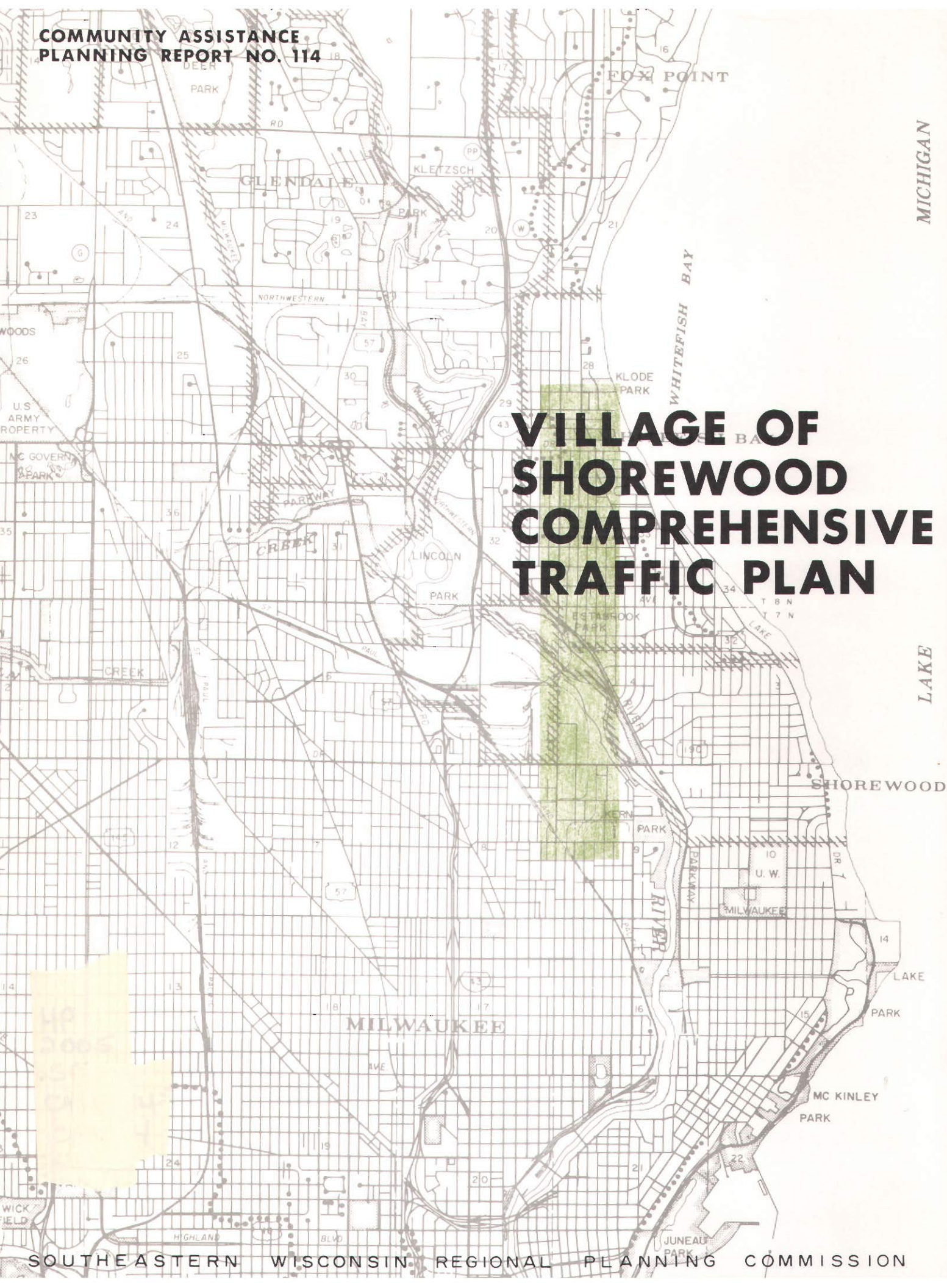
COMMUNITY ASSISTANCE
PLANNING REPORT NO. 114

VILLAGE OF SHOREWOOD COMPREHENSIVE TRAFFIC PLAN



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COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 114

VILLAGE OF SHOREWOOD
COMPREHENSIVE TRAFFIC PLAN

Milwaukee County, Wisconsin

Prepared by the

Southeastern Wisconsin Regional Planning Commission
P. O. Box 769
Old Courthouse
916 N. East Avenue
Waukesha, Wisconsin 53187-1607

The preparation of this report was financed in part through a joint planning grant from the Wisconsin Department of Transportation and the U. S. Department of Transportation, Federal Highway and Urban Mass Transportation Administrations.

September 1984

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SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

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September 1, 1984

Mr. John J. Mann, President
and Members of the Board of
Trustees of the Village of Shorewood
3930 N. Murray Avenue
Shorewood, Wisconsin 53211

Dear Mr. Mann:

In January 1984, at the request of the Board of Trustees of the Village of Shorewood, the Regional Planning Commission undertook a comprehensive traffic study looking to the abatement of traffic and safety problems existing in the Village. A citizen Task Force was created by the Village to work with the Commission staff in the development of actions to increase the operating efficiency and safety of the existing arterial street and highway system and reduce through traffic and increase traffic safety on the local streets of the Village, particularly in residential neighborhoods.

The Task Force and Commission staff have now completed the requested study, and are pleased to provide to you herewith this report setting forth a comprehensive traffic plan for the Village of Shorewood. The plan is based upon a careful inventory of the existing street and highway characteristics and operating conditions in the Village; an analysis of those conditions to identify existing traffic problems; consideration of alternative traffic control measures to solve or mitigate the identified problems; and the identification and recommendation for adoption of the best measures from the alternatives considered. The plan includes a set of criteria that can be used by village officials to evaluate and address future resident requests for the implementation of traffic control measures on the street and highway system of the Village.

The findings and recommendations of this report are the result of an intensive study by the citizen Task Force and the Commission staff. The Task Force unanimously recommends the timely adoption and implementation of the plan presented in this report. Such adoption and implementation would, in the opinion of the Task Force, abate existing traffic problems and enhance the overall environmental quality of the Village.

This report and plan are respectfully submitted on behalf of the Task Force for your consideration and action. The Task Force and the Commission staff stand ready to meet with the Board of Trustees, should the Board so desire, to discuss the findings and recommendations of the study and, should the plan be adopted as recommended, to assist the Village in its implementation over time.

Sincerely,

Kurt W. Bauer
Executive Director

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Chapter I

INTRODUCTION

The Village of Shorewood, Wisconsin, located between Lake Michigan and the Milwaukee River in northeast Milwaukee County, has been experiencing what many residents and elected officials perceive to be an excessively high volume of through traffic on land access streets in residential neighborhoods of the Village. This problem is attributed, in part, to the Village's location adjacent to the campus of the University of Wisconsin-Milwaukee, which is the second largest trip generator in southeastern Wisconsin, and to its location between the Milwaukee central business district, the largest trip generator in southeastern Wisconsin, and the suburban communities located along the Lake Michigan shoreline in northeast Milwaukee County.

To help resolve this perceived land use and traffic flow problem, village officials on September 6, 1983, requested the Southeastern Wisconsin Regional Planning Commission to conduct a comprehensive traffic management study of the Village. The study was intended to identify the traffic problems existing in the Village and recommend actions to abate those problems. More specifically, the study was to consider a range of alternative traffic control measures to provide a better balance between traffic flow on residential streets and on arterial streets; and was to provide a set of guidelines designed to assist the responsible public officials in addressing future requests for traffic control devices and regulations.

On January 6, 1984, the Village Board appointed a 15-member citizen Task Force to guide the Regional Planning Commission staff in the conduct of the traffic study. The membership of that Task Force is listed in Appendix A. The Task Force identified perceived traffic problems in the Village, reviewed and evaluated alternative solutions to those problems, and approved the findings and recommendations of the study as set forth in this report.

STUDY AREA

The Village of Shorewood is located in northeastern Milwaukee County along the Lake Michigan shoreline, approximately four miles north of the Milwaukee central business district. The geographic area covered in this study includes all of the 1.50-square-mile area within the corporate boundaries of the Village of Shorewood (see Map 1). The central business district of the Village is situated along N. Oakland Avenue, a principal north-south arterial, just north of its intersection with E. Capitol Drive (STH 190), a principal east-west arterial. Land use in the Village of Shorewood is predominantly residential, with commercial development located adjacent to N. Oakland Avenue and E. Capitol Drive. The Milwaukee River flows along the western boundary of the Village, with only E. Capitol Drive providing direct east-west arterial service across the river to the Village.

In 1980, the resident population of the Village of Shorewood was estimated at 14,327 persons. This was about 1,249 persons, or 8 percent, less than the 1970 population. As of January 1, 1984, the transportation system in the Village

Map 1

SHOREWOOD TRAFFIC MANAGEMENT STUDY AREA

Source: SEWRPC.

consisted of 27.80 miles of streets and highways. The Village of Shorewood is served by the Milwaukee County Transit System, with general public service seven days a week.

FORMAT OF REPORT PRESENTATION

This report consists of six chapters. This first chapter provides essential information on the organization of the study. Chapter II, "Existing Street and Highway System," describes the existing street and highway system in the Village. Chapter III, "Existing Traffic Conditions," describes the operating characteristics of the existing street and highway system in the Village. This chapter also contains an analysis of vehicular trip origins and destinations, an analysis of existing traffic volumes and movements, and data on average vehicle speeds and delay, motor vehicle accidents, and the traffic problems identified by village residents. Chapter IV, "Traffic Management Control Criteria," sets forth a set of traffic operating and highway system criteria and warrants recommended to be used to identify traffic problems within the Village of Shorewood, to evaluate alternative traffic management actions to abate those problems, and to serve as guidelines for village officials in addressing future requests for traffic management measures. Chapter V, "Analysis and Recommendations," provides an analysis of alternative traffic management actions, and recommends adoption and implementation of the set of actions judged to most effectively abate the traffic problems of the Village. Chapter VI, "Summary and Conclusions," provides a summary of the significant findings and recommendations of the comprehensive traffic study.

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Chapter II

EXISTING STREET AND HIGHWAY SYSTEM

INTRODUCTION

The sound formulation of a traffic management plan requires that definitive data be obtained on the location, configuration, and capacity of the existing street and highway system and on those factors which directly affect the operation of that system. These factors include street and highway functional and jurisdictional classification; the physical characteristics of each of the facilities comprising the total system; the traffic control measures which affect the traffic-carrying capacity of, and traffic flow on, that system; and the major land uses and traffic generators that create the traffic demand on the system.

EXISTING STREET AND HIGHWAY SYSTEM CLASSIFICATION

The total street and highway system of a community must serve several important local and regional functions. It must provide for the free movement of traffic and for access of this traffic to the various land uses within and surrounding the community.

Functional Classification

Because the street and highway system must serve several functions, and because two of these functions--traffic movement and land access--are basically incompatible, street and highway system design must be based upon a functional grouping of streets and highways. The individual facilities comprising the total street and highway system of a community may be classified on the basis of the primary function served, ranging from facilitating a high degree of travel mobility while providing limited access to adjacent land uses, to providing a low degree of travel mobility while providing a high degree of access to adjacent land uses. From a transportation planning standpoint, at least three functional classifications of streets and highways should be recognized: 1) arterial streets; 2) collector streets; and 3) land access streets. Arterials are defined as streets and highways which are intended to serve the through movement of fast or heavy traffic, providing transportation service between major subareas of the Region or through the Region. Together, the arterials should form an integrated, areawide system, located and designed to properly carry the imposed traffic loadings. The primary function of these facilities should be to facilitate the expeditious movement of vehicular traffic. Access to abutting property may be a secondary function of some types of arterial streets and highways, but it should always be subordinate to the primary function of traffic movement.

Collector streets are defined as streets and highways which are intended to serve primarily as connections between the arterial system and the local street system. In addition to collecting and distributing traffic from and to the minor streets, the collector streets usually provide a secondary function of

providing access to abutting property. Local, minor, or land access streets are defined as streets and highways which are intended to serve primarily as a means of access to abutting property.

The arterial system for the Village of Shorewood identified by the Regional Planning Commission through application of the foregoing functional classification concepts is shown on Map 2. This identification involved consideration of the existing and proposed land uses to be served, facility design and spacing, and current and probable future traffic volumes and trip lengths. The Wisconsin Department of Transportation has adopted a national functional highway classification system developed by the U. S. Department of Transportation, Federal Highway Administration, which, based primarily on existing traffic volumes, functionally classifies each street and highway into one of five major types: principal arterial, minor arterial, major collector, minor collector, and local. This classification system, as shown on Map 3, is used by the Wisconsin Department of Transportation for the annual allocation of highway aid monies to the Village of Shorewood. The relationship between the functional classification system developed by the Regional Planning Commission which classifies each street and highway according to the function which should be served, and the classification system used by the Wisconsin Department of Transportation which classifies each street and highway according to the function currently served, can be understood by comparing Maps 2 and 3. As already noted, the Commission's functional classification is based upon the design of each street and its relationship to the existing and proposed land use pattern and to the rest of the street and highway system. The Wisconsin Department of Transportation's functional classification is based primarily upon the traffic volumes presently carried by each street. Differences between these two classifications in the Village--for example, E. Menlo and N. Morris Boulevards between N. Oakland Avenue and E. Capitol Drive being classified as a local street by the Commission and a minor arterial by the Wisconsin Department of Transportation--reflect the concerns of the Village over the current operation of the Village's street system and the reasons underlying the request for this study. Table 1 indicates the distribution of the street and highway system mileage in the Village of Shorewood, as identified by the Regional Planning Commission and the Wisconsin Department of Transportation.

Jurisdictional Classification

Streets and highways must be classified according to jurisdiction as well as function, such classification being particularly important to plan implementation. Jurisdictional classification establishes which level of government--state, county, or local--has or should have responsibility for the design, construction, maintenance, and operation of each segment of street and highway within a community. For the purpose of establishing jurisdictional responsibilities, and therefore participatory funding responsibilities, for the street and highway system in urban areas, arterial facilities within the corporate limits of a community are considered to be one of three types: state trunk highways, county trunk highways, or local trunk highways. A subcategory of state trunk highways is the connecting highway. Connecting highways are the marked and signed routes of state trunk highways leading into and through a village or city which provide for continuity of the state trunk highway through the municipality. The local community involved has, historically, been responsible for the maintenance of connecting highways.

Table 1

DISTRIBUTION OF STREET AND HIGHWAY SYSTEM MILEAGE BY FUNCTIONAL CLASSIFICATION IN THE VILLAGE OF SHOREWOOD TRAFFIC MANAGEMENT STUDY AREA: 1984

Functional Classification	Wisconsin Department of Transportation Classification for Aid Purposes		Southeastern Wisconsin Regional Planning Commission Classification According to Function	
	Miles	Percent	Miles	Percent
Principal Arterial.....	2.44	7.8	--	--
Minor Arterial.....	5.36	17.2	--	--
Total Arterial Streets.	7.80	25.0	6.30	20.0
Collector.....	3.36	10.8	--	--
Land Access.....	19.98	64.2	--	--
Total Local Streets	23.34	75.0	24.84	80.0
Total	31.14	100.0	31.14	100.0

Source: Wisconsin Department of Transportation and SEWRPC.

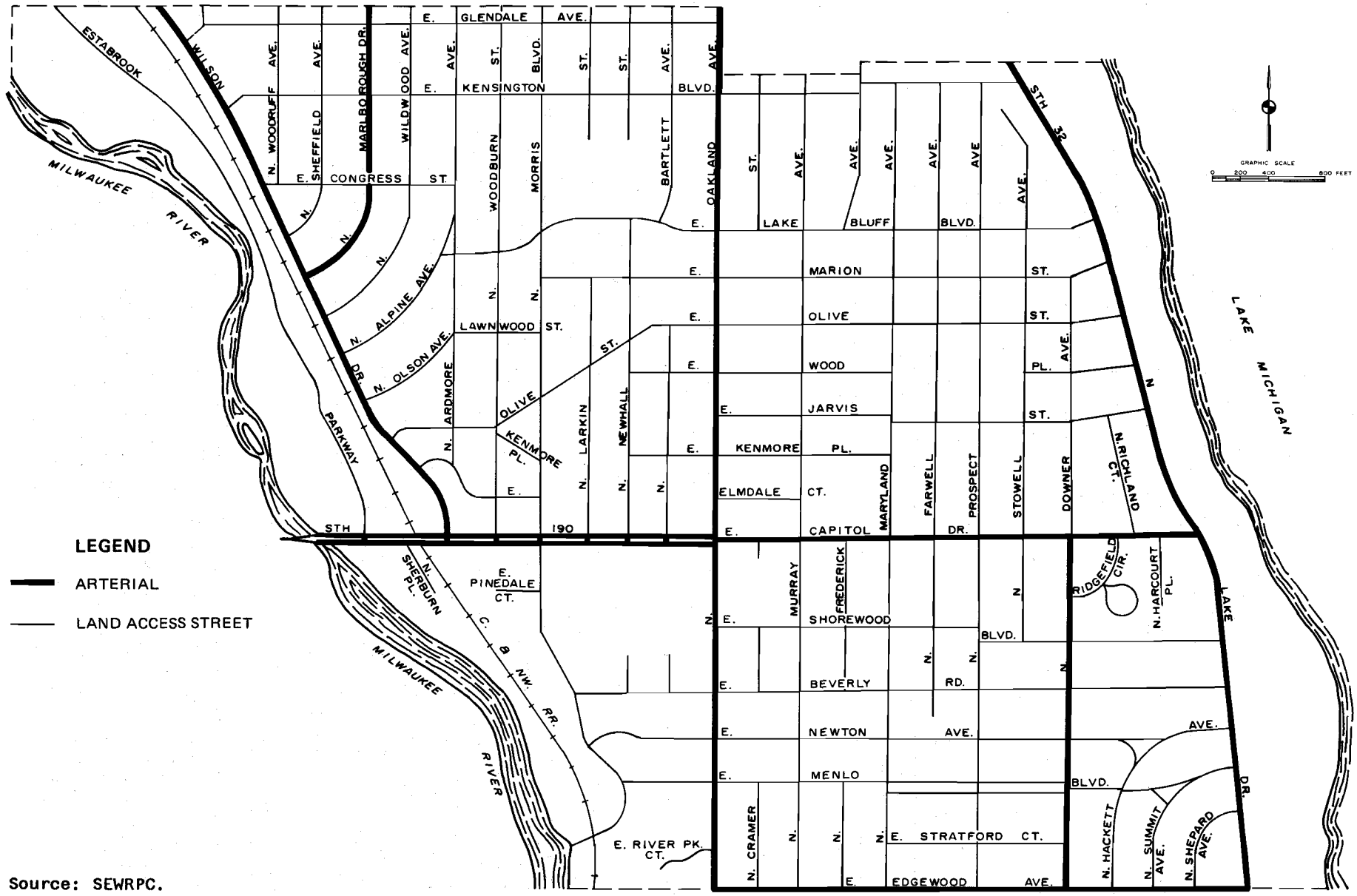
Map 4 shows the jurisdictional classification of the streets and highways in the Village of Shorewood. Of the total 31.14 miles of streets and highways in the Village, 2.44 miles, or 8 percent, are classified as connecting highways; 0.90 mile, or 3 percent, are classified as county-maintained park road; and 27.80 miles, or 89 percent, are classified as local streets and highways. The Village has primary jurisdictional responsibility for all connecting highways and for all local streets and highways within its corporate limits. Since the connecting highways are intended to provide continuity on the state trunk highway system, the State provides financial aids to the Village for the maintenance and operation of these facilities in a manner consistent with their functional classification as arterials. Therefore, while the Village has primary jurisdictional responsibility for the connecting highways, that jurisdiction is exercised under the aegis of the Wisconsin Department of Transportation. Accordingly, the approval of the state agency is required before any action can be taken by the Village which would substantially alter the use or capacity of a connecting highway. This would include the implementation of such traffic control measures as prohibiting turning movements, modifying traffic control devices, and changing intersection geometrics.

Other Street and Highway Systems

In addition, under its statutory authority the Village of Shorewood has designated, in the interest of public safety, a system of through streets as shown on Map 5. This through street system is comprised of the previously identified arterial and collector street system and selected land access streets within the Village. These streets are protected by arterial stop signs on cross streets or by traffic signals. This system has been identified to control vehicle conflicts and ensure the safe and efficient movement of vehicular traffic on the arterial and collector street system, as well as on the land access street system in the residential neighborhoods of the Village.

Map 2

ARTERIAL STREET AND HIGHWAY SYSTEM IN THE VILLAGE OF SHOREWOOD: 1984



LEGEND

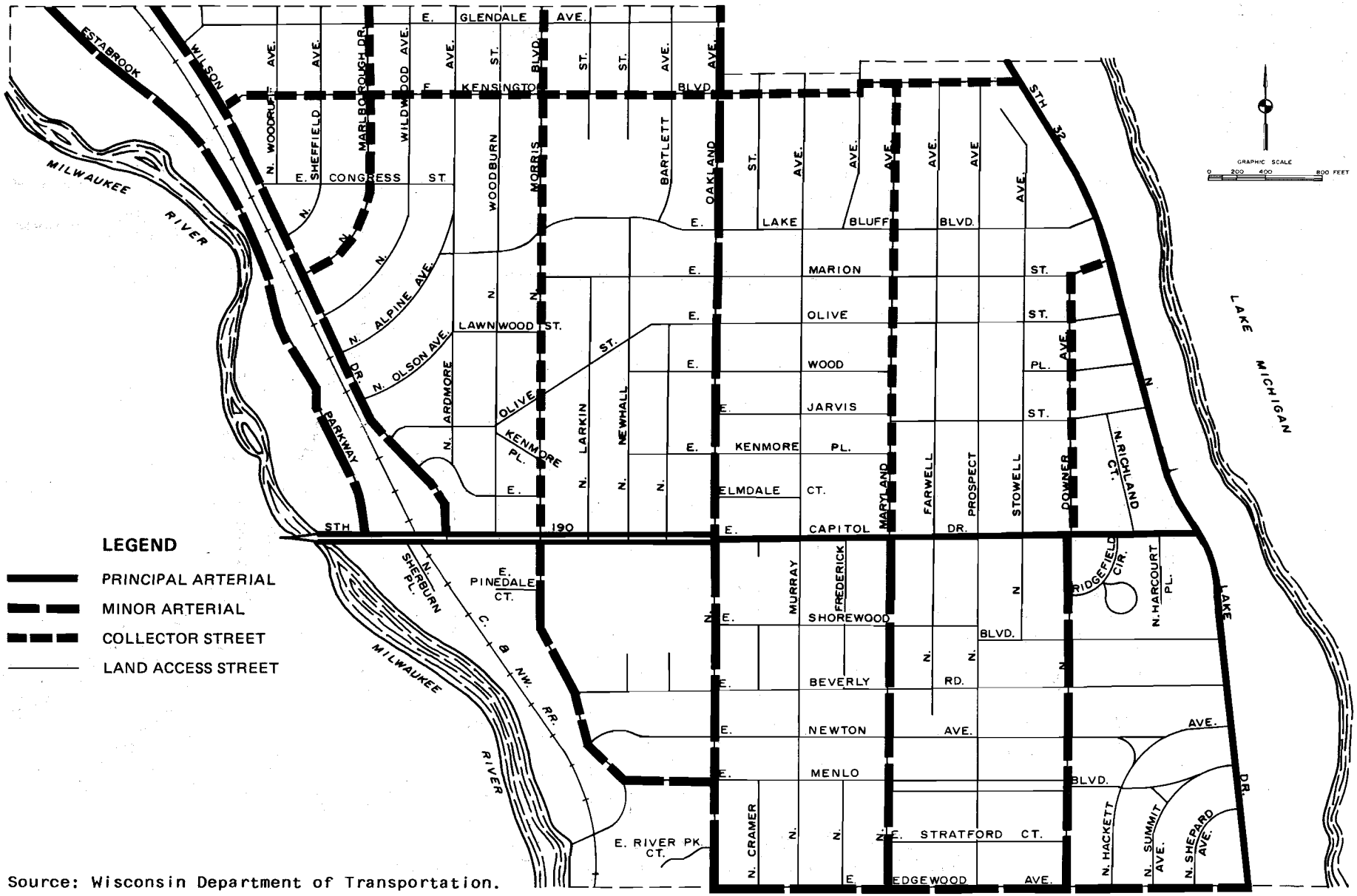
ARTERIAL

LAND ACCESS STREET

Source: SEWRPC.

Map 3

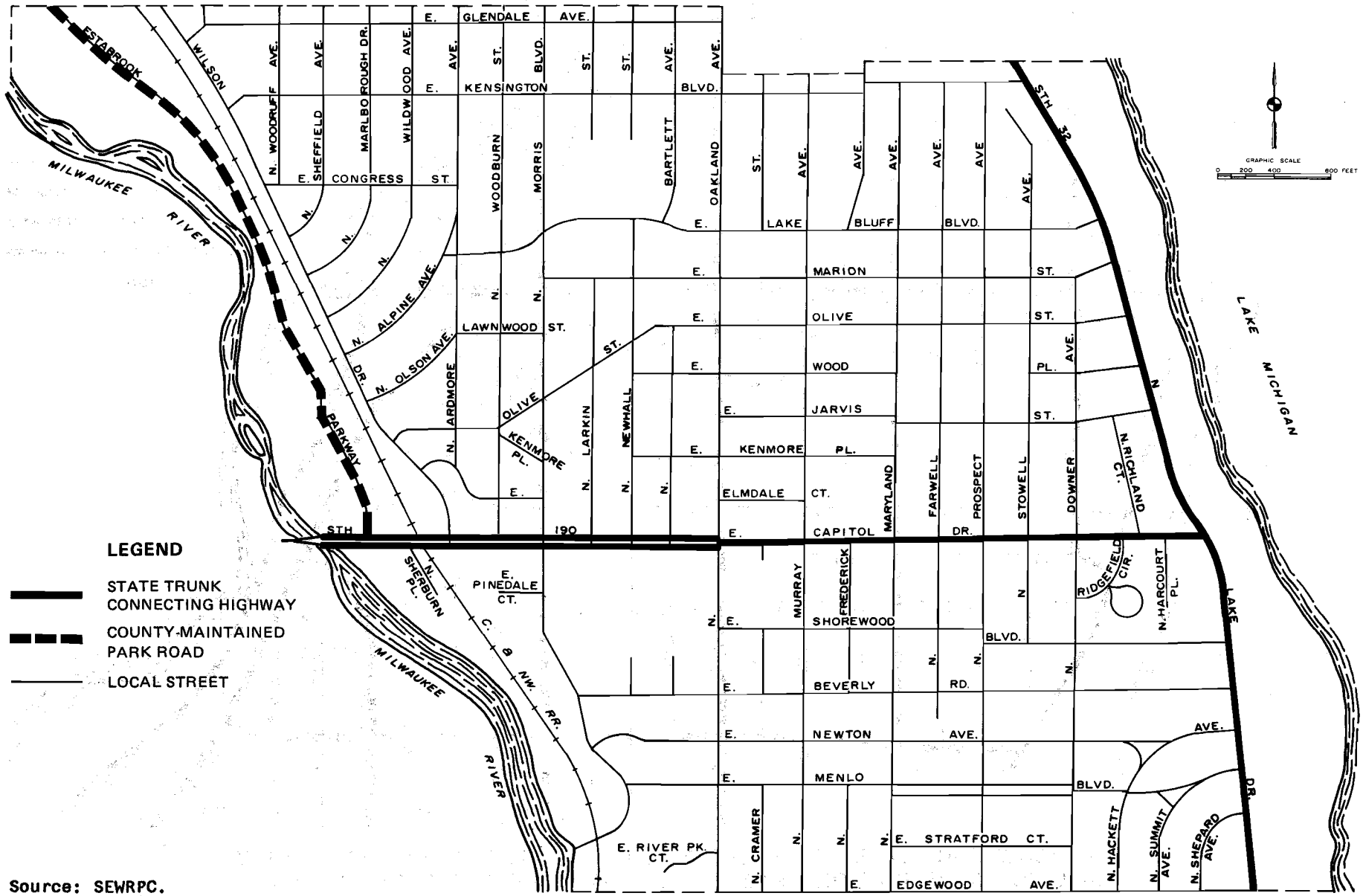
FUNCTIONAL CLASSIFICATION OF STREETS AND HIGHWAYS FOR THE PAYMENT OF STATE HIGHWAY AIDS IN THE VILLAGE OF SHOREWOOD: 1984



Source: Wisconsin Department of Transportation.

Map 4

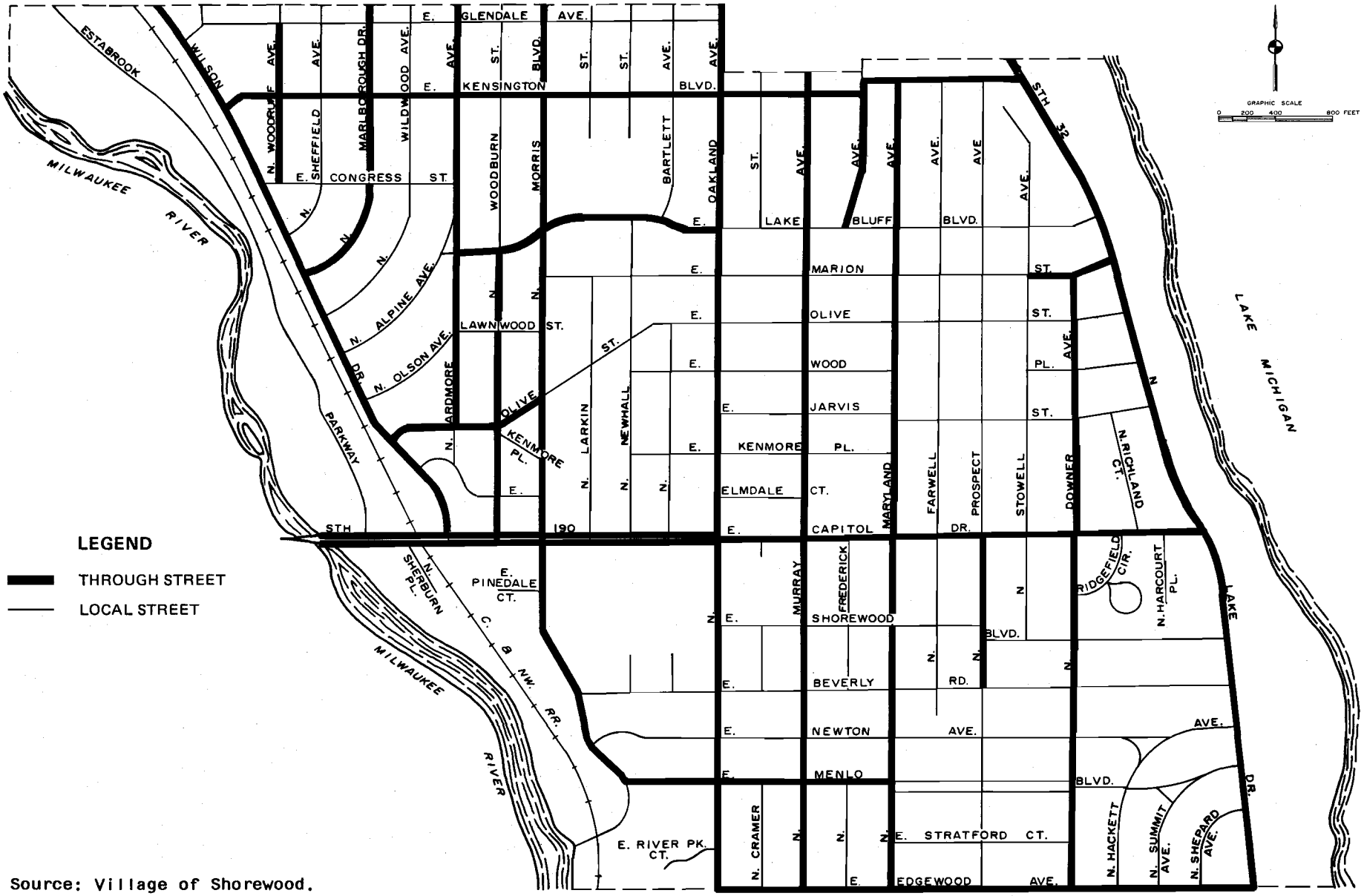
JURISDICTIONAL SYSTEM OF STREETS AND HIGHWAYS IN THE VILLAGE OF SHOREWOOD: 1984



Source: SEWRPC.

Map 5

THROUGH STREET SYSTEM IN THE VILLAGE OF SHOREWOOD: 1984



Source: Village of Shorewood.

Two other roadway systems important to transportation service exist in the Village. Fire and police emergency vehicles garaged at the Village Hall use the emergency vehicle route system shown on Map 6, and the Milwaukee County Transit System uses the bus route system shown on Map 7. A total of 64 bus stops are located in the Village. These two systems operate on the streets and highways within the Village and are an important and necessary transportation amenity to village residents.

Physical Characteristics of the Existing Street and Highway System

The physical characteristics of a street and highway system determine the volume of traffic a facility can efficiently accommodate and, thus, are of major importance in the development of traffic management actions. These characteristics include right-of-way width, pavement width, on-street parking conditions, and operation as a one- or two-way facility.

The right-of-way and pavement widths for each section of street and highway within the Village are shown in Appendix B. Minor roadway reconstruction of these roadways such as providing cul-de-sacs, narrowings, and channelization may be considered to be alternative traffic management actions.

As shown on Map 8, on-street curb parking is permitted on almost all streets and highways in the Village. On-street one- and two-hour parking restrictions are in effect in parts of the Village, particularly in the southeastern quarter of the Village where a high parking demand is generated by traffic destined for the University of Wisconsin-Milwaukee. Two residential parking districts have been designated for this area of the Village, as shown on Map 8. A residential parking district restricts on-street parking to no more than two hours unless the vehicle displays a permit issued by the Village to persons who reside in the area. The Village Board has the statutory authority to establish parking districts when the average number of commuter vehicles parking in a residential area exceeds 25 percent of the parking spaces in that area, and the total number of parking spaces occupied by any vehicles exceeds 65 percent of the spaces available in that area. In addition to these one- and two-hour restrictions, many of the land access streets located east of N. Oakland Avenue have no-parking-at-any-time restrictions imposed on one side of the street, as shown on Map 8. The segment of E. Elmdale Court between N. Oakland Avenue and N. Murray Avenue is the only designated one-way street in the Village.

TRAFFIC CONTROL MEASURES ON THE EXISTING STREET AND HIGHWAY SYSTEM

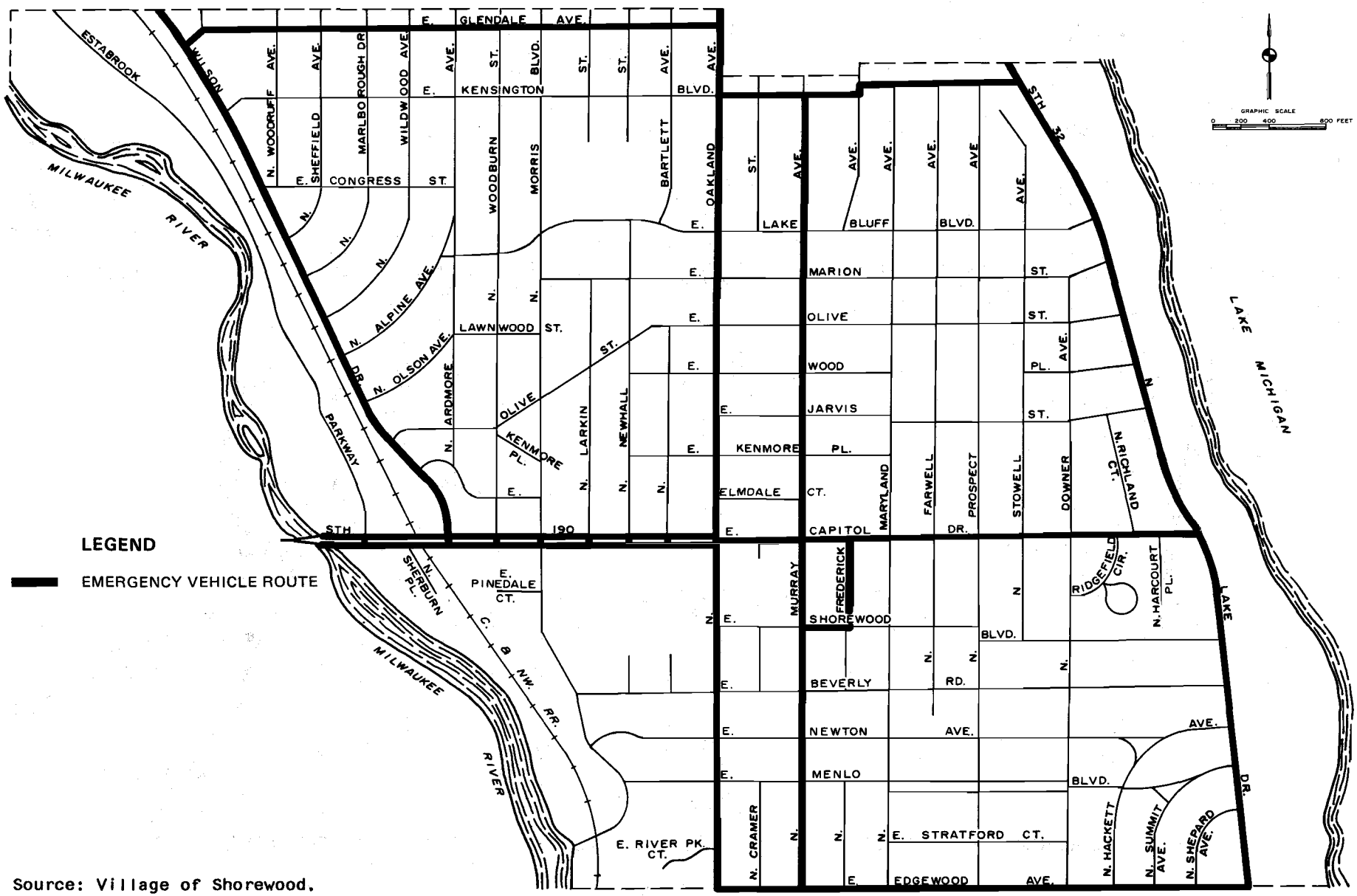
Traffic control measures have a direct effect on the capacity, operating characteristics, and safety of a roadway facility. The principal traffic control measures that must be inventoried as part of any traffic management planning effort include traffic signals and signs, school crossing protection devices, turn prohibitions, and posted speed limit restrictions.

