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Special acknowledgement is due Mr. Peter C. Daniels, P.E., SEWRPC Senior Engineer, for his contribution to the preparation of this report.

MEMORANDUM REPORT NUMBER 50

TRAFFIC ENGINEERING STUDY OF COUNTY LINE ROAD (CTH Q) BETWEEN THE INTERSECTION WITH APPLETON AVENUE (STH 175) AND USH 41/45

Prepared by the

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

December 1990

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SEWRPC Memorandum Report No. 50

TRAFFIC ENGINEERING STUDY OF COUNTY LINE ROAD (CTH Q) BETWEEN THE INTERSECTION WITH APPLETON AVENUE (STH 175) AND USH 41/45

INTRODUCTION

In April 1988 the Commission staff was requested by Village of Germantown representatives on the Technical Coordinating and Advisory Committee on Jurisdictional Highway Planning for Washington County to conduct a traffic engineering study of the segment of County Line Road (CTH Q) between the intersection with Appleton Avenue (STH 175) and USH 41/45.

This memorandum report presents the findings and recommendations of the requested traffic engineering study. The report describes the existing and planned land uses along County Line Road (CTH Q) between USH 41/45 and Appleton Avenue (STH 175) in the study area; describes the traffic problems which currently exist on this segment of County Line Road (CTH Q); presents probable future traffic volumes on County Line Road (CTH Q) based on the Commission's year 2010 land use plan under preparation, and recommends improvements to County Line Road (CTH Q) to abate existing and potential future traffic problems.

EXISTING CONDITIONS

Essential to the identification of existing traffic problems is the collection and analysis of data concerning existing roadway physical and operational characteristics; traffic volumes; and a history of motor vehicle accidents.

Jurisdictional Classification

The jurisdictional classification of streets and highways establishes which level of government--state, county, or local--has responsibility for the design, construction, maintenance, and operation of each segment of street or

highway within a community. County Line Road (CTH Q) is a county trunk highway and, consequently, actions taken to substantially alter the capacity or use of County Line Road (CTH Q) are taken by, and must be approved by, the county government. While the majority of the segment of County Line Road (CTH Q) under study is entirely in Washington County, a portion of the roadway is partly in both Washington County and Waukesha County. Actions typically requiring approval include implementation of traffic control measures such as turning movement prohibitions, modification of traffic control devices, and modification of intersection geometrics.

Both USH 41/45 and Appleton Avenue (STH 175) are under the jurisdiction of the Wisconsin Department of Transportation (WisDOT). Any action taken at the intersection of County Line Road (CTH Q) and the on-off ramps to USH 41/45 or Appleton Avenue (STH 175) would require Wisconsin Department of Transportation approval. In addition, Wisconsin Department of Transportation controls access rights approximately 1,300 feet west of the southbound USH 41/45 on-ramp. Any proposed changes in access would require Wisconsin Department of Transportation approval.

Roadway Physical and Operational Characteristics

County Line Road (CTH Q) between USH 41/45 and River Crest Drive, is constructed to a rural cross-section with a median with twin roadways 28 feet wide and with 10-foot-wide outer gravel shoulders and drainage ditches. There are four through traffic lanes with separate left- and right-turn lanes provided at the intersections with Richfield Way and the southbound USH 41/45 on-ramp. County Line Road (CTH Q) between River Crest Drive and a point 500 feet east of Appleton Avenue (STH 175), is constructed to a rural cross-section with a pavement width of 48 feet; and six-foot-wide gravel shoulders and drainage ditches. There are four through traffic lanes, with a separate east-bound right-turn lane recently added to enter the Taco Bell and Burger King Restaurants. A passing lane was also recently added on the north side of the roadway to allow room for a westbound left-turn lane into the Taco Bell Restaurant. County Line Road (CTH Q) between Appleton Avenue (STH 175) and a point 500 feet east of Appleton Avenue (STH 175) is constructed as a four-traffic-lane urban cross-section with curb and gutter, and has a pavement

width of 52 feet. In 1990 the Wisconsin Department of Transportation has programmed reconstruction of the segment of County Line Road (CTH Q) between Appleton Avenue (STH 175) and a point 850 feet east of Appleton Avenue (STH 175) as part of the reconstruction of Appleton Avenue (STH 175) between St. Francis Drive and County Line Road (CTH Q). County Line Road (CTH Q) east of Appleton Avenue (STH 175) is planned to be widened to an urban cross-section with a median with twin 24-foot-wide roadways. A right-turn lane and left-turn lane will be provided at the intersection with Appleton Avenue (STH 175). The median will prevent left turns into and out of the Fleet Farm driveway closest to this intersection. A channelizing island will also prevent motorists exiting this same driveway from crossing two lanes of traffic to turn left onto southbound Appleton Avenue (STH 175). A right-turn lane will also be provided into the Fleet Farm driveway farthest from the same intersection, as well as protected left-turn lanes into the same Fleet Farm driveway and the Tri City National Bank driveway.

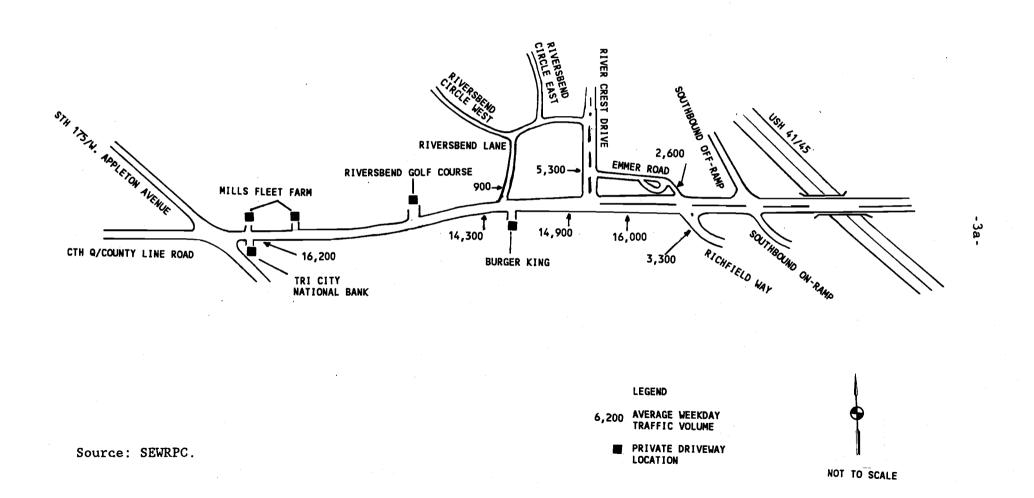
Traffic on County Line Road (CTH Q) is controlled by traffic signals at its intersections with Appleton Avenue (STH 175) and the northbound on/off ramps to USH 41/45. Traffic on all cross-street approaches along this segment of County Line Road (CTH Q) is stop sign-controlled. The posted speed limit along this segment of County Line Road (CTH Q) is 40 miles per hour.

Traffic Volumes

Existing average weekday traffic volumes based on counts taken by the Village of Germantown and by the Commission staff in April 1988, in addition to counts conducted by the Wisconsin Department of Transportation in September 1988, are shown on Figure 1. The average weekday traffic volumes on the study segment of County Line Road (CTH Q) currently range from 14,300 to 16,200 vehicles. Richfield Way south of County Line Road (CTH Q) has an average weekday traffic volume of 3,300 vehicles; River Crest Drive north of County Line Road (CTH Q) has an average weekday traffic volume of 5,300 vehicles; and Riversbend Lane north of County Line Road (CTH Q) has an average weekday traffic volume of 900 vehicles. The one-way segment of Emmer Road north of County Line Road (CTH Q) carries 2,600 vehicles per average weekday.

Figure 1

24-HOUR WEEKDAY TRAFFIC VOLUMES ON COUNTY
LINE ROAD AND SELECTED INTERSECTING STREETS: 1988



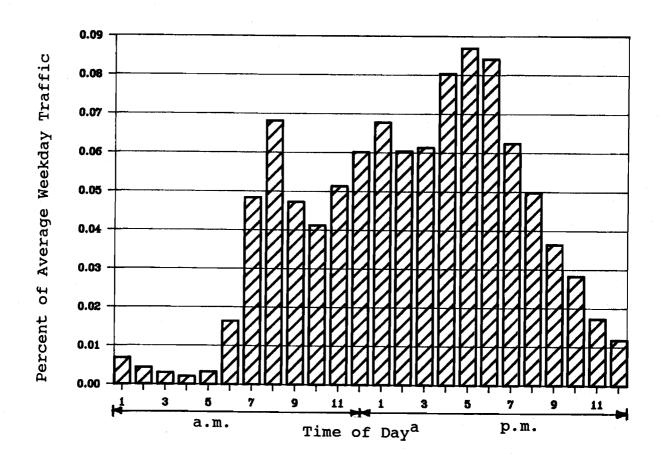
The number of traffic lanes provided is a primary determinant of the traffic carrying capacity of an arterial. A two-traffic-lane arterial generally has a design capacity of 13,000 vehicles per average weekday; a four-traffic-lane undivided arterial has a design capacity of 17,000 vehicles per average weekday; a four-traffic-lane divided arterial has a design capacity of 25,000 vehicles per average weekday; and a six-traffic-lane divided arterial has a design capacity of 35,000 vehicles per average weekday. Currently, County Line Road (CTH Q) is a divided four-traffic-lane arterial from Division Road to River Crest Drive, and an undivided four-traffic-lane arterial between River Crest Drive and Appleton Avenue (STH 175). County Line Road (CTH Q) currently carries average weekday traffic volumes below the design capacity for a four-traffic-lane undivided arterial. The historic growth in average weekday traffic volume on County Line Road (CTH Q) east of Appleton Avenue (STH 175) shows an average annual growth rate of 8.8 percent, with average weekday traffic volumes increasing from 3,850 in 1971 to 16,200 in 1988.

