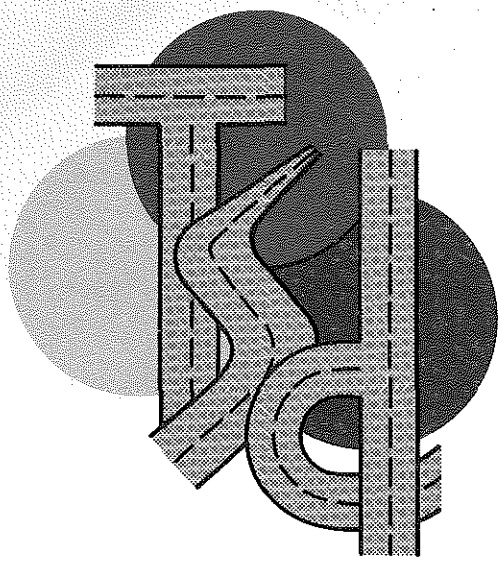
A TRAFFIC ACCIDENT ANALYSIS OF HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Report TSD-SS-175-71



TRAFFIC and SAFETY DIVISION

DEPARTMENT OF STATE HIGHWAYS
STATE OF MICHIGAN

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Report TSD-SS-175-71

by

JOSEPH L. MESZAROS

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April, 1972

PREPARED BY THE

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Bureau of Operations
Michigan Department of State Highways

in cooperation with

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and
The U. S. Department of Transportation
National Highway Traffic Safety Administration

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CITY OF NILES

Frank Frucci - Former Mayor
Ralph Wegner - Mayor

Arthur Reed - Engineer
Rayford Crocker - Chief of Police
Carl Lowell - Safety Officer

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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 a traffic accident analysis of locations which experience a high accident frequency and summarizing the 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 Niles (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 Niles were determined by manually extracting and compiling those locations with the highest number of accidents from the 1968 city accident reports. From this list the 16 highest accident locations were selected. Once the problem locations were identified, additional accident information for the years 1966, 1967, 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 Niles.

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.

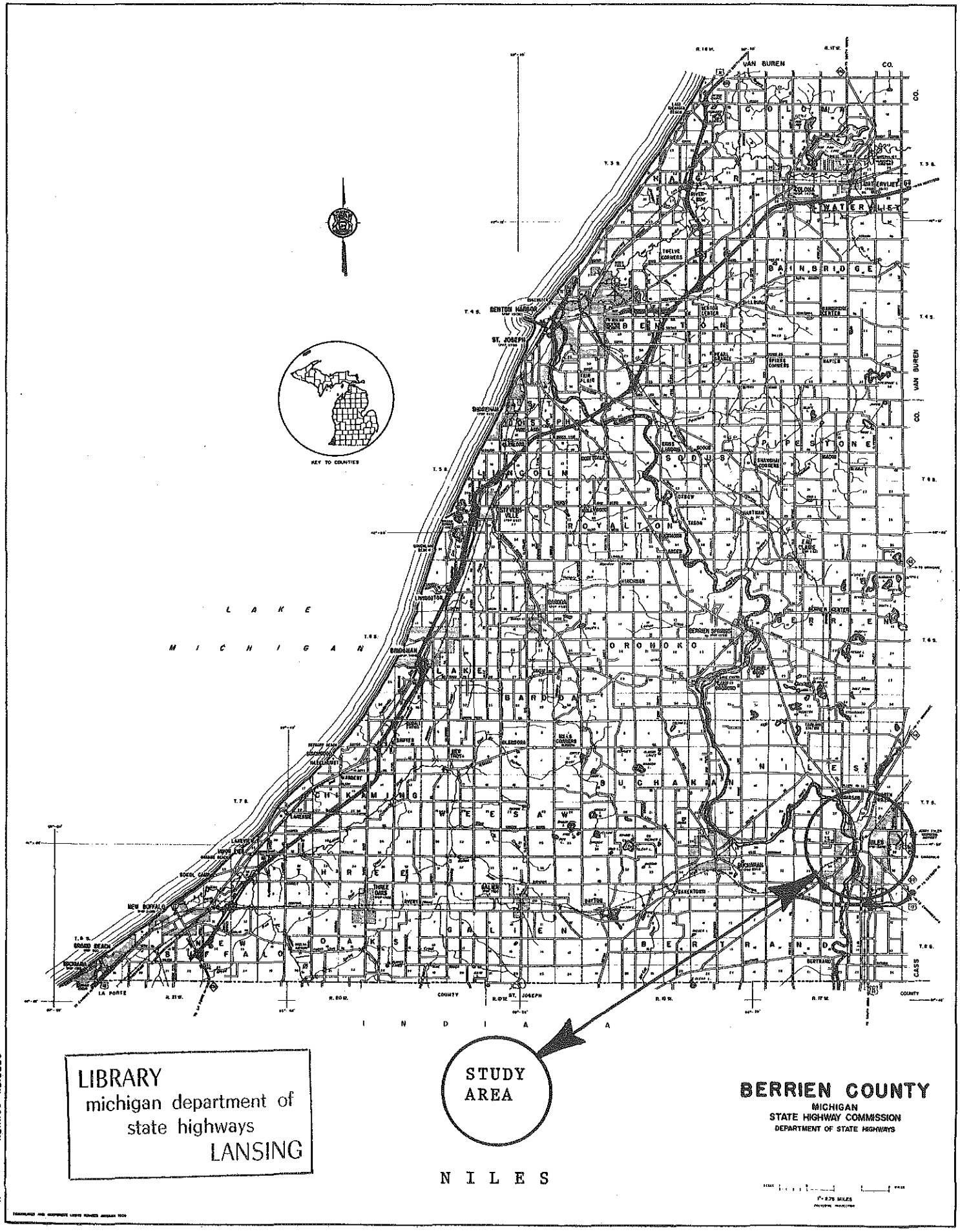
The traffic engineering analysis phase involves evaluating the summarized facts and field data and prescribing the proper remedial treatment.

STUDY AREA

The City of Niles is situated in Niles Township in the southeastern corner of Berrien County (Figure 1). Niles acquired the distinction as the only city in the State of Michigan to have four different countries claim it; the French, the British, the Spanish and the American flags have flown above the city. Niles is the second largest city in Berrien County and was incorporated in 1838. It possesses a history of settlements dating back to 1697 when the first fort, Fort St. Joseph, was erected. Prior to this, Indian settlements were situated throughout the area.

Niles has many excellent modes of transportation to meet the increased needs of its industry and residents. It

FIGURE 1


VAN BUREN CO.
BENTON HARBOR
ST. JOSEPH
KEY TO COUNTIES
L A K E
M I C H I G A N
I N D I A N A
LIBRARY
michigan department of
state highways
LANSING
STUDY AREA
N I L E S
BERRIEN COUNTY
MICHIGAN
STATE HIGHWAY COMMISSION
DEPARTMENT OF STATE HIGHWAYS

has been called the "Gateway to Michigan", since five highways radiate from the city. US31/33 provides northwest-south access through the city; M-140 begins at Niles and continues north to South Haven; M-51 (formerly M-40) begins at Niles and extends northeast to I-94; M-60 begins at Niles and extends easterly to Jackson; and US-12 (Chicago Road) provides east-west access to Detroit and Chicago, following the Great Sauk Indian Trail. The Indiana Toll Road is located five miles south of Niles providing a link with Chicago and New York. The Jerry Tyler Municipal Airport serves the community's transportation needs with a 3,300 foot paved runway equipped to handle private planes and a limited amount of commercial aircraft. The City of Niles is also serviced by the Penn Central Railroad, with one line extending from Detroit to Chicago and another from Benton Harbor to South Bend.

The population in the community of Niles increased substantially between 1910 and 1960 and decreased slightly in the last decade (Population Chart, Figure 2). However, the surrounding townships, Bertrand and Niles in Berrien County and Howard and Miltown in Cass County, have grown very rapidly in the last decade. The decline in population in the City of Niles can be attributed to the developing trend toward decentralization occurring in urban areas. In the future an expanding population is being forecast for the Greater Niles Area.

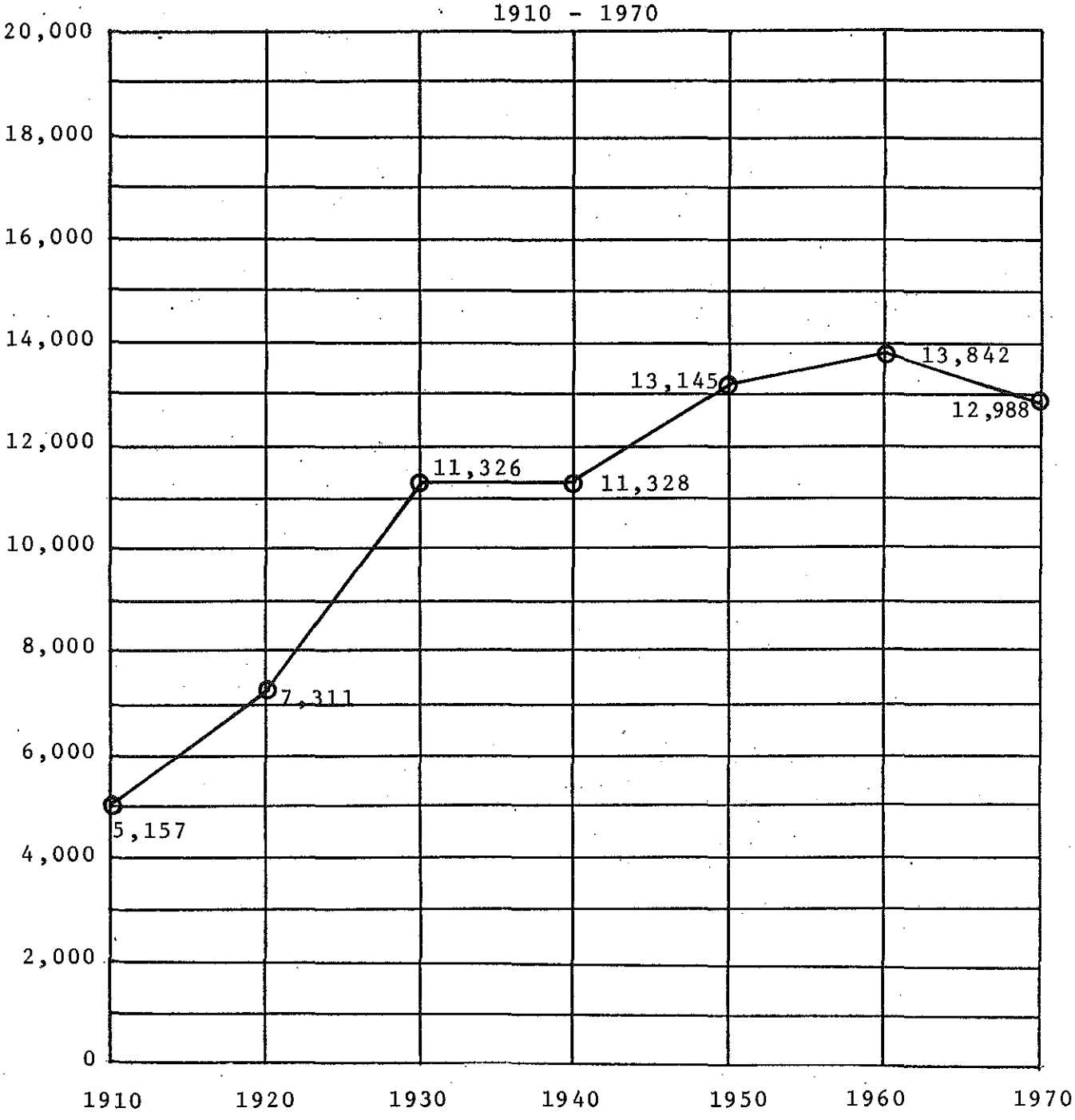
According to the Twentieth Annual Progress Report, as compiled by the Local Government Division of the Michigan

FIGURE 2

CITY OF NILES

POPULATION CHART

1910 - 1970



SOURCE: U. S. BUREAU OF THE CENSUS

Department of State Highways, the City of Niles had 69.94 miles of streets. This figure includes 6.62 miles of State trunklines, 16.40 miles of major city streets and 46.92 miles of local city streets. A map showing these road types can be found on the following page (Figure 3).

STATE OF MICHIGAN

DEPARTMENT OF STATE HIGHWAYS

CITY OF NILES BERRIEN 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 ⊗

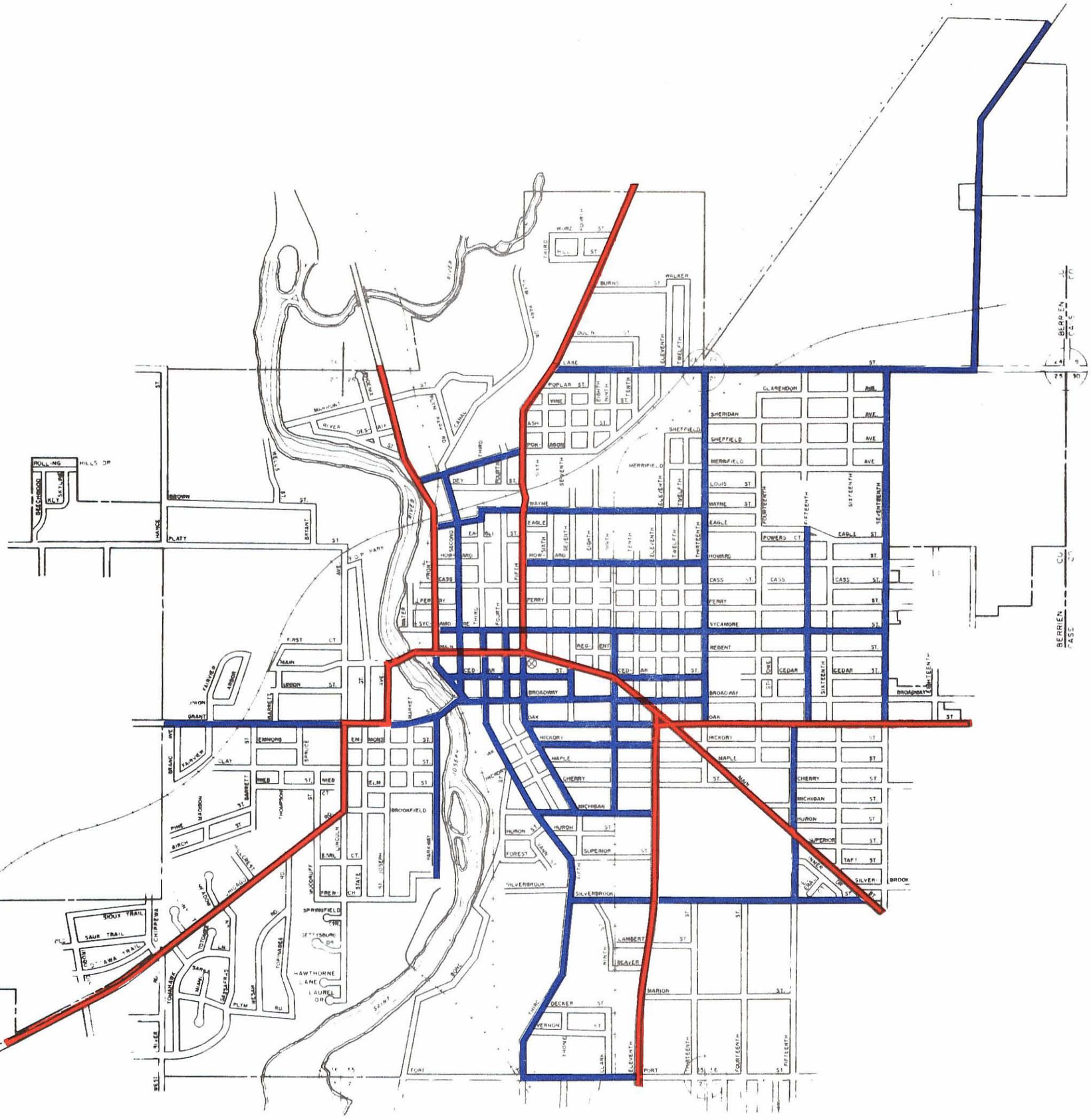


FIGURE 3

TRAFFIC ENGINEERING ANALYSIS

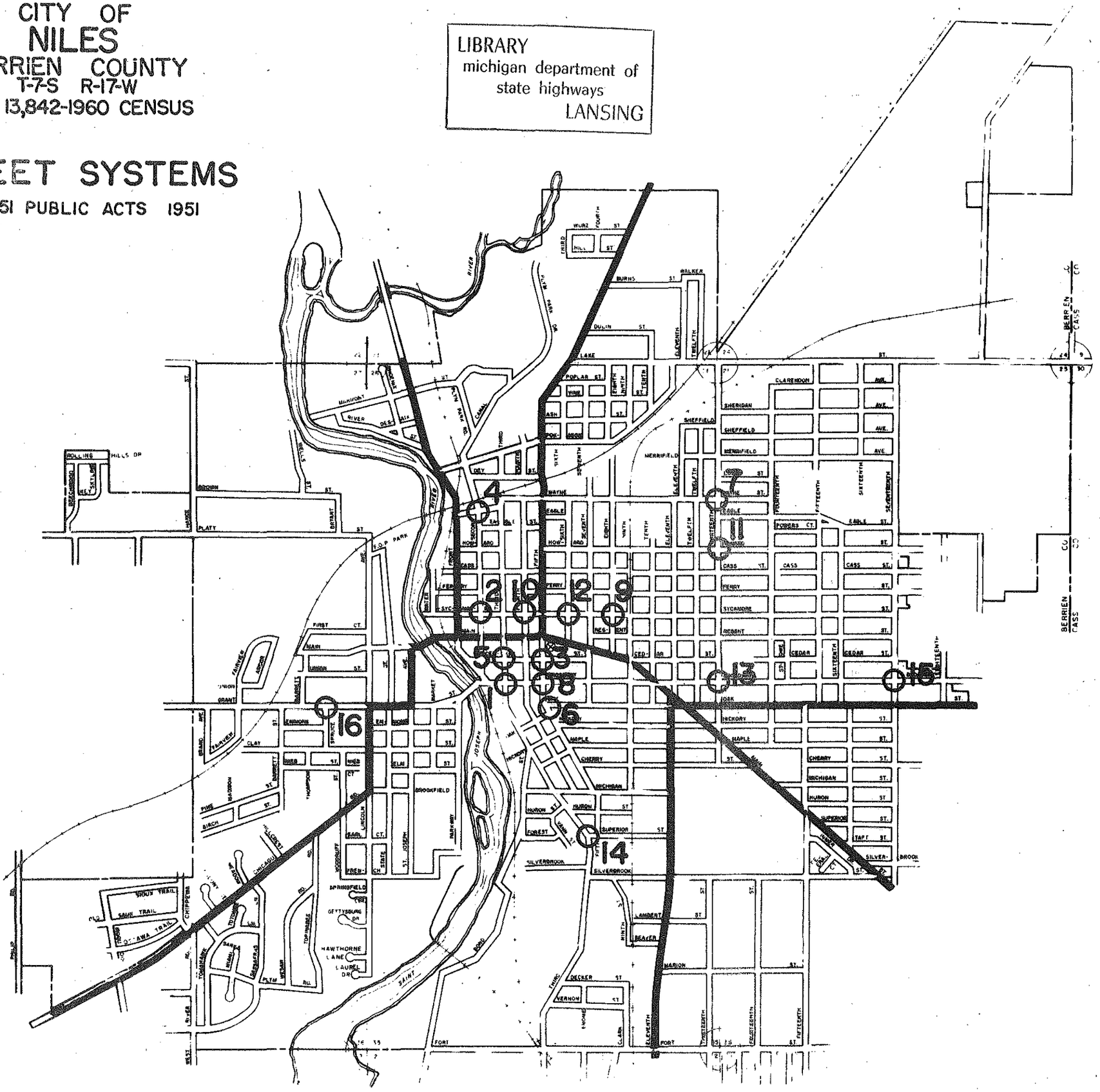
The traffic engineering analysis phase of our study involves evaluating the summarized facts and field data and prescribing the proper remedial treatment. One of the basic tools used in this type of analysis is a graphic representation of accidents either on a spot collision diagram or strip map which 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, and accident patterns do 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 Niles the traffic engineering analysis began when the State Police, after compiling the accident data, transmitted to the Michigan Department of State Highways 16 high accident locations (Spot Map, Figure 4). Additional statistical information was collected on the reported traffic accidents in the City of Niles.

CITY OF
NILES
BERRIEN COUNTY
T-7-S R-17-W
POP. 13,842-1960 CENSUS

STREET SYSTEMS

ACT 51 PUBLIC ACTS 1951



HIGH ACCIDENT
LOCATION
SPOT MAP

FIGURE 4

Table 1 shows that reported traffic accidents increased between 1968 and 1969, while the reported traffic accidents decreased between 1966 and 1968 and between 1969 and 1970. There was a total of 1,239 reported traffic accidents on the City of Niles' streets during the five-year study period for an average of 248 accidents per year. The 16 high accident locations accounted for 215 of the total reported accidents in the city. This figure is approximately 17.3 percent of the total reported accidents. It would appear from these figures that the greatest portion of the City of Niles' reported off-trunkline 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 16 high accident locations, the following tables were prepared to tabulate and chart specific data (Tables 2-8, pp. 14-18).

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 2 reveals that the peak accident day in the City of Niles was Friday with 41 accidents occurring on this day.

TABLE 1

REPORTED TRAFFIC ACCIDENTS IN THE CITY OF NILES

Year	Total	City Streets	Property Damage	Injury	Fatal	Persons Injured	Persons Killed
1966	616	299	419	197	1	308	1
1967	521	219	316	203	2	336	2
1968	509	237	324	184	1	301	1
1969	567	252	386	180	1	294	1
1970	499	232	357	141	1	217	1

COMPARISON OF ACCIDENT FREQUENCY

Year	Niles' Streets	Berrien County Roads	Total Accidents State of Mich.
1966	299	6,159	302,880
1967	219	5,981	299,004
1968	237	6,224	305,495
1969	252	6,791	331,223
1970	232	6,918	313,715

PERCENTAGE OF CHANGE FOR THE ABOVE TOTALS

1966-67	-26.8	-3.0	-1.3
1967-68	+ 8.7	+4.1	+2.2
1968-69	+ 6.3	+9.1	+8.4
1969-70	- 7.9	+1.9	-5.3

ACCIDENT ANALYSIS

Table 2

MONTHLY AND DAILY ACCIDENT OCCURRENCE

SIXTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Period Studied: 1966 through 1970

Month	Day of the Week							Monthly Total	Of Total
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.		
January		2	1	4	1	2		10	5.0
February	4	5	3	3	8	2	1	26	12.0
March			4	2	2	3	1	12	6.0
April	1	2	3		1	3	4	14	7.0
May	2		1		1	3		7	3.0
June		3	3	2	1	2	5	16	7.0
July	3	3	4	2	3	5	3	23	10.0
August	2	2		1	2	2	3	12	6.0
September		1	4	2	3	3	1	14	7.0
October	3	5	1	3	6	3		21	10.0
November	5	1	3	2	7	4	3	25	11.0
December	2	10	4	3	6	8	2	35	16.0
Day Total	22	34	31	24	41	40	23	215	100.0
% of Total	10.0	16.0	14.0	11.0	19.0	19.0	11.0	100.0	

Peak Accident Day: Friday

Peak Accident Month: December

ACCIDENT ANALYSIS

Table 3

ANNUAL ACCIDENT SUMMARY

SIXTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Period Studied: 1966 through 1970

Accident Type	Day	Night	Total
Fatal Accident	-	-	-
Personal Injury Acc.	54	33	87
Property Damage Acc.	80	48	128
Total	134	81	215

Month	Fatal		Injury		Prop. Damage		Sub. Total		Total
	Day	Night	Day	Night	Day	Night	Day	Night	
January			1	1	4	4	5	5	10
February			7	3	10	6	17	9	26
March			4	1	4	3	8	4	12
April			4	3	5	2	9	5	14
May			3	2	2		5	2	7
June			1	2	9	4	10	6	16
July			8	3	8	4	16	7	23
August			4	1	2	5	6	6	12
September			5	2	6	1	11	3	14
October			1	5	11	4	12	9	21
November			5	6	7	7	12	13	25
December			11	4	12	8	23	12	35
S. Total			54	33	80	48	134	81	215
Total	-		87		128		215		

Table 4

DAILY AND HOURLY ACCIDENT OCCURRENCE

SIXTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Period Studied: 1966 through 1970

Hour	Day of the Week							Hour Total	% of Total
	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.		
12 - 1AM	1						1	2	1.0
1 - 2AM						1	2	3	1.0
2 - 3AM	1				3	2	1	7	4.0
3 - 4AM					1		1	2	1.0
4 - 5AM						2		2	1.0
5 - 6AM		1		1				2	1.0
6 - 7AM	1	1	3	1	1	1	1	9	4.0
7 - 8AM		1	2	1	1			5	2.0
8 - 9AM	1	3			1			5	2.0
9 - 10AM	1	1		2			1	5	2.0
10 - 11AM		2			1			3	1.0
11 - 12AM	1	2	3	1	1	2	2	12	6.0
12 - 1PM	3	1	1	1	3	5	2	16	7.0
1 - 2PM	1	4	1		3	4	1	14	7.0
2 - 3PM	3	2	4		2	1		12	6.0
3 - 4PM	1	3	3	5	5	4	1	22	10.0
4 - 5PM	2	6	2	4	3	1	2	20	9.0
5 - 6PM	4	2	2	2	3	2		15	7.0
6 - 7PM		1	2	3	6	3	1	16	8.0
7 - 8PM	1	1	2			3	3	9	4.0
8 - 9PM		2	1	1		3	1	8	4.0
9 - 10PM			1	1	3	2		7	4.0
10 - 11PM	1		2		3	2	1	9	4.0
11 - 12PM		1	2	1	1	2	2	9	4.0
Not Stated									
Day Total	22	34	31	24	41	40	23	215	100.0
% of Total	10.0	16.0	14.0	11.0	19.0	19.0	11.0	100.0	

Peak Accident Hour: 3 - 4 p.m.

