

# PILGRIM PARKWAY TRAFFIC STUDY

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**MEMORANDUM REPORT NUMBER 4**  
**PILGRIM PARKWAY TRAFFIC STUDY**

**VILLAGE OF ELM GROVE**  
**WAUKESHA COUNTY, WISCONSIN**

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**December 1986**

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## Pilgrim Parkway Traffic Study Village of Elm Grove

### INTRODUCTION

The principal north-south traffic artery in eastern Waukesha County providing a continuous 19-mile-long route between the Rock Freeway (STH 15) and Mequon Road (STH 167) is an arterial street located about two miles west of N. and S. 124th Street, as shown on Map 1, and is named Moorland Road in portions of the Cities of New Berlin and Brookfield; Pilgrim Parkway in portions of the Village of Elm Grove and City of Brookfield; and Pilgrim Road in portions of the City of Brookfield and the Villages of Menomonee Falls and Germantown.

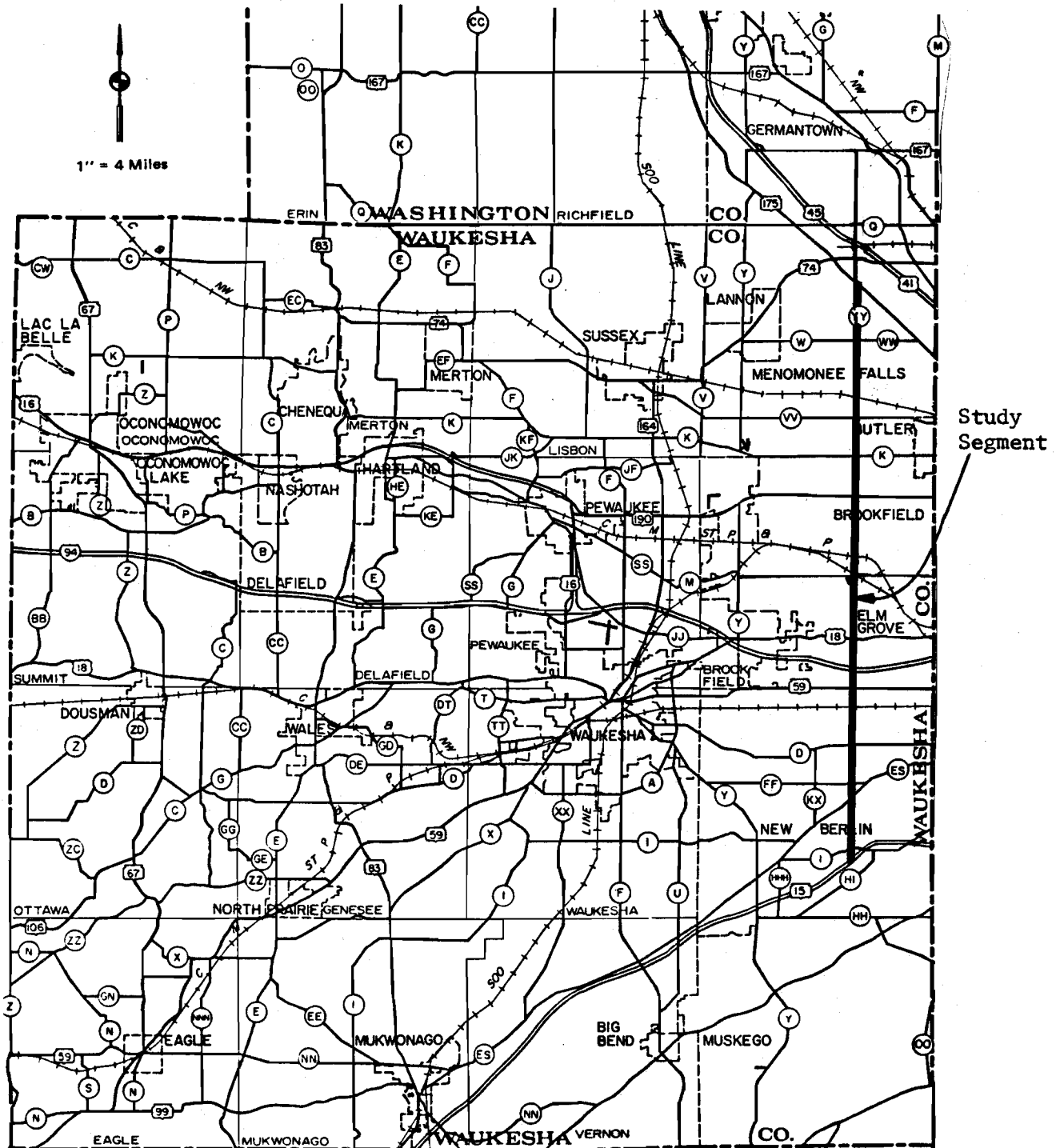
Over the past several years, local elected officials and residents of the Village of Elm Grove have become concerned about increasing traffic volumes and the attendant deterioration in motor vehicle operating conditions, and accessibility to land uses adjacent to the 1.8-mile-long segment of Pilgrim Parkway from W. Watertown Plank Road to W. North Avenue. This roadway segment forms, in effect, the boundary between the Village of Elm Grove and the City of Brookfield; an approximately 0.3-mile portion of the segment south of its intersection with W. North Avenue being located, however, entirely in the City of Brookfield. Such concern about traffic congestion along this segment of Pilgrim Parkway should not be surprising. The adopted regional transportation system plan has for many years recommended both functional improvements to, and jurisdictional reassignment of, Moorland Road/Pilgrim Road/Pilgrim Parkway, recognizing the importance of that facility to serving the rapidly developing portions of eastern Waukesha County.

To help resolve these and related traffic problems, village officials on November 27, 1985, requested the Southeastern Wisconsin Regional Planning Commission to conduct a study of traffic operating conditions and attendant problems on Pilgrim Parkway. This memorandum report presents the findings and recommendations of that study. The report describes existing operating conditions and access provided to land development along Pilgrim Parkway; assesses the potential impact on Pilgrim Parkway of the proposed construction of a new roadway along W. Wisconsin Avenue in the City of Brookfield; and describes the need and alternative cross-sections for the reconstruction of this segment of Pilgrim Parkway.

An essential consideration in the implementation of any improvement measures recommended in this report for Pilgrim Parkway is the level of government that

Map 1

LOCATION OF THE STUDY SEGMENT OF  
PILGRIM PARKWAY IN WAUKESHA COUNTY



Source: SEWRPC.

should have jurisdictional authority over, and be responsible for, the operation, maintenance, and improvement of Pilgrim Parkway. A jurisdictional highway system plan was prepared by the Regional Planning Commission for Waukesha County, and was adopted by the Waukesha County Board in 1975. That plan is documented in SEWRPC Planning Report No. 18, A Jurisdictional Highway System Plan for Waukesha County. That plan, jurisdictionally classifies each segment of the total arterial street and highway system according to three basic characteristics: 1) the type and volume of trips served; 2) the land uses connected and served; and 3) the operational characteristics of the facility. The study recommended that Pilgrim Parkway/Pilgrim Road/Moorland Road should be an integral part of the county trunk highway system. Implementation of that recommendation was initiated when a segment of Moorland Road between STH 59 (Greenfield Avenue) and STH 15 (Rock Freeway) in the City of New Berlin was transferred in 1980 to Waukesha County by the City of New Berlin, in accordance with the jurisdictional highway plan recommendations.

While some progress has been made in implementing the Waukesha County jurisdictional highway system plan, the transfer of the segment of Pilgrim Parkway which is the subject of this study to the county trunk highway system remains to be accomplished. Transfer of the six-mile-long segment of Pilgrim Parkway/Pilgrim Road/Moorland Road between STH 59 and CTH K (W. Lisbon Road) would serve to provide a continuous 15-mile-long north-south county trunk highway route between STH 15 and STH 175 (Appleton Avenue). This transfer of jurisdictional responsibility is an important element in the achievement of the objectives of the jurisdictional highway system plan, especially as those objectives pertain to the more systematic programming of arterial improvements to assure the most effective use of the total public resources invested in the provision of highway transportation, and the more equitable distribution of arterial highway system development costs and revenues among the levels and agencies of government concerned.

It is therefore recommended that both the Village of Elm Grove and the City of Brookfield, in keeping with the recommendations contained in the Waukesha County jurisdictional highway system plan, proceed with actions to transfer Pilgrim Parkway to the county trunk highway system.

#### EXISTING CONDITIONS

Essential to the identification of existing traffic problems is the collection of data concerning roadway geometrics, average weekday and peak hour traffic volumes and turning movements, and a detailed history of motor vehicle accident patterns and frequencies.

##### Roadway Geometrics

The study segment of Pilgrim Parkway consists basically of a 24-foot-wide undivided rural roadway with four- to eight-foot-wide gravel shoulders. The northbound shoulder on the segment between W. Watertown Plank Road and W. Gebhardt Road contains a paved six-foot-wide bicycle/pedestrian lane. At its intersection with W. Bluemound Road/W. Watertown Plank Road, Pilgrim Parkway consists of a divided urban roadway providing two through lanes and exclusive left-and right-turn lanes. A 400-foot-long taper is provided on Pilgrim Parkway north of its intersection with W. Watertown Plank Road to accommodate the transition from an undivided to a divided roadway.

The segment of Pilgrim Parkway between W. Gebhardt Road and W. North Avenue is paralleled on the west by a land access street--called Pilgrim Parkway West--that originally was apparently constructed with the intent of both providing access to adjacent residential development, and the potential for a future divided roadway for Pilgrim Parkway. The Dousman Ditch watercourse, as shown on Figure 1, lies between the Pilgrim Parkway and Pilgrim Parkway, West roadways and extends along the west side of Pilgrim Parkway south of W. Gebhardt Road to a point north of the proposed W. Wisconsin Avenue extension.

Pilgrim Parkway, as shown on Figure 1, intersects W. North Avenue with a set of off-set "T" intersections separated by a distance of about 900 feet, creating a physical discontinuity in routing and traffic flow. Pilgrim Parkway is improved at its intersections with W. North Avenue with a channelized northbound right-turn lane and an exclusive southbound right-turn lane. W. North Avenue, as shown on Figure 2, is 33 feet wide west of the southern approach of Pilgrim Parkway. W. North Avenue is marked for an 11-foot-wide eastbound combined through/right-turn lane and a single 22-foot-wide westbound lane that, although unmarked, accommodates a left-turn and a through lane for vehicles desiring to bypass left-turning vehicles. W. North Avenue narrows to 22 feet east of the Pilgrim Parkway approach from the south to accommodate a gate protected crossing of the Milwaukee Road railway trackage. This crossing is slightly elevated above the approach grade of Pilgrim Parkway from the south and creates a sight distance problem for westbound traffic on W. North Avenue. W. North Avenue widens east of the Milwaukee Road trackage to 33 feet, providing a two-lane, 23-foot-wide approach to its intersection with Pilgrim Road from the north. The westbound approach to this intersection accommodates a 12-foot-wide through/left-turn lane and an exclusive channelized right-turn lane. Opposite the north approach of Pilgrim Road to W. North Avenue is a driveway entrance/exit to a commercial development that contains a convenience food store and several other small businesses.

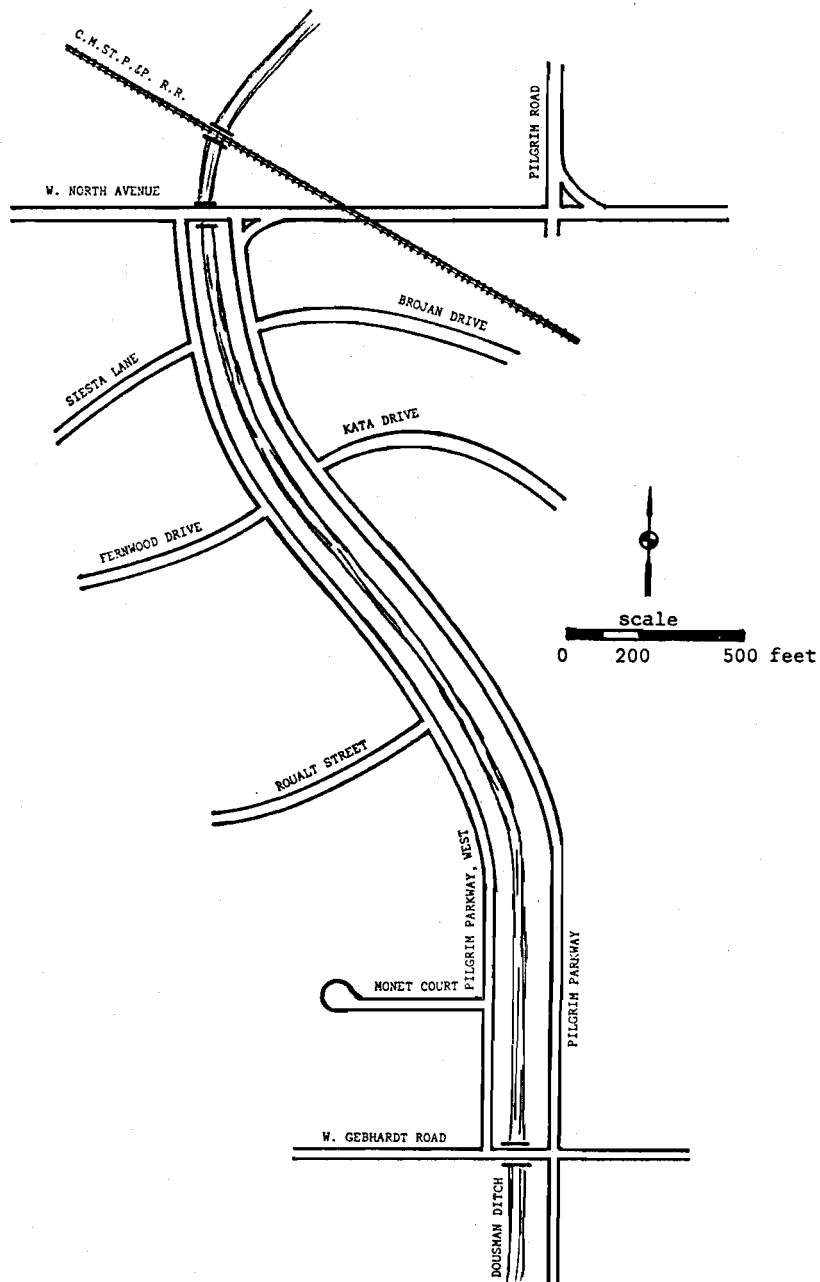
As previously noted, W. Gebhardt Road also intersects with the study segment of Pilgrim Parkway. As shown on Figure 3, the eastbound approach of W. Gebhardt Road is 20 feet wide, facilitating a right-turn and combined through and left-turn lanes, while the westbound approach is only 11.5 feet wide, providing a single combined right-turn, through, left-turn lane. The north- and southbound approaches of Pilgrim Parkway are both 26 feet wide, providing for 13-foot-wide approach lanes to accommodate left-turn, through, and right-turn traffic movements.

Traffic controls and regulations along the study segment of Pilgrim Parkway consist of traffic signal lights that are presently operated in a yellow and red flashing mode at the intersection with W. Watertown Plank Road, a four-way stop sign control at the intersection with W. Gebhardt Road, stop and yield sign controls for northbound left turns and right turns, respectively, at the south approach to W. North Avenue, and a four-way stop sign control with a supplemental westbound right-turn yield sign control at the southbound approach of the Pilgrim Road intersection with W. North Avenue. The speed limit on the study segment of Pilgrim Parkway is posted at 30 mph. A reduced speed limit of 15 mph when children are present is posted on Pilgrim Parkway in the vicinity of the Elmbrook Middle School.



Figure 1

DIAGRAM OF THE ROADWAY CONFIGURATION IN THE VICINITY OF THE  
PILGRIM PARKWAY INTERSECTION WITH W. NORTH AVENUE AND W. GEBHARDT ROAD



Source: SEWRPC.

