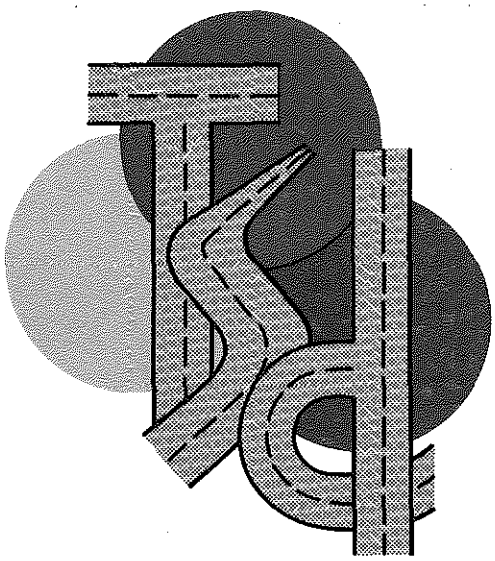
A TRAFFIC ACCIDENT ANALYSIS OF HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Report TSD-SS-174-71



TRAFFIC and SAFETY DIVISION

DEPARTMENT OF STATE HIGHWAYS
STATE OF MICHIGAN

A TRAFFIC ACCIDENT ANALYSIS OF HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Report TSD-SS-174-71

by

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NHTSA PROJECT #MIS-69-3(F)

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INTRODUCTION

The Highway Safety Act of 1966 was enacted by the Congress of the United States in order to promote highway safety programs. Subsequently, various highway safety standards were developed to assure the orderly implementation of the Act.

Highway Safety Standard 4.4.9, Identification and Surveillance of Accident Locations, is one of those standards. The purpose of Standard 4.4.9 is to identify specific locations or sections of streets and highways which have high or potentially high accident experience as a basis for establishing priorities for improvement, selective enforcement or other operational practices that will eliminate or reduce the hazards at the location so identified.

The State of Michigan carries out a program of this type on the state trunkline system; however, many of the state's city and county agencies lack the financial and technical prerequisites necessary to pursue similar programs with similarly defined objectives. To insure that this additional highway safety standard is met and to improve the overall evaluation of the accident picture in Michigan, the Michigan Department of State Highways requested and received through the Office of Highway Safety Planning in the Department of State Police a federally funded project entitled "Traffic Accident Analysis for Cities and Counties". The intent of this new project is to provide a special

traffic engineering field service for cities and counties. In cooperation with participating cities and counties, the proposed service under the direction of department personnel will make a traffic engineering evaluation of the factors causing traffic accidents and will recommend corrections to those conditions which may be contributing to accidents.

SCOPE

The intent of this program is to improve traffic safety on all Michigan streets and roads by expanding the traffic engineering evaluation of factors causing accidents. This should be accomplished by conducting traffic accident analyses on locations which experience high accident frequencies and summarizing recommendations for corrective action.

STUDY PROCEDURES

The study procedures for the subject project involve several distinct phases. They may be described as follows: basic data collection, identifying and locating high accident locations, an accident analysis of these high accident locations, technical evaluation of previously compiled facts and consequent remedial recommendations.

Since a portion of the data collection phase involves accident records and reports and since the Michigan Department of State Police is responsible for keeping all accident

records in Michigan, the task of identifying and locating high accident locations in the City of Three Rivers (and providing an inventory of those locations) was designated as State Police responsibility. Because of the fact that an automated system of locating accidents has not yet been established on a statewide basis, the high accident locations (city streets only) for the City of Three Rivers were determined by manually extracting and compiling those locations with the highest number of accidents from the 1966, 1967 and 1968 city accident reports. From this list the 14 highest accident locations on city streets were selected. Once the problem locations were identified, additional accident information for the years 1969 and 1970 was compiled in order to expand the accident base at each location. Upon completion of this portion of the data collection, the Department of State Police documented and transmitted to the Traffic and Safety Division of the Department of State Highways a list, along with the accident reports, of the high accident locations for the City of Three Rivers.

The second portion of the data collection phase which is the responsibility of the Department of State Highways involves data collection utilizing the following basic steps: 1) preparation of collision diagrams and, if necessary, physical condition diagrams for each selected location and 2) obtaining traffic counts where necessary.

The accident analysis phase involves the analysis of

the summarized facts and field data from the viewpoint of a highway traffic engineer with special attention focused on the effect which the highway environment may have had on the accident. Thus, at each high accident location, individual accident reports were reviewed in detail and the accident factors were tabulated and grouped in various tables. Collision diagrams were prepared for each location in order to identify accident patterns and to locate the accident in relation to the intersection or approaches to the intersection.

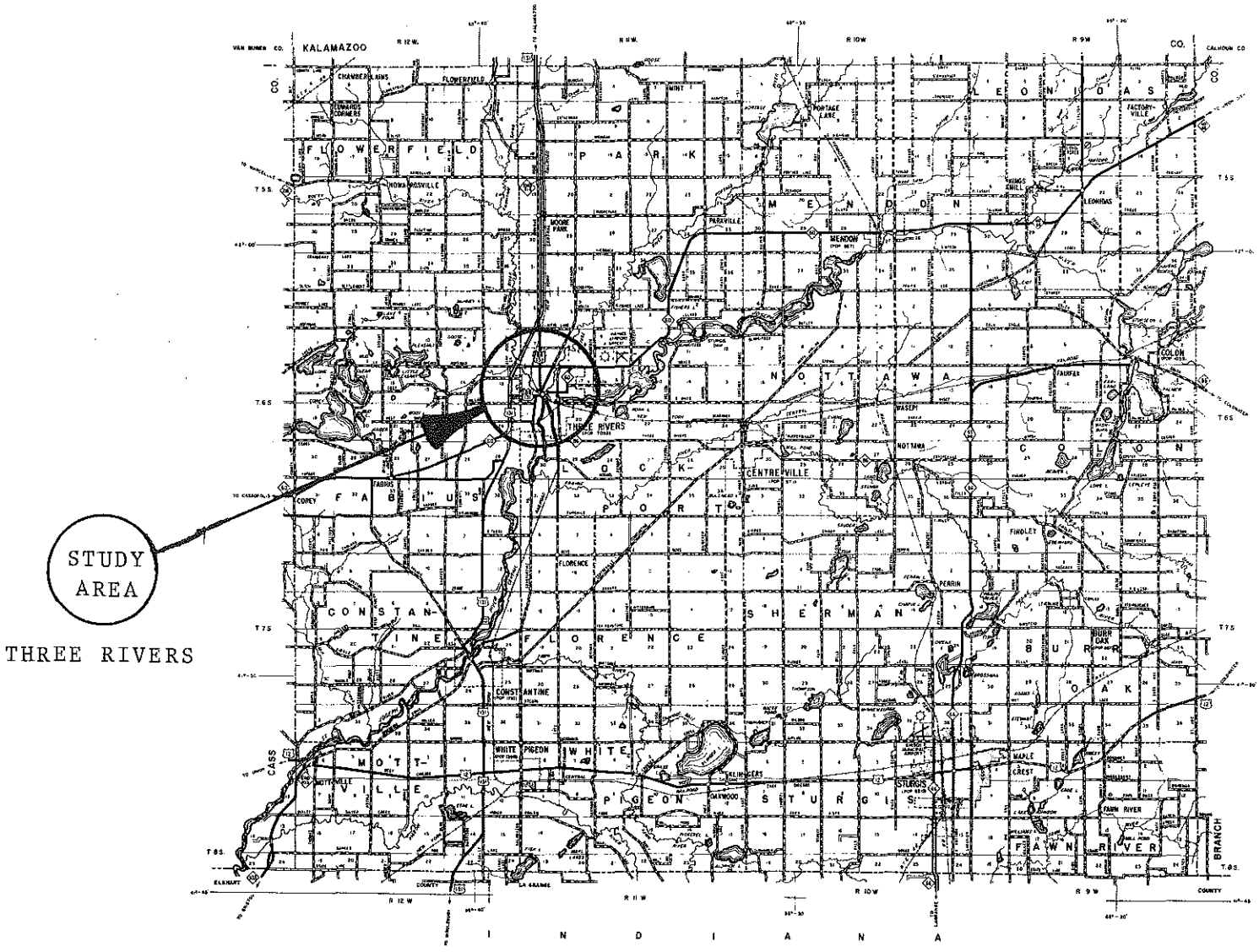
The traffic engineering analysis phase involves evaluating the summarized facts and field data and prescribing the proper remedial treatment.

STUDY AREA

The City of Three Rivers is located in Lockport Township in the northwest portion of St. Joseph County (Figure 1). The city received its name from the confluence of three rivers, the St. Joseph, the Rocky and the Portage Rivers.

The indians were the first people to recognize the scenic beauty and strategic importance of this area. Indian tribes such as the Ottawa, the Chippewa, the Potowatomi and the Shawnee fought over the right to retain this area for themselves. In 1871 the City of Three Rivers, which was plotted in 1836, absorbed two other villages in the area, Moab,

FIGURE 1



GENERAL HIGHWAY MAP
ST. JOSEPH COUNTY
MICHIGAN
STATE HIGHWAY COMMISSION
DEPARTMENT OF STATE HIGHWAYS

plotted in 1830, and St. Joseph, plotted in 1831. This annexation was accomplished after many bitter fights and lawsuits between the three villages.

Connecting Three Rivers with the rest of the state are highways US-131, which provides north-south access; M-60, which provides east-west access; and M-86, an east-west highway which provides access to Centreville, the St. Joseph County Seat. US-131 Business Loop passes through the city providing it with a four-lane divided freeway to Kalamazoo. The Indiana Toll Road, which is the link between Chicago and New York, is situated 12 miles south of the city. The Penn Central Railroad services the Three Rivers' area with lines radiating north, south and east from the city. Located two miles northeast of Three Rivers is the city airport, Dr. Haines Flying Field, possessing a 3,000 foot lighted runway serving private and some commercial planes.

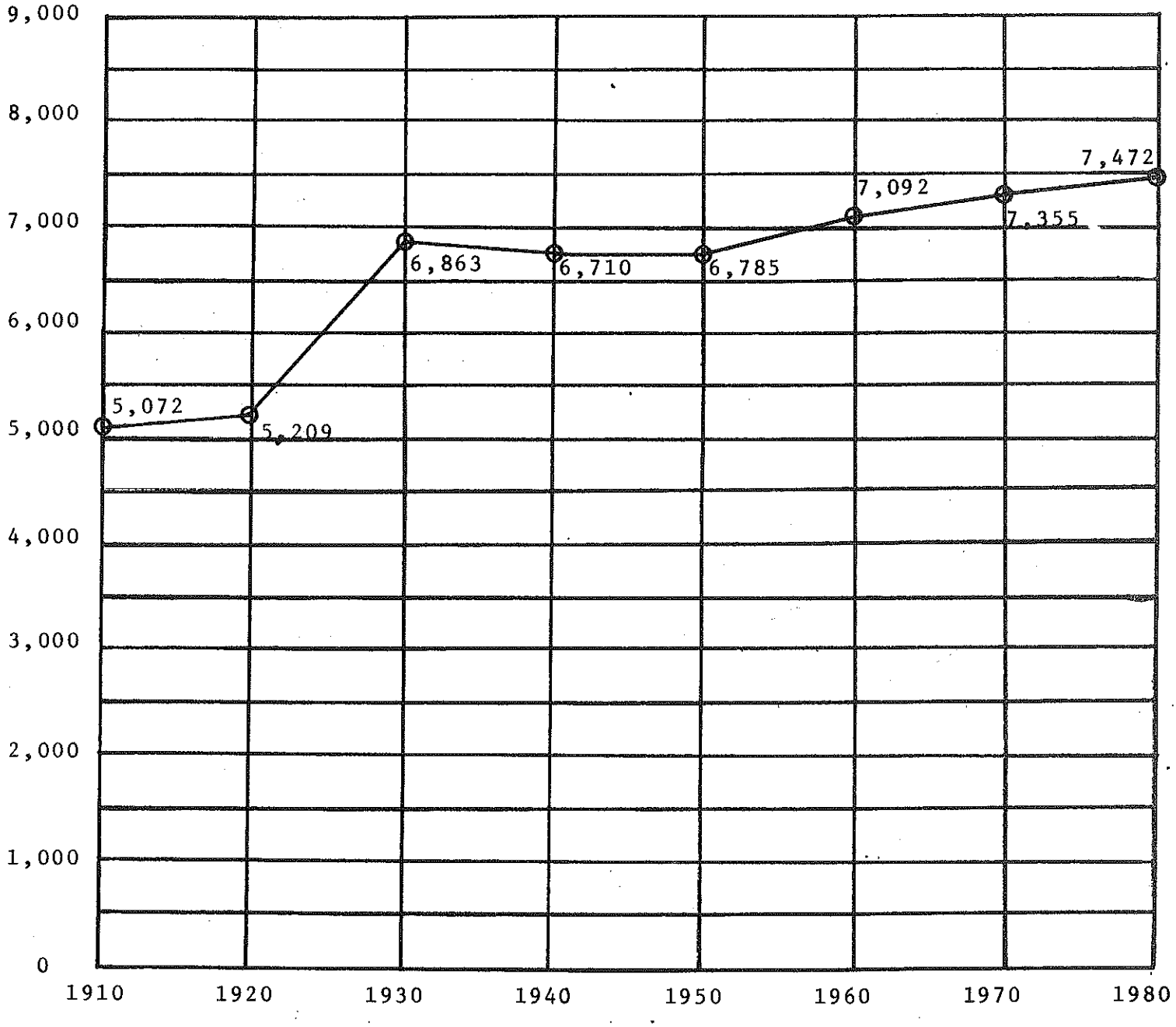
Three Rivers' population expanded by 30.0 percent from 1910 to 1930 and then experienced a stablizing period which extended until after the Second World War (Figure 2). The population growth from 1960 - 1970 increased at a minimal rate, 3.7 percent, as compared to the county's increase of 12.0 percent and to the surrounding townships of Lockport and Fabius which had an increase of 19.3 percent and 50.1 percent, respectively. This indicates that the population in the city is expanding at a reduced rate as compared to the adjacent areas, a trend occurring in many urban areas today. However, there appears to be no reason why the Three

FIGURE 2

POPULATION PROJECTION

CITY OF THREE RIVERS

1910 - 1980



SOURCE: U. S. Bureau of the Census

Rivers' area population will not rise in future years.

The area surrounding Three Rivers is very suitable to agriculture, with farms accounting for over 75 percent of the land use in St. Joseph County. Some of the chief crops grown in the area are corn, wheat, soybeans, oats, mint, wormwood, apples and alfalfa. There exists also a growing dairy and cattle business in this locale.

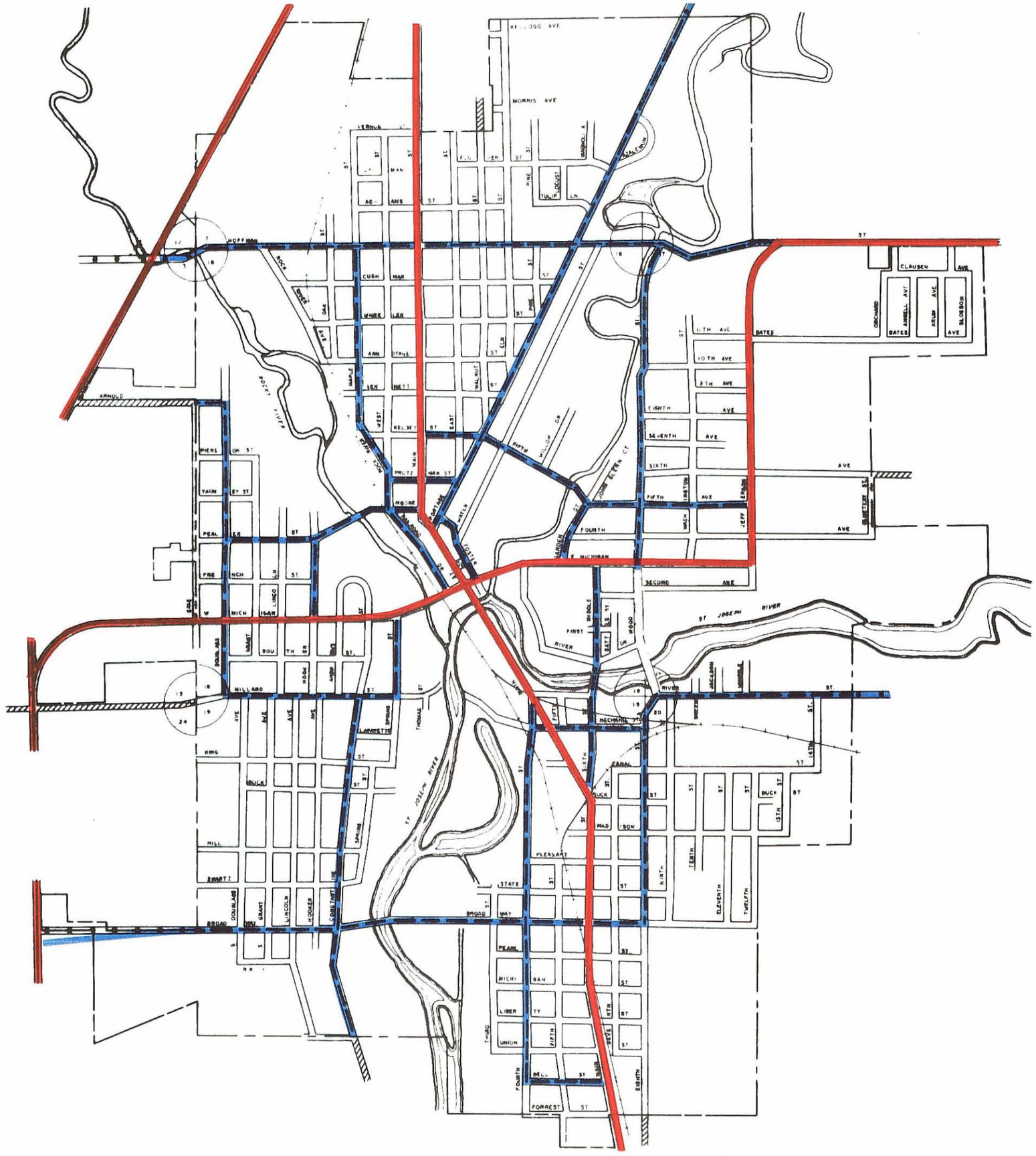
Industry in Three Rivers has developed from a slow beginning in the 19th century to well over 40 industrial operations at this time and many more are moving into the adjacent townships. These operations employ up to 2,500 persons in the Three Rivers' area. Products manufactured are varied to achieve a stable economy for the community and neighboring townships.

Another economic boost to the Three Rivers' region is tourism for which picturesque St. Joseph County is noted. With approximately four miles of rivers in the city and sixteen small lakes in the region, the area caters to the tourist, vacationer and fishermen, in both summer and winter.

According to the Nineteenth Annual Progress Report as compiled by the Local Government Division of the Michigan Department of State Highways the City of Three Rivers has 46.92 miles of streets. This figure includes 4.41 miles of state trunkline, 12.25 miles of major city streets and 30.26 miles of local city streets. A map showing these road types can be found on the following page.

STATE OF MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

CITY OF THREE RIVERS ST. JOSEPH COUNTY



ROAD SYSTEM

- STATE TRUNKLINE
- COUNTY PRIMARY
- COUNTY LOCAL
- ADJACENT COUNTY OR CITY
- CITY OR VILLAGE MAJOR ST.
- CITY OR VILLAGE LOCAL ST.
- CITY OR VILLAGE OFFICES ⊗

N

SCALE

FIGURE 3

TRAFFIC ENGINEERING ANALYSIS

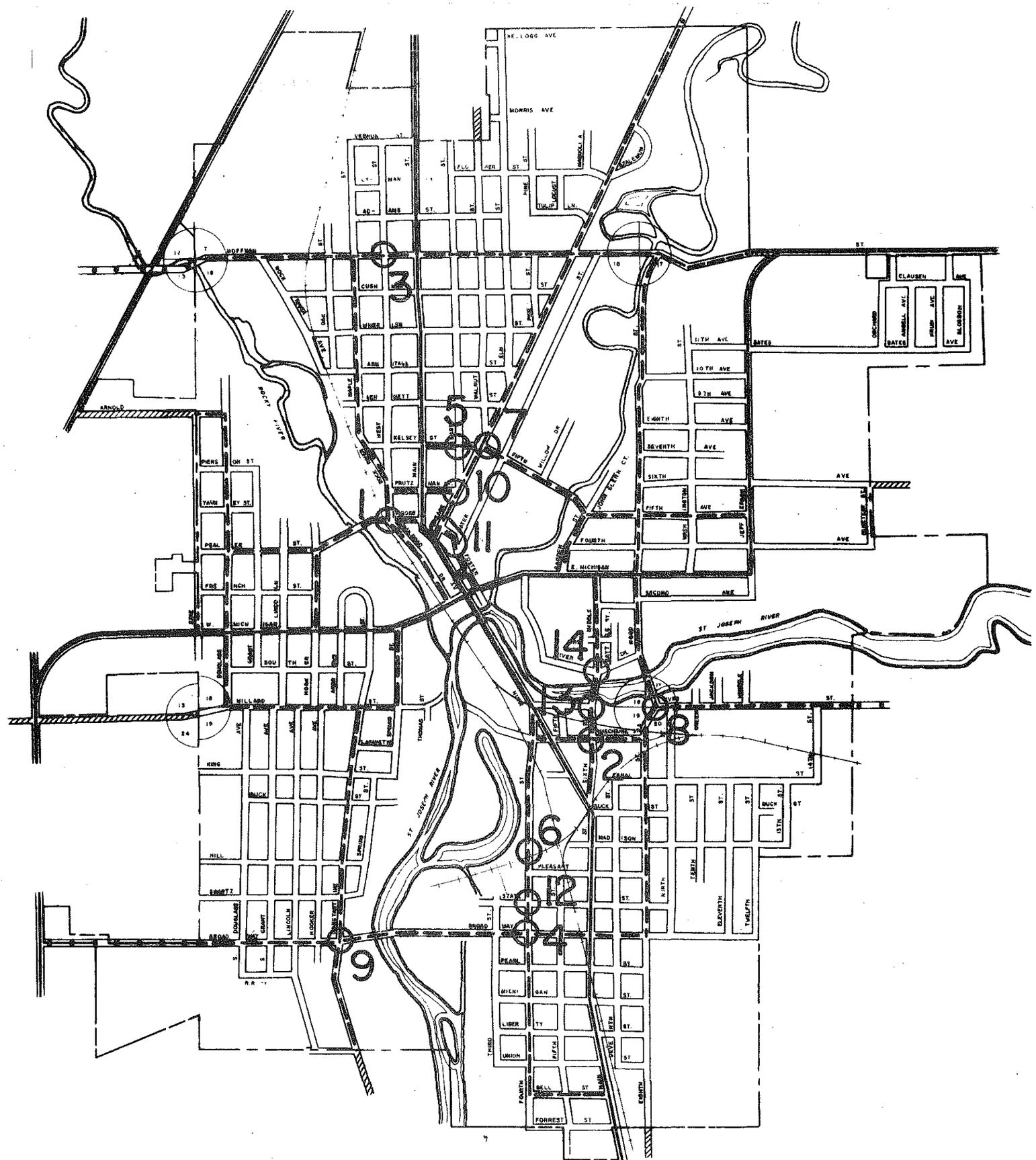
The traffic engineering analysis phase of our study involves evaluating the summarized facts and field data and prescribing the proper remedial treatment. One of the basic tools used in this type of analysis is a graphic representation of accidents either on a spot collision diagram or strip map which is used to locate the accident and determine accident patterns. This is one of the engineering techniques used in trying to eliminate the causes of accidents. Accident causes, however, are numerous and often difficult to determine. An accident pattern does not always exist. In this case the collisions may involve one or more serious driving hazards such as slippery pavement, snow or fog, drinking drivers, defective equipment, excessive speed and inadequate traffic controls. In many cases these hazards may be eliminated or at best controlled. In some cases the accident causes may lie in factors outside the jurisdiction of the traffic engineer, such as enforcement. In this instance he can offer specific information to the police or other responsible agencies and request their cooperation.

In the City of Three Rivers the traffic engineering analysis began when the State Police, after compiling the accident data for the city streets in Three Rivers, transmitted to the Michigan Department of State Highways 14 high accident locations (Figure 4). Additional statistical information was collected on the reported traffic accidents in the City

STATE OF MICHIGAN

DEPARTMENT OF STATE HIGHWAYS

CITY OF
THREE RIVERS
ST. JOSEPH COUNTY



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SCALE

FIGURE 4

SPOT MAP

FOR

HIGH ACCIDENT LOCATIONS

of Three Rivers. Table 1 shows that reported traffic accidents increased between 1966 and 1968 and between 1969 and 1970 while the reported traffic accidents decreased between 1968 and 1969. There was a total of 427 reported traffic accidents on the City of Three Rivers' streets during the five-year study period for an average of 105 accidents per year. The 14 high accident locations accounted for 100 of the total reported accidents in the city. This figure is approximately 23.0 percent of the reported accidents. It would appear from these figures that the greatest portion of Three Rivers' reported accidents have not occurred at any specific locations but are scattered throughout the entire city. Even so, the city as a whole doesn't experience an alarming accident criticality.

