the public transit system.

4. Other Benefits to the Northwest Corridor

A major public transit improvement has the potential to directly and indirectly benefit the northwest corridor in a number of other ways. Benefits include the provision of an attractive alternative to the private automobile which contributes to reduced utilization of, and investment in, the arterial street and highway system, and reduced automobile parking facility needs; a reduced dependence on petroleum-based fuels for urban transportation needs; and assistance in reducing the level of harmful or annoying noise and the amount of air pollutants generated by vehicular traffic. In addition, rapid transit development would serve as a catalyst for desirable development and redevelopment in the corridor, helping vitalize new and revitalize older established portions of the City.

Summary

The need for a rapid transit improvement in the northwest corridor of Milwaukee County is comprehensive and is related to a series of problems in

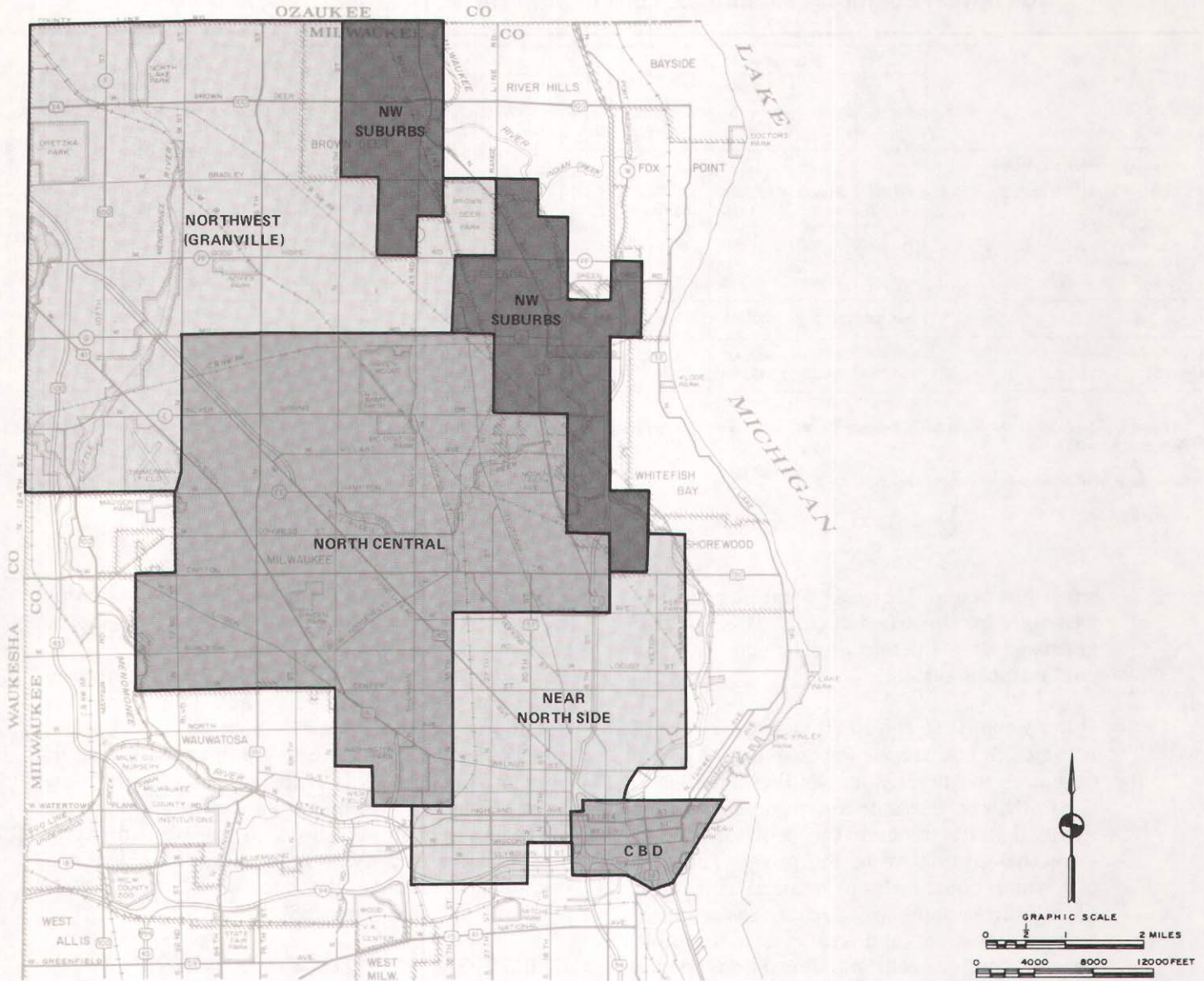
the corridor, including inadequate transportation system capacity, inadequate levels of transportation service, and transit system inefficiencies. The need is also related to broader urban concerns, including the need to guide and shape land use development and redevelopment in the public interest. A rapid transit improvement would provide the corridor with an integrated, more balanced transportation system providing the types of transportation services that are needed in the area. Failure to provide such an improvement will continue to deprive the corridor of an adequate level of transportation service.

EXISTING AND FUTURE CONDITIONS

Table 1 provides a summary of the existing 1980 and projected plan design year 2000 resident population, employment, and household levels within the Milwaukee northwest corridor study area and within Milwaukee County. This information is also provided for certain subareas of the corridor, the boundaries of which are shown on Map 3. The resident population of the Milwaukee northwest corridor totaled about 405,000 persons in 1980, or about 42 percent of the resident population of Milwaukee County of 965,000. This population was concentrated in the near north side and north central sections of the corridor. There were about 148,000 households in the northwest

Map 3

MAJOR SUBAREAS OF THE MILWAUKEE NORTHWEST CORRIDOR



Source: SEWRPC.

corridor in 1980, or about 41 percent of the 364,000 households in all of Milwaukee County. Like population, the households were highly concentrated in the near north side and north-central sections of the corridor. Employment in the corridor totaled about 250,000 jobs in 1980, or about 46 percent of the 548,000 jobs in all of Milwaukee County. Most of this employment was located in the central business district, near north side, and north-central sections of the corridor, with the highest concentrations of the jobs—81,500 jobs—located in the Milwaukee central business district.

Two projections of conditions in the Milwaukee northwest corridor were made for use in evaluating probable future ridership on alternative rapid transit facilities. One of these alternative futures envisioned moderate population growth within the Region under a centralized land use development pattern, and provided an optimistic projection of transit use in the Milwaukee northeast corridor. This alternative future also envisioned moderate growth in employment within the Region. The other alternative future envisioned a stable or declining resident population under a decentralized land

use development pattern, with stable employment within the Region. This future provided a pessimistic projection of transit use in the corridor. These alternative futures were based upon careful consideration of a number of key factors that affect the use of public transit, including possible changes in lifestyles with attendant changes in household size and labor force participation; the ability of this Region to compete economically with other regions of the United States; and continued availability of petroleum-based fuels, and the cost of operating an automobile. Under the optimistic future, it was assumed that the cost of operating an automobile would double from the base year 1984 \$0.06 per mile to \$0.12 per mile, and that fuel supplies would be somewhat restricted, similar to conditions following the 1973 oil embargo. Specifically, it was assumed that motorists would consider their automobile to be about 25 percent less available for travel. Under the pessimistic future, it was assumed that the cost of operating an automobile would remain at about \$0.06 per mile and that there would be no fuel supply restrictions.

Under the optimistic future, employment levels within the corridor were envisioned to increase from about 250,000 jobs in 1980 to about 312,000 jobs in the year 2000, an increase of about 1 percent per year; the number of households within the corridor was envisioned to increase from about 148,000 in 1980 to about 160,000 in the year 2000, an increase of 0.4 percent per year; and the total population within the corridor was envisioned to increase from about 405,000 persons in 1980 to about 423,000 persons in the year 2000, an increase of 0.2 percent per year. Employment in the central business district would increase from 81,500 jobs in 1980 to about 102,000 jobs, an increase of about 1 percent per decade. Under the pessimistic future, employment levels within the corridor would remain stable at about 250,000 jobs to the year 2000; the number of households within the corridor would decline to about 126,000 by the year 2000, a decrease of about 1 percent per year; and the total population within the corridor would decline to about 300,000 persons by the year 2000, a decrease of about 1 percent per year. Employment in the central business district would remain stable under this future at about 82,000 jobs.

DESCRIPTION OF ALTERNATIVE RAPID TRANSIT IMPROVEMENTS

Six alternative rapid transit improvements in the Milwaukee northwest corridor were examined in

detail. The six alternatives included three express bus alternatives and three light rail transit alternatives. In addition, a "no build" alternative, which assumed the continued operation of the existing public transit system, was considered. This alternative, identified herein as Alternative 1, provided a basis for the evaluation of the impacts of the other alternatives. The no build alternative is shown in graphic summary form on Map 4.

Bus Rapid Transit Alternatives

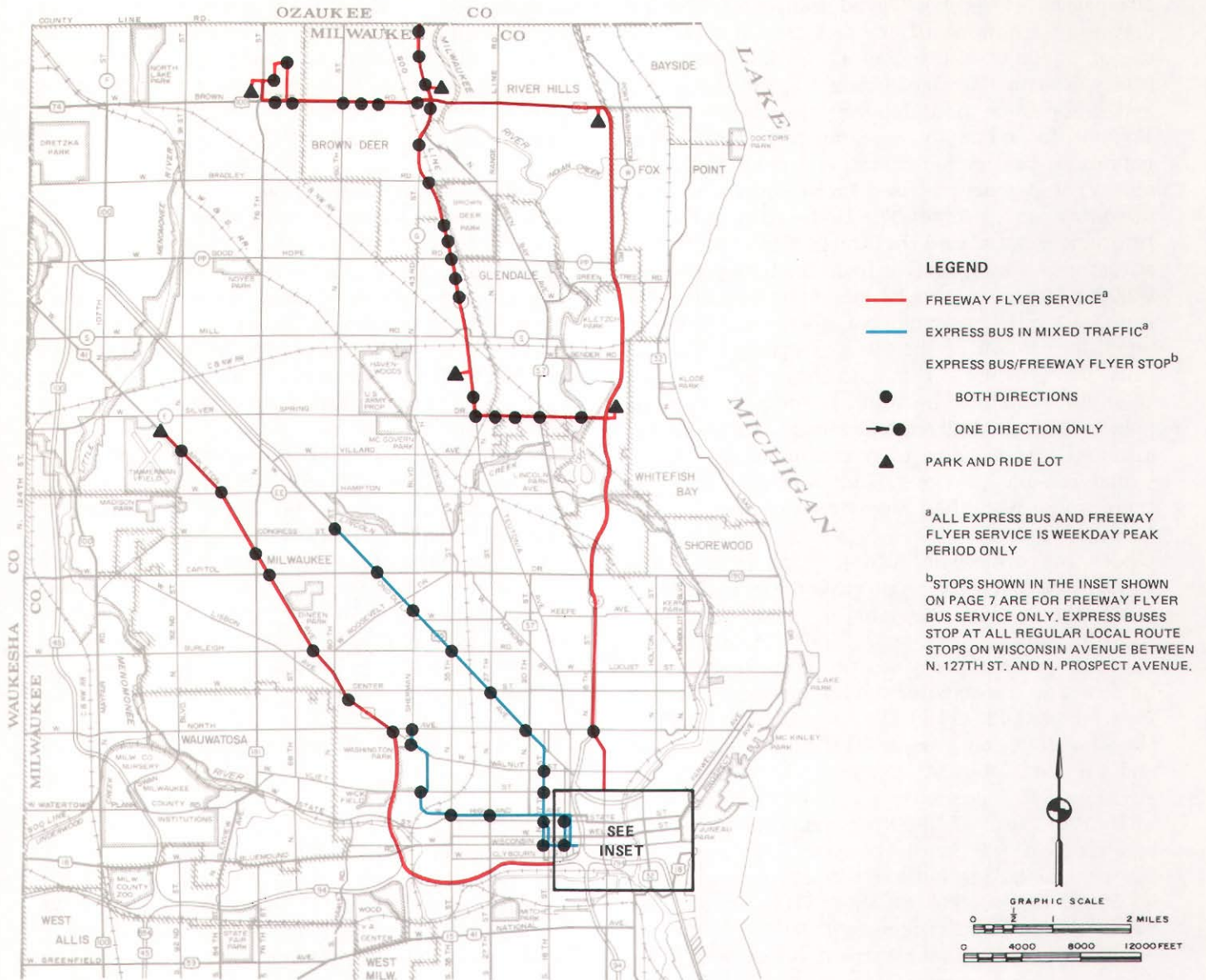
Three express bus alternatives were developed and are identified herein as Alternatives 2A, 2B, and 2C. These alternatives envision the provision of express bus service in the corridor using high-capacity articulated diesel buses, as well as standard buses. Express buses under these alternatives would make only a limited number of stops along each route. Four outlying park-ride lots would be provided under each alternative. Two of the three alternatives include a downtown transit mall. The express buses would operate over reserved lanes on arterial streets, and in mixed traffic over operationally controlled freeways providing preferential access for the buses. Various transportation system management (TSM) actions would be implemented to facilitate the express bus service. Examples of the manner in which express bus service would operate under these alternatives are illustrated in Figure 1.

The three bus rapid transit alternatives include the following:

Alternative 2A: Alternative 2A consists of major service improvements to the existing Bus Route No. 30. Under this alternative, this route would continue to provide local service from the Milwaukee central business district and the University of Wisconsin-Milwaukee campus to the northwest side over W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, W. Lisbon Avenue, N. Sherman Boulevard, and W. Keefe Avenue. However, much of the service on this route—about 85 to 90 percent during weekday peak periods—would be converted to express bus service and extended farther out into northwestern Milwaukee County, as shown on Map 5. Express bus service would be extended north along N. Sherman Boulevard, W. Mill Road, and N. 76th Street to new park-ride lots at N. 60th Street and W. Mill Road, and near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road. Express bus service would also be extended from W. Keefe Avenue along W. Appleton Avenue and USH 45 to existing park-ride lots near Timmerman Field and

Map 4

ALTERNATIVE 1: EXISTING AND COMMITTED (NO BUILD) SYSTEM



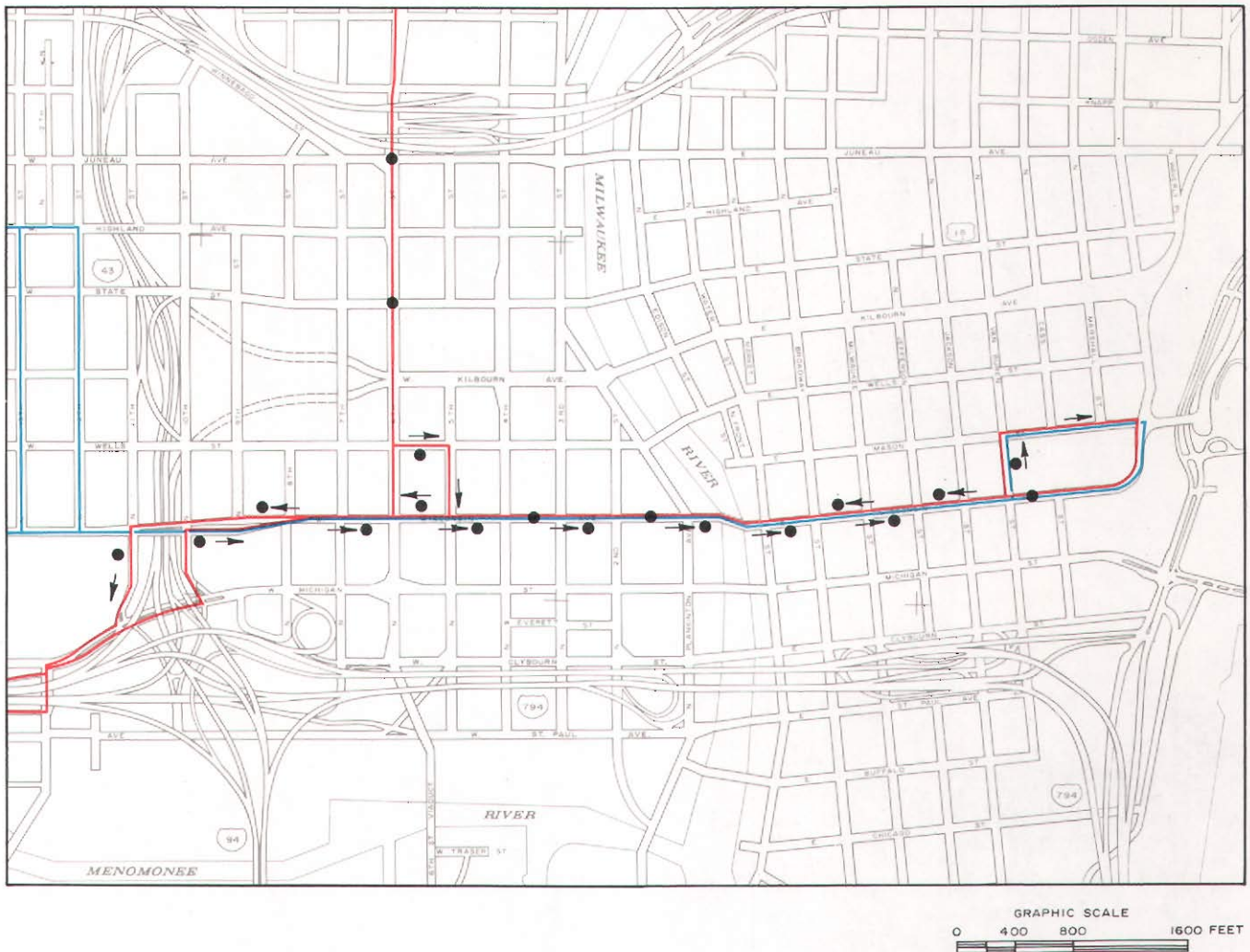
Source: SEWRPC.

at W. Good Hope Road and USH 45. The express bus services from both branches would continue east of the Milwaukee central business district along N. Prospect, N. Farwell, and N. Maryland Avenues to the University of Wisconsin-Milwaukee campus, and would operate throughout the day in both directions.

Under this alternative, the buses would operate over weekday peak-period, peak-direction, curbside reserved bus lanes along W. Wisconsin Avenue, N. 35th Street, and W. Highland Boulevard between

N. 6th Street and W. Vliet Street; and along N. Sherman Boulevard between W. Lisbon Avenue and W. Custer Avenue, just south of W. Silver Spring Drive. In the Milwaukee central business district, E. and W. Wisconsin Avenue between N. Jackson Street and N. 6th Street would be converted to a two-way transit mall for the exclusive use of pedestrians, buses, and emergency vehicles. Westbound local and express buses would use this transit mall, and eastbound buses would use a reserved lane on E. and W. Wells Street between N. Prospect Avenue and N. 10th Street.

Map 4 Inset



In addition, “freeway flyer” buses using an operationally controlled freeway system would provide nonstop service from both the Northridge Shopping Center area park-ride lot and the W. Good Hope Road park-ride lot to the Milwaukee central business district on weekdays throughout the day.

Alternative 2B: Alternative 2B consists of major service improvements to the existing Bus Route No. 23. Under this alternative, this route would continue to provide local service from the Milwaukee central business district to the northwest side over W. Wisconsin Avenue, N. 16th and 17th Streets, W. Fond du Lac Avenue, and W. Congress Street. However, much of the service on this route—about 85 to 90 percent during weekday peak periods—would be converted to express bus service and extended farther out into northwestern Milwaukee

County, as shown on Map 6. Express bus service would be extended in a northerly and westerly direction from W. Fond du Lac Avenue along N. Sherman Boulevard and W. Mill Road to a new park-ride at N. 60th Street and W. Mill Road; along N. 76th Street to a new park-ride lot near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road; along STH 145 to an existing park-ride lot at W. Good Hope Road and USH 45; and along W. Congress Street and N. 92nd Street to an existing park-ride lot near Timmerman Field. The express bus services from all four branches would continue east of the Milwaukee central business district along N. Prospect, N. Farwell, and N. Maryland Avenues to the University of Wisconsin-Milwaukee campus, and would operate throughout the day in both directions.

Figure 1

EXAMPLES OF EXPRESS BUS OPERATION

TYPICAL ARTICULATED
DIESEL MOTOR BUS



OPERATION ON
DOWNTOWN TRANSIT MALL



OPERATION OVER
RESERVED LANE



PREFERENTIAL FREEWAY ENTRANCE
RAMP ON OPERATIONALLY
CONTROLLED FREEWAY SYSTEM



Source: SEWRPC.

Under this alternative, the buses would operate over weekday peak-period, peak-direction, curbside reserved lanes along W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue between N. 6th Street and W. North Avenue; and along W. Fond du Lac Avenue between W. Burleigh Street and N. 60th Street. In the Milwaukee central business district, E. and W. Wisconsin Avenue between N. Jackson Street and N. 6th Street would be converted to a two-way transit mall for the exclusive use of pedestrians, buses, and

emergency vehicles. Westbound local and express buses would use this transit mall, and eastbound buses a reserved lane on E. and W. Wells Street between N. Prospect Avenue and N. 10th Street.

In addition, freeway flyer buses using an operationally controlled freeway system would provide non-stop service from both the Northridge Shopping Center area park-ride lot and the W. Good Hope Road park-ride lot to the Milwaukee central business district on weekdays throughout the day.

Alternative 2C: Alternative 2C consists of service improvements to six existing bus routes which would provide express bus service to the northwest side of Milwaukee County in addition to the local bus service already provided by these routes. Under this alternative, express bus service would largely be provided over the same streets currently used by local Bus Routes No. 12, 23, 30, 57, 67, and 76.

Unlike Alternatives 2A and 2B, which provide a very high level of service along a single express route centrally located within the northwest corridor, Alternative 2C relies on the existing local bus route configuration, with only minor express route extensions to connect the routes with park-ride lots, as shown on Map 7. Much of the service—about 75 to 90 percent—on these routes would be converted to express bus service.

Specifically, new express bus service on Route 12 would operate over E. and W. Wisconsin Avenue, N. 12th and 13th Streets, N. Teutonia Avenue, and W. Good Hope Road to N. 43rd Street and W. Good Hope Road. The existing express bus service on Route 23 would continue to operate over E. and W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue, and would be extended along W. Fond du Lac Avenue and STH 145 to the park-ride lot at W. Good Hope Road and USH 45. The existing express bus service on Route No. 30, which operates along E. and W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, W. Lisbon Avenue, and N. Sherman Boulevard, would be extended north along N. Sherman Boulevard and W. Mill Road to the park-ride lot at N. 60th Street and W. Mill Road. This express bus route would continue to operate from the Milwaukee central business district to the University of Wisconsin-Milwaukee campus along N. Prospect, N. Farwell, and N. Maryland Avenues. The new express bus service along local Route No. 57 would operate along W. St. Paul Avenue, N. 3rd and 4th Streets, W. Walnut Street, W. Lisbon Avenue, W. Center Street, and N. 92nd Street, as does the existing local Bus Route 57, and be extended along N. Swan Boulevard and W. Appleton Avenue to the existing park-ride lot at Timmerman Field. The new express bus service along local Route 67 would operate within the northwest side of Milwaukee County along N. Wauwatosa Avenue, N. 76th Street, and W. Brown Deer Road to a new park-ride lot at N. 84th Street and W. Brown Deer Road near the Northridge Shopping Center. The new express bus service along existing local route No. 76 would operate

within the northwest side of Milwaukee County along N. 68th Street, Milwaukee Avenue, and N. 60th Street to the new park-ride at N. 60th Street and W. Mill Road.

Under this alternative, the buses would operate over a weekday peak-period, peak-direction, curbside reserved bus lane westbound along E. and W. Wisconsin Avenue between N. 6th Street and N. Prospect Avenue, and eastbound on a reserved bus lane on E. and W. Wells Street between N. Prospect Avenue and N. 10th Street. The express bus service would operate throughout the day in both directions.

This alternative combines a relatively high level of transit service with a relatively low capital cost through the intensive use of existing street and highway facilities. Therefore, it serves as the transportation system management (TSM) alternative for the study and, according to Urban Mass Transportation Administration (UMTA) guidelines, is to be used as a basis for evaluating the other alternatives. In addition, freeway flyer buses using an operationally controlled freeway system would provide nonstop service from both the Northridge Shopping Center area park-ride lot and the W. Good Hope Road park-ride lot to the Milwaukee central business district on weekdays throughout the day.

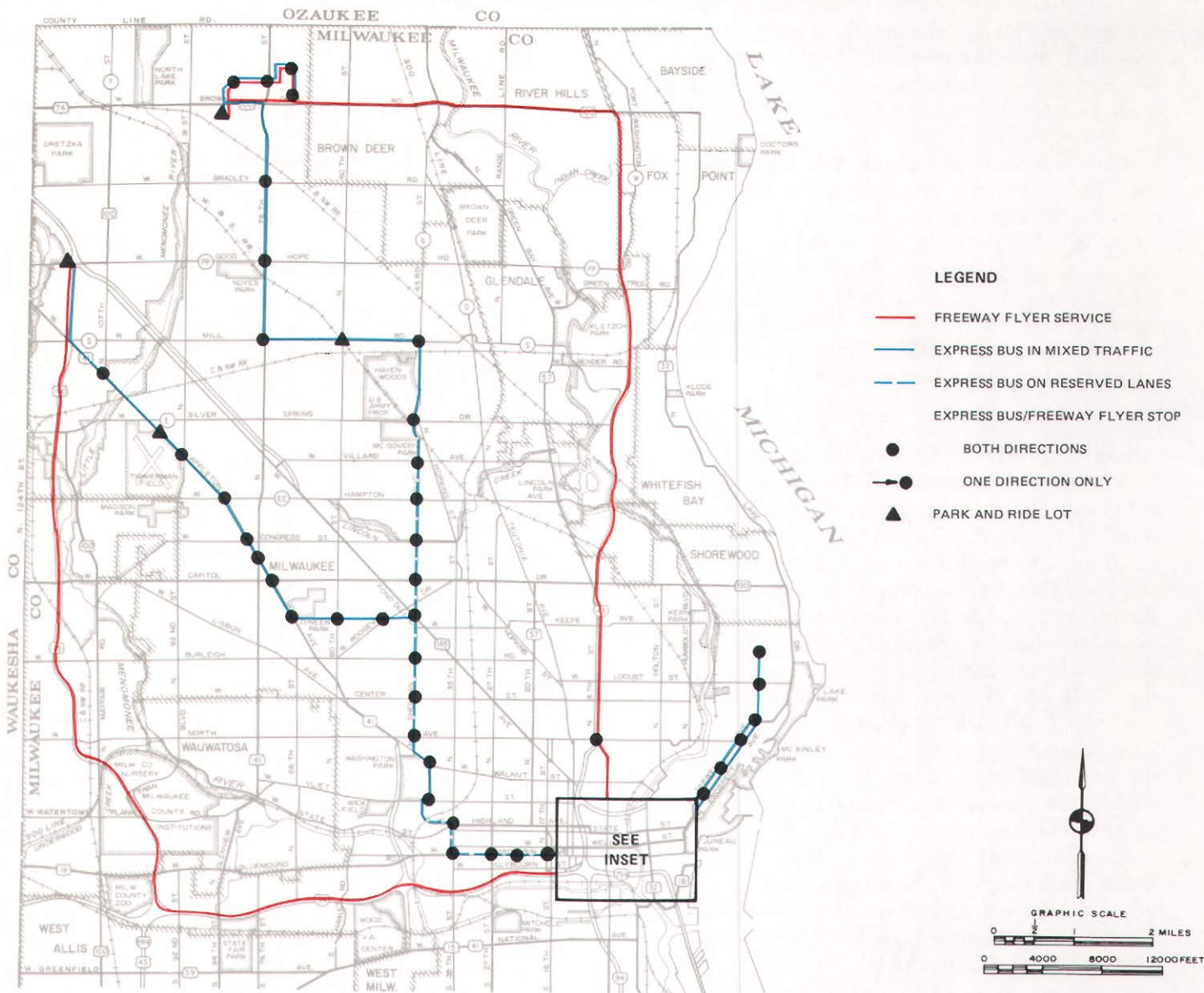
Light Rail Transit Alternatives

Three basic light rail transit alternatives were developed and are identified herein as Alternatives 3A, 3C, and 3E. All have truncated variations, identified as 3B, 3D, and 3F. These alternatives propose the use of electrically powered, reversible, six-axle, articulated light rail vehicles capable of operating either as a single unit or coupled into a multi-car consist, drawing electrical power from overhead lines using a pantograph to provide rapid transit service in the corridor. The light rail vehicles can operate over exclusive rights-of-way or on public streets over reserved lanes, or in mixed traffic. All alternatives considered would operate at-grade, using existing rights-of-way, including public streets and railway rights-of-way. At locations where the light rail line crosses streets and highways at-grade, preferential treatment of the light rail vehicles would be provided.

The type of light rail line envisioned under these alternatives is similar to the light rail lines currently operating in Pittsburgh, Boston, San Diego, and Calgary; under construction in Portland and San Jose; and in advanced stages of planning for Dallas

Map 5

ALTERNATIVE 2A: EXPRESS BUS ON RESERVED LANES—N. SHERMAN BOULEVARD



Source: SEWRPC.

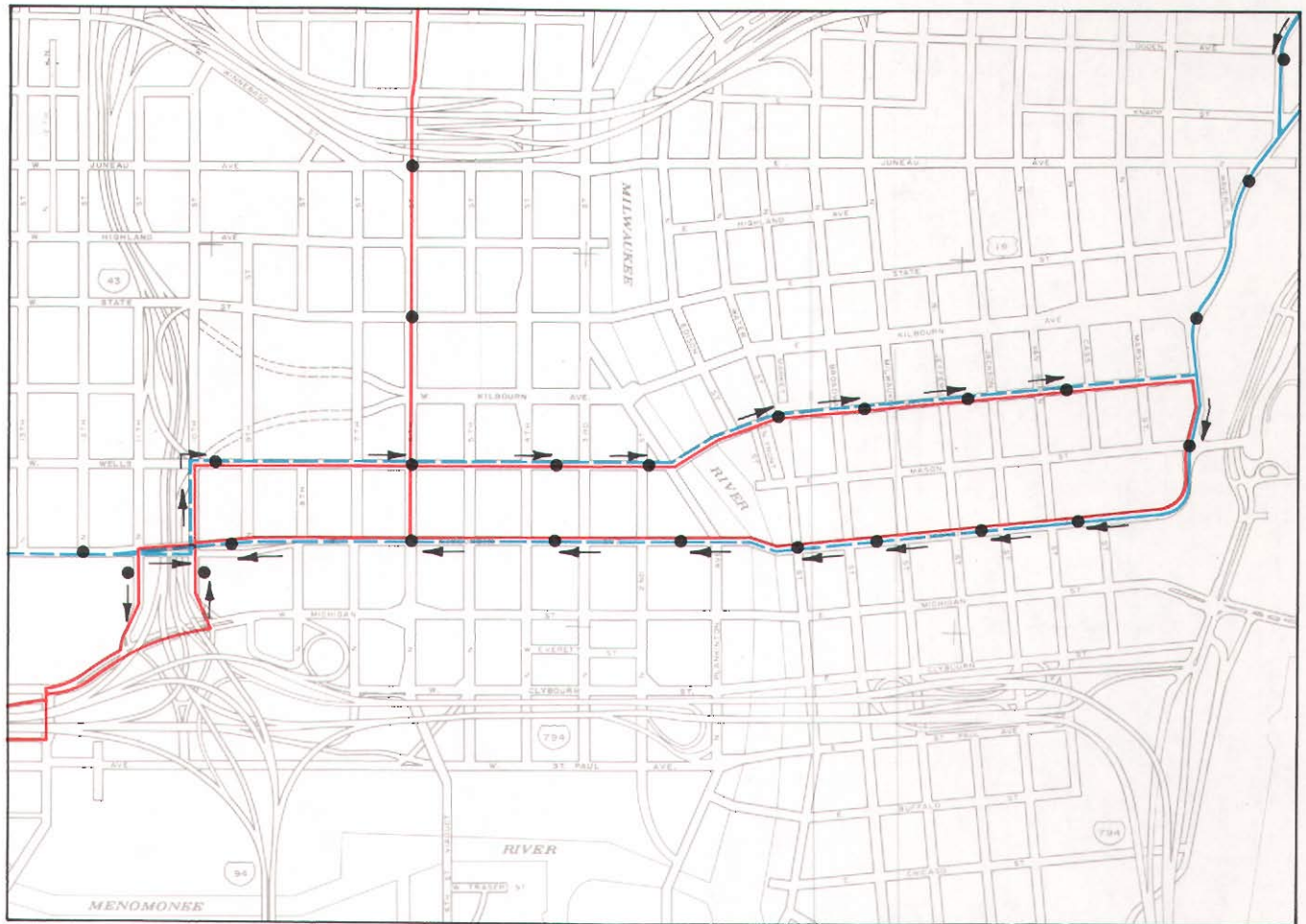
and St. Louis. Examples of the manner in which light rail would operate under these alternatives are illustrated in Figure 2.

The three basic light rail alternatives include the following:

Alternative 3A: Alternative 3A consists of a new light rail line between the Milwaukee central business district and N. 84th Street and W. Brown Deer

Road near the Northridge Shopping Center. The line would be located along W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, W. Lisbon Avenue, N. Sherman Boulevard, the Wisconsin & Southern Railroad Company right-of-way, and the Wisconsin Electric Power Company right-of-way, as shown on Map 8. Feeder express bus service would be provided from the light rail line to the park-ride lots located at W. Good Hope Road and USH 45, and at Timmerman

Map 5 Inset



Field; to the University of Wisconsin-Milwaukee campus; and throughout the Northridge Shopping Center area around N. 76th Street and W. Brown Deer Road. Two other park-ride lots would be located on the light rail line, one at N. 60th Street and W. Mill Road and the other at N. 84th Street and W. Bradley Road.

In the Milwaukee central business district, E. and W. Wisconsin Avenue between N. Jackson Street and N. 6th Street would be converted to a two-way transit mall for the exclusive use of pedestrians, light rail transit vehicles, buses, and emergency vehicles. The light rail line would terminate in

downtown Milwaukee on a turnaround loop which would begin at E. Wisconsin Avenue and N. Jackson Street, and use N. Jackson Street, an off-street terminal on land located just north of E. Clybourn Street, N. Van Buren Street, and E. Wisconsin Avenue back to N. Jackson Street.

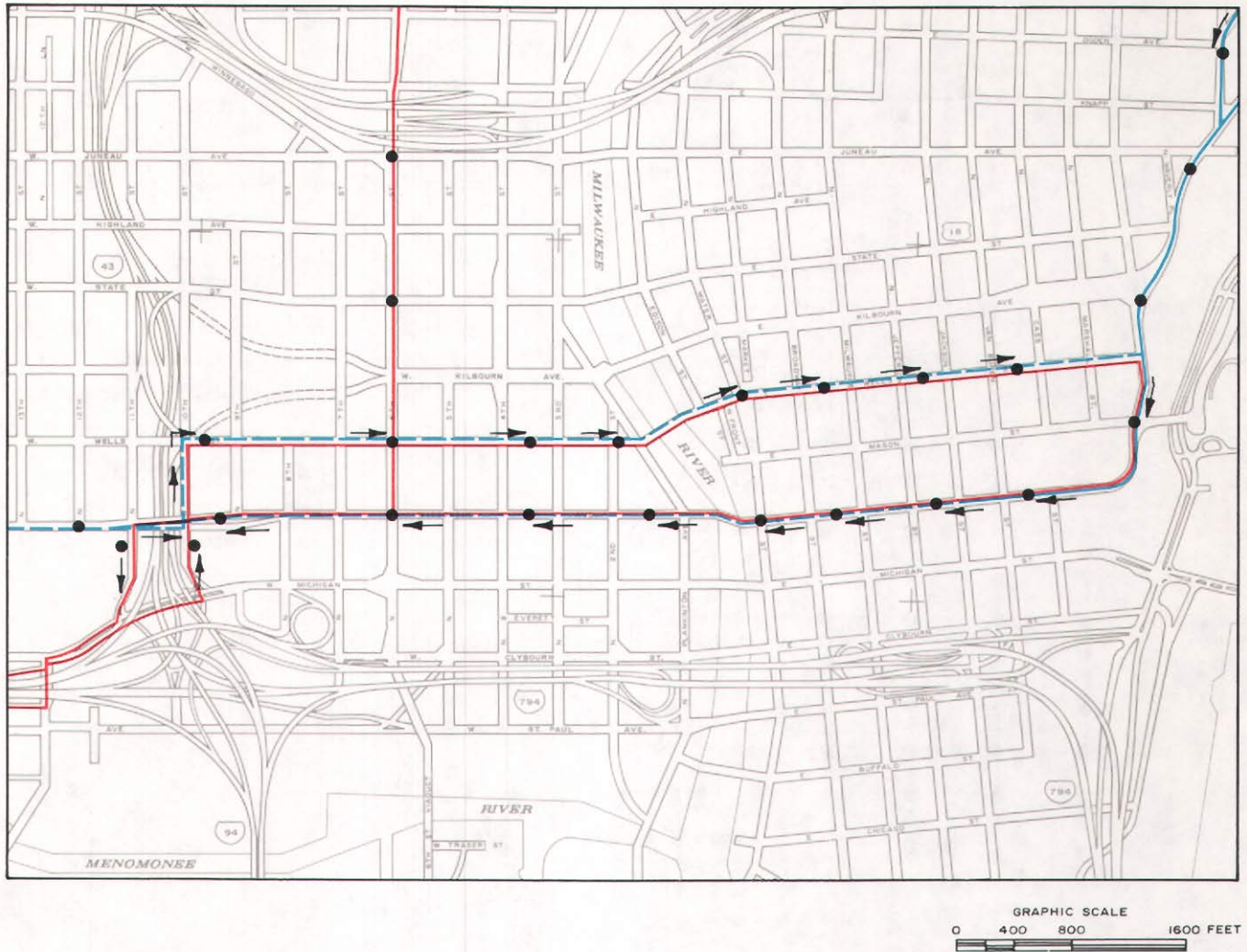
A variation of this alternative, identified as Alternative 3B, consisting of a new light rail line and attendant feeder bus service, is identical to Alternative 3A except that the light rail line would terminate at W. Mill Road, with additional express feeder bus service to the Northridge Shopping Center area also examined.

ALTERNATIVE 2B: EXPRESS BUS ON RESERVED LANES—N. FOND DU LAC AVENUE



In the Milwaukee central business district, a transit mall and turnaround loop would be provided for the light rail line identical to that described for Alternative 3A.

Map 6 Inset



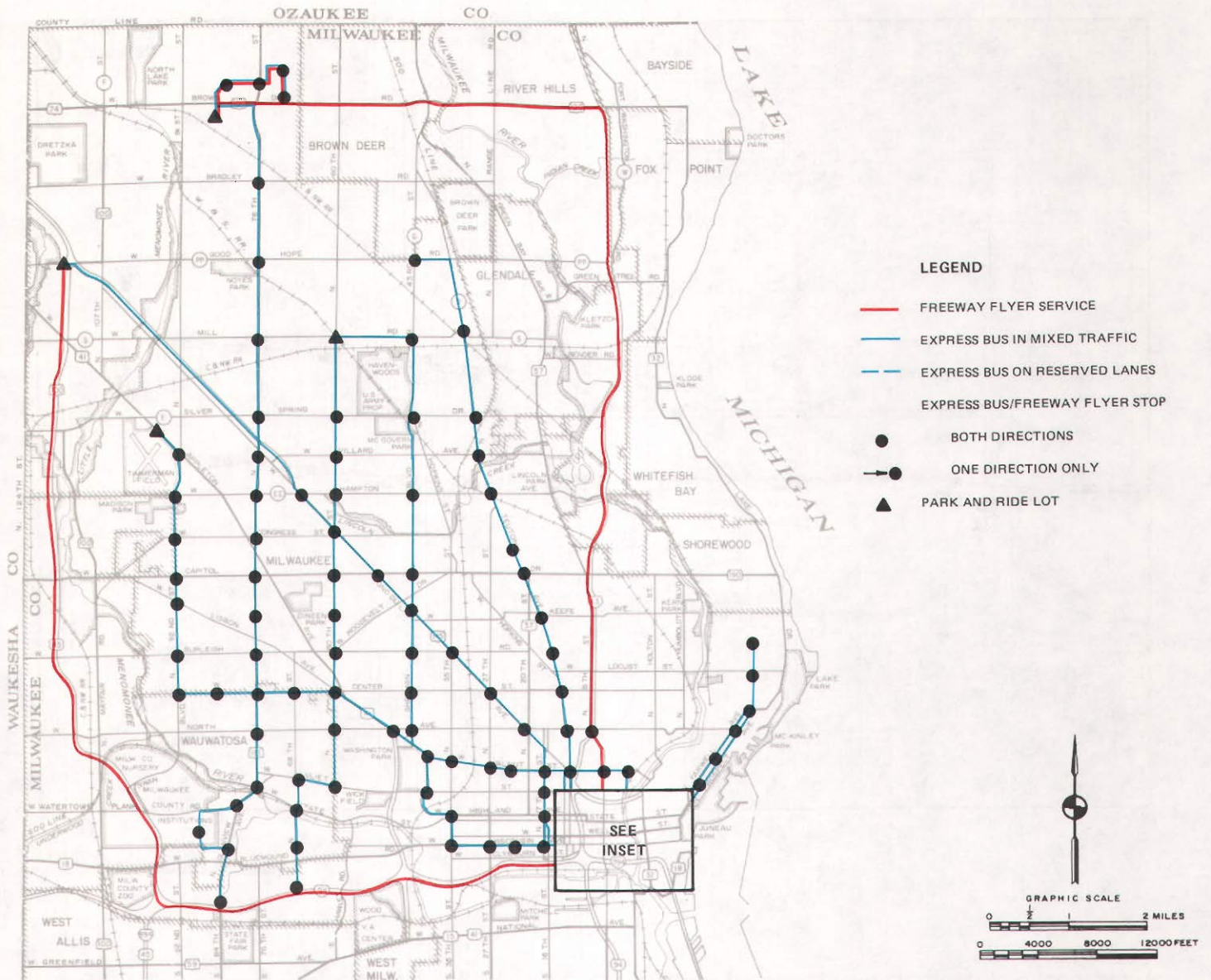
A variation of this alternative, identified as Alternative 3D, consisting of a new light rail line and feeder bus service, is identical to Alternative 3C except that the light rail line would terminate at W. Mill Road, with additional express feeder bus service to the Northridge Shopping Center area also examined.

A second variation of Alternative 3C, identified as Alternative 3CL, would extend to W. Brown Deer Road as would Alternative 3C. However, Alternative 3CL would provide "true" rapid transit service to the outlying portion of the corridor by limiting the number of stations along the route to 15 at generally a two-mile spacing outside the central

business district. This compares with the 25 stations which would be provided under Alternative 3C at generally a one-half-mile spacing outside the central business district except for the far northwest side, where one-mile spacing would be provided. Alternative 3CL would reduce line-haul transit travel times to the central business district from the outlying portion of the corridor from about 35 to 28 minutes. The disadvantage of Alternative 3CL is that it would be largely inaccessible to the central and inner portions of the corridor, where the need for public transit is greatest, and where the overall use of public transit is much greater because of the location and density of development and resident socioeconomic characteristics.

Map 7

ALTERNATIVE 2C: ADDITION OF EXPRESS BUS SERVICE TO MAJOR TRANSIT ROUTES

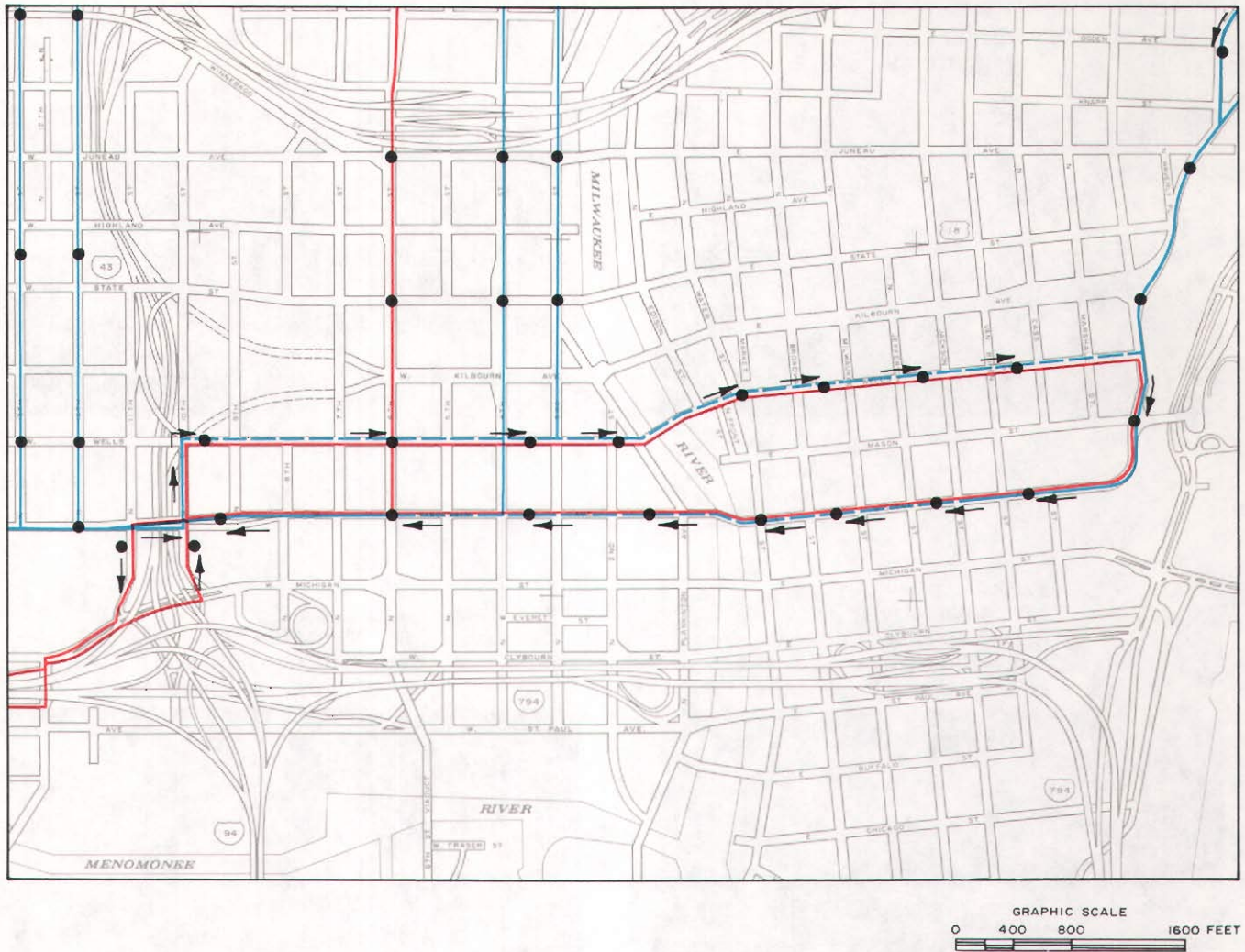


Source: SEWRPC.