Figure 2

EXISTING ROADWAY GEOMETRICS AT THE PILGRIM  
PARKWAY INTERSECTION WITH W. NORTH AVENUE: 1986

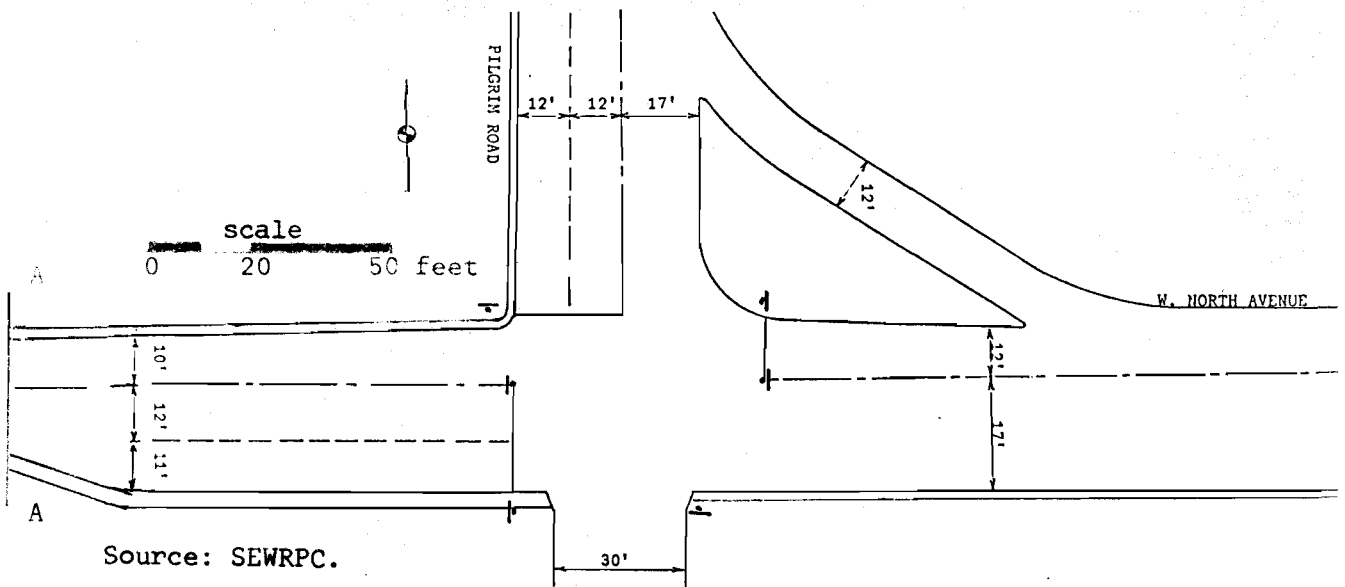
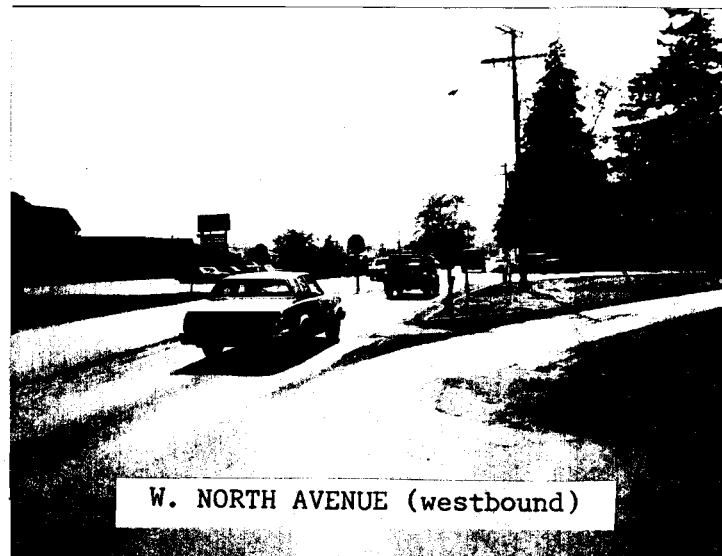
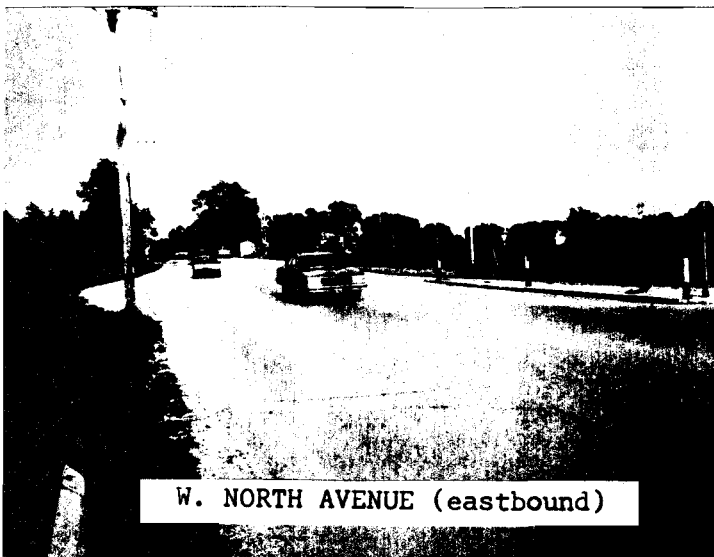
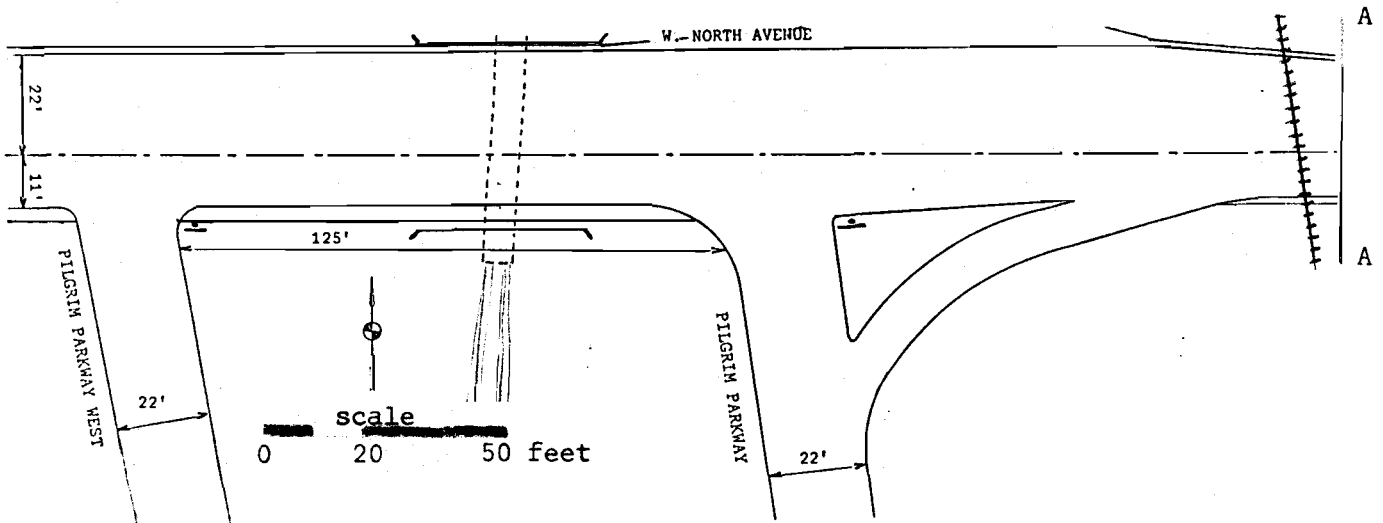
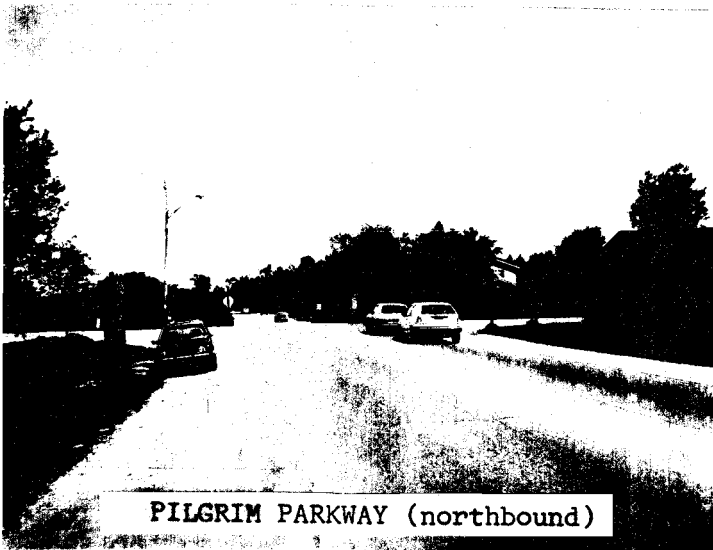
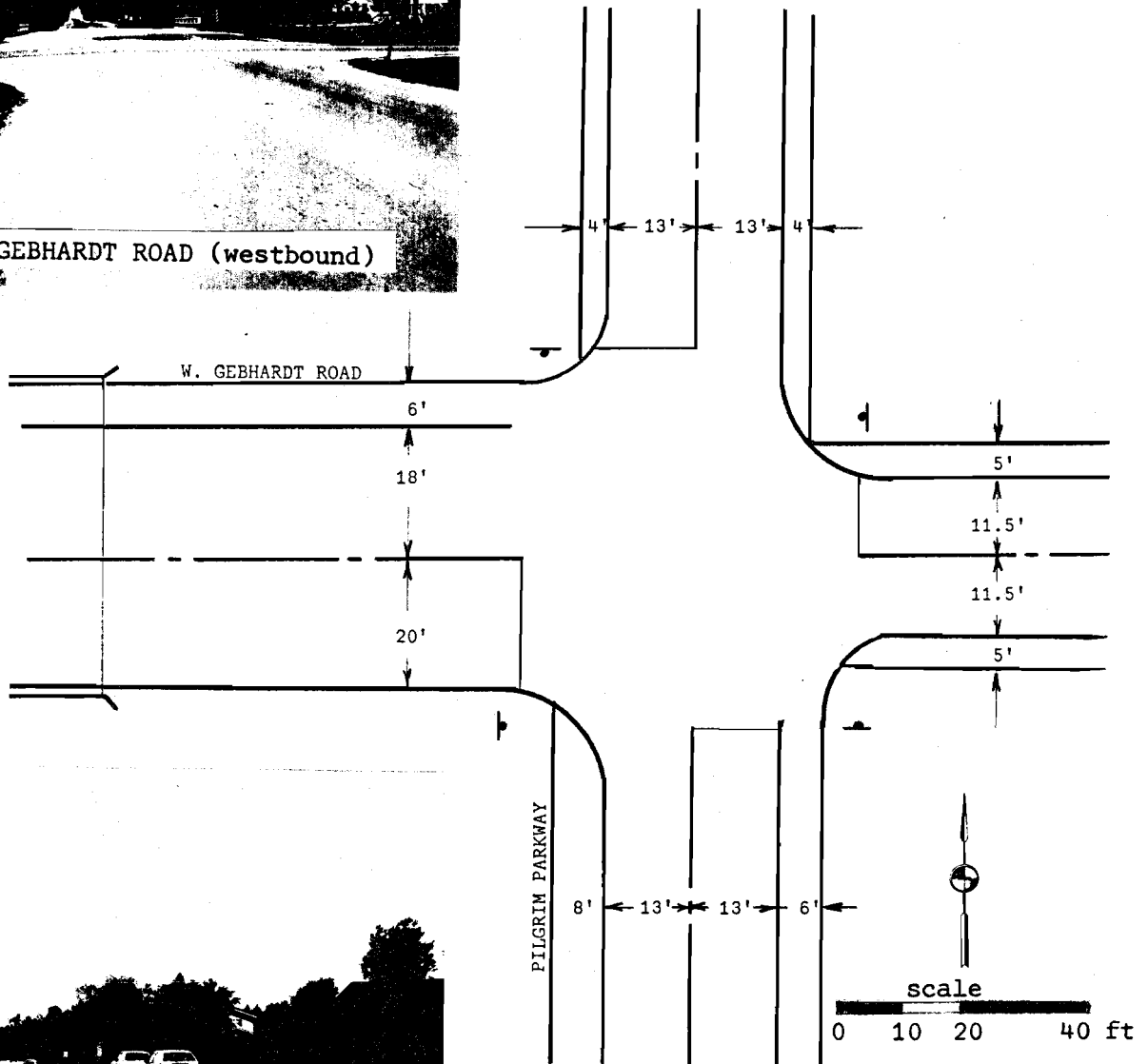
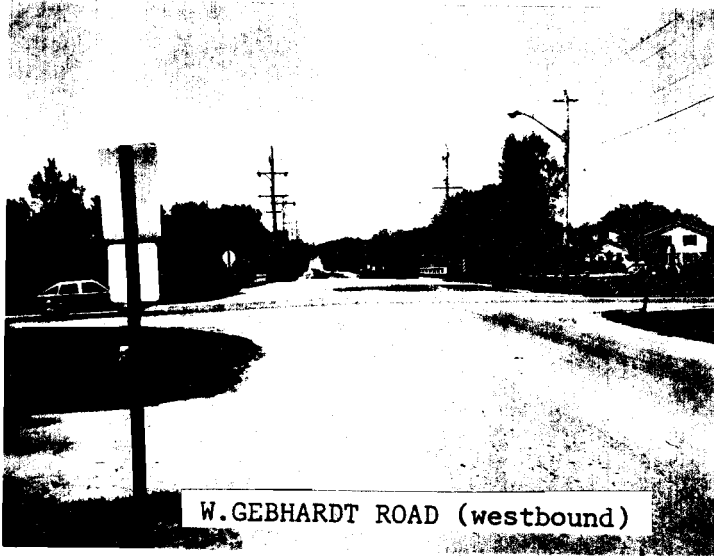


Figure 3

EXISTING ROADWAY GEOMETRICS AT THE PILGRIM  
PARKWAY INTERSECTION WITH W. GEBHARDT ROAD: 1986



### Traffic Volumes

Among the more important data required for roadway planning are 24-hour weekday traffic volumes. Special traffic volume counts were taken by the Wisconsin Department of Transportation for the study in March 1986. As shown on Figure 4, weekday traffic volumes on Pilgrim Parkway ranged from a high of 10,600 vehicles on the segment between W. Watertown Plank Road and W. Gebhardt Road, to a low of 7,700 vehicles on the segment immediately north of W. Gebhardt Road. Weekday traffic volumes on Pilgrim Parkway West approximated about 760 vehicles per weekday.

Weekday traffic volume on W. Gebhardt Road ranged from 2,100 vehicles east of its intersection with Pilgrim Parkway to 3,420 vehicles west of its intersection with Pilgrim Parkway. Although W. Gebhardt Road west of Pilgrim Parkway was open to traffic at the time of these traffic counts, traffic on W. Gebhardt Road was probably lower than normal due to a roadway obstruction created by sewer construction work that may have discouraged some trips from using W. Gebhardt Road. Weekday traffic on W. North Avenue totaled 10,800 vehicles west of Pilgrim Parkway, West; 17,200 vehicles between the two "T" intersections with Pilgrim Parkway and Pilgrim Road; and 11,800 vehicles east of Pilgrim Road. In comparison, weekday traffic volume on W. Bluemound Road was 34,000 vehicles west of its intersection with Pilgrim Parkway.

Figure 5 indicates the hourly distribution of weekday traffic flow on Pilgrim Parkway south of its intersection with W. Gebhardt Road. Morning peak traffic demand occurs during the 7:00 to 8:00 a.m. time period, and constitutes about 8 percent of the daily traffic volume. After 8:00 a.m., traffic volumes decline to about 5 percent of the daily volume, and then gradually increase to a high of about 9 percent of the daily volume during the 3:00 p.m. to 6:00 p.m. period. This flow pattern is typical of urban traffic except for the extended three-hour evening peak period, which, on urban arterials, typically reaches a high of 9 percent for only a one-hour time period. Based upon these data, it may be concluded that traffic congestion and delay problems occur most frequently on the study segment of Pilgrim Parkway during the 7:00 a.m. to 8:00 a.m. and 3:00 p.m. to 6:00 p.m. time periods.

In addition to hourly traffic volume data collected by the Wisconsin Department of Transportation, the Commission staff, in cooperation with the Village of Elm Grove, counted hourly turning movement volumes at the Pilgrim Parkway intersections with W. Gebhardt Road and W. North Avenue. This detailed count information was necessary to investigate intersection operating conditions and to evaluate the the potential need for traffic signal devices. The turning movement count data obtained by Commission and Village staffs were for the 7:00 a.m. to 6:00 p.m. time period, which includes the previously identified peak traffic periods and, in total, accounts for approximately 76 percent of the average weekday traffic volume using Pilgrim Parkway.