Signals

In 1984 there were 10 traffic signals in operation in the Village of Shorewood. Table 2 indicates the location, phasing, timing, and total cycle length for each of these signals. These traffic signal cycle lengths vary between 60 and

Map 6

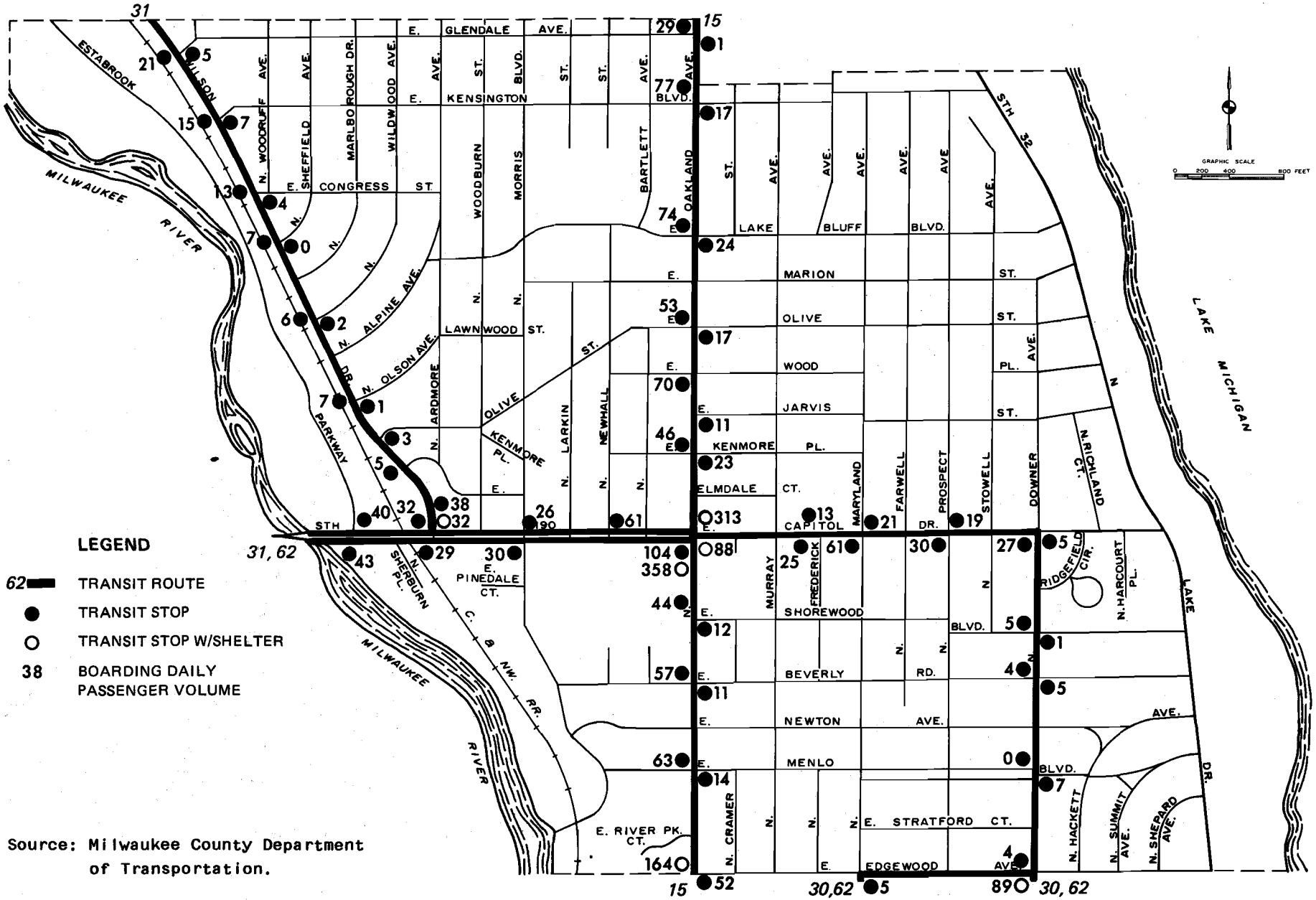
EMERGENCY VEHICLE ROUTES IN THE VILLAGE OF SHOREWOOD: 1984



Source: Village of Shorewood.

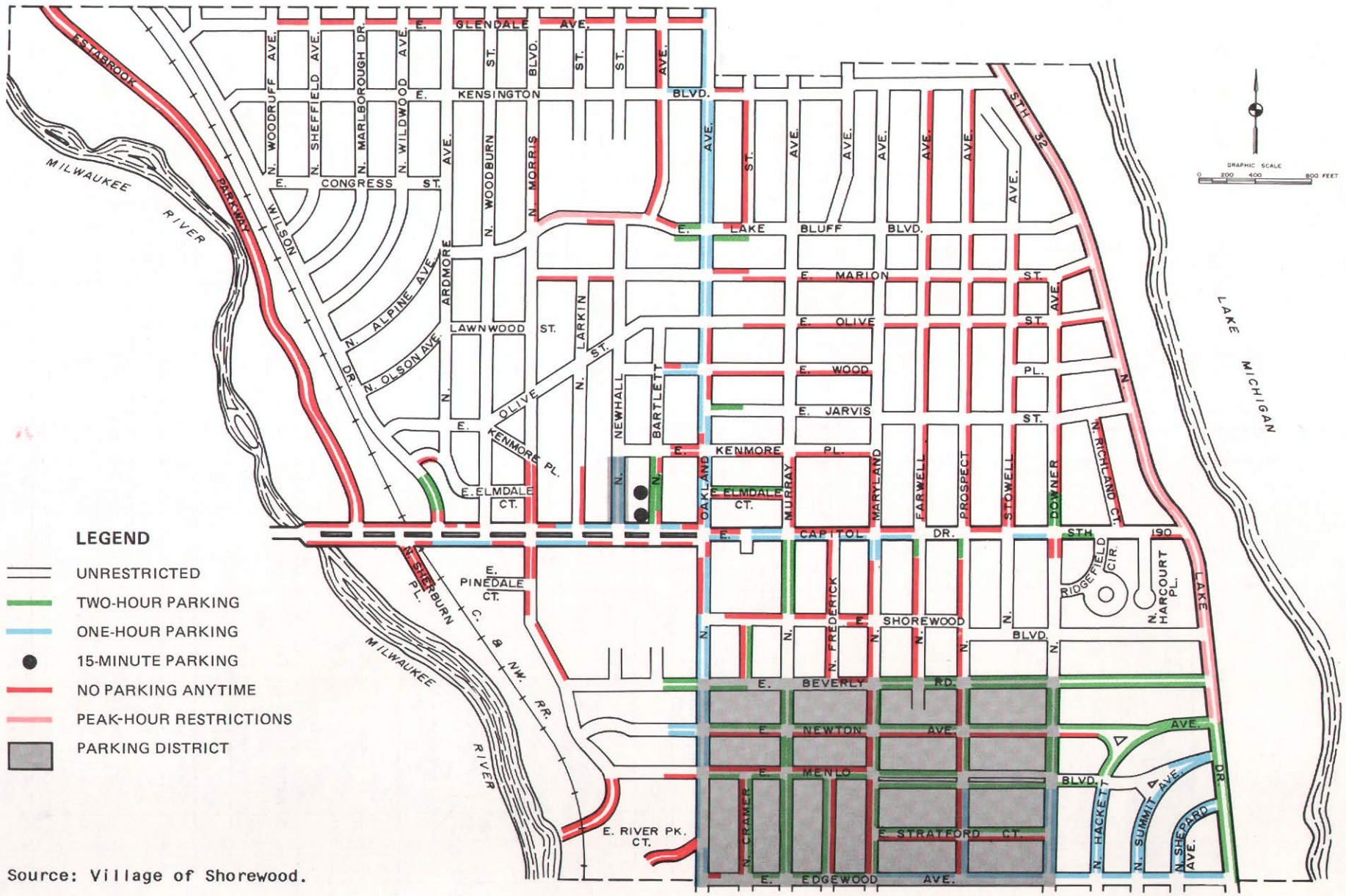
Map 7

MILWAUKEE COUNTY TRANSIT SYSTEM ROUTES IN THE VILLAGE OF SHOREWOOD: 1984



Map 8

ON-STREET PARKING RESTRICTIONS IN THE VILLAGE OF SHOREWOOD: 1984



Source: Village of Shorewood.

Table 2

TRAFFIC SIGNAL OPERATION IN THE VILLAGE OF SHOREWOOD: 1984

Phase	Intersection Time (seconds)		
	E. Capitol Drive		
	Eastbound	Westbound	N. Wilson Street
Green	55.8	43.2	23.4
Yellow	3.6	3.6	3.6
Red	30.6	43.2	63.0
Leading Left Arrow	9.9	--	--
Yellow Arrow	2.7	--	--
Leading Right Turn	--	25.2	--
Yellow Arrow	--	3.6	--
Total Cycle	90.0	90.0	90.0

Phase	Intersection Time (seconds)		
	E. Capitol Drive	N. Morris Boulevard	
		Northbound	Southbound
Green	52.2	27.0	23.4
Yellow	3.6	3.6	3.6
Red	34.2	59.4	63.0
Total Cycle	90.0	90.0	90.0

Phase	Intersection Time (seconds)			
	E. Capitol Drive		N. Oakland Avenue	
	Eastbound	Westbound	Northbound	Southbound
Green	38.0	28.0	50.0	24.0
Yellow	4.0	4.0	4.0	4.0
Red	58.0	68.0	46.0	72.0
Leading Left Arrow	7.0	--	23.0	--
Yellow Arrow	3.0	--	3.0	--
Total Cycle	100.0	100.0	100.0	100.0

Phase	Intersection Time (seconds)	
	E. Capitol Drive	N. Maryland Avenue
Green	24.6	24.6
Yellow	3.6	3.6
Red	31.8	31.8
Total Cycle	60.0	60.0

Phase	Intersection Time (seconds)	
	E. Capitol Drive	N. Downer Avenue
Green	21.0	22.2
Yellow	6.0	4.8
Red	33.0	33.0
Total Cycle	60.0	60.0

Table 2 (continued)

Phase	Intersection Time (seconds)		
	E. Capitol Drive	N. Lake Drive	
		Northbound	Southbound
Green.....	24.3	51.3	42.3
Yellow.....	4.5	4.5	4.5
Red.....	61.2	34.2	43.2
Leading Left Arrow....	--	6.3	--
Yellow Arrow.....	--	2.7	--
Total Cycle	90.0	90.0	90.0

Phase	Intersection Time (seconds)	
	N. Oakland Avenue	E. Edgewood Avenue
Green.....	31.2	19.2
Yellow.....	3.6	3.6
Red.....	25.2	36.0
Total Cycle	60.0	60.0

Phase	Intersection Time (seconds)	
	N. Oakland Avenue	E. Menlo Boulevard
Green.....	33.6	16.8
Yellow.....	3.6	3.6
Red.....	22.8	39.6
Total Cycle	60.0	60.0

Phase	Intersection Time (seconds)	
	N. Oakland Avenue	N. Shorewood Boulevard
Green.....	70.0	18.0
Yellow.....	4.0	4.0
Red.....	26.0	78.0
Total Cycle	100.0	100.0

Phase	Intersection Time (seconds)	
	N. Oakland Avenue	E. Lake Bluff Boulevard
Green.....	30.0	18.0
Yellow.....	3.0	3.0
Red.....	27.0	39.0
Total Cycle	60.0	60.0

Source: Village of Shorewood and SEWRPC.

100 seconds. In addition to these signals, the Village makes extensive use of stop signs. Map 9 shows the location of the 10 existing traffic signals and 252 stop signs in the Village of Shorewood. In addition to these traffic controls, the Village of Shorewood has 35 yield signs controlling traffic at selected intersections, as shown on Map 9.

Turn Restrictions at Intersections

As shown on Map 9, right turns and left turns are prohibited at selected intersections in the Village to control traffic conflicts and in some cases to discourage through traffic on residential streets. These turn prohibitions are located on E. Capitol Drive and along N. Oakland Avenue.

Speed Limits

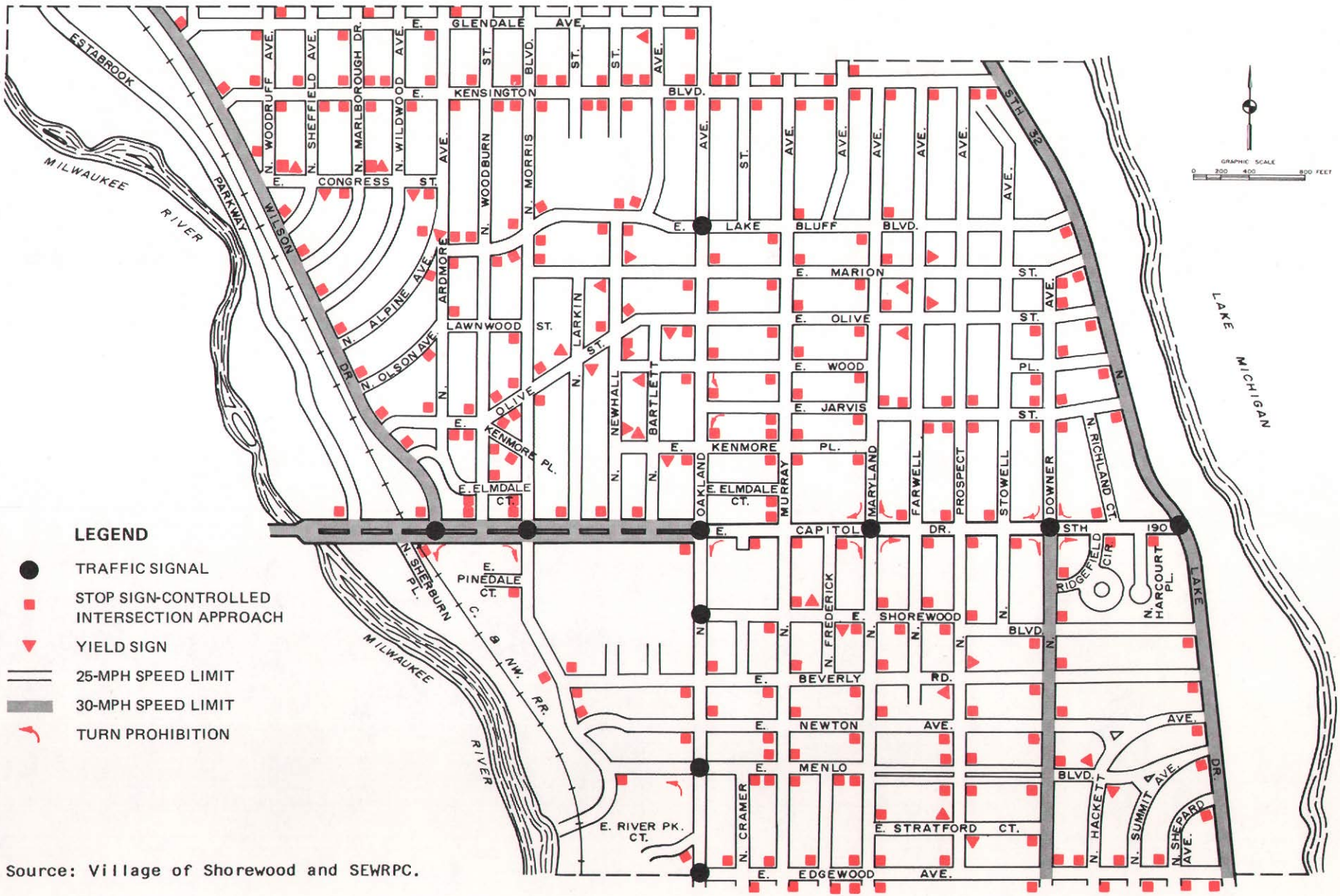
All streets and highways in the Village are posted for 25 miles per hour (mph) except segments on N. Lake Drive extending from the north to the south village limits; on N. Downer Avenue from E. Edgewood Avenue to E. Capitol Drive; on N. Wilson Drive from the north village limits to E. Capitol Drive; and on E. Capitol Drive from the east village limits to N. Oakland Avenue, all of which are posted for 30 mph. In addition to these posted speed limits, reduced 15-mph speed restrictions are in effect on all roadways adjacent to the public and private schools in the Village except the segment of E. Capitol Drive and N. Oakland Avenue adjacent to Shorewood High School. These 15-mph speed restrictions, which are in effect only during the hours when children are present, and a school crossing guard program serve as the principal school crossing protection measures utilized in the Village of Shorewood.

SUMMARY

This chapter has presented information on the existing street and highway system in the Village of Shorewood and on those factors which directly affect the operation of that system. A total of 31.14 miles of streets and highways were located within the Village of Shorewood in 1984. Of the total street and highway mileage in the Village, 3.91 miles are classified according to primary function as arterial streets, 3.36 miles are classified as collector streets, and 23.87 miles are classified as land access streets. Of the 31.14 miles of streets and highways in the Village, 2.44 miles are jurisdictionally classified as connecting highways, 0.90 mile is classified as county trunk highway, and 27.80 miles are classified as local streets and highways. A detailed description of the right-of-way and pavement widths of the streets and highways within the Village and the traffic control measures currently utilized in the Village has been documented in this chapter. A total of 64 Milwaukee County Transit System bus stops are located in the Village. In 1984, there were 10 traffic signals and 252 stop signs in the Village of Shorewood. All streets and highways in the Village are posted for 25 miles per hour except segments on N. Lake Drive, N. Downer Avenue, N. Wilson Drive, and E. Capitol Drive. It is only through the complete identification of the existing street and highway system that alternative actions can be designed and evaluated to determine the most effective traffic engineering improvements to control traffic on that system.

Map 9

TRAFFIC SIGNAL, STOP SIGN, YIELD SIGN, TURN PROHIBITION LOCATIONS AND POSTED SPEED LIMITS IN THE VILLAGE OF SHOREWOOD: 1984



Source: Village of Shorewood and SEWRPC.

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Chapter III

EXISTING TRAFFIC CONDITIONS

INTRODUCTION

A complete and accurate assessment of the operating performance of the existing street and highway system is essential to the identification of traffic problems and the formulation of traffic engineering actions to solve or mitigate those problems. A comprehensive assessment of the operating conditions of an existing street and highway system requires the collection and analysis of definitive data on: 1) the composition and volume of traffic utilizing the system; 2) the traffic operating conditions on the system; and 3) the travel patterns served by that system. The measurement of average annual weekday traffic volumes and other characteristics of those volumes--such as variation of traffic flow throughout the hours of the day, and the proportion of turning movements at selected intersections--serves to quantify the demand on the existing system. The ability of the existing system to accommodate that demand is defined in terms of traffic operating conditions, including such measures as volume-to-capacity ratios, average vehicle speeds, delays at controlled intersections, and motor vehicle accidents. The identification of existing travel patterns within a community is required to understand the basic factors underlying the existing traffic volume and operating conditions of the street and highway system; to identify the causes as well as the existence of traffic problems; and to formulate sound solutions to those problems. The data on existing traffic conditions presented herein, together with the data presented in Chapter II on the physical characteristics of the existing street and highway system, constitute the basic information necessary to identify deficiencies in the transportation system and to formulate traffic engineering actions to better manage vehicular traffic on the residential land access streets and collector and arterial streets of the Village.

TRAFFIC VOLUMES

Among the more important data used to quantify existing demand on a community transportation system are vehicular traffic counts. Current traffic counts are an important measure of the utilization of the street and highway system within a community. Analyses of vehicular traffic count data on an hourly, daily, and monthly basis can provide insights into the demand for travel within the community and are essential to any determination of the effectiveness of the existing street and highway system in meeting the demand for vehicular travel within the community.

In order to quantify existing demand on the street and highway system of the study area, average weekday traffic volumes were obtained for selected roadway segments comprising the system. Traffic volume counts on the entire arterial street and highway system have been taken by the Wisconsin Department of Transportation on a periodic basis since 1965. The historic growth trends exhibited by traffic on key arterials in the study area since 1965 are indicated in Table 3. As indicated in Table 3, vehicular traffic volumes in the Village of Shorewood have increased slowly but steadily since 1965 at an

Table 3

AVERAGE ANNUAL WEEKDAY TRAFFIC VOLUME OF SELECTED STREETS AND HIGHWAYS IN THE VILLAGE OF SHOREWOOD: 1965-1983

Location	Year								Annual Growth Rate (percent)
	1965	1968	1970	1972	1975	1977	1980	1983	
E. Capitol Drive									
at west village limits	25,900	28,300	26,600	27,600	30,600	27,800	28,000	25,600	0.0
east of N. Oakland Avenue	15,500	12,600	10,900	10,800	14,800	11,400	15,600	12,190	- 1.1
west of N. Lake Drive	4,600	4,800	3,400	3,100	3,300	4,000	3,700	4,900	0.2
							Average		- 0.4
N. Lake Drive									
at south village limits	14,500	15,200	11,500	12,500	14,800	12,800	10,800	17,010	1.0
north of E. Capitol Drive	11,200	11,800	10,300	11,100	15,200	14,900	11,600	15,490	1.8
at north village limits	12,300	12,200	8,900	10,900	13,300	13,500	14,200	14,600	1.0
							Average		1.2
N. Oakland Avenue									
at south village limits	19,400	16,600	18,400	19,800	16,800	17,900	18,600	18,490	- 0.2
south of E. Capitol Drive	15,500	11,300	13,200	15,400	16,400	14,100	13,500	18,300	1.0
north of E. Capitol Drive	10,200	10,800	10,900	12,000	13,200	11,100	11,600	14,010	1.8
at north village limits	7,600	7,400	8,300	8,100	7,600	7,400	7,200	9,720	1.4
							Average		0.8
N. Wilson Drive									
at north village limits	7,700	7,400	9,000	8,500	8,200	8,600	8,700	10,300	1.6
N. Morris Boulevard									
south of E. Capitol Drive	9,600	9,400	10,800	9,200	8,500	9,500	8,300	4,080	- 2.6
north of E. Capitol Drive	5,500	4,900	5,000	3,800	3,300	3,400	2,700	3,200	- 2.0
							Average		- 2.3
N. Maryland Avenue									
north of E. Edgewood Avenue	4,400	5,200	4,900	5,400	5,300	5,900	8,800	5,660	1.4
north of E. Capitol Drive	2,500	2,500	2,500	2,600	2,800	2,600	2,400	2,800	0.6
							Average		1.1
N. Downer Avenue									
north of E. Edgewood Avenue	5,300	5,300	5,900	6,300	6,300	6,200	8,100	6,100	0.8
north of E. Capitol Drive	1,600	1,700	1,800	1,600	1,700	1,700	1,400	1,600	0.0
							Average		0.6
E. Edgewood Avenue									
east of N. Oakland Avenue	3,700	3,400	3,600	3,400	3,200	3,500	3,900	3,489	- 2.5
Total	177,000	170,800	165,900	172,100	185,300	176,300	179,100	184,390	0.2

Source: Wisconsin Department of Transportation and SEWRPC.

average annual rate of about 0.2 percent. The highest growth rates have occurred on the segments of N. Oakland Avenue and N. Lake Drive north of E. Capitol Drive, both of which exhibited an annual growth rate of about 1.8 percent. Between 1980 and 1983, N. Morris Boulevard south of E. Capitol Drive exhibited a 49 percent decrease in traffic, this decrease being attributable to turn prohibitions established at E. Capitol Drive and N. Oakland Avenue in 1983 to reduce traffic volumes on N. Morris Boulevard and E. Menlo Boulevard. Prior to the establishment of the turn restrictions, traffic on these two streets had been decreasing at the rate of about 1 percent per year.

Table 4

AGE DISTRIBUTION OF RESIDENT POPULATION OF THE VILLAGE OF SHOREWOOD: 1970-1980

Age Group	1970	1980
Under 5 years	998	690
5 to 17 years	3,302	2,340
18 to 64 years	8,482	8,399
65 years and older ..	2,794	2,898
Total	15,576	14,327

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

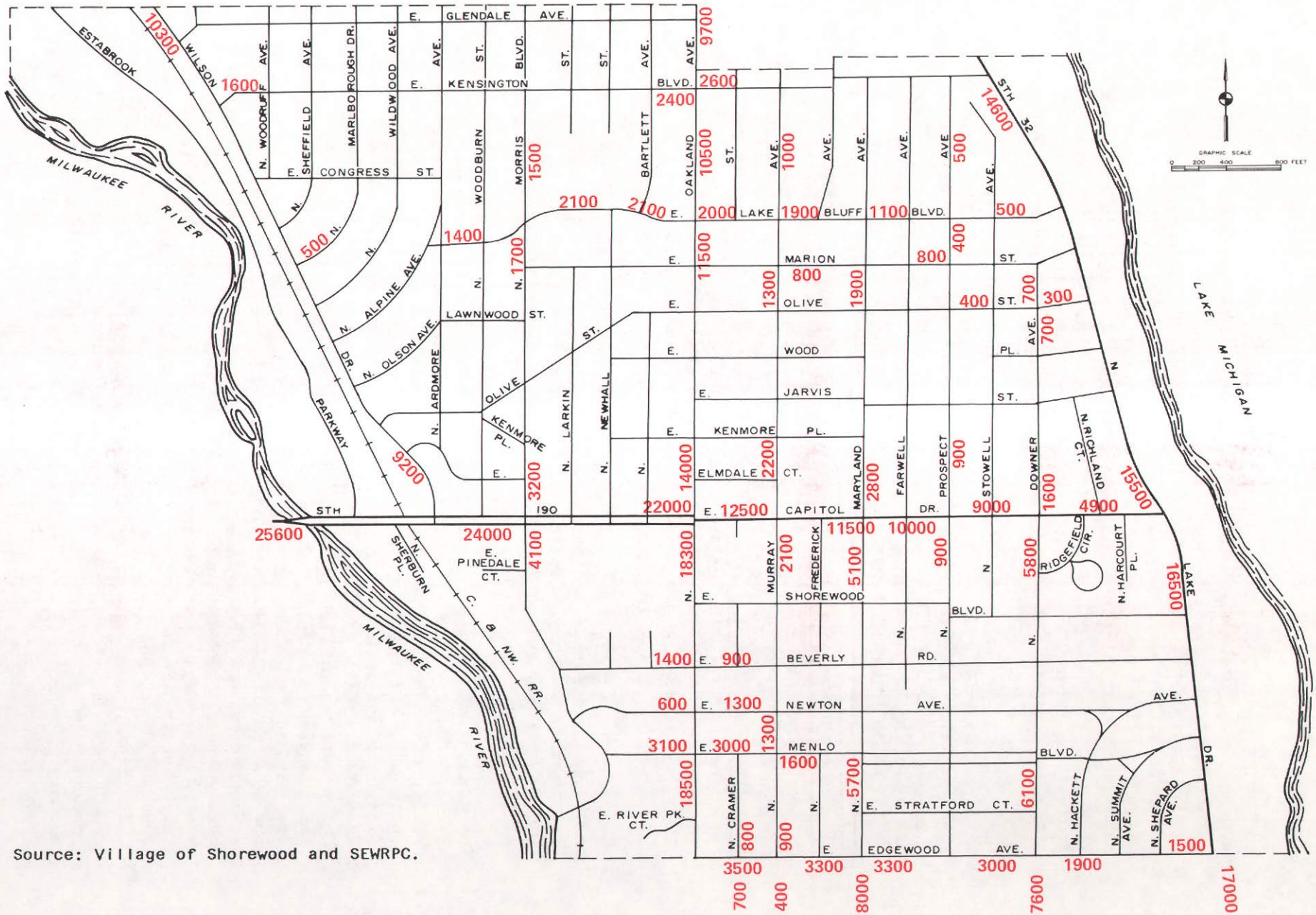
The traffic data indicate that traffic volumes have been relatively stable in the Village over the last 18 years. This conclusion is substantiated by the age distribution data of the resident population of the Village given in Table 4. These data indicate little change in the number of persons in the driver age groups in the Village over the 10-year period between 1970 and 1980.

Map 10 shows the estimated 1984 24-hour average annual weekday traffic volumes on selected streets and highways in the Village. As shown on the map, E. Capitol Drive and N. Oakland Avenue are carrying the highest traffic volumes in the Village. Traffic volumes on E. Capitol Drive range from 4,900 to 25,600 vehicles per average weekday, and on N. Oakland Avenue range from 9,720 vehicles to 18,490 vehicle per average weekday.

The traffic volumes shown in Table 3 and on Map 10 represent average annual weekday conditions. Such conditions are determined for urban areas measuring traffic on an average weekday in the spring or fall of any given year. Traffic counts on a monthly basis were also obtained for selected locations in the Village to determine seasonal variations in traffic volume. Such counts were taken by the City of Milwaukee Bureau of Traffic and Electrical Services on the segment of N. Lake Drive between E. Kenwood Avenue and the south village limits and on E. Capitol Drive between N. Humbolt Avenue and the west village limits. As shown in Figure 1, traffic volumes on N. Lake Drive range from a high of 146 percent of the average annual volume in July to a low of 74 percent of the average annual volume in January, with average annual weekday traffic volumes occurring in the months of April and September. This is a higher than normal seasonal variation in traffic volumes and may be attributed to the recreational traffic on N. Lake Drive attracted to the Lake Michigan shoreline area. The traffic volumes on E. Capitol Drive east of N. Humboldt Avenue show a lesser degree of seasonal variation, ranging from a high of 114 percent above the average annual volume in June to a low of approximately 88 percent of the average annual weekday traffic volume in February. The monthly traffic flow variation shown in Figure 1 for E. Capitol

Map 10

24-HOUR AVERAGE WEEKDAY TRAFFIC VOLUMES ON SELECTED STREETS IN THE VILLAGE OF SHOREWOOD: 1984



Source: Village of Shorewood and SEWRPC.

Drive is more irregular than normal; however, the general trend of increasing traffic volume in the summer months and decreasing volume during the winter months is typical of the monthly traffic volume distribution for an arterial in an urban area.

PEAK-HOUR TRAFFIC VOLUME

Hourly traffic volumes were obtained from the Wisconsin Department of Transportation and analyzed to determine the hourly distribution of vehicular traffic in the Village of Shorewood. As shown in Figure 2, hourly volumes on selected arterial streets in the Village exhibited a general increase--from a low of less than 1 percent of the average weekday 24-hour volume during the early morning hours between 1:00 a.m. and 6:00 a.m. to a high of about 10 percent of the average weekday 24-hour volume between 4:00 p.m. and 6:00 p.m. This distribution of hourly traffic volumes is typical of the traffic flow pattern identified on other arterial streets and highways within the Southeastern Wisconsin Region.

Of the four traffic count locations shown in Figure 2, the segment of N. Lake Drive south of E. Capitol Drive exhibits the most typical commuter rush-hour pattern, with 8 percent of the daily traffic volume occurring during the 7:00 a.m. to 8:00 a.m. rush hour and somewhat higher than 10 percent occurring during the 5:00 p.m. to 6:00 p.m. rush hour. On the other three roadway segments, E. Capitol Drive east of N. Lake Drive and east of N. Wilson Drive and N. Oakland Avenue south of E. Capitol Drive, approximately 6 percent of the average daily traffic occurs between 7:00 a.m. and 8:00 a.m. and approximately 8 percent occurs from 5:00 p.m. to 6:00 p.m. The hourly traffic volume distribution for these three locations reflects the trip generation characteristics of the University of Wisconsin-Milwaukee, which are somewhat different from the trip generation characteristics of typical businesses and industries in the area. Map 11 shows the peak-hour one-way traffic volumes on selected streets and highways in the Village.

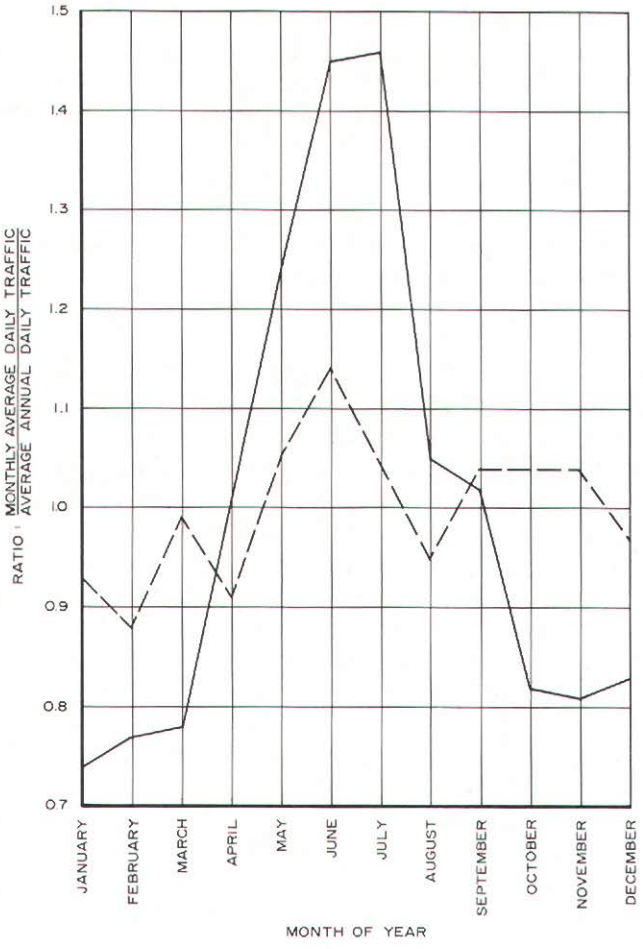
VOLUME-TO-CAPACITY RATIOS

The relationship between the traffic volume on a particular roadway segment to the capacity of that segment is referred to as the volume-to-capacity (v/c) ratio. This ratio is a measure of the degree of traffic congestion on a facility. This relationship is useful in identifying routes where traffic engineering actions should be considered to improve system operating conditions in the Village.

The design hourly capacity is defined as that capacity which will provide a level of service "C," given the physical and operating characteristics of the roadway. In urban areas, the capacity of a roadway segment is normally determined by the maximum number of vehicles that can pass through intersections with other roadways. There are seven basic factors that control intersection capacity: 1) approach pavement width; 2) parking within 200 feet of the intersection; 3) type of traffic control regulations and devices; 4) community population size and character of land development; 5) distribution of right and left turns; 6) percent of trucks and buses in the traffic stream; and 7) the peak-hour factor, which is a measure of the variation in traffic flow rate during the peak hour.

Figure 1

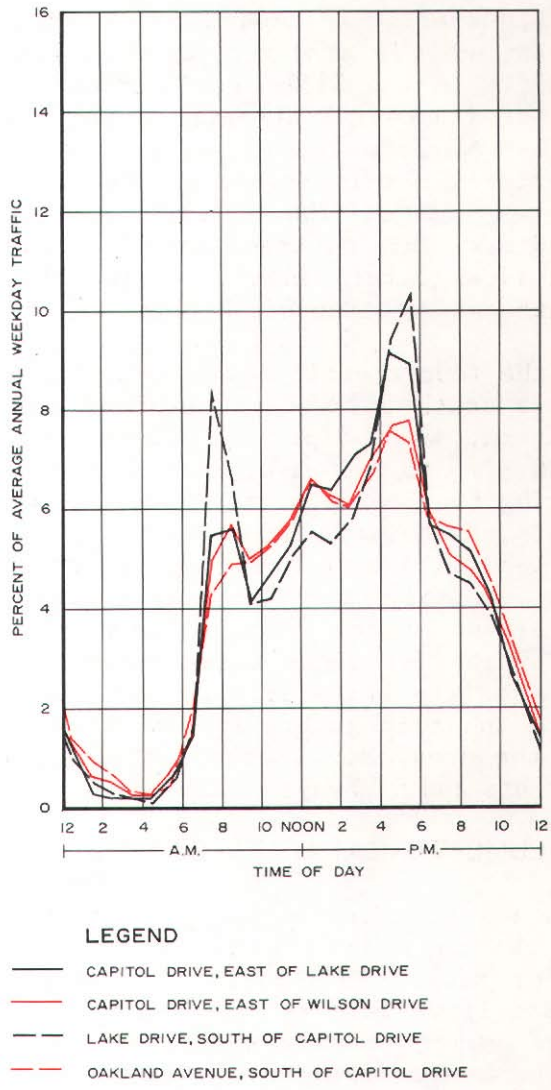
AVERAGE MONTHLY VARIATION IN WEEKDAY TRAFFIC VOLUMES ON N. LAKE DRIVE AND E. CAPITOL DRIVE IN THE VICINITY OF THE VILLAGE OF SHOREWOOD: 1984



Source: City of Milwaukee and SEWRPC.

Figure 2

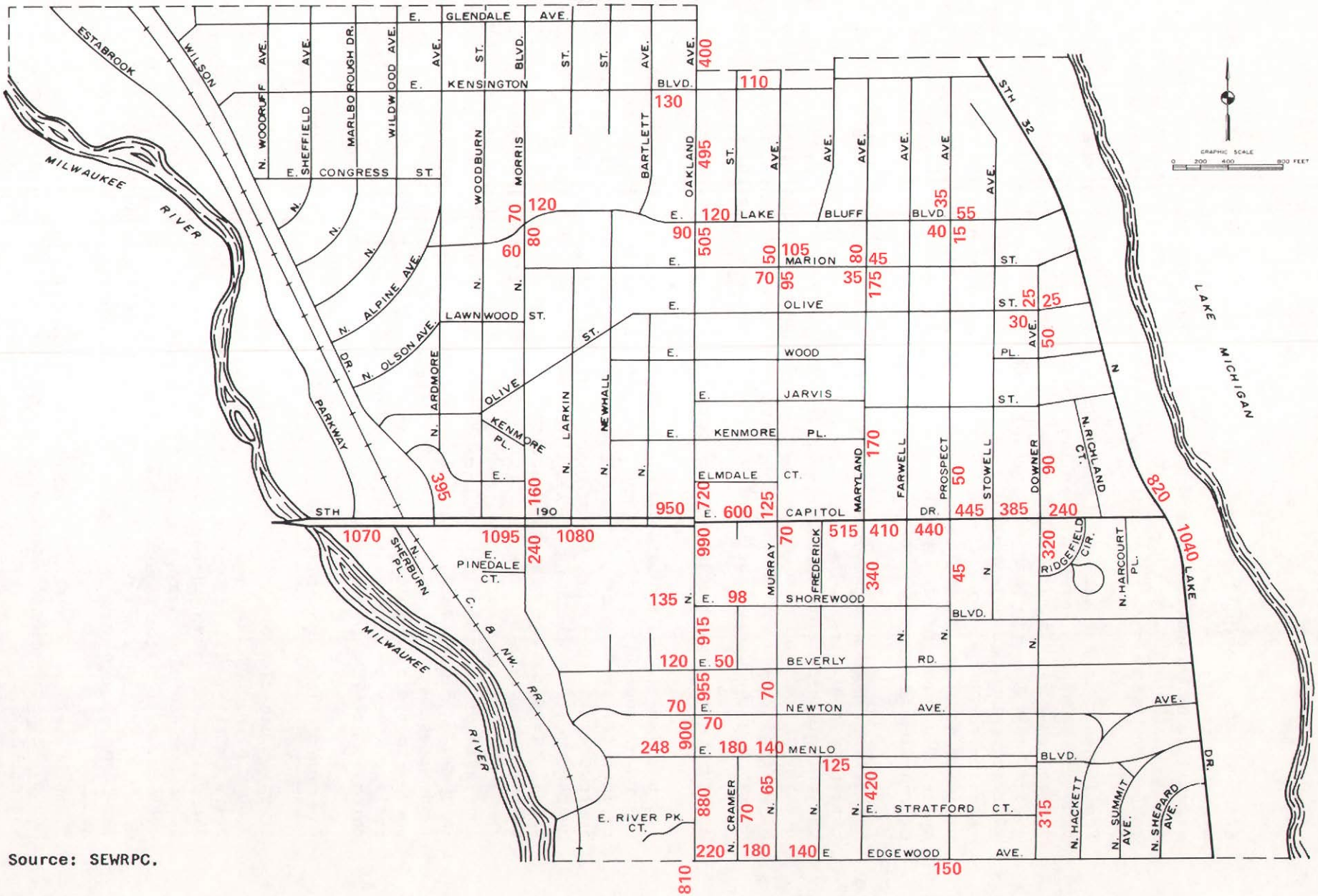
HOURLY VARIATION IN ANNUAL AVERAGE WEEKDAY TRAFFIC ON SELECTED ARTERIAL STREETS IN THE VILLAGE OF SHOREWOOD:1984



Source: Wisconsin Department of Transportation and SEWRPC.

Map 11

PEAK-HOUR TRAFFIC VOLUMES (ONE-WAY) ON SELECTED STREETS IN THE VILLAGE OF SHOREWOOD: 1984



Source: SEWRPC.

Based on the previously described traffic flow characteristics, the average weekday traffic volume-to-design capacity ratio was calculated for each signalized intersection approach in the Village utilizing the procedures set forth in the Highway Capacity Manual--1965.[1] Design capacity was calculated for a level of service "C" condition equal to 0.80 of maximum capacity.

Facilities that operate at or under this design capacity are assumed to provide an adequate level of service. Under level of service "C" conditions, drivers may occasionally have to wait through more than one signal cycle and queues may develop behind turning vehicles. Most drivers feel somewhat restricted but not objectionably so. Facilities operating over design capacity experience traffic congestion, with long queues of vehicles waiting upstream of intersections. Most drivers may have to wait through more than one signal cycle. The back-up of vehicles may in turn restrict or prevent the movement of vehicles from cross streets and driveways.

Map 12 indicates whether individual intersection approaches in the Village are currently operating below, at, and over design capacity. As shown on Map 12, the only intersection approaches in the Village operating over design capacity are the northbound left turn and the southbound through traffic movements on N. Oakland Avenue at E. Capitol Drive and the eastbound right-turn traffic movement on E. Capitol Drive at N. Oakland Avenue during the evening peak hour.