Peak Accident Day: Friday

Table 5

AGE OF DRIVERS INVOLVED IN ACCIDENTS

SIXTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Period Studied: 1966 through 1970

Age Group	Number of Drivers Involved in				Percent
	Fatal	Injury	Property Damage	Total	
Under 16					
16 - 19		35	42	77	19.0
20 - 24		30	36	66	16.0
25 - 34		37	45	82	20.0
35 - 44		25	38	63	15.0
45 - 54		28	33	61	15.0
55 - 64		4	21	25	6.0
65 - 74		8	14	21	5.0
75 & Over		4	8	12	4.0
Not Stated					
TOTAL		171	237	408	100.0

Table 6

RESIDENCE OF DRIVERS INVOLVED IN ACCIDENTS

Residence	Number of Drivers Involved in				Percent
	Fatal	Injury	Property Damage	Total	
City		119	185	304	74.0
County		24	27	51	13.0
Michigan		10	8	18	4.0
Out of State		18	17	35	9.0
Not Stated					
TOTAL		171	237	408	100.0

Table 7

WEATHER CONDITIONS AT SCENE OF ACCIDENTS

SIXTEEN HIGH ACCIDENT LOCATIONS IN THE CITY OF NILES

Period Studied: 1966 through 1970

Weather	Severity of Accident				Percent
	Fatal	Injury	Property Damage	Total	
Clear or Cloudy		59	91	150	70.0
Rain		20	19	39	18.0
Fog					
Snow or Sleet		8	18	26	12.0
Not Stated					
TOTAL		87	128	215	100.0

Table 8

PAVEMENT CONDITIONS AT SCENE OF ACCIDENTS

Pavement	Severity of Accident				Percent
	Fatal	Injury	Property Damage	Total	
Dry		50	71	121	56.0
Wet		29	39	68	32.0
Snowy/Icy		8	18	26	12.0
Icy					
Not Stated					
TOTAL		87	128	215	100.0

Two days, Friday and Saturday, accounted for 38.0 percent of the accidents during the week. The peak accident month was December which had 35 accidents. The late fall and winter months of October, November, December and February accounted for 49.0 percent of the accidents at the high accident locations in the City of Niles.

The accident types identified by Table 3 are fatals, personal injury and property damage accidents. At the 16 high accident locations during the five-year study period there were no fatal accidents, 87 personal injury accidents and 128 property damage accidents.

The peak accident hour in the City of Niles, as indicated by Table 4, was between 3:00 p.m. and 4:00 p.m. The hours between 3:00 p.m. and 7:00 p.m. accounted for 34.0 percent of the accidents. These peak hours coincide with the peak shopping hours and the returning from work-to-home period.

Table 5 shows that 408 drivers were involved in the accidents at the 16 high accident locations in the City of Niles. There were 171 drivers involved in accidents which caused injuries and 237 drivers involved in accidents which caused property damage. The 25-34 age group, which totaled 20.0 percent of the accidents, had the highest accident percentage. The age groups, 16-19, 20-24, and 25-34, accounted for 55.0 percent of the accidents at the 16 high accident locations during the five-year study period.

The residence of the drivers involved in accidents at the 16 high accident locations is indicated by Table 6. Drivers who resided in the City of Niles accounted for 74.0 percent of the accidents while those residing in Berrien County accounted for another 13.0 percent. These two groups were responsible for 87.0 percent of the accidents, thereby indicating that drivers involved in accidents at the 16 high accident locations were familiar with the City of Niles.

Tables 7 and 8 reveal the types of weather and the pavement conditions that existed at the accident scenes. Seventy percent of the accidents at the 16 high accident locations occurred when the weather was clear or cloudy. The other 30.0 percent was divided between rainy weather (18.0 percent) and snowy or sleeting weather (12.0 percent).

Dry pavement was present during 56.0 percent of the accidents at the 16 high accident locations with another 32.0 percent of the accidents occurring on wet pavement and 12 percent occurring on snowy or icy pavement.

In the City of Niles observations have indicated that there are a number of locations where parking is allowed in violation of the Michigan Vehicle Code. In residential neighborhoods where parking stalls are not defined, vehicles are parked next to crosswalks, stop signs, etc. Vehicles parked too near the intersection in either residential or commercial areas present a visibility problem to entering traffic. Strict enforcement of the Michigan Vehicle Code

(Section 674) should be applied to all vehicles that violate these parking regulations. Parking is prohibited according to the Code in the following areas:

1. On a sidewalk;
2. In front of a public or private driveway;
3. Within an intersection;
4. Within 15 feet of a fire hydrant;
5. On a crosswalk;
6. Within 20 feet of a crosswalk, or if none, then within 15 feet of the intersection of property lines at an intersection of highways; and
7. Within 30 feet upon the approach to any flashing beacon, stop sign or traffic control signal located at the side of a highway.

Only two of the high accident locations were signalized intersections, one of which had two overhead signal faces visible per approach. This location is not only in agreement with the Michigan Manual of Uniform Traffic Control Devices' requirement concerning signal heads, but conforms to the suggested requirements of the Manual by using a second signal head. It is suggested that the City of Niles erect another signal head at the location which has only one signal head to bring their signalized intersections in accordance with each other, and to have at least two vehicular signal faces provided per approach for the following reasons:

1. Two (or more) properly located overhead faces will in almost all cases provide drivers with a signal

indication even though trucks or buses may momentarily obscure one signal face.

2. Multiple faces provide a safety factor where the signals must compete with a brilliant background such as advertising signs or the sun.
3. The occasional inevitable lamp failure in one face will not leave an approach without any signal indication.

While it may not be entirely feasible to purchase another signal head to upgrade this intersection at the present time, it is recommended that the City of Niles program their future budget for an additional signal head.

Another factor which should be considered in the City of Niles is the amount of parking in residential areas in relation to street width. Since 11.0 percent of the accidents at the high accident locations involve parked vehicles, the city should adopt a policy concerning curb parking and street width. One lane of moving vehicles requires a minimum of 11ft. 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 feet of street width. Parking should be permitted only on one side for streets that are less than 30 feet wide and prohibited on streets less than 26 feet wide.

After the analysis of the 16 high accident locations was complete, it was apparent that no engineering recommendations would be feasible for five of these locations.

There were no accident patterns at the five 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 nine locations. The collision diagrams and pictures for these locations will be found on the pages following each discussion. The collision diagrams and pictures for the remaining locations are found in Appendix I.

LOCATION 1 THIRD STREET AT BROADWAY STREET

Third Street intersects Broadway Street on the edge of the Central Business District in the City of Niles. This location is a right-angle signalized intersection which has two overhead vehicular signal heads.

Broadway Street west of the intersection has a 64ft wide bituminous pavement with a negative gradient in a westerly direction. Broadway Street east of the intersection has a 58ft wide bituminous pavement. Third Street has a 36ft wide bituminous pavement north of the intersection and a 38ft wide bituminous pavement south of the intersection. Parking is prohibited only on the east side of Third Street.

The most prevalent accident at this location was the rear end type which accounted for eleven of the twenty-nine accidents. The other accidents at this location consisted of five turning, three backing, three right-angle, three car-pedestrian, two vehicles colliding with parked cars, one head-on left turn and one ran off roadway accident.

Recommendations

Due to the horizontal and vertical alignment of the west leg of Broadway Street and the fact that six of the 11 rear end accidents involved eastbound Broadway Street traffic, it is recommended that a "Signal Ahead" sign (See Part I, Section C, p. 96 of the Manual, Appendix II, p. 96) be erected

on Broadway west of the intersection. Furthermore, on Broadway Street east and west of the intersection lane line markings should be applied (See Part III, Section B, p. 279 of the Manual, Appendix II, p. 101).

Since turning movements at intersections cause delays, there is generally a need for a minimum of two approach lanes on each approach to a signalized intersection. Therefore, it is recommended that two approach lanes be used on Third Street, one of which would be a left turn lane (Figure 5c). In conjunction with creating two approaches to the intersection, it is recommended that the parking on the west side of Third Street north of the intersection be removed for one block to improve capacity and to increase visibility (at Location 5).

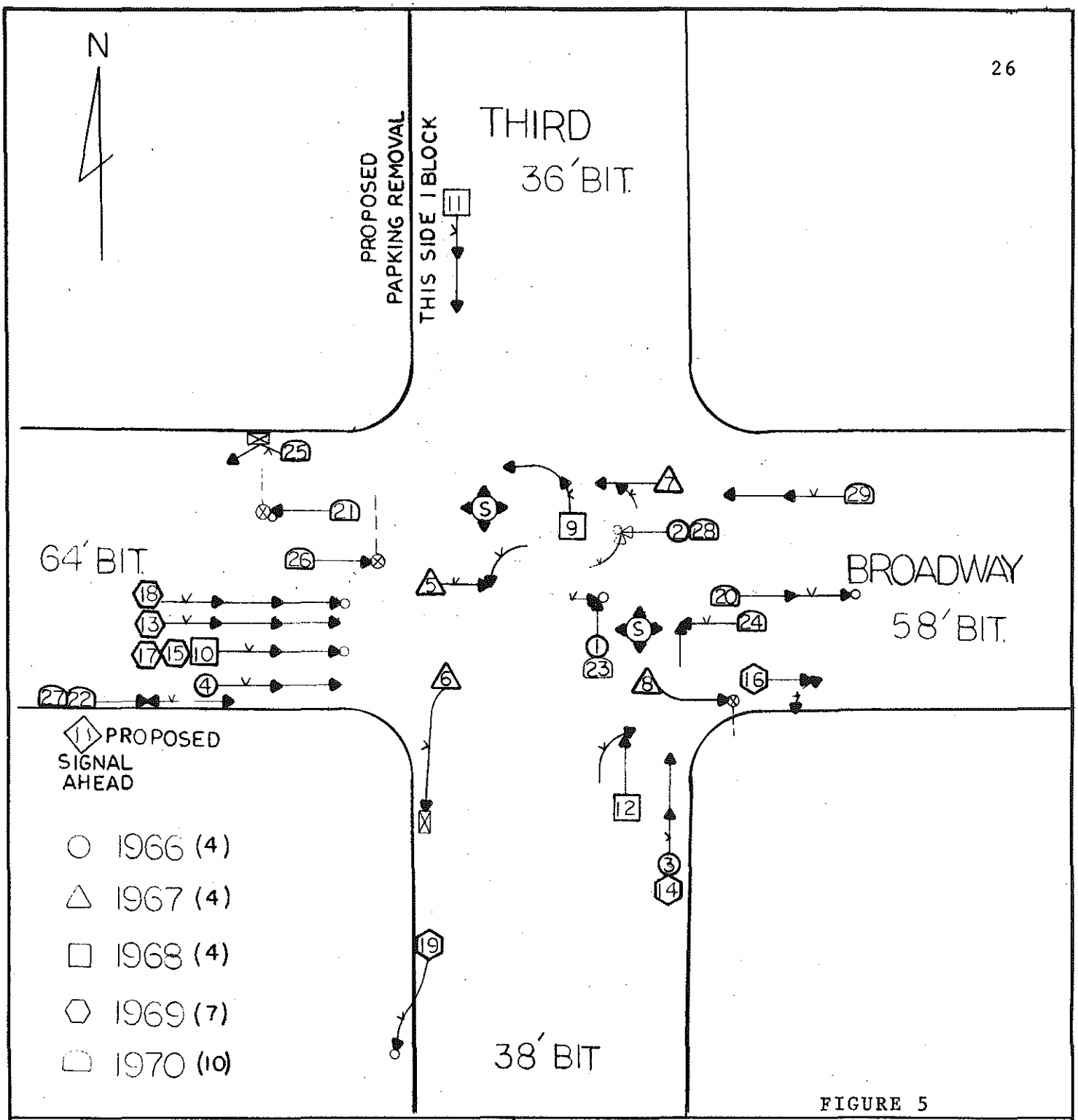


FIGURE 5

LEGEND

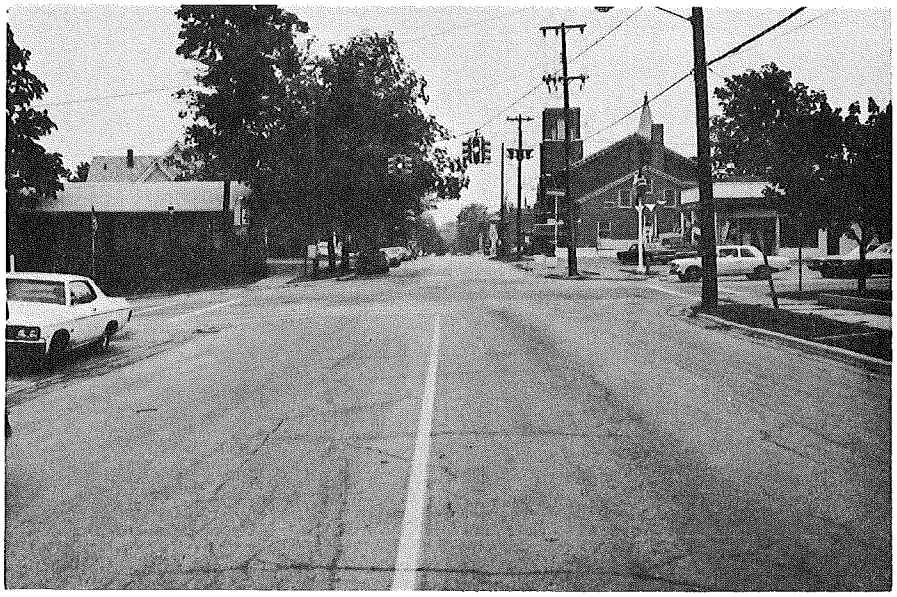
Stop & Go Signal — S, R, Y, F
Flashing Beacon
Stop Sign — S
Yield Sign — Y
Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian — X
Tree
Out of Control
Driver Intent
Deer
Violator — V

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location THIRD AT BROADWAY
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 29 **P.D.** 18
Injury 11 (17) **Fatal** (0)
C.S. _____ **Miles** _____ **Drawn** DJM
Plan No. LOCATION 1 **Date** 8-18-71

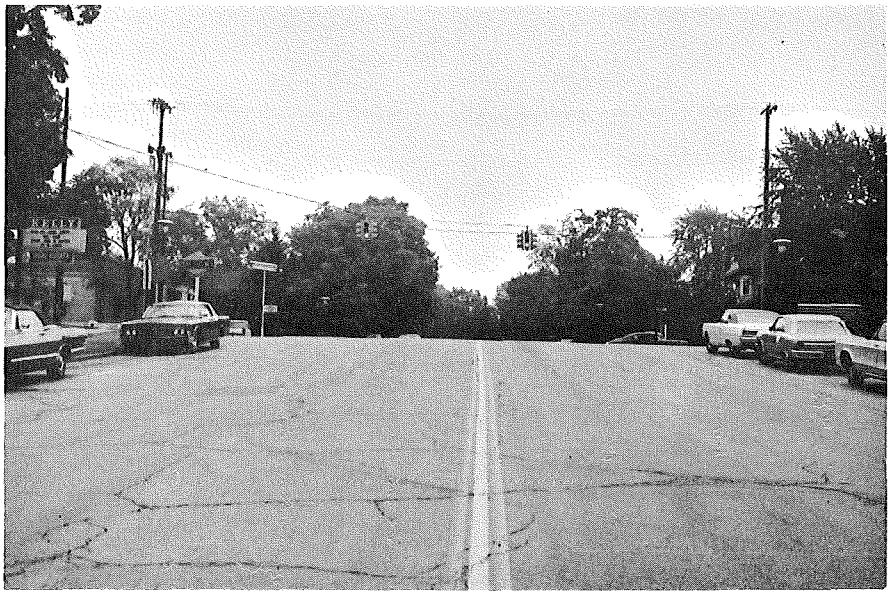
Form 1547 B (Rev. 11/70)



NORTHBOUND THIRD STREET

SOUTHBOUND THIRD STREET

FIGURE 5a



EASTBOUND BROADWAY

WESTBOUND BROADWAY

FIGURE 5b

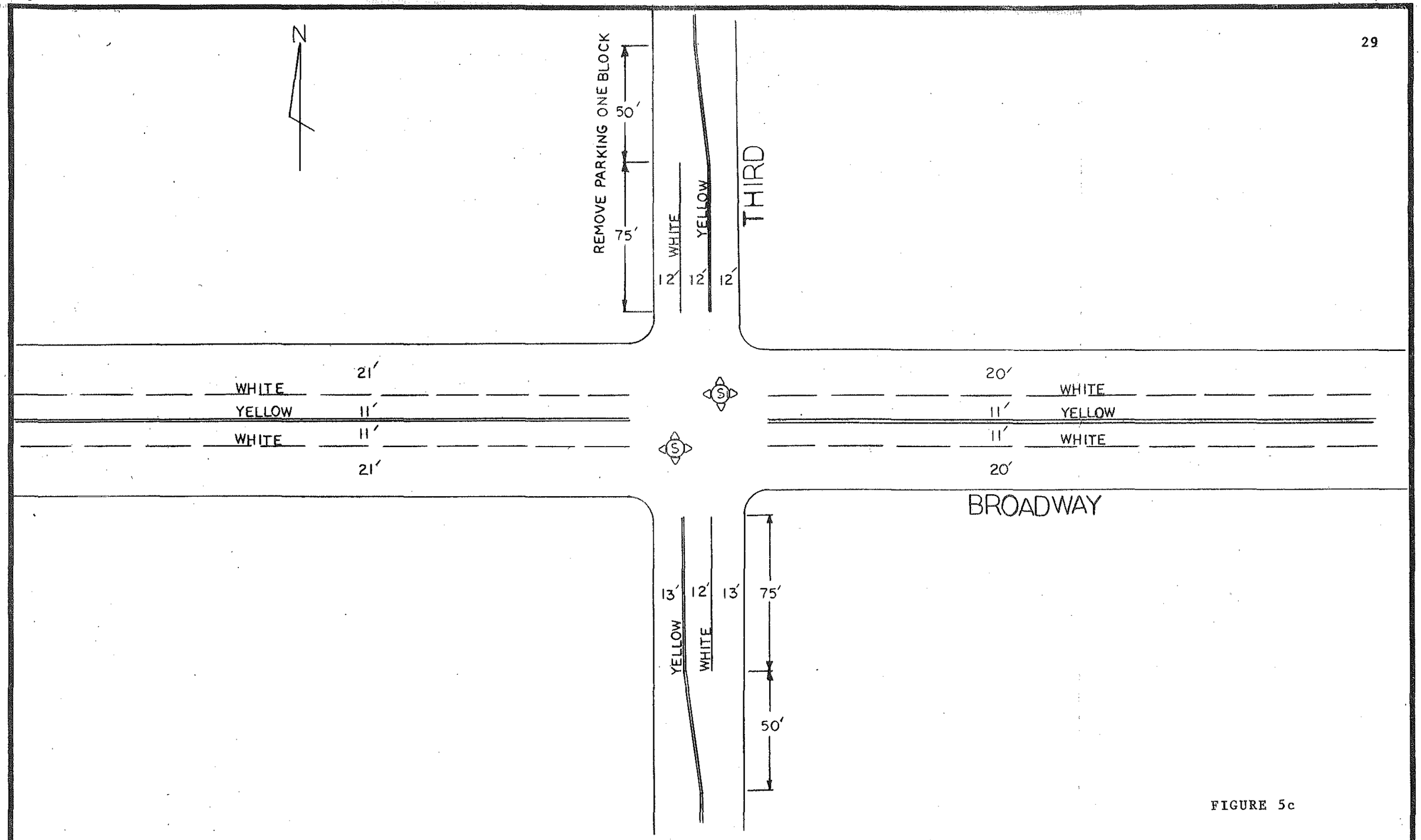


FIGURE 5c

STATE OF MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC & SAFETY DIVISION	AUTH. No.	DRAWN DJM	PROPOSED PAVEMENT MARKING
	CONT. SEC.	DATE 5-23-72	
	REF.	SCALE	
	SHEET OF	PLAN	

FORM 1395A (REV. 10-68)

LOCATION 2 SYCAMORE STREET AT SECOND STREET

Sycamore Street at Second Street is a signalized intersection that is located in the Central Business District of the City of Niles. The traffic controls at this intersection consist of a single overhead vehicular signal head.

Second Street is a 41ft wide bituminous roadway. Sycamore Street, which has a positive gradient in the easterly direction, is a 50ft wide bituminous roadway west of the intersection and a 42ft wide bituminous roadway east of the intersection. Parking is prohibited on the east side of Second Street for a half block south of the intersection.

The prevalent accident at this signalized location was the right-angle type which accounted for 16 of the 22 accidents that occurred at this location during the five-year study period. Further analysis revealed that ten of the angle accidents occurred during the flasher phase of the stop and go signal. The remaining six accidents at this location indicated no definite pattern.

Recommendations

Since there is only one signal head at this location, it is recommended that another signal head be installed to make it conform with the suggested recommendations of the Manual. (It is suggested that the City of Niles modernize this location by installing span adjustable signals at this location so that the signal faces can be adjusted to point in each direction.)

The addition of this second signal head will provide added emphasis to the traffic controls at this location and will also increase the visibility of the controls at night. However, if the angle accidents during the flasher period continue, it is recommended that the operation of the stop and go phase be extended.