Alternative 3E: Alternative 3E consists of a new light rail line between the Milwaukee central business district and W. Brown Deer Road and N. 84th Street along E. and W. Wisconsin Avenue, N. 16th and 17th Streets, W. Fond du Lac Avenue, the right-of-way originally cleared for construction of the Park-West Freeway, the Soo Line Railroad Company N. 33rd Street railway right-of-way, W. Fond du Lac Avenue again, N. 60th Street, the

Wisconsin & Southern Railroad Company right-of-way, and the Wisconsin Electric Power Company right-of-way. This alternative is shown on Map 10. The location of park-ride lots, and express feeder bus service from the light rail line to those park-ride lots and to the University of Wisconsin-Milwaukee campus and the Northridge Shopping Center area, would be the same as under Alternative 3A.

Map 7 Inset



In the Milwaukee central business district, a transit mall and turnaround loop would be provided for the light rail line identical to that described for Alternative 3A.

A variation of this alternative, Alternative 3F, consisting of a new light rail line and feeder bus services, is identical to Alternative 3E except that the line would terminate at W. Mill Road and N. 60th Street, with additional express feeder bus service to the Northridge Shopping Center area also examined.

Other Route Options: A number of route options exist under the rapid transit improvement alternatives. Under the bus rapid transit alternatives, there

was one option for the location of express bus routes in the central business district. This option included the use of E. and W. Wisconsin Avenue for operation of the express and freeway flyer buses in both directions instead of the operation of such buses eastbound on E. and W. Wells Street, and westbound on E. and W. Wisconsin Avenue.

There were a number of route options throughout the northwest corridor for the light rail alternatives. In the central business district, there were two such options: the use of E. and W. Wells Street, N. Van Buren Street, and E. and W. Wisconsin Avenue for a downtown loop, and the operation of the light rail line in mixed traffic on Wisconsin Avenue, terminating on E. Wisconsin Avenue

Figure 2

EXAMPLES OF LIGHT RAIL OPERATION

OPERATION
IN TRANSIT MALL



OPERATION
IN MIXED TRAFFIC



OPERATION OVER
RESERVED LANES OR
IN MEDIAN AREA



OPERATION ON
RAILROAD RIGHT-OF-WAY



Source: SEWRPC.

between N. Jackson and N. Cass Streets, with no turnaround loop. Both these options would be lieu of operating the light rail line on Wisconsin Avenue in a pedestrian/transit mall.

In the near north side of the northwest corridor, there were two route options for the location of a light rail line. These included the use of N. 16th and 17th Streets and W. Highland Boulevard

between N. 7th Street and N. 35th Street, instead of W. Wisconsin Avenue and N. 35th Street; and the use of W. Fond du Lac Avenue between N. 20th Street and the Soo Line Railroad Company's N. 33rd Street right-of-way instead of the right-of-way cleared for the once-planned Park Freeway-West. The Fond du Lac Avenue option included operation of a light rail line either in mixed traffic or in reserved lanes, which would require the widening of W. Fond du Lac Avenue.

In the far northwest section of the corridor, a route option for the location of the light rail line included the use of N. 76th Street instead of the Wisconsin Electric Power Company right-of-way north of approximately W. Good Hope Road.

Alternatives Dismissed from Further Consideration: A number of alternatives were considered but rejected from further examination under this study either on the basis of the findings of previous studies or on the basis of preliminary analyses under this study. These alternatives fell into one of two categories. The first category consisted of those alternatives found not to be promising technologically; the second category consisted of those alternatives found not to be promising because of the particular route alignment involved. The first category included heavy rail rapid transit, commuter rail, exclusive busways, electric trolley buses, dual mode transit, monorails, and moving sidewalks.² The second category included a light rail facility between the Amtrak station in downtown Milwaukee and the northwest side of Milwaukee, located on existing mainline railway rights-of-way over the entire length. Also included in the second category were two combination light rail and express bus alternatives, as shown on Map 11.³

RELATIONSHIP TO OTHER TRANSIT IMPROVEMENTS IN THE MILWAUKEE AREA

The alternatives examined under this study are intended to provide a significantly improved level of public transit service to the northwest side of Milwaukee County. This corridor, however, represents but a portion of the greater Milwaukee area, making it necessary to consider the improvements proposed under this study within the context of all the transit improvements that are recommended for implementation over the next 15 years in the greater Milwaukee area. This is necessary, as the

²See SEWRPC Technical Report No. 24, State-of-the-Art of Primary Transit System Technology, and SEWRPC Planning Report No. 33, A Primary Transit System Plan for the Milwaukee Area.

³See Parsons Brinckerhoff Quade & Douglas, Inc., Milwaukee Northwest Corridor Rapid Transit Study Report No. 10, Description of Alternatives, and SEWRPC, A Scoping Report for Detailed Planning of Rapid Transit Improvements in the Milwaukee Northwest Corridor.

travel patterns of the northwest side and the rest of the greater Milwaukee area are not independent of each other, and transit improvements must, therefore, be planned within the context of an areawide system. Also, the cost of the major transit improvements proposed for the northwest corridor should be considered within the context of the financial resources necessary to implement all the transit improvements proposed to be made in the Milwaukee area over the next 15 years.

The adopted regional transit system plan, as shown on Map 12, recommends a modest expansion of local transit service to those areas of Milwaukee County expected to be fully developed to urban densities by the year 2000, including the far north and south sides of Milwaukee County.⁴ Bus rapid transit service operating between the Milwaukee central business district and outlying park-ride lots is also recommended to be expanded from the present system serving 23 park-ride lots to a system of 57 park-ride lots.

By the year 2000, the expansion of transit service outside the northwest corridor may be expected to result in 3.1 million to 4.3 million additional revenue bus-miles of service in the Milwaukee area annually, or a 20 percent increase in area bus-miles of service. This increase will require the addition of 28 to 55 buses to the present bus fleet of 535 vehicles.

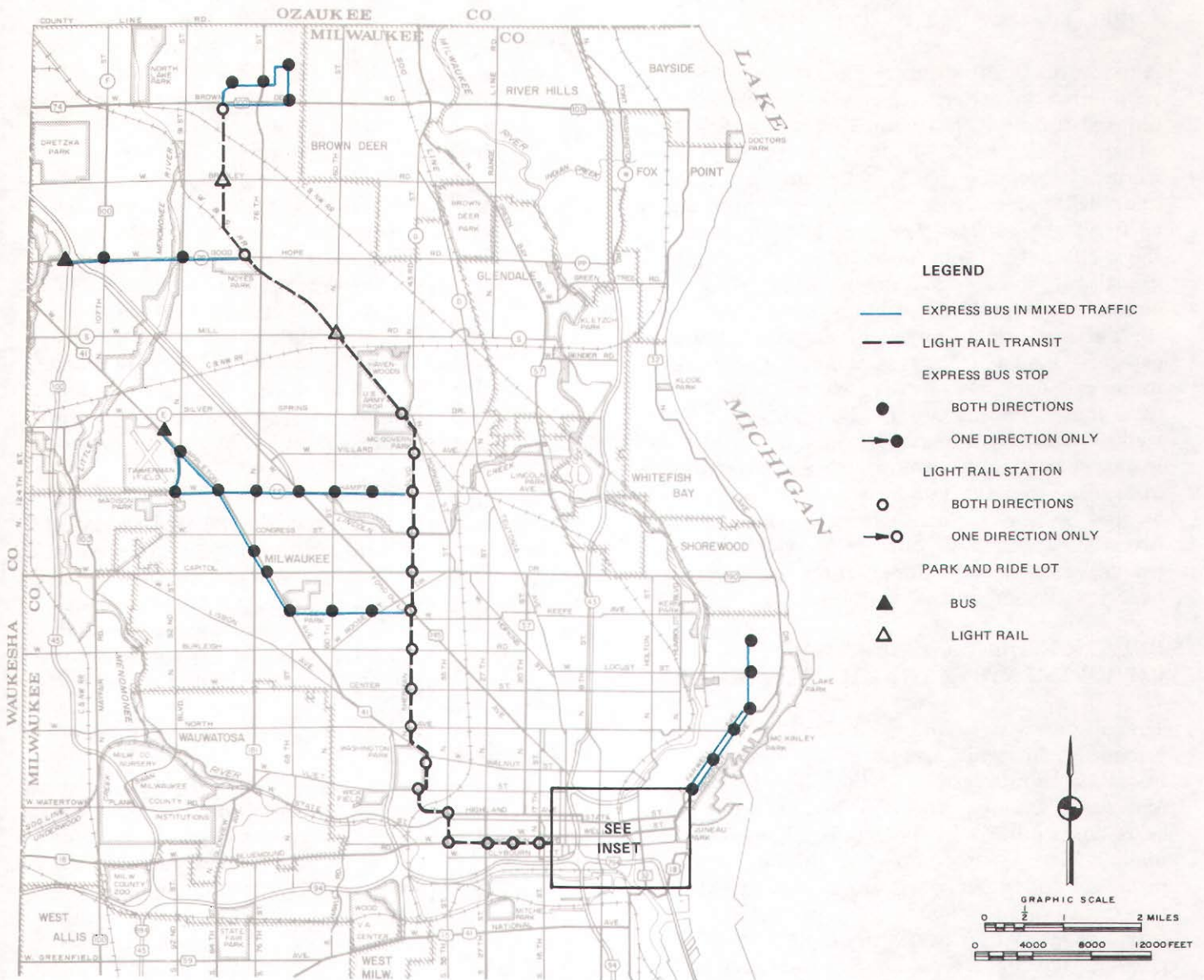
SUMMARY

This planning report presents the findings of a study of alternative rapid transit improvements for northern Milwaukee County, and documents the alternative improvements recommended for adoption and implementation. The Milwaukee northwest corridor rapid transit study was undertaken by Milwaukee County to determine whether light rail or express bus transit improvements could better alleviate the transportation problems of, and help meet the transportation and community development and redevelopment needs within, northern Milwaukee County. Previous areawide transit studies had concluded that express buses and light rail were the most promising alternatives for improving public transit service in Milwaukee County, and recommended further study to

⁴See SEWRPC Planning Report No. 33, A Primary Transit System Plan for the Milwaukee Area.

Map 8

ALTERNATIVE 3A: LIGHT RAIL—N. SHERMAN BOULEVARD



Source: SEWRPC.

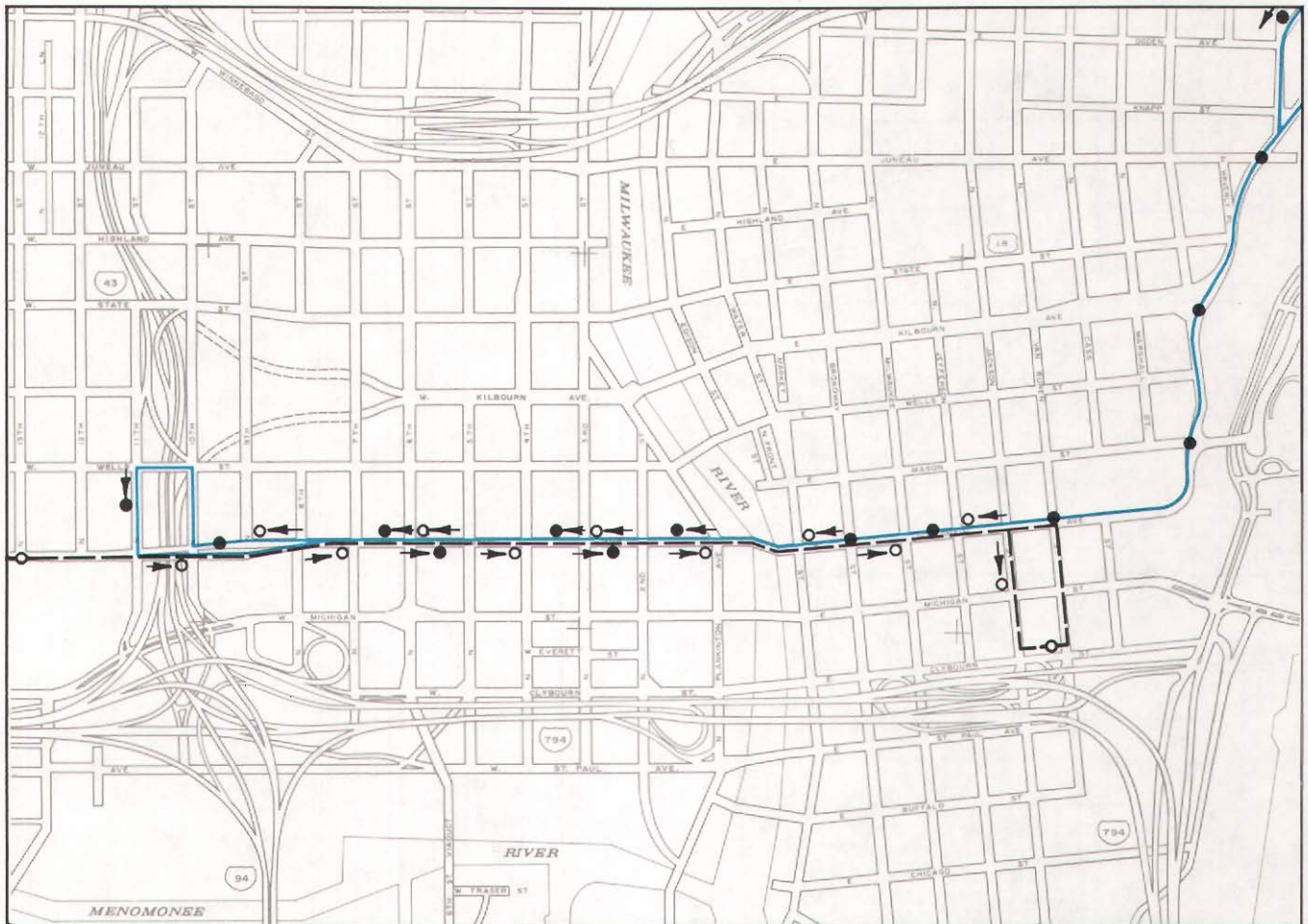
establish the relative costs and benefits of these two alternatives in the northern part of the County, particularly the intangible benefits such as the potential of light rail transit to promote land development and redevelopment.

The Milwaukee northwest corridor study area is a 78-square-mile area extending from the City of Milwaukee central business district to the northwest section of Milwaukee County. The need for a rapid transit improvement in the northwest corridor of Milwaukee County is comprehensive and is related

to a series of problems in the corridor, including inadequate transportation system capacity, inadequate levels of transportation service, and transit system inefficiencies. The need is also related to broader urban concerns, including the need to guide and shape land use development and redevelopment in the public interest. These needs are summarized below:

- Additional transportation system capacity— Additional transportation capacity through improved public transit services and facilities

Map 8 Inset



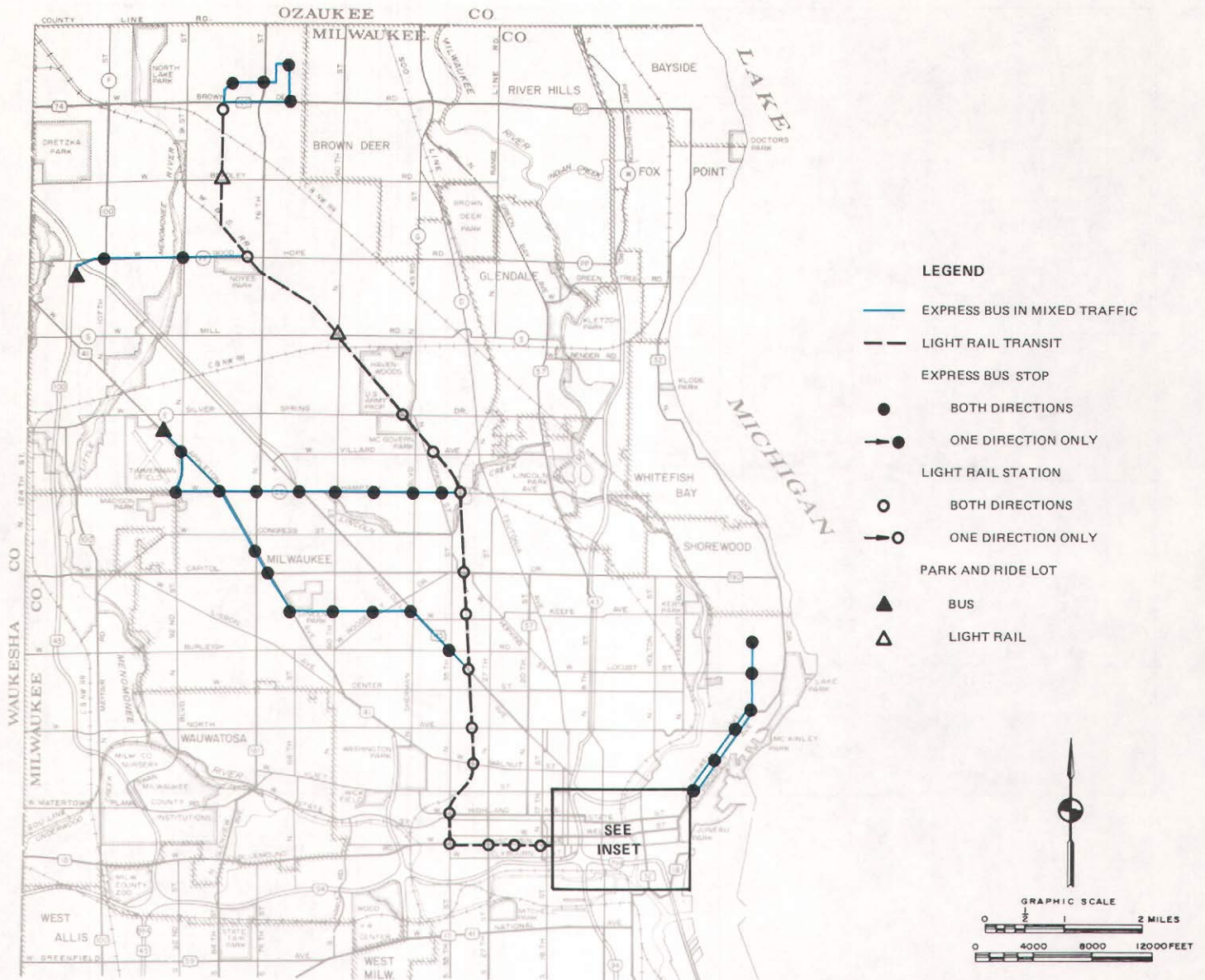
ties, including a major rapid transit improvement, is necessary to serve existing and future travel within the corridor over the next 15 years in the absence of the once-planned Park Freeway-West and Stadium Freeway-North, and the widening of existing arterial streets which would entail substantial community disruption through property acquisition.

- Improved level of transportation service—A major rapid transit improvement is necessary to improve the level of transportation service

for transit riders who are limited to using local bus routes that must travel through a densely developed area where severe traffic congestion occurs during weekday peak travel periods. Automobile drivers and passengers are also restricted to the same system of local streets because of the absence of any freeway facilities. Both transit travel and automobile travel in the corridor are subject to traffic congestion, inefficient operating speeds, and frequent stops, conditions which may be expected to become more severe over the next 15 years.

Map 9

ALTERNATIVE 3C: LIGHT RAIL—N. 33RD STREET RAILWAY

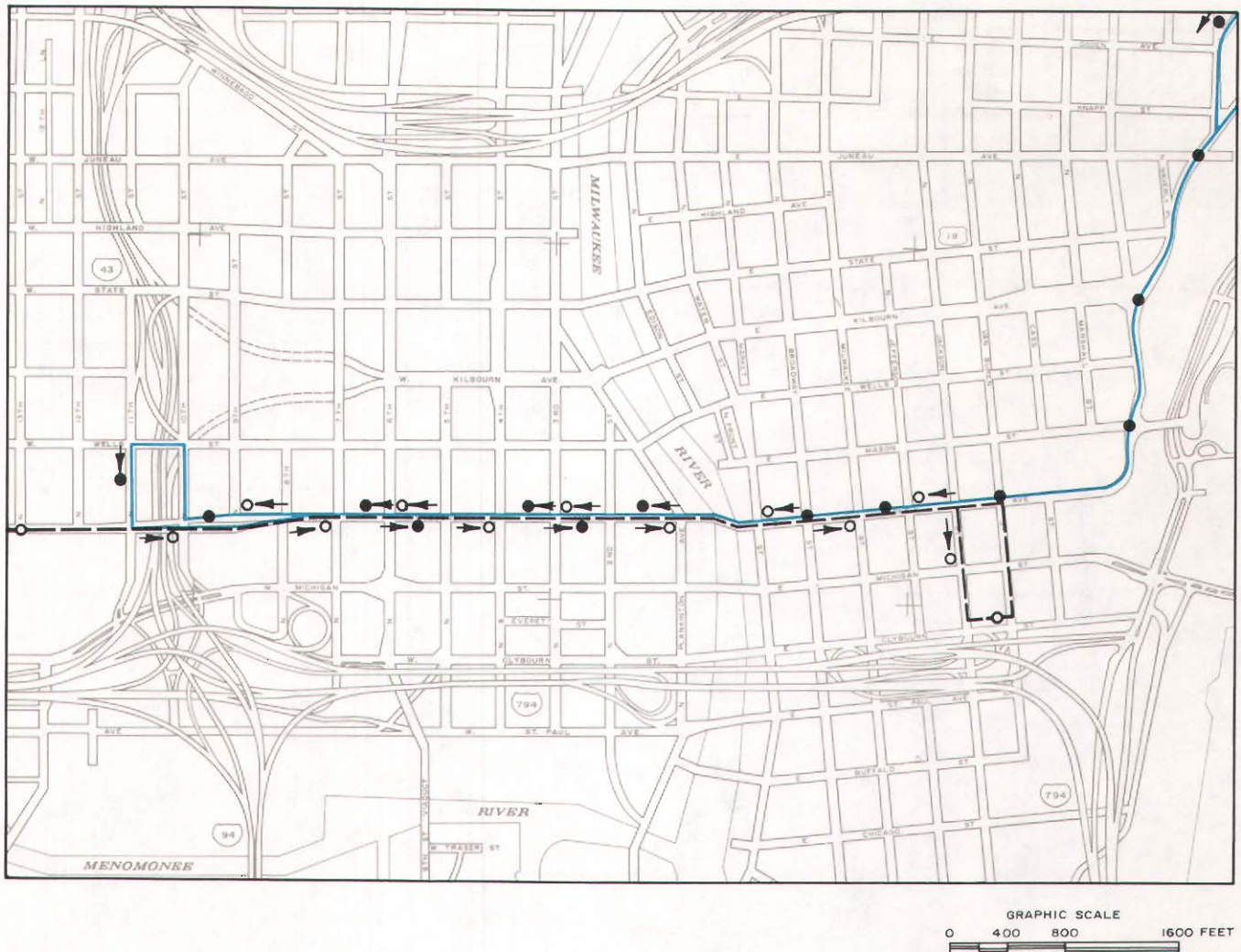


Source: SEWRPC.

- **Increased public transit system efficiency**—A major rapid transit improvement is necessary to shift transit passengers from local bus routes to a high-quality, high-speed transit service with increased average trip speed, shorter trip times, and lower operating costs per passenger in high-volume travel corridors such as the northwest corridor.
- **Other benefits**—A major rapid transit improvement is necessary because it has the

potential to directly and indirectly provide the following benefits to the northwest corridor: 1) reduced utilization of, and investment in, the arterial street and highway system; 2) reduced automobile parking needs; 3) reduced dependence on petroleum-based fuels; and 4) assistance in reducing harmful air pollutants and annoying noise. Such an improvement would also positively influence urban land use development and redevelopment.

Map 9 Inset



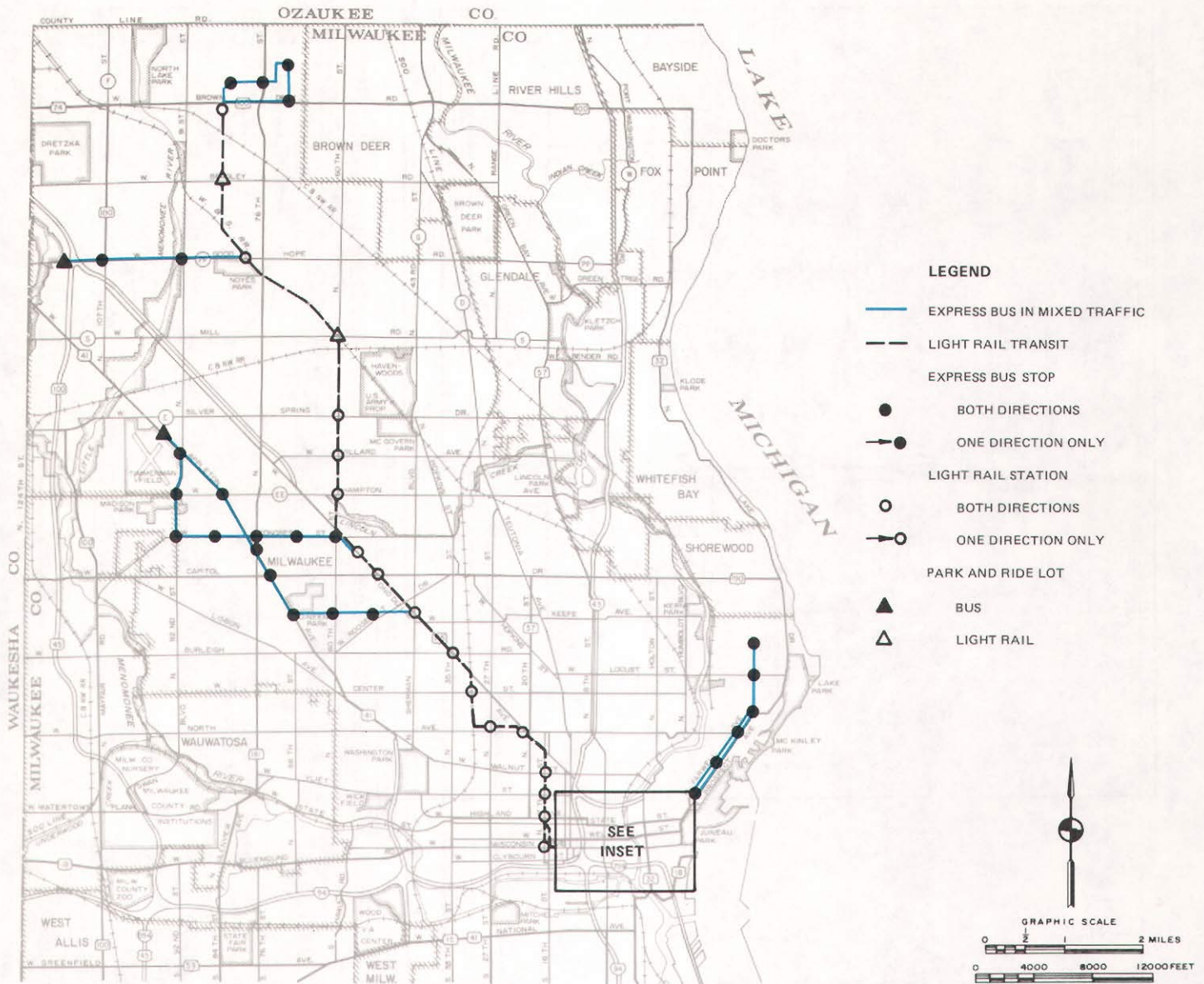
A major rapid transit improvement would provide the corridor with an integrated, better balanced transportation system providing the types of services that are needed in the area. Failure to provide such an improvement will continue to deprive the corridor of an adequate level of transportation service.

Six basic alternative rapid transit improvements in the Milwaukee northwest corridor were examined in detail. The six alternative included three express bus alternatives and three light rail transit alternatives. In addition, a "no build" alternative, which assumed the continued operation of the existing

public transit system, was considered. This alternative, which included only a limited amount of express bus and "freeway flyer" service during weekday peak periods, provided a basis for the evaluation of the impacts of the other alternatives. A number of alternatives were considered but rejected from further examination under this study, either on the basis of the findings of previous studies or on the basis of analyses under this study. A number of such alternatives were found not to be technically sound for further consideration at this time, including heavy rail rapid transit, commuter rail, exclusive busways, electric trolley buses, dual mode transit, monorails, and moving sidewalks.

Map 10

ALTERNATIVE 3E: LIGHT RAIL-FOND DU LAC AVENUE

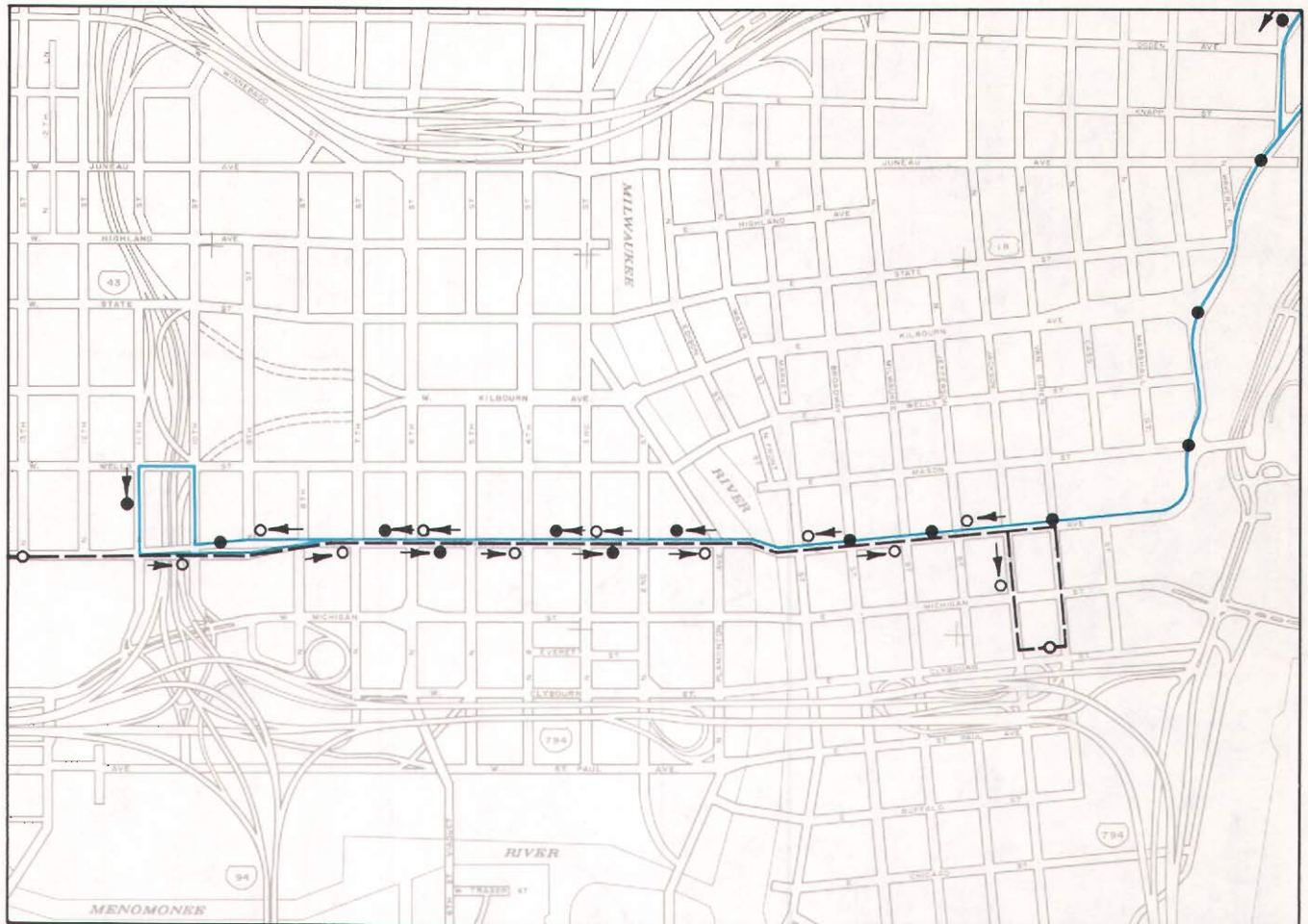


Source: SEWRPC.

The three express bus alternatives would provide for the operation of high-capacity, articulated diesel motor buses, as well as standard diesel motor buses, making only a limited number of stops between the Milwaukee central business district and four outlying park-ride lots in the northwest side of Milwaukee County. Two of the alternatives would operate over a downtown transit mall and over substantial segments of reserved lanes on arterial streets. The first alternative would reflect a

major improvement to the existing Bus Route No. 30, with service concentrated along W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard prior to the route splitting into two branches to serve the northwest side of Milwaukee County. The second alternative would reflect a major improvement to the existing Bus Route No. 23, with service concentrated along W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue prior to

Map 10 Inset



the route splitting into four branches to serve the northwest side of Milwaukee County. The third alternative would entail the addition of express bus service to six existing bus routes—Nos. 12, 23, 30, 57, 67, and 76. Unlike the first two alternatives, the third alternative would not concentrate express service on a single route, but would provide such service over a number of routes. The buses would operate in mixed traffic, with reserved lanes being provided only in the Milwaukee central business district, the routing there being over E. and W. Wisconsin Avenue.

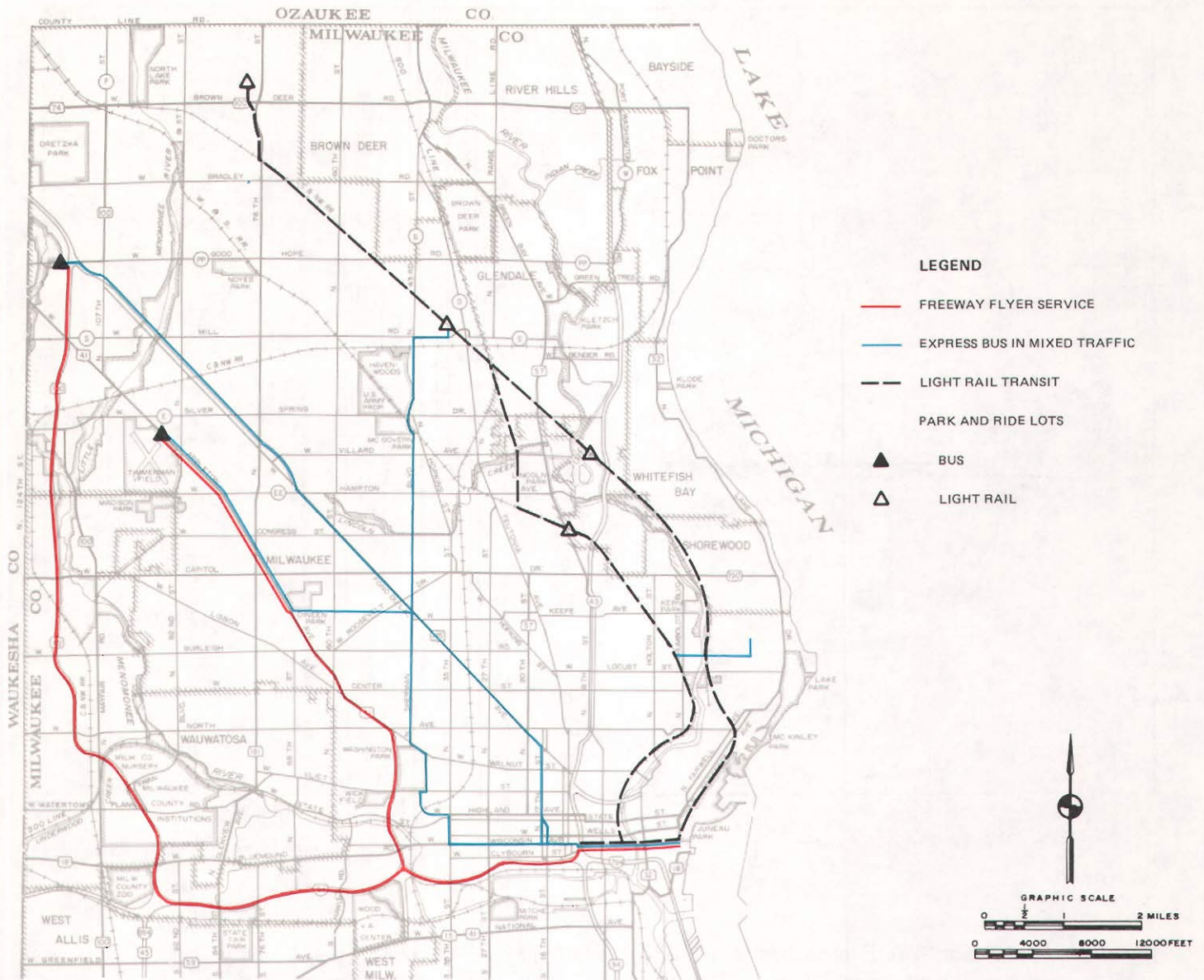
All three express bus alternatives would provide for the continuation of local bus service along the routes to be improved, as well as all-day freeway

flyer service over operationally controlled freeways, providing nonstop service from selected outlying park-ride lots to the Milwaukee central business district. Under each of the three express bus alternatives, service would be provided over routes east and north of the Milwaukee central business district to the University of Wisconsin-Milwaukee campus. Under these alternatives, optional bus routing schemes in the Milwaukee central business district were examined.

The three light rail transit alternatives would provide for the operation of electrically powered, reversible, six-axle articulated light rail vehicles, capable of operating either as a single unit or coupled together into a multi-car consist and

Map 11

COMBINATION ALTERNATIVES DISMISSED FROM FURTHER CONSIDERATION



Source: SEWRPC.

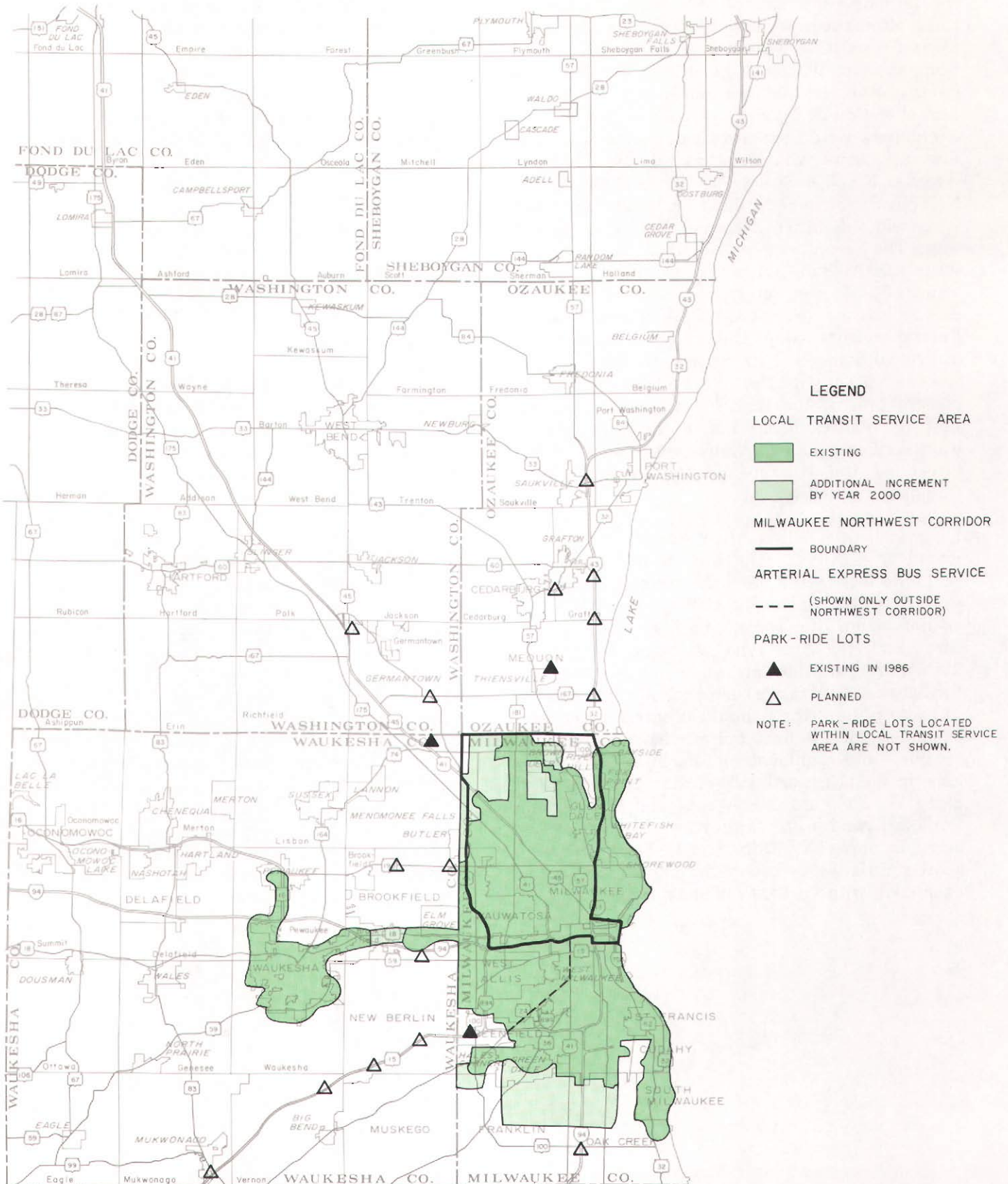
drawing electrical power from overhead wires. The light rail vehicles would operate over a combination of rights-of-way, including mixed traffic operation on public streets, reserved lanes in public street rights-of-way such as in median areas, and exclusive rights-of-way. All the rights-of-way used would be existing, requiring little acquisition of new right-of-way. At locations where the light rail line crosses streets and highways at-grade, preferential treatment of the light rail vehicles would be provided. The type of light rail line envisioned

under these alternatives is similar to the light rail lines currently operating, under construction, or in advanced stages of planning in a number of North American cities.

Each of the three alternatives consists of a double-track light rail line between the Milwaukee central business district and the northwest side of Milwaukee County in the vicinity of N. 84th Street and W. Brown Deer Road near the Northridge Shopping Center. In the central business district, all three

Map 12

**EXTENT OF PUBLIC TRANSIT SERVICES IN THE YEAR 2000 FOR THE
GREATER MILWAUKEE AREA IN THE MILWAUKEE NORTHWEST CORRIDOR**



Source: SEWRPC.

alternatives would use E. and W. Wisconsin Avenue, which would be converted to a transit mall; and in the far northwest side of Milwaukee County, all three alternatives would use the same alignment along the existing Wisconsin & Southern Railroad Company and Wisconsin Electric Power Company rights-of-way. In the near north side and north-central section of the corridor, each of the light rail alternatives would use a different alignment. The first alternative would continue on W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard to the Wisconsin & Southern Railroad Company right-of-way. The second alternative would continue on Wisconsin Avenue, but would use the former Milwaukee Road—now Soo Line—N. 33rd Street right-of-way to the Wisconsin & Southern Railroad Company right-of-way. The third alternative would use N. 16th and N. 17th Streets, W. Fond du Lac Avenue, the right-of-way originally cleared for construction of the Park Freeway-West, the Soo Line Railroad Company's N. 33rd Street right-of-way, W. Fond du Lac Avenue again, and N. 60th Street to the Wisconsin & Southern Railroad Company right-of-way.

Under all three alternatives, express bus service would be provided from the light rail line to two park-ride lots in the northwest side of Milwaukee County, to the University of Wisconsin-Milwaukee campus from the central business district, and throughout the Northridge Shopping Center area. Two more park-ride lots would be located along the light rail lines under each alternative. A number of route options throughout the corridor were also examined for the light rail alternatives, including various route alignment options in the downtown area, in the near north side portion of the corridor along W. Fond du Lac Avenue and W. Highland Boulevard, and in the far northwest section of the corridor along N. 76th Street. Furthermore, a shorter variation of each light rail alternative was examined, with the light rail line terminating in the

vicinity of N. 60th Street and W. Mill Road, and with express bus service extending north to the Northridge Shopping Center area. In addition, a number of light rail alternatives were considered but rejected from further examination, including lines located on existing mainline railway rights-of-way over the entire distance, and combination light rail and express bus alternatives, whereby the light rail line would be located primarily outside the corridor.

This planning report, which documents the alternative recommended for adoption and implementation in the Milwaukee northwest corridor, is one of two major reports prepared under this study. The other is the environmental assessment report prepared by the consulting firm of Parsons Brinckerhoff Quade & Douglas, Inc., which documents the findings of the assessment of the potential environmental impacts and the costs and benefits; broadly defined, of the alternatives considered. The technical reports prepared by Parsons Brinckerhoff Quade & Douglas, Inc., under this study include Milwaukee Northwest Corridor Rapid Transit Study Reports No. 1, Detailed Study Design; No. 3, Operating and Maintenance Cost Estimation and Analysis Procedures; No. 4, Capital Cost Estimations and Analysis Procedures; No. 5, Financial Analysis Procedures; No. 6, Alternative Plan Evaluation Methodology; No. 7, Environmental Analysis Methodologies; No. 8, Public Involvement Procedures; No. 9, Land Development and Redevelopment Assessment Procedures; No. 10, Descriptions of Alternatives; No. 11, Design Standards and Criteria; No. 12, Preliminary Operating Plans for Alternatives; No. 13, Final Alternatives and Operating Plans; No. 14, Operating and Maintenance Cost Estimates; No. 15, Capital Cost Estimates; No. 16, Financial Plans; and No. 17, Land Development Potential Analysis. The Regional Planning Commission prepared Milwaukee Northwest Corridor Rapid Transit Study Report No. 2, Travel Simulation Models.

Chapter II

ALTERNATIVE EVALUATION AND SELECTION OF PREFERRED ALTERNATIVES

INTRODUCTION

The rapid transit alternatives described in Chapter I were carefully analyzed to determine their performance, costs, and impacts. Ridership estimates were prepared for each alternative using travel simulation models developed, calibrated, and validated by the Commission.¹ Based upon these forecasts, final operating plans were developed which defined the level of service provided by, and the operating characteristics and equipment requirements of, each alternative.² Capital and operation and maintenance costs were subsequently developed using information provided by the final operating plans,³ and by the plans and profiles for the light rail alternatives. A special analysis was also conducted to determine the potential for each rapid transit technology considered—express bus or light rail—to induce or otherwise influence sound land development and redevelopment within the Milwaukee northwest corridor.⁴ Finally, the probable impacts of the alternatives on the transportation system and environment within the northwest corridor were identified in an environmental assessment. The

¹See SEWRPC Milwaukee Northwest Corridor Rapid Transit Study Report No. 2, Travel Simulation Models, December 1985.

²See Parsons Brinckerhoff Quade & Douglas, Inc., Milwaukee Northwest Corridor Rapid Transit Study Report No. 13, Final Alternatives and Operating Plans, June 1986.

³See Parsons Brinckerhoff Quade & Douglas, Inc., Milwaukee Northwest Corridor Rapid Transit Study Report No. 14, Operating and Maintenance Cost Estimates, July 1985; and Parsons Brinckerhoff Quade & Douglas, Inc., Milwaukee Northwest Corridor Rapid Transit Study Report No. 15, Capital Cost Estimates, July 1986.

⁴See Parsons Brinckerhoff Quade & Douglas, Inc., Milwaukee Northwest Corridor Rapid Transit Study Report No. 17, Land Development Potential Analysis, January 1986.

results of these analyses were used in the evaluation of the alternatives and the selection of preferred alternatives.

