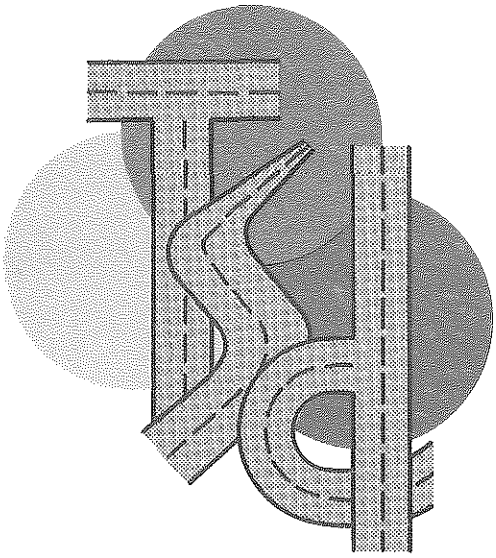
EVALUATION OF A SAFETY PROJECT

RECONSTRUCTION OF MEDIAN
CROSSOVERS

TSD-SS-152-71



TRAFFIC and SAFETY DIVISION

DEPARTMENT OF STATE HIGHWAYS
STATE OF MICHIGAN

65-7910

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EVALUATION OF A SAFETY PROJECT

RECONSTRUCTION OF MEDIAN CROSSOVERS

TSD-SS-152-71

On M-85 in the vicinity of Oak Street
in the Cities of Wyandotte and Southgate
Wayne County

MICHIGAN DEPARTMENT OF STATE HIGHWAYS

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February, 1971

Synopsis

This report is an evaluation of the reduction in the number of accidents on M-85 (Fort Street) in the Cities of Wyandotte and Southgate, Wayne County. This reduction resulted from: 1) the reconstruction of two median crossovers which included the addition of deceleration lanes; 2) removal of parking in the median; and 3) the installation of a traffic signal at Oak Street.

This safety project, while costing $47,000, contributed to a 58 percent reduction (108 to 45) in the total number of accidents in a two year "after" period. More importantly, the number of injuries decreased by 74 percent (65 to 17). The reduction, according to National Safety Council criteria, amounted to a savings of $112,000 to the motoring public in two years.