Shown on Figure 6 are the 24-hour weekday turning movement volumes at each intersection, as derived from the 7:00 a.m. to 6:00 p.m. count data. As indicated on Figure 6, the principal daily southbound traffic movement on Pilgrim Road north of W. North Avenue is the right-turn movement of 3,500 vehicles per day, which constitutes about 80 percent of the traffic stream. This traffic moves westbound on W. North Avenue, merging with the 5,050 vehicles traveling westbound on W. North Avenue across the Pilgrim Road intersection. At the Pilgrim Parkway intersection, 3,600 vehicles per day, or about 42 percent of

Figure 4

24-HOUR WEEKDAY TRAFFIC VOLUME ON PILGRIM  
PARKWAY AND SELECTED INTERSECTING STREETS: 1986

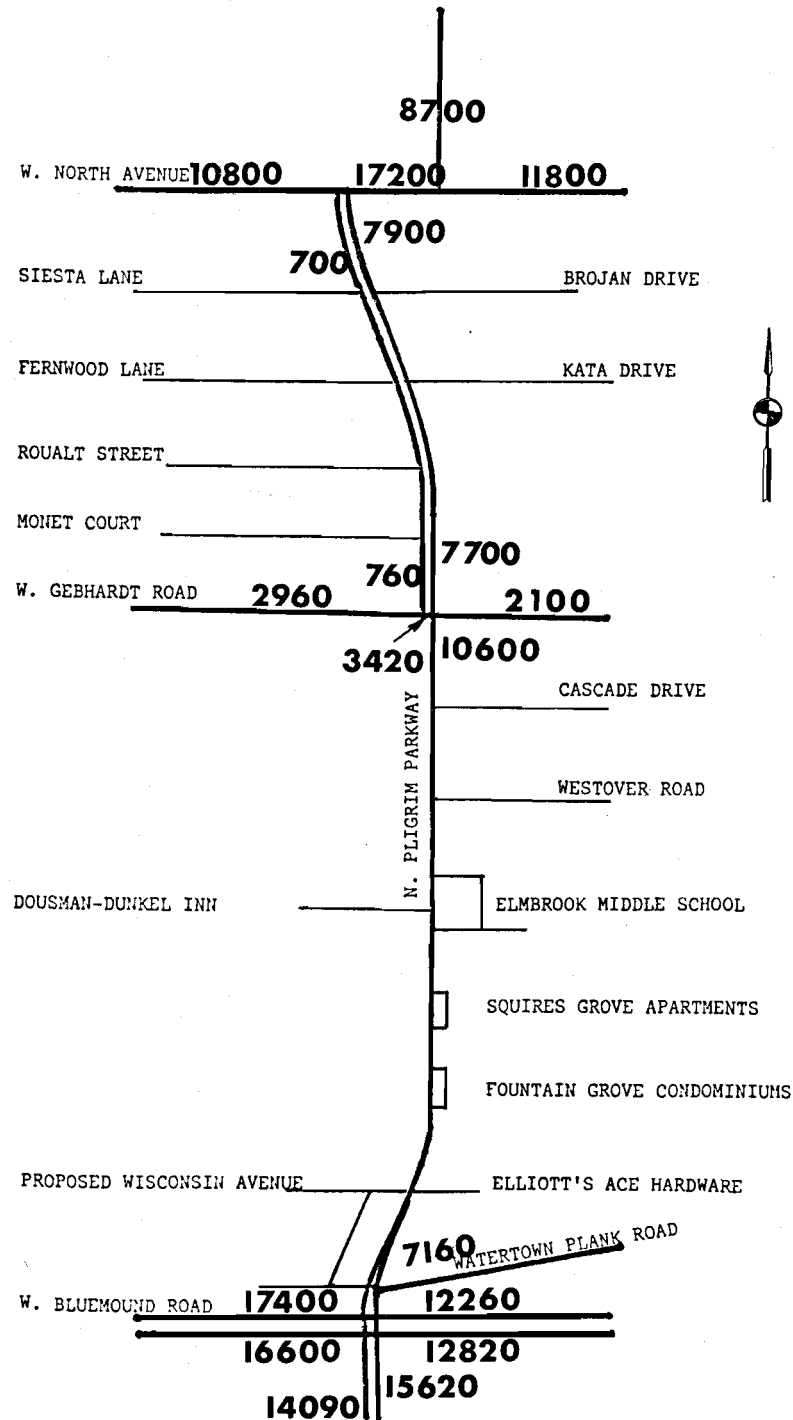
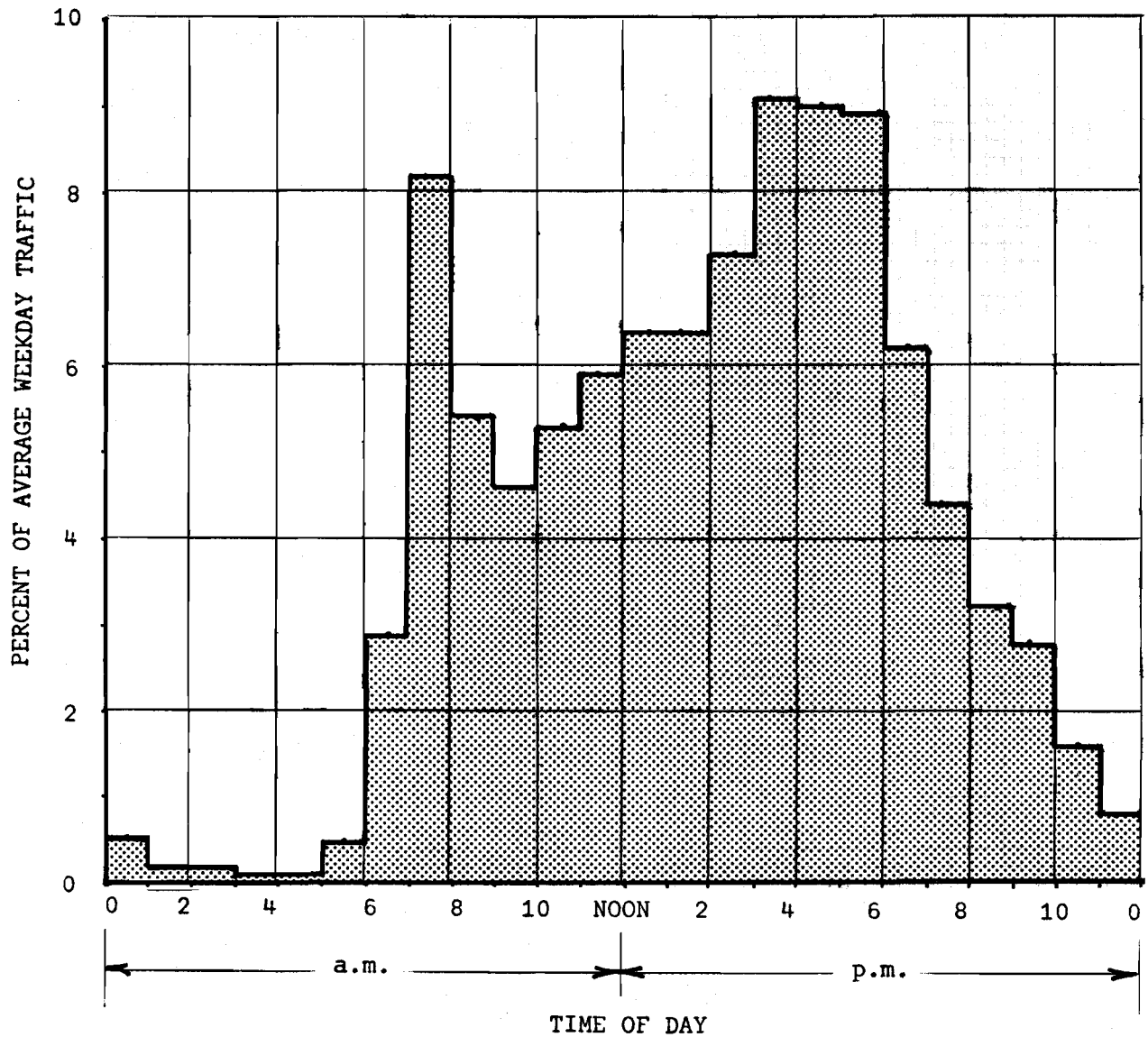


Figure 5

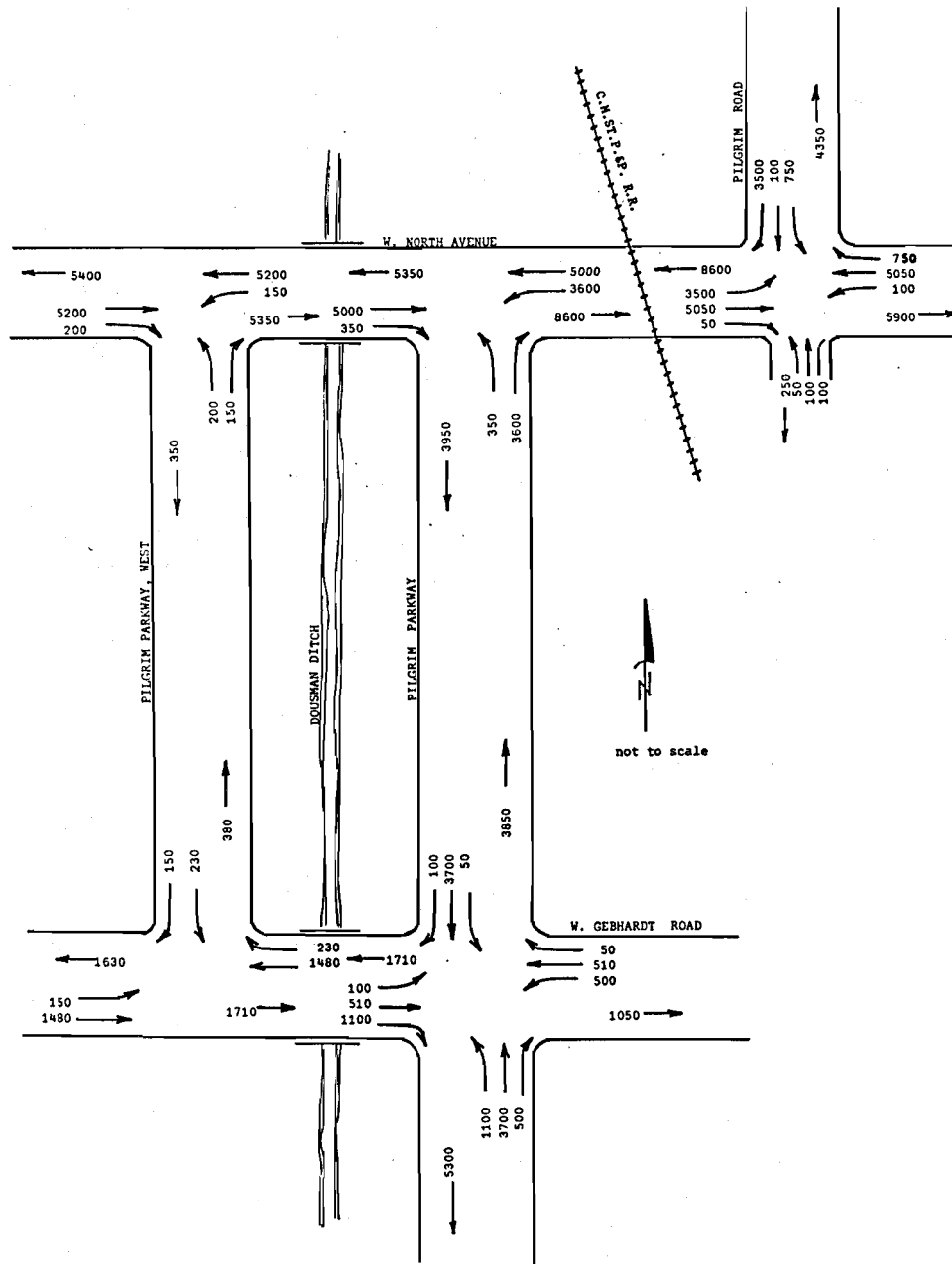
HOURLY VARIATION IN WEEKDAY TRAFFIC VOLUME  
ON PILGRIM PARKWAY SOUTH OF W. GEBHARDT ROAD: 1986



Source: Wisconsin Department of Transportation.

Figure 6

24-HOUR WEEKDAY TURNING MOVEMENT VOLUMES  
AT THE PILGRIM PARKWAY INTERSECTIONS WITH  
W. NORTH AVENUE AND W. GEBHARDT ROAD: 1986



Source: SEWRPC.

the westbound traffic stream, turn left, crossing the stream of 5,000 eastbound vehicles. At the Pilgrim Parkway intersection with W. Gebhardt Road, 3,700 vehicles per day, or about 96 percent of the traffic stream, continue south through the intersection.

The complementary northbound traffic stream on Pilgrim Parkway at its intersection with W. Gebhardt Road contains a heavy left-turn movement, about 1,100 vpd, or 21 percent of the traffic stream, that conflicts with the stream of 3,700 southbound vehicles; and the stream of 3,700 vehicles that continues northbound across the intersection. At W. North Avenue, the great majority--about 3,600 out of 3,950 vehicles per day--or about 91 percent of the traffic stream--turn right to merge with the 5,000 vehicles traveling eastbound on W. North Avenue. At the W. North Avenue intersection with Pilgrim Road, about 5,050 vehicles per day, or 59 percent of 8,600 vehicles eastbound on W. North Avenue, continue eastbound; while another 3,500 vehicles per day, or 40 percent, turn left, conflicting with westbound traffic at the intersection, to travel north on Pilgrim Road.

These traffic flow patterns indicate high left-turn/opposing through traffic volume conflicts at the Pilgrim Parkway intersections with W. Gebhardt Road and W. North Avenue. This pattern is further documented on Figures 7 and 8, which show similar morning and evening peak hour traffic patterns. Over 36 percent of the northbound traffic on Pilgrim Parkway turns left at W. Gebhardt Road and 54 percent of the westbound traffic on W. North Avenue turns left at Pilgrim Parkway during the 7:00 a.m. to 8:00 a.m. time period. During the evening 4:00 p.m. to 5:00 p.m. time period, 24 percent of the northbound traffic at W. Gebhardt Road and 36 percent of the westbound traffic on W. North Avenue at Pilgrim Parkway turns left across the opposing stream.

A capacity analysis of the Pilgrim Parkway intersections with W. Gebhardt Road and W. North Avenue was conducted to identify existing traffic congestion and delay problems. The intersection of Pilgrim Parkway and W. Gebhardt Road, which is controlled by four-way stop signs, experiences capacity problems during the morning 7:00 a.m. to 8:00 a.m. peak hour, and the three-hour evening 3:00 p.m. to 6:00 p.m. peak hour. Both the morning and evening peak period traffic patterns exhibit a high approach lane imbalance; with between 70 to 87 percent of the hourly traffic volume approaching the intersection on Pilgrim Parkway, and the remaining 13 to 30 percent on W. Gebhardt Road.

Four-way stop signs are most effective in managing traffic flows exhibiting an even distribution of traffic on all intersecting approaches. The ineffectiveness of the four-way stop signs at this intersection leads to extensive traffic congestion with long back-ups and delays on Pilgrim Parkway.

