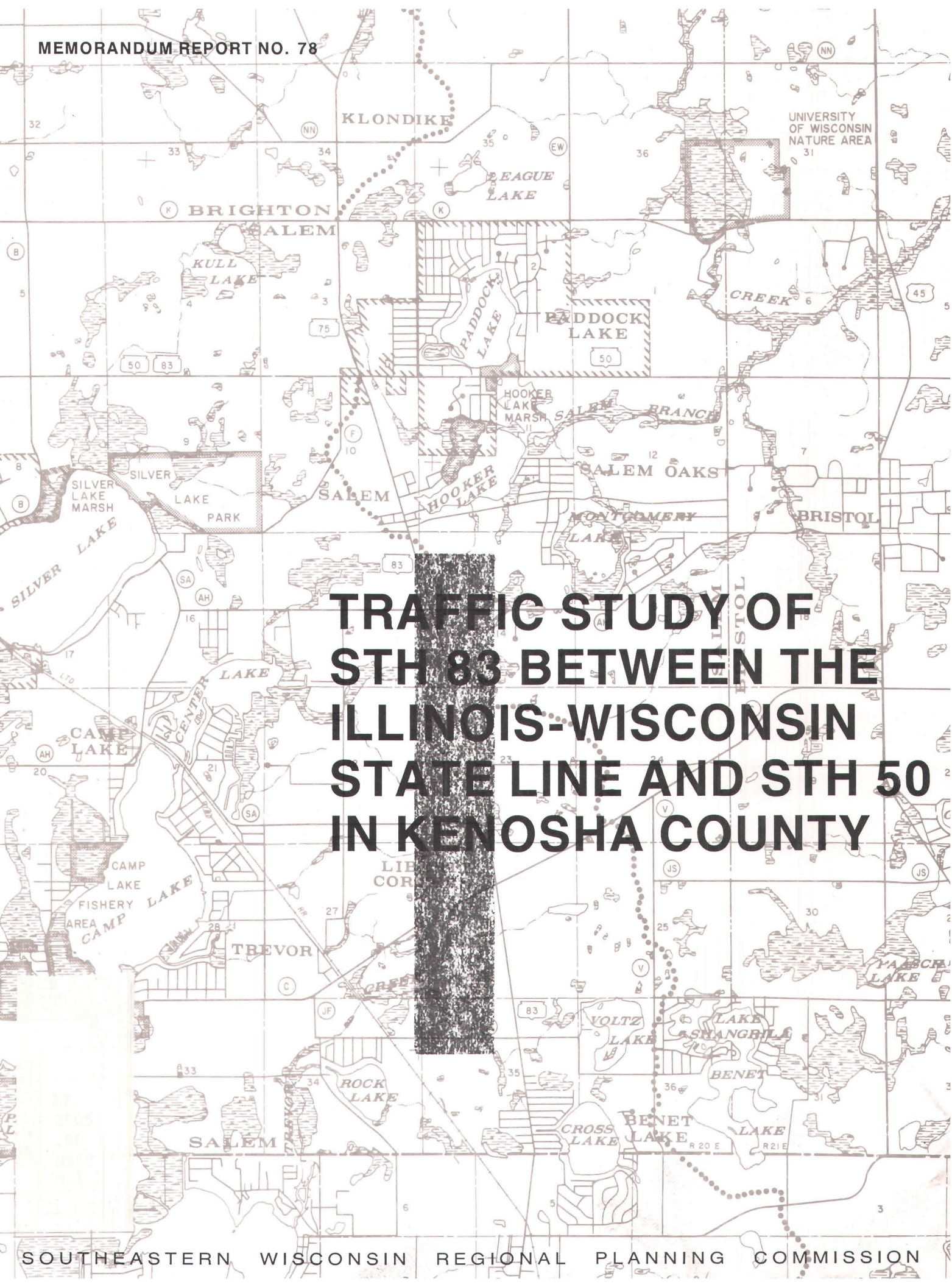
MEMORANDUM REPORT NO. 78



TRAFFIC STUDY OF STH 83 BETWEEN THE ILLINOIS-WISCONSIN STATE LINE AND STH 50 IN KENOSHA COUNTY

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MEMORANDUM REPORT
NUMBER 78

TRAFFIC STUDY OF STH 83 BETWEEN THE ILLINOIS-WISCONSIN STATE LINE AND STH 50 IN KENOSHA COUNTY

Prepared by the

Southeastern Wisconsin Regional Planning Commission
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SEWRPC Memorandum Report No. 78

TRAFFIC STUDY OF STH 83 BETWEEN THE ILLINOIS-WISCONSIN STATE LINE AND STH 50 IN KENOSHA COUNTY

INTRODUCTION

On June 27, 1991, the Kenosha County Highway Commissioner requested that the Regional Planning Commission conduct a traffic study of that segment of STH 83 between the Illinois-Wisconsin State line and STH 50. The study was to identify existing traffic safety and congestion problems and recommend a short-range plan for the abatement of the identified problems. The study was also to recommend a long-range plan for the improvement of STH 83, based upon forecast design year 2010 traffic volumes derived from the planned land use pattern for the corridor. Finally, the study was to recommend access control measures, including public street and private driveway spacing. This memorandum report presents the findings and recommendations of the requested study.

The conduct of the study was guided by a Task Force appointed by the Kenosha County Highway Committee. The membership of the Task Force is listed in Figure 1.

Study Segment

The study segment of STH 83 is located within the Town of Salem in western Kenosha County. The study segment is shown on Map 1 and is about 5.1 miles in length from the Wisconsin-Illinois State line to STH 50. This segment of STH 83 is one of the principal north-south arterial highways through western Kenosha County, and the only direct such route through the Town of Salem as shown on Map 1.

LOCAL CONCERNS

On August 12, 1991, members of the Commission staff and Wisconsin Department of Transportation met with members of the Task Force including Ms. Shirley Boening, Chairperson Town of Salem; Mr. Geoffrey L. Wheeler, Kenosha County Board Supervisor and Mr. Frederick J. Patrie, Kenosha County Highway Commissioner to identify perceived problems existing along the segment of STH 83 concerned. The meeting included a tour of the segment, and resulted in the following list of perceived problems:

- High volume of heavy truck traffic.
- Inadequate parking for certain land uses with attendant parking on the highway shoulders and related safety problems. Land uses cited include the Spring Valley Country Club located in the southeast quadrant of the intersection of STH 83 and CTH C, the electronic sales and service build-

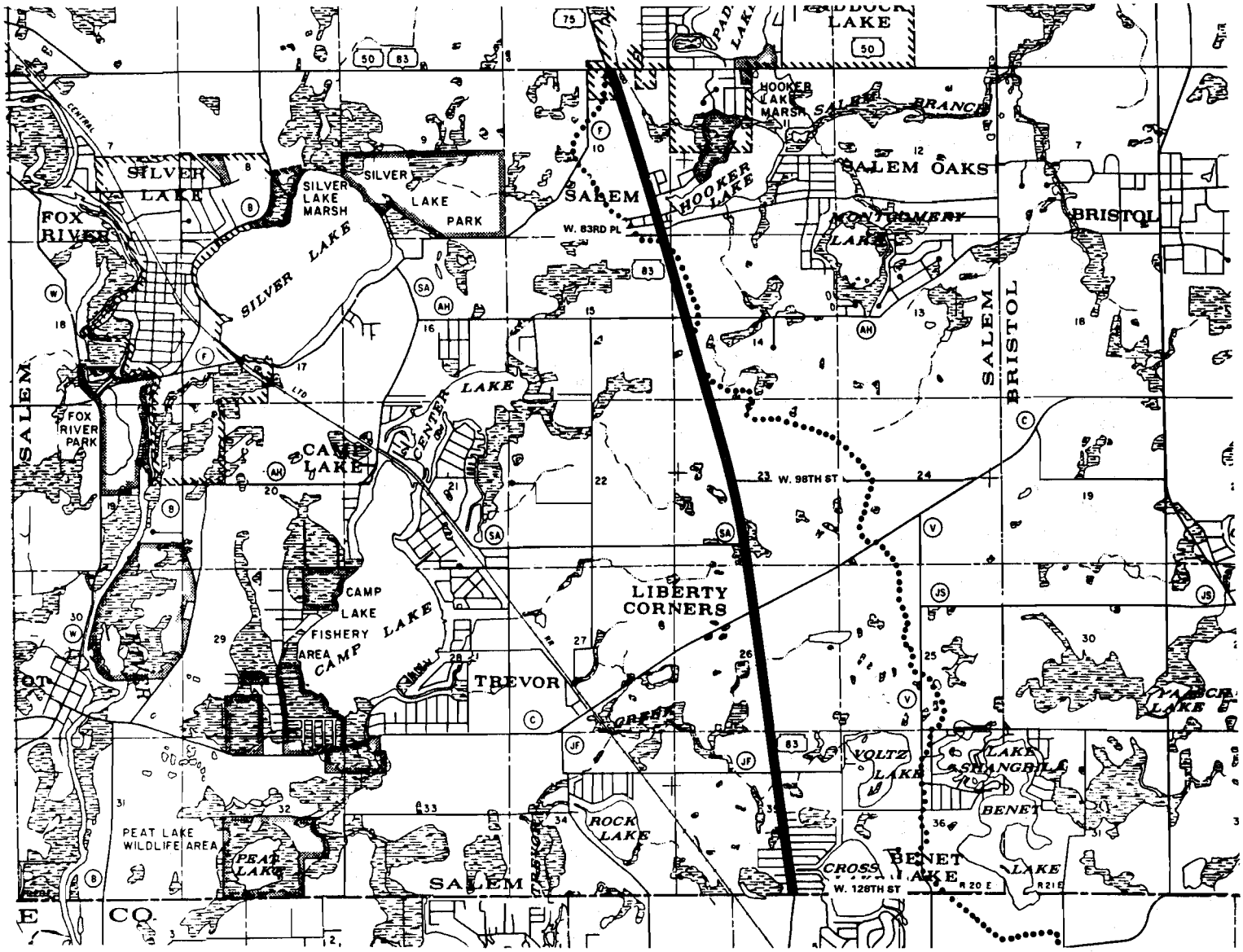
Figure 1

STH 83 TASK FORCE

Shirley Boening	Chairperson, Town of Salem
Thomas J. Gorlinski	Kenosha County Board Supervisor
William Houte	Chairman, Town of Salem Plan Commission
Frederick J. Patrie	Highway Commissioner, Kenosha County
Fred C. Schmalfeldt	Kenosha County Board Supervisor; Chairman, Kenosha County Highway and Parks Committee
Geoffrey L. Wheeler	Citizen Member
Thomas A. Winkel	District Chief Transportation Assistance and Planning Engineer, District 2, Wisconsin Department of Transportation

Map 1

THE STH 83 STUDY SEGMENT IN THE TOWN OF SALEM



Source: SEWRPC.

ing located in the northwest quadrant of the intersection of STH 83 and W. 83rd Place, and Salem School at STH 83 and CTH AH.

- Restrictions in sight distance in the urbanized areas along the segment concerned near Cross Lake at the southern end and Salem at the northern end of the study segment, respectively; and at the intersection of CTH AH at STH 83. Such restrictions may be exacerbated by parked vehicles.

- Inadequate building set-backs in the unincorporated urban area of Salem.

- Difficulty in safely entering the STH 83 traffic stream, during peak traffic periods in the urban areas of Salem and Cross Lake; at the STH 83 and CTH AH intersection; and the bank, Town Hall, and Town Emergency Services Station located near the intersection STH 83 and W. 98th Street.

INVENTORY AND ANALYSIS OF EXISTING CONDITIONS

Functional Classification

A street system may be functionally classified into one of three classes: 1) arterial streets; 2) collector streets; and 3) land access streets. Arterial streets and highways are those streets and highways intended primarily to serve the movement of through traffic and may as a secondary function provide access to abutting property. However, such access should always be subordinate to their principal function of carrying traffic. Collector streets are those streets or highways which are intended to serve as connections between the arterial street network and the land access street system. Collector streets typically also function to provide access to abutting properties. Land access streets are those streets which primarily serve to provide access to abutting property.

The primary function of the study segment of STH 83 is to accommodate the movement of through traffic and thus the street is properly functionally classified as an arterial street. Of the facilities intersecting the study segment of STH 83, STH 50, CTH AH, and CTH C also function as arterial streets. All of the remaining 25 facilities which intersect the study segment function either as collector streets or as land access streets.

Jurisdictional Classification

The arterial street element of the total street and highway system can be further divided by jurisdictional responsibility into State, county, and local trunk highways. The jurisdictional classification of a particular segment of an arterial facility indicates which level of government--State, county, or local--has primary responsibility for its planning, design, construction, operation, and maintenance. The study segment of STH 83 is under the jurisdiction of the State of Wisconsin, Department of Transportation, along with STH 50 which is the northern boundary of the study segment. The two remaining arterials which intersect the study segment of STH 83--CTH AH, and CTH C--are under the jurisdiction of Kenosha County. Two non-arterial facilities under the jurisdiction of Kenosha County--CTH JF and CTH SA--also intersect the study segment. All the remaining facilities which intersect the study segment of STH 83 are under the jurisdiction of the Town of Salem.

Physical Conditions

The study segment of STH 83 is constructed as a rural type cross section with shoulders and open drainage ditches. With the exception of the intersection approach at STH 50, which has twin 24-foot pavements separated by a 24-foot median, the study segment of STH 83 has a pavement width of 24 feet with seven- to eight-foot shoulders. In the urban area near Cross Lake at the southern end of the study segment and in the unincorporated urban area of Salem near the northern end of the study segment, approximately seven feet of the shoulder are paved with the remainder of the shoulder gravel. For the remainder of the study segment, three feet of the shoulder is paved and the remaining four to five feet is gravel.

The number of traffic lanes on an arterial facility largely, although not entirely, establishes its traffic carrying capacity. Traffic carrying capacities also differ between urban and rural facilities, as urban facilities typically have lower speeds of 25-40 miles per hour and a lower percentage of trucks of about 5 percent and rural facilities have speeds of 40-55 miles per hour and a percentage of trucks of about 10 percent. Also affecting arterial design capacity are the characteristics of its intersections,including intersection approach pavement width including provision of exclusive turn lanes; parking within 200 feet of the intersection; type and operation of traffic control; and percentage of right and left turns at intersections. A two traffic lane urban arterial generally has a design capacity of about 13,000 vehicles per average weekday. A four traffic lane undivided urban arterial generally has a design capacity of about 17,000 vehicles per average weekday, and a four-lane divided urban facility generally has a design capacity of about 25,000 vehicles per average weekday. In comparison a two traffic lane rural arterial generally has a design capacity of about 7,000 vehicles per average weekday.

The study segment of STH 83 is intersected by 28 streets and highways. The intersections have an average spacing of 1,000 feet, a maximum spacing of 5,600 feet, and a minimum spacing of 50 feet. State trunk highway 83 has been widened at four study segment intersections to provide additional traffic lanes, including STH 83 at STH 50; at CTH C; at CTH SA; and at W. 87th Street. The northbound STH 83 approach to the intersection with STH 50 has an exclusive left-turn lane and an exclusive right-turn lane in addition to two through lanes. There are two lanes on the northbound and southbound STH 83 approaches to its intersection with CTH C. Left turning and through movements are permitted from the left lane and right turning and through movements are permitted from the right lane. Although through traffic may use either of the lanes, it may be noted that the second lane is dropped on the far side of the intersection. Thus, the right lane on each approach is used primarily to make right turns except in those instances when there is a vehicle in the left lane making a left turn, a right hand lane may be used for the through movement. Finally, a left-turn bypass lane has been provided on the northbound STH 83 approach to its intersection with CTH SA and on the southbound STH 83 approach to its intersection with W. 87th Street. As these latter two intersections are T intersections, the provision of a left-turn bypass lane permits through traffic to bypass left-turning vehicles which may be stopped to await a gap in the opposing traffic stream.

The horizontal alignment of the study segment of STH 83 as shown on Figure 2 may be characterized as predominantly straight or tangent, with three discernible but relatively flat horizontal curves. One of these curves is located in the vicinity of 128th Street, a second curve is located between CTH SA and W. 98th Street, and a third curve is located just south of STH 50. It may be further noted that the change in the center line alignment of the tangent sections is rather moderate. Thus, because there are no radical changes in the horizontal alignment and because the horizontal curves are relatively flat, it may be concluded that the horizontal alignment presents no abrupt change in conditions which may result in a traffic safety problem.

The vertical alignment or profile of the study segment also as shown on Figure 2 is comprised of a series of gradients which reflect the terrain which the study segment traverses. The steepest gradients, as well as the most frequent changes in gradient, are generally found between CTH SA and W. 98th Street. It may be noted that there is a 4 percent gradient just south of W. 98th Street and two gradients of approximately 5 percent just south of CTH C. Between CTH SA and W. 98th Street the speed limit on STH 83 is 55 miles per hour, and just south of CTH C the speed limit is 45 miles per hour. The 4 percent gradient equals maximum gradient for a rural arterial with a 60 mph design speed in rolling terrain. The 5 percent gradients equal the maximum gradient for a rural arterial with a 50 mile per hour design speed in rolling terrain.

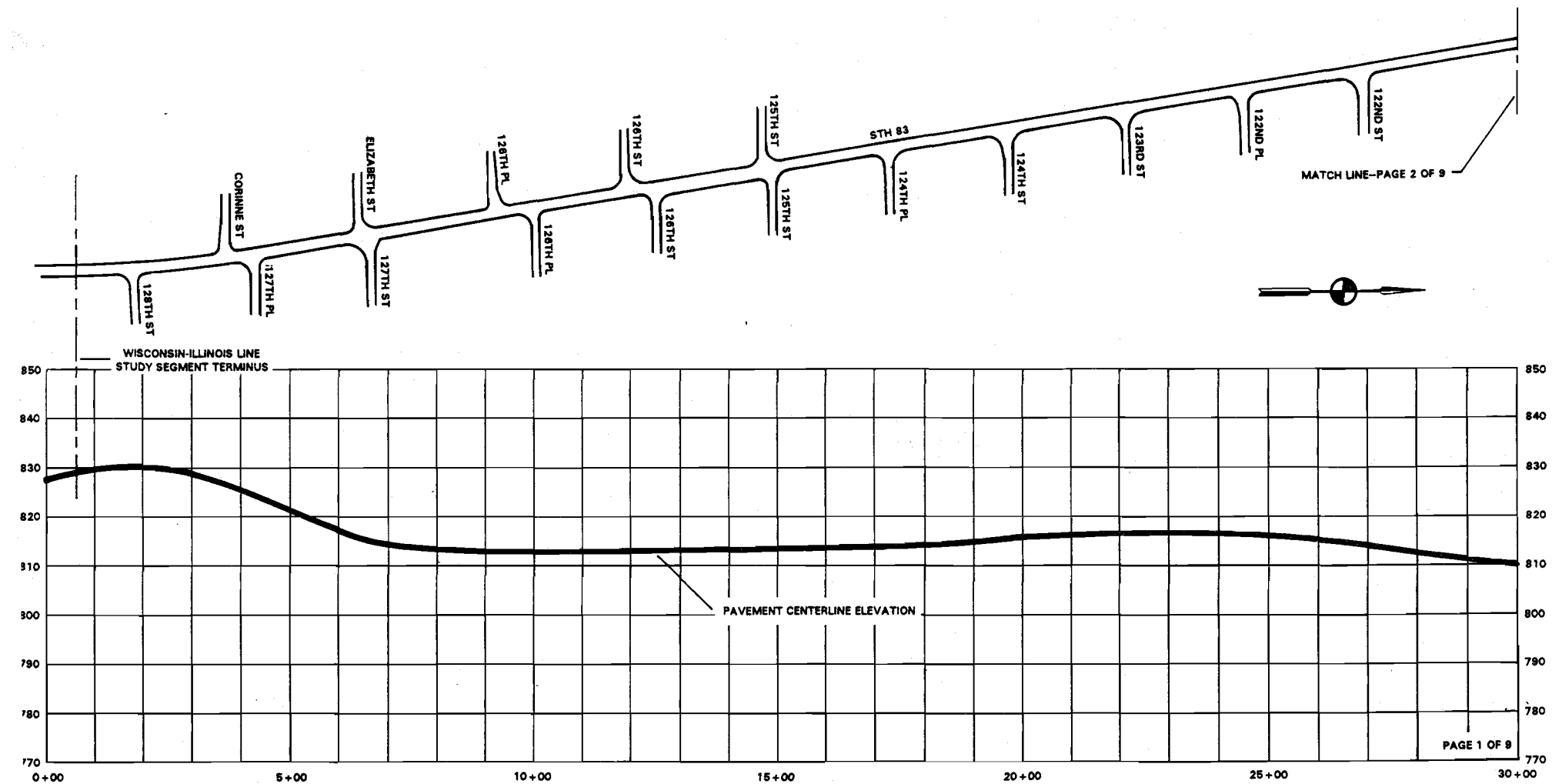
Changes in gradient are accommodated through the use of vertical curves. There are 14 locations in the study segment where a vertical curve accommodates a major change in the gradient from upward to downward or downward to upward. There are a number of other vertical curves which accompany more modest changes in the gradient; that is, the overall gradient continues either upward or downward but at a different rate along the study segment.

The horizontal and vertical alignments were reviewed to determine whether there are any sight distance restrictions due to abrupt changes in these alignments which may result in traffic safety problems. Of particular concern, in this regard, is the roadway segment just south of W. 98th Street where a change in the vertical alignment occurs simultaneously with a change in the horizontal alignment. When sharp horizontal curvature begins at or near the top of a pronounced vertical curve, the combination may be a traffic safety hazard as the ability of motorists to perceive the change in the horizontal alignment may be reduced, especially at night if the vertical curve is so pronounced that vehicle head light beams do not illuminate the roadway surface. Also of concern are vertical curves which may restrict sight distances.

Stopping sight distance may be defined as that distance required for a motorist to perceive an object in the roadway and to safely brake to a stop prior to striking the object. Determination of restricted stopping distance is based on an eye height of 3.5 feet and an object height of 0.5 foot. Passing sight distance may be defined as the length of highway ahead necessary for one vehicle to pass another before meeting a vehicle which may appear from the opposite direction after the passing maneuver began. The passing sight distance determination was based on the minimum sight distance warrant for the application of no passing zone pavement markings set forth in the Manual of Uniform Traffic Control Devices using 3.5 feet for both the eye height and the object height.