Arterial roadways carrying average weekday traffic volumes exceeding their design capacity may be expected to experience significant delays at controlled intersections; reduced speeds between intersections; and increased accident rates. The reduced speeds and intersection delays on urban arterials carrying average weekday traffic volumes equaling or exceeding their design capacity will generally occur only during the morning, noon, and evening peak traffic hours. During evening and early morning hours, there will generally be little, if any, traffic congestion and delay. Also, on most urban arterial streets, weekend traffic peaks will typically be less than weekday traffic peaks.

Figure 2 indicates the hourly distribution of average weekday traffic volume on County Line Road (CTH Q) west of Riversbend Lane. Hourly traffic volumes in the early morning hours between 12:00 midnight and 5:00 a.m. are very low, representing less than 1 percent of average weekday traffic volume. After 5:00 a.m. hourly traffic volumes increase rapidly to an early morning peak of about 7 percent of average weekday traffic volume during 7:00 to 8:00 a.m. Hourly traffic volumes then decline for the next few hours and then increase to a late morning-early afternoon peak of about 7 percent of the average

Figure 2

HOURLY VARIATION IN WEEKDAY TRAFFIC VOLUMES
ON COUNTY LINE ROAD WEST OF RIVERSBEND LANE: 1988



^aTimes shown are for hour ending.

Source: SEWRPC.

weekday traffic volume between 12:00 noon and 1:00 p.m. Hourly traffic again declines for the next few hours and then increases to an all-day peak of 9 percent of the average weekday traffic volume during the hours 4:00 to 5:00 p.m. Traffic volume then declines steadily each hour to the end of the day.

The pattern exhibited by the hourly distribution of traffic occurs as a result of work-related trips being made during the morning peak traffic hour of 7:00 to 8:00 a.m.; shopping, social-recreation, and personal business trips being made during the midday; and a combination of these types of trips being made during the afternoon peak traffic hour of 4:00 to 5:00 p.m. This pattern is typical of arterial facilities which serve retail activity. The evening peak traffic hour and period are of primary concern because this is when traffic volumes on the roadway are greatest.

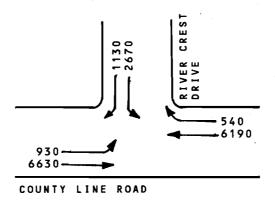
The Regional Planning Commission conducted hourly turning movement traffic volume counts from 6:00 a.m. to 6:00 p.m. on Tuesday and Wednesday, August 2 and 3, 1988, at the County Line Road (CTH Q) intersection with River Crest Drive. River Crest Drive is by far the most heavily used local street or driveway intersecting with this segment of County Line Road (CTH Q) being studied. These traffic count data were necessary to investigate intersection operating conditions and to evaluate the potential need for traffic signal devices at the intersection. Shown on Figure 3 are the estimated 24-hour weekday turning movement volumes at the intersection, as estimated from the 6:00 a.m. to 6:00 p.m. count data, and the morning peak hour--7:00 a.m. to 8:00 a.m.--and afternoon peak hour--4:30 p.m. to 5:30 p.m.--turning movements. As indicated in Figure 3, the principal traffic movement on River Crest Drive is the southbound left-turn movement of 2,670 vehicles per average weekday, which constitutes about 70 percent of the traffic stream.

A capacity analysis of the County Line Road (CTH Q) intersection with River Crest Drive was conducted to identify existing traffic congestion and delay problems. At the intersection of County Line Road (CTH Q) and River Crest Drive, which is controlled by a stop sign on River Crest Drive, the southbound left-turn movement is presently exceeding capacity during seven hours of an

Figure 3

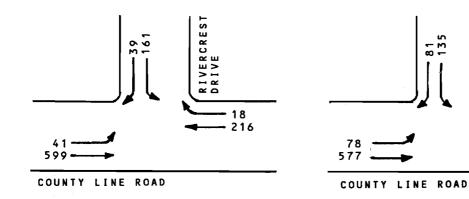
ESTIMATED EXISTING AVERAGE WEEKDAY 24-HOUR AND PEAK TRAFFIC HOUR TRAFFIC TURNING MOVEMENT VOLUMES AT THE INTERSECTION OF COUNTY LINE ROAD AND RIVER CREST DRIVE

Total Average Weekday Traffic Volumes



Morning Peak Hour: Average Weekday Traffic Volumes: 7:00 a.m. to 8:00 a.m.

Afternoon Peak Hour: Average Weekday Traffic Volumes: 4:30 p.m. to 5:30 p.m.



Not to Scale

- 35

760

Source: SEWRPC.

average weekday, indicating there are insufficient gaps in traffic on County Line Road (CTH Q).

Operating Speeds

The posted speed limit on the study segment of County Line Road (CTH Q) is 40 miles per hour. On August 24, 1988, the Commission staff conducted a spot speed study on County Line Road (CTH Q) 400 feet west of Riversbend Lane. On May 1, 1989, the staff conducted a spot speed study on County Line Road (CTH Q) just east of the Mills Fleet Farm driveways. The spot speed studies were conducted to determine the average vehicular operating speed, the 85th percentile speed, and the "10 mile per hour pace."

The average vehicular operating speed is the average of all speeds at which motorists are traveling. The 85th percentile speed is the speed at which 85 percent of all motorists are traveling at or below, and which is considered to be a safe and reasonable speed for prevailing traffic, roadway, and roadside conditions. The 85th percentile speed is recognized nationally as the principal factor in determining the appropriate speed limit. The 10 mile per hour pace is the 10 mile per hour increment of speed range which includes the largest number of vehicles. As the percentage of vehicles within the 10 mile per hour increment increases, the uniformity of speeds increases and the potential for accidents resulting from a disparity in speeds decreases.

The average vehicular operating speed on County Line Road (CTH Q) west of Riversbend Lane was found to be approximately 40 miles per hour; and east of the Mills Fleet Farm driveway was found to be approximately 34 miles per hour. The 85th percentile speed was found to be 45 miles per hour west of Riversbend Land and 38 miles per hour east of the Mills Fleet Farm driveways. Thus, it may be concluded that the existing speed limit of 40 miles per hour is within the range of the 85th percentile speed on the study segment, and is therefore a reasonable speed limit. The 10 mile per hour pace was found to be 36 to 45 miles per hour, and included 70 percent of all vehicles west of Riversbend Lane. East of the Mills Fleet Farm, the 10 mile per hour pace was found to be 29 to 38 miles per hour and included 71 percent of all vehicles. Thus, the

majority of motorists are traveling through the study segment at relatively uniform speeds.

Traffic Accidents

The incidence and location of traffic accidents provides another important measure of the efficiency and operating characteristics of an arterial facility such as County Line Road (CTH Q). The three-year motor vehicle accident history for the study segment of County Line Road (CTH Q) is shown on Table 1. The number of accidents increased from a total of 20 accidents on the study segment in 1985 to 28 accidents in 1986; and 37 accidents in 1987. None of the accidents involved a fatality, but over 28 percent of all accidents, or over one in four, over the three-year period involved injuries. The principal concentration of accidents was the block stretch of County Line Road (CTH Q) between Appleton Avenue (STH 175) and Riversbend Lane, which accounted for 26, or 30 percent, of the total 85 accidents over the three-year period.

Another measure used to identify accident problem locations is the accident rate at intersections. This rate considers for intersections not only the frequency of accidents, but also the volume of traffic entering an intersection. The highest annual intersection accident rate on the study segment of County Line Road (CTH Q) occurred in 1986 at the Richfield Way-Emmer Road intersection, 1.87 accidents per million vehicles entering the intersection. In descending order, the next highest accident rates in 1987 were 1.36 accidents per million vehicles entering the intersection at Riversbend Lane, and 1.19 accidents per million vehicles entering the intersection at Appleton Avenue (STH 175).

Another consideration in identifying accident problem locations is the increase in accident frequency over the three-year period. Two locations should be noted: the intersection with Riversbend Lane, where accident frequency increased from one in 1985 to two in 1986 and to six in 1987; and the midblock stretch between Appleton Avenue (STH 175) and Riversbend Lane, where accident frequency increased from six in 1985 to seven in 1986 and to 13 in 1987.

Table 1

INCIDENCE AND SEVERITY OF MOTOR VEHICLE ACCIDENTS ON THE STUDY
SEGMENT OF CTH Q BETWEEN APPLETON AVENUE (STH 175) AND USH 41/45: 1985-1987

-		1985		_	1986			1987			Total	
	Property		Property			Property			Property			
Intersection	Injury	Damage	Total	Injury	Damage	Total	Injury	Damage	Total	Injury	Damage	Total
ounty Line Road												
Intersection												
USH 41/45 Southbound Ramps		1	1	1	2	3	1	1	2	2	4	6
Richfield Way-Emmer Road	2	1	3		9	9	2	4	6	4	14	18
Rivercrest Drive	1	2	3	1	2	3		1	1	2	5	7
Riversbend Lane		1	1	1	1	2	4	2	6	5	4	9
Appleton Avenue	4	2	6	1	2	3	2	5	7	7	9	16
Midblock												
Between USH 41/45												
Southbound Ramps and												
Richfield Way-Emmer Road								2	2		2	2
Between Richfield Way-Emmer								_	_		- '	_
Road and River Crest Drive												
Between River Crest Drive												
and Riversbend Lane					1	1					1	1
Between Riversbend Lane											-	
and Appleton Avenue	2	4	6		7	7	2	11	13	4	22	26
	_		•									
Total	9	11	20	4	24	28	11	26	37	24	61	85

Source: Village of Germantown and SEWRPC.