To further document the various facts present at the 14 high accident locations, the following tables were prepared to tabulate and chart specific data (see Tables 2 through 8 on pps. 15 - 19).

2) Monthly and Daily Accident Occurrence

3) Annual Accident Summary

4) Daily and Hourly Accident Occurrence

5) Age of Drivers Involved in Accidents

6) Residence of Drivers Involved in Accidents

7) Weather Conditions at the Scene of Accidents

8) Pavement Conditions at the Scene of Accidents

Table 1

REPORTED TRAFFIC ACCIDENTS IN THE CITY OF THREE RIVERS

Year	Total	City Streets	Property Damage	Injury	Fatal	Persons Injured	Persons Killed
1966	238	101	190	48	0	67	0
1967	253	106	204	47	2	90	2
1968	267	114	200	67	0	95	0
1969	255	111	196	59	2	77	2
1970	262	95	194	68	0	98	0

COMPARISON OF ACCIDENT FREQUENCY

Year	Three Rivers' Streets	St. Joseph County Roads	Total Accidents State of Mich.
1966	101	1,379	302,880
1967	106	1,447	299,004
1968	114	1,703	305,495
1969	111	1,857	331,223
1970	95	1,848	313,715

PERCENTAGE OF CHANGE FOR THE ABOVE TOTALS

1966 - 67	4.9	4.9	-1.3
1967 - 68	7.5	17.7	2.2
1968 - 69	-2.6	9.3	8.4
1969 - 70	-14.4	-0.5	-5.3

Table 2 shows that the day on which the most accidents occurred was Thursday (20.0 percent). This day together with Friday (14.0 percent) and Saturday (17.0 percent) accounted for over 50 percent of the accidents during the week. The highest accident month in the City of Three Rivers was October with 13.0 percent of the accidents. The three months of October, November and December accounted for 35.0 percent of the accidents during the year.

The information summarized in Table 3 shows that of the 100 accidents at the 14 high accident locations 75 resulted in property damage, 24 resulted in personal injury, and there was one fatal accident during the five-year study period. The table also shows that the majority of accidents (74.0 percent) occurred during the daylight hours.

The peak hour for accidents, as revealed by Table 4, was between 3:00 to 4:00 p.m. This hour accounted for 12 accidents, while the 4:00 to 5:00 p.m. period accounted for 11 accidents. The afternoon hours from 3:00 to 6:00 p.m. accounted for 32 percent or one-third of the accidents that happened during the day. The only other peak period was the one from 11:00 a.m. to 1:00 p.m. when 14 percent of the accidents occurred.

Table 5 indicates that the 16 - 19 age group had the highest accident rate in the City of Three Rivers. They were involved in 19.9 percent of the accidents. This group along with the 20 - 24 and 25 - 34 age groups comprised over 50.0 percent of the drivers involved in accidents occurring in the

ACCIDENT ANALYSIS

Table 2

MONTHLY AND DAILY ACCIDENT OCCURRENCE

FOURTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Period Studied: 1966 through 1970

Month	Day of the Week							Monthly Total	% Of Total
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.		
January					2	5		7	7.0
February		1	2	3	1	2	1	10	10.0
March	1	2		2	1	2	1	9	9.0
April	1	2	1	1	1			6	6.0
May			1	1	2	2	1	7	7.0
June	1	1	2		1	1	1	7	7.0
July	1	1	2	3	1			8	8.0
August	1	2		3	1		1	8	8.0
September	1	1			1			3	3.0
October	3	1	2	2	2	1	2	13	13.0
November	1	1	1	5	1		1	10	10.0
December	2	1	3			4	2	12	12.0
Day Total	12	13	14	20	14	17	10	100	100.0
% of Total	12.0	13.0	14.0	20.0	14.0	17.0	10.0	100.0	

Peak Accident Day: Thursday

Peak Accident Month: October

ACCIDENT ANALYSIS

Table 3

ANNUAL ACCIDENT SUMMARY

FOURTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Period Studied: 1966 through 1970

Accident Type	Day	Night	Total
Fatal Accident	1		1
Personal Injury Acc.	17	7	24
Property Damage Acc.	56	19	75
Total	74	26	100

* * * * * * * *

Month	Fatal		Injury		Prop. Damage		Sub. Total		Total
	Day	Night	Day	Night	Day	Night	Day	Night	
January			2		4	1	6	1	7
February			1	4	5		6	4	10
March					6	3	6	3	9
April			2	1	3		5	1	6
May					6	1	6	1	7
June			1		5	1	6	1	7
July			1		6	1	7	1	8
August			1	1	5	1	6	2	8
September	1		1		1		3	0	3
October			4		5	4	9	4	13
November			2	1	5	2	7	3	10
December			2		5	5	7	5	12
S. Total	1	0	17	7	56	19	74	26	100
Total	1		24		75		100		

Table 4

DAILY AND HOURLY ACCIDENT OCCURRENCE

FOURTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Period Studied: 1966 through 1970

Hour	Day of the Week							Hour Total	% of Total
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.		
12-1 a.m.			1	1				2	2.0
1-2 a.m.				1		2	1	3	3.0
2-3 a.m.	1						1	2	2.0
3-4 a.m.								0	0.0
4-5 a.m.								0	0.0
5-6 a.m.				1				1	1.0
6-7 a.m.		1						1	1.0
7-8 a.m.	1	1	1	2				5	5.0
8-9 a.m.		1				1		2	2.0
9-10 a.m.		1	1	2				4	4.0
10-11 a.m.			1			3		4	4.0
11-12 a.m.		3	1	2		2		8	8.0
12-1 p.m.	1	1			3	1		6	6.0
1-2 p.m.		1			1			2	2.0
2-3 p.m.		1	1	1		1		5	5.0
3-4 p.m.	2	3	2	3	1	1		12	12.0
4-5 p.m.	4			3	1	2	1	11	11.0
5-6 p.m.	1		2	1	3	2		9	9.0
6-7 p.m.	1			1	2			4	4.0
7-8 p.m.			1	1				2	2.0
8-9 p.m.			2			1	3	6	6.0
9-10 p.m.						1	3	4	4.0
10-11 p.m.	1				3			4	4.0
11-12 p.m.				1			1	2	2.0
Not Stated			1					1	1.0
Day Total	12	13	14	20	14	17	10	100	100.0
% of Total	12.0	13.0	14.0	20.0	14.0	17.0	10.0	100.0	

Peak Accident Hour: 3 - 4 p.m.

Peak Accident Day: Thursday

Table 5

AGE OF DRIVERS INVOLVED IN ACCIDENTS

FOURTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Period Studied: 1966 through 1970

Age Group	Number of Drivers Involved in				Percent
	Fatal	Injury	Property Damage	Total	
Under 16					
16 - 19		8	26	34	19.9
20 - 24	1	7	17	25	14.6
25 - 34		2	26	28	16.4
35 - 44		8	19	27	15.8
45 - 54		9	15	24	14.0
55 - 64		1	12	13	7.6
65 - 74		3	10	13	7.6
75 & Over		2	1	3	1.8
Not Stated		2	2	4	2.3
TOTAL	1	42	128	171	100.0

Table 6

RESIDENCE OF DRIVERS INVOLVED IN ACCIDENTS

Residence	Number of Drivers Involved in				Percent
	Fatal	Injury	Property Damage	Total	
Local	1	38	121	160	93.6
Michigan		3	3	6	3.5
Out of State		1	4	5	2.9
Not Stated					
TOTAL	1	42	128	171	100.0

ACCIDENT ANALYSIS

Table 7

WEATHER CONDITIONS AT SCENE OF ACCIDENTS

FOURTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF THREE RIVERS

Period Studied: 1966 through 1970

Weather	Severity of Accident				Percent
	Fatal	Injury	Property Damage	Total	
Clear or Cloudy	1	16	56	73	73.0
Rain		4	9	13	13.0
Fog					
Snow or Sleet		4	10	14	14.0
Not Stated					
TOTAL	1	24	75	100	100.0

TABLE 8

PAVEMENT CONDITIONS AT SCENE OF ACCIDENTS

Pavement	Severity of Accident				Percent
	Fatal	Injury	Property Damage	Total	
Dry	1	14	44	59	59.0
Wet		5	17	22	22.0
Snowy/Icy		5	14	19	19.0
Icy					
Not Stated					
TOTAL	1	24	75	100	100.0

city.

According to Table 6, 77.8 percent of the drivers involved in accidents resided in the City of Three Rivers and another 15.8 percent of the drivers resided in St. Joseph County. These two groups were responsible for 93.6 percent of the accidents in the city, thereby indicating that the operators involved in accidents at the 14 high accident locations were familiar with the City of Three Rivers.

Tables 7 and 8 show that 59 percent of the accidents occurred on dry pavement and 73 percent occurred in clear weather. These percents include both personal injury and property damage accidents. Adverse weather, in general, does not account for much more than a minimal amount of the accidents that occurred in the City of Three Rivers. The pattern seems to be that accidents occurred on dry pavement in clear weather and the drivers involved in the accidents were familiar with the city.

An analysis of the 14 high accident locations indicated that right-angle accidents contributed heavily to the total accident picture. Right-angle and ran-off roadway accidents together accounted for over 50 percent of the accidents occurring in the last five years at the high accident locations. Upon further analysis of the right-angle and ran-off roadway accidents, the following evidence has been derived: 31 of 36 right-angle accidents occurred in the daylight hours, almost half (17) were on dry pavement, 33 percent were due to

vehicles failing to stop at the stop signs, which means that the operator never attempted to stop at the stop sign, and 56 percent were for failure to yield to thru traffic, which means that the operator stopped at the stop sign but then proceeded into the intersection. In the ran-off roadway accidents over half (8) occurred in the daylight hours, 11 of 15 happened on dry pavement and 11 of 15 were due to speeding. All violation designations are taken off the accident reports that are compiled by the investigating police agency.

This analysis indicates that over 50 percent of the accidents at the 14 high accident locations in the City of Three Rivers during the last five years involves drivers who were committing a moving traffic violation by driving in a careless or inattentive manner. These accidents are beyond the control of the traffic engineer; however, the high number indicates that the city might concern itself with enforcement.

Another factor which should be considered in the City of Three Rivers is the amount of parking in residential areas in relation to street width. Since 14.0 percent of the accidents at the high accident locations involved parked vehicles, the city should adopt a policy concerning curb parking and street width. One lane of moving vehicles requires a minimum of 11 ft of street space, while vehicles parked at curbs need eight feet of space. Consequently, two-way movement and on-street parking on both sides of the street will require 38 to 40 ft of street width. Parking should be permitted

only on one side for streets that are less than 30 ft wide and prohibited on streets less than 26 ft wide.

A general maintenance program should be initiated by the City of Three Rivers for removing trees and other obstacles that are located in the clear-vision areas at intersections throughout the city. At an intersection controlled by a stop sign on the minor road, the operator (15 ft from the corner) must be able to see enough of the major roadway to be able to cross the road. The length of major roadway open to view is related to the speed of vehicles on this roadway, 25 mph needs 50 ft, 30 mph needs 60 ft and 35 mph needs 70 ft. The area (triangle) enclosed by these distances should be cleared of all obstacles.

After our analysis was complete, it was apparent that no engineering recommendations would be feasible for six of the fourteen locations. There were no accident patterns at these six locations and no present or potential serious driving hazards that could be eliminated or controlled by traffic engineering. Consequently, this report will discuss in detail only the remaining eight locations. The collision diagrams and pictures for each of these will be found on the page following the discussion. The collision diagrams and pictures for the remaining six locations are found in Appendix I.

LOCATION 1 PEALER STREET, MOORE STREET AT RAILROAD DRIVE AND WEST STREET

There are four streets at this accident location, three of which form a four-legged intersection: Pealer Street from the west, Moore Street from the east and Railroad Drive from the south and north. The fourth street, West Street, passes under Pealer Street.

Pealer Street is a two-lane 22 ft bituminous roadway. It approaches the subject intersection via the Pealer Street Bridge (Wooden Railroad Bridge). Sight distance as one approaches the intersection from the west is poor because of the humpback design of the railroad bridge. In addition the wood surface is slippery during inclement weather.

Moore Street has a 50 ft wide bituminous pavement with parking prohibited on both sides of the street approximately 200 ft from the intersection.

Railroad Drive is a 26 ft wide bituminous roadway south of the intersection with a negative gradient in a southerly direction. North of the intersection Railroad Drive is a 21 ft roadway. Southbound and northbound Railroad Drive must stop (24 in. stop signs) at the Moore-Pealer Street intersection. Right turns are not allowed for southbound Railroad Drive traffic onto the Pealer Street Bridge.

West Street has an 18 ft wide bituminous roadway which passes under the Pealer Street Bridge with only an eight foot clearance. During a large part of the study period, West

Street was operated as a bi-directional roadway with a 30 in. yield sign at Railroad Drive south of the bridge and a 24 in. stop sign at Railroad Drive north of the bridge. However, in an effort to improve traffic operations at this location, the City of Three Rivers has recently transformed West Street into a one-way street southbound from Railroad Drive north of the bridge to Railroad Drive south of the bridge.

The collision diagram shows that 24 accidents occurred at this location. Five were head-on accidents on the Pealer Street Bridge, four were rear-end collisions as eastbound vehicles were struck as they attempted to make an illegal left turn off the bridge, two vehicles lost control because of the bridge's slippery surface, two vehicles hit the bridge due to the low underclearance and one vehicle made an illegal right turn onto the bridge striking an oncoming vehicle. Over 56 percent of the accidents at this location can be attributed directly to the Pealer Street Wooden Railroad Bridge. Also, at this location there were three backing accidents, two ran-off roadway, four right-angle accidents, three of which involved vehicles exiting the bank parking lot located in the southeast quadrant onto Railroad Drive and one sideswipe accident. Inclement weather also played an important part in the accidents at this location with over 54 percent of them occurring on wet pavement.

RECOMMENDATIONS

It is recommended that a 24 in. x 30 in. "No Left Turn" sign (see Part I, Section B, p. 23 of the Michigan Manual of Uniform Traffic Control Devices - Appendix II, p. 83) for eastbound Pealer Street traffic be erected in the northeast quadrant of the intersection between the drive-in window driveway and the bank parking lot driveway. It is also recommended that the nonstandard (size) "No Left Turn" sign on the south side of the street be replaced with a 24 in. x 30 in. "No Left Turn" sign (see Part I, Section B, p. 23 of the Manual - Appendix II, p. 83).

Since a single yellow centerline marking is nonstandard, the existing yellow centerline on the Pealer Street Bridge should be changed to a double yellow centerline pavement marking which should be extended eastward to the intersection.

Whenever the Pealer Street Wooden Bridge becomes wet, stopping on it without skidding and sliding becomes impossible, unless the vehicle is moving slowly. Therefore, it is recommended that "Slippery When Wet" signs (see Part I, Section C, p. 117 of the Manual - Appendix II, p. 89) be erected at each approach to the bridge. Also, the "Keep Right" sign located on the east end of the bridge should be removed. The "Keep Right" sign is to be used on medians or channelizing islands and on the face of piers or other obstructions in the center of the roadways where traffic is

required to keep to the right of such obstructions. At its present location the sign is misleading and its size and color make it a nonstandard sign.

It is further recommended that skidometer tests be made on the Pealer Street Bridge, since most of the accidents occurring on the bridge were due to wet pavement. This service is available from the Testing and Research Division of the Michigan Department of State Highways. Prior arrangement should be made with Mr. Max N. Clyde, Engineer in the Testing and Research Division. Skidproofing on a similar wooden structure in the City of Niles produced a significant reduction in the amount of accidents.

Furthermore, it is recommended that the existing bi-directional bank drive located on the south leg of Railroad Drive be converted to a one-way operation (inbound only) because of the inadequate visibility for vehicles exiting the bank parking lot through this drive. Lastly, it is also recommended that the 30 in. yield sign (nonstandard) on West Street south of the bridge be replaced with a 36 in. sign (see Part I, Section B, p. 15 of the Manual - Appendix II, p. 82).

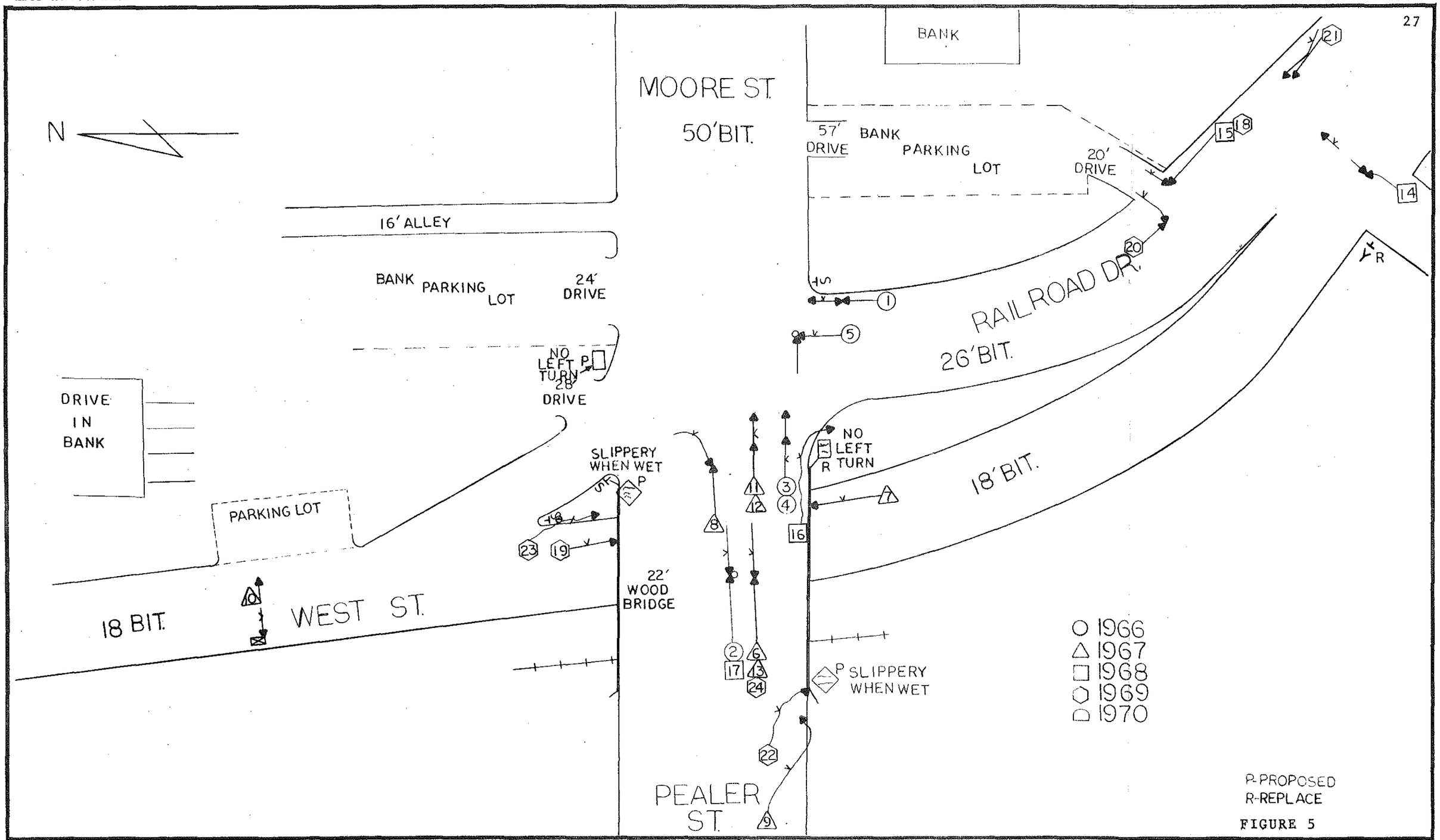


FIGURE 5

LEGEND

Fatal	Out of Control	Pedestrain	Tree
Injury	Driver Intent	Stop & Go Signal	Stop Sign
Skidding	Deer		
Jackknife	Violator	Flashing Beacon	Yield Sign
Overturned	Backing		

Period: 1966 THRU 1970

Accidents – Total 24 P.D. 21

Injury 3 (8) Fatal 0 ( )

C.S. _____ Miles _____ Drawn DJN

Plan No. LOCATION 1 Date 9-9-71

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

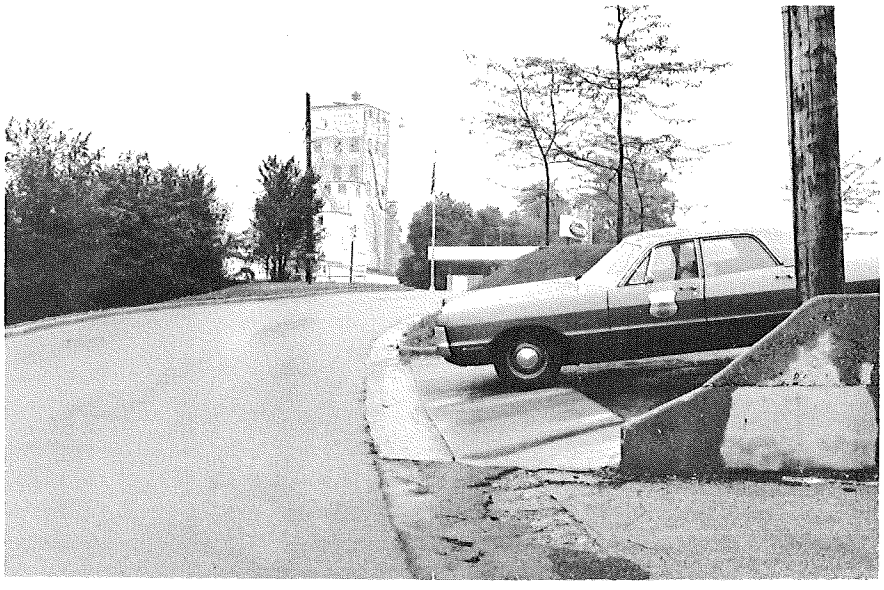
Location MOORE ST. AND PEALER ST. AT WEST ST. AND RAILROAD DR.
CITY OF THREE RIVERS
ST JOSEPH CO.