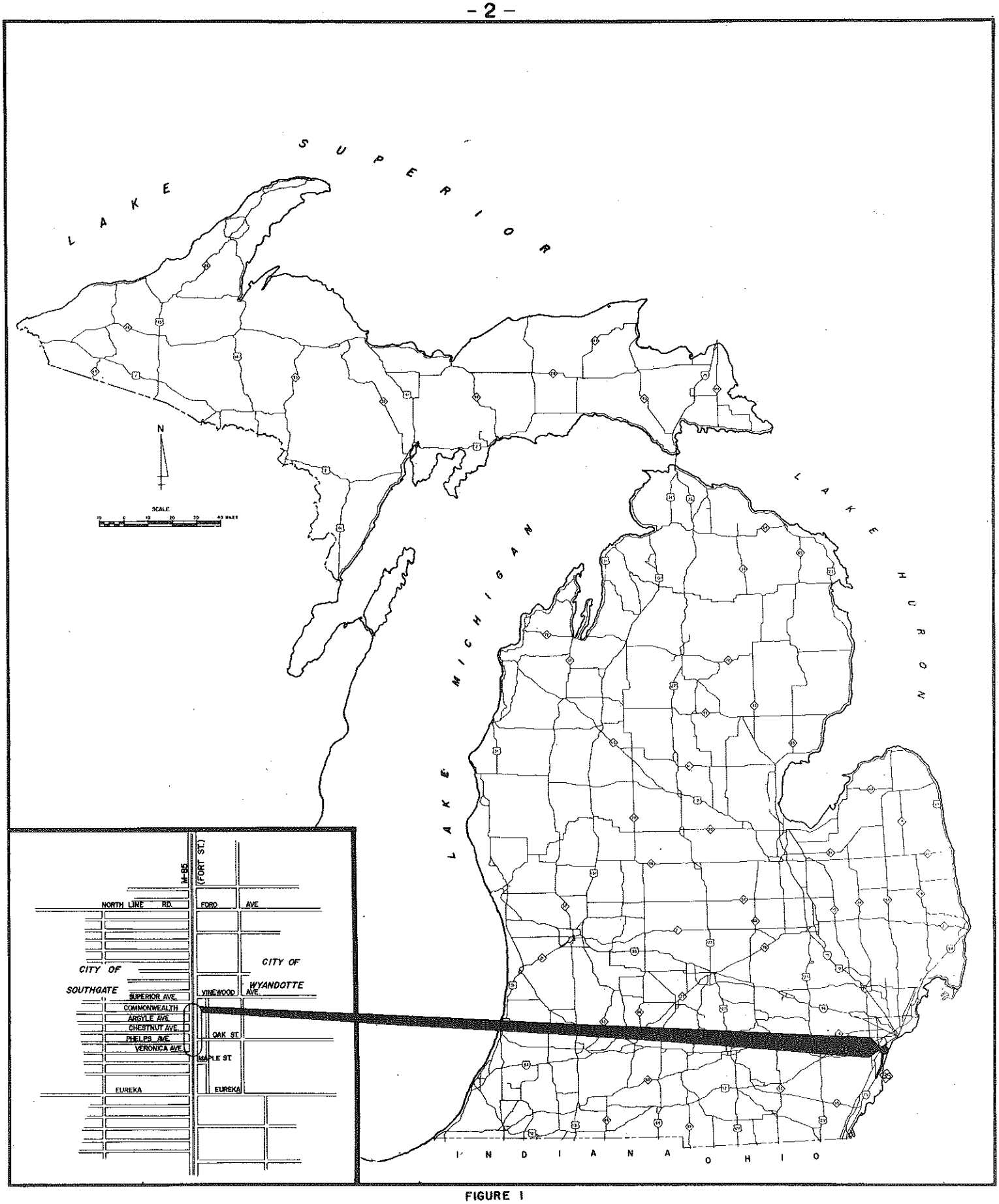

LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
N
SCALE
M-85 (FORT ST.)
NORTH LINE RD.
FORD AVE
CITY OF SOUTHGATE
CITY OF WYANDOTTE
VINEWOOD AVE.
SUPERIOR AVE.
COMMONWEALTH
ARGYLE AVE.
CHESTNUT AVE.
PHELPS AVE.
VERONICA AVE.
OAK ST.
MAPLE ST.
EUREKA
EUREKA
INDIANA
OHIO

FIGURE 1

Location

The study area includes six intersections on M-85 (Fort Street) between Veronica and Commonwealth Streets. From its beginning at the I-75 freeway, M-85 runs northerly through several communities, forms a boundary between the cities of Wyandotte and Southgate and terminates in the City of Detroit (see Figure #1). Oak Street is a major east-west street with heavy commercial development in the City of Wyandotte. Veronica, Phelps, Chestnut, Argyle and Commonwealth Streets are east-west residential streets in the City of Southgate.

M-85 has three through lanes per direction, separated by a median 85 feet wide. Parking in this area is permitted on the right side of the northbound roadway. An aerial photograph (see Figure #2) of the study location before the improvement shows parking conditions and commercial development.

Problem

During a two year period (May 18, 1965 to May 17, 1967) prior to improvements, 108 accidents occurred in the study area. Thirty-six were of the injury type resulting in 65 persons being injured (see accident record table). The majority of these accidents occurred at Oak Street. Further, 30 percent (33 of 108) of the total accidents occurred during a turning maneuver. These 33 turning accidents consisted of the following types: 9 rear-ends, 16 left turns, 2 sideswipes and 6 turning from the wrong lane.

Figure #2

Site Location before the Improvements

Looking North

The right angle type of accident was also prevalent, amounting to 24 percent of the total (26 of 108). Of the 26 right angle accidents, 23 occurred at Oak Street.

The following are the traffic volumes on M-85:

Year	Average Daily Traffic		
	1400 ft. south of Oak St.	3500 ft. north of Oak St.	Average
1966	50,000	48,000	49,000
1967	43,000	45,000	44,000
1968	36,500	42,000	39,250
1969	40,500	46,700	43,600

Improvement

The improvements made between May 18 and December 1, 1967, involved:

1. The construction of directional median cross-overs with deceleration lanes on M-85 at Oak and Phelps Streets and at Argyle Street.
2. The removal of median parking.
3. The addition of a stop-and-go signal and an illuminated case sign on northbound M-85 at Oak Street. This installation was completed just before starting the construction project (see Figure 3).