This chapter presents a comparative evaluation of the rapid transit alternatives considered. The evaluation of the alternatives was conducted in two steps. Under the first step, the express bus and light rail alternatives were comparatively evaluated separately to identify the best alternative among those proposed for each alternative transit technology. Under the second step, the best alternatives for the express bus and light rail technologies were comparatively evaluated to determine the preferred transit technology and routing alignment for major rapid transit improvements within the northwest corridor.

EVALUATION OF EXPRESS BUS ALTERNATIVES

The findings of the comparative evaluation of the three express bus alternatives and the “no build” alternative under both the optimistic and pessimistic futures are summarized in Table 2. The express bus alternatives were evaluated with respect to travel time savings; forecast transit ridership; capital costs, operating and maintenance costs, and operating deficits; and development and redevelopment impacts, environmental impacts, and arterial street and highway system impacts.

Alternative 2C—Transportation System Management Alternative

The evaluation indicates that Alternative 2C would have the lowest capital cost of the three express bus alternatives. That alternative proposes that express bus service be provided on several of the more heavily traveled existing local bus routes within the corridor, along with new or improved “freeway flyer” bus service from park-ride lots near the Northridge Shopping Center and the intersection of USH 45 and W. Good Hope Road, and transit service improvements and extensions throughout the remainder of the Milwaukee area. Under the pessimistic and optimistic futures, capital costs for Alternative 2C would range from

Table 2

**EVALUATION OF MILWAUKEE NORTHWEST CORRIDOR EXPRESS BUS
ALTERNATIVES: YEAR 2000 OPTIMISTIC AND PESSIMISTIC FUTURES**

Evaluation Measure	Alternative 1— Existing and Committed Transit System		Alternative 2A— N. Sherman Boulevard Express Bus Alignment		Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment		Alternative 2C— All Major Routes (TSM)	
	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future
Travel Time Savings								
• Net Decrease in Annual Transit Passenger Hours of Travel from Alternative 1 (no build) ^a	--	--	2,021,100	1,145,200	2,301,200	1,223,600	1,441,200	786,700
• Annual Value of Travel Time Saved ^b	--	--	\$ 6,221,500	\$ 3,744,300	\$ 6,846,300	\$ 3,821,000	\$ 4,452,800	\$ 2,580,200
Forecast Transit Ridership— Average Weekday Linked Revenue Passenger Trips ^c								
• Total Milwaukee Area	241,800	145,600	266,600	157,900	269,700	159,700	261,900	154,200
• Total Northwest Corridor ^d	120,500	70,200	131,400	75,400	133,400	76,700	127,000	72,800
• Total on Proposed North- west Corridor Rapid Transit Services ^e	8,500	5,600	57,600	35,600	62,300	35,700	49,300	29,200
Costs								
• Capital Cost Requirement to Design Year (1985 dollars)								
1. Total Incremental Costs Over Alternative 1	\$. ^g	\$. ^g	\$40,600,000	\$36,240,000	\$39,540,000	\$38,520,000	\$29,400,000	\$26,380,000
2. Average Annual Incre- mental Capital Cost ^h ^g	. ^g	3,880,000	3,440,000	3,770,000	3,710,000	3,260,000	2,950,000
• Total Systemwide Operating and Maintenance Cost Requirement in Design Year (1985 dollars) ^{i,j}	68,584,500	64,168,900	72,234,000	69,655,700	72,492,700	71,660,600	72,184,700	70,287,900
• Total Systemwide Annual Operating Deficit in Design Year (1985 dollars) ^j								
1. Total	25,049,200	38,496,300	23,359,500	41,481,300	23,016,400	43,331,400	24,187,800	42,795,100
2. Per Revenue Passenger	0.35	0.91	0.30	0.90	0.29	0.93	0.31	0.95

Evaluation Measure	Alternative 1— Existing and Committed Transit System		Alternative 2A— N. Sherman Boulevard Express Bus Alignment		Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment		Alternative 2C— All Major Routes (TSM)	
	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future
Land Development/ Redevelopment Impacts	None		None		None		None	
Environmental Impacts								
• Disruption								
1. Number of Structures Taken	None		None		None		None	
2. Land Acquisition	1.2-1.6 acres		7.2-11.8 acres		6.0-9.7 acres		5.2-8.9 acres	
• Noise								
1. Range of Noise Levels ^k at Sites Along Alternative Route Alignments	62.4-75.4 dba		62.7-73.4 dba		62.4-74.6 dba		62.4-73.9 dba	
2. Impact of Change in Noise Levels from No Build Alternative	--		None		None		None	
• Energy								
1. Average Annual Change in Total Transportation System Operating Energy Requirements from No Build Alternative								
a. Within Greater Milwaukee Area	-- ^l		19.1 billion BTU's/year		17.7 billion BTU's/year		53.5 billion BTU's/year	
b. Within Milwaukee Northwest Corridor	-- ^l		-44.4 billion BTU's/year		-45.6 billion BTU's/year		-17.0 billion BTU's/year	
2. Annual Transit System Energy Requirements for Vehicle Manufac- ture (billions BTU's)	32.8		38.6		38.9		38.6	
3. Total Transit System Energy Requirements for Transit Mall Con- struction (billions BTU's)	--		54.6		54.6		--	
• Air Quality—Maximum Reduction in Pollutant Emissions within Mil- waukee Area from No Build Alternative ^m								
1. Carbon Monoxide	--		947 tons/year		1,069 tons/year		765 tons/year	
2. Hydrocarbons	--		120 tons/year		136 tons/year		96 tons/year	
3. Nitrogen Oxides	--		32 tons/year		40 tons/year		18 tons/year	

Table 2 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 2A— N. Sherman Boulevard Express Bus Alignment	Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment	Alternative 2C— All Major Routes (TSM)
<ul style="list-style-type: none"> Acceptance by Residents and Business in Affected Areas. 	No significant opposition by area residents and businesses	Express bus route currently operated over small portion of proposed alignment on N. Sherman Boulevard. No significant opposition by area residents to improved bus service. Some concerns expressed by downtown merchants over conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall	Express bus route similar to that currently operated over most of proposed alignment on W. Fond du Lac Avenue. No significant opposition by area residents to improved bus service. Some concerns expressed by downtown merchants over conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall	Express bus route similar to that currently operated over small portion of proposed alignment on W. Fond du Lac Avenue. No significant opposition by area residents to improved bus service
Highway System Impacts <ul style="list-style-type: none"> Traffic and Parking Impacts of Reserved Lanes. 	--	Loss of curb lanes for traffic/parking during a.m. and p.m. peak traffic periods for use as reserved bus lanes along N. Sherman Boulevard between W. Lisbon Avenue and W. Silver Spring drive; W. Highland Boulevard from W. Juneau Avenue to N. 35th Street; E. and W. Wisconsin Avenue from N. 35th Street to N. 10th Street; and E. and W. Wells Street between N. 10th Street and N. Prospect Avenue. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street as street is converted to transit/pedestrian mall. Potential design capacity and congested operation of N. Sherman Boulevard from W. Lisbon Avenue to W. Capitol Drive, N. 35th Street from W. Highland Boulevard to W. State Street, and E. and W. Michigan Street and Wells Street in Milwaukee CBD	Loss of curb lanes for traffic/parking during a.m. and p.m. peak traffic periods for use as reserved bus lanes along W. Fond du Lac Avenue between N. 60th and N. 35th Streets; N. 16th and N. 17th Streets between W. Fond du Lac Avenue and W. Wisconsin Avenue; W. Wisconsin Avenue between N. 10th Street and N. 17th Street; and E. and W. Wells Street between N. 10th Street and N. Prospect Avenue. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street as street is converted to transit/pedestrian mall. Potential design capacity and congested operation of E. and W. Wells Street and Michigan Street in Milwaukee CBD	Loss of curb lanes for traffic/parking during a.m. and p.m. peak periods for use as reserved bus lanes on E. and W. Wells Street between N. 10th Street and N. Prospect Avenue; and E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street
<ul style="list-style-type: none"> Traffic Impacts of Additional Transit Trips 	--	9,200 to 18,200 fewer automobile trips (diverted to improved transit)	10,500 to 20,500 fewer automobile trips (diverted to improved transit)	6,400 to 14,800 fewer automobile trips (diverted to improved transit)

^a The figures shown are based upon an analysis of consumer surplus and reflect principally the difference between the transit travel time made under an express bus or light rail alternative and the travel time made under the existing and committed transit system proposed under Alternative 1. For this analysis, a measure of the "price" of using transit under each alternative expressed in units of travel time was developed by converting the fares and automobile access costs for each transit trip to equivalent units of travel time, and combining these times with the transit in-vehicle and out-of-vehicle travel times for each trip. Out-of-vehicle travel times have been weighted by a factor of two, as studies have found time spent waiting for a vehicle is twice as onerous as time spent traveling in a vehicle. Travel time savings for nonwork trips have been weighted by a factor of one-half, as studies have indicated savings in travel time for work trips is valued twice as much as such savings for nonwork trips. The increase or decrease from Alternative 1 in the price of transit use was calculated for each trip under each express bus or light rail alternative, then weighted by the number of affected trips. The figures shown in the table represent the sum of all trip-weighted differences—both positive and negative—in the price of using transit. Because differences in the price of using transit are largely the result of differences in transit travel times between each express bus or light rail alternative and Alternative 1, they have been considered here as an overall measure of travel time savings from Alternative 1.

^b Assumes a value of time of \$4.00 per hour for work trips and \$2.00 per hour for nonwork trips based upon Urban Mass Transportation Administration (UMTA) guidelines.

^c Average weekday ridership on the public transit services in the Milwaukee area in 1984 is estimated to be as follows:

1. Total Revenue Passengers	174,100
2. Total Passengers on Northwest Corridor Rapid Transit Services	5,900
3. Total Revenue Passengers Within Northwest Corridor	86,400

^d Includes transit trips with origins or destinations within an area bounded by the Milwaukee-Ozaukee County line on the north, IH 43 on the east, IH 94 on the south, and USH 45 on the west.

^e For the no build and express bus alternatives, ridership figures include transit trips made using the freeway flyer and arterial express bus routes operating within the northwest corridor. For the light rail alternatives, ridership figures include trips made on the light rail line and trips made on the express bus feeder routes serving light rail stations. Trips that transfer between light rail and express bus feeder services are counted only once—as light rail trips.

Table 2 (continued)

^f The potential effect on the capital costs for each alternative of general inflation over the design, engineering, and construction period was also considered, based upon UMTA guidelines which specify that total capital costs be inflated to the midpoint of the construction period for each alternative. A rate of inflation of 4.4 percent per year was assumed to adjust the total capital costs to reflect inflated costs at the midpoint of construction which, based upon the project timetable, would be reached by 1994. Capital costs were also adjusted to reflect an annual rate of deflation of 2.0 percent to the midpoint of project construction. Assuming the 4.4 percent per year rate of inflation, capital costs in 1994 dollars would be approximately 47 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, capital costs would be approximately 17 percent lower than those shown in 1985 dollars.

^g Total capital costs for Alternative 1 are estimated to be \$103,950,000 under the pessimistic future, and \$108,168,800 under the optimistic future. The average annual capital costs for Alternative 1 are estimated to be \$9,859,400 under the pessimistic future and \$10,261,000 under the optimistic future.

^h The figures shown in the table were calculated assuming a 6 percent discount rate. The average annual capital costs for each alternative were also calculated assuming a 10 percent discount rate as specified by UMTA guidelines. Assuming that discount rate, the average annual capital costs would be approximately 31 percent higher than those shown for Alternatives 2A and 2B; and 25 percent higher than those shown for Alternative 2C.

ⁱ The potential effect of price inflation on operating and maintenance costs for the transit system in the plan design year was also considered, based on UMTA guidelines. As was assumed for capital cost analysis, a rate of inflation of 4.4 percent per year and a rate of deflation of 2.0 percent per year were assumed to estimate operating and maintenance costs for each alternative in the year 2000. Assuming the 4.4 percent per year rate of inflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 91 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 26 percent lower than those shown in 1985 dollars.

^j During 1984, the transit systems in the Milwaukee area had operating expenses totaling about \$64,079,000; operating deficits totaling about \$33,643,300; and an average operating deficit per passenger of about \$0.66.

^k Noise levels are measured in A-weighted decibels (dba). A decibel is a logarithmic measure of the small rapid pressure changes in the air caused by a sound level. The A-weighted network in a sound level meter accounts for the range of human sensitivity to frequency or pitch. To compensate for the human lack of sensitivity to low-pitched or high-pitched sound levels, the A-weighted network deemphasizes very low and very high pitched sound so that measured levels correlate well with our human perceptions of loudness.

^l The total operating energy required for the existing and committed transportation system under Alternative 1 is estimated to be 13,000 billion British thermal units (BTU's) per year within the Milwaukee northwest corridor, and 34,000 billion BTU's per year within the greater Milwaukee area.

^m Figures shown are for each alternative under the optimistic future scenario.

Source: SEWRPC.

\$26.4 to \$29.4 million, respectively—or an average of \$27.9 million—over the capital costs required to maintain the existing and committed transit system as described under Alternative 1 in Table 2. The capital cost to the year 2000 of maintaining the existing transit system would range from \$104.0 million under the pessimistic future to \$108.2 million under the optimistic future—or an average capital cost of \$106.1 million, which is primarily for bus replacement.

Total transit ridership levels on the transit services within the corridor for Alternative 2C are forecast to increase by 4 to 5 percent over the ridership levels forecast under Alternative 1. These forecast increases would be the smallest forecast under the three express bus alternatives. This is primarily due to the fact that, in comparison to the express bus services offered under the other alternatives, the express bus services offered under Alternative 2C result in a smaller reduction in transit travel times from the times shown under Alternative 1.

Because bus service is added to several of the more heavily traveled local bus routes within the corridor, transit ridership under Alternative 2C is dis-

tributed over several express bus routes operating on several arterial streets, rather than focused on a single alignment. Consequently, under this alternative, transit service levels and vehicle volumes on the express bus routes are not high enough to warrant the use of exclusive bus lanes on arterial streets outside the central business district. This results in lower operating speeds for the express bus services and longer transit travel times for transit patrons under Alternative 2C than under the other express bus alternatives. Alternative 2C, consequently, provides the lowest travel time savings benefits of the three express bus alternatives.

The lower ridership increases forecast under Alternative 2C result in an average operating deficit under both alternative futures that is slightly higher than under the other express bus alternatives. Because fewer trips would be diverted from automobile to public transit, implementation of Alternative 2C would also result in a larger increase in energy requirements, and a smaller reduction in air pollutant emissions. The limited use of reserved bus lanes under this alternative would restrict traffic and parking impacts to only two streets within the Milwaukee central business district.

Alternatives 2A—N. Sherman Boulevard
Express Bus Alignment—and 2B—W. Fond
du Lac Avenue Express Bus Alignment

Alternative 2A, which proposes that express bus service be focused on N. Sherman Boulevard and W. Wisconsin Avenue, and Alternative 2B, which proposes that express bus service be focused on W. Fond du Lac Avenue and N. 16th and N. 17th Streets, would have quite similar costs. The capital costs of these alternatives over that required to maintain the existing transit system as proposed under Alternative 1 would vary by only \$1 to \$2 million; however, the average capital cost of these alternatives would exceed the capital cost for Alternative 2C by about \$11 million. The significant increase in capital costs for Alternatives 2A and 2B over those for Alternative 2C can be attributed primarily to the costs of constructing a full-amenity transit/pedestrian mall on E. Wisconsin Avenue between N. 6th Street and N. Jackson Street, as proposed under the two alternatives. Instead of a transit/pedestrian mall in downtown Milwaukee, Alternative 2C would utilize an exclusive bus lane on Wisconsin Avenue. Both Alternatives 2A and 2B could also utilize an exclusive bus lane on Wisconsin Avenue, or operate in mixed traffic instead of a transit/pedestrian mall. The consequences of this exclusive lane option would be slightly slower operating speeds for buses on Wisconsin Avenue, which would increase transit travel times by one to two minutes. The increase in bus travel time would be more substantial with bus operation in mixed traffic. This increase would not be expected to significantly change the ridership and operating characteristics of these alternatives. The annual operating and maintenance costs and annual operating deficits for the transit system in the plan design year 2000 would not vary significantly between Alternatives 2A and 2B.

Both Alternatives 2A and 2B may be expected to have higher transit ridership levels than Alternative 2C. Ridership levels on the transit services within the corridor would be about 7 to 9 percent higher under Alternative 2A than under Alternative 1; and from 9 to 11 percent higher under Alternative 2B. The increase in ridership levels within the corridor would range from 3 to 5 percent under Alternative 2C. The higher ridership levels forecast for Alternatives 2A and 2B may be attributed primarily to the extensive use of reserved lanes for operation of the buses on arterial streets within the corridor outside the central business district, and high service levels which result from focusing express bus service over a single route. Both these factors result in signifi-

cantly higher transit travel speeds and lower transit travel times for transit users. As a result, when compared with Alternative 1, Alternative 2A would result in 40 to 45 percent greater travel time savings benefits than Alternative 2C. Travel time savings benefits for Alternative 2B would be even greater than those for Alternative 2A, because Alternative 2B provides express bus service over more branch routes, and consequently can provide reduced travel times to more trips.

While reducing transit travel times, the more extensive use of reserved bus lanes under Alternatives 2A and 2B would nevertheless have impacts on the arterial street and highway system. One such impact would be the loss of some traffic lanes and curbside parking lanes on streets with exclusive lanes when such lanes are in operation during peak traffic periods. Alternatives 2A and 2B could have some adverse impacts on auto traffic, as these alternatives make extensive use of reserved lanes and propose an exclusive transit/pedestrian mall in the central business district. Under Alternatives 2A and 2B, traffic conditions on E. and W. Wells Street and Michigan Street in the Milwaukee central business district can be expected to be aggravated and, under Alternative 2A, traffic conditions on segments of N. Sherman Boulevard and N. 35th Street can also be expected to be degraded. However, it should be noted that on an areawide basis, Alternatives 2A and 2B will have beneficial impacts on the arterial street and highway system by removing 10,000 to 20,000 weekday automobile trips from the street system.

Selection of Best Express Bus Alternative

Based upon the above evaluation, the express bus alignment focusing on W. Fond du Lac Avenue, as proposed under Alternative 2B, was selected as the best express bus alternative for the northwest corridor. This alternative would provide the largest travel time savings benefits of all express bus alternatives, as the operation of four express bus route branches, combined with the use of exclusive bus lanes, would result in reduced travel times for more trips made within the corridor, when compared with Alternative 2A or Alternative 2C. Consequently, Alternative 2B may be expected to generate the highest increase in transit ridership over the existing system as defined under Alternative 1. This alternative would also have good potential for implementation, as a basic level of express bus service is currently provided over most of the alignment on W. Fond du Lac Avenue by Milwaukee County Transit System Route 23. This alternative

would modify the existing express route by adding additional route branches, increasing service levels and hours of operation, and adding exclusive lanes to increase vehicle operating speeds.

EVALUATION OF LIGHT RAIL ALTERNATIVES

The evaluation of the three basic alternative light rail alignments, including the full and truncated variations of each routing alignment, are presented in Table 3. The light rail alternatives were evaluated using the same measures used to evaluate the express bus alternatives—that is, travel time savings; forecast transit ridership; capital costs, operating and maintenance costs, and operating deficits; land development and redevelopment impacts; environmental impacts; and arterial street and highway system impacts.

Alternatives 3A and 3B—N. Sherman Boulevard Light Rail Alignment

The evaluation indicates that Alternatives 3A and 3B, the full and truncated variations of a light rail alignment focusing on N. Sherman Boulevard, would have the highest capital costs of the light rail alternatives considered. The capital costs of Alternative 3A, which proposes that the terminus of the light rail line be located at W. Brown Deer Road, over the capital cost required to maintain the existing and committed system, which constitutes Alternative 1, would range from \$252.6 million under the pessimistic future to \$268.4 million under the optimistic future—or an average capital cost of \$260.5 million. The additional capital costs of Alternative 3B, which proposes a shorter light rail line with a terminus at W. Mill Road, would range from \$212.5 million under the pessimistic future to \$227.1 million under the optimistic future—or an average capital cost of \$219.8 million.

Forecast ridership levels on the transit services within the northwest corridor for these alternatives would represent increases of 7 to 11 percent over forecast ridership levels under Alternative 1. These increases are not significantly higher than the increases forecast for the other light rail alternatives.

The travel time savings benefits generated by these alternatives would be somewhat higher than those generated by the other light rail alternatives, due primarily to the better accessibility of the light rail service to potential transit patrons within the central portion of the corridor. In this respect, the

spacing of stops along the light rail line between the central business district and W. Silver Spring Drive under Alternatives 3A and 3B would make the service more conveniently available to a larger number of riders.

The light rail alignment proposed under Alternatives 3A and 3B may be expected to have an overall positive impact on land development and redevelopment within the corridor. Within the downtown and far northwest portions of the corridor, the land development and redevelopment impacts would be similar under all light rail alternatives. Within the near northwest portion of the corridor—between W. Silver Spring Drive and W. Highland Boulevard—the light rail line proposed under Alternatives 3A and 3B would help to stabilize the neighborhoods traversed by providing a more accessible, higher level of transit service. Because the area along the alignment is primarily residential, however, opportunities for new development would be limited. In the near west portion of the corridor, the alignment over Wisconsin Avenue west of N. 17th Street would make the area potentially more desirable as a residential neighborhood, and would thus support other public programs targeted at revitalizing this portion of the City of Milwaukee. Of the alternatives considered, the Wisconsin Avenue alignment may be expected to have the most positive impact on land use development and redevelopment in the near west portion of the corridor.

The light rail alignment under these alternatives may be expected to have some negative impacts on the arterial street and highway system. South of W. Silver Spring Drive, the light rail alignment for Alternatives 3A and 3B would be located within the existing street medians, or along reserved curbside lanes on arterial streets. Attendant traffic impacts may be expected to include the loss of street capacity or parking where curb lanes are used for reserved lanes for the light rail vehicles. Where light rail vehicles would operate in the street median, the left-turn lane would be located on the light rail guideway, with little adverse impact.

Alternatives 3A and 3B also propose the construction of a full-amenity transit/pedestrian mall on E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street, as do all the other light rail alternatives. The traffic and parking impacts of a downtown transit mall under the light rail alternatives would be similar to those of the transit/pedestrian mall proposed under express bus Alternatives

Table 3

**EVALUATION OF MILWAUKEE NORTHWEST CORRIDOR RAPID TRANSIT
STUDY ALTERNATIVES: YEAR 2000 OPTIMISTIC AND PESSIMISTIC FUTURES**

Evaluation Measure	Alternative 1— Existing and Committed Transit System		Alternative 3A—N. Sherman Boulevard Light Rail Alignment (W. Brown Deer Road Terminus)		Alternative 3B—N. Sherman Boulevard Light Rail Alignment (W. Mill Road Terminus)		Alternative 3C— N. 33rd Street Railway Corridor Light Rail Alignment (W. Brown Deer Road Terminus)		Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)		Alternative 3E—W. Fond du Lac Avenue Light Rail Alignment (W. Brown Deer Road Terminus)		Alternative 3F— W. Fond du Lac Avenue Light Rail Alignment (W. Mill Road Terminus)	
	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future
Travel Time Savings														
• Net Decrease in Annual Transit Passenger Hours of Travel from Alternative 1 (no build) ^a	--	--	2,214,800	1,060,800	2,179,300	1,044,700	2,100,600	1,058,500	2,064,100	1,039,800	1,963,000	1,013,500	1,927,300	986,100
• Annual Value of Travel Time Saved ^b	--	--	\$ 6,591,810	\$ 3,585,500	\$ 6,533,200	\$ 3,535,600	\$ 6,328,000	\$ 3,611,000	\$ 6,270,500	\$ 3,556,400	\$ 5,923,400	\$ 3,390,900	\$ 5,836,900	\$ 3,299,310
Forecast Transit Ridership— Average Weekday Linked Revenue Passenger Trips ^c														
• Total Milwaukee Area	241,800	145,600	268,400	156,800	268,100	156,800	267,100	156,600	266,800	156,600	266,600	156,700	266,300	156,600
• Total Northwest Corridor ^d	120,500	70,200	133,500	74,900	133,300	75,000	132,100	74,600	132,000	74,700	131,700	74,700	131,600	74,800
• Total on Proposed North- west Corridor Rapid Transit Services ^e	8,500	5,600	66,500	34,400	67,500	35,400	67,200	35,300	68,300	36,300	54,400	30,100	55,200	30,700
• Total on Light Rail	--	--	52,600	24,400	50,200	23,100	52,600	24,900	50,200	23,600	40,200	19,900	37,700	18,400
Costs														
• Capital Cost Requirement to Design Year (1985 dollars)														
1. Total Incremental Costs Over Alternative 1	\$ -- ^g	\$ -- ^g	\$268,360,000	\$252,560,000	\$227,100,000	\$212,490,000	\$255,790,000	\$239,010,000	\$211,970,000	\$199,520,000	\$257,410,000	\$243,460,000	\$215,690,000	\$203,790,000
2. Average Annual Incre- mental Capital Cost ^h	-- ^g	-- ^g	19,940,000	18,830,000	17,002,000	16,010,000	18,990,000	17,810,000	15,870,000	15,010,000	19,140,000	18,160,000	16,200,000	15,340,000
• Total Systemwide Operat- ing and Maintenance Cost Requirement in Design Year (1985 dollars) ^{i,j}	68,584,500	64,168,900	77,836,400	72,717,800	76,592,700	71,919,000	77,398,100	71,256,100	76,308,700	72,124,100	76,157,300	71,825,700	74,168,000	71,552,200
• Total Systemwide Annual Operating Deficit in Design Year (1985 dollars) ^j														
1. Total	25,049,200	38,496,300	28,786,600	44,852,600	27,644,800	44,057,200	28,592,500	44,416,900	27,573,300	44,288,400	27,446,200	43,982,000	25,515,700	43,738,100
2. Per Revenue Passenger	0.35	0.91	0.36	0.98	0.35	0.97	0.36	0.97	0.35	0.97	0.35	0.96	0.32	0.96

Table 3 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 3A—N. Sherman Boulevard Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3B—N. Sherman Boulevard Light Rail Alignment (W. Mill Road Terminus)	Alternative 3C— N. 33rd Street Railway Corridor Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)	Alternative 3E—W. Fond du Lac Avenue Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3F— W. Fond du Lac Avenue Light Rail Alignment (W. Mill Road Terminus)
Land Development/ Redevelopment Impacts							
<ul style="list-style-type: none"> Downtown (area bounded by the Park-East Freeway on the north, Lake Michigan on the east, IH 794 on the south, and IH 43 on the west) 	None	Potentially be another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet	Potentially another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet	Potentially another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet	Potentially be another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet	Potentially be another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet	Potentially be another factor which would reinforce revitalization. Impact alone would be minimal; possibly increasing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet
<ul style="list-style-type: none"> Near West Side (area bounded by Highland Boulevard on the north, IH 43 on the east, IH 94 on the south, and N. 35th Street on the west) 	None	Strengthen residential appeal of area, although redevelopment and stabilization depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year	Strengthen residential appeal of area, although redevelopment and stabilization depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year	Strengthen residential appeal of area, although redevelopment and stabilization depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year	Strengthen residential appeal of area, although redevelopment and stabilization will depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year	Strengthen residential appeal of area, although redevelopment and stabilization will depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year	Strengthen residential appeal of area, although redevelopment and stabilization will depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year
<ul style="list-style-type: none"> Near Northwest Side (from W. Highland Boulevard north to W. Silver Spring Drive) 	None	Help stabilize neighborhoods	Help stabilize neighborhoods	Help stabilize neighborhoods but probable negligible impact alone. Will not alone bring about redevelopment of 33rd Street railway corridor	Help stabilize neighborhoods, but probable negligible impact alone. Will not alone bring about redevelopment of 33rd Street railway corridor	Help stabilize neighborhoods. Will not alone bring about redevelopment of Fond du Lac Avenue	Help stabilize neighborhoods. Will not alone bring about redevelopment of Fond du Lac Avenue
<ul style="list-style-type: none"> Far Northwest Side (area from W. Silver Spring Drive north to Milwaukee/Ozaukee County line) 	None	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract convenience retail development near major park-ride stations
<ul style="list-style-type: none"> Number of Stations Outside Downtown with Significant Development Potential 	None	5	4	5	4	4	3

Table 3 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 3A—N. Sherman Boulevard Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3B—N. Sherman Boulevard Light Rail Alignment (W. Mill Road Terminus)	Alternative 3C— N. 33rd Street Railway Corridor Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)	Alternative 3E—W. Fond du Lac Avenue Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3F— W. Fond du Lac Avenue Light Rail Alignment (W. Mill Road Terminus)
Environmental Impacts							
• Disruption							
1. Number of Structures Taken	None	None	None	None	None	2	2
2. Land Acquisition	1.2-1.6 acres	38.4-44.5 acres	26.2-31.2 acres	54.6-60.8 acres	42.5-47.3 acres	43.1-49.0 acres	30.7-35.1 acres
• Noise							
1. Range of Noise Levels ^k at Sites Along Alter- native Route Alignments	62.4-75.4 dba	62.4-73.2 dba	62.4-73.2 dba	62.6-73.2 dba	62.4-73.3 dba	62.4-73.8 dba	62.5-73.8 dba
2. Impact of Change in Noise Levels from No Build Alternative	--	None	None	None	None	None	None
• Energy							
1. Average Annual Change in Total Transportation System Operating Energy Requirements from No Build Alternative							
a. Within Greater Milwaukee Area	--	66.2 billion BTU's/year	51.8 billion BTU's /year	70.1 billion BTU's/year	62.1 billion BTU's/year	46.4 billion BTU's/year	46.6 billion BTU's/year
b. Within Milwaukee Northwest Corridor	--	6.7 billion BTU's/year	-8.8 billion BTU's/year	7.7 billion BTU's/year	-5.1 billion BTU's/year	-10.2 billion BTU's/year	18.3 billion BTU's/year
2. Annual Transit System Energy Requirements for Vehicle Manufacture	32.8 billion BTU's	40.5 billion BTU's	39.8 billion BTU's	40.4 billion BTU's	40.0 billion BTU's	39.4 billion BTU's	39.4 billion BTU's
3. Total Transit System Requirements for Guideway Construction	--	434.6 billion BTU's	347.7 billion BTU's	431.2 billion BTU's	345.2 billion BTU's	415.2 billion BTU's	329.2 billion BTU's
• Air Quality—Maximum Reduction in Pollutant Emissions Within Mil- waukee Area from No Build Alternative ^m							
1. Carbon Monoxide	--	1,034 tons/year	1,016 tons/year	982 tons/year	968 tons/year	959 tons/year	945 tons/year
2. Hydrocarbons	--	134 tons/year	131 tons/year	127 tons/year	125 tons/year	124 tons/year	122 tons/year
3. Nitrogen Oxides	--	57 tons/year	52 tons/year	54 tons/year	48 tons/year	50 tons/year	45 tons/year
• Acceptance by Residents and Business in Affected Areas	No significant opposition by area residents and businesses	Significant opposition expressed by residents along N. Sherman Boule- vard toward construction of a light rail line in the median of N. Sherman Boulevard. Some concerns expressed by downtown mer- chants over conversion of E. and W. Wisconsin Avenue into a transit/ pedestrian mall	Significant opposition expressed by residents along N. Sherman Boule- vard toward construction of a light rail line in the median of N. Sherman Boulevard. Some concerns expressed by downtown mer- chants over conversion of E. and W. Wisconsin Avenue into a transit/ pedestrian mall	No significant opposition expressed by area resi- dents. Some questions expressed concerning the safety of passengers at light rail stations located below street level in the 33rd Street railway right-of-way. Some concerns expressed by downtown merchants over the conversion of E. and W. Wisconsin Avenue into a transit/ pedestrian mall	No significant opposition expressed by area resi- dents. Some questions expressed concerning the safety of passengers at light rail stations located below street level in the 33rd Street railway right-of-way. Some con- cerns expressed by down- town merchants over the conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall	No significant opposition expressed by area resi- dents toward primary rout- ing alignment which uses the 33rd Street railway corridor and the cleared Park-West Freeway corridor instead of Fond du Lac Avenue between N. 35th Street and N. 17th Street. Significant opposition has been expressed over align- ment variations which would operate over W. Fond du Lac Avenue between N. 35th Street and N. 17th Street, particularly if widening of Fond du Lac Avenue in this area is included to accommodate preferential treatment for light rail vehicles	No significant opposition expressed by area resi- dents toward primary rout- ing alignment which uses the 33rd Street railway corridor and the cleared Park-West Freeway corridor instead of Fond du Lac Avenue between N. 35th Street and N. 17th Street. Significant opposition has been expressed over align- ment variations which would operate over W. Fond du Lac Avenue between N. 35th Street and N. 17th Street, particularly if widening of Fond du Lac Avenue in this area is included to accommodate preferential treatment for light rail vehicles

Table 3 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 3A—N. Sherman Boulevard Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3B—N. Sherman Boulevard Light Rail Alignment (W. Mill Road Terminus)	Alternative 3C— N. 33rd Street Railway Corridor Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)	Alternative 3E—W. Fond du Lac Avenue Light Rail Alignment (W. Brown Deer Road Terminus)	Alternative 3F— W. Fond du Lac Avenue Light Rail Alignment (W. Mill Road Terminus)
Highway System Impacts • Traffic and Parking Impacts	--	Loss of some curb lanes for traffic/parking along W. Lisbon Avenue, N. 40th Street, and W. Vliet Street between N. Sherman and W. Highland Boulevards; N. 35th Street between W. Highland Boulevard and W. Wisconsin Avenue; and W. Wisconsin Avenue between N. 35th and N. 10th Streets. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street as street is converted to transit/pedestrian mall. Left-turn lane for automobiles will be shared by light rail in median along N. Sherman Boulevard and W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and Michigan Street in Milwaukee CBD; and N. 35th Street between W. Highland Boulevard and W. Wisconsin Avenue	Loss of some curb lanes for traffic/parking along W. Lisbon Avenue, N. 40th Street, and W. Vliet Street between N. Sherman and W. Highland Boulevards; N. 35th Street between W. Highland Boulevard and W. Wisconsin Avenue; and W. Wisconsin Avenue between N. 35th and N. 10th Streets. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th Street and N. Jackson Street as street is converted to transit/pedestrian mall. Left-turn lane for automobiles will be shared by light rail in median along N. Sherman Boulevard and W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and Michigan Street in Milwaukee CBD; and N. 35th Street between W. Highland Boulevard and W. Wisconsin Avenue	Loss of some curb lanes for traffic/parking along N. 35th Street between W. Vliet Street and W. Wisconsin Avenue; and W. Wisconsin Avenue between N. 35th Street and N. 10th Street. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Left-turn lanes for automobiles will be shared by light rail in median along W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and Michigan Street in Milwaukee CBD, and N. 35th Street between W. Vliet Street and W. Wisconsin Avenue	Loss of some curb lanes for traffic/parking along N. 35th Street between W. Vliet Street and W. Wisconsin Avenue; and W. Wisconsin Avenue between N. 35th Street and N. 10th Street. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Left-turn lanes for automobiles will be shared by light rail in median along W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and Michigan Street in Milwaukee CBD, and N. 35th Street between W. Vliet Street and W. Wisconsin Avenue	Loss of some curb lanes for traffic/parking along N. 60th Street between W. Bender Road and W. Fond du Lac Avenue; W. Fond du Lac Avenue between N. 35th and W. Locust Streets; N. 16th and N. 17th Streets between W. Fond du Lac Avenue and W. Wisconsin Avenue; W. Wisconsin Avenue between N. 17th and N. 10th Streets. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Left-turn lane for automobiles will be shared by light rail in median along W. Fond du Lac Avenue and W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and E. and W. Michigan Street in Milwaukee CBD	Loss of some curb lanes for traffic/parking along N. 60th Street between W. Bender Road and W. Fond du Lac Avenue; W. Fond du Lac Avenue between N. 35th and W. Locust Streets; N. 16th and N. 17th Streets between W. Fond du Lac Avenue and W. Wisconsin Avenue; W. Wisconsin Avenue between N. 17th and N. 10th Streets. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Left-turn lane for automobiles will be shared by light rail in median along W. Fond du Lac Avenue and W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and E. and W. Michigan Street in Milwaukee CBD
• Traffic Impacts of Additional Transit Trips	--	8,400 to 19,600 fewer automobile trips (diverted to improved transit)	8,400 to 19,300 fewer automobile trips (diverted to improved transit)	8,200 to 18,600 fewer automobile trips (diverted to improved transit)	8,200 to 18,400 fewer automobile trips (diverted to improved transit)	8,300 to 18,200 fewer automobile trips (diverted to improved transit)	8,200 to 18,000 fewer automobile trips (diverted to improved transit)

Table 3 (continued)

^a The figures shown are based upon an analysis of consumer surplus and reflect the difference between the transit travel time and the transit costs of each trip made under an express bus or light rail alternative, and the travel time and cost of the same trip made under the existing and committed transit system proposed under Alternative 1. For this analysis, a measure of the "price" of using transit under each alternative expressed in units of travel time was developed by converting the fares and automobile access costs for each transit trip to equivalent units of travel time, and combining these times with the transit in-vehicle and out-of-vehicle travel times for each trip. Out-of-vehicle travel times have been weighted by a factor of two, as studies have found time spent waiting for a vehicle is twice as onerous as time spent traveling in a vehicle. Travel time savings for nonwork trips have been weighted by a factor of one-half, as studies have indicated savings in travel time for work trips is valued twice as much as such savings for nonwork trips. The increase or decrease from Alternative 1 in the price of transit use was calculated for each trip under each express bus or light rail alternative, then weighted by the number of affected trips. The figures shown in the table represent the sum of all trip-weighted differences—both positive and negative—in the price of using transit. Because differences in the price of using transit are largely the result of differences in transit travel times between each express bus and light rail alternative and Alternative 1, they have been considered here as an overall measure of travel time savings from Alternative 1.

^b Assumes a value of time of \$4.00 per hour for work trips and \$2.00 per hour for nonwork trips based upon Urban Mass Transportation Administration (UMTA) guidelines.

^c Average weekday ridership on the public transit services in the Milwaukee area in 1984 is estimated to be as follows:

1. Total Revenue Passengers	174,100
2. Total Passengers on Northwest Corridor Rapid Transit Services	5,900
3. Total Revenue Passengers Within Northwest Corridor	86,400

^d Includes transit trips with origins or destinations within an area bounded by the Milwaukee-Ozaukee County line on the north, IH 43 on the east, IH 94 on the south, and USH 45 on the west.

^e For the no build and express bus alternatives, ridership figures include transit trips made using the freeway flyer and arterial express bus routes operating within the northwest corridor. For the light rail alternatives, ridership figures include trips made on the light rail line and trips made on the express bus feeder routes serving light rail stations. Trips that transfer between light rail and express bus feeder services are counted only once—as light rail trips.

^f The potential effect on the capital costs for each alternative of general inflation over the design, engineering, and construction period was also considered, based upon UMTA guidelines which specify that total capital costs be inflated to the midpoint of the construction period for each alternative. A rate of inflation of 4.4 percent per year was assumed to adjust the total capital costs to reflect inflated costs at the midpoint of construction which, based upon the project timetable, would be reached by 1994. Capital costs were also adjusted to reflect an annual rate of deflation of 2.0 percent to the midpoint of project construction. Assuming the 4.4 percent per year rate of inflation, capital costs in 1994 dollars would be approximately 47 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, capital costs would be approximately 17 percent lower than those shown in 1985 dollars.

^g Total capital costs for Alternative 1 are estimated to be \$103,950,000 under the pessimistic future, and \$108,168,800 under the optimistic future. The average annual capital costs for Alternative 1 are estimated to be \$9,859,400 under the pessimistic future, and \$10,261,000 under the optimistic future.

^h The figures shown in the table were calculated assuming a 6 percent discount rate. The average annual capital costs for each alternative were also calculated assuming a 10 percent discount rate as specified by UMTA guidelines. Assuming the discount rate, the average annual capital costs for each alternative would be approximately 44 percent higher than those shown.

ⁱ The potential effect of price inflation on operating and maintenance costs for the transit system in the plan design year was also considered, based on UMTA guidelines. As was assumed for capital cost analysis, a rate of inflation of 4.4 percent per year and a rate of deflation of 2.0 percent per year were assumed to estimate operating and maintenance costs for each alternative in the year 2000. Assuming the 4.4 percent per year rate of inflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 91 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 26 percent lower than those shown in 1985 dollars.

^j During 1984, the transit systems in the Milwaukee area had operating expenses totaling about \$64,079,000; operating deficits totaling about \$33,643,300; and an average operating deficit per passenger of about \$0.66.

^k Noise levels are measured in A-weighted decibels (dba). A decibel is a logarithmic measure of the small rapid pressure changes in the air caused by a sound level. The A-weighted network in a sound level meter accounts for the range of human sensitivity to frequency or pitch. To compensate for the human lack of sensitivity to low-pitched or high-pitched sound levels, the A-weighted network deemphasizes very low and very high pitched sound so that measured levels correlate well with our human perceptions of loudness.

^l The total operating energy required for the existing and committed transportation system under Alternative 1 is estimated to be 13,000 billion British thermal units (BTU's) per year within the Milwaukee northwest corridor, and about 34,000 billion BTU's per year within the greater Milwaukee area.

^m Figures shown are for each alternative under the optimistic future scenario.

Source: SEWRPC.

2A and 2B. It would, however, also be possible to operate the light rail line without converting Wisconsin Avenue into a transit/pedestrian mall, and thus reduce the traffic and parking impacts in this area. Under a variation of the primary alignments for all the light rail alternatives, the light rail line could operate in mixed traffic on E. and W. Wisconsin Avenue to a tail track located between N. Jackson and N. Cass Streets. Other than resulting in somewhat slower speeds and slightly longer transit travel times on the light rail line, this option would not be expected to have a substantial impact on the operating characteristics of the light rail alternatives. It would, however, reduce the capital costs for each light rail alternative by about \$10.6 million.

Alternatives 3A and 3B would have both positive and negative environmental impacts. These alternatives may be expected to significantly reduce air pollutant emissions within the greater Milwaukee area, but would result in a substantial increase in energy requirements. The routing of the light rail line over N. Sherman Boulevard, as proposed under these two alternatives, has met with significant opposition from residents within the central area of the corridor along N. Sherman Boulevard. Residents in this area are concerned that the construction of the light rail line on N. Sherman Boulevard would destroy the beauty of the landscaped street and disturb community cohesion by dividing and isolating neighborhoods along the alignment. These concerns have been expressed at public informational meetings, small work group meetings, and special briefings of local community groups held during the course of the study within the central portion of the corridor.

Alternatives 3E and 3F—W. Fond du Lac Avenue Light Rail Alignment

The capital costs of Alternatives 3E and 3F, which propose full and truncated variations of a light rail alignment focusing on W. Fond du Lac Avenue, would be from 4 to 5 percent less than those of Alternatives 3A and 3B. The additional capital costs of Alternative 3E, which proposes that the terminus of the light rail line be located at W. Brown Deer Road, over the capital cost of Alternative 1 would range from \$243.5 million under the pessimistic future to \$257.4 million under the optimistic future—or an average capital cost of \$250.5 million. The additional capital costs of Alternative 3F, which proposes a shorter light rail line with a terminus at W. Mill Road, would range

from \$203.8 million under the pessimistic future to \$215.7 million under the optimistic future—or an average capital cost of \$209.8 million.

Under these alternatives, forecast ridership levels on all the transit services within the northwest corridor would be 6 to 10 percent higher than forecast ridership levels under Alternative 1, and would not differ significantly from ridership levels forecast for Alternatives 3A and 3B. However, ridership would be somewhat lower under Alternatives 3E and 3F than under Alternatives 3A and 3B, in part because the alignment for Alternatives 3E and 3F would not operate down Wisconsin Avenue between N. 35th and N. 17th Streets. Instead, the line would operate over N. 16th and N. 17th Streets until it reaches Wisconsin Avenue at N. 17th Street. The Wisconsin Avenue alignment under Alternatives 3A and 3B would have a higher volume of boarding passengers than the N. 16th and N. 17th Streets alignment under Alternatives 3E and 3F. In addition, the light rail line under Alternatives 3E and 3F would not operate down Fond du Lac Avenue between N. 33rd Street and N. 19th Street, operating instead over the 33rd Street railway right-of-way and returning to W. Fond du Lac Avenue via the Park Freeway-West corridor. This alignment has a lesser amount of residential and commercial development within walking distance of the light rail line than an alignment which follows W. Fond du Lac Avenue between N. 33rd and N. 19th Streets. Alternatives 3E and 3F would also generate lower travel time savings benefits, primarily because fewer transit trips would use the light rail line and benefit from the reductions in travel time it would provide.

The land development and redevelopment impacts of the light rail alignment proposed under Alternatives 3E and 3F would be similar to those of Alternatives 3A and 3B within the downtown and far northwest portions of the corridor. The portion of the alignment in the near northwest portion of the corridor—between W. Silver Spring Drive and N. 35th Street—serving the Capitol Court Shopping Center would have the greatest potential of all alignments considered through this portion of the corridor for reinforcing existing development and for generating development and redevelopment. Between N. 35th Street and N. 17th Street, the N. Fond du Lac Avenue alignment would have less potential for enhancing development and redevelopment than the alternative alignment that would include Wisconsin Avenue west of N. 17th Street, as proposed under Alternatives 3A and 3B.

The W. Fond du Lac Avenue alignment proposed under Alternatives 3E and 3F would have impacts on the arterial street and highway system similar to those of the N. Sherman Boulevard alignment proposed under Alternatives 3A and 3B. Alternatives 3E and 3F may also be expected to have a similar increase in energy requirements when compared to the other light rail alternatives. Alternatives 3E and 3F would also have a similar impact on air pollutant emissions within the greater Milwaukee area.

No significant opposition has been expressed by area residents or businesses to the primary routing alignment for Alternatives 3E and 3F, which uses the N. 33rd Street railway corridor and the cleared Park Freeway-West lands instead of W. Fond du Lac Avenue between N. 35th Street and N. 17th Street. Between N. 35th Street and N. 17th Street, W. Fond du Lac Avenue narrows considerably, and the light rail vehicles would have to be operated in mixed traffic over this segment, or the street would have to be widened to provide preferential treatment for the vehicles. Bypassing this portion of W. Fond du Lac Avenue with the primary alignment was considered a good alternative, both for operational reasons and because of the strong opposition by residents and business leaders to operating the light rail line over W. Fond du Lac Avenue between N. 35th Street and N. 17th Street. Such opposition was based upon concerns over the potential negative impacts of operating light rail vehicles in mixed traffic over this segment of W. Fond du Lac Avenue, which is already experiencing severe traffic congestion problems, the lack of local support for widening this segment, and State Legislation prohibiting the widening of this segment. The use of W. Fond du Lac Avenue between N. 35th Street and N. 17th Street, however, could be reconsidered further as a variation to the primary alignment, should a W. Fond du Lac Avenue alignment be selected as the preferred light rail alignment.