The locations along the segment of County Line Road (CTH Q) concerned which may be considered problem locations are those where the incidence and rate of accidents is high, as well as those which have exhibited substantial increases in accidents from year to year. Therefore, the principal accident problem location identified in the study was the midblock stretch of County Line Road (CTH Q) between Riversbend Lane and Appleton Avenue (STH 175), with a total of 26 accidents reported over the three-year study period.

Other less substantial accident problem locations include the intersection of Richfield Way and County Line Road (CTH Q), with a total of 18 accidents over the three year period and an accident rate of 1.87 accidents per million vehicles entering the intersection in 1986; the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q), with a total of 16 accidents over the three year period and an accident rate of 1.19 accidents per million vehicles entering the intersection in 1987; and the intersection of Riversbend Lane and County Line Road (CTH Q), with a total of nine accidents over the three year period and an accident rate of 1.36 accidents per million vehicles entering the intersection in 1987. Analyses of the accidents along County Line Road (CTH Q) between Appleton Avenue (STH 175) and Riversbend Lane, and its intersection with Richfield Way, Appleton Avenue (STH 175), Riversbend Lane, and River Crest Drive are provided in Appendix A.

An analysis of the 26 midblock accidents reported between Appleton Avenue (STH 175) and Riversbend Lane during the 1985 through 1987 time period indicated that 23, or about 88 percent, of the accidents occurred at the Mills Fleet Farm driveways; and of those 23 accidents, 15, or about 65 percent of the accidents, occurred at the western Mills Fleet Farm driveway. These accidents were generally the result of the western driveway being located too close to the intersection of County Line Road (CTH Q) and Appleton Avenue (STH 175), as motorists attempted to cross the queue of vehicles at the traffic signal found that their sight distance was limited by the queue, or motorists thought the right turn signal of an approaching vehicle was indicating that the vehicle would turn into the Mills Fleet Farm driveway when actually the motorist was signaling to turn at the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q). The programmed improvement of this

segment by the Wisconsin Department of Transportation may be expected to abate this accident problem.

An analysis of the 18 accidents reported at the intersection of Richfield Way-Emmer Road and County Line Road (CTH Q) during the 1985 through 1987 time period indicated that nine accidents--or 50 percent--occurred when northbound traffic from Richfield Way failed to yield the right of way to traffic on County Line Road (CTH Q). This could be due to a lack of adequate gaps in traffic on County Line Road (CTH Q). It should be noted that a new traffic signal recently installed at the intersection of County Line Road (CTH Q) and the northbound USH 41/45 on/off ramps may be expected to provide additional gaps in westbound traffic at the intersection of County Line Road (CTH Q) and Richfield Way-Emmer Road.

An analysis of the 16 accidents reported at the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q) during the 1985 through 1987 time period indicated that nine accidents, or 56 percent, involved vehicles making a left- or right-turn maneuver; three accidents, or 19 percent, involved vehicles colliding into the rear of another vehicle; and three accidents, or 19 percent, involved vehicles that collided at a right angle. Of the 16 accidents, 13 accidents, or 72 percent, occurred during periods of daylight, and five accidents, or 38 percent, occurred under wet, snowy, or icy roadway conditions. The programmed improvement of the intersection by the Wisconsin Department of Transportation may be expected to abate this accident problem.

An analysis of the nine accidents reported at the intersection of Riversbend Lane driveway and County Line Road (CTH Q) during the 1985 through 1987 time period indicated that six accidents, or 66 percent, involved vehicles making a left-turn maneuver from County Line Road (CTH Q). The number of accidents has risen significantly from one and two accidents in 1985 and 1986, respectively, to six accidents in 1987. This is partially due to the opening of the Burger King restaurant, which can account for four of the six accidents reported in 1987, all four of which involved westbound vehicles turning left into the restaurant driveway from County Line Road (CTH Q).

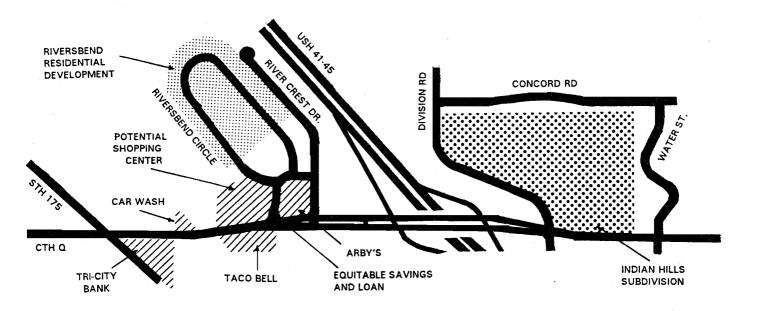
Subsequent to the conduct of the average weekday traffic counts on the study segment of County Line Road (CTH Q) in 1988, development in the Village of Germantown has occurred on vacant parcels abutting the study segment. In addition, proposals have been made for the development of the other vacant parcels. An estimate of the traffic which may be expected to be generated by this subsequent and proposed development was prepared. As shown on Map 1, development that has occurred since the traffic counts were taken include an Arby's Restaurant, a Taco Bell Restaurant, and the Tri-City National Bank building. In addition, construction of additional residential units in the Indian Hills subdivision and Riversbend development has continued, and construction of a car wash is underway. Also, a shopping center is planned for the north side of County Line Road (CTH Q) west of Riversbend Lane. The potential shopping center site is anticipated to have 23,000 square feet of commercial floor area.

The development completed, underway, or proposed since the traffic counts were conducted is estimated to potentially generate an additional 5,700 vehicle trips per average weekday. It is further estimated that 1,300 of the 5,700 vehicle trips per average weekday would be made by vehicles currently using CTH Q and, therefore, the remaining 4,400 vehicle trips per average weekday would represent additional traffic on the study segment of CTH Q since the counts were conducted.

The potential shopping center may be expected to generate approximately 900 of the estimated total 5,700 vehicle trips per average weekday generated by the additional development along CTH Q. Approximately 200 of those 900 trips may be expected to be made by vehicles currently using CTH Q. The potential shopping center could include one to two "fast food" restaurants in addition to its proposed commercial floor space. Construction of one fast food restaurant may be expected to generate an additional 1,700 vehicle trips per average weekday, with approximately 800 of those trips made by vehicles already in the traffic stream on CTH Q. If two fast food restaurants are constructed, the site may be expected to generate an additional 3,400 vehicle trips per average

Map 1

PROPOSED LAND USES ABUTTING COUNTY
LINE ROAD WITHIN AND OUTSIDE STUDY AREA



LEGEND ////, Commercial Land use Multi-Family Residential Land Use Single Family Residential Land Use

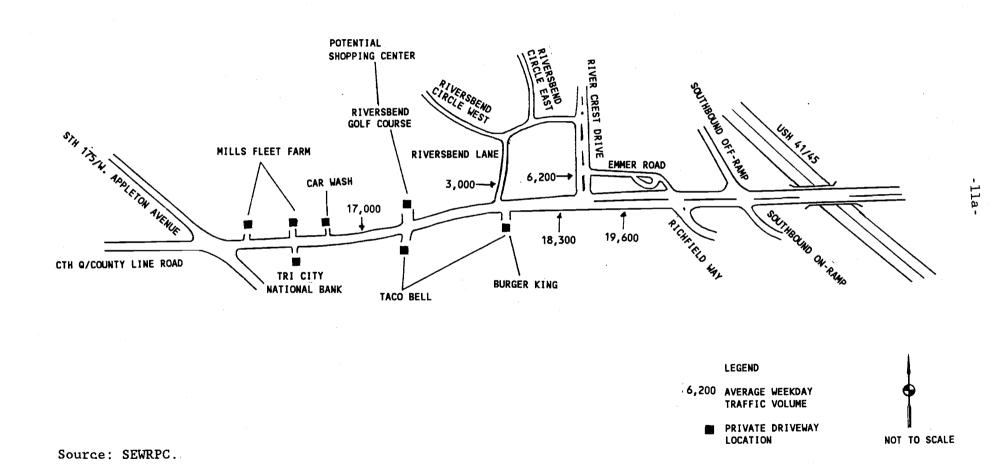
Source: SEWRPC.

weekday. Approximately 1,600 of those trips may be expected to be made by vehicles currently using CTH Q and the remaining 1,800 vehicle trips per average weekday will be additional traffic on the study segment of CTH Q.

Thus, the subsequent and proposed development along CTH Q in the Village, including two potential fast food restaurants within the potential shopping center site, is estimated to generate approximately 9,100 vehicle trips per average weekday in addition to the traffic volume on CTH Q since traffic counts were taken in 1988. About 2,900 vehicle trips of the estimated 9,100 vehicle trips per average weekday will be made by vehicles already using County Line Road (CTH Q); and the remaining 6,200 vehicle trips per average weekday may be expected to be new trips and, therefore, represent additional traffic on the study segment of County Line Road (CTH Q). As shown on Figure 4, traffic volumes on County Line Road (CTH Q) may be expected to increase from the 14,300 to 16,000 vehicles per average weekday in 1988 to 17,000 to 19,600 vehicles per average weekday when the development of vacant parcels abutting the study segment is completed. That portion of County Line Road (CTH Q) east of River Crest Drive which has a four-traffic-lane divided cross-section may be expected to continue to operate well below its design capacity of 25,000 vehicles per average weekday. West of River Crest Drive, County Line Road (CTH Q) has a four-lane undivided cross-section. Under the estimated traffic volume of 17,000 to 18,300 vehicles per average weekday, this segment may be expected to operate in the short term at or over the design capacity of 17,000 vehicles per average weekday. Therefore, it may be concluded that, in the near term, County Line Road (CTH Q) will require a capacity improvement to meet the travel demand.