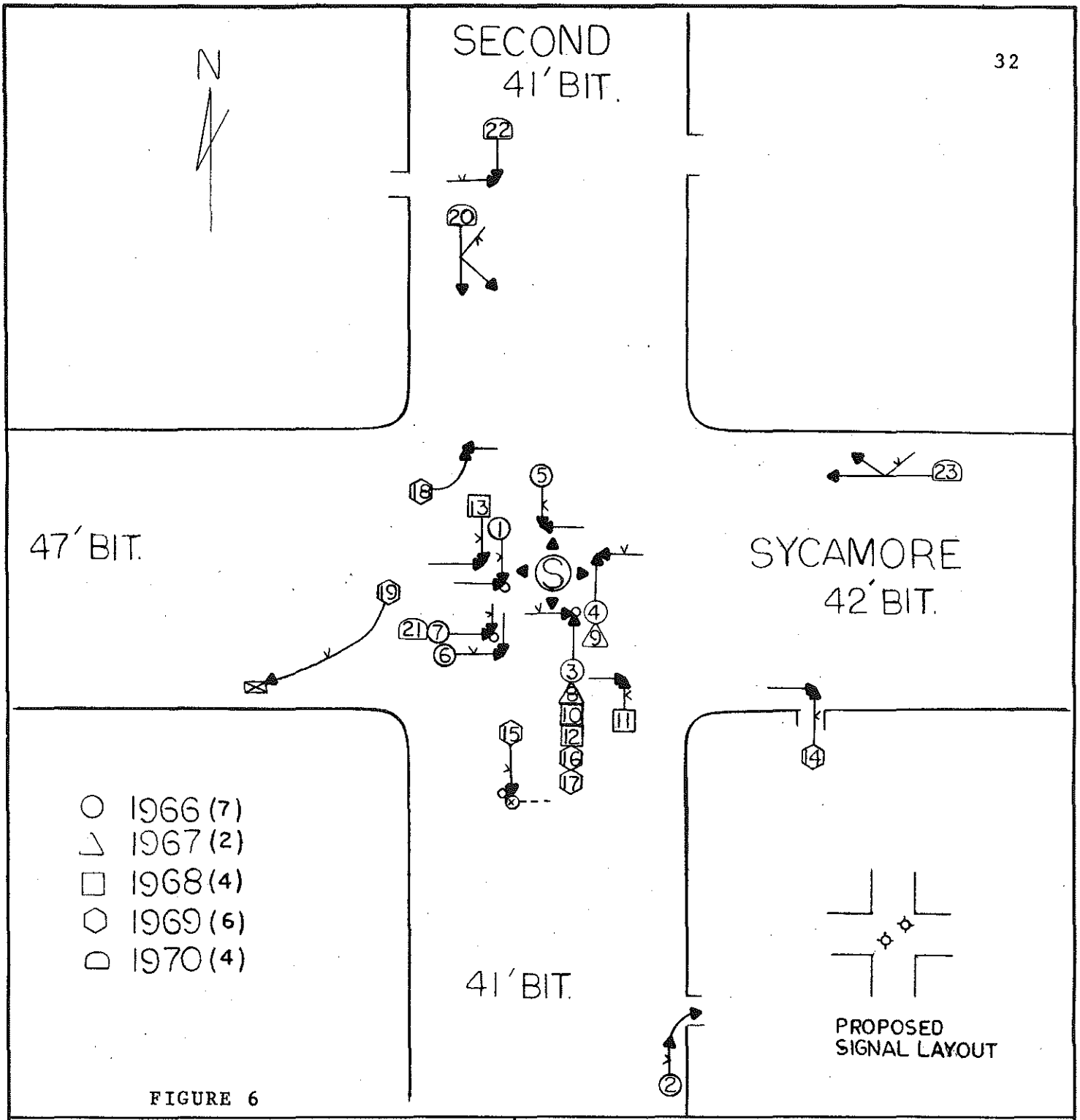


FIGURE 6

LEGEND

Stop & Go Signal — S — R — F — Y — Y
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 SECOND AT SYCAMORE
CITY OF NILES
BERRIEN CO.

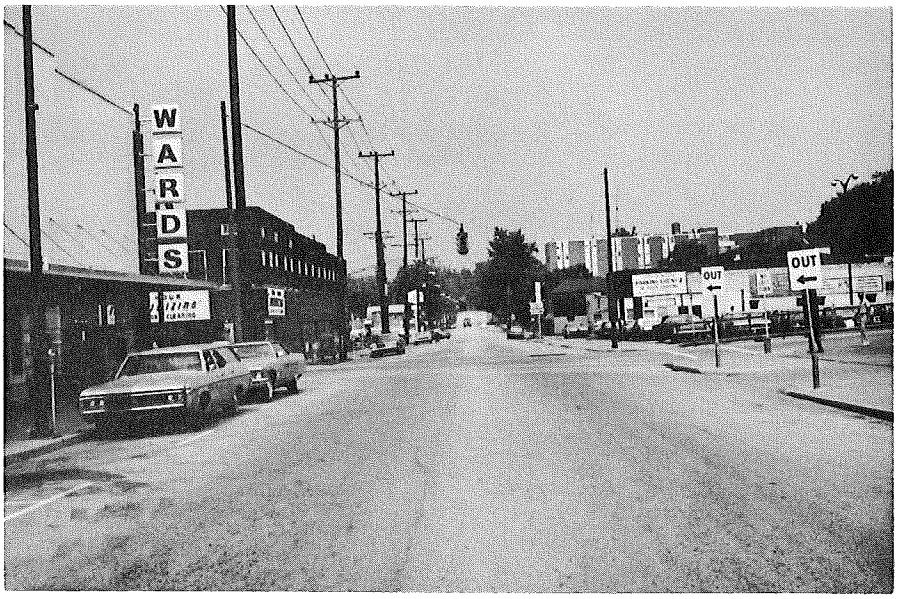
Period: 1966 THRU 1970

Accidents – Total 23 **P.D.** 13

Injury 10 (24) **Fatal** 0 ( )

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

Plan No. LOCATION 2 **Date** 9-13-71



NORTHBOUND SECOND STREET

SOUTHBOUND SECOND STREET

FIGURE 6a

EASTBOUND SYCAMORE STREET

WESTBOUND SYCAMORE STREET

FIGURE 6b

LOCATION 3 CEDAR STREET AT FIFTH STREET

Cedar Street at Fifth Street is a right-angle intersection located in the Central Business District. Fifth Street has a 29ft wide bituminous pavement. Parking is not permitted on Fifth Street. Cedar Street has a 40ft wide bituminous pavement with metered parking west of the intersection and nonmetered parking east of the intersection. Controlling traffic at this intersection are two 24 inch "Stop" signs located on Cedar Street. A large refuse container located in the southwest quadrant of the intersection presents a visibility problem and is a contributing factor in accidents involving northbound vehicles on Fifth Street.

Right-angle accidents accounted for 19 of a total of 21 accidents at this location. A rear end and a sideswipe accident accounted for the remaining two accidents.

Recommendations

Since twelve of the nineteen accidents at this intersection occurred as operators did not stop for the "Stop" sign, and since 47 percent occurred during the night, it is recommended that a flashing beacon (See Part V, Section A, p. 399 of the MANUAL, Appendix II, p. 106) be installed to emphasize the stop. Fifth Street would have the right-of-way (caution lens), while Cedar Street would have to stop (red lens). To augment the flasher, it is recommended that 36 inch "Stop" signs (See Part I, Section B, p. 14 of the MANUAL, Appendix II, p. 89) replace the existing 24 inch signs.

Further, it is recommended that parking be prohibited for 50 feet on the south side of Cedar Street west of the intersection, and the city should make every effort to have the previous mentioned refuse container relocated.

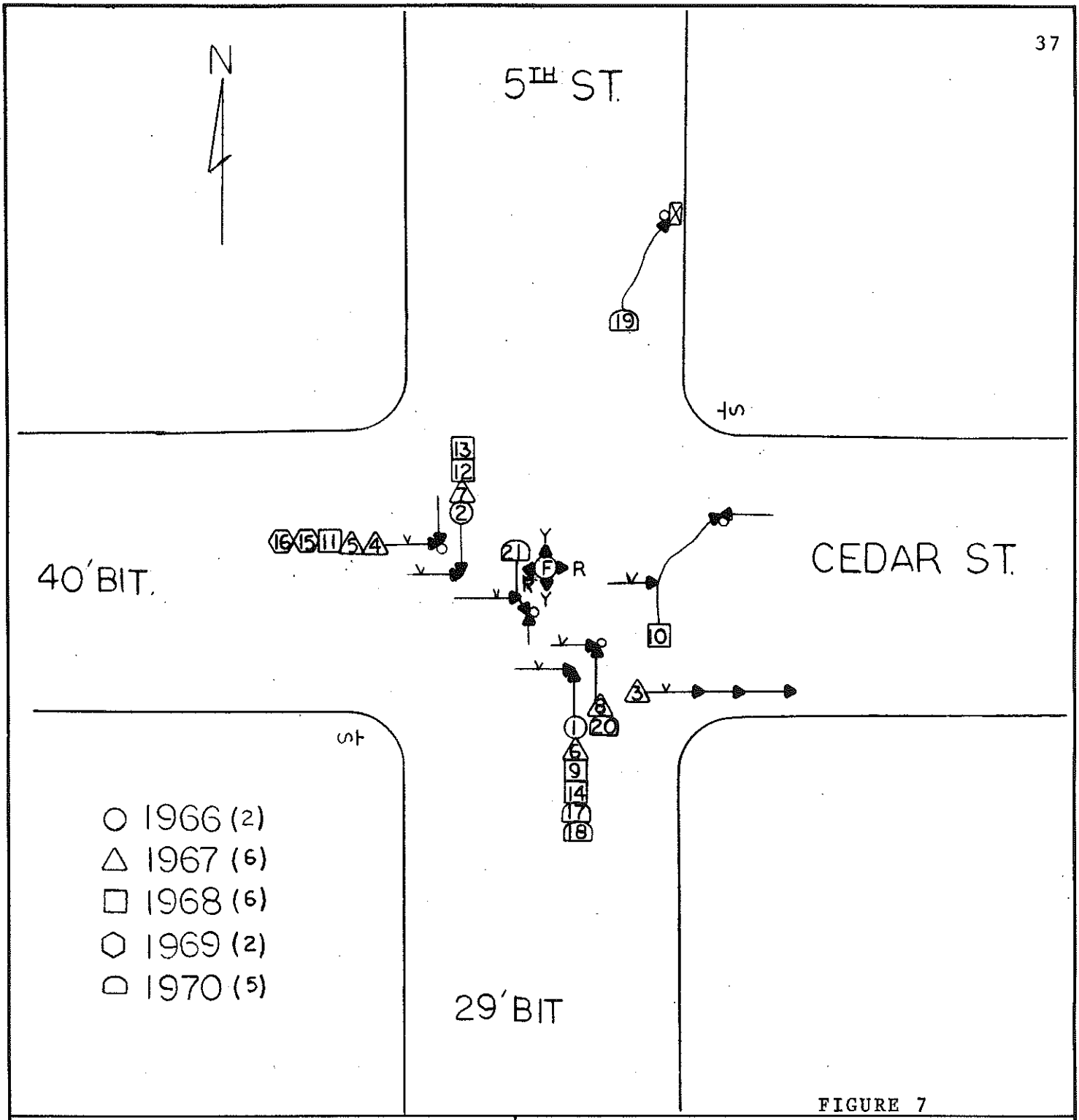


FIGURE 7

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 CEDAR ST. AT 5TH ST.
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 21 P.D. 11
Injury 10 (15) Fatal 0 ( )
C.S. Miles Drawn DJM
Plan No. LOCATION 3 Date 9-13-71

Form 1547 B (Rev. 11/70)

EASTBOUND
CEDAR STREET

NORTHBOUND
FIFTH STREET

WESTBOUND
CEDAR STREET

FIGURE 7a

LOCATION 4 WAYNE STREET AT SECOND STREET

Wayne Street at Second Street is a right-angle intersection located in the north section of the City of Niles. Wayne Street is a 30ft wide bituminous roadway that provides east-west access. Second Street is a 42ft wide bituminous roadway south of the intersection and a 39ft wide bituminous roadway north of the intersection. The 39ft pavement narrows to 20ft under the railroad overpass that is located north of the intersection. Parking is not restricted anywhere at this location. The traffic controls present are two 30 inch "Stop" signs for Second Street traffic.

There were 18 accidents at this location during the five-year study period. Right-angle accidents accounted for 78 percent of the total. The remaining accidents consisted of three ran off roadways and one motor vehicle-bicycle accident.

Recommendations

Since 10 of the 14 right-angle accidents happened because the driver ran a "Stop" sign (Ran a "Stop" sign means the operator never attempted to stop, while failure to yield means the operator stopped then proceeded into the intersection.), it is recommended that 36 inch "Stop" signs replace the existing 30 inch signs (See Part I, Section B, p. 14 of the Manual, Appendix II, p. 89).

Furthermore, Second Street has no traffic controls for approximately one-half mile and since most accidents involved drivers who ran a "Stop" sign, it is also recommended that a 36 inch "Stop Ahead" sign (See Part I, Section C, p. 94 of the Manual, Appendix II, p. 95) be used for traffic northbound on Second Street to alert the drivers of the approaching stop.

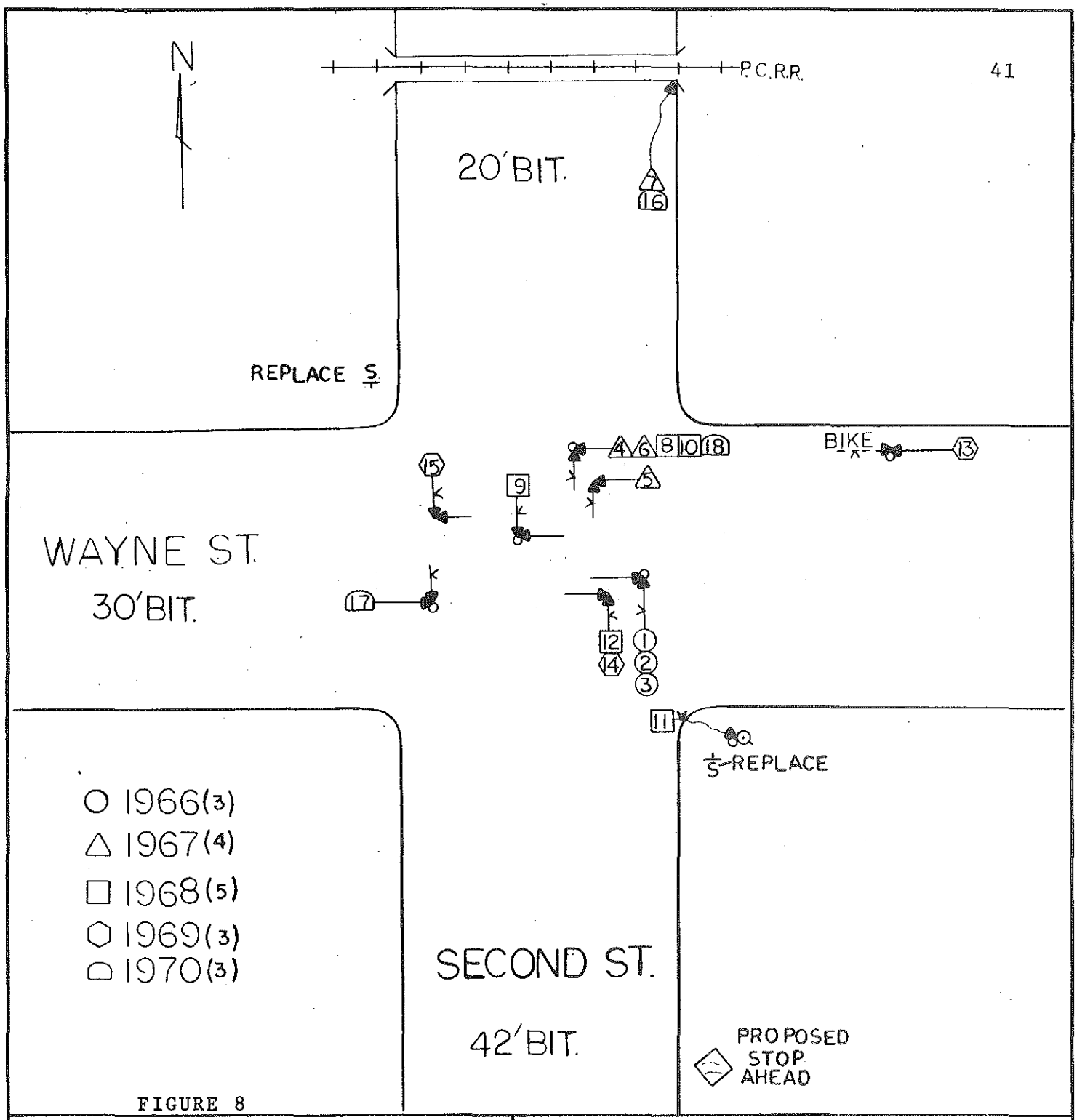


FIGURE 8

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

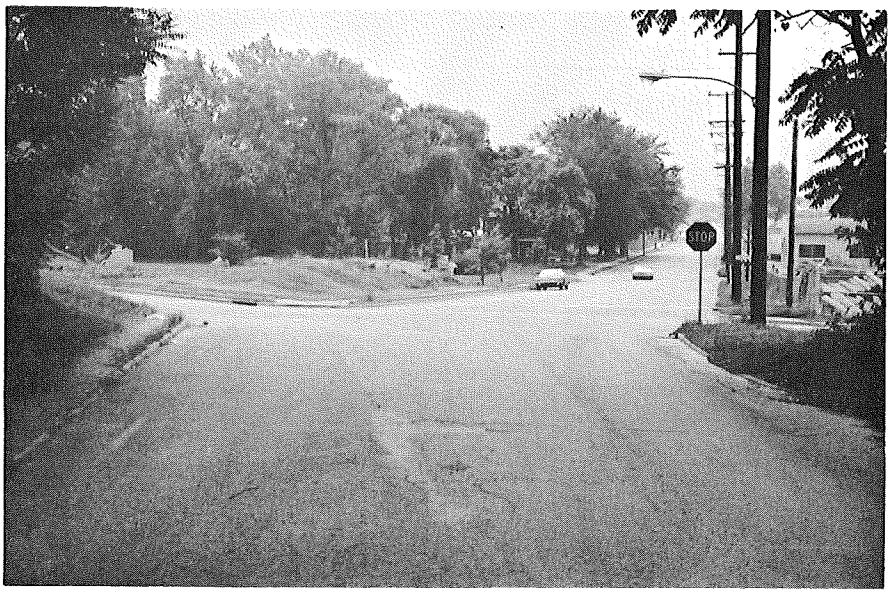
MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location SECOND ST. AT WAYNE ST.
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 18 P.D. 6
Injury 12 (24) Fatal 0 ( )
C.S. Miles Drawn DJM
Plan No. LOCATION 4 Date 9-16-71

NORTHBOUND
SECOND STREET

EASTBOUND
WAYNE STREET



SOUTHBOUND
SECOND STREET

FIGURE 8a

LOCATION 5 CEDAR STREET AT THIRD STREET

Cedar Street at Third Street is a right-angle intersection located in the Central Business District of the City of Niles. The only traffic controls present at this location are two 24 inch "Stop" signs on Cedar Street.

Cedar Street has a 40ft wide bituminous pavement with a negative gradient in the westerly direction. Third Street has a 45ft wide bituminous pavement north of the intersection and a 36ft wide bituminous pavement south of the intersection. Metered parking is permitted on each leg of this intersection except on the east side of Third Street south of the intersection.

The collision diagram for this intersection indicates that the prevalent accident was the right-angle type which accounted for 12 of the total 16 accidents. The remaining accidents consisted of three turning accidents and one rear end accident.

Recommendations

Since Cedar Street west of the intersection has a negative gradient and since visibility is a problem for vehicles stopped on Cedar Street, due mainly to parked vehicles, it is recommended that parking be removed 50 feet from the crosswalk on both the north and south side of Cedar Street. The recommendation that parking be eliminated on the west side of Third Street south of the intersection for one block has been made in the recommendation for Location 1.

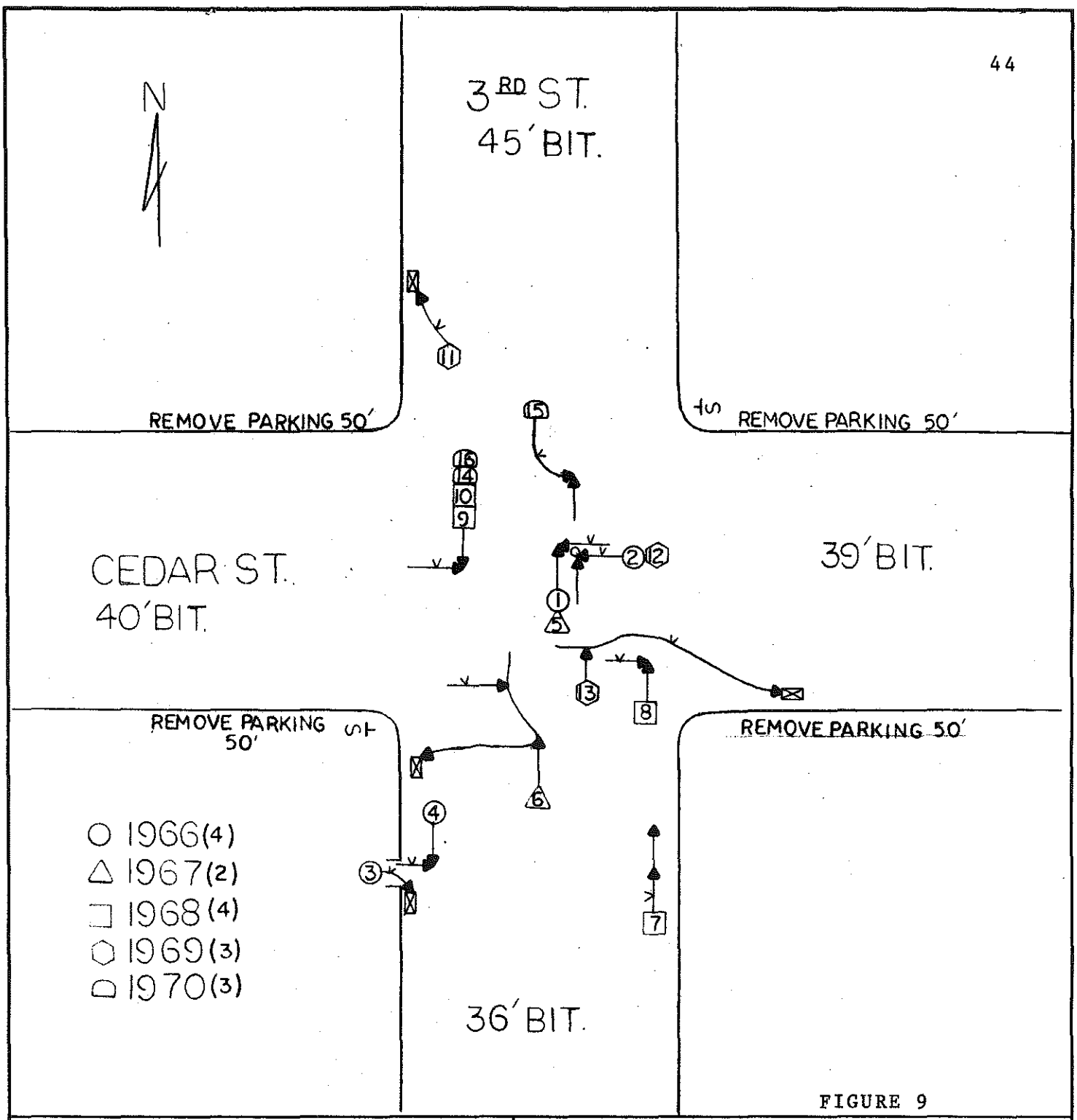


FIGURE 9

LEGEND

Stop & Go Signal — S, R, Y, F
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 CEDAR AT 3RD ST.
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970

Accidents – Total 16 **P.D.** 14

Injury 2 (4) **Fatal** 0 ( )

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

Plan No. LOCATION 5 **Date** 9 - 16 - 71

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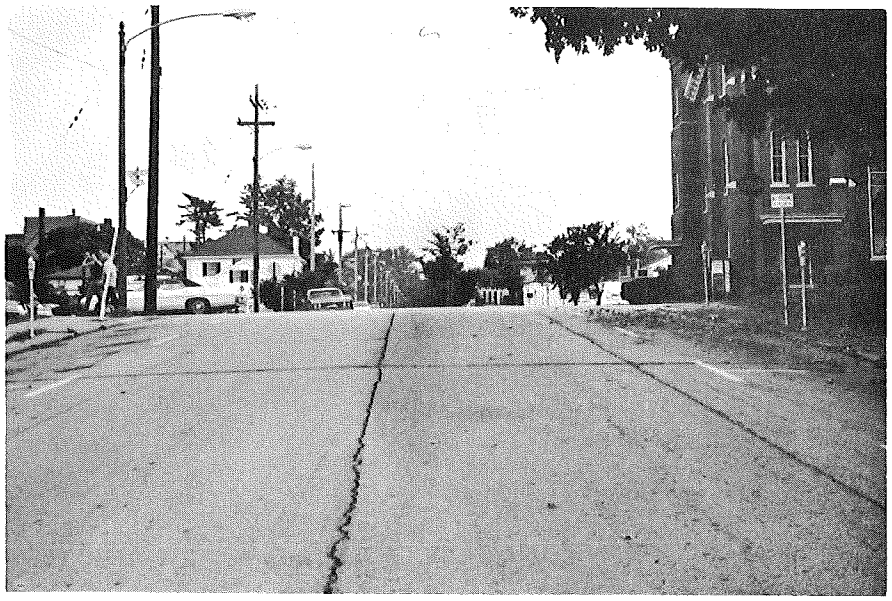
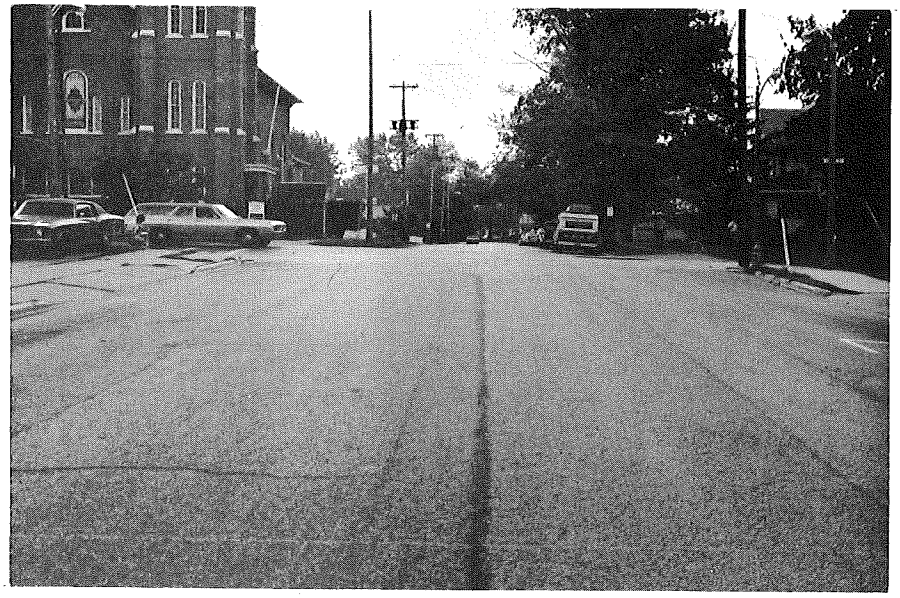


EASTBOUND
CEDAR STREET



SOUTHBOUND
THIRD STREET

WESTBOUND
CEDAR STREET

FIGURE 9a

LOCATION 6 OAK STREET AT FIFTH STREET

Oak Street at Fifth Street is a four-legged intersection with the east leg of Oak Street offset in relation to its west leg. Oak Street is a 25ft wide bituminous roadway. Parking on Oak Street is prohibited on the south side of its west leg. Fifth Street is a 30ft wide bituminous roadway that provides north-southeast access. Parking is prohibited on Fifth Street except on the east side north of Oak Street.