Alternatives 3C and 3D—N. 33rd Street Railway Corridor Alignment

Alternatives 3C and 3D, which propose full and truncated variations of the light rail alignment focusing on the N. 33rd Street railway corridor, would have the lowest capital costs of the light rail alternatives considered. The additional capital costs of Alternative 3C, which proposes that the terminus for the light rail line be located at W. Brown Deer Road, over the capital costs required under Alternative 1 would range from \$239.0 million under the pessimistic future to \$255.8 million

under the optimistic future—an average capital cost of \$247.4 million. The additional capital costs of Alternative 3D, which proposes a shorter light rail line which would terminate at W. Mill Road, would range from \$199.5 million under the pessimistic future to \$212.0 million under the optimistic future—or an average capital cost of \$205.7 million. The average additional capital costs of these alternatives would be from 1 to 2 percent less than the capital costs of Alternatives 3E and 3F, and from 5 to 7 percent less than the capital costs of Alternatives 3A and 3B.

Under these alternatives, forecast transit ridership levels on all the transit services within the corridor would represent increases of 6 to 10 percent over the ridership levels forecast under Alternative 1, and thus would be about the same as the ridership levels forecast under the N. Sherman Boulevard and W. Fond du Lac Avenue light rail alignments.

The travel time savings benefits generated by Alternatives 3C and 3D would be somewhat higher than those generated by Alternatives 3E and 3F, but somewhat lower than those generated by Alternatives 3A and 3B. The station spacing within the central portion of the corridor between W. Silver Spring Drive and W. Highland Boulevard would be slightly wider under Alternatives 3C and 3D than under Alternatives 3A and 3B, which would result in three fewer stops and somewhat lower accessibility in this area than under Alternatives 3A and 3B.

The land development and redevelopment impacts of the light rail alignment focusing on the N. 33rd Street railway corridor, as proposed under Alternatives 3C and 3D, would be similar to the impacts of the alignments focusing on N. Sherman Boulevard and W. Fond du Lac Avenue within the downtown and far northwest portions of the corridor. The land development and redevelopment potential of the portion of the alignment in the near northwest portion of the corridor between W. Silver Spring Drive and N. 35th Street—which would be in the railway corridor—may be expected to be slight. As noted for Alternatives 3A and 3B, the portion of the alignment on Wisconsin Avenue west of N. 17th Street may be expected to have the most positive impact on development and redevelopment in the near west portion of the corridor.

The alignment proposed under Alternatives 3C and 3D would have the fewest impacts on arterial street and highway traffic and parking of the alternative alignments considered. Because a substantial por-

tion of the alignment for Alternatives 3C and 3D would be located over utility or railway rights-of-way, the total number of miles of streets affected by the alignment would be less than one-half that for the other two alignments. The parking and traffic impacts along the affected streets would be similar to the impacts of Alternatives 3A and 3B.

When compared with the other alternatives, Alternatives 3C and 3D would result in a similar increase in transit system energy requirements and a similar reduction in air pollutant emissions in the greater Milwaukee area. While opposition to the alignments focusing on N. Sherman Boulevard and W. Fond du Lac Avenue has been expressed by residents and business leaders in the affected areas, there has been no significant opposition to the alignment focusing on the N. 33rd Street railway corridor. Opponents of both the N. Sherman Boulevard and W. Fond du Lac Avenue alignments have, in fact, expressed support for the N. 33rd Street railway corridor alignment. Therefore, Alternatives 3C and 3D would probably have the broadest community support within the northwest corridor.

A variation of Alternative 3C which would provide for much wider station spacing, and consequently greater travel time savings to downtown from the far northwest side was also considered in the evaluation of the light rail alternatives. However, this alternative—Alternative 3CL—was rejected because, while having about the same capital costs as Alternative 3C, it would be expected to have significantly lower transit ridership—that is, from 17,000 to 30,000 riders per average weekday on the light rail line, compared with 25,000 to 53,000 on the light rail line under Alternative 3C, or about 35 percent less ridership. This lower ridership would result from the elimination of stations in the central portion of the corridor which, while increasing travel speeds and lowering travel times from outlying areas, would reduce the accessibility of the light rail service to transit ridership in areas of very heavy transit ridership in the central city.

Selection of a Best Light Rail Alternative

Based upon the information provided by the comparative evaluation, the light rail alignment focusing on the N. 33rd Street railway corridor, as proposed under Alternatives 3C and 3D, was selected as the best light rail alignment within the northwest corridor. This alignment would generate significantly higher travel time savings benefits than the alignment focusing on W. Fond du Lac

Avenue, but only slightly lower travel time savings benefits than the alignment focusing on N. Sherman Boulevard. The capital costs of the N. 33rd Street railway alignment would be from \$3 million to \$4 million less than the capital costs of the W. Fond du Lac Avenue alignment, and from \$13 million to \$14 million less than the capital costs of the N. Sherman Boulevard alignment. Although the portion of the alignment within the N. 33rd Street railway corridor would not be expected to have as great an impact on nonresidential development within the near northwest portion of the corridor as would the portion of the W. Fond du Lac Avenue alignment between W. Silver Spring Drive and N. 35th Street, the portion of the alignment along W. Wisconsin Avenue west of N. 17th Street would probably have the greatest positive impact on development and redevelopment in the near west portion of the corridor.

The W. Wisconsin Avenue alignment through the near west portion of the corridor also would generate a high volume of ridership, and this is one reason why ridership is somewhat higher on the light rail line under the N. 33rd Street railway alignment proposed under Alternatives 3C and 3D than under the W. Fond du Lac Avenue alignment proposed under Alternatives 3E and 3F. The N. 33rd Street railway alignment would minimize traffic and parking impacts on the arterial street and highway system because the light rail vehicles would operate over significantly fewer miles of arterial streets than under the N. Sherman Boulevard or W. Fond du Lac Avenue alignments. Finally, the N. 33rd Street railway alignment may be expected to have the broadest support by the residents and businesses within the corridor. The strong opposition expressed by residents along N. Sherman Boulevard to the N. Sherman Boulevard alignment makes it unlikely that a light rail line could ever be constructed along this alignment. Opposition expressed to the W. Fond du Lac Avenue alignment also raises a question concerning the likelihood of constructing a light rail facility over this alignment. Consequently, if light rail transit service were to be recommended within the northwest corridor, it would probably have the highest probability of implementation if it followed the N. 33rd Street railway corridor alignment.

The comparative evaluation also indicates that Alternative 3D, which would truncate the light rail line at W. Mill Road, would be superior to Alternative 3C. Total transit ridership levels on all the transit services within the corridor for Alternative

3D may be expected to be virtually the same as for Alternative 3C, which would extend the light rail line to W. Brown Deer Road. As might be expected, the longer light rail line proposed under Alternative 3C would indeed carry more passengers than the truncated line. Alternative 3C would also have a slight advantage over Alternative 3D in terms of travel time savings benefits, as more transit patrons would directly benefit from the lower transit travel times associated with using the light rail line. The use of express bus feeder routes between the Northridge Shopping Center area and the W. Mill Road terminus on the shortened light rail alignment, as proposed under Alternative 3D, would, however, reduce the impact on transit travel times of a shortened light rail line. The difference in ridership and travel time savings between the two alternatives is, however, not enough to justify the additional capital expense required to construct the light rail line to W. Brown Deer Road, which would range from \$39.5 million under the pessimistic future to \$43.8 million under the optimistic future—or an average of \$41.7 million.

EVALUATION OF FINAL EXPRESS BUS AND LIGHT RAIL ALTERNATIVES

The previous sections of this chapter have presented separate comparative evaluations of alternative express bus and alternative light rail rapid transit improvements for the Milwaukee northwest corridor. Through these evaluations, the best express bus and the best light rail alternative for improving rapid transit service within the corridor were identified from among the range of alternatives considered for each transit technology. The following section of this chapter presents a comparative evaluation of these two best rapid transit alternatives. This evaluation is summarized in Table 4. The alternatives were evaluated with respect to service coverage; travel time savings; transit ridership; capital costs, operating and maintenance costs, and operating deficits; land development and redevelopment impacts; environmental impacts; and arterial street and highway system impacts.

With regard to the extent of transit service coverage within the corridor, both of the alternatives would expand the coverage provided by the existing transit system, as described under Alternative 1, the no build alternative. The existing transit system serves virtually the entire study area south of W. Mill Road, with a dense network of local routes which form a grid pattern using most arterial streets. Some express bus service is also provided to down-

town Milwaukee during peak periods over short segments of two regular routes where some of the local service has been converted to express service, and over freeway flyer routes from park-ride lots on the extreme fringes of the corridor. North of W. Mill Road, transit service is limited to a few local and freeway flyer bus routes which primarily serve the Northridge Shopping Center area.

Under Alternatives 2B—the best express bus alternative—and 3D—the best light rail alternative—the transit service coverage within the corridor and study area would be expanded by extending service into the area north of W. Mill Road. Local bus service under these alternatives would be provided over most major arterials north of W. Mill Road, including W. Mill Road, W. Good Hope Road, W. Bradley Road, N. 68th Street, N. 91st Street, and N. 107th Street. Express transit service over arterial express bus routes, or rapid transit service over freeway flyer routes or over a light rail transit line, would be provided from park-ride lots located near the Northridge Shopping Center, and at the intersections of USH 45 and W. Good Hope Road and N. 60th Street and W. Mill Road. South of W. Mill Road, the extensive local bus system would be maintained, including express bus service from the existing park-ride lot located near Timmerman Field.

Outside the corridor and study area, both alternatives assume that local transit service would be expanded into areas within southern Milwaukee County which, by the year 2000, may be expected to be developed to urban densities; and that freeway flyer bus service would be extended to serve a total of 57 transit stations—compared with 23 under the present Milwaukee area transit system—located throughout the greater Milwaukee area, including stations located in Ozaukee, Washington, and Waukesha Counties. The extent of public transit service outside the northwest corridor study area in the year 2000 was assumed to be identical under both alternatives, and is presented in graphic form on Map 12 in Chapter I of this report. This expansion of transit service outside the study area under both alternatives would increase the revenue vehicle miles of transit service provided within the Milwaukee area by about 20 percent over current service levels. The overall geographic coverage of Alternative 2B and Alternative 3D both within and outside the corridor would thus be similar.

The type of transit service that would be available to a transit patron, however, would vary in different areas of the corridor under Alternative 2B and

Table 4

**EVALUATION OF MILWAUKEE NORTHWEST CORRIDOR RAPID TRANSIT STUDY FINAL EXPRESS BUS
AND LIGHT RAIL ALTERNATIVES: YEAR 2000 OPTIMISTIC AND PESSIMISTIC FUTURES**

Evaluation Measure	Alternative 1— Existing and Committed Transit System		Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment		Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)	
	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future	Optimistic Future	Pessimistic Future
Travel Time Savings						
<ul style="list-style-type: none"> Door-to-Door Travel Time in Minutes for Representative Trips During AM Peak Period: 						
1. Trips to CBD:						
To: From:						
First Wisconsin Center Fond du Lac Avenue						
and North Avenue	35	36	26	26	33	33
First Wisconsin Center 33rd Street and						
Capitol Drive	44	44	39	39	32	32
First Wisconsin Center 60th Street and						
Mill Road	66	66	51	52	39	39
First Wisconsin Center Timmerman Field						
Park-Ride Lot	54	54	54	54	52	52
First Wisconsin Center Northridge Shopping						
Center	60	60	45	45	54	54
First Wisconsin Center Park Place						
Development (107th						
Street and W. Good						
Hope Road)	--	--	43	43	58	58
2. Trips to Northridge/Industrial Land Bank:						
To: From:						
Northridge Sherman Boulevard						
Shopping Center and Capitol Drive	56	56	39	40	42	42
Northridge 33rd Street and						
Shopping Center Walnut Street	71	71	48	49	40	40
Northridge 27th Street and						
Shopping Center Wisconsin Avenue	75	75	56	56	43	43
84th Street and Fond du Lac Avenue						
Bradley Road and North Avenue	65	65	55	56	50	50
3. Trips To and From Central Portion of Corridor:						
To: From:						
27th Street and Sherman Boulevard						
Wisconsin Avenue and Capitol Drive	36	36	34	35	29	29
Milwaukee County 33rd Street and						
Courthouse Walnut Street	29	29	27	27	21	21
Capitol Court Fond du Lac Avenue						
Shopping Center and North Avenue	31	31	26	26	34	34
Capitol Court 60th Street and						
Shopping Center Mill Road	31	31	26	26	26	26
<ul style="list-style-type: none"> Net Decrease in Annual Transit Passenger Hours of Travel from Alternative 1 (no build)^a Annual Value of Travel Time Saved^b 	--	--	2,301,200 \$ 6,846,300	1,223,600 \$ 3,821,000	2,064,100 \$ 6,270,500	1,039,800 \$ 3,556,400
Forecast Transit Ridership— Average Weekday Linked Revenue Passenger Trips ^c						
<ul style="list-style-type: none"> Total Milwaukee Area Total Northwest Corridor^d Total on Proposed Northwest Corridor Rapid Transit Services^e Total on Light Rail 	241,800 120,500 8,500 --	145,600 70,200 5,600 --	269,700 133,400 62,300 --	159,700 76,700 35,700 --	266,800 132,000 68,300 50,200	156,600 74,700 36,300 23,600
Costs						
<ul style="list-style-type: none"> Capital Cost Requirement to Design Year (1985 dollars)^f <ul style="list-style-type: none"> 1. Total Systemwide Capital Costs 2. Total Systemwide Incremental Costs Over Alternative 1 3. Average Annual Systemwide Incremental Capital Cost^g 4. Incremental Cost Within Northwest Corridor Study Area Over Alternative 1 Annual Operating and Maintenance Cost Requirement in Design Year (1985 dollars)^{h,j} <ul style="list-style-type: none"> 1. Total Systemwide 2. Change Within Northwest Corridor Study Area from Alternative 1 Annual Operating Deficit in Design Year (1985 dollars)ⁱ <ul style="list-style-type: none"> 1. Total Systemwide^l 2. Total Systemwide per Revenue Passenger 3. Change Within Northwest Corridor Study Area from Alternative 1 	\$108,168,800 -- -- ^h -- 68,584,500 -- 25,049,200 0.35 --	\$103,950,000 -- -- ^h -- 64,168,900 -- 38,496,300 0.91 --	\$147,708,800 39,540,000 3,770,000 21,550,000 72,492,700 -2,991,600 23,016,400 0.29 -5,370,300	\$142,470,000 38,520,000 3,710,000 21,560,000 71,660,600 469,000 43,331,400 0.93 -767,300	\$320,138,800 211,970,000 15,870,000 192,950,000 76,308,700 824,400 27,573,300 0.35 -813,400	\$303,470,000 199,520,000 15,010,000 182,550,000 72,124,100 932,500 44,288,400 0.97 189,700

Table 4 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment	Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)
Potential Land Development/ Redevelopment Impacts	--	No additional impacts beyond Alternative 1; however, substantial development expected in any case, particu- larly in downtown and far northwest side	Some potential positive development and redevel- opment impacts, potentially resulting in additional development/redevelopment, and stabilization of existing development in corridor. Will not result in new economic activity in Milwaukee area, but rather will encourage loca- tion of activity along rail line
<ul style="list-style-type: none"> Downtown (area bounded by the Park-East Freeway on the north, Lake Michigan on the east, IH 794 on the south, and IH 43 on the west) 	--	None	Potentially be another factor which would rein- force revitalization. Impact alone would be minimal; possibly increas- ing anticipated annual new office development of 200,000 square feet by 5 to 10 percent, or 10,000 to 20,000 square feet
<ul style="list-style-type: none"> Near West Side (area bounded by Highland Boulevard on the north, IH 43 on the east, IH 94 on the south, and N. 35th Street on the west) 	--	None	Strengthen residential appeal of area, although redevelopment and stabili- zation will depend upon coordination with other public programs. Could increase anticipated development of 20 housing units per year to 30 units per year
<ul style="list-style-type: none"> Near Northwest Side (from W. Highland Boulevard north to W. Silver Spring Drive) 	--	None	Help stabilize neighbor- hoods, but probable negli- gible impact alone. Will not alone bring about redevelopment of 33rd Street railway corridor
<ul style="list-style-type: none"> Far Northwest Side (area from W. Silver Spring Drive north to Milwaukee/Ozaukee County line) 	--	None	May increase anticipated development of about 175 housing units per year to 225 to 250 units per year. Also could attract develop- ment near major park-ride stations
<ul style="list-style-type: none"> Number of Stations Outside Downtown with Significant Development Potential 	None	None	4
Environmental Impacts			
<ul style="list-style-type: none"> Disruption 1. Number of Structures Taken 2. Land Acquisition 	None 1.2-1.6 acres	None 6.0-9.7 acres	None 42.5-47.3 acres
<ul style="list-style-type: none"> Noise^k 1. Noise Levels at Selected Sites Along Alternative Route Alignments a. Northwest Senior Citizen Center, 7717 W. Good Hope Road. b. N. 60th Street and W. Mill Road c. City of Milwaukee Public Library, 814 W. Wisconsin Avenue d. Reuss Federal Plaza, 517 W. Wisconsin Avenue 2. Impact of Change in Noise Levels from No Build Alternative 	68.1-68.4 dba 62.4-62.5 dba 69.5-69.8 dba 73.0-73.6 dba None	68.3 dba 62.4 dba 69.3-69.7 dba 73.1-73.3 dba None	68.3 dba 62.4-62.5 dba 68.3-69.2 dba 73.3 dba None
<ul style="list-style-type: none"> Energy 1. Average Annual Change in Transportation System Operating Energy Requirements from No Build Alternative a. Within Greater Milwaukee Area b. Within Milwaukee Northwest Corridor 2. Average Transit System Energy Requirements for Vehicle Manufacture 3. Total Transit System Energy Requirements for Guideway Construction 	-- -- 32.8 billion BTU's --	19.1 billion BTU's/year -44.4 billion BTU's/year 38.9 billion BTU's 54.6 billion BTU's	62.1 billion BTU's/year -5.1 billion BTU's/year 40.0 billion BTU's 345.2 billion BTU's

Table 4 (continued)

Evaluation Measure	Alternative 1— Existing and Committed Transit System	Alternative 2B— W. Fond du Lac Avenue Express Bus Alignment	Alternative 3D—N. 33rd Street Railway Corridor Light Rail Alignment (W. Mill Road Terminus)
Environmental Impacts (continued) <ul style="list-style-type: none"> Air Quality <ol style="list-style-type: none"> Maximum Carbon Monoxide Concentrations at Selected Locations Along Alternative Alignments (1-hour level/8-hour level): <ol style="list-style-type: none"> Wisconsin Avenue Between N. 6th Street and N. Jackson Street N. Sherman Boulevard Between W. Keefe Avenue and W. Lisbon Avenue N. 76th Street Between W. Good Hope Road and W. Mill Road W. Fond du Lac Avenue Between W. Congress Street and N. Sherman Boulevard Maximum Reduction in Pollutant Emissions Within Milwaukee Area from No Build Alternative^m <ol style="list-style-type: none"> Carbon Monoxide Hydrocarbons Nitrogen Oxides Acceptance by Residents and Business in Affected Areas 	<p>10.3 ppm/6.4 ppm</p> <p>12.7 ppm/7.8 ppm</p> <p>12.8 ppm/7.9 ppm</p> <p>11.8 ppm/7.3 ppm</p> <p>--</p> <p>--</p> <p>--</p> <p>No significant opposition by area residents and businesses</p>	<p>9.0 ppm/5.6 ppm</p> <p>10.7 ppm/6.6 ppm</p> <p>11.1 ppm/6.9 ppm</p> <p>10.2 ppm/6.3 ppm</p> <p>1,069 tons/year</p> <p>136 tons/year</p> <p>40 tons/year</p> <p>No significant opposition expressed by area residents. Express bus route similar to that currently operated over most of proposed alignment on W. Fond du Lac Avenue. Some concerns expressed by downtown merchants over conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall</p>	<p>8.9 ppm/5.6 ppm</p> <p>10.7 ppm/6.6 ppm</p> <p>11.1 ppm/6.9 ppm</p> <p>10.4 ppm/6.5 ppm</p> <p>968 tons/year</p> <p>125 tons/year</p> <p>48 tons/year</p> <p>No significant opposition expressed by area residents. Some questions expressed concerning the safety of passengers at light rail stations located below street level in the 33rd Street railway right-of-way. Some concerns expressed by downtown merchants over the conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall</p>
Highway System Impacts <ul style="list-style-type: none"> Traffic and Parking Impacts of Reserved Lanes 	--	<p>Loss of some curb lanes for traffic/parking during a.m. and p.m. peak traffic periods for use as reserved bus lanes along W. Fond du Lac Avenue between N. 60th and N. 35th Streets; N. 16th and N. 17th Streets between W. Fond du Lac Avenue and W. Wisconsin Avenue; W. Wisconsin Avenue between N. 10th Street and N. 17th Street; and E. and W. Wells Street between N. 10th Street and Prospect Avenue. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Potential design capacity and congested operation of E. and W. Wells Street and Michigan Street in Milwaukee CBD</p>	<p>Loss of some curb lanes for traffic/parking along N. 35th Street between W. Vliet Street and W. Wisconsin Avenue between N. 35th Street and N. 10th Street. Elimination of automobile traffic on E. and W. Wisconsin Avenue between N. 6th and N. Jackson Streets as street is converted to transit/pedestrian mall. Left-turn lanes for automobiles will be shared by light rail in median along W. Wisconsin Avenue. Potential design capacity and congestion problem on E. and W. Wells Street and E. and W. Michigan Street in Milwaukee CBD, and N. 35th Street between W. Vliet Street and W. Wisconsin Avenue</p>
<ul style="list-style-type: none"> Traffic Impacts of Additional Transit Trips 	--	<p>10,500 to 20,500 fewer automobile trips (diverted to improved transit)</p>	<p>8,200 to 18,400 fewer automobile trips (diverted to improved transit)</p>

Table 4 (continued)

^aThe figures shown are based upon an analysis of consumer surplus and reflect the difference between the transit travel time and the transit costs of each trip made under an express bus or light rail alternative, and the travel time and cost of the same trip made under the existing and committed transit system proposed under Alternative 1. For this analysis, a measure of the "price" of using transit under each alternative expressed in units of travel time was developed by converting the fares and automobile access costs for each transit trip to equivalent units of travel time, and combining these times with the transit in-vehicle and out-of-vehicle travel times for each trip. Out-of-vehicle travel times have been weighted by a factor of two, as studies have found time spent waiting for a vehicle is twice as onerous as time spent traveling in a vehicle. Travel time savings for nonwork trips have been weighted by a factor of one-half, as studies have indicated savings in travel time for work trips is valued twice as much as savings for nonwork trips. The increase or decrease from Alternative 1 in the price of transit use was calculated for each trip under each express bus or light rail alternative, then weighted by the number of affected trips. The figures shown in the table represent the sum of all trip-weighted differences—both positive and negative—in the price of using transit. Because differences in the price of using transit are largely the result of differences in transit travel times between each express bus and light rail alternative and Alternative 1, they have been considered here as an overall measure of travel time savings from Alternative 1.

^bAssumes a value of time of \$4.00 per hour for work trips and \$2.00 per hour for nonwork trips based upon Urban Mass Transportation Administration (UMTA) guidelines.

^cAverage weekday ridership on the public transit services in the Milwaukee area in 1984 is estimated to be as follows:

1. Total Revenue Passengers	174,100
2. Total Passengers on Northwest Corridor Rapid Transit Services	5,900
3. Total Revenue Passengers Within Northwest Corridor	86,400

^dIncludes transit trips with origins or destinations within an area bounded by the Milwaukee-Ozaukee County line on the north, IH 43 on the east, IH 94 on the south, and USH 45 on the west.

^eFor the no build and express bus alternatives, ridership figures include transit trips made using the freeway flyer and arterial express bus routes operating within the northwest corridor. For the light rail alternative, ridership figures include trips made on the light rail line and trips made on the express bus feeder routes serving light rail stations. Trips that transfer between light rail and express bus feeder services are counted only once—as light rail trips.

^fThe potential effect on the capital costs for each alternative of general inflation over the design, engineering, and construction period was also considered, based upon UMTA guidelines which specify that total capital costs be inflated to the midpoint of the construction period for each alternative. A rate of inflation of 4.4 percent per year was assumed to adjust the total capital costs to reflect inflated costs at the midpoint of construction which, based upon the project timetable, would be reached by 1994. Capital costs were also adjusted to reflect an annual rate of deflation of 2.0 percent to the midpoint of project construction. Assuming the 4.4 percent per year rate of inflation, capital costs in 1994 dollars would be approximately 47 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, capital costs would be approximately 17 percent lower than those shown in 1985 dollars.

^gThe figures shown in the table were calculated assuming a 6 percent discount rate. The average annual capital costs for each alternative were also calculated assuming a 10 percent discount rate as specified by UMTA guidelines. Assuming the 10 percent discount rate, the average annual capital costs would be approximately 31 percent higher than those shown for Alternative 2B, and approximately 44 percent higher than those shown for Alternative 3D.

^hThe average annual capital costs for Alternative 1 are estimated to be about \$9,859,400 under the pessimistic future and about \$10,261,000 under the optimistic future.

ⁱThe potential effect of price inflation on operating and maintenance costs for the transit system in the plan design year was also considered, based on UMTA guidelines. As was assumed for capital cost analysis, a rate of inflation of 4.4 percent per year and a rate of deflation of 2.0 percent per year were assumed to estimate operating and maintenance costs for each alternative in the year 2000. Assuming the 4.4 percent per year rate of inflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 91 percent higher than those shown in 1985 dollars. Assuming the 2.0 percent per year rate of deflation, operating and maintenance costs for the alternatives, in year 2000 dollars, would be approximately 26 percent lower than those shown in 1985 dollars.

^jDuring 1984, the transit systems in the Milwaukee area had operating expenses totaling about \$64,079,000; operating deficits totaling about \$33,643,300; and an average operating deficit per passenger of about \$0.66.

^kNoise levels are measured in A-weighted decibels (dba). A decibel is a logarithmic measure of the small rapid pressure changes in the air caused by a sound level. The A-weighted network in a sound level meter accounts for the range of human sensitivity to frequency or pitch. To compensate for the human lack of sensitivity to low-pitched or high-pitched sound levels, the A-weighted network deemphasizes very low and very high pitched sound so that measured levels correlate well with our human perceptions of loudness.

^lThe total operating energy required for the existing and committed transportation system under Alternative 1 is estimated to be 13,000 British thermal units (BTU's) per year within the Milwaukee northwest corridor, and 34,000 billion BTU's per year within the greater Milwaukee area.

^mFigures shown are for each alternative under the optimistic future scenario.

Source: SEWRPC.

Alternative 3D. In the northwest portion of the corridor, Alternative 2B and Alternative 3D would both provide express bus or rail rapid transit service from the same outlying park-ride lots. In the downtown area, these alternatives would both focus service on Wisconsin Avenue, using lanes reserved for the exclusive operation of transit vehicles. The major difference between these

alternatives is in the routing alignments proposed within the central portion of the corridor. Under Alternative 2B, transit service improvements would be focused on W. Fond du Lac Avenue and N. 16th and N. 17th Streets, closely following the alignment of an existing local bus route—Route 23. Under Alternative 3D, transit service improvements would be focused on an existing railway corridor

paralleling N. 33rd Street and located approximately one-half mile to three-quarters of a mile to the east of N. Sherman Boulevard.

Both Alternatives 2B and 3D would result in reductions in transit travel times from those provided under Alternative 1. The amount of travel time reduction for a particular trip under these two alternatives would be dependent upon how well the trip is served by the rapid transit alignment proposed under each alternative. In this respect, trips having origins and/or destinations directly served by a particular rapid transit alignment will have lower travel times. For example, a trip from W. Fond du Lac Avenue and W. North Avenue to the Capitol Court Shopping Center would be directly served by the express bus alignment using W. Fond du Lac Avenue, and would therefore have the lowest transit travel times under express bus Alternative 2B. A trip from N. 33rd Street and W. Walnut Street would be directly served by the light rail transit alignment along the N. 33rd Street railway corridor, and would therefore have the lowest travel times under Alternative 3D.

The difference in travel times between Alternatives 2B and 3D indicates that different portions of the corridor are best served by different alternatives. For trips between the northwest portion of the corridor and downtown Milwaukee, Alternative 2B would have significantly lower travel times. The lower travel times reflect the operation of nonstop freeway flyer bus service over an operationally controlled freeway system from park-ride lots located in the Northridge area and near the intersection of USH 45 and W. Good Hope Road to downtown Milwaukee under this alternative. The higher speeds of nonstop freeway flyer operation over the relatively long length of these trips result in significantly lower travel times for Alternative 2B. Travel times for trips made between the central portion of the corridor and the Northridge area would generally be comparable under both alternatives. For trips made entirely within the central portion of the corridor, travel times would be lower under Alternative 3D than under Alternative 2B.

Both Alternative 2B and Alternative 3D would significantly increase total transit ridership within the corridor over that forecast under Alternative 1. Alternative 2B may be expected to generate 9 to 11 percent more transit trips within the corridor, depending upon the alternative future envisioned, and Alternative 3D may be expected to generate 6 to 10 percent more transit trips.

Alternative 2B would have lower capital costs than Alternative 3D. The total capital costs entailed in sustaining the existing transit system under Alternative 1 would range from \$104.0 million under the pessimistic future to \$108.2 million under the optimistic future—or an average capital cost of \$106.1 million. The average additional capital costs of Alternative 2B over that required to sustain Alternative 1 would be \$39 million. The average additional capital costs of Alternative 3D would be \$206 million. Under both the optimistic and the pessimistic future for Alternative 2B, about \$21.6 million of these additional capital costs would be attributable to the transit improvements proposed within the northwest corridor. Under Alternative 3D, the additional capital costs for the transit service improvements within the corridor would range from \$182.6 million under the pessimistic future to \$193.0 million under the optimistic future—or an average of \$187.8 million. It should be noted that the capital costs of Alternative 2B do not include any costs for the replacement of street pavements necessitated by the wear and tear caused by the operation of buses. Such costs may be expected to increase the capital costs of Alternative 2B.

Annual transit operating and maintenance costs may also be somewhat lower under Alternative 2B than under Alternative 3D. Within the northwest corridor, the express bus transit service improvements proposed under Alternative 2B may be expected to reduce transit system operating expenses from Alternative 1 levels by about \$3.0 million under the optimistic future, and to increase transit system operating expenses within the corridor by about \$469,000 under the pessimistic future—or an average reduction in operating expenses of about \$1.3 million. Much of the savings in operating costs within the corridor would be the direct result of replacing existing local and freeway flyer bus service provided by standard 40-foot buses with new or improved express bus and freeway flyer services provided by articulated buses, which would have a 60 percent higher seated capacity and a 75 percent higher passenger capacity than a standard 40-foot bus. The light rail transit service improvements proposed under Alternative 3D may be expected to result in a slight increase in transit system operating expenses within the corridor of \$824,000 to \$933,000 per year—depending upon the alternative future envisioned—over Alternative 1 levels—or an average increase of \$878,000. This increase would be attributable primarily to higher costs entailed in operating light rail transit service.

The total annual operating deficit for the transit system under Alternative 2B may be expected to range from \$23.0 million under the optimistic future to \$43.3 million under the pessimistic future—or an average operating deficit of \$33.1 million. This deficit would be about the same as the total annual operating deficit for the transit system in 1984 of \$33.6 million. The annual operating deficit under Alternative 3D may be expected to range from \$27.6 million under the optimistic future to \$44.3 million under the pessimistic future—or an average operating deficit of \$36.0 million, about 7 percent higher than the operating deficit for the transit system in 1984.

Both Alternative 2B and Alternative 3D may be expected to result in a reduction in the operating deficit for the transit services provided within the corridor. Under Alternative 2B, the annual operating deficit for the transit services within the corridor may be expected to be reduced from Alternative 1 levels by about \$767,000 under the pessimistic future, and by about \$5.4 million under the optimistic future—an average reduction in the annual operating deficit of about \$3.1 million. Under Alternative 3D, the annual operating deficit for the transit services provided within the corridor may be expected to increase by about \$189,000 under the pessimistic future, but to be reduced by about \$813,000 under the optimistic future—an average reduction in the annual operating deficit of about \$312,000. The differences in the amount by which the operating deficits would be reduced under the two alternatives may be attributed primarily to the differences in operating expenses of the alternatives. In addition, Alternative 2B would generate somewhat higher passenger revenues within the corridor owing to slightly higher forecast total ridership levels, and to fares of \$1.00 per passenger assumed for freeway flyer services operated between the northwest portion of the corridor and downtown Milwaukee. Fares of \$0.80 per passenger were assumed to be charged for the light rail service operated under Alternative 3D.

Alternatives 2B and 3D would have different land development and redevelopment impacts. The potential for the different transit technologies and alternative routing alignments to influence sound land development and redevelopment within the Milwaukee northwest corridor was the subject of an in-depth market analysis. The following conclusions were reached regarding the overall impacts of each transit technology on land use development and redevelopment within the corridor:

- The Milwaukee area currently has a very good bus system that includes several express bus and freeway flyer routes from outlying areas into the downtown. If an improved bus system, with more express service, were developed as an alternative to a light rail transit system in the northwest corridor, it would likely have little impact on land use development or redevelopment within the corridor. Development in the corridor could be expected to continue to occur as it would with a no build or “status quo” transit system.
- Light rail service may be expected to have some positive impact on land use development and redevelopment within the corridor. However, it would not be expected to stimulate new economic activity in the greater Milwaukee area. Rather, it would encourage development that would occur anyway within the greater Milwaukee area to locate along the light rail line. Some portion of this development may be expected to otherwise occur outside the City of Milwaukee and perhaps farther into the future.
- Light rail service may be expected to help stabilize declining neighborhoods; however, it could not alone bring about significant land use development and redevelopment. Other programs and incentives would be necessary to bring about revitalization of the declining neighborhoods concerned. Such programs would use public funding to bring entrepreneurial risk down to a level justified by potential rewards.
- Light rail service would help focus and cluster development in areas attractive to new development. Light rail service could act as a catalyst in such areas, encouraging development to proceed earlier and more quickly. It should be noted, however, that some of this development may be a result of relocation from less attractive areas.
- Light rail service may be expected to provide some reinforcement of downtown revitalization efforts; to provide some encouragement of more concentrated development in the far northwest area of the corridor; and to help stabilize mid-corridor neighborhoods.

Based upon the above conclusions, the improvements in freeway flyer and arterial express bus service proposed under Alternative 2B may not be expected to have any significant impacts on land development and redevelopment within the corridor. The construction of a light rail line through the corridor, as proposed under Alternative 3D, may, however, be expected to have some positive impact on development activities in the downtown, near west, and far northwest areas of the corridor. In the near northwest area of the corridor, where the alignment would operate over the N. 33rd Street railway right-of-way, this alternative would be expected to have little impact on development activities. In this portion of the corridor, the proposed light rail line would run through an area of primarily industrial land uses, which are traditionally less transit-sensitive than office or retail uses. The line would, moreover, be depressed, and thereby would not provide convenient access to, or visibility from, transit stations along the light rail line.

Neither the express bus services proposed under Alternative 2B nor the light rail line proposed under Alternative 3D would require the removal of any existing buildings. However, more land would need to be acquired under Alternative 3D than under Alternative 2B. This may be attributed to the need for land for the construction of the light rail line within the N. 33rd Street railway right-of-way, the construction of a yard and shop complex for light rail vehicles, and the construction of a downtown terminal.

Alternative 2B and Alternative 3D may be expected to result in similar increases in energy requirements and similar reductions in air pollutant emissions. Both alternatives may be expected to reduce carbon monoxide concentrations along major streets within the corridor from levels that would be experienced under Alternative 1, with the level of reduction being virtually the same under both alternatives. Neither alternative would significantly reduce noise levels on major street segments.

Light rail service would, however, minimize the localized environmental impacts of transit operations. Light rail transit vehicles emit no air pollutants along the routes of operation, as associated combustion emissions are released at remotely located central electric power-generating stations. Diesel motor buses, on the other hand, release about one-half the carbon monoxide and hydrocarbons, six times the nitrogen oxides, and three

times the particulate matter released by an automobile along the routes of operation. In addition, a diesel motor bus may be expected to generate about 20 percent more noise than a light rail transit vehicle, and 5 to 15 percent more noise than an automobile.

There would be significant differences between the alternatives in noise and air pollutant emissions in the central business district of Milwaukee. On the proposed Wisconsin Avenue transit mall, only transit vehicle traffic would be permitted, and transit vehicle traffic volumes would be substantial, ranging from 170 to 200 vehicles per hour during peak periods. However, light rail vehicle volumes would represent only a small proportion—6 to 9 percent—of total transit volumes on the proposed transit mall. Consequently, the pollutant emission levels and noise levels of diesel motor buses would be greater than those of light rail vehicles.

No significant opposition was expressed by area residents during the course of the study to either Alternative 2B or Alternative 3D. In fact, there were indications of some public support for both alternatives. The Milwaukee County Transit System currently operates peak-period express bus service over W. Fond du Lac Avenue using a routing alignment similar to that proposed under Alternative 2B. As previously noted, opponents of the light rail alignments focusing on N. Sherman Boulevard and W. Fond du Lac Avenue expressed support for the N. 33rd Street railway corridor alignment as proposed under Alternative 3D. Concerns were raised by businessmen in the downtown over the conversion of E. and W. Wisconsin Avenue into a transit/pedestrian mall between N. 6th Street and N. Jackson Street, as proposed under both alternatives, and the elimination of automobile traffic from this street segment. However, under both alternatives, the express bus, freeway flyer, and light rail transit services could be operated through the downtown area without the transit/pedestrian mall.

Both Alternatives 2B and 3D may be expected to have beneficial impacts on the arterial street and highway system by diverting 8,200 to 10,500 trips from automobiles to transit under the pessimistic future, and 18,400 to 20,500 trips under the optimistic future. Under each set of future conditions, a slightly higher number of automobile trips may be expected to be diverted to transit under Alternative 2B than under Alternative 3D. Both alternatives would involve the loss of the use of

some street curb lanes for traffic movement or parking, these lanes being used as reserved bus lanes during peak periods or reserved light rail lanes all day.

Also considered in the evaluation of the rapid transit alternatives for the Milwaukee northwest corridor were any intangible differences between the alternatives. All such differences would support public investment in the light rail transit alternative, but some would support public investment in the express bus alternative as well. The intangibles considered included the potential for continued and expanded public transit operation during a severe petroleum energy shortage; the potential to increase the reliability of public transit operations; and rider preference for rail transit service over motor bus transit service.

One intangible advantage of electrically propelled light rail transit is that it is not adversely affected by serious petroleum shortages, and, in fact, may be readily expanded to limits imposed by safe minimum headways and vehicle fleet size during such shortages. This may not appear to be a significant advantage, given recent trends in the supply of petroleum fuels and petroleum fuel prices. However, these trends should not be expected to continue into the long-term future. Because petroleum is a finite and exhaustible natural resource, the potential exists for shortages of motor fuel to occur again, in which case light rail would have an advantage over diesel-powered motor buses.

An intangible advantage of all public transit services operated over exclusive guideways, or over reserved lanes, is that they are generally more reliable than public transit services provided over arterial streets in mixed traffic. This is because public transit services operated on exclusive guideways, or over reserved lanes, are not as readily affected by traffic congestion and traffic accidents. Also, operational problems caused by inclement weather conditions—particularly snow and ice conditions—may be expected to be less severe for transit service provided over guideways than for buses operated on public streets, even those operated in reserved lanes. Express bus or light rail transit service provided over arterial street medians or reserved lanes can, however, be affected by traffic at at-grade intersections. With light rail, the potential also exists for an entire guideway segment to lose service should a single vehicle break down or become involved in an accident since, unlike rubber-tired motor vehicles, rail vehicles

cannot be steered around obstructions. Light rail transit service is also subject to disruption from power outages and breakdowns in the overhead power distribution system.

Another intangible advantage of light rail public transit is the belief of proponents of light rail that transit passengers prefer rail transit services to equivalent motor bus services. The basis of this argument is that there is something about rail transit that makes it intrinsically more attractive than diesel motor bus service, even if the levels of service provided are the same. This attraction is usually described in terms of ride quality, comfort, or image.

A final intangible advantage of light rail transit is the perception of permanence given to transit patrons and landowners and developers by the rail line. The fixed guideway and station facilities of a light rail transit line provide visible evidence of a long-term public commitment to the continued provision of high-quality transit service. People living in the vicinity of the rail line, therefore, may be more likely to ride transit, because they will be more aware of the service being provided, and of the high quality of the service. In addition, a light rail line may be expected to promote land development and redevelopment and the stabilization and revitalization of an area, as it provides an indication of a high level of public commitment to the area, as well as an indication of high-quality transit service to an area.

SUMMARY AND CONCLUSIONS

This chapter has presented a comparative evaluation of the three express bus and three light rail rapid transit alternatives considered as possible rapid transit improvements in northern Milwaukee County. The three express bus alternatives considered proposed the operation of high-capacity, articulated diesel motor buses, as well as standard diesel motor buses, in limited-stop service. Two of the alternatives would operate over a downtown transit mall and over substantial segments of reserved lanes on arterial streets. The first of these two alternatives—Alternative 2A—would reflect a major improvement to the existing Bus Route No. 30, with service concentrated along W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard prior to the route splitting into two branches to serve the northwest side of Milwaukee County. The second alternative—Alternative 2B—would reflect a major

improvement to the existing Bus Route No. 23, with service concentrated along W. Wisconsin Avenue, N. 16th and N. 17th Streets, and W. Fond du Lac Avenue prior to the route splitting into four branches to serve the northwest side of Milwaukee County. The third express bus alternative—Alternative 2C—would entail the addition of express bus service to six existing bus routes—Nos. 12, 23, 30, 57, 67, and 76. Unlike the first two alternatives, the third alternative would not concentrate express service on a single route, and the express buses would operate in mixed traffic and not over reserved lanes.

The comparative evaluation of these alternatives with respect to performance, costs, and impacts under pessimistic and optimistic futures for public transit in the year 2000 indicated that Alternatives 2A and 2B would be superior to Alternative 2C, resulting in higher levels of service and transit ridership, and a larger potential reduction in annual transit operating deficits. Compared to Alternative 2C, about 4,000 more weekday transit trips would be made in the northwest corridor, a 4 percent increase; and an additional \$1.0 million savings in annual transit operating deficit would be realized in the corridor, a savings of approximately 3 percent areawide. The capital costs of Alternatives 2A and 2B would be about \$11 million higher than the cost of Alternative 2C, due primarily to the inclusion of a downtown transit mall in these alternatives.

Of these two express bus alternatives, Alternative 2B—express bus on reserved lanes on a W. Fond du Lac Avenue alignment—was selected as the better alternative for the northwest corridor. When compared to Alternative 2A, Alternative 2B would provide a slightly higher level of service and transit ridership, and would probably have a better probability of implementation, as a basic level of express bus service is currently provided over most of the alignment by Milwaukee County Transit System Route 23. Alternative 2B would modify the existing express bus route by adding additional route branches, increasing service levels and hours of operation, converting the route from largely local service to nearly all express service, adding exclusive lanes to increase vehicle operating speeds, and operating the service with articulated rather than standard diesel motor buses.

The three light rail transit alternatives considered propose the operation of electrically powered, reversible, six-axle articulated light rail vehicles,

capable of operating either as a single unit or coupled together into a multi-car consist and drawing electric power from overhead wires. The light rail vehicles would operate over a combination of rights-of-way, including public streets in mixed traffic; public streets on reserved lanes and median areas; and exclusive rights-of-way. All the rights-of-way used are existing, and facility construction would require little acquisition of new right-of-way. The type of light rail line envisioned under these alternatives is similar to light rail lines currently operating, under construction, or in advanced stages of planning in a number of North American cities.

Each of the three alternatives would consist of a double-track light rail line between the Milwaukee central business district and the northwest side of Milwaukee County in the vicinity of N. 84th Street and W. Brown Deer Road near the Northridge Shopping Center. In the central business district, all three alternatives would use E. and W. Wisconsin Avenue, which would be converted to a transit mall; and in the far northwest side of Milwaukee County, all three alternatives would use the same alignment along the existing Wisconsin & Southern Railroad Company and Wisconsin Electric Power Company rights-of-way. In the near north side and north-central section of the corridor, each of the light rail alternatives would use a different alignment. The first alternative—Alternative 3A—would be routed over W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard to the Wisconsin & Southern Railroad Company right-of-way. The second alternative—Alternative 3C—would be routed over W. Wisconsin Avenue, but would use the former Milwaukee Road—now Soo Line—N. 33rd Street right-of-way to the Wisconsin & Southern Railroad Company right-of-way. The third alternative—Alternative 3E—would be routed over N. 16th and N. 17th Streets, W. Fond du Lac Avenue, the right-of-way originally cleared for construction of the Park Freeway-West, the Soo Line Railroad Company N. 33rd Street right-of-way, W. Fond du Lac Avenue again, and N. 60th Street to the Wisconsin & Southern Railroad Company right-of-way.

A shorter variation of each light rail alternative was considered, with the light rail line terminating in the vicinity of N. 60th Street and W. Mill Road, and with connecting express bus service extending north to the Northridge Shopping Center area.

Based upon the information provided by the comparative evaluation of the light rail alternatives, the light rail alignment focusing on the N. 33rd Street railway corridor, as proposed under Alternative 3C, was selected as the best light rail alignment within the northwest corridor. The capital costs of this alternative would range from \$3 million to \$4 million below the capital costs of the W. Fond du Lac Avenue alignment; and from \$13 million to \$14 million below the capital costs of the N. Sherman Boulevard alignment. The potential land development impacts of Alternative 3C would be similar to those of the other two light rail alternatives, as would its anticipated travel time savings, transit ridership, and reduction in annual transit operating deficit. Perhaps most importantly, the N. 33rd Street railway alignment may be expected to have the broadest support of residents and businessmen within the corridor. The strong opposition expressed by residents along N. Sherman Boulevard to the N. Sherman Boulevard alignment makes it unlikely that a light rail line could be constructed along this alignment. Similarly, opposition expressed to the W. Fond du Lac Avenue alignment also makes the construction of a light rail facility over this alignment unlikely. Consequently, if the provision of light rail transit service was found to be desirable within the northwest corridor, facility construction would probably have the highest probability of implementation if the facility followed the N. 33rd Street railway corridor alignment.

The comparative evaluation of the light rail alternatives also indicated that initial truncation of the light rail line at W. Mill Road would be superior to initial extension of the line all the way to W. Brown Deer Road. This truncated version of the alignment was identified as Alternative 3D. Total transit ridership levels on the transit services within the corridor under Alternative 3D were forecast to be virtually the same as under Alternative 3C, which would extend the light rail line all the way to W. Brown Deer Road, while capital costs would be reduced by about \$42 million.