A capacity analysis of the Pilgrim Parkway intersection with W. North Avenue, which is stop sign controlled for northbound left turns and yield sign controlled for northbound right turns, indicates that the northbound left-turn movement experiences capacity problems during the morning 7:00 a.m. to 8:00 a.m. peak period and during the three-hour evening 3:00 p.m. to 6:00 p.m. peak periods. This problem may be attributed to the normal priority given to the traffic movements, whereby the northbound left turn is free to move only after both the higher volume uncontrolled eastbound through and westbound through and left-turn movements have completed their respective maneuvers and cleared



Figure 7

TURNING MOVEMENT VOLUMES DURING THE 7:00 A.M.  
TO 8:00 A.M. MORNING PEAK HOUR AT THE PILGRIM PARKWAY  
INTERSECTIONS WITH W. NORTH AVENUE AND W. GEBHARDT ROAD: 1986

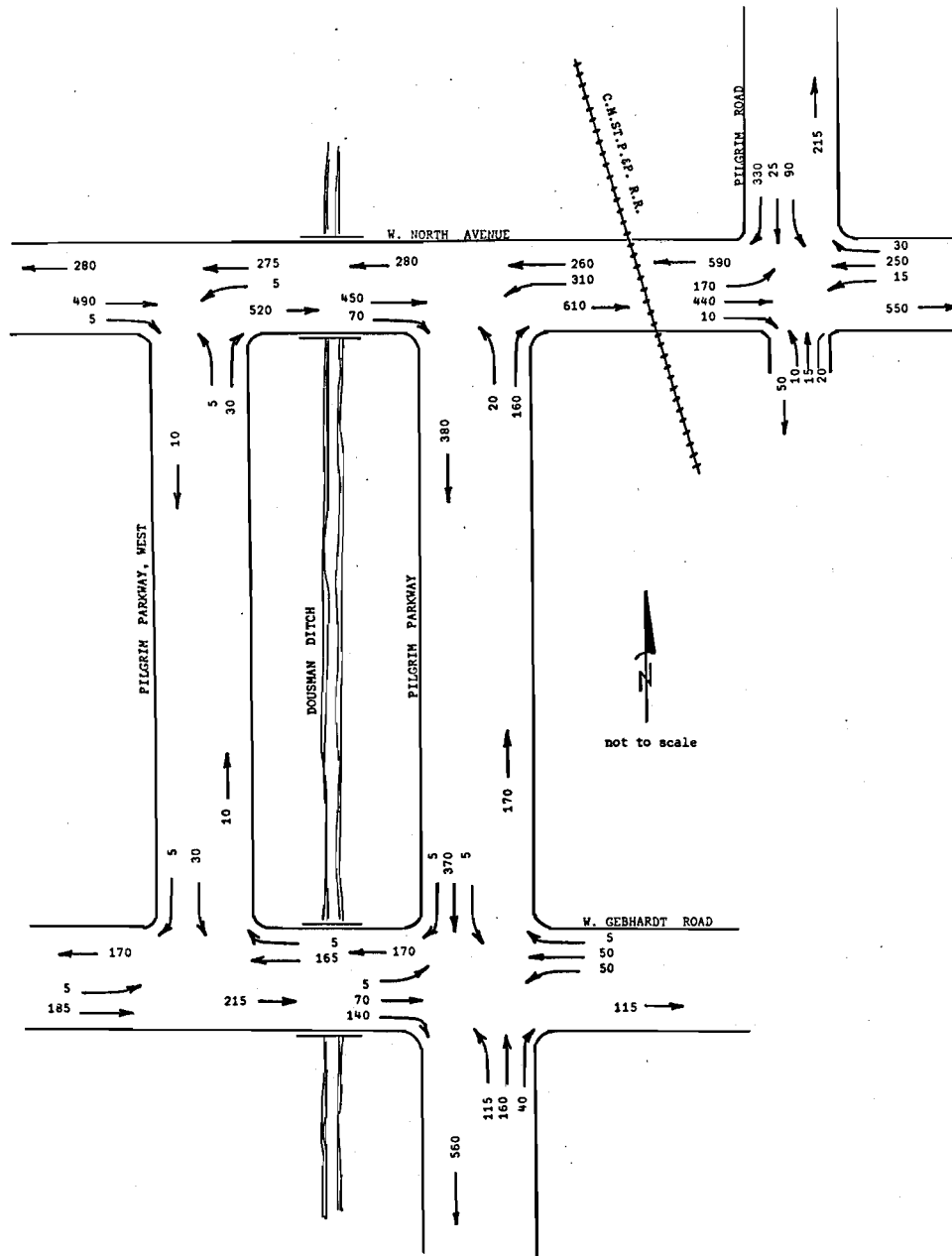
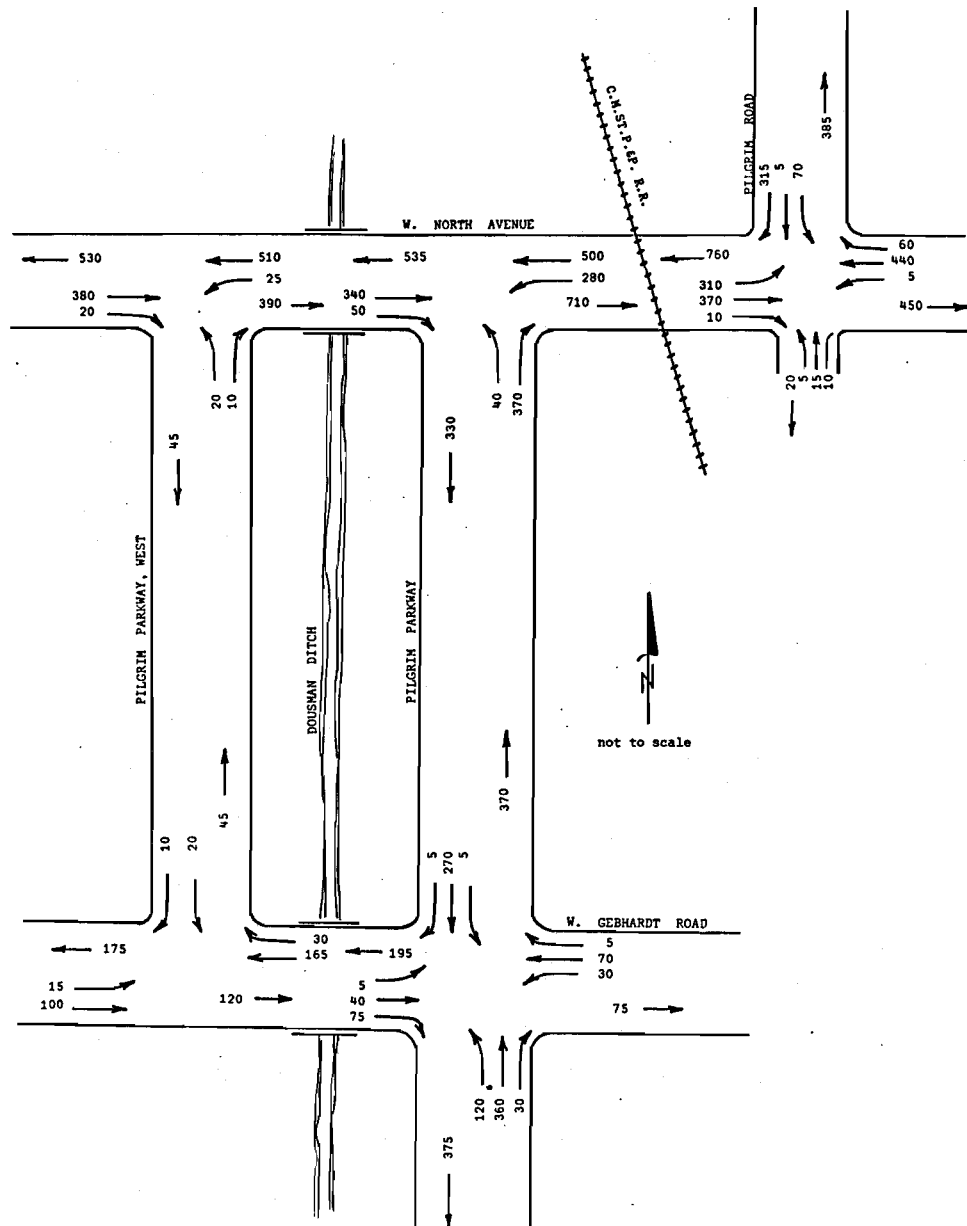


Figure 8

TURNING MOVEMENT VOLUMES DURING THE 4:00 P.M.  
TO 5:00 P.M. EVENING PEAK HOUR AT THE PILGRIM PARKWAY  
INTERSECTIONS WITH W. NORTH AVENUE AND W. GEBHARDT ROAD: 1986



Source: SEWRPC.

the intersection. All other traffic movements at the intersection were operating at or below design capacity levels with minimal delays and back-ups.

Finally, a capacity analysis of the Pilgrim Road intersection with W. North Avenue, which is four-way stop sign controlled, was made. This analysis indicated that both the morning and evening peak periods were operating well below design capacity levels, with minimal delays and back-ups.

Additional traffic operational problems were identified at the parking lot driveway to Elliott's Ace Hardware on Pilgrim Parkway and at the entrance to Elmbrook Middle School on Pilgrim Parkway. Based upon Commission staff field observations, numerous vehicle conflicts occur between traffic entering or exiting the Elliott's Ace Hardware parking lot and northbound traffic on Pilgrim Parkway. This problem may be attributed to a number of factors, including internal parking lot circulation problems; driveway traffic controls; vertical and horizontal roadway alignment; the merging of northbound traffic into a single lane; and the desire of southbound traffic to pass left-turning vehicles entering the parking lot on the right hand side.

Commission staff observations also indicated that access to Elmbrook Middle School is difficult during school starting and dismissal times. Vehicular traffic on southbound Pilgrim Parkway encounters delays from left-turning vehicles waiting for gaps in the traffic stream to enter the school driveways. Traffic exiting the school driveways also encounters delays as vehicles wait for gaps to enter the traffic stream on Pilgrim Parkway.

#### Traffic Accidents

The incidence and location of traffic accidents provides another important measure of the efficiency and operating characteristics of an arterial facility such as Pilgrim Parkway. The motor vehicle accident history for the study segment of Pilgrim Parkway is shown on Table 1 and Figures 9, 10, and 11. A total of 38 accidents occurred on the study segment in 1983, 44 accidents occurred in 1984, and 60 accidents occurred in 1985. Also shown for purposes of comparison in Table 1 and Figures 9, 10, and 11 is the accident history for the intersection of Pilgrim Parkway and W. Bluemound Road.

As shown on Figure 9 and on Table 1, of the 38 accidents reported on Pilgrim Parkway study segment in 1983, five occurred at the intersection with W. Watertown Plank Road; three at the intersection with W. Gebhardt Road; and 23 at the intersection with W. North Avenue. The remaining seven accidents were reported as midblock accidents located between the aforementioned intersections. Of the 44 accidents reported in 1984, six occurred at the intersection with W. Watertown Plank Road; four at the intersection with W. Gebhardt Road; and 24 at the intersection with W. North Avenue. The remaining 10 accidents were reported as midblock accidents located between the aforementioned intersections.

A significant increase in accidents occurred on the study segment of Pilgrim Parkway in 1985, with a total of 60 accidents reported. As shown on Figure 11 and in Table 1, there were seven accidents at the W. Watertown Plank Road intersection; four accidents at the W. Gebhardt Road intersection; and 27 accidents at the W. North Avenue intersection. Twenty-two accidents were reported as midblock accidents.

Table 1

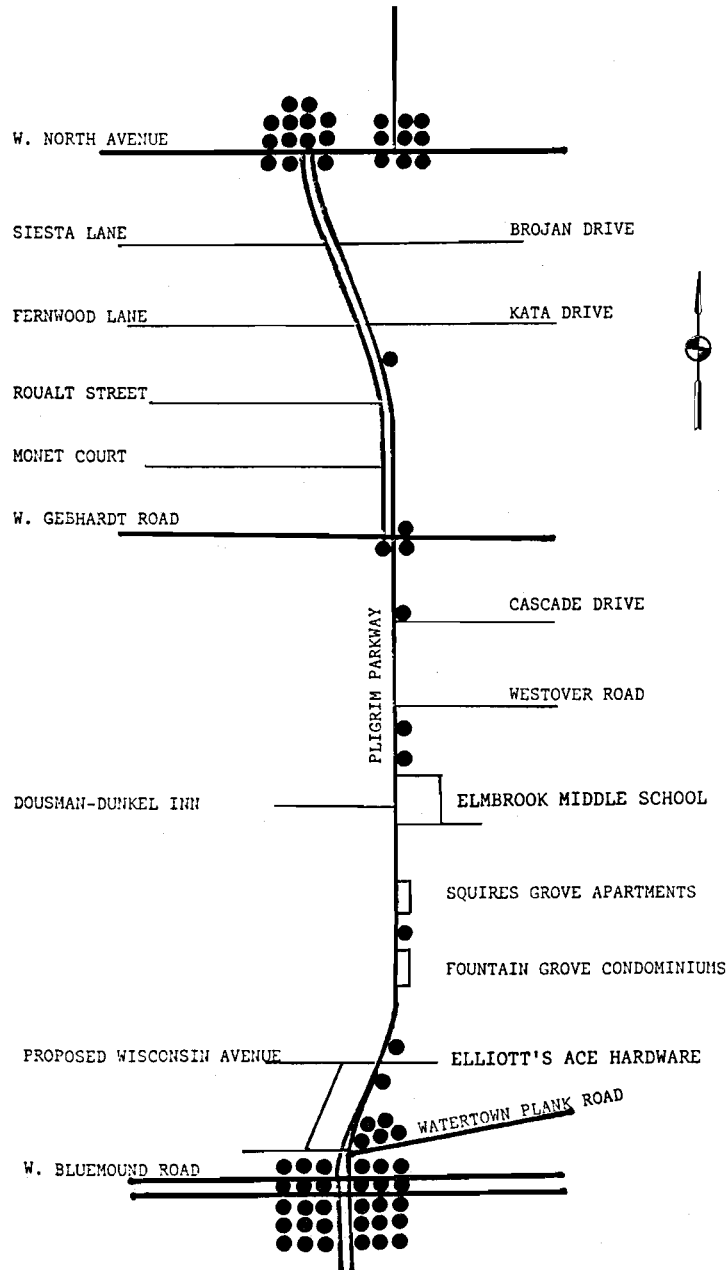
INCIDENCE AND SEVERITY OF MOTOR VEHICLE ACCIDENTS ON THE STUDY SEGMENT OF  
 PILGRIM PARKWAY BETWEEN W. WATERTOWN PLANK ROAD AND W. NORTH AVENUE  
 AND AT THE INTERSECTION OF PILGRIM PARKWAY WITH W. BLUEMOUND ROAD: 1983-1985

Intersection	1983			1984			1985			Total		
	Injury	Property Damage	Total	Injury	Property Damage	Total	Injury	Property Damage	Total	Injury	Property Damage	Total
Pilgrim Parkway W. Watertown Plank Road.....	--	5	5	--	5	6	1	6	7	1	17	18
W. Gebhardt Road.....	1	2	3	1	3	4	--	4	4	2	9	11
W. North Avenue.....	3	20	23	3	21	24	5	22	27	11	63	74
Midblock Between W. Watertown Plank Road and W. North Avenue.....	--	7	7	3	7	10	6	16	22	9	30	39
Subtotal	4	34	38	7	37	44	12	48	60	23	119	142
W. Bluemound Road.....	9	21	30	7	19	26	15	28	43	31	68	99
Total	13	55	68	14	56	70	27	76	103	54	187	241

Source: Village of Elm Grove and SEWRPC.

Figure 9

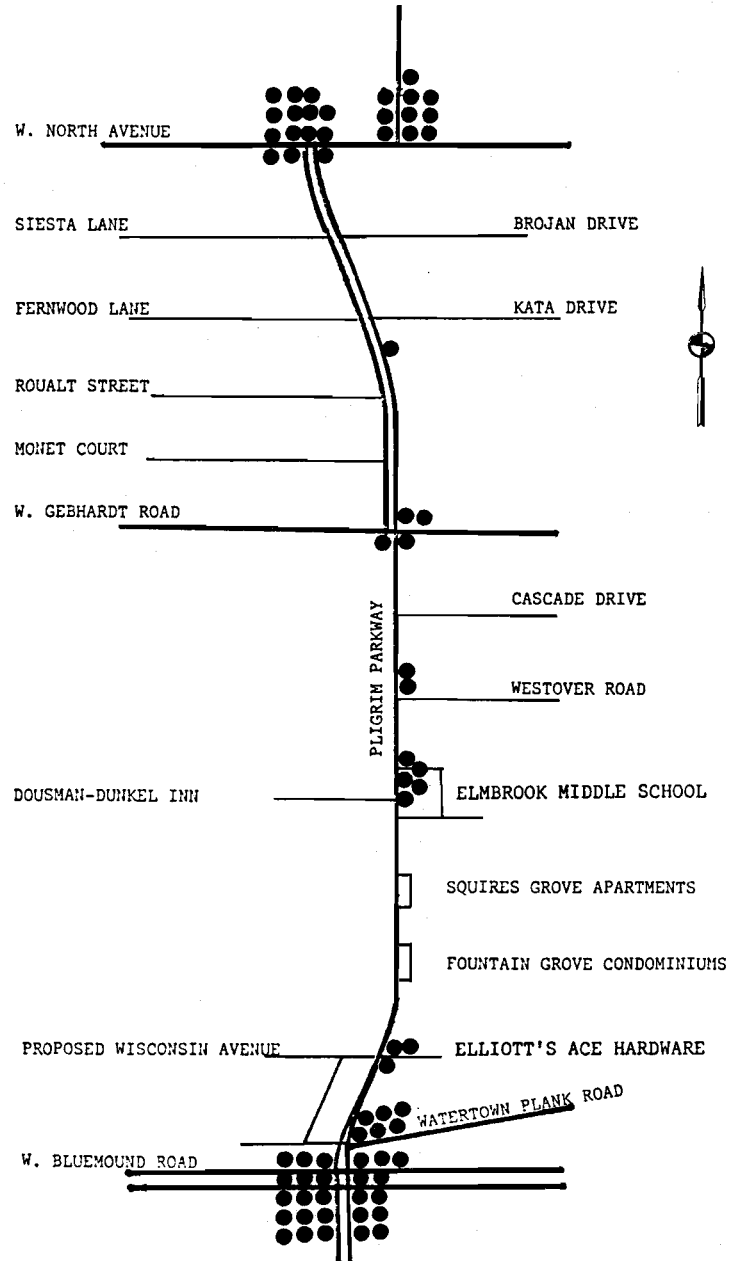
ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS  
REPORTED ON THE STUDY SEGMENT OF PILGRIM PARKWAY: 1983



Source: Village of Elm Grove and SEWRPC.