Figure 2

THE STH 83 STUDY SEGEMENT
HORIZONTAL AND
VERTICAL ALIGNMENT



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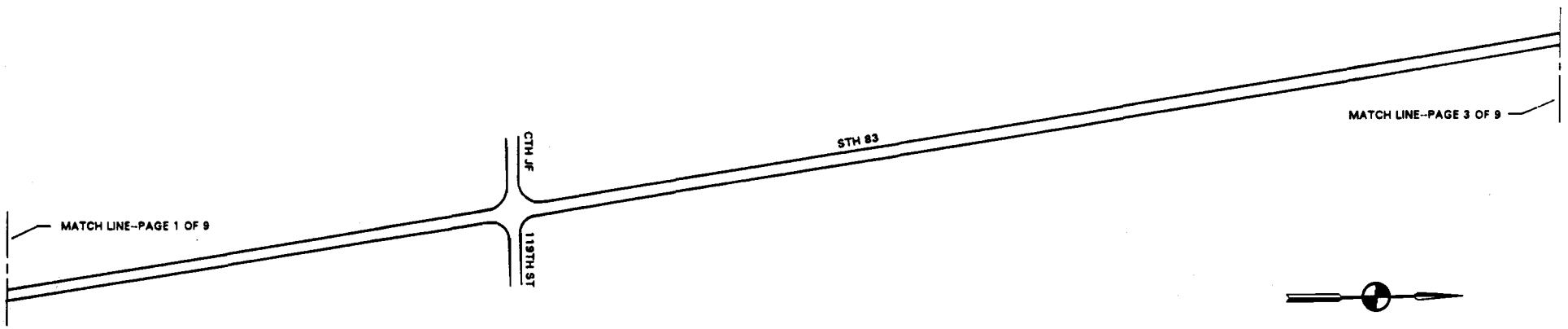

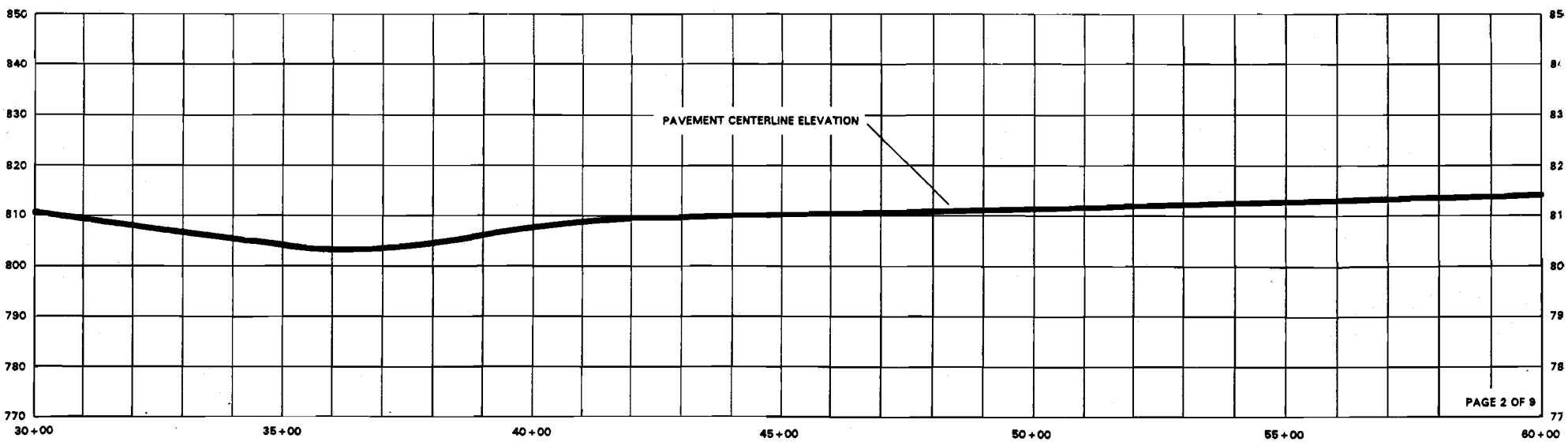

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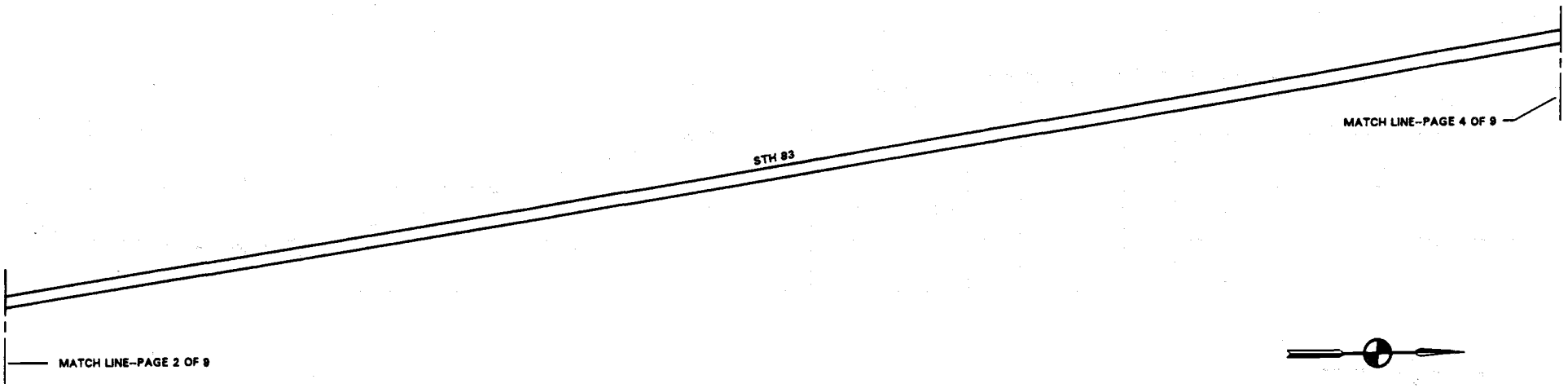

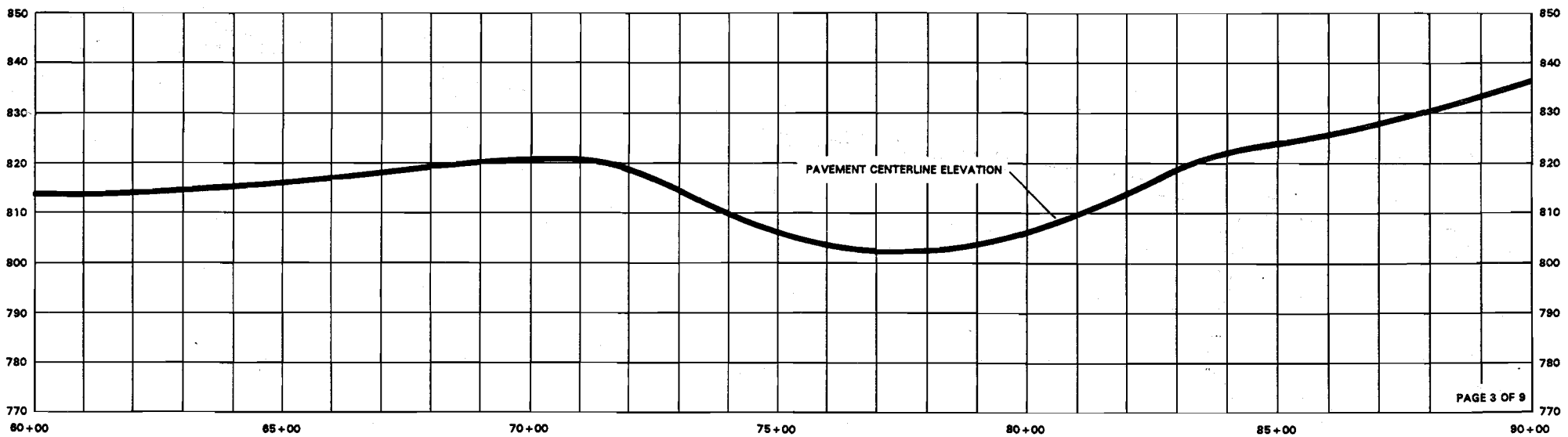

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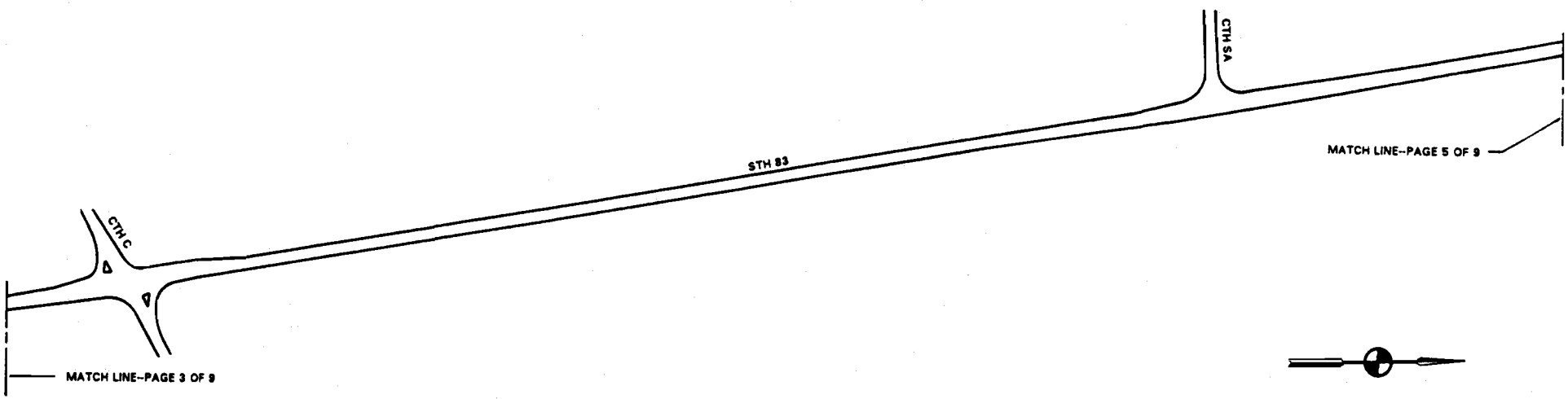

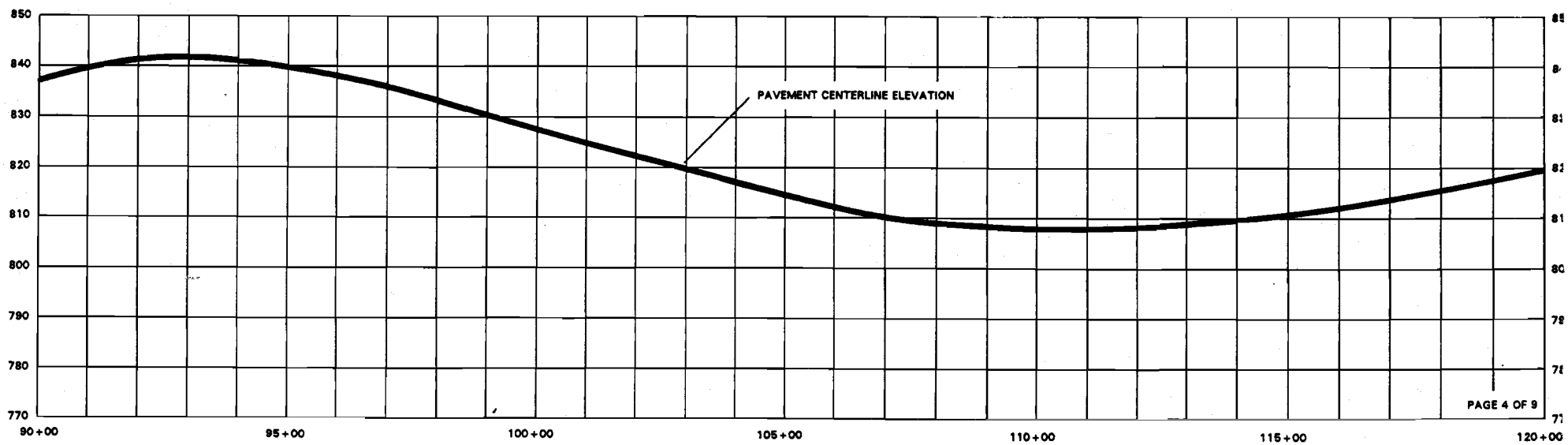

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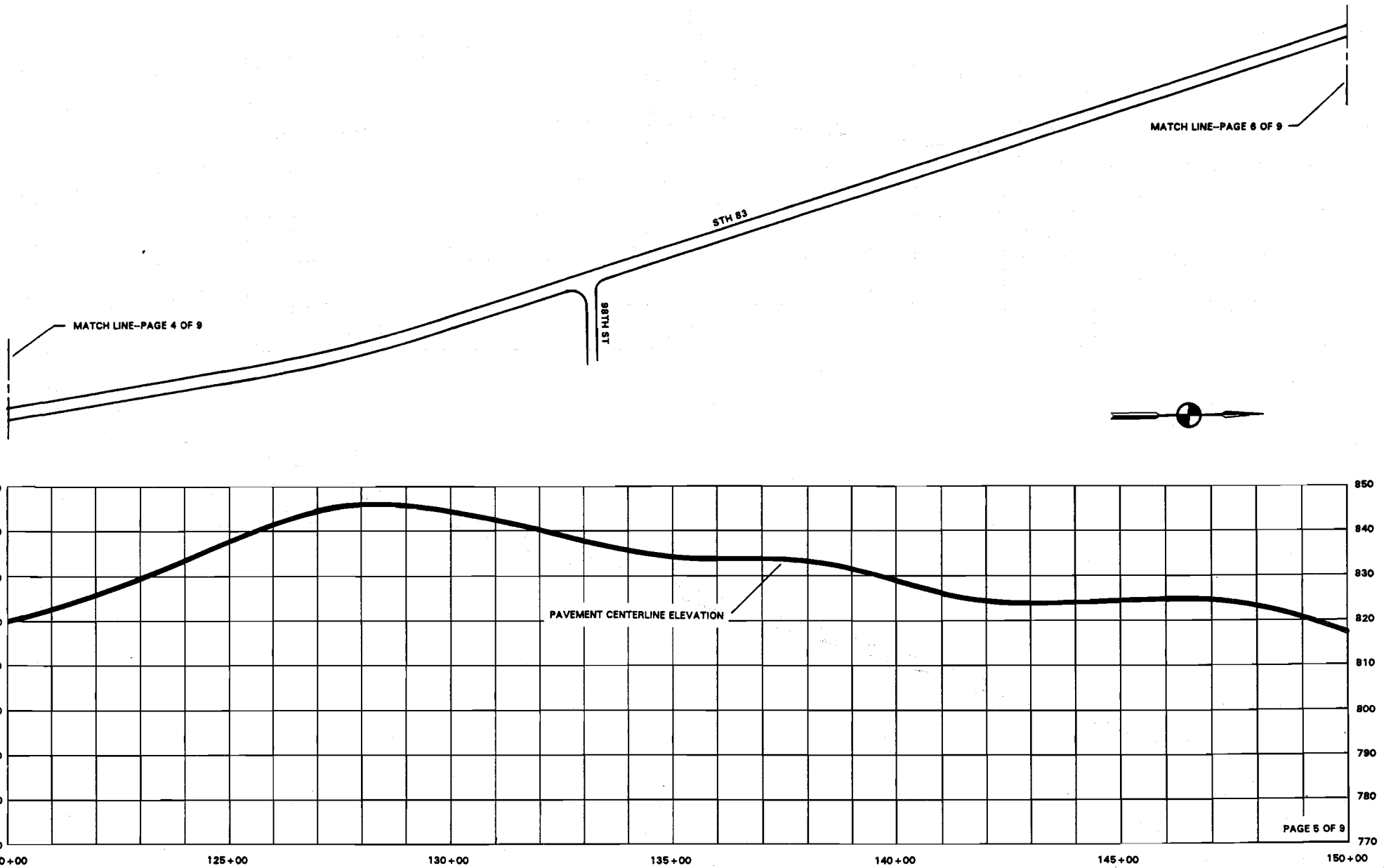

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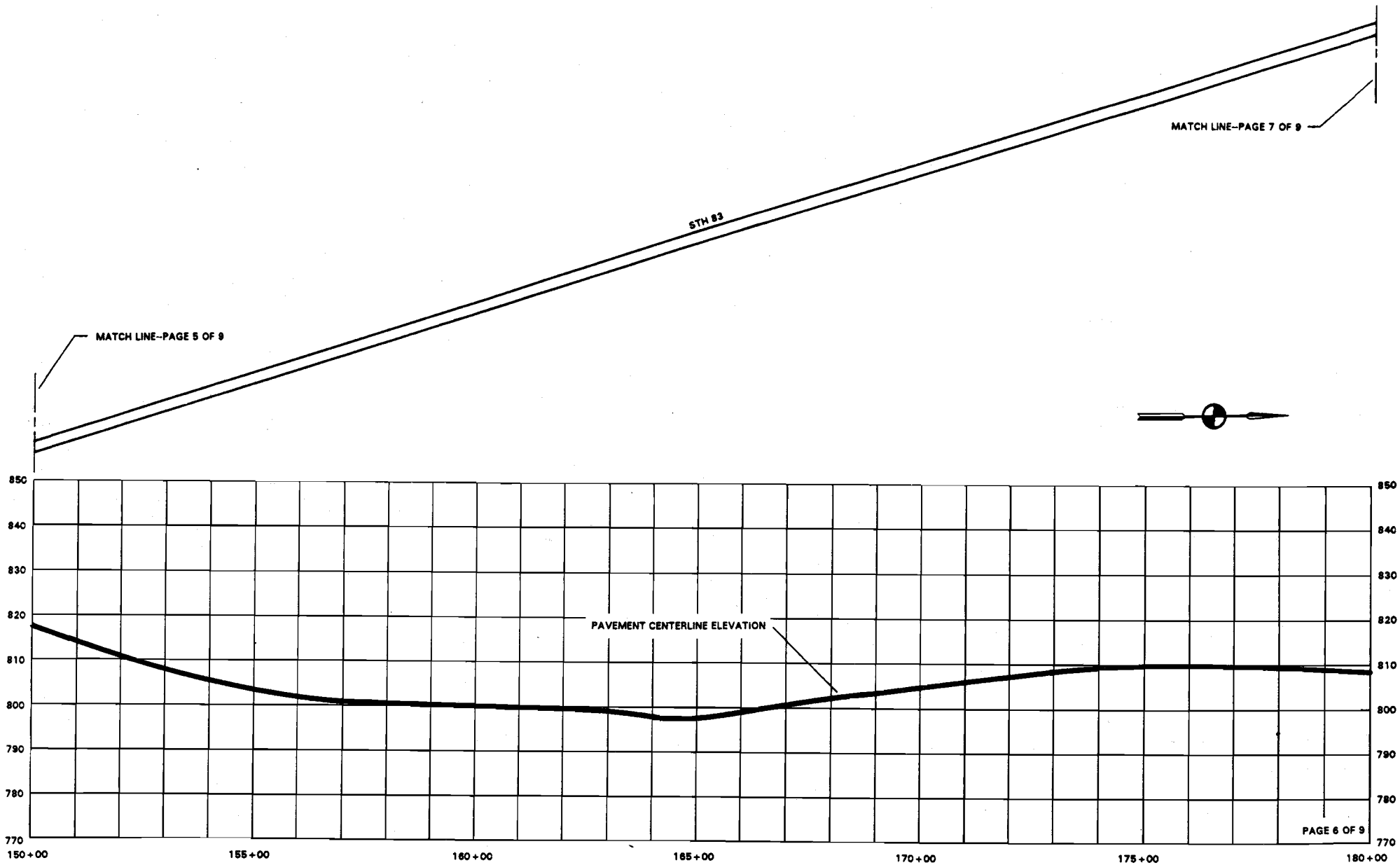

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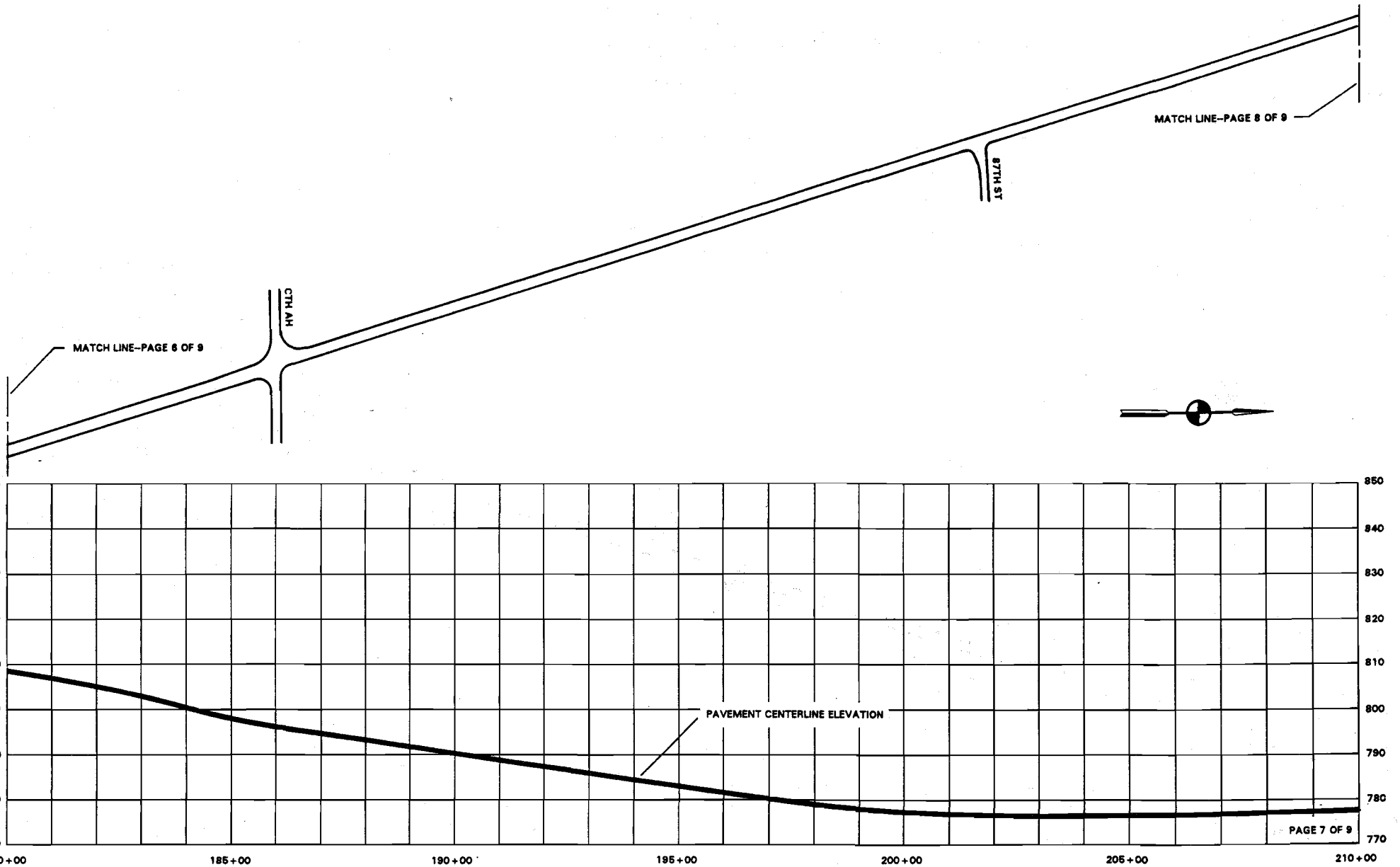

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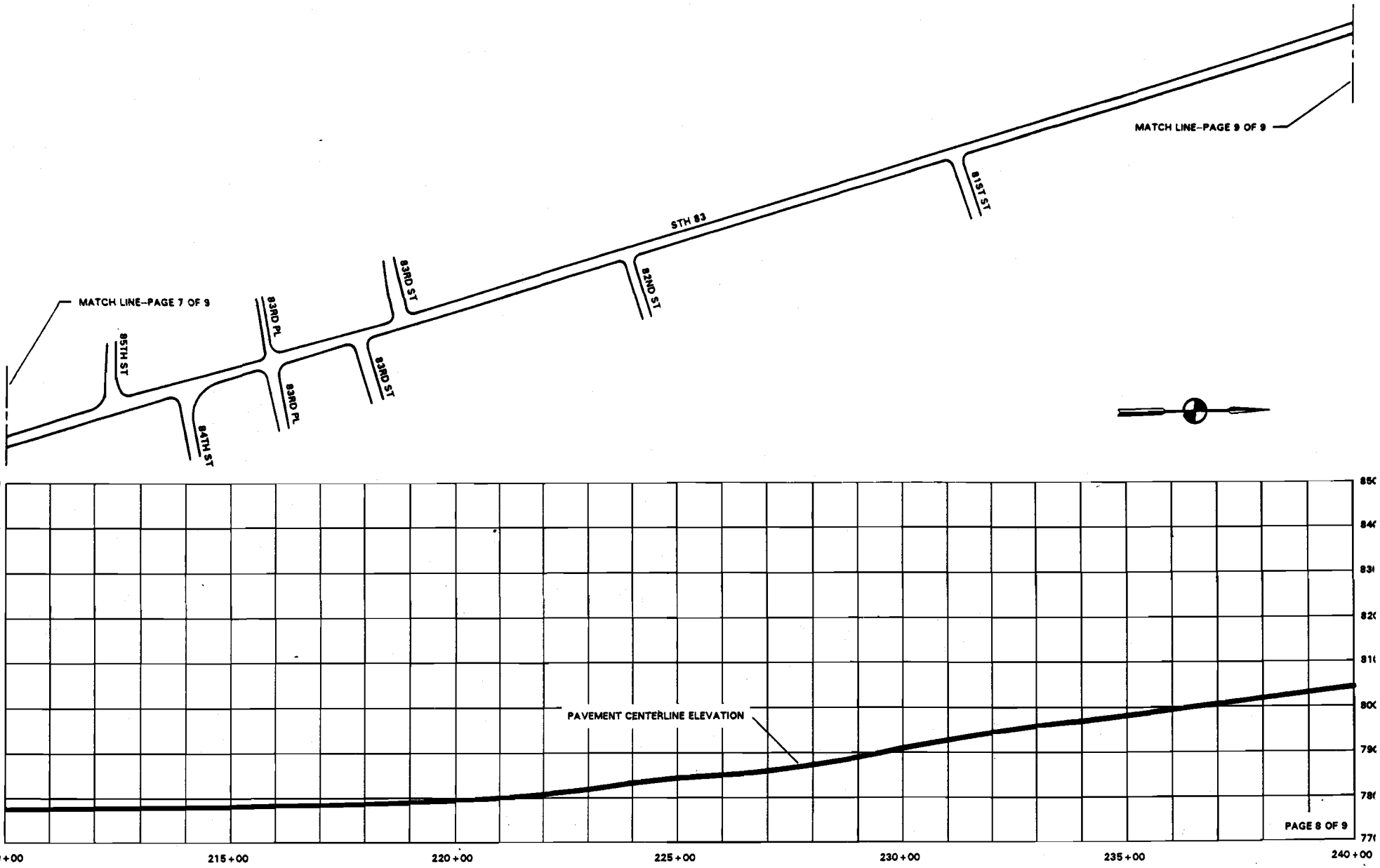

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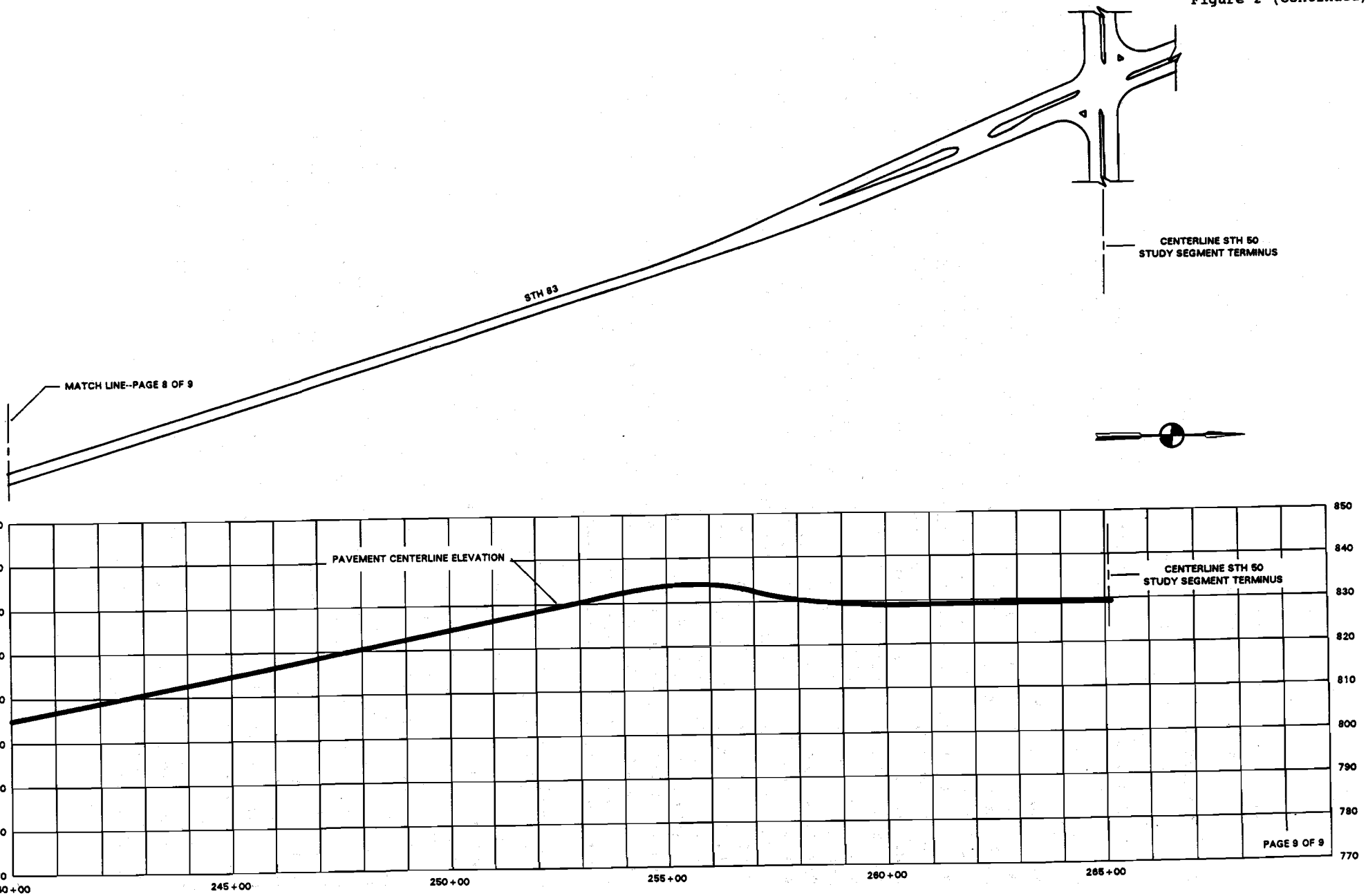


Source: SEWRPC

Both the stopping sight and passing sight distance are dependent upon and increase with vehicle speed.