It should be noted that the development of land abutting CTH Q is only one factor which will affect traffic volumes on CTH Q in the short and long term. Other factors will include other development in the Village of Germantown, surrounding communities, the remainder of Washington and Waukesha Counties, and the remainder of southeastern Wisconsin; and, as well, changes in socioeconomic characteristics of the population, the characteristics of businesses and industry, the cost of travel, and the transportation system. All these

AVERAGE WEEKDAY TRAFFIC VOLUMES ON COUNTY LINE ROAD--CTH Q--WHICH MAY BE EXPECTED AS A RESULT OF DEVELOPMENT OF ABUTTING LANDS COMPLETED, UNDERWAY, OR PROPOSED SINCE TRAFFIC COUNTS WERE TAKEN IN 1988



factors are explicitly considered in the year 2010 forecast of CTH Q traffic presented later in this report.

SHORT-RANGE RECOMMENDATIONS

A plan of recommended low-cost, short-range traffic engineering improvements to abate the identified principal existing traffic congestion and safety problems is presented in this section of the memorandum. For each identified problem, a number of alternative traffic control measures were considered.

Commercial Access Between Appleton Avenue (STH 175) and the Menomonee River: The identified problem along this segment of County Line Road (CTH Q) is traffic accidents, with a total of 26 accidents reported in the calendar years 1985 through 1987, of which 23 of the accidents occurred as patrons of Mills Fleet Farm entered or exited the two driveways; and of those 23 accidents, 15 accidents -- about two-thirds -- occurred at the western Mills Fleet Farm drive-Many of these accidents are the result of the western driveway being located too close to the intersection; many motorists attempting to cross the queue of vehicles at the traffic signal found that their sight distance was limited by the queue, or mistakenly thought the right turn signal of an approaching vehicle was indicating that the vehicle would turn into the Mills Fleet Farm driveway when actually the motorist was signaling to turn at the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q). The Wisconsin Department of Transportation has programmed an improvement for the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q) for the year 1990. This improvement is expected to include reconstruction of County Line Road (CTH Q) from its intersection with STH 175 to approximately the Menomonee River, with a 24-foot-wide median. Preliminary plans include a median opening at the Mills Fleet Farm and Tri-City National Bank driveways. Eastbound and westbound left-turn bays at this median opening will permit the separation of left-turning vehicles from through traffic, thus reducing congestion and delay and improving traffic safety. Further, motorists making a left turn out of these driveways can seek refuge in the median, and will need to find a gap in only one direction of traffic at a time, rather than finding a simultaneous gap in both directions of traffic. Therefore, implementation of

this improvement may be expected to substantially abate the accident problem at the Mills Fleet Farm driveways in addition to improving the operation of the intersection and should be undertaken as soon as possible.

The traffic engineering action considered to alleviate the principal accident problem along this stretch of CTH Q is the closure of the west driveway to Mills Fleet Farm and the provision of a second driveway to Mills Fleet Farm from Appleton Avenue (STH 175). The advantage of this action is to remove the driveway conflict area from the intersection of STH 175 and CTH Q. In addition, vehicles currently using the western driveway would not be delayed by vehicles queued at the traffic signal-controlled STH 175 and CTH Q intersection. The disadvantages of this action include the potential need to modify the existing parking stall layout with the attendant loss of about 10 parking spaces; the relocation of vehicular conflicts from a driveway on CTH Q to a driveway on STH 175; and the need for Mills Fleet Farm to acquire right-of-way and construct a new driveway to the north of their existing property. It is, therefore, recommended that this traffic engineering action be implemented, at an estimated cost of \$40,000 to construct the driveway, not including the cost of right-of-way acquisition.

Other traffic management actions considered to alleviate the accident problem, but rejected, include the installation of traffic signals at the intersection of CTH Q and the east Mills Fleet Farm driveway; and the reduction of the existing speed limit on CTH Q. The installation of traffic signals was rejected because the existing average weekday traffic volumes at the driveways do not meet traffic volume warrants¹, as shown in Appendix B, nor are the

¹Based on a traffic count conducted by the Wisconsin Department of Transportation at the intersection of the Mills Fleet Farm driveway with CTH Q on Saturday, June 3, 1989, the Saturday traffic volumes meet the volume warrants for installation of a traffic signal. However, officials of Mills Fleet Farm indicate that Saturday is the busiest shopping day of the week and, therefore, should not be considered representative of typical conditions. According to the Manual on Uniform Traffic Control Devices, only those conditions which are representative should be used in determining whether or not warrants are met for traffic signal installation.

accident types generally susceptible to correction by traffic signal control. In addition, motorists on CTH Q would be subject to additional delay and the installation of traffic signals increases the potential for certain accident types such as rear-end accidents, particularly if the signals are installed without exclusive left-turn lanes. As stated earlier, the programmed improvement of the intersection of STH 175 and CTH Q, and the reconstruction of CTH Q to the Menomonee River, may be expected to substantially abate the accident problem at the Mills Fleet Farm driveways. It may be noted, however, that the traffic volumes at the intersection of CTH Q and the Mills Fleet Farm driveway do approach the traffic volume warrants for traffic signals. Therefore, the need for the signals should be monitored over time, as traffic on CTH Q increases and upon implementation of the closure of the western Fleet Farm driveway.

A reduction of the speed limit was rejected because the 85th percentile speed of 38 miles per hour is virtually the same as the speed limit. In addition, 71 percent of all traffic on this segment is traveling within a 10 mile per hour pace, or at a relatively uniform speed, which is important given the travel speed and the traffic volume on the roadway. Further, the existing speed limit is appropriate given existing and planned roadway and roadside conditions, including the current and planned spacing between driveways of at least 185 feet.

County Line Road (CTH Q) Between the Menomonee River and Riversbend Lane

Although this segment of CTH Q was not identified as a problem segment, Village officials requested that the access proposed for the potential shopping center be reviewed. The potential shopping center with two fast food restaurants is estimated to generate a total traffic volume of 4,300 vehicles per average weekday in and out of the site. These traffic volumes would best be served by two access points, with one access point on CTH Q and a supplementary access point onto Riversbend Lane. The supplementary driveway will reduce traffic volumes at the driveway onto CTH Q and may be expected to reduce the delay experienced by driveway vehicles. In addition, the supplementary driveway onto Riversbend Lane may be expected to reduce total conflict frequency and severity for the site by moving some of the driveway traffic volumes from

CTH Q to Riversbend Lane, which has a lower speed limit. Median openings on CTH Q are recommended upon construction of a divided cross-section at Riversbend Lane and the potential shopping center driveway, thereby improving traffic safety by providing refuge for, and permitting motorists to take advantage of, an acceptable gap in the traffic stream in one direction at a time. One driveway would be located on CTH Q opposite the westernmost Taco Bell driveway, and the other located on Riversbend Lane directly opposite the northernmost Equitable Savings and Loan driveway.

County Line Road (CTH Q) and River Crest Drive Intersection: The identified problem at this intersection is excessive delay for the southbound left-turn movement on River Crest Drive. The traffic engineering action recommended to alleviate the identified problems involves the installation of actuated traffic signals at the intersection of River Crest Drive and County Line Road (CTH Q).

The installation of actuated traffic signals would have an estimated cost of \$60,000 and an annual operation and maintenance cost of \$2,000. traffic volumes at the intersection meet the warrants for the installation of traffic signals as set forth in the Manual on Uniform Traffic Control Devices and are shown in Appendix C. These warrants are based upon accepted engineering standards related to traffic volume, accidents, delay, and pedestrian The advantage of traffic signal installation is that it may be expected to allow the southbound left-turn movement on River Crest Drive to operate at or under design capacity with existing traffic volumes as well as with the added traffic volumes from the development of abutting lands. traffic signal will provide additional gaps in County Line Road (CTH Q) traffic at Richfield Way, Riversbend Lane, and adjacent driveways, and may improve The disadvantages include a possible increase in rear-end accidents on County Line Road (CTH Q). Another disadvantage associated with this alternative is that traffic on County Line Road (CTH Q) which now generally experiences no delay at the intersection may be expected to experience delays of about four seconds per vehicle upon traffic signal installation.

A proposed second driveway to Burger King is aligned opposite River Crest Drive and County Line Road (CTH Q). The Wisconsin Department of Transportation has refused to permit this second driveway. The Department has the right to deny this driveway because the driveway is located 1,000 feet from the on-ramp in the southeast quadrant of the CTH Q and USH 41/45 interchange; and the Department has acquired the access rights along the south side of CTH Q for a distance of 1,300 feet westerly from the on-ramp. The Department's opposition to a driveway at this location is based on a concern for the potential conflict and impedance to CTH Q traffic, particularly eastbound CTH Q traffic traveling to the southeastbound USH 41/45 on-ramp.

The first of the two major Department of Transportation concerns in this regard is that westbound CTH Q traffic turning left into the proposed driveway will impede other CTH Q traffic. Currently, at this location the roadway cross-section of CTH Q is a four-traffic-lane undivided roadway without exclusive left-turn lanes to provide refuge for westbound traffic waiting to enter the proposed driveway. Only the reconstruction of CTH Q to a divided cross-section with turn lanes can address this concern. The second major concern is that vehicles exiting the proposed driveway, particularly through and left-turn movements, will conflict with CTH Q traffic. However, the proposed short-term recommendation to install a traffic signal at the intersection of CTH Q and River Crest Drive--which is located opposite the proposed driveway--should address this concern.

The Wisconsin Department of Transportation has indicated two other concerns regarding the proposed driveway. One of these concerns is that River Crest Drive traffic, particularly left-turning traffic proceeding from River Crest Drive to CTH Q and then to southbound USH 41/45, will conflict with traffic exiting the proposed driveway, especially right-turn exits. No short- or long-term action can address this concern.

The other concern is that eastbound CTH Q traffic will be impeded by traffic entering and exiting the driveway. Specifically, eastbound CTH Q traffic turning right into the potential driveway will impede eastbound CTH Q traffic. This may be addressed by installation of a right-turn deceleration and

acceleration lane. Also, eastbound CTH Q traffic may be impeded by traffic exiting the proposed driveway. This concern could be addressed by the proposed installation of the traffic signal and the prohibition of right turns on red on the driveway approach.