Figure 10

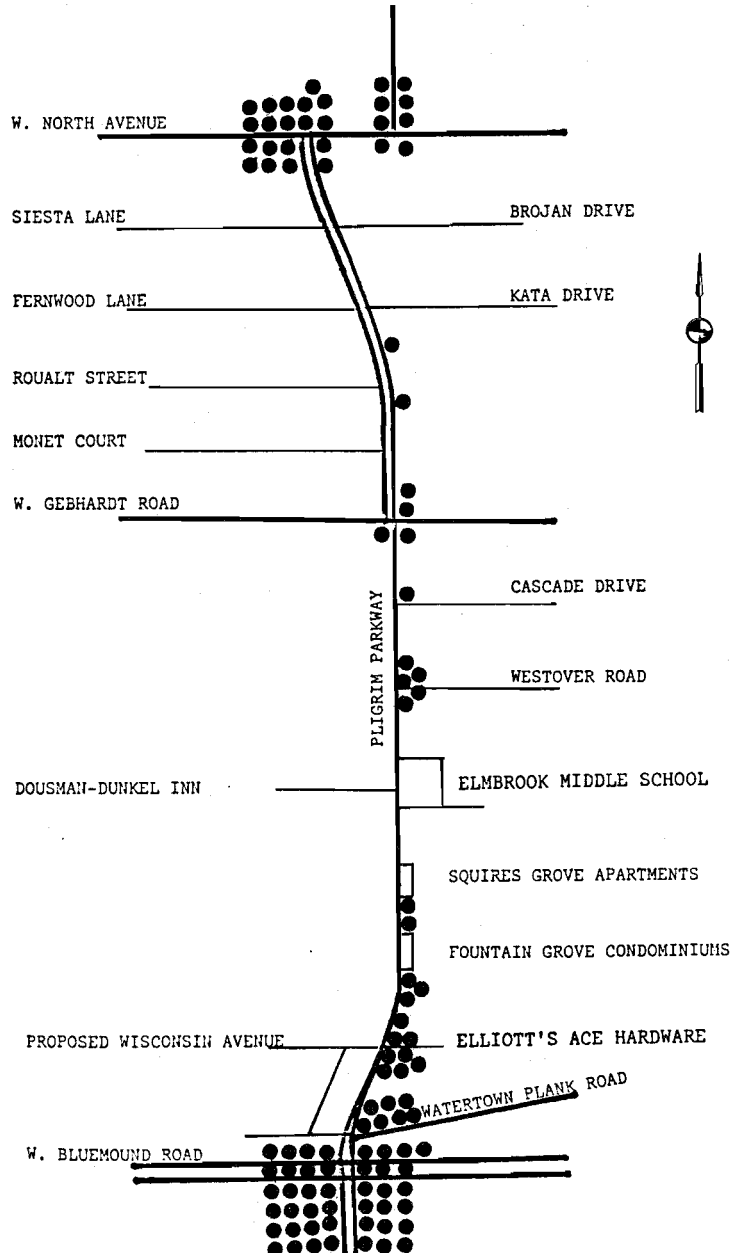
ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS  
REPORTED ON THE STUDY SEGMENT OF PILGRIM PARKWAY: 1984



Source: Village of Elm Grove and SEWRPC.

Figure 11

ON-STREET MOTOR VEHICLE ACCIDENT LOCATIONS  
REPORTED ON THE STUDY SEGMENT OF PILGRIM PARKWAY: 1985



Source: Village of Elm Grove and SEWRPC.

The principal increase in traffic accidents along the study segment of Pilgrim Parkway, as shown in Table 1, for the year 1985, in comparison to 1983 and 1984, occurred at midblock locations between intersections. Some of this increase may be attributed to traffic diversion from construction activity on roads in the area during that year, such as IH 94, N. Calhoun Road, and W. Gebhardt Road.

The highest incidence in intersection traffic accidents along the study segment occurred at the two W. North Avenue intersections with Pilgrim Road and Pilgrim Parkway. In total, there were 23, 24, and 27 accidents reported at these two intersections in 1983, 1984, and 1985, respectively. In comparison, the Pilgrim Parkway intersection with W. Gebhardt Road was a relatively safe intersection, with only three, four, and four accidents reported, respectively, over the same three-year period. The W. Watertown Plank Road intersection was also relatively safe, with five, six, and seven accidents reported, respectively, over the same three-year period.

Another measure used to identify accident problem locations is the accident rate. This rate considers not only the frequency of accidents, but also the volume of traffic entering an intersection. The highest annual accident rate on the study segment of Pilgrim Parkway in 1985 occurred at the W. North Avenue intersection--3.20 accidents per million vehicles entering the intersection. In descending order, the next highest accident rates in 1985 were 1.32 accidents per million vehicles entering the W. North Avenue intersection with Pilgrim Road; 1.19 accidents per million vehicles entering the intersection at the W. Watertown Plank Road intersection; and 1.01 accidents per million vehicles entering the intersection at the W. Gebhardt Road intersection.

The locations along the study segment which may be considered problem locations are those where the frequency and/or rate of accidents appears relatively high in comparison to the accident experience at the other locations, as well as those locations which show substantial increases in accidents from year to year. Therefore, the principal accident problem locations identified in the study were the Pilgrim Parkway intersection with W. North Avenue and the midblock stretches of the roadway between intersections.

An analysis of the accidents occurring at the intersection of Pilgrim Parkway and W. North Avenue is given on Figure 12. Of the 47 intersection accidents reported during the 1983 through 1985 time period, 34 accidents, or 72 percent, involved vehicles making a left- or right-turn maneuver; 22 accidents, or 47 percent, involved vehicles colliding into the rear of another vehicle; and eight, or 17 percent, involved vehicles that went out of control. Of the 47 accidents, 43 accidents, or 91 percent, occurred during periods of daylight, and 35 accidents, or 74 percent, occurred under wet, snowy, or icy roadway conditions.

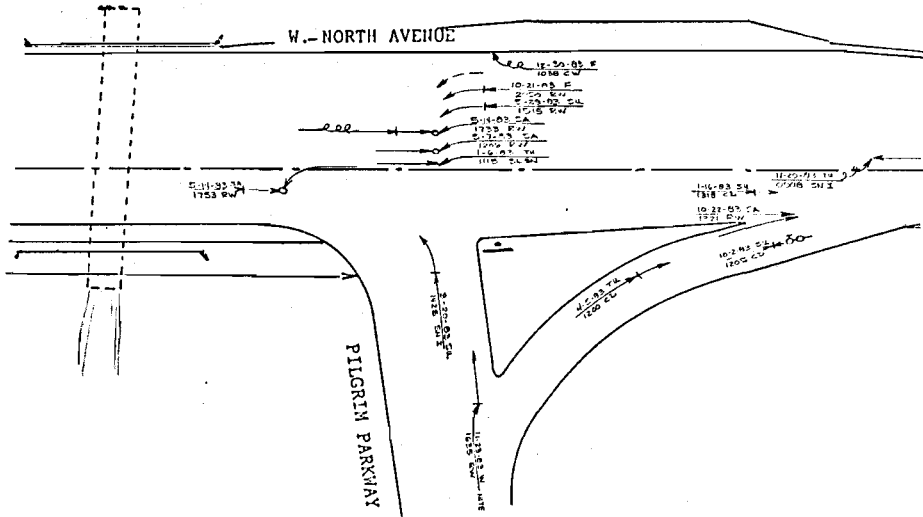
An analysis of the 39 midblock accidents reported on Pilgrim Parkway during the 1983 through 1985 time period indicated that 25 accidents--almost two-thirds--occurred under wet or snowy conditions, with 12, or 31 percent, related to high speeds. In 1985, when the annual frequency of accidents more than doubled, five accidents occurred in the vicinity of the driveway to Elliot's Ace Hardware.



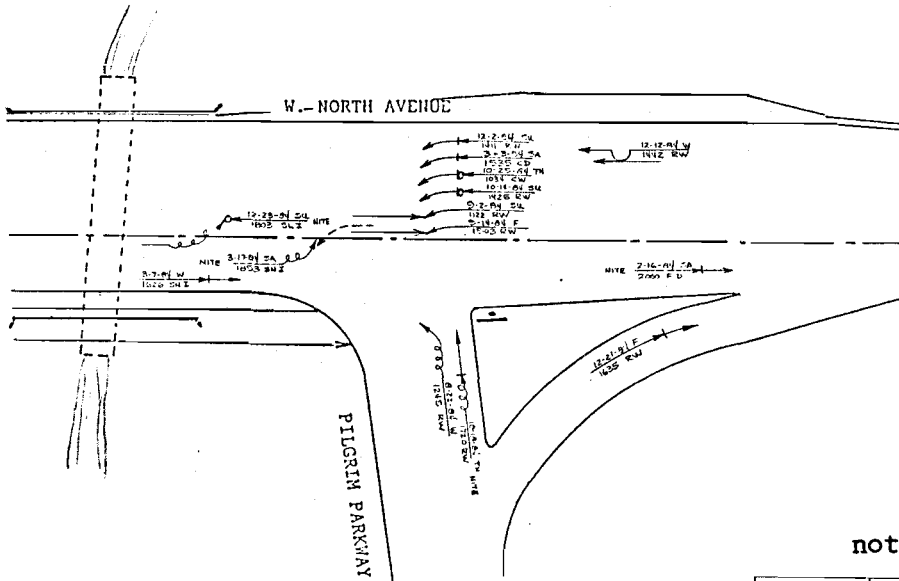
Figure 12

COLLISION DIAGRAM FOR THE INTERSECTION OF  
PILGRIM PARKWAY AND W. NORTH AVENUE: 1983-1985

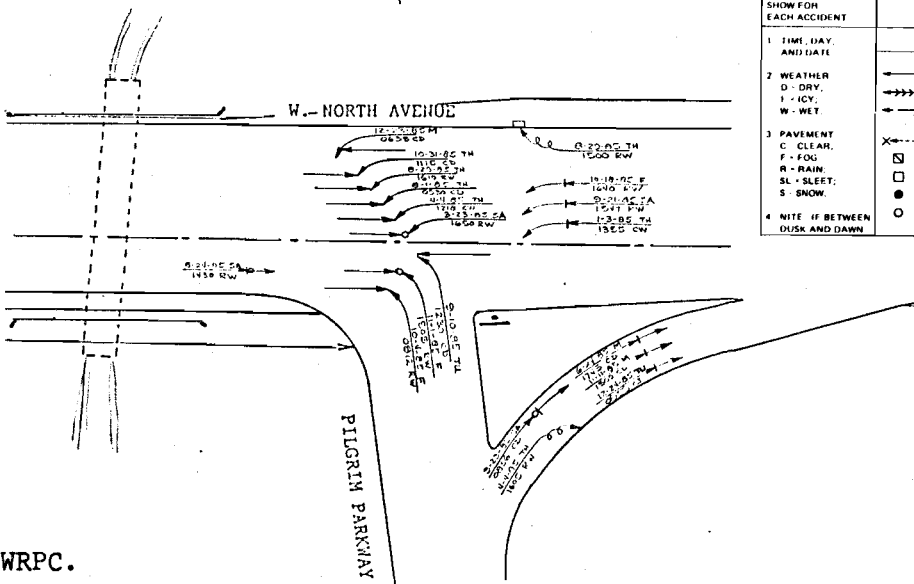
1983



1984



1985



not to scale

SHOW FOR EACH ACCIDENT		LEGEND	
1. TIME, DAY, AND DATE	2. WEATHER	SYMBOLS	TYPES OF COLLISION
D - DRY, I - ICY, W - WET	C - CLEAR, F - FOG, R - RAIN, SL - SLEET, S - SNOW	<div>  MOVING VEHICLE </div> <div>  BACKING VEHICLE </div> <div>  NONINVOLVED VEHICLE </div> <div>  PEDESTRIAN </div> <div>  PARKED VEHICLE </div> <div>  FIXED OBJECT </div> <div>  FATAL ACCIDENT </div> <div>  INJURY ACCIDENT </div>	<div>  REAR END </div> <div>  HEAD ON </div> <div>  SIDESWIPE </div> <div>  OUT OF CONTROL </div> <div>  LEFT TURN </div> <div>  RIGHT ANGLE </div>
4. NITE IF BETWEEN DUSK AND DAWN			

## PROBABLE FUTURE TRAFFIC CONDITIONS

Any determination of the need for roadway improvements should consider both existing and anticipated future traffic conditions. Based upon the Commission adopted design year 2000 regional land use plan, average weekday traffic on the study segment of Pilgrim Parkway may be expected to increase from its current levels of about 8,000 to 11,000 vehicles per average weekday to about 11,000 to 14,000 vehicles per average weekday. However, land development in the W. Bluemound Road corridor in the City of Brookfield is approaching, and in some areas exceeding, household and employment levels anticipated by the year 2000 in the regional land use plan. The City of Brookfield, assisted by the planning and engineering firm of Howard Needles Tammen & Bergendoff, is currently preparing a land use plan for lands in the City adjacent to W. Bluemound Road. Until that plan is completed--identifying additional lands which should be planned to be developed and redeveloped, and the intensities of planned development, the traffic forecasts for the year 2000 for Pilgrim Parkway cannot be updated. However, it can be concluded that the impact on future traffic of potential growth in the W. Bluemound Road corridor on Pilgrim Parkway may be substantial, resulting in a more urgent need for roadway widening, perhaps within the next five to 10 years, than the present forecasts indicate. In particular, the extension of Wisconsin Avenue from Calhoun Road to Pilgrim Parkway and the intensive development of adjacent lands, as proposed under some alternative land use plans, would be expected to substantially increase traffic on Pilgrim Parkway.

The expected increase in traffic may also be expected to increase the existing traffic safety problem at the driveway entrance to the Elliot's Ace Hardware parking lot. The traffic problem, as previously identified to exist at this location, may be expected to become more acute with the convergence of the aforementioned vehicle conflicts, roadway design deficiencies, future increases in vehicular traffic, and the extension of Wisconsin Avenue.

The planned extension of N. 124th Street from W. Watertown Plank Road to W. Bluemound Road would not be expected to significantly reduce traffic on Pilgrim Parkway except on the segment between W. Watertown Plank Road and W. Bluemound Road, on which a reduction of approximately 2,000 vehicles per average weekday would be anticipated.

## ANALYSIS AND RECOMMENDATIONS

The existing roadway conditions and the expected changes in those conditions as land development and traffic volumes continue to increase in the Elm Grove/Brookfield area indicate a need to prepare plans for both short-range and long-range roadway improvements for the study segment of Pilgrim Parkway. Accordingly, this memorandum includes a short-range element plan consisting of recommended traffic engineering improvements to abate existing traffic conflict and accident problems; and a long-range plan consisting of recommended roadway improvements to serve probable future traffic volumes efficiently and safely within reasonable costs.