Both the passing sight and the stopping sight distances are restricted by the pronounced vertical curve just south of W. 98th Street. The crest of this vertical curve is located near the beginning of a horizontal curve in the southbound direction. Other locations identified as having potentially restricted sight distance caused by the pronounced crest of a vertical curve are shown on Map 2.

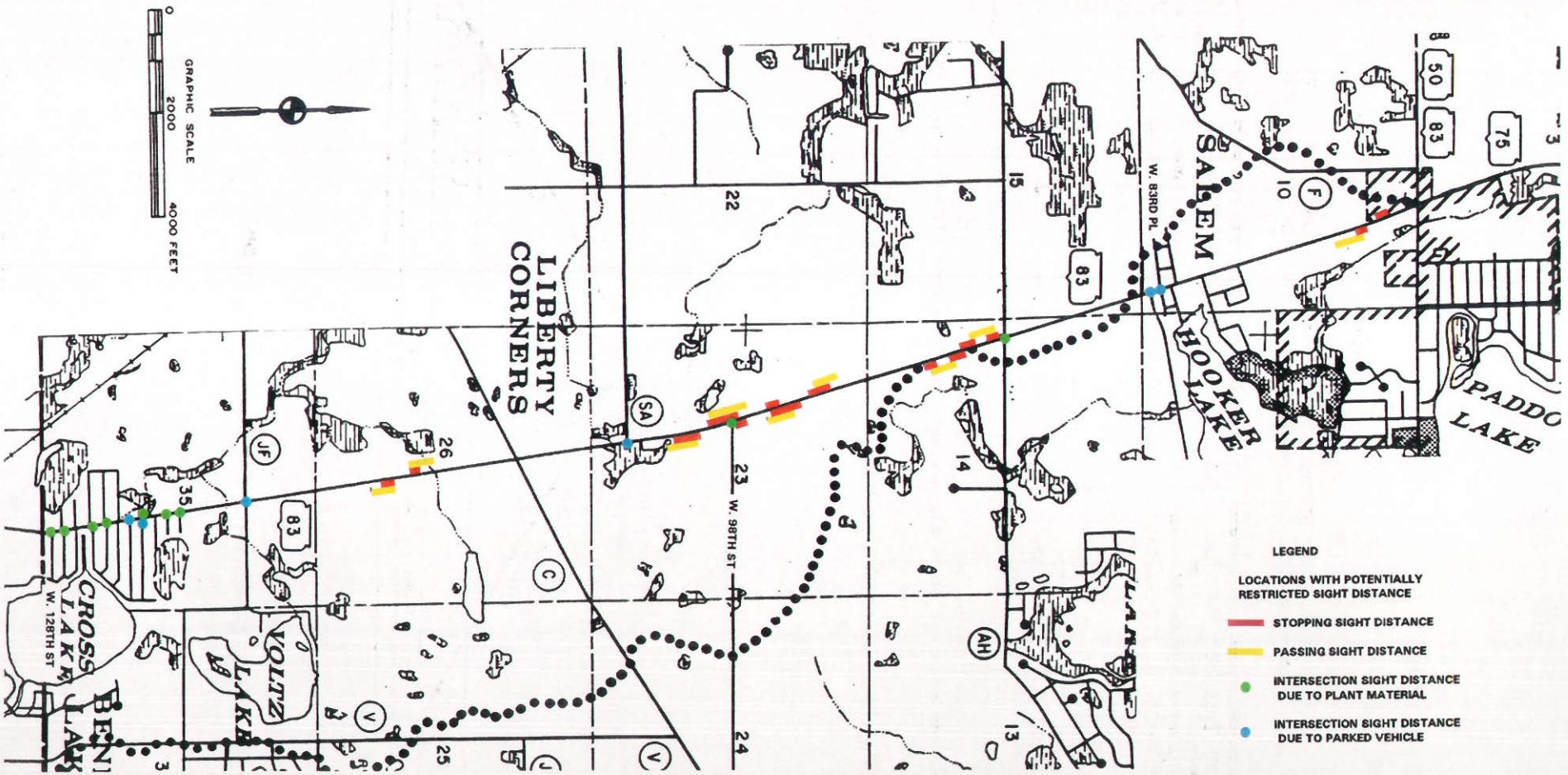
Intersection sight distances on the cross street approaches to STH 83 were also examined to determine if these sight distances are restricted. Intersection sight distance is determined by the sight triangle at an intersection. Because all the cross street approaches to STH 83 are stop sign controlled, the intersection sight distance may be defined as the distance required between a vehicle on a major street and a stop sign controlled intersecting minor street which would permit a motorist stopped on the minor street approach to either cross or enter the major street traffic stream without causing the vehicle on the major street to reduce speed. Just as the stopping sight distance and passing sight distances are dependent upon an increase with vehicle speed the intersection site distance also increases with speed. The necessary safe sight distance in feet for a passenger vehicle to complete an indicated maneuver from a crossing street shown in Table 1. At W. 98th Street, the sight distance to the south is restricted by the crest of the vertical curve and to the north it restricted by shrubbery adjacent to the roadway. Intersection sight distances is also restricted by shrubbery either to the north or to the south or to both the north and south at a number of other intersections as shown on Map 2. Also shown on Map 2 are intersections at which sight distance may be restricted intermittently by the presence of parked vehicles. Restricted intersection sight distance at these intersections represents a potential traffic safety problem, and may contribute to an increase in traffic accidents.

As already noted, the study segment of STH 83 is intersected by a total of 28 streets and highways, including STH 50 at the northern end of the study segment. Of the 28 intersections, only seven are four-legged intersections, while the remainder are three-legged "tee" intersections. To enhance roadway operating conditions and traffic safety, design standards for desirable intersection spacing on an arterial include minimum spacing of one-half mile between intersections of the arterial with other arterial streets and minimum spacing of 300 feet between intersections of the arterial and non-arterial, or local streets. Intersection spacing that is less than the desirable may have a negative impact on traffic safety as the driving task is made more complex. Motorists on the cross street approaches must monitor not only the STH 83 traffic stream, but adjacent intersection traffic, as well as for potential conflicting traffic. Further, as spacing decreases, the potential for conflict between a vehicle accelerating on STH 83 after entering STH 83 from a cross street and a vehicle decelerating on STH 83 to exit at the adjacent cross street increases.

Existing arterial intersection spacing along the study segment generally meets spacing standards. Between W. 128th Street and W. 122nd Street in the Cross Lake urban area there are a total of 14 intersections in a total distance of less than one-half mile. Spacing ranges from about 50 feet to about 265 feet and, thus,

Map 2

AREAS WITH POTENTIALLY RESTRICTED PASSING
OR STOPPING SIGHT DISTANCE
ON THE STH 83 STUDY SEGMENT



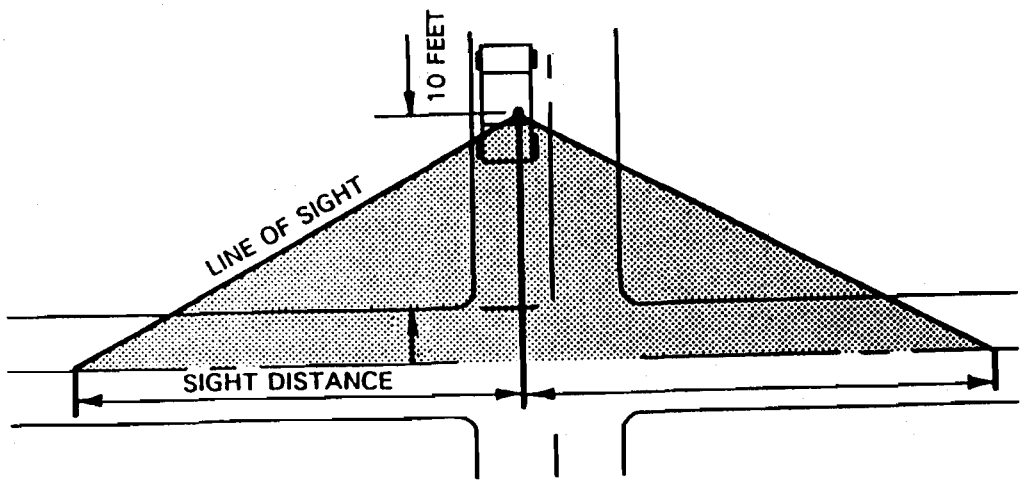
Source: SEWRPC.

Table 1

SAFE SIGHT DISTANCE IN FEET FOR A PASSENGER VEHICLE TO COMPLETE INDICATED MANEUVER FROM INTERSECTING CROSS STREET

Speed (miles per hour)	Left Turn onto Street		Right Turn onto Street		Crossing Street	
	Safe Sight Distance to the Right	Safe Sight Distance to the Left	Safe Sight Distance to the Right	Safe Sight Distance to the Left	Safe Sight Distance to the Right	Safe Sight Distance to the Left
25	325	375	N/A	325	250	250
30	405	415	N/A	405	300	300
35	515	500	N/A	515	350	350
40	675	575	N/A	675	400	400
45	840	610	N/A	840	450	450
50	1,050	695	N/A	1,050	500	500

Source: American Association of State Highway and Transportation Officials and SEWRPC.



Source: U.S. Department of Transportation and SEWRPC.

none of these intersections meets the 300-foot spacing standard. Similarly, between W. 85th Street and W. 83rd Street in the Salem urban area there are a total of five intersections in a total distance of about 1,100 feet. Intersection spacing ranges from about 100 feet to about 200 feet and, thus, none of the intersections meets the 300-foot spacing standard. These two areas are shown on Map 3.

In the two locations where intersection spacing is substandard, existing driveway location and spacing may further exacerbate the problem. Minimum driveway spacing standards which should be maintained are shown in Table 2. In addition, driveways on opposite sides of the roadway should be directly aligned or offset by a minimum of 150 feet. Finally, the minimum desirable driveway corner clearances at signalized and unsignalized intersections are shown in Figure 3.

Building Setbacks

The Kenosha County General Zoning and Shoreland/Floodplain Zoning Ordinance, adopted in 1983 and last revised in 1989, requires a street yard or building setback of not less than 65 feet from the right-of-way line of all Federal, State and County trunk highways.[1] The building setback requirement applies to all types of land uses. This requirement is more stringent than the current building setback required by the Wisconsin Department of Transportation for residential land uses of 50 feet from the right-of-way line of Federal and State highways.

Substandard building setbacks may be considered a problem if a structure restricts intersection corner sight distance. Substandard building setbacks may also be considered a problem if the setback is such that there is inadequate space available at commercial land uses to provide sufficient off-street parking, both with respect to number of vehicles and size of vehicles. Substandard setbacks may also become a problem when a roadway requires widening to provide additional traffic lanes. When a roadway is widened, the edge of the new pavement is moved closer to existing structures than the existing edge of pavement. Widening often requires the acquisition of strips of right-of-way from adjacent parcels and, in extreme cases, may require acquisition of structures dependent upon the ultimate roadway cross-section and the proximity of existing structures to the existing roadway.

No structure constructed since May 1983, should be located less than 98 feet--the required 65 foot building setback, plus half of the existing right-of-way width--from the study segment centerline. However, many of the structures abutting the study segment were constructed prior to the adoption of the current zoning ordinance and may be located closer to the roadway than would be permitted under that ordinance. It may be noted that structures may be found within 98

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[1] When a parcel meets certain conditions, the building setback may be 30 feet for single family residential developments. These conditions include: 1) the parcel abuts a city of the second class; 2) the parcel abuts an existing subdivision located within the city of the second class; and, 3) the parcels within the subdivision do not exceed 6,000 square feet in area and are served by public sanitary sewer. Because the study segment is not located within nor adjacent to a city of the second class, the more stringent 65 foot setback requirement should be met.

Map 3

LOCATIONS WITH SUBSTANDARD INTERSECTION SPACING
ALONG THE STH 83 STUDY SEGMENT: 1991

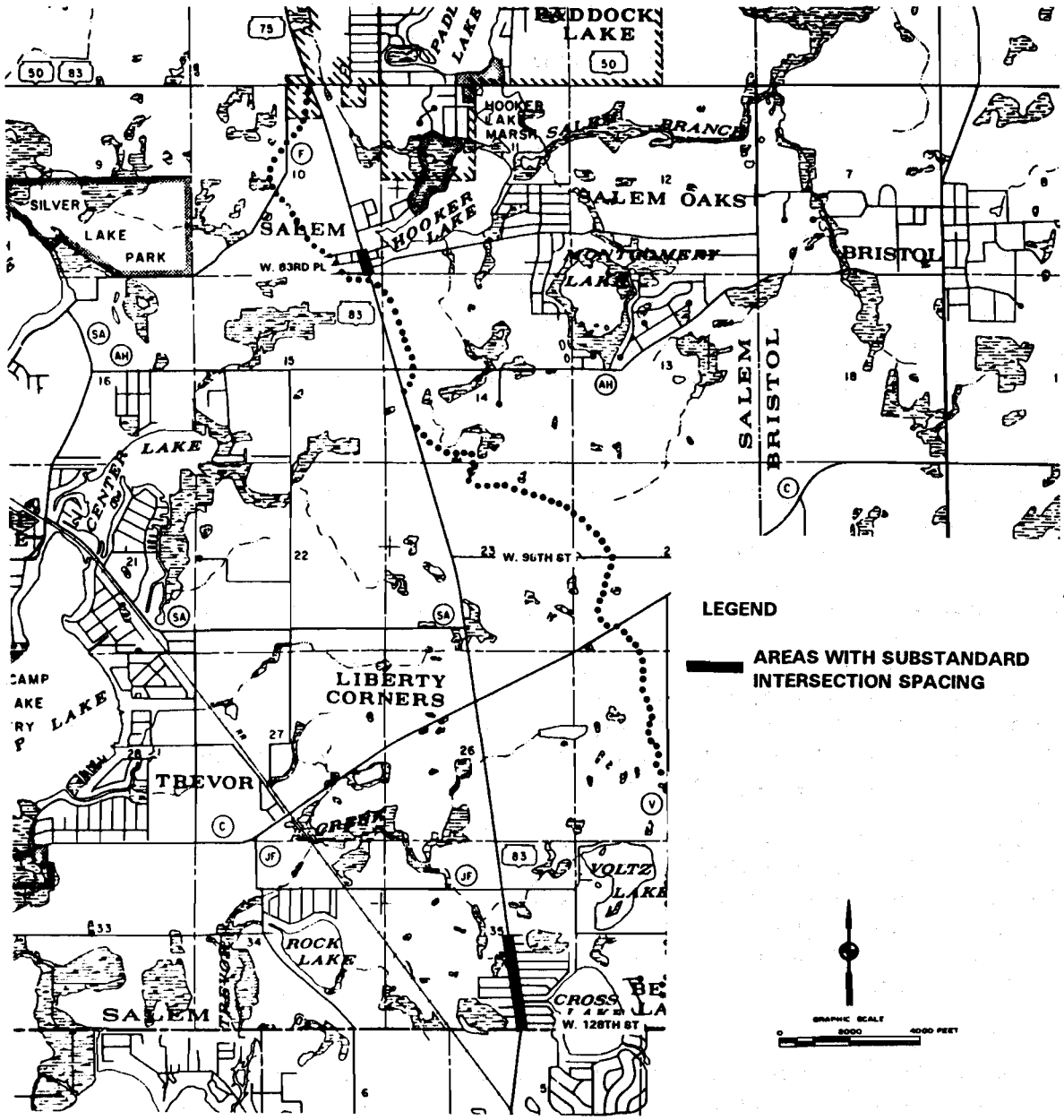


Table 2

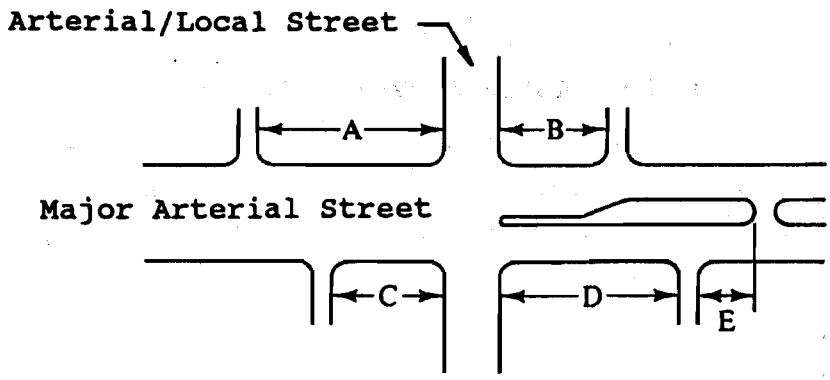
MINIMUM DRIVEWAY SPACING STANDARDS

Highway Speeds (miles per hour)	Minimum Spacing (feet)
20	85
25	100
30	125
35	150
40	185
45	230
50	275

Source: Federal Highway Administration.

Figure 3

MINIMUM DESIRABLE CORNER CLEARANCES AT
SIGNALIZED AND UNSIGNALIZED INTERSECTIONS



Intersection of Major Arterial
and Arterial/Local Street
Controlled by Traffic Signal

Item	Corner Clearance (Feet)
A	230
B	115
C	230
D	230
E	150

Intersection of Major Arterial
and Arterial/Local Street Controlled by
Stop Signs on Arterial/Local Street

Item	Corner Clearance (Feet)
A	115
B	115
C	85
D	115
E	150

Source: Institute of Transportation Engineers.

feet of the existing roadway centerline along the entire length of the STH 83 study segment. At least one structure, in the southeast quadrant of the STH 83 and W. 84th Street intersection, is located within the existing highway right of way. This structure restricts sigh distance to and from the south at this intersection. Five structures in the unincorporated area of Salem and one in the southeast quadrant of the intersection of STH 83 and 98th Street are located at the existing highway right-of-way line. Map 4 shows the generalized location of parcels with substandard streetyard setbacks for the structures thereon.

Traffic Control

Traffic is controlled at the intersections on the study segment of STH 83 by traffic signals or stop signs. The intersection of STH 50 and STH 83 is currently the only intersection on the study segment controlled by traffic signals. The intersection of STH 83 and CTH C is currently the only four-way stop sign controlled intersection.[2] At each of the 26 remaining cross street intersections on the study segment of STH 83 the cross street approaches are controlled by stop signs and the STH 83 approaches are uncontrolled.

There are a variety of speed limits in force on the study segment of STH 83 ranging between 30 miles per hour and 55 miles per hour. The lower speed limits are in force in the urbanized area near Cross Lake at the southern end of the study segment and in the unincorporated urban area of Salem near the northern end of the study segment. Map 5 shows the speed limits in force on the study segment of STH 83.

Parking is prohibited along the study segment of STH 83 between the Wisconsin-Illinois State line and CTH C. Parking is also currently prohibited on the east side of the study segment between W. 85th Street and W. 82nd Street in the urbanized area of Salem. Off-street parking is generally provided at the various commercial establishments along the study segment. Most of the identified perceived parking problems are located north of CTH C. Seasonal recreational activities at these sites create demand for more parking than is available in the off-street facilities at these locations. The excess demand is currently satisfied by parking on the shoulders of adjacent facilities--STH 83 and CTH C. A perceived parking problem related to the commercial business in the northwest quadrant of the STH 83 and N. 83rd Place intersection was also identified and is related to off-street parking facilities which are not adequate to accommodate trucks. This demand, which is also sporadic, is currently satisfied by parking on the shoulder of STH 83.

Motorists parking on the shoulders have the potential to interfere with the traffic stream as they maneuver into and out of parking spaces. Motorists--parking in close proximity to their destination--park near intersecting streets and driveways potentially reducing intersection sight distance at these locations. This is particularly true of trucks. Obstructions on the right--in the form of parked cars or trucks--tend to reduce roadway capacity and may cause

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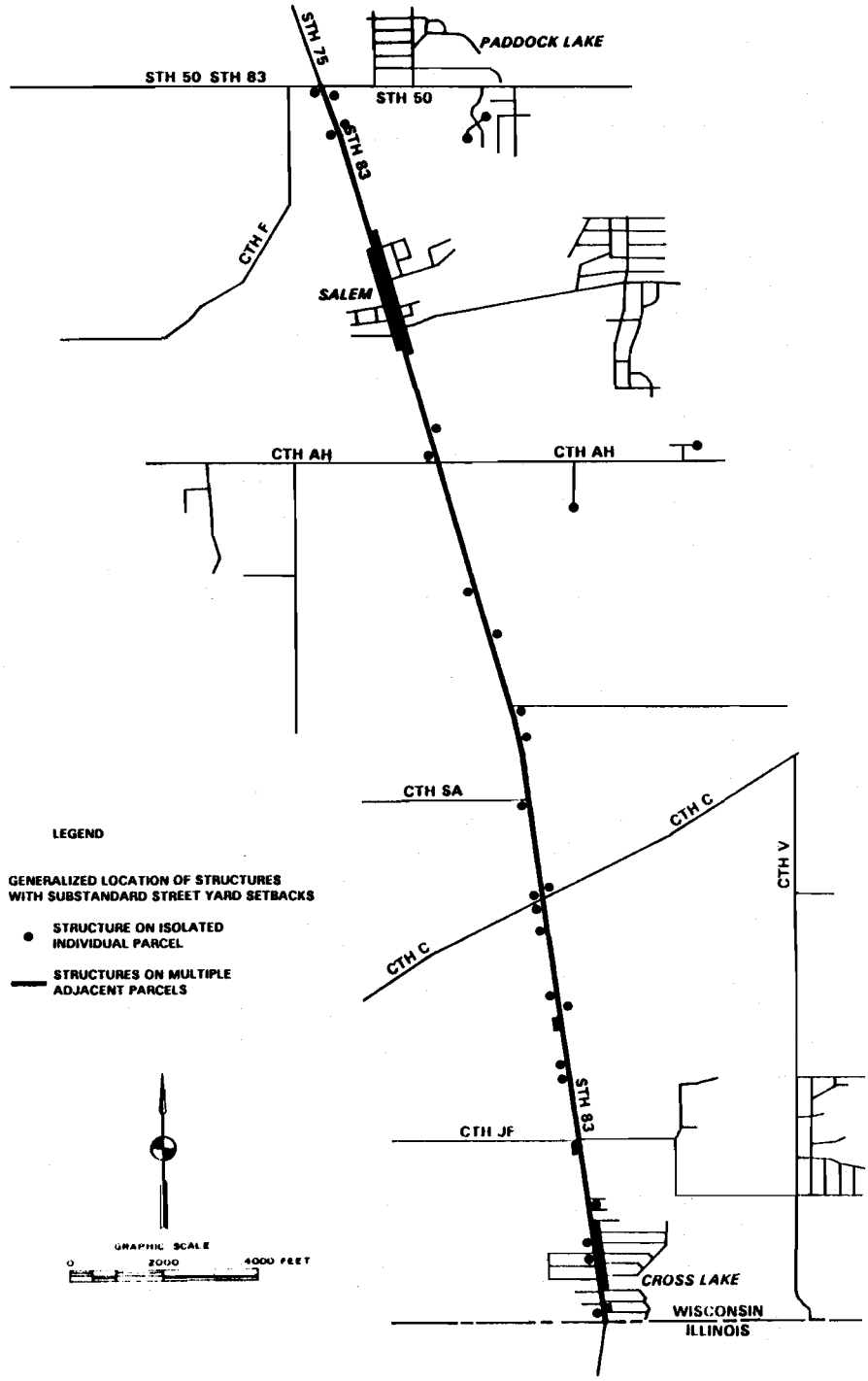
[2]The intersection of STH 83 and CTH C is currently being analyzed by the Wisconsin Department of Transportation to determine if the installation of traffic signals is warranted.