The comparative evaluation of the best bus alternative—Alternative 2B—to the best light rail alternative—Alternative 3D—is summarized in Tables 5 through 7. Table 5 presents the advantages and disadvantages of Alternative 2B compared to maintaining the existing transit system. Table 5 clearly indicates that implementing the express bus alternative is superior to continuing to maintain the existing transit system. The principal disadvan-

tage of the express bus alternative is the additional capital cost of about \$21.6 million, of which \$15.9 million would be entailed in the provision of a downtown transit/pedestrian mall which would not have to be implemented as part of the alternative. The alternative has a number of advantages compared to the do nothing alternative, including substantially increased transit ridership, improvement in the level of transit service, and lower annual operating costs and deficits. The express bus alternative is forecast to result in an additional 10,000 weekday trips in the year 2000, or about a 10 percent increase in northwest corridor transit trips. Improvements in the level of service would provide reductions in travel time of 5 to 20 minutes, or about 15 percent, for passengers using the express bus service in the year 2000. The savings in transit operating costs in the year 2000 may be expected to be about \$1.3 million within the corridor, and the transit operating deficit in the year 2000 may be expected to be reduced by about \$3.1 million. Thus, the additional capital costs to implement the express bus alternative, even with a downtown transit/pedestrian mall, would be offset by lower operating costs and deficits within a six- to seven-year period. Thus, Alternative 2B clearly constitutes a worthwhile improvement of the existing transit system.

Such a conclusion cannot be as readily reached on the proposed light rail improvement. As can be seen in Table 6, the identified best light rail alternative—Alternative 3D—would have a much higher additional capital cost than the alternative of maintaining the existing transit system. Specifically, the capital cost of the light rail alternative within the northwest corridor would be \$188 million higher than the cost of maintaining the existing transit system. In addition, Alternative 3D may be expected to have an additional operating cost in the corridor each year of about \$0.9 million. However, because of the higher ridership which may be expected in the corridor under the light rail alternative—about 8,000 additional weekday transit trips—the transit operating deficit within the northwest corridor may be expected to be about \$0.3 million lower under Alternative 3D than under the do nothing alternative.

The other major advantages of the light rail alternative would be that it would rely upon electricity rather than petroleum-based motor fuel for power, and it could be expected to have positive development impacts. Land development consultants have indicated that the light rail alternative could be a

Table 5

**ADVANTAGES AND DISADVANTAGES COMPARED TO MAINTAINING EXISTING TRANSIT
SYSTEM OF ALTERNATIVE 2B—W. FOND DU LAC AVENUE EXPRESS BUS ALIGNMENT**

Major Differences	Disadvantages	Advantages
Capital Cost	\$21.6 million additional capital cost within northwest corridor—15 percent increase in total area transit capital cost to year 2000 ^a	--
Transit Ridership	--	10,000 additional weekday transit trips—a 10 percent increase in northwest corridor transit trips and 5 percent increase in total transit trips within greater Milwaukee area
Improvement in Transit Service through Travel Time Savings	--	5 to 20 minutes, or approximately 15 percent, travel time savings for those using the express bus service
Transit Operating Costs	--	\$1.3 million, or 4 percent, lower operating cost within corridor, and about 3 percent lower operating cost for total area transit system
Transit Operating Deficit	--	\$3.1 million, or 20 percent, lower deficit within corridor, and about 10 percent decrease in total area transit operating deficit

^aWithout the proposed transit/pedestrian mall on Wisconsin Avenue in downtown Milwaukee, the additional capital cost would be about \$5.7 million, principally for buses and park-ride lots.

Source: SEWRPC.

factor in the reinforcement of downtown revitalization efforts; would encourage more concentrated development in the far northwest area of the corridor; and could help stabilize mid-corridor neighborhoods. Specifically, the consultants projected that light rail could result in a 5 to 10 percent increase in the amount of new office development anticipated downtown annually, or an additional 10,000 to 20,000 square feet of office space per

year over the 200,000 square feet expected under a base or improved bus transit system. The consultants also projected that light rail could be expected to result in a 50 percent increase in the amount of new residential development anticipated annually on the near west side, or an additional 10 housing units per year over the 20 expected under a base or improved bus transit system. On the northwest side, light rail was envisioned as being a factor

Table 6

**ADVANTAGES AND DISADVANTAGES COMPARED TO MAINTAINING EXISTING TRANSIT
SYSTEM OF ALTERNATIVE 3D—N. 33RD STREET RAILWAY LIGHT RAIL ALIGNMENT**

Major Differences	Disadvantages	Advantages
Capital Cost	\$187.8 million additional capital cost—177 percent increase in total area transit capital cost	--
Transit Operating Cost	\$0.9 million higher operating cost within corridor, and about a 1 percent increase in total area transit operating costs	--
Influence Land Development and Redevelopment	--	<p>Light rail has potential positive development impacts. Light rail may be expected to be a factor in helping to stabilize declining neighborhoods; focus and cluster development; and act as a catalyst, encouraging development to proceed more quickly. Light rail may be expected to provide some reinforcement of downtown revitalization efforts; encourage more concentrated development in the far northwest area of the corridor; and possibly help in stabilizing mid-corridor neighborhoods. Specifically, light rail is projected to result in a 5 to 10 percent increase in the 200,000 square feet of new office development anticipated downtown annually, or an additional 10,000 to 20,000 square feet per year. It is expected to result in a 50 percent increase in residential development on the near west side, or an additional 10 housing units per year over the 20 housing units expected under a base or improved bus transit system. On the near northwest side, light rail will help stabilize neighborhoods, but will not alone bring about redevelopment. On the far northwest side, light rail may increase new residential development from 175 to 225 units per year</p> <p>However, light rail will not stimulate new economic activity in the Region, but rather will encourage development that would have occurred anyway within the greater Milwaukee area to locate along the light rail line. This development would perhaps have occurred outside the City and County of Milwaukee</p>

Table 6 (continued)

Major Differences	Disadvantages	Advantages
Transit Ridership	--	8,000 additional weekday transit trips—a 7 percent increase in northwest corridor transit trips and 4 percent increase in total area transit trips
Improvement in Transit Service through Travel Time Savings	--	5 to 20 minutes, or a travel time savings of approximately 15 percent for those using the light rail service
Transit Operating Deficit	--	\$0.3 million lower operating deficit within corridor, and a decrease of about 1 percent in total area transit operating deficit
Dependence on Petroleum	--	Relies upon electricity rather than petroleum-based fuels for power

Source: SEWRPC.

that would help stabilize neighborhoods. However, the consultants emphasized that light rail by itself could not be expected to bring about redevelopment. On the far northwest side, light rail was projected to increase the annual amount of high-density housing to be developed from 175 housing units to 225 to 250 units. The land development consultant specifically cautioned that light rail could not be expected to stimulate new economic activity in the greater Milwaukee area, but rather would encourage development that would have occurred anyway within the greater Milwaukee area to locate along the light rail line. Such development may otherwise occur outside the City and County of Milwaukee.

Thus, the major advantage of the light rail alternative compared to simply maintaining the existing transit system is that it could have a positive impact on land development, in addition to pro-

viding improved transit service and higher transit ridership. The light rail alternative would also provide a mode of transportation that is not dependent upon petroleum-based motor fuel. This light rail alternative, however, would have a substantially higher capital cost for implementation than the alternative of simply maintaining the existing transit system, requiring an additional \$188 million to implement.

Table 7 presents the advantages and disadvantages of the express bus alternative in comparison to the light rail alternative. Comparing the express bus alternative to the light rail alternative indicates that if only direct costs and benefits are considered, the express bus alternative is superior to the light rail alternative in northern Milwaukee County. Both alternatives may be expected to have about the same direct transportation benefits as reflected in improved service levels and increased transit

Table 7

**KEY ADVANTAGES AND DISADVANTAGES OF ALTERNATIVE 2B—FOND DU LAC
AVENUE EXPRESS BUS ALIGNMENT—IN COMPARISON TO ALTERNATIVE 3D—
N. 33RD STREET RAILWAY CORRIDOR LIGHT RAIL ALIGNMENT**

Major Differences	Disadvantages of Express Bus Alternative 2B in Comparison with Light Rail Alternative 3D	Advantages of Express Bus Alternative 2B in Comparison with Light Rail Alternative 3D
Capital Cost	--	\$166.2 million, or 88 percent, lower capital cost within corridor; and about 81 percent lower total area capital cost
Transit Operating Costs	--	\$2.2 million, or 7 percent, lower annual operating costs within corridor; and about 3 percent lower operating expenses for total area transit system
Transit Operating Deficits	--	\$2.8 million, or 18 percent, lower annual operating deficit within corridor; and about 8 percent lower operating deficit for total area transit system
Influence Land Development and Redevelopment	Express bus service would likely have little incremental impact on land use development and redevelopment within corridor	--
Dependence on Petroleum	Relies upon petroleum-based fuels for power, and consequently has the potential to be adversely affected by a serious petroleum shortage	--

Source: SEWRPC.

ridership. The express bus alternative, however, may be expected to provide \$2.2 million savings in annual operating costs compared to the light rail alternative, and a \$2.8 million greater reduction in annual operating deficits. In addition, the bus alternative would have a \$166 million lower capital cost.

The advantages of light rail are thus indirect and intangible. In this respect, it is important to note that the potentially positive land development and redevelopment impacts of light rail are significant. Very few opportunities are available to stimulate development in the outlying and downtown areas of the City while at the same time revitalizing and

maintaining the attractiveness of central city neighborhoods. Without further incentives for sound central city development and redevelopment, there is a potential for a substantial erosion of the property tax base, for further loss of population and jobs, and for an underused infrastructure. Indeed, many public projects are pursued precisely because they have the potential to indirectly affect the well-being of the area—for example, development of the Grand Avenue Mall, construction of the downtown sky walk system, and construction of halls and stadia for conventions and the attraction and retention of professional sports teams. The development that would be stimulated by the

light rail line would not represent new activity in the Milwaukee area, but rather development that would have occurred anyway within the Milwaukee area, but probably not within the corridor or the City of Milwaukee.

Based upon these conclusions, the Advisory Committee recommended that express bus Alternative 2B, as the best express bus alternative, and light rail Alternative 3D, as the best light rail alternative, be the preferred alternatives for the Milwaukee northwest corridor. The Advisory Committee also recommended that a final decision concerning which alternative should be implemented within the corridor be made by the elected officials of the City of Milwaukee, Milwaukee County, and the State of Wisconsin. In making this recommendation, the Committee recognized that neither alternative could be implemented solely by Milwaukee County; that financial assistance from both the federal and state governments would be needed to help defray a major portion of the capital costs of each alternative; and that, while federal transit capital assistance is currently available through

programs administered by the Urban Mass Transportation Administration, there is currently no state program for financing mass transit capital improvements.

With regard to the need for state funds for capital assistance, the Advisory Committee believed that the State had responsibility for funding a major rapid transit improvement within the Milwaukee corridor. This belief was based upon the State's previous commitment to build two planned freeway segments—the Park Freeway-West and the Stadium Freeway-North gap closure—which would have served existing travel within the corridor, and the increased travel anticipated to occur over the next two decades. It was therefore the opinion of the Advisory Committee that the State should fulfill its previous commitment to improving the transportation system within the northwest corridor of Milwaukee County by providing financial assistance in support of the capital costs of the preferred rapid transit alternatives for the Milwaukee northwest corridor.

Chapter III

PLAN IMPLEMENTATION

INTRODUCTION

Based upon the comparative evaluation of the express bus and light rail alternatives presented in the previous chapter, the study Advisory Committee identified Alternative 2B—express bus on reserved lanes on W. Fond du Lac Avenue—as the best express bus alternative, and Alternative 3D—light rail in the N. 33rd Street railway corridor terminating at W. Mill Road—as the best light rail alternative in the Milwaukee northwest corridor. In recommending these two alternatives as the preferred alternatives in the corridor, the Advisory Committee recognized that implementation of either the best express bus or best light rail alternative would have significant benefits for the northwest corridor of Milwaukee County.

In this respect, the Advisory Committee recognized that both alternatives may be expected to have about the same direct transportation benefits within the corridor as reflected in improved transit service levels and increased transit ridership. The express bus alternative may be expected to provide a savings in annual transit system operating costs within the corridor, and a larger reduction in annual transportation operating deficits within the corridor than the light rail alternative. In addition, the express bus alternative would have a \$167 million lower capital cost than the light rail alternative. Consequently, if only the direct costs and benefits of the two alternatives are considered, the bus alternative would be superior to the light rail alternative within the corridor.

However, the Advisory Committee also recognized that the major advantage of the light rail alternative was not related to its direct transportation benefits, but rather to the indirect and intangible benefits of light rail associated with its potential positive impacts on land development and redevelopment within the community. The light rail alternative could be expected to provide some reinforcement of downtown revitalization efforts, potentially helping to stabilize mid-corridor neighborhoods, and encouraging more concentrated land use development in the far northwest portion of the corridor. Very few opportunities are available to stimulate development in the outlying and downtown areas of the City while at the same time revitalizing and maintaining the attractiveness of central city neighborhoods.

Because of the intangible merits differentiating the alternatives, the study Advisory Committee chose not to recommend the implementation of one alternative over the other. Rather, the Committee determined that such a decision should be made by the elected officials in the affected communities. The Committee also recognized that neither alternative could be implemented without substantial financial assistance from both the federal and state governments to help defray a portion of the capital costs of each alternative. While there is no current state program for providing transit capital assistance, the Advisory Committee believed that the State had a responsibility to provide capital assistance for a major rapid transit project within the northwest corridor of Milwaukee County because of the needs created when two planned freeway segments—the Park Freeway-West and the Stadium Freeway-North gap closure—which would have served the corridor and which would have provided exclusive lanes for express bus operation were removed from the regional transportation system plan.

This chapter is presented as a guide for use in implementing the recommendations of the Advisory Committee concerning the preferred rapid transit alternatives for the Milwaukee northwest corridor. It outlines the actions which must be taken by the various levels and agencies of government concerned if either the recommended express bus plan or the recommended light rail plan is to be fully carried out over the next 15 years. Because of this dual plan recommendation by the Advisory Committee, the actions outlined represent a departure from the typical plan implementation actions recommended in previous transit planning studies in the Milwaukee area, where a single plan has been recommended for implementation. In this respect, the plan implementation recommendations presented herein include a description of the steps to be followed in determining which of the preferred rapid transit alternative plans should be the final recommended plan for the northwest corridor, as well as a complete description of the plan implementation actions required for both preferred alternative plans so that implementation can proceed once a decision on a final recommended plan is made. Within the chapter, those units and agencies of government that should be involved in the

final plan selection process, and that have plan adoption and implementation powers applicable to the final recommended plan, are identified; necessary or desirable formal plan adoption, endorsement, and acknowledgement actions are specified; and specific implementation actions are recommended to each of the units and agencies of government and private parties concerned for each preferred alternative plan. In addition, financial considerations pertaining to implementation of each preferred alternative are discussed.

PLAN IMPLEMENTATION ORGANIZATIONS

Although the Regional Planning Commission can promote and encourage plan implementation in various ways, the completely advisory role of the Commission makes actual implementation of a final recommended rapid transit plan within the northwest corridor of Milwaukee County entirely dependent upon action by local, state, and federal units and agencies of government, as well as by certain private concerns. These agencies include general-purpose local units of government, particularly Milwaukee County and the City of Milwaukee; certain state agencies, particularly the Wisconsin Department of Transportation; and federal agencies, particularly the U. S. Department of Transportation, Urban Mass Transportation Administration (UMTA). Because of the number of governmental agencies concerned with rapid transit improvement within the corridor, it becomes important to identify the key agencies having the legal authority and financial capability to most effectively implement a final recommended plan.

Accordingly, those agencies whose actions will have a significant effect either directly or indirectly upon the successful implementation of a final recommended rapid transit plan for the northwest corridor of Milwaukee County, and whose full cooperation in plan implementation will be essential, are listed and discussed below. For convenience, the agencies are discussed by level of government; however, it is important to emphasize the interdependence between the various levels, as well as between agencies, of government, and the need for close intergovernmental coordination in plan implementation.

Advisory Committee

The conduct of the Milwaukee northwest corridor rapid transit study was guided by a 25-member Milwaukee Northwest Corridor Rapid Transit Plan-

ning Study Advisory Committee appointed by the Milwaukee County Executive for that purpose. The membership of this Committee is set forth on the inside front cover of this report. Upon adoption of a final recommended plan by Milwaukee County and the Regional Planning Commission, this Committee will have completed its work and can, accordingly, be dissolved. The implementing agencies themselves may be expected to carry out, as a normal part of the plan implementation activities, more direct public official and citizen involvement programs in the day-to-day decision-making required for making the recommended rapid transit improvements.

Milwaukee County

Milwaukee County is of key importance to the implementation of rapid transit service improvements within the northwest corridor of Milwaukee County, as it provides urban transit services within the corridor and all of Milwaukee County through the operation of the Milwaukee County Transit System. In Milwaukee County, public transit services are provided under policy direction by the Milwaukee County Board of Supervisors acting through the Board's Mass Transit Committee and, to a lesser extent, the Board's Transportation and Public Works Committee. The services are administered by the office of the County Executive acting primarily through the County Department of Public Works. All matters of policy relating to the development and operation of the Milwaukee County Transit System are considered by the Mass Transit Committee, the County Board, and the County Executive. The Transportation and Public Works Committee is primarily involved with the construction and maintenance of park-ride lots. At the present time, Milwaukee County contracts with Milwaukee Transport Services, Inc. (MTS, Inc.), a private transportation firm operating within the County Department of Public Works, to provide the day-to-day management and operation of the County's public transit system. The President of MTS, Inc., and the Director of Transportation of the Milwaukee County Department of Public Works advise the Mass Transit Committee, the County Board, and the County Executive on all transit-related policy issues. Because they are directly responsible for the operation of the transit system in the corridor, the Mass Transit Committee, the Milwaukee County Board, and the Milwaukee County Executive will have the singularly most important responsibilities attendant to implementation of a final recommended rapid transit plan for the northwest corridor.

City of Milwaukee

The City of Milwaukee, while it does not itself directly provide urban public transit service, has a number of important functions that indirectly support and relate to implementation of the recommended rapid transit improvements. In particular, the Departments of Public Works and City Development, working through appropriate committees of the Common Council of the City of Milwaukee, will carry a significant level of responsibility in facilitating the implementation of certain important elements of the rapid transit plan, including the final locations of park-ride lots; the implementation of reserved lanes on arterial streets for use by express bus or light rail vehicles; and the conversion of Wisconsin Avenue into a transit/pedestrian mall between N. 6th Street and N. Jackson Street.

Should the light rail transit facility be implemented within the corridor, the City of Milwaukee would have important responsibilities in promoting land use development and redevelopment within the corridor that would reinforce the beneficial impacts of the light rail facility on the land use pattern. Without appropriate actions in this regard, the potential land use benefits that would accrue to the community will not be realized. The Department of City Development would be the lead agency for implementing those measures that will enable the City to realize the positive land development and redevelopment impacts of a light rail facility within the corridor.

Regional Planning Commission

The Regional Planning Commission is not a plan implementation agency per se. While the Commission has no statutory plan implementation powers, it may in its role as an advisory and coordinating agency for planning and development activities in the Region promote implementation of the recommended rapid transit improvements within the northwest corridor. In addition, the Commission may provide a resource to be used in carrying out some of the detailed planning and engineering activities necessary for implementation of the recommended rapid transit improvements in the northwest corridor of Milwaukee County. Finally, under current federal laws and regulations, the Commission is responsible for developing and annually updating a transportation improvement program for the Region which identifies both highway- and transit-related improvement projects for an upcoming five-year period; provides for the staging of improvements over the five-year period; includes estimates of costs and revenues over the

program period; and relates the improvements recommended in the program to the adopted transportation plan for the Region. The inclusion of projects drawn from the final recommended rapid transit plan for the northwest corridor in the transportation improvement program will be essential to the implementation of the plan.

State Level Agencies

At the state level, there is one agency that is particularly important to implementation of the transit plan: the Wisconsin Department of Transportation.

Wisconsin Department of Transportation: Responsibility for the planning and development of all modes of transportation in Wisconsin is centered in the Wisconsin Department of Transportation. The Department is authorized to preserve and improve transportation in the State and to provide the State with a highly integrated transportation system. The Department is responsible for administering all state and federal aids for highway improvements; for the planning, design, construction, and maintenance of all state trunk highways; and for planning, laying out, revising, constructing, reconstructing, and maintaining a national system of interstate and defense highways, the federal aid primary system, the federal aid secondary system, and the federal aid urban system, the latter four functions all being subject to federal review and regulation. The Department further administers state and federal aid programs for public transit, airports, railroads, harbors, and local streets.

The Wisconsin Department of Transportation also has authority to administer urban rail transit system programs within the State, pursuant to Section 85.063(2) of the Wisconsin Statutes. This Statute, enacted in 1979, specifically authorizes the Department to plan, design, and engineer urban rail transit systems for any area that includes a city or village having a population of 50,000 or more, and wherein the provision of rail transit is appropriate, in the judgment of the Department. To date, no state appropriations have been made under this authority.

Federal Level Agencies

There are two agencies at the federal level, both within the U. S. Department of Transportation, which administer programs that can have important effects upon implementation of the recommended rapid transit improvements within the corridor: The Urban Mass Transportation Administration and the Federal Highway Administration.

U. S. Department of Transportation, Urban Mass Transportation Administration: The Urban Mass Transportation Administration provides capital grants and operating subsidies to local agencies providing urban public transit. The UMTA also provides grants for detailed planning studies, such as the Milwaukee northwest corridor rapid transit study, conducted as a prerequisite to receiving federal capital assistance for major fixed-guideway rapid transit investments. Should the recommended light rail alternative be chosen as the final recommended plan for the northwest corridor, the UMTA may be a source of federal assistance for preliminary and final engineering studies for the light rail line, as well as of funds for its construction.

U. S. Department of Transportation, Federal Highway Administration: The Federal Highway Administration provides financial support through the federal interstate primary, secondary, and urban systems for the development of arterial highways. Such support can be important in the development of park-ride lots along such highways.

Private Corporations

The implementation of the recommended rapid transit improvements within the northwest corridor of Milwaukee County also involves other public agencies, as well as private corporations, that hold land that some day may be needed if the proposed light rail line is to be implemented. Of particular importance in this respect is the Soo Line Railroad Company. The Soo Line owns rights-of-way which may some day be needed for use in the provision of light rail transit service. The State of Wisconsin, although not a private corporation, also owns right-of-way within the City of Milwaukee as a result of acquisition for the purpose of railway freight service preservation. This right-of-way was formerly owned and operated by the Chicago, Milwaukee, St. Paul & Pacific Railroad Company (Milwaukee Road), and is currently operated by the Wisconsin & Southern Railroad Company. This right-of-way would also be needed in order to provide light rail service.

SELECTION OF A FINAL RECOMMENDED PLAN

The first step in implementing improved rapid transit services within the Milwaukee northwest corridor will be the selection of a final recommended rapid transit facility plan for the corridor from between the two preferred plans recommended by the Advisory Committee. This step

represents a departure from the typical plan implementation process used for Milwaukee area transportation studies by the Commission. Under previous studies, the typical plan implementation process would begin after a final recommended plan was selected from among the various alternative plans considered during the course of the study. However, the recommendation of the Advisory Committee that state and local elected officials make the decision as to which preferred alternative should be the final recommended plan requires the addition of this step to the plan implementation process.

The Commission will initiate the actions to be followed in selecting a final recommended rapid transit plan for the northwest corridor by formally transmitting a copy of the report documenting the best express bus alternative and the best light rail alternative to the County Executive and the Milwaukee County Board of Supervisors. The Milwaukee County Board will be asked to take formal action endorsing one of the two recommended plans. In this endorsement process, the County will need to carefully consider the levels of service, the costs, the support within the community, and the financing options attendant to each of the two plans prior to endorsing one of the plans. Thus, the responsibility for selecting the final rapid transit plan to be implemented within the Milwaukee northwest corridor will lie with Milwaukee County as the provider of public transit service within the corridor. In making the decision, however, Milwaukee County will need to consider carefully the preferences of the City of Milwaukee, whose cooperation will be essential if either plan is to be fully implemented, and the preferences of the state and federal officials concerned. Therefore, copies of the plan report will also be sent to the Mayor and Common Council of the City of Milwaukee; to the Secretary of the Wisconsin Department of Transportation; and to each state and federal legislator with a constituency within the corridor. These bodies and officials will be asked to review the report and make their preferences known to Milwaukee County prior to county selection of a final plan.

It should be noted that should the express bus alternative be selected, this action should not be interpreted as foreclosing the ultimate construction of a light rail facility within the corridor. Rather, the express bus services and facilities would serve to build transit ridership within the northwest corridor, providing a base for the possible imple-

mentation of the light rail transit alternative. It may take a considerable period of time to build a public consensus in favor of the proposed light rail facility, and to put in place the necessary local, state, and federal financing arrangements for the project. The selection of the recommended express bus alternative should thus be viewed as a deferral of the proposed light rail project until such time that conditions are favorable for implementing the light rail alternative.

RAPID TRANSIT PLAN IMPLEMENTATION

The study Advisory Committee recommended that the best express bus and light rail plans be considered as the preferred rapid transit plans for the Milwaukee northwest corridor. Further, the Advisory Committee determined that the final decision as to which of these two preferred plans should be implemented should be made by the local and state elected officials concerned. Therefore, the implementation actions required to carry out both of the preferred plans are described herein. Implementation of either plan can thus proceed once a decision is made concerning a final recommended rapid transit plan for the corridor. The following sections identify the specific plan implementation actions required to be taken by the units and agencies of government concerned to carry out the elements of each of the recommended plans.

Recommended Express Bus Plan

The recommended express bus plan consists of six basic elements: express bus transit service, a downtown transit mall, reserved bus lanes, park-ride lots, plan staging, and right-of-way protection and preservation for the possible provision of light rail transit service.

Express Bus Transit Service: It is recommended that responsibility for the implementation of the express bus transit services proposed under the recommended express bus plan be assumed directly by Milwaukee County, acting through the Department of Public Works, as the transit owner within the corridor. The most significant of the express bus transit services proposed under the plan would be the service improvements proposed for the Milwaukee County Transit System bus route currently operating over W. Fond du Lac Avenue—Route No. 23. Under the plan, this bus route would continue to provide local service from the Milwaukee central business district to the northwest side of Milwaukee County. However, much of the service on this route—up to about 90 percent during weekday peak travel periods—would be

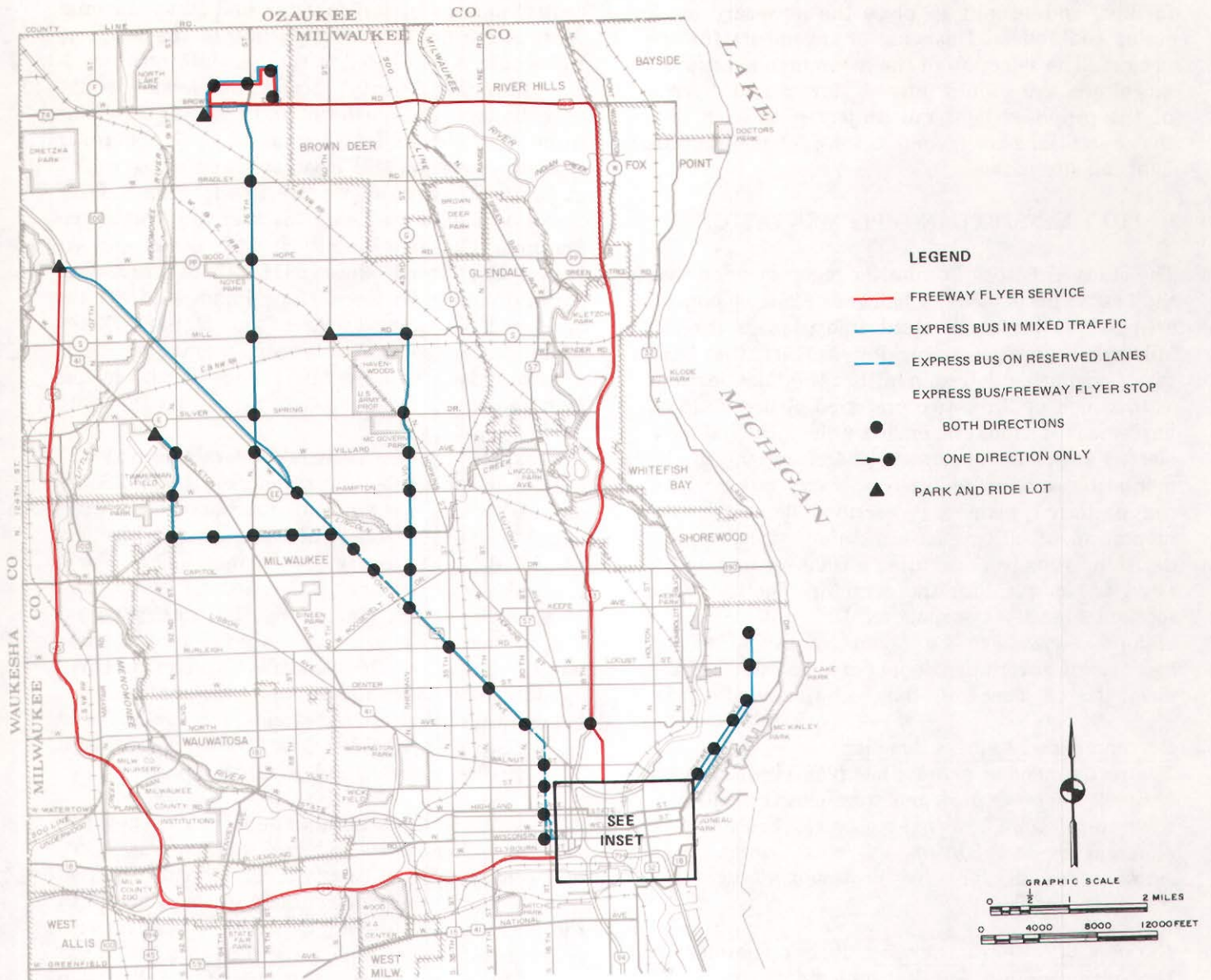
converted from local bus service with stops about every 0.1 mile to express bus service with stops about every one-quarter to one-half mile in the central portion of the corridor, and up to one mile apart in the far northwest portion of the corridor, and would be extended farther out into northwestern Milwaukee County. Express bus service would be extended in a northerly and westerly direction from W. Fond du Lac Avenue along N. Sherman Boulevard and W. Mill Road to a new park-ride lot at N. 60th Street and W. Mill Road; along N. 76th Street to a new park-ride lot near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road; along STH 145 to an existing park-ride lot at W. Good Hope Road and USH 45; and along W. Congress Street and N. 92nd Street to an existing park-ride lot near Timmerman Field. The proposed express bus service is shown on Map 13.

The express bus service would operate throughout the day in both directions seven days a week. Some express bus service from all four branches would continue east of the Milwaukee central business district along N. Prospect, N. Farwell, and N. Maryland Avenues to the University of Wisconsin-Milwaukee campus. The express bus service would use high-capacity articulated diesel motor buses which would operate over a transit/pedestrian mall in downtown Milwaukee, and over reserved bus lanes over several arterial streets, including E. and W. Wells Street, W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue.

In addition to the arterial express bus services, the plan recommends new or improved “freeway flyer” bus service over an operationally controlled freeway system to provide nonstop service from both the Northridge Shopping Center area park-ride lot and the W. Good Hope Road park-ride lot to the Milwaukee central business district throughout the day on weekdays. To provide service from the Northridge Shopping Center area, the plan recommends that Milwaukee County Transit System Route No. 49 be modified to operate nonstop to downtown Milwaukee from the new park-ride lot proposed to be located near the Northridge Shopping Center. The existing route currently makes several stops along W. Brown Deer Road after leaving the freeway flyer terminal located in the Northridge Shopping Center parking lot, including a stop at the park-ride lot located at IH 43 and W. Brown Deer Road. Under the plan, the existing route would essentially be split into two branches—with one branch providing nonstop bus service from the Northridge Shopping Center area and

Map 13

RECOMMENDED EXPRESS BUS PLAN



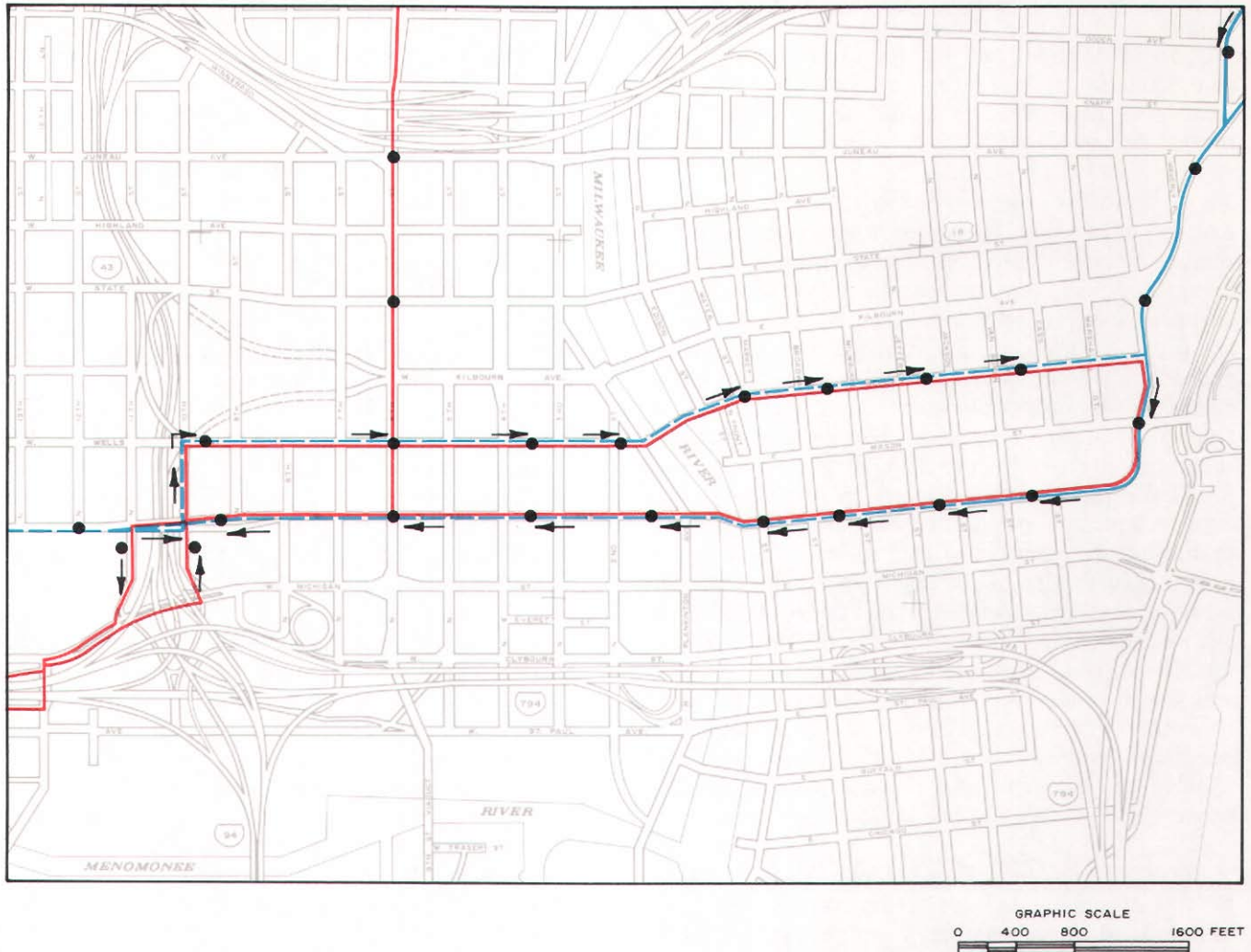
Source: SEWRPC.

the second branch serving the existing park-ride lot at IH 43 and W. Brown Deer Road. The plan recommends that a new freeway flyer route be implemented to provide nonstop bus service to downtown Milwaukee from the existing W. Good Hope Road park-ride lot. The proposed freeway flyer bus routes are also shown on Map 13.

Downtown Transit Mall: The recommended plan calls for the development of a transit/pedestrian mall in the Milwaukee central business district, extending along Wisconsin Avenue from N. 6th

Street on the west to N. Jackson Street on the east, a distance of about 0.8 mile. This facility would serve motor buses providing local, express, and freeway flyer bus service to the central business district. It is recommended that Milwaukee County act as the lead agency in the development of the mall as an integral part of the transit system, obtaining any state and federal grants and providing the necessary local funding. Close cooperation will be required between the City and the County in the design of the mall, and the City should act as the actual construction agency under an agreement

Map 13 Inset



with the County, since the street right-of-way concerned is owned by the City, and would have to continue to be maintained by the City.

It should be noted that the express bus services proposed under the plan could be implemented without the construction of the transit/pedestrian mall, as the proposed express bus services could also use an exclusive bus lane or operate in mixed traffic on Wisconsin Avenue. It should also be noted that the construction of a transit mall on Wisconsin Avenue was considered by the City of Milwaukee based on the findings of a feasibility study conducted in 1980.¹ However, the construc-

tion of the transit mall was not pursued after it was determined that federal funding for the project was not available at that time.

Finally, it should be noted that the proposed routing of freeway flyer, express, and local bus service in the Milwaukee central business district differs from the routing currently used for such service. Under the existing transit system, all three types of bus service are routed in both directions over Wisconsin Avenue between N. 10th Street and N. Prospect Avenue. Wisconsin Avenue would have insufficient capacity to efficiently carry the potential volume of transit buses in the plan design year if the current routing of freeway flyer, express, and local routes were maintained. Consequently, the recommended express bus plan proposes that by the year 2000, local bus routes be separated from

¹ See *Wisconsin Avenue Transit Mall Feasibility Study, Phase I*, prepared for the City of Milwaukee by Barton-Aschman Associates, Inc., 1980.

freeway flyer and express bus routes on Wisconsin Avenue in downtown Milwaukee. This would be accomplished by operating all existing and proposed freeway flyer and express bus routes eastbound over Wells Street and westbound over Wisconsin Avenue; and by operating the local bus routes currently operating on Wisconsin Avenue eastbound over Wisconsin Avenue and westbound over Michigan Street.

It is therefore recommended that the existing routing of freeway flyer, express, and local bus service be maintained until the number of buses using Wisconsin Avenue reaches a level where transit operations are adversely affected. Conversion to the proposed loop routing in downtown Milwaukee should then be considered. Bus volumes warranting such conversion would not be reached until all freeway flyer and express bus services that are recommended to be provided within the greater Milwaukee area in the adopted regional transportation system plan are in operation in the late 1990's, including such services within the northwest corridor. Because it is likely that the improved transit services envisioned under the express bus alternative could be operated for some time without modifying the existing routing in downtown Milwaukee, it is also recommended that the proposed downtown transit/pedestrian mall be designed to accommodate both the existing and proposed routing of freeway flyer, express, and local bus service in downtown Milwaukee.

Reserved Bus Lanes: In addition to the provision of a pedestrian mall on Wisconsin Avenue, the recommended express bus plan includes proposals to establish reserved lanes on certain surface arterial streets for the exclusive use of buses. The six reserved lane proposals included in the recommended express bus plan are identified in Table 8. These include curbside reserved lanes along E. and W. Wells Street between N. 10th Street and N. Prospect Avenue; along W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue between N. 6th Street and N. 19th Street; and along W. Fond du Lac Avenue between N. 35th Street and N. 60th Street. It is recommended that these lanes be constructed by the City of Milwaukee with funds provided through Milwaukee County.

All the reserved bus lanes would require the removal of existing curbside parking during the morning and afternoon peak periods when the reserved lanes would be in operation. All the street seg-

ments outside the central business district proposed to be provided with reserved bus lanes have sufficient capacity to facilitate the proposed ban on curbside parking without major adverse impacts on traffic operations. The possible exception is W. Fond du Lac Avenue between N. 17th and N. 19th Streets. This segment currently has only two traffic lanes and two parking lanes. However, a project under which W. Fond du Lac Avenue between W. 14th and W. 19th Streets would be reconstructed to provide for two additional lanes has been initiated by the Wisconsin Department of Transportation in accordance with recommendations contained in SEWRPC Planning Report No. 34, A Transportation System Plan for the Milwaukee Northwest Side/Ozaukee County Study Area, a major long-range transportation planning effort. The plan was adopted in 1983. This project is scheduled for completion during 1987. Thus, reconstruction of this segment should alleviate any traffic congestion problems due to reserved bus lane operation. There are currently no plans for widening any of the other street segments over which reserved bus lanes are proposed.

It should be noted that reserved bus lanes are not proposed for the segment of W. Fond du Lac Avenue between N. 19th and N. 35th Streets. Within this segment, W. Fond du Lac Avenue narrows, from the two traffic lanes and one parking lane in each direction separated by a 26-foot-wide median between N. 35th and N. 60th Streets to an undivided facility with two traffic lanes and two parking lanes. The right-of-way for this segment also narrows considerably—from approximately 120 feet between N. 35th and N. 60th Streets to approximately 66 feet. In order to provide for reserved bus lanes over this segment without exacerbating existing traffic congestion problems, this segment of W. Fond du Lac Avenue would need to be widened from the existing four lanes to six lanes. This action was considered in Planning Report No. 34.

In weighing the advantages and disadvantages of widening this segment of W. Fond du Lac Avenue as proposed under the previous study, it was recognized that any benefits from this action would accrue primarily to the local community and to the City of Milwaukee. That is, the benefits of the abatement of existing traffic congestion and the avoidance of future congestion would largely be realized by the neighborhood and by the City. Similarly, the costs of the widening improvements—its impact on the future of the shopping area

located at and around W. Fond du Lac Avenue and W. North Avenue and along W. Fond du Lac Avenue from W. North Avenue to N. 35th Street—would be borne by the neighborhood and the City. In this respect, because of the narrow right-of-way for this segment of W. Fond du Lac Avenue, the widening of this segment would require a substantial amount of property taking. Because of this, strong opposition was expressed toward any widening of this segment of W. Fond du Lac Avenue by owners of area businesses and by neighborhood groups.

The Advisory Committee guiding the previous planning study therefore chose not to recommend any widening of this segment of W. Fond du Lac Avenue. Rather, the Committee recommended that a building setback line be established by the City under its official mapping authority to, over time, reserve adequate right-of-way for the ultimate widening of this segment of W. Fond du Lac Avenue. The widening of this segment would not be actively pursued through the acquisition of property within the proposed right-of-way. Instead, as redevelopment of the existing property within the proposed right-of-way occurred, any redevelopment would be required to adhere to the building setback base line. The setback base line would ultimately permit an additional two lanes to be provided over time on this segment of W. Fond du Lac Avenue. Until W. Fond du Lac Avenue is so widened, the Advisory Committee recommended that on-street parking be prohibited in the peak direction during peak traffic periods in order to provide for four traffic lanes on W. Fond du Lac Avenue. To replace the lost on-street parking, it was also recommended that off-street parking be developed, including on the vacant lots located at 2007-2443, 2404-2405, and 2636-2650 W. Fond du Lac Avenue.

These recommendations were made in specific response to the request of an organization of neighborhood groups—the Community Action Coalition to Save Fond du Lac Avenue—at public informational meetings held within the area. In addition, State Legislation was enacted on July 1, 1983, which supported these recommendations and prohibited the use of state and federal funds for the widening of this segment of W. Fond du Lac Avenue. Consequently, the adopted transportation plan for the Region contains no recommendations for the widening of W. Fond du Lac Avenue between N. 35th Street and N. 19th Street.

Express buses would therefore operate in mixed traffic on W. Fond du Lac Avenue between N. 19th and N. 35th Streets. In lieu of providing reserved bus lanes over this segment, it is recommended that on-street parking in the peak direction during peak weekday travel periods be prohibited in order to provide for four traffic lanes. This action should alleviate, somewhat, traffic congestion problems over this segment of W. Fond du Lac Avenue and thus increase travel speeds for all vehicles using the facility, including buses providing express transit service. As shown in Table 9, peak-period, peak-direction parking restrictions currently in effect over portions of this segment of W. Fond du Lac Avenue are generally directed toward outbound traffic during the afternoon peak period. Because residents and businessmen from this area have been opposed to the elimination of on-street parking from this segment of W. Fond du Lac Avenue, it is also recommended that off-street parking be developed to replace the on-street parking lost because of the enactment of parking restrictions, possibly by using vacant lots located along this segment as noted above.

Park-Ride Lots: The recommended express bus plan calls for the establishment of four park-ride lots for the proposed arterial express bus and freeway flyer transit services within the corridor. These four lots include two new facilities that would need to be constructed as part of plan implementation, one located near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road, and the other located at N. 60th Street and W. Mill Road. The other two park-ride lots are existing facilities which would need to be expanded to accommodate more parked cars, one located at USH 41/45 and W. Good Hope Road and one located at Timmerman Field. The agencies recommended to assume responsibility for implementing these parking facilities are identified in Table 10.

It is recommended that the Wisconsin Department of Transportation be responsible for implementing the modifications to the two existing park-ride lots, and for constructing the new park-ride lot near the Northridge Shopping Center. All these facilities lie along or in proximity to the state trunk highway and connecting street system. It is further recommended that the Wisconsin Department of Transportation utilize federal and state highway funds to the greatest extent possible in the construction of these lots. Milwaukee County would be responsible for constructing the remaining park-ride lot.