SOUTHBOUND

RAILROAD DRIVE

SOUTHBOUND

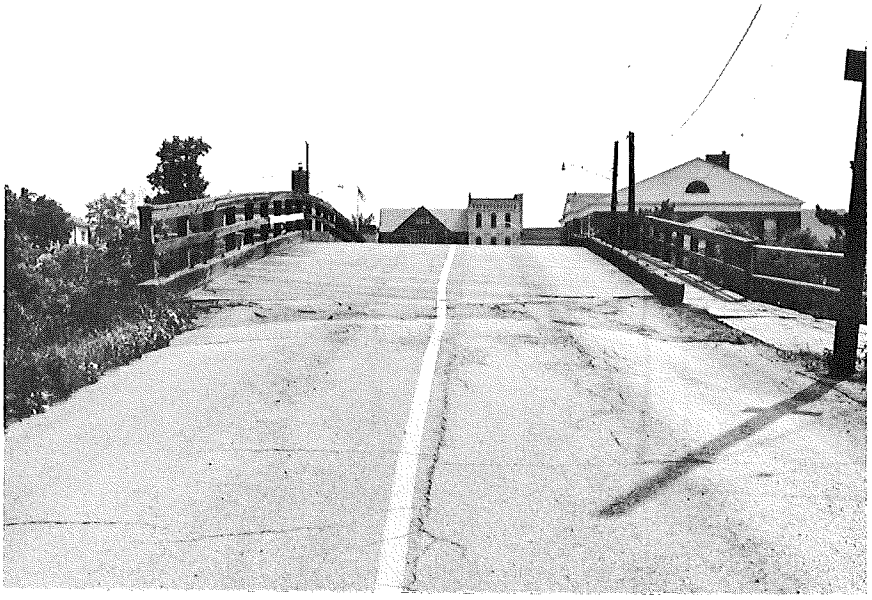
RAILROAD DRIVE



NORTHBOUND

RAILROAD DRIVE

FIGURE 5a



EASTBOUND PEALER STREET

EASTBOUND PEALER STREET

WESTBOUND PEALER STREET

FIGURE 5b

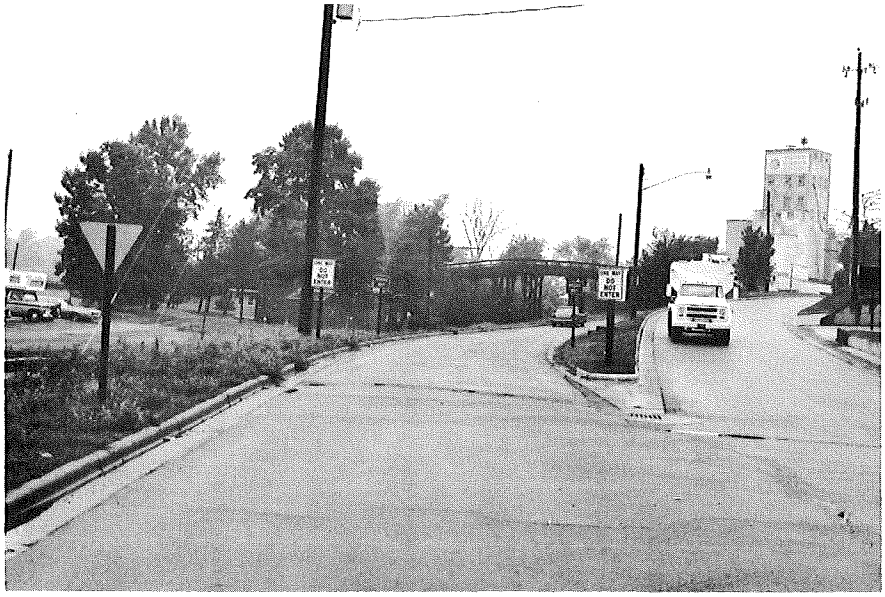
NORTHBOUND WEST STREET

AND RAILROAD DRIVE

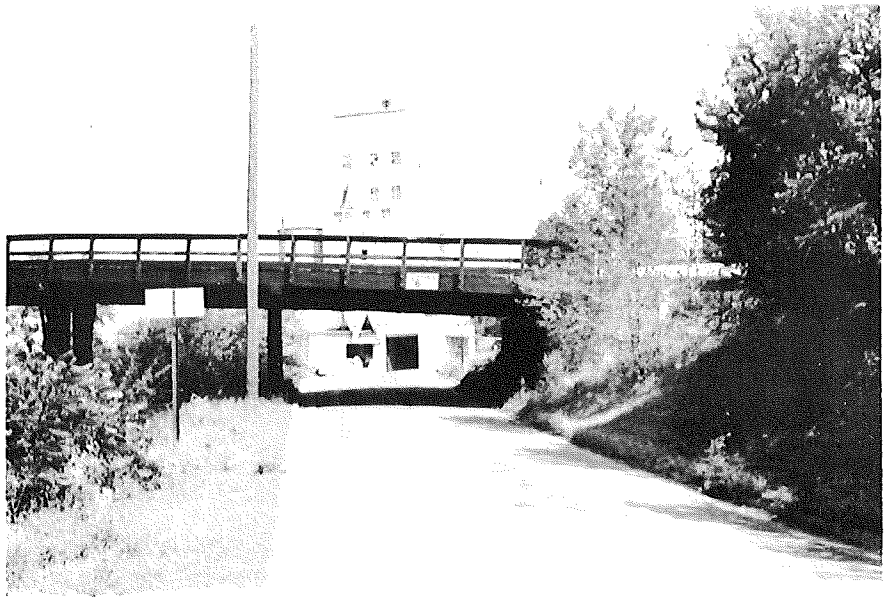
SOUTHBOUND WEST STREET

AND RAILROAD DRIVE

FIGURE 5c



NORTHBOUND WEST STREET



NORTHBOUND WEST STREET

FIGURE 5d

LOCATION 2 MECHANIC STREET AT SIXTH STREET

Mechanic Street at Sixth Street is a right-angle intersection located in a residential neighborhood. Mechanic Street is a 30 ft wide bituminous roadway, while Sixth Street is a 25 ft wide bituminous roadway north of the intersection and a 30 ft wide bituminous roadway with neither shoulders nor curb south of the intersection. On-street parking is permitted on all legs of the intersection. The traffic control devices for this location consist of two 24 in. stop signs for north and southbound Sixth Street traffic.

On Mechanic Street, there are a number of large trees, both east and west of the intersection. These trees cause drivers waiting at the stop sign to momentarily lose sight of oncoming traffic. This is reflected in the types of accidents occurring at this location. In view of the low frequency of accident occurrence at this intersection, it may not be practical at this time to remove all of these trees, but the removal of those close to the corner will improve visibility significantly.

The prevalent accident at this location was the right-angle type which accounted for 64 percent of the total. Two of these accidents resulted from failure to stop and the rest were due to the operators failing to yield the right of way to oncoming traffic. The rest of the accidents at this location formed no specific pattern.

RECOMMENDATIONS

Since the stop sign on Sixth Street south of the intersection has lost its reflectivity, it should be replaced with a new 24 in. stop sign (see Part I, Section B, p. 14 of the Manual - Appendix II, p. 81). It is further recommended that a 30 in. stop ahead sign (see Part I, Section C, p. 94 of the Manual - Appendix II, p. 88) be used in advance of this stop sign, since several of the accidents involved poor observance of the stop and because the road curves as it approaches the intersection on this leg.

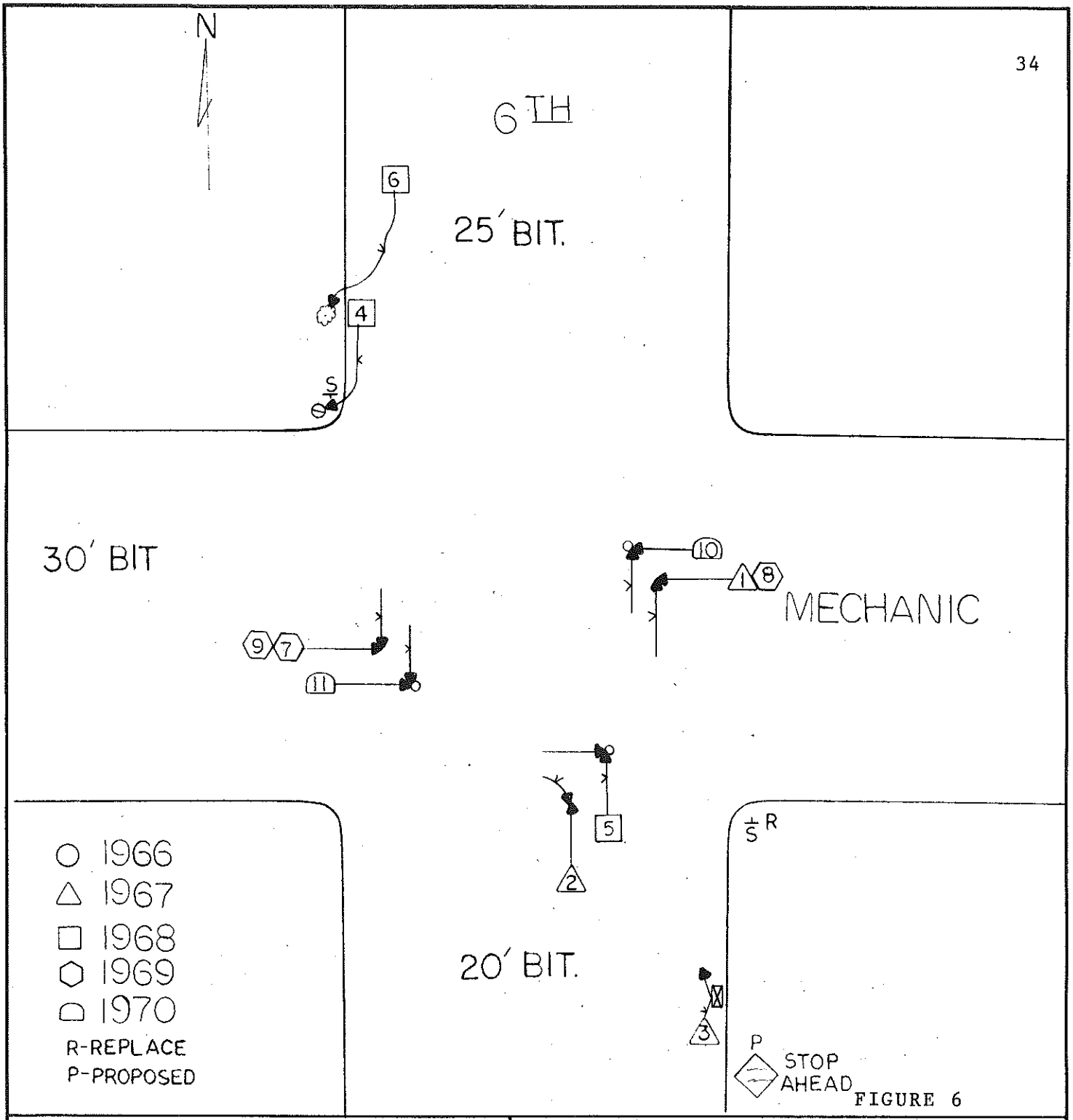


FIGURE 6

LEGEND

Stop & Go Signal — Stop Sign S
Flashing Beacon — Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian
Tree
Out of Control
Driver Intent
Deer
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location 6TH AT MECHANIC
CITY OF THREE RIVERS
ST JOSEPH CO.

Period: 1966 THRU 1970

Accidents – Total 11 **P.D.** 8

Injury 3 (5) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D.J.M.

Plan No. LOCATION 2 **Date** 8-18-71

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NORTHBOUND

SIXTH STREET

EASTBOUND

MECHANIC STREET

SOUTHBOUND

SIXTH STREET

FIGURE 6a

LOCATION 3 WEST STREET AT HOFFMAN STREET

Hoffman Street and West Street intersect to form a right-angle intersection which is located in a residential neighborhood in the northwest section of the city. The traffic controls at this location consist of 24 in. stop signs on the north and south legs of West Street.

West Street has a 28 ft wide bituminous roadway, and Hoffman Street has a 36 ft wide bituminous roadway. Parking is restricted only on the south side of Hoffman Street east of the intersection. Trees on Hoffman Street make visibility in the east and westbound directions inadequate for operators who are stopped on West Street.

The collision diagram for this location indicates that seven out of ten accidents during the five-year study period were the right-angle type. These were caused by people whose visibility was diminished by the trees on Hoffman Street (see comment about tree removal at Location 2). The remaining three accidents involved vehicles running off the road. The accident data shows that southbound vehicles involved in accidents stopped for the stop sign and then proceeded into the intersection, while most northbound vehicles never attempted to obey the stop sign.

RECOMMENDATIONS

It is recommended that the existing 24 in. stop sign on the south leg of West Street be replaced with a 36 in. stop

sign (see Part I, Section B, p. 14 of the Manual - Appendix II, p. 81). Also, it is recommended that a 36 in. stop ahead sign (see Part I, Section C, p. 94 of the Manual - Appendix II, p. 88) be erected for northbound West Street traffic. Vehicles approaching Hoffman Street from northbound West Street can't see the stop sign due to overhanging tree limbs. Consequently, it is recommended that these trees be trimmed in order to improve visibility of the stop sign as vehicles approach the intersection.

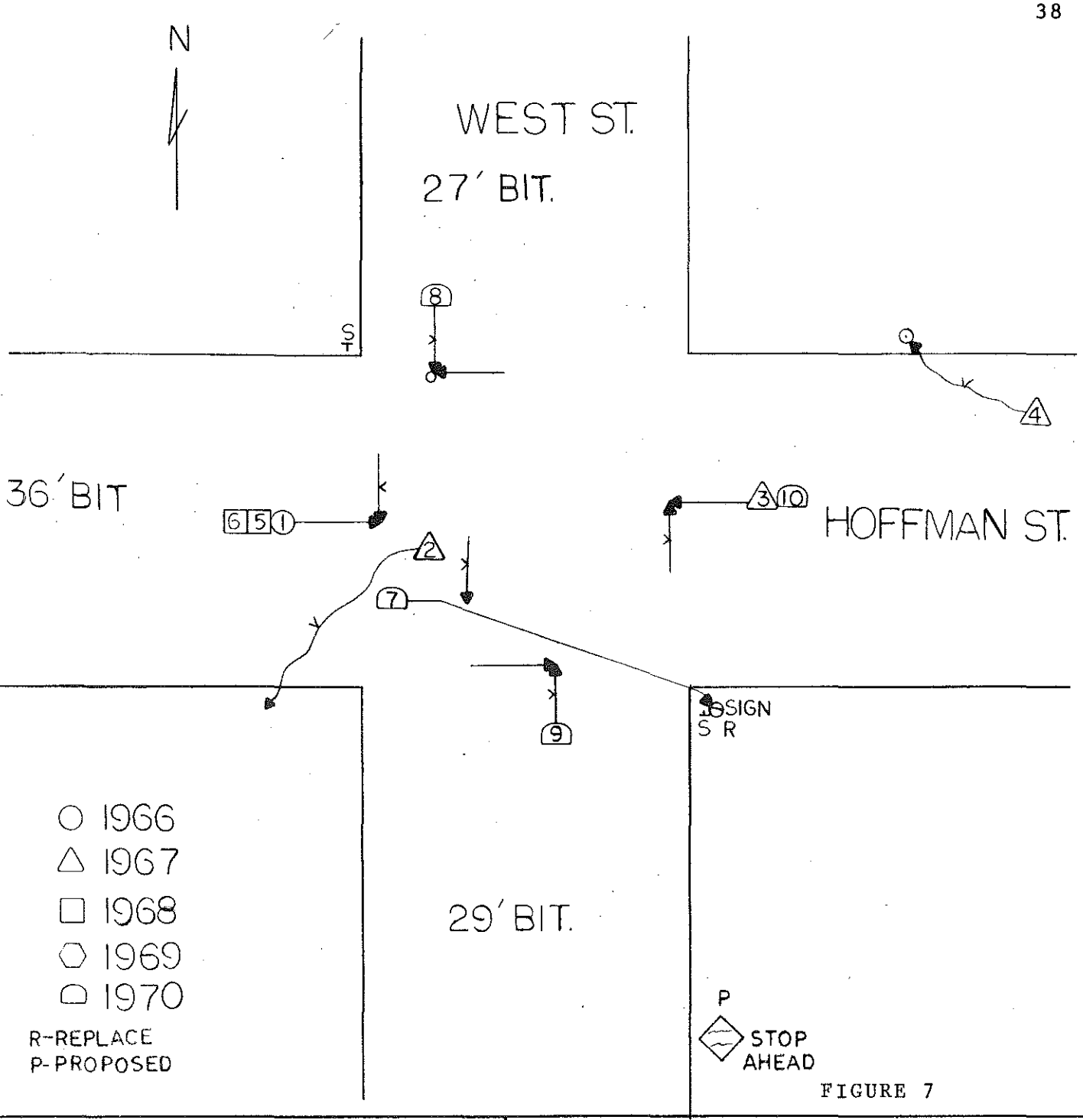

FIGURE 7

LEGEND

Stop & Go Signal — Stop Sign S
Flashing Beacon — Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian
Tree
Out of Control
Driver Intent
Deer
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location WEST AT HOFFMAN
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

Accidents – Total 10 **P.D.** 9

Injury 1 (1) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D. J. M.

Plan No. LOCATION 3 **Date** 8-19-71

NORTHBOUND

WEST STREET

WESTBOUND

HOFFMAN STREET

SOUTHBOUND

WEST STREET

FIGURE 7a

LOCATION 4 FOURTH STREET AT BROADWAY STREET

Broadway Street and Fourth Street intersect to form a right-angle intersection. This intersection is located in a residential neighborhood in the southwest section of the city. Broadway Street is a two-lane 26 ft wide bituminous roadway. Fourth Street has a 25 ft wide bituminous pavement north of the intersection and a 29 ft wide bituminous pavement south of the intersection. On-street parking is permitted only on the east side of the north leg of Fourth Street.

The traffic control devices at this location consist of 24 in. stop signs for north and southbound Fourth Street traffic.

From the collision diagram, it is apparent that the accident pattern at this intersection is the right-angle type. Additionally, there was a right turn - head on accident and a left turn - angle accident. Fifty percent of the accidents at this intersection occurred after vehicles stopped for the stop sign on the north leg of Fourth Street. Driver visibility at this point is inadequate because of high hedges located in the northwest corner.

RECOMMENDATIONS

It is recommended that the City of Three Rivers make every effort to have the previously mentioned hedges trimmed. This will, of course, improve sight distance at the intersection.

It is further recommended that the 24 in. stop sign located on the south leg of Fourth Street be replaced with a new 24 in. stop sign (see Part I, Section B, p. 14 of the Manual - Appendix II, p. 81), since the existing sign has lost its reflectivity.

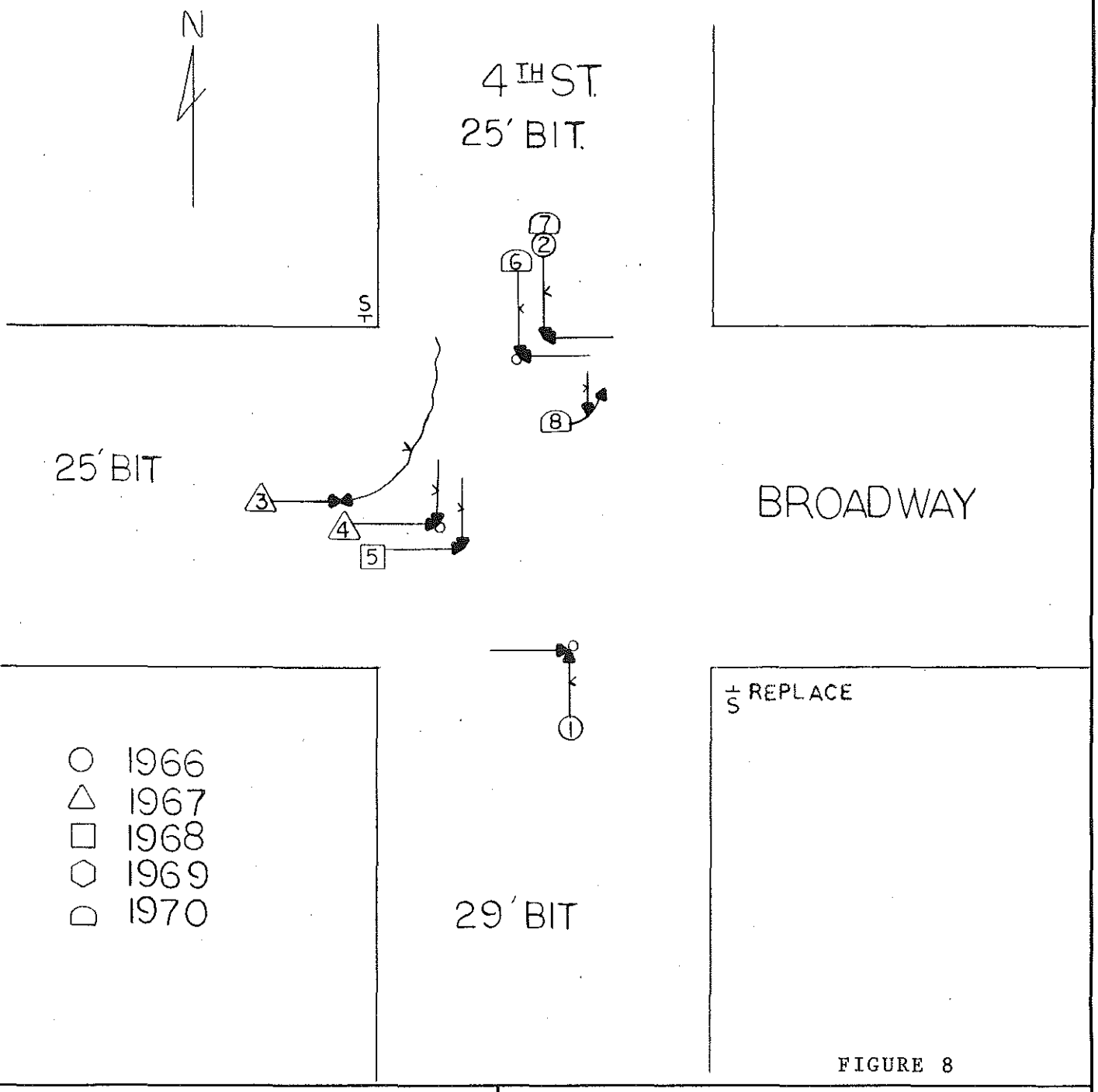

FIGURE 8

LEGEND

Stop & Go Signal — S — R — Y — F — Y
Flashing Beacon
Stop Sign S
Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian (X)
Tree
Out of Control
Driver Intent
Deer
Violator (V)

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location BROADWAY AT 4TH ST.
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

Accidents – Total 8 **P.D.** 5

Injury 3 (7) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D J M.

Plan No. LOCATION 4 **Date** 8-19-71

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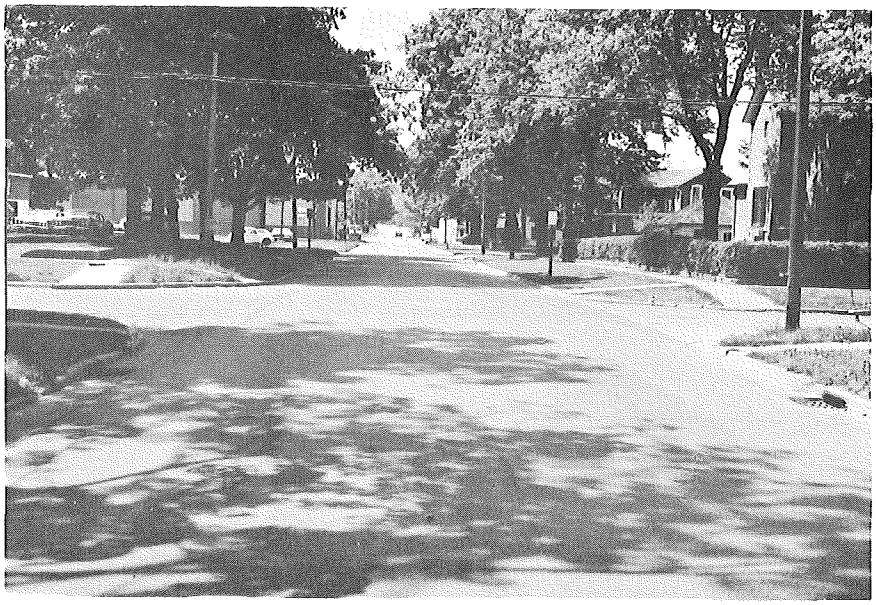
NORTHBOUND

FOURTH STREET



WESTBOUND

BROADWAY STREET

SOUTHBOUND

FOURTH STREET

FIGURE 8a

LOCATION 5 KELSEY STREET AT EAST STREET

Kelsey Street and East Street intersect to form a right-angle intersection. Kelsey Street is a 28 ft bituminous roadway providing east-west access, and East Street is a 25 ft bituminous roadway providing north-south access. This intersection is located in a residential neighborhood with no parking allowed on the east side of East Street. Traffic controls at this intersection consist of 24 in. stop signs requiring vehicles on Kelsey Street to stop.

The collision diagram shows that there were eight accidents at this location with five or 63 percent of them being of the right-angle variety. Of the remaining three accidents there was one head-on, one backing and one parking collision.

RECOMMENDATIONS

Since 40.0 percent of the angle accidents involved drivers who failed to stop at the stop signs, it is recommended that 30 in. stop signs (see Part I, Section C, p. 14 of the Manual - Appendix II, p. 81) replace the existing 24 in. signs.