### Short-Range Highway Improvement Plan

The short-range plan element for Pilgrim Parkway consists primarily of low-cost traffic engineering improvement measures such as traffic control signals

and isolated roadway improvements. The following analysis addresses the previously identified existing traffic problems along the study segment of Pilgrim Parkway with respect to short-term actions.

W. Gebhardt Road and Pilgrim Parkway Intersection: The principal problem identified at this intersection consists of excessive delays and traffic congestion during the morning 7:00 a.m. to 8:00 a.m. and the evening 3:00 p.m. to 6:00 p.m. time periods. The alternative traffic engineering actions with potential to solve this traffic congestion problem involve removal of the stop signs controlling traffic on Pilgrim Parkway; the installation of traffic signals; and the reconstruction of the Pilgrim Parkway intersection to provide two lanes of traffic on the north and south approaches.

The first alternative action considered was the removal of the stop signs controlling traffic on Pilgrim Parkway at an estimated cost of \$100. This action has the advantage of reducing vehicle delays on Pilgrim Parkway. The disadvantages of this action are that it could potentially increase the number of accidents at the intersection, particularly involving vehicles making a north-bound left turn or vehicles entering or crossing the traffic stream from W. Gebhardt Road; it cannot provide safe pedestrian/school crossings; and it may be expected to increase the amount of delay and congestion experienced by vehicles on W. Gebhardt Road. Implementation of this alternative is not recommended.

The second alternative action considered to improve vehicle operating conditions at the intersection of Pilgrim Parkway and W. Gebhardt Road involves the installation of traffic-actuated signals, at an estimated capital cost of \$30,000 and an annual operation and maintenance cost of \$2,000. The advantage of this alternative is that it should serve to reduce vehicle delays on Pilgrim Parkway. The disadvantage of this alternative is that the existing traffic volumes do not meet the warrants for the installation of<sup>1</sup> traffic signals as set forth in the Manual on Uniform Traffic Control Devices. These warrants are based upon accepted engineering standards related to traffic volume, accidents, delay, and pedestrian activity. Installation of unwarranted traffic signals has been found to result in an increase in delay and accidents, and a general disrespect for all traffic control devices. Consideration of traffic signals can be justified when the daily traffic volumes on Pilgrim Parkway approaches 14,500 vpd, and/or traffic on W. Gebhardt Road approaches 6,860 vehicles per average weekday. Current weekday traffic on Pilgrim Parkway is 10,600 and current weekday traffic on W. Gebhardt Road is 3,420. Implementation of this alternative is not recommended.

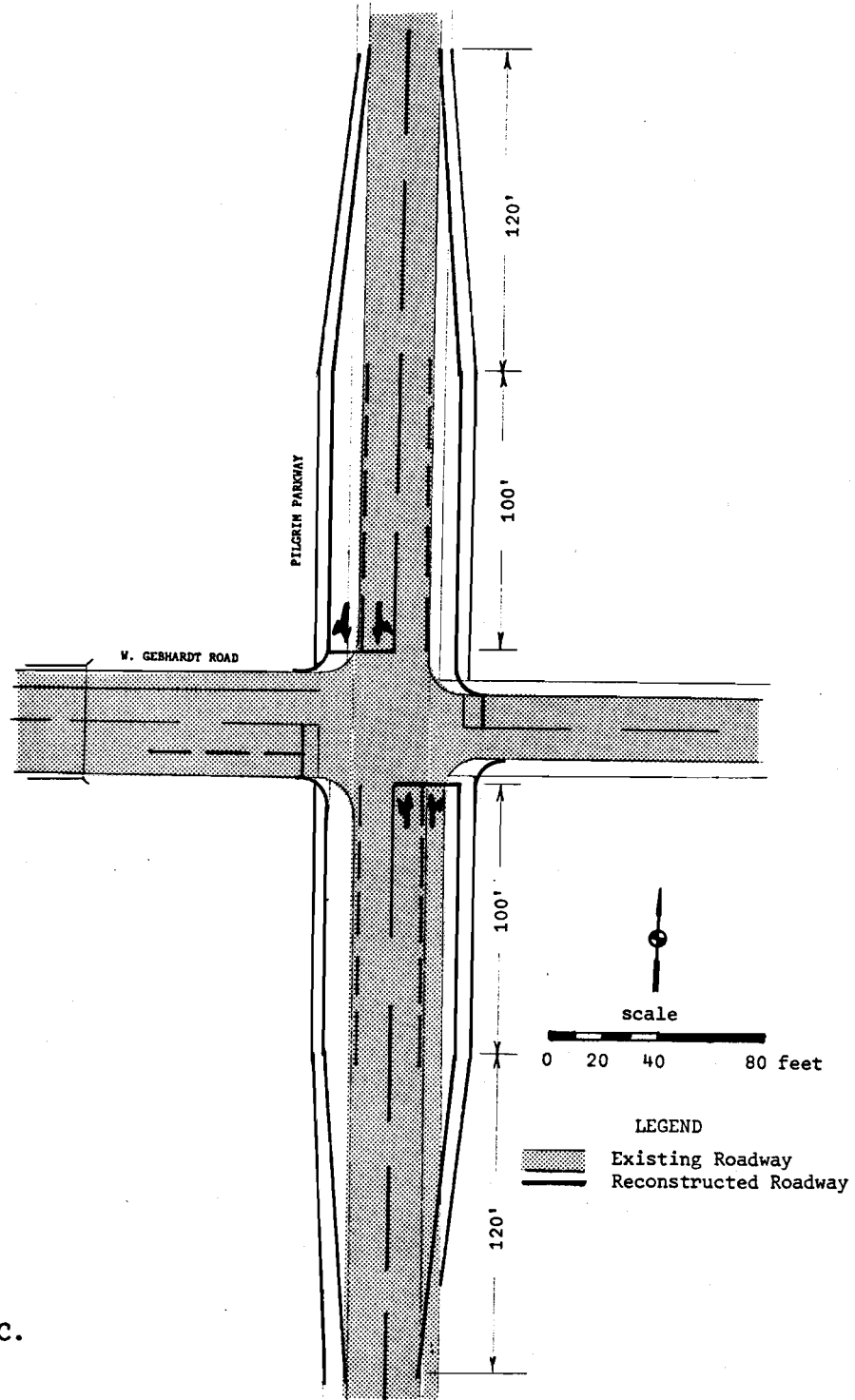
The final alternative action considered to improve vehicle operating conditions at this intersection involves reconstruction of the Pilgrim Parkway approaches to W. Gebhardt Road to permit two lanes of travel in each direction, at an estimated cost of \$40,000, as shown in Figure 13. The advantages of this alternative are that it would increase the capacity of the Pilgrim Parkway intersection; it would increase the efficiency of the four-way stop

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<sup>1</sup>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.

Figure 13

ALTERNATIVE ROADWAY IMPROVEMENT FOR THE  
INTERSECTION OF PILGRIM PARKWAY AND W. GEBHARDT ROAD



Source: SEWRPC.

sign controls by improving the lane distribution of vehicles on each approach to the intersection--northbound 255 vehicles per lane per hour (vplph), southbound 140 vplph, eastbound 120 vplph, and westbound 105 vplph; and it would provide a right-hand through lane for northbound traffic that should not be delayed due to northbound left-turning vehicles. The disadvantage of the alternative is that it would increase pedestrian crossing time on Pilgrim Parkway. It is recommended that this alternative be implemented.

Concluding Remarks: It may be concluded that, to alleviate the existing traffic congestion problem at the intersection of Pilgrim Parkway and W. Gebhardt Road, the north- and southbound approaches to the intersection should be widened to accommodate two lanes of traffic in both directions.

#### W. North Avenue and Pilgrim Parkway Intersections

As previously noted, this intersection is composed of two "T" intersections, one with Pilgrim Parkway from the south and one with Pilgrim Road from the north, offset a distance of about 900 feet along W. North Avenue. The principal problems identified at the Pilgrim Parkway intersection are accident-related, with a total of 47 accidents reported in calendar year 1983 through 1985, together with traffic congestion. Of the 47 accidents reported at this intersection, 23 accidents involved westbound left-turning vehicles and 34 accidents occurred under wet or icy roadway conditions. The traffic congestion problem at this intersection involves excessive delays encountered by northbound left-turning vehicles during both the morning 7:00 a.m. to 8:00 a.m. and evening 4:00 p.m. to 5:00 p.m. time periods. The alternative traffic engineering actions with potential to solve these problems involve the installation of three-way stop signs or traffic signals; channelization; closure of the Pilgrim Parkway West intersection with W. North Avenue; skid proofing the roadway surface, and a reduction of the posted 35 mph speed limit on W. North Avenue.

The first alternative action considered with potential to solve the accident problem at this intersection involves the installation of three-way stop signs at the Pilgrim Parkway intersection with W. North Avenue at an estimated cost of \$200. The advantage of this alternative is that it may be expected to ameliorate the left-turn accident problem by stopping oncoming traffic to accommodate left-turning vehicles. The disadvantages of this action are that it may increase westbound rear end accident problems due to the inadequate sight distance provided by the vertical alignment of W. North Avenue at its intersection with the Milwaukee Road railway trackage; it may be expected to significantly increase vehicle delay on W. North Avenue; and it may be expected to queue stopped vehicles across the Milwaukee Road crossing of W. North Avenue. Implementation of this alternative is not recommended.

The second alternative action considered with potential to solve the accident and congestion problems at this intersection involves the installation of traffic control signals at an estimated capital cost of \$70,000, and an estimated annual operation and maintenance cost of \$2,000. To avoid the hazardous queueing of vehicles across the Milwaukee Road trackage located midway between the Pilgrim Parkway and Pilgrim Road intersections with W. North Avenue, it would be necessary to signalize and interconnect both of the W. North Avenue intersections and provide a signal preemption for railroad crossing gate operation. The advantages of this alternative are that it would serve to separate and control the conflict between left-turning vehicles and through

traffic; it may be expected to minimize delays encountered by northbound left-turning vehicles; and it would control the speed of traffic on W. North Avenue as it traverses the Pilgrim Parkway intersection. Traffic volumes at the intersection do satisfy the four-hour and peak hour warrants for the installation of traffic signals. The disadvantage of this alternative is that it may be expected to provide an inefficient pedestrian crossing operation and will cause northbound right-turning and east- and westbound through traffic to encounter periodic delays at the intersection. These delays would, however, be minimized through the coordination of progressive traffic movement through the two adjacent "T" intersections. It is therefore recommended that traffic signals be installed at this intersection.

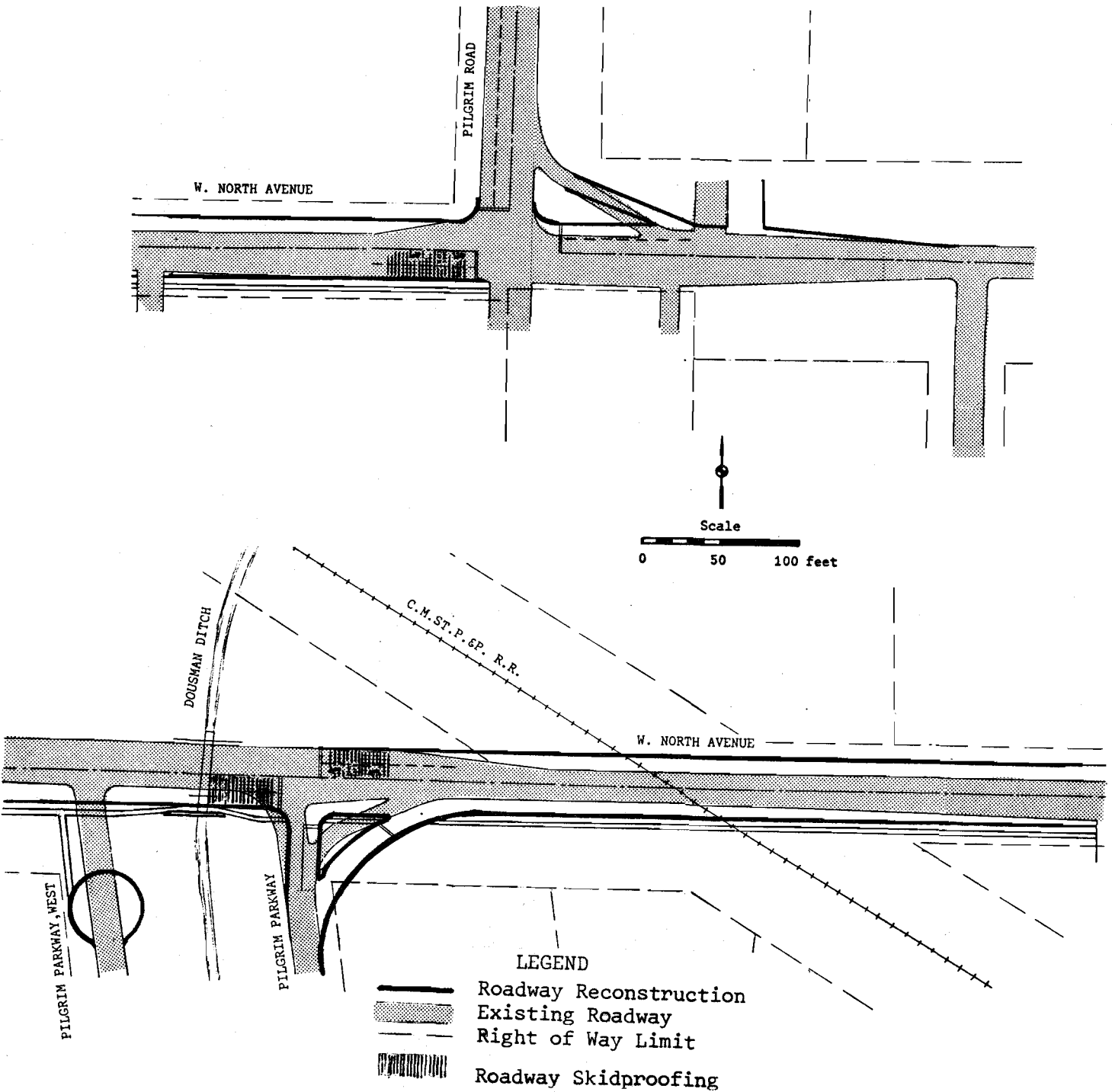
The third alternative action considered with potential to solve the accident problem at this intersection, as shown on Figure 14, involves roadway widening on W. North Avenue to accommodate channelization for an exclusive westbound left-turn lane and to provide lane continuity for the northbound right-turn lane as it merges into eastbound W. North Avenue, at an estimated cost of \$125,000. This cost estimate includes the reconstruction of the existing Milwaukee Road crossing of W. North Avenue to provide a four-lane undivided roadway between the two adjacent W. North Avenue "T" intersections. Such a project is recommended in the adopted regional transportation system plan. The advantages of this alternative are that it should serve to reduce the number of vehicle conflicts and rear end accidents reported on W. North Avenue and on the existing northbound exclusive right-turn lane; it may be expected to reduce vehicle delay; and it should improve overall traffic operating conditions between the two "T" intersections. There are no significant disadvantages associated with this alternative. It is, therefore, recommended that the segment of W. North Avenue between the Pilgrim Parkway and Pilgrim Road intersections be reconstructed to accommodate two lanes of traffic in each direction.

Another alternative considered with potential to solve the accident problem at this intersection involves closing the Pilgrim Parkway, West intersection with W. North Avenue at an estimated cost of \$10,000. Alternative routes on Pilgrim Parkway-West to W. Gebhardt Road and Pilgrim Parkway, as well as on Siesta Lane to Glen Cove Land and W. North Avenue are available to accommodate the approximately 700 vehicles per day that currently use the intersection of Pilgrim Parkway-West and W. North Avenue. The advantages of this alternative are that it would reduce and control vehicle conflicts on W. North Avenue; it would be compatible with the previous recommendation to install traffic signals by eliminating a potential accident problem on the W. North Avenue approach to Pilgrim Parkway; it would decrease motorist confusion in attempting to identify right- and left-turn maneuver locations along W. North Avenue; and it should serve to reduce through traffic on a local street (Pilgrim Parkway, West) by vehicles attempting to avoid traffic congestion on Pilgrim Parkway. The disadvantages of this alternative are that it would reduce accessibility to the residential development located adjacent to Pilgrim Parkway, West; and it would increase traffic volumes on other land access streets as drivers alter their routes to the residential development served by Pilgrim Parkway, West. It is recommended that Pilgrim Parkway, West be made a cul-de-sac south of its intersection with W. North Avenue.