Map 4

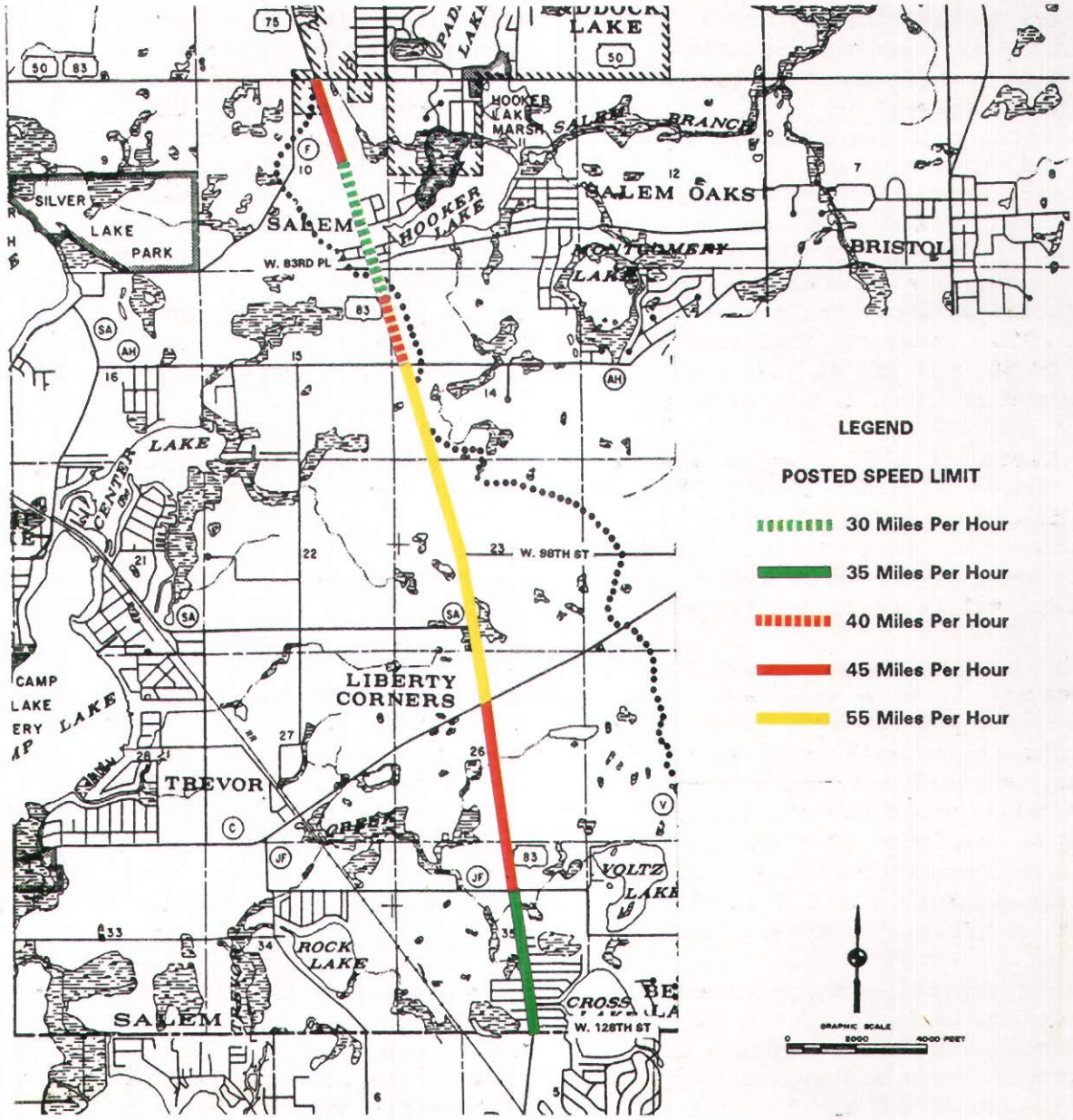
STRUCTURES ON PARCELS ABUTTING THE STH 83 STUDY SEGMENT HAVING SUBSTANDARD STREET YARD SETBACKS: 1991



Source: SEWRPC.

Map 5

SPEED LIMITS IN FORCE
ON THE STH 83 STUDY SEGMENT: 1991



Source: SEWRPC.

motorists to "crowd" or cross over the roadway centerline into the path of oncoming vehicles. Finally, parking on the shoulder introduces pedestrians walking along and across facilities with posted speed limits ranging as high as 45 miles per hour increasing the potential for a pedestrian vehicular accident.

Traffic Counts

Average weekday traffic count data were collected by the Wisconsin Department of Transportation in 1990, on the study segment of STH 83 and on selected cross streets in the vicinity of the study segment. These data were based on 24 hour continuously recording machine traffic counts. In August 1991 the Regional Planning Commission staff conducted additional 24 hour machine traffic counts on the study segment of STH 83, just north of its intersection with CTH AH. The 24 hour machine counts conducted by the Regional Planning Commission Staff included weekend traffic counts and were conducted in conjunction with manual 24-vehicle classification counts. Finally, in September 1991, the Commission staff conducted three additional 24-hour machine traffic counts on the STH 83 study segment. For comparative purposes, one traffic count was conducted at the same location as the August 1991 traffic count, and the other two traffic counts were conducted at locations counted by the Wisconsin Department of Transportation in June 1990. These two locations included STH 83 approximately one-half mile south of STH 50, and STH 83 just north of CTH C. The average weekday traffic counts observed at these locations are shown in Map 6.

The September 1991 average weekday traffic count just orth of CTH C--7,390 vehicles--was about 10.6 percent less than the August 1991 average weekday traffic count of 8,270 vehicles. Some variation in average weekday traffic counts at the same location but at different times is typical.[3] The count data indicate that the study segment may be subject to increased traffic volumes due to seasonal recreational travel.

Study segment average weekday traffic counts south of STH 50 increased by nearly 9 percent between 1990 and 1991, from 6,610 to 7,200 vehicles per average weekday, respectively. As shown in Table 3, this is approximately three times the annual increase observed at this location between 1975 and 1990. Although it may be concluded that part of the increase in the traffic volume is due to the time difference in data collection--June 1990 compared to September 1991--it may also be concluded that the traffic volume on the study segment increased more than it has historically. It is important to note, however, that the 1991 average weekday traffic count of 7,200 vehicles was substantially below the 13,000 vehicles per average weekday design capacity of the existing roadway.

Shown on Map 6 is a comparison of the existing average weekday traffic counts to the design capacity of the existing roadway at selected locations on the study segment. With the exception of STH 83 between CTH C and CTH AH where current traffic volumes are approaching or at the design capacity of the roadway, the study segment of STH 83 generally carries traffic volumes below its design

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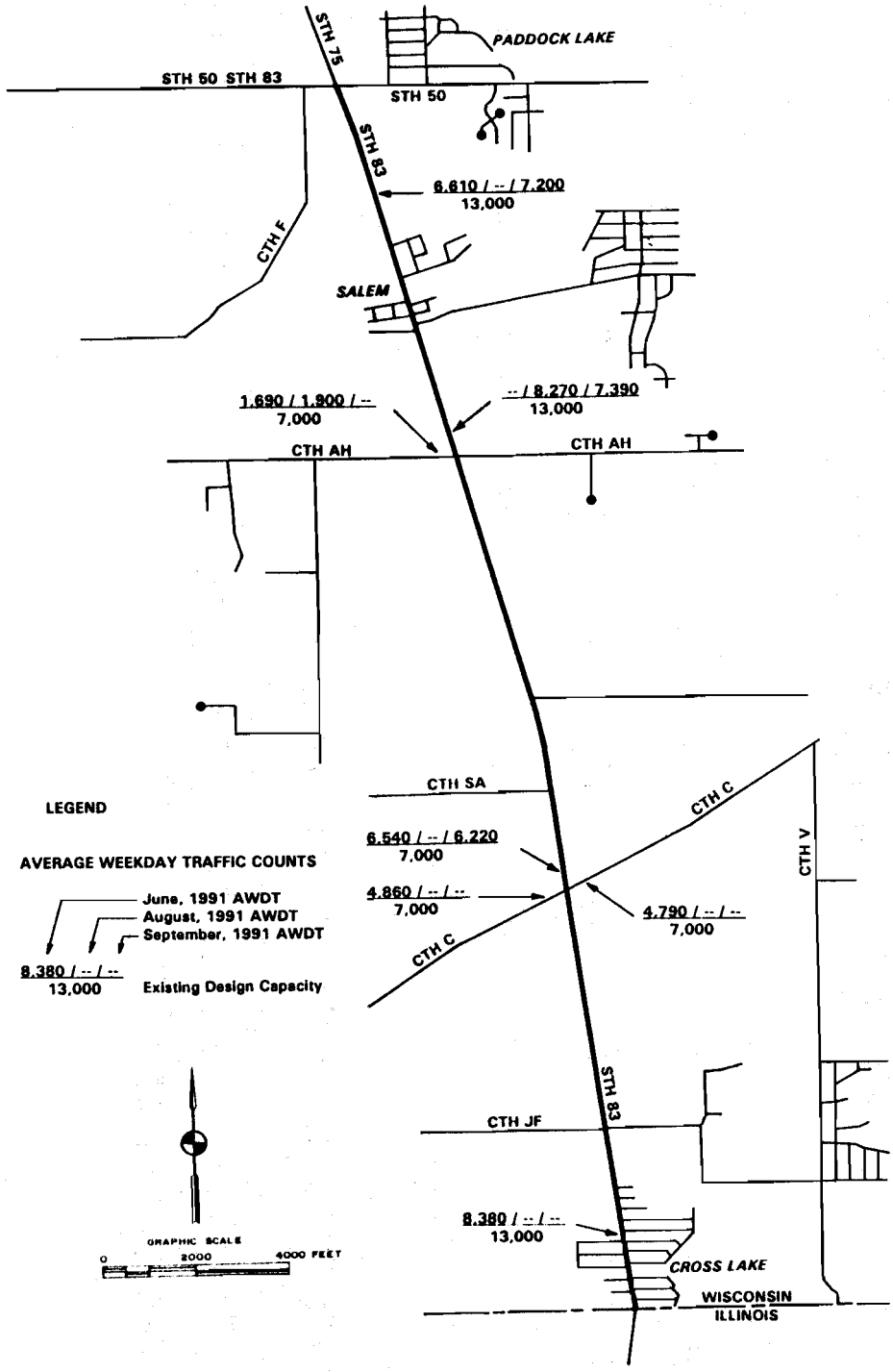
[3]Based on historic, statewide, Wisconsin Department of Transportation traffic count data, the variation between average weekday traffic counts conducted at the same location in August and September may typically be expected to be about 5 percent.

Map 6

COMPARISON OF EXISTING 1990 AND 1991 AVERAGE WEEKDAY TRAFFIC COUNTS TO EXISTNG ROADWAY DESIGN CAPACITY ON THE STH 83 STUDY SEGMENT



Source: Wisconsin Department of Transportation and SEWRPC

Table 3

HISTORIC AVERAGE WEEKDAY TRAFFIC COUNTS AT SELECTED LOCATIONS ON THE STH 83 STUDY SEGMENT

LOCATION	YEAR							ANNUAL PERCENT INCREASE
	1975	1978	1981	1984	1987	1990	1991	
STH 83 0.5 Miles South of STH 50	4470	4470	5630	6730	8050[a]	6610[b]	7200[b]	3.13
STH 83 at 125th Street	5720	6120	7470	7470	7500	8380[b]	--	3.07

[a] The average weekday traffic at this location was estimated, not counted in 1987.

[b] Beginning in 1990, average weekday traffic counts were adjusted to correct an overstatement of the actual traffic volume caused by vehicles in the traffic stream having more than two axles. The average weekday traffic counts shown in this Table for 1990 and 1991 have not had this adjustment applied for compatiblity with counts taken in prevoius years and thus do not match the counts for these locations shown on Map 6.

Source: Wisconsin Department of Transportation and SEWRPC

capacity. Thus, it may be concluded that no additional traffic lanes are necessary for the existing traffic volumes. Such lanes may, however, be necessary to accommodate future travel demand.

The weekend traffic counts in August 1991 were somewhat greater than the weekday traffic counts. The Saturday traffic count of 8,610 vehicles was about 4 percent greater than the average weekday traffic count on STH 83 just north of CTH AH. The Sunday traffic count of 8,530 vehicles was about 3 percent greater than the average week day traffic at that same location. While these counts are both below the existing roadway design capacity, the pattern of weekend traffic counts exceeding average weekday traffic counts is atypical of arterial traffic counts throughout Southeastern Wisconsin. Typically, Saturday and particularly Sunday counts are less than average weekday counts.

Based on the Commission's 24 hour vehicle classification count data, automobiles and light trucks--pickups and vans--account for about 90 percent of the total traffic stream on an average week day with the remaining 10 percent comprised of trucks. On Saturday and Sunday the percentage of the traffic stream comprised of automobiles, pickups and vans increased to about 99 percent, while the percentage of trucks decreased to about 1 percent.

Operating Speeds

Three spot speed studies were conducted by the Regional Planning Commission Staff on the study segment of STH 83 on September 4, 1991 between the hours of 9:30 a.m. and 3:30 p.m. Spot speed data were collected on STH 83 in the vicinity of W. 83rd Place, in the vicinity of CTH AH and just south of W. 98th Street. Additional spot speed data were collected on STH 83 in the vicinity of W. 126th Street in late October, 1991, between the hours of 9:30 a.m. and 3:30 p.m. Table 4 summarizes the results of the operations regarding the operating speed at these four locations on the study segment of STH 83. The 85th percentile speed--the speed at or below which 85 percent of the traffic was observed to be traveling--may be considered to be the speed at which motorists perceive to be safe and reasonable for the roadway segment being traveled. The 10 mile per hour pace is the 10 mile per hour speed range which includes the largest number of vehicles. The greater the percentage of motorists traveling within the 10 mile per hour pace speed, the greater the uniformity in travel speeds of the traffic stream.

Because the 85th percentile speed is approximately 4.5 miles above the speed limit on STH 83 at W. 83rd Place it may be concluded that there is a speeding problem at this location. However, because 84 percent of all traffic travels within the 10 mile per hour pace, it may be concluded that the speeding problem is modest. At CTH AH the 85th percentile speed is more than eight miles an hour the posted speed limit. This in part reflects the fact that motorists are changing from a 40 mile per hour speed zone to a 55 mile per hour speed zone. However, the percentage of motorists traveling within the 10 mile hour pace is only about 72 percent. As the differential in speeds increases, the potential for severe accidents increases as well. It may be concluded that there is a significant disregard for the posted speed limit in this vicinity with a potential traffic safety problem. Just south of W. 98th Street, the 85th percentile speed observed is below the 55 mile per hour speed limit by almost three miles per hour. At this location only 66 percent of the motorists are traveling within the 10 mile per hour pace. Because of the wide disparity in

Table 4

OBSERVED OPERATING SPEED ON STH 83 AT SELECTED LOCATIONS IN THE OFF-PEAK TRAFFIC HOURS: 1991

	W. 83rd Place	CTH AH	W. 98th Street	W. 126th Street
Posted Speed Limit....	30 miles per hour	40 miles per hour[a]	55 miles per hour	35 miles per hour
Average Speed.....	+1.0 mile per hour over the speed limit	+3.6 miles per hour over the speed limit	-7.0 miles per hour below the speed limit	+3.7 miles per hour over the speed limit
Percent of Motorists Traveling at or Below the Posted Speed Limit.....	45	24	93	28
85th Percentile Speed.	+4.4 miles per hour over the speed limit	+8.1 miles per hour over the speed limit	-2.8 miles per hour below the speed limit	+8.0 miles per hour over the speed limit
10 Mile Per Hour Pace.	26 to 35 miles per hour	40 to 49 miles per hour	42 to 51 miles per hour	34 to 43 miles per hour
Percentage of Motorists Traveling Within the 10 Mile Per Hour Pace.....	84	72	66	71
Highest Observed Speed.....	41	55	63	55

[a]The posted speed limit changes at CTH AH from 40 miles per hour north of CTH AH to 55 miles per hour south of CTH AH.

Source: SEWRPC

travel speeds it may be concluded that there is a potential traffic safety problem at this location. Further, because motorists tend to travel at a speed that they consider safe and reasonable, this may indicate that the 55 mile per hour speed limit at this location should be reduced. At W. 126th Street, the 85th percentile speed was observed to be eight miles per hour above the posted speed limit. About 71 percent of the motorists were traveling within the 10 mile per hour pace. It many be concluded that there is a significant disregard for the posted speed limit in this vicinity with a potential traffic safety problem.

Accidents

Traffic accidents provide another important measure of the efficiency and operating characteristics of the roadway. Motor vehicle accident histories for the study segment of STH 83 were obtained from the Wisconsin Department of Transportation, for the time period of August 1, 1988 through June 30, 1991. A total of 96 accidents were reported on the study segment during this period. Of the 96 total accidents one accident involved both fatalities and injuries, 38 additional accidents involved personal injuries and the remaining 57 accidents involved property damage only. The number of accidents on the study segment has increased annually over the two year and 11 month period with 29 occurring from August 1st of 1988 to July 31st of 1989, 32 in the period between August 1 of 1989 and July 31st of 1990 and 35 having occurred during the 11 months between August 1, 1990 and June 30, 1991.

Of the 96 total accidents reported, 52, or about 54 percent, occurred at intersections along the study segment. The remaining 44, or about 45 percent, occurred at mid-block locations. The locations of the motor vehicle accidents which have occurred on the study segment during the past two years and eleven months are shown on Map 7. As shown on Map 7, the traffic accidents occur along the entire study segment. However, it may noted that there is a concentration of accidents in the urbanized Cross Lake area at the southern end of the study segment; at the intersection of STH 83 with CTH C; at the intersection of STH 83 with W. 98th Street; and in the unincorporated urban area of Salem near the northern end of study segment. It may be noted that, with the exception of the STH 83 and CTH C intersection, these locations have been identified as having potential sight distance problems; and, in the two urbanized areas, inadequate street and driveway spacing which may contribute to the accidents at these locations. In addition, the intersections of STH 50, CTH AH and CTH JF with STH 83 are all multiple accident locations. It may be noted that the fatal accident occurred approximately one quarter of a mile north of CTH JF. These locations warrant detailed analyses for potential safety improvements.[4]

Of the 52 total intersection accidents, 26 occurred during daylight hours and 26 in darkness. Of the 52 intersection accidents, 15 were right-angle collisions, or about 29 percent; 14 were rear-end collisions, or about 27 percent; and 8 were side-swipe collisions, or about 15 percent. The remaining 29 percent included collisions with a fixed object, head collisions, collisions between turning vehicles and opposing traffic, and a collision with a bicyclist. Of the 52

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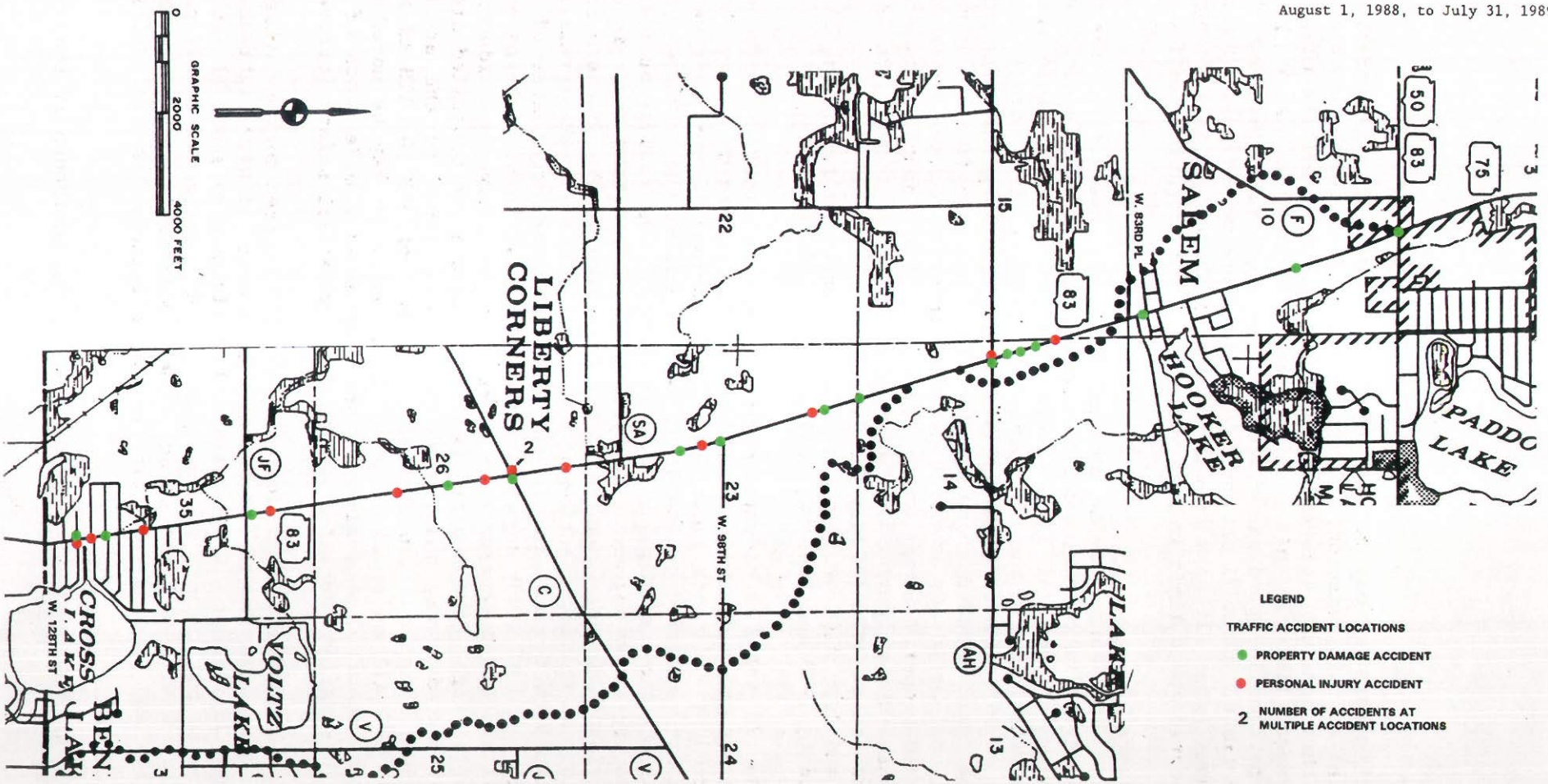
[4]Accidents were considered intersection accidents if they occurred within 150 feet of an intersection.

Map 7

LOCATIONS OF TRAFFIC ACCIDENTS
ON THE STH 83 STUDY SEGMENT

August 1, 1988, to July 31, 1989



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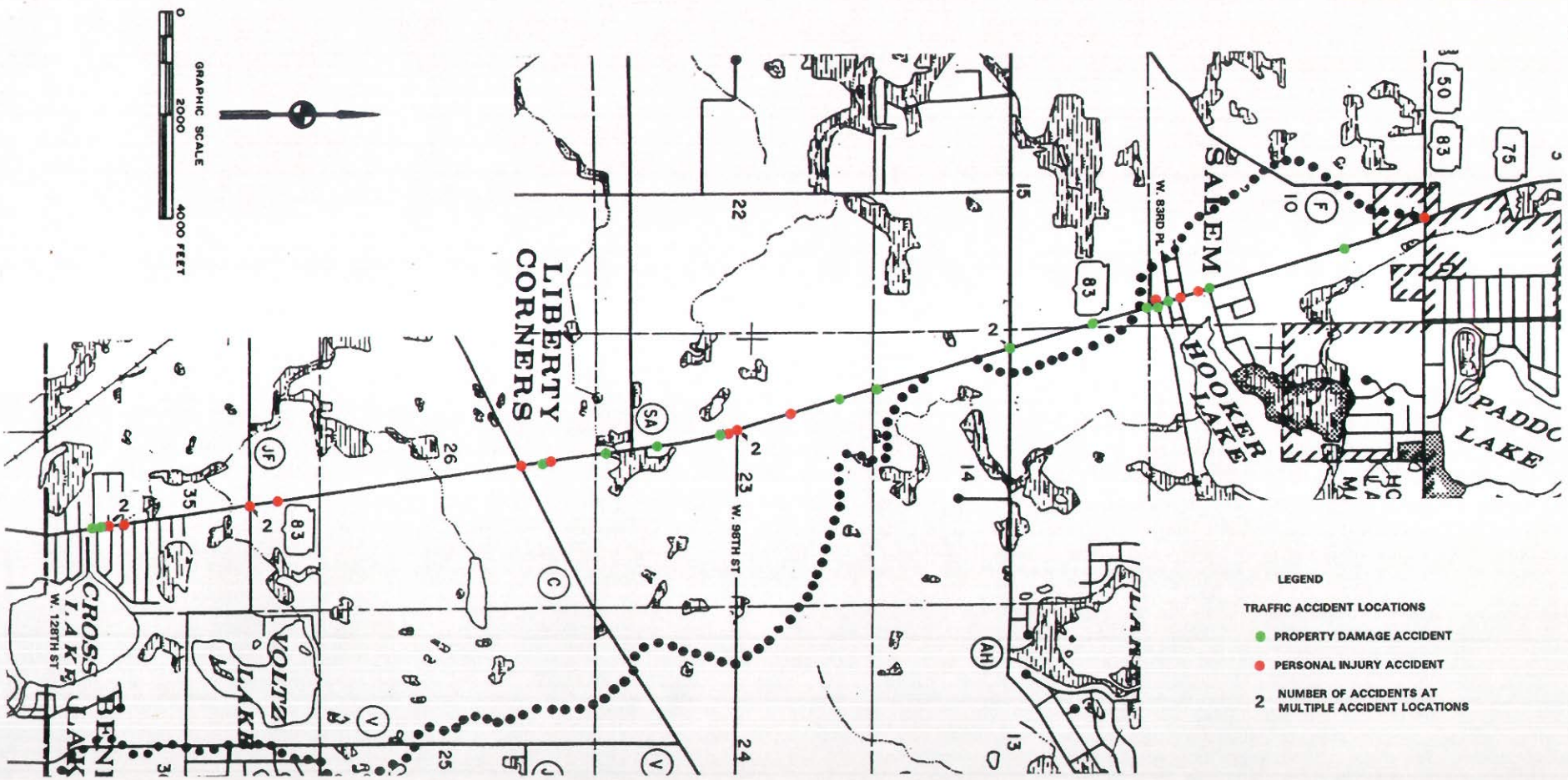
Map 7 (continued)

(August 1, 1989, to July 31, 1990)



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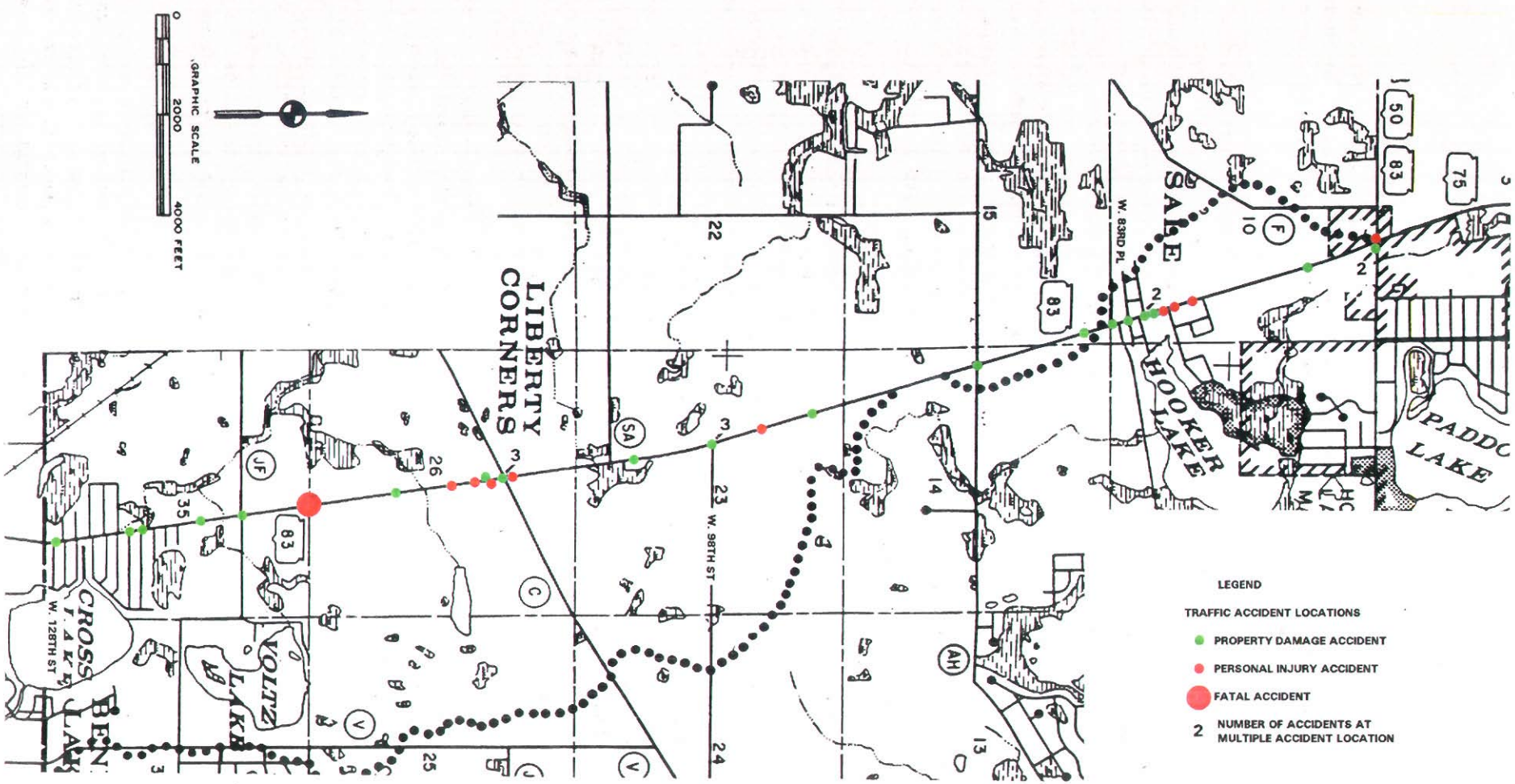
Map 7 (continued)

August 1, 1990, to June 30, 1991



Source: Wisconsin Department of Transportation and SEWRPC.

intersection accidents the most accidents--14, or about 27 percent of the total--occurred on Wednesday with 10 each on Monday and Friday. The month during which most intersection accidents occurred was June with seven accidents, or about 13 percent of the total.