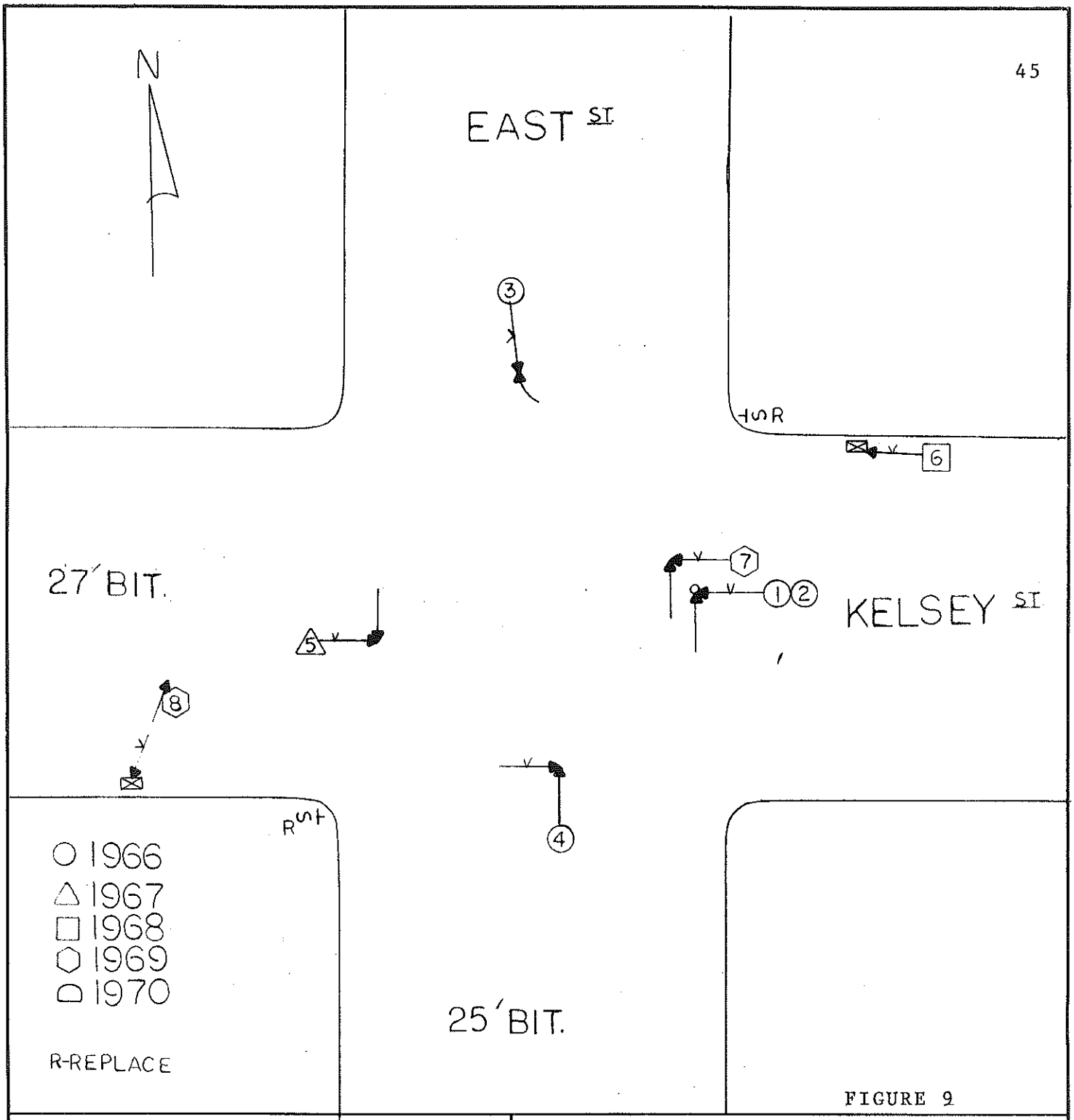


FIGURE 9

LEGEND

Stop & Go Signal — Flashing Beacon — Stop Sign S — Yield Sign Y

Fatal — Injury — Skidding — Jackknife — Overturned — Backing

Pedestrian — Tree — Out of Control — Driver Intent — Deer — Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location EAST AT KELSEY
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

Accidents – Total 8 **P.D.** 6

Injury 2 (2) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D.J.M

Plan No. LOCATION 5 **Date** 8-30-71

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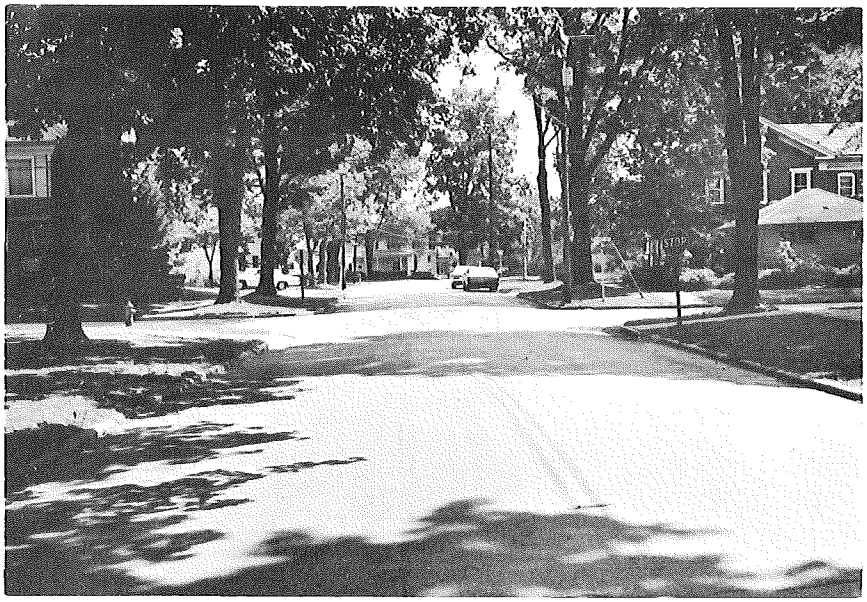
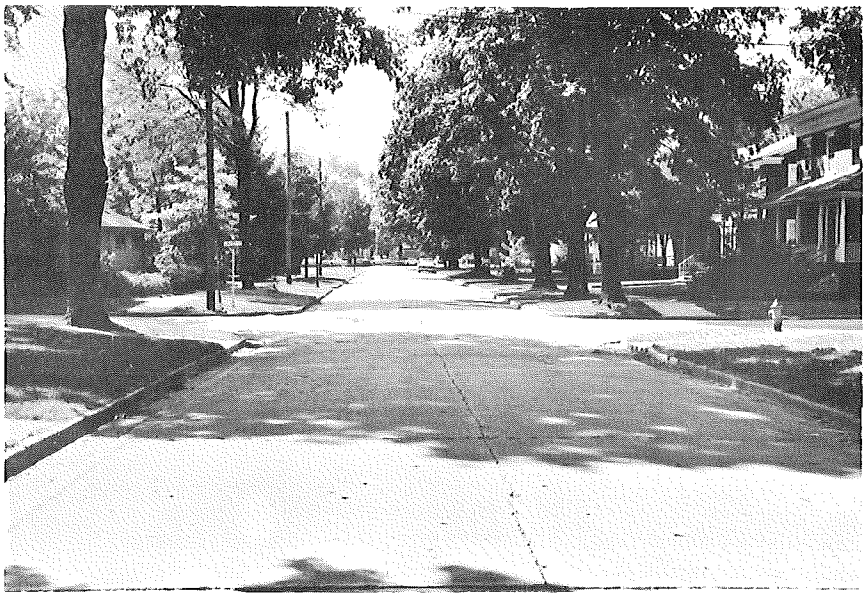


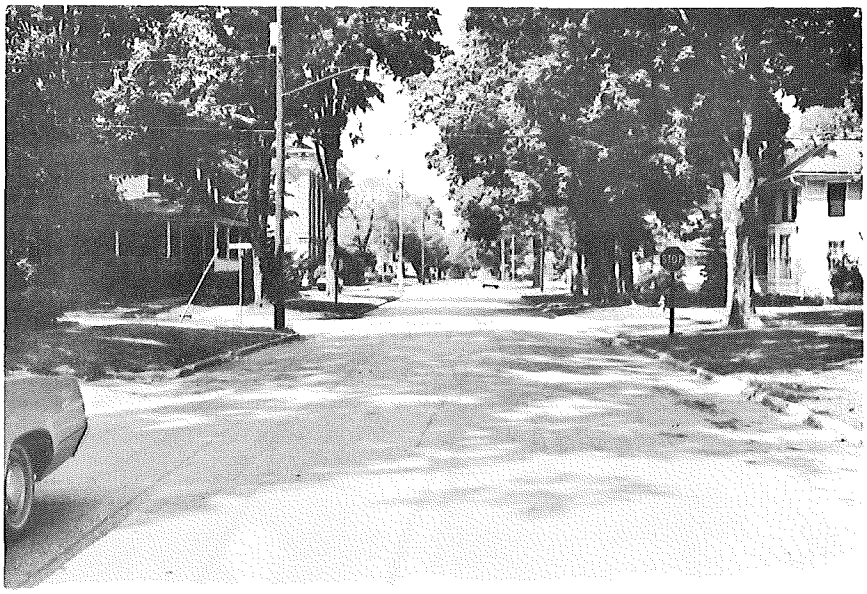
EASTBOUND

KELSEY STREET



SOUTHBOUND

EAST STREET



WESTBOUND

KELSEY STREET

FIGURE 9a

LOCATION 6 FOURTH STREET AT PENN CENTRAL RAILROAD

Fourth Street traffic at the Penn Central Railroad tracks is controlled by warning signal lights. Fourth Street as it crosses the tracks has an 18 ft bituminous pavement with 5 ft shoulders. The flashing beacon on the west side of the roadway is located against the front gate of a factory entrance and is hard to see as vehicles approach it from the north on Fourth Street.

The collision diagram shows that in 1967 two vehicles struck signal abutments that were located in the center of the roadway; however, these abutments have since been removed. Of the remaining five accidents, two vehicles struck moving trains, one vehicle ran off the road, one vehicle was involved in a backing accident and one vehicle was involved in a rear-end accident.

RECOMMENDATIONS

It is recommended that a 36 in. railroad advance warning sign (see Part I, Section C, p. 127 of the Manual - Appendix II, p. 90) be erected in advance of the railroad tracks for north and southbound Fourth Street traffic. It is also recommended that a yellow skip centerline pavement marking (see Change Memorandum No. 5, Appendix II, p. 98) be applied on Fourth Street from Main Street (M-86) to Pleasant Street.

Fourth Street is a major city street accommodating a

large majority of the local traffic; however, its 18 ft width is inadequate to handle modern traffic, which requires 11 ft of pavement per lane, safely. Therefore, if the city is contemplating construction in this area of Three Rivers in the future, it is suggested that this street be widened to a minimum of 22 ft.

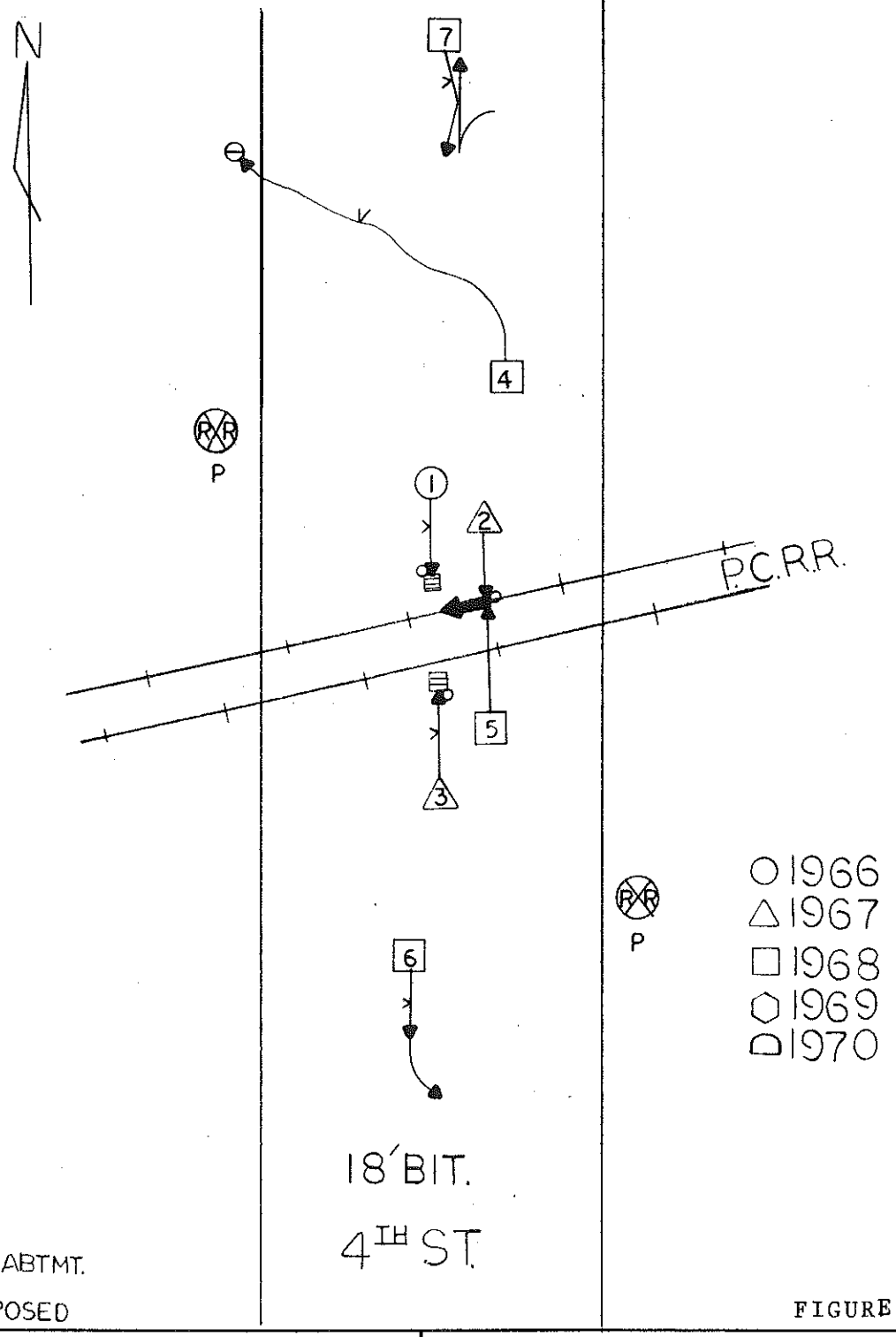


FIGURE 10

LEGEND

Stop & Go Signal — S — R — Y — F — Y
Flashing Beacon
Stop Sign S
Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian — X
Tree
Out of Control
Driver Intent
Deer — V
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location 4TH ST AT P.C.R.R.
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970
Accidents – Total 7 **P.D.** 3
Injury 4 (4) **Fatal** 0 ( )
C.S. _____ **Miles** _____ **Drawn** DJM
Plan No. LOCATION 6 **Date** 9-10-71

NORTHBOUND FOURTH STREET

SOUTHBOUND FOURTH STREET

FIGURE 10a

LOCATION 7 KELSEY STREET, FIFTH AVENUE AT PORTAGE STREET

The intersection of Portage Street with Kelsey Street and Fifth Avenue forms a four-legged intersection. It is located in a residential neighborhood near the Central Business District of the City of Three Rivers. Existing traffic control devices at this location (24 in. stop signs) require traffic on Kelsey Street and Fifth Avenue to stop.

Kelsey Street is a 29 ft bituminous roadway west of the intersection, and Fifth Avenue is a 27 ft bituminous roadway east of the intersection with an ascending grade as it approaches the intersection. There is, however, a flat gradient of approximately 15 ft in length adjacent to the main roadway.

Portage Street has a 28 ft bituminous pavement and provides northeasterly-southwesterly access to and from the Central Business District. Parking is prohibited on the west side of Portage Street.

The collision diagram indicates that there were six accidents at this location during the study period, four of which were the right-angle type. Of the remaining accidents one involved a parked vehicle and one involved a collision at a private driveway.

RECOMMENDATIONS

The stop sign on Fifth Avenue is presently located 15 ft from the corner. It is recommended that this stop sign be

relocated exactly at the corner.

Since westbound traffic is required to ascend Fifth Avenue to the intersection and since the stop sign will not be visible for approaching vehicles, it is recommended that a 30 in. stop ahead sign (see Part I, Section C, p. 94 of the Manual - Appendix II, p. 88) be erected for westbound Fifth Avenue traffic.

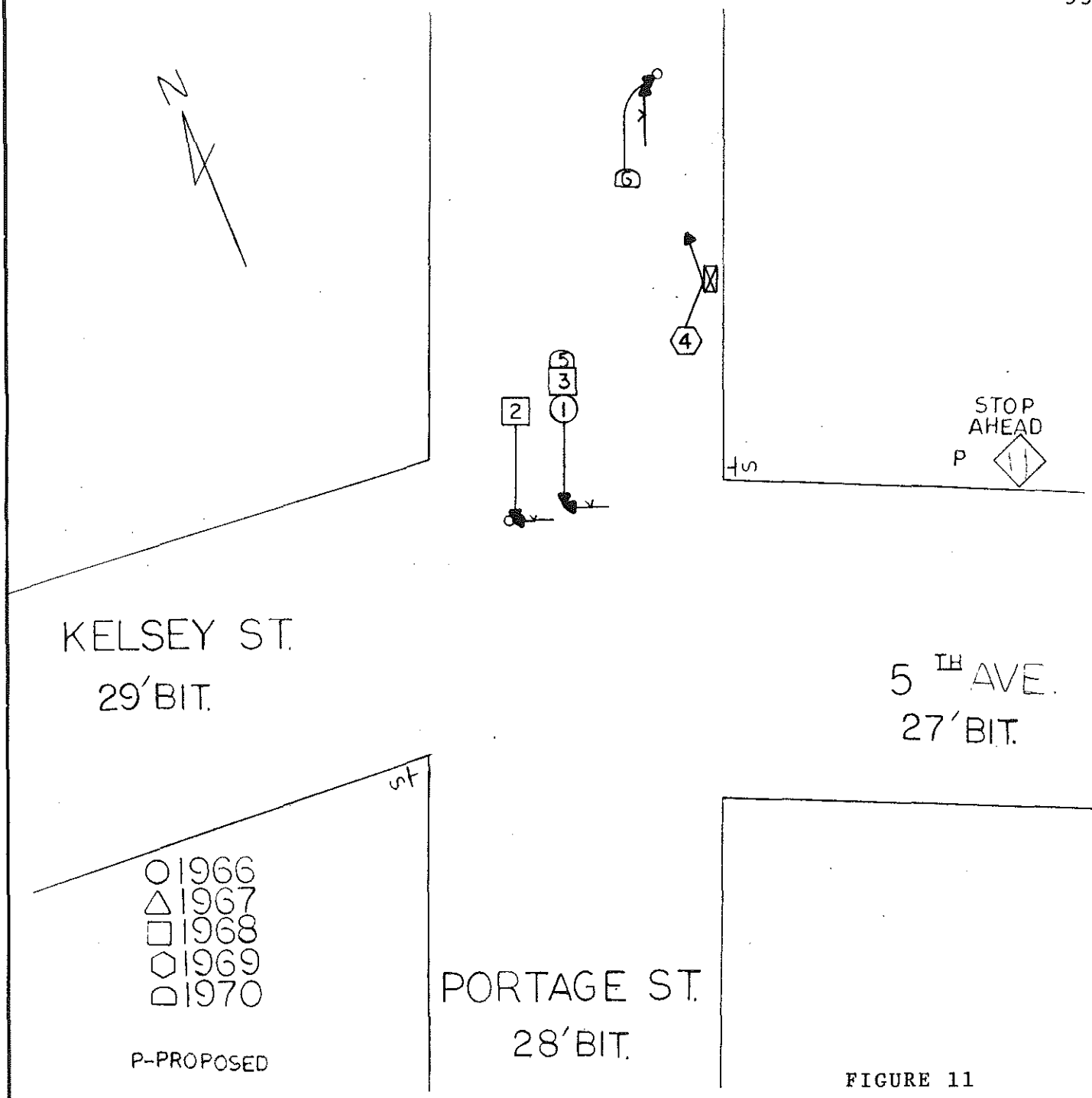


FIGURE 11

LEGEND	MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC AND SAFETY DIVISION
Stop & Go Signal (S, R, Y, F, Y) — Stop Sign S — Flashing Beacon — Yield Sign Y	Location PORTAGE ST. AT KELSEY AND 5TH AVE. CITY OF THREE RIVERS ST. JOSEPH CO
Fatal ● Injury o Skidding Jackknife Overturned Backing Pedestrian (X) Tree Out of Control Driver Intent Deer (V) Violator Y	Period: 1966 THRU 1970 Accidents -- Total 6 P.D. 4 Injury 2 (2) Fatal 0 ( ) C.S. ____ Miles ____ Drawn D J M Plan No. LOCATION 7 Date 9-10-71

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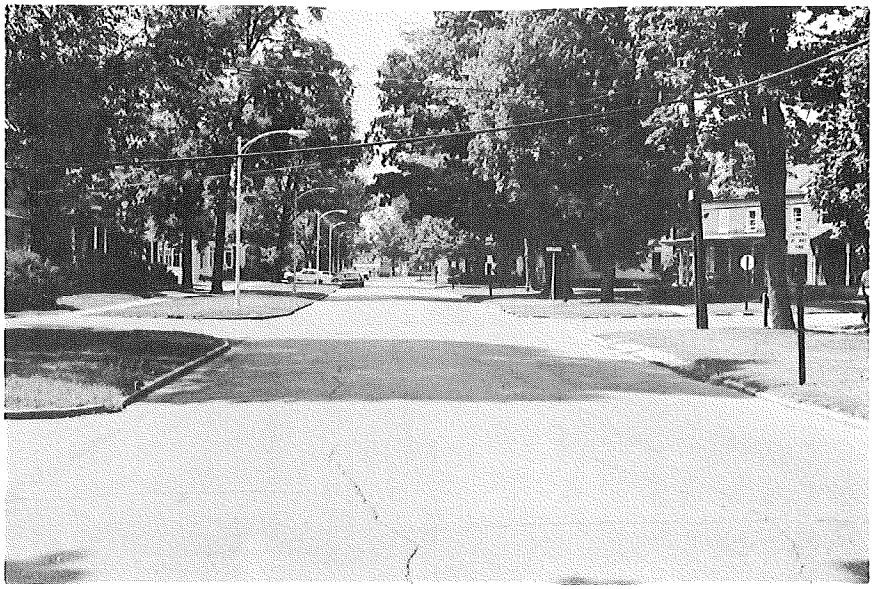
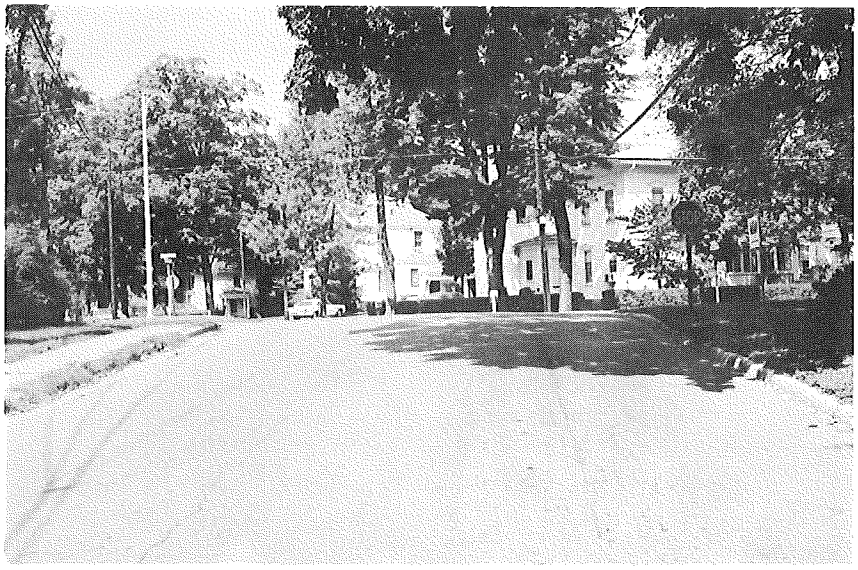
EASTBOUND

KELSEY STREET



SOUTHBOUND

PORTAGE STREET



WESTBOUND

FIFTH AVENUE

FIGURE 11a

LOCATION 8 EIGHTH STREET, WOOD STREET AT RIVER STREET

River Street, Eighth Street and Wood Street intersect to form a "Y" intersection. Eighth Street is the south leg of the intersection, Wood Street the north leg and River Street the east leg of the intersection. The Wood Street Bridge which carried Wood Street over the St. Joseph River has been closed to vehicular traffic. Consequently, Wood Street no longer operates as part of the intersection. This means that the east leg (River Street) and the south leg (Eighth Street) operate as a continuous roadway providing the area with north-south and east-west access. The south leg of the intersection is a 27 ft wide bituminous roadway and the east leg is a 30 ft wide bituminous roadway.

Traffic controls for this location consist of a target arrow for southbound Eighth Street traffic and a curve sign for eastbound traffic. In addition there is a 24 in. stop sign located in the northeast quadrant of the intersection for southbound traffic and a 24 in. stop sign located on the southeast side of Eighth Street for northeastbound traffic. The turn is also pavement marked (yellow-centerline).

The most critical aspects of this section of roadway is its alignment and its roadway width. River Street which is the east-west portion of the roadway makes a 90^{o} turn as it continues south as Eighth Street. The sharp turn and the narrow pavement make it difficult for vehicles to negotiate

this turn without coming to a complete stop. This is particularly true if the vehicle is a truck.

There were a total of six accidents at this location during the study period. Two were ran-off the roadway, two were head-on (left of center), one rear-end and one backing accident.

RECOMMENDATIONS

As an interim solution to the traffic problem at this location, it is recommended that the stop signs on River Street and Eighth Street be removed. In place of these stop signs, turn signs with curve speed panels are recommended to be erected.

Since River Street is a major county road, it is recommended that a 36 in. turn sign (see Part I, Section C, p. 81 of the Manual - Appendix II, p. 86) with a 10 mph advisory curve speed panel (see Part I, Section C, p. 132 of the Manual - Appendix II, p. 91) be erected for westbound River Street traffic. Also, the 24 in. x 48 in. target arrow on westbound River Street has lost its reflectivity and should be replaced.

Furthermore, it is recommended that a 24 in. x 48 in. target arrow (see Part I, Section C, p. 88 of the Manual - Appendix II, p. 87) be erected in target position for northbound Eighth Street. Since the curve sign on northbound Eighth

Street is nonstandard (a curve sign is to be used on curves for speeds between 30 and 60 mph), it is recommended that a 30 in. turn sign (see Part I, Section C, p. 81 of the Manual - Appendix II, p. 86) with a 10 mph advisory curve speed panel (see Part I, Section C, p. 132 of the Manual - Appendix II, p. 91) replace the curve sign. Also, the single yellow centerline is nonstandard, and therefore it is recommended that it be changed to a yellow skip centerline pavement marking (see Change Memorandum No. 5, Appendix II, p. 98).