Another alternative action considered with potential to reduce the rear end accident problem at both of the Pilgrim Parkway and Pilgrim Road "T" intersec-

Figure 14

ALTERNATIVE ROADWAY WIDENING IMPROVEMENT FOR THE  
INTERSECTION OF PILGRIM PARKWAY AND W. NORTH AVENUE



tions with W. North Avenue involves skid proofing the approaches to the intersection, as shown on Figure 14. This can be done through grooving the pavement with transverse saw cuts--which is a short-term solution on asphalt roadway surfaces--or through the placement of an asphalt overlay with special skid-resistant aggregate. The estimated cost of this alternative is \$15,000. The advantage of this alternative is that it would reduce the braking distance of vehicles slowing down or stopping to accommodate conflicting traffic movements. The disadvantage of this alternative is that it may increase the noise level of vehicular traffic. It is recommended that this alternative be implemented in conjunction with the previously recommended widening of W. North Avenue.

Another alternative action considered with potential to reduce the rear end accident problem at this intersection involves lowering the speed limit from 35 to 25 mph on W. North Avenue. The cost of the regulatory signing changes involved would be about \$400. As in all regulatory procedures, the limit imposed on highway speeds should be reasonable and appropriate. A reduced speed limit may be expected to ameliorate the rear end accident problem at this intersection. However, the speed limit would have to be strictly enforced, as drivers may have a tendency to drive at a higher speed than that posted because of the suburban nature of land development along W. North Avenue. For safety purposes it is important that the traffic speed of all vehicles should be uniform along a roadway segment. Implementation of this alternative is not recommended.

Elliott's Ace Hardware Driveway on Pilgrim Parkway: The principal problem identified at this location consists of a traffic safety problem involving vehicle conflicts and roadway design deficiencies. The only alternative traffic engineering actions considered to abate this problem involve driveway closure and driveway reconstruction. The first alternative, driveway closure, is not considered a satisfactory action, even though it would resolve the driveway conflict problem on Pilgrim Parkway. Such action would only create parking lot circulation problems and driveway conflict problems on W. Watertown Plank Road.

Reconstruction of the Elliott's Ace Hardware driveway on Pilgrim Parkway, as shown in Figure 15, at an estimated cost of \$10,000, has the advantages of improving parking lot circulation, reducing delay of vehicles on Pilgrim Parkway entering the parking lot driveway, and providing an improvement that would be compatible with the proposed extension of Wisconsin Avenue and the future reconstruction to provide for four traffic lanes on Pilgrim Parkway. There are no significant disadvantages to this alternative. It is recommended that this alternative be implemented.

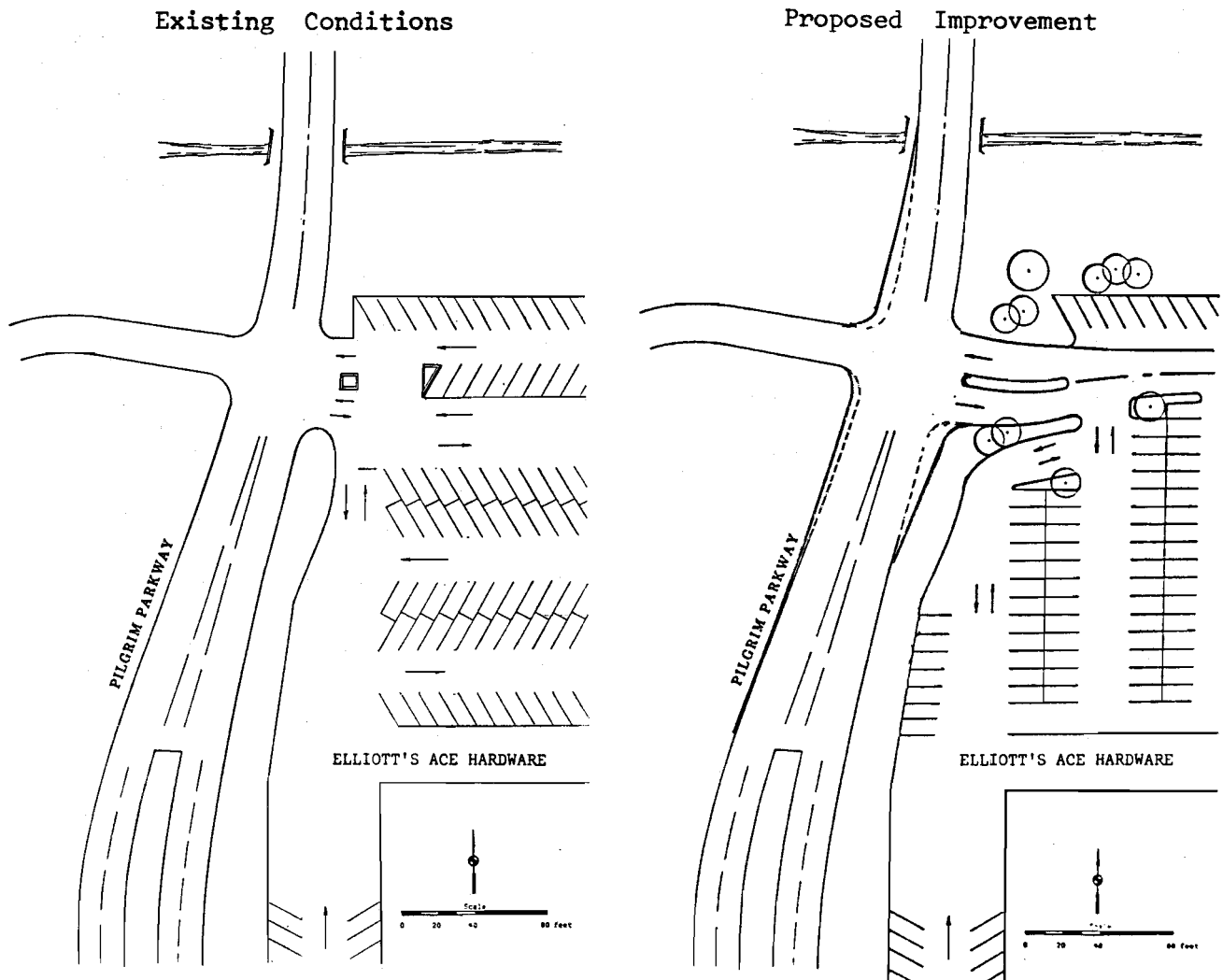
Elmbrook Middle School: The principal problem identified at this location consists of a traffic conflict problem between vehicles desiring to enter or exit the school driveways and traffic on Pilgrim Parkway. Primarily, left turns into the school driveways block southbound through traffic on Pilgrim Parkway, and exiting left turns block right turn traffic desiring to exit the Elmbrook Middle School driveways.

The first alternative traffic engineering action considered to abate the conflict problem involves the construction of a southbound roadway widening to accommodate a left-turn bypass lane and widening of the southern Elmbrook



Figure 15

ALTERNATIVE RECONSTRUCTION IMPROVEMENT FOR  
THE ELLIOTT'S ACE HARDWARE DRIVEWAY ON PILGRIM PARKWAY<sup>a</sup>



<sup>a</sup> Elliott's Ace Hardware driveway improvement is shown with existing two-lane, undivided roadway conditions, but is designed to be compatible with either four-lane, undivided or divided recommended future improvement of Pilgrim Parkway and with the proposed extension of W. Wisconsin Avenue.

Middle School driveway to a 44-foot width to accommodate two-lane exit and entrance operation at an estimated total cost of \$10,000. The advantages of this alternative are that left-turning vehicles will not block traffic on Pilgrim Parkway or the school driveway, and that left- and right-turning vehicles can both enter the school driveway simultaneously, further reducing traffic delays and conflicts on Pilgrim Parkway. There are no significant disadvantages associated with this alternative. It is, therefore, recommended that this alternative be implemented.

The other alternative traffic engineering action considered to solve this problem involves installing actuated traffic signals at the southern Elmbrook Middle School driveway on Pilgrim Parkway at an estimated cost of \$35,000. The advantage of this alternative is that it would permit a conflict free traffic movement for vehicles exiting the school driveway. The disadvantages of this alternative are that it would increase vehicle delays on Pilgrim Parkway; it may not be expected to effectively abate the southbound left-turn problem of vehicles waiting for a gap in northbound traffic without a separate traffic signal turning phase, which would increase delays to north- and southbound traffic on Pilgrim Parkway; and it may be expected to increase the potential for rear end accidents on Pilgrim Parkway. Implementation of this alternative is not recommended.

Concluding Remarks: It may be concluded that, to solve or alleviate the existing traffic accident and congestion problems at the intersection of W. North Avenue and Pilgrim Parkway, traffic signals should be installed and interconnected at both W. North Avenue "T" intersections with Pilgrim Parkway and Pilgrim Road; that the segment of W. North Avenue between Pilgrim Parkway and Pilgrim Road should be widened to accommodate four lanes of traffic; that the north end of Pilgrim Parkway, West at its intersection with W. North Avenue should be made into a cul-de-sac; that intersection approaches be skid-proofed in conjunction with the implementation of the W. North Avenue widening recommendation; that Elliot's Ace Hardware driveway on Pilgrim Parkway be reconstructed; that a southbound left-turn bypass lane be constructed at the Elmbrook Middle School driveways on Pilgrim Parkway; and that the southern driveway to Elmbrook Middle School be widened to accommodate two-lane entrance and exit operations. The total capital cost of these improvements is estimated at \$280,000.

#### LONG-RANGE HIGHWAY IMPROVEMENT PLAN

With the volume of vehicles traveling on Pilgrim Parkway expected to increase to 11,000 to 14,000 vehicles per average weekday under the adopted regional land use plan, and perhaps to even larger traffic volumes, as the potential exists for the density of development in the W. Bluemound Road corridor to exceed that of the adopted year 2000 regional land use plan, a need exists to initiate now the actions toward implementation of the long-recommended widening and improvement of Pilgrim Parkway. The short-range traffic engineering actions recommended in the study were designed to maximize the efficiency and safety of the existing facility without resorting to capital-intensive construction projects. However, it must be recognized that there is a limit to the improvement in the level of service that can be obtained through the implementation of low cost-oriented traffic engineering actions. Ultimately, when the limits of the capacity and safety enhancements provided by traffic engineering actions are reached, it becomes necessary to consider the implementation of

more capital-intensive construction or reconstruction alternatives to serve expected increases in future travel demand.

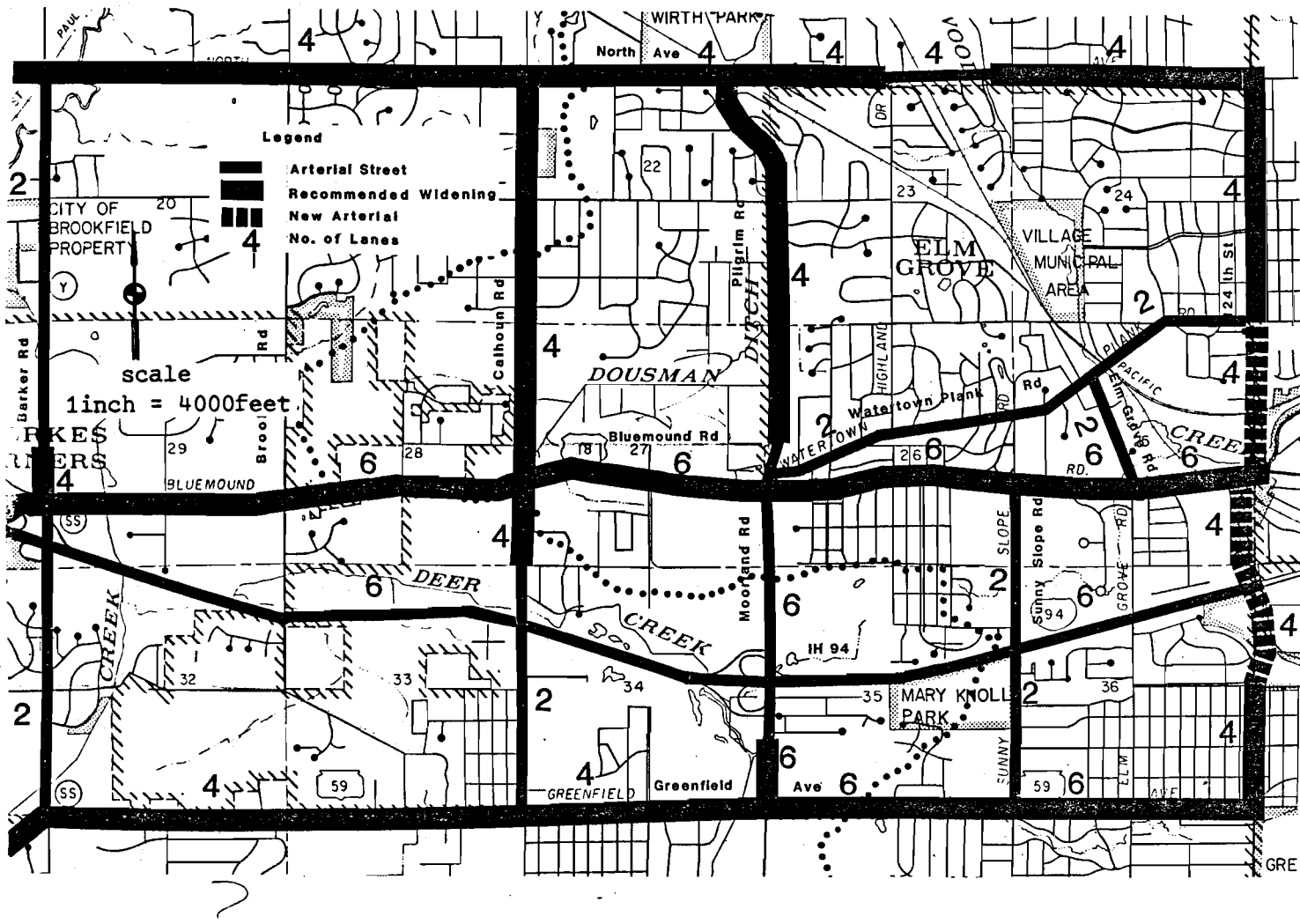
The adopted regional long-range transportation system plan recommends improvements to Pilgrim Parkway which would permit maintaining future traffic operating conditions within design capacity levels as land development and traffic volumes continue to increase in the Elm Grove/Brookfield area. The long-range plan addresses the future cross-section of Pilgrim Parkway and future traffic engineering improvements required to maintain safety and accessibility to land development adjacent to Pilgrim Parkway. Based upon traffic volume increases projected to occur on Pilgrim Parkway, four lanes will be needed for the movement of traffic, consistent with the adopted regional transportation system plan as shown on Map 2.

The adopted regional transportation system plan also recommends the elimination of the indirection of Pilgrim Parkway/Pilgrim Road at W. North Avenue, as shown on Figure 16. As shown on Figure 16, this new roadway could be constructed north or south of W. North Avenue. Construction of a new roadway to eliminate the existing indirection has the advantages of eliminating the route continuity problem between Pilgrim Parkway and Pilgrim Road; reducing traffic volumes on the segment of W. North Avenue between the existing Pilgrim Parkway/Pilgrim Road intersections; and reducing left and right turn traffic movements, thereby reducing vehicle delays and accident potential on Pilgrim Parkway, Pilgrim Road, and W. North Avenue. The estimated cost of this alternative, as shown on Figure 16, is \$110,000 for roadway construction and an additional \$500,000 to \$1 million for right-of-way acquisition. The disadvantages of this alternative are that the northern route would require roadway construction through the City of Brookfield Wirth Park, and the southern route would require construction through a residential area in Brookfield and Elm Grove, displacing the White Hen Pantry commercial development on W. North Avenue and between one to four homes along Pilgrim Parkway. An additional disadvantage associated with either route involves vertical alignment problems created by the levels of the existing Milwaukee Road railway trackage, the Dousman Ditch watercourse, and the W. North Avenue/Pilgrim Parkway roadways which must be accommodated within proximity of each other and a proposed four-legged normal intersection for W. North Avenue, Pilgrim Parkway, and Pilgrim Road. It is therefore recommended that a preliminary engineering study be conducted to resolve the design problems and determine feasibility of this roadway improvement. This study should be initiated by Waukesha County upon transfer of the roadway to county jurisdiction, as recommended in the adopted Waukesha County jurisdictional highway system plan.