Of the 44 mid-block accidents 19, or about 43 percent, occurred daylight hours and 25, or 57 percent, occurred after dark. The most prevalent accident type was a single vehicle leaving the road and colliding with a fixed object, representing 15 accidents, or about 34 percent, of the total 44 mid-block accidents. This was followed by eight side-swipe accidents, or about 18 percent, and six rear-end accidents, or 14 percent, of the total mid-block accidents. It may be noted that the fatal accident involved a side-swipe by vehicles traveling in the opposite direction. Four of the mid-block accidents involved a vehicle and an animal with the remaining collision types including right-angle, head-on, turning vehicles. The accident involving a pedestrian was at a mid-block location. The day of the week on which most mid-block traffic accidents occurred was Thursday with 14, or about 32 percent, of the total mid-block accidents. The month during which most of the mid-block accidents occurred was December with eight, or about 18 percent, of the total mid-block accidents.

Because nearly half of the total accidents during the two-year 11-month traffic accident history reviewed by the staff occurred during the daylight hours while the other half occurred during non-daylight hours--47 percent and 53 percent, respectively--ambient light conditions do not appear to be a factor in the traffic accidents on the study segment. No more than 17 accidents, or about 18 percent of all accidents, occurred on a particular day of the week and no more than 12 accidents, or 13 percent, occurred in a particular month. Thus, neither day of week nor time of year appears to be a factor in traffic accidents on the study segment. However, it may be noted that snowy or "icy" pavement conditions were a factor in 15 accidents, or about 16 percent of all accidents, on the study segment, said conditions which only occur during certain times of the year. By comparison, 68 accidents, or 71 percent, occurred on dry pavement with the remaining 13 accidents, or 14 percent, occurring on wet pavement.

Failure to yield the right-of-way--cited 17 times--was the most frequently identified driver-related potential contributing factor to the traffic accidents on the study segment. When combined with "disregarded stop sign," these two factors account for about 20 percent of all driver-related potential contributing factors. Inadequate sight distance may potentially have contributed to as many as 13 of these accidents as they occurred at locations where sight distance is potentially restricted. Failure to have the vehicle under control was cited 10 times; inattentive driving and driving too fast for conditions were each cited nine times; and improper overtaking and the condition of the driver were each cited eight times. Together, these factors account for almost two-thirds of all identified driver-related potential contributing factors. No other factor was identified more than five times.

Based on the analysis of the two-year, 11-month history of traffic accidents then, it may be concluded that: 1) traffic accidents are increasing annually; 2) there are four locations where the concentration of accidents indicate that additional analysis for potential roadway improvements is warranted; and 3) there are no other very strong patterns with respect to time of accident or nature of

accident. Because of the concentration of accidents at the four locations--the urbanized areas of Cross Lake and Salem, and the intersections of STH 83 with CTH C and STH 83 with W. 98th Street--these four locations may be considered to be traffic safety problem locations.

Gap and Stopped Delay

The Commission staff also conducted an inventory of the gaps available in the STH 83 traffic stream at the STH 83 intersections with CTH AH and W. 83rd Place on an average weekday. As already noted 26 of the 28 intersections on the study segment of STH 83 have no traffic control on the STH 83 approaches to the cross street intersections but are stop sign controlled on the cross street approaches. The capacity of the stop sign controlled intersections is dependent upon the availability and distribution of gaps in the STH 83 traffic stream and upon the judgement of the motorist on the cross street approaches in selecting gaps through which to turn left or right or to cross STH 83. As the number of gaps acceptable to the motorist decreases, stopped delay on cross-street approach may be expected to increase. If the stopped delay increases sufficiently, motorists on the cross-street approaches may be expected to accept shorter gaps in which to attempt to complete the desired maneuver. The acceptance of shorter gaps may result in an increase in traffic accidents and a decrease in traffic safety.

The critical gap is defined as the median time headway between two successive vehicles in the major street traffic stream that will be accepted by drivers on the cross street approaches to cross and or merge with the major street traffic flow. The critical gap varies with the maneuver by the cross street traffic and with the speed of the major street traffic stream; that is, motorists executing a left turn from the cross street require more time then motorists executing a right turn, and the time required to execute these movements increases as the speed of the major street traffic stream increases. The basic critical gap in seconds for cross street traffic on W. 83rd Place and CTH AH, in the traffic stream on STH 83 is shown in Table 5 by maneuver. Also shown in Table 5 are the number of gaps observed in the STH 83 traffic stream during an average weekday peak hour that were equal to or greater than the critical gap required to execute the movements from the cross street at W. 83rd Place and CTH AH. This table also shows the average gap length observed during the peak hour.

In conjunction with the inventory of gaps in the STH 83 traffic stream , the Commission staff also collected average weekday peak hour stopped delay information at the intersections of STH 83 with W. 83rd Place and CTH AH. The maximum observed delay per vehicle, the average delay per vehicle and the estimated total delay for each intersection are shown in Table 5. Although the average delay at either intersection would not be considered excessive, it may be noted that any motorist incurring the maximum observed delay, particularly at CTH AH may become dangerously impatient. As a result, those motorists may begin to accept shorter gaps in which to execute the desired maneuver. The use of shorter gaps may lead to an increase in traffic accidents as motorists in the STH 83 traffic stream have less time to react to an unexpected maneuver by cross-street motorists. It may be noted that, of the five accidents which occurred at this intersection from August 1, 1988, to July 31, 1991, four accidents cited failure to yield the right-of-way as a possible contributing circumstance which may indicate that motorists became impatient and tried to enter the STH 83 traffic stream in a gap that was too short.

Table 5

OBSERVED AVERAGE WEEKDAY PEAK HOUR GAP AND STOPPED DELAY
AT THE INTERSECTIONS OF STH 83 AND W. 83RD PLACE AND STH 83 AND CTH AH

Cross Street	Basic Critical Gap (seconds)			Average Weekday Peak Hour Gaps Observed in STH 83 Traffic Stream				Average Weekday Peak Hour Delay on Cross Street Approaches			
					Number of Gaps Observed Equal To or Greater Than Basic Critical Gap						
	To Cross Major Street	To Turn From Minor Street		Average Gap Length (seconds)	To Cross Major Street	To Turn From Minor Street		Longest Observed Vehicular Queue	Maximum Observed Delay (seconds)	Average Observed Delay (seconds)	Total Delay (hours)
		Right	Left			Right	Left				
W. 83rd Place....	6.3	5.7	6.8	6.5	178	196	168	2	44	9.5	0.1
CTH AH.....	7.2	6.3	7.7	6.1	181	208	165	6	100	15.9	0.6

Forecast Future Traffic Volumes

Forecast design year 2010 traffic volumes for the study arterial segment were prepared by the Regional Planning Commission. The traffic forecasts are based upon, and assume implementation of, the adopted regional transportation system plan, the year 2010 regional land use plan, and the forecast design year 2010 regional resident population, employment, and household levels upon which those plans have been developed.

The regional plan recommends transportation system management actions to promote more efficient use of arterial street and highway facilities by promoting carpooling and vanpooling. The regional plan also recommends the substantial improvement and expansion of the regional arterial street and highway system although there are no recommended improvements in the adopted regional plan which propose widening to provide additional traffic lanes on the STH 83 study segment. Completion of the long-recommended USH 12 freeway in neighboring Walworth County and in Illinois may be expected to limit the increase in traffic volumes on the study segment. It should be noted, however, that if the regional transportation system plan is not implemented by the year 2010--and implementation of the plan is currently behind schedule--average weekday traffic volumes in the year 2010 on the study segment may be higher than those forecast.

Forecast design year 2010 average weekday traffic volume for the STH 83 study segment are shown on Map 8 along with the design capacity of the existing roadway. A comparison of the forecast design year 2010 average weekday traffic volumes to existing roadway design capacity indicates that the design year 2010 traffic volumes may be expected to equal or exceed the existing design capacity along the entire study segment. The existing regional and county jurisdictional system plans have not recommended improvements, such as widening, to address this capacity problem as they have a design year of 2000. These plans will be updated shortly to extend their design years and incorporate any needed improvement to this segment of STH 83.

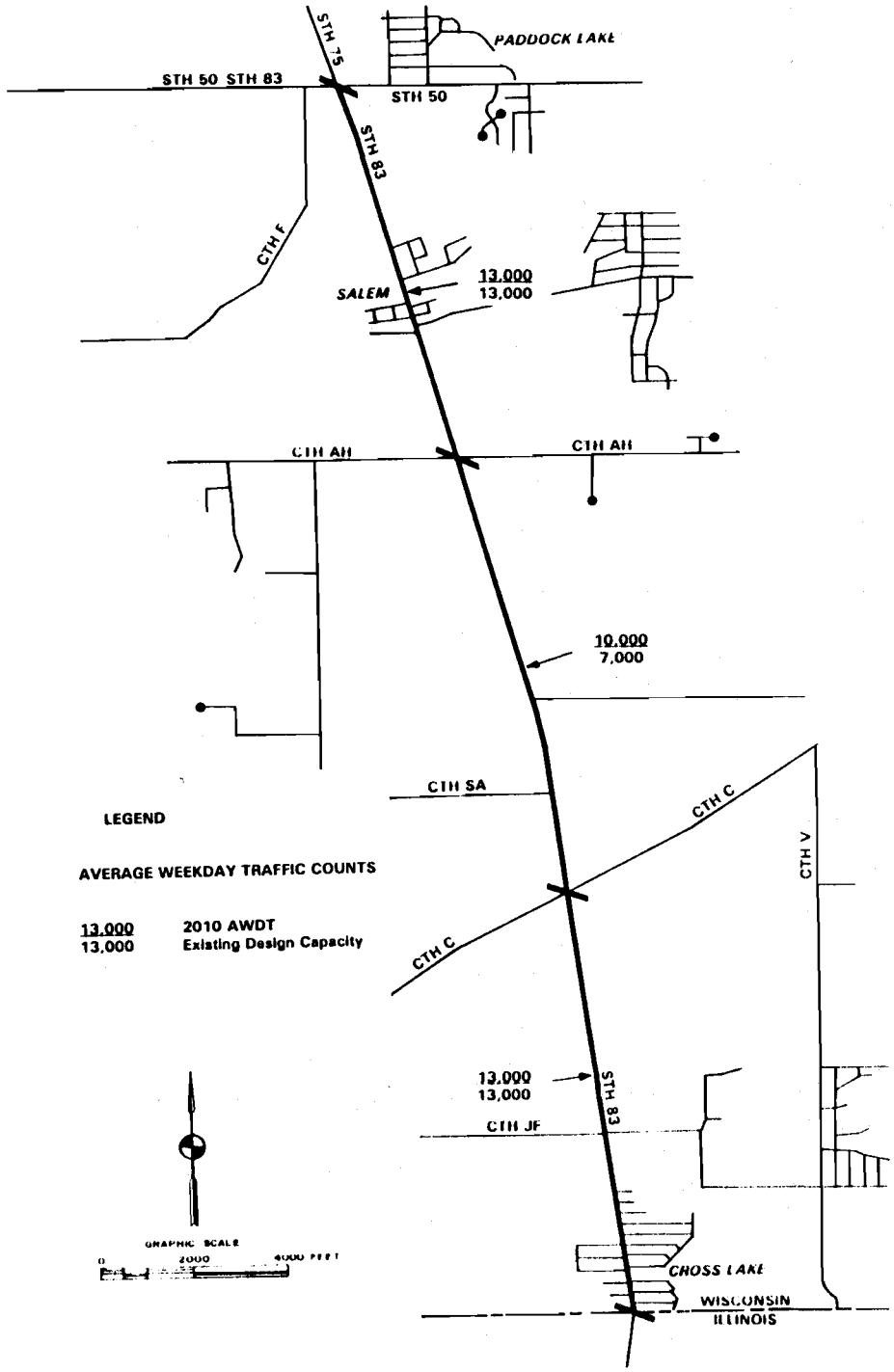
Problem Identification

Based on analyses of topographic mapping and field observations, a number of locations were identified with substandard sight distance. The vertical curvature of the roadway restricts the passing and/or stopping sight distance at eight locations on the study segment. Existing plant material located too close to intersecting streets restricts intersection corner sight distance at an estimated nine intersections. Sporadically parked vehicles may restrict intersection corner sight distance at an estimated additional six intersections along the study segment. Restricted sight distance reduces the time available for motorists to perceive and safely react to unexpected potentially dangerous situations, and thus, may be considered to represent a traffic safety problem.

Analyses of existing intersection and driveway spacing along the study segment indicate that substandard intersection and driveway spacing exist along the study segment particularly in the urbanized areas of Salem and Cross Lake. Substandard spacing increases the potential for conflict between vehicles entering and exiting the study segment to and from intersecting streets and driveways. Further, motorists are required to simultaneously monitor multiple closely spaced

MAP 8

COMPARISON OF FORECAST DESIGN YEAR 2010 AVERAGE WEEKDAY TRAFFIC VOLUMES ON THE STH 83 STUDY SEGMENT TO EXISTING ROADWAY CAPACITY



Source: SEWRPC

points of egress and ingress thereby making the driving task more complex, and potentially contributing to traffic accidents. Thus, substandard intersection and driveway spacing may be considered a traffic safety problem.

Current streetyard or building setbacks for structures abutting the study segment were compared to the currently adopted streetyard standard in the County's zoning ordinance. Because most of the existing structures were constructed prior to adoption of the ordinance, few of the buildings have sufficient setback. With respect to the existing facility, this may be considered to be more of a nuisance than a problem. It may be noted that one structure is located within the existing highway right-of-way and restricts intersection corner sight distance to and from the south at the intersection of STH 83 and W. 84th Street. This has been identified as a traffic safety problem.

Parking on the shoulders of facilities in the vicinity of Spring Valley Country Club and Salem School indicate that sufficient off-street parking is not available to meet periods of peak seasonal demand. The off-street parking provided for patrons of the commercial establishment in the northwestern quadrant of the STH 83 and 83rd Place intersection will not accommodate trucks. It may be concluded that the off-street parking provided at these locations is inadequate. The resultant on-street parking may degrade traffic safety as well.

Based on spot speed studies conducted by the Commission staff, it may be concluded that there is a modest speeding problem on the STH 83 study segment in the urbanized area of Salem where the 85th percentile speed was about 4.4 mile per hour above the speed limit. Further, it may be concluded that a speeding problem exists in the vicinity of CTH AH where the 85th percentile speed was about 8.1 miles per hour above the speed limit. Excessive vehicular speeds may be expected to contribute to a traffic safety problem.

Analyses of a three-year history of traffic accidents on the study segment indicates that the incidence of traffic accidents has increased annually. A review of the pattern of accidents indicates a concentration of accidents at four locations--the urbanized areas of Cross Lake and Sale, and at the intersections of STH 83 and CTH C and with 98th Street. Because of the annual increase in traffic accidents and because of the concentration of accidents at several locations, it may be concluded that a traffic safety problem exists.

Analyses of the number of gaps available and the average stopped delay to enter or cross the study segment traffic stream at selected locations indicate that, on the average, vehicles experience less delay than would be expected at a traffic signalized intersection. Thus, the delay presently incurred may be considered more a nuisance than a problem. It may be noted, however, that the maximum observed delay for a vehicle exceeded one and one-half minutes at the intersection of STH 83 and CTH AH. As vehicular delay increases, motorists accept shorter and shorter gaps in the cross-street traffic and may ultimately select a gap which is too short to permit the safe execution of the desired maneuver.

Based on a comparison of forecast design 2010 average weekday traffic volumes to the existing roadway design capacity it may be concluded that the design year traffic volumes may be expected to equal or exceed the current design capacity

along the entire study segment. This may be expected to result in congested traffic operating conditions with an attendant increase in travel times and delay, air pollutant emissions, and fuel consumption, and a degradation of traffic safety. Thus, it may be concluded that there will be a roadway design capacity problem by the design year 2010.

In summary, a total of five existing traffic problems were identified on the study segment of STH 83. These included: 1) traffic safety problems due to restricted sight distance; 2) traffic safety problems caused by substandard intersection and driveway spacing; 3) inadequate off-street parking at selected locations; 4) vehicular speeding problems; and 5) an annual increase in the incidence of traffic accidents and a concentration of traffic accidents at selected locations. One future traffic problem was identified: insufficient roadway capacity to accommodate forecast design year 2010 average weekday traffic volumes.

ALTERNATIVE AND RECOMMENDED TRAFFIC ENGINEERING AND ROADWAY IMPROVEMENT ACTIONS

The Commission staff considered a number of traffic engineering and roadway improvement actions to alleviate the existing and anticipated future traffic problems identified on the STH 83 study segment. Traffic engineering actions are relatively low cost, short-range improvements which may be expected to alleviate existing traffic problems and which may be undertaken in the near future. Traffic engineering actions typically include pavement markings, signing, traffic control, and spot intersection geometric improvements.

Traffic engineering actions may be expected to improve existing operating conditions. The effectiveness of such actions, however, may be expected to diminish as traffic volumes increase over time. As traffic volumes approach and exceed the roadway design capacity, operating conditions may again be expected to deteriorate, and a roadway improvement project may become necessary. Roadway improvement actions are relatively high cost, long-range improvements which may be expected to alleviate both existing and anticipated future traffic problems. Roadway improvements include the provision of added capacity in a corridor through the construction of new traffic lanes on existing facilities or through the construction of a new facility on new alignment.

Restricted Intersection Corner Sight Distance

The corner sight distance along the study segment of STH 83 is restricted by plant material at nine intersections and may potentially be restricted by parked vehicles at six intersections.

The first traffic engineering action considered to abate the problem of restricted corner sight distance due to parked vehicles was the prohibition of on-street parking at those intersections where parked vehicles represent a potential sight distance obstruction. It should be noted that this action would be applicable to only one intersection along the study segment--the intersection of STH 83 with CTH SA. The advantage of this alternative would be to eliminate the potential for a parked vehicle to obstruct the sight distance. The disadvantage of this alternative would be the attendant loss of on-street parking.

It is recommended that on-street parking be prohibited on both sides of STH 83 for a distance of 400 feet north and south of CTH SA. It is also recommended that additional no parking signs be erected on the east side of STH 83 between W. 83rd Place and W. 83rd Street to help define the existing no parking zone between W. 82nd Street and W. 85th Street to improve the sight distance at the intersection of W. 83rd Place and STH 83. The estimated cost of implementing this recommendation is $1,200.

The second traffic engineering action considered to abate the problem of restricted corner sight distance due to parked vehicles was the relocation of the stop signs and provision of stop lines on the westbound approaches of the STH 83 intersections with W. 84th Street and with W. 83rd Place. The stop sign on the westbound approach at W. 84th Street is located approximately 36 feet east of the east edge of pavement of STH 83. At W. 83rd Place, the stop sign on the westbound approach is located about 58 feet east of the east edge of pavement of STH 83.[5] Neither approach has a stop line currently.

Ideally, when a stop line is used in conjunction with a stop sign, it is located in line with the stop sign. However, when the sign cannot be located precisely where vehicles are expected to stop, a stop line may be placed at the desired stopping location. Disadvantages of providing a stop line with pavement markings are that they may be obscured by snow and ice; are subject to reduced visibility through normal use; and require periodic maintenance.

On the westbound W. 83rd Place intersection approach the stop sign should be moved to a location six feet east of the edge of pavement of STH 83 and a stop line provided in line with the sign through the use of pavement markings. The advantage of relocating the stop sign and providing a stop line is to place motorists at the stop line westbound on W. 83rd Place in a position which eliminates the potential sight obstructions of parked vehicles in the off-street parking lot on the east side of STH 83 between W. 83rd Place and W. 83rd Street as potential sight obstructions. Relocation of the stop sign on W. 83rd Place and the provision of a stop line six feet east of the edge of pavement of STH 83 would provide motorists on this approach with unrestricted sight distance. It is recommended that the stop sign be relocated and a stop line be provided on the westbound approach of the W. 83rd Place and STH 83 intersection. The estimated cost of implementing this recommendation is $200.

Consideration was also given to moving the stop sign on the westbound W. 84th Street intersection approach to STH 83 to a location six feet east of the edge of pavement of STH 83 and a stop line provided in line with the sign through the use of pavement markings. The advantage of relocating the stop sign and providing a stop line is to place westbound motorists at the stop line on W. 84th Street in a position which substantially improves the sight distance to and from the south at this intersection.

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[5]A building is located approximately 16 feet east of the east edge of pavement of STH 83 in the Southeast quadrant of the W. 84th Street intersection with STH 83 which restricts corner sight distance to and from the south.

A potential disadvantage of relocating this stop sign is that--because of the 75 foot radius connecting W. 84th Street with STH 83 in the Northeast quadrant of the intersection--the relocated sign would be about 45 feet north of a motorist intending to turn left from W. 84th Street. Motorists turning left from the westbound approach may either fail to see the relocated sign or perceive that it applies to motorists turning right from this approach, and thus, believe that they have the right-of-way and are not required to stop. This has the potential to lead to an increase in accidents at this location. Because the potential for confusion with regard to the need to stop, it is not recommended that the stop sign be relocated. It is, however, recommended that a stop line be provided on the westbound approach using pavement markings at a point six feet east of and parallel to the edge of pavement of STH 83 from the center of W. 84th Street to a point 15 feet north and from that point northeasterly at a 45 degree angle to the edge of pavement. The estimated cost of implementing this recommendation is $160.

Kenosha County officials requested Commission staff comment on the proposed expansion of the existing fire station in the Salem urban area onto the vacant parcel in the northeast quadrant of the W. 84th Street and STH 83 intersection within the context of this study. Because a site plan for the proposed expansion had not been prepared, the comments were necessarily general in nature. The building located in the intersection's southeast quadrant and which restricts sight distance to and from the south on the westbound intersection approach, may also restrict sight distance to and from the south when fire trucks and other emergency service vehicles exit the station. It was recommended that, upon expansion of the fire station, warning signs with an advisory distance plate and amber lights which would be activated to flash as the emergency service vehicles responded to a call be installed. The sign message should read, "FIRE TRUCKS ENTERING WHEN FLASHING." The estimated cost of implementing this recommendation is $1,350.