The cost of the construction project, the installation of the traffic signal and placement of new signing totaled approximately $47,000.

Figures #3 and #4 are "before" and "after" photographs at Oak Street.

FIGURE #3
M-85 (Fort St.) @ Oak St. looking north before the construction improvement.

FIGURE #4
M-85 @ Oak Street looking north after the improvements.

ACCIDENT RECORD TABLE

	Before May 18, 1965 to May 17, 1967	After Dec. 2, 1967 to Dec. 1, 1969
TOTAL ACCIDENTS	108	45
Property Damage	72	34
Injury	36(65)	11(17)
TYPES OF ACCIDENTS		
Rear end	31*	16*
Right angle	26**	5**
Left turn	16	9
Lost Control	14	0
Sideswipe	12	10
Others	9	5

During the fall of 1969, a bituminous wearing surface was applied on the southbound M-85 roadway and it was found that two accidents occurred on the northbound roadway during this time. These two accidents are charged to the "after" period.

Results

Before the improvements there were four predominant types of accidents (see accident record table) occurring in this area:

() Number of persons injured.

* 9 of 31 and 1 of 16 occurred during the turning operation.

** 23 of 26 and 2 of 5 occurred at Oak Street.

1&2. Rear-end and Lost Control Accidents

Sudden traffic stream interruptions were created by: 1) motorists who were either trying to turn onto or off M-85, 2) motorists trying to cross M-85, and 3) motorists backed up in the through lanes. As a result of these interruptions, there were 31 rear-end and 14 lost control accidents during the "before" period as compared to only 16 rear-end and no lost control accidents in the "after" period.

3. Left Turn Accidents

Heavy left turn volumes during the "before" period resulted in 16 left turn accidents. Construction of directional median openings and removal of median parking relieved this condition, resulting in a 44 percent reduction in left turn accidents (16 to 9).

4. Right Angle Accidents

Due to a short gap availability in the northbound M-85 traffic stream, 23 right angle accidents occurred at Oak Street during the "before" period. The signal installation improved this situation considerably as there were only two right angle accidents during the "after" period.

As a result of all the improvements, the total number of accidents decreased by 58 percent (108 to 45) and the number of injuries decreased by 74 percent (65 to 17). Figure 5 is the collision diagram of the "before" period and also shows the roadway layout before the improvements. Figure 6 is the collision diagram for the "after" period and the layout of the roadway after the improvements.

Conclusions

The three traffic safety improvements (the reconstruction of median crossovers, the removal of median parking and the traffic signal installation) effected an exceptionally significant reduction in the number of accidents and related injuries (see Appendix A).

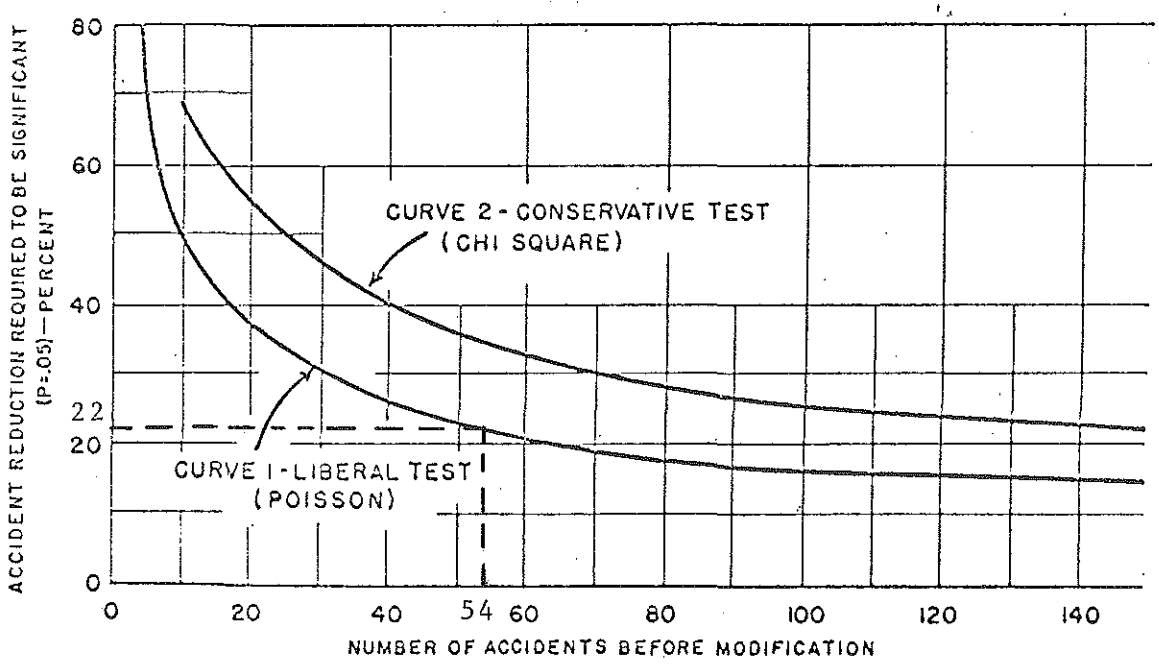
In addition to the safety improvements, the median parking removal permitted landscaping of the median to enhance the area aesthetically.