County Line Road (CTH Q) and Richfield Way: The identified problem at this intersection is traffic accidents, with a total of 18 accidents reported in calendar years 1985 through 1987; with nine accidents, or 50 percent, occurring when northbound traffic from Richfield Way failed to yield the right-ofway to traffic on County Line Road (CTH Q). The new traffic signal recently installed at the intersection of County Line Road (CTH Q) and the northbound USH 41/45 on/off ramps may be expected to provide additional gaps in westbound traffic at the intersection of County Line Road (CTH Q) and Richfield Way-Emmer Road. The recommended traffic signal at the intersection of CTH Q and River Crest Drive will also provide additional gaps in eastbound traffic at this intersection.

A concern expressed by Village officials at this location was that many east-bound CTH Q motorists mistakenly enter the right-turn deceleration lane to Richfield Way, believing it to be a turn lane for the southbound USH 41/45 on-ramp. These motorists then have difficulty merging back into eastbound CTH Q traffic to reach the on-ramp.

The existing signing and pavement marking west of the southbound USH 41/45 on-ramp is adequate according to the Manual of Uniform Traffic Control Devices. However, the Commission staff considered two traffic engineering actions to alleviate potential motorist confusion at the intersection of CTH Q and Richfield Way. One alternative which was considered involves the extension of the eastbound right-turn deceleration lane between Richfield Way and the southbound USH 41/45 on-ramp, at a cost of \$9,000. The advantage of this action would be to eliminate the need for USH 41/45-bound motorists to merge back into CTH Q traffic. However, northbound Richfield Way motorists would then have to cross three lanes of traffic rather than the current two, and may enter the intersection in the path of an eastbound CTH Q vehicle which they believe is destined for Richfield Way, but actually destined for the

southbound USH 41/45 on-ramp. It is, therefore, not recommended that this alternative be implemented.

Another action which was considered to alleviate potential motorist confusion at this intersection involves the installation of overhead guide signing. As shown in Figure 5, the guide signing would consist of a "To" marker, a "Route" marker, and a single-headed directional arrow located over the southernmost through lane approximately 250 feet east of the beginning of the right-turn deceleration lane to Richfield Way. In addition, a "Right Turn Only" arrow and word message "Only" would be located over the southern right-turn lane. The advantage of this action is to provide motorists with the necessary information to get to the USH 41/45 southbound on-ramp without mistakenly first entering the Richfield Way right-turn deceleration lane. Therefore, it is recommended that the guide signing be erected, at an estimated cost of \$5,500.

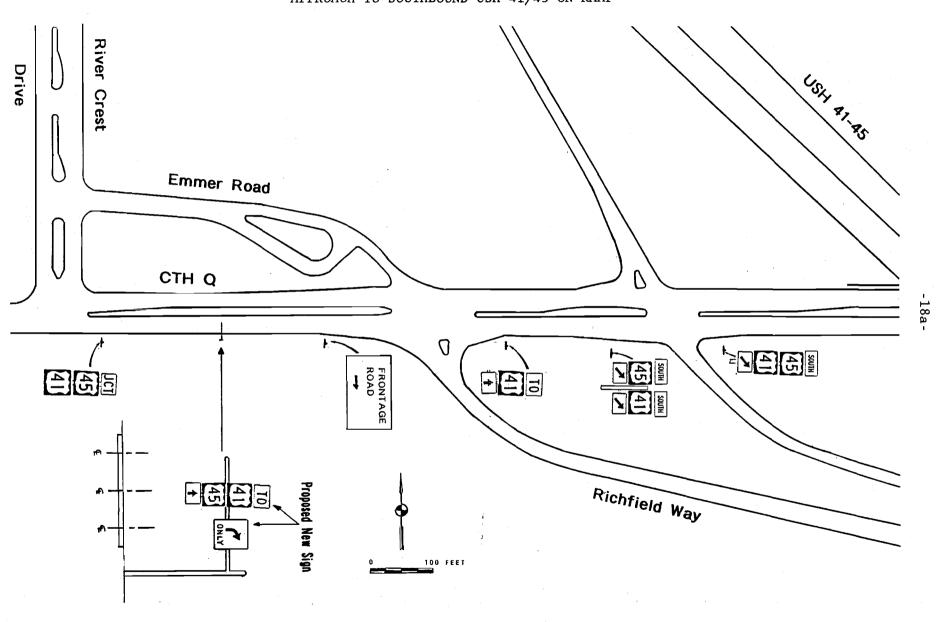
LONG-RANGE IMPROVEMENT PLAN: TRAFFIC VOLUMES AND ROADWAY NEEDS IN THE YEAR 2010

A traffic forecast for the year 2010 was prepared for the segment of County Line Road (CTH Q) between USH 41/45 and Appleton Avenue (STH 175) and the results are summarized in Figure 6. This traffic forecast is based primarily on the Commission's year 2010 land use plan under preparation. The anticipated year 2010 average weekday traffic volumes on County Line Road (CTH Q), River Crest Drive, and Riversbend Lane are shown on Figure 6. County Line Road (CTH Q) is expected to have an average weekday traffic volume ranging from about 20,000 to 25,000 vehicles. These volumes require that the divided cross-section of CTH Q which currently terminates at River Crest Drive be extended to meet the divided cross-section 850 feet east of STH 175 programmed to be constructed by the Wisconsin Department of Transportation in 1990, thus converting the four-traffic-lane undivided rural cross-section to a four-traffic-lane divided urban cross-section, at a cost of \$500,000.

This measure will provide an increase in capacity on County Line Road (CTH Q) to 25,000 vehicles per average weekday. The existing right-of-way along this stretch of County Line Road (CTH Q) is 130 feet. To provide a desirable four-traffic-lane divided cross-section, a right-of-way of 110 feet will be

Figure 5

EXISTING AND PROPOSED SIGNING FOR APPROACH TO SOUTHBOUND USH 41/45 ON-RAMP

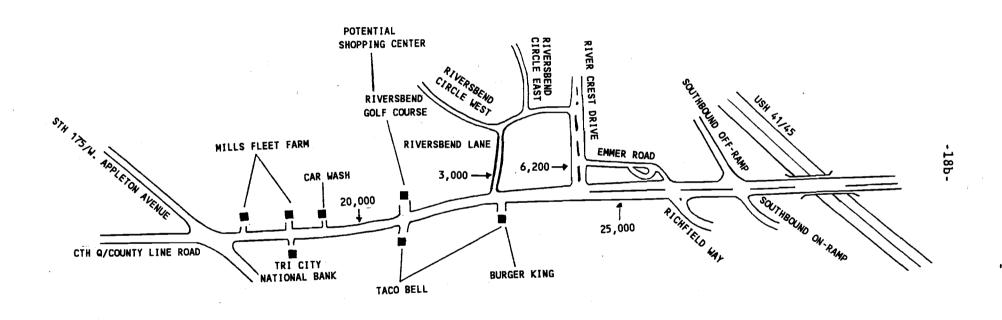


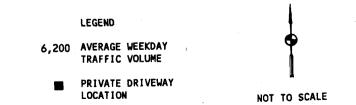
Source: SEWRPC.

Figure 6

COUNTY LINE ROAD YEAR 2010

AVERAGE WEEKDAY TRAFFIC VOLUMES





Source: SEWRPC.

necessary; and to provide four traffic lanes with right-turn lanes, a right-of-way of 130 feet will be necessary.

As shown in Figures 7 and 8, Median openings would be recommended at River Crest Drive, at the Riversbend Lane-Burger King driveway-Taco Bell driveway, and at the Taco Bell driveway-Riversbend Golf Course-potential shopping center driveway. Typically, median openings are spaced a minimum of 300 feet apart for a running speed of 40 miles per hour, with 25 feet of spacing added for each car to be stored in the turn lane at maximum queue length. The spacing between the proposed median openings at River Crest Drive and Riversbend Lane is 520 feet; and between the proposed median openings at Riversbend Lane and the Taco Bell-potential shopping center-Riversbend Golf Course is 370 feet.

The possibility of a median opening was also investigated at the proposed car wash driveway proposed to be located east of Mills Fleet Farm and Tri City National Bank. The proposed car wash may be expected to generate a total of 130 vehicles in the peak hour in and out of the proposed driveway; approximately half of these movements would be left turns into or out of the driveway. Based on an estimated 35 left-turning vehicles in the peak hour, and opposing westbound volumes in excess of 800 vehicles in the peak hour, the left-turn storage required for the car wash is 75 feet. The total center-tocenter median opening spacing required would be 300 feet plus the length of turn bays at both ends, or 50 feet and 75 feet, which represents the left-turn bay storage lengths at the Tri City National Bank driveway and the proposed car wash driveway, or a total of 425 feet. The center line of the driveway of the proposed car wash is located approximately 390 feet east of the Tri City National Bank and Fleet Farm driveways. Therefore, a properly spaced median opening could not be provided to align with the driveway of the proposed car wash. It should be noted that, if the speed limit were lowered in the future and additional development occurred which entailed a driveway directly

²U. S. Department of Transportation, Federal Highway Administration, <u>Access Management for Streets and Highways</u>, 1982.