As a permanent solution to the traffic problem at this location, it is recommended that the existing stop signs for northeastbound and southbound Eighth and River Street traffic be removed. In conjunction with the removal of these traffic controls, it is recommended that the existing curve at this location be flattened (see Figure 12b, p. 60 for suggested construction).

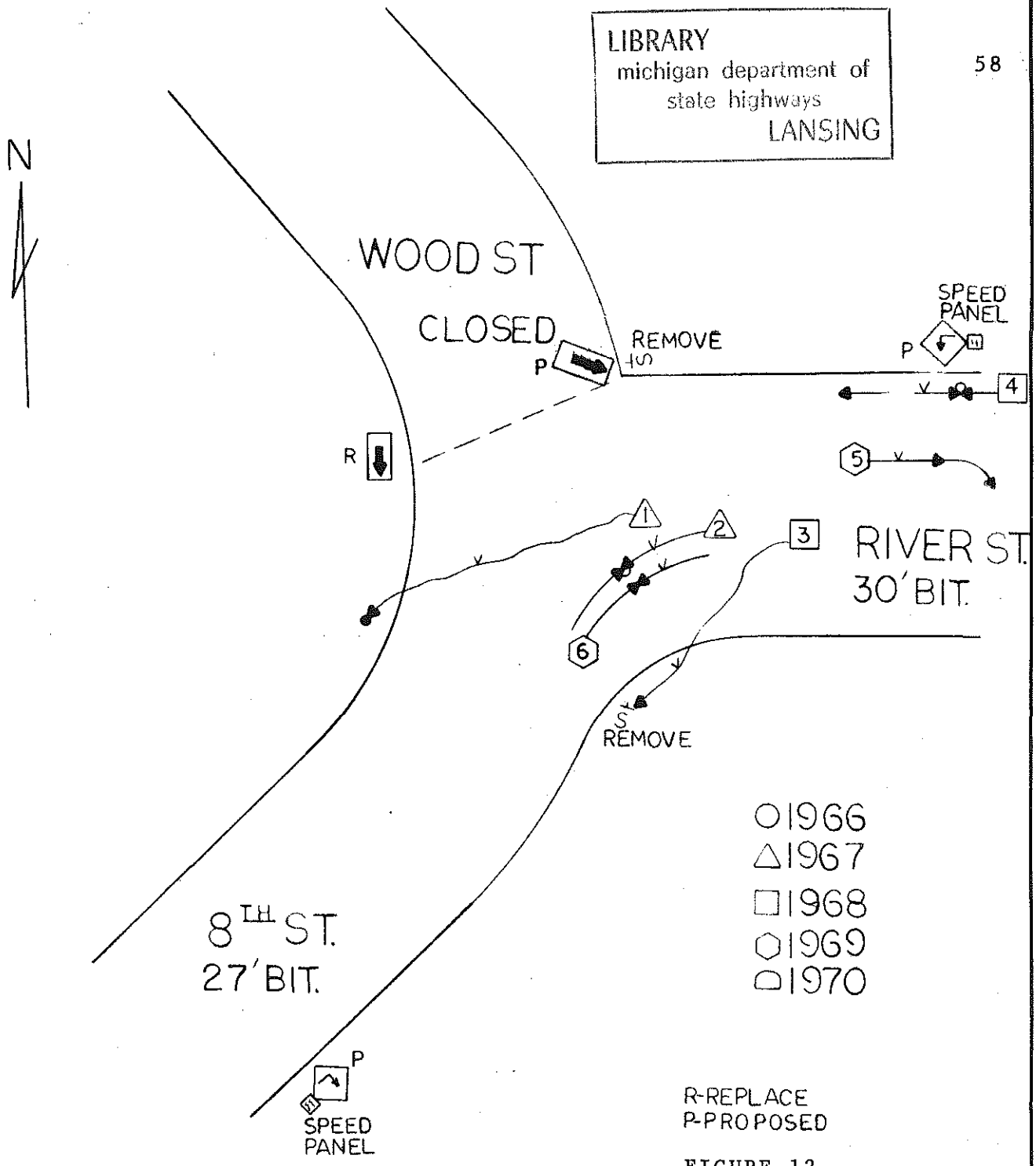


FIGURE 12

LEGEND	MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC AND SAFETY DIVISION
Stop & Go Signal (S) R; Flashing Beacon (F) Y Y; Stop Sign S; Yield Sign Y	Location RIVER ST. AT 8TH AND WOOD CITY OF THREE RIVERS ST. JOSEPH CO.
Fatal; Injury; Skidding; Jackknife; Overturned; Backing; Pedestrian (X); Tree; Out of Control; Driver Intent; Deer; Violator (V)	Period: 1966 THRU 1970 Accidents – Total 6 P.D. 3 Injury 2 (4) Fatal 1 (1) C.S. ____ Miles ____ Drawn DJM Plan No. LOCATION 8 Date 9-10-71

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NORTHBOUND EIGHTH STREET

WESTBOUND RIVER STREET

FIGURE 12a

1. REMOVE EXISTING STOP SIGNS
2. RELOCATE UTILITY POLE
3. RELOCATE CATCH BASIN
4. REPLACE EXISTING TARGET ARROW FOR WEST-BOUND TRAFFIC AND PLACE ADDITIONAL TARGET ARROW W1-6-48 FOR NORTHEAST BOUND TRAFFIC
5. PLACE W1-1-30 TURN SIGNS WITH APPROPRIATE SPEED PANELS 250' IN ADVANCE OF THE TURN IN BOTH DIRECTIONS.
6. PLACE STEEL BEAM GUARDRAIL ALONG NORTH SIDE OF THE ENTIRE TURN

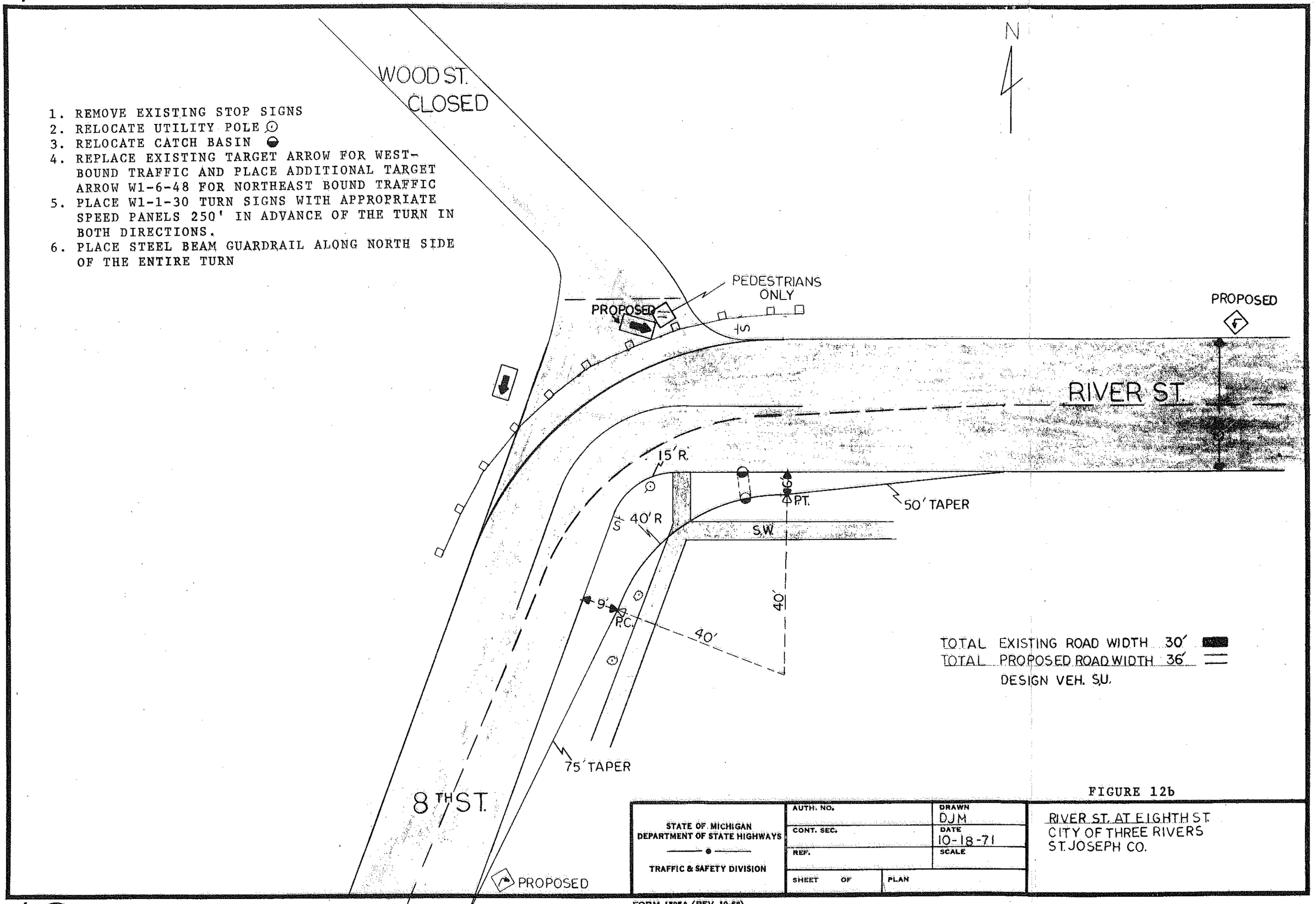


FIGURE 12b

STATE OF MICHIGAN DEPARTMENT OF STATE HIGHWAYS — TRAFFIC & SAFETY DIVISION	AUTH. NO.	DRAWN DJM	RIVER ST. AT EIGHTH ST. CITY OF THREE RIVERS ST. JOSEPH CO.
	CONT. SEC.	DATE 10-18-71	
	REF.	SCALE	
	SHEET OF	PLAN	

FORM 1595A (REV. 10-68)

LOCATION 9 CONSTANTINE STREET AT BROADWAY STREET (see Appendix I, p. 66)

Total	P. D.	Inj.	Fatal
4	4	0	0

LOCATION 10 PRUTZMAN STREET AT PORTAGE STREET (see Appendix I, p. 68)

Total	P. D.	Inj.	Fatal
4	4	0	0

LOCATION 11 PORTAGE STREET, FOSTER STREET AT WATER STREET (see Appendix I, p. 70)

Total	P. D.	Inj.	Fatal
4	3	1	0

LOCATION 12 STATE STREET AT FOURTH STREET (see Appendix I, p. 73)

Total	P. D.	Inj.	Fatal
3	1	2	0

LOCATION 13 RIVER STREET AT SIXTH STREET (see Appendix I, p. 75)

Total	P. D.	Inj.	Fatal
3	3	0	0

LOCATION 14 RIVER DRIVE AT MIDDLE STREET (see Appendix I, p. 77)

Total	P. D.	Inj.	Fatal
2	1	1	0

SUMMARY

The Department of State Police submitted 14 high accident locations for the City of Three Rivers to the Michigan Department of State Highways. After an indepth study of these locations, we formulated recommendations for nine of them. The locations and their recommendations are as follows:

Location Number	Location	Quantity	Recommendations
1	Pealer Street, Moore Street at Railroad Drive and West Street	1 2 2	R1-2-36 R3-1-24 W8-4-30 Solid double yellow centerline pavement marking
2	Mechanic Street at Sixth Street	1 1	R1-1-30 W3-1-30
3	West Street at Hoffman Street	1 1	R1-1-36 W3-1-36
4	Fourth Street at Broadway Street	1	R1-1-30
5	Kelsey Street at East Street	2	R1-1-30
6	Fourth Street at Penn Central Railroad	2	W10-1-36 Yellow skip centerline pavement marking
7	Kelsey Street, Fifth Avenue at Portage Street	1 1	R1-1-24 W3-1-30

Location Number	Location	Quantity	Recommendations
			Interim
8	Eighth Street, Wood Street at River Street	2	W12-1-21
		1	W1-1-30
		1	W1-1-36
		2	W1-6-48
			Yellow skip centerline pavement marking
			Permanent
		2	W1-1-36
		2	W12-1-24
			Increase the radius of the southeast corner. Move the utility pole.
		80'	Guardrail

Furthermore, a few general recommendations were formulated that should be implemented by the City of Three Rivers.

1) A policy should be adopted by the city concerning on-street parking in relation to street width.
2) A program should be initiated by the city for removing vision obstructions that are located in the clear-vision areas at intersections throughout the city.

APPENDIX I

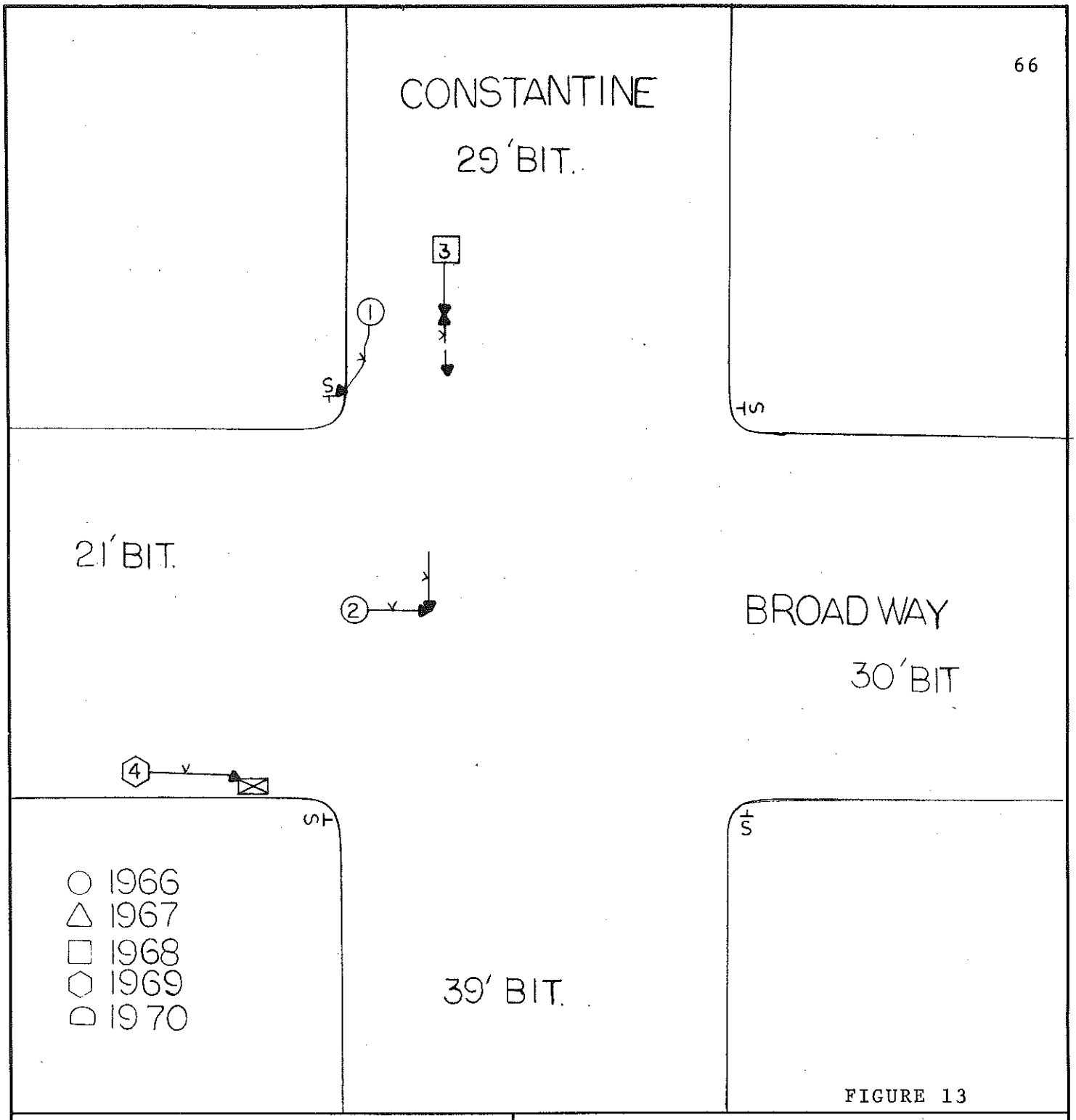


FIGURE 13

LEGEND

Stop & Go Signal — S — R — Y — F — Y
Flashing Beacon

Stop Sign S
Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing

Pedestrian X
Tree
Out of Control
Driver Intent
Deer V
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location CONSTANTINE AT BROAD WAY
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

Accidents – Total 4 **P.D.** 4

Injury 0 ( ) **Fatal** 0 ( )

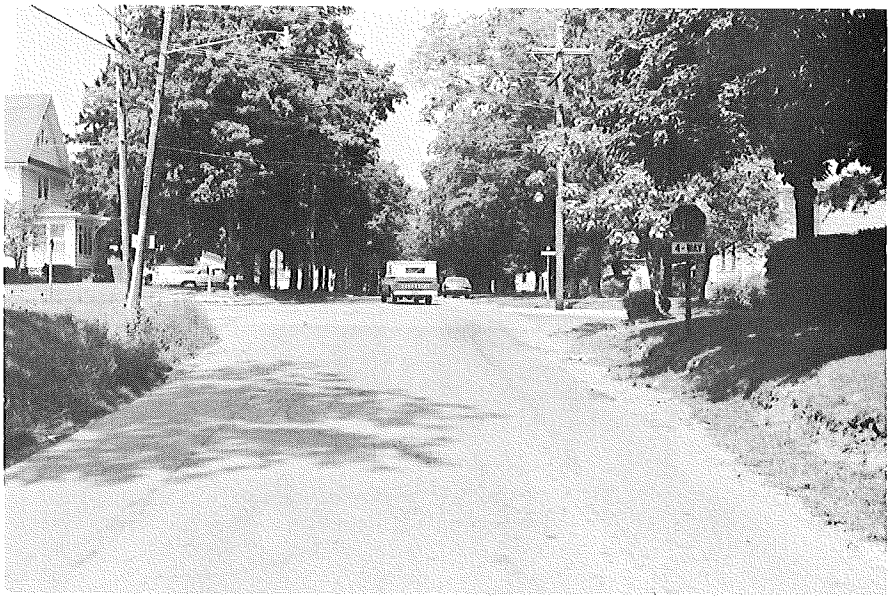
C.S. _____ **Miles** _____ **Drawn** DJM

Plan No. LOCATION 9 **Date** 9-1-71

Form 1547 B (Rev. 11/70)

EASTBOUND

BROADWAY STREET



NORTHBOUND

CONSTANTINE STREET

WESTBOUND

BROADWAY STREET

FIGURE 13a

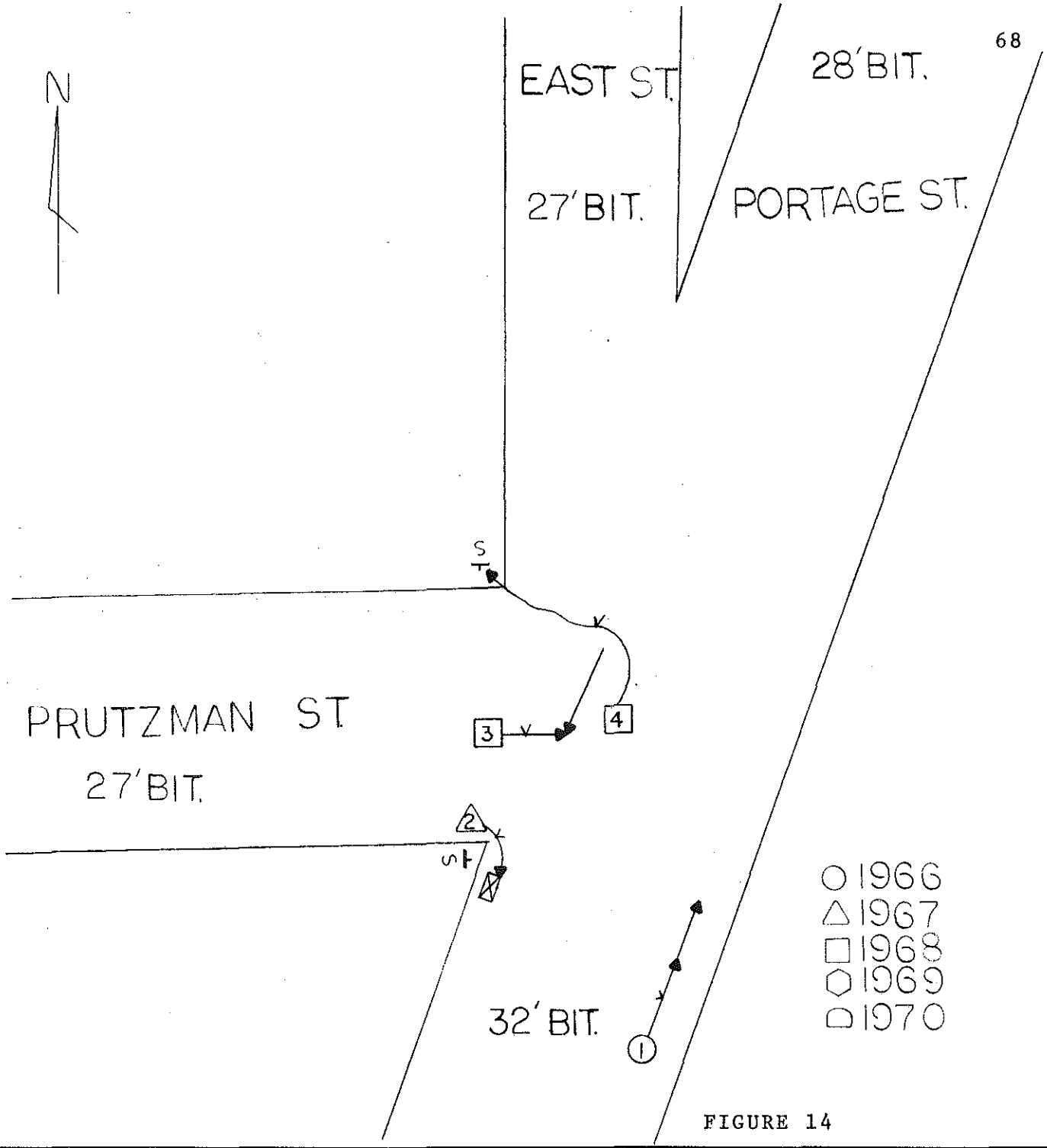


FIGURE 14

LEGEND

Stop & Go Signal — S — R — Y — F — Y
Flashing Beacon
Stop Sign S
Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian — X
Tree
Out of Control
Driver Intent
Deer
Violator — V

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location PRUTZMAN ST. AT PORTAGE ST.
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

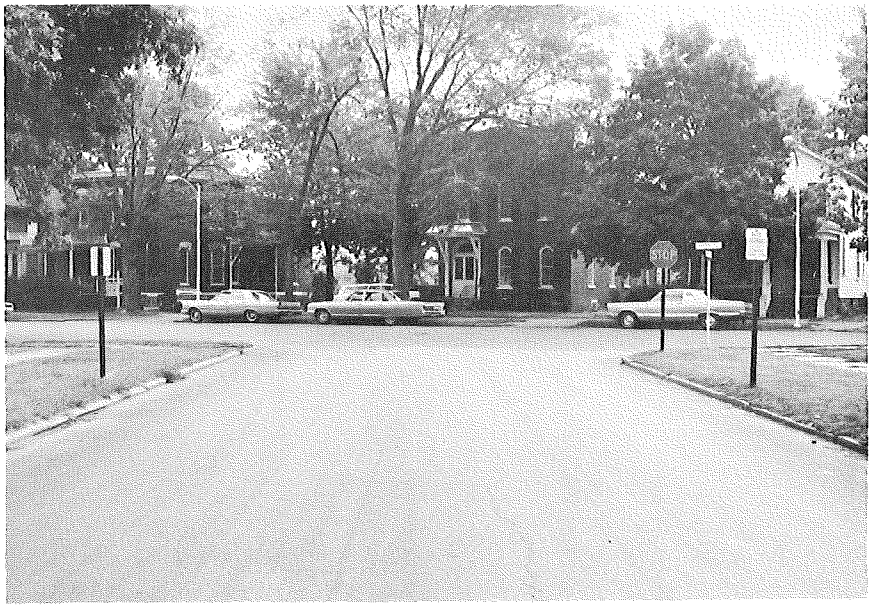
Accidents – Total 4 **P.D.** 4

Injury 0 ( ) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D J M

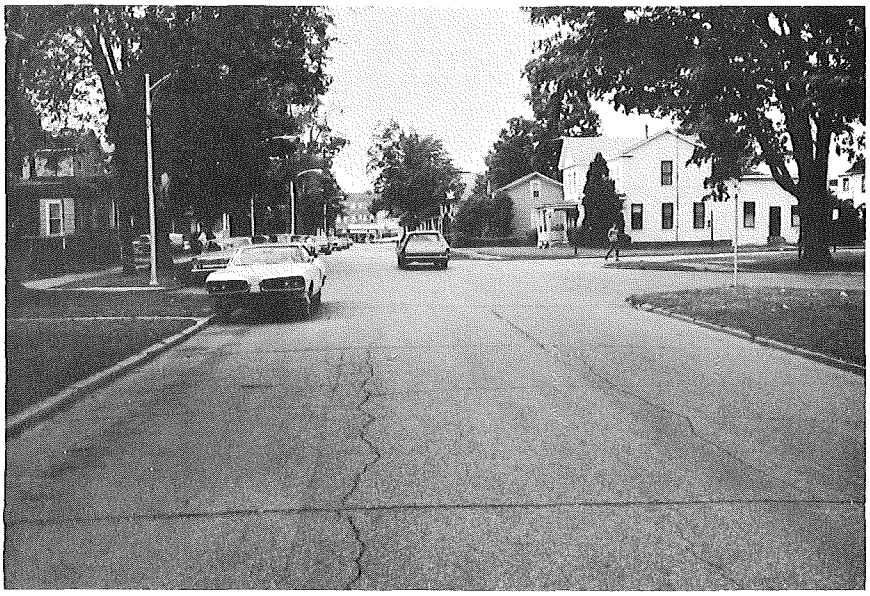
Plan No. LOCATION 10 **Date** 9-10-71

Form 1547 B (Rev. 11/70)