ARTERIAL SYSTEM OPERATING SPEEDS

Travel time and delay information on arterial streets is a useful indicator of system operating efficiency. Intersection delay information can be used to identify traffic congestion and a need for traffic engineering actions to improve arterial intersection operation. In addition to intersection delay, average vehicle operating speeds which are directly related to arterial system travel times can be used to quantify the relative efficiency of traffic flow through the Village. If a facility is operating at speeds substantially below the posted speed limit, the roadway capacity of the facility may need to be increased or the coordination between traffic signals may need to be improved. In general, if arterial traffic is congested, the traffic will divert onto land access streets in residential neighborhoods which will serve as bypass routes to avoid congested areas. Therefore, it is important in a comprehensive traffic study to improve traffic flow on the arterial street system to attract through traffic onto that system.

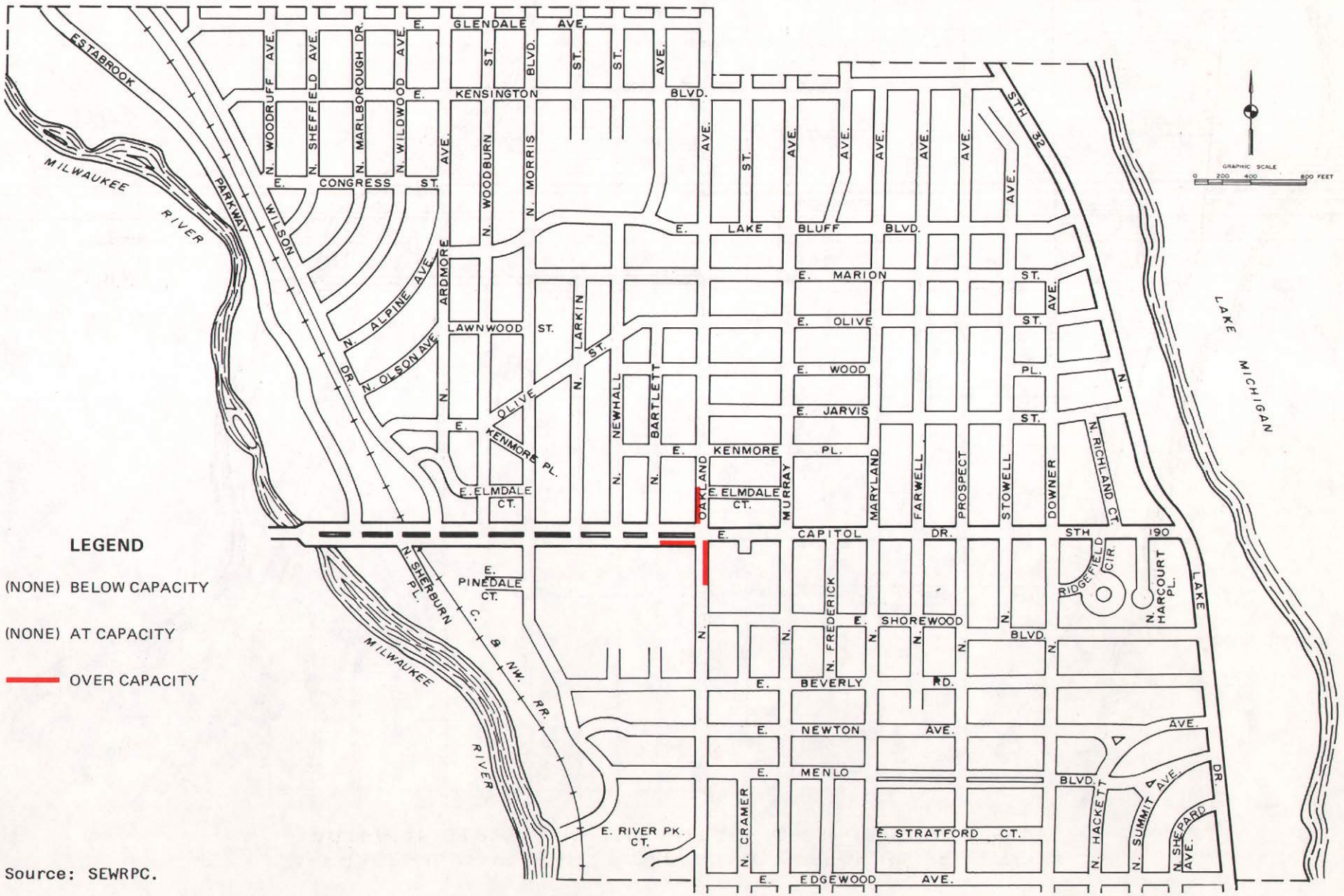
Average Vehicle Operating Speeds

Average vehicle operating speeds were measured during the 1:00 p.m. to 3:00 p.m. midday time period on N. Oakland Avenue, E. Capitol Drive, N. Lake Drive, and N. Wilson Drive in the Village of Shorewood. These speeds were determined using the floating car method, which utilizes a test car that is driven at the average speed of the other vehicles in the traffic stream over measured segments of roadway. Map 13 shows the average operating speed on each of the roadway segments surveyed. As shown on Map 13 and indicated in Table 5, the average travel speed on northbound N. Oakland Avenue was

[1]Transportation Research Board Special Report No. 87, Highway Capacity Manual--1965, National Academy of Sciences, National Research Council, Washington, D. C.

Map 12

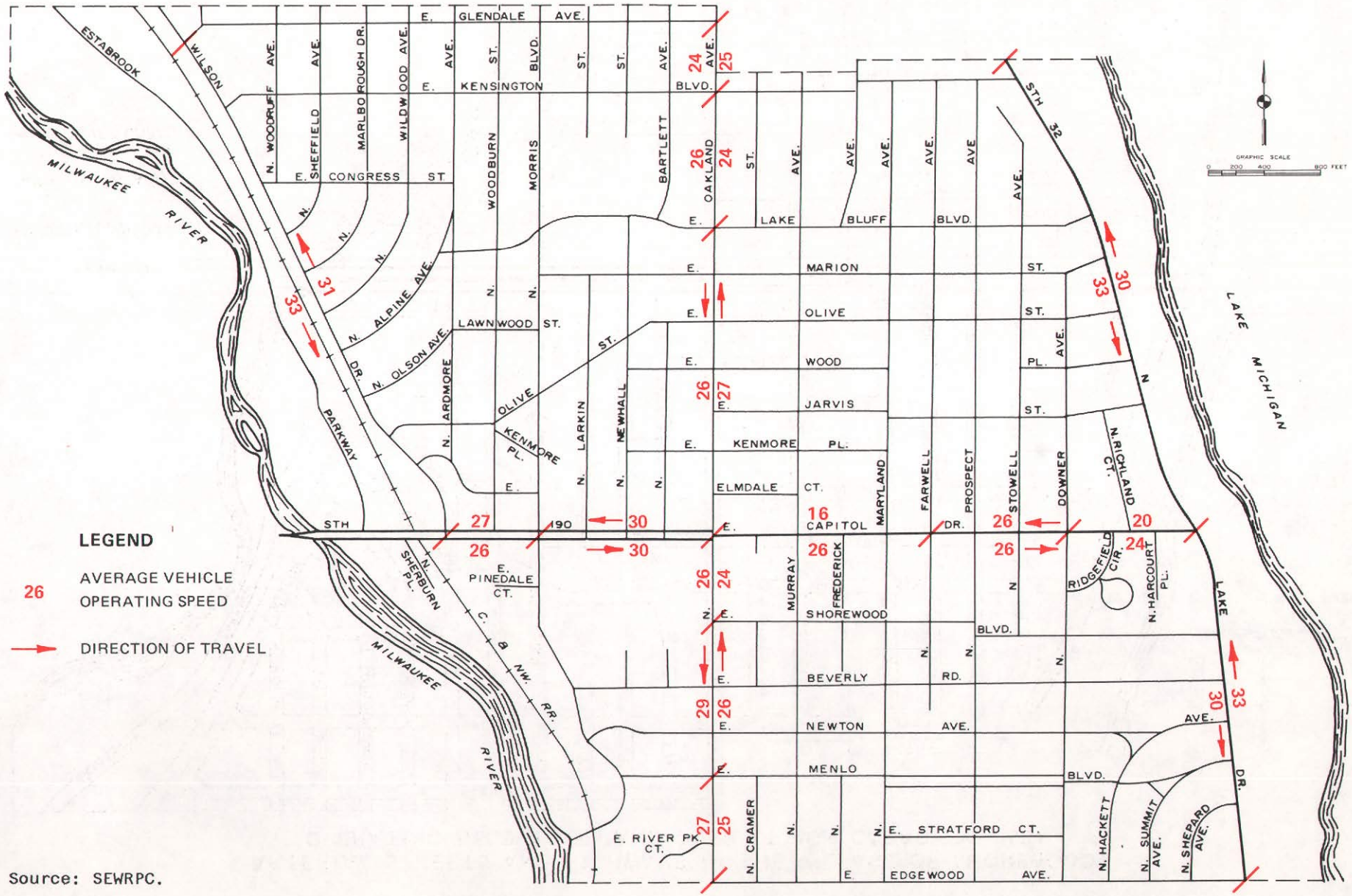
ARTERIAL STREETS AND HIGHWAYS IN THE VILLAGE OF SHOREWOOD OPERATING BELOW, AT, AND OVER DESIGN CAPACITY: 1984



Source: SEWRPC.

Map 13

AVERAGE MIDDAY VEHICLE OPERATING SPEEDS ON SELECTED ARTERIAL STREETS IN THE VILLAGE OF SHOREWOOD: 1984



Source: SEWRPC.

Table 5

AVERAGE WEEKDAY TRAVEL TIMES, OPERATING SPEEDS, AND SIGNALIZED INTERSECTION DELAYS ON E. CAPITOL DRIVE AND N. OAKLAND AVENUE DURING THE 1:00 P.M. to 3:00 P.M. MIDDAY TIME PERIOD: 1984

Roadway Segment	Length (miles)	Posted Speed Limit (mph)	Speed (mph)	Delay (seconds)	Travel Time (seconds)
E. Capitol Drive--Westbound:					
N. Lake Drive to N. Downer Avenue	0.17	25	20.1	30.5	30.5
N. Downer Avenue to N. Maryland Avenue	0.25	25	25.5	23.4	34.8
N. Maryland Avenue to N. Oakland Avenue	0.25	25	16.4	23.8	33.6
N. Oakland Avenue to N. Morris Boulevard	0.24	30	29.5	21.2	29.6
N. Morris Boulevard to N. Wilson Avenue	0.13	30	27.3	--	17.5
Total/Average	1.04	--	26.7	92.8	139.9
E. Capitol Drive--Eastbound:					
N. Wilson Drive to N. Morris Boulevard	0.13	30	25.9	4.4	18.4
N. Morris Boulevard to N. Oakland Avenue	0.24	30	29.5	9.8	29.6
N. Oakland Avenue to N. Maryland Avenue	0.25	25	26.1	7.2	34.0
N. Maryland Avenue to N. Downer Avenue	0.25	25	26.2	21.6	33.8
N. Downer Avenue to N. Lake Drive	0.17	25	23.8	25.4	25.8
Total/Average	1.04	--	26.4	68.4	141.6
N. Oakland Avenue--Northbound:					
E. Edgewood Avenue to E. Menlo Boulevard	0.16	25	25.4	13.0	22.0
E. Menlo Boulevard to E. Shorewood Boulevard	0.22	25	26.1	25.0	30.0
E. Shorewood Boulevard to E. Capitol Drive	0.12	25	23.7	--	19.0
E. Capitol Drive to E. Lake Bluff Boulevard	0.44	25	27.2	14.8	58.2
E. Lake Bluff Boulevard to N. Kennsington Boulevard	0.18	25	24.5	11.0	27.0
N. Kennsington Boulevard to E. Glendale Avenue	0.10	25	24.9	--	14.5
Total/Average	1.22	--	25.7	64.0	170.8
N. Oakland Avenue--Southbound:					
E. Glendale Avenue to N. Kennsington Boulevard	0.10	25	24.4	4.2	14.8
N. Kennsington Boulevard to E. Lake Bluff Boulevard	0.18	25	26.2	17.2	25.2
E. Lake Bluff Boulevard to E. Capitol Drive	0.44	25	26.1	44.5	60.2
E. Capitol Drive to E. Shorewood Boulevard	0.12	25	25.7	7.5	17.5
E. Shorewood Boulevard to E. Menlo Boulevard	0.22	25	28.8	12.5	27.2
E. Menlo Boulevard to E. Edgewood Avenue	0.16	25	27.3	9.5	20.5
Total/Average	1.22	--	26.5	95.5	165.8
N. Lake Drive--Northbound:					
E. Edgewood Avenue to E. Capitol Drive	0.45	30	32.8	N/A	49.5
E. Capitol Drive to E. Glendale Avenue	0.63	30	30.3	N/A	74.8
Total/Average	1.08	--	31.3	--	124.3
N. Lake Drive--Southbound:					
E. Glendale Avenue to E. Capitol Drive	0.63	30	33.2	N/A	68.2
E. Capitol Drive to E. Edgewood Avenue	0.45	30	30.2	N/A	53.8
Total/Average	1.08	--	31.9	--	122.0
N. Wilson Drive--Northbound:					
E. Kenmore Street to E. Glendale Avenue	0.52	30	30.9	N/A	60.8
N. Wilson Drive--Southbound:					
E. Glendale Avenue to E. Kenmore Street	0.52	30	32.9	N/A	57.1

NOTE: N/A indicates data not available.

Source: SEWRPC.

25.7 miles per hour (mph), while the average travel speed on southbound N. Oakland avenue was slightly higher at 26.5 mph. Average travel speeds ranged from a low of 23.7 mph for the northbound segment of N. Oakland Avenue between E. Shorewood Boulevard and E. Capitol Drive to a high of 28.8 mph for the southbound segment of N. Oakland Avenue between E. Shorewood Boulevard and E. Menlo Boulevard.

A similar pattern of average vehicle operating speeds was found on E. Capitol Drive. Travel speeds on the 30 mph-posted segment of E. Capitol Drive between N. Wilson Drive and N. Oakland Avenue ranged from a low of 25.9 mph in the eastbound direction between N. Wilson Drive and N. Morris Boulevard to a high of 29.5 mph on the segment between N. Oakland Avenue and N. Morris Boulevard in the east- and westbound directions. Average vehicle operating speeds on the 25 mph-posted segment of E. Capitol Drive between N. Oakland Avenue and N. Lake Drive ranged from a low of 20.1 mph in the westbound direction between N. Lake Drive and N. Downer Avenue to a high of 26.4 mph on the westbound segment of E. Capitol Drive between N. Maryland Avenue and N. Oakland Avenue.

The average travel speeds are reasonably close to the posted speed limits during the midday time period of an average weekday and indicate, basically, that operation is congestion free on the mid-block segments of E. Capitol Drive and N. Oakland Avenue.

As shown in Table 5, the average travel speed on northbound N. Lake Drive ranged from a high of 32.8 mph on the segment between E. Edgewood Avenue and E. Capitol Drive to a low of 30.3 mph on the segment between E. Capitol Drive and E. Glendale Avenue. Similarly, average travel speeds on southbound N. Lake Drive ranged from a high of 33.2 mph on the segment between E. Glendale Avenue and E. Capitol Drive to a low of 30.2 mph on the segment between E. Capitol Drive and E. Edgewood Avenue. It is noted that N. Lake Drive is posted for a 30-mph speed limit.

As also shown in Table 5, the average travel speed on N. Wilson Drive, which is posted for a 30-mph speed limit, was 30.9 mph in the northbound direction and 32.9 mph in the southbound direction. The midday travel speeds on both N. Lake Drive and N. Wilson Drive exceed the posted speed limits and indicate that there is a speeding vehicle traffic problem on both arterial facilities.

Signalized Intersection Delays

Signalized intersection delay is a measure of the amount of time vehicular traffic must stop and wait prior to proceeding through a signalized intersection. This measure of delay is used to indicate the efficiency of traffic signal timing plans and vehicular progression in accommodating the traffic traversing a series of signalized intersections. As shown in Table 5, intersection delays on N. Oakland Avenue in the northbound direction ranged from a low of none on the northbound approach to E. Capitol Drive to a high of 25 seconds on the northbound approach to E. Shorewood Boulevard. Delay on the southbound direction of N. Oakland Avenue ranged from a low of 9.5 seconds on the southbound approach to E. Edgewood Avenue to a high of 44.5 seconds on the southbound approach to E. Capitol Drive. This compares to intersection traffic delays on E. Capitol Drive in the westbound direction ranging from a low of none at N. Wilson Drive to 30.5 seconds at N. Downer Avenue and

for eastbound Capitol Drive ranging from a low of 4.4 second at N. Morris Boulevard to 25.4 seconds at N. Lake Drive. Since the through traffic movements at these intersections were found to be operating below design-capacity levels throughout the day, traffic signal progression could be changed to minimize these traffic delays at each intersection. As shown in Table 2 in Chapter II, the total cycle length between the signalized intersections in the Village ranges between 60 and 100 seconds per cycle. A common cycle length for all these signalized intersections would improve vehicular progression and would serve to reduce average vehicle delay at these intersections.

TRAFFIC PATTERNS

In order to properly analyze vehicular travel in the Village of Shorewood, it is essential to determine the trip patterns of traffic entering and passing through the Village. This is of particular concern in the Village of Shorewood, which is located immediately adjacent to the University of Wisconsin-Milwaukee and is located between the Milwaukee central business district and the northeastern suburbs of Milwaukee County. An understanding of the traffic patterns imposed on the street and highway system of the Village is important to the development of traffic engineering actions which should be designed to more effectively serve those patterns. The origin-destination travel data collected by the Commission in 1972 were analyzed and extrapolated to determine 1984 trip patterns in the Village. This data extrapolation accounted for traffic growth changes since 1972 and the impact of the reconstruction of the E. Capitol Drive bridge over the Milwaukee River.

Vehicle trips may be classified by type as: internal trips--those trips with both the origin and the destination within the Village; internal-external trips--those trips with either the origin or the destination, but not both, within the Village; and through trips--those trips that pass through the Village and which have both origin and destination in areas outside the Village. As indicated in Table 6, a total of 88,200 vehicle trips were made in the Village on an average weekday in 1984. Of this total, approximately 11,500, or 13 percent, were internal trips; 45,900, or 52 percent, were internal-external trips; and the remaining 30,800, or 35 percent, were through trips. This is a much higher than normal through-trip percentage than found in other communities in southeastern Wisconsin, and may be attributed to the location of the Village in the greater Milwaukee area.

Table 6

DISTRIBUTION OF TOTAL VEHICLE TRIPS OCCURRING IN THE VILLAGE OF SHOREWOOD ON AN AVERAGE WEEKDAY: 1984

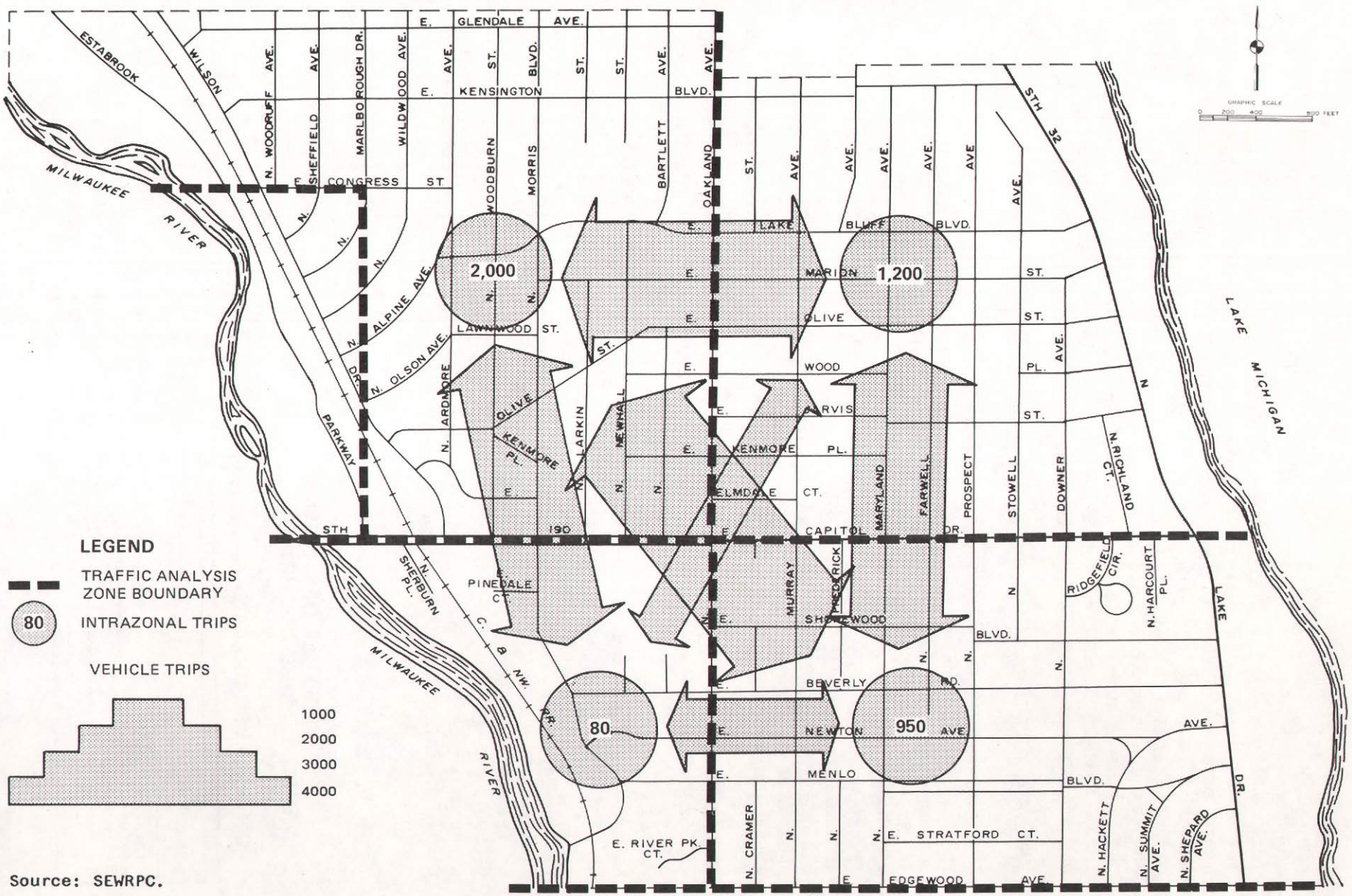
Trip Type	Vehicle Trips	Percent of Total
Internal.....	11,500	13.0
Internal/External...	45,900	52.0
Through.....	30,800	35.0
Total	88,200	100.0

Source: SEWRPC.

Figure 3 indicates the pattern of internal trip movement within the Village. The northwest quadrant of the Village generated the highest number of internal vehicle trips within the Village in 1984. Approximately 2,000 internal circulation trips occurred within the northwest quadrant. An additional 1,570 trips occurred between the northwest quadrant and the northeast quadrant, 1,880 trips occurred between the

Figure 3

MAJOR AVERAGE WEEKDAY INTERNAL TRIP INTERCHANGES IN THE VILLAGE OF SHOREWOOD: 1984



northwest quadrant and the southeast quadrant, and another 1,310 trips occurred between the northwest and southwest quadrants of the Village, for a total of 6,760 vehicle trips, or approximately 59 percent of the total vehicle trips that occurred in the Village.

Figure 4 indicates the pattern of movement of the 45,900 internal-external trips made in the Village on an average weekday in 1984. Of this total, approximately 10,500 vehicle trips, or about 23 percent, entered or exited on the east side of the Village on E. Capitol Drive. Approximately 20,900 trips, or about 46 percent of the total trips, entered or exited on the south side of the Village, with approximately 9,300 vehicle trips traveling on N. Oakland Avenue, 3,700 vehicle trips traveling on N. Maryland Avenue, 3,900 vehicle trips traveling on N. Downer Avenue, and another 4,000 vehicle trips traveling on N. Lake Drive. This indicates a very heavy north-south internal trip pattern across the southern portion of the Village of Shorewood. In addition to the high travel demand into and out of the Village of Shorewood on E. Capitol Drive, another 13,700 vehicle trips, or 30 percent of the total internal-external trips made within the Village, entered or exited the north side of the village limits, with approximately 4,700 vehicle trips using N. Wilson Drive, 7,000 vehicle trips using N. Oakland Avenue, and 2,000 vehicle trips using N. Lake Drive.

Figure 5 indicates the pattern of movement through the Village of Shorewood on an average weekday in 1984. As indicated in the figure, the major through trip movements across the Village were from E. Capitol Drive on the west to the south village limits. Of the 15,100 through trips on E. Capitol Drive at the west village limits, approximately 1,200 traveled through to N. Lake Drive, 2,200 to N. Downer Avenue, 2,000 to N. Maryland Avenue, and another 4,900 to N. Oakland Avenue, for a total of 10,300 vehicle trips traveling from E. Capitol Drive across the southern limits of the Village. As also indicated in Figure 5, the other major vehicular through trip movements across the Village were from N. Lake Drive at the north village limits to N. Lake Drive at the south village limits. Approximately 12,600 vehicles used N. Lake Drive for this through trip movement.

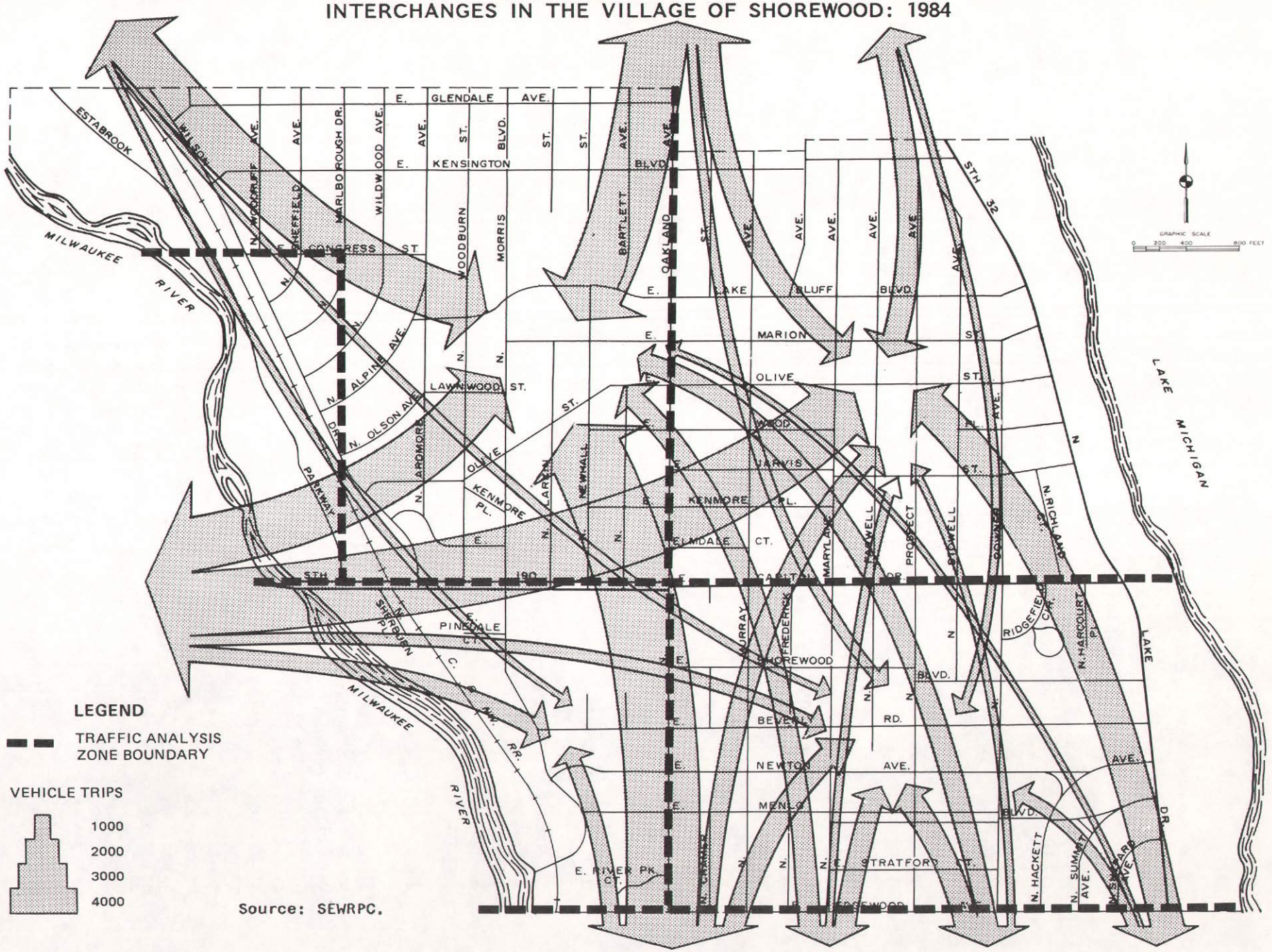
TRAFFIC ACCIDENTS

The incidence of traffic accidents is another measure of the efficiency and operating characteristics of a community's transportation system. The motor vehicular accident history for the street and highway system of the Village of Shorewood was reviewed for all on-street traffic accidents which occurred in 1981, 1982, and 1983. Each of these accidents was plotted on a map of the study area to identify locations and severity of the accidents. It was determined from this analysis that there were a total of 337 on-street accidents in 1981, 466 on-street accidents in 1982, and 315 on-street accidents in 1983 within the Village. There were no fatal accidents during 1981, there was one fatal accident in 1982, and no fatal accidents were reported in 1983. The majority of these accidents--71 percent in 1981, 73 percent in 1982, and 73 percent in 1983--resulted in property damage only.

All locations with three or more motor vehicle accidents per year are shown on Maps 14 through 16. There were 32 locations on the street and highway system in the Village in 1981 with three or more accidents. Of those 32 locations,

Figure 4

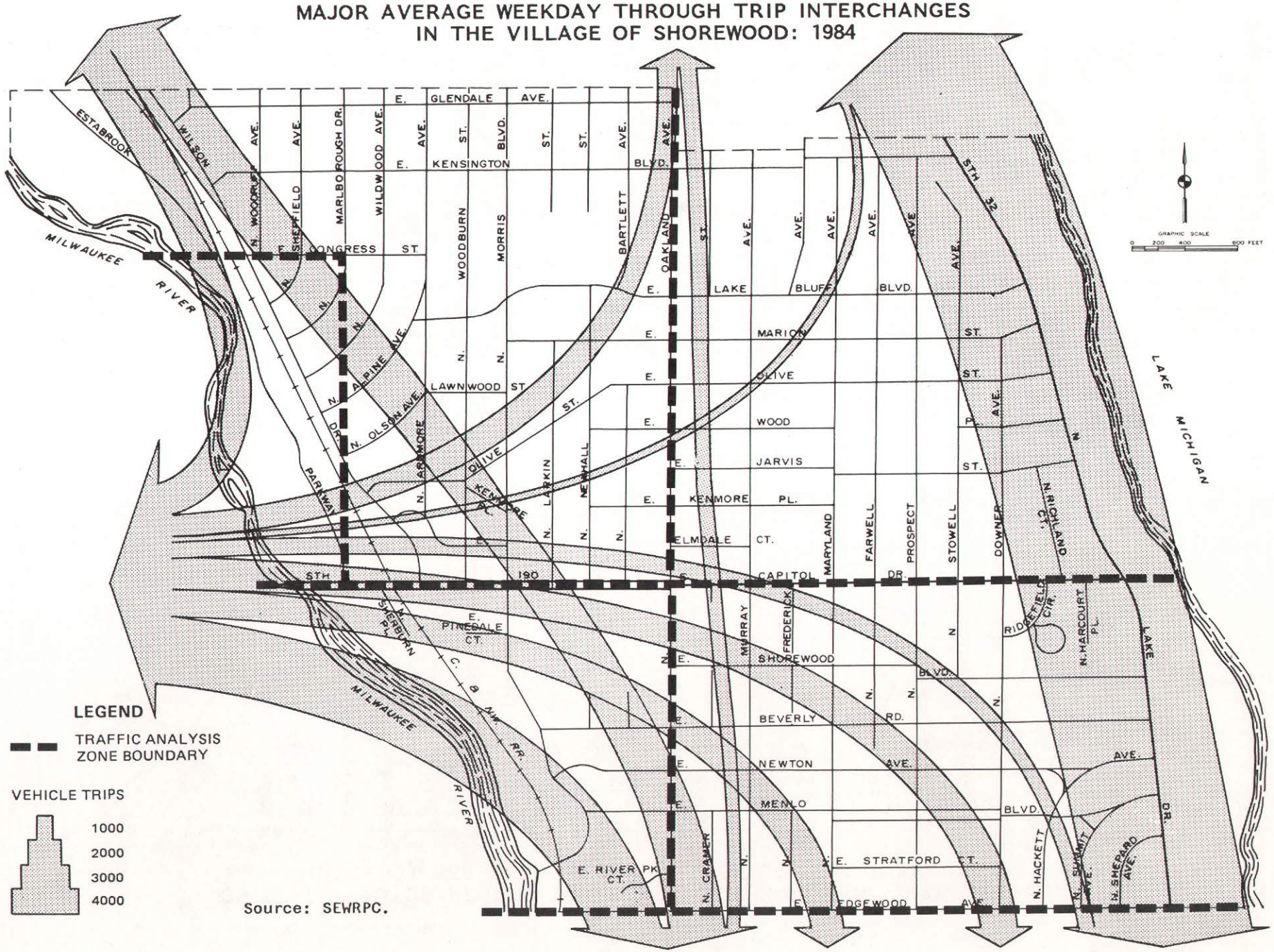
MAJOR AVERAGE WEEKDAY INTERNAL/EXTERNAL TRIP INTERCHANGES IN THE VILLAGE OF SHOREWOOD: 1984



Source: SEWRPC.

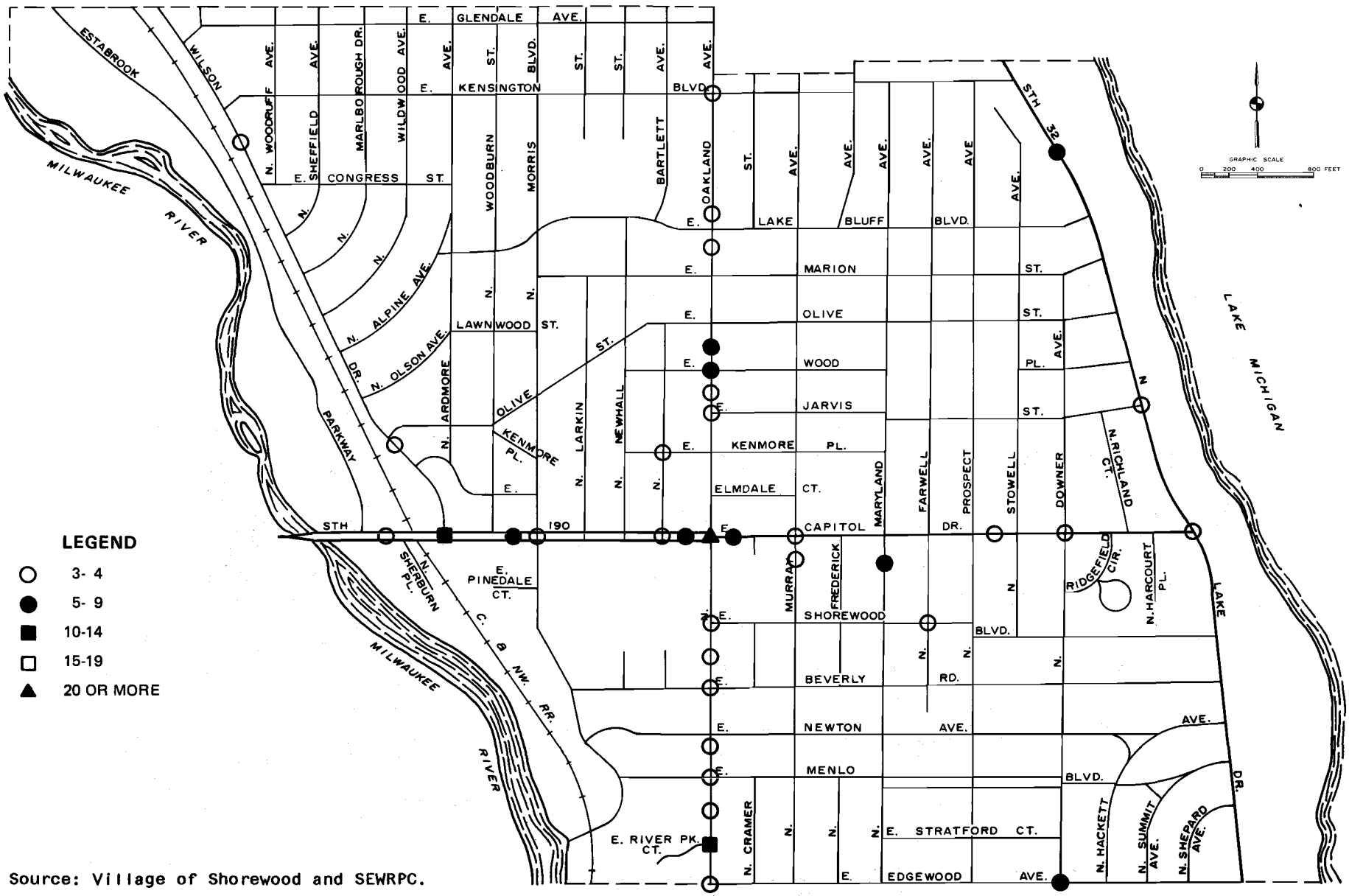
Figure 5

MAJOR AVERAGE WEEKDAY THROUGH TRIP INTERCHANGES IN THE VILLAGE OF SHOREWOOD: 1984



Map 14

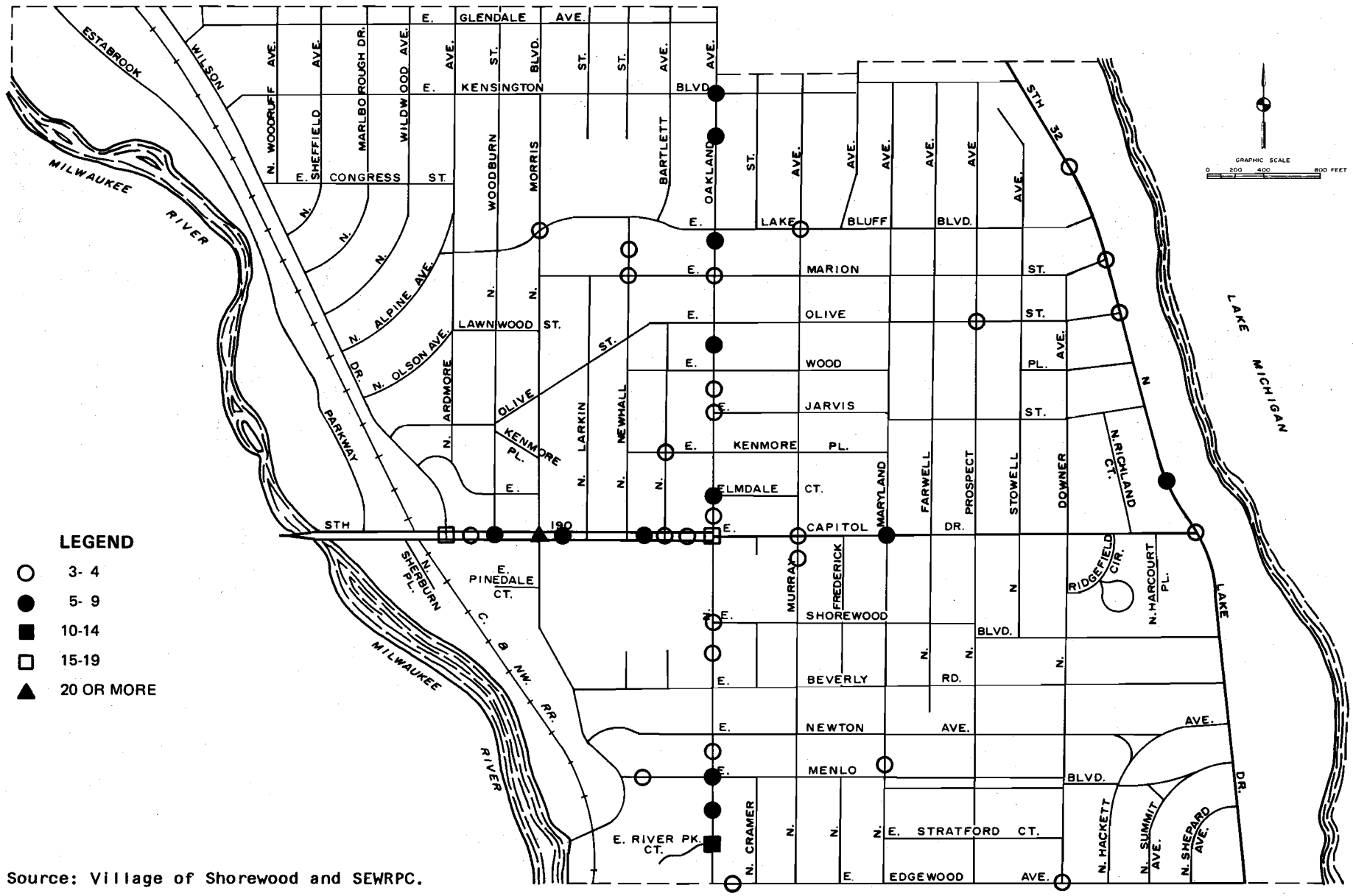
ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS WITH THREE OR MORE ACCIDENTS PER YEAR IN THE VILLAGE OF SHOREWOOD: 1981



Source: Village of Shorewood and SEWRPC.

