65-6025

EVALUATION OF A SAFETY PROJECT

M-17 (Ecorse Road) in the vicinity of Pelham Road

CITY OF ALLEN PARK & TAYLOR TOWNSHIP
WAYNE COUNTY

State of Michigan - DEPARTMENT OF STATE HIGHWAYS
TRAFFIC AND SAFETY DIVISION

65-6025

An Evaluation of a Safety Project

Intersection of M-17 (Ecorse Road) at Pelham Road
City of Allen Park, Wayne County

Widening of M-17 from Four to Five Lanes to Provide a Center Lane for Left Turns

Project Mob 82041-013
(Inventory of Highway Safety Improvement Projects Item #128)

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ACKNOWLEDGEMENTS

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SYNOPSIS

This report contains the evaluation of a four lane, two-way section of a trunkline (M-17) which was widened from four to five lanes.

The improvement (widening) extended for a distance of approximately 900 feet (including 225 foot tapers) on each side of Pelham, an intersecting local road. The center lane on M-17 was utilized for left turns, with the other lanes being utilized as through lanes. Geometrics on Pelham, a five lane roadway, were not revised.

The study revealed that there was a substantial reduction of accidents, particularly those involving left turning vehicles, in the one year "after" period.

The annual benefit for the first year after the improvement was $51,822, while the total cost of the project was $77,000.

Widening of M-17 from Four to Five Lanes to Provide a Center Lane for Left Turns

This report is an evaluation of a safety project involving the intersection at M-17 (Ecorse Road) and Pelham Road on the west city limits of Allen Park (See Figure #1). The evaluation reveals that there was a 40.5% reduction in the number of accidents (79 to 47) for a period of one year "before" and one year "after" the improvement. This accident reduction is attributed primarily to the changes of geometrics of the intersection, which permitted vehicles to make left turns more safely than before. The resurfacing of the roadways was also a factor.

Allen Park, a suburb of the City of Detroit, has had a 200% population growth between 1950 and 1960. The city's 42,000 residents are largely employed in the industrial complex of the Detroit metropolitan area. Other cities of comparable size surrounding Allen Park are Melvindale, Dearborn, Dearborn Heights, Southgate and Lincoln Park.

M-17 (Ecorse Road) is an east-west road that runs from Ann Arbor in Washtenaw County easterly through Ypsilanti and ends in Allen Park at M-39 (Southfield Road). Pelham Road is a north-south street that starts at Allen Road, in the south side of Allen Park, and runs northward along the west city limits. It continues north through Dearborn Heights and ends in Dearborn at Rotunda Drive.

M-17 is "commercial" both east and west of Pelham Road. The commercial establishments are mostly individual businesses that serve the surrounding residential areas. In contrast, Pelham Road is primarily residential except for a few businesses within the first block south of the intersection. The area surrounding the intersection is composed of individual residences except for one small apartment development one-half mile to the north.

The speed limit along M-17 is 40 MPH and along Pelham Road it is 35 MPH. Parking is not allowed on M-17 or adjacent to the edge of pavement, but parking is allowed beyond a distance of about 10 feet from the edge of pavement. Parking is prohibited on Pelham Road without exceptions.

M-17 was a four lane road at the intersection. The section of roadway, where the improvement was made, extended approximately 900 feet on both sides of the intersection and had 79 accidents during the one year period "before" the improvement. One of the accidents was fatal, while 36 were injury accidents with a total of 49 injuries.

Twenty-eight of the 79 accidents involved vehicles executing a left turn from M-17. These 28 accidents account for more than 35% of the total number of accidents occurring on this section of roadway. Twenty of these were at the Pelham Road intersection and the remaining 8 were at other intersecting roads and drives.