Table 8

**RECOMMENDED RESERVED LANES FOR EXCLUSIVE USE OF BUSES ON
STANDARD ARTERIAL STREETS IN THE MILWAUKEE NORTHWEST CORRIDOR**

Arterial Street			Reserved Bus Lanes			Remarks	Existing Peak-Period Parking Restrictions (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.)		Adjacent Land Use
Street Name	Termini						Termini		
	From	To	Type	Direction	Duration				
W. Wells Street	N. 10th Street	N. Prospect Avenue	Curb lane	Eastbound	6:00 a.m.-9:00 a.m. 3:00 p.m.-6:00 p.m.	Requires the removal of curb parking during morning and afternoon peak periods	N. 10th Street to N. 9th Street N. 9th Street to N. 6th Street N. 6th Street to N. 5th Street N. 5th Street to N. 2nd Street N. 2nd Street to N. Edison Street N. Edison Street to N. Water Street N. Water Street to N. Broadway N. Broadway to N. Jackson Street N. Jackson Street to N. Cass Street N. Cass Street to N. Prospect Avenue	No parking any time No parking 7:00 a.m. to 9:00 a.m. One-hour parking 3:00 p.m. to 6:00 p.m. No parking any time No parking 7:00 a.m. to 9:00 a.m. One-hour parking 3:00 p.m. to 6:00 p.m. No parking any time No parking 7:00 a.m. to 9:00 a.m. One-hour parking 3:00 p.m. to 6:00 p.m. One-hour parking 3:00 p.m. to 6:00 p.m. Two-hour parking 8:00 a.m. to 9:00 a.m. Two-hour parking 3:00 p.m. to 6:00 p.m. One-hour parking 8:00 a.m. to 9:00 a.m. One-hour parking 3:00 p.m. to 6:00 p.m. Two-hour parking 7:00 a.m. to 9:00 a.m. Two-hour parking 3:00 p.m. to 6:00 p.m.	Off-street parking Governmental, off-street parking Commercial Commercial, off-street parking Commercial, off-street parking, river Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking Residential, off-street parking
W. Wisconsin Avenue	N. 17th Street	N. 6th Street	Curb lane	Eastbound ^a Westbound ^b	6:00 a.m.-9:00 a.m. 3:00 p.m.-6:00 p.m.	Requires the removal of curb parking during morning and afternoon peak periods	N. 17th Street to N. 10th Street N. 6th Street to N. 8th Street N. 8th Street to midblock N. 8th/N. 9th Streets Midblock N. 8th/N. 9th Streets to N. 9th Street N. 9th Street to N. 10th Street N. 10th Street to N. 12th Street N. 12th Street to midblock N. 12th/N. 13th Streets Midblock N. 12th/N. 13th Streets to N. 16th Street	No parking any time No parking any time 15-minute parking No parking any time Two-hour parking 3:00 p.m. to 6:00 p.m. No parking any time One-hour parking 3:00 p.m. to 3:30 p.m. No parking 3:30 p.m. to 5:30 p.m. No parking any time	Institutional, off-street parking Commercial Governmental Governmental Institutional, off-street parking Institutional, off-street parking Institutional Institutional
N. 16th Street/ N. Renee Street/ N. 17th Street	W. Wisconsin Avenue	W. Fond du Lac Avenue	Curb lane	Northbound	3:00 p.m.-6:00 p.m.	Requires the removal of curb parking during the afternoon peak period	W. Wisconsin Avenue to W. Wells Street W. Wells Street to W. Kilbourn Avenue W. Kilbourn Avenue to N. 17th Street W. State Street to W. Fond du Lac Avenue	No parking any time One-hour parking	Institutional, off-street parking Residential, off-street parking Residential, institutional Residential, recreational

Table 8 (continued)

Arterial Street						Remarks	Existing Peak-Period Parking Restrictions (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.)		
Street Name	Termini		Reserved Bus Lanes				Termini	Restrictions	Adjacent Land Use
	From	To	Type	Direction	Duration				
N. 17th Street	W. Wisconsin Avenue	W. Fond du Lac Avenue	Curb lane	Southbound	6:00 a.m.-9:00 a.m.	Requires the removal of curb parking during the morning peak period	W. Fond du Lac Avenue to W. Juneau Avenue W. Juneau Avenue to W. Highland Avenue W. Highland Avenue to W. Wisconsin Avenue	-- No parking 7:30 a.m. to 9:00 a.m. on school days Two-hour parking	Recreational, residential Institutional Residential, institutional
W. Fond du Lac Avenue	N. 17th Street	N. 19th Street	Curb lane	Westbound Eastbound	3:00 p.m.-6:00 p.m. 6:00 a.m.-9:00 a.m.	Requires the removal of curb parking during the morning and afternoon peak periods	N. 17th Street to N. 18th Street N. 18th Street to N. 19th Street N. 19th Street to N. 18th Street N. 18th Street to N. 17th Street	No parking any time No parking 3:30 p.m. to 5:30 p.m. -- No parking 6:30 a.m. to 8:30 a.m.	Open land Commercial, institutional Recreational Recreational
	N. 35th Street	N. 60th Street	Curb lane	Westbound Eastbound	3:00 p.m.-6:00 p.m. 6:00 a.m.-9:00 a.m.	Requires the removal of curb parking during the morning and afternoon peak periods	N. 35th Street to N. 36th Street N. 36th Street to midblock N. 36th/N. 37th Streets Midblock N. 36th/N. 37th Streets to N. 37th Street N. 37th Street to N. 39th Street N. 39th Street to N. 42nd Street N. 42nd Street to N. Sherman Boulevard N. Sherman Boulevard to W. Ridge Street W. Ridge Street to point 120 feet west of W. Ridge Street Point 120 feet west of W. Ridge Street to W. Melvina Street W. Melvina Street to W. Capitol Drive W. Capitol Drive to N. 51st Street N. 51st Street to W. Fiebrantz Avenue W. Fiebrantz Avenue to W. Maxwell Place W. Maxwell Place to W. Ely Place W. Ely Place to point 80 feet west of W. Ely Place Point 80 feet west of W. Ely Place to W. Vance Place W. Vance Place to N. 60th Street N. 60th Street to point 270 feet west of W. Maxwell Place Point 270 feet west of W. Maxwell Place to W. Maxwell Place W. Maxwell Place to N. 52nd Street N. 52nd Street to W. Capitol Drive W. Capitol Drive to W. Melvina Street W. Melvina Street to W. Roosevelt Drive W. Roosevelt Drive to N. Sherman Boulevard N. Sherman Boulevard to N. 42nd Street N. 42nd Street to N. 39th Street N. 39th Street to N. 36th Street N. 36th Street to N. 35th Street	One-hour parking 3:00 p.m. to 6:00 p.m. 15-minute parking No parking any time No parking 3:00 p.m. to 4:30 p.m. -- No parking 3:00 p.m. to 6:00 p.m. -- No parking any time One-hour parking 3:00 p.m. to 6:00 p.m. No parking 3:30 p.m. to 5:30 p.m. -- No parking any time Two-hour parking 3:00 p.m. to 5:00 p.m. No parking any time Two-hour parking 3:00 p.m. to 6:00 p.m. -- -- No parking any time -- No parking any time One-hour parking 6:00 a.m. to 9:00 a.m. -- No parking 7:00 a.m. to 9:00 a.m. One-hour parking 7:00 a.m. to 9:00 a.m. -- Two-hour parking 7:00 a.m. to 9:00 a.m. No parking 7:00 a.m. to 9:00 a.m.	Commercial Governmental Governmental Institutional Commercial, institutional, off-street parking, residential Commercial, residential Residential Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking Commercial Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking Commercial Commercial, off-street parking, residential Open land, commercial Commercial Residential Commercial, off-street parking Commercial, off-street parking Commercial, off-street parking, utility Commercial, institutional, off-street parking Off-street parking

^aBetween N. 17th and N. 10th Streets only.

^b Between N. 6th and N. 16th Streets only.

Source: SEWRPC.

Table 9

**EXISTING PEAK DIRECTION, PEAK-PERIOD PARKING RESTRICTIONS ON
W. FOND DU LAC AVENUE BETWEEN N. 35TH STREET AND N. 19TH STREET**

Segment Limits		Direction	Existing Parking Restrictions
From	To		
N. 35th Street	N. 34th Street	Eastbound	No parking any time
N. 34th Street	N. 32nd Street	Eastbound	No parking 6:00 a.m. to 7:30 a.m.
N. 32nd Street	Point 350 feet west of N. 30th Street	Eastbound	No parking any time
Point 350 Feet West of N. 30th Street	N. 28th Street	Eastbound	--
N. 28th Street	W. Center Street	Eastbound	No parking any time
W. Center Street	N. 20th Street	Eastbound	No parking 6:30 a.m. to 8:30 a.m.
N. 20th Street	N. 19th Street	Eastbound	--
N. 19th Street	N. 20th Street	Westbound	No parking 3:30 p.m. to 5:30 p.m.
N. 20th Street	W. Meinecke Avenue	Westbound	One-hour parking 3:00 p.m. to 6:00 p.m.
W. Meinecke Avenue	W. Wright Street	Westbound	No parking 3:30 p.m. to 5:30 p.m.
W. Wright Street	W. Hickory Street	Westbound	--
W. Hickory Street	N. 27th Street	Westbound	No parking any time
N. 27th Street	W. Center Street	Westbound	No parking 3:00 p.m. to 6:00 p.m.
W. Center Street	Point 400 feet west of N. 30th Street	Westbound	--
Point 400 Feet West of N. 30th Street	N. 32nd Street	Westbound	No parking any time
N. 32nd Street	Point 200 feet west of N. 32nd Street	Westbound	--
Point 200 Feet West of N. 32nd Street	Point 300 feet west of N. 32nd Street	Westbound	Two-hour parking 3:00 p.m. to 6:00 p.m.
Point 300 Feet West of N. 32nd Street	Point 550 feet west of N. 32nd Street	Westbound	--
Point 550 Feet West of N. 32nd Street	N. 35th Street	Westbound	No parking 4:00 p.m. to 6:00 p.m.

Source: SEWRPC.

Plan Staging: Full operation of the arterial express bus and freeway flyer bus services proposed under the express bus plan should occur by the year 2000. However, it is recommended that the proposed service changes be implemented in several stages. The implementation of each stage of service should be based upon ridership analyses which consider then-existing ridership levels on affected routes and the density of urban development in the areas served. In this respect, certain elements of the

proposed express bus services should be warranted based upon existing ridership levels and urban development, and could therefore be implemented immediately. Elements of the recommended plan that could not be supported by existing ridership levels and development patterns would be implemented over the next 10 to 15 years, as outlying areas of the corridor fully develop to densities capable of generating the ridership levels needed to support express bus service.

Table 10

**RECOMMENDED JURISDICTIONAL RESPONSIBILITY FOR IMPLEMENTATION OF PARK-RIDE
LOTS ASSOCIATED WITH EXPRESS BUS SERVICES UNDER RECOMMENDED EXPRESS BUS PLAN**

Location of Lot	Civil Division	Transit Agency Responsible for Implementation	Number of Parking Spaces		
			Existing	Proposed	
				Optimistic Future	Pessimistic Future
N. 84th Street and W. Brown Deer Road	City of Milwaukee	Wisconsin Department of Transportation	--	540	450
N. 60th Street and W. Mill Road. . . .	City of Milwaukee	Milwaukee County	--	170	110
USH 41 and W. Good Hope Road. . . .	City of Milwaukee	Wisconsin Department of Transportation	135	510	270
Timmerman Field	City of Milwaukee	Wisconsin Department of Transportation	140	270	190

Source: SEWRPC.

The first stage of implementation of the recommended express bus plan was developed jointly by the Commission staff and the staff of the Milwaukee County Transit System based upon the foregoing concepts. This first stage would include additional peak-period express bus service on Milwaukee County Transit System Route No. 23, as well as a restructuring of local bus operations on the route in the far northwest portion of the corridor. All the service changes would be immediately implementable. No changes would be proposed for existing freeway flyer bus routes or local bus routes other than for Route 23. The recommended changes for Route No. 23 under the first stage are listed in Table 11.

Under the first stage of plan implementation, the existing express bus route would be extended from its present terminus at W. Congress Street northwest over W. Fond du Lac Avenue, then north on N. 76th Street to W. Mill Road. Express bus service over the extended route would then be provided in both directions during the morning—6:00 a.m. to 9:00 a.m.—and afternoon—3:00 p.m. to 6:00 p.m.—peak periods. Currently, express bus service is provided over the express route only in the peak

direction of travel—inbound in the morning, outbound in the afternoon—and primarily during the peak hour of each peak period.

Reserved lanes for express buses operating over the route would not be proposed as part of the first stage of plan implementation. However, curbside parking during the peak periods in the peak direction would be prohibited, wherever possible, on all arterial streets outside the central business district traversed by the express bus route in order to increase travel speeds for all transit vehicles. The elimination of on-street parking from some arterial streets within the corridor, in particular along W. Fond du Lac Avenue, has been opposed by area residents and businessmen. Therefore, in order to implement the recommended parking prohibitions, it may be necessary to consider the development of additional off-street parking to replace the lost on-street parking, or to limit the period that parking restrictions would be in effect to only that portion of the peak period during which the additional arterial street capacity gained is essential to maintaining high travel speeds for transit vehicles. Some period of time could be expected to be entailed to implement these measures. The desired parking

Table 11

**RECOMMENDED CHANGES TO MILWAUKEE COUNTY TRANSIT SYSTEM
ROUTE NO. 23 UNDER FIRST STAGE OF RECOMMENDED EXPRESS BUS PLAN**

Service Characteristic	Existing Operations	Proposed Operations Under First Stage of Express Bus Plan
1. Percent of Service Provided as Express Service Over Route	50 percent of bus trips in peak direction	50 percent of bus trips in both directions
2. Service Levels (trunk)	Peak hour: Express—11 to 12 minutes Local—11 to 13 minutes All service—6 minutes Midday off-peak: Local—10 to 11 minutes Night off-peak: Local—13 to 18 minutes	Peak period: Express—10 to 12 minutes Local—10 to 12 minutes All service—5 to 6 minutes Midday off-peak: Local—10 to 11 minutes Night off-peak: Local—13 to 18 minutes
3. Hours of Express Bus Operation	Peak hours of morning and afternoon peak periods	Entire morning and afternoon peak periods
4. Preferential Treatment	None	Peak period parking bans outside Milwaukee central business district in the peak direction on: <ul style="list-style-type: none"> a. N. 76th Street between W. Mill Road and W. Fond du Lac Avenue b. W. Fond du Lac Avenue between N. 76th Street and N. 17th Street c. N. 16th and 17th Streets between W. Fond du Lac Avenue and W. Wisconsin Avenue d. W. Wisconsin Avenue between N. 17th Street and N. 6th Street
5. Express and Local Bus Routing	Three local branches; express bus service provided over trunk portion of route between W. Congress Street and W. Fond du Lac Avenue and N. 16th Street and W. Wisconsin Avenue	Two local branches; additional express service added on: <ul style="list-style-type: none"> a. N. 76th Street between W. Mill Road and W. Fond du Lac Avenue b. W. Fond du Lac Avenue between N. 76th Street and W. Congress Street c. E. and W. Wisconsin Avenue between N. 16th Street and N. 10th Street
6. Express Stop Location	Express stops along existing express route described above	Same basic express stops as currently used; additional stops added on N. 76th Street, W. Fond du Lac Avenue, and W. Wisconsin Avenue

Source: Milwaukee County Transit System and SEWRPC.

prohibitions could be implemented after the recommended express bus service is initiated in order to prevent those prohibitions from acting as a barrier to the implementation of the recommended express bus service.

Under the first stage of plan implementation, the existing local route operations on Route 23 would also be restructured. In particular, the local route branches north and west of W. Fond du Lac Avenue and W. Congress Street would be modified. As shown on Map 14, the existing local route splits into two branches at W. Congress Street and W. Fond du Lac Avenue, with one branch continuing west along W. Congress Street, then north along N. 84th Street to W. Hampton Avenue, and the other branch continuing northwest along W. Fond du Lac Avenue to N. 76th Street. At N. 76th Street, the route branches again, with one branch continuing along N. 76th Street and W. Mill Road to N. Joyce Avenue, and the second branch continuing northwest along W. Fond du Lac Avenue, west along W. Silver Spring Drive, north along N. 91st Street, northwest along W. Fond du Lac Avenue again, south along N. 107th Street, and east along W. Mill Road to N. Joyce Avenue. The local bus routing recommended under the first stage, as shown on Map 15, would reduce the number of local branch routes from three to two. The local branches retained would include the W. Congress Street branch which would be extended along W. Appleton Avenue and N. 91st Street to W. Mill Road, and the N. 76th Street-W. Mill Road branch which would be extended west on W. Mill Road and W. Fond du Lac Avenue to N. 107th Street.

Peak-period headways on the W. Congress Street branch would not be changed. However, peak-period headways on the N. 76th Street-W. Mill Road branch would be reduced to one-half the current headways—from approximately 40 to 20 minutes—as service from two existing branches would be combined into one new branch.

The transit system management has, in the past, considered the restructuring of the existing local route branches on Route 23. The proposed changes would provide for a more logical branching of the local route and better service levels in the areas serviced by the route branches. The restructuring of the existing local route branches would not be essential to the implementation of additional express service on the route during the peak periods, as described above. Implementation of the proposed changes to the local route would, how-

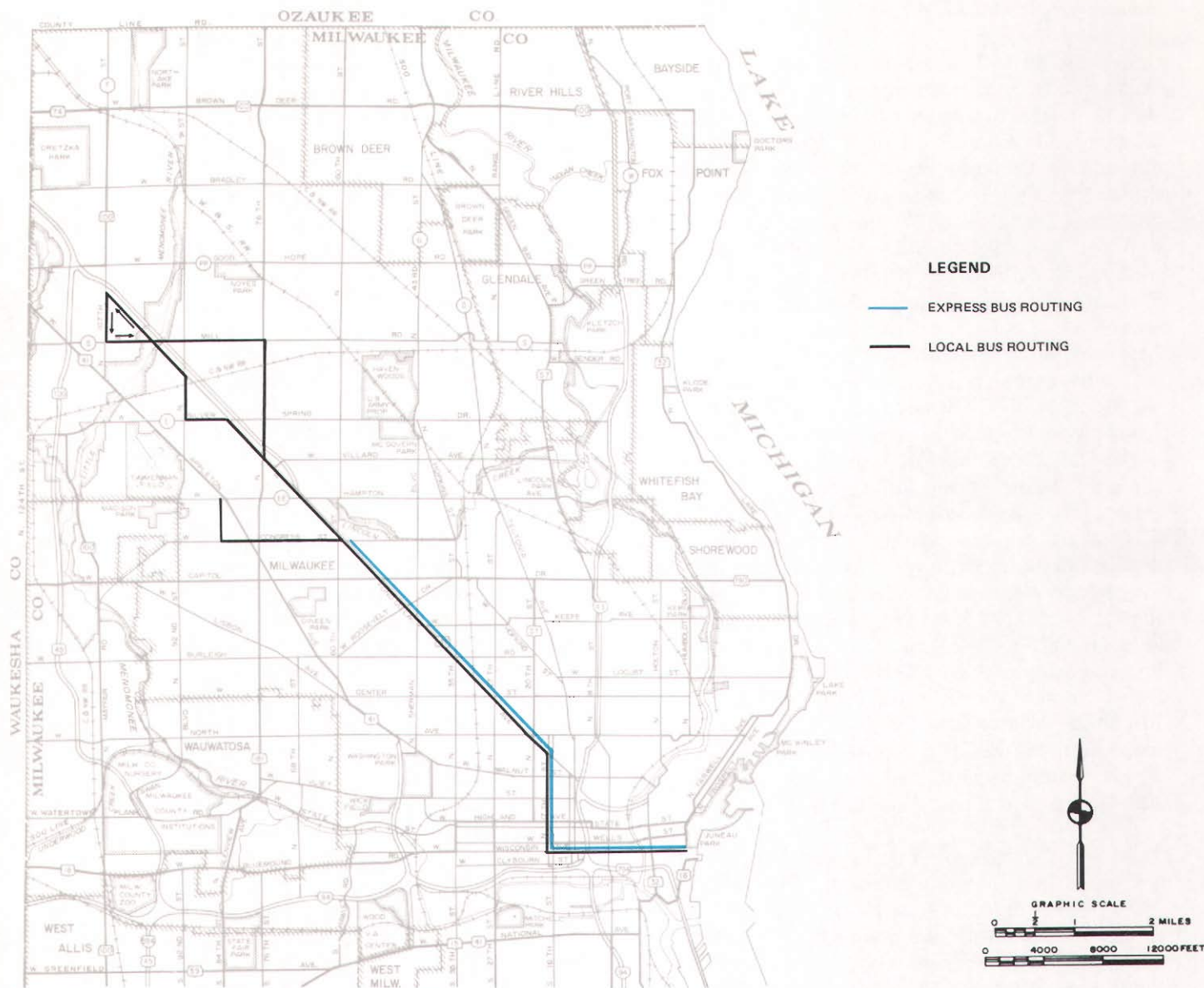
ever, facilitate better coordination of local and express bus service on the route. In this respect, with the restructuring of the local route branches as described above, express bus service would replace the local bus service over the N. 76th Street-W. Mill Road local branch between W. Congress Street and W. Mill Road during the peak periods, and all local bus service over W. Mill Road would be provided as an extension of the express bus route.

An analysis of the financial impacts of the first stage of plan implementation on the current transit system operating budget was conducted by the staff of the Milwaukee County Transit System in response to a request by the study Advisory Committee. The results of this analysis indicated that the peak-period service changes for both the express and local bus operations on Route 23 as proposed under the first stage would result in some additional operating costs for the route. These costs would be attributable primarily to the need to add additional buses to provide express service over the extended express bus route during the entire peak period, and to provide local service over the extended W. Congress Street branch of the route. However, because the proposed peak-period service changes would generate additional ridership and passenger revenues, the net cost of the proposed changes, or the increase in the annual transit system operating deficit, would be about \$60,000, or less than 0.2 percent of the projected operating deficit of about \$35.3 million for the transit system in 1986. The operation of the restructured local route during the afternoon and evening non-peak periods would entail an increase in the operating deficit of the transit system.

It should be noted that the cost estimates for the service changes proposed under the first stage of plan implementation do not take into account the economies that could be realized as a result of the improved efficiency of express operation over local operation, such as lower operating costs due to faster turnaround of drivers. In addition, the first stage of plan implementation does not include the use of reserved bus lanes. Reserved bus lanes would reduce travel times over the express route, which would result in further cost savings due to increased operating efficiencies over the route, as well as further increases in transit ridership and farebox revenues. Finally, the first stage of plan implementation assumes that express bus service will be provided using standard rather than articulated motor buses, because existing ridership levels would not

Map 14

EXISTING EXPRESS AND LOCAL BUS ROUTING FOR MILWAUKEE COUNTY TRANSIT SYSTEM ROUTE NO. 23



Source: Milwaukee County Transit System and SEWRPC.

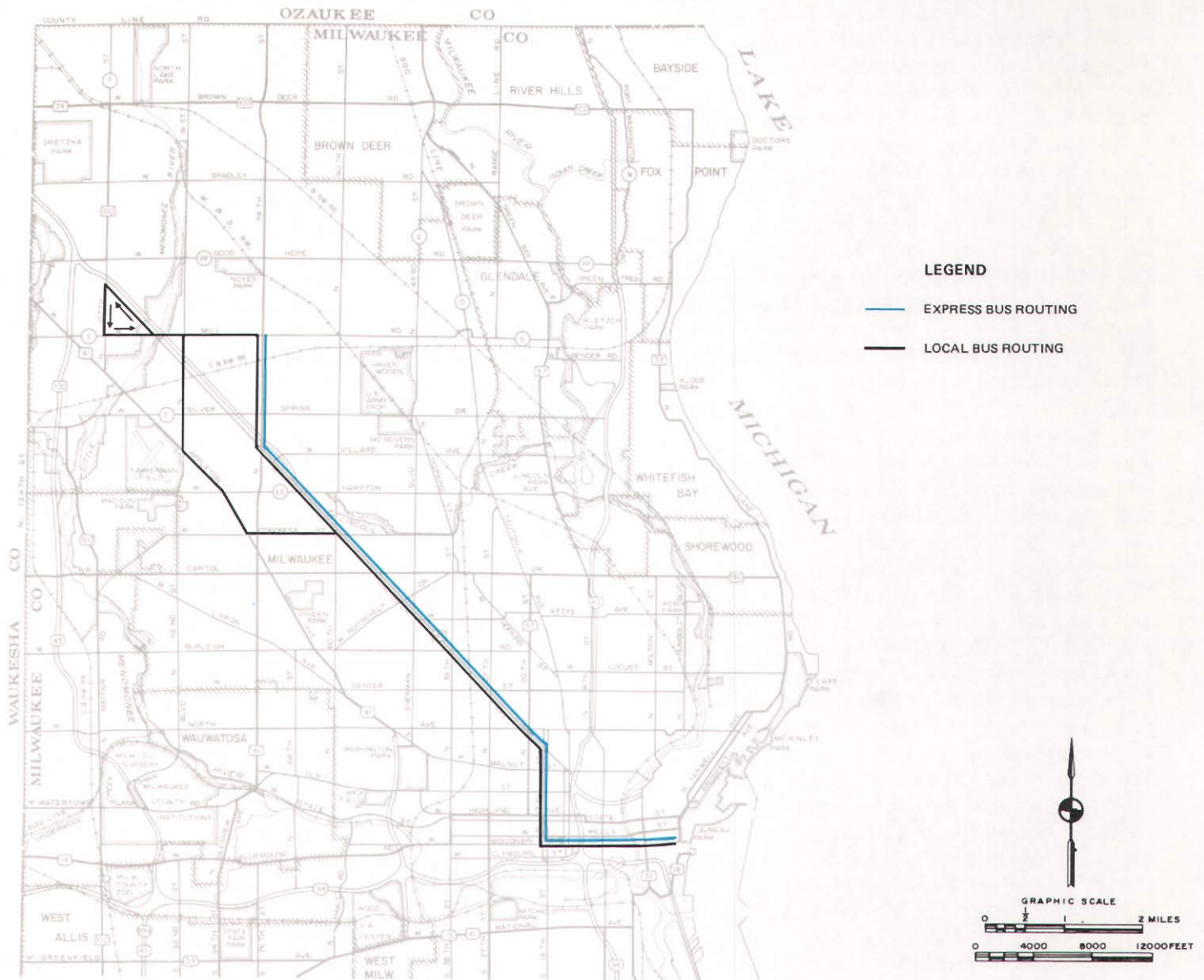
initially warrant the use of articulated buses. The eventual use of articulated buses would, however, further increase the operating efficiency of the route, as more passengers could be carried with the same number of vehicles. All these factors, which were not considered in the first stage of plan implementation, could reduce operating costs for the service and increase transit ridership and farebox revenues, and thereby reduce the operating deficit for the proposed service.

The proposed service changes could be provided using vehicles currently within the existing transit system bus fleet. Consequently, there would be no capital costs associated with the proposed service changes under the first stage of express bus plan implementation.

Right-of-Way Protection and Preservation: If the recommended express bus plan is ultimately selected for implementation within the northwest

Map 15

PROPOSED EXPRESS AND LOCAL BUS ROUTING FOR MILWAUKEE COUNTY TRANSIT SYSTEM ROUTE NO. 23 UNDER FIRST STAGE OF RECOMMENDED EXPRESS BUS PLAN



Source: Milwaukee County Transit System and SEWRPC.

corridor of Milwaukee County, it is recommended that pursuit of the ultimate construction of a light rail line in the Milwaukee northwest corridor not be abandoned, but rather that it be deferred. The new express bus services and facilities should serve to build transit ridership in the northwest corridor of Milwaukee County, providing a base for possible future implementation of the light rail line. Accordingly, it is recommended that actions be taken so as not to foreclose the option of implementing the

light rail line proposed under the recommended light rail plan. In this respect, it is important that, to the greatest extent possible, the right-of-way along the recommended alignment for the proposed light rail facility be protected and preserved. To the extent possible, steps should be taken to ensure that, where the land is currently open, it is kept open, and that options for light rail transit service are not unnecessarily and unknowingly foreclosed.

The recommended light rail alignment would include 10.4 miles of fixed guideway, of which about 3.5 miles would lie in current public street rights-of-way along N. 35th Street between the Soo Line Railroad Company right-of-way and W. Wisconsin Avenue; along E. and W. Wisconsin Avenue between N. 35th Street and N. Van Buren Street; and along N. Jackson and Van Buren Streets between E. Wisconsin Avenue and E. Clybourn Street. Accordingly, no special efforts need to be taken by the City of Milwaukee or Milwaukee County to protect this portion of the alignment other than to be aware of possible future use of street rights-of-way along this alignment for light rail transit purposes, and to take such possibility into account when reviewing street reconstruction proposals.

Of the remaining 6.9 miles of guideway for the light rail facility, 4.3 miles would be on or along the railway right-of-way currently owned by the Soo Line Railroad Company. Should the Soo Line consider abandoning freight service over the right-of-way and the right-of-way be proposed for sale by the Company, it is recommended that the Wisconsin Department of Transportation exercise its first right to acquire abandoned railway rights-of-way and purchase the right-of-way on behalf of Milwaukee County. It is also recommended that Milwaukee County monitor the situation over time; should the Company or other parties propose the sale of parcels adjoining the right-of-way or other change in the ownership or use of such parcels which would be needed for the proposed light rail alignment or the yard and shop complex, the County should consider the acquisition of the parcels for use in providing light rail transit service. The remaining 2.6 miles of guideway for the light rail facility would be on or along the right-of-way owned by the Wisconsin Department of Transportation, over which the Wisconsin & Southern Railroad Company currently operates. It is recommended that the Wisconsin Department of Transportation retain ownership of this railway right-of-way and take into account the possible use of this right-of-way for the light rail transit line when reviewing proposals for reconstruction of the existing railway.

Recommended Light Rail Plan

The recommended light rail plan proposes the construction of a new light rail transit line between the Milwaukee central business district and a new park-ride lot located at N. 60th Street and W. Mill Road, with feeder express bus service to the light rail line

from park-ride lots located near the Northridge Shopping Center, USH 41/45 and W. Good Hope Road, and Timmerman Field. The plan consists of three basic elements: light rail and feeder express bus transit service, a downtown transit/pedestrian mall, and park-ride lots.

Light Rail Transit Service: Under the light rail plan, light rail transit service would be provided over a new light rail transit facility which would be constructed between an off-street terminal located just north of E. Clybourn Street between N. Jackson and N. Van Buren Streets in the Milwaukee central business district and a new park-ride lot located near N. 60th Street and W. Mill Road. The alignment of the proposed light rail line would be along N. Jackson and N. Van Buren Streets, E. and W. Wisconsin Avenue, N. 35th Street, the Soo Line Railroad Company's N. 33rd Street right-of-way, and the Wisconsin & Southern Railroad Company right-of-way. This alignment is shown on Map 16.

As was proposed for the express bus service under the recommended express bus plan, transit service over the light rail line would be provided throughout the day, seven days a week. The light rail transit service would also be provided using articulated light rail vehicles which would operate over a transit/pedestrian mall in downtown Milwaukee. Outside downtown Milwaukee, light rail vehicles would operate in the median areas of arterial streets, including W. Wisconsin Avenue and N. 35th Street, and in railway rights-of-way.

In addition to the above light rail transit service, the plan recommends an extensive network of feeder express bus routes which would connect the proposed light rail line with park-ride lots located in the Northridge Shopping Center area near N. 84th Street and W. Brown Deer Road; at W. Good Hope Road and USH 41/45; and at Timmerman Field. Feeder express bus service would also be provided from light rail stations in the Milwaukee central business district to the University of Wisconsin-Milwaukee campus. The feeder express bus routes are also shown on Map 16.

Because the proposed light rail transit facility is located entirely within Milwaukee County, and, indeed, within the City of Milwaukee, responsibilities for plan implementation would fall primarily upon the County and the City. Accordingly, it is recommended that responsibility for implementation of the proposed light rail transit service be assigned directly to Milwaukee County, acting

through the Department of Public Works, as the primary agency responsible for the provision of public transit service within the northwest corridor of the County.

Milwaukee County is thus envisioned as the lead agency in plan implementation. The City of Milwaukee, acting through the staffs of the Departments of Public Works and City Development, would have important implementation responsibilities. In addition, the Regional Planning Commission, as the metropolitan planning organization, would provide technical assistance, upon request, toward implementation of the light rail transit facility. The Wisconsin Department of Transportation would also be involved in plan implementation, particularly with regard to the financing of the necessary engineering studies, the construction of the fixed guideway and other necessary facilities, and ultimate operation.

If federal funds are desired to support the costs of the engineering studies and the construction of the proposed light rail facility, Milwaukee County should proceed to develop the proposed facility in the manner envisioned in the federal guidance promulgated by the Urban Mass Transportation Administration.² Following the process outlined in this guidance is mandatory if federal funding is to be obtained to complete the light rail facility. Under this guidance, the following steps would be required:

1. All technical work undertaken as part of the current study—which represents the alternatives analysis phase of development of a light rail project for the Milwaukee northwest corridor—must be completed and approved by UMTA. This technical work would include the preparation of an environmental assessment report, which documents the findings of the alternatives analysis portion of the detailed corridor planning study, as well as the findings of the assessment of the potential environmental impacts of the alternatives that were considered; and of all the supporting technical reports which document the methods used in conducting the required analyses and the findings of the analyses undertaken. The alternatives analysis/draft environmental impact statement report will

need to be approved by UMTA and a formal public hearing will need to be held under federal aegis to solicit comments on both the analysis of alternatives and the environmental impacts documented in the report. Concurrence with the findings and recommendations of the alternatives analysis phase of the light rail project development for the northwest corridor, as documented in the aforementioned reports, would need to be obtained from UMTA before work on the next phase of project development—preliminary engineering—could be initiated with the support of federal funding.

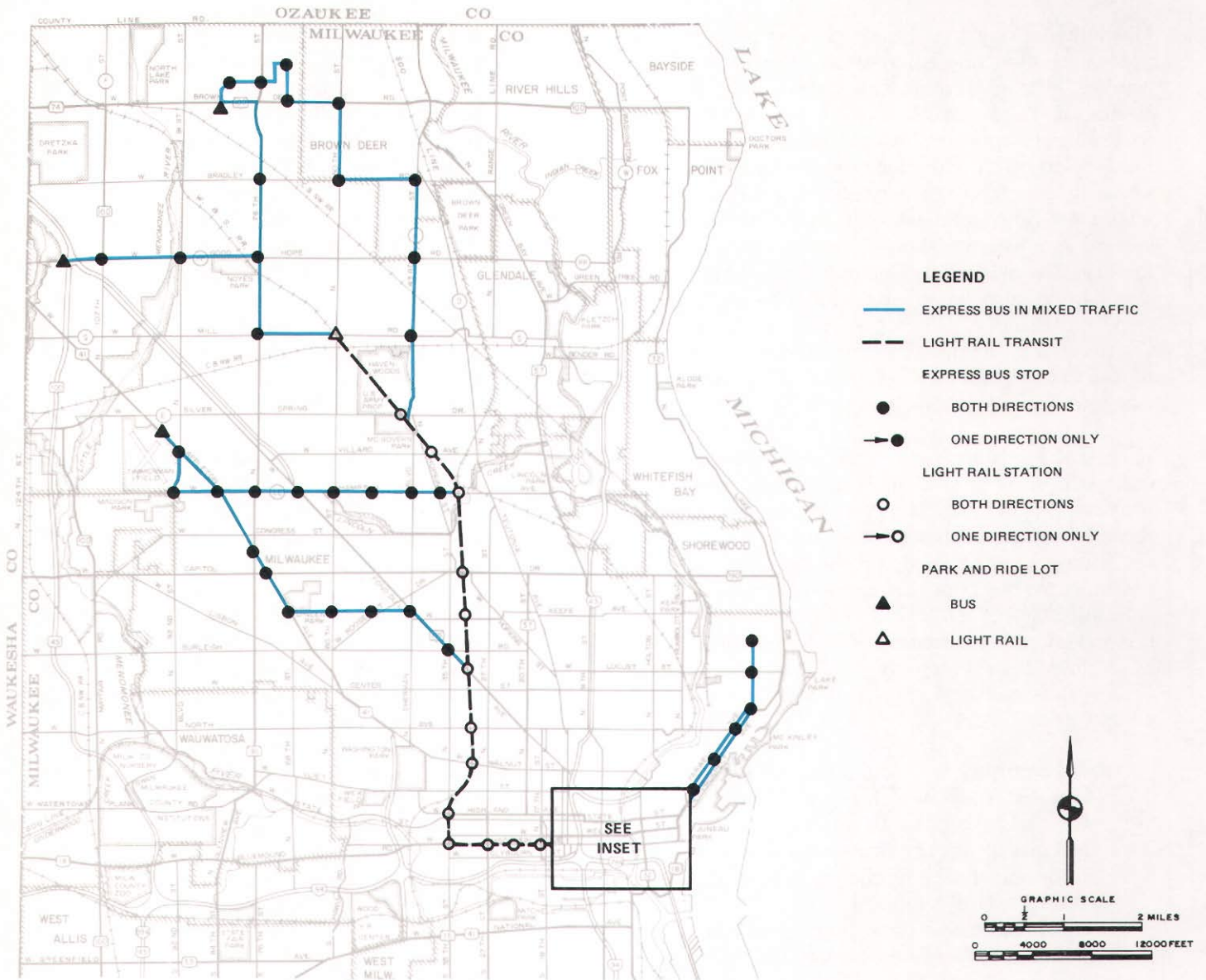
In addition to the above reports, this report, which documents the preferred alternative recommended for adoption and implementation within the northwest corridor, must be transmitted to UMTA for its review and concurrence. It should be noted that, if a final decision is made to select the light rail alternative as the final preferred alternative, it would be necessary to amend this report to indicate the rationale for selecting the light rail alternative as the preferred alternative. A detailed financial plan for funding the construction and operation of the proposed light rail facility would have to be included in this amended report. The financial plan would have to indicate the amounts of funds needed and the sources of the funding. The amended report would also need to include letters and resolutions from state and local governments endorsing the light rail plan, along with other materials supporting the local financing effort called for under the financial plan. The amended preferred alternative report would then be transmitted to UMTA.

2. Milwaukee County could then proceed with what has been termed herein as the preliminary engineering phase of the light rail project. In order to obtain UMTA approval to initiate preliminary engineering, Milwaukee County would transmit a copy of the amended report documenting the light rail alternative as the locally preferred alternative, including the modifications described above, to UMTA, together with a request for approval to initiate preliminary engineering. The granting of such approval would depend on whether or not UMTA finds that the recommended light rail plan is reasonably

²See "Urban Mass Transportation Major Capital Investment Policy: Notice," *Federal Register*, Volume 49, No. 98, May 18, 1984, pp. 21284-21291.

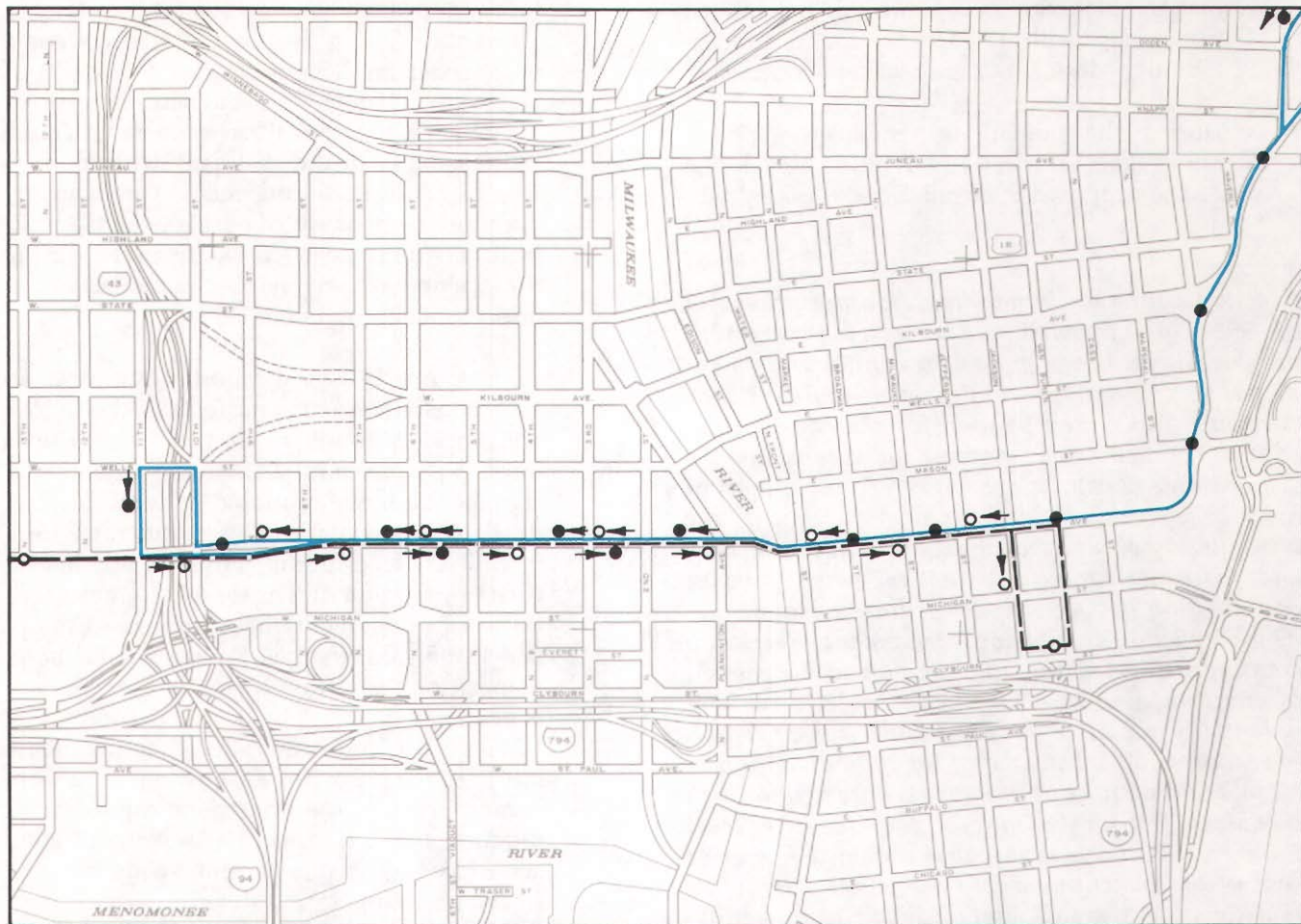
Map 16

LIGHT RAIL AND FEEDER EXPRESS BUS SERVICE UNDER RECOMMENDED LIGHT RAIL PLAN



Source: SEWRPC.

Map 16 Inset



GRAPHIC SCALE

0 400 800 1600 FEET

A horizontal scale bar with four segments. The first segment is labeled '0', the second '400', the third '800', and the fourth '1600 FEET'. The segments are colored in a sequence of light blue, light green, light yellow, and light orange from left to right.

cost-effective when compared to the other alternatives considered. Upon approval, federal funds could be used to support the costs of the preliminary engineering work. Preliminary engineering work would be funded principally with UMTA Section 3 funds,³ although state funds may also be available.⁴

During the preliminary engineering phase, Milwaukee County would refine the design of the proposed light rail facility, taking into

consideration all reasonable design alternatives. Areas subject to further refinement would include capital cost estimates and operating and maintenance expenses, and forecasts of transit ridership and travel times. Milwaukee County would also be encouraged to consider implementation of a program of local supportive policies and actions designed to enhance the cost-effectiveness and financial feasibility of the proposed light rail project. In addition, arrangements for financing the nonfederal share of costs of the light rail facility would need to be finalized during the preliminary engineering phase, as would project management concepts.

At least one technical report would need to be prepared documenting all the above concerns. Milwaukee County would also have to prepare a final environmental impact statement for the proposed light rail facility, describing the detailed design, costs, environmental and community impacts, and appropriate mitigation measures. After approval of these two documents by Milwaukee County and UMTA, Milwaukee County would be in a position to complete the preliminary engineering work phase as envisioned by UMTA. The preliminary engineering phase must conclude with a showing of a firm commitment of the nonfederal capital funds required for the project, a showing of state and local government consensus on the financing of operating deficits attendant to the facility, and a showing of planning for and financial commitment to any necessary supportive actions, such as, for example, land use development and redevelopment, that would promote effective utilization of the proposed transit facility.

3. After completion of the preliminary engineering phase, including the preparation of a final environmental impact statement as described above, Milwaukee County would be in a position to proceed with the final design phase of light rail project development. In order to proceed to this phase with the support of federal funds, Milwaukee County would need to obtain a "letter of intent" and approval of UMTA Section 3 discretionary funding for the final design work from UMTA. A letter of intent is a formal pledge which documents UMTA's intention to obligate discretionary funds for a particular project. UMTA uses a rating system to

³Section 3 of the Urban Mass Transportation Act of 1964, as amended, authorizes a program to provide discretionary grants for capital investment in public transportation equipment and facilities. Section 3 funds may be used for the construction of new fixed-guideway systems and extensions; the acquisition, construction, and reconstruction of mass transportation facilities and equipment; the introduction of new technology into public service; and joint development activities which enhance coordination between modes of transportation and which enhance economic development. Section 3 grants provide federal funds for up to 75 percent of the total cost of such eligible projects, and are potentially available to any public transportation operation in an urban area of 50,000 population or more. Funding for this program is obtained through the Mass Transit Account of the Highway Trust Fund, which includes revenues obtained from one cent of the current nine-cent-per-gallon federal fuel tax. Section 3 grants are made on a project-by-project basis at the discretion of the Secretary of the U. S. Department of Transportation. At this time, it is proposed that UMTA Section 3 funds be used to fund the total costs of preliminary engineering studies for the light rail facility, because capital assistance monies being made available under the Section 9 formula assistance program would be needed for other capital improvements. This decision will need to be reviewed at the time approval is given to proceed with the preliminary engineering phase of the light rail project.

⁴The Wisconsin Department of Transportation has set aside in its 1985-1987 biennial budget approximately \$400,000 in support of up to 10 percent of the costs of a preliminary engineering study for a light rail facility within the Milwaukee northwest corridor. These funds will lapse on June 30, 1987, if they are not committed for such a project by that time, or again included in the Department's budget for the 1987-1989 biennium.

annually evaluate the relative merit of all projects that are performing or have completed the preliminary engineering phase. The rating system uses two primary factors—cost-effectiveness and level of local financial support—to rank all projects in the nation, identifying those projects that represent the most productive use of federal resources. Letters of intent would normally be given to those most meritorious projects which can be funded within an available budget authorization of UMTA Section 3 discretionary funds. Milwaukee County would thus be competing for limited UMTA discretionary funds with other fixed guideway projects throughout the nation.

Upon receipt of the letter of intent and the necessary funding for the initial year of final design work, Milwaukee County would proceed with right-of-way acquisition, utility relocation, and the preparation of final construction plans, including detailed project specifications, engineers' cost estimates, and bid documents. During this phase, Milwaukee County would also enter into a full funding contract agreement with UMTA which would specify a fixed ceiling or maximum amount of federal participation in the project, and a yearly funding schedule. Upon execution of the contract, Milwaukee County would be required to complete the construction of the light rail facility to the point of initiation of revenue service, and to absorb any additional costs incurred, except those incurred under extraordinary circumstances.

4. Upon completion of the final design phase, Milwaukee County would proceed with the physical construction of the proposed light rail facility, the procurement of light rail vehicles and buses, and the necessary pre-service testing of facilities and equipment. Federal funding for the project would be provided in accordance with the full funding contract entered into during the final design phase.

A proposed schedule indicating the time frame that would be needed to complete the various steps required to implement the proposed light rail project is set forth in Figure 3. This schedule is based on the assumption that Milwaukee County would use federal funds to design and construct

the light rail facility. The schedule also assumes that agreement on the recommended light rail plan as the final plan for the Milwaukee northwest corridor would be reached by 1990, and that the preliminary engineering phase could then be initiated. The decision as to whether or not to proceed with the preliminary engineering phase properly rests with the Milwaukee County Board of Supervisors and the Milwaukee County Executive. While Milwaukee County represents the logical lead agency in the conduct of such engineering, provision must be made to actively involve the other concerned parties in this matter—in particular, the City of Milwaukee. Milwaukee County could approach the conduct of the preliminary engineering study in a number of ways. It is suggested that Milwaukee County consider a cooperative, intergovernmental study under which certain work would be done by the county staff, certain work by the city staff, and certain work by one or more private consultants. The Regional Planning Commission staff would also be available to perform the work required under this phase related to the refinement of the transit ridership and transit travel time forecasts that it prepared under the alternatives analysis phase.

The work required under the preliminary engineering phase would take approximately 18 months to complete and should be finished by the end of 1992. Assuming that Milwaukee County would then reaffirm its support for the light rail project and that the approval of federal funding for construction of the project can be obtained from UMTA, the final design phase of the project could be initiated by mid-1994, and the light rail facility could be constructed during the years 1996 through 1999. The proposed light rail line could start revenue operations early in 2000.