Map 15

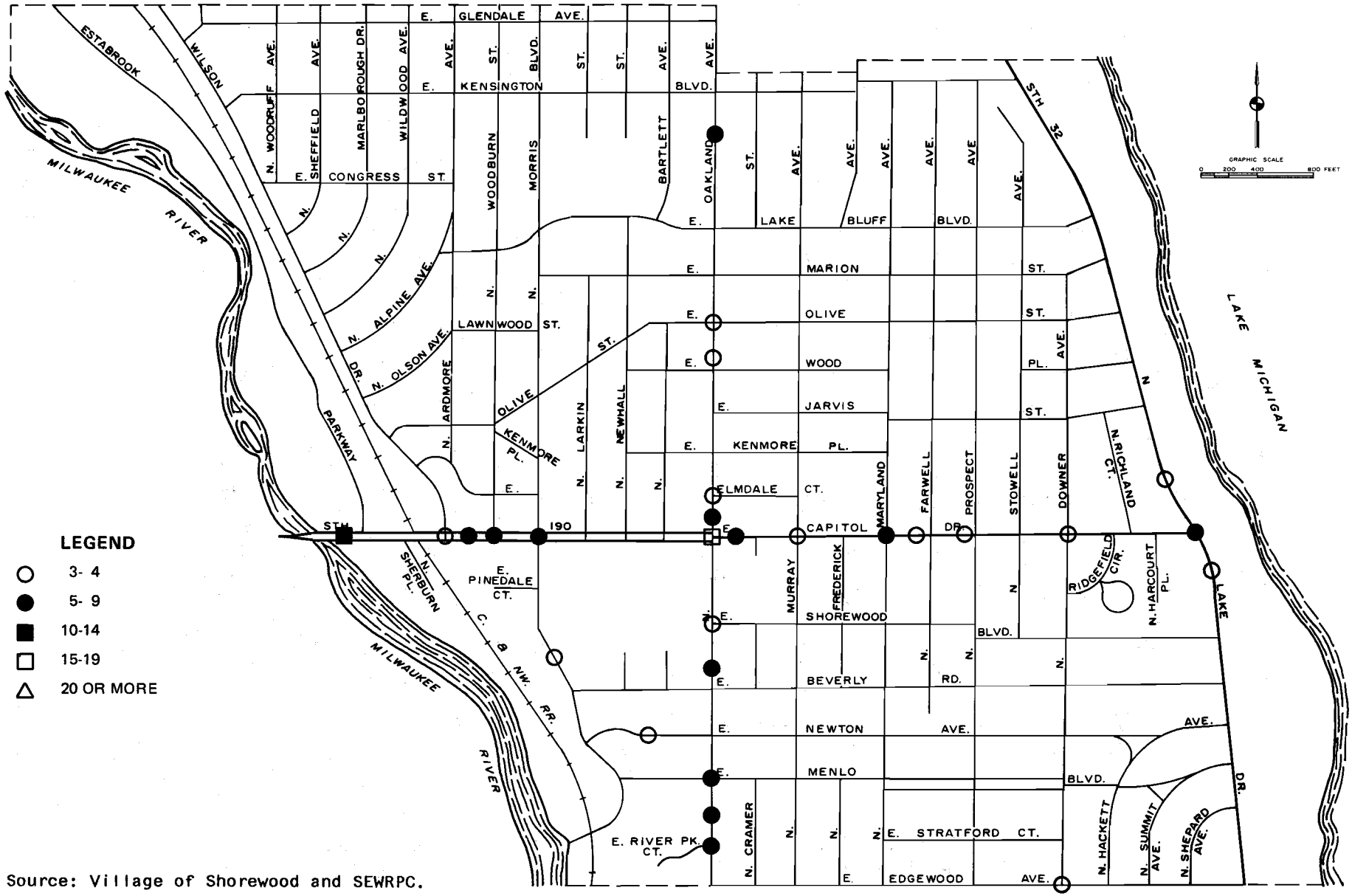
ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS WITH THREE OR MORE ACCIDENTS PER YEAR IN THE VILLAGE OF SHOREWOOD: 1982



Source: Village of Shorewood and SEWRPC.

Map 16

ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS WITH THREE OR MORE ACCIDENTS PER YEAR IN THE VILLAGE OF SHOREWOOD: 1983



Source: Village of Shorewood and SEWRPC.

27, or 84 percent, were located on E. Capitol Drive or N. Oakland Avenue. There were 41 locations with three or more accidents in 1982. Of those 41 locations, 27, or 66 percent, were located on E. Capitol Drive or N. Oakland Avenue. There were 27 locations in 1983 with three or more accidents, of which 22 locations, or 81 percent, were located on E. Capitol Drive or N. Oakland Avenue. The highest accident locations in the Village over the three-year period from 1981 through 1983 were the intersections of N. Oakland Avenue and E. Capitol Drive with an average of 19 accidents, E. Capitol Drive and N. Wilson Drive with an average of 16 accidents, N. Oakland Avenue and River Park Drive with an average of 12 accidents, and E. Capitol Drive and N. Morris Boulevard with an average of 11 accidents.

CITIZEN COMPLAINTS

A valuable source of information in identifying street and highway system problems is the citizen who regularly uses the system, and is therefore intimately familiar with the traffic conditions on the system. Not only are citizen complaints concerning traffic conditions at various locations throughout the study area useful in identifying potential problems areas, but they can also serve to reinforce and lend support to traffic inventory findings, particularly as applied to neighborhood traffic problems. Therefore, the 15 members of the Village of Shorewood Comprehensive Traffic Study Task Force were asked to describe the traffic problems in the Village as individually perceived, and to report the comments of noncommittee members who had contacted them in response to local newspaper articles requesting such comments from residents of the Village.

As a result of this public involvement effort, a list of 31 perceived traffic problem locations was compiled for the Village. This list is presented in Table 7 and the locations are shown on Map 17. The perceived traffic problems listed in Table 7 have been grouped into 13 categories. The majority of perceived traffic problems pertain directly to street intersections with N. Oakland Avenue. Villagewide street system problems identified by the Task Force consisted of 1) bicycle safety, 2) pedestrian safety, 3) speeding vehicles, 4) disrespect for stop signs, 5) lack of stop signs, 6) through traffic, and 7) inappropriately placed bus stop locations.

SUMMARY

This chapter has provided information on existing vehicular traffic volumes on the arterial street and highway system of the Village of Shorewood, on the operating conditions of that system, and on the travel patterns in the Village. This information has been supplemented with data on motor vehicle accident histories and citizen complaints of perceived traffic problems. This information, together with the information on the physical characteristics of the street and highway systems provided in Chapter II and the traffic management control criteria presented in Chapter IV, provide a basis resolving the traffic problems in the Village of Shorewood.

The vehicular traffic count information presented in this chapter indicates that the highest traffic volumes on the arterial street and highway system in the Village of Shorewood occur on E. Capitol Drive and range from 4,900 to 25,600 vehicles per average weekday. The next highest traffic volumes occur

Table 7

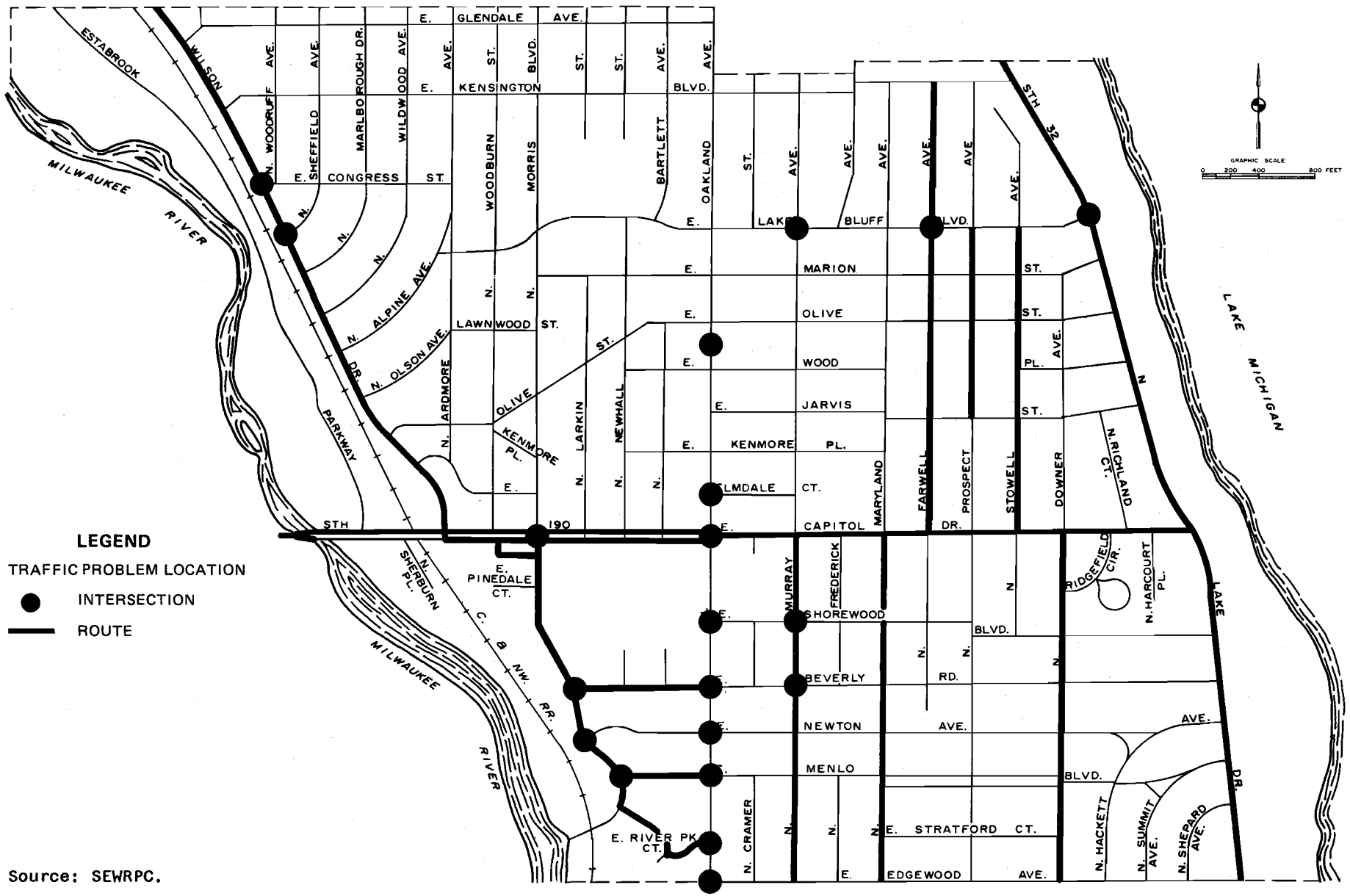
SUMMARY OF TRAFFIC PROBLEMS AS PERCEIVED BY CITIZENS WITHIN THE VILLAGE OF SHOREWOOD COMPREHENSIVE TRAFFIC MANAGEMENT STUDY AREA: 1984

Facility	Location	Inadequate Sight Distance	Congestion or Delay	Accessibility	Difficulty in Entering Traffic Stream	Motor Vehicle Accidents	Bicycle Safety	Pedestrian Safety	Speeding Vehicles	Stop Sign: Disrespect	Stop Sign: Lack of	On-Street Parking	Through Traffic	Traffic Diversion to Avoid Traffic Controls	Other
N. Lake Drive	E. Edgewood Avenue to E. Glendale Avenue								•		•				
	E. Lake Bluff Boulevard							•							
N. Stowell Avenue	E. Capitol Drive to E. Lake Bluff Boulevard										•				Intersection safety
N. Prospect Avenue	E. Jarvis Street to E. Lake Bluff Boulevard										•				
N. Farwell Avenue	E. Capitol Drive to E. Kensington Boulevard								•		•				
	E. Lake Bluff Boulevard										•				
N. Oakland Avenue	River Park Court Private Drive													•	
	E. Shorewood Avenue		•		•			•							
	E. Capitol Drive		•					•							Lane continuity
	Sendik's Food Store		•		•			•							
	Kohl's Food Store		•		•										
	Benjamin's Delicatessen and Baskin Robbins Ice Cream Store		•		•										
	E. Menlo Boulevard			•				•		•				•	
	E. Beverly Road							•						•	
	E. Newton Avenue							•						•	
	E. Edgewood Avenue													•	
	River Park Court					•	•								
N. Morris Boulevard	E. Capitol Drive to E. Menlo Boulevard								•	•					
	E. Capitol Drive													•	
	E. Beverly Road						•		•	•					
	E. Newton Avenue						•			•					
	E. Menlo Boulevard/ Hubbard Park Access Road	•							•	•					
E. Beverly Road	N. Oakland Avenue to N. Morris Boulevard			•									•	•	
E. Capitol Drive	N. Wilson Drive to N. Lake Drive		•												
	Alley West of N. Morris Boulevard													•	
N. Wilson Drive	E. Capitol Drive to E. Glendale Avenue							•	•						
N. Murray Avenue	Edgewood Avenue to E. Capitol Drive								•						
	E. Shorewood Boulevard									•	•				
	E. Beverly Road									•					
	E. Lake Bluff Boulevard									•					
N. Downer Avenue	E. Edgewood Avenue to E. Capitol Drive	•		•	•						•	•	•		
N. Maryland Avenue	E. Edgewood Avenue to E. Capitol Drive								•						
Villagewide Street System Problem							•	•	•	•	•		•		Bus stop locations

Source: SEWRPC.

Map 17

CITIZEN-PERCEIVED TRAFFIC PROBLEM LOCATIONS IN THE VILLAGE OF SHOREWOOD COMPREHENSIVE TRAFFIC MANAGEMENT STUDY AREA: 1984



Source: SEWRPC.

on N. Oakland Avenue, where they range from 9,700 to 18,500 vehicles per average weekday, and on N. Lake Drive, where they range from 14,600 to 17,000 vehicles per average weekday.

The highest weekday traffic volumes in the Village occur during the months of June and July, when weekday traffic volumes are approximately 14 percent greater than the average annual volumes on the arterial street and highway system except on N. Lake Drive, where volumes are about 46 percent greater than the annual average. The lowest traffic volumes on the arterial street and highway system occur in January and February when weekday traffic volumes comprise about 88 percent of the annual average except on N. Lake Drive, where volumes comprise about 74 percent of the annual average weekday volume.

In general, about 1 percent of the average weekday volume is exhibited during the early morning hours between 1:00 a.m. and 6:00 a.m. in the Village, increasing to about 6 percent during the 7:00 a.m. to 8:00 a.m. peak hour, leveling off at about 7 percent during the midday time period between noon and 3:00 p.m., and increasing again to a high of about 8 percent during the 5:00 p.m. to 6:00 p.m. evening peak hour.

The efficiency of the utilization of the arterial street and highway system in the Village has been quantified by determining the volume-to-capacity ratios, average arterial travel times, intersection delays, motor vehicle accidents, and citizen complaints of perceived traffic problems. Vehicular traffic equals or exceeds design capacity on the northbound left-turn and southbound through traffic movements on N. Oakland Avenue at its intersection with E. Capitol Drive and on the eastbound right-turn traffic movement on E. Capitol Drive at N. Oakland Avenue during the evening peak hour.

Midday vehicle operating speeds on N. Oakland Avenue range from 23.7 to 28.8 mph, on E. Capitol Drive from N. Wilson Drive to N. Oakland Avenue from 25.9 to 29.5 mph, from N. Oakland Avenue to N. Lake Drive from 20.1 to 26.4 mph, on N. Lake Drive from 30.2 to 33.2 mph, and on N. Wilson Drive from 30.9 to 32.9 mph. Both N. Oakland Avenue and the segment of E. Capitol Drive from N. Oakland Avenue to N. Lake Drive are posted with a 25-mph speed limit, with the other arterial segments noted above posted for a 30-mph speed limit. Average vehicle delays at the signalized intersections on N. Oakland Avenue and E. Capitol Drive exceed 30 seconds on the westbound E. Capitol Drive approach to N. Downer Avenue and on the southbound N. Oakland Avenue approach to E. Capitol Drive.

An analysis of the travel patterns in and through the Village of Shorewood indicates that 88,200 vehicle trips were made on an average weekday in 1984. The analysis further indicated that 11,500 vehicle trips, or 13 percent, were internal trips; 45,900, or 52 percent, were internal/external trips; and 30,800, or 35 percent, were through trips. Internal vehicle trips were found to be evenly distributed throughout the Village. Of the 45,900 internal/external trips, about 10,500, or 23 percent, entered or exited on the east side of the Village on E. Capitol Drive, about 20,900, or 46 percent, entered or exited on the south side of the village limits, and about 13,700, or 30 percent, entered or exited on the north side of the village limits. The major through trip movements across the Village were from E. Capitol Drive on the west to the south village limits, about 10,300 trips, and from the north to the south village limits on N. Lake Drive, about 12,600 trips.

There were a total of 337 on-street motor vehicle accidents in the Village in 1981, 466 accidents in 1982, and 315 accidents in 1983. There were 32 locations on the street and highway system in 1981 with three or more accidents, of which 84 percent occurred on N. Oakland Avenue or E. Capitol Drive. In 1982 there were 41 locations with three or more accidents, of which 66 percent occurred on N. Oakland Avenue or E. Capitol Drive, and in 1983 there were 27 locations with three or more accidents, of which 81 percent occurred on N. Oakland Avenue or E. Capitol Drive. The highest accident locations in the Village over the three-year time period from 1981 through 1983 were the intersections of E. Capitol Drive with N. Oakland Avenue, N. Wilson Drive, and E. Morris Boulevard and the intersections of N. Oakland Avenue with River Park Drive.

To supplement the traffic inventory data presented in this chapter, citizen complaints of perceived traffic problems were solicited from residents of the Village and from members of the Advisory Task Force for the study. A list of 31 traffic problem locations was compiled to assist in identifying traffic problems in the Village. The majority of reported traffic problems pertain directly to street intersections with N. Oakland Avenue.

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Chapter IV

TRAFFIC MANAGEMENT CONTROL CRITERIA

INTRODUCTION

Planning and decision-making for the improvement of the operation of a municipal street and highway system should be based upon criteria which permit the objective evaluation of the merits of implementing potential traffic management control measures. These criteria should be based upon sound engineering principles for the operation of the arterial street and highway system as well as the collector and land access street systems. Traffic management control measures can be effective only if they are used where their need is publicly understood and supported. Otherwise such measures may not be obeyed, and public disregard can spread to measures which are essential for the safety as well as efficiency of the street system.

Traffic management control criteria fall into two basic categories: absolute and comparative. Absolute criteria can be applied individually to any existing condition or plan alternative since such criteria are expressed in terms of maximum, minimum, or desirable system operating levels. An example of such a criterion is a warrant for the installation of a traffic control signal at the intersection of two arterial streets. Such a warrant could require a minimum of 500 vehicles per hour for eight hours of the day on the major arterial street and a minimum of 150 vehicles per hour for the same eight hours on the intersecting arterial street.

Comparative criteria must be applied through a comparison of the performance of alternative traffic control measures. An example of such a criterion is the minimization of through traffic on a land access street; alternative traffic control measures would be compared to each other and to the existing conditions to identify the measure which best meets the criterion. In the formulation of traffic management measures under this study, an attempt was made to meet as many of the agreed-upon traffic management control criteria as practicable.

TRAFFIC MANAGEMENT CONTROL CRITERIA

The traffic management control criteria set forth in Table 8 were formulated to serve as guidelines in addressing existing and future traffic problems in the Village of Shorewood, and in evaluating requests for the installation of, or changes in, traffic control measures and devices. These criteria are set forth in three basic categories: 1) street and highway system development criteria; 2) internal traffic control measure warrants; and 3) peripheral traffic control measure warrants.

The application of the traffic management control criteria set forth in Table 8 is intended to assure uniformity in the placement and installation of traffic control measures throughout the Village of Shorewood. Uniformity simplifies the task of the driver because it aids in recognition and understanding. By treating similar situations in the same way, traffic control measures will be respected and obeyed with a minimum of enforcement. A standard traffic control measure used where it is inappropriate may be expected to result in disrespect at those locations where it is needed.

The application of the traffic management control criteria presented in Table 8 is not a substitute for sound engineering judgment. A particular traffic control measure should only be applied exercising sound engineering judgment in conjunction with the criteria.

Table 8

TRAFFIC MANAGEMENT CONTROL CRITERIA

Street and Highway System Development Criteria

1. The arterial street and highway system should comprise from 15 to 25 percent of the total community street and highway system mileage.

2. Arterial streets and highways should be spaced no more than one-half mile in each direction in urban high-density areas (7.0 to 17.9 dwelling units per net residential acre).

3. The time required for the response of emergency vehicles to all areas of the community should be minimized.

4. Circuitous travel routing of through and land access traffic should be discouraged.

5. The penetration of residential and environmentally sensitive areas such as parks by arterial streets and highways should be avoided.

6. The total vehicle miles of travel within a community should be minimized.

7. The conflict between the movement of through traffic and local traffic and pedestrians within a community should be minimized.

8. Through traffic should use the arterial street and highway system within a community.

9. The volume-to-capacity ratio of existing arterial facilities should not exceed 0.80.

10. Average vehicle delays at signalized intersections should not exceed 30 seconds per vehicle.

11. Local transit service should provide an appropriate balance between passenger convenience and safety; speed of operation with convenient walk distances; and, in general, bus stop spacings no less than 600 feet apart, and no more than 1,250 feet apart.

Internal Traffic Controls Warrants

1. Traffic control devices such as traffic signals, stop signs, yield signs, and pavement markings should be installed in accordance with the following warrants:

a. On the arterial street and highway system, the installation of traffic control devices should conform with the warrants set forth in the Manual on Uniform Traffic Control Devices[a] published by the U. S. Department of Transportation.

b. On land access and collector streets, the installation of traffic control devices should conform to the following warrants:

   i. The Village has designated in its traffic code a system of "through" streets. The Village's through street system, as shown on Map 5 in Chapter II, includes arterial streets and collector streets. The arterial streets are intended to carry the heaviest volumes of traffic, including all traffic traveling through the Village. Collector streets are intended to distribute traffic from the arterials to the land access streets, and to collect traffic from the land access streets for routing to the arterials. Accordingly, traffic control devices should be installed on arterial and collector streets in such a manner as to encourage all through traffic to use arterials, and to encourage all traffic between land access and arterial streets to use collector streets. The following warrants provide guidelines for the installation of stop and yield signs on land access streets which intersect the designated "through" collector streets:

      - A stop control shall be used on a land access street--those streets not designated as through streets--when sight distance from the land access street is equal to or less than 250 feet in either direction at a four-legged intersection; when sight distance from the land access street is equal to or less than 125 feet in either direction at a T-type intersection, a pedestrian crosswalk is present on any leg of an intersection, or an accident problem, as evidenced by three or more accidents in a 12-month period, is susceptible to correction by stop control; or when unusual geometrics exist that may require positive control.

      - Yield control may be used on land access streets where sight distance exceeds 250 feet at four-legged intersections or 125 feet at T-type intersections, provided none of the other stop control criteria are satisfied. Yield control should be used at four-legged intersections only when there are relatively low volumes of land access street traffic.

      - Multiway stop signs should be considered only when roadways of similar character intersect and cannot operate at an acceptable level of safety with only one street controlled. Multiway stop control should be considered at the intersection of two or more through streets or at the termination

[a]U. S. Department of Transportation, Federal Highway Administration, "Warrants for the Installation of Traffic Signals and Stop and Yield Signs," Manual on Uniform Traffic Control Devices, 1978.

of the through street when the volume characteristics of both streets are similar. This similarity should be indicated by a total six-hour volume split within the range of 60 percent-40 percent for four-legged intersections and by no approach less than 25 percent for T-type intersections. Multiway stop controls may also be considered when three or more accidents susceptible to correction by multiway stop control have occurred within a 12-month period. Prior to recommending multiway stop control based upon accidents, all less restrictive measures to resolve the accident problem shall have been exhausted.

ii. Each intersection of two land access streets shall be analyzed primarily with regard to safety rather than convenience.

A two-way stop control shall be used to control two approaches at a four-legged intersection of two land access streets whenever one or more of the following conditions exist: sight distance is equal to or less than 125 feet from the uncontrolled approaches; an accident problem as evidenced by three or more accidents in a 12-month period is susceptible to correction by two-way stop control; or there are unusual geometrics or pedestrian or vehicle patterns that suggest a need for positive control.

Two-way yield control may be used to control two approaches at a four-legged intersection where sight distance from the uncontrolled approach exceeds 125 feet, provided none of the other stop sign criteria are satisfied. Two-way yield control should be used at four-legged intersections only when there are relatively low volumes of traffic.

Although intersection control at a T-type intersection is generally limited to the approach on the stem of the T, special conditions may warrant consideration of controls on other approaches. The same criteria shall be used for the placement of stop or yield controls for the stem of T-type intersections as used for such placement for a four-legged intersection. A decision to provide no control at a T-type intersection must be based upon a clear judgment that conditions are safe beyond reasonable doubt based upon a minimum sight distance of 200 feet on all approaches to the intersection, as well as a lack of an accident problem or geometric deficiencies.

Multiway stop controls should be considered only when roadways of equal character intersect and cannot operate at an acceptable level of safety with only one street controlled. Multiway stops should be considered under the following conditions: a sight distance of 125 feet cannot be obtained for any approach when stop signs are placed on that approach; or an accident problem as evidenced by three or more accidents within a 12-month period is susceptible to correction by multiway stop control. Under both criteria, all less restrictive measures to obtain

adequate sight distance or improve intersection safety shall have been considered. It is noted that all sight distances shall be measured from a vehicle 35 feet back of the curb or edge line of the cross street.

iii. Traffic stop signs should not be used for speed control. Speed studies have shown that this device does not reduce speeds and that the use of unwarranted devices breeds disregard for all traffic control devices and laws and, in many cases, may cause accident problems where no accident problem previously existed.

2. Children-at-Play signs attempting to warn motorists of normal conditions in residential areas should be discouraged. Children should not be encouraged to play within the street travelways. Children-at-Play signs serve as an open suggestion that this behavior is acceptable.

   Specific warnings for schools, playgrounds, parks, and other recreational facilities are available for use where clearly justified. These specific warnings should, according to the Manual on Uniform Traffic Control Devices, be based upon an engineering study and be erected no less than 150 feet, or no more than 700 feet, in advance of the school grounds or school crossing, and must be used in advance of every school crossing sign. It is important that uniform approaches to school area traffic controls be applied to assure a uniform behavior on the part of vehicle operators and pedestrians.

3. Channelization to discourage through traffic and control vehicle speeds in residential areas consists of such devices as roadway narrowings, traffic circles, and cul-de-sacs. Such devices should be used to preserve the integrity of the neighborhood while causing little inconvenience to the residents on the land access street to which they are applied, or to other residents in the neighborhood. Application of these devices is not warranted on arterial facilities, and should be applied only where there are identifiable conflicts between through and local traffic or where excessive vehicle speeds are identified through observation or traffic accident patterns.

4. Designation of one-way streets in residential areas should be used to discourage through traffic patterns on land access streets, reduce vehicular/pedestrian traffic conflicts, or reduce vehicle conflicts at an identified accident problem location where such a problem would be ameliorated through a reduction in vehicle conflicts. One-way street designation should not create adverse traffic impacts on other land access streets or create circuitous and time-consuming travel for residents of the neighborhood or community.

5. A residential parking permit program is a traffic control action designed to manage on-street vehicular parking in neighborhood areas and to enhance the livability for the residents of those neighborhoods. The Village currently has an ordinance for residential permit parking which sets forth the criteria for the establishment and operation of such a program. Parking regulation signs should include a message that indicates the area is in a parking control district.

Peripheral Traffic Control Warrants

1. Peripheral traffic controls include turn prohibitions, one-way street designations, roadway diverters, and street closures. These controls are designed and used to divert through traffic from residential areas and discourage "short-cutting" by drivers to avoid arterial street system congestion problems. These traffic control measures shall not be applied unless the volume of traffic on a land access street exceeds 200 vehicles per hour in one direction. Streets with peak-hour one-way traffic volumes below 200 vehicles per hour are generally considered by residents as possessing desirable neighborhood ammenities with minimum physical danger, noise, vibration, dust, and air pollution.

Chapter V

ANALYSIS AND RECOMMENDATIONS

INTRODUCTION

This chapter describes and evaluates a range of alternative traffic control measures which were considered as potential solutions to traffic problems in the Village of Shorewood. The alternative traffic control measures considered were carefully designed to provide a proper balance between traffic flow on residential streets and on arterial streets in the Village, while maintaining and improving the safety and efficiency of the movement of vehicles and pedestrians within and through the Village. This evaluation of traffic control measures considered the capital cost and advantages and disadvantages of each action, and was based upon consideration of the traffic management control criteria set forth in Chapter IV.

Each traffic problem reported in the Village of Shorewood is analyzed in this chapter in the order reported and summarized in Table 7 of Chapter III of this report.

N. LAKE DRIVE

Traffic problems were found to exist at several locations along N. Lake Drive.

E. Edgewood Avenue to E. Glendale Avenue

As shown in Table 9, it was reported that speeding vehicles are a problem on the segment of N. Lake Drive between E. Edgewood Avenue and E. Glendale Avenue. North Lake Drive is an arterial street and carries STH 32 through the Village. Average vehicle operating speeds were measured on N. Lake Drive during the midday time period on Wednesday, June 13, 1984. The average travel speeds on the segment of N. Lake Drive between E. Edgewood Avenue and E. Capitol Drive in the north- and southbound directions were found to be 32.8 and 30.2 miles per hour (mph), respectively; and on the segment of N. Lake Drive between E. Capitol Drive and E. Glendale Avenue in the north- and southbound directions 30.3 and 33.2 mph, respectively. Although these speeds do not indicate a major speeding vehicle problem, they do, in fact, exceed the posted 30-mph speed limit on N. Lake Drive.

As shown in Table 9, the alternative traffic control measures considered to resolve this speeding vehicle problem include reducing the posted speed limit from 30 to 25 mph, installing traffic signals or stop signs on N. Lake Drive, strict enforcement of the existing speed limit, and the construction of roadway narrowings or speed control humps.

Reducing the posted speed limit from 30 to 25 mph on N. Lake Drive, at an estimated cost of $200, was not considered to be an effective action to reduce vehicle speeds. Under normal conditions, drivers will tend to travel at the

Table 9

SUMMARY OF ALTERNATIVE AND RECOMMENDED TRAFFIC MANAGEMENT CONTROLS TO SOLVE IDENTIFIED TRAFFIC PROBLEMS IN THE VILLAGE OF SHOREWOOD: 1984

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
N. Lake Drive E. Edgewood Avenue to E. Glendale Avenue	Speeding vehicles	Reduce posted speed limit from 30 to 25 mph	• None	• Ineffective • Can create an accident problem	Do not implement
		Install traffic signals or stop signs	• Reduces speed at signal/sign location	• Do not meet warrants • Can create an accident problem	Do not implement
		Strictly enforce speed limit	• Reduces travel speed	• Requires police manpower • Temporary solution	Implement
		Construct roadway narrowings	• Reduces travel speeds	• Can create an accident problem • Reduces roadway capacity	Do not implement
		Install speed humps	• Reduces travel speeds	• Not recommended for arterial operation	Do not implement
at E. Lake Bluff Boulevard	Pedestrian safety Speeding vehicles Lack of stop signs	Reduce posted speed limit from 30 to 25 mph	• Increases pedestrian conflict awareness	• Ineffective • Can create an accident problem	Do not implement
		Install pedestrian-actuated traffic signal	• Provides for safe pedestrian movement	• Only effective at crosswalk • Can create an accident problem	Implement
		Strictly enforce speed limit	• Reduces travel speeds	• Requires police manpower • Temporary solution	Implement
		Construct median island	• Reduces pedestrian exposure to traffic	• Can create an accident problem • Reduces roadway capacity	Do not implement
		Construct roadway narrowings	• Reduces pedestrian exposure to traffic	• Can create an accident problem • Reduces roadway capacity	Do not implement
		Install speed humps	• Reduces travel speeds	• Not recommended for arterial operation	Do not implement
		Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
N. Stowell Avenue E. Capitol Drive to E. Lake Bluff Boulevard	Speeding vehicles Lack of stop signs	Install speed humps	• Reduces travel speeds	• None	Do not implement
		Construct roadway narrowings	• Reduces travel speeds	• Roadway only 24 feet wide	Do not implement
		Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
N. Prospect Avenue E. Jarvis Street to E. Lake Bluff Boulevard	Lack of stop sign respect	Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
N. Farwell Avenue E. Capitol Drive to E. Kensington Boulevard	Speeding vehicles Lack of stop signs	Install speed humps Construct roadway narrowings Strictly enforce speed limit Villagewide stop sign evaluation based upon adopted plan criteria	• Reduces travel speeds • Reduces travel speeds • Reduces travel speeds • Increases respect for stop sign controls	• None • Roadway only 30 feet wide • Requires police manpower • Temporary solution • None	Do not implement Do not implement Do not implement Implement
at E. Lake Bluff Boulevard	Lack of stop signs	Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
N. Oakland Avenue at River Park Court	Traffic diversion to avoid traffic controls	Install "Private Drive" signs Construct driveway cul-de-sac Install speed bumps Improve traffic flow on N. Oakland Avenue Prohibit northbound left turn on N. Oakland Avenue at River Park Drive	• Reduces traffic diversion • Eliminates traffic diversion • Reduces traffic diversion • Reduces traffic diversion • Eliminates traffic diversion	• None • Reduces driveway accessibility • Creates noise problem • Unsafe for emergency vehicle occupants • None • Reduces resident accessibility	Implement Do not implement Do not implement Implement Do not implement
at E. Shorewood Boulevard	Congestion Difficulty in entering traffic stream Pedestrian safety	Retime traffic signal Provide traffic progression on N. Oakland Avenue Modify traffic signal to traffic-actuated operation with background cycle and pedestrian actuation Prohibit east- and westbound left turns	• Partially effective • Reduces congestion • Reduces congestion • Reduces vehicle conflicts • Reduces intersection delay	• Creates other vehicle delays • None • None • Increases vehicle conflicts at other intersections • Diverts traffic to land access streets	Do not implement Implement Implement Do not implement
at E. Capitol Drive	Congestion Pedestrian safety Lane continuity	Modify traffic signal to traffic-actuated operation Provide traffic progression for traffic movement on N. Oakland Avenue south of E. Capitol Drive to E. Capitol Drive west of N. Oakland Avenue Install lane designation for two northbound left-turn lanes Reconstruct eastbound left- and right-turn channelization to increase storage capacity Prohibit parking on E. Capitol Drive east of N. Oakland Avenue	• Reduces congestion • Maximizes effective roadway capacity • Reduces traffic delays • Maximizes effective roadway capacity • Reduces traffic diversion to other routes • Increases left-turn capacity • Provide additional signal time for pedestrian and other traffic movements • Improves eastbound lane continuity • Increase intersection capacity • Increases intersection capacity	• None • None • Can cause an accident problem • None • Can cause an accident problem	Implement Implement Do not implement Implement Do not implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measure	Advantages	Disadvantages	Recommendation
at Sendik's Food Store	Congestion Difficulty in entering traffic stream Pedestrian safety	Prohibit left turns into driveways	● Reduces congestion ● Increases pedestrian safety	● Reduces accessibility	Do not implement
		Reduce driveway openings	● Reduces congestion ● Increases pedestrian safety ● Controls vehicle conflicts at one location	● Reduces accessibility	Implement
		Install pedestrian crossing	● Increases pedestrian safety	● Increases vehicle delays	Do not implement
		Construct roadway narrowings	● Reduces pedestrian exposure	● Reduces on-street parking	Implement
		Modify traffic signal sequence at E. Capitol Drive for traffic-actuated operation	● Reduces traffic delays ● Increases pedestrian safety	● None	Implement
		Construct median barrier	● Increases pedestrian safety ● Reduces vehicle conflict areas	● Reduces effective roadway width ● Reduces accessibility	Do not implement
at Kohl's Food Store	Congestion Difficulty in entering traffic stream	Prohibit left turns into driveways	● Reduces congestion	● Decreases accessibility	Do not implement
		Reduce number of driveways	● Reduces congestion ● Concentrates vehicle conflicts at one location	● Decreases accessibility O Adverse parking lot circulation	Do not implement
		Install traffic signals at N. Oakland Avenue and E. Wood Street or E. Olive Street	● Provides gaps in southbound traffic stream for turn movements	● Increases vehicle delay at signalized intersection ● Can cause an accident problem	Do not implement
at Benjamin's Delicatessen and Baskin Robbins Ice Cream Store	Congestion Difficulty in entering traffic stream	Construct additional driveway	● Improves parking lot circulation ● Meets design criteria for parking lots ● Reduces vehicle conflicts	● Residential relocation	Implement (long-range improvement)
		Redesign parking lot	● Improves parking lot circulation ● Approaches design criteria for parking lots	● Reduces number of parking stalls ● Can cause an accident problem	Implement
		Reconstruct driveway	● Controls vehicle conflicts ● Provides parking lot identity ● Reinforces circulation pattern	● None	Implement
at E. Menlo Boulevard	Accessibility Pedestrian safety Disrespect for traffic signal controls	Remove northbound left-turn prohibitions	● Increases accessibility ● Reduces turns at other intersections	● Increases conflict between local and through traffic ● Reduces pedestrian safety	Implement
		Modify traffic signal timing	● Increases pedestrian safety	● Creates congestion ● Increases conflict between through and local traffic	Do not implement
		Provide traffic progression on N. Oakland Avenue	● Increases pedestrian safety ● Diverts through traffic from land access streets ● Reduces vehicle delays	● None	Implement
		Install guide signing to UWM campus	● Encourages diversion of through traffic from land access streets	● None	Implement
		Construct new arterial street from E. Capitol Drive/ N. Wilson Drive intersection to N. Oakland Avenue/ E. Edgewood Avenue intersection	● Eliminates traffic congestion at E. Capitol Drive/N. Oakland Avenue intersection ● Increases pedestrian safety ● Diverts through traffic from land access streets	● Removes River Park land development ● Creates environmental conflict problem along Milwaukee River	Do not implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
at E. Menlo Boulevard (continued)		Construct cul-de-sac on N. Morris Boulevard	• Eliminates conflict between through and local traffic on land access streets • Increases pedestrian safety	• Reduces accessibility	Do not implement
		Construct roadway narrowings	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Reduces on-street parking	Implement
		Construct traffic circles on E. Menlo Boulevard	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Decreases emergency vehicle accessibility • Reduces on-street parking	Do not implement
at E. Beverly Road	Pedestrian Safety Traffic Diversion to avoid traffic controls	Provide traffic progression on N. Oakland Avenue Construct median island	• Diverts through traffic to arterial facilities • Decreases pedestrian exposure	• None • Can cause an accident problem • Reduces capacity	Implement Do not implement
at E. Newton Avenue	Pedestrian safety Traffic diversion to avoid traffic controls	Provide traffic progression on N. Oakland Avenue Construct median island	• Reduces traffic diversion • Reduces pedestrian exposure to traffic	• None • Can cause an accident problem • Reduces roadway capacity	Implement Do not implement
at E. Edgewood Avenue	Traffic diversion to avoid traffic controls	Designate N. Cramer Street one-way southbound	• Restricts street to local traffic	• Reduces accessibility • Diverts traffic to N. Murray Street	Do not implement
		Provide traffic progression on N. Oakland Avenue	• Reduces traffic diversion	• None	Implement
at River Park Court	Motor vehicle accidents Bicycle safety	Prohibit parking on southbound approach to E. Edgewood Avenue	• Removes vehicle conflicts from intersection • Increases intersection capacity	• Reduces on-street parking	Implement
		Continue public school bicycle safety program	• Increases school-age children's awareness of bicycle laws and procedures	• None	Implement
N. Morris Boulevard E. Capitol Drive to E. Menlo Boulevard	Speeding vehicles Lack of stop sign respect	Remove northbound left-turn prohibitions	• Increases accessibility • Reduces turns at other intersections	• Increases conflict between through and local traffic • Reduces pedestrian safety	Implement
		Modify traffic signal timing	• Increases pedestrian safety	• Creates congestion • Increases conflict between through and local traffic	Do not implement
		Provide traffic progression on N. Oakland Avenue	• Increases pedestrian safety • Diverts through traffic from land access streets • Reduces vehicle delays	• None	Implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
E. Capitol Drive to E. Menlo Boulevard		Install guide signing to UWM campus	• Encourages diversion of through traffic from land access streets	• None	Implement
		Construct new arterial street from E. Capitol Drive/ N. Wilson Drive intersection to N. Oakland Avenue/E. Edgewood Avenue intersection	• Eliminates traffic congestion at E. Capitol Drive/N. Oakland Avenue intersection • Increases pedestrian safety • Diverts through traffic from land access streets	• Removes River Park land development • Creates environmental conflict problem along Milwaukee River	Do not implement
		Construct cul-de-sac on N. Morris Boulevard	• Eliminates conflict between through and local traffic on land access streets • Increases pedestrian safety	• Reduces accessibility	Do not implement
		Construct roadway narrowings	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Reduces on-street parking	Implement
		Construct traffic circles on E. Menlo Boulevard	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Decreases emergency vehicle accessibility • Reduces on-street parking	Do not implement
at Capitol Drive	Traffic diversion to avoid traffic controls	Replace eastbound right-turn prohibition at intersection of N. Morris Boulevard/E. Capitol Drive with the prohibition of right turn on red only	• Eliminates need to avoid traffic controls • Improves accessibility to N. Morris Boulevard	• Promotes traffic diversion to N. Morris Boulevard	Implement
		Restrict alley to one-way westbound traffic flow	• Eliminates pedestrian-vehicle conflict at alley/sidewalk • Eliminates traffic diversion to avoid traffic signals	• Reduces accessibility between N. Morris Boulevard and Thompson's parking lot	Do not implement
at E. Beverly Road	Bicycle safety	Continue public school bicycle safety program	• Increases school-age children's awareness of bicycle safety	• None	Implement
	Lack of stop sign respect	Change intersection geometrics to encourage westbound right-turn stop sign respect	• Reduces bicyclist and vehicle speed through intersection • Reinforces stop regulation at intersection • Manages vehicle conflicts and reduces accident potential at intersection	• None	Implement
		Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
at E. Newton Avenue	Bicycle safety Lack of stop sign respect	Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
		Continue public school bicycle safety program	• Increases school-age children's awareness of bicycle safety	• None	Implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
at E. Menlo Boulevard/ Hubbard Park Access Road	Inadequate sight distance Speeding vehicles Lack of stop sign respect	Change intersection geometrics to reduce vehicle conflict area	• Improves vehicle sight distance • Encourages reduced travel speed across intersection • Reinforces stop regulation at intersection • Reduces pedestrian exposure at intersection	• None	Implement
		Villageside stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
E. Beverly Road N. Oakland Avenue to E. Morris Boulevard	Accessibility Through traffic Traffic diversion to avoid traffic controls	Remove northbound left-turn prohibitions	• Increases accessibility • Reduces turns at other intersections	• Increases conflict between local and through traffic • Reduces pedestrian safety	Implement
		Modify traffic signal timing	• Increases pedestrian safety	• Creates congestion • Increase conflict between through and local traffic	Do not implement
		Provide traffic progression on N. Oakland Avenue	• Increases pedestrian safety • Diverts through traffic from land access streets • Reduces vehicle delays	• None	Implement
		Install guide signing to UWM campus	• Encourages diversion of through traffic from land access streets	• None	Implement
		Construct new arterial street from E. Capitol Drive/ N. Wilson Drive intersection to N. Oakland Avenue/ E. Edgewood Avenue intersection	• Eliminates traffic congestion at E. Capitol Drive/N. Oakland Avenue intersection • Increases pedestrian safety • Diverts through traffic from land access streets	• Removes River Park land development • Creates environmental conflict problem along Milwaukee River	Do not implement
		Construct cul-de-sac on N. Morris Boulevard	• Eliminates conflict between through and local traffic on land access streets • Increases pedestrian safety	• Reduces accessibility	Do not implement
		Construct roadway narrowings	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Reduces on-street parking	Implement
		Construct traffic circles on E. Menlo Boulevard	• Increases pedestrian safety • Diverts through traffic to arterial facilities • Improves residential streetscape • Reduces travel speeds	• Decreases emergency vehicle accessibility • Reduces on-street parking	Do not implement
E. Capitol Drive N. Wilson Drive to N. Lake Drive	Congestion	Provide traffic progression on E. Capitol Drive	• Reduces vehicle delays • Diverts through traffic from land access streets	• None	Implement