Traffic controls at this location consist of a 24 inch "Stop" sign for westbound Oak Street, a 24 inch x 48 inch Bi-directional Target Arrow for westbound Oak Street and a 36 inch "Yield" sign for eastbound Oak Street.

The collision diagram indicates that ran off roadway accidents were the predominant type at this location, accounting for six accidents. Further tabulation reveals that there were four sideswipes, one turning, one passing and one rear end accident.

Recommendations

It is recommended that 24 inch x 48 inch Target Arrows be erected in target position for north and southbound Fifth Street traffic (See Part I, Section C, p. 88 of the Manual, Appendix II, p. 94).

Also, it is recommended that yellow skip centerline pavement markings (See Change Memorandum No. 5, Appendix II,

p. 109) be used on Fifth Street to aid in keeping vehicles in their proper traffic lanes.

Since the sight distance is not adequate and traffic on the west leg of Oak Street has to come to a complete stop, it is recommended that the "Yield" sign be replaced by a 24 inch "Stop" sign (See Part I, Section B, p. 14 of the MANUAL, Appendix II, p. 89).

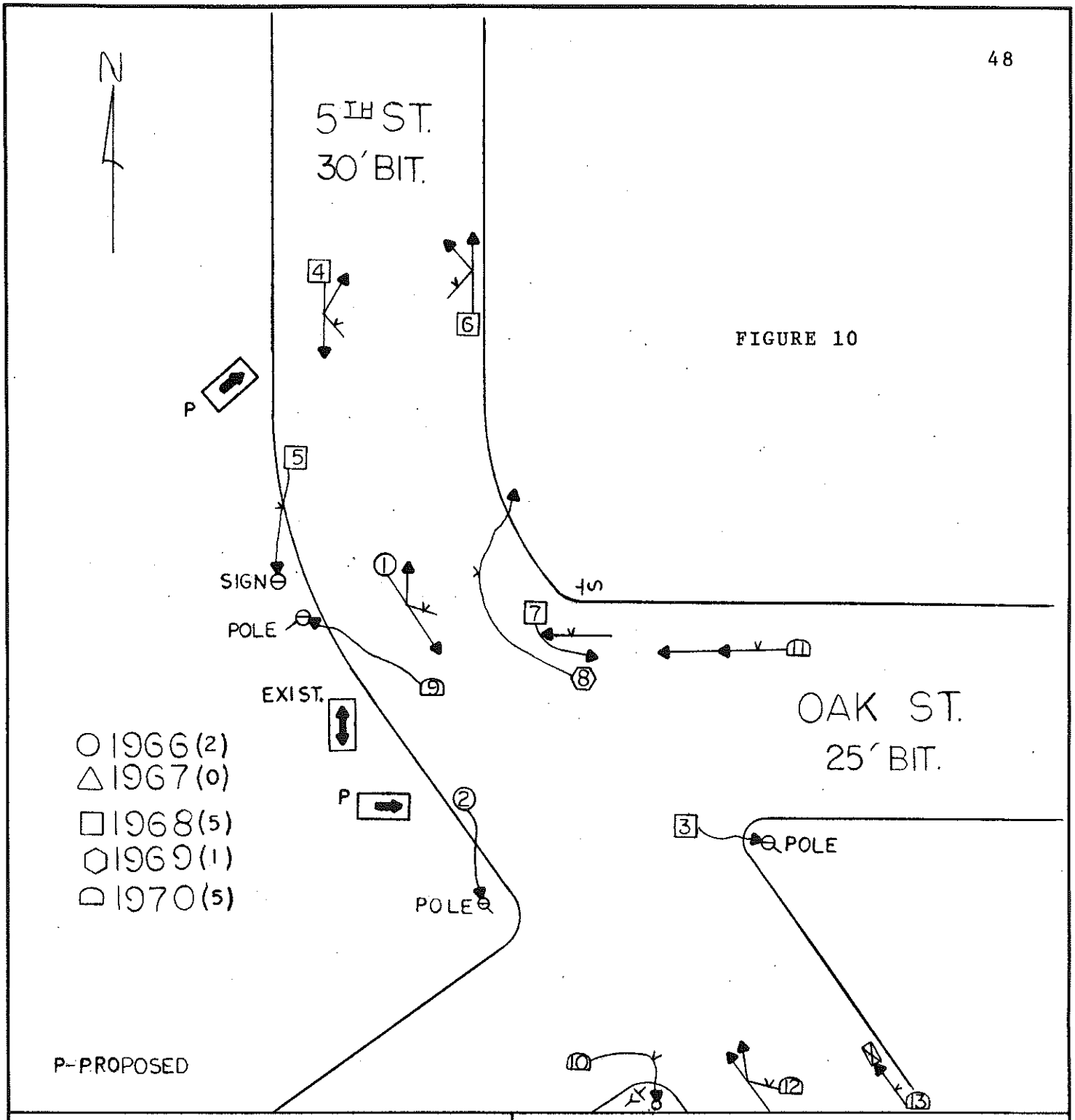


FIGURE 10

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 5TH ST. AT OAK ST.
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 13 **P.D.** 12
Injury 1 (2) **Fatal** 0 ( )
C.S. _____ **Miles** _____ **Drawn** DJM
Plan No. LOCATION 6 **Date** 9-17-71

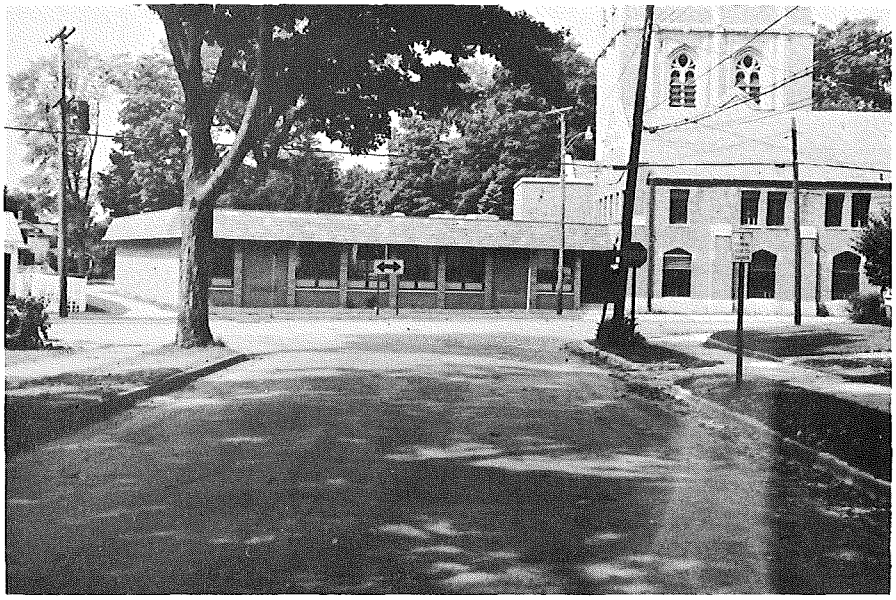
Form 1547 B (Rev. 11/70)

NORTHBOUND FIFTH STREET

SOUTHBOUND FIFTH STREET

FIGURE 10a

EASTBOUND OAK STREET



WESTBOUND OAK STREET

FIGURE 10b

LOCATION 7 WAYNE STREET AT THIRTEENTH STREET

Wayne Street and Thirteenth Street form a right-angle intersection located in a residential neighborhood in the northeast section of Niles. The east leg of Wayne Street is offset 17 feet to the north in relation to its west leg. Wayne Street is a 30ft wide bituminous roadway east of the intersection and a 35ft wide bituminous roadway west of the intersection. Thirteenth Street is a 36ft wide bituminous roadway that provides north-south access. Parking is permitted on all legs of the intersection except the west leg of Wayne Street.

Traffic controls at this location include four 24 inch "Stop" signs, two "25 MPH Speed Limit" signs for north and southbound Thirteenth Street traffic and a "Watch for Blind Child" warning sign located east of the intersection on Wayne Street.

The prevalent accident at this location was the rear end type which accounted for six of the 12 accidents. The remaining accidents at this location consisted of three backing, two right-angle and one turning accident.

Recommendations

Since there are no traffic controls on Thirteenth Street along its entire length except at this intersection, it is recommended that two 30 inch "Stop Ahead" signs (See Part I, Section C, p. 94 of the Manual, Appendix II, p. 95) be erected

on north and southbound Thirteenth Street to alert drivers of the subsequent stop.

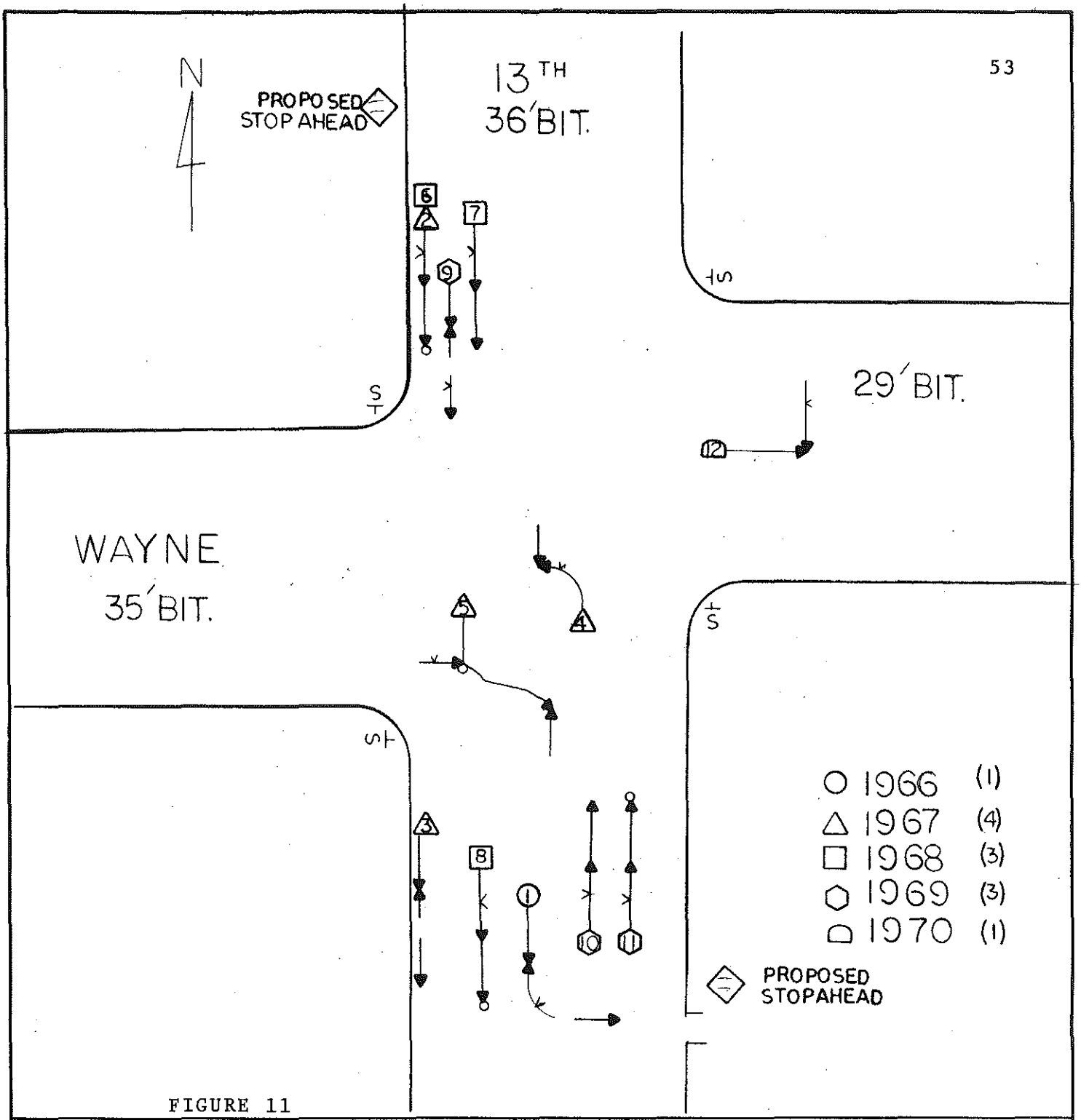


FIGURE 11

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 13TH AT WAYNE
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 12 P.D. 7
Injury 5 (7) Fatal 0 ( )
C.S. Miles Drawn DJM
Plan No. LOCATION 7 Date 9-17-71

Form 1547 B (Rev. 11/70)

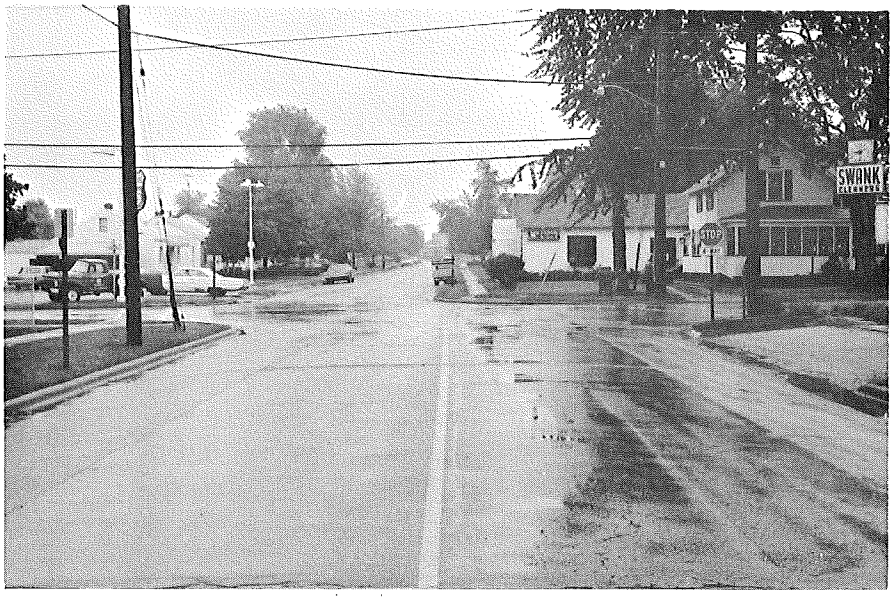
NORTHBOUND

THIRTEENTH STREET

SOUTHBOUND

THIRTEENTH STREET

FIGURE 11a



EASTBOUND

WAYNE STREET

WESTBOUND

WAYNE STREET

FIGURE 11b

LOCATION 8 BROADWAY STREET AT FIFTH STREET

Broadway Street and Fifth Street form an intersection that is located south of the Central Business District. Fifth Street is a 30ft wide bituminous roadway with parking permitted on the east side of the street south of the intersection. Broadway Street is a 56ft wide bituminous roadway west of the intersection and a 31ft wide bituminous roadway east of the intersection. The west leg of Broadway Street is offset 20 feet to the south in relation to its east leg. Parallel parking is permitted on Broadway Street west of the intersection.

Traffic controls at this location include five 24 inch "Stop" signs and a "Right Lane Must Turn Right" sign located on the "Stop" sign support in the southwest corner. There is one "Stop" sign for each leg of the intersection and one extra sign for eastbound Broadway Street traffic.

The accidents at this high accident location during the study period formed no specific pattern. The accidents included three angles, three ran off roadways, two rear ends, one sideswipe, one vehicle-motorcycle, one vehicle-bicycle, and one vehicle-pedestrian accident.

Recommendations

It is recommended that the "Right Lane Must Turn Right" sign located on the "Stop" sign support in the southwest corner be removed and erected on another support. The Manual

states that only one sign or sign panel group shall be displayed on the same support. Two signs on the same support tend to distract the vehicle operator and both messages then lose their effectiveness.

It is further recommended that the existing "Stop" sign located at the end of the west leg of Broadway Street be removed. When used, "Stop" signs should be placed at the desired point of obediency.

It is also recommended that the white centerline on Broadway Street be changed to a double yellow centerline, and a solid white lane line be used to mark the exclusive left turn lane.

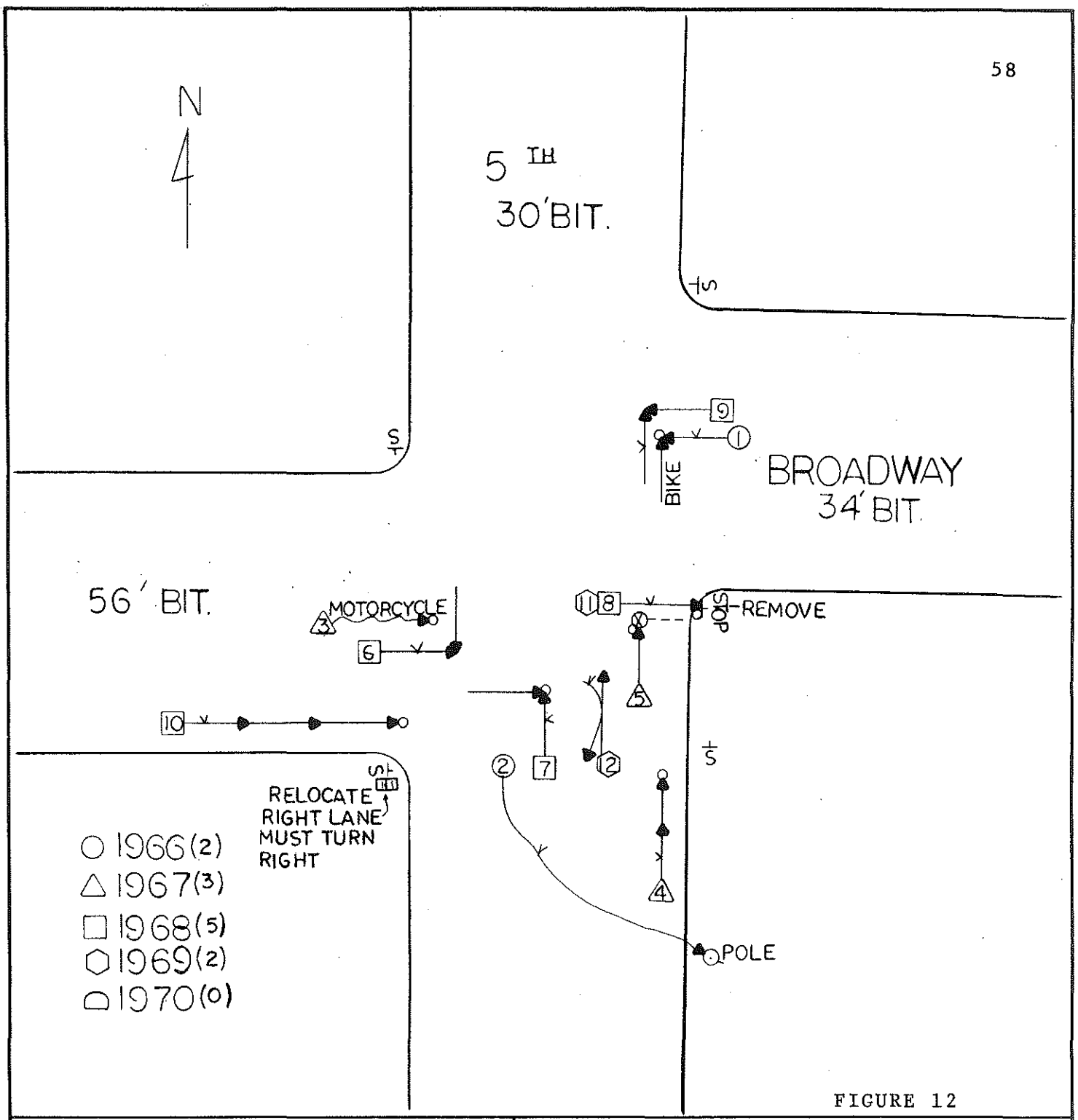
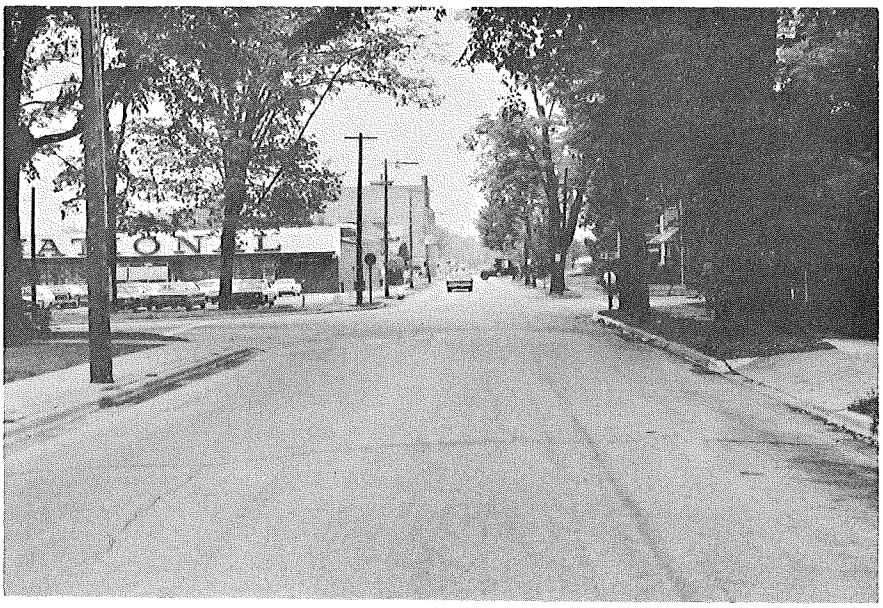


FIGURE 12

LEGEND	MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC AND SAFETY DIVISION
Stop & Go Signal (S, R, F, Y) — Stop Sign S — Flashing Beacon — Yield Sign Y	Location BROADWAY AT 5TH CITY OF NILES BERRIEN CO.
Fatal — Injury — Skidding — Jackknife — Overturned — Backing — Pedestrian (X) — Tree — Out of Control — Driver Intent — Deer — Violator (V)	Period: 1966 THRU 1970 Accidents – Total 12 P.D. 4 Injury 8 (11) Fatal 0 ( ) C.S. ____ Miles ____ Drawn DJM Plan No. LOCATION 8 Date 9-20-71

Form 1547 B (Rev. 11/70)



NORTHBOUND FIFTH STREET

SOUTHBOUND FIFTH STREET

FIGURE 12a

EASTBOUND BROADWAY

WESTBOUND BROADWAY

FIGURE 12b

LOCATION 9 SYCAMORE STREET AT EIGHTH STREET

Sycamore Street and Eighth Street intersect to form a right-angle intersection which is located in a residential neighborhood. Sycamore Street has a 34ft wide bituminous roadway that provides east-west access and Eighth Street has a 30ft wide bituminous roadway that provides north-south access. Parking is permitted on each leg of the intersection.