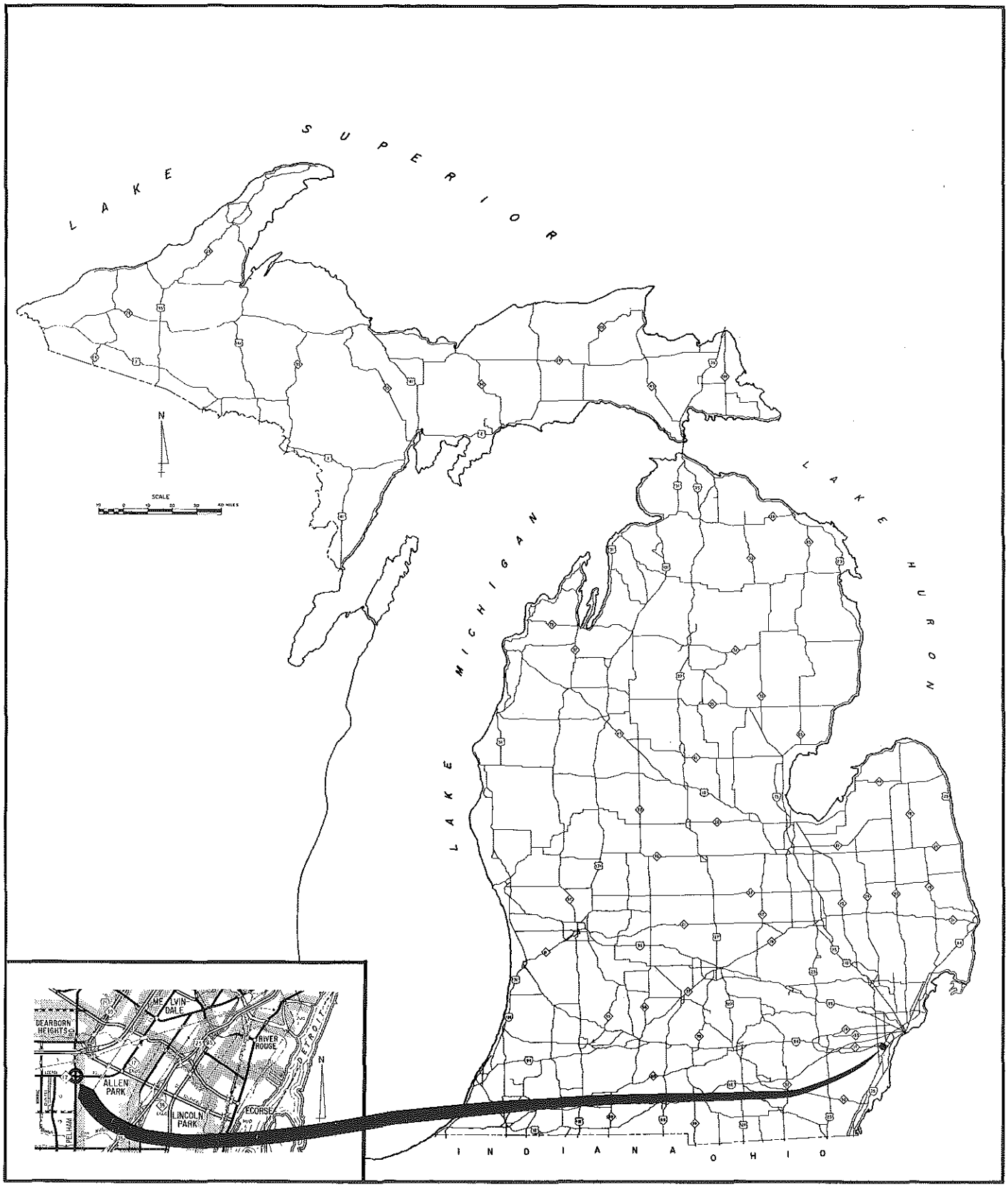

LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
N
SCALE
INDIANA
OHIO
DEARBORN HEIGHTS
MELVINDALE
RIVER ROUGE
DETROIT
ALLEN PARK
LINCOLN PARK
ECORSE
N

FIGURE 1

Since the major pattern of accidents involved vehicles executing left turns from M-17, a method for executing left turns more safely had to be provided. The method selected was to widen the pavement to five lanes with the center lane for left turning vehicles before completing the turn and while waiting for opposing traffic to clear. This was accomplished by widening the four lane pavement to 60 feet wide. (See Figure #5). Also, during reconstruction, curbs were added along M-17 to control the points of ingress and egress to abutting properties. Operationally the center lane provided the driver with a better view of oncoming traffic and also a place for storage which would not hinder through traffic flow in either direction. Pelham Road also has five lanes with the center lane for left turns at the M-17 intersection.

On July 12, 1968, a field observation was made at this intersection from 12 noon to 5:15 p.m. Traffic on M-17 including the center lane flowed smoothly at all times. The left turn lane on Pelham Road, however, "backed-up" intermittently during rush hour. When this "back-up" occurred, vehicles would complete their left turns when the signal turned red. Other than the left turn lane congestion however, Pelham Road traffic flowed smoothly.