The preliminary engineering study should establish the best roadway alignment and cross-section to carry the needed four traffic lanes on Pilgrim Parkway in the future. The study should determine whether the roadway should be constructed as an urban cross-section with curb, gutter, and storm sewer, or as a rural cross-section with shoulders and open ditches. The study should also determine whether parking lanes should be provided on the roadway if the improvement is to be made to urban standards; and whether shoulders should be paved or unpaved if the roadway is improved to rural standards. The study should also determine whether a median should be provided as part of the roadway improvement on the full length of Pilgrim Parkway or on part of its length. The need for, and width of, a median along Pilgrim Parkway may vary with traffic volumes along the route. Moreover, the abutting land uses south

Map 2

ADOPTED LONG-RANGE REGIONAL TRANSPORTATION SYSTEM PLAN: 2000

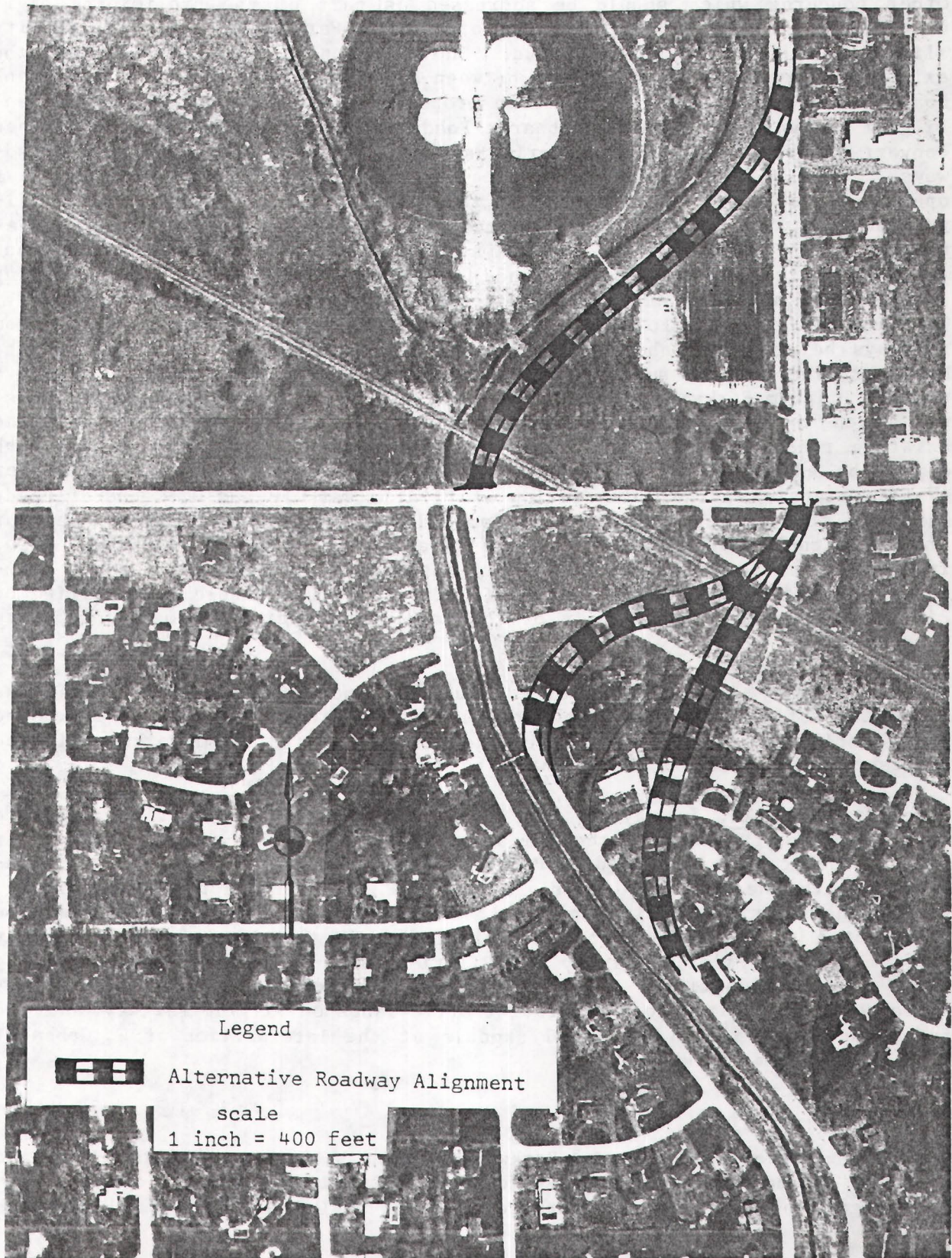


Source: SEWRPC.



Figure 16

ROADWAY CONSTRUCTION ALTERNATIVES FOR A RELOCATED  
PILGRIM PARKWAY INTERSECTION WITH W. NORTH AVENUE





of Gebhardt Road include commercial land uses, a middle school, and higher density residential development, which generate substantial peak traffic which may require a roadway median.

Other concerns which should be addressed as part of the preliminary engineering of the recommended widening of Pilgrim Parkway include the facility alignment south of W. North Avenue. The principal alternative is along the existing alignment of the roadway between W. North Avenue and Watertown Plank Road. Another option which has been proposed in the past would be to extend Pilgrim Parkway West from W. Gebhardt Road to Watertown Plank Road, and then convert Pilgrim Parkway and Pilgrim Parkway West to a pair of one-way roadways, with Pilgrim Parkway operating northbound and Pilgrim Parkway West operating southbound. A suboption of this alternative would be to extend Pilgrim Parkway West to an extended Wisconsin Avenue and operate the roadways as a pair of parallel, two-lane roadways. There are certain serious disadvantages to this alignment option and its suboption which warrant its being dropped now, and from any consideration in the preliminary engineering study. They include the traffic delays and accident problems which would result from roadways being spaced about 100 feet apart to accommodate the Dousman Ditch. Moreover, the cost of such a split roadway could be substantially more than a widened Pilgrim Parkway, as new structures would be required to span the Dousman Ditch to provide adequate accessibility to abutting land uses, if the existing roadways were converted to one-way roadways. Another concern which should be addressed in the preliminary engineering is the eventual need for traffic signals at the intersection of Pilgrim Parkway and W. Gebhardt Road. Based on the projected traffic increase, it may be expected that a need for traffic signals--which should be traffic-actuated--would be required. Also, it is recommended that the preliminary engineering address the need to eliminate the existing vertical and horizontal curvature problems identified on Pilgrim Parkway in the vicinity of the parking lot driveway to Elliott's Ace Hardware.

The preliminary engineering study should be coordinated with the land use study currently being conducted by the City of Brookfield for the Bluemound Road corridor so that the improvements designed for Pilgrim Parkway will be consistent with land use plans now being developed.

Concluding Remarks: It may be concluded from analyses of traffic growth and land development trends in the Elm Grove/Brookfield area, that four lanes for moving traffic will be needed on Pilgrim Parkway within the next decade. Consistent with the adopted long-range regional transportation system plan for the Southeastern Wisconsin Region, it is recommended that a new roadway be constructed at W. North Avenue to eliminate the existing route continuity problem between Pilgrim Parkway and Pilgrim Road. A preliminary engineering study should be initiated to address this improvement, as well as the roadway cross-section required to carry four traffic lanes on Pilgrim Parkway and the future need for traffic-actuated signals at the intersection of W. Gebhardt Road and Pilgrim Parkway.

#### SUMMARY

The study segment of Pilgrim Parkway between W. Watertown Plank Road and W. North Avenue is basically a 24-foot-wide, two-lane undivided roadway with stop sign controls at its intersections with W. Gebhardt Road and W. North

Avenue. The segment of Pilgrim Parkway between W. Gebhardt Road and W. North Avenue is paralleled by Pilgrim Parkway West, a land access street located approximately 125 feet west of Pilgrim Parkway; and by the Dousman Ditch waterway, which continues south of W. Gebhardt Road to a point approximately 1,900 feet north of W. Watertown Plank Road. The W. North Avenue intersection with Pilgrim Parkway is constructed as a pair of off-set "T" intersections separated by a distance of about 900 feet.

Existing daily traffic volumes on Pilgrim Parkway range from a low of about 8,000 to a high of about 11,000 vehicles north and south of W. Gebhardt Road, respectively. Peak hour traffic volumes occur during the 7:00 a.m. to 8:00 a.m. morning rush hour, carrying approximately 8 percent of the average daily volume; and during an extended 3:00 p.m. to 6:00 p.m. evening hour, averaging about 9 percent of the daily volume for each hour. Heavy left-turn traffic movements occur in the northbound direction at the W. Gebhardt Road intersection, 1,100 vehicles per average weekday; and in the westbound direction at the W. North Avenue intersection, about 3,600 vehicles per average weekday. These left-turn movements are opposed by traffic streams of 3,700 and 5,000 vehicles per average weekday, respectively.

Based upon inventories and analyses of the existing roadway geometric conditions, traffic control devices, and traffic volumes, it was determined that serious vehicle conflict and congestion problems do exist at the Pilgrim Parkway intersections with W. Gebhardt Road and W. North Avenue. More specifically, the W. Gebhardt Road intersection was found to be operating above design capacity levels due to the inefficient operation of the four-way stop sign control, with heavily imbalanced traffic flows--over 70 percent of traffic entering the intersection doing so on Pilgrim Parkway. The low volume northbound left-turn movement--40 vehicles during the peak hour--at the W. North Avenue intersection also operates above design capacity levels due to the normal priority of traffic movements which dictate that the northbound left turn is free to move only after both the higher volume uncontrolled eastbound through and westbound left-turn movements have cleared the intersection.

Although not causing a traffic congestion problem, two additional traffic operational problems with numerous vehicle conflicts was identified at the parking lot entrance to Elliott's Ace Hardware and the Elmbrook Middle School driveways on Pilgrim Parkway.

A review of motor vehicle accident records for Pilgrim Parkway during the three-year period between 1983 and 1985 indicates that, while there was an increasing pattern of midblock accidents, the majority of accidents occurred at the W. North Avenue intersection. Out of a three-year total of 142 accidents, 74 accidents, or 52 percent, occurred at the W. North Avenue intersection.

The accident problem at the intersection of W. North Avenue and Pilgrim Parkway involves primarily westbound left-turning vehicles either colliding with oncoming traffic or being struck in the rear by westbound through vehicles; and northbound right-turning vehicles which were struck in the rear by other right-turning vehicles.

Future traffic volumes on Pilgrim Parkway may be expected to increase to 14,000 vehicles per average weekday under the adopted regional land use plan for the year 2000.

This future increase in traffic on Pilgrim Parkway may be expected to further exacerbate existing traffic congestion and accident problems identified at the Pilgrim Parkway intersections with W. Gebhardt Road and W. North Avenue, as well as vehicle conflict problems identified at the Pilgrim Parkway driveway access to Elliott's Ace Hardware parking lot and Elmbrook Middle School.

A number of alternative both short- and long-range roadway improvement measures were evaluated with respect to their potential to alleviate both existing and expected future traffic problems on the study segment of Pilgrim Parkway. Based upon this analysis of alternative roadway improvement measures, as shown on Table 2, it is recommended in the short-range to widen the Pilgrim Parkway intersection approaches to W. Gebhardt Road to accommodate two lanes of traffic in each direction; to install and interconnect traffic signals at the W. North Avenue intersections with Pilgrim Parkway and Pilgrim Road; to reconstruct and skidproof the roadway surface of the segment of W. North Avenue between its intersections with Pilgrim Parkway and Pilgrim Road to accommodate two lanes of traffic in each direction; to cul-de-sac the north end of Pilgrim Parkway West south of its intersection with W. North Avenue; to reconstruct the driveway entrance on Pilgrim Parkway at the Elliott's Ace Hardware parking lot; and to construct a southbound left-turn bypass lane and widen the driveway at Elmbrook Middle School. The estimated cost of all these recommended improvements is \$280,000.

Ultimately, by the year 2000 when the limits of capacity and safety enhancements provided by the recommended short-range traffic engineering improvements are reached, a pressing need will exist to provide four traffic lanes on Pilgrim Parkway as recommended in the Commission adopted long-range regional transportation system plan. An integral part of such a roadway improvement includes construction of a new roadway to eliminate the indirection and route continuity problem at the Pilgrim Parkway and Pilgrim Road intersections with W. North Avenue, as is also recommended in the adopted regional transportation system plan.

An important element necessary to the implementation of any short- or long-range highway improvement measures on a highway facility is the assignment of the level of government that should logically be responsible for the design, construction, maintenance, and operation of that facility. It is recommended in SEWRPC Planning Report No. 18, A Jurisdictional Highway System Plan for Waukesha County, that Pilgrim Roadway should be an integral part of the county trunk highway system. It is recommended as a part of this study that actions be initiated by the Village of Elm Grove, the City of Brookfield, and Waukesha County to initiate the transfer of Pilgrim Parkway to the Waukesha County trunk highway system, as long recommended in that plan.

It is, accordingly, recommended that, upon transfer of Pilgrim Parkway to Waukesha County, a preliminary engineering study be initiated to address the roadway cross-section and alignment that can best provide the needed four traffic lanes; provide for the installation of traffic-actuated signals at the intersection of Pilgrim Parkway and W. Gebhardt Road; and provide for the



improved vertical and horizontal alignment problems identified on Pilgrim Parkway in the vicinity of the parking lot driveway at Elliot's Ace Hardware.

Action taken now may be expected to ameliorate existing traffic accident and congestion problems identified on the study segment of Pilgrim Parkway, and provide the direction required to meet future traffic demand on Pilgrim Parkway generated by planned and proposed land development in the Elm Grove/Brookfield area.

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Table 2

SUMMARY OF TRAFFIC ENGINEERING IMPROVEMENT AND ROADWAY  
CONSTRUCTION ACTIONS RECOMMENDED TO SOLVE EXISTING  
AND FUTURE TRAFFIC PROBLEMS ON PILGRIM PARKWAY FROM  
W. WATERTOWN PLANK ROAD TO W. NORTH AVENUE: 1986 THROUGH 2000

Location	Recommendation	Estimated Cost	Responsibility for Implementation
Short-Range Plan W. Gebhardt Road and Pilgrim Parkway.....	o Widen intersection approaches to accommodate two lanes of traffic in both directions on Pilgrim Parkway.	\$ 40,000	Village of Elm Grove.
W. North Avenue.....	o Install and interconnect traffic signals.	70,000	City of Brookfield.
	o Widen the segment of W. North Avenue to accommodate two lanes of traffic in both directions between its intersections with Pilgrim Parkway.	125,000	City of Brookfield.
	o Skidproof approaches to intersections of W. North Avenue with Pilgrim Parkway and Pilgrim Road.	15,000	City of Brookfield.
	o Cul-de-Sac Pilgrim Parkway West south of its intersection with W. North Avenue.	10,000	City of Brookfield.
	o Reconstruct Elliott's Ace Hardware parking lot driveway on Pilgrim Parkway.	10,000	Elliott's Ace Hardware.
	o Construct a southbound left-turn bypass lane and widen driveway at Elmbrook Middle School	10,000	Village of Elm Grove and Elmbrook School District.
Long-Range Plan W. Watertown Plank Road to W. North Avenue.....	o Construct a new roadway to eliminate roadway continuity problems between the Pilgrim Parkway and Pilgrim Road intersections with W. North Avenue.	-- <sup>a</sup>	Long-range improvement actions are the responsibility of Waukesha County upon acceptance of petition for jurisdictional transfer of Pilgrim Parkway/Pilgrim Road/Moorland Road by the Village of Elm Grove and the City of Brookfield.
	o Reconstruct Pilgrim Parkway to a four-traffic-lane roadway east of Dousman Ditch.	-- <sup>a</sup>	
	o Reduce vertical and horizontal curvature at the parking lot entrance to Elliot's Ace Hardware and proposed Wisconsin Avenue extension.	-- <sup>a</sup>	
W. Gebhardt Road and Pilgrim Parkway.....	o Install traffic-actuated signals.	35,000	

<sup>a</sup>The capital cost of reconstructing Pilgrim Parkway cannot be reliably determined without the conduct of a detailed engineering study that addresses both structural soil deficiency problems along Pilgrim Parkway, and roadway alignment problems at the W. North Avenue and Pilgrim Parkway intersections with the Dousman Ditch and Milwaukee Road trackage.

Source: SEWRPC.