It may be noted that similar problems may be avoided in the future through the provision of adequate building setbacks as provided in Chapter 12 of the currently adopted Kenosha County Zoning Ordinance. The Kenosha County Zoning Ordinance requires a minimum setback of 65 feet from the right-of-way of all Federal, State, and County trunk highways. The advantage of this action is to ensure that new structures will not present vision problems at intersections. There are no disadvantages to this action. Thus, it is recommended that adequate building setbacks be required as a condition of approval by the Town of Salem of requests for development or redevelopment of parcels abutting the study segment.

Another alternative action considered to abate the problem of restricted intersection corner sight was the improvement of vision triangles at the intersections shown on Map 2. The vision triangles should conform to the requirements set forth in Section 12.13-1(b) of the County Zoning Ordinance. This requires a clear field of vision within a triangle which has the intersecting right-of-way lines as two of its sides, and a line which connects a point on each of two intersecting right-of-way lines located 50 feet from the point of intersection as its third side. The advantage of this alternative action is a substantial improvement in intersection sight distance, i.e., that sight distance restrictions due to plant material and/or parked vehicles would be eliminated.

Disadvantages associated with the creation of vision triangles include: a potentially negative impact on roadside aesthetics due to the removal of plant material; a potential reduction in or loss of all off-street parking at selected commercial sites; and a potential reduction in on-street parking. The application of this section of the ordinance to conditions which existed prior to its adoption may be difficult without payment of compensation to the landowners affected. It is, however, recommended that voluntary compliance be sought as warranted, and that the provision of adequate vision triangles be required as development occurs or as existing development seeks to expand or change uses.

Restricted Roadway Sight Distance

In order to facilitate the identification and evaluation of alternative actions to abate the problem of restricted roadway sight distance, the study segment was divided into three sub-segments: 1) from the Wisconsin-Illinois state line to CTH C; 2) from CTH C to CTH AH; and 3) from CTH AH to STH 50. The sub-segments from the Wisconsin-Illinois state line to CTH C and from CTH AH to STH 50 each have one vertical curve with restricted sight distance. Each of these sub-segments experienced two traffic accidents between August 1, 1988, and June 30, 1991, within the length of roadway wherein the sight distance is restricted. Of these four traffic accidents, three were limited to property damage and one involved a personal injury. It may be noted that no major driveways--driveways with traffic volumes greater than 500 vehicles per day--or public streets currently intersect the study segment in the length of roadway with restricted sight distance on these two sub-segments.

The remaining sub-segment--CTH C to CTH AH--has five vertical curves with restricted sight distances. Eight traffic accidents, six property damage only and two with personal injuries, occurred within the length of roadway wherein the sight distance is restricted between August 1, 1988, and June 30, 1991. It may be noted that W. 98th Street and driveways to the Salem Town Hall and a bank currently intersect the study segment in the length of roadway with restricted sight distance. One other driveway is of potential concern, not because it provides access to a land use generating substantial traffic volumes, but because it provides access for Town of Salem rescue squad vehicles.

STH 83 between the State Line and CTH C: Two alternative traffic engineering actions were considered but rejected to abate the problem of restricted roadway sight distance in the segment of STH 83 and CTH C. The first alternative considered but rejected was a reduction in the current speed limit between CTH JF and CTH C from 45 miles per hour to 35 miles per hour. Reducing the speed limit may be expected to reduce the length of roadway with substandard stopping and passing sight distances but not eliminate these conditions at the vertical curve on this portion of the study segment. Because neither sight distance restriction may be expected to be eliminated, this alternative action is not recommended for implementation.

The other alternative action considered but rejected was the designation of a speed zone with a 35 mile per hour speed limit at the vertical curve. Although reducing the speed limit may be expected to reduce the length of roadway with substandard stopping and passing sight distance, neither condition would be completely eliminated. Further, this would result in three different speed

limits on a roadway segment of about one mile in length, with the lowest speed limit in the middle of the segment. Not only may this create a speed limit enforcement problem as motorists transition from one speed zone to another, but it may create a need for additional enforcement. Limited development currently exists adjacent to the roadway segment which would have to have a reduced speed limit and some motorists may be expected to perceive that speeds in excess of the proposed 35 mile per hour limit would be safe and reasonable. The percentage of motorists traveling within the 10 mile per hour range of pace speeds may be expected to decrease and disparity in travel speeds and the potential for additional and more severe accidents may be expected to increase. Thus, this alternative action is not recommended for implementation.

One other alternative considered but rejected was a spot geometric improvement to lower the crest of the vertical curve. Although this alternative may be expected to eliminate the restricted sight distance problems at the vertical curve on this sub-segment, because only two accidents have occurred over a two-year 11-month period at this vertical curve and because of the relatively high cost entailed in lowering the crest, this alternative is not recommended for implementation at this time. It is, however, recommended that the incidence of traffic accidents in the vicinity of this vertical curve continue to be monitored. If the incidence or severity of traffic accidents increases, further consideration should be given to lowering the crest of the vertical curve. It is further recommended that the Wisconsin Department of Transportation consider improving the vertical alignment of the study segment in conjunction with the roadway reconditioning project which the Department currently has programmed for the study segment in 1998.

STH 83 Between CTH C and CTH AH: The first alternative traffic engineering action considered to abate the problem of restricted roadway sight distance on the segment of STH 83 between CTH C and CTH AH was to reduce the current speed limit on the study segment from 55 miles per hour to 45 miles per hour. One advantage of this alternative action is to reduce the stopping and passing sight distances required. The number of vertical curves with stopping or passing sight distances restricted is reduced from five to two and three, respectively. Further, the length of roadway over which these respective sight distances remain restricted is also reduced. Another advantage is the reduction in the unobstructed sight distance required at intersections. Yet another advantage is a modest reduction in the length of gap required in the study segment traffic stream for motorists to safely cross or enter the study segment traffic stream from the cross streets. The 85th percentile speed--the speed that most motorists perceive to be safe and appropriate on this portion of the study segment--was observed to be about 52 miles per hour which may indicate that the existing speed limit should be reduced.

One disadvantage of this alternative action is that not all of the sight distance restrictions on this portion of the study segment would be eliminated. Another disadvantage of this action is that adjacent lands are substantially undeveloped and some motorists may be expected to perceive that a higher travel speed is safe and appropriate. A program of increased periodic, random speed enforcement activity may, therefore, be necessary. The reduction of speed limit from 55 to 45 miles per hour between CTH C and CTH AH is recommended for implementation at a cost of $1000.

Another traffic management action considered to abate the problem of restricted roadway sight distance between CTH C and CTH AH was the installation of warning signs. Such a sign would display the pictogram for a side road on the east side of STH 83 south of W. 98th Street. The advantage of this alternative action would be to alert northbound motorists to the presence of an intersection which is hidden from view by the crest of a vertical curve and the attendant potential for cross traffic. This alternative action is recommended for implementation at a cost of $200.

Also considered, but rejected, were the use of short speed zones to reduce the speed limit in the area of vertical curves with restricted sight distances, and limited roadway reconstruction to lower the crest of selected existing vertical curves to provide the necessary stopping and passing sight distances. The use of speed zones between CTH C and CTH AH was rejected because the vertical curves with restricted sight distances are so located that the zones would either overlap or have very short intervening segments zoned for higher speeds. A uniform speed limit over a segment may be expected to result in more uniform vehicular speeds and increase the number vehicles traveling within the ten mile per hour range of pace speeds thereby improving traffic safety. Speed limit enforcement would be simplified.

Limited roadway reconstruction was rejected at this time because the recommended reduction in the speed limit from 55 to 45 miles per hour may be expected to substantially eliminate or reduce the length of restricted sight distance at the problem vertical curves at a nominal cost.

It is, however, recommended that the incidence of accidents, particularly in the vicinity of W. 98th Street, continue to be monitored. If the incidence of accidents remains at its current level or increases at this location, consideration should be given to lowering the crest of the vertical curves on either side of W. 98th Street. It is further recommended that the Wisconsin Department of Transportation consider improving the vertical alignment of the study segment in conjunction with the roadway reconditioning project which the Department currently has programmed for the study segment in 1998.

STH 83 Between STH 50 and CTH AH: Two alternative traffic engineering actions were considered but rejected to abate the problem of restricted roadway sight distance in the segment of STH 83 between STH 50 and CTH AH. The first alternative considered but rejected was a reduction in the current speed limit between the Salem area and STH 50 from 45 miles per hour to 30 miles per hour--the speed limit in effect through the Salem area. Although the reduction in speed limit may be expected to eliminate the stopping sight distance problem, it would not be expected to eliminate the passing sight distance problem. Further, because there is limited development located along the roadway segment proposed to have a reduced speed limit, some motorists may be expected to perceive that speeds in excess of the proposed 30 miles per hour speed limit would be safe and reasonable. The percentage of motorists traveling within the 10 miles per hour range of pace speeds may be expected to decrease and the potential for additional and more severe accidents may be expected to increase. Thus, this alternative action is not recommended for implementation.

The other alternative considered but rejected was the designation of a speed zone with a 30 mile per hour speed limit at the vertical curve. In addition to the disadvantages already identified the reduction would result in three different speed limits on a roadway segment about one-half mile in length with the lowest speed limit in the middle of the segment. This may create speed limit enforcement problems. Thus, this alternative action is not recommended for implementation.

One other alternative considered but rejected was a spot geometric improvement to lower the crest of the vertical curve. Although this alternative may be expected to eliminate the restricted sight distance problems at the vertical curve on this sub-segment, because only two accidents have occurred over a two-year 11-month period at this vertical curve and because of the relatively high cost entailed in lowering the crest, this alternative is not recommended for implementation at this time. It is, however, recommended that the incidence of traffic accidents in the vicinity of this vertical curve continue to be monitored. If the incidence or severity of traffic accidents increases, further consideration should be given to lowering the crest of the vertical curve. It is further recommended that the Wisconsin Department of Transportation consider improving the vertical alignment of the study segment in conjunction with the roadway reconditioning project which the Department currently has programmed for the study segment in 1998.

Substandard Intersection and Driveway Spacing

Substandard intersection spacing currently exists along the STH 83 study segment in the Cross Lake and Salem areas. In addition, access to parking lots in these areas is currently not limited to driveways, but can occur along the full length of the parking lots. Both of these conditions result in a degradation of the traffic carrying capacity and of the traffic safety of the segment concerned. The operational problems which result from these two conditions include: 1) an increase in the number of vehicular conflict points in proportion to the number of driveways and intersections present; 2) a reduction in roadway capacity caused by the temporary blockage of traffic in one direction while left-turning vehicles await gaps in the opposing traffic stream of sufficient length to execute the left turn; 3) the necessity for motorists to be cognizant of arterial street traffic and cross-street and multiple driveway traffic simultaneously; and 4) a potential for conflict between a motorist accelerating from a driveway or cross street and another motorist decelerating into an adjacent driveway or cross street.

Intersection Spacing: Land access street intersections along the STH 83 study segment should have a minimum spacing of at least 300 feet and a desirable spacing of at least 500 feet. Collector street intersection spacing along the study segment should have a minimum spacing of at least 1,300 or a desirable spacing of at least 2,000 feet.

It is recommended that future land access street and collector street intersections with the study segment be spaced at least 500 feet and at least 2,000 feet apart, respectively. Some flexibility may be permitted in order to ensure: 1) that an intersection sight distance problem is not created by the topography when the recommended intersection spacing is used; and 2) that a future street becomes

the fourth leg of an existing tee intersection rather than create another tee intersection less than 300 feet from an existing tee intersection.

There are two areas where the current spacing of local street intersections along the study segment were found to be substandard in the Cross Lake and Salem areas. Although no traffic engineering action may be expected to modify the existing intersection spacing, there are traffic engineering actions which may be expected to mitigate the potential negative impacts on traffic safety of substandard intersection spacing.

The first traffic engineering action considered to mitigate the problem of substandard intersection spacing was the prohibition of on-street parking on the study segment of STH 83. The advantage of this alternative would be to improve the sight distance at all intersections. Thus, the task of monitoring the cross streets for conflicting traffic is facilitated for drivers and an attendant improvement in traffic safety may be expected. A disadvantage of this action is that intersection spacing does not physically change and motorists must continue to monitor multiple conflict points simultaneously. It may be noted that such a parking prohibition already exists in the Cross Lake area and in portions of the Salem area as well. Another disadvantage of this alternative would be the attendant loss of on-street parking.

It is recommended that on-street parking be prohibited on both sides of STH 83 for a distance of at least 180 feet from local street intersections in the Salem urban area. The estimated cost of implementing this recommendation is $1,250.

The second traffic engineering action considered to mitigate the problem of substandard intersection spacing was a reduction in the speed limit within the Cross Lake and Salem areas. The advantage of this alternative is to reduce vehicular speeds, thereby providing motorists with additional time to monitor and react to conflicting traffic from the local street approaches and driveways. The potential for improvement in traffic safety through the reduction of the speed limit may be expected to be highly dependent upon motorist compliance with the new speed limit. The 85th percentile speed observed in the Salem urban area is nearly five miles per hour higher than the current 30 mile per hour posted speed limit. Because the segments of STH 83 over which the speed limit would be lowered are relatively short and because the speed limits on adjacent segments are at least 10 miles per hour higher, it may be anticipated that there would be a wider range of travel speeds, particularly in those areas transitioning from one speed limit to the other. As the range of travel speeds becomes more disparate, both the potential for additional accidents and more severe accidents increases. The final disadvantage of a reduction in speed limits is the potential need for increased speed limit enforcement activity.

Another alternative action considered to mitigate the problem of substandard intersection spacing was the creation of vision triangles at intersections in the Salem and Cross Lake areas. The advantage of this alternative action is a substantial improvement in intersection sight distance, thereby facilitating the monitoring of multiple potential conflict points. The disadvantages associated with the creation of vision triangles include: a potentially negative impact on roadside aesthetics through the removal of plant material; a potential reduction in or loss of all off-street parking at selected commercial sites; a potential

reduction in on-street parking; and implementation at existing intersections may require compensation. It is recommended, however, that voluntary compliance be sought as currently warranted; and the provision of adequate vision triangles be required as development occurs or existing development seeks to expand or change uses.

Another alternative action to achieve more desirable intersection spacing is the closure of selected streets at their intersection with the study segment of STH 83. This technique--which would require the construction of cul-de-sacs on selected existing land access streets to eliminate their intersections with STH 83--may be expected to improve traffic safety by reducing the number of potential conflict points on the study segment. It would, however, result in circuitous travel for residents with property abutting the closed streets. It would also increase emergency response times to those properties. Additional right-of-way would be required to accommodate the construction of the turn-arounds at the end of the cul de sacs. Altogether, six of the intersecting streets in the Cross Lake urban area and one intersecting street in the Salem urban area have no outlet other than via an intersection with STH 83.

It is recommended that consideration be given to the closure of selected local street intersections along the STH 83 study segment provided that the maximum length of the street after closure does not exceed 750 feet. Based on the existing local street system in the Cross Lake area, the street closures would be limited to either W. 124th Street or W. 124th Place. The extension of 235th Avenue between W. 123rd Street and W. 124th Street, and between W. 124th Place and W. 125th Street; and the extension of 236th Avenue between W. 122nd Street and W. 123rd Street as platted would permit the closure of additional land access streets as shown in Map 9.

Although either W. 81st Street or W. 82nd Street could be closed in the Salem area, closures of either of these facilities is not recommended because they conform to intersection spacing standards. Thus, based on the existing local street pattern, street closures would be limited to W. 83rd Place or W. 83rd Street.

Another action considered, but rejected, to abate the substandard intersection problem was to convert selected existing land access cross streets from two-way to one-way operation. The advantage of this action would be to reduce the number of conflict points which exist within a typical four legged intersection from 24 to eight. The disadvantages of this alternative include the imposition of circuitous travel on residents and visitors; the intersection itself remains as source of potential conflict which must be monitored by the motorist in the same manner as it is currently; and the frequency with which conflict points must be monitored by motorists remains unchanged.

Access to Abutting Parcels: The management of access to abutting parcels may be utilized to preserve arterial roadway capacity and to enhance traffic safety. The criteria set forth in Table 6 may be utilized by Town of Salem officials in their review of development or redevelopment proposals to evaluate the proposed access to and from parcels abutting the STH 83 study segment. These criteria should be supplemented by the spacing requirements between street intersections and driveways set forth in Figure 3. It is recommended that all newly proposed

Map 9

EXISTING AND PLATTED ROADWAYS ADJACENT
THE STH 83 STUDY SEGMENT IN THE CROSS LAKE AREA

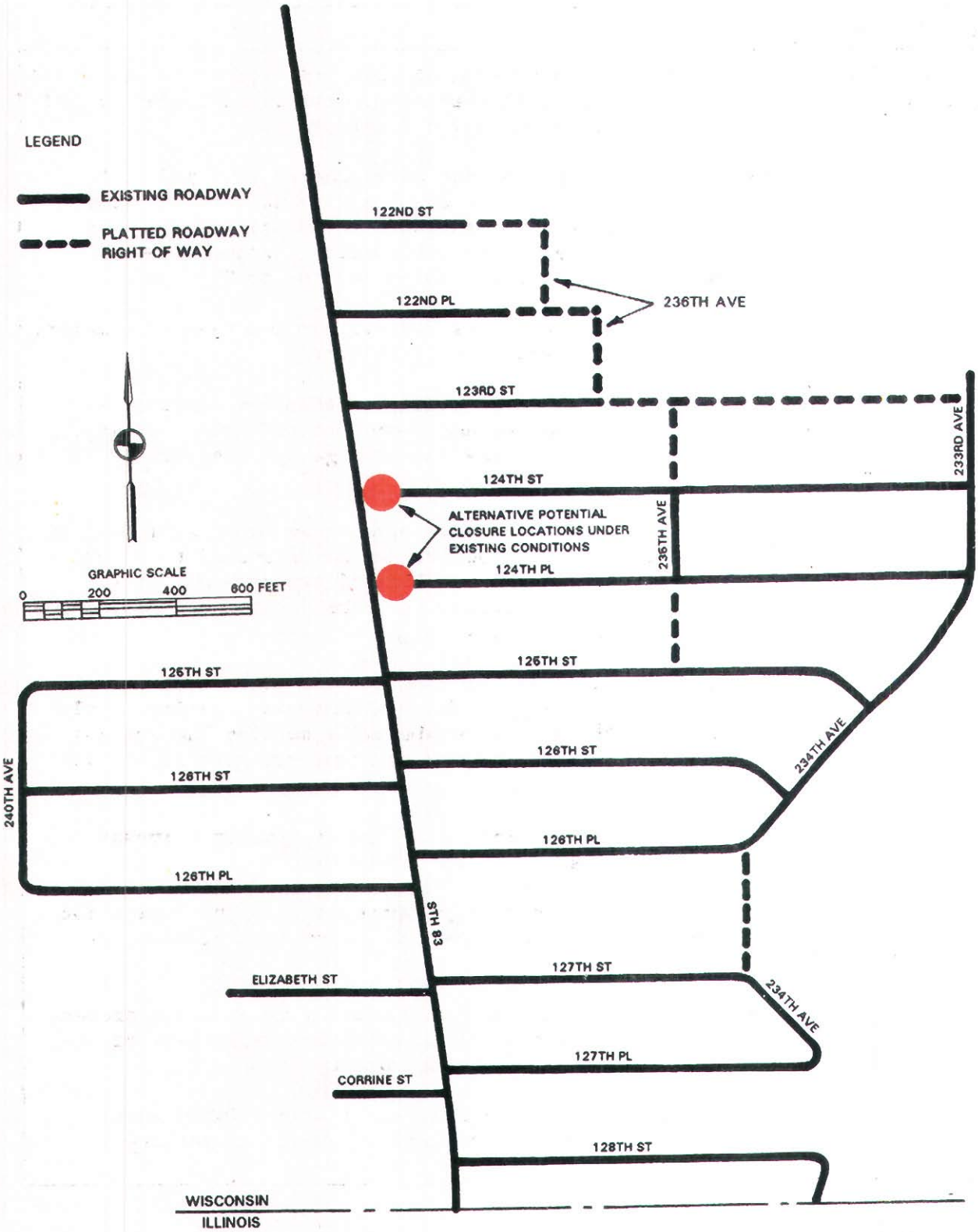

Table 6

ACCESS CONSIDERATIONS TO
PRESERVE ROADWAY CAPACITY AND ENHANCE TRAFFIC SAFETY

Access Elements	Criteria
Non-Residential Access Considerations	• Require the provision of left and right turn lanes on the arterial street at new intersecting collector and local streets and major driveways. • Consider requiring the provision of left and right turn lanes on the arterial street at other driveways if the proposed development to be served may be is expected to generate substantial turning movement volumes during peak travel periods on STH 83. • Left turns from a driveway within 200 feet of a major intersection should be prohibited. • Access should be consolidated whenever separate parcels are assembled under one purpose, plan, entity, or usage to increase the average spacing between adjacent driveways. • Access to existing development can be consolidated if adjacent property owners can be persuaded to share joint-use driveways in lieu of separate driveways. The joint-use driveway shall be located on the centerline between adjacent properties. • Optimize driveway spacing between intersections or existing driveways; that is, driveway spacing should be as uniform as possible while meeting the spacing and number of driveways per property constraints identified below. • Deny access to small frontage if minimum driveway spacing constraints cannot be met. • Access should not be permitted across the entire lot frontage but should be restricted to a clearly defined driveway or driveways. • Designate the number of driveways to existing properties and deny additional driveways regardless of future subdivision of the property. • Require access on intersecting street (when available) in lieu of additional driveway on primary street.

-continued-

Table 6 (continued)

<table>
<tr><th>Access Elements</th><th>Criteria</th></tr>
<tr><td>Non-Residential Access Considerations (continued)</td><td>• Properties shall be permitted a maximum of one driveway per property from each abutting street, except one additional driveway may be permitted for properties if the continuous frontage on one abutting street exceeds 300 feet; or two additional driveways if the continuous frontage on one abutting street exceeds 600 feet.</td></tr>
<tr><td>Residential Access Considerations</td><td>• Designate the number of driveways to existing properties and deny additional driveways regardless of future subdivision of the property.

• Direct access to the study segment should be permitted only for R-1 Rural Residential District--5 acre minimum lot size with 300 foot minimum frontage.

• Access for other new residential development should be via a land access street or land access and collector street system.</td></tr>
<tr><td>Driveway Location/ Spacing</td><td>• Spacing is variable, dependent upon speed limit.

<table>
<tr><th>Highway Speed</th><th>Minimum Centerline Driveway</th></tr>
<tr><td>20 mph</td><td>85 feet</td></tr>
<tr><td>25 mph</td><td>105 feet</td></tr>
<tr><td>30 mph</td><td>125 feet</td></tr>
<tr><td>35 mph</td><td>150 feet</td></tr>
<tr><td>40 mph</td><td>185 feet</td></tr>
<tr><td>45 mph</td><td>230 feet</td></tr>
<tr><td>50 mph</td><td>275 feet</td></tr>
</table>

• Locate driveways at median openings or offset from median opening by a minimum of 150 feet.

• The centerline of a single driveway shared by two adjacent properties should be located on the joint property line.

• Spacing near an intersection should be as shown in Figure 3.

• The centerline of driveways should be directly aligned with an opposing driveway or the third leg of a three-legged intersection.</td></tr>
</table>

-continued-

Table 6 (continued)

Access Elements	Criteria
Driveway Location/ Spacing (continued)	• When opposing driveways are not directly aligned, the minimum offset between driveway centerlines should be 150 feet, with 300 feet desirable. • If opposing driveways are offset, the relative positions of the driveways should provide for left-turn egress to right-turn ingress.
Driveway Design	• Without driveway channelizing island to separate ingress and egress, driveway width should be restricted to a maximum 30 feet at the right-of-way line. • With driveway channelizing island to separate ingress and egress, range 16 to 24 feet for both ingress and egress separated by channelizing island 4 to 10 feet in width at right-of-way line. • Driveway design should provide a throat with a minimum of 50 feet for vehicular storage in which no conflicting maneuvers are possible.

Source: SEWRPC

access to STH 83 conform to these criteria as a condition of Town and Wisconsin Department of Transportation approval of any proposed developments or redevelopment. It is further recommended that left and right turn lanes be required on STH 83 at new intersecting collector and local streets and major driveways as a condition of approval of new development or redevelopment. Consideration may be given on a case-by-case basis to requiring left and right turn lanes at other driveways as well, if the proposed development may be expected to generate substantial turning movement volumes during peak travel periods on STH 83. It is further recommended that the requirement for the provision of off-street parking set forth in Section 12.13-3, Parking Requirements in Chapter 12 of the Kenosha County Zoning Ordinance be strictly required.

Under current Wisconsin Department of Transportation policy, the costs to construct the right and left turn lanes on STH 83 should be borne by the developer when the new access benefits only a single development. In the case of new access for local and collector roads which benefit more than one development, the Town of Salem and the Department should each fund 50 percent of the costs of constructing the right and left turn lanes. The cost of providing adequate off-street parking would be borne by the developer.

The retrofit of existing properties both with respect to access and off-street parking would require the voluntary cooperation of the owners of abutting lands. Compliance, however, may be difficult to achieve given the depth and frontages of the lots abutting the STH 83 study segment in the areas where substandard driveway spacing occurs or where there is inadequate off-street parking. Lot frontages ranging from 40 feet to 66 feet preclude the provision of adequate driveway spacing. When the spacing requirements for adjacent driveways are combined with the spacing requirements between driveways and intersecting streets, proper spacing may only be achieved if the access to and from STH 83 for certain parcels is eliminated or substantially curtailed. It is recommended that Town of Salem officials work with the owners of existing development to reduce the number of driveways per parcel and to improve driveway spacing through voluntary compliance.