Table 9 (continued)

Loctation	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
N. Wilson Drive E. Capitol Drive to E. Glendale Avenue	Pedestrian safety Speeding vehicles	Construct median islands Install pedestrian-actuated traffic signals Reduce posted speed limit from 30 to 25 mph Strictly enforce speed limit Install speed humps Construct roadway narrowings	• Decreases pedestrian exposure • Reduces vehicle speeds at signal/sign location • Decreases speed of some vehicles • Reduces travel speeds • Reduces travel speeds • Reduces travel speeds • Decreases pedestrian exposure	• None • Does not meet warrants • Can cause accident problems • Can cause an accident problem • Not warranted • Requires police manpower • Temporary solution • Not recommended for arterial operation • Reduces roadway capacity • Can create an accident problem	Do not implement Do not implement Do not implement Implement Do not implement Do not implement
N. Murray Avenue E. Edgewood Avenue to E. Capitol Drive	Speeding vehicles	Install speed humps Construct roadway narrowings Strictly enforce speed limits Provide traffic progression on N. Oakland Avenue	• Reduces travel speeds • Reduces travel speeds • Reduces travel speeds • Reduces traffic diversion	• Emergency vehicle route • Can create an accident problem • Requires police manpower • Temporary solution • None	Do not implement Do not implement Do not implement Implement
at E. Shorewood Boulevard	Lack of stop sign respect Lack of stop signs	Villagewide stop sign evaluation based upon adopted plan criteria Install additional stop signs	• Increases respect for stop sign controls • Provides necessary stop sign controls • Discourages through traffic	• None • Promote increased vehicle travel speeds • Can create an accident problem • Promotes disrespect for warranted traffic controls	Implement Do not implement
at E. Beverly Road	Lack of stop sign respect	Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
at E. Lake Bluff Boulevard	Lack of stop sign respect	Villagewide stop sign evaluation based upon adopted plan criteria	• Increases respect for stop sign controls	• None	Implement
N. Downer Avenue E. Edgewood Avenue to E. Capitol Drive	Inadequate sight distance Accessibility Difficulty in entering traffic stream On-street parking Through traffic	Provide traffic progression on N. Oakland Avenue Increase parking setback distance from 15 to 20 feet from corner Construct roadway narrowings Villagewide stop sign evaluation based upon adopted plan criteria	• Reduces traffic diversion • Increases sight distance • Discourages through traffic • Provides necessary stop sign controls	• None • Reduces on-street parking • Adverse bus service impact • Not recommended for arterial operation • None	Implement Implement Do not implement Implement

Table 9 (continued)

Location	Traffic Problems	Alternative Control Measures	Advantages	Disadvantages	Recommendation
N. Maryland Avenue E. Edgewood Avenue to E. Capitol Drive	Speeding vehicles	Construct roadway narrowings	• Reduces travel speeds	• Can create accident problem • Reduces roadway capacity	Do not implement
		Strictly enforce speed limit	• Reduces travel speeds	• Requires police manpower • Temporary solution	Implement
		Install speed humps	• Reduces travel speeds	• Not recommended for arterial operation	Do not implement
		Provide traffic progression on N. Oakland Avenue	• Reduces traffic diversion	• None	Implement
Villagewide Street System Problems	Bicycle safety Pedestrian safety	Continue public school bicycle safety program	• Increase school-age children's awareness of bicycle laws	• None	Implement
	Lack of stop sign respect	Villagewide stop sign evaluation based upon	• Increases respect for stop sign controls	• None	Implement
	Lack of stop signs	Strictly enforce speed limits	• Reduces travel speeds	• Requires police power • Temporary solution	Implement
	Bus stop location	Conduct villagewide traffic slogan contest and appropriate gateway signing program	• Promotes citizen involvement and traffic management awareness • Identifies village as a traffic management community • Serves as coordinating action to reinforce and promote traffic management plan recommendations	• None	Implement
		Villagewide bus stop location review based upon adopted plan criteria	• Improved transit service	• None	Implement

Source: SEWRPC.

speed which they consider to be safe and appropriate. Reducing the speed limit to 25 mph may be expected to increase the speed differential between vehicles traveling on N. Lake Drive, as some drivers will obey the posted speed limit while others will continue to travel at the speed they consider to be safe and appropriate. This increase in speed differential may be expected to cause increased vehicle conflicts and passing maneuvers, resulting in a higher potential for accidents. Therefore, implementation of this alternative is not recommended.

The installation of traffic signals at an estimated cost of $23,000 or stop signs at an estimated cost of $100 on N. Lake Drive may be expected to reduce average travel speeds in the vicinity of such devices. According to the criteria set forth in the Manual on Uniform Traffic Control Devices, published by the U. S. Department of Transportation, Federal Highway Administration, however, additional traffic signals are not warranted along N. Lake Drive. The disadvantages of this alternative are that it may be expected to increase vehicle delay by stopping vehicles that were previously uncontrolled; it may be expected to increase the accident potential in the vicinity of the stop-controlled intersections; and it may be expected to actually increase vehicle speeds between traffic signal or stop sign locations along N. Lake Drive as drivers increase their travel speeds to make up for time lost at stop-controlled intersections. Implementation of this alternative is not recommended.

Increased enforcement of the existing speed limit may be expected to reduce vehicle operating speeds to the posted 30-mph speed limit. The disadvantages of this alternative are that it will require police manpower, which diverts officers from other police department duties. Moreover, such enforcement serves only as a temporary solution, with average travel speeds being reduced primarily during periods of police surveillance. Nevertheless, if the community desires to solve this speeding vehicle problem, then it is recommended that the speed limit on N. Lake Drive be strictly enforced, particularly during the midday and evening time periods.

The construction of roadway narrowings along N. Lake Drive at an estimated cost of $1,500 per narrowing may be expected to effectively reduce vehicle speeds by reducing the effective pavement width from 44 to 28 feet. However, this alternative would also create a traffic congestion problem by effectively removing a lane of traffic from N. Lake Drive which is required for the safe and efficient operation of traffic during the peak travel times of the day. The resulting congestion may be expected to divert through traffic to other arterial and local streets in the Village. Implementation of this alternative is not recommended.

A final alternative that may be expected to reduce vehicle speeds on N. Lake Drive is the construction of speed control humps at an estimated cost of $700 each. Speed control humps are 4 inch high-by-12 feet wide raised undulations in the roadway surface spaced approximately 600 feet apart. Speed control humps are not recommended for installation on arterial facilities, however, because of the severe impedance they have on traffic flow within and through a community, and the attendant safety problems that can be created. Traffic speeds are generally reduced to about 20 mph as vehicles traverse a speed control hump installation. Implementation of this alternative is not recommended.

E. Lake Bluff Boulevard

In addition to a speeding vehicle problem, a pedestrian safety problem and lack of stop signs was reported at the N. Lake Drive intersection with E. Lake Bluff Boulevard. Commission staff conducted field observations at this location during the 12:00 noon to 5:00 p.m. time period on Wednesday, February 22, 1984, when weather conditions were 60°F and sunny, and on Thursday, May 31, 1984, when weather conditions were 72°F and sunny. During the five-hour survey period on February 22, the greatest number of pedestrians--11--crossed N. Lake Drive at E. Lake Bluff Boulevard between 4:00 p.m. and 5:00 p.m., with the two-way peak traffic volume on N. Lake Drive of 1,063 vehicles occurring at the same time. On May 31, the greatest number of pedestrians--eight--crossed N. Lake Drive between 1:00 p.m. and 2:00 p.m., and the maximum two-way traffic volume was 1,460 vehicles from 4:00 p.m. to 5:00 p.m. A vehicle gap study was subsequently conducted by Commission staff on June 15, 1984, between 2:00 p.m. and 3:00 p.m. to identify gaps in the traffic stream for safe pedestrian movement during the nonpeak midday time period. The minimum vehicle gap is equal to the amount of time a pedestrian requires to safely cross the street without coming in conflict with a passing vehicle. Based upon a minimum vehicle gap time of 16 seconds, an adequate gap in the traffic stream for safe pedestrian movement across N. Lake Drive was found to exist only about 9 percent of the time between 2:00 p.m. and 3:00 p.m.

Alternative traffic management actions in addition to those already mentioned for N. Lake Drive with potential to solve these problems include the installation of a pedestrian-actuated traffic signal and the construction of median islands at the intersection. The advantage of a pedestrian-actuated traffic signal at this intersection, at an estimated cost of $25,000, is that it may be expected to increase traffic safety for pedestrians crossing N. Lake Drive without unnecessarily delaying vehicular traffic, and it may be expected to solve the reported stop sign disrespect problem on N. Lake Bluff Boulevard. The disadvantage of this alternative is that not all pedestrian crossings of N. Lake Drive occur at E. Lake Bluff Boulevard, limiting the effectiveness of this alternative to the E. Lake Bluff Boulevard intersection crosswalks. This disadvantage is partially offset by the fact that eastbound vehicular traffic on E. Lake Bluff Boulevard would periodically actuate the traffic signals, providing an additional gap for pedestrians to cross N. Lake Drive at other crosswalk locations. It is therefore recommended that a semi-traffic/pedestrian-actuated traffic signal be installed at this location.

A second alternative considered to improve pedestrian safety at this intersection is the construction of median pedestrian refuge islands on N. Lake Drive at an estimated cost of $1,500. This alternative would create a mid-roadway refuge area for pedestrians, thereby reducing the vehicle gap time required for pedestrians to safely cross to the center of the N. Lake Drive roadway and thence to the opposite side. The disadvantage of this alternative is that a minimum width, four-foot-wide pedestrian island would reduce the usable roadway width to 40 feet. This would provide for four 10-foot-wide traffic lanes, considered substandard for an urban arterial facility, and thus this alternative could be expected to lead to increased motor vehicle accidents and restricted traffic flow through the intersection. Implementation of this alternative is not recommended.

Even though the installation of a pedestrian-actuated traffic signal at the N. Lake Drive intersection with E. Lake Bluff Boulevard will also resolve the problem of a lack of stop signs at that intersection, it is recommended that a stop sign evaluation and public information program be undertaken by village officials--based upon the adopted plan criteria--to eliminate unwarranted stop signs. Stopping frequently at intersections with unwarranted stop signs can create problems for traffic flow, is irritating to motorists, increases travel speeds downstream from the stop sign, and encourages disrespect for warranted stop signs and traffic controls. Implementation of this recommendation should serve to improve traffic control respect and reduce speeding vehicle problems throughout the Village, particularly on land access streets in residential neighborhoods.

In summary, it is recommended that there be greater enforcement of the 30-mph speed limit on N. Lake Drive; that a semi-traffic/pedestrian-actuated traffic signal be installed at the N. Lake Drive intersection with E. Lake Bluff Boulevard; and that a stop sign evaluation and public information program be undertaken in the Village based upon the adopted traffic management control criteria set forth in this report.

N. STOWELL AVENUE

Speeding vehicles and a lack of stop signs are the problems that reportedly exist at the local street intersections with N. Stowell Avenue between E. Capitol Drive and E. Lake Bluff Boulevard. As shown in Table 9, the alternative traffic control measures considered to resolve these problems include installing speed control humps, constructing roadway narrowings, and carrying out a villagewide stop sign evaluation program.

The installation of speed control humps along N. Stowell Avenue at an estimated cost of $700 each may be expected to effectively reduce and control vehicle operating speeds. Speed control humps are a positive form of speed control which causes discomfort for drivers who are traveling at a high rate of speed and should be restricted to use on land access streets with low traffic volumes which are not expected to carry heavy truck, bus, or through traffic. Average speeds of slightly under 20 mph can be expected on speed hump-controlled streets. The disadvantage of speed control humps is that traffic may be diverted to alternative routes. Since N. Stowell Avenue is a land access street which lacks through street continuity, its principal function is to provide access to the abutting residential properties. Under these circumstances, traffic diversion should be minimal since there are few alternative routes to serve the residential land uses adjacent to N. Stowell Avenue. Based upon concern expressed by members of the Comprehensive Traffic Study Task Force that speed control humps would not be an acceptable traffic control measure to village residents on N. Stowell Avenue, implementation of this alternative is not recommended.

As previously noted, stop signs should not be installed for speed control purposes only. As shown on Maps 14 through 16 in Chapter III, there were no high motor vehicle accident locations found along N. Stowell Avenue from 1981 through 1983. Implementation of this alternative is not recommended. However, N. Stowell Avenue should be evaluated under the recommended villagewide stop sign evaluation and public information program.

The construction of roadway narrowings on N. Stowell Avenue at an estimated cost of $1,500 per narrowing may be expected to reduce vehicle travel speeds. However, the existing roadway width is 24 feet and further width reductions through narrowings could adversely restrict traffic flow. Implementation of this alternative is not recommended.

In summary, it is recommended that a villagewide stop sign and public information program be initiated based upon the adopted traffic management control criteria set forth in this report.

N. PROSPECT AVENUE

It was reported that there is a lack of respect for stop signs on the segment of N. Prospect Avenue between E. Jarvis Street and E. Lake Bluff Boulevard. The initiation of the recommended stop sign evaluation and public information program in the Village should serve to effectively improve stop sign respect on this segment of N. Prospect Avenue.

N. FARWELL AVENUE

It was reported that there is a speeding vehicle problem and a lack of stop signs on the segment of N. Farwell Avenue between E. Capitol Drive and E. Kensington Boulevard. In particular, a need for stop signs at the intersection of N. Farwell Avenue and E. Lake Bluff Boulevard was indicated. North Farwell Avenue is similar in design and functional service to N. Stowell Avenue except the portion between E. Capitol Drive and E. Jarvis Street, which varies in roadway width from 30 to 37 feet. The alternative traffic control measures considered to resolve these problems, as shown in Table 9, are similar to those considered for N. Stowell Avenue. As already noted, stop signs should not be installed to control vehicle speeds. As shown on Maps 14 through 16 in Chapter III, there was not a motor vehicle accident problem on N. Farwell Avenue from 1981 through 1983. For this reason, the installation of additional stop signs along N. Farwell Avenue is not recommended at this time. However, the initiation of the recommended stop sign evaluation and public information program in the Village in accordance with the adopted traffic management control criteria set forth in this report should help to alleviate the traffic management problems on this segment of N. Farwell Avenue.

N. OAKLAND AVENUE

Traffic problems were reported at several locations on N. Oakland Avenue.

River Park Court Apartments

As shown in Table 9, one reported problem on N. Oakland Avenue is traffic diversion at River Park Court to avoid the northbound left-turn restriction at the intersection of N. Oakland Avenue and E. Menlo Boulevard. The alternative traffic control measures considered to solve this problem include installing private drive signs at the River Park Court apartments,[1] constructing

[1]This was implemented in 1984 at a cost of about $50, while the traffic study was in progress.

a driveway cul-de-sac, installing speed control bumps, improving traffic flow on N. Oakland Avenue, and prohibiting northbound left turns at the River Park Court intersection with N. Oakland Avenue.

The primary advantage of constructing a cul-de-sac on the River Park Court apartment driveway, at an estimated cost of $2,000, is that it would physically prohibit vehicles from using River Park Court as a diversion route to access N. Morris Boulevard. This action would have the disadvantage of reducing accessibility and emergency vehicle access to the River Park Court apartments. Implementation of this alternative is not recommended.

The installation of speed control bumps at an estimated cost of $400 each on the driveway along the east and north sides of the River Park Court apartments may be expected to discourage traffic diversion by requiring vehicles to travel at a reduced speed of 5 mph. Such bumps--in contrast to speed control humps--are 4 inches high by 12 feet wide. The disadvantages of this alternative are that it would create a noise problem since the bumps would be located immediately adjacent to the windows of the first floor apartment units, and it would create a hazardous situation for emergency vehicle occupants. Implementation of this alternative is not recommended.

Improving traffic flow conditions on N. Oakland Avenue and E. Capitol Drive through traffic signal timing improvements and the provision of traffic progression, at an estimated total cost of $45,000, may be expected to reduce traffic diversion to other arterial routes and land access streets while reducing unnecessary vehicle delays and congestion on N. Oakland Avenue. This alternative involves interconnecting the traffic signals on E. Capitol Drive and installing new traffic signal control equipment and traffic actuation loops on the approaches to the intersection of E. Capitol Drive and N. Oakland Avenue. There are no significant disadvantages to this alternative. It is recommended that this alternative be implemented.

The final alternative considered to solve this traffic diversion problem is the prohibition of northbound left turns at River Park Court at an estimated cost of $100. This alternative should discourage a majority of the vehicles using River Park Court as a short-cut route to N. Morris Boulevard. In so doing, however, this alternative would also reduce accessibility to the River Park Court apartments, resulting in increased vehicle travel times and delay for drivers with a destination at the apartments. Implementation of this alternative is not recommended.

E. Shorewood Boulevard

As shown in Table 9, the traffic problems at the intersection of N. Oakland Avenue with E. Shorewood Boulevard include traffic congestion, difficulty in entering the traffic stream, and pedestrian safety problems. The alternative traffic control measures considered to solve these problems include traffic signal retiming, the provision of traffic progression on N. Oakland Avenue, modification of the traffic signal operation, and the prohibition of left turns on the E. Shorewood Avenue and Shorewood High School parking lot approaches to the intersection.

Traffic signal retiming, which has no capital costs, would involve changing the proportion of red and green time allotted per signal cycle to N. Oakland Avenue and E. Shorewood Boulevard, respectively. This action may be expected to reduce vehicle delays for motorists on E. Shorewood Boulevard and the Shorewood High School parking lot driveway approaches to the intersection. High school parking lot traffic demand peaks during the school starting, dismissal, and lunch time periods of the day, with a maximum hourly volume of 103 vehicles exiting the lot from 3:00 p.m. to 4:00 p.m. During the same time period, N. Oakland Avenue has a northbound volume of 711 vehicles. The peak-hour traffic volumes on E. Shorewood Boulevard and the high school driveway approaches to the intersection do not exceed 14 percent of the volume entering the intersection, and, as shown in Table 2 in Chapter II, currently receive, 18 seconds of green time, or about 20 percent of the existing 90-second signal cycle time. Any modifications to the traffic signal cycle timing may be expected to disproportionately delay high volumes of traffic on N. Oakland Avenue in comparison to traffic delays experienced by motorists on E. Shorewood Boulevard or the high school driveway. Implementation of this alternative is not recommended.

The provision of traffic progression through the interconnection and retiming of the traffic signals on N. Oakland Avenue and E. Capitol Drive, at an estimated cost of $45,000, should reduce vehicle delays and congestion experienced by vehicles on N. Oakland Avenue at the E. Shorewood Boulevard intersection. As previously noted, there are no significant disadvantages to this alternative. This recommendation is supported by the improvement in traffic flow that would result at the intersection of N. Oakland Avenue and E. Shorewood Boulevard.

Another alternative action considered at this intersection is the modification of the existing traffic signal from a fixed-time to a semi-actuated operation, with a background cycle for traffic progression, at a capital cost of $15,000. This action would permit the traffic signal to be actuated by vehicular traffic on the E. Shorewood Boulevard or the Shorewood High School parking lot driveway approaches to the intersection; in addition, the signal could be actuated by push-button by pedestrians desiring to cross N. Oakland Avenue. The advantages of this alternative are that it does not require the traffic signal to unnecessarily interrupt traffic flow on N. Oakland Avenue; it permits the traffic signal to vary the amount of green time provided for traffic on the E. Shorewood Boulevard or high school driveway intersection approaches, based upon the volume demand on those approaches; and it increases pedestrian safety by reducing delay for a pedestrian desiring to cross N. Oakland Avenue. It is recommended, therefore, that the existing traffic signal be modified to a semi-traffic/pedestrian-actuated operation with a background cycle for traffic progression.

The final alternative action considered at this intersection is the prohibition of east- and westbound left turns at an estimated cost of $200. This alternative would eliminate the basic conflicting traffic movements at the intersection and reduce the delay experienced by vehicles entering N. Oakland Avenue from both the high school parking lot and E. Shorewood Avenue approaches to the intersection. The disadvantages of this alternative are that it would increase vehicle delays and conflicts at other intersections

along N. Oakland Avenue, and may be expected to divert traffic onto land access streets in residential areas of the Village. Implementation of this alternative is not recommended.

E. Capitol Drive

It was reported that there are traffic congestion, pedestrian safety, and lane continuity problems at this intersection. As noted in Chapter III, the southbound approach of N. Oakland Avenue is experiencing a congested average delay of 44.5 seconds per vehicle during the midday period. Maps 14 through 16 in Chapter III identify the intersection of N. Oakland Avenue and E. Capitol Drive as the highest accident location in the Village during the years 1981 through 1983.

As shown in Table 9, the alternative traffic control measures considered to resolve the traffic problems at this intersection include modifying the traffic signals to traffic-actuated operation, the provision of traffic progression on N. Oakland Avenue and E. Capitol Drive, the designation of two lanes for northbound left turns, the reconstruction of the eastbound right- and left-turn channelization, and the prohibition of parking on E. Capitol Drive.

Modification of the traffic signals would involve the installation of traffic-actuated capabilities on all four approaches to the intersection, including the north- and eastbound exclusive left-turn lanes, at an estimated cost of $25,000. This intersection would be designed to serve as the master control intersection for traffic progression on E. Capitol Drive and N. Oakland Avenue. This alternative has the advantage of maximizing the capacity of the existing intersection and minimizing vehicle delays without requiring major reconstruction of the approaches to the intersection or regulatory turn and parking restrictions. This alternative also has the advantage, through improved intersection operation, of attracting through traffic from residential land access streets and arterials in the Village. There are no significant disadvantages to this alternative. It is therefore recommended that a traffic-actuated signal system be installed at the intersection of N. Oakland Avenue and E. Capitol Drive.

The recommended provision of traffic progression on N. Oakland Avenue and E. Capitol Drive may be expected to reduce vehicle delays and traffic diversion to other routes in the Village. The provision of efficient traffic progression should also serve to improve operating conditions and maximize utilization of the existing capacity of the intersection of N. Oakland Avenue and E. Capitol Drive.

Another alternative action considered to solve the traffic problems at this intersection is changing the northbound approach lane designation from three separate lanes for left-, through, and right-turn movements to a separate lane for left turns, a combined left-turn and through lane, and a separate right-turn lane, at an estimated cost of $1,000. The advantage of this alternative is that it would provide additional roadway capacity to accommodate the high-volume, northbound, left-turn movement, thereby permitting additional green signal time to be used to reduce the delay and congestion experienced by the southbound through traffic movement. The disadvantage of this alternative is that the additional left-turn lane may be expected to adversely impact

the northbound through traffic movement, creating a potential accident and operational problem as northbound left-turn vehicles in the center, or combined through and left-turn, lane may be required to wait for a gap in the southbound traffic stream, effectively restricting the northbound through movement, causing increased delays for that traffic movement and creating a potential accident problem as the restricted through vehicles attempt to maneuver around the left-turn vehicles and conflict with vehicles in the adjacent right-turn lane. Implementation of this alternative is not recommended.

Another alternative considered to improve operating conditions, as well as to solve the lane continuity problem on the eastbound approach to the intersection, involves reconstructing the left- and right-turn lanes to increase the left-turn lane taper from 65 to 100 feet and to replace the sharp right-turn lane taper with a more gradual transition radius, at an estimated cost of $5,000 each. Both of these actions would serve to improve lane continuity and may be expected to control and minimize last-second vehicle lane changes and uncertainty as the driver enters the intersection. This alternative would require lane designation signs and pavement markings to adequately inform drivers of the restricted lane use through the intersection. The only disadvantage of this alternative is the potential for through vehicles to utilize the right-hand turn lane as a through traffic lane. This problem can be ameliorated with the installation of adequate advance signing and pavement markings. It is recommended that the eastbound left- and right-turn lanes be reconstructed with increased transition tapers and that attendant lane designation signs and pavement markings be installed to improve driver guidance through the intersection.

The final alternative action considered to solve the traffic problems at this intersection is the prohibition of on-street parking on the south side of E. Capitol Drive east of its intersection with N. Oakland Avenue at an estimated cost of $100. The advantage of this alternative is that it would increase intersection capacity and permit traffic signal modification to provide additional green signal time for the congested southbound through traffic movement. The disadvantages of this alternative are that it would adversely impact transit system operation on eastbound E. Capitol Drive and create a potential accident problem, since vehicles in the two eastbound through traffic lanes would be required to merge in the vicinity of N. Murray Avenue. Implementation of this alternative is not recommended.

In summary, it is recommended that the traffic signals at this intersection be modified for traffic-actuated operation; that traffic progression signalization be provided on both N. Oakland Avenue and E. Capitol Drive, particularly for the north- to westbound left-turn movement; that the eastbound left- and right-turn exclusive turn lanes be reconstructed with increased transition tapers; and that lane designation signs be installed and pavement markings be added on the eastbound approach to the intersection.

Sendik's Food Market

Traffic congestion, difficulty in entering the traffic stream, and pedestrian safety problems were reported in the vicinity of the Sendik's Food Market driveways on N. Oakland Avenue. A special pedestrian and driveway turning movement study was conducted by Commission staff from 11:00 a.m. to 4:00 p.m. on Wednesday, February 22, 1984, at the Sendik's Food Market.

Weather conditions were favorable for pedestrian activity, with sunny skies and 55°F temperatures. As shown in Table 10, a total of 420 pedestrians crossed N. Oakland Avenue during this five-hour midday time period; and a total of 402 vehicles entered the three Sendik's parking lot driveways on N. Oakland Avenue, of which 197, or 49 percent, made northbound left turns. In addition, a total of 264 vehicles exited the parking lot, of which 78, or 30 percent, made left turns to travel northbound on N. Oakland Avenue.

As shown in Table 9, the alternative traffic control measures considered to resolve these problems include the prohibition of left turns, the construction of a median barrier on N. Oakland Avenue, a reduction in the number of driveway openings, the installation of a pedestrian-actuated traffic signal, the construction of roadway narrowings, and traffic signal modification at the intersection of N. Oakland Avenue and E. Capitol Drive.

The prohibition of left turns into the Sendik's Food Market driveways, at an estimated cost of $400, would reduce the number of vehicle conflict areas along N. Oakland Avenue. This action would improve traffic flow, thereby reducing congestion and increasing pedestrian safety in the area of Sendik's Food Market. The disadvantages of this action are the reduced accessibility that would be provided to customers using the Sendik's parking lot and the attendant increases in vehicular traffic at the E. Kenmore Place intersection with N. Oakland Avenue, as northbound drivers would be required to use E. Kenmore Place to enter the Sendik's parking lot. Implementation of this alternative is not recommended.

The construction of a four-foot-wide median barrier along the segment of N. Oakland Avenue from E. Capitol Drive to E. Kenmore Place, at an estimated cost of $10,000, would increase pedestrian safety by providing a mid-roadway refuge area for pedestrians crossing N. Oakland Avenue in the vicinity of Sendik's Food Market, and would reduce vehicle conflict areas by eliminating movement of left turns in and out of the Sendik's parking lot. The disadvantage of this alternative is that it would reduce the usable roadway width on N. Oakland Avenue from 50 to 46 feet, decreasing vehicle maneuverability on

Table 10

MIDDAY PEDESTRIAN AND TURNING MOVEMENT VOLUMES AT THE N. OAKLAND AVENUE AND E. ELMDALE COURT INTERSECTION AND SENDIK'S FOOD MARKET PARKING LOT DRIVEWAYS ON N. OAKLAND AVENUE ON WEDNESDAY, FEBRUARY 22, 1984: 11:00 A.M. TO 4:00 P.M.

Time Period	Pedestrian Crosswalks				Turning Movement Volumes Sendik's Parking Lot Driveways							
	N. Oakland Avenue			E. Elmdale Court	South Entrance		Center Exit		North Entrance		Total Entering	
	North	South	Total		Left	Right	Left	Right	Left	Right	Left	Right
11:00 a.m. to Noon.....	11	65	76	47	39	15	42	8	8	17	47	32
Noon to 1:00 p.m.....	18	91	109	49	23	13	32	13	11	21	34	34
1:00 p.m. to 2:00 p.m..	13	62	75	42	24	27	41	16	10	25	34	52
2:00 p.m. to 3:00 p.m..	19	55	74	63	33	19	33	18	9	19	42	38
3:00 p.m. to 4:00 p.m..	25	61	86	78	31	27	38	23	9	22	40	49
Total	86	334	420	279	150	101	186	78	47	104	197	205

Source: SEWRPC.

this roadway segment of heavy pedestrian and vehicle parking activity and reducing accessibility to the Sendik's parking lot. Implementation of this alternative is not recommended.

Another alternative action considered to solve the traffic problems at this location is reducing the number of Sendik's parking lot driveways on N. Oakland Avenue from three to one at an estimated cost of $15,000. This action would reduce and control the number of vehicle conflict areas on N. Oakland Avenue and thus may be expected to reduce congestion and improve pedestrian safety on N. Oakland Avenue. The only disadvantage of this alternative is the minor reduction in accessibility provided to Sendik's parking lot. It is therefore recommended that the number of driveways on N. Oakland Avenue to the Sendik's Food Market parking lot be reduced.

The installation of a pedestrian-actuated traffic signal at the intersection of N. Oakland Avenue and E. Elmdale Court, at an estimated cost of $25,000, could increase pedestrian safety in the vicinity of the Sendik's Food Market. However, implementation of this action may be expected to increase traffic congestion and vehicle delays on N. Oakland Avenue. The distance from E. Elmdale Court to E. Capitol Drive, about 250 feet, is not a favorable spacing for efficient traffic progression on N. Oakland Avenue. Implementation of this alternative is not recommended.

The construction of roadway narrowings on N. Oakland Avenue at the southern E. Elmdale Court pedestrian crosswalk, at an estimated cost of $2,000 per narrowing, would reduce the roadway pavement width on N. Oakland Avenue from 50 to 36 feet. The advantage of this alternative is that it would improve pedestrian safety by providing a readily identifiable location for motorists to expect pedestrian activity and would reduce pedestrian exposure to vehicular traffic. This action would not be expected to create a significant vehicle congestion problem, as the proposed narrowings would not extend into the through roadway beyond the vehicles parked on the segment of N. Oakland Avenue between E. Capitol Drive and E. Elmdale Court. The only disadvantage of this alternative is that it would remove one on-street parking stall on both the east and west sides of N. Oakland Avenue south of E. Elmdale Court. It is recommended that a roadway narrowing for a pedestrian crosswalk area be constructed at the southern crosswalk of the intersection of N. Oakland Avenue and E. Elmdale Court.

The recommended traffic signal modification to traffic-actuated operation at the intersection of N. Oakland Avenue and E. Capitol Drive should reduce vehicle queues and congestion on southbound N. Oakland Avenue in the vicinity of Sendik's Food Market, thereby improving pedestrian safety at the E. Elmdale Court intersection. Implementation of this recommendation is supported by the beneficial impact it may be expected to have in the vicinity of Sendik's Food Market.

In summary, it is recommended that the number of driveway openings at the Sendik's Food Market parking lot on N. Oakland Avenue be reduced from three to one, that a roadway narrowing be constructed at the southern crosswalk of the intersection of N. Oakland Avenue and E. Elmdale Court, and that the traffic signal operation at the intersection of N. Oakland Avenue and E. Elmdale Court be modified from fixed-time to traffic-actuated.

Kohl's Food Store

Problems of traffic congestion and difficulty in entering the traffic stream were reported at the Kohl's Food Store development on N. Oakland Avenue. As shown in Table 9, the alternative traffic control actions considered to resolve these problems include the prohibition of left turns, a reduction in the number of driveway openings, and the installation of traffic signals at the intersection of N. Oakland Avenue and E. Wood Street or E. Olive Street.

The prohibition of left turns and a reduction in the number of driveway openings at the Kohl's Food Store parking lot have advantages and disadvantages similar to those discussed for Sendik's Food Market. According to a parking lot design analysis conducted by village staff, however, internal parking lot circulation would be severely restricted by a reduction in the number of driveway openings on N. Oakland Avenue. Implementation of this alternative is therefore not recommended.

Another alternative action considered to solve the traffic problems at the Kohl's Food Store development is the installation of a traffic signal at the intersection of N. Oakland Avenue and E. Wood Street or E. Olive Street, at an estimated cost of $30,000. This alternative would provide additional gaps in the southbound traffic stream to facilitate the movement of turns into and out of the Kohl's parking lot. The disadvantages of this alternative are that it would increase delay for vehicular traffic on N. Oakland Avenue and it has the potential to create an accident problem in the vicinity of the traffic signals. Neither local street intersection with N. Oakland Avenue meets the warrants for traffic signals set forth in the Manual on Uniform Traffic Control Devices. Implementation of this alternative is not recommended.

In summary, there are no recommended traffic management solutions to the problems of traffic congestion and difficulty in entering the traffic stream in the vicinity of the Kohl's Food Store development on N. Oakland Avenue.

Benjamin's Delicatessen and Baskin Robbins Ice Cream Store

Problems of traffic congestion and difficulty in entering the traffic stream were reported at the N. Oakland Avenue parking lot driveway shared by these two commercial developments. The parking lot is approximately 50 feet wide and 140 feet long, with a row of 14 parking stalls set at 90 degrees to the northern lot boundary adjacent to both Benjamin's Delicatessen and Baskin Robbins Ice Cream Store, and a row of eight parking stalls set at an angle of about 45 degrees to the southern boundary of the parking lot. This parking lot design results in an effective center aisle width between parked vehicles of about 12 feet.

As shown in Table 9, the alternative traffic control actions considered to resolve these reported problems include construction of an additional parking lot driveway, redesign of the existing parking lot layout, and reconstruction of the parking lot driveway on N. Oakland Avenue.

Construction of an additional driveway on the eastern boundary of the existing parking lot, at an estimated cost of $10,000 plus $100,000 for right-of-way acquisition, would permit the operation of the center aisle to be changed from

two-way to one-way operation, and the angle parking stalls along the northern lot boundary to be changed to 45-degree angle stalls. These changes would improve internal parking lot circulation meeting standard parking lot design criteria, and would reduce vehicle conflict problems at the parking lot driveway on N. Oakland Avenue. The disadvantage of this alternative is that it would require the razing of at least one residential home and the relocation of the family residing therein. It is recommended that this alternative be implemented as a long-range improvement when the required property becomes available for village purchase.

Redesign of the existing parking lot layout would involve changing the 45-degree parking stalls located along the southern boundary of the parking lot to parallel parking, at an estimated cost of $300. This would reduce the total number of parking stalls in the lot from 22 to 18. This alternative has the advantage of increasing the center aisle width from 12 to 22 feet, which approaches the acceptable standard aisle width of 25 feet for 90-degree angle parking, permitting improved traffic circulation within the lot. The disadvantages of this alternative are that it creates a potential accident problem, with vehicles backing out of the 90-degreee parking stalls and striking a parallel-parked vehicle, and it reduces the total number of parking stalls in the lot by 18 percent. It is recommended as a short-range improvement measure that the 45-degree angle parking be changed to parallel parking along the southern parking lot boundary.