EASTBOUND

PRUTZMAN STREET



SOUTHWESTBOUND

PORTAGE STREET

SOUTHBOUND

EAST STREET

FIGURE 14a

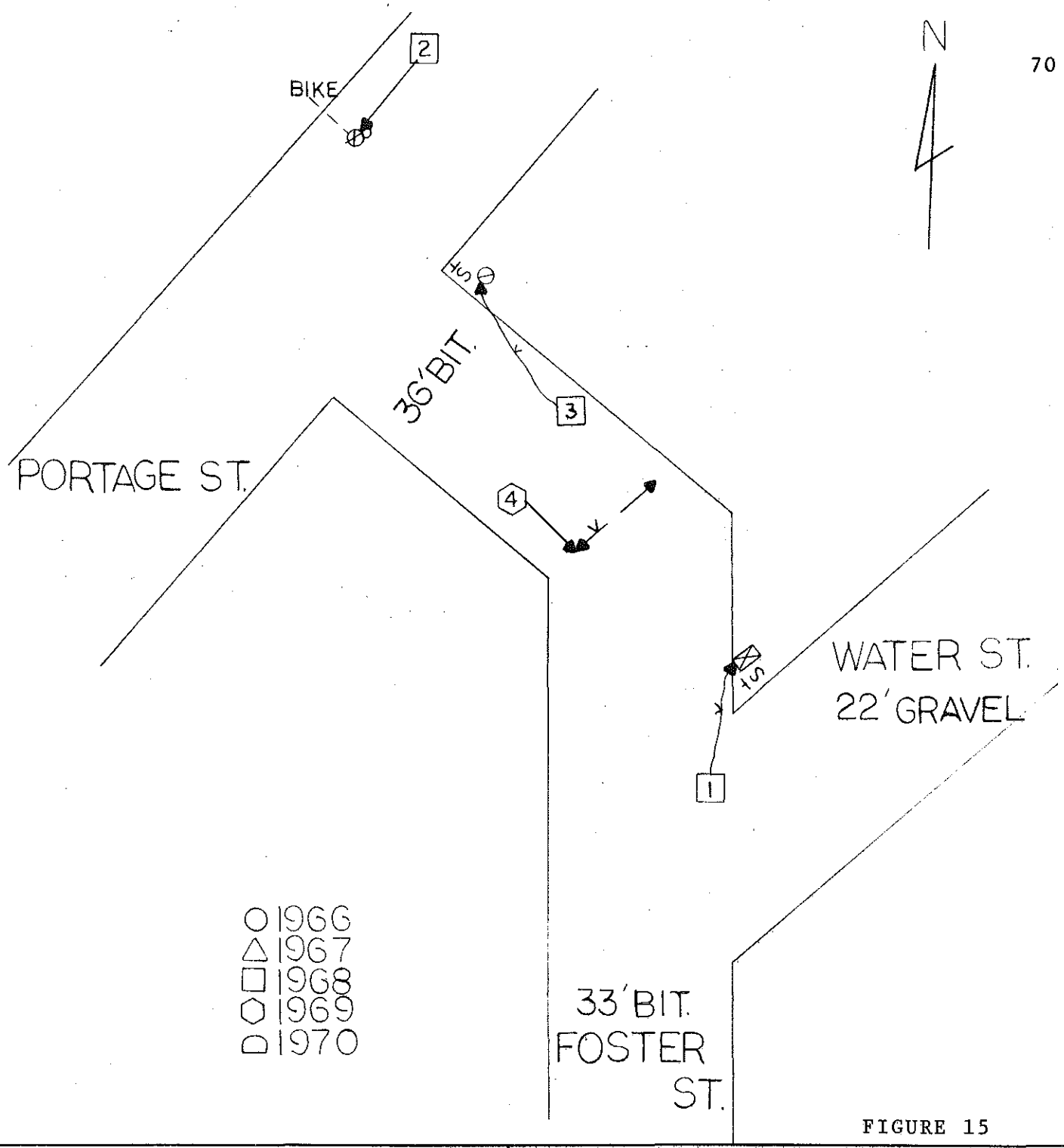


FIGURE 15

LEGEND

Stop & Go Signal — S, R, Y, F
Flashing Beacon
Stop Sign — S
Yield Sign — Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian — X
Tree
Out of Control
Driver Intent
Deer
Violator — V

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location FOSTER AT PORTAGE AND WATER
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970

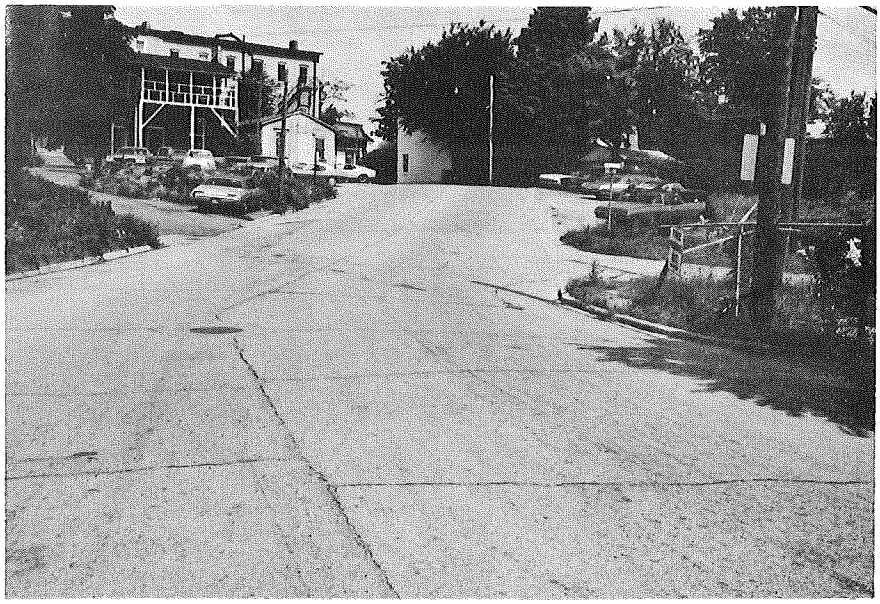
Accidents – Total 4 **P.D.** 3

Injury 1 (1) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** D J M

Plan No. LOCATION 11 **Date** 9-10-71

Form 1547 B (Rev. 11/70)



NORTHBOUND

FOSTER STREET

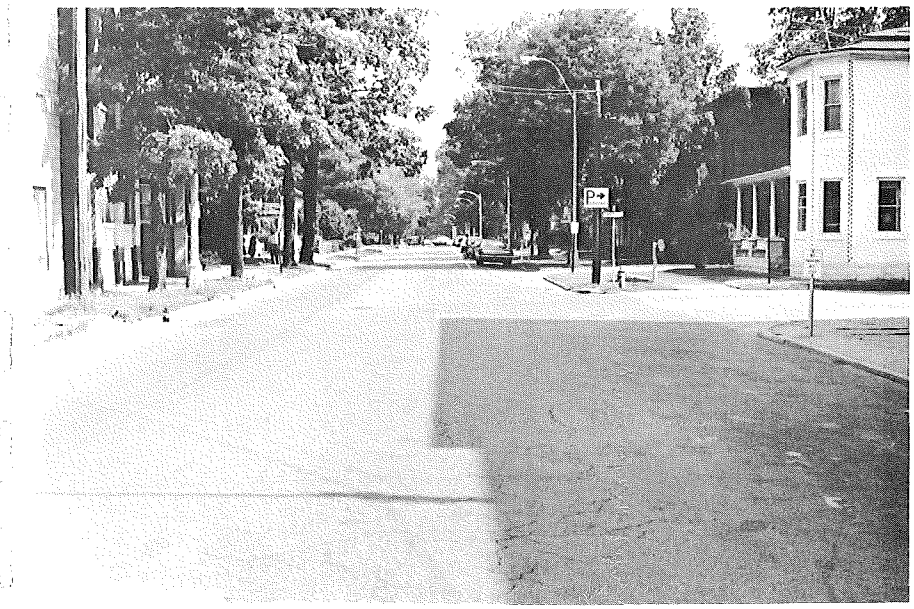
WESTBOUND

WATER STREET

SOUTHBOUND

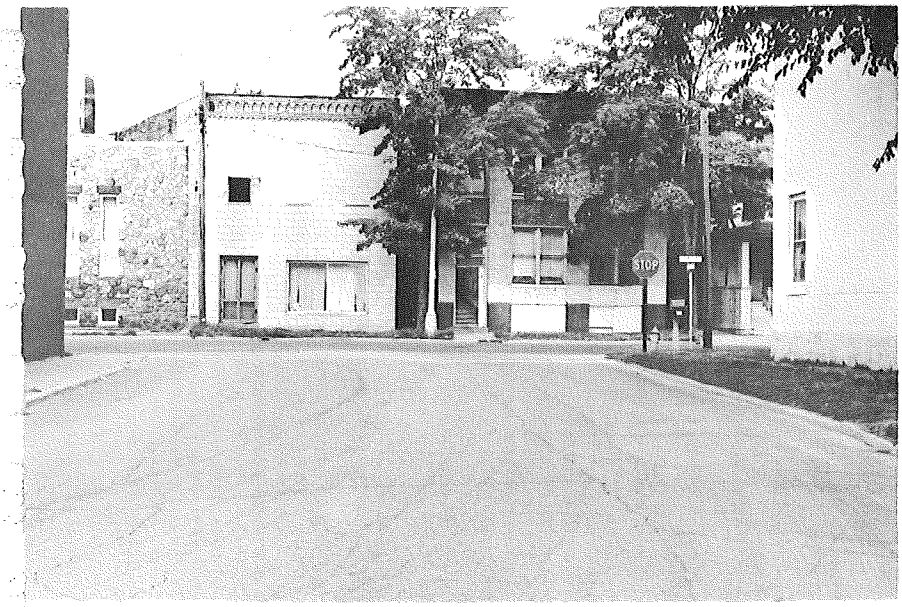
FOSTER STREET

FIGURE 15a



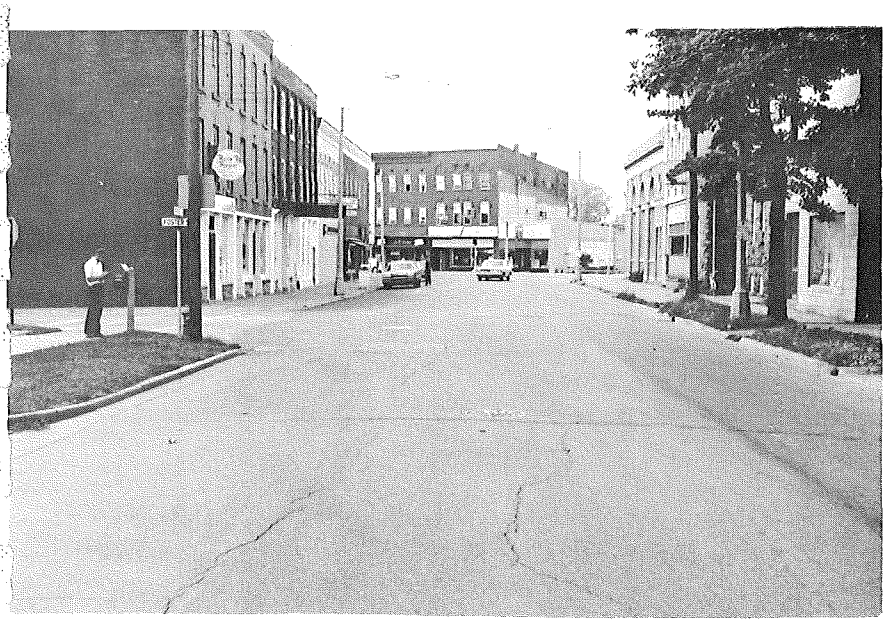
EASTBOUND

PORTAGE STREET



NORTHBOUND

FOSTER STREET



WESTBOUND

PORTAGE STREET

FIGURE 15b

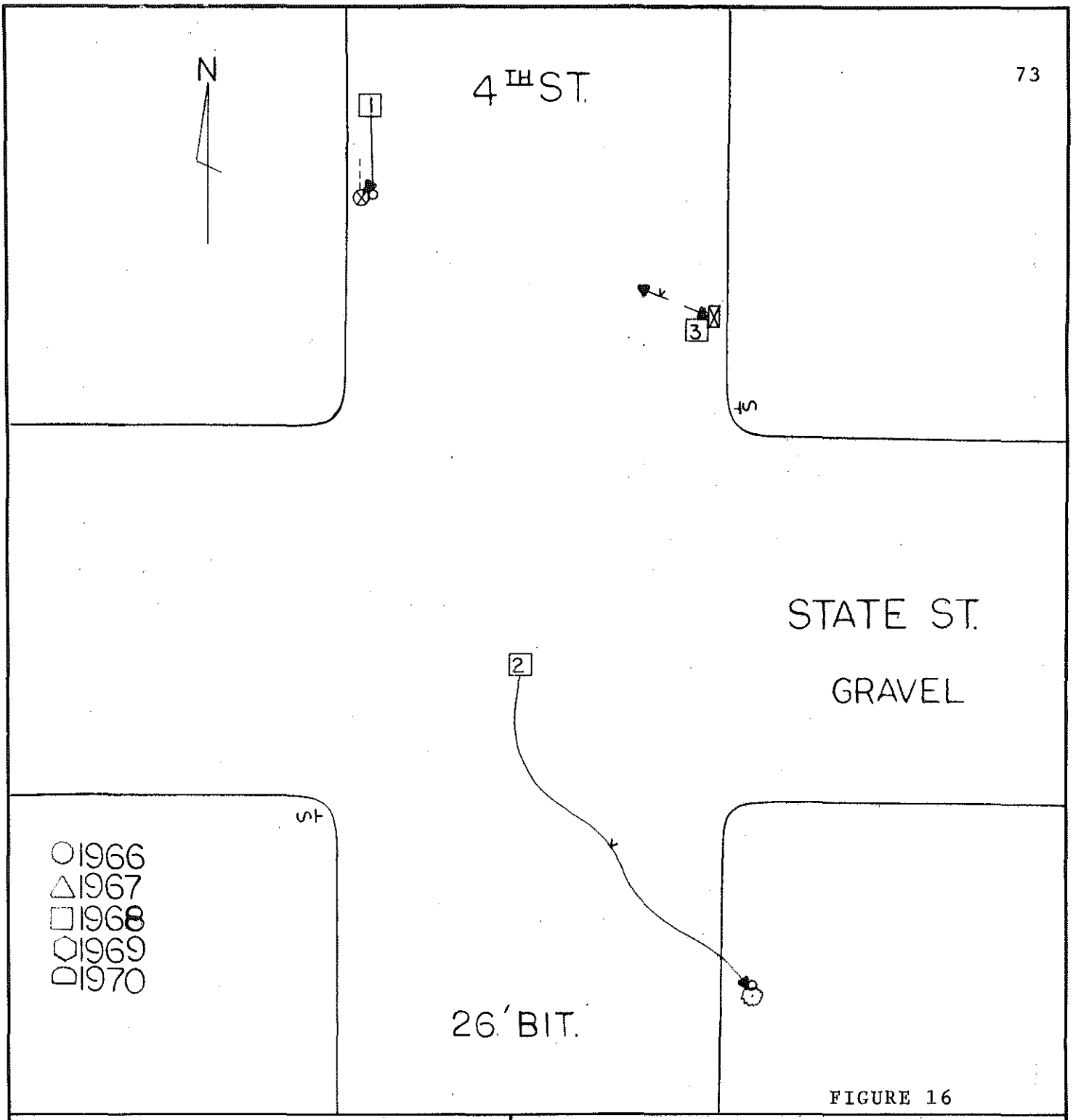


FIGURE 16

LEGEND

Stop & Go Signal — Stop Sign S
Flashing Beacon — Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian
Tree
Out of Control
Driver Intent
Deer
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location 4TH AT STATE ST.
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970
Accidents – Total 3 P.D. 1
Injury 2 (2) Fatal 0 ( )
C.S. Miles Drawn DJM
Plan No. LOCATION 12 Date 9-1-71

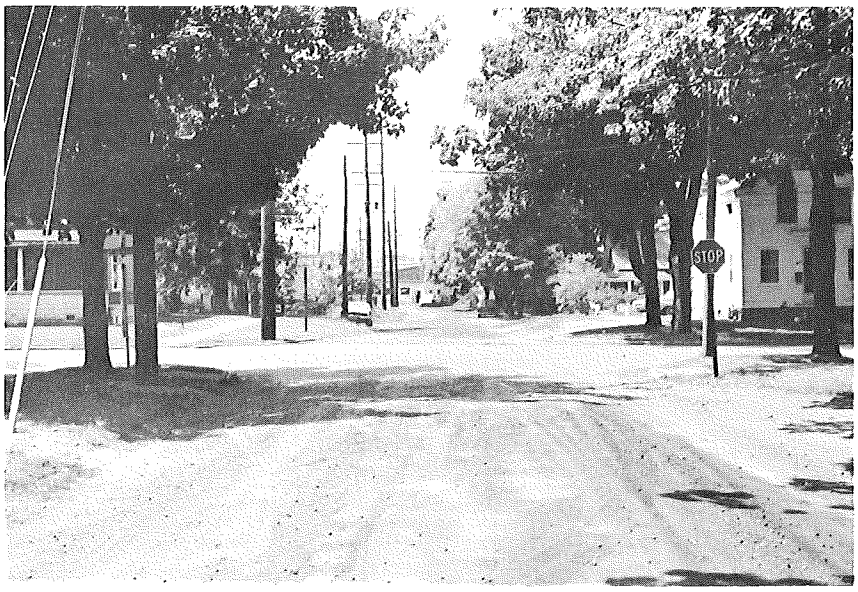
Form 1547 B (Rev. 11/70)

EASTBOUND

STATE STREET

NORTHBOUND

FOURTH STREET



WESTBOUND

STATE STREET

FIGURE 16a

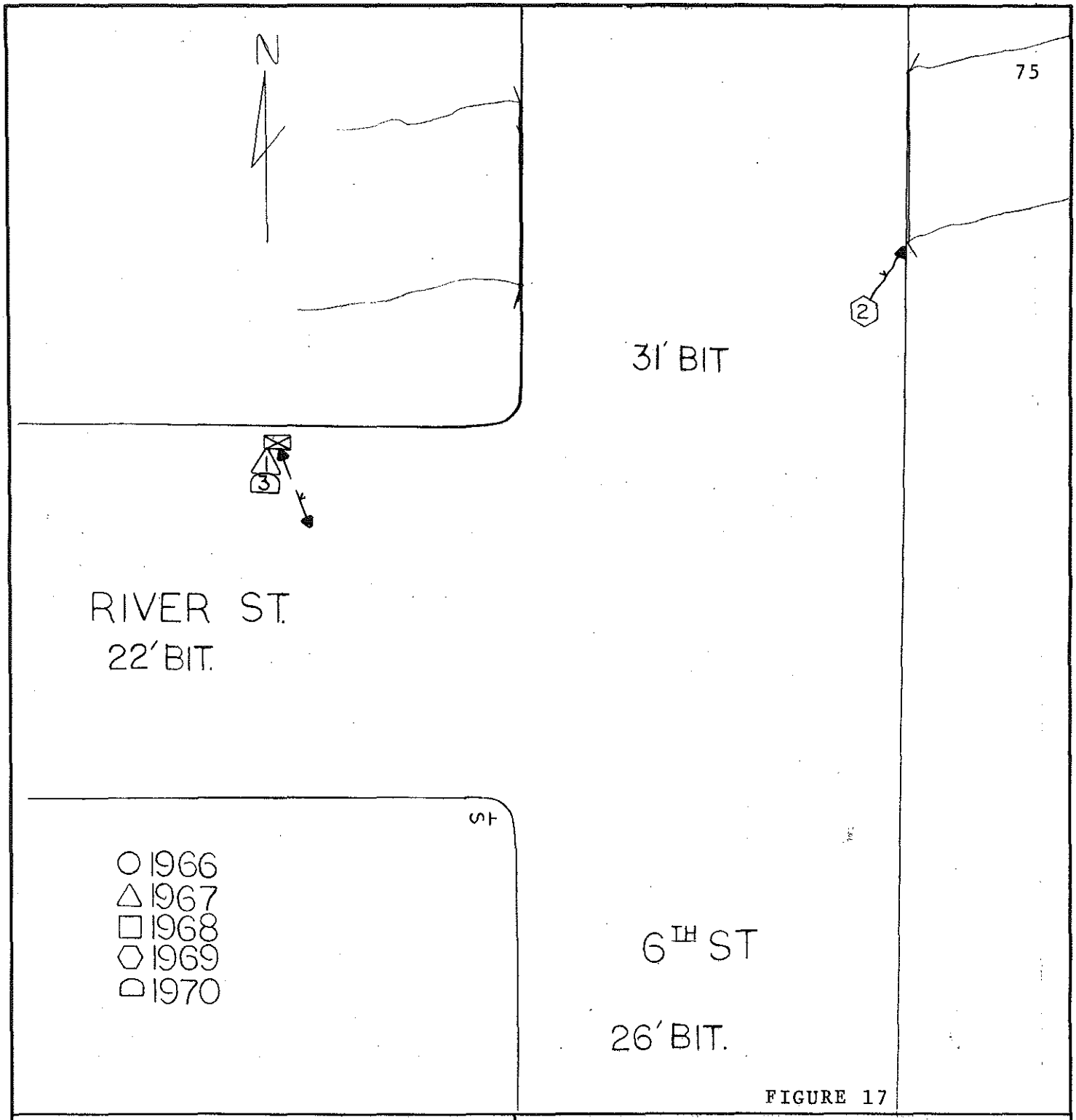


FIGURE 17

LEGEND

Stop & Go Signal — S R Y F Y
Flashing Beacon
Stop Sign S
Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian X
Tree
Out of Control
Driver Intent
Deer
Violator V

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location RIVER AT 6TH ST.
CITY OF THREE RIVERS
ST JOSEPH CO.