The traffic controls at this location consist of 24 inch "Stop" signs for north and southbound Eighth Street traffic. In addition, there are two 30 inch Railroad Advance Warning signs located on the east leg of Sycamore Street.

The collision diagram indicates that the predominate accident at this location was the right-angle type. Right-angle accidents accounted for 9 of the 12 accidents at this location. The remaining three accidents occurred as the result of collisions with parked vehicles.

Recommendations

Since more than 50 percent of the right-angle accidents occurred when drivers failed to stop at the "Stop" sign, it is recommended that the "Stop" sign size be increased from a 24 inch to 36 inch (See Part I, Section B, p. 14 of the Manual, Appendix II, p. 89) in order to provide added emphasis to the stop.

Furthermore, it is recommended that the nonstandard size Railroad Advance Warning signs be replaced with 36 inch signs (See Part I, Section C, p. 127 of the Manual, Appendix II, p. 97).

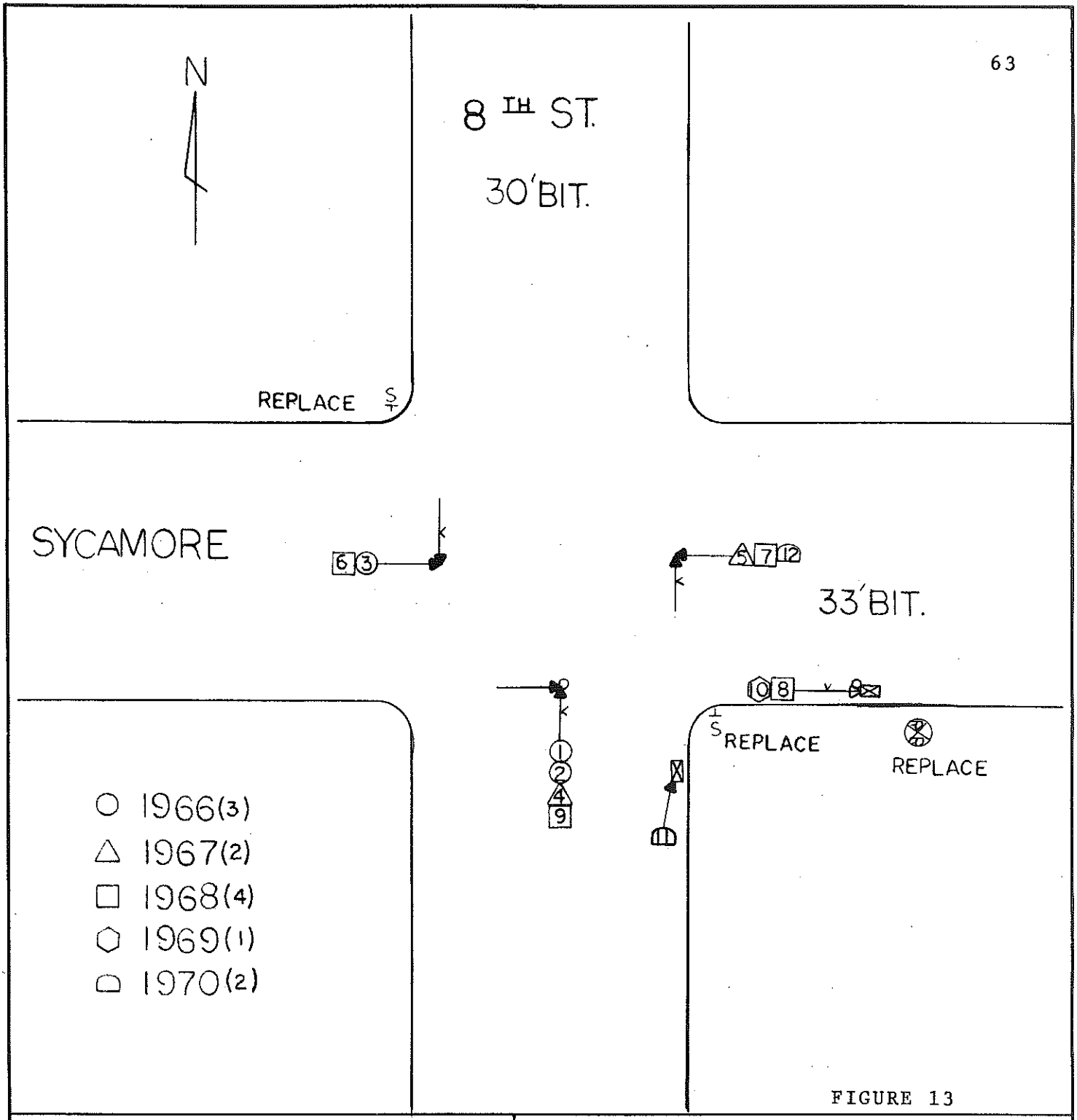
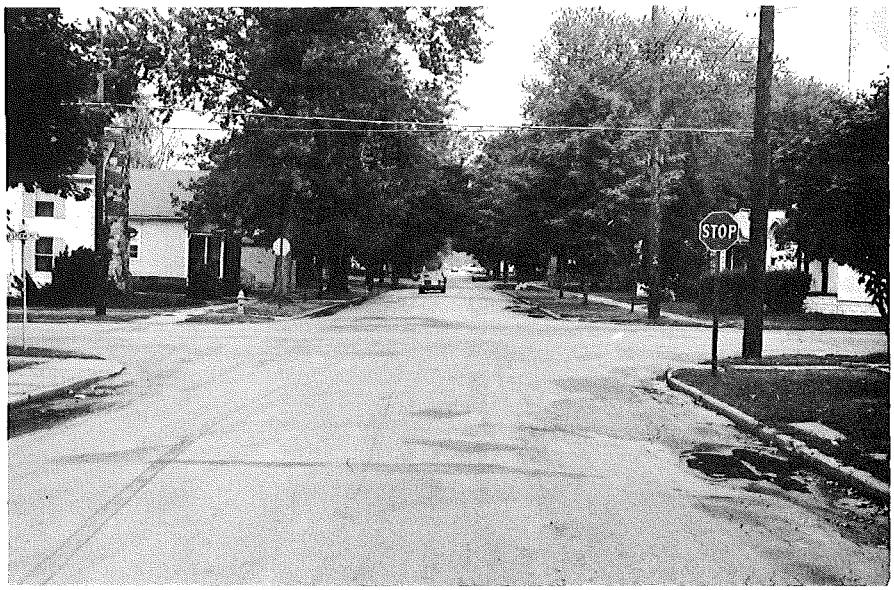


FIGURE 13

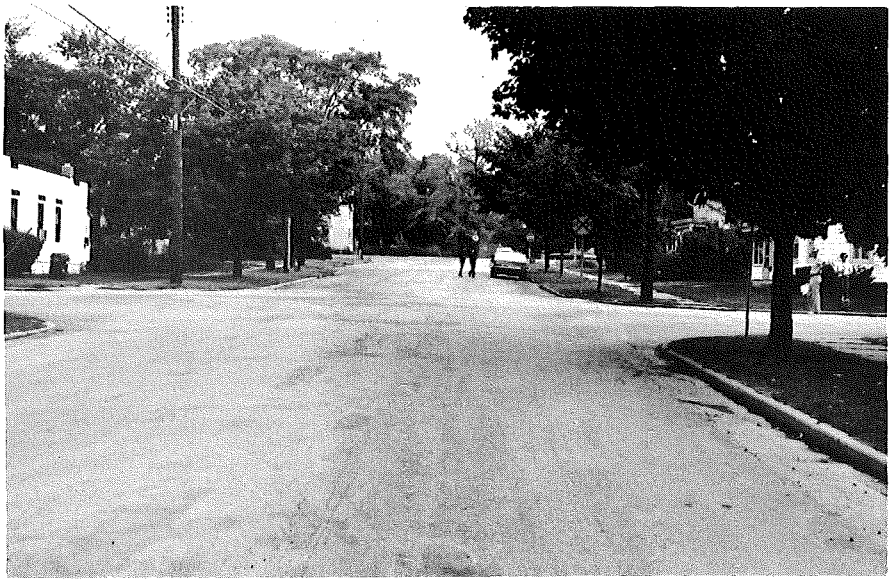
LEGEND	MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC AND SAFETY DIVISION
Stop & Go Signal (S, R, Y, F, Y) Stop Sign S Flashing Beacon Yield Sign Y	Location SYCAMORE AT 8TH CITY OF NILES BERRIEN CO.
Fatal Injury Skidding Jackknife Overturned Backing Pedestrian (X) Tree Out of Control Driver Intent Deer (V) Violator Y	Period: 1966 THRU 1970 Accidents – Total 12 P.D. 6 Injury 6 (7) Fatal 0 ( ) C.S. Miles Drawn DJM Plan No. LOCATION 9 Date 9-20-71

Form 1547 B (Rev. 11/70)



NORTHBOUND
EIGHTH STREET

EASTBOUND
SYCAMORE STREET



SOUTHBOUND
EIGHTH STREET

FIGURE 13a

LOCATION 10 FOURTH STREET AT SYCAMORE STREET
(See Appendix I, p. 77)

Total	P.D.	Inj.	Fatal
11	9	2	0

LOCATION 11 HOWARD STREET AT THIRTEENTH STREET
(See Appendix I, p. 79)

Total	P.D.	Inj.	Fatal
10	5	5	0

LOCATION 12 SIXTH STREET AT SYCAMORE STREET

Sixth Street at Sycamore Street is a right-angle intersection located in a residential neighborhood on the fringe of the Central Business District. Sycamore Street is a 34ft wide bituminous roadway that has parking allowed on all but the south side of the street west of the intersection. Sixth Street is a 30ft wide bituminous roadway with parking prohibited on the west side of the south leg, while one-hour metered parking is permitted on the east side of the south leg. North of the intersection, angle parking is allowed on the east side between the sidewalk and curb (partly on the street), and parallel parking on the west side of the street. The traffic controls at this location consist of 24 inch "Stop" signs for north and southbound Sixth Street traffic.

The collision diagram reveals that the predominant accident at this location was the right-angle type. The accidents consisted of seven right-angles, two rear ends and one sideswipe.

Recommendations

Parking on Sycamore Street is allowed too near the intersection and is in violation (20 feet from crosswalk) of the Michigan Vehicle Code. It is therefore recommended that parking on the north side of Sycamore Street east and west of the intersection be prohibited for a distance of 50 feet from the crosswalk to improve the sight distance. Since Sycamore Street isn't wide enough to allow for parking on both sides and still maintain two-way traffic on the street, it is recommended that parking on the south side of Sycamore Street east of the intersection be prohibited.

Sixth Street north of the intersection is not wide enough to permit parking on both sides and provide adequate pavement width for maintaining two-way traffic. Therefore, it is recommended that the angle parking on the east side of the street be converted to parallel parking. This parallel parking on the east side of the street should be located between the sidewalk and curb so that two-way traffic can be maintained on Sixth Street.

It is further recommended that the parallel parking on the west side of Sixth Street be prohibited for a distance of 50 feet from the crosswalk to improve the sight distance.

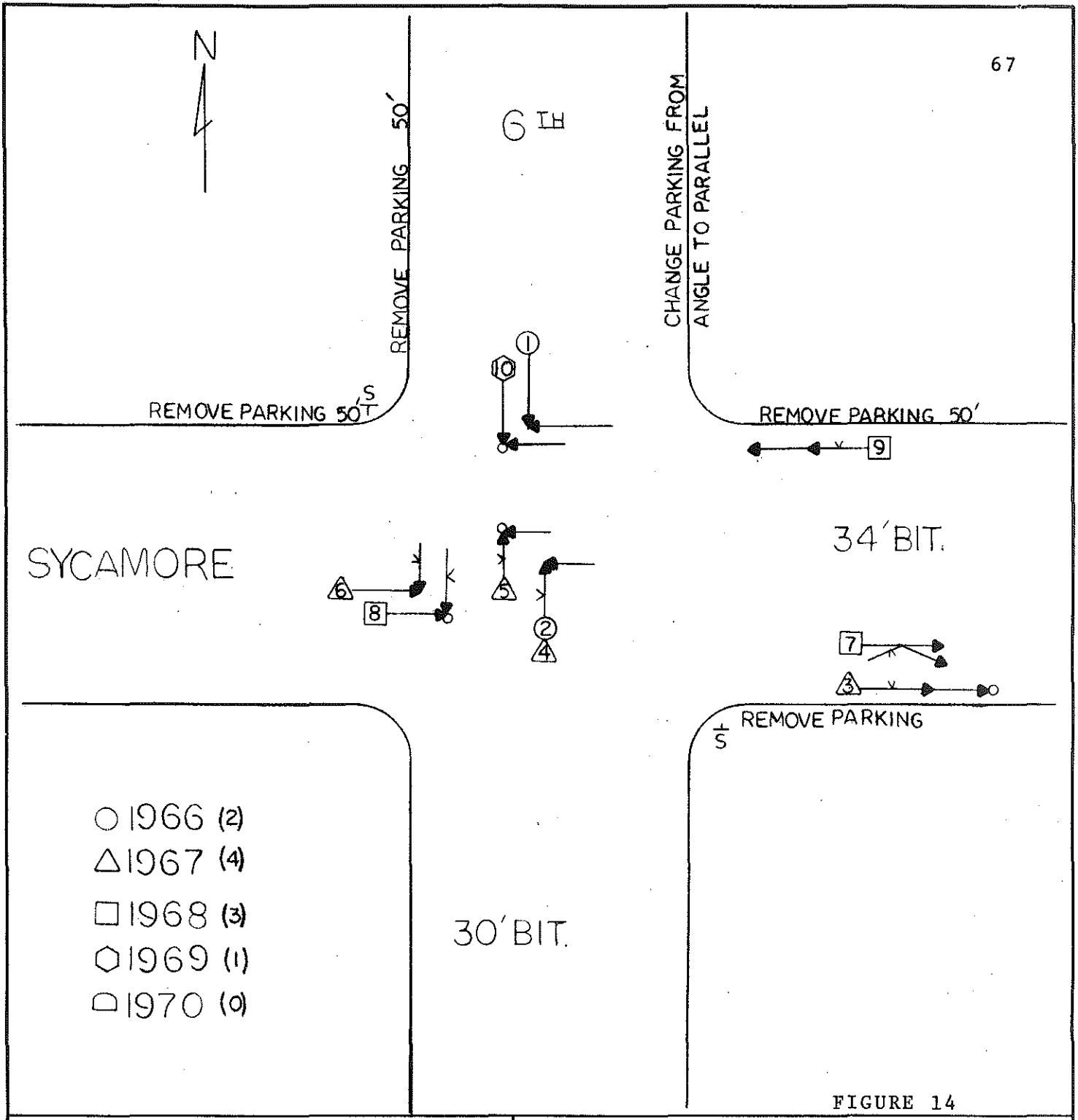


FIGURE 14

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

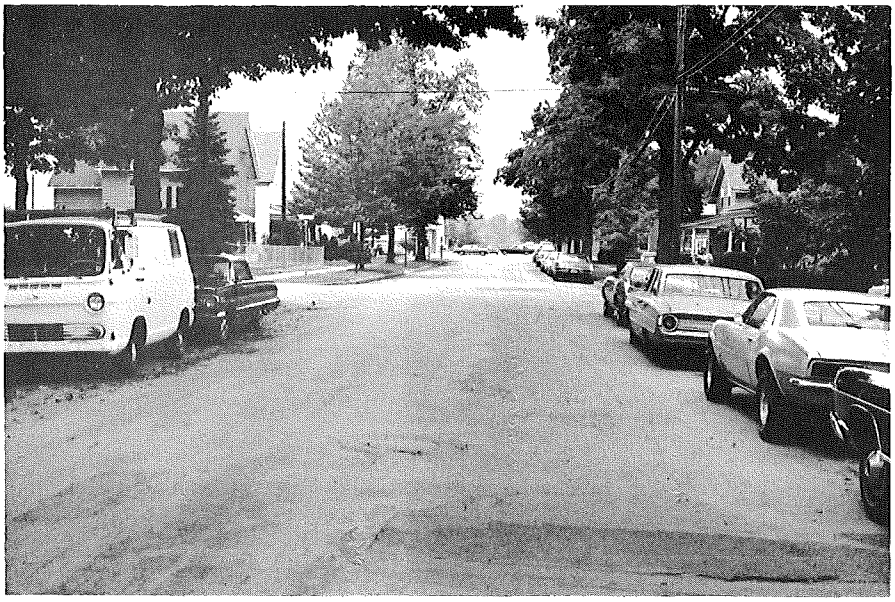
MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location SYCAMORE AT 6TH
CITY OF NILES
BERRIEN CO.

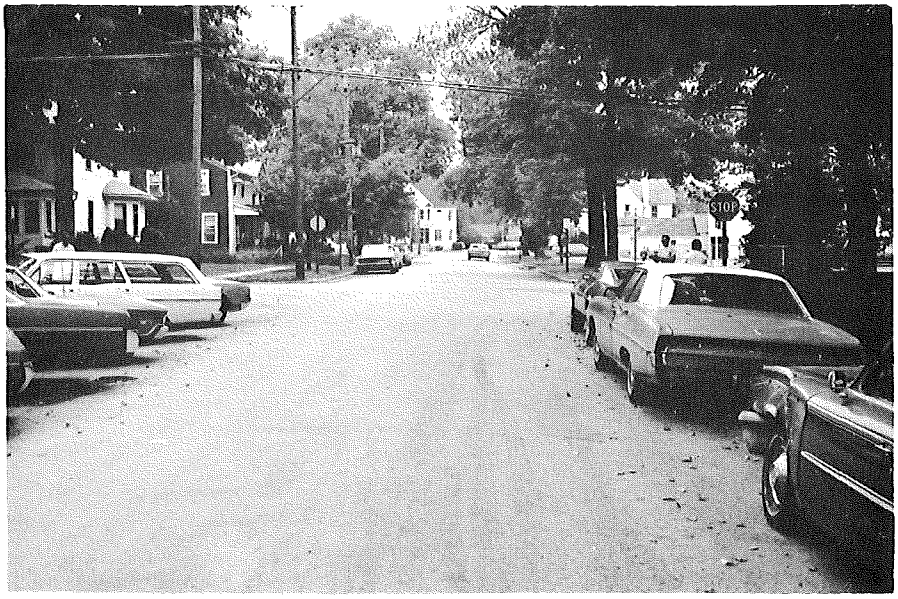
Period: 1966 THRU 1970
Accidents – Total 10 **P.D.** 6
Injury 4 (7) **Fatal** 0 ( )
C.S. _____ **Miles** _____ **Drawn** DJM
Plan No. LOCATION 12 **Date** 9 – 21 – 71

Form 1547 B (Rev. 11/70)

NORTHBOUND
SIXTH STREET



WESTBOUND
SYCAMORE STREET



SOUTHBOUND
SIXTH STREET

FIGURE 14a

LOCATION 13 BROADWAY STREET AT THIRTEENTH STREET
(See Appendix I, p. 81)

Total	P.D.	Inj.	Fatal
8	4	4	0

LOCATION 14 SUPERIOR STREET AT THIRD STREET

Superior Street and Third Street form a "T" intersection in a residential neighborhood. Superior Street is a 24ft wide bituminous roadway. Third Street is a 36ft wide bituminous roadway providing south-northwesterly access. Parking is prohibited at this intersection.

Traffic controls at this intersection include a 24 inch "Stop" sign for Superior Street. For southbound Third Street traffic there is a Warning sign with the legend "Dangerous Curve", a Curve sign and a "25 MPH Speed Limit" sign, while for northbound Third Street traffic there is another "Dangerous Curve" Warning sign and a Curve sign.

The collision diagram indicates that five of the seven total accidents were the ran off roadway type. The remaining accidents included one angle and one rear end.

Recommendations

Since five of the seven accidents at this location involved running off the roadway, it is recommended that two Target Arrows (See Part I, Section C, p. 88 of the Manual, Appendix II, p. 94) be erected in target position one for northbound and one for southbound Third Street traffic.

Also, it is recommended that the white centerline on Third Street be changed to a double yellow centerline pavement marking (See Change Memorandum No. 5, Appendix II, p. 109).

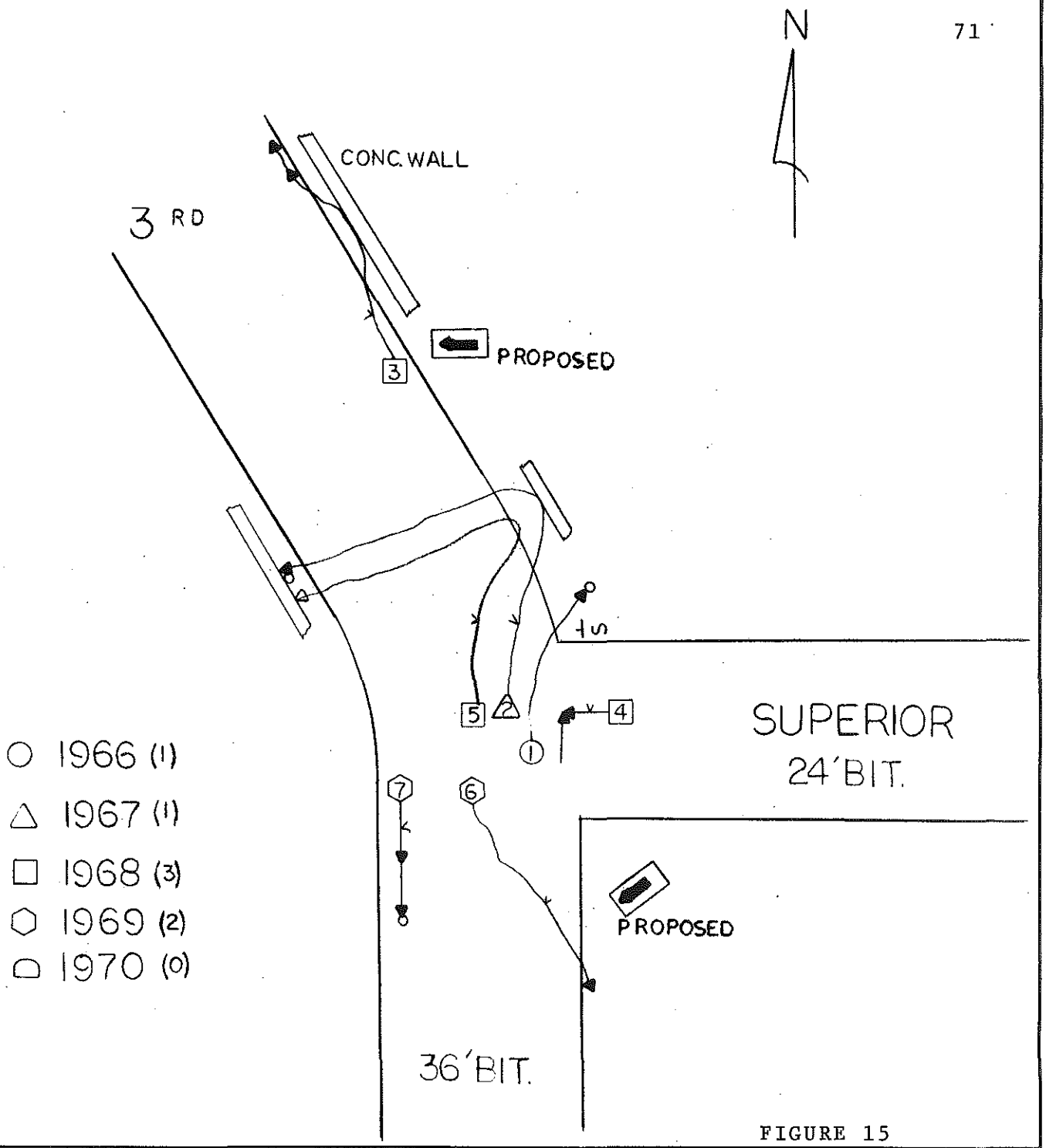


FIGURE 15

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 SUPERIOR AT 3RD.
CITY OF NILES
BERRIEN CO.