As previously noted, Kenosha County officials requested Commission staff comment on the proposed expansion of the existing fire station in the Salem urban area to the northeast quadrant of the W. 84th Street and STH 83 intersection. As a site plan had not yet been prepared, the comments were necessarily general in nature. With respect to access, it was recommended that consideration be given to accommodating the ability to drive vehicles through the building with access from a side street to eliminate the need to back vehicles into the station from STH 83 upon return to the station. It was further recommended that the new fire station be set back a minimum of 65 feet from the nearest STH 83 right-of-way line.[6] Finally, it was recommended that a clearly defined driveway be provided on STH 83 rather than the continuously paved area adjacent to the STH 83 pavement which currently exists. These recommendations should be required as part of the

[6]Subsequent to this recommendation, the need to provide four traffic lanes by the year 2010 was identified on the STH 83 study segment. Thus, the 65 foot setback should be from the future right-of-way line which may be expected to be from seven to 14 feet further east than the current right-of-way line.

Town of Salem Plan Commission and Wisconsin Department of Transportation approval of the access to the proposed development.

Vehicular Speeding Problem

At three of the four locations where spot speed studies were conducted by the Commission staff on the study segment, motorists appear to be disregarding the posted speed limit. These locations include both the Salem and Cross Lake areas, and in the vicinity of CTH AH. No traffic engineering action may be expected to abate this particular problem. It may be expected that the only action with the potential to abate the modest vehicular speeding problem is an increase in enforcement activity by law enforcement officials. The advantages of this action would be improved compliance with the posted speed limits and an attendant improvement in traffic safety. Another advantage would be a modest reduction in the length of gap required in the study segment traffic stream for motorists to safely cross or enter the study segment traffic streams from the cross streets. The disadvantages of this action include a decrease in compliance when a law enforcement officer is not present and the cost of providing an increased level of enforcement activity. Because of the length of the study segment--5.1 miles--it may be expected that a significant number of man-hours per week would be required for this action to be effective. Not only may this action be expected to be relatively costly, but it may be noted that the Town of Salem currently relies on the Kenosha County Sheriff to provide such services. Thus, Town officials can neither "direct" that such enforcement activity take place, nor can they be assured that such enforcement will remain a priority issue for the County Sheriff.

It is recommended that the Town of Salem request that the Kenosha County Sheriff provide directed activities aimed at enforcing speed limits. It is further recommended that the Town request that the Kenosha County Sheriff undertake ten man hours per week of directed enforcement activity on a random basis between the hours of 6:00 a.m. and 6:00 p.m. The estimated cost of implementing this recommendation is $13,000 annually.[7]

Inadequate Off-Street Parking

A problem of inadequate off-street parking at selected locations along the study segment was identified. These locations include the Salem area, Salem School, and the Spring Valley Country Club. The lack of adequate off-street parking at these locations is exacerbated by the fact that motorists then park on-street--often illegally-- creating a traffic safety problem.

The first alternative action considered to abate the problem of inadequate off-street parking was that all land uses be required to provide adequate on-site off-street parking. Kenosha County adopted a Zoning Ordinance in 1983, that specifies the size and location for off-street parking lots by land use. The advantage of providing adequate on-site off-street parking is that the problem of inadequate off-street parking is virtually eliminated. Another advantage of

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[7]Assumes an hourly cost of $25.00 and includes only the time spent in directed enforcement activities. It does not reflect associated costs such as court time which may be expected to result from the directed enforcement activity.

this alternative action is that the cost of providing parking to meet his needs is borne by the property tax owner. A disadvantage of this alternative is the difficulty in retrofitting existing development. Such retrofit is dependent upon not only the voluntary cooperation of the existing landowner but the availability of vacant land on site which may be converted to parking. Land to provide sufficient parking at the Spring Valley Country Club, however, is not available unless the layout of the golf course is modified.

The Salem School site does have open lands which could be converted to off-street parking between the existing parking lot and the north driveway on STH 83. The available off-street parking, however, is sufficient to meet the typical weekday needs of the Salem School, but is not sufficient to meet the needs of non-school related recreational sports activities at the school including "tee" ball and soccer. It is recommended that Town officials work with the School District to provide added off-street parking at Salem School. The estimated cost of implementing this alternative action is $65,000.

Another alternative action considered to alleviate the problem of inadequate on-site off-street parking was to increase the time between scheduled special events to permit all vehicles parked on the lot to exit prior to vehicles entering the lot for the next scheduled event. The advantage of this alternative action is that it avoids peaking in parking demand, and thereby limits such demand to that attendant to a single event. It is recommended that the Town of Salem work with the parties responsible for scheduling events at the Salem School to reschedule events to eliminate peaking in the parking demand at this site until a project can be budgeted and constructed.

Another alternative action considered was to prohibit on-street parking near intersections and driveways in the vicinity of the sites where such parking has been identified as a problem. The advantage of this alternative is improved traffic safety through the provision of improved site triangles at intersections and driveways. The disadvantage of this alternative action is that it exacerbates the existing problem of inadequate on-site off-street parking supply. Patrons of these activity centers may be expected to continue to park on-street, but would be forced to park further from the activity center. This may increase the distance that pedestrians would be walking on the roadway from parked vehicles to the activity center. It is recommended that on-street parking be prohibited on both sides of the STH 83 study segment for a distance of 180 feet from existing driveways and cross-street intersections in the Salem area and at Salem School. It is also recommended that parking be prohibited on both sides of CTH C for a distance of 700 feet from its intersection with STH 83. It is estimated that the cost of implementing this alternative action would be approximately $750.

As previously noted, Kenosha County officials requested Commission staff comment on the proposed expansion of the existing fire station in the Salem urban area to the northeast quadrant of the W. 84th Street and STH 83 intersection. As a site plan for the proposed expansion had not yet been prepared, the comments were necessarily general in nature. With respect to parking, it was recommended that paved on-site, off-street parking not be permitted immediately adjacent to the existing roadway.

Traffic Accidents

The final problem identified on the study segment is the observed increase in the incidence of traffic accidents and the concentration of traffic accidents at certain locations along STH 83. The annual increase in the incidence of accidents may, in part, be attributed to the annual increase in average weekday traffic volume using the study segment. Also, as traffic volumes begin to approach or exceed the design capacity of the roadway, there is an attendant increase in the potential for traffic accidents. No traffic engineering action or other low-cost short-range alternative action may be expected to specifically alleviate this problem.

With respect to the concentration of traffic accidents in the urbanized areas of Cross Lake and Salem areas, and at the intersections of STH 83 with CTH C and with 98th Street, a number of alterative traffic management and other short-range, low cost alternative actions have already been recommended to specifically address other problems identified on the study segment, but which may also be expected to improve traffic safety at these locations. These actions may, as well, be expected to reduce the trend in the annual increase in the incidence of traffic accidents. These actions include: the prohibition of on-street parking at those intersections where parked vehicles represent a potential sight distance obstruction; the relocation of stop signs and provision of stop lines on selected intersection approaches; the creation of vision triangles at selected intersections; a reduction in speed limit on the study segment between CTH C and CTH AH; and increased speed limit enforcement activity on a random basis.

A total of 60 accidents were analyzed at the four accident problem locations of the Cross Lake area, the intersection of STH 83 with CTH C, the intersection of STH 83 with 98th Street, and the Salem area. Of these 60 accidents, 20 involved right angle collisions, or 33 percent of all accidents. An additional 14 accidents involved vehicles running off the roadway, 13 involved rear-end accidents, and 8 involved side-swipe accidents, or 23 percent, 22 percent, and 13 percent, respectively. Together, these four accident types accounted for 55 accidents, or 91 percent of the total 60 accidents. The alternative actions which would typically be considered to address these accident types include the removal of site obstructions at intersections, restrictions in on-street parking, installation of regulatory or warning signs, installation or improvement of existing lane markings, a reduction in speed limit, the relocation of driveways to side streets, the regulation of driveway spacing, and the installation of curbs to define driveway location.

The Cross Lake Area: A total of 14 accidents were reported on the study segment of STH 83 in the Cross Lake area during the study period. The most prevalent accident type was a rear-end collision, accounting for 36 percent of the accidents in this area, followed by right angle collisions and side-swipe collisions, which each accounted for an additional 21 percent. The provision of adequate intersection sight distance triangles and the enforcement of the existing speed limit have already been recommended for this area. Together, these actions may be expected to improve traffic safety in the area by improving sight distances and by reducing the travel speed through the area to provide motorists with additional time to react to unexpected conditions.

Another action considered to improve traffic safety in this area was to modify the existing access from abutting parcels to STH 83. This action could include the relocation of driveways to abutting intersecting streets, the regulation of driveway spacing, and the installation of curbs to define driveway locations. The advantage of this alternative would be to reduce the number of potential conflict points which motorists would be required to monitor simultaneously. The disadvantage of this alternative with respect to existing development is that implementation requires the voluntary cooperation of the owners of abutting parcels. Appropriate driveway spacing and relocation of driveways to intersecting streets may be implemented as the Town Plan Commission reviews requests for existing parcels to be redeveloped or for changes in conditional use permits. It is recommended that requests for redevelopment or changes in conditional use of existing development, or for the development of vacant parcels only be approved if the proposed access meets the criteria set forth in Table 6.

A reduction in the posted speed limit was also considered, but was rejected because of the disregard for the existing speed limit in this area, and because an increase in speed limit enforcement activity has been recommended.

The Intersection of STH 83 with CTH C: A total of 8 accidents occurred during the study period at this location. Of the 8 accidents of this type, 3 were right angle collisions, the most predominant collision type, which accounted for 38 percent of all accidents. It may be noted that failure to yield the right-of-way was cited as a possible contributing factor in each of these 3 accidents. The remaining 5 accidents involved five different collision types. Actions already recommended which may be expected to improve traffic safety in the vicinity of the intersection of STH 83 with CTH C include the prohibition of parking on CTH C for a distance of 700 feet from the intersection, and a reduction in the speed limit on STH 83 from 55 miles per hour to 45 miles per hour north of CTH C.

The installation of traffic signals at this intersection was considered but rejected. The accepted warrants for such installation require that at least five accidents susceptible to the correction through the installation of traffic signals occur in a 12-month period. The predominant collision type observed at this intersection was the right angle collision. Although this collision type is considered susceptible to correction through the installation of traffic signals, fewer than five such accidents occurred in any 12-month period in the almost 3 year period of record reviewed. Thus, the installation of traffic signals is not warranted based on the accident history at this intersection.[8] It is recommended that this intersection continue to be monitored. If operation as a multi-way stop becomes unacceptable as traffic volumes increase, or if five accidents of a type susceptible to correction through the installation of traffic signals occurs in a 12-month period, then the installation of traffic signals should be reconsidered.

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[8]A Wisconsin Department of Transportation analysis of this intersection conducted in July 1991 has concluded that although traffic signals may be marginally warranted based on existing volumes, the present multiway stop sign control at this intersection functions well and, thus, the intersection is not a candidate for traffic signalization at this time.

The Intersection of STH 83 with W. 98th Street: A total of nine accidents occurred in the vicinity of this intersection during the study period. Of those nine accidents, three accidents were rear end accidents, and three accidents involved vehicles leaving the roadway, accounting for 66 percent of the total accidents, and 33 percent each. Of the three remaining accidents, one was a right angle collision between two vehicles and the other two accidents involved a vehicle striking a deer. Motorists traveling northbound on STH 83 were involved in all three of the accidents in which a vehicle left the roadway; both accidents in which a deer was struck; and in one of the rear end collisions. In two of the three accidents in which a vehicle left the roadway, citations were issued for operating a vehicle while under the influence of alcohol. Southbound STH 83 motorists were involved in two rear end accidents and one right angle collision. A citation was issued for open intoxicants in the vehicle in one of the rear end accidents. Because the condition of the driver was identified as a possible contributing circumstance in three accidents and because two other accidents involved a vehicle striking a deer, no definitive conclusion may be drawn as to the potential effect of a combined change in the vertical and horizontal alignment at this location.

Four additional accidents in which a deer was struck by a vehicle occurred on the study segment, all between CTH C and W. 98th Street. It was, therefore, recommended that deer crossing signs be installed 400 feet north of W. 98th Street for southbound motorists and 400 feet north of CTH C for northbound motorists with an advisory plate reading: "Next 2 Miles" at an estimated cost of $450.

An alternative action already recommended in this vicinity which may be expected to improve traffic safety is a proposed reduction in the speed limit from 55 miles per hour to 45 miles per hour. Also recommended is the provision of adequate sight triangles and an increase in speed limit enforcement activity on a random basis.

Another traffic engineering action which may be expected to improve traffic safety in the vicinity of this intersection and which has been recommended previously is the installation of an intersection warning sign south of W. 98th Street for northbound STH 83 traffic. The advantage of this alternative action is to alert northbound motorists to the impending intersection which is hidden from view by the crest of a vertical curve in STH 83.

Also considered and rejected was the installation of plowable prismatic pavement markers to help delineate the edge of the roadway. The advantage of this alternative action is to provide high visibility definition of the edge of the roadway pavement, particularly during periods of inclement weather and low ambient light levels. The disadvantage of this alternative action is reduced effectiveness when the condition of the driver has been impaired. Because the condition of the driver was cited in two of the three accidents in which the vehicle left the roadway, and because edge line pavement marking currently exists, it is not recommended that raised pavement markers be installed at this time.

The Salem Area: A total of 29 traffic accidents occurred in the Salem urbanized area during the study period. Of those 29 traffic accidents, 12 were right angle

collisions, which accounted for 41 percent of all the traffic accidents. Eight of the traffic accidents involved motorists leaving the roadway, accounting for 28 percent of all the accidents. Rear end accidents and side-swipe accidents accounted for four each, or 14 percent each of the total accidents. The remaining accident was a head-on collision. It may be noted that failure to yield the right-of-way was cited as a possible contributing circumstance in 10 of the 12 right angle collisions. A number of alternative actions are herein recommended in the Salem urbanized area which may be expected to improve traffic safety. These include the provision of adequate sight triangles, an increase in the enforcement of the speed limit on a random basis, parking prohibitions, relocation of selected stop signs and the provision of stop lines, and a speed limit reduction at CTH AH.

Another alternative action considered to improve traffic safety was the regulation of driveway spacing and the installation of curbs to define existing driveways. The advantage of this alternative is to reduce the number of conflict points which must be monitored simultaneously by motorists through the provision of adequate driveway spacing. Another advantage is to limit ingress and egress from the site to a specific location thereby clearly defining for motorists a potential conflict point. The disadvantage of this alternative is in the retrofit of parcels which are already developed. In these cases, the town must rely on the voluntary cooperation of the property owner to comply. It is recommended that the Town Plan Commission require the definition of driveways and that adequate spacing between adjacent driveways be provided upon reviewing development proposals for vacant parcels, and when reviewing redevelopment proposals or requests for changes in conditional use permits of existing development. Driveway definition entails the physical delineation of the access point within the highway right of way with respect to its location and width to clearly identify access points.

Also considered and rejected was the installation of traffic control on STH 83 at selected intersections and an expansion in the areal extent of the reduction in the speed limit on STH 83 in the Salem urbanized area. The installation of traffic control devices on STH 83 was rejected because such control is not warranted by cross-street volumes or delay, nor by the accident history. The further reduction in the speed limit was rejected because of the recommendation that there be an increase in speed limit enforcement.

Summary of Short-Range Low-Cost Actions

A number of short-range, low-cost actions were recommended to abate the traffic problems identified on the STH 83 study segment. These actions are listed in Table 7. Although certain actions were specifically recommended to abate one problem, these actions may also be expected to help abate other problems as well. The recommendation to prohibit on-street parking may be expected to improve traffic safety as well as providing unrestricted sight distance at selected intersections. An increase in directed law enforcement activity may be expected to improve traffic safety in addition to abating the problem of vehicular speeding on the study segment. Thus, implementation of the recommended actions may be expected to promote a general improvement in the traffic operating conditions experienced under existing average weekday traffic volumes.

Table 7

RECOMMENDED SHORT-RANGE, LOW-COST ACTIONS TO ALLEVIATE TRAFFIC PROBLEMS IDENTIFIED ON THE STH 83 STUDY SEGMENT

Traffic Problem	Recommended Action	Implementing Agency	Estimated Cost
Restricted Sight Distance	• Selected on-street parking prohibitions.	Town of Salem	$ 1,200
	• Relocation of stop signs and the provision of stop lines on selected intersection approaches.	Town of Salem	360
	• Install warning signs with advisory distance plates and flashing amber lights just south of 85th Street.[a]	WisDOT	1,350
	• Creation or improvement of existing vision triangles at selected intersections in accordance with the provisions of Section 12.13-1, Traffic Visibility in Chapter 12 of the Kenosha County Zoning Ordinance.	Town of Salem	--
	• Require minimum setback of 65 feet from the right-of-way line as required in Sections 12.19-1 through 12.26-6 of Chapter 12 of the Kenosha County Zoning Ordinance.	Town of Salem	--
	• Reduce the speed limit from 55 miles per hour to 45 miles per hour from CTH C to CTH AH.	WisDOT	1,000
	• Install warning signing for northbound STH 83 traffic just south of W. 98th Street.	WisDOT	200
	• Conduct the design of an improved vertical alignment for the study segment to eliminate roadway sight distance problems caused by existing vertical alignment concurrent with design of roadway reconditioning project scheduled for 1998.	WisDOT	--

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Table 7 (continued)

Traffic Problem	Recommended Action	Implementing Agency	Estimated Cost
Substandard Intersection and Driveway Spacing	• Selected on-street parking prohibitions.	Town of Salem	1,250
	• Creation or improvement of existing vision triangles at selected intersections.	Town of Salem	--
	• Require that proposed STH 83 access to new development or redevelopment of existing parcels conform to the criteria set forth in Table 6 and shown in Figure 3 as a condition of approval of the development or redevelopment proposal.	Town of Salem/ WisDOT	--
	• Require the provision of left and right turn lanes on STH 83 at collector and local streets and major driveways as a condition of approval of development and redevelopment proposals. Consider requiring the provision of left and right turn lanes at other driveways if the proposed development or redevelopment is expected to generate substantial turning movements during the peak travel periods on STH 83.	Town of Salem/ WisDOT	-- --
	• Seek voluntary compliance to define driveways at existing commercial sites abutting STH 83 where access is currently permitted along the entire frontage.	Town of Salem	--
Vehicular Speeding Problem	• Provide 10 manhours weekly of directed enforcement activity on a random basis between the hours of 6:00 a.m. and 6:00 p.m.	Town of Salem/ Kenosha County Sheriff	13,000[b]

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Table 7 (continued)

Traffic Problem	Recommended Action	Implementing Agency	Estimated Cost
Inadequate Off-Street Parking	• Provide additional off-street parking at the Salem School site.	School District/Town of Salem	65,000
	• Schedule sufficient time between recreational events to permit one group of participants to leave prior to the arrival of the next group.	Town of Salem	--
	• Selected on-street parking prohibitions.	Town of Salem	750
	• Require the provision of off-street parking in conformance with the provisions of Section 12.13-3, Parking Requirements in Chapter 12 of the Kenosha County Zoning Ordinance as a condition of approval of development and redevelopment proposals.	Town of Salem	--
Traffic Accidents	• Modify the existing access where currently substandard as requests for redevelopment of existing development or for changes in conditional use permits are reviewed.	Town of Salem	--
	• Require that proposed access for the development of vacant parcels conform to the criteria set forth in Table 6, and as shown on Figure 3.	Town of Salem/ WisDOT	--
	• Selected on-street parking prohibitions.	Town of Salem	Previously reported
	• Reduce the speed limit form 55 miles per hour to 45 miles per hour from CTH C to CTH AH.	WisDOT	Previously reported
	• Installation of deer crossing warning signs.	WisDOT	450

[a]To be implemented upon expansion of the fire station in the Salem urban area.
[b]Assumes an hourly cost of $25.00 and includes only the time spent in directed enforcement activities. Does not reflect associated costs such as court time, which may be expected to result from the directed enforcement activity.
Source: SEWRPC.

Although it is recommended herein that the Wisconsin Department of Transportation improve the vertical alignment for the study segment to eliminate roadway sight distance problems caused by the existing vertical alignment concurrently with the design of a roadway reconditioning project scheduled for 1998 on the study segment, immediate modification of the existing vertical alignment is not envisioned. Rather, it is envisioned that improvements in the vertical alignment would be considered for implementation as part of the roadway reconditioning project scheduled for 1998, particularly on the subsegment between CTH C and CTH AH. Completion of the design of the improved vertical alignment may be expected to ensure that other improvements within the highway right-of-way or on abutting parcels are compatible with the future vertical alignment thereby avoiding the need for costly modifications.

A number of other low-cost, short-range actions were considered but rejected because the disadvantages outweighed the advantages. These included further speed limit reductions, the installation of stop signs or traffic signals on the study segment at various intersections; the conversion of some existing land access streets from two-way to one-way operation, and the installation of plowable prismatic pavement markers.

LONG-RANGE ROADWAY IMPROVEMENT ALTERNATIVES

The provision of sufficient capacity on the STH 83 study segment to meet the anticipated design year 2010 average weekday traffic volumes will require the provision of four traffic lanes. The existing design capacity of the STH 83 study segment roadway approximates 7,000 vehicles per average weekday on those sub-segments where the speed limit is 45 miles per hour or higher; and approximates 13,000 vehicles per average weekday on those sub-segments where the speed limit is 40 miles per hour or lower. Average weekday traffic counts in 1991 ranged from about 6,200 to about 6,500 vehicles; and from about 7,400 to about 8,400 vehicles on study subsegments with respective roadway design capacities of 7,000 and 13,000 vehicles per average weekday. Although the existing average weekday traffic volumes on study sub-segments with a design capacity of 13,000 vehicles were below the design capacity, existing average weekday traffic volumes on study subsegments with a design capacity of 7,000 vehicles are approaching the design capacity and the provision of additional traffic lanes is, therefore, warranted.

Forecast design year 2010 average weekday traffic volumes may be expected to range from about 10,000 vehicles on study subsegments with an existing design capacity of 7,000 vehicles per average weekday to about 13,000 vehicles on study sub-segments with an existing design capacity of 13,000 vehicles per average weekday. Thus, forecast design year traffic volumes may be expected to equal or exceed the design capacity of the existing roadway along the entire study segment and the provision of additional traffic lanes is, therefore, warranted over the entire study segment by the year 2010.

Two alternative four-lane urban roadway cross-sections were considered for those sub-segments of the STH 83 study segment which are anticipated to be urbanized in the adopted year 2010 regional land use plan. These sub-segments are between the state line and CTH C and between a point about one half mile south of CTH AH and STH 50. The two alternative four-lane urban roadway cross-sections are shown

in Figure 4. Also shown in Figure 4 is a four-lane rural cross-section for theTH 83 study sub-segments between the two urban areas.

A two-way left turn lane facility differs in cross-section from a four-lane undivided facility only by the presence of fifth lane reserved for left turning vehicles and located in the center of the facility as shown in Figure 4. Thus, it may be considered a subalternative of the four-lane undivided facility. While marginally increasing capacity, the most attractive benefit of a two-way left turn lane cross-section is the separation of left turning and through traffic. Typically used in commercial areas where there are 60 or more low to moderate volume access points and where left turn maneuvers total 20 percent or more of the through traffic during peak periods, two-way left turn lanes may also be utilized in residential areas. The primary disadvantage of a two-way left turn lane cross-section is the additional width of the center lane--14 to 16 feet--and the total pavement width of 66 to 68 feet. The new edge of pavement would be located 21 to 22 feet closer to existing buildings than the existing edge of pavement. Given the concern expressed by local officials with respect to the proximity of existing development to the existing roadway, it may be anticipated that locating the new edge of pavement even closer to that development than required by a four-lane undivided facility would not receive local support. The increased width makes pedestrian crossing more difficult and may be considered aesthetically unattractive. Finally, construction of any of the four-lane cross-sections would permit through traffic to bypass left turning vehicles in the adjacent lane, thereby substantially providing the same benefit as the two-way left turn lane cross-section. Thus, this subalternative is not recommended for further consideration.

The first alternative four-lane urban roadway cross section considered was an undivided four-lane highway with four standard width 12-foot lanes on 80-feet of right-of-way. The second alternative four-lane urban roadway cross section considered was a divided four-lane roadway with a 24-foot wide median and twin 28-foot wide roadways. Each of these alternative urban roadway cross-sections and the rural roadway cross-section would provide the required two traffic lanes in each direction. In order to provide sufficient capacity to accommodate the forecast design year 2010 traffic volume, no on-street parking would be permitted along the entire study segment length under any of the alternative roadway cross-sections considered.

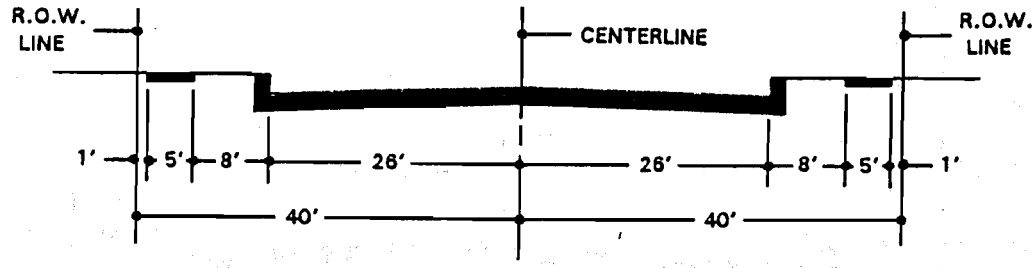
Four-Lane Undivided Roadway Cross-Section: A four-lane undivided cross-section would provide two traffic lanes in each direction with a typical design capacity of about 17,000 vehicles per average weekday. Therefore, it may be expected to provide sufficient capacity for existing and anticipated future travel demand on the study segment. Traffic congestion and delay may be expected to be reduced with an attendant improvement in traffic safety. Direct access to each parcel abutting the study segment for both northbound and southbound motorists would remain. There is ample curb lawn for the storage of snow plowed from the roadway and for the provision of trees.