Period: 1966 THRU 1970

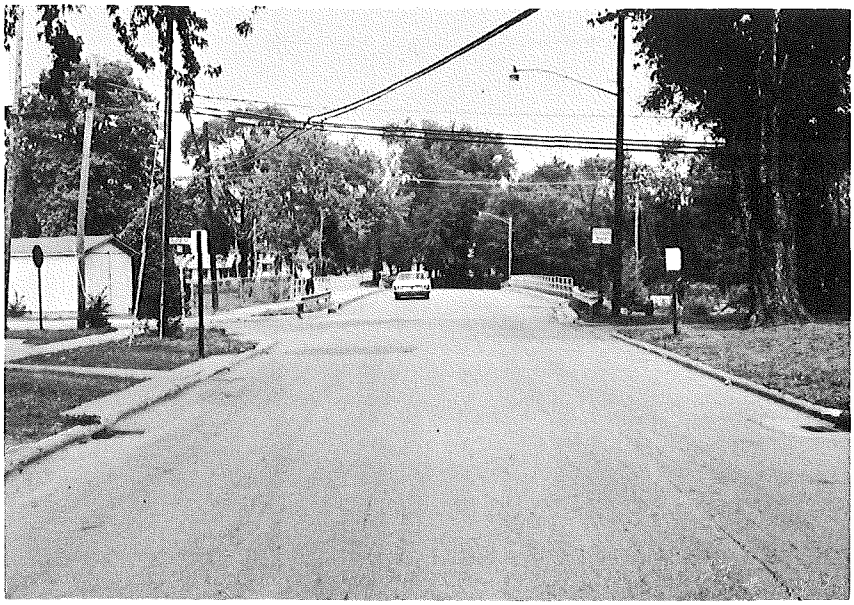
Accidents – Total 3 **P.D.** 3

Injury 0 ( ) **Fatal** 0 ( )

C.S. _____ **Miles** _____ **Drawn** DJM

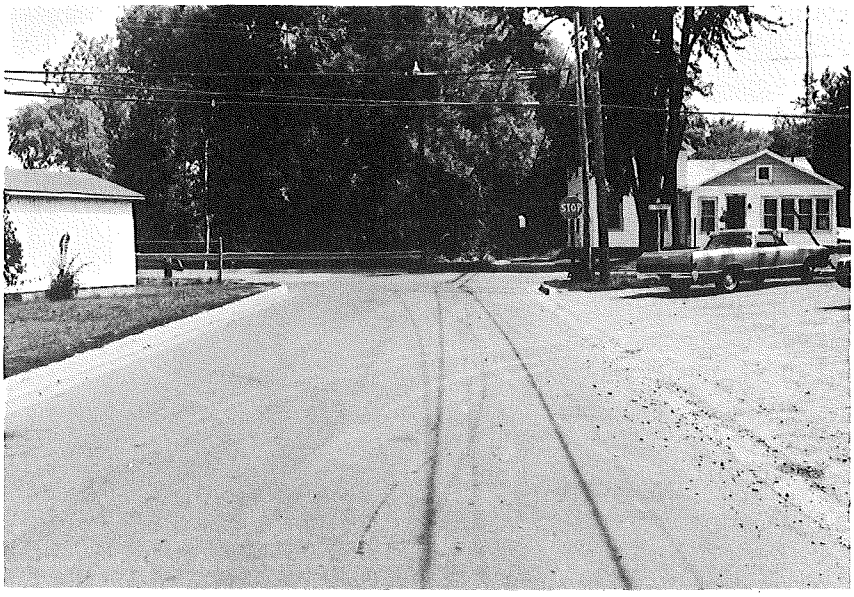
Plan No. LOCATION 13 **Date** 9-1-71

Form 1547 B (Rev. 11/70)



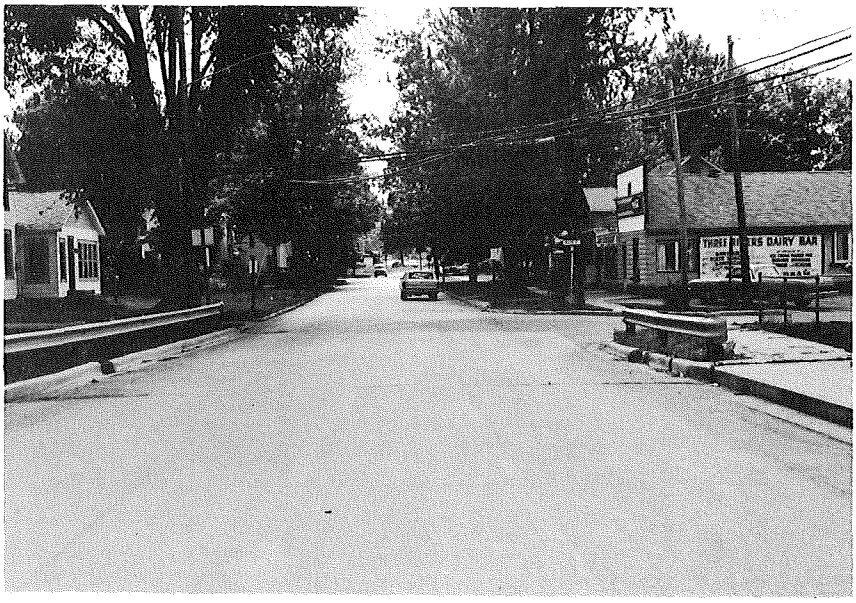
NORTHBOUND

SIXTH STREET



EASTBOUND

RIVER STREET



SOUTHBOUND

SIXTH STREET

FIGURE 17a

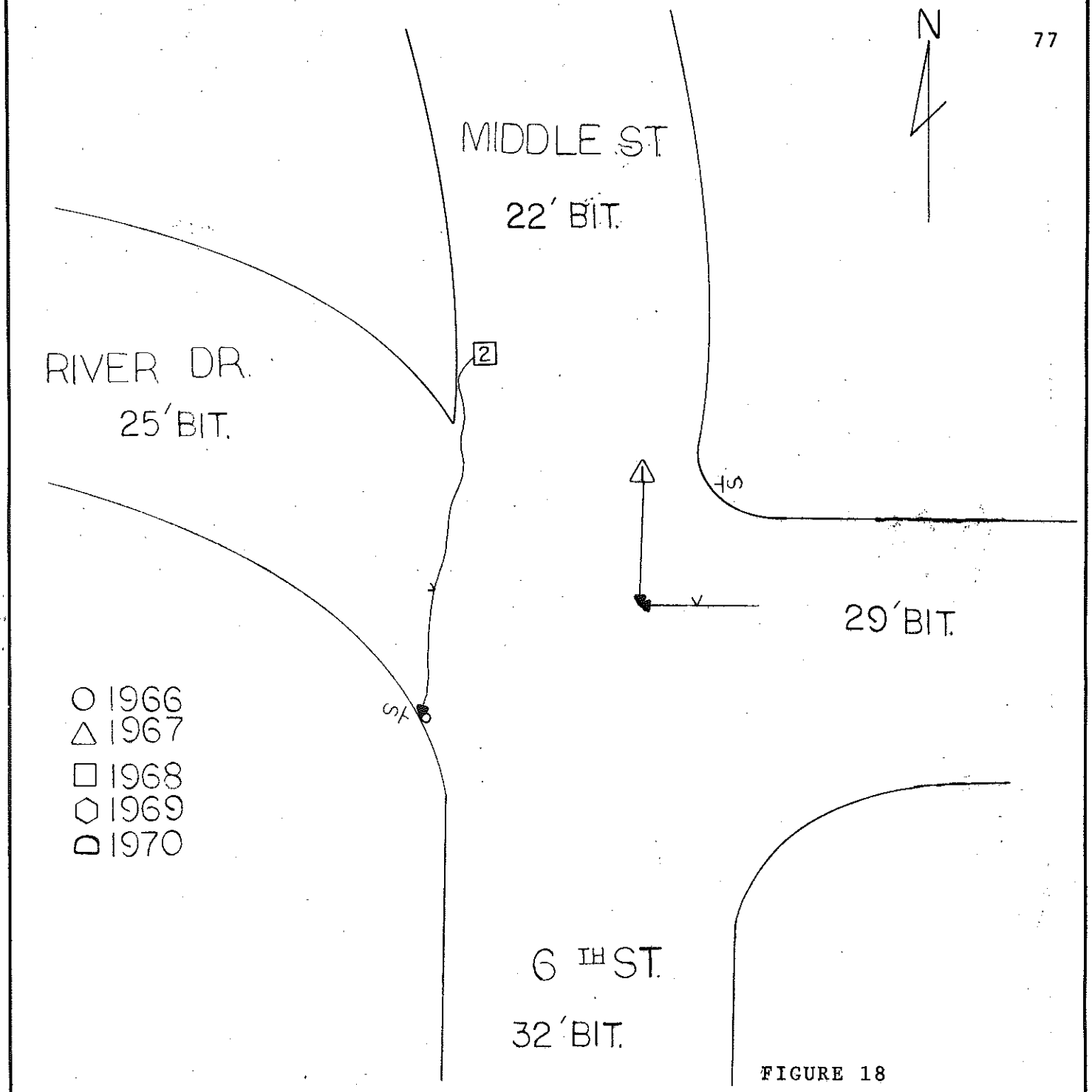


FIGURE 18

LEGEND

Stop & Go Signal — Stop Sign S
Flashing Beacon — Yield Sign Y

Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian
Tree
Out of Control
Driver Intent
Deer
Violator

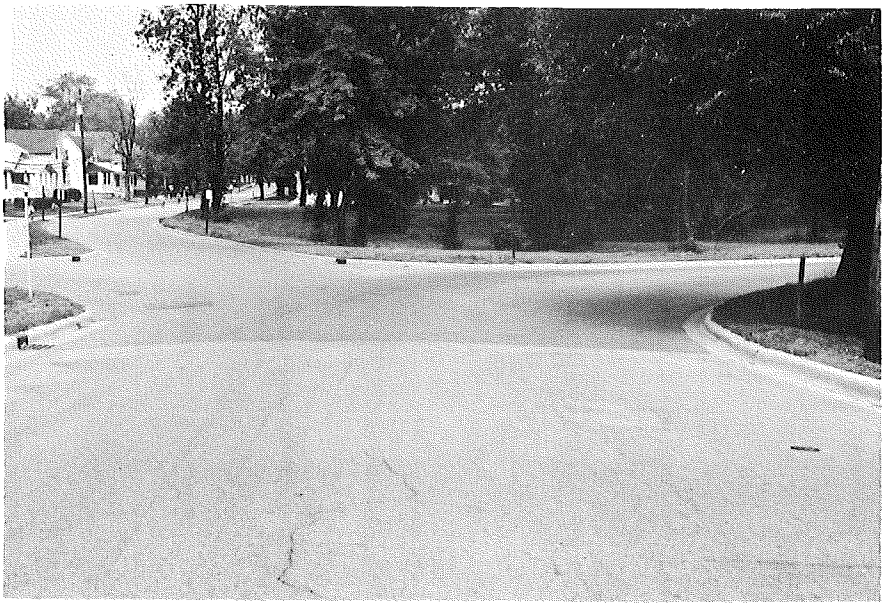
MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location RIVER DR. AT MIDDLE ST AND 6TH ST.
CITY OF THREE RIVERS
ST. JOSEPH CO.

Period: 1966 THRU 1970
Accidents – Total 2 **P.D.** 1
Injury 1 (1) **Fatal** 0 ( )
C.S. _____ **Miles** _____ **Drawn** D J M
Plan No. LOCATION 14 **Date** 9-7-71

EASTBOUND

RIVER DRIVE



NORTHBOUND

SIXTH STREET

WESTBOUND

RIVER DRIVE

FIGURE 18a

APPENDIX II

Section B. Regulatory Signs

Regulatory Signs shall be used to inform highway users of traffic laws or regulations that apply at given places or on given highways. They are essential to indicate the applicability of legal requirements that would not otherwise be apparent. Great care must be exercised to see that they are erected wherever needed to fulfill this purpose, but unnecessary mandates should be avoided.

Included among regulatory signs are some, like those marking the end of a restricted zone, that are related to operational controls though not in themselves imposing any obligations or prohibitions.

Regulatory signs shall be erected at those locations where the regulations apply and shall be mounted so as to be easily visible and legible to the motorist whose actions they are to govern. Signs that have been erected but are no longer applicable shall be removed. Regulatory signs cannot be expected to command respect and obedience unless the regulations thereon set forth are adequately enforced.

Regulatory signs are classified in the following groups:

(1)	Right-of-Way a. "STOP" Sign b. "YIELD" Sign	(R1 Series)
(2)	Speed	(R2 Series)
(3)	Movement a. Turning b. Alignment c. One Way d. Exclusion	(R3 Series)
(4)	Parking	(R4 Series)
(5)	Pedestrian	(R5 Series)
(6)	Miscellaneous	(R6 Series)

With few exceptions, hereinafter detailed in the specifications for individual signs, regulatory signs are rectangular in shape with the larger dimension vertical and have black legends on white backgrounds. The principal exceptions referred to are the "STOP" sign, the Yield sign, the One Way arrow, and the Parking signs.

STOP SIGN

Reflectorized

R1-1-24	24″ x 24″	(8″ letters)
R1-1-30	30″ x 30″	(12″ letters)
R1-1-36	36″ x 36″	(12″ letters)

All "STOP" signs shall be reflectorized or internally illuminated so that the shape, color, and legend will be comparable to that in day time conditions and will not produce detrimental glare to traffic.

The "STOP" sign may be supplemented by two alternating red flashing beacons in the face or by one red flashing beacon directly above the sign. Such beacon(s) shall be operated continuously.

Place at the point where it is desired to have traffic stop, or as near thereto as possible at the following locations:

1. On streets or highways intersecting a through street or highway.
2. Railroad crossing where a stop is required by order of the appropriate public authority.
3. Opposite all Stop lines applied on the pavement, except at intersections controlled by a traffic control signal.
4. At intersections where a flashing red beacon exists.

There shall be no "STOP" signs on approaches to an intersection where such approaches are controlled by a traffic control signal.

An overhead internally illuminated "STOP" sign may be used in lieu of roadside "STOP" signs.

Secondary messages shall not be used on the face of a "STOP" sign. At a four-way stop intersection, each "STOP" sign may

be supplemented by a separate panel reading "4-WAY". Where this panel is used in conjunction with an R1-1-24, it shall be 24″ x 9″ with 5-inch legend. Where used with an R1-1-30 or R1-1-36, it shall be 30″ x 12″ with a 7-inch legend. Each panel shall have a black legend and border with a white reflectorized background. No additional sign shall be displayed with a "STOP" sign except one of the following: R3-1, R3-2, R3-3, R3-5, R3-6, or R3-23.

A hand held "STOP" sign may be used by Traffic Regulators as provided in Part II, Section E. Drivers facing the hand held "STOP" sign shall come to a complete stop and remain standing until an indication is given to proceed.

For placement see figures 1-3 and 1-4 and for special interim application see page 409.

YIELD SIGN

Reflectorized

R1-2-36 36″ Equilateral Triangle (8″, 3″ and 2½″ letters)

All Yield signs shall be reflectorized or internally illuminated so that the shape, color, and legend will be comparable to that in day time condition and will not produce detrimental glare to traffic.

Place at the point where it is desired to have traffic yield or as near thereto as possible at the following locations:

1. At the approach to an intersection where it is necessary to assign right-of-way to the major road, but where a stop is not necessary at all times.
2. At any location where a special problem exists and where an engineering study indicates the problem to be susceptible to correction by use of the Yield sign.

NO LEFT TURN SIGN

Reflectorized

R3-1-24 24″ x 30″ (6″ and 5″ letters)
R3-1-36 36″ x 48″ (8″ and 7″ letters)

At intersections where left turns are prohibited, one roadside sign shall be placed on the near right corner and one on the far left corner facing approaching traffic. An illuminated sign may be suspended over the roadway in place of, or supplementary to, roadside signs.

When the left turn restriction applies during certain periods only, the use of the "NO LEFT TURN" sign calls for special treatment. The following alternatives are listed in order of preference:

(1) Internally illuminated disappearing legend signs.

(2) Permanently mounted signs incorporating a supplementary legend showing the hours during which the prohibition is in effect.

(3) Movable signs or signs that can be covered.

At intersections with a one-way street the R3-1 shall not be used in lieu of the One Way Arrow sign (R3-23), except where such intersection is the terminus of a one-way street.

For placement see figures 1-4 and 1-5.

Section C. Warning Signs

Introduction

Warning signs shall be used for the purpose of warning traffic of existing or potentially hazardous conditions either on or adjacent to the roadway. Warning signs require caution on the part of the motorist and may call for reduction of speed or other maneuver in the interest of his own safety and that of other motorists and pedestrians. Adequate warnings are of great assistance to the vehicle operator and are valuable in safeguarding and expediting traffic. However, the use of warning signs should be kept to a minimum. Too frequent use of them or their unnecessary use to warn of conditions which are apparent tends to bring disrespect for all signs.

The conditions warranting warning signs are classified in the following groups according to the type of conditions to which they are applied:

1.	Changes in Horizontal Alignments	(W1 Series)
2.	Intersections	(W2 Series)
3.	Advance Warning of Control Devices	(W3 Series)
4.	Converging Traffic Lanes	(W4 Series)
5.	Narrow Roadways	(W5 Series)
6.	Changes in Highway Design	(W6 Series)
7.	Grades	(W7 Series)
8.	Roadway Surface Conditions	(W8 Series)
9.	Schools and Pedestrians	(W9 Series)
10.	Railroad Crossings	(W10 Series)
11.	Entrances and Crossings	(W11 Series)
12.	Miscellaneous	(W12 Series)
13.	Construction and Maintenance	(W13 Series)*

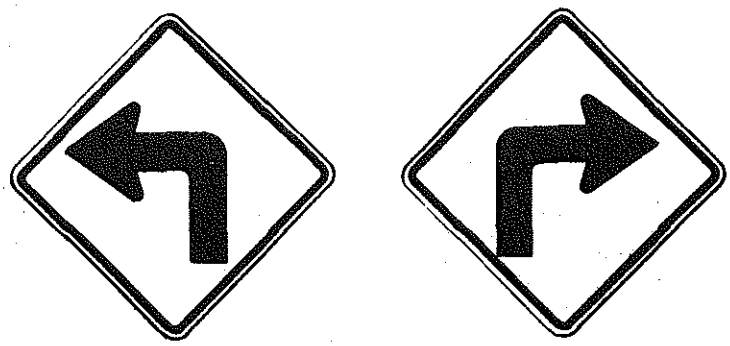
Warning signs with certain exceptions shall be diamond-shaped (square with one diagonal vertical) and shall have a "Highway Yellow" background with black legend. These exceptions are

*Special warning signs for highway construction and maintenance projects are to be found in Part II of this Manual.

the Railroad Crossing signs, the Target Arrow signs, the Curve Speed panel, the Exit Speed sign, the Obstruction panel, and the Lattice Background. Other exceptions to the diamond shape are provided for in the case of temporary signs for highway construction and maintenance.

The use of warning signs should be limited to those standard signs set forth in this section. However, after the Engineer has exhausted all possibilities, it may be found that no standard sign fits the situation and warning signs, other than those specified, may be required. Such signs shall conform with the general specifications for size (30″ minimum), shape, and color of warning signs. All warning signs having significance during hours of darkness shall be reflectorized or illuminated.

TURN SIGN



Reflectorized

W1-1-30 30″ x 30″
W1-1-36 36″ x 36″
W1-1-48 48″ x 48″

The Turn sign shall be used to denote changes in the horizontal alignment of all roads (except minor roads and streets where in the judgment of the engineer the use of this sign is unnecessary) where a ball bank indicator or Devil Level registers ten degrees or more at a speed of 30 miles per hour or less. Where this sign is warranted, consideration should be given to the use of a Target Arrow (W1-6). Additional protection may be provided by use of the Curve Speed panel (W12-1).

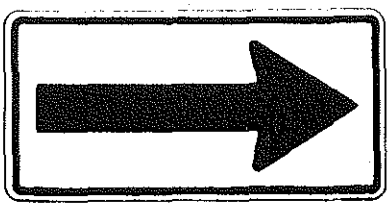
This sign shall be located in advance of the point of curvature at the approximate distance indicated below:

85th Percentile Speed			
35 & Below	36-45	46-55	56 & Over
250′	400′	550′	750′

Turns or a turn and a curve that are less than 400 feet apart shall be designated by the W1-3 sign.

For placement see figure 1-11.

TARGET ARROW SIGN



Reflectorized

W1-6-48 48″ x 24″

W1-6-96 96″ x 48″

This sign may be used as a supplement to a Turn or Curve sign for potentially hazardous turns or curves. To increase its target value and to obscure misleading topography, the sign may be mounted on a Lattice Background (W12-10).

Where further emphasis of the required movement is desired, the W1-6-96 may be used in lieu of the unit consisting of the W1-6-48 and the W12-10.

This sign shall not be used to mark the ends of medians, centerpiers, etc., where there is no change in the direction of travel for all traffic. Further, it shall not be used as a route directional confirmatory marker or in any location where an intersecting street or highway of equal or nearly equal importance presents a choice of movement.

When used, the Target Arrow sign shall be erected in target position and, if possible, mounted high enough to be visible for at least 500 feet. It shall be placed at five feet minimum bottom height and two feet from the edge of the shoulder or curb face.

STOP AHEAD SIGN

Reflectorized

W3-1-30 30″ x 30″ (6″ letters)
W3-1-36 36″ x 36″ (8″ letters)

The "STOP AHEAD" sign shall be erected in advance of an intersection where traffic is required to stop and the "STOP" sign is not visible to motorists for a sufficient distance or where emphasis is needed because of poor observance of the stop. The "STOP AHEAD" sign may also be used in advance of a red flashing beacon.

Where required, the W3-1-30 shall be used in advance of a 24-inch "STOP" sign and the W3-1-36 in advance of a 30 or 36-inch "STOP" sign.

Except where used on State trunkline highways at junctions with other State trunkline highways, it shall be located in advance of the required stop at the approximate distance indicated below:

85th Percentile Speed			
35 & Below	36-45	46-55	56 & Over
250′	400′	550′	750′

For location on State trunkline highways see figures 1-17 and 1-26.

For placement see figure 1-11.

SLIPPERY WHEN WET SIGN

Reflectorized

W8-5-36 36″ x 36″ (6″ letters)

The "SLIPPERY WHEN WET" sign shall be used to warn traffic of a section of pavement that becomes sufficiently slippery when wet to present a hazard at speeds normally traveled.

Where used, this sign should be located approximately 500 feet in advance of the beginning of the slippery section and at intervals throughout the length of pavement where this condition exists.

For placement see figure 1-11.

RAILROAD ADVANCE WARNING SIGN

Reflectorized

W10-1-36 36″ diameter (8″ letters)

The circular Railroad Advance Warning sign shall be erected in advance of all railroad crossings. The distance from the intersection of the center line of the highway with the nearest rail to the sign location shall be not less than 250 feet nor more than 350 feet. All such signs must be maintained free from obstruction to vision for not less than 300 feet in advance of the sign.

For placement see figure 1-11.

CURVE SPEED PANEL

Reflectorized

W12-1-21 21″ x 21″ (10″ and 3″ letters)
W12-1-24 24″ x 24″ (12″ and 3″ letters)

The Curve Speed panel may be used as a supplement to the W1-1 through W1-5 signs only and shall display a speed legend in increments of five miles per hour. Since this legend is advisory, no Traffic Control Order is required. The W12-1-21 shall only be used with the appropriate 36 inch W1 sign and the W12-1-24 with the appropriate 48 inch W1 sign.

To determine the accurate negotiable speed on a turn or curve by the use of a ball bank indicator or Devil Level, several runs should be made in the same direction to obtain the most accurate reading possible. Readings obtained from several trial runs in the same direction shall determine the curve speed for that respective direction. Since the comfortable turn or curve speed on a specific turn or curve may vary, depending on direction of travel, the same procedure shall be used to obtain the curve speed for the opposite direction.

The following table indicates the speed to be used on the Curve Speed panel.

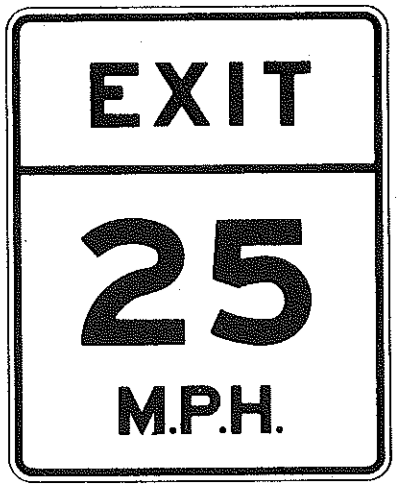
Indicator Reading	Speedometer Reading	Appropriate Panel Legend
10°	60, 59, or 58	60
10°	57, 56, 55, 54, or 53	55
10°	52, 51, 50, 49, or 48	50
10°	47, 46, 45, 44, or 43	45
10°	42, 41, 40, 39, or 38	40
10°	37, 36, 35, 34, or 33	35
12°	32, 31, 30, 29, or 28	30
12°	27, 26, 25, 24, or 23	25

Indicator Reading	Speedometer Reading	Appropriate Panel Legend
14°	22, 21, 20, 19, or 18	20
14°	17, 16, 15, 14, or 13	15
14°	12, 11, or 10	10

The speed legend displayed may equal but never exceed that of the posted speed limit in a Speed Control Zone.

For placement see figure 1-11.

EXIT ____ MILES PER HOUR SIGN



Reflectorized

W12-2-48 48″ x 60″ (8″, 16″, and 6″ letters)

This advisory sign shall be used only at ramps exiting from freeways where the safe speed of the first curve on the off-ramp, as determined by conditions at each individual location, is found to be less than 70 percent of the design speed for the freeway.

If a safe speed indication is required for a second curve on an off-ramp well beyond the gore, a curve sign with a curve speed panel should be used.

For placement see figure 1-35.

Section B. Pavement and Curb Markings

Materials

Pavement and curb markings are generally placed with paint, however, a number of substitutes, such as thermoplastics, flat units, and metal inserts may be used. Paint substitutes, when used, shall conform to the color, reflectorization, and dimension specifications for paint markings.

Paint substitutes on or in the pavement surface shall be set so that their upper surfaces are essentially flush with the pavement surface. They may be placed in continuous contact or separated by small spaces, approximately equal to the length of a single unit. Either type of line may be used where a solid line is prescribed in this Manual. Particular care shall be taken to assure accurate alinement and spacing.

Paint substitutes shall be not less than 4″ in diameter, if round, or not less than 4″ in width and of equivalent minimum area if of other shape. They shall be spaced not more than 16″ apart, center to center, on transverse lines and not more than 36″ apart on longitudinal lines. They shall have rounded surfaces that present a smooth contour to the wheels of vehicles and shall not project more than ¾ of an inch above the level of the pavement. They shall be permanently fixed in place.