Another alternative parking lot redesign would involve prohibiting parking along the southern lot boundary, at an estimated cost of $200. This alternative would improve traffic circulation within the lot, removing the conflict between parked vehicles on the north and south lot boundaries and providing a 31-foot-wide center aisle which exceeds the recommended standard width of 25 feet. The disadvantage of this alternative is that it reduces parking lot capacity by 36 percent, from 22 to 14 stalls. Implementation of this alternative is not recommended.

The final alternative considered to solve the traffic problems associated with this parking lot involves reconstructing the parking lot entrance on N. Oakland Avenue to provide a well-defined and identifiable driveway with an effective 24-foot-wide combined entrance and exit. Under this alternative, the parking lot driveway would be redesigned with raised entrance channelization planters and pavement markings at an estimated total cost of $10,000 to provide a positive parking stall and parking lot boundary identification. This alternative would control vehicle conflicts at the driveway entrance, providing a positive parking lot identity and reinforcing the internal parking lot traffic circulation pattern. There are no significant disadvantages to this alternative. It is therefore recommended that the parking lot entrance be reconstructed to a 24-foot width, with attendant raised entrance channelization, planters, and pavement markings.

In summary, it is recommended as a short-range improvement measure that the Benjamin's Delicatessen and Baskin Robbins Ice Cream Store combined parking lot be redesigned to include parallel parking stalls along the southern lot boundary and that the parking lot entrance be reconstructed to provide a 24-foot-wide driveway with raised channelization, planters, and pavement markings. It is further recommended as a long-range improvement measure that

the Village of Shorewood purchase the right-of-way necessary to construct an additional driveway on the eastern boundary of the parking lot to permit one-way operation and improve parking lot circulation.

E. Menlo Boulevard

Problems of accessibility, pedestrian safety, and disrespect for traffic signal control were reported at the intersection of N. Oakland Avenue and E. Menlo Boulevard. As shown on Map 9 in Chapter II, northbound left turns are prohibited at this intersection. Maps 14 through 16 in Chapter III indicate that this intersection has been identified as an accident problem intersection in the Village for the period 1981 through 1983. Of the 22 accidents reported over this three-year period, one accident involved a pedestrian and one accident involved a collision with a bicycle, the other 20 accidents having involved vehicles only. It is estimated, based on the trip data shown in Figures 3 and 4 in Chapter III, that 4,000 vehicle trips per average weekday either originate at, or are destined for, the residences located adjacent to E. Menlo and N. Morris Boulevards, E. Newton Avenue, and E. Beverly Road. This is in comparison to the 1984 average weekday traffic volume of 4,100 vehicles per day for N. Morris Boulevard south of E. Capitol Drive, as shown on Map 10 in Chapter III, and 3,100 vehicles per day on E. Menlo Boulevard west of N. Oakland Avenue, which indicates that approximately 1,500 vehicles are still using the E. Menlo/N. Morris Boulevard as a through arterial. Prior to the 1983 prohibition of northbound left turns at this intersection and eastbound right turns at the intersection of N. Morris Boulevard and E. Capitol Drive, approximately 8,300 vehicles per average weekday traversed the E. Menlo/ N. Morris Boulevard route.

As shown in Table 9, the alternative traffic control measures considered to solve these problems include removing the northbound left-turn prohibition, modification of the traffic signal sequence, the provision of traffic progression on N. Oakland Avenue, the provision of guide signing to the UWM campus, the construction of a new arterial street from N. Wilson Drive to E. Edgewood Avenue, the construction of a cul-de-sac on E. Menlo Boulevard or N. Morris Boulevard, the construction of roadway narrowings, and the construction of traffic circles on E. Menlo Boulevard.

The removal of the northbound left-turn prohibition at the intersection of N. Oakland Avenue and E. Menlo Boulevard, which was implemented by village officials to reduce through traffic on N. Morris and E. Menlo Boulevards, would increase accessibility to the residences adjacent to E. Menlo and N. Morris Boulevards, and reduce northbound left-turn volumes at the N. Oakland Avenue intersections with E. Newton Avenue, E. Beverly Road, and E. Capitol Drive. There is no capital cost associated with this alternative. The disadvantages of this alternative are that it may be expected to increase the conflict between local and through traffic volumes on E. Menlo and N. Morris Boulevards, and decrease pedestrian safety at the intersection of N. Oakland Avenue and E. Menlo Boulevard. It is recommended that the northbound left-turn prohibition not be removed until all the other traffic control recommendations for N. Morris and E. Menlo Boulevards set forth in this report have been implemented so that traffic volumes do not start to increase to the previously noted 8,300 vehicles per average weekday on the N. Morris/E. Menlo Boulevard route.

Modification of the traffic signal sequence to provide increased walk time for pedestrians crossing N. Oakland Avenue may be expected to increase pedestrian safety at the intersection. There is no capital cost associated with this alternative. The disadvantage of this alternative is that it would create a vehicle delay and congestion problem on N. Oakland Avenue, which may be expected to increase traffic diversion to alternative land access street routes as drivers change their travel patterns to reach their trip destinations with a minimum of delay and inconvenience. Implementation of this alternative is not recommended.

The recommended provision of traffic progression signalization on N. Oakland Avenue and E. Capitol Drive may be expected to reduce vehicle delays and traffic diversion to other routes in the Village, including E. Menlo and N. Morris Boulevards. The provision of efficient traffic progression signalization on N. Oakland Avenue may be expected to reduce vehicle delays and queues at this intersection, thereby increasing pedestrian safety. The recommendation to provide traffic progression signalization on N. Oakland Avenue is supported by the need to improve operating conditions and safety at this intersection.

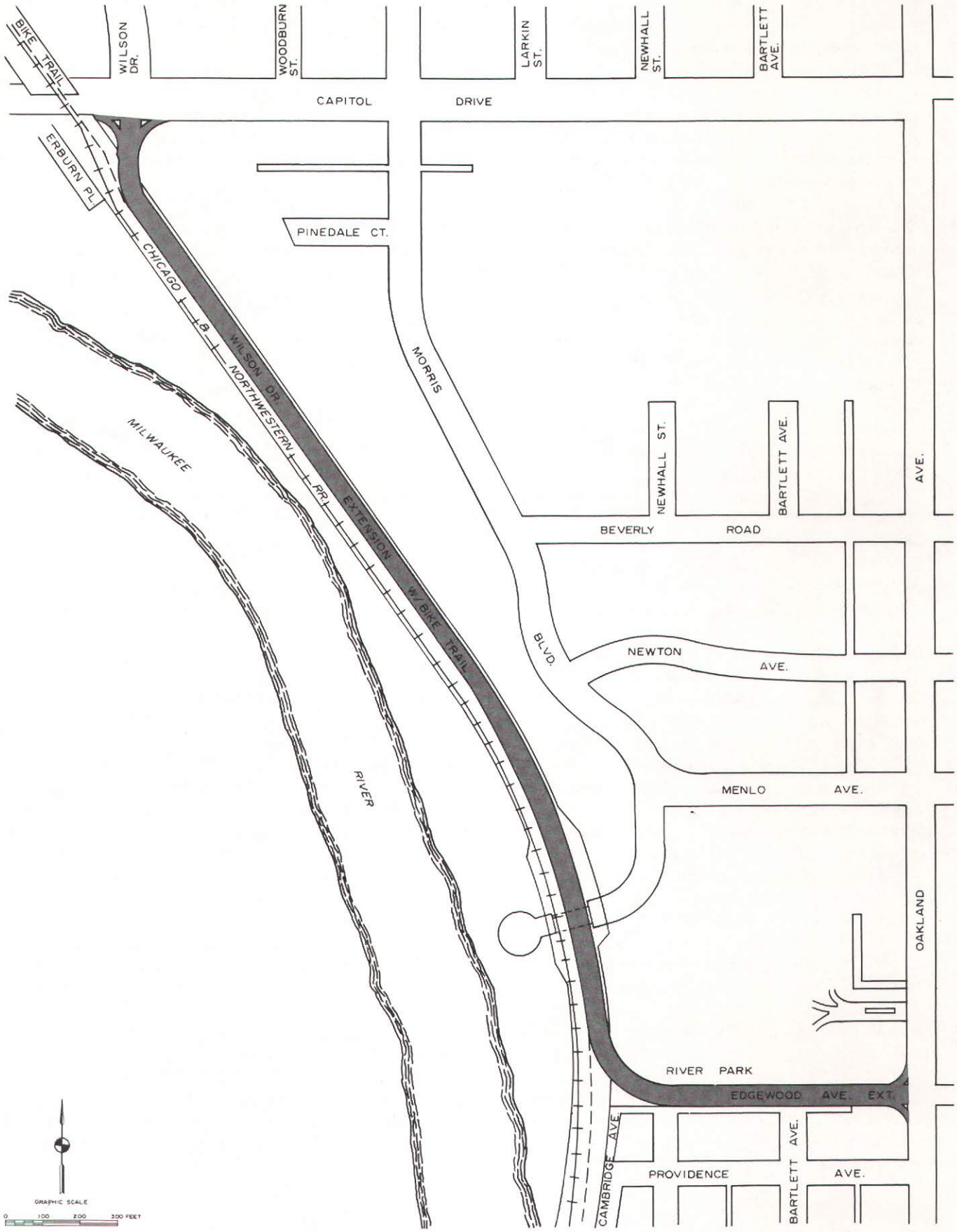
The provision of guide signing to the UWM campus, at an estimated cost of $1,000, may be expected to reduce the conflict between through and local traffic in residential areas of the Village. There are no significant disadvantages to this alternative. It is therefore recommended that guide signing be installed on the segment of E. Capitol Drive between N. Wilson Drive and N. Oakland Avenue, and on the segment of N. Oakland Avenue between E. Capitol Drive and E. Edgewood Avenue. The City of Milwaukee should be encouraged to continue this guide signing program south of E. Edgewood Avenue.

A new arterial street from the intersection of E. Capitol Drive and N. Wilson Drive to the intersection of N. Oakland Avenue and E. Edgewood Avenue, as shown on Map 18, was designed and analyzed in 1978 by the UWM/East Side-North Shore Area transit improvement study citizens' task force. Construction of such an arterial street would cost about $1.1 million. This study involved extensive participation by members of the task force, which included Village of Shorewood residents, and was undertaken to improve transit service to the UWM campus. As indicated in that study, such a new roadway may be expected to abate traffic congestion at the intersection of E. Capitol Drive and N. Oakland Avenue, reduce the conflict between through and local traffic in residential areas of the Village, and increase pedestrian safety along the segment of N. Oakland Avenue between E. Capitol Drive and E. Edgewood Avenue. The disadvantages of this alternative are that it requires the use of the River Park land development for roadway construction purposes, and would require construction in the primary environmental corridor along the Milwaukee River. Implementation of this alternative is not recommended.

A 1983 neighborhood survey was conducted by concerned village citizens of the 144 residences located adjacent to the segment of E. Menlo and N. Morris Boulevards between N. Oakland Avenue and E. Capitol Drive. As shown in Table 11, 88, or 61 percent, of the 144 residences returned completed survey forms. Of these 88 surveys, 80 surveys, or about 91 percent, supported the construction of a cul-de-sac in the vicinity of the N. Morris/E. Menlo Boulevard intersection with the Hubbard Park access road. This basic cul-de-sac traffic control

Map 18

ARTERIAL STREET CONSTRUCTION ALTERNATIVE CONSIDERED TO SOLVE EXISTING TRAFFIC PROBLEMS IN THE VILLAGE OF SHOREWOOD: 1984



Source: UWM/East Side-North Shore Area Transit Improvement Study, 1978.

Table 11

MORRIS BOULEVARD-MENLO BOULEVARD CUL-DE-SAC SURVEY RESPONSES: 1983

Response	Morris Boulevard	Menlo Boulevard	Total	Percent of Total
Strongly in Favor.....	53	18	71	49
Moderately in Favor.....	7	2	9	6
Indifferent.....	4	--	4	3
Moderately Oppose.....	3	--	3	2
Strongly Oppose.....	--	1	1	1
Unreturned.....	36	20	56	39
Total	103	41	144	100

Source: Village of Shorewood Residents.

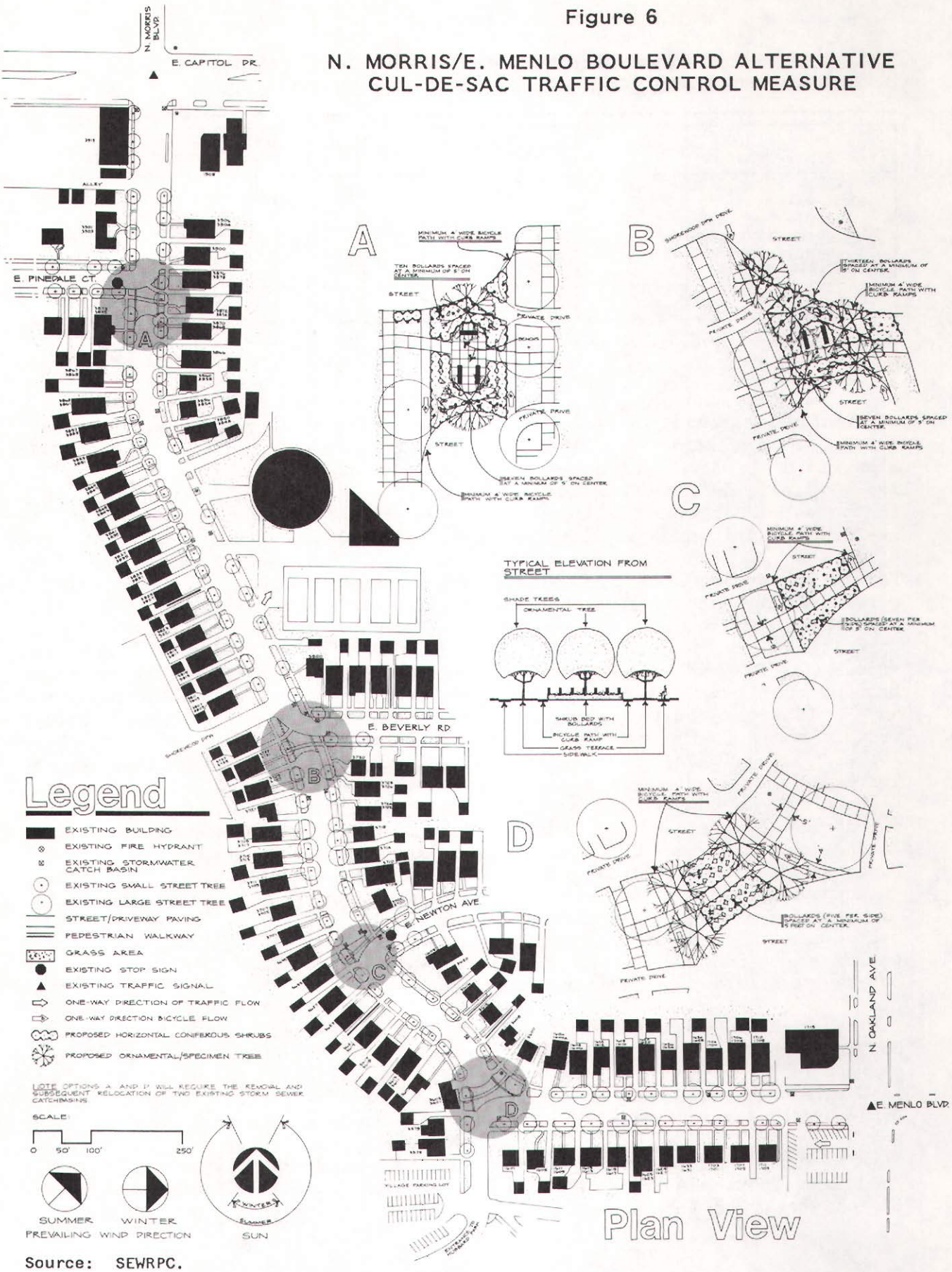
alternative, as shown in Figure 6, could be implemented by constructing a cul-de-sac, at an estimated cost of $12,000, at one of four different locations along E. Menlo Boulevard or E. Morris Boulevard. In each case, the traffic impacts could be expected to be basically similar, with differences only in the volume of traffic diverted to other routes or in the impacts on the residents most directly affected by each alternative cul-de-sac location.

The basic advantage of this alternative is that it eliminates the conflict between through and local traffic on a land access street, thereby increasing pedestrian safety along that street. The disadvantage of this alternative is that it reduces accessibility to the residential and governmental land uses adjacent to E. Menlo and N. Morris Boulevards. More specifically, the construction of cul-de-sac Alternative A at the intersection of N. Morris Boulevard and E. Pinedale Court would have the advantage of eliminating all through traffic on N. Morris Boulevard, reducing traffic volumes from about 4,100 to about 2,500 vehicles per day. The disadvantage of this alternative is the increased travel time and delays that would be experienced by residents on N. Morris Boulevard with a trip origin or destination north or west of the cul-de-sac, as residents would be required to use E. Beverly Road and N. Oakland Avenue to access E. Capitol Drive. This alternative would also restrict accessibility to the Shorewood Middle School on N. Morris Boulevard, resulting in increased traffic volumes at the intersection of N. Oakland Avenue and E. Capitol Drive and on E. Beverly Road. Traffic volumes on E. Beverly Road, based upon the trip data shown in Figure 4 of Chapter III, may be expected to increase from about 1,400 to 2,700 vehicles per day. Implementation of cul-de-sac Alternative A is not recommended.

The construction of cul-de-sac Alternative B at the intersection of N. Morris Boulevard and E. Beverly Road would eliminate all through traffic from the segment of N. Morris Boulevard south of E. Beverly Road. The disadvantages of this alternative are that it would permit through traffic to use the N. Morris Boulevard/E. Beverly Road route to avoid the intersection of E. Capitol Drive and N. Oakland Avenue, which, based upon the trip data shown in Figures 4 and 5 of Chapter III, may be expected to increase traffic volumes on E. Beverly Road from about 1,400 to about 4,000 vehicles per day; it would prohibit direct access to the Shorewood Middle School by residents located south of

Figure 6

N. MORRIS/E. MENLO BOULEVARD ALTERNATIVE CUL-DE-SAC TRAFFIC CONTROL MEASURE



Source: SEWRPC.

E. Beverly Road; and it would increase travel time and delays experienced by those residents on N. Morris Boulevard having trip origins or destinations north or west of E. Beverly Road. Implementation of cul-de-sac Alternative B is not recommended.

The advantages and disadvantages of cul-de-sac Alternative C at the intersection of N. Morris Boulevard and E. Newton Avenue would be similar to those of cul-de-sac Alternative B. Based upon the trip data shown on Figures 4 and 5 in Chapter III, traffic volumes on E. Newton Avenue and E. Beverly Road would increase from about 600 to about 2,000 vehicles per day and from about 1,400 to 2,600 vehicles per day, respectively, under this alternative. Implementation of cul-de-sac Alternative C is not recommended.

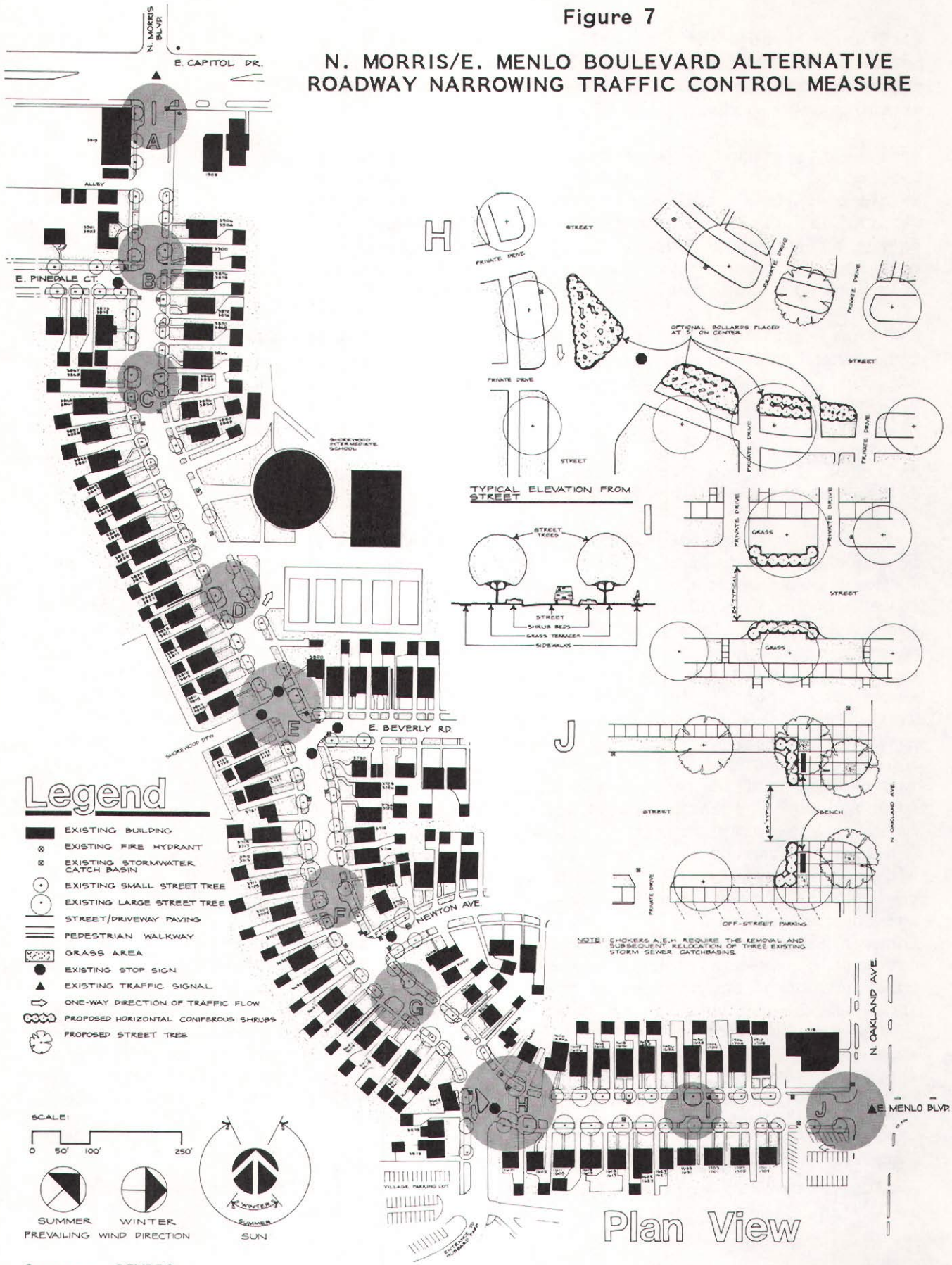
The construction of cul-de-sac Alternative D at the intersection of N. Morris and E. Menlo Boulevards and the Hubbard Park access road would have the advantage of eliminating all through traffic from the segment of E. Menlo Boulevard between N. Morris Boulevard and N. Oakland Avenue. Like Alternatives B and C, this alternative may be expected to increase traffic volumes on E. Newton Avenue and E. Beverly Road, from about 600 to about 1,600 vehicles per day and from 1,400 to 2,600 vehicles per day, respectively. Implementation of cul-de-sac Alternative D is not recommended.

The construction of roadway narrowings, as shown in Figure 7, involves reducing the roadway width from 44 to 24 feet at selected locations along E. Menlo and N. Morris Boulevards, at an estimated cost of $15,000. Because of the reduced roadway pavement width at the E. Menlo Boulevard approach to N. Oakland Avenue and N. Morris Boulevard approach to E. Capitol Drive, this alternative would encourage through traffic to travel on the arterial street system by creating a restricted roadway entrance on E. Menlo and N. Morris Boulevards, and by increasing vehicle delay for through traffic as it re-enters the arterial system on N. Oakland Avenue or E. Capitol Drive. It is noted that this alternative will not eliminate all through traffic on E. Menlo and N. Morris Boulevards as under the cul-de-sac alternative.The midblock roadway narrowings may be expected to reduce vehicle travel speeds, particularly at the Hubbard Park access road intersection with E. Menlo and N. Morris Boulevards, and to improve vehicular operating conditions and sight distance for northbound vehicles on the Hubbard Park access road approach to the intersection. This alternative may be expected to increase pedestrian safety and improve the residential streetscape to encourage a "neighboring" atmosphere while maintaining accessibility to the residential and governmental land development located along E. Menlo and N. Morris Boulevards. The only disadvantage of this alternative is the removal of on-street parking that would be required by the construction of the roadway narrowings. This alternative, as shown in Figure 7, includes the designation of the parking lot driveway on the southwest corner of the intersection of E. Menlo Boulevard and N. Oakland Avenue as a one-way exit only to solve reported northbound left-turn prohibition and traffic signal short-cutting problems, respectively. It is recommended that roadway narrowings be constructed to reduce traffic volumes and speeding vehicle problems along E. Menlo and N. Morris Boulevards.

The final alternative action considered to solve the E. Menlo/N. Morris Boulevard traffic problems is the construction of traffic circles at selected locations, as shown in Figure 8, at an estimated total cost of $40,000. This

Figure 7

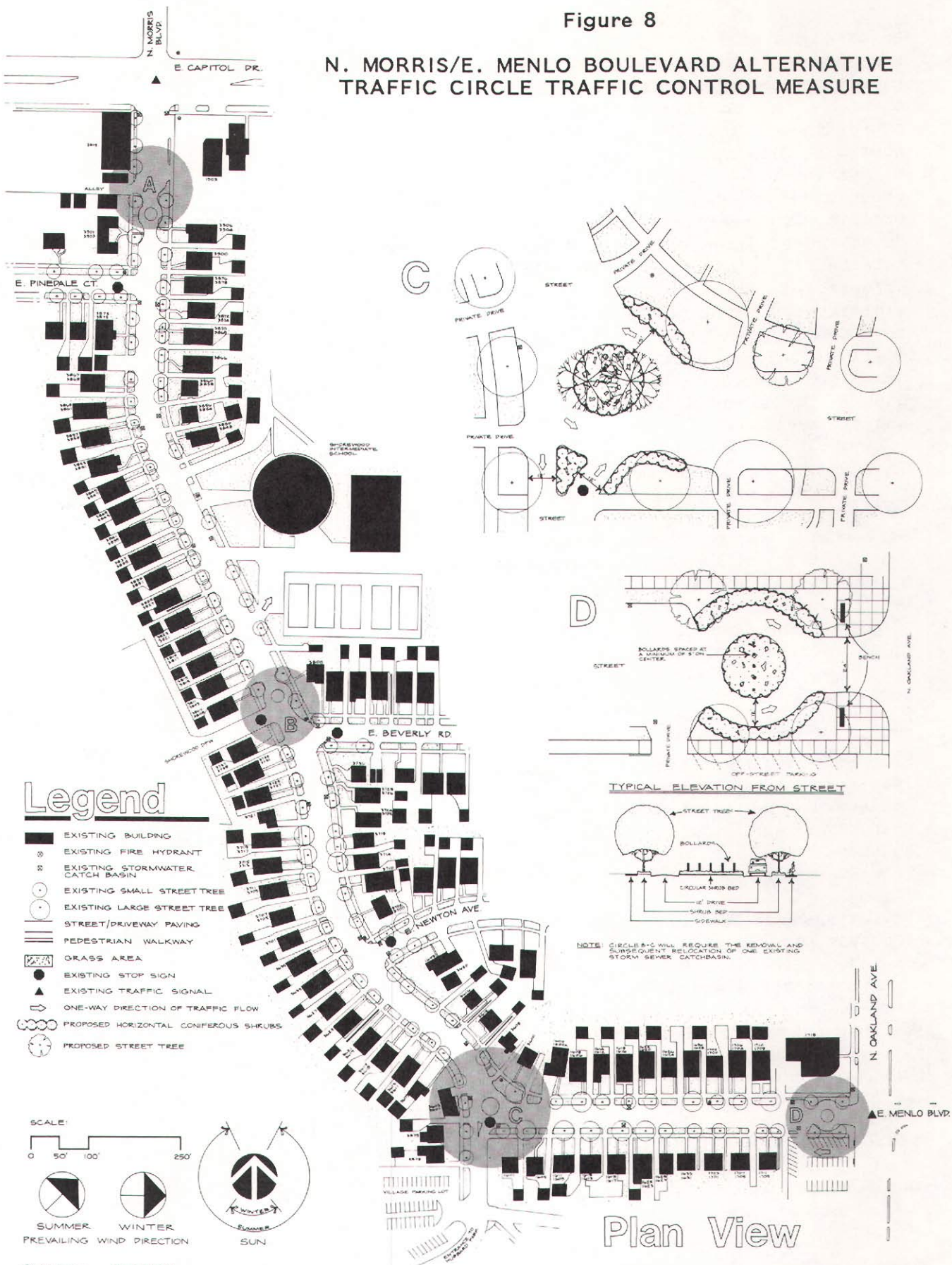
N. MORRIS/E. MENLO BOULEVARD ALTERNATIVE
ROADWAY NARROWING TRAFFIC CONTROL MEASURE



Source: SEWRPC.

Figure 8

N. MORRIS/E. MENLO BOULEVARD ALTERNATIVE TRAFFIC CIRCLE TRAFFIC CONTROL MEASURE



Source: SEWRPC.

alternative action, which is used successfully in European countries and to some extent in other parts of this country, would have the advantage of diverting through traffic to arterial facilities through the provision of a restricted roadway entrance, similar to that discussed for the roadway narrowing alternative. It is noted that this alternative, like the roadway narrowing alternative, will not eliminate all through traffic on E. Menlo and N. Morris Boulevards. This alternative may also be expected to increase pedestrian safety reduce vehicle travel speeds as vehicles maneuver around each traffic circle--studies have shown that vehicles exiting a traffic circle do not accelerate as fast as do vehicles departing from a stop sign-controlled intersection. This alternative also may be expected to improve the residential streetscape, encouraging a "neighboring" atmosphere, and to maintain accessibility to the residential and governmental land development located adjacent to E. Menlo and N. Morris Boulevards. The disadvantages of this alternative are a reduction in the amount of on-street parking at selected locations and decreased emergency vehicle accessibility to the residences located along both E. Menlo and N. Morris Boulevards. Implementation of this alternative is not recommended.

In summary, to solve the traffic problems reported at the intersections of E. Menlo Boulevard and N. Oakland Avenue, N. Morris Boulevard and E. Capitol Drive, and Hubbard Park access road and E. Menlo Boulevard, and on the segment of E. Menlo and N. Morris Boulevards between N. Oakland Avenue and E. Capitol Drive, it is recommended that traffic progression signalization be provided on N. Oakland Avenue and E. Capitol Drive; that guide signing to the UWM campus be installed; that roadway narrowings be constructed at selected locations along E. Menlo and N. Morris Boulevards; and that the parking lot driveway on the southwest corner of E. Menlo Boulevard and N. Oakland Avenue be designated as a one-way exit only.

E. Beverly Road

Problems of pedestrian safety and traffic diversion to avoid the northbound left-turn restriction at the intersection of N. Oakland Avenue and E. Menlo Boulevard were reported at the intersection of N. Oakland Avenue and E. Beverly Road. As shown in Table 9, the alternative traffic control actions considered to solve these problems include the provision of traffic progression on N. Oakland Avenue and the construction of a median island on N. Oakland Avenue.

Improving traffic flow on N. Oakland Avenue through traffic signal timing improvements and the attendant provision of traffic progression may be expected to reduce traffic diversion on E. Beverly Road. As previously noted, there are no significant disadvantages to this alternative. The recommendation to provide traffic progression on N. Oakland Avenue and E. Capitol Drive is supported by the reduced traffic diversion that would result at this intersection.

The construction of a median island on N. Oakland Avenue, at an estimated cost of $500, would provide a mid-roadway refuge area for pedestrians crossing N. Oakland Avenue. The disadvantages of this alternative are that a standard width, six-foot-wide pedestrian island would reduce the usable roadway width from 50 to 44 feet, decreasing roadway capacity and creating a potential accident problem at this intersection. Implementation of this alternative is not recommended.

In summary, to abate the pedestrian safety and traffic diversion problem at the intersection of N. Oakland Avenue and E. Beverly Road, it is recommended that traffic progression signalization be provided on N. Oakland Avenue and E. Capitol Drive.

E. Newton Avenue

Problems of pedestrian safety and traffic diversion to avoid the northbound left-turn restriction at the intersection of N. Oakland Avenue and E. Menlo Boulevard were also reported at the intersection of N. Oakland Avenue and E. Newton Avenue. As shown in Table 9, the alternative traffic control measures considered to solve these problems are similar to those considered for the E. Beverly Road/N. Oakland Avenue intersection, and include traffic signal timing improvements and the attendant provision of traffic progression signalization on N. Oakland Avenue, and the construction of a median island on N. Oakland Avenue. As previously recommended, the provision of traffic progression signalization to improve traffic flow on N. Oakland Avenue may also be expected to solve the traffic problems at this intersection.

E. Edgewood Avenue

A traffic diversion problem to avoid a northbound left-turn restriction at the intersection of E. Menlo Boulevard and N. Oakland Avenue was reported at the intersection of E. Edgewood Avenue and N. Oakland Avenue. Traffic counts taken by Commission staff from 7:00 a.m. to 6:00 p.m. on Friday, February 10, 1984, do not support the existence of a traffic diversion problem. Approximately 400 vehicles made a northbound right turn at the intersection of N. Oakland Avenue and E. Edgewood Avenue during the 11-hour period. During the same time period, only about 100 vehicles made an eastbound left turn at the intersection of E. Edgewood Avenue and N. Cramer Street. Since some of these 100 vehicles were destined for the residences located adjacent to N. Cramer Street and some made a right turn at the intersection of N. Cramer Street and E. Menlo Boulevard, it does not appear that a significant number of vehicles use the N. Oakland Avenue, E. Edgewood Avenue, N. Cramer Street, E. Menlo Boulevard route to avoid the northbound left-turn prohibition at the intersection of N. Oakland Avenue and E. Menlo Boulevard.

Nevertheless, if the Village determines to abate what is more a perceived rather than an actual problem, then, as shown in Table 9, N. Cramer Street could be designated as a one-way southbound facility. The designation of N. Cramer Street as a one-way southbound facility, at an estimated cost of $200, may be expected to restrict N. Cramer Street to local traffic. The disadvantages of this alternative are that it would reduce accessibility to the residential development adjacent to N. Cramer Street and it may divert traffic to N. Oakland Avenue and N. Murray Street. Implementation of this alternative is not recommended.

As previously recommended, the provision of traffic progression signalization to improve traffic flow on N. Oakland Avenue may also be expected to abate the traffic diversion problem at this intersection.

River Park Court

Motor vehicle accident and bicycle safety problems were reported at the intersection of N. Oakland Avenue and River Park Court. As shown on Maps 14 through 16 in Chapter III, this intersection has been identified as a high accident problem intersection in the Village of Shorewood for the years 1981 through 1983. Of the 37 accidents reported over the three-year period from 1981 to 1983, five accidents involved collisions with bicycles, and the other 32 accidents involved vehicles only.

As shown in Table 9, the alternative traffic control measures considered to solve these problems include prohibiting on-street parking on the southbound approach to E. Edgewood Avenue and increased emphasis on the Village's public school bicycle safety program.

The prohibition of parking on the southbound approach to N. Oakland Avenue at River Park Court, at an estimated cost of $100, may be expected to reduce vehicle conflicts from the roadway area immediately adjacent to the signalized intersection of N. Oakland Avenue and E. Edgewood Avenue. It may be expected to improve operating conditions by permitting southbound through vehicles to safely maneuver around southbound left-turn vehicles that are waiting in the combined through and left-turn lane for a gap in the northbound traffic stream. This alternative should also increase intersection capacity, thereby reducing intersection delay for vehicles on N. Oakland Avenue. The only disadvantage of this alternative is that it removes two on-street parking stalls on southbound N. Oakland Avenue. It is therefore recommended that on-street parking on the southbound approach of N. Oakland Avenue at E. River Park Court be prohibited.

The other alternative action considered to solve the traffic problems at this intersection is the continuation of and increased emphasis on the Village's public school bicycle safety program, at an estimated cost of $3,000. This alternative would increase school-age children's awareness of bicycle laws and safety procedures. The disadvantage of this alternative is that it requires Village of Shorewood police officer time, removing a police officer from other department duties. It is recommended that the Village of Shorewood Police Department continue and increase its efforts in a public school bicycle safety program.

In summary, it is recommended that on-street parking be prohibited on the southbound approach of N. Oakland Avenue at River Park Court, and that the Police Department continue and increase its efforts in a public school bicycle safety program.

N. MORRIS BOULEVARD

Traffic problems were reported to exist at several locations on the segment of N. Morris Boulevard between E. Capitol Drive and E. Menlo Boulevard. Problems of speeding vehicles and a lack of stop sign respect were reported along this segment. As previously recommended, the provision of traffic progression on N. Oakland Avenue, the installation of guide signing to the UWM campus on E. Capitol Drive and N. Oakland Avenue, the construction of roadway narrowings,

and the initiation of a villagewide stop sign evaluation and public information program should effectively serve to control vehicle speeds and improve stop sign respect on N. Morris Boulevard.

E. Capitol Drive

A problem of parking lot traffic diversion to avoid the eastbound right-turn restriction was reported at the intersection of N. Morris Boulevard and E. Capitol Drive. As shown in Table 9, the alternative traffic control measures considered to solve this problem include removal of the eastbound right-turn prohibition and designation of the alley on the southwest corner of the intersection of N. Morris Boulevard and E. Capitol Drive as one-way, westbound.

Removal of the eastbound right-turn prohibition, at an estimated cost of $100, would increase accessibility to the residential and governmental land development adjacent to N. Morris and E. Menlo Boulevards. The disadvantage of this alternative is that it may be expected to increase the conflict between through and local traffic on N. Morris and E. Menlo Boulevards. It is recommended that the eastbound right-turn prohibition not be removed until the other recommendations for N. Morris and E. Menlo Boulevards set forth in this report have been implemented, and that right turns be prohibited during the red phase of the signal cycle on E. Capitol Drive.

The other traffic control action considered to solve this problem is designating the alley located on the southwest corner of this intersection behind the Grande Flowers Store for one-way, westbound operation only, at an estimated cost of $100. This alternative would eliminate the vehicle-pedestrian conflict problem at the alley intersection with the west sidewalk on N. Morris Boulevard. This is currently a potential accident location because of the restricted sight distance provided to eastbound motorists in the alley and southbound pedestrians and bicyclists on the sidewalk. This alternative would also eliminate the movement of vehicular traffic to avoid the eastbound right-turn prohibition at the intersection of E. Capitol Drive and N. Morris Boulevard. The disadvantages of this alternative are that it would reduce accessibility between N. Morris Boulevard the Thompson Serv-U Pharmacy parking lot on E. Capitol Drive and it would require vehicles parked in the garages fronting the alley to use the Thompson Serv-U Pharmacy parking lot to exit onto E. Capitol Drive. Implementation of this alternative is not recommended.

In summary, it is recommended that the eastbound left-turn prohibition at the intersection of E. Capitol Drive and N. Morris Boulevard be replaced with a right-turn-on-red prohibition after the implementation of the traffic control actions recommended for E. Menlo and N. Morris Boulevards.

E. Beverly Road

Problems of bicycle safety and a lack of stop sign respect were reported at the intersection of N. Morris Boulevard and E. Beverly Road. As indicated in Table 9, the alternative traffic control actions considered to solve these problems include the continuation of a public school bicycle safety program, redesign of the intersection geometrics, and the initiation of a villagewide stop sign evaluation and public information program.

The previously recommended continuation of and increased emphasis on a public school bicycle safety program by the Village of Shorewood Police Department and initiation of a villagewide stop sign evaluation and public information program are supported by the need to improve bicycle safety and stop sign respect at this intersection.

The other alternative action considered to improve bicycle safety and stop sign respect at this intersection is the redesign of the westbound approach of E. Beverly Road at N. Morris Boulevard. This alternative can be undertaken simultaneously with the recommended construction of roadway narrowings along N. Morris and E. Menlo Boulevards. As shown in Figure 7, the roadway narrowings recommended for this intersection would create an improved right-angle intersection with the westbound approach of N. Morris Boulevard. This alternative would have the advantage of reducing bicyclist and vehicle speeds through the intersection, reinforcing the westbound stop sign control, and reducing the vehicle conflict area at the intersection, thereby more efficiently managing vehicular movement and reducing the accident potential at the intersection. There are no disadvantages to this alternative. It is therefore recommended that the westbound approach of E. Beverly Road at N. Morris Boulevard be reconstructed to accommodate the recommended roadway narrowings on N. Morris Boulevard.