There are a number of disadvantages of this alternative roadway improvement. The continued provision of direct access to each abutting parcel for both directions of travel may be expected to continue to have a negative impact on traffic operations and safety. Left turning vehicles may temporarily block one lane

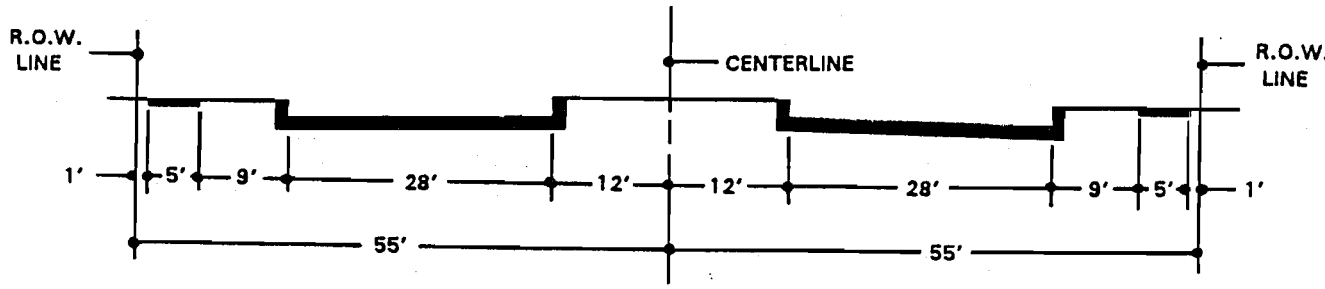
Figure 4

ALTERNATIVE ROADWAY IMPROVEMENTS

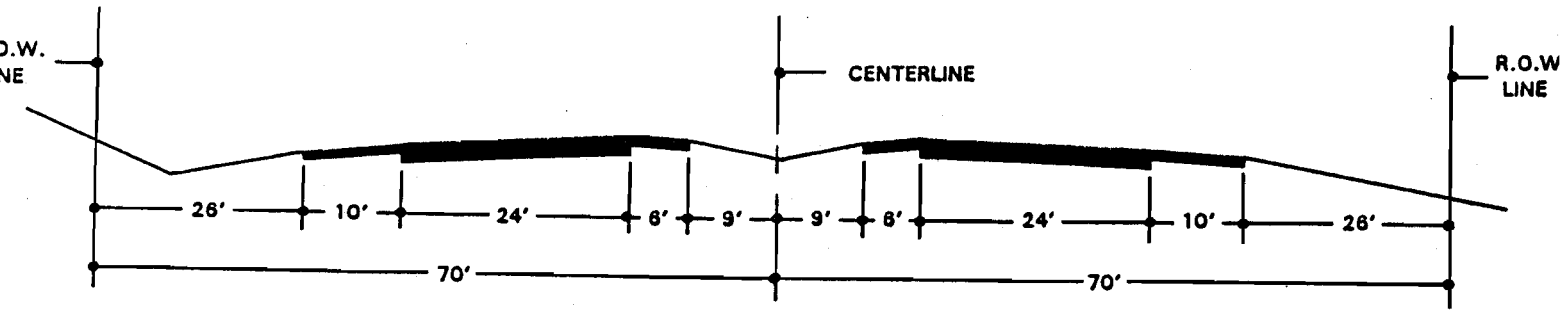
FOUR-LANE UNDIVIDED URBAN ROADWAY



FOUR-LANE DIVIDED URBAN ROADWAY



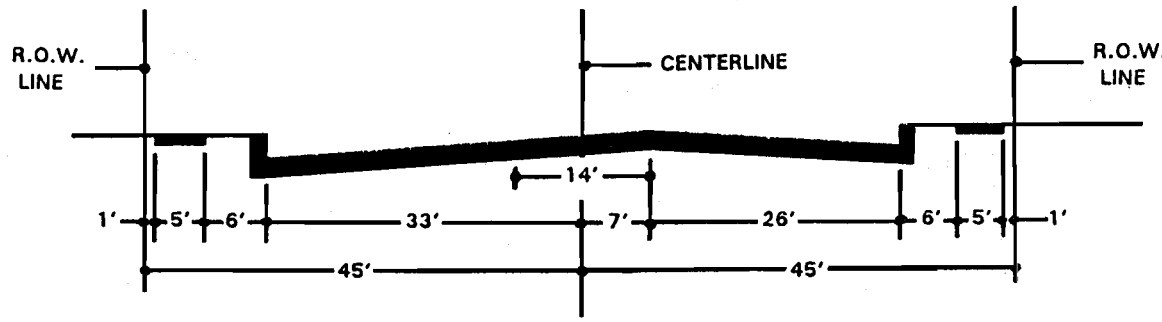
FOUR-LANE DIVIDED RURAL ROADWAY



Source: SEWRPC

Figure 4 (continued)

FIVE LANE UNDIVIDED URBAN ROADWAY
WITH TWO-WAY LEFT TURN LANE



Source: SEWRPC

thereby reducing the roadway capacity. Existing substandard driveway and intersection spacing would continue to require motorists to monitor multiple potential conflict points simultaneously. This alternative cross-section would require the acquisition of 14-feet of right-of-way and the new edge of pavement would be about 12-feet closer to existing development on each side of the roadway if the new roadway is constructed on the same centerline as the existing roadway. No on-street parking would be permitted under this alternative.

Four-Lane Divided Roadway Improvement Alternative: The other roadway cross-section alternative considered is a four-lane divided roadway which would provide two traffic lanes in each direction with a typical design capacity of about 25,000 vehicles per average weekday. Therefore, it may be expected to provide sufficient capacity for existing and future travel demand on the study segment. This alternative would minimize conflicts between through traffic and left-turning vehicles, reducing traffic congestion and delay and improving traffic safety. Left-turn bays provided at each median opening would remove left-turning vehicles from the through traffic stream. Median openings provide refuge for motorists executing left-turns from intersecting streets permitting the use of gaps in the traffic stream by direction rather than awaiting a gap in the entire traffic stream. There is ample curb lawn for the storage of plowed snow and the provision of trees on the urban cross-section, and ample space off the shoulders for plowed snow on the rural cross-section.

There are a number of disadvantages to this alternative roadway improvement, however, with respect to access. Median openings would be provided at arterial, collector, and some land access street intersections with the STH 83 study segment. Non-intersection median openings may be expected to range from a minimum spacing of about 300 feet--urban--or about 530 feet--rural--to a desirable spacing of approximately 500 feet--urban--or about 900 feet--rural. Thus, access to some abutting parcels along the STH 83 would be eliminated from one traffic direction, and most properties could only be reached by executing a U-turn. Another disadvantage of this alternative cross-section is the need to acquire substantial additional right-of-way. With the exception of about 1,500 feet just south of STH 50, and about 1,500 feet just north of CTH C, the existing right-of-way width along the study segment is 66 feet. Construction of a four-lane divided roadway cross-section would require the acquisition of an additional 44 feet of right-of-way for the urban cross-section and 74 feet for the rural cross-section. No parking would be permitted under this alternative cross-section.

Roadway Cross-Section Recommendations: The provision of four traffic lanes over the entire study segment length is recommended by the year 2010 to provide sufficient capacity to meet existing and future traffic demand and to enhance traffic safety. It is further recommended that a four-lane divided roadway cross-section be provided on the STH 83 study segment with the exception of the Salem area where, in order to minimize disruption, it is recommended that a four-lane undivided urban roadway cross-section be provided from a point approximately 200 feet north of W. 87th Street to a point approximately 600 feet north of W. 81st Street. The sub-segment from CTH C to a point approximately one half mile south of CTH AH is recommended to be constructed as a rural cross-section while the remainder of the study segment is recommended to have an urban cross-section.

The estimated cost to construct four traffic lanes on the STH 83 study segment is approximately $11.8 million. The construction may be expected to require the strip taking of approximately 30 acres of land. It may be expected that eight residences, nine businesses, and the Salem Township Rescue Squad would be displaced. The estimated cost to acquire the right-of-way is approximately $2.8 million and the total estimated project cost is approximately $14.6 million.

While the Wisconsin Department of Transportation has the responsibility to implement the recommended long-range improvement of the STH 83 study segment, the Town of Salem may be asked to pay a portion of the costs of that improvement. It is the Department's current policy that local jurisdictions and private interests directly benefitting from a highway project should share in the project costs, with the level of participation reflecting the degree of benefit. Current department policy requires that local jurisdictions pay 25 percent of the cost of new state trunk highways or the cost of adding traffic lanes to existing state trunk highways where such projects will serve significant local traffic. Significant local traffic is defined as traffic that uses a segment of road and that has one end of its trip, either the origin or destination, within one-half mile of the project limits. Cost-sharing will be required when 40 percent or more of the traffic on a segment is local. Thus, if a determination is made by the Wisconsin Department of Transportation that 40 percent or more of the traffic on the study segment of STH 83 is local, the Town of Salem would be expected to fund 25 percent of the total cost to implement the improvement.

It should be noted that the Wisconsin Department of Transportation is currently engaged in the engineering of a roadway reconditioning project for the study segment of STH 83 to be implemented in 1998. This project is basically intended to improve the existing pavement extending its expected life to about the year 2010. Minor spot geometric improvements, including the elimination of vertical alignment problems, are also being considered for implementation as recommended herein. Current Department policy would not require local funding participation to implement this reconditioning project.

Based upon the anticipated life of the pavement upon completion of the reconditioning project in 1998, it may be expected that the Wisconsin Department of Transportation would not consider implementation of the recommended improvement of the study segment to four traffic lanes until the year 2010 or beyond. As a result, some roadway capacity problems--particularly on the subsegment between CTH AH and CTH C where the existing average weekday traffic volumes are approaching the roadway design capacity--may not be abated until the year 2010 or beyond.

The recent extension of sanitary sewer northward along the study segment from the Salem urban area to STH 50 was cited by members of the study Task Force as substantially increasing the potential for development within the next five years of vacant lands which abut this stretch of the study segment. This includes developable lands on the east side of STH 83 currently owned by the School District. Task Force members indicated that such development would be commercial in nature and may include a grocery store. Such development may be expected to add considerable traffic volumes to the study segment.

It may be noted that the Town of Salem has approved a site plan for the construction of a library in the southeast quadrant of the intersection of STH 83 and CTH AH. This library is intended to serve all of western Kenosha County. Access to the site will be from CTH AH only, and thus, it may be expected that a substantial increase in turning movements will occur at this intersection upon opening of the library, including southbound left turns and northbound right turns from STH 83 and westbound left and right turns from CTH AH. It may also be noted that southbound right turns currently constitute about 15 percent of the total volume on the southbound intersection approach and eastbound left turns constitute about 58 percent of the total volume on the eastbound intersection approach between 9:00 a.m. and 7:00 p.m. Thus, it is recommended that the Wisconsin Department of Transportation consider reconstructing the arterial intersection at STH 83 and CTH AH to the recommended four lane cross-section as part of the reconditioning project scheduled for 1998 to accommodate existing and probable future turning movements.

Existing turning movements at the arterial interseciton of STH 83 and CTH C do not constitute the same substantial proportion of approach volumes as at the STH 83 and CTH AH intersection, ranging from about 12 percent to about 21 percent of total approach volumes. As traffic volume increases, however, these turning movements may be expected to constitute a greater impediment to safe and efficient intersection operations. Thus, because implementation of the recommended improvement of the study segment appears unlikely before the year 2010, it is also recommended that consideration be given to reconstructing this intersection to the recommended four lane cross-section as part of the reconditioning project scheduled for 1998. It is further recommended that consideration be given to implementing the recommended four lane cross-section between CTH AH and CTH C in lieu of the reconditioning project because current average weekday traffic volumes are approaching the existing roadway design capacity. Consideration may also be given to extending the current four lane divided cross-section on STH 83 from its current terminus just south of STH 50 to the Salem urban area. Local funding participation may be required to implement these intersection and roadway improvements.

SUMMARY

On June 27, 1991, the Kenosha County Highway Commissioner requested that the Regional Planning Commission conduct a traffic study of that segment of STH 83 between the State line and STH 50. The study was to have three purposes. The first was to identify existing traffic safety and congestion problems and recommend a short-range plan for the abatement of those problems. The second was to recommend a long-range plan for the improvement of STH 83 based upon forecast design year 2010 traffic volumes. The third was to recommend access control measures, including public street and driveway spacing. The conduct of the study was guided by a task force composed of local officials and a representative of the Wisconsin Department of Transportation.

Task force members identified a number of local concerns, which included: 1) a high volume of heavy truck traffic on the study segment; 2) inadequate parking for certain land uses with attendant parking on the highway shoulders, and related safety problems; 3) restrictions in sight distance in the urbanized areas near Cross Lake and Salem, and at the intersection of CTH AH and STH 83; 4) in-

adequate building setbacks in the urban area of Salem; and 5) the delay encountered in safely entering the STH 83 traffic stream from intersecting streets and driveways during peak traffic periods.

The Commission staff conducted a series of inventories to establish existing physical and operating conditions, on the study segment. The study segment functions as an arterial street under the jurisdiction of the Wisconsin Department of Transportation which has primary responsibility for its planning, design, construction, operation and maintenance. State Trunk Highway 50, CTH AH, and CTH C, which intersect the study segment, were also identified as arterial streets, with the remaining intersecting streets functioning either as collector or land access streets.

The study segment of STH 83 is constructed as a rural-type cross-section with shoulders and open drainage ditches and provides two 12-foot wide traffic lanes. These two traffic lanes generally have a design capacity of about 13,000 vehicles per average weekday in the Salem and Cross Lake urban areas where the speed limits are relatively low. Between CTH AH and CTH C, where speeds are higher, the design capacity of STH 83 is about 7,000 vehicles per average weekday.

Both the horizontal and vertical alignments of the study segment were analyzed. Changes in the horizontal alignment, which is predominantly straight or tangent, are accomplished by means of three relatively flat, horizontal curves along the study segment. Changes in the vertical alignment are accomplished through the use of vertical curves, and there are 14 locations on the study segment where such a vertical curve accommodates a major change in the gradient from upward to downward, or downward to upward. The stopping sight distance and the passing sight distance on the study segment is restricted at seven of these vertical curves.

Intersection sight distances were also analyzed and found to be restricted by plant material in at least one quadrant of nine intersections along the study segment. Further, the sight distance to and from the south is restricted by a building located in the right-of-way in the southeast quadrant of the intersection of W. 84th Street and STH 83, and the sight distance may be restricted at six intersections by the presence of vehicles parked in off-street parking lots or on the shoulder of STH 83.

Existing street spacing was also inventoried and ranges between about 50 feet and 265 feet in the Cross Lake urban area, and from about 100 feet to about 200 feet in the Salem urban area. These spacings are substantially less than even the 300 foot minimum desirable intersection spacings.

Existing building setbacks were inventoried and compared to the setback required by the Kenosha County Zoning Ordinance which was adopted in 1983. In general, structures constructed prior to the adoption of this zoning ordinance do not meet the current setback requirement of 65 feet from the highway right-of-way. At least one structure--located in the Southeast quadrant of the STH 83 and W. 84th Street intersection--is located within the existing highway right-of-way. Six other structures appear to be located at the existing highway right-of-way line, with five of those being located in the Salem urban area.

The existing traffic control on the study segment was inventoried. Traffic on the study segment of STH 83 is controlled by a traffic signal at the intersection of STH 83 with STH 50, and by stop signs at the intersection of STH 83 with CTH C. At each of the remaining cross-street intersections on the study segment, the STH 83 approaches are uncontrolled, and the cross-street approaches are controlled by stop signs. The posted speed limits along the study segment of STH 83 range between 30 and 55 miles per hour with the lower speed limits in the Cross Lake and Salem urban areas and the highest speed limit between CTH AH and CTH C. Parking is prohibited along the study segment between the Wisconsin-Illinois state line and CTH C, and on the east side of the study segment between W. 85th Street and W. 82nd Street in the Salem urbanized area.

Average weekday traffic count data were collected along the study segment in 1990 and 1991. Traffic counts ranged from about 6,540 to about 8,380 vehicles per average weekday. With the exception of STH 83 between CTH C and CTH AH, where current traffic volumes are approaching the design capacity of the roadway, traffic volumes are generally below the design capacity of the study segment. Traffic count data were also collected on a Saturday and a Sunday in 1991, just north of CTH AH. The Saturday count of 8,610 vehicles was about 4 percent greater than the average weekday count observed at this location, and the Sunday count of 8,530 vehicles was about 3 percent greater. While the pattern of weekend traffic counts exceeding average weekday traffic counts is atypical of arterial travel throughout Southeastern Wisconsin, these counts are generally below the existing roadway design capacity. Vehicle classification counts conducted in 1991 indicate that about 10 percent of the average weekday traffic on the study segment was truck traffic.

Spot speed data were collected at four locations along the STH 83 study segment. At two of the locations, the 85th percentile speed, or the speed at which 85 percent of all motorists are traveling at or below, was observed to be eight or more miles per hour over the speed limit. At a third location, the 85th percentile speed was observed to be more than four miles over the posted speed limit, and at the fourth location, the 85th percentile speed was observed to be nearly three miles per hour below the posted speed limit.

Motor vehicle accidents on the study segment were inventoried for a two year eleven month period. Beginning with August 1 of 1988 through June 30 of 1991, a total of 96 accidents were reported on the study segment during this period, with the number of accidents in each 12-month period increasing slightly over the preceding 12 months. Only one of the 96 accidents involved a fatality. An additional 38 accidents involved personal injuries, and the remaining 57 accidents involved property damage only. The number of traffic accidents was observed to be increasing annually. A modest concentration of accidents in the Cross Lake and Salem areas, and at the intersections of STH 83 with CTH C and with W. 98th Street was observed. No other strong patterns with respect to time of accident or the nature of the accident were observed.

The Commission staff conducted a survey of the gaps in the study segment traffic stream and of the delay incurred by vehicles on the cross-street approaches at selected intersections. The average length of the gap in the study segment traffic stream was 6.1 seconds and 6.5 seconds. More than two gaps were observed each minute which were of sufficient length to permit execution of the maneuver

which requires the longest gap, namely left turns from the cross-street into the study segment traffic stream. The average delay per vehicle observed at one of the intersections was 9.5 seconds, and at the other intersection was 15.9 seconds. The maximum delays observed were 44 seconds and 100 seconds, respectively.

The Commission staff also prepared forecast design year 2010 traffic volumes for the study segment. The traffic forecasts were based on assumed implementation of the adopted regional transportation system plan, the year 2010 regional land use plan, and the forecast design year 2010 regional population and employment levels upon which those plans have been developed. The forecast design year 2010 average weekday traffic volumes were compared to the existing roadway design capacity and were found to equal or exceed the existing design capacity along the entire study segment. It should be noted, however, that if the regional transportation system plan is not implemented by the year 2000--and implementation of the plan is currently behind schedule--average weekday traffic volumes in the year 2010 on the study segment may be higher than those forecast as the anticipated diversion of traffic to other facilities may not occur because planned improvements on those facilities are not implemented in a timely manner.

The inventory data were compared to generally accepted engineering standards and five existing traffic problems were identified on the study segment of STH 83. These included: 1) traffic safety problems due to restricted sight distance; 2) traffic safety problems caused by substandard intersection and driveway spacing; 3) inadequate off-street parking at selected locations; 4) vehicle speeding problems; and 5) an annual increase in the incidence of traffic accidents and a modest concentration of traffic accidents at selected locations. Further, the forecast design year 2010 average weekday traffic volumes may be expected to exceed the existing roadway design capacity.

A number of traffic engineering and roadway improvement actions to alleviate the existing and future traffic problems identified on the STH 83 study segment were considered. Traffic engineering actions are defined as relatively low-cost, short-range improvements which may be undertaken in the near future and may be expected to alleviate existing traffic problems, but which may not be expected to provide sufficient improvement in the operating conditions to accommodate substantial increases in average weekday traffic volumes. A substantial increase in average weekday traffic volumes may be expected to require a roadway improvement project which would be capital intensive and require several years for implementation. The roadway improvements considered include the provision of additional capacity in a corridor through the construction of new traffic lanes on existing facilities.

The short-range, low cost traffic engineering actions and long-range roadway improvements recommended to alleviate the existing and anticipated future traffic problems identified on the STH 83 study segment are summarized on Table 8. Other traffic engineering actions considered but rejected included a further reduction in existing speed limits, installation of stop signs or traffic signals on the study segment at various intersections, the conversion of some land access cross-streets from two-way to one-way operation, and the installation of plowable, prismatic pavement markers.

Table 8

ACTIONS RECOMMENDED TO ALLEVIATE EXISTING AND PROBABLE FUTURE TRAFFIC PROBLEMS ON THE STH 83 STUDY SEGMENT IN THE TOWN OF SALEM

Implementing Agency	Recommended Actions		Estimated Cost
Town of Salem	Traffic Engineering and Related Actions	• Selected on-street parking prohibitions.	$ 2,450
		• Relocation of stop signs and the provision of stop lines on selected intersection approaches.	$ 360
		• Provide additional off-street parking at the Salem School site.	$ 65,000
		• Schedule sufficient time between recreational events to permit one group of participants to leave prior to the arrival of the next group.	--
	Access	• Consider local street closures at STH 83 in Cross Lake and Salem.	--
		• Require that proposed STH 83 access to new development or redevelopment of existing parcels conform to the criteria set forth in Table 6 and shown in Figure 3 as a condition of approval of the development or redevelopment proposal.	--
		• Require the provision of left and right turn lanes on STH 83 at collector and local streets and major driveways as a condition of approval of development and redevelopment proposals. Consider requiring the provision of left and right turn lanes at other driveways if the proposed development or redevelopment is expected to generate substantial turning movements during the peak travel periods on STH 83.	--
		• Modify the existing access where currently substandard as requests for development of existing development or for changes in conditional use permits are reviewed.	--
		• Require minimum setback of 65 feet from the right-of-way line as required in Sections 12.19-1 through 12.26-6 of Chapter 12 of the Kenosha County Zoning Ordinance.	--
		• Require the provision of off-street parking in conformance with the provisions of Section 12.13-3, Parking Requirements, in Chapter 12 of the Kenosha County Zoning Ordinance.	--
		• Seek voluntary compliance to define driveways at selected commercial sites abutting STH 83 where access is currently permitted along the entire frontage.	--
		• Creation or improvement of existing vision triangles at selected intersections in accordance with the provisions of Section 12.13-1, Traffic Visibility, in Chapter 12 of the Kenosha County Zoning Ordinance.	--
Kenosha County	Traffic Engineering and Related Actions	• Selected on-street parking prohibitions.	$ 750
		• Provide 10 manhours weekly of directed enforcement activity on a random basis between the hours of 6:00 a.m. and 6:00 p.m.	$ 13,000[a]

-continued-

Table 8 (continued)

Implementing Agency	Recommended Actions		Estimated Cost
WisDOT	Traffic Engineering and Related Actions	• Reduce the speed limit from 55 miles per hour to 45 miles per hour from CTH C to CTH AH.	$ 1,000
		• Install warning signing for northbound STH 83 traffic just south of W. 98th Street.	$ 200
		• Conduct the design of an improved vertical alignment for the study segment to eliminate roadway sight distance problems caused by existing vertical alignment concurrent with design of roadway reconditioning project scheduled for 1998.	
		• Install warning signs with advisory distance plates and flashing amber lights just south of 85th Street.[b]	$ 1,350
		• Installation of deer crossing warning signs.	$ 450
	Roadway Improvements	• Consider improvement of vertical alignment, particularly between CTH AH and CTH C, as part of the roadway reconditioning project scheduled for the study segment in 1998.	$ 2,430,000
		• Consider reconstruction of the arterial intersections of STH 83 at CTH AH and CTH C as part of the roadway reconditioning project scheduled for the study segment in 1998.	$ 3,100,000
		• Consider implementation of the recommended four lane roadway improvement between STH 50 and the Salem urban area and between CTH AH and CTH C in conjunction with the roadway reconditioning project scheduled for the study segment in 1998.	$ 1,100,000
		• Reconstruction of the existing roadway to provide four traffic lanes along the study segment by the year 2010.	$ 14,200,000[c]
	Access	• Require that proposed STH 83 access to new development or redevelopment of existing parcels conform to the criteria set forth in Table 6 and shown in Figure 3 as a condition of approval of the development or redevelopment proposal.	--
		• Require the provision of left and right turn lanes on STH 83 at collector and local streets and major driveways as a condition of approval of development and redevelopment proposals. Consider requiring the provision of left and right turn lanes at other driveways if the proposed development or redevelopment is expected to generate substantial turning movements during the peak travel periods on STH 83.	--
		• Modify the existing access where currently substandard to conform to the criteria set forth in Table 6, and as shown on Figure 3, as requests for redevelopment of existing development or for changes in conditional use permits are reviewed.	--

[a]Assumes an hourly cost of $25.00 and includes only the time spent in directed enforcement activities. Does not reflect associated costs such as court time, which may be expected to result from the directed enforcement activity.

[b]To be implemented upon expansion of the fire station in the Salem urban area.

[c]Under current WisDOT policy, the Town of Salem may be expected to fund 25 percent of this improvement.

Source: SEWRPC

In order to accommodate the forecast design year 2010 traffic volumes, the provision of four traffic lanes over the entire study segment length was recommended to meet existing and future traffic demand, and to enhance traffic safety. It was further recommended that a rural four-lane divided roadway cross-section be provided from a point approximately one-half mile south of CTH AH to CTH C, and that a four-lane divided urban roadway be constructed over the remainder of the study segment, except a four-lane undivided urban roadway cross-section was recommended to be provided from a point approximately 200 feet north of W. 87th Street to a point approximately 600 feet north of W. 81st Street in the Salem area in order to minimize disruption. A pavement reconditioning project, scheduled for the Study segment in 1998, is anticipated to extend the life of the existing roadway to the year 2010 or beyond. As a result, additional improvements to abate identified problems would likely not be considered until the year 2010. Therefore, it was further recommended that the Wisconsin Department of Transportation consider improvements to the vertical alignment--particularly between CTH C and CTH AH--in conjunction with the reconditioning project. It was also recommended that consideration be given to reconstructing the arterial intersections of STH 83 with CTH C and CTH AH to the recommended cross-sections in conjunction with the reconditioning project due to substantial turning movement volumes at these intersections. Finally, because existing STH 83 average weekday traffic volumes are nearly equal to the roadway design capacity, consideration of the reconstruction of the subsegment of STH 83 from CTH C to CTH AH was recommended in lieu of the planned reconditioning project.

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