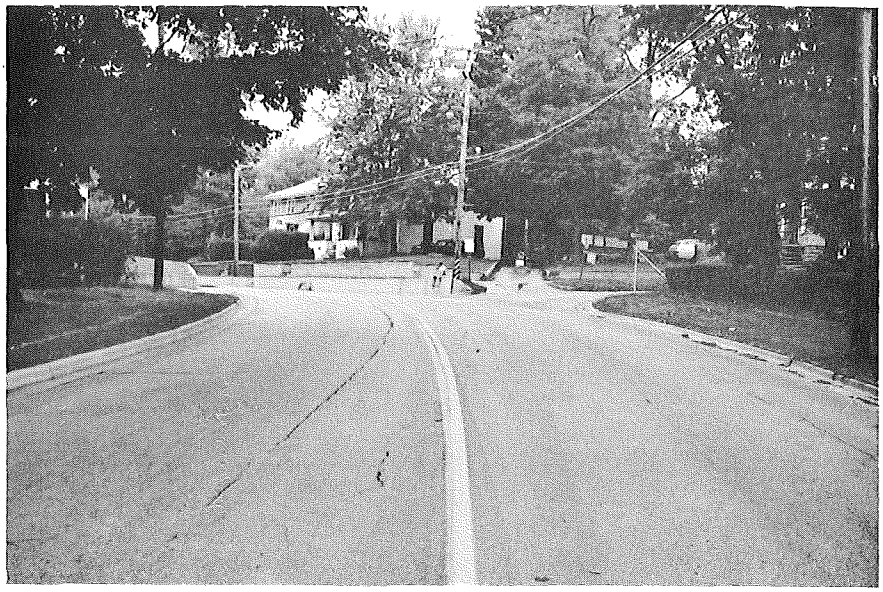
Period: 1966 THRU 1970

Accidents – Total 7 **P.D.** 4

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

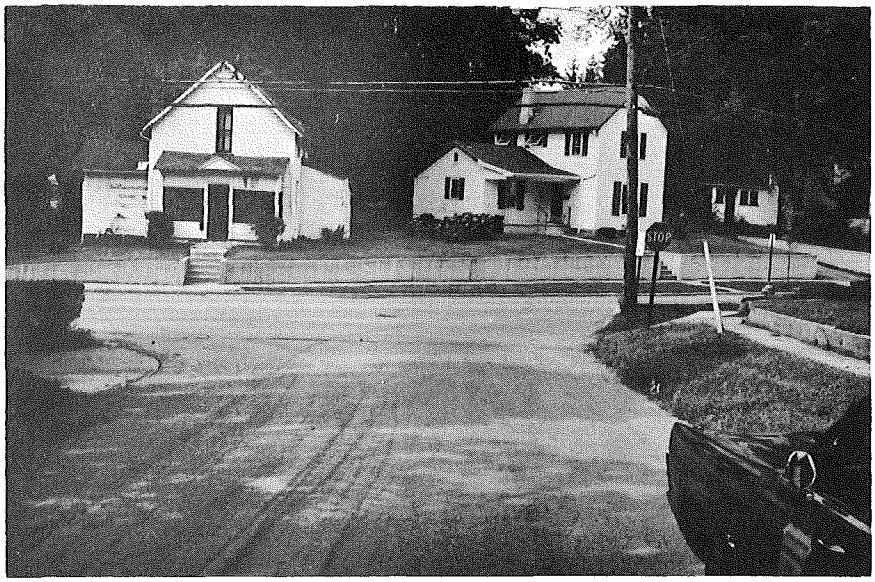
C.S. _____ **Miles** _____ **Drawn** D J M

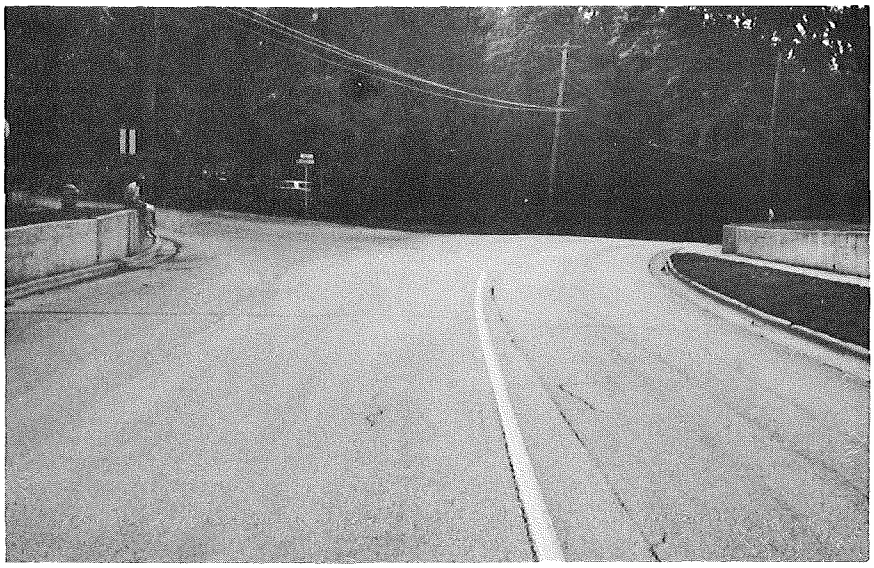
Plan No. LOCATION 14 **Date** 9-20-71



NORTHBOUND
THIRD STREET

WESTBOUND
SUPERIOR STREET





SOUTHBOUND
THIRD STREET

FIGURE 15a

LOCATION 15 BROADWAY STREET AT SEVENTEENTH STREET
(See Appendix I, p. 83)

Total	P.D.	Inj.	Fatal
7	5	2	0

LOCATION 16 GRANT STREET AT SPRUCE STREET
(See Appendix I, p. 85)

Total	P.D.	Inj.	Fatal
6	4	2	0

SUMMARY

The Department of State Police submitted 16 high accident locations for the City of Niles to the Michigan Department of State Highways. After an indepth study of these locations, we formulated recommendations for 11 of them. The locations and their recommendations are as follows:

Location Number	Location Description	Quantity	Recommendations
1	Broadway Street at Third Street	1	W3-3-36 Lane Line Markings Remove Parking
2	Sycamore Street at Second Street	1	Signal Head
3	Cedar Street at Fifth Street	2 1	R1-1-36 Flasher Beacon Remove Parking
4	Second Street at Wayne Street	2 1	R1-1-36 W3-1-36
5	Cedar Street at Third Street		Remove Parking
6	Fifth Street at Oak Street	2 1	W1-6-48 R1-1-24 Yellow Skip Centerline Pavement Markings
7	Wayne Street at Thirteenth Street	2	W3-1-30
8	Broadway Street at Fifth Street		Remove Sign from "Stop" Sign Support Remove "Stop" Sign Double Yellow Centerline and Solid White Lane Line Markings
9	Eighth Street at Sycamore Street	2 2	W10-1-36 R1-1-36

Location Number	Location Description	Quantity	Recommendations
12	Sycamore Street at Sixth Street		Remove Parking
14	Superior Street at Third Street	2	W1-6-48 Double Yellow Center-line Pavement Marking

Furthermore, some general recommendations were formulated that should be implemented at all locations throughout the City of Niles. These recommendations are:

1. Parking should conform to the Michigan Vehicle Code.
2. A policy concerning on-street parking in relation to pavement widths should be adopted.
3. Signalized intersections should have two overhead signal heads as suggested by the Manual of Uniform Traffic Control Devices.

APPENDIX I

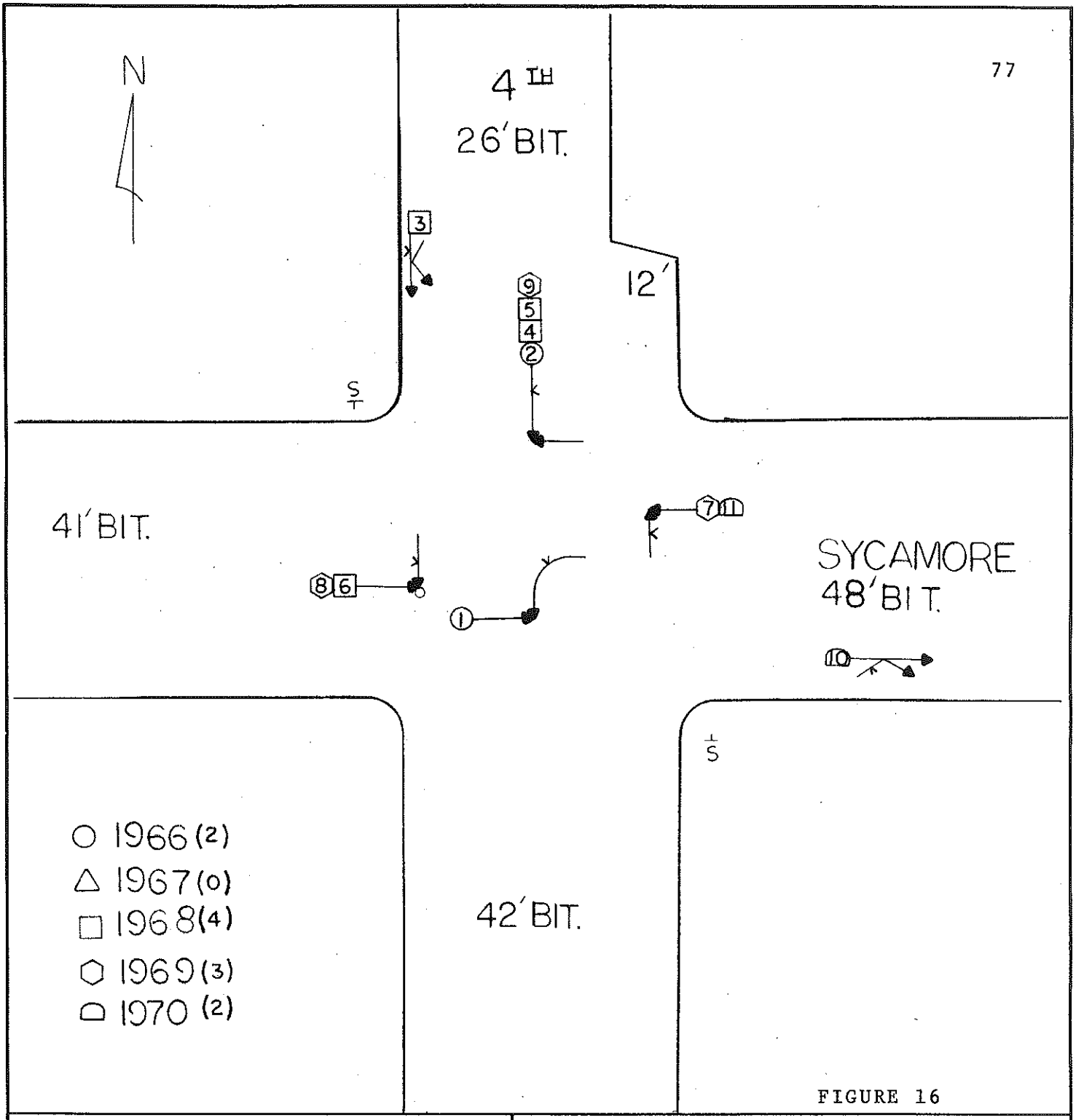


FIGURE 16

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 SYCAMORE
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 11 P.D. 9
Injury 2 (3) Fatal 0 ( )
C.S. ____ Miles ____ Drawn DJM.
Plan No. LOCATION 10 Date 9-21-71

Form 1547 B (Rev. 11/70)

NORTHBOUND
FOURTH STREET

EASTBOUND
SYCAMORE STREET

SOUTHBOUND
FOURTH STREET

FIGURE 16a

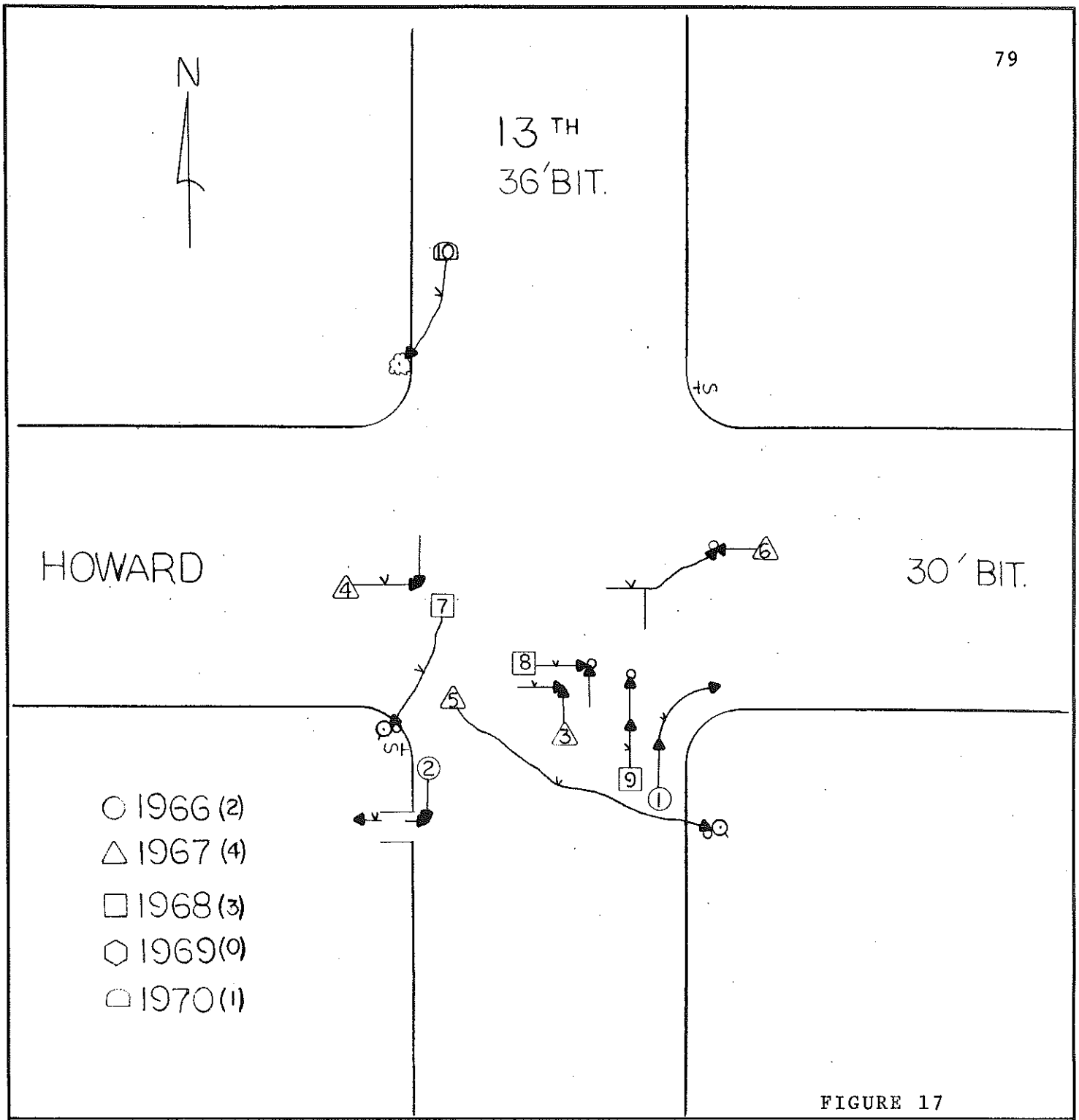


FIGURE 17

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 HOWARD AT 13TH
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970
Accidents – Total 10 **P.D.** 5
Injury 5 (8) **Fatal** 0 ( )
C.S. _____ **Miles** _____ **Drawn** D J M
Plan No. LOCATION 11 **Date** 9-21-71

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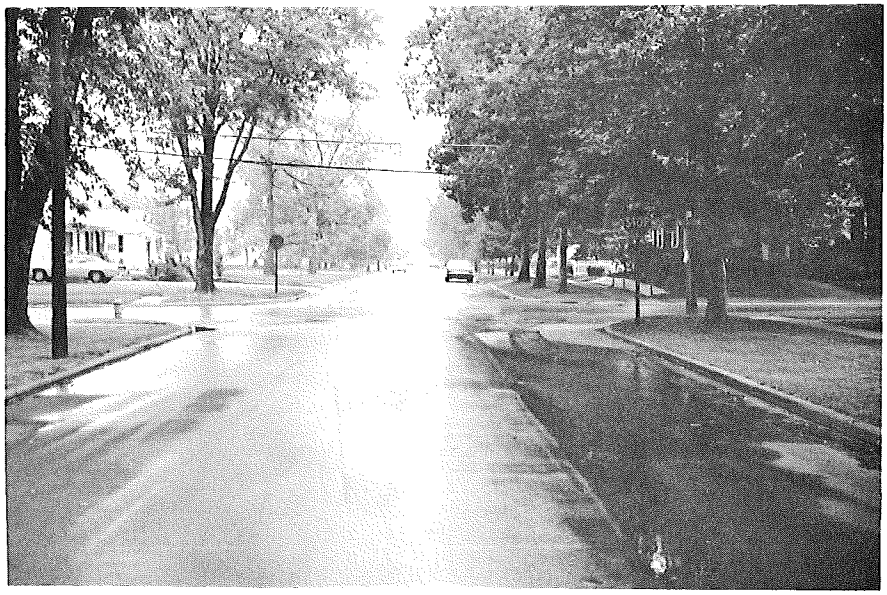
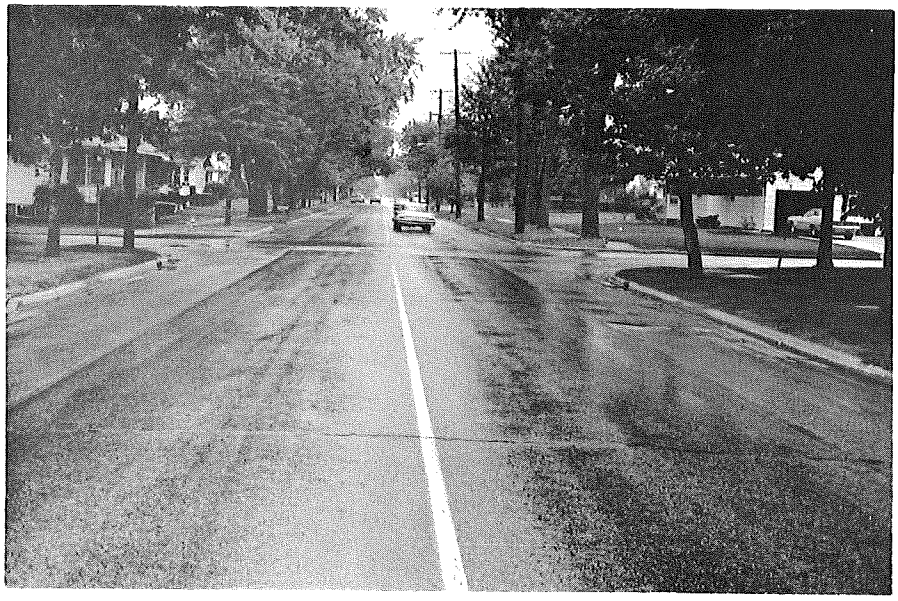
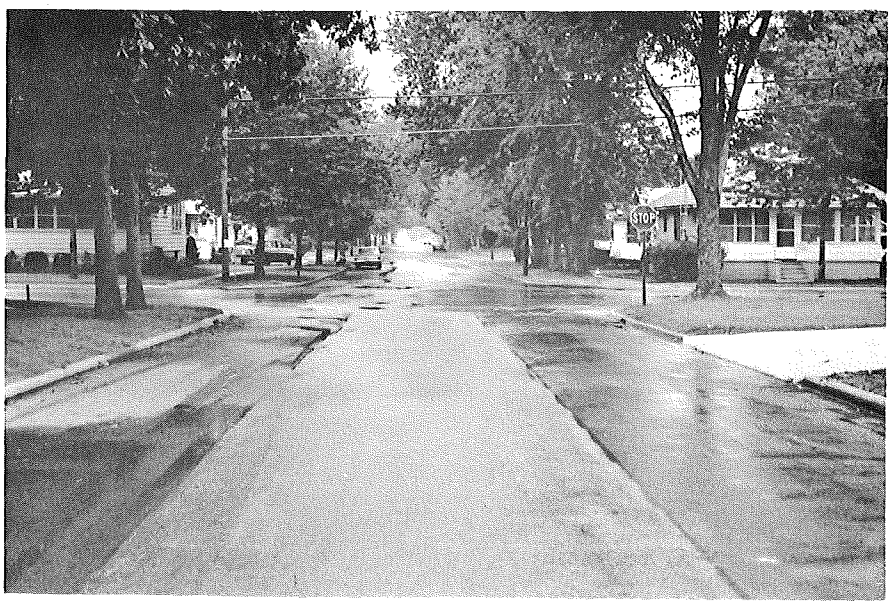


EASTBOUND
HOWARD STREET

NORTHBOUND
THIRTEENTH STREET





WESTBOUND
HOWARD STREET

FIGURE 17a

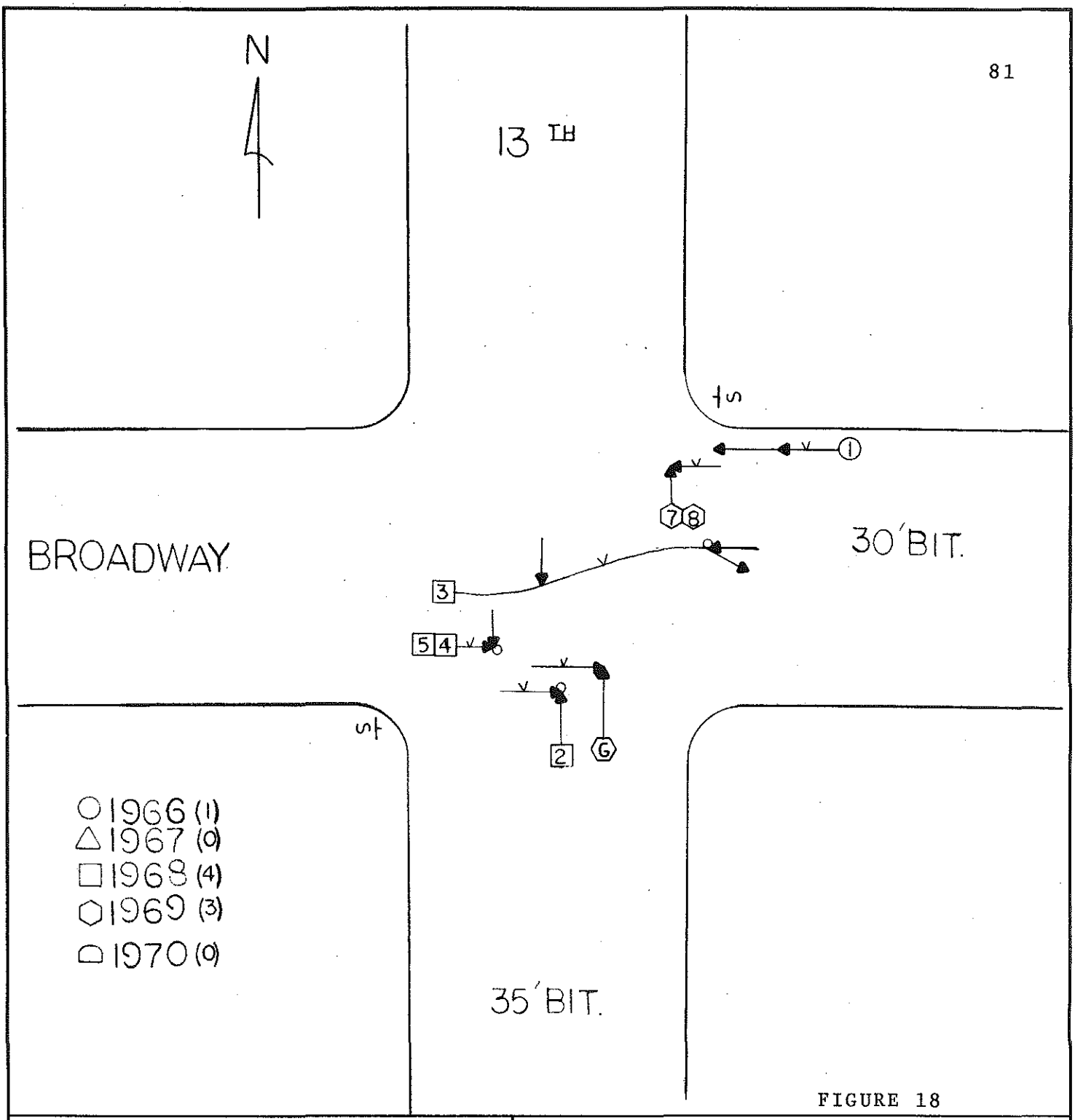


FIGURE 18

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, Y

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location BROADWAY AT 13TH
CITY OF NILES
BERRIEN CO.