RECOMMENDED IMPROVEMENTS TO COUNTY LINE ROAD (CTH Q) BETWEEN
THE RIVERSBEND LANE/TACO BELL/BURGER KING DRIVEWAY AND THE
POTENTIAL SHOPPING CENTER/RIVERSBEND GOLF COURSE/TACO BELL DRIVEWAY

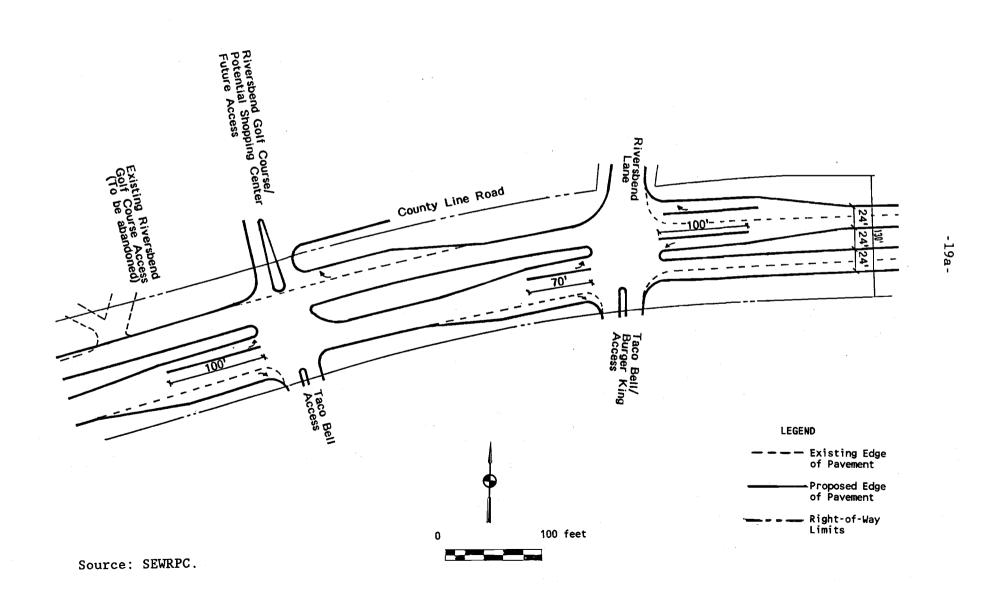
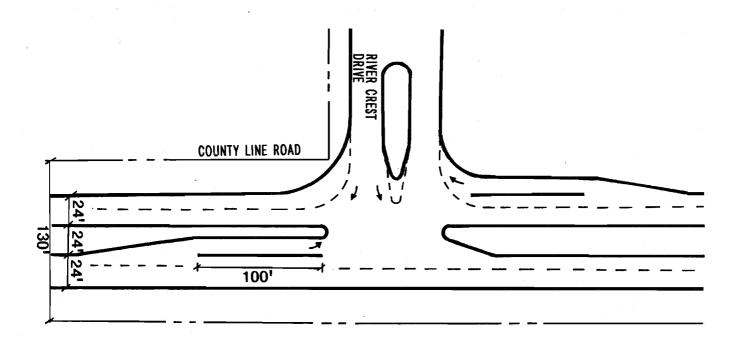


Figure 8

RECOMMENDED IMPROVEMENTS TO THE INTERSECTION
OF COUNTY LINE ROAD (CTH Q) AND RIVER CREST DRIVE





Source: SEWRPC.

opposite the car wash driveway, then the need for a median opening could be reevaluated.

Exclusive eastbound and westbound left-turn lanes within the median are recommended to improve traffic operating conditions at the intersection of County Line Road (CTH Q) with River Crest Drive, Riversbend Lane, and the Riversbend Golf Course-potential shopping center driveway. The left-turn lanes should provide sufficient storage space for vehicles queued at the intersection, as shown in Figures 7 and 8. The advantages of this improvement include the removal of turning vehicles from the through traffic lanes.

It may be noted with respect to the potential second driveway to Burger King opposite River Crest Drive that the proposed widening of the remaining four-traffic-lane undivided section of County Line Road (CTH Q) to a four-traffic-lane divided section would address the Wisconsin Department of Transportation's major concern that westbound CTH Q traffic turning left into the potential driveway will impede other CTH Q traffic, especially if an exclusive left-turn lane were provided. However, the widening of County Line Road (CTH Q) and other short-term actions proposed for implementation would not address the minor concern of the Wisconsin Department of Transportation that the potential driveway would represent a potential conflict and potential impedance, particularly between traffic turning left from River Crest Drive to eastbound County Line Road (CTH Q) to enter the on-ramp to southeastbound USH 41/45 and traffic turning right from the new driveway.

Another long-range improvement alternative considered but rejected was the extension of Maple Road between STH 175 and CTH Q. The extension of Maple Road between STH 175 and CTH Q was rejected because such an extension would not be expected to remove traffic or turning movements from CTH Q between STH 175 and River Crest Drive and, thus, would not be expected to have any impact on the accident potential over that segment. In addition, the existing and forecast long-range potential problems at the intersection of STH 175 and CTH Q may be expected to be abated by the programmed improvement of this intersection.

A third long-range improvement alternative considered but rejected was the extension of River Crest Drive from its terminus at CTH Q to STH 175 in the Village of Menomonee Falls. Based on existing traffic patterns, it is estimated that approximately 3,500 vehicles per average weekday would use this extension to avoid the intersection of CTH Q and STH 175. An advantage of this alternative would be a modest improvement in the operation of CTH Q and STH 175. The disadvantages of this alternative include an estimated cost of \$650,000, including the cost of right-of-way; the severing of a primary environmental corridor along the Menomonee River; and the penetration of a planned residential neighborhood in the Village of Menomonee Falls by 3,500 vehicles per average weekday that have neither trip end in the neighborhood. Further, those motorists who may be expected to divert to the extension of River Crest Drive are currently properly using, and, upon implementation of, the improvements recommended in this plan will be adequately served by, the arterial street system in the area. Therefore, it is recommended that River Crest Drive not be extended to STH 175 from its current terminus at CTH Q.

A fourth long-range improvement alternative considered but rejected was to extend and relocate Richfield Way from its current intersection with CTH Q and Emmer Road to align with the intersection of CTH Q and River Crest Drive. The advantages of this alternative would be to eliminate motorist confusion regarding the proper entrance to the southbound USH 41/45 freeway, and a modest improvement in traffic safety through the relocation of a number of vehicular conflict points to an intersection recommended for implementation of traffic signal control. The disadvantages of this alternative are related to the penetration of a primary environmental corridor and the Menomonee River floodplain, and the substandard geometric constraints at the new intersection imposed by the proximity of the Menomonee River and CTH Q. This proximity would necessitate a very short radius curve with a design speed of 20 miles per hour on Richfield Way immediately south of CTH Q, which would constitute a safety hazard. Virtually all the proposed roadway would be constructed in the environmental corridor and the floodplain, at an estimated cost--including right-of-way--of \$100,000. Therefore, it is recommended that this alternative not be implemented.

SUMMARY AND CONCLUSIONS

In April 1988, the Commission staff was requested by Village of Germantown representatives on the Technical Coordinating and Advisory Committee on Jurisdictional Highway Planning for Washington County to conduct a traffic engineering study of the segment of County Line Road (CTH Q) between the intersections of Appleton Avenue (STH 175) and USH 41/45.

The average weekday traffic volumes on the study segment of County Line Road (CTH Q) currently range from 14,300 to 16,200 vehicles. Richfield Way south of County Line Road (CTH Q) has an average weekday traffic volume of 3,300 vehicles; River Crest Drive north of County Line Road (CTH Q) has an average weekday traffic volume of 5,300 vehicles; and Riversbend Lane north of County Line Road (CTH Q) has an average weekday traffic volume of 900 vehicles. The one-way segment of Emmer Road north of County Line Road (CTH Q) carries 2,600 vehicles per average weekday.

A capacity analysis of the County Line Road (CTH Q) intersection with River Crest Drive was conducted to identify existing traffic congestion and delay problems. At the intersection of County Line Road (CTH Q) and River Crest Drive, which is controlled by a stop sign on River Crest Drive, the southbound left-turn movement is presently exceeding capacity during seven hours of an average weekday.

The average vehicular operating speed on County Line Road (CTH Q) west of Riversbend Lane was found to be approximately 40 miles per hour; and east of the Mills Fleet Farm driveway was found to be approximately 34 miles per hour. The 85th percentile speed was found to be 45 miles per hour west of Riversbend Lane and 38 miles per hour east of the Mills Fleet Farm driveways. Thus, it may be concluded that the existing speed limit of 40 miles per hour is within the range of the 85th percentile speed on the study segment, and is therefore a reasonable speed limit. The 10 mile per hour pace was found to be 36 to 45 miles per hour, and included 70 percent of all vehicles west of Riversbend Lane. East of the Mills Fleet Farm, the 10 mile per hour pace was found to be 29 to 38 miles per hour and included 71 percent of all vehicles. Thus, the

majority of motorists are traveling through the study segment at relatively uniform speeds.

The incidence and location of accidents provides another important measure of the efficiency and operating characteristics of an arterial facility such as County Line Road (CTH Q). The number of accidents increased from a total of 20 accidents on the study segment in 1985 to 28 accidents in 1986; and 37 accidents in 1987. None of the accidents involved a fatality, but over 28 percent of all accidents, or over one in four, over the three-year period involved injuries.

Subsequent to the collection of average weekday count data in September 1988, additional development of lands abutting CTH Q has either occurred or is being planned. The new development and proposed development may be expected to generate approximately 9,100 vehicle trips on an average weekday. Of the 9,100 total vehicle trips expected to be generated per average weekday by the recent or planned development along County Line Road (CTH Q), 2,900 vehicle trips per average weekday may be expected to come from traffic already on County Line Road (CTH Q), and 6,200 vehicle trips per average weekday may be expected to be new trips and, therefore, represents additional traffic on County Line Road (CTH Q). Thus, the average weekday traffic volumes upon completion of the planned development may be expected to increase from 14,300 vehicles per average weekday in 1988 to 17,000 vehicles per average weekday west of Riversbend Lane; and from an existing 16,000 vehicles per average weekday in 1988 to 19,600 vehicles per average weekday east of River Crest Drive.