It should be noted that the steps and project schedule outlined above assume that Milwaukee County will desire to use federal funds for the design and construction of the proposed light rail facility, and would, accordingly, be required to follow a federally mandated process to complete the project. Most of the federal funds required—in particular for the final design and construction phase—would be discretionary funds obtained through the UMTA Section 3 program. As described above, UMTA will issue a letter of intent to fund the project with such discretionary funds only if the project is deemed to merit federal funding based on the results of the preliminary engineering phase. Should a letter of intent for the proposed

Figure 3

**PROPOSED PROJECT SCHEDULE FOR MILWAUKEE NORTHWEST CORRIDOR LIGHT RAIL FACILITY
ASSUMING THE NEED TO COMPLY WITH FEDERAL GUIDELINES TO OBTAIN FEDERAL FUNDING**

IMPLEMENTATION STEPS	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1. SELECTION AND ADOPTION OR ENDORSEMENT OF RECOMMENDED LIGHT RAIL PLAN AS THE FINAL PLAN FOR THE MILWAUKEE NORTHWEST CORRIDOR														
2. UMTA CONCURRENCE WITH FINDINGS AND RECOMMENDATIONS OF ALTERNATIVES ANALYSIS PHASE														
3. TRANSMITTAL OF FINAL PREFERRED ALTERNATIVE REPORT AND APPLICATION FOR FEDERAL FUNDING TO COMPLETE PRELIMINARY ENGINEERING PHASE BY MILWAUKEE COUNTY														
4. UMTA CONCURRENCE WITH LOCALLY PREFERRED ALTERNATIVE AND APPROVAL OF APPLICATION FOR FUNDS TO CONDUCT PRELIMINARY ENGINEERING PHASE														
5. CONDUCT OF PRELIMINARY ENGINEERING WORK AND PREPARATION OF FINAL ENVIRONMENTAL IMPACT STATEMENT BY MILWAUKEE COUNTY														
6. APPROVAL OF PRELIMINARY ENGINEERING STUDY AND FINAL ENVIRONMENTAL IMPACT STATEMENT BY MILWAUKEE COUNTY														
7. APPLICATION FOR FEDERAL FUNDING TO COMPLETE FINAL DESIGN PHASE BY MILWAUKEE COUNTY														
8. APPROVAL OF LIGHT RAIL PROJECT FOR THE MILWAUKEE NORTHWEST CORRIDOR BY UMTA AND ISSUANCE OF LETTER OF INTENT TO FUND PROJECT														
9. CONDUCT OF FINAL DESIGN WORK BY MILWAUKEE COUNTY AND NEGOTIATION OF FEDERAL FUNDING CONTRACT BETWEEN MILWAUKEE COUNTY AND UMTA														
10. CONSTRUCTION OF LIGHT RAIL FACILITIES, PROCUREMENT OF REVENUE VEHICLES, AND PRE-SERVICE TESTING BY MILWAUKEE COUNTY														
11. INITIATION OF REVENUE OPERATION BY MILWAUKEE COUNTY														

Source: SEWRPC.

light rail project not be forthcoming from UMTA, Milwaukee County could forego the use of Section 3 discretionary funds and complete the final design and construction phase of the light rail project using its share of the UMTA Section 9 formula funds⁵ allocated annually to the Milwaukee urbanized area, supplementing this limited amount with state and local funds. If this funding option is chosen, Milwaukee County would be required to enter into a contractual agreement with UMTA stating that supplemental Section 3 discretionary funds will not be sought to complete the project. In addition, approval from UMTA would also be needed before Milwaukee County could commence with right-of-way acquisition and facility construction using Section 9 funds.⁶

Milwaukee County could also forego the use of all federal funds and rely solely on a combination of state and local funds to complete the project. In this event, the major steps for completing the project—preliminary engineering, final design, and facility construction—would remain essentially the same as described above. However, the steps pre-

⁵Section 9 of the Urban Mass Transportation Act of 1964, as amended, authorizes a formula-apportioned block grant program which makes federal transit assistance available to designated recipients within urbanized areas of over 50,000 population for capital, operating, or planning purposes. The funds provided annually under the Section 9 program are distributed among the nation's urbanized areas on the basis of a statutory formula which takes into account only population and population density for urbanized areas under 200,000 population; and population and population density, fixed-guideway route miles, bus and fixed-guideway revenue vehicle miles, and transit system efficiency as measured by passenger miles of travel and operating expenses for urbanized areas over 200,000 population, such as the Milwaukee urbanized area. Under this program, the federal matching share for planning and/or capital assistance is not to exceed 80 percent of the eligible project costs, while the federal matching share for operating assistance is not to exceed 50 percent of the transit system operating deficits. For the Milwaukee urbanized area, the four counties—Milwaukee, Ozaukee, Washington, and Waukesha—have been jointly designated by the Governor and the Southeastern Wisconsin Regional Planning Commission as recipients of Section 9 funds allocated to the Milwaukee urbanized area. Funds for this program are made available from general fund appropriations.

scribing the involvement of UMTA in the review and approval of work performed under these steps would not be required. The elimination of UMTA involvement could reduce the time required to complete the project by at least two years. Should a decision be made to forego use of federal funds for the project, Milwaukee County would, in all likelihood, look to the State to assume responsibility for funding the major portion of the project costs.

Downtown Transit Mall: Like the recommended express bus plan, the recommended light rail plan calls for the development of a transit/pedestrian mall in the Milwaukee central business district extending along Wisconsin Avenue from N. 6th Street on the west to N. Jackson Street on the east. This facility would serve light rail vehicles operating over the proposed light rail line, as well as motor buses providing express and freeway flyer bus service to the central business district. It is recommended that Milwaukee County act as the lead agency in the development of the mall as an integral part of the transit system, obtaining any state and federal grants and providing the necessary local funding. Close cooperation will be required between the City and the County in the design of the mall, and the City should act as the actual construction agency under an agreement with the County, since the street right-of-way is owned by the City, and would continue to be maintained by the City.

⁶UMTA approval will depend upon Milwaukee County certifying that:

- a. No future Section 3 discretionary funds will be required for either the light rail project or other routine capital needs for the rest of the transit system, which may be constrained by a decision to use Section 9 funds for the design and construction of the light rail facility;
- b. Sufficient funds would be available to operate and maintain the light rail facility after it is completed;
- c. The results of the alternatives analysis phase indicate that the project meets UMTA cost-effectiveness requirements; and
- d. The light rail project will meet minimum design criteria to ensure safe system construction and operation.

As noted with regard to the express bus plan, the proposed light rail transit facility could be implemented without the construction of the downtown transit/pedestrian mall. In this event, the light rail vehicles would operate in mixed traffic on Wisconsin Avenue to a tail track between N. Van Buren Street and N. Prospect Avenue.

Also as noted for the express bus plan, Wisconsin Avenue would have insufficient capacity to efficiently accommodate all transit vehicles by the plan design year under the recommended light rail plan. Consequently, the local bus service that is currently routed over Wisconsin Avenue would be routed eastbound over Wells Street and westbound over Michigan Street. Freeway flyer and express bus service would continue to be routed over Wisconsin Avenue, along with the light rail line. It is recommended that the existing routing be maintained by the transit system until the number of transit vehicles using Wisconsin Avenue reaches a level where transit operations are adversely affected. At that time, local routes would be removed from Wisconsin Avenue, as described above. This would not be expected to occur until the recommended light rail facility—including the downtown transit/pedestrian mall—is com-

pleted and in operation in the late 1990's, and the additional freeway flyer and express bus services that are also recommended to be implemented within the greater Milwaukee area as part of the adopted transportation system plan are fully implemented.

Park-Ride Lots: The recommended light rail plan also calls for the establishment of four park-ride lots: one served by the proposed light rail line and three served by feeder express bus routes connecting with the proposed light rail line. The park-ride lot served by the light rail line would be a new facility constructed at the northern terminus of the line at N. 60th Street and W. Mill Road. Of the remaining three park-ride lots—to be served by the proposed feeder express bus routes—one would be a new facility which would be located near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road. The other two lots are existing facilities which would need to be expanded to accommodate more parked cars, one located at USH 41/45 and W. Good Hope Road and one located at Timmerman Field. The agencies responsible for implementing these facilities are identified in Table 12.

Table 12

**RECOMMENDED JURISDICTIONAL RESPONSIBILITY FOR IMPLEMENTATION
OF PARK-RIDE LOTS ASSOCIATED WITH LIGHT RAIL AND FEEDER
EXPRESS BUS SERVICES UNDER RECOMMENDED LIGHT RAIL PLAN**

Location of Lot	Civil Division	Transit Agency Responsible for Implementation	Number of Parking Spaces		
			Existing	Proposed	
				Optimistic Future	Pessimistic Future
N. 84th Street and W. Brown Deer Road	City of Milwaukee	Wisconsin Department of Transportation	--	420	400
N. 60th Street and W. Mill Road. . .	City of Milwaukee	Milwaukee County	--	510	260
USH 41 and W. Good Hope Road. . .	City of Milwaukee	Wisconsin Department of Transportation	135	400	180
Timmerman Field	City of Milwaukee	Wisconsin Department of Transportation	140	310	200

Source: SEWRPC.

The park-ride lot located at the northern terminus of the proposed light rail line would be constructed in conjunction with the proposed light rail facility, and would, accordingly, be the responsibility of Milwaukee County. It is recommended that the Wisconsin Department of Transportation be responsible for implementing the modifications to the two existing park-ride lots, and for constructing the new park-ride lot near the Northridge Shopping Center. These three facilities lie along or in proximity to the state trunk highway and connecting street system. It is further recommended that the Wisconsin Department of Transportation utilize federal and state highway funds to the greatest extent possible in the construction of these lots.

Private Enterprise Involvement

The U. S. Department of Transportation, Urban Mass Transportation Administration, has a policy directed at increasing the involvement of the private sector in the provision of urban transit services.⁷ The policy specifies that proposals from the private sector must be considered in the planning, programming, and operation of public transit services. The intent of the policy is to promote a greater competitive environment and increased opportunities for the private sector in the provision of public transit services and operation. This policy will have to be considered in implementation of the rapid transit proposals contained in the recommended plans. This will require due consideration of whether or not the new or improved transit services proposed under each recommended alternative, and any related support services, could be provided more efficiently through the private sector. Under the policy, consideration should also be given to means of financing the capital costs of the proposed transit services and facilities through the private sector. However, the conclusions of the consultants' financial analyses indicated that special capital investment strategies involving the private sector, such as joint development proposals and benefit assessment districts, would not be feasible with the light rail system proposed for the northwest corridor.

FINANCIAL CONSIDERATIONS IN PLAN IMPLEMENTATION

Operating and Maintenance Costs

The costs of implementing the recommended express bus and light rail alternatives and the

⁷See "Private Enterprise Participation in the Urban Mass Transportation Program," *Federal Register*, Volume 49, No. 205, October 22, 1984, pp. 41310-41312.

remainder of the long-range planned transit system for the entire Milwaukee urbanized area are summarized in Table 13. It is estimated that the transit operation and maintenance costs in the year 2000 would range from \$72.1 million with the recommended express bus alternative in the northwest corridor, to \$74.2 million with the recommended light rail alternative in the northwest corridor. The operating and maintenance costs of the areawide planned transit system with the recommended express bus facility in the northwest corridor would be about \$6 million more than the cost of simply maintaining the existing transit system; and the operating and maintenance costs of the areawide planned transit system with a light rail line would be about \$8 million more than the cost of maintaining the existing system. The existing operating and maintenance costs of the Milwaukee County Transit System in 1985 totaled about \$66 million.

Within the northwest corridor, the operating and maintenance costs of the transit system with an express bus line would be about \$1 million less than the costs of continuing to maintain the existing transit system. The operating and maintenance costs with a light rail line would be about \$1 million more than the costs of continuing to operate the existing transit system. Thus, the recommended improvements under the express bus and light rail alternatives would provide efficiencies in annual costs of providing services while providing greatly improved transit services.

Recommended Allocation of Operating and Maintenance Costs

Under present State Legislation, state aids would be available to cover 37.5 percent of the transit operating and maintenance costs. Thus, average state aids in the year 2000 could be expected to range from \$27.0 million systemwide with the express bus alternative to \$27.8 million systemwide with the light rail alternative. The remaining monies necessary to operate the transit system would have to be obtained through a combination of farebox revenues, federal aids, and local tax monies.

Average farebox revenues in the year 2000 may be expected to range from \$38.2 million for the entire Milwaukee area planned transit system with a light rail alternative in the northwest corridor to \$38.9 million for the areawide system with an express bus alternative in the northwest corridor. This assumes that action would be taken, if general

Table 13

**CAPITAL AND OPERATING COSTS FOR THE RECOMMENDED EXPRESS BUS AND
LIGHT RAIL ALTERNATIVES WITHIN THE MILWAUKEE NORTHWEST CORRIDOR
(MILLIONS OF 1985 DOLLARS)**

Cost Category	Recommended Express Bus Alternative			Recommended Light Rail Alternative		
	Optimistic Future	Pessimistic Future	Average	Optimistic Future	Pessimistic Future	Average
Capital Cost to Design Year						
Total Systemwide	\$147.71	\$142.47	\$145.09	\$320.14	\$303.47	\$311.81
Increment Over No Build Alternative						
Systemwide	39.54	38.52	39.03	211.97	199.52	205.75
Within Northwest Corridor	21.55	21.56	21.55	192.95	182.55	187.75
Operating and Maintenance Costs in Design Year						
Total Systemwide	\$ 72.49	\$ 71.66	\$ 72.08	\$ 76.31	\$ 72.12	\$ 74.22
Increment Over No Build Alternative						
Systemwide	3.91	7.49	5.70	7.73	7.95	7.84
Within Northwest Corridor	-2.99	0.47	-1.26	0.82	0.93	0.88
Operating Revenues in Design Year						
Total Systemwide	\$ 49.48	\$ 28.33	\$ 38.91	\$ 48.74	\$ 27.84	\$ 38.29
Increment Over No Build Alternative						
Systemwide	5.94	2.66	4.30	5.20	2.17	3.69
Within Northwest Corridor	2.38	1.24	1.81	1.64	0.74	1.19
Operating Deficit in Design Year						
Total Systemwide	\$ 23.01	\$ 43.33	\$ 33.17	\$ 27.57	\$ 44.28	\$35.93
Increment Over No Build Alternative						
Systemwide	-2.03	4.83	1.40	2.53	5.78	4.15
Within Northwest Corridor	-5.37	-0.77	-3.07	-0.82	0.19	-0.31

Source: Parsons Brinckerhoff Quade & Douglas, Inc., and SEWRPC.

price inflation occurs, to maintain fares at the relative level envisioned in the plan. The average farebox recovery rate would be 51 percent and 54 percent under the areawide system with a light rail alternative and with an express bus alternative, respectively. Farebox revenues in the year 2000 for the planned Milwaukee area transit system with the express bus alternative or with the light rail alternative in the northwest corridor may be expected to total about \$4 million more than the farebox revenues that would be generated if the existing transit system continues to be operated and maintained. The farebox revenues of the Milwaukee County Transit System in 1985 were about \$30 million. Specifically, within the northwest corridor, the express bus alternative plan may be expected to result in about \$2 million more in farebox revenues than the existing transit system would in the year 2000, and the light rail alternative plan may be expected to result in about \$1 million more in farebox revenues.

The forecast operating deficit for the entire Milwaukee area planned transit system in the year 2000 may be expected to be \$33 million with a bus alternative in the northwest corridor, and \$36 million with a light rail alternative in the northwest corridor. This is approximately \$1 and \$4 million, respectively, greater than the deficit would be if the existing transit system were operated and maintained. Much of this increase in deficit may be attributed to extensions of transit service outside the northwest corridor. In comparison to continuing to operate the existing transit system, implementation of the express bus alternative within the northwest corridor may be expected to result in a reduction of about \$3 million in the operating deficit in the year 2000; and implementation of the light rail alternative may be expected to result in a reduction of about \$0.3 million in the operating deficit. The operating deficit of the Milwaukee County Transit System in 1985 was about \$36 million.

Since it came into office in 1981, the present federal administration has proposed phasing out the federal aid program providing transit operating assistance. To date, the administration has not been able to achieve elimination of the federal transit assistance program. The federal transit assistance program, however, has had severe funding limits placed upon it. Specifically, the federal funds available to an urbanized area for use as transit operating assistance are currently limited to a fixed percentage of the operating assistance funds which were allocated to each urbanized area in 1982. For the Milwaukee urbanized area, federal transit operating assistance during 1986 was limited to about \$6.4 million, or 80 percent of the transit operating assistance funds it was allocated in 1982. Transit operating assistance to the Milwaukee urbanized area during 1987 will be reduced by about 3.7 percent to approximately \$6.16 million.

Assuming that such limits on transit operating assistance levels remain in place, the amount of federal transit operating assistance available within the Milwaukee urbanized area would remain at current levels through the year 2000. Should general price inflation occur, federal transit operating assistance would represent a decreasing proportion of the funds available to offset transit system operating deficits in future years, and additional funds would be needed from nonfederal sources to operate the transit system. In this event, the financial analysis conducted for the recommended alternatives indicated that consideration should be given to sharing of future increases in nonfederal transit operating subsidies on an equal basis between the state transit operating assistance program and Milwaukee County. Under this funding scenario, the proportion of operating costs covered by state aids would need to be increased slightly, as would local revenues used by Milwaukee County for operating assistance.

Capital Costs

The total capital investment required to implement the recommended long-range rapid transit plan for the Milwaukee area, expressed in constant 1985 dollars, is expected to range from \$145 million with an express bus alternative in the northwest corridor to \$312 million with a light rail alternative in the northwest corridor. These costs represent the capital costs for the entire transit system within the greater Milwaukee area under each alternative, and, as such, include costs for bus replacement and bus fleet expansion for the entire transit system. The capital costs associated with

only arterial express bus services on W. Fond du Lac Avenue, as proposed under the recommended express bus alternative, are estimated at \$34 million. It should be noted, however, that implementation of the express bus alternative in the northwest corridor would result in significant capital cost savings with respect to the local transit element of the transit system in the northwest corridor of about \$13 million, principally due to a reduced need to expand and replace buses used in local transit service. The total capital costs of the light rail facility under the recommended light rail alternative are estimated at \$195 million. It should be noted that implementation of the light rail line in the northwest corridor will, similarly, result in a reduced need to expand and replace local bus service in the corridor, resulting in a cost savings of approximately \$8 million, which would in part offset the additional costs of the light rail alternative. A more detailed accounting of these capital costs is provided in Tables 14 and 15.

Recommended Allocation of Capital Costs

To date, all major capital projects attendant to transit system development within the greater Milwaukee area have been funded under federal transit assistance programs. Such programs have provided funds on either a 75 percent federal-25 percent local or 80 percent federal-20 percent local matching basis. Some state aids have also been used for motor bus purchases. The financial analysis of the recommended alternatives indicated that federal funding should again be maximized in implementing the capital projects required under each alternative.

With respect to the proposed express bus services on W. Fond du Lac Avenue, the results of the consultant's financial analysis indicated that the capital costs of these services, as shown in Table 14, should qualify for federal funding under either UMTA Section 3 discretionary or Section 9 formula transit assistance programs. The allocation of the capital costs of the recommended express bus services among available funding sources is shown in Table 16. As shown in this table, federal funding should provide about \$25 to \$27 million, or 75 to 80 percent, of the total capital costs of about \$34 million. The nonfederal share of these costs would be \$7 to \$9 million.

With respect to the nonfederal share of the capital costs of the recommended express bus service within the corridor, the Advisory Committee concluded that state funding will be essential if

Table 14

**CAPITAL COSTS FOR THE EXPRESS BUS SERVICE ON MILWAUKEE COUNTY TRANSIT
SYSTEM ROUTE NO. 23 PROPOSED UNDER THE RECOMMENDED EXPRESS BUS ALTERNATIVE**

Cost Category	Capital Costs by Alternative Future (millions of 1985 dollars) ^a		
	Optimistic Future	Pessimistic Future	Average
Land Acquisition ^b	\$ 0.44	\$ 0.35	\$ 0.40
Reserved Bus Lanes ^c	16.11	16.11	16.11
Express Bus Stop and Park-Ride Lot Facilities	3.63	2.69	3.16
Vehicle Acquisition	15.90	12.90	14.40
Total	\$36.08	\$32.05	\$34.07

^aIncludes contingencies and percentage add-ons.

^bRight-of-way purchased for park-ride lots.

^cIncludes cost of downtown transit mall of \$15.85 million.

Source: Parsons Brinckerhoff Quade & Douglas, Inc., and SEWRPC.

Table 15

**CAPITAL COST FOR THE LIGHT RAIL FACILITY PROPOSED
UNDER THE RECOMMENDED LIGHT RAIL ALTERNATIVE**

Cost Category	Capital Costs by Alternative Future (millions of 1985 dollars) ^a		
	Optimistic Future	Pessimistic Future	Average
Land Acquisition			
N. 33rd Street Railway Corridor	\$ 0.95	\$ 0.95	\$ 0.95
Yard and Shop Complex	0.66	0.66	0.66
Downtown Terminal	0.72	0.72	0.72
60th Street and Mill Road Park-Ride Lot	0.17	0.08	0.13
Subtotal	\$ 2.50	\$ 2.41	\$ 2.46
Fixed Guideway	\$142.45	\$142.45	\$142.45
Station and Park-Ride Facilities	3.33	2.83	3.08
Vehicle Storage and Maintenance	22.82	22.04	22.43
Vehicle Acquisition	30.85	18.35	24.60
Total	\$201.95	\$188.08	\$195.02

^aIncludes contingencies and percentage add-ons.

Source: Parsons Brinckerhoff Quade & Douglas, Inc., and SEWRPC.

Table 16

**DISTRIBUTION OF THE AVERAGE CAPITAL COSTS AMONG FUNDING
SOURCES FOR PROPOSED EXPRESS BUS SERVICES ON W. FOND DU LAC
AVENUE UNDER THE RECOMMENDED EXPRESS BUS ALTERNATIVE**

Funding Source	Share of Capital Costs of Recommended Fond du Lac Avenue Express Bus Services (millions of 1985 dollars) ^a
Federal (UMTA Section 3/9)	\$25.6-27.3
State/Local ^b	6.8-8.5
Total	\$34.1

^aThe capital costs of the recommended express bus services on W. Fond du Lac Avenue would be an element of the total capital costs of the areawide transit system for the Milwaukee urbanized area, which are estimated to be \$145 million. Excluding the capital costs for the recommended express bus services of \$34 million, as shown above, the remaining \$111 million in capital costs for the areawide transit system would be for other bus services within the Milwaukee urbanized area. These costs would include about \$82 million for the replacement of standard and articulated buses in the current transit system bus fleet, and about \$29 million for the addition of more articulated buses to the existing bus fleet. The cost for bus replacement reflects a savings of about \$24 million when compared with the fleet replacement costs under Alternative 1, the no build alternative, of about \$106 million. The lower fleet replacement costs for the recommended express bus alternative reflect the need for fewer standard motor buses in the bus fleet for this alternative than in the bus fleet for Alternative 1 owing to the replacement of local bus service within the corridor with the proposed express bus services, and the replacement of standard motor buses with articulated motor buses on express and freeway flyer bus routes throughout the areawide transit system. The estimated fleet replacement cost of \$82 million could be funded with about \$66 million in federal funds and about \$16 million in local funds under the UMTA Section 9 program. The remaining \$29 million in capital costs for fleet expansion could be funded with a combination of UMTA Section 3 and Section 9 funds, which would result in a maximum federal share of \$22 to \$23 million, and a minimum local share of \$6 to \$7 million.

^bThere is currently no state program that could be used to provide funding for transit system capital costs. However, the Advisory Committee believed that the State should provide funding for a major rapid transit improvement within the Milwaukee northwest corridor. Participation by the State in funding the capital costs of any rapid transit improvements within the corridor will require the passage of new legislation.

Source: SEWRPC.

the implementation of any rapid transit service improvements within the corridor is to be realized. However, because there is currently no state program that provides funding for transit system capital costs, state participation in funding the capital costs of any rapid transit improvements within the corridor will require new legislation.

The capital costs of the recommended express bus services on W. Fond du Lac Avenue described above would be an element of the capital costs of the entire transit system within the Milwaukee urbanized area, such costs being estimated at \$145 million. The remaining capital costs of about \$111 million would be for maintaining and improving

the transit services provided by the areawide transit system, and would primarily consist of bus fleet replacement and expansion costs. These remaining costs could also be funded with 75 to 80 percent federal funding under UMTA Section 3 and Section 9 funding programs. The maximum federal share of these capital costs would be \$88 to \$89 million, and the minimum nonfederal share would be \$22 to \$23 million under these federal funding programs. The total capital cost of \$145 million, including both the capital costs for the recommended Fond du Lac Avenue express bus services and the remaining areawide capital costs for the Milwaukee area transit system, would thus be funded with between \$113 and \$116 million in

federal funding. The remaining \$29 to \$32 million would need to be funded with state and local funds over a 13-year implementation period.

Federal participation in funding the capital costs of the light rail alternative is uncertain. At the present time, the federal government has an announced policy of not providing funding for new rail transit development projects. Nevertheless, some federal funding for new rail transit projects has been provided in other urban areas to advance projects from the alternatives analysis phase to the preliminary engineering phase. In the decision process followed to approve federal funding for new rail projects, UMTA uses a rating system to rank all such projects in the nation competing for UMTA Section 3 discretionary funds. This rating system includes consideration of the amount and proportion of the local financial commitment to the proposed project. Projects that will have a higher local funding commitment than the 25 percent minimum required under the UMTA Section 3 discretionary program are considered before those with a lower commitment. In addition, a large local commitment of funds toward the capital costs of a project may enhance the chance of a locally preferred alternative to receive federal funding, particularly where a different alternative has been shown to have lower costs or greater benefits.

Given the uncertainties regarding the funding of any new rail transit project, the consultant's financial analysis of the capital costs of the light rail alternative indicated that a realistic approach to funding the capital costs of the light rail facility, as set forth in Table 15, would be to seek federal funding under the UMTA Section 3 discretionary funding program for only 33 percent of the total facility costs excluding the local project administration costs, or about \$59 million. This level of federal funding would be substantially below the maximum potential federal share under the Section 3 program of 75 percent of the estimated light rail facility cost. In return for accepting a lower federal share of the capital costs of the facility, Milwaukee County would negotiate for 100 percent Section 3 funding of the local project administration costs for the alternative, estimated at \$17 million. The total federal participation in funding the light rail facility costs would be about \$76 million, or about 39 percent of the total facility cost of \$195 million, expressed in constant 1985 dollars. As noted for the capital costs of the recommended express bus services, the remaining \$119 million, or 61 percent of the light rail facility costs, would also

need to be funded using a combination of state and local funding. The allocation of capital costs among funding sources for the light rail facility is shown in Table 17.

In addition to the capital costs for the light rail facility within the northwest corridor, capital costs would be required under the light rail alternative for maintaining and improving bus service within the entire Milwaukee urbanized area. These costs would total about \$117 million, and could be funded with 75 to 80 percent federal funding under the UMTA Section 3 and Section 9 programs. Under these funding programs, the maximum federal share of these costs would be between \$92 and \$94 million, and the local share between \$23 and \$25 million. The total capital costs of the light rail alternative of about \$312 million, which would include the light rail facility costs and the areawide bus-related capital costs, would thus be funded with between \$168 and \$170 million in federal funding, and between \$142 and \$144 million in state and local funding.

Conclusions

From the foregoing, it is apparent that there is substantial uncertainty regarding the funding of the recommended rapid transit service improvements within the northwest corridor of Milwaukee County, particularly with respect to the proposed light rail alternative. The situation will, accordingly, require careful monitoring by all parties concerned as implementation of these alternatives proceeds. Given the uncertainties regarding the federal position on transit system operating aids and the funding of investments in rail transit facilities, and given the willingness of the County to continue to raise sufficient tax and farebox revenues to provide a high level of transit service, it will be necessary to give consideration to state funding of the recommended rapid transit improvements within the corridor. In particular, the financial analysis of the capital costs of the recommended express bus service and light rail facility indicated that the additional capital costs entailed in implementing these improvements within the corridor will require state funding if the proposed services and facilities are to be implemented.

It is therefore recommended that the Wisconsin Department of Transportation and the State Legislature consider providing funding in support of the nonfederal share of the capital costs of either the recommended express bus service or the recommended light rail facility within the north-

Table 17

**DISTRIBUTION OF THE AVERAGE CAPITAL COSTS AMONG FUNDING SOURCES FOR THE
PROPOSED LIGHT RAIL FACILITY UNDER THE RECOMMENDED LIGHT RAIL ALTERNATIVE**

Funding Source	Share of Capital Costs of Recommended Fond du Lac Avenue Express Bus Services (millions of 1985 dollars) ^a
Federal (UMTA Section 3)	\$ 75.6
State/Local ^b	119.4
Total	\$195.0

^aThe capital costs of the recommended light rail facility would be an element of the total capital costs of the areawide transit system within the Milwaukee urbanized area, which are estimated to be \$312 million. Excluding the capital costs of the light rail facility, the remaining \$117 million in areawide capital costs would be for the supporting bus services within the Milwaukee urbanized area, and would include about \$82 million for the replacement of standard and articulated buses in the existing bus fleet, and about \$35 million for the addition of more articulated buses to the existing bus fleet and the construction of park-ride lots within the corridor for feeder bus services. The cost for bus replacement reflects a savings of \$24 million when compared with the fleet replacement costs under Alternative 1, the no build alternative, of about \$106 million. The lower fleet replacement costs for the recommended express bus alternative reflect the need for fewer standard motor buses in the bus fleet for this alternative than in the bus fleet for Alternative 1 owing to the replacement of local bus service within the corridor with light rail transit service, and the replacement of standard motor buses with articulated motor buses on express and freeway flyer bus routes throughout the areawide transit system. The estimated fleet replacement cost of \$82 million could be funded with about \$66 million in federal funds and about \$16 million in local funds under the UMTA Section 9 program. The remaining \$35 million in capital costs for bus fleet expansion and park-ride lot construction could be funded with a combination of UMTA Section 3 and Section 9 funds, which would result in a maximum federal share of \$26 to \$28 million, and a minimum local share of \$7 to \$9 million.

^bThere is currently no state program that could be used to provide funding for transit system capital costs. However, the Advisory Committee believed that the State should provide funding for a major rapid transit improvement within the Milwaukee northwest corridor. Participation by the State in funding the capital costs of any rapid transit improvements within the corridor will require the passage of new legislation.

Source: SEWRPC.

west corridor of Milwaukee County. It should be noted in this respect that there is currently no state program that provides transit system capital assistance.⁸ However, the State currently provides substantial transit operating assistance to the

Milwaukee County Transit System, specifically in 1985 a total of \$22.3 million, representing nearly 62 percent of the total operating deficit of the Milwaukee County Transit System, and 37.5 percent of the system operating costs.

⁸A state program authorized under Section 85.055 of the Wisconsin Statutes provided capital assistance between 1979 and 1981 to urban transit systems eligible to receive state urban transit operating assistance. Under this program, state aids were provided on a one-time basis to eligible transit systems to pay up to 50 percent of the nonfederal share of total eligible capital costs, which were limited under the program to the purchase of buses.

In making this determination, recent trends in the level of state aids provided as transit operating assistance for the Milwaukee County Transit System should be considered. Since 1985, such state aids have amounted to about three times the amount of funds contributed by Milwaukee County to support the annual operating deficit of the transit system. If similar capital assistance were provided for the recommended rapid transit

improvements within the corridor, the State would be responsible for about 75 percent of the total nonfederal share of the capital costs of the improvements. For the recommended express bus service, the State would, under such a formula, be responsible for between \$5.1 and \$6.4 million of the total nonfederal share of \$6.8 to \$8.5 million. For the recommended light rail facility, the State would be responsible for about \$89.6 million of the total nonfederal share of \$119.4 million. Consideration should also be given to funding the nonfederal share of the capital costs of the recommended rapid transit improvements on a basis similar to funding the construction of a state trunk highway through the northwest corridor. This approach would be justified, based upon forecast ridership levels for the express bus and light rail transit services which indicate that both services would carry a person trip volume similar to volumes that could be expected to be carried on a state trunk highway. If the State were to fund the recommended rapid transit improvements on this basis, state funds would be available for up to 100 percent of the nonfederal share of the total capital costs for each rapid transit improvement.

The decision as to whether and how to fund the nonfederal share of the total capital costs of the recommended rapid transit improvements should be made in selecting the final alternative to be pursued for implementation within the corridor. Whether or not federal funding should be pursued for the project should also be considered. Such consideration should recognize that the State of Wisconsin currently contributes more in taxes to the federal transportation funds than it receives in grants from those funds.

SUMMARY

Based upon the comparative evaluation of the express bus and light rail alternatives presented in the previous chapter, the study Advisory Committee identified Alternative 2B—express bus on reserved lanes on W. Fond du Lac Avenue—as the best express bus alternative, and Alternative 3D—light rail in the N. 33rd Street railway corridor terminating at W. Mill Road—as the best light rail alternative in the Milwaukee northwest corridor. Because identification of the best mode entailed consideration of intangible benefits, particularly impacts on land use development, the study Advisory Committee chose not to recommend implementation of one alternative over the other. Rather, the Committee recommended that such a

decision be made by the chief executives and elected legislative bodies concerned, namely the County Board and County Executive and the State Legislature and Governor.

This chapter has described the various means available for implementation of either the recommended express bus or light rail rapid transit alternative in the northwest corridor of Milwaukee County. Because of the dual nature of the plan recommended by the Advisory Committee, the actions outlined represent a departure from more typical plan implementation recommendations. In this respect, the plan implementation recommendations presented included a description of the steps to be followed in determining which of the preferred alternative plans should be the final recommended plan, as well as a description of the actions required for implementation of both preferred alternative plans so that implementation can proceed once a decision on a final recommended plan is made. The most important recommended plan implementation actions are summarized below.

Selection of a Final Recommended Plan

The first step toward improved rapid transit service within the Milwaukee northwest corridor will be the selection of a final recommended plan for the corridor from between the two preferred plans identified by the study Advisory Committee. This step represents a departure from the typical plan implementation process used in transportation studies conducted for the Milwaukee area. The Regional Planning Commission will initiate the actions to be followed in this step by formally transmitting a copy of the report documenting the best express bus alternative and the best light rail alternative to the County Executive and the Milwaukee County Board of Supervisors. The Milwaukee County Board will be asked to take formal action endorsing one of the two recommended rapid transit plans.

In deciding upon the final rapid transit plan for the corridor, Milwaukee County will need to consider carefully the preferences of the City of Milwaukee, whose full and wholehearted cooperation will be essential if the final plan is to be fully implemented, and the preferences of the state and federal officials concerned. Therefore, copies of the final plan report should also be sent by Milwaukee County to the Mayor and Common Council of the City of Milwaukee, to the Secretary of the Wisconsin Department of Transportation, and to each state and federal legislator with a constituency

within the corridor. These bodies and officials will be asked to review the report and make their preferences known to Milwaukee County prior to plan selection by the County.

Plan Implementation Actions for
Recommended Express Bus Alternative

If the recommended express bus alternative is selected as the final plan for the northwest corridor of Milwaukee County, actions or responsibilities toward the implementation of the alternative would rest with Milwaukee County, the City of Milwaukee, the Southeastern Wisconsin Regional Planning Commission, the Wisconsin Department of Transportation, and the U. S. Department of Transportation, as indicated below:

Milwaukee County: It is recommended that Milwaukee County:

1. Adopt the recommended express bus plan as an amendment to the regional transportation system plan.
2. Implement the proposed arterial express bus services on W. Fond du Lac Avenue, and the proposed "freeway flyer" services to downtown Milwaukee from park-ride lots located near the Northridge Shopping Center and near the intersection of USH 41/45 and W. Good Hope Road.
3. Construct a new park-ride lot at N. 60th Street and W. Mill Road.
4. Cooperate with the Wisconsin Department of Transportation in the development or expansion of three additional park-ride lots within the corridor near the Northridge Shopping Center, the intersection of USH 41/45 and W. Good Hope Road, and Timmerman Field.
5. Assume the lead agency role in the design and construction of the downtown Milwaukee transit/pedestrian mall proposed under the alternative following the completion and approval of a preliminary engineering study for the facility, including providing for the necessary funding. The County should cooperate closely with the City in this action, and the City should act as the actual construction agency under an agreement with the County, since the street right-of-way concerned is owned by the City, and would have to continue to be maintained by the City.
6. Cooperate with the City of Milwaukee in the design and construction of the reserved bus lanes proposed under the alternative along selected arterial streets within the corridor, including providing for the necessary funding.
7. Help protect the right-of-way potentially needed for the light rail facility proposed under the recommended light rail plan so that options for light rail transit facility construction within the corridor are not unnecessarily and unknowingly foreclosed.

City of Milwaukee: It is recommended that the City of Milwaukee:

1. Adopt the recommended express bus plan as an amendment to the regional transportation system plan.
2. Cooperate in the design of the downtown Milwaukee transit/pedestrian mall and act as the construction agency for the mall, using funds provided by Milwaukee County after completion and approval of a preliminary engineering study for the facility.
3. Design and construct the reserved bus lanes recommended on E. and W. Wells Street, W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue using funds provided by Milwaukee County.

Southeastern Wisconsin Regional Planning Commission: It is recommended that the Southeastern Wisconsin Regional Planning Commission:

1. Adopt the express bus alternative as an amendment to the regional transportation system plan.
2. At the specific request of Milwaukee County, include recommended operating and capital projects representing various stages of plan implementation in the transportation improvement program for the Southeastern Wisconsin Region.

Wisconsin Department of Transportation: It is recommended that the Wisconsin Department of Transportation:

1. Endorse the recommended express bus alternative as an amendment to the regional transportation system plan.

2. Develop or expand the three park-ride lots located along the state trunk highway and connecting street system within the Milwaukee northwest corridor to be served by the proposed arterial express bus and freeway flyer transit services.
3. Carefully monitor the situation pertaining to the funding of transit system operating expenses and capital projects, and advise the State Legislature of any need to modify the existing state aid programs to provide for increased levels of transit operating assistance.
4. Review the capital costs of the proposed express bus service, and advise the State Legislature of the need to provide funding to support the nonfederal share of the capital costs for the project. In determining the level of state funding for the project, consideration should be given to funding the nonfederal share of total capital costs on a basis similar to funding the construction of a state trunk highway, which would provide state funds for up to 100 percent of the nonfederal share of the total capital costs of the service; or on a basis which reflects recent practice in supporting the nonfederal share of transit system operating deficits, which would result in the provision of state funds for up to 75 percent of the nonfederal share of total capital costs.
5. Retain the ownership of the right-of-way currently operated by the Wisconsin & Southern Railroad Company and take into account the possible future use of this right-of-way for the light rail transit line in matters attendant to proposals for reconstruction of the railway.
6. Should the Soo Line Railroad Company consider abandoning freight service over its right-of-way in the N. 33rd Street railway corridor, exercise its first right to acquire abandoned rights-of-way and purchase this right-of-way on behalf of Milwaukee County for future use in providing light rail transit service.

U. S. Department of Transportation, Urban Mass Transportation Administration: It is recommended that the U. S. Department of Transportation, Urban Mass Transportation Administration:

1. Formally acknowledge the recommended express bus alternative as an amendment to the regional transportation system plan.
2. Use the recommended express bus alternative as a guide in the administration and granting of federal aids for transit system development and operation within Milwaukee County.

U. S. Department of Transportation, Federal Highway Administration: It is recommended that the U. S. Department of Transportation, Federal Highway Administration:

1. Formally acknowledge the recommended express bus alternative as an amendment to the regional transportation system plan.
2. Use the recommended express bus alternative as a guide in the administration and granting of federal aids for the development of park-ride lots and reserved lanes within the northwest corridor of Milwaukee County.

Plan Implementation Actions for Recommended Light Rail Alternative

If the recommended light rail alternative is selected as the final plan for the northwest corridor of Milwaukee County, actions or responsibilities toward the implementation of the alternative would rest with Milwaukee County, the City of Milwaukee, the Southeastern Wisconsin Regional Planning Commission, the Wisconsin Department of Transportation, and the U. S. Department of Transportation, as indicated below:

Milwaukee County: It is recommended that Milwaukee County:

1. Adopt the recommended light rail alternative as an amendment to the regional transportation system plan.
2. Implement the light rail facility and supporting feeder express bus routes in the northwest corridor of Milwaukee County as proposed under the recommended light rail alternative, including the conduct of appropriate preliminary and final engineering studies in conjunction with the City of Milwaukee, the Regional Planning Commission, and the Wisconsin Department of Transportation.

3. Cooperate with the Wisconsin Department of Transportation in the development or expansion of the three park-ride lots within the corridor to be served by the feeder express bus routes for the light rail transit facility.
4. Assume the lead agency role in the design and construction of the downtown Milwaukee transit/pedestrian mall proposed under the alternative following the completion and approval of a preliminary engineering study for the facility, including providing for the necessary funding. The County should cooperate closely with the City in this action, and the City should act as the actual construction agency under an agreement with the County, since the street right-of-way concerned is owned by the City, and would have to continue to be maintained by the City.

City of Milwaukee: It is recommended that the City of Milwaukee:

1. Adopt the recommended light rail alternative as an amendment to the regional transportation system plan.
2. Design and construct the downtown transit/pedestrian mall proposed under the alternative using funds provided by Milwaukee County after the completion and approval of the preliminary and final engineering studies conducted by Milwaukee County for the light rail facility.
3. Conduct the necessary detailed land use planning along the light rail alignment, and, accordingly, modify zoning and other land use controls so that the potential land development and redevelopment impacts of light rail may be realized. Also, coordinate the development of the light rail line with other urban development and redevelopment incentives and programs in declining neighborhoods. Such programs may involve public funding to bring entrepreneurial risk down to a level justified by potential rewards.

Southeastern Wisconsin Regional Planning Commission: It is recommended that the Southeastern Wisconsin Regional Planning Commission:

1. Adopt the recommended light rail alternative as an amendment to the regional transportation system plan.

2. At the request of Milwaukee County, cooperate in the conduct of a preliminary engineering study for the proposed light rail facility in the northwest corridor of Milwaukee County.
3. At the request of Milwaukee County, include recommended planning, operating, and capital projects representing various stages of plan implementation in the transportation improvement program for the Southeastern Wisconsin Region.

Wisconsin Department of Transportation: It is recommended that the Wisconsin Department of Transportation:

1. Endorse the recommended light rail alternative as an amendment to the regional transportation system plan.
2. Cooperate with Milwaukee County in the funding and conduct of preliminary and final engineering studies attendant to the implementation of the proposed light rail facility in the northwest corridor of Milwaukee County.
3. Develop or expand the three park-ride lots located along the state trunk highway and connecting street system within the corridor to be served by the feeder express bus routes for the light rail facility. These park-ride lots would be located near the Northridge Shopping Center, the intersection of USH 41/45 and W. Good Hope Road, and Timmerman Field.
4. Carefully monitor the situation pertaining to the funding of transit operating expenses, and advise the State Legislature of any need to modify the existing state aid program to provide for increased levels of state transit operating assistance.
5. Review the capital costs of the proposed light rail facility and supporting feeder express bus routes, and advise the State Legislature of the need to provide funding to support the nonfederal share of the capital costs for the project. In determining the level of state funding for the project, consideration should be given to funding the construction of the light rail facility on a basis similar to funding the construction of a state trunk

highway, which would provide state funds for up to 100 percent of the nonfederal share of the total capital costs of the facility; or on a basis which reflects recent practice in supporting the nonfederal share of transit system operating deficits, which would result in the provision of state funds for up to 75 percent of the nonfederal share of total facility capital costs.

6. Retain the ownership of the right-of-way currently operated by the Wisconsin & Southern Railroad Company and take into account the use of this right-of-way for the light rail transit line in matters attendant to proposals for reconstruction of the railway.
7. Should the Soo Line Railroad Company consider abandoning freight service over its right-of-way in the N. 33rd Street railway corridor prior to the implementation of the light rail facility, exercise its first right to acquire abandoned rights-of-way and purchase this right-of-way on behalf of Milwaukee County for future use in providing light rail transit service.

U. S. Department of Transportation, Urban Mass Transportation Administration: It is recommended that the U. S. Department of Transportation, Urban Mass Transportation Administration:

1. Formally acknowledge the recommended light rail alternative as an amendment to the regional transportation system plan.
2. Use the recommended light rail alternative as a guide in the administration and granting of federal aids for transit system development and operation within Milwaukee County.
3. Cooperate with Milwaukee County, the Regional Planning Commission, and the other agencies concerned in the conduct of the preliminary and final engineering studies for the proposed light rail transit facility in the northwest corridor of Milwaukee County.

U. S. Department of Transportation, Federal Highway Administration: It is recommended that the U. S. Department of Transportation, Federal Highway Administration:

1. Formally acknowledge the recommended light rail alternative as an amendment to the regional transportation system plan.
2. Use the recommended light rail alternative as a guide in the administration and granting of federal aids for transit system development and operation within Milwaukee County.

Chapter IV

SUMMARY

INTRODUCTION

The Milwaukee northwest corridor rapid transit study was undertaken by Milwaukee County to identify the best means of providing transit improvements to meet the transportation and community development and redevelopment needs of northern Milwaukee County. Previous areawide studies had concluded that express buses and light rail were the two most promising alternatives for improving public transit service in the greater Milwaukee area, and recommended further study to establish the relative costs and benefits of these two alternative modes in the northern part of the County.

This report summarizes the findings and recommendations of the county study. A companion report prepared under the study by the firm of Parsons Brinckerhoff Quade & Douglas, Inc., constitutes an environmental assessment report. These two major reports are based upon findings presented in a series of 17 technical reports prepared by Parsons Brinckerhoff Quade & Douglas, Inc., and the Regional Planning Commission under this study. These 17 reports are:

1. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 1, Detailed Study Design, Parsons Brinckerhoff Quade & Douglas, Inc., December 1984.
2. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 2, Travel Simulation Models, Southeastern Wisconsin Regional Planning Commission, December 1984.
3. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 3, Operating and Maintenance Cost Estimation and Analysis Procedures, Parsons Brinckerhoff Quade & Douglas, Inc., December 1984.
4. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 4, Capital Cost Estimations and Analysis Procedures, Parsons Brinckerhoff Quade & Douglas, Inc., December 1984.
5. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 5, Financial Analysis Procedures, Parsons Brinckerhoff Quade & Douglas, Inc., January 1985.
6. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 6, Alternative Plan Evaluation Methodology, Parsons Brinckerhoff, Quade & Douglas, Inc., December 1984.
7. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 7, Environmental Analysis Methodologies, Parsons Brinckerhoff Quade & Douglas, Inc., December 1984.
8. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 8, Public Involvement Procedures, Parsons Brinckerhoff Quade & Douglas, Inc., December 1984.
9. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 9, Land Development and Redevelopment Assessment Procedures, Parsons Brinckerhoff Quade & Douglas, Inc., January 1985.
10. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 10, Descriptions of Alternatives, Parsons Brinckerhoff Quade & Douglas, Inc., August 1986.
11. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 11, Design Standards and Criteria, Parsons Brinckerhoff Quade & Douglas, Inc., August 1985.
12. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 12, Preliminary Operating Plans for Alternatives, Parsons Brinckerhoff Quade & Douglas, Inc., August 1985.
13. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 13, Final Alternatives and Operating Plans, Parsons Brinckerhoff Quade & Douglas, Inc., August 1986.

14. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 14, Operating and Maintenance Cost Estimates, Parsons Brinckerhoff Quade & Douglas, Inc., August 1986.
15. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 15, Capital Cost Estimates, Parsons Brinckerhoff Quade & Douglas, Inc., August 1986.
16. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 16, Financial Plans, Parsons Brinckerhoff Quade & Douglas, Inc., December 1986.
17. Milwaukee Northwest Corridor Rapid Transit Study Technical Report No. 17, Land Development Potential Analysis, Real Estate Research Corporation, February 1986.

STUDY AREA

The Milwaukee northwest corridor is a 78-square-mile area extending from the City of Milwaukee central business district to the north and west limits of Milwaukee County. The need for a rapid transit improvement in this corridor is related to a series of problems, including inadequate transportation system capacity, inadequate levels of transportation service, and transit system inefficiencies. The need is also related to broader urban concerns, including the need to guide and shape land use development and redevelopment within the corridor in the public interest.

RAPID TRANSIT ALTERNATIVES CONSIDERED

Six basic alternative rapid transit improvements in the Milwaukee northwest corridor were examined in detail. The six alternatives included three express bus alternatives and three light rail transit alternatives. In addition, a "no build" alternative, which assumed the continued operation of the existing public transit system, was considered. This alternative—Alternative 1—which entailed the provision of only limited express bus and "freeway flyer" service during weekday peak travel periods, provided a basis for the evaluation of the impacts of the other alternatives. Alternative 1 is graphically summarized on Map 4 of this report. A number of other alternatives were also considered but rejected from further, more detailed examination under this study either on the basis of the findings of previous

studies or on the basis of analyses conducted under this study, including heavy rail rapid transit, commuter rail, exclusive busways, electric trolley buses, dual mode transit, and monorail.

The three express bus alternatives envisioned the operation of high-capacity, articulated diesel motor buses, as well as standard diesel motor buses, in express, or limited-stop, service—including service on arterial street lanes reserved for the exclusive operation of buses—between the Milwaukee central business district and four outlying park-ride lots in the northwest side of Milwaukee County. The first express bus alternative—Alternative 2A—would entail improvement of the existing No. 30 bus route, with service concentrated along W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard prior to the route splitting into two branches to serve the northwest side of Milwaukee County.

The second express bus alternative—Alternative 2B—would entail improvement of the existing No. 23 bus route, with service concentrated along W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue prior to the route splitting into four branches to serve the northwest side of Milwaukee County. Both Alternative 2A and Alternative 2B would also entail the provision of an exclusive transit/pedestrian mall along Wisconsin Avenue in the central business district of Milwaukee.

The third express bus alternative—Alternative 2C—would entail the addition of express bus service to six existing bus routes—Nos. 12, 23, 30, 57, 67, and 76. Unlike the first two express bus alternatives, the third alternative would not concentrate express service on a single route, but would provide such service over a number of routes and would do so without reserved lanes.

The three express bus alternatives considered are graphically summarized on Maps 5, 6, and 7 of this report.

The three light rail transit alternatives envision the operation in the corridor of electrically powered, reversible, six-axle articulated light rail vehicles, capable of operating either as a single unit or coupled together into a multi-car consist and drawing electrical power from overhead wires. The light rail vehicles would operate in a variety of operating environments, including in mixed traffic on public streets; over reserved lanes in public street rights-of-way, including in median areas; and over exclu-

sive rights-of-way. All the rights-of-way used would be existing, requiring little acquisition of new right-of-way. The type of light rail line envisioned under these alternatives is similar to light rail lines currently operating, under construction, or in advanced stages of planning in a number of North American cities.

Each of the three light rail alternatives consists of a double-track light rail line between the Milwaukee central business district and the northwest side of Milwaukee County in the vicinity of N. 84th Street and W. Brown Deer Road near the Northridge Shopping Center. In the central business district, all three alternatives would use E. and W. Wisconsin Avenue, which would be converted to a transit mall; and in the far northwest side of Milwaukee County, all three alternatives would use an alignment along the Wisconsin & Southern Railroad Company and Wisconsin Electric Power Company rights-of-way. In the near north and north-central sections of the corridor, each of the light rail alternatives would use a different alignment.

The first light rail alternative—Alternative 3A—would operate over E. and W. Wisconsin Avenue, N. 35th Street, W. Highland Boulevard, N. 40th Street, and N. Sherman Boulevard to the Wisconsin & Southern Railroad Company right-of-way.

The second light rail alternative would also operate over E. and W. Wisconsin Avenue, but would use the former Milwaukee Road—now Soo Line—N. 33rd Street railway right-of-way to the Wisconsin & Southern Railroad Company right-of-way.

The third light rail alternative would also operate over E. and W. Wisconsin Avenue, but would use N. 16th and N. 17th Streets, W. Fond du Lac Avenue, the right-of-way originally cleared for construction of the Park Freeway-West, the Soo Line Railroad Company N. 33rd Street right-of-way, W. Fond du Lac Avenue again, and N. 60th Street to the Wisconsin & Southern Railroad Company right-of-way.

The three basic light rail alternatives are shown on Maps 8, 9, and 10 of this report.

A shorter variation of each light rail alternative was also examined, with the light rail line terminating in the vicinity of N. 60th Street and W. Mill Road, and with connecting express bus service extending north to the Northridge Shopping Center area.

EVALUATION AND COMPARISON OF EXPRESS BUS ALTERNATIVES

The findings of a comparative evaluation of the express bus alternatives considered with respect to performance, costs, and impacts under pessimistic and optimistic futures for public transit use in the year 2000 are summarized in Table 2 of this report. This evaluation indicated that Alternatives 2A and 2B would be superior to Alternative 2C, providing higher levels of service and ridership, and a larger reduction in annual operating deficits. Compared to Alternative 2C, about 4,000, or 4 percent, more transit trips per average weekday could be expected to be made in the northwest corridor in the plan design year; and an additional \$1.0 million reduction in annual transit operating deficit could be expected to be realized, approximately a 3 percent savings systemwide, all of which would be attributed to transit service changes within the corridor. When compared with Alternative 1, the additional systemwide capital costs of Alternatives 2A and 2B would be about \$11 million, or 39 percent, higher than the additional cost of Alternative 2C, due primarily to the inclusion of a downtown transit mall in these alternatives.

Of the two best express bus alternatives, Alternative 2B—express bus on reserved lanes over the W. Fond du Lac Avenue alignment—was selected as the better alternative for the northwest corridor. Alternative 2B would provide a somewhat higher level of service and transit ridership, and may be expected to have a higher probability of implementation, as a basic level of express bus service is currently provided over most of the alignment by Milwaukee County Transit System Route No. 23. Alternative 2B would modify the existing express bus route by adding additional route branches, increasing levels of service and hours of operation, converting the route from largely local service to nearly all express service, using exclusive lanes to increase vehicle operating speeds, and operating the service with articulated rather than standard diesel motor buses.

EVALUATION AND COMPARISON OF LIGHT RAIL ALTERNATIVES

The findings of a comparative evaluation of the light rail alternatives considered are presented in Table 3 of this report. Based upon the information provided by the comparative evaluation, the light rail alignment along the N. 33rd Street railway

corridor—Alternative 3C—was selected as the best light rail alignment for the northwest corridor. The capital costs of this alternative would range from \$3 million to \$4 million below the capital costs for an alignment along W. Fond du Lac Avenue; and from \$13 million to \$14 million below the capital costs for an alignment along N. Sherman Boulevard. The potential land development impacts of Alternative 3C would be similar to those of the other two light rail alternatives, as would its anticipated travel time savings, ridership, and reduction in annual operating deficit. The N. 33rd Street railway alignment may also be expected to have the broadest support of residents and business owners within the corridor. The strong opposition expressed by residents along N. Sherman Boulevard to the N. Sherman Boulevard alignment makes it unlikely that a light rail line could be constructed along this alignment. Similar opposition to the W. Fond du Lac Avenue alignment makes the construction of a light rail facility over this alignment also unlikely. Consequently, if the provision of light rail transit service within the northwest corridor was found to be desirable, such service could be expected to have the highest probability of implementation if the light rail facility followed the N. 33rd Street railway alignment.

The comparative evaluation of the light rail alternatives also indicated that initial truncation of the light rail line at W. Mill Road would be superior to initial extension of the line all the way to W. Brown Deer Road. This truncated version of the alignment was identified as Alternative 3D. Total transit ridership levels on the transit services within the corridor under Alternative 3D were forecast to be virtually the same as under Alternative 3C, which would extend the light rail line all the way to W. Brown Deer Road; while capital costs would be reduced by about \$42 million.

COMPARISON OF PREFERRED BUS AND LIGHT RAIL ALTERNATIVES

The findings of a comparative evaluation of the best bus alternative—Alternative 2B—to the best light rail alternative—Alternative 3D—are summarized in Table 4 of this report. The advantages and disadvantages of Alternative 2B compared to maintaining the existing transit system are presented in Table 5 of this report. Review of the advantages and disadvantages of Alternative 2B indicated that implementing the express bus alternative would be clearly superior to continuing to maintain the existing transit system within the northwest corridor of

Milwaukee County. The only disadvantage of the express bus alternative was the additional capital cost within the corridor of about \$21.6 million, of which \$15.9 million would be entailed in the provision of a downtown transit mall, a feature not essential to implementation of this alternative. The alternative would have a number of advantages over simply maintaining the existing system, including substantially increased transit ridership, improvement in the level of transit service, and lower annual operating costs and deficits within the corridor. Under this alternative, transit ridership within the corridor is forecast to increase by about 10,000 trips per average weekday in the plan design year 2000, or by about 10 percent. Improvements in the level of service would provide travel time reductions ranging from 5 to 20 minutes, or about 15 percent, for those using the express bus service in the plan design year. The annual savings in transit operating costs would approximate \$1.3 million within the corridor in the plan design year, and the transit operating deficit may be expected to be reduced by about \$3.1 million per year within the corridor. Thus, the additional capital costs entailed in implementing the express bus alternative, even with a downtown transit mall, would be offset by lower operating costs and deficits within six to seven years. Thus, Alternative 2B would clearly constitute a worthwhile improvement to the existing transit system.

The advantages and disadvantages of Alternative 3D compared to maintaining the existing transit system are presented in Table 6 of this report. As may be expected, the best light rail alternative would have a much higher capital cost than simply maintaining the existing transit system. Within the northwest corridor, the light rail alternative would have an additional capital cost of \$187.8 million. In addition, compared to the existing system, Alternative 3D would have an additional operating cost in the corridor of about \$0.9 million per year. Because of the higher ridership in the corridor which may be expected under the light rail alternative—about 8,000 more weekday transit trips than under the “do nothing” alternative—the transit operating deficit within the northwest corridor may be expected to be about \$0.3 million lower under Alternative 3D than under the do nothing alternative. Other important advantages of the light rail alternative would be that it would rely upon electricity rather than petroleum-based motor fuel for power, and it could be expected to have some positive land development and redevelopment impacts. The light rail alternative may be expected

to provide some reinforcement of downtown revitalization efforts; provide some encouragement for more concentrated development in the far northwest portion of the corridor; and be a positive factor in helping to stabilize mid-corridor neighborhoods.

More specifically, the light rail alternative may be expected to result in a 5 to 10 percent increase in the amount of new office space to be developed in the downtown, or an additional 10,000 to 20,000 square feet of new office space per year over the 200,000 square feet of new office space expected without a light rail line. The light rail alternative could also be expected to result in an additional 10 new housing units per year of residential development on the near west side over the 20 new housing units per year expected without a light rail line. Light rail would also help stabilize existing neighborhoods, but it could not alone bring about land use development and redevelopment, or revitalize a declining neighborhood. On the far northwest side, a light rail facility may be expected to attract additional high-density housing, about 50 to 75 new units per year over the 170 new housing units per year expected to be developed in any case. A light rail facility cannot be expected to stimulate new economic activity in the greater Milwaukee area. Rather, its development and redevelopment impacts would be limited to encouraging development that would have occurred anyway within the greater Milwaukee area to locate along the light rail line. Such development might otherwise occur outside the City and County of Milwaukee.

Thus, the major advantages of the light rail alternative, compared to simply maintaining the existing transit system, are that a light rail line may be expected to have a positive impact on land development and redevelopment in the corridor, in addition to providing improved transit service and attracting higher levels of transit ridership. The light rail alternative would also provide a mode of transportation that is not dependent upon petroleum-based motor fuel. However, implementation of the light rail alternative would have a substantially higher capital cost within the corridor than simply maintaining the present system, about \$187.8 million.

The advantages and disadvantages of the express bus alternative in comparison to the light rail alternative are presented in Table 7 of this report. Comparing the express bus alternative to the light rail alternative indicated that if only direct costs

and benefits are considered, the express bus alternative would be superior to the light rail alternative. Both alternatives may be expected to have about the same direct transportation benefits as reflected in improved service levels and increased transit ridership. The express bus alternative, however, may be expected to provide savings in annual operating costs of about \$2.2 million compared to the light rail alternative; and a \$2.8 million greater reduction in annual operating deficits in the design year. In addition, the bus alternative would have a \$166.2 million lower capital cost.

The advantages of light rail would thus be largely indirect and intangible. In this respect, while the impacts of light rail would be primarily related to the relocation of development within the Milwaukee area rather than the generation of new development, it is important to note that the positive land development and redevelopment impacts of light rail could still be significant. Very few opportunities are available to stimulate development in the outlying and downtown areas of the City while, at the same time, revitalizing and maintaining the attractiveness of central city neighborhoods. Without further incentives for sound central city development and redevelopment, there is a potential for a substantial erosion of the property tax base, for further loss of resident population and jobs, and for an underused infrastructure. Indeed, many public projects have been pursued in the Milwaukee area precisely because they have the potential to indirectly affect the well-being of the area—for example, the Grand Avenue Mall; the downtown sky walk system; and halls and stadia for conventions and the attraction and retention of professional sports teams. Such projects relied on local, federal, and private funding for their implementation.

ADVISORY COMMITTEE RECOMMENDATION

The Advisory Committee recommended that express bus Alternative 2B, as the best express bus alternative, and light rail Alternative 3D, as the best light rail alternative, be the preferred alternatives for the Milwaukee northwest corridor. The Advisory Committee also recommended that a final decision concerning which of these two alternatives should be implemented within the corridor be made by the elected officials of the City of Milwaukee, Milwaukee County, and the State of Wisconsin. In making this recommendation, the Committee recognized that neither alternative could be implemented solely by Milwaukee County,

but that such implementation would require a high degree of intergovernmental cooperation; that financial assistance from both the federal and state governments was needed to help defray a major portion of the capital costs for each alternative; and that while federal transit capital assistance is currently available through programs administered by the Urban Mass Transportation Administration (UMTA), there is no state program for financing mass transit capital improvements.

With regard to the need for state funding of capital investment, the Advisory Committee expressed the collective opinion that the State had a responsibility to fund a major rapid transit improvement within the Milwaukee northwest corridor. This opinion was based upon the State's previous commitment to build two planned freeway segments—the Park Freeway-West and the Stadium Freeway-North gap closure—which would have served existing and probable future travel demand within the corridor. It was, therefore, the opinion of the Advisory Committee that the State should fulfill its previous commitment to improving the transportation system within the northwest corridor of Milwaukee County by providing financial assistance in support of the capital costs of the preferred rapid transit alternatives for the corridor.

Wisconsin Department of Transportation staff on the Advisory Committee, however, indicated that the once-proposed freeway, unlike the potential rapid transit improvement, would have carried intercounty, interregional, and interstate traffic, including truck traffic, and that it is the responsibility of the Department to provide facilities to carry such traffic. Moreover, the direct benefits of the freeway were expected to exceed its direct costs, while the direct benefits of the light rail rapid transit improvement would clearly not exceed its cost.

RECOMMENDED RAPID TRANSIT ALTERNATIVES

Recommended Express Bus Alternative

Under the recommended express bus alternative, improvements in express bus transit services within the corridor would be provided by using a combination of arterial express bus and freeway flyer routes. The most significant of the express bus transit services proposed under the alternative would be the service improvements proposed for the Milwaukee County Transit System bus route currently operating over W. Fond du Lac Avenue—

Route No. 23. Under the alternative, much of the service on this route—up to about 90 percent during weekday peak travel periods—would be converted from local bus service with stops about every 0.1 mile to express bus service with stops about every one-quarter mile to one-half mile in the central portion of the corridor, and up to one mile apart in the far northwest portion of the corridor; and would be extended farther out into northwestern Milwaukee County. Express bus service would be extended in a northerly and westerly direction from W. Fond du Lac Avenue along N. Sherman Boulevard and W. Mill Road to a new park-ride lot at N. 60th Street and W. Mill Road; along N. 76th Street to a new park-ride lot near the Northridge Shopping Center at about N. 84th Street and W. Brown Deer Road; along STH 145 to an existing park-ride lot at W. Good Hope Road and USH 45; and along W. Congress Street and N. 92nd Street to an existing park-ride lot near Timmerman Field.

In addition to the arterial express bus services, the alternative includes new or improved freeway flyer bus service over an operationally controlled freeway system to provide nonstop service from both the Northridge Shopping Center area park-ride lot and the W. Good Hope Road park-ride lot to the Milwaukee central business district throughout the day on weekdays. To provide service from the Northridge Shopping Center area, the alternative envisions that existing Milwaukee County Transit System Route No. 49 would be modified to operate nonstop to downtown Milwaukee from the new park-ride lot proposed to be located near the Northridge Shopping Center. The existing route currently makes several stops along W. Brown Deer Road after leaving the freeway flyer terminal located in the Northridge Shopping Center parking lot. The plan also envisions a new freeway flyer route that would provide nonstop bus service to downtown Milwaukee from the existing W. Good Hope Road park-ride lot. The proposed arterial express and freeway flyer bus routes are shown on Map 13 of this report.

The express and freeway flyer bus services would operate throughout the day in both directions using high-capacity articulated diesel motor buses. Express bus service would be provided seven days a week, while freeway flyer bus service would be provided only on weekdays. The buses providing express and freeway flyer services would operate over a transit mall in downtown Milwaukee which would be developed along Wisconsin Avenue from

N. 6th Street on the west to N. Jackson Street on the east, a distance of about 0.8 mile. This facility would also serve motor buses providing local bus service to the central business district. While a transit mall was included under this alternative, the express and freeway flyer bus services proposed could be implemented without the development of the mall, as the bus services could also use exclusive bus lanes or operate in mixed traffic on Wisconsin Avenue.

In addition to the development of a transit mall on Wisconsin Avenue, the recommended express bus alternative proposes the establishment of reserved lanes on certain surface arterial streets for the exclusive use of buses. The six reserved lane proposals included in the recommended express bus plan are identified in Table 8 of this report. These include curbside reserved lanes along E. and W. Wells Street between N. 10th Street and N. Prospect Avenue; along W. Wisconsin Avenue, N. 16th and 17th Streets, and W. Fond du Lac Avenue between N. 6th Street and N. 19th Street; and along W. Fond du Lac Avenue between N. 35th Street and N. 60th Street.

It should be noted that reserved bus lanes are not proposed for the segment of W. Fond du Lac Avenue between N. 19th and N. 35th Streets. Within this segment, W. Fond du Lac Avenue narrows considerably, reducing both the number of existing traffic lanes—from six to four—and the right-of-way—from 120 to 66 feet—available for making street improvements. In order to provide for reserved lanes over this segment without exacerbating existing traffic congestion problems, this segment of W. Fond du Lac Avenue would need to be widened from the existing four lanes to six lanes. This action was considered under a major long-range transportation planning effort completed by the Commission in 1983 for the area, but was rejected by the advisory committee guiding the previous study in response to the strong opposition expressed toward any widening of this segment of W. Fond du Lac Avenue by owners of area businesses and by organizations representing neighborhood residents.

Buses providing the recommended express bus service would therefore operate in mixed traffic on W. Fond du Lac Avenue between N. 19th and N. 35th Streets. In lieu of providing reserved bus lanes over this segment of W. Fond du Lac Avenue, the express bus alternative proposes that on-street parking in the peak direction during peak weekday

travel periods be prohibited in order to provide for four traffic lanes. This action should alleviate, somewhat, existing traffic congestion problems over this segment of W. Fond du Lac Avenue and thus increase travel speeds for all vehicles using the facility, including buses providing express transit service. Because residents and businessmen from this area have in the past been opposed to the elimination of on-street parking from this segment of W. Fond du Lac Avenue, the alternative also proposes that off-street parking be developed to replace the on-street parking lost because of the enactment of parking restrictions, possibly by using vacant lots located along this segment.

Within the northwest corridor, where the express bus services would be implemented and modifications made to local bus lines, including the replacement of some lines and addition of some lines to serve as feeders and distributors to the express bus routes, the annual operating and maintenance costs of the transit system would be about \$1 million less than the cost of simply maintaining the existing transit system in the plan design year. Thus, the recommended improvements under the express bus alternative would provide efficiencies in annual transit system operating costs, while providing greatly improved transit services. The capital costs associated with only arterial express bus services on W. Fond du Lac Avenue as proposed under the recommended express bus alternative are estimated at \$34 million. Implementation of the express bus alternative in the northwest corridor would, however, result in significant capital cost savings with respect to the local transit element of the transit system in the northwest corridor of about \$13 million, principally due to a reduced need to expand and replace buses used in local transit service. A more detailed accounting of the costs of the express bus alternative is provided in Tables 13 and 14 of this report.

Financial analyses indicated that it should be possible to fund the capital costs of the proposed express bus services using existing federal transit assistance programs and Milwaukee County funding. However, the Advisory Committee concluded that state funding would also be essential if the implementation of any rapid transit service within the corridor is to be realized. Using the current federal Urban Mass Transportation Administration Section 3 and Section 9 transit assistance programs, federal funding could provide \$25 to \$27 million, or from 75 to 80 percent, of the total capital costs of about \$34 million. The nonfederal share of the

capital costs would be \$7 to \$9 million, and would need to be funded using a combination of state and local sources. A possible allocation of the total capital costs of the recommended express bus alternative among available funding sources is presented in Table 16 of this report.

Full operation of the arterial express and freeway flyer bus services proposed under the recommended express bus alternative should occur by the plan design year 2000. The proposed service changes would be implemented in several stages. A first stage of implementation for the recommended express bus alternative was developed jointly by the Commission and the staff of the Milwaukee County Transit System. It would include the expansion of express bus service on Milwaukee County Transit System Route No. 23 from a peak-hour, peak-direction service only to a full peak-hour service in both directions. It would also include a restructuring of local bus operations on the route in the far northwest portion of the corridor to reduce the number of local route branches from three to two, and to improve local service levels along the areas served by the route branches. All service changes would be immediately implementable. No changes would be proposed for existing freeway flyer bus routes or local bus routes other than Route 23. The recommended changes for Route No. 23 under the first stage are listed in Table 11 of this report. The required restructuring of local and express bus routing is shown on Maps 14 and 15 of this report.

An analysis of the financial impacts of the first stage of plan implementation on the current transit system operating budget was conducted by the staff of the Milwaukee County Transit System in response to a request by the study Advisory Committee. The results of this analysis indicated that the changes in peak-period service proposed for both the express and local bus operations on Route No. 23, as proposed under the first stage, would result in an increase in the annual transit system operating deficit of about \$60,000, or less than 0.2 percent of the projected operating deficit of about \$35.3 million for the transit system as a whole in 1986. The operation of the restructured local route during the afternoon and evening nonpeak periods would entail some additional increase in the operating deficit of the transit system.

If the recommended express bus alternative is ultimately selected for implementation within the northwest corridor of Milwaukee County, it is

recommended that pursuit of the ultimate construction of a light rail line in the Milwaukee northwest corridor not be abandoned, but rather be deferred. The new express bus services and facilities should serve to build transit ridership in the northwest corridor of Milwaukee County, providing a base for possible implementation of the light rail line. Accordingly, the recommended express bus alternative proposes that no actions be taken that would foreclose the option of implementing the light rail line proposed under the recommended light rail plan. In this respect, it is important that to the greatest extent possible, the rights-of-way needed along the recommended alignment for the proposed light rail facility be protected and preserved so that where the land is currently open it is kept open, and options for light rail transit service development are not unnecessarily or unknowingly foreclosed.

Recommended Light Rail Alternative

Under the light rail alternative, light rail transit service would be provided over a new light rail facility which would be constructed between an off-street terminal located just north of E. Clybourn Street between N. Jackson and N. Van Buren Streets in the Milwaukee central business district, and a new park-ride lot located near N. 60th Street and W. Mill Road. The alignment of the proposed light rail line would be along N. Jackson and N. Van Buren Streets, E. and W. Wisconsin Avenue, N. 35th Street, the Soo Line Railroad Company N. 33rd Street right-of-way, and the Wisconsin & Southern Railroad Company right-of-way. The alternative also includes an extensive network of feeder express bus routes which would connect the proposed light rail line with park-ride lots located in the Northridge Shopping Center area near N. 84th Street and W. Brown Deer Road; at W. Good Hope Road and USH 41/45; and at Timmerman Field. Feeder express bus service would also be provided from light rail stations in the Milwaukee central business district to the University of Wisconsin-Milwaukee campus. The proposed alignment of the light rail facility and the network of supporting feeder express bus routes are shown on Map 16 of this report.

Transit service over the light rail line would be provided throughout the day seven days a week. The light rail transit service would be provided using articulated light rail vehicles which would operate over a transit mall in downtown Milwaukee, extending along Wisconsin Avenue from N. 6th Street on the west to N. Jackson Street on the

east. This facility would serve light rail vehicles operating over the proposed light rail line, as well as motor buses providing express and freeway flyer bus service to the central business district. The proposed light rail facility could be implemented without the construction of the downtown transit mall. In that event, the light rail vehicles would operate in mixed traffic on Wisconsin Avenue to a tail track between N. Van Buren Street and N. Prospect Avenue.

The annual operating and maintenance costs of the transit system in the northwest corridor with a light rail line would be about \$1 million more in the plan design year than the costs of simply continuing to operate and maintain the existing transit system. The recommended light rail alternative would provide some efficiencies in annual transit system operating costs, while providing greatly improved transit service. The total capital cost of the recommended light rail facility as proposed under the recommended light rail alternative was estimated at \$195 million. Implementation of the light rail line in the northwest corridor would, however, result in a reduced need to expand and replace local bus service in the corridor. This would result in a savings in capital costs of approximately \$8 million, which would in part offset the additional capital costs of the light rail alternative. A more detailed accounting of the costs of the light rail alternative is provided in Table 13 of this report.

Financial analyses indicate that federal funding provided under the UMTA Section 3 discretionary funding program should be sought to fund a portion of the capital costs of the facility. The level of federal participation in the funding of such costs under the program would, however, be uncertain, because the federal government has an announced policy of not providing funding for new rail transit development projects. Because UMTA currently uses a rating system to evaluate funding requests for all rail projects nationwide which includes consideration of the amount and proportion of local financial commitment to each project, a realistic approach to securing federal funding for the project might be to seek a larger local commitment of funds toward the capital costs of the light rail facility than the minimum local funding commitment required under the Section 3 program.

Under such a funding scenario, federal funding under the UMTA Section 3 program would be sought for only 33 percent of the total facility capital cost excluding local project administration

costs, or for about \$59 million. In addition, the total local project administration costs for the facility, estimated at \$17 million, would be sought. The total federal participation in funding the light rail facility costs would thus be about \$76 million, or about 39 percent of the total facility cost of \$195 million, expressed in constant 1985 dollars. The nonfederal share of the capital costs would be about \$119 million, or 61 percent of the facility costs. This allocation of capital costs among funding sources for the light rail facility is shown in Table 17 of this report.

Financial analyses also indicated that state funding would be required for the nonfederal share of the total capital costs entailed in the construction of the recommended light rail facility. It was therefore recommended that the State Legislature consider providing funding in support of the nonfederal share of the light rail facility capital costs through the Wisconsin Department of Transportation. In determining the level of state aid that should be provided for the project, the State should take into consideration the ridership levels forecast for the light rail facility, which indicate that the facility would carry a person trip volume similar to such volumes carried on a state trunk highway. On this basis, the State might fund the project in a manner similar to the construction of a state trunk highway through the area by providing funds for up to 100 percent of the nonfederal share of the total capital costs. As an alternative, the State might consider using as a guide the relative proportion of state and local funds used to support the nonfederal share of transit system operating deficits in recent years. Using this approach, state funds would provide up to 75 percent of the nonfederal share of facility capital costs. The decision as to whether and how to fund the nonfederal share of the total capital costs of the light rail facility would need to be made in selecting the final alternative to be pursued for implementation within the corridor.

PLAN IMPLEMENTATION

Selection of a Final Recommended Plan

The first step in implementing improved rapid transit services within the Milwaukee northwest corridor would be the selection of a final recommended rapid transit facility plan from between the two preferred rapid transit plans identified by the study Advisory Committee. This step represents a departure from the typical plan implementation process used in transportation studies conducted for the greater Milwaukee area. Accord-

ingly, the plan implementation recommendations as set forth herein include a description of the steps to be followed in selecting a final recommended rapid transit plan for the northwest corridor, and identify the actions required to implement both of the preferred alternative plans. Thus, plan implementation could proceed once a decision on a final recommended plan is made.

The Commission will initiate the actions to be followed in this step by formally transmitting a copy of the report documenting the best express bus alternative and the best light rail alternative to the County Executive and the Milwaukee County Board of Supervisors. The Milwaukee County Board will be asked to take formal action endorsing one of the two recommended rapid transit plans. In deciding upon the final rapid transit plan for the corridor, Milwaukee County will need to consider carefully the preferences of the City of Milwaukee, whose cooperation will be essential if either plan is to be fully implemented, as well as the preferences of the state and federal officials concerned. Therefore, copies of the final plan report will also be sent by the Commission on behalf of the County to the Mayor and Common Council of the City of Milwaukee, to the Secretary of the Wisconsin Department of Transportation, and to each state and federal legislator with a constituency within the corridor. These bodies and officials will be asked to review the report and make their preferences known to county officials prior to county action on a final plan selection.

Plan Implementation Actions for Recommended Alternatives

In Chapter III of this report, a plan implementation program was provided indicating the specific actions required to be taken by each level, agency, and unit of government operating in the greater Milwaukee area if either of the rapid transit alternatives is to be fully implemented. The plan implementation recommendations outlined in Chapter III will not be repeated here. It is, however, important to recognize that the major responsibilities for implementation of either alternative plan will rest with three units of government: the City of Milwaukee, Milwaukee County, and the State of Wisconsin. The need for close coordination and cooperation among these units of government cannot be overemphasized. The adoption or endorsement of the recommended plan by these local units of government and by various state and federal agencies is highly desirable, and in some cases essential, in order to secure a common under-

standing of the rapid transit system development objectives, and to permit the necessary plan implementation work to be cooperatively programmed and jointly executed. Finally, it should be understood that the recommended rapid transit alternatives, as presented in this report, are intended to constitute flexible guides to the development of rapid transit facilities and services in the northwest corridor of Milwaukee County, and therefore should be subject to reappraisal over time and such amendment as is necessary or desirable.

CONCLUSION

During the course of the Milwaukee northwest corridor rapid transit study, a number of promising rapid transit alternatives utilizing both express bus and light rail transit technologies were examined in an effort to determine whether light rail or express bus transit improvements could best alleviate the existing transportation problems of northern Milwaukee County, and help meet the existing and probable future transportation needs of the County. The performance of each alternative considered was examined with regard to operating characteristics, ridership levels, capital and operating costs, cost-effectiveness, impacts on the environment, and community acceptance. Based upon the performance of the alternatives with respect to these considerations, one "best" express bus alternative and one "best" light rail alternative were selected. The identification of these alternatives as the preferred rapid transit alternatives for the northwest corridor of Milwaukee County was unanimously endorsed by the study Advisory Committee created by the Milwaukee County Executive and composed of elected and appointed public officials representing the local, county, state, and federal levels of government, as well as knowledgeable and concerned citizens. The study Advisory Committee, however, chose not to recommend the implementation of one alternative over the other.

The dual plan recommendation of the Advisory Committee places the responsibility for the selection of a final rapid transit plan for the corridor with the state, county, and local elected officials concerned. If only the direct costs and benefits of each of the preferred alternatives are considered, then the express bus alternative will be selected for adoption and implementation. The express bus alternative would have significantly lower capital costs, would result in a savings in annual transit operating expenses, and would have a greater

reduction in annual transit operating deficits within the corridor than the recommended light rail alternative.

The selection and adoption of the light rail alternative would have to be based upon its potential intangible benefits, including impacts on land development and redevelopment. The light rail alternative may be expected to be one of a number of factors potentially reinforcing downtown revitalization efforts, helping to stabilize mid-corridor neighborhoods, and encouraging more concentrated land use development in the far northwest portion of the corridor. Very few opportunities are available to stimulate development in the outlying and downtown areas of the City while, at the same time, revitalizing and maintaining the attractiveness of central city neighborhoods. Accordingly, the significance of these potentially positive impacts should not be overlooked in deciding between the two plans. The development that would be stimulated along the light rail line would not represent new activity in the Milwaukee area, but rather development that would have occurred anyway within the Milwaukee area, but perhaps not within the corridor or the City of Milwaukee.

Regardless of which alternative is ultimately selected as the final rapid transit plan for the

Milwaukee northwest corridor, that plan will provide a sound basis for the development of rapid transit services and facilities within the corridor. Both the recommended express bus and light rail alternatives represent a significant improvement in transit service within the corridor when compared with the alternative of maintaining the existing transit system, and both alternatives may be expected to result in substantial increases in transit service and ridership levels over existing levels within the corridor.

On October 1, 1987, the Milwaukee County Board of Supervisors acted to adopt this report, and the Committee-identified best express bus and light rail alternatives; and further to specifically endorse the first stage of the best express bus alternative for implementation, with the option for implementation of the best light rail alternative not to be foreclosed, but postponed until unfolding events warrant its implementation. In response to this action by the County and a request from the Urban Mass Transportation Administration, the Advisory Committee directed the Commission staff not to seek UMTA approval of the environmental assessment report, as such approval was not necessary to the funding of the express bus plan, and not to hold further public hearings on the report.

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APPENDICES

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Appendix A

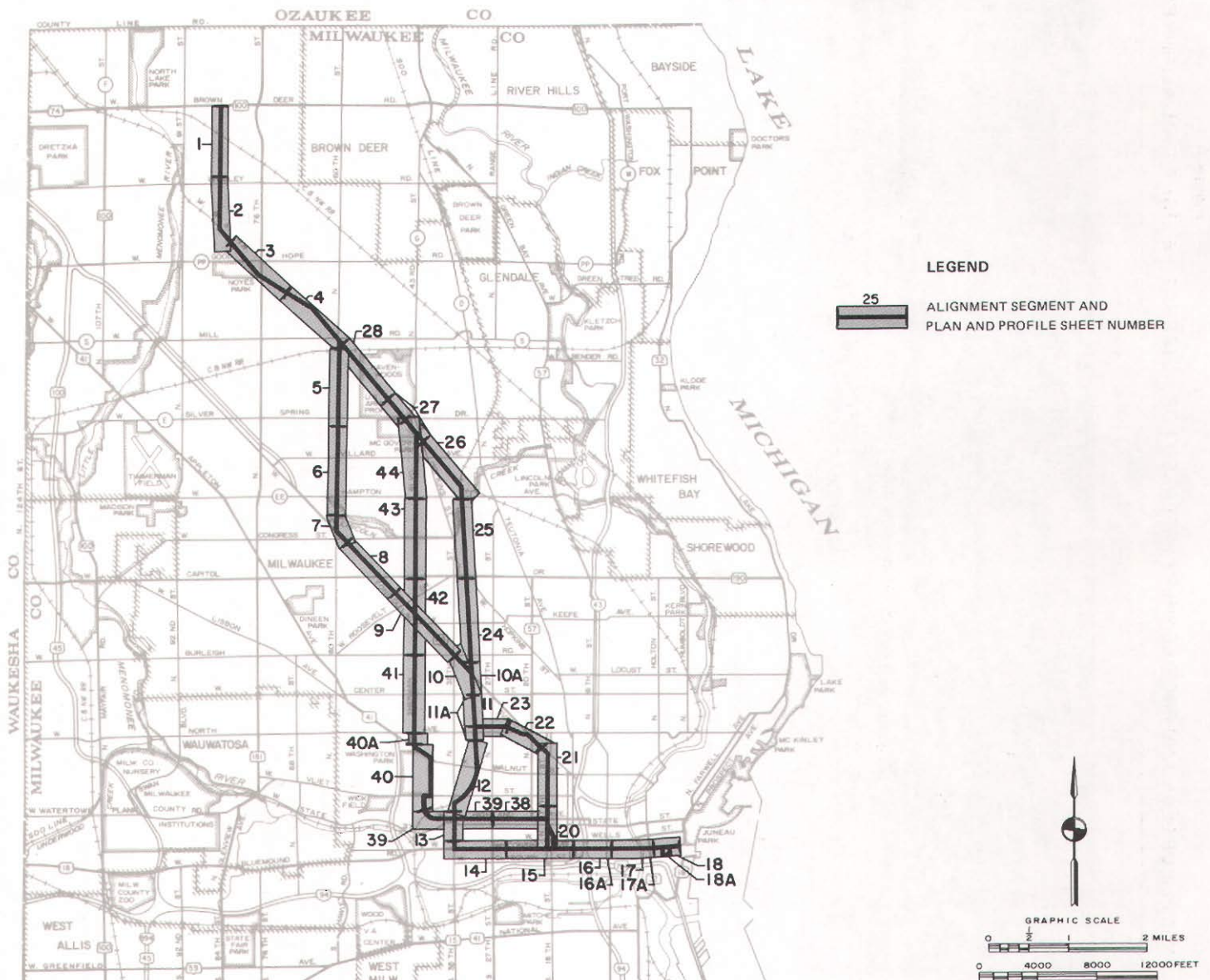
PLANS AND PROFILES FOR LIGHT RAIL ALTERNATIVES

As part of the Milwaukee northwest corridor rapid transit study, plans and profiles were prepared by the consulting firm of Parsons Brinckerhoff Quade & Douglas, Inc., showing the horizontal and vertical alignments of the light rail guideway as proposed under each light rail alternative. In total, 40 plan and profile sheets were prepared to provide complete coverage of the alternative light rail alignments, as shown on Map A-1. For the portion of the light rail alignments located outside the Milwaukee central business district, the plans were prepared on Regional Planning Commission ratioed and rectified aerial photographs having a scale of 1 inch equals 200 feet, with profiles having a vertical scale of 1 inch equals 20 feet. In the Milwaukee central business district, the plans were prepared on Regional Planning Commission topographic maps at a scale of 1 inch equals 100 feet, with the attendant profiles having a vertical scale of 1 inch equals 10 feet.

An example of each type of plan and profile prepared under the study is shown at a reduced scale in Figures A-1 and A-2. The complete set of full-size plan and profile drawings has been published by the Regional Planning Commission in a separate document entitled, Milwaukee Northwest Corridor Rapid Transit Study, Plans and Profiles for Light Rail Alternatives, January 1988.

Map A-1

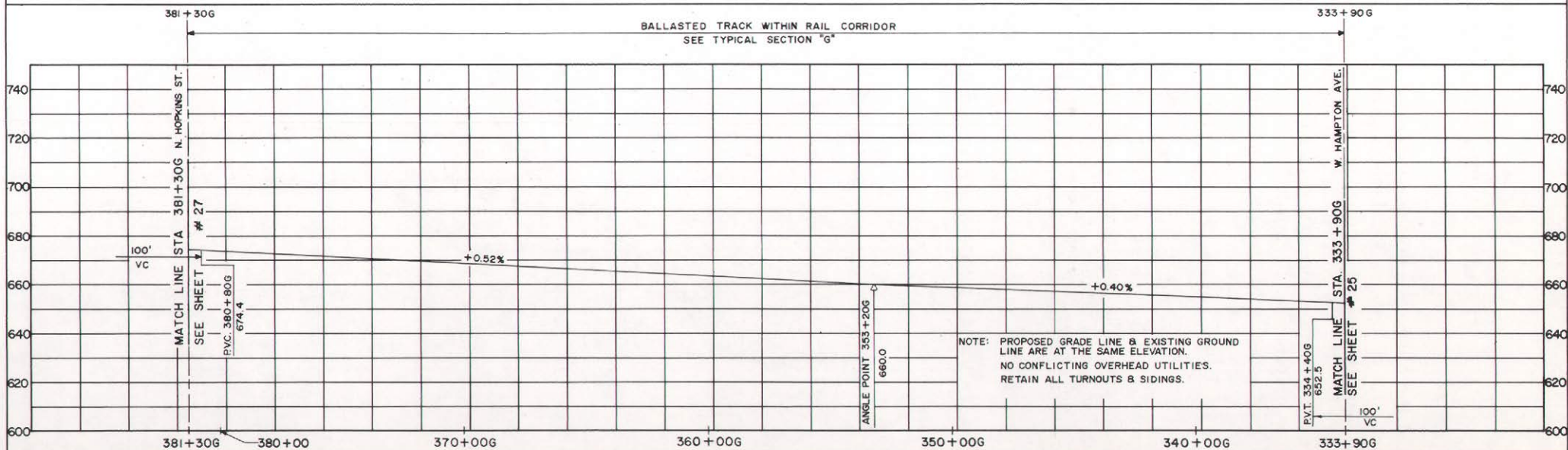
COVERAGE OF PLAN AND PROFILE DRAWINGS PREPARED FOR ALTERNATIVE LIGHT RAIL ALIGNMENTS



Source: Parsons Brinckerhoff Quade and Douglas, Inc., and SEWRPC.

Figure A-1

EXAMPLE OF PLAN AND PROFILE SHEET PREPARED FOR ALTERNATIVE LIGHT RAIL ALIGNMENTS OUTSIDE THE MILWAUKEE CENTRAL BUSINESS DISTRICT



**Milwaukee Northwest Corridor
Rapid Transit Study**

A cooperative effort of the
Southeastern Wisconsin Regional Planning Commission
Milwaukee County
Wisconsin Department of Transportation

Assisted by:
Parsons Brinckerhoff Quade & Douglas, Inc.

In association with:
Barton-Archman Associates, Inc.
Madison Hudson International
Robert J. Harmon & Associates, Inc.
Real Estate Research Corporation

Planning & Design Partnership
Community Design Center, Inc.
L. L. Brown

The preparation of this drawing was financed
through a joint planning grant from the U.S. Department
of Transportation, Urban Mass Transportation
Administration; the U.S. Department of Housing and
Urban Development; the Wisconsin Department of
Transportation and Milwaukee County.

Scale

Horizontal

Vertical

MILWAUKEE NORTHWEST CORRIDOR ALTERNATIVES ANALYSIS

ALTERNATIVE 3C, & 3D OPTION C1 (CENTRAL) & C3 (CENTRAL)

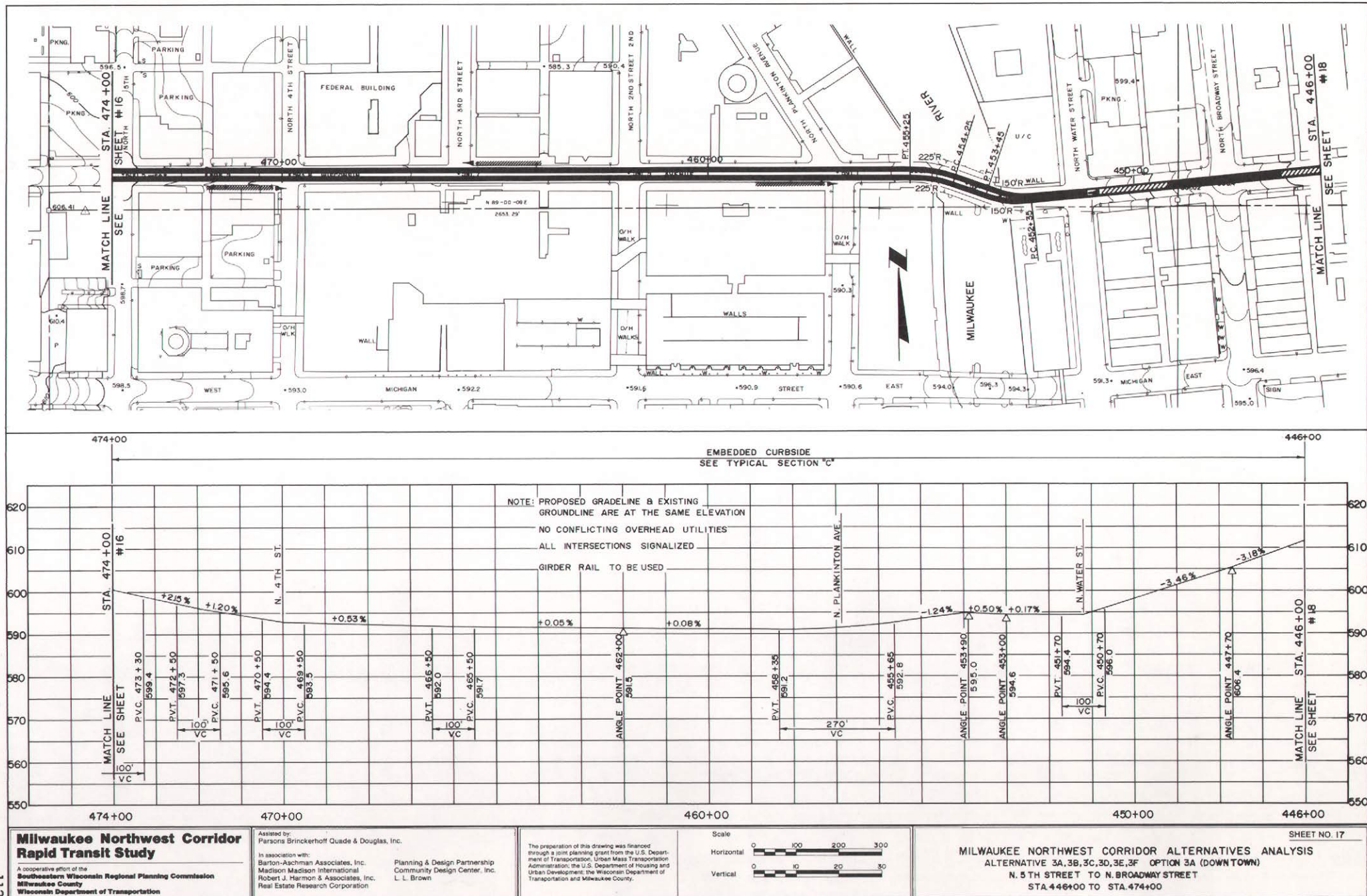
W. HAMPTON AVE. TO W. CUSTER AVE.

STA. 333+90 G TO STA. 381+30 G

SHEET NO. 26

Figure A-2

EXAMPLE OF PLAN AND PROFILE SHEET PREPARED FOR ALTERNATIVE LIGHT RAIL ALIGNMENTS WITHIN THE MILWAUKEE CENTRAL BUSINESS DISTRICT



Source: Parsons Brinckerhoff Quade and Douglas, Inc., and SEWRPC.

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