Period: 1966 THRU 1970

Accidents – Total 8 **P.D.** 4

Injury 4 (6) **Fatal** 0 ( )

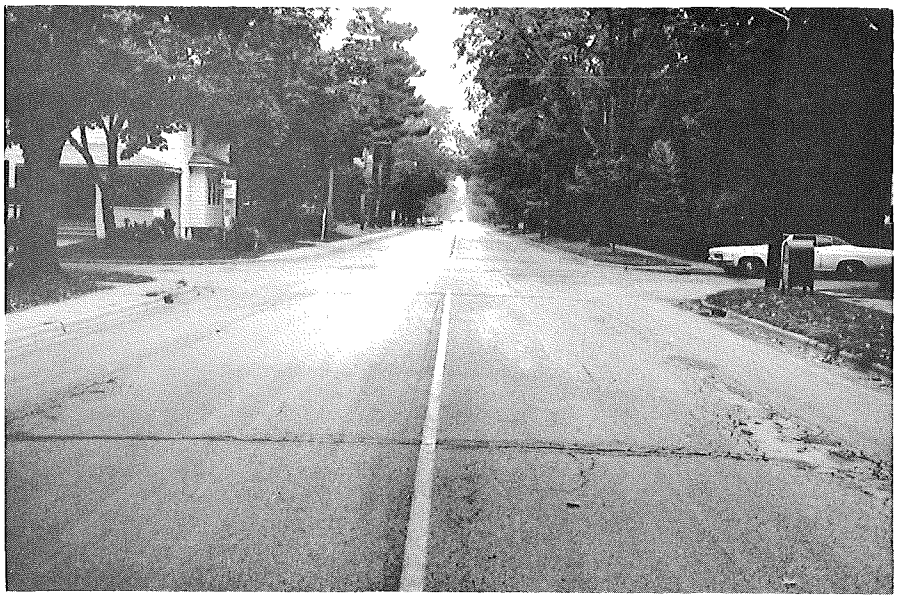
C.S. _____ **Miles** _____ **Drawn** DJM

Plan No. LOCATION 13 **Date** 9-21-71

Form 1547 B (Rev. 11/70)

WESTBOUND
BROADWAY

NORTHBOUND
THIRTEENTH STREET



EASTBOUND
BROADWAY

FIGURE 18a

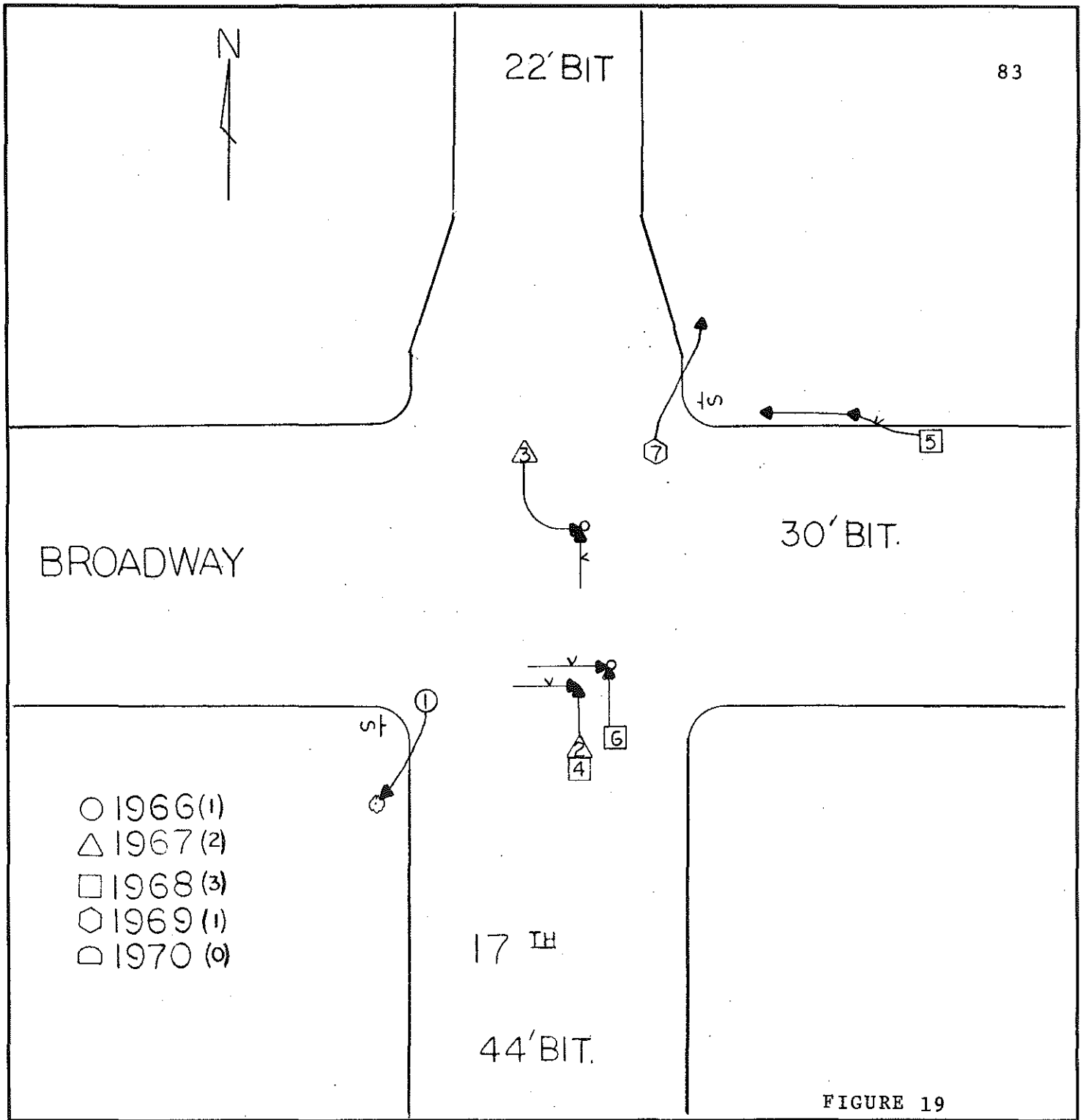


FIGURE 19

LEGEND

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

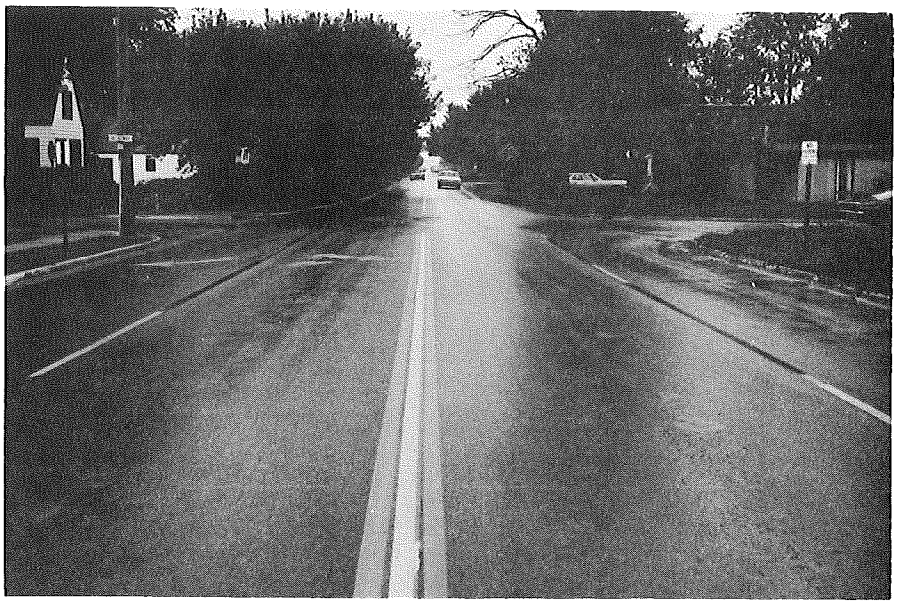
Fatal
Injury
Skidding
Jackknife
Overturned
Backing
Pedestrian
Tree
Out of Control
Driver Intent
Deer
Violator

MICHIGAN DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

Location BROADWAY AT 17 TH
CITY OF NILES
BERRIEN CO.

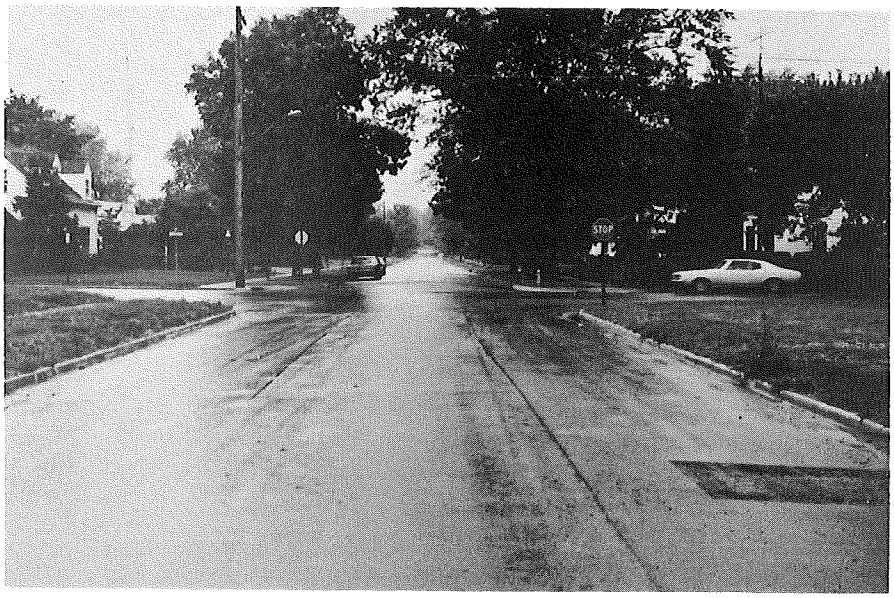
Period: 1966 THRU 1970
Accidents – Total 7 P.D. 5
Injury 2 (3) Fatal 0 ( )
C.S. Miles Drawn D J M
Plan No. LOCATION 15 Date 9-21-71

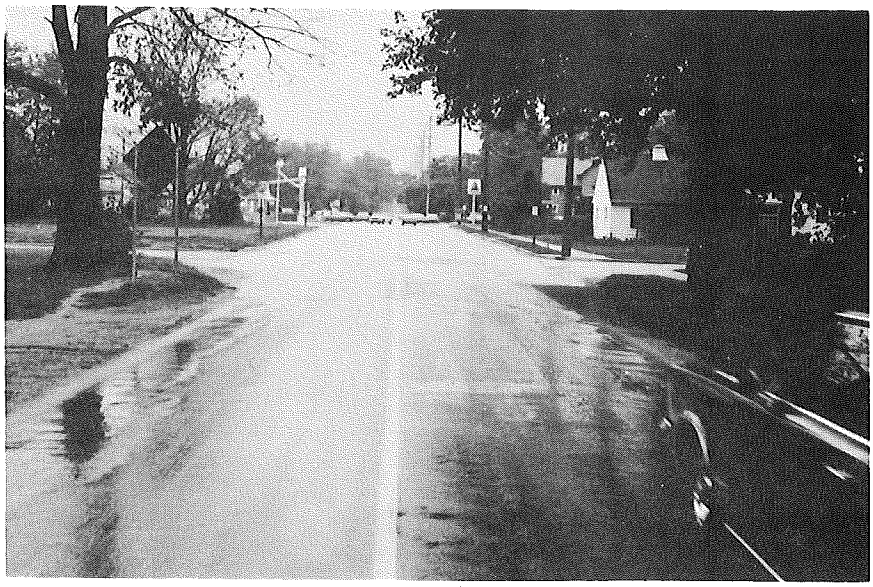
Form 1547 B (Rev. 11/70)



NORTHBOUND
SEVENTEENTH STREET

WESTBOUND
BROADWAY





SOUTHBOUND
SEVENTEENTH STREET

FIGURE 19a

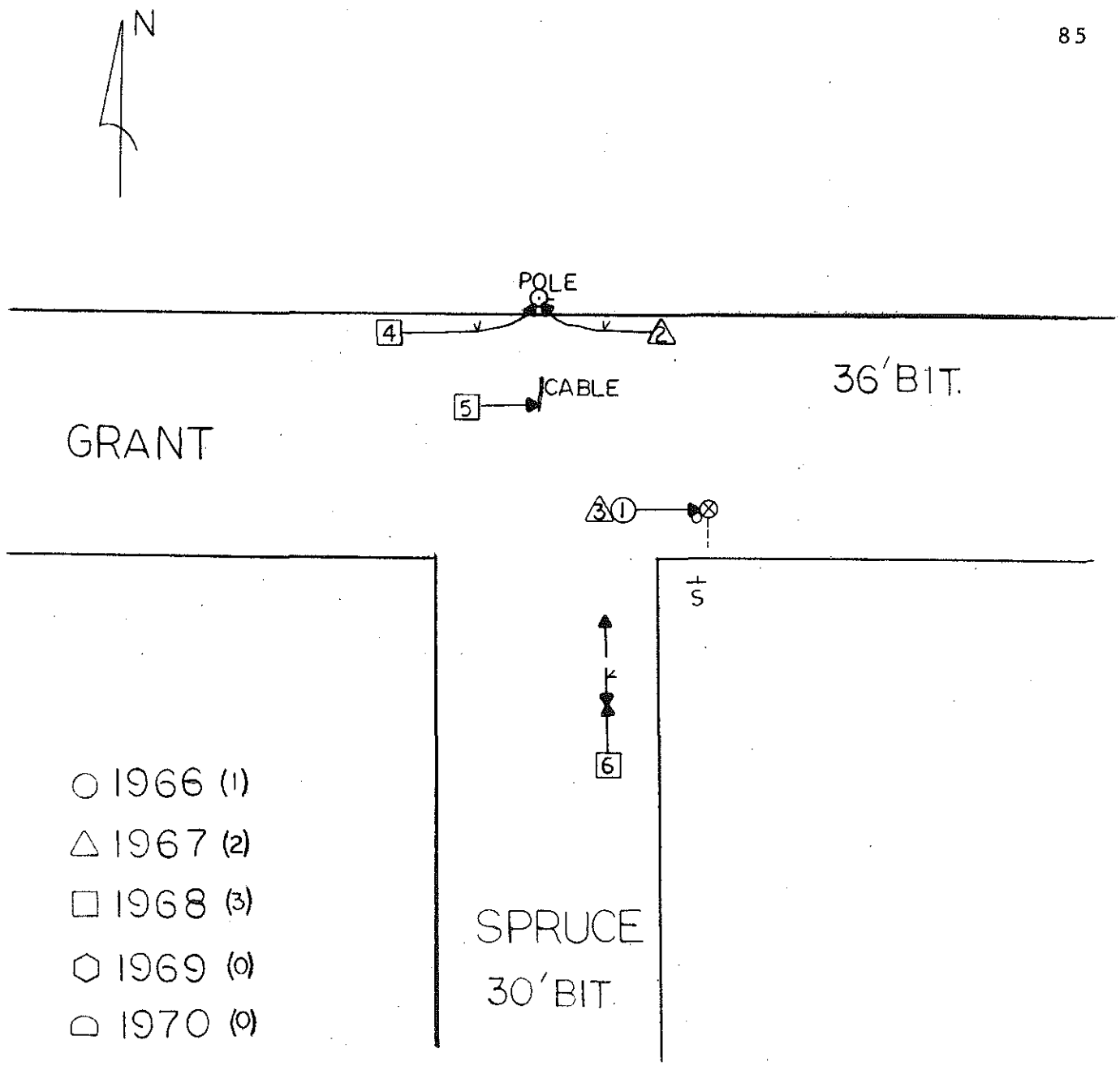
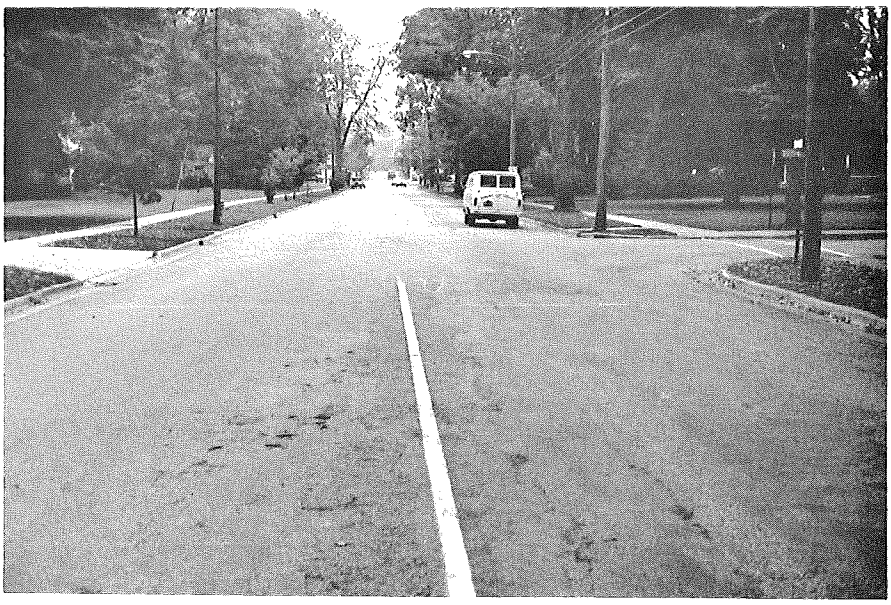


FIGURE 20

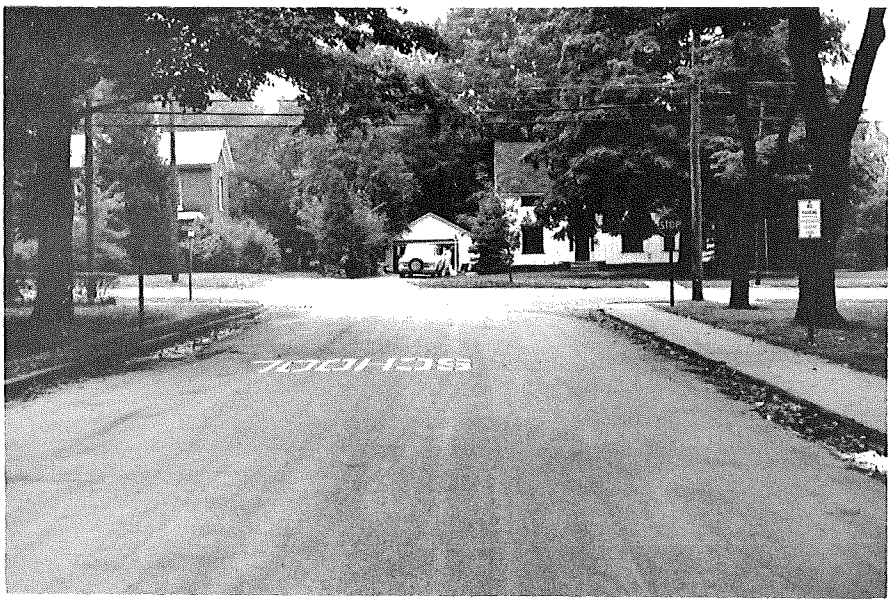
LEGEND	MICHIGAN DEPARTMENT OF STATE HIGHWAYS TRAFFIC AND SAFETY DIVISION
Stop & Go Signal (S, R, Y, F, Y) Stop Sign S Flashing Beacon Yield Sign Y	Location GRANT AT SPRUCE CITY OF NILES BERRIEN CO.
Fatal Injury Skidding Jackknife Overturned Backing Pedestrian (X) Tree Out of Control Driver Intent Deer (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 16 Date 9-20-70

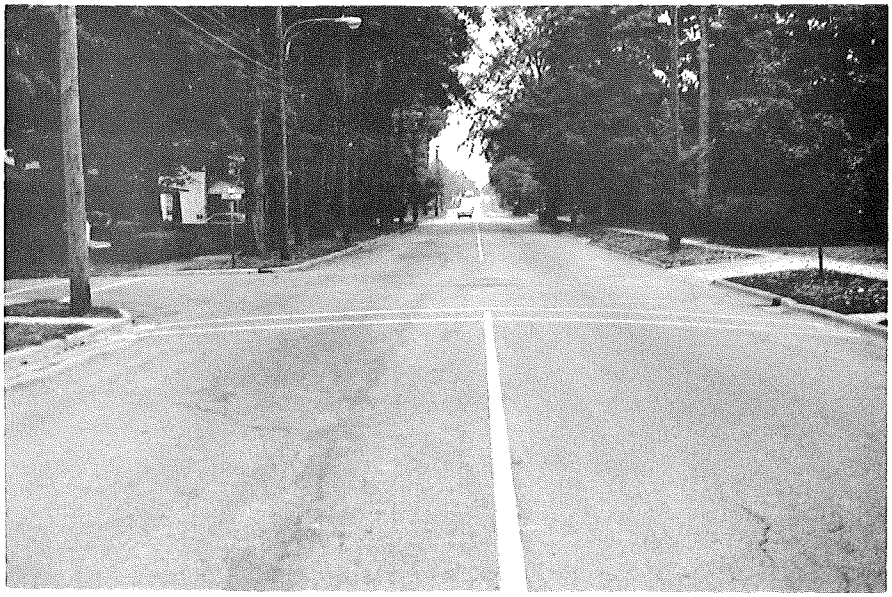
Form 1547 B (Rev. 11/70)



EASTBOUND
GRANT STREET

NORTHBOUND
SPRUCE STREET





WESTBOUND
GRANT STREET

FIGURE 20a

APPENDIX II

Part I. Signs

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.

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

For placement see figures 1-3 and 1-4.