County Line Road (CTH Q) east of River Crest Drive is a four-traffic-lane divided roadway with a design capacity of 25,000 vehicles per average weekday; and west of River Crest Drive is a four-traffic-lane undivided roadway with a design capacity of 17,000 vehicles per average weekday. County Line Road (CTH Q) carried 14,300 to 16,200 vehicles per average weekday in 1988, which is within its design capacity. Based on subsequent and proposed development of abutting lands, CTH Q is anticipated to carry 17,000 to 19,600 vehicles per average weekday, which will exceed the design capacity of its segments which are four-traffic-lane undivided cross-sections.

The principal existing accident problem identified is located on the segment of County Line Road (CTH Q) between Appleton Avenue (STH 175) and the Menomonee River, with a total of 26 accidents reported in the calendar years 1985 through 1987, of which 23 of the accidents occurred as patrons of Mills Fleet Farm entered or exited the two driveways; and of those 23 accidents, 15 accidents--about two-thirds--occurred at the western Mills Fleet Farm driveway. Many of these accidents are the result of the western driveway being located too close to the intersection of County Line Road (CTH Q) with Appleton Avenue (STH 175). The reconstruction of the intersection of Appleton Avenue (STH 175) and County Line Road (CTH Q) programmed to be done in 1990 by the Wisconsin Department of Transportation, which will improve this segment of County Line Road (CTH Q) to a divided cross-section and will eliminate left turns to and from the westernmost Mills Fleet Farm driveway, may be expected to abate this problem. It is also recommended that the west driveway to the Mills Fleet Farm be closed and replaced with an additional driveway north of Fleet Farm onto STH 175 at a cost of \$40,000 to construct the new driveway, excluding the cost of acquiring right-of-way.

Village officials requested that the access proposed for the potential shopping center be reviewed. The 4,300 vehicles per average weekday estimated to be generated by the potential shopping center with two fast food restaurants would best be served by two access points, with one access point on CTH Q and a supplementary access point onto Riversbend Lane.

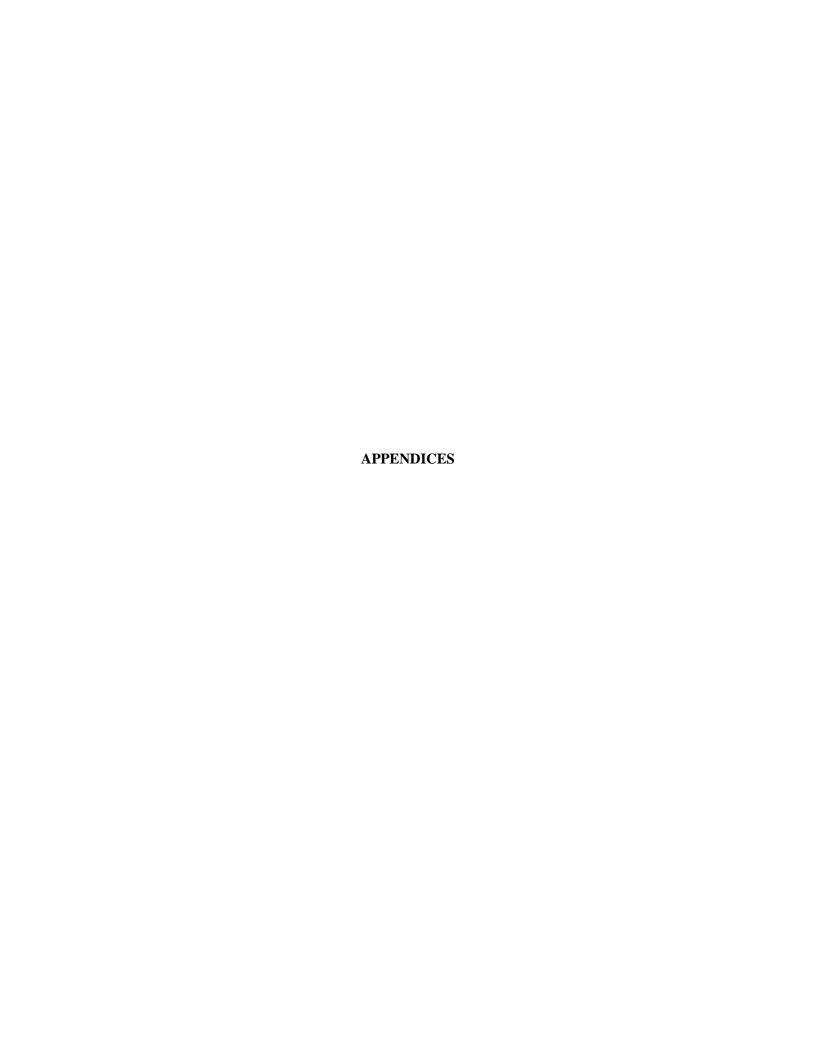
A traffic congestion problem was identified at the intersection of County Line Road (CTH Q) and River Crest Drive, with excessive delay for the southbound left-turn movement from River Crest Drive to County Line Road (CTH Q). The traffic engineering action recommended to alleviate the identified problem was the installation of actuated traffic signals at the intersection, at a cost of \$60,000.

A problem of potential motorist confusion at Richfield Way and CTH Q was identified by Village officials. Eastbound motorists may mistakenly enter the right-turn deceleration lane to Richfield Way believing it to be the south-bound USH 41/45 on-ramp and then attempt to merge back into eastbound

CTH Q traffic to reach the on-ramp. The traffic engineering action identified to abate this problem was the installation of additional guide signing, at a cost of \$5,500.

A traffic forecast for the year 2010 was prepared for the segment of County Line Road (CTH Q) between USH 41/45 and Appleton Avenue (STH 175). This traffic forecast is based on the year 2010 land use plan under preparation. County Line Road (CTH Q) may be expected to have a year 2010 average weekday traffic volume of about 20,000 to 25,000 vehicles per average weekday. These volumes may be expected to require that the four-traffic-lane divided cross-section of CTH Q which currently terminates at River Crest Drive be extended to meet the proposed four-traffic-lane divided cross-section 850 feet east of STH 175 programmed to be constructed by the Wisconsin Department of Transportation in 1990, providing an increase in capacity to 25,000 vehicles per average weekday, at a cost of \$500,000.

Median openings are recommended at River Crest Drive, at Riversbend Lane-Burger King driveway-Taco Bell driveway, and at the Taco Bell-Riversbend Golf Course-potential shopping center driveway. Exclusive left-turn lanes are also recommended at the intersection of County Line Road (CTH Q) with River Crest Drive, Riversbend Lane, and the Taco Bell-potential shopping center-Riversbend Golf Course driveway.

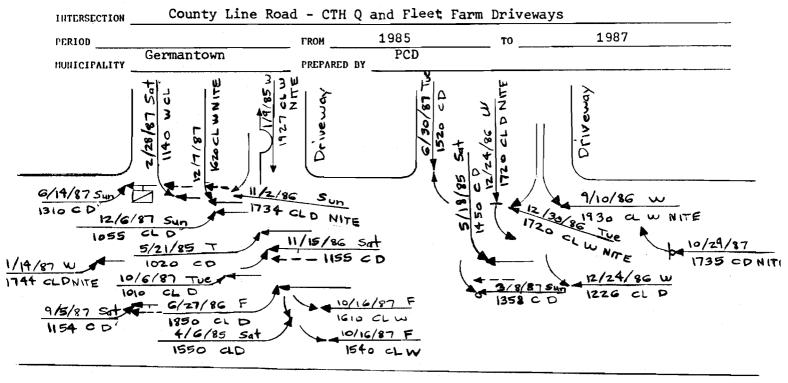


Appendix A

MOTOR VEHICLE COLLISION DIAGRAMS

COLLISION DIAGRAM

Southeastern Wisconsin Regional Planning Commission



CTH Q



SHOW FOR EACH ACCIDENT	LEC	SUHMARY				
1. Time, Day & Date	SYMBOLS	TYPES OF COLLISION	Туре	Day	Night	Total
2. Pavement:	→ Hoving vehicle	Rear end	Fatal			-
D = Dry I = Icy W = Wet	Backing vehicle		Pedestrian Injury	į	. 1	-
 Weather C = Clear; F = Fog; 	Non-involved vehicle	Side swipe Out of control	Other Injury	-	ŀ	2
R = Rain; SL = Sleet; SN = Snow; CL = Cloudy	X → Pedestrian O → Bicycle	Left turn	Property Damage Only	14	7	21
4. NITE - If between dusk and dawn.	Parked vehicle Fixed object	Right angle	Total	15	8	23
	Fatal accident O Injury accident					

Southeastern Wisconsin Regional Planning Commission

INTERSECTION	County	Line Road	- CTH Q - a	and Richfield W	lay/Emme	r Road			
PERIOD			FROM	1985	TO	1987			
MUNICIPALITY _	Germant	own	PREPARED BY	PCD			 -		-
TORICITALITY _	10/	58 CL D 58 CL D 6/3 1450	12/7/85 F 2030 CDNI 12/7/86 17/2 102 102 102 102 102 102 102 10	Sun D NITE /86 Sat CL D NITE 7/86 Sun 0 CD 1/23/86 W 712 CD 4/18/87 Sat 2157 CD NITE	7/17/87 1946 CE 24/87 1820 3/21/8	Sat CD NITE 1 Sat CD	H	Q	
				<u>. </u>	\ \(\varphi \)		_		U
HOW FOR EACH AC	CIDENT		LEG	END		SUN	MARY		
. Time, Day & D	ate	SYMBOL	s	TYPES OF COLL	ISION	Туре	Day	Night	Total
Davament									L