In summary, the previous recommendations to continue the Village's public school bicycle safety program and to initiate a villagewide stop sign evaluation program are reinforced by the favorable impact such actions may be expected to have on the traffic problems reported at this intersection. It is also recommended that the westbound approach of E. Beverly Road be reconstructed at its intersection with N. Morris Boulevard for improved right-angle geometric design.

E. Newton Avenue

Problems of bicycle safety and a lack of stop sign respect were reported at the intersection of N. Morris Boulevard and E. Newton Avenue. As recommended for a similar set of traffic problems at the intersection of N. Morris Avenue and E. Beverly Road, the continuation of and increased emphasis on a public school bicycle safety program and the initiation of a villagewide stop sign evaluation and public information program may also be expected to improve bicycle safety and stop sign respect at this intersection. There are no other alternative actions practically available to effectively solve the reported traffic problems at this intersection.

E. Menlo Boulevard/Hubbard Park Access Road

Problems of inadquate sight distance, speeding vehicles, and a lack of stop sign respect were reported at the intersection of N. Morris Boulevard with E. Menlo Boulevard and the Hubbard Park access road. As shown in Table 9, the alternative traffic control measures considered to solve these problems include redesign of the intersection geometrics and the initiation of a villagewide stop sign evaluation and public information program.

As shown in Figure 7, the roadway narrowings previously recommended for this intersection would reduce the vehicle conflict area at the intersection and

permit the vehicles on the northbound Hubbard Park access road to stop on a level roadway section, as opposed to the steep grade at the existing stop sign location. The advantages of this alternative are that it would improve vehicle sight distance, encourage reduced travel speed through the intersection, reinforce the northbound stop sign control, reduce pedestrian exposure, and increase stop sign respect at the intersection. There are no disadvantages to this alternative. The recommendation to construct roadway narrowings on E. Menlo and N. Morris Boulevards is reinforced by the favorable impacts the narrowings would have on this intersection.

In summary, the previous recommendations to initiate a villagewide stop sign evaluation and public information program and to construct roadway narrowings on E. Menlo and N. Morris Boulevards are reinforced by the favorable impacts such actions may be expected to have on the traffic problems reported at this intersection.

E. BEVERLY ROAD

Problems of accessibility, excessive volumes of through traffic, and traffic diversion to avoid the northbound left-turn prohibition at the intersection of N. Oakland Avenue and E. Menlo Boulevard were reported on the segment of E. Beverly Road from N. Oakland Avenue to N. Morris Boulevard. As shown on Map 10 in Chapter III, the 1984 average weekday traffic volume on E. Beverly Road west of its intersection with N. Oakland Avenue is 1,400 vehicles per day. As shown in Table 9, the recommended provision of improved traffic flow on N. Oakland Avenue through traffic signal retiming and progression, and the construction of roadway narrowings on E. Menlo and N. Morris Boulevards with the subsequent removal of the northbound left-turn prohibition at the intersection of N. Oakland Avenue and E. Menlo Boulevard, may be expected to also solve the traffic problems reported on this segment of E. Beverly Road.

E. CAPITOL DRIVE

It is reported that a traffic congestion problem exists on the segment of E. Capitol Drive from N. Wilson Drive to N. Lake Drive. The midday average vehicle travel speeds on E. Capitol Drive, as shown in Table 5 in Chapter III, are 26.7 mph in the westbound direction and 26.4 mph in the eastbound direction. However, average vehicle delay at the signalized intersections along E. Capitol Drive ranges from a high of 30.5 seconds on the westbound approach to N. Downer Avenue to no delay on the eastbound approach to N. Morris Avenue. The total midday vehicle delay experienced at the five signalized intersections between N. Wilson Drive and N. Lake Drive was measured by Commission staff to be 92.8 and 68.4 seconds, respectively, in the westbound and eastbound directions of travel on E. Capitol Drive. This signalized intersection delay is not caused by excessively high midday traffic volumes, but rather by the existing difference in traffic signal cycle lengths which, as shown in Table 2 in Chapter II, are of 60-, 90-, and 100-second durations, which serve to inhibit efficient progression.

As shown in Table 9, and in reinforcement of previous recommendation to improve traffic flow on E. Capitol Drive, the retiming of these traffic signal cycles for compatibility and the provision of efficient traffic progression may be expected to solve the traffic congestion problems on E. Capitol Drive from N. Wilson Drive to N. Lake Drive.

N. WILSON DRIVE

Pedestrian safety and speeding vehicle problems were reported on the segment of N. Wilson Drive from E. Capitol Drive to E. Glendale Avenue. Average vehicle operating speeds were measured by Commission staff on N. Wilson Drive during the midday time period. As shown in Table 5 in Chapter III, the average travel speeds on N. Wilson Drive in the north- and southbound directions were 30.9 and 32.9 mph, respectively. However, individual travel speeds in the northbound direction ranged from a high of 32.6 mph to a low of 28.8 mph, and in the southbound direction from a high of 35.5 mph to a low of 30.0 mph. From these average travel speed data, it is apparent that a majority of motorists on N. Wilson Street are exceeding the posted speed limit of 30 mph, with travel speeds in the southbound direction being significantly higher than those in the northbound direction.

As shown in Table 9, the alternative traffic control measures considered to solve the speeding vehicle and associated pedestrian safety problems on this segment of N. Wilson Drive include reducing the posted speed limit from 30 to 25 mph, strict enforcement of the existing speed limit, installation of a pedestrian-actuated traffic signal, and the construction of median islands, roadway narrowings, or speed humps.

Reducing the posted speed limit from 30 to 25 mph on N. Wilson Drive, at an estimated cost of $300, is not considered to be an effective action to reduce vehicle speeds. As described in the N. Lake Drive speeding vehicle problem analysis, under normal conditions drivers will tend to travel at the speed which they consider to be safe and appropriate. Reducing the travel speed to 25 mph will increase the speed differential between vehicles traveling on N. Wilson Drive, as many drivers will obey the posted speed limit and other drivers will continue to travel at the speed they consider to be safe and appropriate. This resultant increase in travel speed differential may be expected to cause increased vehicle conflicts and passing maneuvers, resulting in a higher potential for motor vehicle conflicts and accidents. Implementation of this alternative is therefore not recommended.

Increased enforcement of the existing speed limit may be expected to reduce vehicle operating speeds to the 30-mph posted speed limit. The disadvantages of this alternative are that it will require police manpower, which removes an officer from other police department duties, and it serves as a temporary solution, with average travel speeds expected to be reduced primarily during the periods of police surveillance. It is recommended, based upon the average travel speed data, that strict enforcement of the speed limit in the southbound direction of travel on N. Wilson Drive be implemented, particularly during the midday and evening time periods.

The installation of a pedestrian-actuated traffic signal on N. Wilson Drive may be expected to reduce average travel speeds in its vicinity and increase pedestrian safety at the crosswalks protected by the signal. Based upon Commission staff field observations, there does not appear to be a vehicle/pedestrian gap acceptance problem on N. Wilson Drive. Such a signal would not, however, meet warrants. The disadvantages of this alternative are that it may be expected to increase vehicle delay by stopping vehicles that were previously uncontrolled, to increase the accident potential in the vicinity

of the signals, and to increase vehicle travel speeds between traffic signal-controlled intersections as drivers increase their travel speeds to recover time lost at a signalized intersection. Implementation of this alternative is not recommended.

The construction of median islands on N. Wilson Drive, at an estimated total cost of $3,500, would provide a mid-roadway refuge area for pedestrians. The construction of a standard-width, six-foot-wide pedestrian island would reduce the usable roadway width from 56 to 50 feet, which still provides for four 12-foot-wide traffic lanes on N. Wilson Drive. The disadvantages of this alternative are that it may create an accident problem and it may also interfere with snow removal operations. Implementation of this alternative is not recommended.

The construction of roadway narrowings along N. Wilson Drive, at an estimated cost of $1,500 per narrowing, may be be expected to effectively reduce vehicle travel speeds and increase pedestrian safety by reducing the effective pavement width from 56 to 40 feet. However, this alternative may also be expected to create traffic congestion and accident problems by creating four 10-foot-wide traffic lanes, which do not meet the accepted standard arterial lane width of 12 feet required for the safe and efficient movement of arterial traffic. Implementation of this alternative is not recommended.

A final alternative that may be expected to reduce vehicle speeds on N. Wilson Drive is the construction of speed humps at an average spacing of 600 feet, at an estimated total cost of $6,000. Traffic speeds are generally reduced to about 20 mph as vehicles traverse a speed hump installation. Speed humps, however, are not recommended for installation on arterial facilities because of the impedance they have on traffic flow within and through the community and the uncomfortable ride they provide to transit system and emergency vehicle occupants. Implementation of this alternative is not recommended.

In summary, it is recommended that the 30-mph speed limit on southbound N. Wilson Drive be strictly enforced.

N. MURRAY AVENUE

Traffic problems were reported to exist at several locations along N. Murray Avenue.

E. Edgewood Avenue to E. Capitol Drive

It was reported, as shown in Table 9, that a speeding vehicle problem exists along the segment of N. Murray Avenue from E. Edgewood Avenue to E. Capitol Drive. The alternative traffic control measures considered to solve this problem include the construction of speed control humps or roadway narrowings, strict enforcement of the existing speed limit, and the provision of traffic progression on N. Oakland Avenue.

The construction of speed control humps on N. Murray Avenue, at an estimated total cost of $5,000, may be expected to effectively reduce vehicle travel speeds. Traffic speeds are generally decreased to about 20 mph as vehicles

traverse a speed control hump installation. Speed control humps are not recommended for installation on emergency vehicle routes such as N. Murray Avenue because of the delay they impose on emergency vehicle response times. Implementation of this alternative is not recommended.

The construction of roadway narrowings on N. Murray Avenue, at an estimated cost of $1,500 per narrowing, may be expected to reduce travel speeds. However, the existing roadway width is 30 feet, and the construction of three-foot-wide narrowings would reduce the effective roadway width to 24 feet, which may be expected to create a vehicle accident problem. Implementation of this alternative is not recommended.

Strict enforcement of the existing 25-mph speed limit on N. Murray Avenue may be expected to reduce vehicle travel speeds. However, the previously noted disadvantages of strict speed enforcement on an arterial street are exacerbated by the ineffectiveness of strictly enforcing speed limits on a low-volume land access street such as N. Murray Avenue. As shown on Map 10 of Chapter III, average weekday traffic volumes on N. Murray Avenue range from a high of 2,100 vehicles south of E. Capitol Drive to a low of 900 vehicles north of E. Edgewood Avenue. Implementation of this alternative is not recommended.

The recommendation to improve traffic flow conditions on N. Oakland Avenue through traffic signal timing improvements and the provision of traffic progression signalization may be expected to reduce traffic diversion to land access streets and decrease the need for traffic on N. Murray Avenue to exceed the posted 25-mph speed limit. There are no disadvantages to this alternative. This recommendation is, therefore, supported by the favorable impact it may be expected to have on traffic speeds on N. Murray Avenue.

In summary, it is recommended that traffic flow conditions be improved on N. Oakland Avenue to divert through traffic from N. Murray Avenue, thereby reducing the need for traffic on N. Murray Avenue to exceed the speed limit.

E. Shorewood Boulevard

Problems of a lack of stop signs and stop sign disrespect were reported at the intersection of N. Murray Avenue and E. Shorewood Boulevard. As shown on Map 9 in Chapter II, the east- and westbound approaches of E. Shorewood Boulevard are stop sign-controlled at its intersection with N. Murray Avenue.

As shown in Table 9, the traffic control measures considered to solve these problems include the initiation of a villagewide stop sign evaluation and public information program, and the installation of stop signs on the N. Murray Avenue approaches to the intersection. The previously recommended initiation of a villagewide stop sign evaluation and public information program, based upon the criteria set forth in Chapter IV of this report, is supported by the impact this action would have on the stop sign disrespect problem at this intersection.

The installation of additional stop signs at this intersection, at an estimated cost of $100, would discourage through traffic on N. Murray Avenue. The disadvantages of this alternative are that it may be expected to increase vehicle speeds on segments of N. Murray Avenue between stop signs, it has

the potential to create an accident problem, and it promotes disrespect for warranted traffic controls in the Village. Implementation of this alternative is not recommended.

E. Beverly Road

There is a reported lack of stop sign respect at the stop signs on the east- and westbound approaches of E. Beverly Road at its intersection with N. Murray Avenue. As shown in Table 9, the only traffic control measure considered to solve this traffic problem is the initiation of a villagewide stop sign evaluation and public information program. The initiation of this previously recommended measure should also serve to improve stop sign respect at this intersection.

E. Lake Bluff Boulevard

There is a reported lack of stop sign respect at the stop signs on the east- and westbound approaches of E. Lake Bluff Boulevard at its intersection with N. Murray Avenue. As shown in Table 9, the only traffic control measure considered to solve this traffic problem is the initiation of a villagewide stop sign evaluation and public information program. The initiation of this previously recommended measure should also serve to improve stop sign respect at this location.

N. DOWNER AVENUE

Problems of inadequate sight distance, accessibility, difficulty in entering the traffic stream, lack of stop signs, on-street parking, and through traffic were reported on the segment of N. Downer Avenue from E. Edgewood Avenue to E. Capitol Drive. As shown on Maps 2 and 3 in Chapter II, the segment of N. Downer Avenue between E. Edgewood Avenue and E. Capitol Drive is functionally classified by both the Wisconsin Department of Transportation and the Regional Planning Commission as an arterial street. The area bounded by E. Edgewood Avenue, N. Downer Avenue, E. Beverly Road, and N. Maryland Avenue has been designated by the Village of Shorewood as a residential parking district which, by village regulation, is an area where parking is limited to no more than two hours unless the vehicle displays a parking district permit. A parking district permit is issued only to residents residing in the areas designated as residential parking districts.

As shown in Table 9, the alternative traffic control measures considered to solve these problems include the provision of traffic progression on N. Oakland Avenue, an increase in the on-street corner parking setback distance, the construction of roadway narrowings, and the initiation of a villagewide stop sign evaluation and public information program.

Improving traffic flow conditions on N. Oakland Avenue through traffic signal timing improvements and the provision of traffic progression, as previously recommended, should reduce traffic diversion to N. Downer Avenue. As previously noted, there are no significant disadvantages to these alternatives. The recommendation to provide traffic progression on N. Oakland Avenue is further supported by the favorable traffic impact this action may be expected to have on the through traffic problem on N. Downer Avenue.

An increase in the corner setback vehicle parking distance from 15 to 20 feet, at an estimated cost of $200 per intersection, may be expected to improve driver sight distance of vehicles entering the traffic stream on N. Downer Avenue. As shown on Map in of Chapter II, on-street one-hour parking is provided on both sides of N. Downer Avenue between E. Edgewood Avenue and E. Menlo Boulevard, and two-hour parking is provided between E. Menlo Boulevard and E. Beverly Road.

Every September, the City of Milwaukee, Bureau of Traffic Engineering and Electrical Services, conducts a parking survey in the UWM campus area bounded by Lake Michigan, the Milwaukee River, E. Edgewood Avenue, and E. Park Place. As shown in Table 12, the number of parked vehicles in the UWM study area decreased from 3,060 in 1972 to 1,886 vehicles in 1983, a reduction of about 38 percent. This decrease is attributed to the University's successful efforts to encourage its students to utilize the U-Bus and remote university parking facilities. Moreover, Commission staff observations of midday parking conditions while UWM classes were in regular session this past spring did not identify a heavy on-street parking demand on N. Downer Avenue. It is therefore recommended that the corner setback vehicle parking distance be increased from 15 to 20 feet at the N. Downer Avenue intersection approaches between E. Beverly Road and E. Edgewood Avenue.

As previously noted, the construction of roadway narrowings, at an estimated cost of $1,500 per narrowing, would reduce vehicle travel speeds and through traffic to other arterial facilities. However, roadway narrowings are not recommended for implementation on arterial streets because of the adverse impacts they would have on the safe and efficient operation of traffic within and through a community.

The initiation of the previously recommended villagewide stop sign evaluation and public information program should effectively serve to identify any locations along N. Downer Avenue that warrant the installation of stop sign controls.

In summary, it is recommended that traffic progression signalization be provided on N. Oakland Avenue; that the corner setback vehicle parking distance be increased from 15 to 20 feet at the N. Downer Avenue intersections between E. Beverly Road and E. Edgewood Avenue; and that a villagewide stop sign evaluation and public information program be initiated based upon the adopted criteria set forth in this report.

Table 12

ESTIMATED UWM-RELATED VEHICLES PARKED ON THE THIRD WEDNESDAY OF SEPTEMBER IN THE AREA BOUNDED BY LAKE MICHIGAN, THE MILWAUKEE RIVER, E. EDGEWOOD AVENUE, AND E. PARK PLACE DURING THE 10:30 A.M. TO 11:30 A.M. TIME PERIOD: 1972-1983

Year	Vehicles	Percent Change Since 1972
1972	3,060	--
1973	2,959	- 3.3
1974	2,474	- 19.2
1975	1,431	- 53.2
1976	1,681	- 45.0
1977	1,599	- 47.7
1978	1,499	- 51.0
1979	1,240	- 59.5
1980	1,182	- 61.4
1981	1,384	- 54.8
1982	N/A	--
1983	1,886	- 38.4

NOTE: N/A indicates data not available.

Source: City of Milwaukee, Bureau of Traffic Engineering and Electrical Services.

N. MARYLAND AVENUE

A vehicle speeding problem was reported on the segment of N. Maryland Avenue between E. Edgewood Avenue and E. Capitol Drive. As shown on Maps 2 and 3 in Chapter II, this segment of N. Maryland Avenue is functionally classified as an arterial street by the Wisconsin Department of Transportation and as a land access/collector street by the Regional Planning Commission. The Commission's classification of N. Maryland Avenue as a land access/collector street is based upon an application of regionwide-adopted street and highway system design criteria that do not indicate a need for four continuous north-south arterial streets in the approximately three-quarter-mile-wide travel corridor bounded by N. Oakland Avenue and N. Lake Drive. The Wisconsin Department of Transportation's classification of N. Maryland Avenue as an arterial street for highway aid payment purposes is based primarily on traffic volume which, as shown on Map 10 in Chapter III, is approximately the same on both N. Maryland Avenue and N. Downer Avenue--about 6,000 vehicles per day. Because of the location and high volume of traffic attracted to UWM and Columbia Hospital, it is the Commission staff conclusion that the only actions which may be expected to significantly reduce traffic volumes on N. Maryland Avenue are the construction of a cul-de-sac north of E. Edgewood Avenue or the designation of a portion of N. Maryland Avenue north of E. Edgewood Avenue as a one-way, northbound, only facility. These actions are not considered to be feasible alternatives since they would cause accessibility and traffic congestion problems on the other streets and highways in the Village of Shorewood. As shown in Table 9, the alternative traffic management actions considered to solve this problem include the construction of roadway narrowings, strict enforcement of the existing speed limit, the construction of speed control humps, and the provision of traffic progression signalization on N. Oakland Avenue.

The construction of roadway narrowings along N. Maryland Avenue, at an estimated cost of $1,500 per narrowing, may be expected to effectively reduce vehicle speeds by reducing the effective pavement width from 40 to 28 feet. This alternative has the disadvantage of reducing roadway capacity and creating a potential accident problem on N. Maryland Avenue. Based upon existing traffic volumes, this reduction in roadway capacity should not create a traffic congestion problem on N. Maryland Avenue. The reduction in roadway capacity, however, would divert a portion of the 2,500 average daily through vehicle trips shown in Figure 5 in Chapter III on N. Maryland Avenue to the land access street system in the Village. Implementation of this alternative is not recommended.

The strict enforcement of the existing 25-mph speed limit on N. Maryland Avenue may be expected to reduce vehicle travel speeds. The disadvantages of this alternative are that it requires police manpower, which removes an officer from other police department duties, and it serves as a temporary solution, with average vehicle speeds expected to be reduced primarily during the periods of police surveillance. It is recommended that the speed limit on N. Maryland Avenue be strictly enforced.

The construction of speed control humps on N. Maryland Avenue would involve installing 12 foot wide-by 4 inch high raised undulations on the roadway surface at a spacing of about 600 feet, at an estimated total cost of $5,000.

Traffic speeds are generally reduced to about 20 mph as vehicles traverse a speed control hump installation. Speed control humps are not recommended for construction on N. Maryland Avenue because of the potential impedance and adverse traffic safety impact they may have on the high volume of traffic using N. Maryland Avenue.

The final alternative that may be expected to reduce vehicle travel speeds on N. Maryland Avenue is the previously recommended provision of traffic progression on N. Oakland Avenue. The provision of traffic progression on N. Oakland Avenue should reduce traffic diversion to other arterial and land access streets and decrease the need for traffic on N. Maryland Avenue to exceed the speed limit. There are no disadvantages to this alternative. This recommendation is, therefore, supported by the favorable impact it may be expected to have on traffic speeds on N. Maryland Avenue.

In summary, it is recommended that the speed limit on N. Maryland Avenue be strictly enforced and that traffic flow conditions be improved on N. Oakland Avenue to divert through traffic from N. Maryland Avenue.

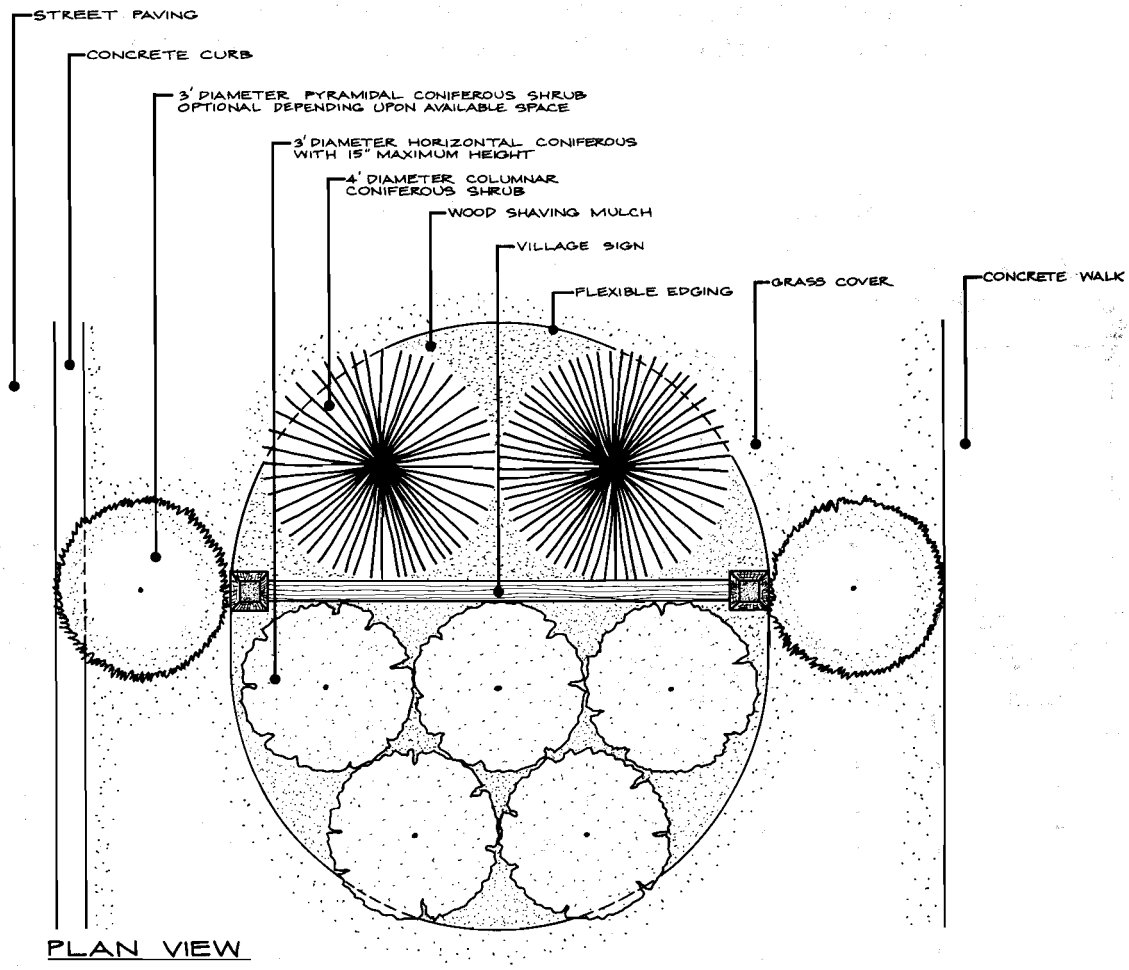
VILLAGEWIDE STREET SYSTEM PROBLEMS

Problems of bicycle and pedestrian safety, speeding vehicles, a lack of stop sign respect and stop signs, and inappropriately located bus stops were located on the street and highway system throughout the Village of Shorewood. These systemwide problems have been addressed in previous sections of this chapter for many specific locations in the Village. As recommended in this chapter to solve these reported problems, and as shown in Table 9, the alternative traffic control measures considered to best solve these problems include the continuation of and increased emphasis on a public school bicycle safety program, the initiation of a villagewide stop sign evaluation and public information program, and the strict enforcement of existing speed limits on specific arterial routes such as N. Lake Drive, N. Wilson Drive, and N. Maryland Avenue. The implementation of these programs and enforcement measures may be expected to abate traffic problems on other streets in the Village and increase the safety and efficient movement of traffic within and through the Village.

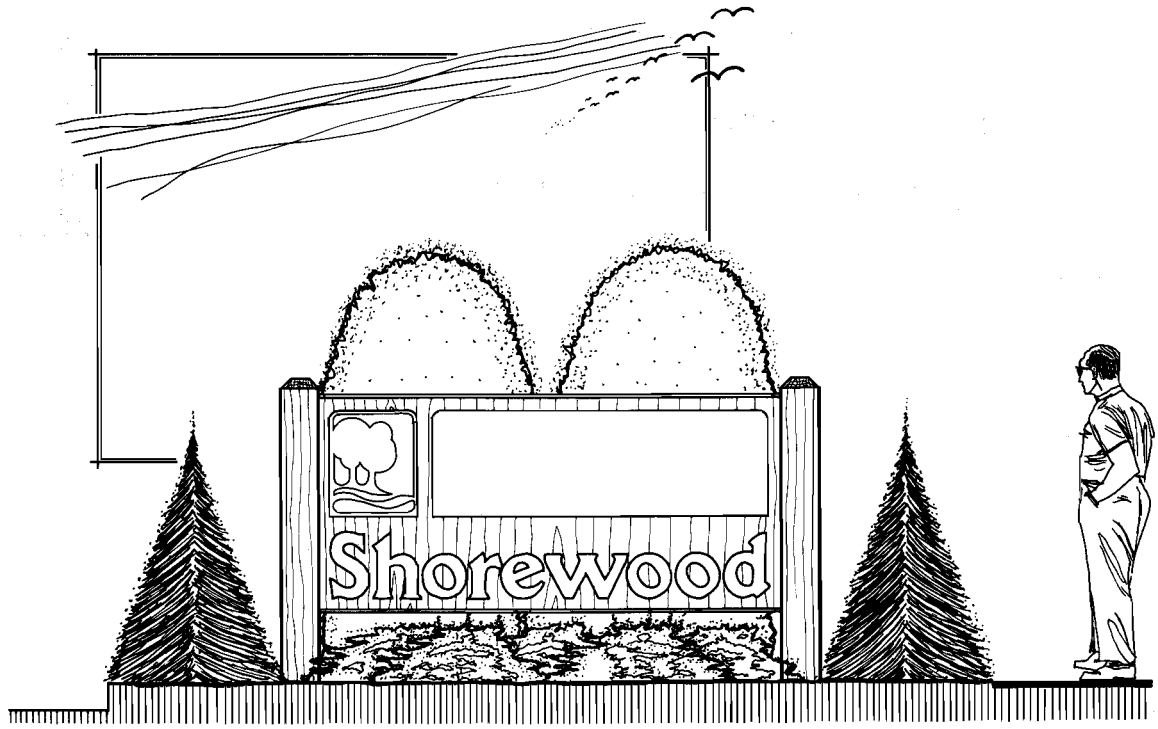
Another villagewide project that may be expected to reinforce and supplement the street and highway system traffic control measures and programs recommended in this study is a villagewide gateway signing program and traffic slogan contest. These two actions are intended to be undertaken simultaneously to obtain the maximum benefit on traffic flow within the Village. More specifically, it is recommended that a gateway signing program be undertaken by village officials to enhance the existing signing program and provide the Village with an identifiable boundary that is readily apparent to the 30,800 vehicle trips per average weekday that pass through the Village. It is recommended that two types of gateway signs, as shown in Figures 9 and 10, be installed on all arterial and selected land access streets entering the Village of Shorewood. The design of these gateway signs is based upon the existing signs used to identify public buildings in the Village and installed at most of the arterial streets entering the Village. The gateway sign enhancement shown in Figure 9 should serve to improve village boundary sign recognition on the arterial street system entering the Village. It is estimated that the landscaping shown in Figure 9 would cost $1,000 per sign location and would be

Figure 9

RECOMMENDED ENHANCEMENT LANDSCAPING FOR THE EXISTING GATEWAY SIGNS ON THE ARTERIAL STREETS AND HIGHWAYS IN THE VILLAGE OF SHOREWOOD



PLAN VIEW

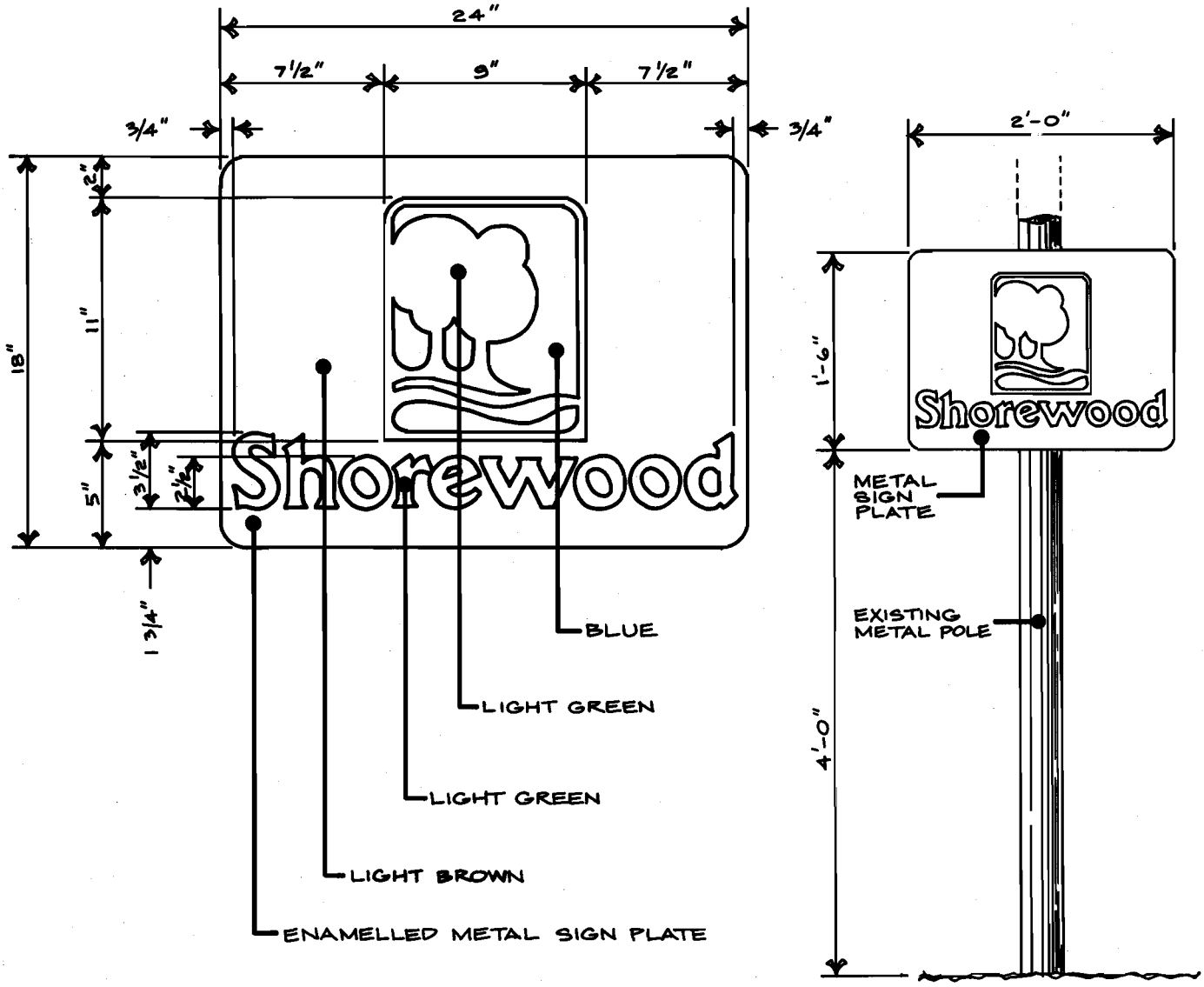


ELEVATION VIEW

Source: SEWRPC.

Figure 10

RECOMMENDED GATEWAY SIGN FOR SELECTED LAND ACCESS STREETS IN THE VILLAGE OF SHOREWOOD



Source: SEWRPC.

dependent upon available parkway space. The gateway sign shown in Figure 10, would have an estimated cost of $200, and would be installed on selected land access streets entering the Village, particularly those streets intersecting with E. Edgewood Avenue. The total cost of implementing the recommended gateway sign program is estimated at $8,000.

In conjunction with this gateway signing program, it is recommended that the two residential parking districts in the Village located adjacent to E. Edgewood Avenue be identified to the general public through a secondary informational signing program for each parking district, at an estimated cost of $3,000. This informational signing program would involve installing a 6 inch-by-12 inch sign below each parking restriction sign in a residential parking district with the message "Residential Parking District." This action should serve to reinforce the Village's desire to inform nonresident motorists of its efforts to manage traffic and promote a quality neighborhood environment.

It is noted, as shown in Figures 9 and 10, that the recommended arterial gateway sign should be modified to include a blank space set aside for the village traffic control slogan. It is intended that a villagewide traffic slogan contest be conducted by village officials to determine the best slogan for these signs. The slogan should be a short phrase such as "Traffic Management Community," or "A Neighborhood Traffic Control Community," that relays the Village's desire to control and improve traffic flow and safety, and to enhance the quality of its residential neighborhoods. The advantage of this recommendation is that the entire community can become better aware of and involved in a program aimed at improving and controlling traffic flow by both nonresidents and residents of the Village. This recommendation also has the advantage of serving as a coordinating program to reinforce and promote implementation of the traffic control measures recommended in this report.

A final reported villagewide traffic problem addressed in this report involves bus stop locations. As shown on Map 7 in Chapter II, there are a total of 64 bus stops located in the Village of Shorewood, of which six stops are provided with passenger shelters. A comparison of those bus stop locations with the criteria set forth in Chapter IV indicates that there are more than an adequate number of bus stops within the Village to provide convenient walking distances for transit patrons.

Based upon a Commission staff field inspection of each transit route and bus stop location, it is recommended, for system bus stop location consistency, that an additional bus stop be located on eastbound E. Capitol Drive at N. Newhall Street, and that the bus stops on southbound N. Downer Avenue at E. Newton Avenue and E. Stratford Court be relocated to E. Beverly Road and E. Menlo Boulevard, respectively. These bus stop location recommendations may be expected to improve transit system consistency with the other bus stops in the Village and minimize passenger walking distances.

It is also recommended that the Milwaukee County Transit System consider the installation of four new passenger shelters, at an estimated total cost of $20,000, at the southbound N. Oakland Avenue bus stops at E. Olive Street, E. Jarvis Street, and E. Menlo Boulevard; and on E. Capitol Drive eastbound at E. Maryland Avenue. These four locations, as shown on Map 7 in Chapter II, have passenger boarding counts in excess of 50 passengers per day and should

be able to physically accommodate a shelter facility. It is noted that the Milwaukee County Transit System uses a detailed bus shelter location identification procedure that may place these potential shelter locations on a low systemwide priority.

In summary, to solve villagewide traffic problems, it is recommended that the Village's public school bicycle safety program be continued; that a villagewide stop sign evaluation and public information program be initiated; that a villagewide traffic slogan contest be held; that a gateway signing program be implemented; and that the Milwaukee County Transit System consider the installation of a new bus stop on eastbound E. Capitol Drive at N. Newhall Street, the relocation of two bus stops to the southbound N. Downer Avenue intersections with E. Beverly Road and E. Menlo Boulevard, and the construction of passenger shelters at four existing bus stop locations in the Village.

SUMMARY

This chapter has presented and evaluated a broad range of alternative traffic control measures and recommended those actions determined to best solve the existing traffic problems in the Village of Shorewood. Each recommended traffic control solution is summarized below. This summary includes a prioritization of those recommended traffic control measures. A number of the recommended measures should be implemented prior to undertaking other recommended measures to ensure that the maximum benefit from each measure is achieved and that temporary traffic problems are not created in the residential neighborhoods of the Village. This prioritization of selected traffic control measures should serve to ensure a sound and effective traffic control system for the Village of Shorewood.

As previously noted, the key traffic control measures recommended to be implemented in the Village of Shorewood are those measures required to improve traffic operating conditions on N. Oakland Avenue and E. Capitol Drive. The highest priority traffic control measure recommended to eliminate congestion and unnecessary vehicle delay involves modifying the traffic signals at the intersection of N. Oakland Avenue and E. Capitol Drive to provide for traffic-actuated operation on all four approaches to the intersection, including the northbound and eastbound exclusive left-turn lanes, at an estimated cost of $25,000. As an integral part of this traffic signal modification, it is recommended that the traffic signals on N. Oakland Avenue and E. Capitol Drive be interconnected, at an estimated cost of $45,000, to permit the operation of progressive traffic flow on both arterial facilities. It is also recommended that the exclusive eastbound left- and right-turn lanes be reconstructed for increased roadway transition tapers to improve lane continuity at this intersection, at an estimated cost of $10,000. Included with this lane reconstruction recommendation is the installation of advance lane designation signs and pavement markings to improve driver guidance through the intersection.

To reduce traffic congestion, difficulties in entering the traffic stream, and pedestrian safety problems at the intersection of N. Oakland Avenue and E. Shorewood Boulevard, it is recommended that the existing traffic signals be modified into a semi-traffic/pedestrian-actuated operation with a background cycle for traffic progression, at an estimated cost of $15,000.

Additional recommended traffic engineering improvements on N. Oakland Avenue include the construction of roadway narrowings at the south crosswalk of the intersection with E. Elmdale Court to improve pedestrian safety, at an estimated cost of $2,000; a reduction in the number of driveways from three to one at the Sendik's Food Market parking lot to reduce congestion and control vehicular conflicts[2]; and the prohibition of parking on the southbound approach of N. Oakland Avenue at its intersection with E. Edgewood Avenue to improve traffic safety and control vehicle conflicts at the intersection, at an estimated cost of $100.

Following the implementation of these high-priority traffic control measures, it is recommended that through traffic be encouraged to utilize the arterial street and highway facilities in the Village--rather than the collector and land access streets--through the installation of guide signing to the University of Wisconsin-Milwaukee campus on E. Capitol Drive and N. Oakland Avenue, at an estimated cost of $1,000. It is further recommended that roadway narrowings be constructed on the segments of N. Morris and E. Menlo Boulevards between E. Capitol Drive and N. Oakland Avenue, at an estimated cost of $15,000, to reduce the conflict between through and local traffic; to reduce vehicle operating speeds; to improve drive sight distance at the intersection of N. Morris Boulevard and the Hubbard Park access road; and to re-create a residential atmosphere in the adjacent neighborhood. This action should also serve to improve stop sign respect at the intersections of N. Morris Boulevard with E. Beverly Road and the Hubbard Park access road. Finally, it is recommended that the northbound left-turn prohibition at the intersection of N. Oakland Avenue and E. Menlo Boulevard be removed and that the eastbound right-turn prohibition at the intersection of E. Capitol Drive and N. Morris Boulevard be changed to a right-turn-on-red prohibition, at an estimated cost of $100, to improve accessibility to the residences located along N. Morris and E. Menlo Boulevards. These two turn prohibition recommendations should not be undertaken until the other traffic control measures have been implemented.