The computed benefit for the two years after the completion of this project as determined by a National Safety Council criteria is $112,000 (see Appendix B). Comparing this benefit with the improvement costs of $47,000, reveals that the motoring public was repaid in less than one year.

APPENDIX A

The Significance of the Accident Reduction

The graph below appeared in an article entitled, "Two Simple Techniques for Determining the Significance of Accident Reduction Measures" by Richard H. Michaels in the September, 1966, issue of Traffic Engineering magazine.



Curves for determining the statistical significance of accident-reducing techniques.

Curve 1 is the liberal curve and may be used where more than minimum accident records are available such as two years before and two years after, as in this case. Curve 2 should be used where data may only be available one year before and one year after.

During the two year period (May 26, 1965 to May 25, 1967) before the improvements, an average of 54 accidents per year occurred at the subject area. Using Curve 1, the percentage of reduction required to be significant is 22%. There was a 58% reduction in accidents at the subject location studied in this report.

Therefore, the accident reduction at this location after the improvement is statistically significant.

APPENDIX "B"

Computed Benefits Derived Through Accident Reduction Cost Analysis

The method of evaluation accident costs, used below, is given on page 67 of Roy Jorgensen's report of Highway Safety Improvement Criteria, 1966 edition. This same method is given in the Federal Highway Administration PP21-16 (March 7, 1969).

In the following analysis the costs provided by the National Safety Council are:

	Y E A R		
	1968	1969	Avg.
Death -	$38,700	$41,700	$40,200
Non-fatal Injury -	2,300	2,500	2,400
Property Damage Accident -	360	380	370

$$B = \frac{ADT_a}{ADT_b} \times (2{,}400 \times R_1^* + 370\ R_2^*)$$

where

B = benefit in dollars

ADT_a = average traffic volume after the improvement (41,450)**

ADT_b = average traffic volume before the improvement (47,600)**

R_1 = reduction in injuries (65-17) = 48

R_2 = reduction in property damage accidents (72-34) = 38

The computed benefits to the motoring public accrued during the "after" period is then:

$$B = \frac{41{,}450}{47{,}600} \times (2{,}400 \times 48 + 370 \times 38)$$

$$= \$112{,}000$$

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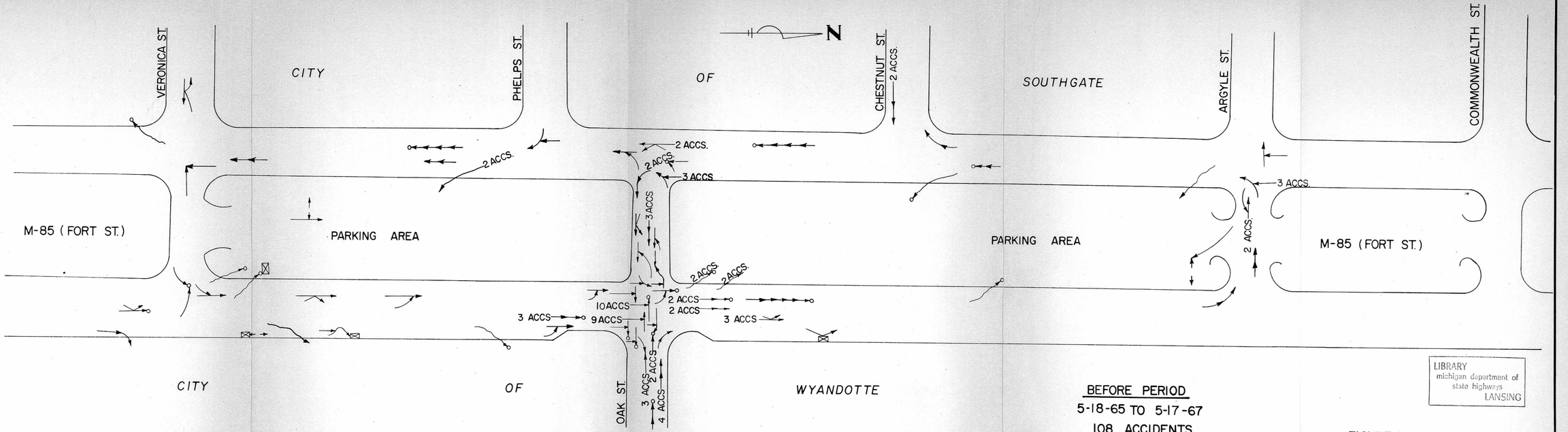
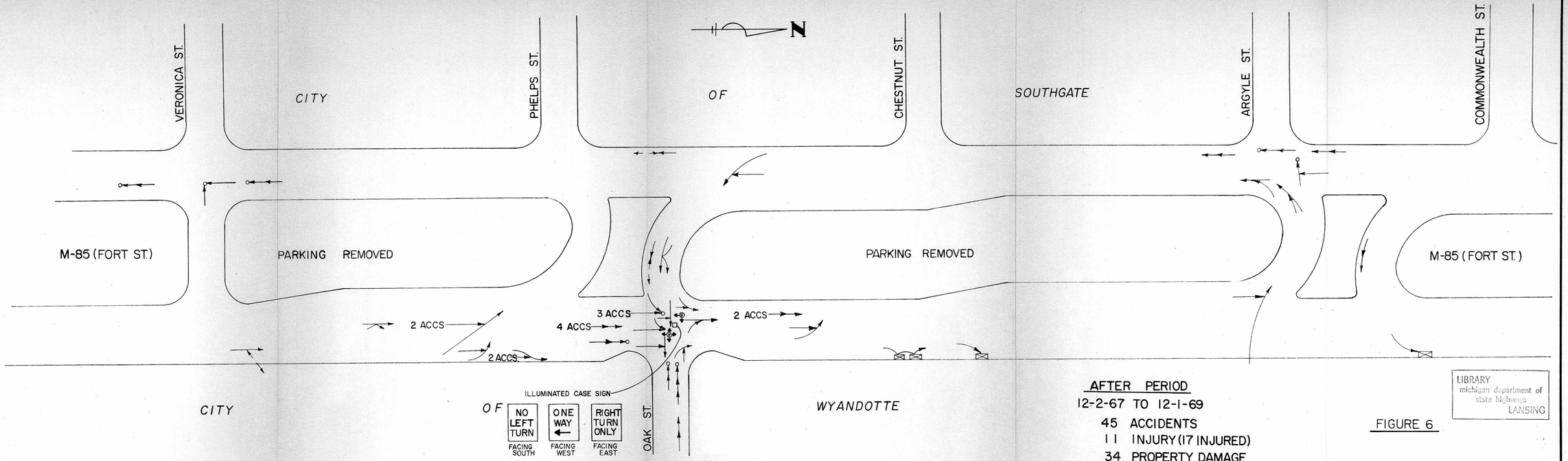
*In the above noted reference, R_1 is listed as $A_{fi} \times P_{fi}$. It is evident upon inspection that $P_{fi} = \frac{R_1}{A_{fi}}$ (see definition above) so that $A_{fi} \times P_{fi} = A_{fi} \times \frac{R_1}{A_{fi}} = R_1$. Similarly R_2 replaces $A_{pd} \times P_{pd}$.

**ADT_a and ADT_b have been computed as average figures covering the entire project for the study period.



BEFORE PERIOD
5-18-65 TO 5-17-67
108 ACCIDENTS
36 INJURY (65 INJURED)
72 PROPERTY DAMAGE

FIGURE 5



AFTER PERIOD
12-2-67 TO 12-1-69
45 ACCIDENTS
11 INJURY (17 INJURED)
34 PROPERTY DAMAGE

FIGURE 6