SHOW FOR EACH ACCIDENT	LEC	SURMARY				
1. Time, Day & Date	SYMBOLS	TYPES OF COLLISION	Туре	Day	Night	Total
<pre>2. Pavement: D = Dry</pre>	◄ Moving vehicle	Rear end	[atal	_		_
I = Icy W = Wet	Backing vehicle	llead on	Pedestrian Injury	_	-	
<pre>3. Weather C = Clear; F = Fog; R = Rain; SL = Sleet;</pre>	vehicle ———————————————————————————————————	Side swipe Out of control	Other Injury	3	ı	4
SN = Snow; CL = Cloudy 4. NITE - If between	O Bicycle	Left turn	Property Damage Only	7	7	14
dusk and dawn.	Parked vehicle Fixed object	Right angle	Total	lo	8	18
	Fatal accident O Injury accident					

Southeastern Wisconsin Regional Planning Commission

PERIOD FROM 1985 TO 1987 HUNICIPALITY Germantown PREPARED BY PCD 1987 198
1030 CD
11/2/8C Sun 1030 CD C/2/85 Sun 6/2/85 Sun 6/2/85 Sun 6/2/85 Sun 6/2/85 Sun 6/2/85 Sun
12/G/87 SUN 2115 S I NITE 3/31/87 Tue 2148 CD NITE CTH G

SHOW FOR EACH ACCIDENT	LEC	SUHMARY				
1. Time, Day & Date	SYMBOLS	TYPES OF COLLISION	Туре	Day	Night	Total
2. Pavement:	- Moving vehicle	→ - Rear end	Fatal			~
D = Dry I = Icy W = Wet	Backing vehicle		Pedestrian Injury	_	_	
<pre>3. Weather C = Clear; F = Fog;</pre>	Non-involved vehicle	Side swipe Out of control	Other Injury	6	l	7
R = Rain; SL = Sleet; SN = Snow; CL = Cloudy	X → Pedestrian O TO Bicycle	Left turn	Property Damage Only	7	2	9
4. NITE - If between dusk and dawn.	Parked vehicle	Right angle	Total	13	3	16
	Fixed object Fatal accident Injury accident					

Southeastern Wisconsin Regional Planning Commission County Line Road - CTH Q- and Riversbend Lane

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				CTH	<u>Q</u>
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SHOW FOR EACH ACCIDENT	LE	GEND	SUHMARY				
1. Time, Day & Date	SYMBOLS	TYPES OF COLLISION	Туре	Day	Night	Total	
<pre>2. Pavement: D = Dry</pre>	→ Moving vehicle	← ← Rear end	Fatal .			-	
I = Icy W = Wet	Backing vehicle	llead on	Pedestrian Injury			_	
<pre>3. Weather C = Clear; F = Fog; R = Rain; SL = Sleet;</pre>	vehicle Yelicle	Side swipe Out of control	Other Injury	5		5	
SN = Snow; CL = Cloudy 4. NITE - If between	O Bicycle	Left turn	Property Damage Only	2	2	4	
dusk and dawn.	Parked vehicle Fixed object	Right angle	Total	7	2	9	
	Fatal accident						
	O Injury accident						

Southeastern Wisconsin Regional Planning Commission

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HUNICIPALITY	Germantown	PREPARED BY	PCD		
	(0	20 CD NITE 10/5/85 SA - RW /27/87 Tue 20 CD NITE	10/21/ 12/20/ 12/26/		- .



SHOW FOR EACH ACCIDENT	LEC	SUMMARY				
1. Time, Day & Date	SYMBOLS	TYPES OF COLLISION	Туре	Day	Night	Total
<pre>2. Pavement: D = Dry</pre>	Hoving vehicle	Rear end	Fatal .	_	_	_
I = Icy W = Wet	Backing vehicle	Ilead on	Pedestrian Injury	_	1	١
<pre>3. Weather C = Clear; F = Fog; R = Rain; SL = Sleet;</pre>	Non-involved vehicle	Side swipe Out of control	Other Injury	-	-	l
SN = Snow; CL = Cloudy	O Bicycle	Left turn	Property Damage Only	3	2	5
4. NITE - If between dusk and dawn.	Parked vehicle	Right angle	Total	4	3	7
	Fixed object Fatal accident O Injury accident					

Appendix B

WARRANTS FOR TRAFFIC SIGNAL INSTALLATION AT INTERSECTION OF COUNTY LINE ROAD AND MILLS FLEET FARM EAST DRIVEWAY

Warrant 1: Minimum Vehicular Volume

	f Lanes for on Each Approach Minor Street	Vehicles Per Hour on Major Street (total of	Vehicles Per Hour On Minor Street Approach (one
1 9	(Mills Fleet Farm)	both approaches)a	direction only)a
(county bine near)	(MIIII)	both approaches,	<u> </u>
2	2	600 ^b	200b
		Warrant	Warrant
Hours Counts Conduc	ted		
1. 9:00 a.m10):00 a.m	520	89
2. 10:00 a.m1	1:00 a.m	568	145
	2:00 p.m		155
4. 12:00 p.m1	:00 p.m	905	155
5. 1:00 p.m2:	00 p.m	705	150
6. 2:00 p.m3:	00 p.m	812	142
7. 3:00 p.m4:	00 p.m	907	141
8. 4:00 p.m5:	00 p.m	1,074	174
9. 5:00 p.m6:	00 p.m	1,082	155
10. 6:00 p.m7:	00 p.m	818	151
11. 7:00 p.m8:	00 p.m	651	181
12. 8:00 p.m9:	00 p.m	486	120
ļ			

^{*}Hours exceeding warrant (8 hours required)

Warrant 2: Interruption of Continuous Traffic

Number of Moving Traffic of Major Street (County Line Road)	n Each Approach Minor Street	Vehicles Per Hour on Major Street (total of both approaches) ^a	Vehicles Per Hour On Minor Street Approach (one direction only) ^a
2	2	900b Warrant	100 ^b Warrant
2. 10:00 a.m11: 3. 11:00 a.m12: 4. 12:00 p.m2:00 6. 2:00 p.m3:00 7. 3:00 p.m4:00 8. 4:00 p.m5:00 9. 5:00 p.m6:00 10. 6:00 p.m7:00 11. 7:00 p.m8:00	d 10 a.m 00 a.m 00 p.m 0 p.m	520 568 797 905* 705 812 907* 1,074* 1,082* 818 651 486	89 145 155 155* 150 142 141* 174* 155* 151 181

^{*}Hours exceeding warrants (8 hours required).

Source: SEWRPC.

 $^{^{\}mathrm{a}}\mathrm{Traffic}$ volumes shown reflect a reduction of the right-turn volumes by one-half to account for right turns on red.

bWhen the 85th percentile speed of major street traffic exceeds 40 mph, the warrant is 70 percent of requirements given in the <u>Manual on Uniform Traffic Control Device</u>. A spot speed study conducted on May 1, 1989, found an 85th percentile speed of 38 mph; therefore, the numbers shown have been not reduced to 70 percent of requirements.

Appendix C

WARRANTS FOR TRAFFIC SIGNAL INSTALLATION AT INTERSECTION OF COUNTY LINE ROAD AND RIVER CREST DRIVE

Warrant 1: Minimum Vehicular Volume

Moving Traffi	of Lanes for c on Each Approach Minor Street	Vehicles Per Hour on Major Street (total of	Vehicles Per Hour On Minor Street Approach (one
1	(River Crest Drive)	both approaches)a	direction only)a
2	2	420b Warrant	140b Warrant
Hours Counts Condu			
	00 a.m	698*	160*
	00 a.m	865*	180*
3. 8:00 a.m9:	00 a.m	864*	153*
4. 9:00 a.m10	:00 a.m	623*	181*
5. 10:00 a.m1	1:00 a.m	541	122
6. 11:00 a.m1	2:00 p.m	852*	143*
7. 12:00 p.m1	:00 p.m	911*	280*
8. 1:00 p.m2:	00 p.m	826*	196*
9. 2:00 p.m3:	00 p.m	821*	171*
10. 3:00 p.m4:	00 p.m	920*	175*
11. 4:00 p.m5:	00 p.m	1,365*	145*
12. 5:00 p.m6:	00 p.m	1,246*	200*

Warrant 2: Interruption of Continuous Traffic

Number of Lanes for Moving Traffic on Each Approach Major Street Minor Street		Vehicles Per Hour on Major Street (total of	Vehicles Per Hour On Minor Street Approach (one
(County Line Road) (Ri		both approaches)a	direction only)a
2	2	630 ^b Warrant	70b Warrant
Hours Counts Conducted			
1. 6:00 a.m7:00 a.m		698*	160*
2. 7:00 a.m8:00 a.m		865*	180*
3. 8:00 a.m9:00 a.m			153*
4. 9:00 a.m10:00 a.m		623	181
5. 10:00 a.m11:00 a.m		541	122
6. 11:00 a.m12:00 p.m		852*	143*
7. 12:00 p.m1:00 p.m		911*	280*
8. 1:00 p.m2:00 p.m		826*	196*
9. 2:00 p.m3:00 p.m		821*	171*
10. 3:00 p.m4:00 p.m		920*	175*
11. 4:00 p.m5:00 p.m		1,365*	145*
12. 5:00 p.m6:00 p.m.	• • • • • • • • • • • • • • • • • • • •	1,246*	200*

^{*}Hours exceeding warrant (8 hours required).

bWhen the 85th percentile speed of major street traffic exceeds 40 mph, the minimum vehicular volume warrant is 70 percent of requirements given in the <u>Manual on Uniform Traffic Control Device</u>. A spot speed study conducted on August 24, 1988, found an 85th percentile speed of 44.9 mph; therefore, the numbers shown have been reduced to 70 percent of requirements.

Source: SEWRPC.

 $^{^{}a}\mathrm{Traffic}$ volumes shown reflect a reduction of the right-turn volumes by one-half to account for right turns on red.