In addition to these high-priority traffic control measures for N. Oakland Avenue and E. Capitol Drive, it is recommended that at the Benjamin's Delicatessen-Baskin Robbins Ice Cream Store parking lot on N. Oakland Avenue the parking stall layout be changed from 45-degree angle parking to parallel parking along the southern parking lot boundary, at an estimated cost of $300, and that the parking lot driveway be reconstructed with raised entrance channelization, planters, and pavement markings at an estimated cost of $10,000 to improve parking lot circulation and provide a positive parking lot identity. In the long range, it is also recommended that an additional driveway be constructed on the eastern parking lot boundary, at an estimated cost of $10,000, to permit changing the center aisle operation from two way to one way and redesign of the parking lot layout for 45-degree angle parking stalls. This action, however, would require the acquisition of the property adjacent to the eastern parking lot boundary at an estimated cost of $100,000.

The only other traffic control action recommended along N. Oakland Avenue is the already implemented installation of a "Private Drive" sign at the River Park Court apartments driveway to discourage through traffic from avoiding

[2]This recommended action was implemented by the Village in June 1984, during the course of the study.

the existing traffic control regulations at the intersection of N. Oakland Avenue and E. Menlo Boulevard.

It is recommended that a pedestrian-actuated traffic signal be installed, at an estimated cost of $25,000, at the N. Lake Drive intersection with E. Lake Bluff Boulevard to improve pedestrian safety. On N. Downer Avenue south of E. Capitol Drive, it is recommended that the corner parking setback distance be increased from 15 to 20 feet to improve sight distance for drivers of vehicles on the land access streets intersecting with N. Downer Avenue.

In response to villagewide street system problems of stop sign disrespect, a perception of an insufficient number of stop signs, speeding vehicles, bicycle and pedestrian safety, and inappropriately located bus stops, a series of general traffic programs and enforcement measures have been recommended to abate traffic problems throughout the Village and increase the safety and efficiency of the movement of traffic within and through the Village.

In order to solve driver disrespect for existing stop signs and correct the perceived lack of stop signs throughout the Village, and specifically at the street intersections along E. Lake Bluff Boulevard east of N. Oakland Avenue; on N. Stowell Avenue north of E. Capitol Drive; on N. Prospect Avenue from E. Jarvis Street to E. Lake Bluff Boulevard; on N. Farwell Avenue north of E. Capitol Drive; on N. Morris Boulevard at E. Beverly Road, E. Newton Avenue, and the Hubbard Park access road; on N. Murray Avenue at E. Shorewood Boulevard and at E. Beverly Road; and on N. Downer Avenue south of E. Capitol Drive, it is recommended that a villagewide stop sign evaluation program be undertaken based upon the stop sign installation criteria recommended in Chapter IV of this report. In conjunction with the villagewide stop sign evaluation program, it is recommended that the Village place increased emphasis on a bicycle safety program for both child and adult bicyclists.

It is recommended that the posted speed limits throughout the Village be strictly enforced to solve speeding vehicle problems, with particular attention directed at enforcement of the existing 30-mph speed limit on N. Lake Drive and N. Wilson Drive, and the 25-mph speed limit on N. Maryland Avenue.

A villagewide gateway signing program and traffic slogan contest are recommended to be undertaken simultaneously by village officials to improve boundary recognition and increase public awareness of, and community involvement in, the Village's efforts at improving and controlling traffic flow and safety, and enhancing the quality of its residential neighborhood environment. In conjunction with the gateway signing program, it is recommended that "Residential Parking District" signs be installed on each parking restriction sign in the Village's two residential parking districts adjacent to E. Edgewood Avenue.

Finally, based upon a review of the Milwaukee County Transit System routes within the Village of Shorewood, it is recommended that an additional bus stop be installed at the intersection of E. Capitol Drive and N. Newhall Street, that two existing bus stops on N. Downer Avenue be relocated, and that passenger shelters be installed at four other existing bus stops in the Village, at an estimated cost of $20,000. Of the 31 traffic problem locations identified in this study, no recommended solution was advanced for the problems of traffic congestion and difficulties in entering the traffic stream

identified at the Kohl's Food Store on N. Oakland Avenue. It was concluded by the Task Force that the traffic problem at this location was not severe enough to warrant implementation of any of the alternative traffic control measures considered.

The capital cost of implementing the recommended traffic control measures designed to solve existing traffic problems and improve vehicular operating conditions and safety in the Village of Shorewood is estimated at $279,300, of which $179,300 would be for short-range traffic control measure improvements, and $100,000 for long-range property acquisition to permit the construction of a driveway at the Benjamin's Delicatessen/Baskin Robbins Ice Cream Store parking lot. Implementation of these recommendations should be undertaken by village officials in the order described above, particularly as they relate to the recommended high-priority traffic operation improvements on N. Oakland Avenue and E. Capitol Drive, to ensure that subsequent actions achieve their maximum expected beneficial impact on travel within and through the Village.

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Chapter VI

SUMMARY AND CONCLUSIONS

INTRODUCTION

Because of concern over high volumes of through traffic on nonarterial streets in residential neighborhoods of the Village of Shorewood by local elected officials and residents, village officials requested the Southeastern Wisconsin Regional Planning Commission (SEWRPC) on September 6, 1983, to conduct a study to improve traffic operations and resolve the conflict between land use and traffic flow within the Village.

The primary objectives of the study were to recommend traffic control measures which would reduce traffic on residential streets while not seriously degrading the level of service on arterial streets and to provide a set of criteria to assist the responsible public officials in addressing future requests for traffic control devices and regulations. To help guide the conduct of the study, the Village Board appointed a 15-member citizen Task Force on January 6, 1984.

EXISTING STREET AND HIGHWAY SYSTEM

The abatement of traffic problems in any community requires a careful analysis of the condition and operation of the existing street and highway system to identify deficiencies and the causes thereof. This analysis should include consideration of functional and jurisdictional street system classifications, physical roadway characteristics, traffic control measures and devices, and major land use development served.

To facilitate the necessary analysis, a physical inventory of the existing street and highway system of the Village was undertaken. The inventory found that there were, in 1984, 31.14 miles of streets and highways in the Village, of which 7.80 miles, or 25 percent, were functionally classified for highway aid payment purposes by the Wisconsin Department of Transportation as arterials; 3.36 miles, or 11 percent, as collectors; and the remaining 19.98 miles, or 64 percent, as land access streets. Of the 31.14 miles of streets and highways within the Village, 2.44 miles, or 8 percent, were connecting streets of the state trunk highway system; 0.90 mile, or 3 percent, was county park roads; and the remaining 27.80 miles, or 89 percent, were local trunk highways. The right-of-way and pavement widths of all streets and highways within the Village were determined under the system inventory, as were the locations of the 64 bus stops, 10 traffic signals, 252 stop signs, 35 yield signs, on-street parking restrictions within the Village, and the speed limits that affect traffic flow within the Village.

EXISTING TRAFFIC CONDITIONS

In addition to a complete inventory of the physical street and highway system and the traffic controls affecting that system, a comprehensive traffic study requires an examination of the manner in which the existing system is used and

how that system functions to meet the needs of the traveling public. To this end, information on vehicular traffic volumes was collected; traffic operating conditions on the system were observed; and travel patterns within and through the Village were examined. Information was also collected on traffic accidents and citizen traffic complaints. This information, together with the information on the physical characteristics of the street and highway system, provided the basis for identifying the existing traffic problems in the Village.

The highest existing traffic volumes in the Village were found to occur on E. Capitol Drive, which in 1984 carried 25,600 vehicles per average weekday. North Oakland Avenue carried 18,490 vehicles per average weekday, and N. Lake Drive carried 17,000 vehicles per average weekday.

Traffic volumes in the Village have not changed significantly in the last two decades, exhibiting a slow but steady annual average growth rate since 1965 of about 0.2 percent. The highest growth rates were observed on N. Lake Drive and N. Oakland Avenue north of E. Capitol Drive, both of which exhibited an annual growth rate of 1.8 percent over this time period. Between 1980 and 1983, N. Morris Boulevard south of E. Capitol Drive exhibited a 49 percent decrease in traffic, this decrease being attributable to turn prohibitions established on N. Oakland Avenue and E. Capitol Drive in 1983 to reduce through traffic volumes on N. Morris and E. Menlo Boulevards.

Traffic volumes on the arterial streets in the Village were found to vary seasonally, with the highest volumes occurring in June and July, ranging from up to 146 percent of the annual average weekday volume on N. Lake Drive, and to 114 percent of that average on E. Capitol Drive. Traffic volumes in January and February were found to average between 74 and 88 percent of the annual average weekday volumes. Hourly traffic volume fluctuations also occur, with the morning and evening weekday peak-hour traffic volumes found to comprise approximately 6 percent and 8 percent, respectively, of the average weekday traffic volume. North Lake Drive was found to exhibit a higher commuter rush-hour pattern, with morning and evening peak hours comprising about 8 percent and 10 percent, respectively, of the average weekday traffic volume. The morning peak hour was found to occur between 7:00 a.m. and 8:00 a.m., and the evening peak hour between 5:00 p.m. and 6:00 p.m.

Measures of existing arterial street and highway utilization include volume-to-capacity ratios, average operating speeds, intersection delay, and traffic accidents. Existing traffic volumes were found to exceed design capacity during the evening peak hour on the northbound left-turn, the southbound through, and the eastbound right-turn movements at the intersection of N. Oakland Avenue and E. Capitol Drive. Nonpeak-hour vehicle operating speeds on selected arterials in the Village were found to average about 26 miles per hour (mph) on N. Oakland Avenue and E. Capitol Drive, and about 32 mph on N. Lake Drive and N. Wilson Drive. Average nonpeak-hour vehicle delay at the signalized intersections along N. Oakland Avenue was found to range from a low of 4.2 seconds per vehicle in the southbound direction at E. Kensington Boulevard to a high of 44.5 seconds per vehicle in the southbound direction at E. Capitol Drive. Average nonpeak-hour vehicle delay at the signalized intersections along E. Capitol Drive was found to range from a low of 4.4 seconds per vehicle in the eastbound direction at N. Morris Boulevard to a high of 30.5 seconds per vehicle in the westbound direction at N. Downer Avenue.

It was estimated that, on an average weekday in 1984, 88,200 vehicle trips were made within or through the Village of Shorewood. Of these total daily trips, 11,500 trips, or 13 percent, were internal trips; 45,900, or 52 percent, were internal-external trips; and 30,800, or 35 percent, were through trips. The two major through trip patterns across the Village were identified as travel on N. Lake Drive from the north to the south village limits--about 12,600 vehicles per average weekday--and on E. Capitol Drive from the west to the south village limits--about 10,300 vehicles per average weekday. Of these 10,300 through trips traveling on E. Capitol Drive at the west village limits, about 4,900 trips cross the south village limits on N. Oakland Avenue, 2,000 trips cross the south village limits on both N. Maryland and N. Downer Avenues, and 1,200 trips cross the south village limits on N. Lake Drive. In total, these two major trip patterns were found to comprise about 22,900 vehicle trips, or 74 percent of the through trips across the Village.

There were 337 on-street traffic accidents within the Village in 1981, with no fatalities; 446 accidents in 1982, with one fatal accident; and 315 accidents in 1983, with no fatalities. Approximately 72 percent of the accidents from 1981 through 1983 involved property damage only. The highest accident locations in the Village over this period were the intersections of N. Oakland Avenue and E. Capitol Drive; E. Capitol Drive and N. Wilson Drive; N. Oakland Avenue and River Park Drive; and E. Capitol Drive and N. Morris Boulevard.

The 15 members of the Village of Shorewood Comprehensive Traffic Study Task Force identified traffic-related problems in the Village as they individually perceived them, and also as reported to them by village residents who had contacted them in response to local newspaper articles about the traffic study. As a result of this public involvement to identify traffic problems, a total of 31 perceived traffic-related problem locations were identified in the Village. The majority of perceived problems involved specific streets or street intersections. Thirteen types of problems were identified, including traffic congestion and accident problems; a need for stop signs; speeding vehicle problems; and excess through traffic on certain land access streets in residential neighborhoods of the Village. In addition to these specific traffic problems, a set of general villagewide street system problems was identified consisting of bicycle and pedestrian safety; speeding vehicles; disrespect for existing stop signs; through traffic; and inappropriately placed bus stops.

TRAFFIC MANAGEMENT CONTROL CRITERIA

A number of traffic management control criteria were formulated to assess the efficiency of, and to help identify any additional problems on, the existing street and highway system in the Village, and to evaluate proposed alternative traffic control measures designed to solve the identified problems. These criteria were set forth under three basic categories: 1) street and highway system development criteria; 2) internal traffic control measure warrants; and 3) peripheral traffic control measure warrants. The street and highway system development criteria provide desirable absolute and comparative street and highway system performance levels designed to provide an efficient and adequate transportation system for the Village. The internal traffic control measure warrants set forth a series of criteria to be applied to ensure that traffic control devices such as traffic signals, stop and yield signs, children-at-

play signs, roadway channelization, one-way street designation, and on-street parking restriction measures are utilized only when justified, and then in a consistent manner throughout the Village. The peripheral traffic control warrants establish a minimum one-way peak-hour traffic volume of 200 vehicles per hour, which must be exceeded to justify the use of traffic control measures such as turn prohibitions, one-way street designations, roadway diverters, and street closures to control traffic volumes in residential neighborhoods of the Village. The application of these traffic management control criteria is essential to achieving the safe and efficient operation of the street and highway system in the Village of Shorewood.

ANALYSIS AND RECOMMENDATIONS

A broad range of alternative traffic control measures was evaluated to solve the 31 site-specific and communitywide transportation system problems identified in the study. Those traffic control measures determined to have the greatest potential to abate the problems with the least cost and disruption were recommended for implementation. To assist in the implementation of traffic control measure recommendations, an implementation priority was given to those measures which were considered essential to improving the operating conditions of the existing arterial street and highway system within the Village. As shown in Table 13, the traffic control measures recommended to be implemented first in the Village are those measures designed to improve traffic operating conditions on N. Oakland Avenue and E. Capitol Drive. The highest priority traffic control measure recommended in the Village is the modification of the traffic signals to provide traffic-actuated operation at the intersection of N. Oakland Avenue and E. Capitol Drive. To maximize the effectiveness of this improvement and to improve traffic operating conditions throughout the Village, it is recommended that the existing traffic signals on N. Oakland Avenue and E. Capitol Drive be interconnected. It is further recommended as a part of this signalization optimization project that the traffic signals at the intersection of N. Oakland Avenue and E. Shorewood Boulevard be modified to provide for semi-traffic/pedestrian actuation. To maximize the capacity and reduce driver uncertainty, it is recommended that the exclusive eastbound left- and right-turn lanes at the intersection of N. Oakland Avenue and E. Capitol Drive be reconstructed. Following the implementation of these high-priority traffic control measures, it is recommended that guide signing to the UWM campus be installed on both E. Capitol Drive and N. Oakland Avenue to encourage through traffic to utilize the Village's arterial street and highway system.

Upon completion of the implementation of these recommendations, it is recommended that roadway narrowings be constructed on the segments of N. Morris and E. Menlo Boulevards between E. Capitol Drive and N. Oakland Avenue. This recommendation should reduce the conflict between through and local traffic, reduce vehicle travel speeds, and create a "neighboring" atmosphere in the adjacent residential neighborhood. Finally, to improve accessibility to this residential neighborhood, it is recommended that the northbound left-turn prohibition at N. Oakland Avenue and E. Menlo Boulevard be removed and that the eastbound right-turn prohibition be changed to a right-turn-on-red prohibition at E. Capitol Drive and N. Morris Boulevard.

Other recommended traffic control measures designed to solve specific traffic problems on N. Oakland Avenue include: the construction of a roadway narrowing on the south crosswalk at the intersection of N. Oakland Avenue and E. Elmdale Court to improve pedestrian flow and safety; a reduction from three to one in the number of driveway entrances to the Sendik's Food Market parking lot on N. Oakland Avenue to reduce vehicle delays and conflicts; the prohibition of parking on the southbound approach to E. Edgewood Avenue to control vehicle conflicts and improve safety; and the redesign of the parking lot stall layout and entrance channelization at Benjamin's Delicatessen and Baskin Robbins Ice Cream Store--the ultimate solution to this parking facility problem being the recommended long-range acquisition of property to construct a driveway exit on the east side of the parking lot. It is also recommended that a "Private Drive" sign be installed at the River Park Court apartment driveway to discourage through traffic and that the on-street corner setback parking distance be increased from 15 to 20 feet on N. Downer Avenue south of E. Capitol Drive to improve driver sight distance on intersecting land access streets.

In response to a villagewide street system problem of a lack of stop sign respect, it is recommended that a stop sign evaluation program be undertaken based upon the traffic control measure criteria set forth in this report. It is recommended that speeding vehicle problems throughout the Village be reduced through increased enforcement of existing speed limits, particularly on N. Lake Drive, N. Wilson Drive, and N. Maryland Avenue. It is recommended that the Village continue its bicycle safety program and include both child and adult bicyclists in the program. It is further recommended that a villagewide gateway signing program and traffic slogan contest be simultaneously undertaken to improve village boundary recognition and increase public awareness of, and community involvement in, the Village's traffic management efforts to improve traffic flow and safety while enhancing the Village's residential neighborhood environment. Finally, it is recommended that a new bus stop be installed on E. Capitol Drive, that the location of two existing bus stops on N. Downer Avenue be changed, and that passenger shelters be installed at four existing bus stops.

The Village of Shorewood comprehensive plan recommends that 23 traffic control actions be implemented to solve or mitigate the traffic problems at 31 locations in the Village. The total capital investment, in 1984 dollars, required to implement these traffic control measures is estimated at $279,300, of which $100,000 is the long-range cost of acquiring property to construct a new driveway at the Benjamin's Delicatessen/Baskin Robbins Ice Cream Store parking lot.

SUMMARY

If adopted, the comprehensive traffic plan for the Village of Shorewood can provide a valuable guide for use by public officials and citizens in improving the operating efficiency and safety of the arterial street and highway system in the Village, and in reducing the conflict between through and local traffic in the residential neighborhoods of the Village. The plan is based upon extensive inventories and analyses of the physical and operating characteristics of the existing street and highway system.

Table 13

SUMMARY OF TRAFFIC CONTROL MEASURES RECOMMENDED TO IMPROVE TRAFFIC OPERATING CONDITIONS AND SAFETY IN THE VILLAGE OF SHOREWOOD

Traffic Control Measure	Capital Cost
1. Modify Traffic Signals for Traffic-Actuated Operation at the Intersection of N. Oakland Avenue and E. Capitol Drive	$ 25,000
2. Interconnect the Traffic Signals on N. Oakland Avenue and E. Capitol Drive for Progressive Traffic Flow	45,000
3. Reconstruct Exclusive Eastbound Left- and Right-Turn Lanes at Intersection of N. Oakland Avenue and E. Capitol Drive	10,000
4. Modify Traffic Signals for Semi-Traffic/Pedestrian-Actuated Operation at the Intersection of N. Oakland Avenue and E. Shorewood Boulevard	15,000
5. Construct Roadway Narrowings on South Crosswalk of E. Elmdale Court Intersection with N. Oakland Avenue	2,000
6. Reduce From Three to One the Sendix's Food Market Parking Lot Driveways on N. Oakland Avenue	Already implemented
7. Prohibit Parking on the Southbound Approach to the Intersection of N. Oakland Avenue and E. Edgewood Avenue	100
8. Install Guide Signing to UWM Campus on E. Capitol Drive and N. Oakland Avenue	1,000
9. Construct Roadway Narrowing on N. Morris Boulevard and E. Menlo Boulevard between E. Capitol Drive and N. Oakland Avenue	15,000
10. Remove Northbound Left-Turn Prohibition at Intersection of N. Oakland Avenue and E. Menlo Boulevard and Change Eastbound Right-Turn Prohibition to "No Right Turn on Red" at Intersection of E. Capitol Drive and N. Morris Boulevard	100
11. Change Parking Stall Layout and Reconstruct Entrance to Benjamin's Delicatessen/Baskin Robbins Ice Cream Store Parking Lot	10,000
12. Install "Private Drive" Sign at the River Park Court Apartments	Already implemented
13. Install Pedestrian-Actuated Traffic Signal at Intersection of N. Lake Drive and E. Lake Bluff Boulevard	25,000
14. Increase Corner Parking Setback Distance from 15 to 20 Feet on N. Downer Avenue South of E. Capitol Drive	--
15. Conduct Villagewide Stop Sign Evaluation Program Based Upon Adopted Plan Criteria	--
16. Strictly Enforce Posted Speed Limits, Particularly on N. Lake Drive, N. Wilson Drive, and N. Maryland Avenue	--
17. Continue and Increase Emphasis on Villagewide Bicycle Safety Program	--
18. Initiate Villagewide Gateway Signing Program and Traffic Slogan Contest	8,000

Table 13 (continued)

Traffic Control Measure	Capital Cost
19. Install "Residential Parking District" Signs	3,000
20. Install a Bus Stop on Eastbound E. Capitol Drive at N. Newhall Street	100
21. Relocate Two Existing Bus Stops on N. Downer Avenue from E. Newton Avenue and E. Stratford Court to E. Beverly Road and E. Menlo Boulevard	--
22. Install Passenger Shelters on Southbound N. Oakland Avenue Bus Stops at E. Olive Street, E. Jarvis Street, and E. Menlo Boulevard and on Eastbound E. Capitol Drive at E. Maryland Avenue	20,000
23. Acquire Property East of Benjamin's Delicatessen/ Baskin Robbins Ice Cream Store for Construction of a Parking Lot Driveway Exit	100,000
Total	$279,300

Source: SEWRPC.

The plan identifies existing traffic problems and recommends specific traffic control measures to solve or mitigate the identified problems of the existing transportation system, emphasizing low-capital, short-range solutions. Implementation of the traffic control measures recommended in the plan should result in, marked improvement in the traffic operating conditions within the Village. The plan also sets forth criteria to be used by village officials in addressing future requests for the installation of traffic control devices in a consistent and sound manner. Action taken now will ameliorate existing traffic problems and provide the direction required to improve the quality of life in the residential neighborhoods of the Village.

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APPENDICES

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Appendix A

VILLAGE OF SHOREWOOD
COMPREHENSIVE TRAFFIC STUDY TASK FORCE

James T. Caraway,.....Citizen Member,
Chairman Village of Shorewood
Melissa S. Baker,.....Citizen Member,
Vice-Chairman Village of Shorewood
Paul J. Bavlnka, Jr.....Trustee, Village of Shorewood
Curt A. Claus.....Member, Shorewood
Chamber of Commerce
Veronica P. Ceszynski.....Citizen Member,
Village of Shorewood
Edward P. DePreter.....Chairman, Shorewood
Traffic Safety Commission
Michael Gross.....Lieutenant, Shorewood
Police Department
Lawrence C. Hammond, Jr.....Citizen Member,
Village of Shorewood
Jane A. Hirst.....Citizen Member,
Village of Shorewood
Marie A. Lobo.....Citizen Member,
Village of Shorewood
Mason H. Morris.....Citizen Member,
Village of Shorewood
Mrs. Jack Nagle.....Citizen Member,
Village of Shorewood
F. Thomas Rebholz.....Citizen Member,
Village of Shorewood
Richard G. Sinclair.....Member, Shorewood
Plan Commission
Robert A. Ziegert.....Citizen Member,
Village of Shorewood

Mr. Kenneth H. Voigt, Principal Engineer, SEWRPC, although not a member of the Committee, served as its Secretary.

Acknowledgement is also given to Mr. James J. Lynch, Director of Community Development, Village of Shorewood, for his contribution as technical staff to the Task Force.

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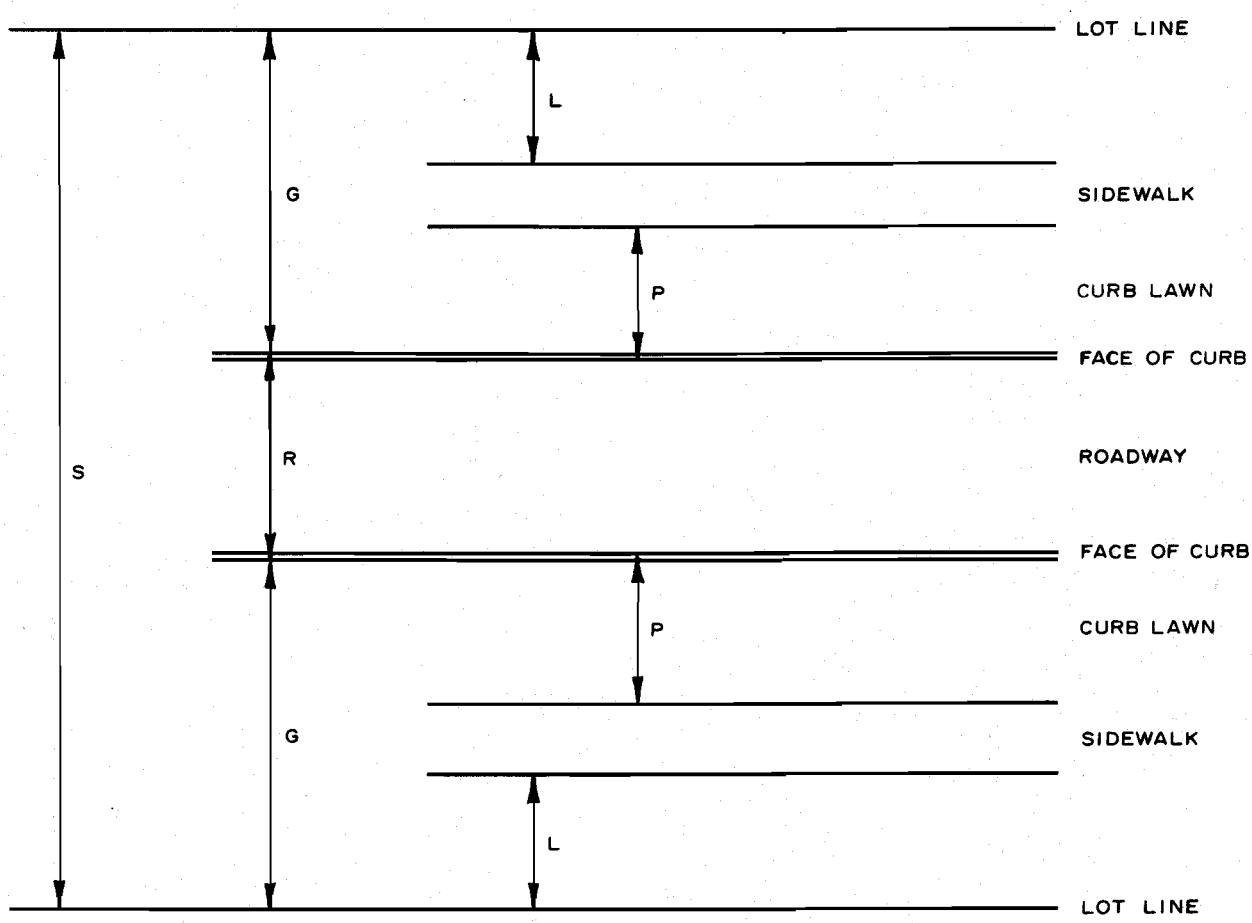
Appendix B

VILLAGE OF SHOREWOOD STREET AND HIGHWAY SYSTEM ROADWAY CHARACTERISTIC INFORMATION



STREET	FROM	TO	S	R	G	L	P
ALPINE	Wilson	Alley E. of Wilson	100	56	22	7	9
"	Alley E. of Wilson	Ardmore	70	36	17	2	9
ARDMORE	Elmdale	Kenmore	60	32	14	2	6
"	Kenmore	Lawnwood	70	30	20	2	12
"	Lawnwood	Alley S. of Kensington	70	36	17	2	9
"	Alley S. of Kensington	Alley N. of Kensington	100	56	22	7	9
"	Alley N. of Kensington	North Village Limits	70	36	17	2	9
BARTLETT	Beverly	High School	70	30	20	2	12
"	Capitol	Alley N. of Capitol	70	51	9.50	2	1.5
"	Alley N. of Capitol	Olive	70	36	17	2	9
"	Lake Bluff	220.72' N. of Lake Bluff	60	26	17	4	7
"	220.72' N. of Lake Bluff	390.65' N. of Lake Bluff(at hydrant S. of 4438)	60 to 70	26	17 to 22	4	7 to 12
"	390.65' N. of Lake Bluff	North Village Limit	70	26	22	4	12
BEVERLY	Morris Blvd.	Oakland	70	30	20	2	12
"	Oakland	Prospect	70	30	20	4	10
"	Prospect	Lake	80	30	25	4	15

CAPITOL DRIVE*

FROM	TO	BLVD. WIDTH	S	R	G	L	P
River	Estabrook Pkwy n/s	4'	120	38	20	8	6
	s/s			42	20	6	8
Est. Pkwy.	Sherburn n/s	12'	120	34	20	8	6
	s/s			34	20	6	8
Sherburn	Wilson n/s	12'	89	31	7.5	0	0
	s/s			31	7.5	0	0
Wilson	Bartlett	12'	120	34	20	2	12
Bartlett	Oakland	-	120	34	-	2	-
Alley E. of Oakland	Downer	none	66	46	10	-	-
Downer	Harcourt n/s	none	73	36	15	4	5
	s/s				22	11	5
Harcourt	Lake n/s	none	73	36	15	4	5
	s/s				22	4	12

*Measure only where walk and pavement run straight east and west

STREET	FROM	TO	S	R	G	L	P
CONGRESS	Wilson	Ardmore	66	30	18	2	10
CRAMER	Edgewood	Alley S. of Menlo	60	24	18	4	8
"	Alley S. of Menlo	Menlo e/s	80	24	24	10	8
		w/s			32	18	8
"	Beverly	Capitol	72	24	24	4	14
"	Lake Bluff	Kensington	60	24	18	4	8
"	Kensington	N. Village Lim. e/s	80	26	26.5	4	16.5
		w/s			27.5	4	17.5
DOWNER	Edgewood	Capitol	80	44	18	4	8
"	Capitol	Alley N. of Capitol e/s	80	42	18	4	8
		w/s			20	4	10
"	All N. on Capitol	Marion	80	30	25	4	15
EDGEWOOD	Oakland	Lake	80	35	22.5	4	12.5
ELMDALE	Ardmore	Woodburn	60	32	14	2	6
"	Woodburn	Morris	60	26	17	2	9
"	Oakland	Murray	70	24	23	4	13
FARWELL	S. Cul de Sac	130' S.of Capitol	66	24	21	4	11
"	130'S.of Capitol	130' N. of Capitol	66	37	14.5	4	4.5
"	130'N.of Capitol	Jarvis	66	30	21	4	11
"	Jarvis	Kensington	80	24	28	4	18
FREDERICK	Edgewood	Alley S. of Menlo	60	24	18	4	8
"	Alley S/Menlo	Menlo	80	24	28	14	8
"	Beverly	Capitol	70	24	23	4	13
"	Lake Bluff	N. Village Limit	80	30	25	4	15
GLENDALE	Wilson	Idlewild	60	41	9.5	2	1.5
"	Idlewild	Woodruff	60	36	12	2	4
"	Woodruff	Marlborough	60	24	18	2	10
"	Marlborough	Woodburn	60	26	17	2	9
"	Woodburn	Morris	60	24	18	2	10
"	Morris	Oakland	60	24	18	4	8

STREET	FROM	TO	S	R	G	L	P
HACKETT	Edgewood	Newton	66	30	18	2	10
HARCOURT	Straight portion		80	26	27	5	16
IDLEWILD	GLENDALE	N.V.L.	60	36	12	2	4
JARVIS	Oakland	Lake	70	30	20	4	10
KENMORE	Wilson	Ardmore	50	30	10	2	2
"	Woodburn	Morris	80	30	25	2	17
"	Newhall	Alley w/Oakland	70	36	17	2	9
"	Alley w/Oakland	Oakland	70	51	9.5	2	1.5
"	Oakland	Maryland	70	24	23	4	13
KENSINGTON	Wilson	Elkhart (vac.)	60	41	9.5	2	1.5
"	Elkhart (vac.)	Woodruff	60	36	12	2	4
"	Woodruff	Marlborough	60	30	15	2	7
"	Marlborough	Oakland	60	30	15	4	5
"	Oakland	Lake	70	30	20	4	10
LAKE BLUFF	Ardmore	Alley w/Oakland	66	30	18	4	8
"	Alley w/Oakland	Oakland	66	43	11.5	4	1.5
"	Oakland	Maryland	66	30	18	4	8
"	Maryland	W. line of Lake Ave.Subd. (N.S.)	66.22	30	14	0	8
		(S.S.)			22.22	8	8.22
"	At W.line of Lake Ave.Subd.	(N.S.)	70	30	14	*	*
		(S.S.)			22.22	*	*
"	At W.line of N. Lake Dr.		70	30	19.70	*	*

*see Field Book #120

LAKE DRIVE

FROM	TO	S	R	G	East L	West L	East P	West P
Edgewood	Menlo (N. line of Lot 2, NE¼ Sec.10)	100	44	28	11 to 17		9 to 5	
Edgewood	Newton	100	44	28		12 to 10		10 to 12
Menlo	Shorewood (S. line of Anderton property)	100	44	28	17 east side		5 east side	west side
Newton	Shorewood	100	44	28		10 west side		12 west side
Shorewood	Capitol	100	44	28	13	4 to 3	11	18 to 19
Capitol	Lake Bluff	80	44	18	4	2	8	10
Lake Bluff	S. Line of Sec. 3	80	44	18	4 east side	* west side	8 east side	* west side
S. Line Sec. 3	N. Line Lot 5, Grnwd. Trrce	100	44	28	11 east side	* west side	11 east side	* west side
N. Line Lot 5 Grnwd.Trrce	N. Vill. Limit	100	44	28	15 east side	* west side	7 east side	* west side
Pt. 479' S of Kensington	Kensington	100	44	28		2 west side		20 west side
Kensington	N. Vill. limit	100	44	28		1 west side		21 west side

*see Field Book #120

STREET	FROM	TO	S	R	G	L	P
LARKIN	Capitol	Marion	70	30	20	2	12
"	School	N. Vill. Limit	70	24	23	4	13
LAWNWOOD	Ardmore	Morris	60	24	18	2	10
MARION	Morris	Newhall	60	26	17	2	9
"	Newhall	120' W.of Oakland	60	30	15	2	7
"	120' W. of Oakland	Oakland	60	43	8.5	2	.5
"	Oakland	Lake	60	24	18	4	8
MARLBOROUGH	Wilson	Congress	66	36	15	2	7
"	Congress	N. Vill. Limit	66	30	18	2	10
MARYLAND	Edgewood	Kensington	80	40	20	4	10
MENLO	Morris	Alley W.of Oakland	80	40	20	2	12
"	Alley W.of Oakland	Oakland	80	54	13	2	5
"	Oakland	Maryland	60	30	15	4	5
"	Maryland	Downer (54 blvd.)	130	18	20	4	10
"	Downer	Lake	66	30	18	2	10
MORRIS	Menlo	Alley S/Capitol	80	40	20	2	12
"	Alley S/Cap.	Capitol	80	54	13	2	5
"	Capitol	Kenmore	80	30	25	7	12
"	Kenmore	Olive (E/S)	75	30	25	7	12
		(W/S)			20	2	12
"	Olive	N. Vill. Limit	70	30	20	2	12
MURRAY	Edgewood	Shorewood	70	30	20	4	10
"	Shorewood	Capitol (E/S)	70	30	20.75	4.75	10
		(W/S)			20	4	10
"	Capitol	N. Vill. Limit	70	30	20	4	10
NEWHALL	Beverly	High School	70	30	20	2	12
"	Capitol	128' N.of Capitol	70	53	8.5	2	.5
"	128' N/Capitol	Olive	70	36	17	2	9
"	Olive	Lake Bluff	70	30	20	2	12
"	School	N.Vill. Limits	70	24	23	4	13
NEWTON	Morris	Oakland	70	30	20	2	12
"	Oakland	Downer	70	24	23	4	13
"	Downer	Hackett	66	24	21	4	11
"	Hackett	Lake	66	30	18	4	8

STREET	FROM	TO	S	R	G	L	P
OAKLAND AVE.	Edgewood	N. Village limit	78	50	15	1	8
except (E/W)	Edgewood	Lot 30 Blk 4	78	50	15	9	0
" (E/W)	Lot 39 Blk 4	Lot 42 Blk 4	78	55	15	1	5
" (E/W)	At Menlo Blvd		78	59	13	4	0
" (E)	At Lot 15, 16, 11, Blk 3		78	50	15	8	0
" (W)	At Lot 5 & 4, Blk 1	Beverly Rd.	78	50	15	9	0
" (E/W)	Lot 12, 13, Blk 3	Lot 21, 22	78	50	15	9	0
" (E)	Lot 9, Blk 3		78	52	15	1	7
" (W)	Lot 11, Blk 3	(Shorewood H.S.)	78	57	10	1	5
" (S)	At Capitol		78	60	10	2	0
" (N)	At Capitol		78	52	14	5	4

E-East side of street

W-West side of street

STREET	FROM	TO	S	R	G	L	P
OLIVE	Wilson	Alley E. of Wilson	95	55	20	2	12
"	Alley E. of Wilson	Woodburn	80	40	20	2	12
"	Woodburn	Larkin	70	30	20	2	12
"	Larkin	110' W. of Oakland	70	36	17	2	9
"	110' W. of Oakland	Oakland	70	53	8.5	2	.5
"	Oakland	Lake	70	24	23	4	13
OLSEN	Wilson	Alley E. of Wilson	100	56	22	7	9
"	Alley E. of Wilson	Ardmore	70	36	17	2	9
PINEDALE	Morris	Cul de sac	70	30	20	2	12
PROSPECT	Edgewood	133' S. of Capitol	80	24	28	4	18
"	133' S. of Capitol	Capitol	80	37	21.5	4	11.5
"	Capitol	130' N. of Capitol, E/S	80	37.5	21.	4	11
"		W/S			21.5	4	11.5
"	130' N. of Capitol	Lake Bluff	80	24	28	7	15
RICHLAND	Capitol	Jarvis	60	24	18	2	10
RIDGEFIELD	Capitol	Downer	70	32	19	2	11
SHEPARD	Edgewood	Lake	66	30	18	1	10
SHEFFIELD	Wilson	120' S. of Kensington	60	32	14	2	6
"	120' S. of Kensington	Kensington	60	43	8.5	2	.5
"	Kensington	N. Vill. Limit	60	30	15	2	7

STREET	FROM	TO	S	R	G	L	P
SHERBURN	Cul-de-sac	Capitol (E/S)	50	26	8	-	-
		(W/S)			16	10	0
SHOREWOOD	Oakland	Cramer (N/S)	67	30	15	4	5
		(S/S)			22	11	5
"	Cramer	Prospect	60	30	15	4	5
"	Prospect	Lake	100	35	32.5	4	22.5
STOWELL	Shorewood	Capitol	100	35	32.5	4	22.5
"	Capitol	Lake Bluff	66	24	21	4	11
"	Lake Bluff	Pt.531.65' N.of Lake Bluff *	80	24	28	7	15
"	Pt.531.65'N.of Lake Bluff	Pt.701.65' N.of Lake Bluff	80	24	28	4	18
STRATFORD	Maryland	Downer	70	24	23	4	13
SUMMIT	Edgewood	Menlo	66	30	18	2	10
WILDWOOD	Wilson	Alley E.of Wilson	100	56	22	7	9
"	Alley E. of Wilson	Alley S. of Kensington	70	36	17	2	9
"	Alley S. of Kensington	Alley N. of Kensington	100	56	22	7	9
"	Alley N. of Kensington	N. Village Limit	70	36	17	2	9
WILSON	Capitol	N. Village Limit	100	56	22	2	14
WOOD	Newhall	135'W.of Oakland	70	36	17	2	9
"	135'W.of Oakland	Oakland	70	53	8.50	2	.5
"	Oakland	Maryland	66	24	21	4	11
"	Stowell	Lake	66	24	21	4	11
WOODBURN	Capitol	Alley N.of Capitol	60	41	9.5	2	1.5
	Alley N.of Capitol	N. Vill. Limits	60	30	15	2	7
WOODRUFF	Congress	120'S.of Kensington	60	32	14	2	6
"	120'S. of Kensington	120'N.of Kensington	60	43	8.5	2	.5
"	120'N. of Kensington	N. Village Limit	60	32	14	2	6

*approximately at bend in street

Source: Village of Shorewood.