SPEED LIMIT SIGN

Reflectorized

R2-1-24 24″ x 30″ (4″ letters and 10″ numerals)
R2-1-48 48″ x 60″ (8″ letters and 16″ numerals)

The "SPEED LIMIT" sign shall be located at the point of change from one speed limit to another and at additional locations, as just beyond major intersections, where it is necessary to remind motorists of the applicable limit. Where the sign cannot be placed at the exact point of change in limit (such as at the center of an intersection), it shall be placed as near as practicable, but in advance of the point of change for a decrease, and beyond such point for an increase. Signs shall be installed at maximum intervals of ½ mile within any Speed Control Zone to confirm the speed of that zone. On freeways, the R2-1-48 sign shall be used.

For placement see figures 1-5 and 1-35.

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

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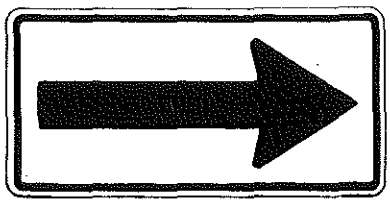
*Special warning signs for highway construction and maintenance projects are to be found in Part II of this Manual.

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.

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.

SIGNAL AHEAD SIGN

Reflectorized

W3-3-30 30″ x 30″ (6″ letters)
W3-3-36 36″ x 36″ (7″ letters)

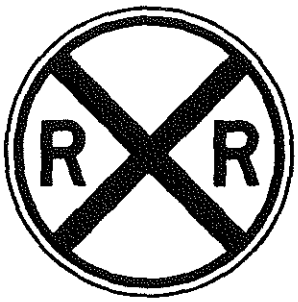
The "SIGNAL AHEAD" sign shall be used in advance of any traffic control signal where the sight distance is less than that specified in the table below:

85th Percentile Speed			
35 & Below	36-45	46-55	56 & Over
400′	550′	750′	1000′

This sign shall be located at or in advance of the distance shown in the above table. The advance distance may be lengthened to take into account the normal signal backup.

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.

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, p. 109

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.

Figure 4-2. Traffic control signal installation with illuminated case sign.

Types of Mountings for Signal Heads

Signal heads shall be mounted over the traveled portion of the roadway using either cable or mast arm suspension. Supplementary signal heads may be placed along the side of the roadway on poles or pedestals.

Signals shall be so located that the meaning of the indications is always clear and unmistakeable. It is essential that signal indications be readily visible to drivers in all lanes approaching the signal location.

Number of Signal Faces

At signalized intersections, where one or more approach is a State trunkline highway, there shall be a minimum of two overhead vehicular signal faces, located over the traveled portion of the roadway, visible to traffic on each approach. Where a separate turning signal(s) is provided, only one indication is required for each signalized turning movement. See figure 4-13.

At all other signalized intersections, a minimum of one overhead vehicular signal face per approach is required. It is strongly recommended, however, that at least two vehicular signal faces be provided per approach for the following reasons:

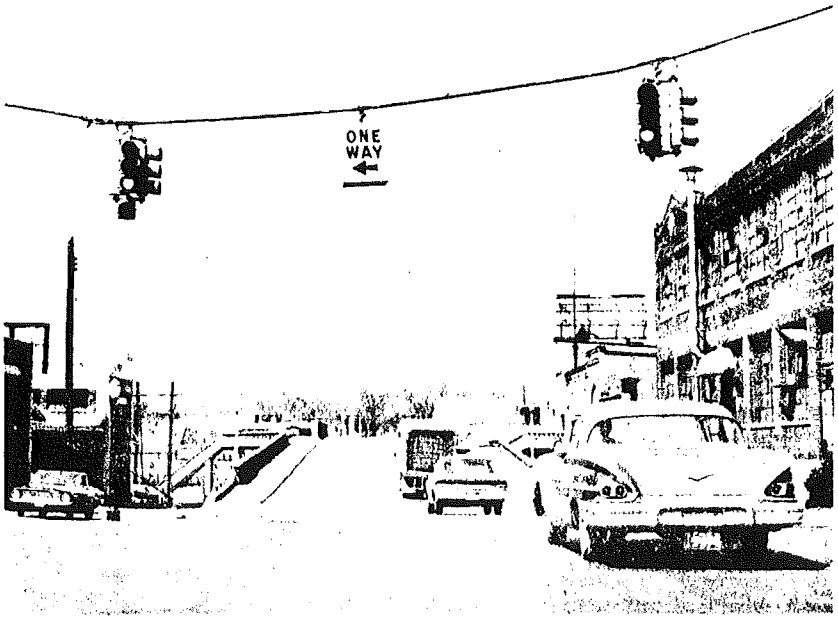


Figure 4-3. Traffic control signal installation with delayed left turn arrow.

1. Two (or more) properly located overhead faces will in almost all cases provide drivers with a signal indication even though trucks or buses may momentarily obscure one signal face.
2. Multiple faces provide a safety factor where the signals must compete with a brilliant background such as advertising signs or the sun.
3. The occasional inevitable lamp failure in one face will not leave an approach without any signal indication.

Where only one vehicular signal face is provided per approach, it shall be positioned as near to the intersection of the centerlines of the intersecting roadways as possible.

The number of signal faces in excess of two per approach will be dictated by local conditions such as the number of vehicular lanes, the need for special turn indications, and the configuration of the intersection and channelizing islands.

Vehicular signals may be supplemented by pedestrian signals, where warranted, located at each end of each controlled crosswalk.

Signal faces shall be located at the intersection so as to give drivers and pedestrians a clear, unmistakeable indication of the right-of-way assignment from their normal positions on the approaches and as they pass through the intersection area. At intersections where signals are installed on the basis of the pedestrian volume warrant, or at other signalized locations where the pedestrian volume equals or exceeds the warrant, pedestrian signals shall be installed.

Pedestals in the roadway to carry signals are driving hazards, and are prohibited despite any advantages as a conspicuous signal location. This is not intended however, to preclude the use of signals on pedestals or posts within the area of properly designed channelized islands or in the median strip of divided roadways.

Where physical conditions prevent the driver from having a continuous view of at least one signal indication for approximately ten seconds before reaching the stop line, consideration may be given to the use of a supplementary signal to improve this visibility.

Advance warning of a signal may be provided by the use of a W3-3 (Signal Ahead) sign. For greater emphasis flashing yellow beacons may be used in conjunction with this sign as provided in Part V, Miscellaneous Electrical Devices.

Height of Vehicular Signal Faces

The vertical clearance of overhead signals shall not be less than 15 feet or normally more than 17 feet. Where used, supplementary pedestal or pole mounted signals shall have a bottom height of not less than 8 feet nor more than 15 feet.

Maximum visibility and adequate clearance should be the guiding consideration in deciding signal height. Grades on approaching streets may be important factors, however, in determining the most appropriate height.

Transverse Location of Signal Faces

Where dual overhead signal faces are provided over the approach to a signal they should normally be centered on the approach with a minimum of 14 foot separation from each other. Transverse spacing, however, should be carefully checked by the Engineer to provide prominent and conspicuous location.

PART V. MISCELLANEOUS ELECTRICAL DEVICES

Section A. Introduction

The number of applications of electricity in the field of traffic control devices is numerous, limited only to the ingenuity of the traffic engineer. A few of these applications will be discussed in this Part of the Manual.

In addition to traffic control signals (which were discussed in Part IV.) electrical traffic control devices may be broken into the following categories:

1. Flashing Beacons.
2. Illuminated Signs.
3. Highway Lighting.
4. Lane Control Signals.

Section B. Flashing Beacons

Definition and Application

A flashing beacon is a section of a standard traffic signal head or a similar type of device, having a yellow or red lens in each face, which is illuminated by intermittent flashes.

Flashing beacons perform a useful function at locations where traffic or physical conditions do not justify conventional traffic signals. At other special points of hazard, experience has indicated that the flashing beacon is effective in calling the attention of drivers to these locations.

Warrants for Flashing Beacons at Intersections

A flashing beacon which flashes yellow for the major highway and red for the minor highway, may be installed over the point of intersection of the center lines of two highways under any one of the following warrants:

1. Where a serious concentration of accidents (four or more over a two year period) which are susceptible of correction by the cautioning or stopping of traffic exists.

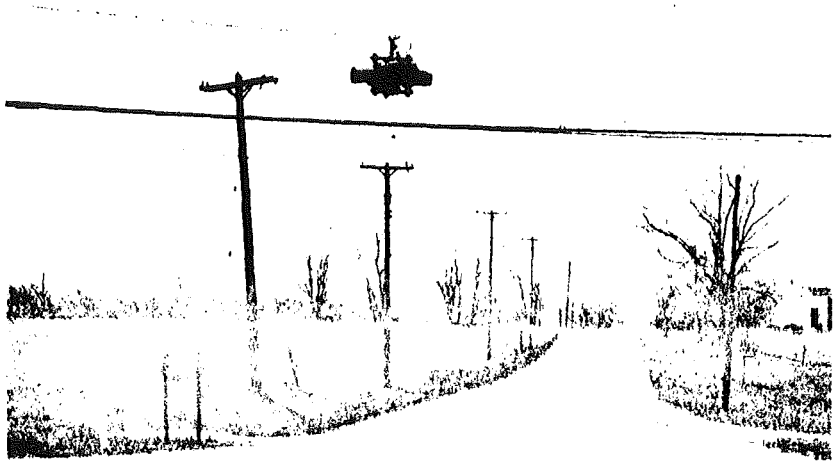


Figure 5-1. Overhead flashing beacon.

2. Where sight distance is extremely limited or where other conditions make it especially desirable to emphasize the need for stopping one street and for cautioning the other.

Since public respect of the flashing beacon depends, to some extent, on the limited, judicial use of the device, it is best to consider the installation of the flashing beacon only after lesser control devices have been tried, such as a 36 inch "STOP" sign (R1-1), a "STOP AHEAD" sign (W3-1), and a Lattice Background (W12-10).

Design

Flashing beacon units and their mountings shall follow the general design specifications for standard traffic signals, which include the following essentials:

1. Each signal unit lens shall have a visible diameter of not less than 8 inches.
2. The illuminating element, lens, reflector, and visor shall each be of such design as to render the lens, when illuminated, clearly visible to traffic facing the signal at all distances up to 1000 feet under all atmospheric conditions except dense fog.

3. The color of the lens shall be red for stop or yellow for caution, in accordance with specifications of the Michigan State Highway Department.

The flashing beacon is controlled by a flasher device which is located in a separate housing. The flasher device provides the continuous intermittent illumination of the lenses of the beacon. All flashing contacts should be equipped with filters for suppression of radio interference.

Location

The intersectional flashing beacon is installed over the intersection of the centerlines of two highways with a minimum vertical clearance of 15 feet. Normally, the clearance should not exceed 17 feet. If it is suspected that a traffic control signal may be required within the next few years the span supporting the beacon should be installed so that it is in the proper position and at the proper height to allow proper minimum clearance after the signals have been installed.

Operation

The illuminating element in a flashing yellow (caution) or flashing red (stop) beacon shall be flashed at a rate of not less than 49 nor more than 59 times per minute. The illuminated period of each flash shall be not less than half nor more than two-thirds of the total cycle. Intersection flashing beacons shall be operated continuously throughout the 24 hours of the day.

Other Application of the Flashing Beacon

Flashing beacons are effectively used in many applications. These applications include:

1. In conjunction with warning signs.
2. In conjunction with "STOP" signs.
3. In the School Speed Limit sign.
4. Route Turn Beacon.
5. Overhead Barricade Beacon.

Warning Signs

Yellow flashing beacons may be used with almost any warning sign to give additional emphasis. Either one or two beacons may

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

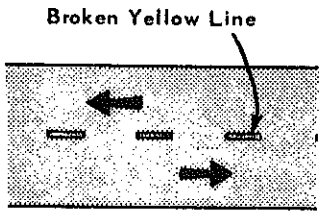
Subject: Change Memorandum No. 5

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.

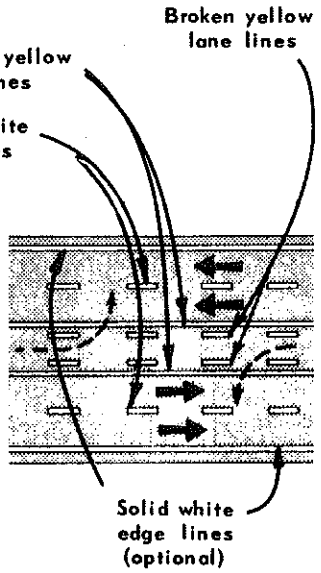
In instances where "may" is used in this memorandum, the 1971 edition of the MUTCD and forthcoming revised edition of the MMUTCD possibly will read "shall". The purpose of using "may" in this memorandum is to temporarily permit the extended use of existing sign inventories.

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 Pavement Marking, pp. 114 & 115



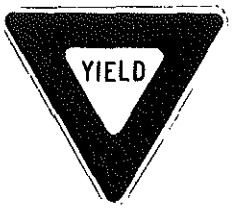
2. Beginning with the 1972 pavement-marking season, on each two-way roadway consisting of three lanes or more, where a two-way, left-turn lane is to be designated, the two-way, left-turn lane shall be marked by a single-direction, no-passing markings (4-inch solid yellow line on the outside and 4-inch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

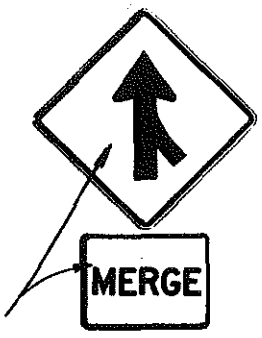


R1–2
36" x 36" x 36"

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).

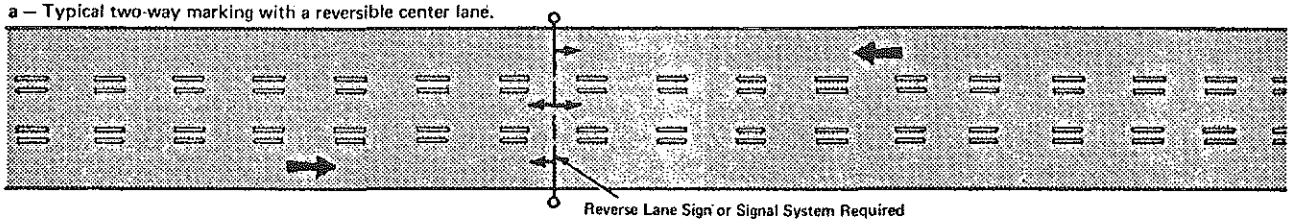
Director
Michigan Department of State Highways

Director
Michigan Department of State Police

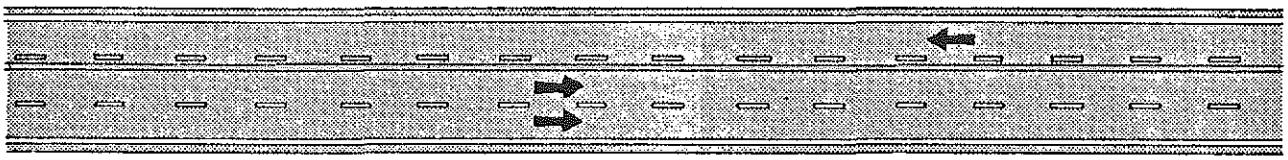
Note for Change Memorandums Only

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.

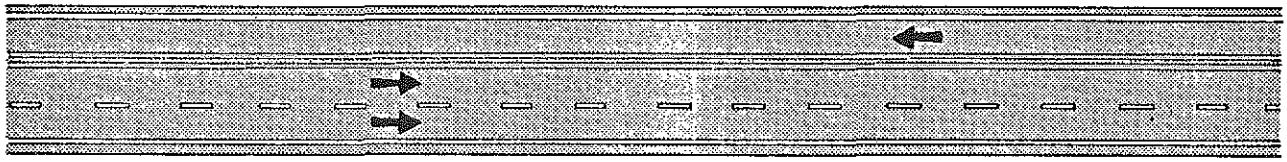
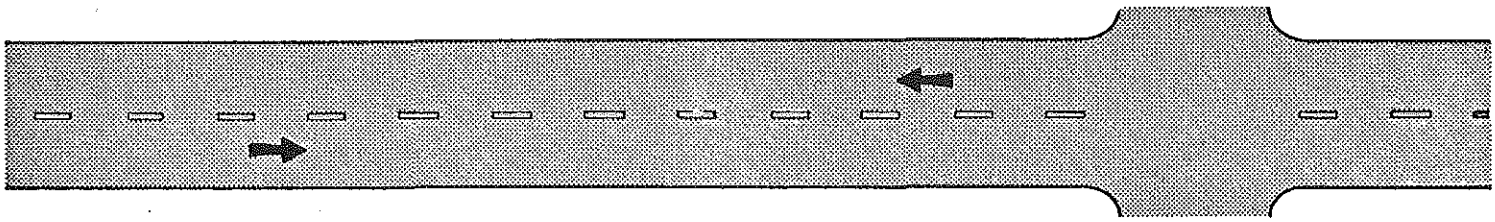


Figure 3–1. Typical two-way marking applications.

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



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

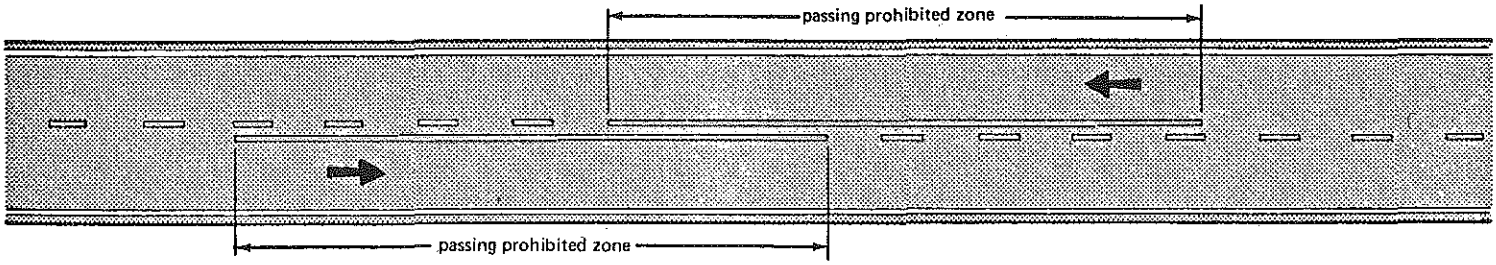
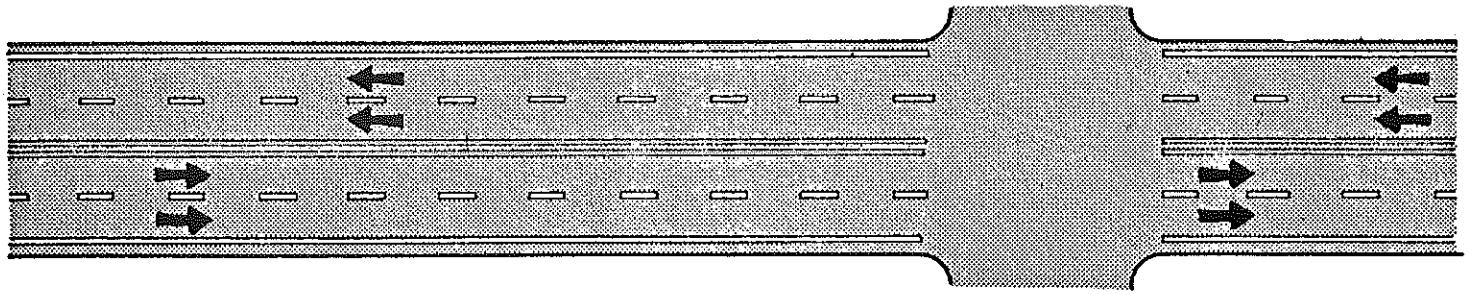


Figure 3–2. Typical 2-lane, two-way marking applications.

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



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

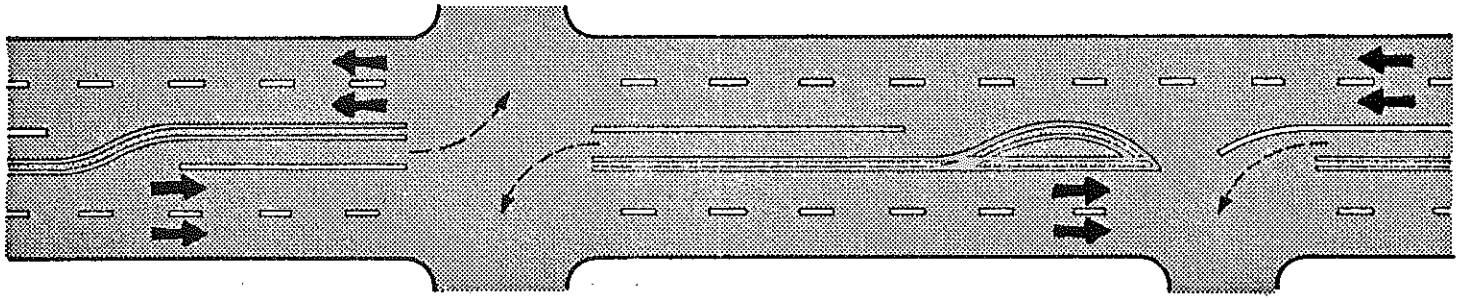
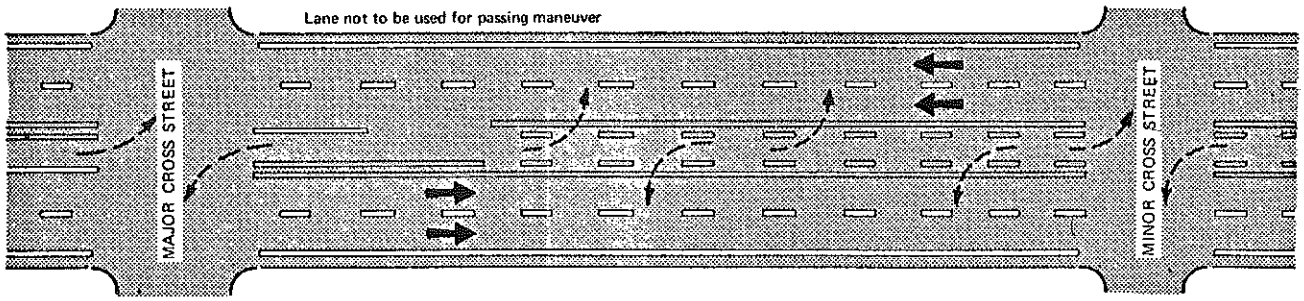


Figure 3–3. Typical multilane, two-way marking applications.

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.

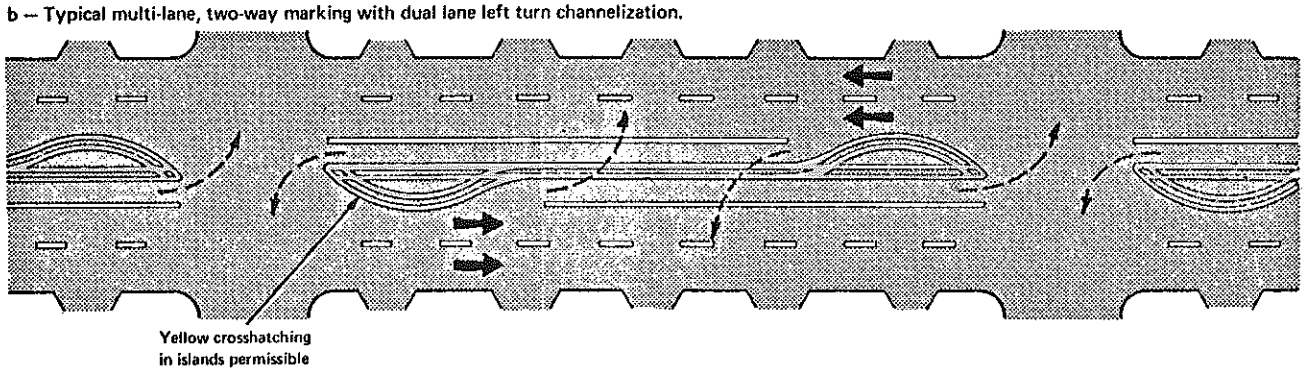


Figure 3–4. Typical multilane, two-way marking applications.