The use of raised bars (commonly known as "jiggle bars") to discourage the use of certain pavement areas is allowed.

Built-in pavement markings of white or colored concrete or inlaid bricks or blocks are not adaptable to reflectorization nor to any change in layout for traffic conditions and their use is not recommended.

Large mushroom buttons or bars of cast iron or concrete several inches high, with or without reflectors, light symbols, or messages, shall not be used for pavement markings. In their application, they are in effect, curbs or islands and are restricted to such applications.

Colors

Pavement markings shall be white or highway yellow in color. The use of black between the white segments of a broken pavement line is permissible where the pavement itself does not provide sufficient contrast. This use of black does not establish

it as a standard color for pavement marking, but is only a means of achieving contrast on a light colored pavement.

White shall be used for:

1. Centerlines on two-lane rural roads and city streets.
2. Lane lines.
3. Pavement edge lines.
4. Paved shoulder markings.
5. Channelizing lines.
6. Approaches to obstructions which may be passed on either side.
7. Special markings at interchanges.
8. Turn markings.
9. Stop lines.
10. Crosswalk lines.
11. Parking space limit lines.
12. Word and symbol markings.

Yellow shall be used for:

1. Barrier lines:
   a. Double center lines on multi-lane pavements.
   b. No passing zones on two and three lane roads.
   c. Pavement width transitions.
   d. Approaches to obstructions which must be passed on the right.
   e. Excluded areas within the roadway.
2. Curb markings:
   a. Parking prohibitions.
   b. Traffic islands.

Width of Lines

Center lines, lane lines, and barrier lines shall be 4 to 6 inches wide. The width of a channelizing line may vary from a minimum of 4″ to a maximum of 12″, depending on the emphasis required. Pavement edge lines shall be 4″ wide. Transverse lines on pavements must be wider than longitudinal lines to be equally visible.

Reflectorization

All pavement markings having application at night shall be reflectorized.

Maintenance

All markings shall be maintained in effective condition at all times. The frequency of repainting depends on the type of surface, composition, and rate of application of paint, climate, and volume of traffic. Particular care should be taken, especially in the case of broken lines, to paint over the old markings as exactly as possible. Otherwise, they will appear increasingly ragged after successive repaintings.

Center Lines*

A center line is used to designate the center of the traveled part of a roadway carrying traffic in both directions. Under some circumstances, as at a pavement-width transition, where parking is allowed on one side, or where a truck lane is provided, it need not be at the geometrical center of the pavement. On all major rural highways having an even number of lanes, and on many urban streets and less important rural roads, center lines are necessary and should be applied throughout the entire length of the pavement. In urban locations and on some rural roads where a continuous center line is not provided, short sections of center line are useful on approaches to busy intersections, marked crosswalks, railroad crossings, around curves or at hillcrests. When so used, the center line serves both to warn of any unusual conditions and to organize and control traffic through a hazardous or congested zone.

The center line on a two-lane paved rural highway shall be a broken white line, not less than 4 nor more than 6 inches wide. Line segments may be 20 feet in length with 30-foot gaps or 15-foot segments separated by 25-foot gaps. On four-lane undivided rural pavements, or on pavements of a greater even number of lanes, the center line shall consist of two solid yellow lines, each not less than 4″ nor more than 6″ wide, separated by a space of not less than 3″. Lines dividing a one-way roadway into two or more lanes are lane lines.

*See Change Memorandum No. 5, pps. 98 - 102.

As a guide to the application of center line markings, the following warrants are suggested:

1. Center lines are desirable on all paved highways and as a minimum should be placed throughout the length of:
   a. Two-lane pavements carrying an ADT (Average Daily Traffic) in excess of 1,000 vehicles.
   b. Two-lane pavements narrower than 20′ carrying an ADT in excess of 500 vehicles.
   c. Two-lane pavements narrower than 18′ but not less than 16′ in width carrying an ADT in excess of 300 vehicles. Center lines should not be used on pavements narrower than 16′.
   d. All four, six, and eight lane undivided pavements.
2. Center lines should be placed at other locations where accident experience indicates their need, and on hard surface roads in areas where driver visibility is likely to be reduced frequently as by fog.

The center line on a two-way city street having only one lane for moving traffic in each direction shall be a solid white line. Such line shall be not less than 4 nor more than 6 inches wide.

A double solid yellow line shall be used on a two-way street with four or more lanes for moving traffic except where a single lane has been reserved for left turning vehicles or where one or more lanes are in use for reversible lane control. In such cases, a solid white line shall be used as shown in figure 3-16.

On a two way street, where it is desired to exclude traffic from a portion of pavement between traffic moving in opposite directions the double solid yellow line shall be used.

Lane Lines

Lane lines are helpful in the organization of traffic in its proper channels, and in increasing the efficiency of the use of the roadway surface at congested locations. They should be used:

1. On all rural highways with an odd number of traffic lanes.
2. In addition to the center line, on all undivided rural highways of four or more lanes.
3. At the approaches to important intersections and cross-

walks, and in dangerous locations on both rural highways and city streets.

4. At congested locations, particularly on city streets, where the roadway will accommodate more lanes of traffic than would be the case without the use of lane lines. These include;
   a. Locations between loading islands and sidewalk curbs.
   b. Locations where the normal lane width is decreased.
   c. Approaches to widened intersections.
5. On one-way streets or roadways where maximum efficiency in utilization of the roadways is desired.

Lane lines shall be broken white lines, not less than 4 nor more than 6 inches wide. Line segments may be 20 feet in length with 30-foot gaps or 15-foot segments separated by 25-foot gaps. The transverse spacing of lane lines, that is, the lane width, should not normally be less than 10 feet with 12 feet being the desirable width. In urban areas, a minimum of 9 feet is permissible where a maximum number of lanes must be made available, as at a signalized intersection where provision must be made for the most efficient storage of stopped vehicles.

No lane which is occupied by legally parked vehicles should be marked with a lane line. When a lane line is located adjacent to parked vehicles on a curbed roadway, the distance from the face of curb to such lane line should be 24 feet (minimum 22 feet).

No Passing Zones

No Passing Zones shall be established at vertical and horizontal curves and elsewhere on two and three lane highways where passing is to be prohibited because of dangerously restricted sight distances or other hazardous conditions.

Under the Michigan Vehicle Code, the State Highway Commission and the County Road Commissions are authorized, after a traffic survey and engineering study, to determine those portions of any highway under their jurisdiction where overtaking and passing is especially hazardous and to indicate such locations by No Passing Zone signs and/or markings positioned in such manner that an ordinary observant driver will be able to observe the directions thereof and obey the same.

OFFICE MEMORANDUM

MICHIGAN
DEPARTMENT OF STATE HIGHWAYS

NOV 10 1971

To: All Holders on Record This Date of the 1963 Edition of the "Michigan Manual of Uniform Traffic Control Devices"

From: Henrik E. Stafseth, Director, Michigan Department of State Highways
John R. Plants, Director, Michigan Department of State Police

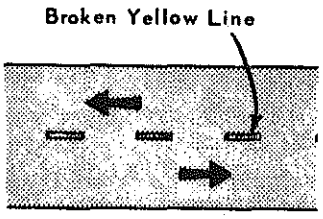
Subject: Change Memorandum No. 5

In order to more nearly conform to the design and application of traffic control devices prescribed by the 1971 edition of the National "Manual on Uniform Traffic Control Devices" (MUTCD) and to comply with recent revisions to the "Michigan Vehicle Code" (MVC), it is necessary that the following changes in the "Michigan Manual of Uniform Traffic Control Devices" (MMUTCD) be made. These and other changes to the 1963 edition of the MMUTCD will ultimately be encompassed in a revised edition of the MMUTCD. However, this Change Memorandum will serve to authorize interim changes of more urgent concern to state, county and municipal agencies.

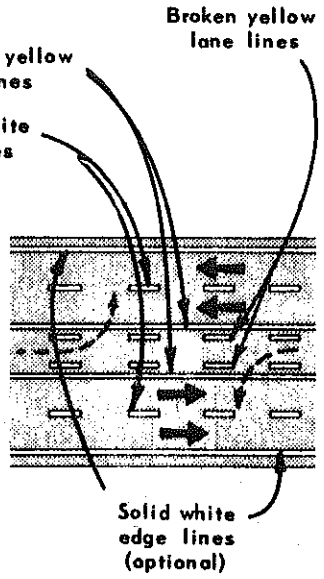
In instances where "may" is used in this memorandum, the 1971 edition of the MUTCD and forthcoming revised edition of the MMUTCD possibly will read "shall". The purpose of using "may" in this memorandum is to temporarily permit the extended use of existing sign inventories.

The interim changes, numerically designated, follow (code numbers shown beneath sign illustrations are from the MUTCD sign coding system):

1. On all two-lane, two-way, hard-surface roadways, beginning with the 1972 pavement-marking season, any center-line marking placed shall be a broken yellow line. Line width, segment length, and the marking of "no-passing" zones shall be the same as currently specified by the MMUTCD.*



*See Typical Application pps. 103-104.



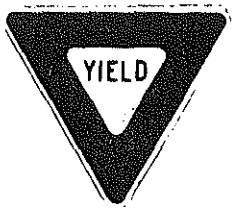
2. Beginning with the 1972 pavement-marking season, on each two-way roadway consisting of three lanes or more, where a two-way, left-turn lane is to be designated, the two-way, left-turn lane shall be marked by a single-direction, no-passing markings (4-inch solid yellow line on the outside and 4-inch broken yellow line on the inside) on each edge of the center lane.

3. By December 31, 1972, the limits of no-passing zones at vertical curves, identified by pavement markings and/or "DO NOT PASS" and "PASS WITH CARE" signs, shall be established where the minimum sight distance measured between points 3.75 feet (maximum) above the roadway surface becomes less than that specified by the table on page 281 (MMUTCD).

4. In accordance with section 257.640 (MVC), a pennant-shaped sign, having a black legend "NO PASSING ZONE" and border on a yellow reflectorized background, shall be located on the left side of the roadway opposite the beginning of each no-passing zone identified by a "DO NOT PASS" sign and/or no-passing zone pavement markings. Consideration of item #3 should be taken into account when locating these signs.

W14-3
36" x 48" x 48"

5. Where an R1–2–36 "YIELD" sign is to be replaced or added, a sign with a red legend and 5-inch red border on a white background may be used.

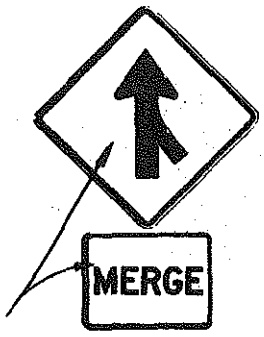


R1–2
36" x 36" x 36"

6. Where an R3–27–24 "DO NOT ENTER" sign is to be replaced or added, a 30-inch white square panel may be used, on which is inscribed a 29-inch diameter red circle with a white band 5 inches in width placed horizontally across the center of the circle. The legend "DO NOT ENTER" shall appear in white letters, with the words "DO NOT" above the band and "ENTER" below the band. If an R3–27–36 sign is to be replaced or added, a similar design, correspondingly larger, may be used. The use of an R3–36–24 "BULLSEYE" sign, as provided for by general revision number 2 to the MMUTCD, is hereby rescinded except for use as an illuminated sign suspended over the roadway at an intersection facing the "wrong-way" direction of travel.

R5–1
30" x 30"

7. Where a W4–1 "MERGING TRAFFIC" sign is to be replaced or added, a 30-inch or 48-inch diamond-shaped symbol sign, together with appropriate size "MERGE" panel, may be used.



Black Legend
on a yellow
background

W4–1
30" x 30"
24" x 18"

8. Where a W9–1 "SCHOOL" or a W9–2 "SCHOOL CROSSING" sign is to be

S1–1
30" x 30"

replaced or added, a 30–inch–by 30–inch pentagon-shaped sign, with figures to represent school children, may be used. When such sign includes crosswalk markings, it shall only be used at or adjacent to an established crosswalk and shall be preceded by a pentagonal sign which excludes crosswalk markings (School Advance Sign).

S2–1
30" x 30"

9. Where a "PEDESTRIAN CROSSING" or a W9–6 "WATCH FOR PEDESTRIANS" sign is to be replaced or added, a 30–inch diamond-shaped sign, bearing a black stylized human shape on yellow reflectorized background, together with a 24–inch–by–18–inch "PED XING" panel, may be used.

W11–2
30" x 30"
24" x 18"

10. For construction, maintenance, or utility operations, warning signs may be designed with a black legend on a reflectorized orange background; barricades may be designed with alternate reflectorized orange and white stripes; barrels may be equipped with alternate reflectorized orange and white, circumferential stripes; and cones, having orange as a predominant color, may be used. The use of standard orange flags in conjunction with orange signs is permitted so long as they do not interfere with a clear view of the sign face. The use of the orange color devices, however, shall be limited to those operations where all warning signs, barricades, barrels, and cones pertaining to the same construction, maintenance, or utility operation are designed with the orange color.

11. On construction, maintenance, or utility operations, where orange is used for traffic control devices and flagmen are required, each flagman shall wear an orange vest and/or an orange cap, conforming to the designs specified by the 1971 edition of the MUTCD.

Standard plans for all signs described in this memorandum may be obtained from the Traffic and Safety Division, Michigan Department of State Highways.

We hereby certify that the provisions of this memorandum constitute an official change in the provisions of the "Michigan Manual of Uniform Traffic Control Devices", as adopted September 3, 1963 in accordance with Section 608, Act 300, P.A. 1949, as amended (MVC).

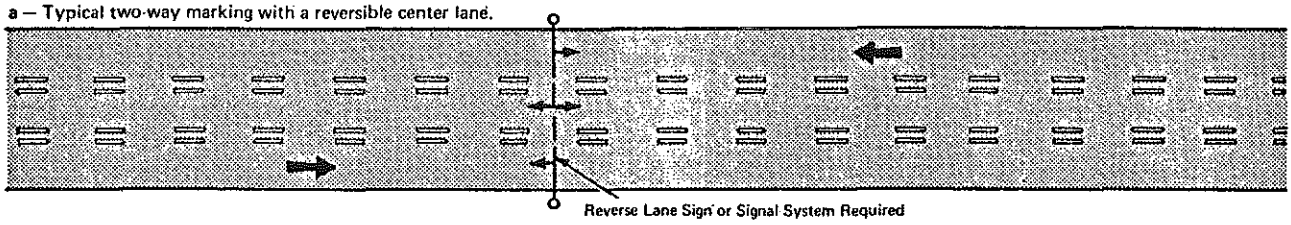
Director
Michigan Department of State Highways

Director
Michigan Department of State Police

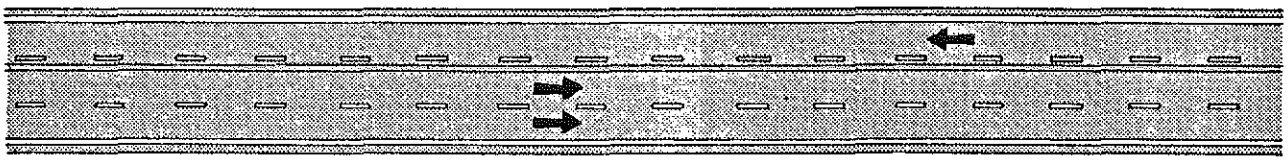
Note for Change Memorandums Only

This change will be reflected in the next Manual Edition. Therefore, this memorandum should be discarded when you receive that Edition.

a — Typical two-way marking with a reversible center lane.



b — Typical two-way marking where motorists in a single lane are permitted to pass.



c — Typical two-way marking where motorists in a single lane are not permitted to pass.

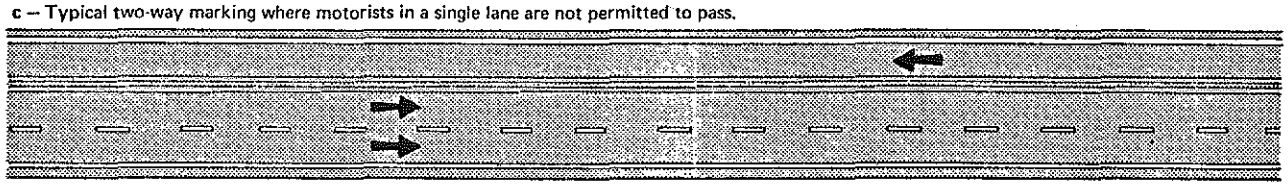
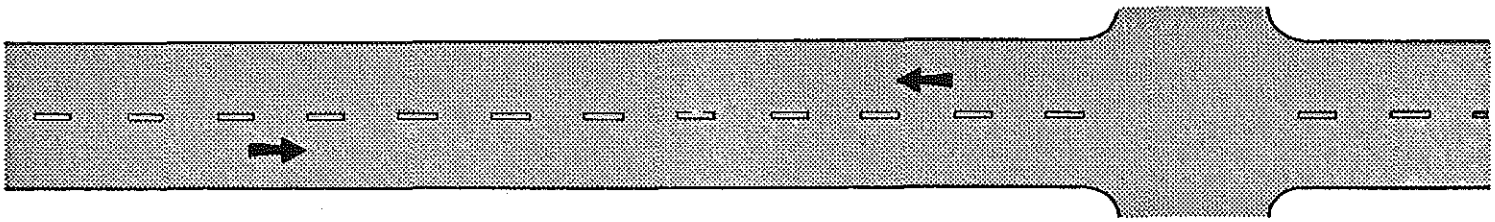


Figure 3–1. Typical two-way marking applications.

a — Typical two-lane, two-way marking with passing permitted.



b — Typical two-lane, two-way marking with passing prohibited zones.

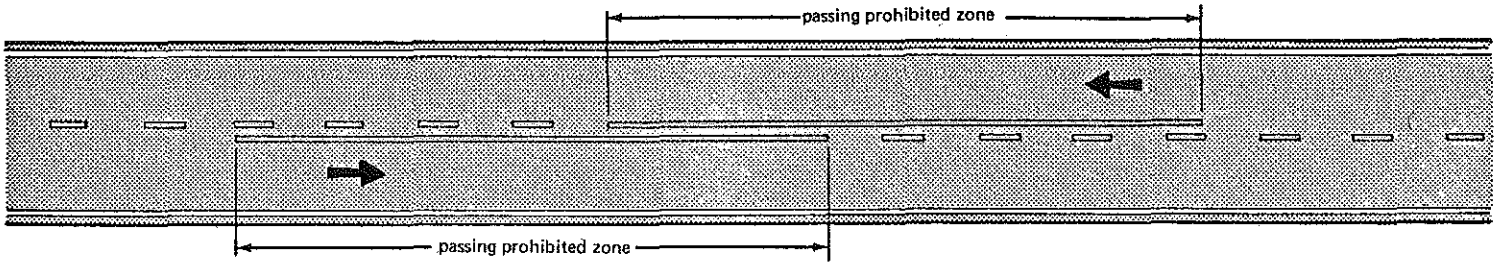
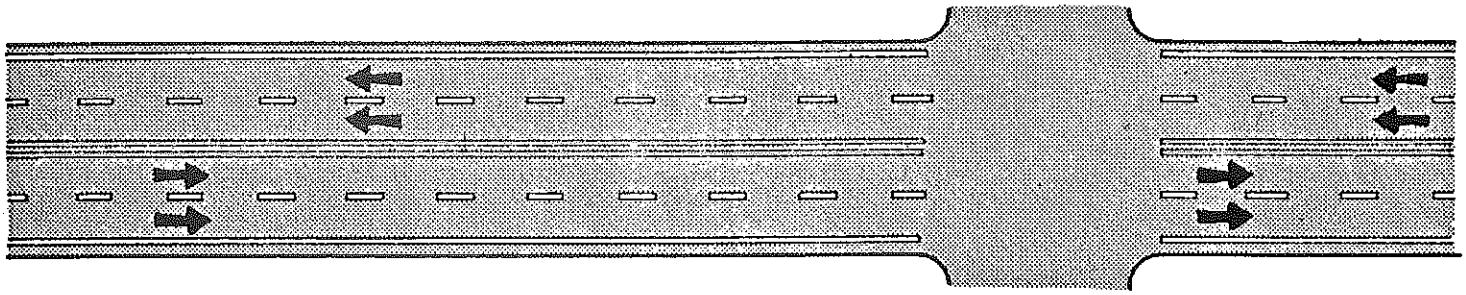


Figure 3–2. Typical 2-lane, two-way marking applications.

a — Typical multi-lane, two-way marking.



b — Typical multi-lane, two way marking with single lane left turn channelization.

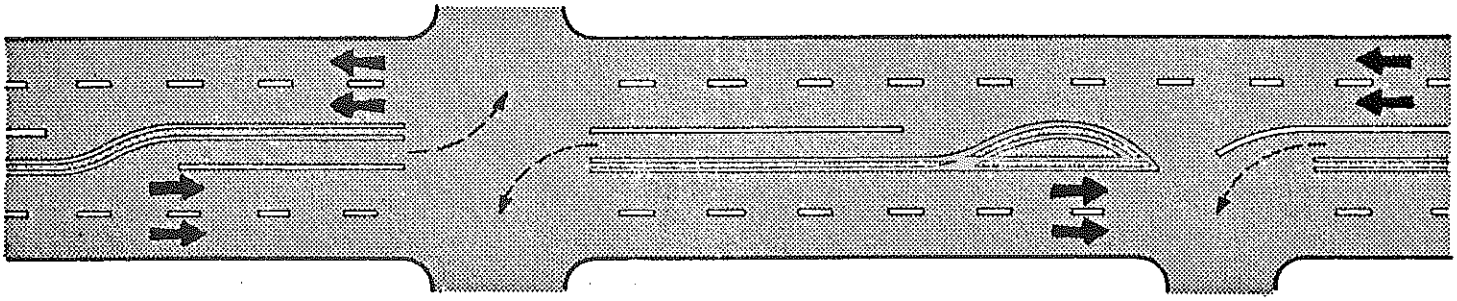
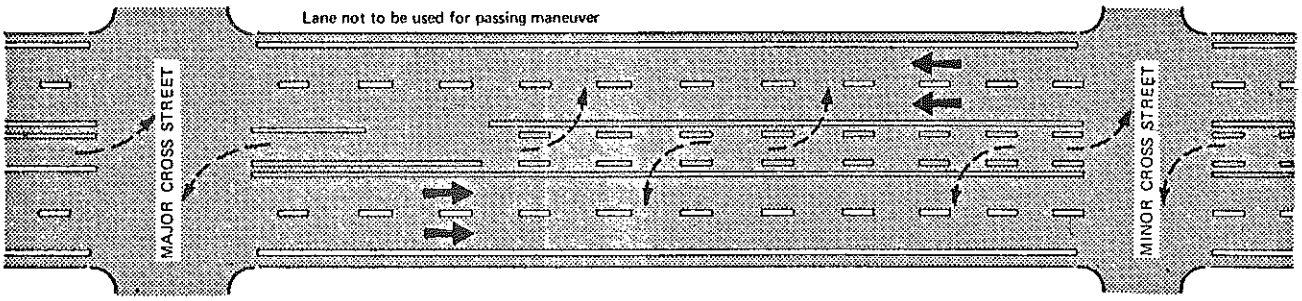


Figure 3–3. Typical multilane, two-way marking applications.

a — Typical multi-lane, two-way marking with single lane, two-way left turn channelization.



b — Typical multi-lane, two-way marking with dual lane left turn channelization.

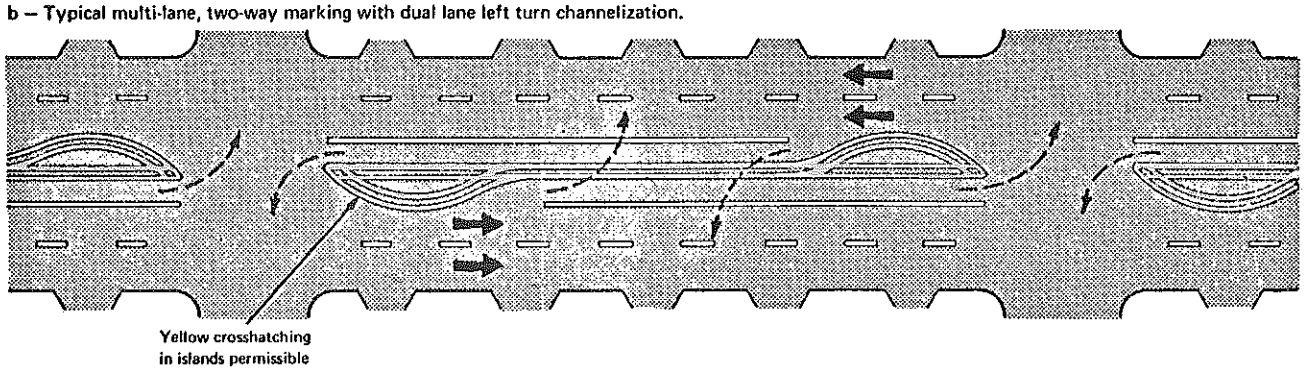


Figure 3–4. Typical multilane, two-way marking applications.