The number of accidents involving left turning vehicles dropped from 28 in the year before the improvement to 12 in the year after the improvement....a reduction of 57.2%. In addition, the rear-end accidents were reduced by 58.3% (12 to 5). Not all of the reduction in rear-end accidents can be attributed to the added lane. Part of the rear-end reduction should be attributed to the new pavement. The Michigan Department of State Highways has through its testing and research program found that in most cases a new pavement is more skid resistant than an older worn pavement. Another indication of a pavement's lack of skid resistance is the percentage of accidents that occur when the pavement is wet. Before the improvement on M-17, 48% of the accidents occurred on wet pavement while only 29.8% occurred on wet pavement after the improvement. This reduction in the percentage of wet pavement accidents indicates that the new pavement improved the skid resistance at this location.

Analysis of the Accident Record Table on page 3 reveals that the greatest reductions in accidents were at the Pelham Road intersection. These reductions included left turn accidents which were reduced by 75% and the rear-end accidents which were reduced by 58.3%. The Accident Record Table also reveals that the total number of trunkline accidents were reduced from 65 to 37, a 43.1% reduction. This is a reduction of 28 accidents of which 21 were rear-end and left turn accidents at Pelham Road.

The benefits received by the public in terms of dollars are hard to define. However, a method used in the Bureau of Public Roads publication IM-21-3-67 is acceptable. Only those accidents that occurred on M-17 will be used in this analysis. Also the method utilizes the costs of accidents as provided by the National Safety Council which are as follows:

FIGURE #2

M-17 (Ecorse Road) looking east from Pelham Road before the improvement.

FIGURE #3

M-17 (Ecorse Road) looking west at Pelham Road before the improvement.

FIGURE #4

M-17 (Ecorse Road) looking east at Pelham Road after the improvement.

FIGURE #5

M-17 (Ecorse Road) looking west at Pelham Road after the improvement.

ACCIDENT RECORD TABLE

	Before 8-23-65 to 8-22-66	After 11-30-66 to 11-29-67
Total Accidents	81	50
Fatal Accidents	1(1)*	1(1)*
Injury Accidents	36(49)**	11(24)**
Accidents on M-17	65	37
Fatal Accidents	1(1)*	1(1)*
Injury Accidents	33(44)**	9(20)**
Property Damage	31	27
Left Turn		
At Pelham	20	5
Other Streets	5	5
Mid-block	3	2
Right Angle		
At Pelham	7	6
At Side Streets	3	3
Rear-end on M-17	12	5
Sideswipe on M-17	4	5
Out-of-control on M-17	4	3
Pedestrian on M-17	0	2
Miscellaneous on M-17	7	1
Sub-total	65	37
Side Street Accidents	14	10
TOTAL	79	47

*Number of persons killed.
**Number of persons injured.

Death - $34,400

Non-fatal Injury - $1,800

Property Damage Accident - $310

The estimated traffic volumes (required in the analysis) for the period of time covered by this report at the intersection for the years 1965, '66, and '67 are 40,000, 43,500, and 43,250 vehicles per day, respectively.

The formula used in the analysis is:

$$B = \frac{ADT_a}{ADT_b} (Q) (A_{fi}) (P_{fi}) + 310 (A_{pd}) (P_{pd})$$

where

B = annual benefit in dollars

ADT_a = average traffic volume after the improvement (43,250)

ADT_b = average traffic volume before the improvement (41,750)

A_{fi} = annual average number of fatalities and injuries combined at the location the year before (45)

P_{fi} = percentage reduction in fatalities and injuries $\frac{45-21}{45} \times 100 = 53.4\%$

A_{pd} = property damage accidents in the year before (31)

P_{pd} = percentage reduction in property damage accidents $\frac{31-27}{31} \times 100 = 12.9\%$

and

$$Q = \frac{34,400 + (I/F)\ (1800)}{1+I/F}$$

where

I/F = ratio of injuries to fatalities that occurred statewide during 1966 in cities with a population of over 25,000

$$I/F = \frac{82,922}{583} = 142$$

Therefore,

$$Q = \frac{34,400 + (142 \times 1800)}{1+142} = 2,030$$

The computed annual benefit is:

$$B = \frac{43,250}{41,750} \quad 2,030\ (45)\ (.534) + 310\ (31)\ (.129)$$

$$= 1.036 \quad 48,781 + 1240$$

$$= 1.036 \quad 50,021$$

$$B = \$51,822$$

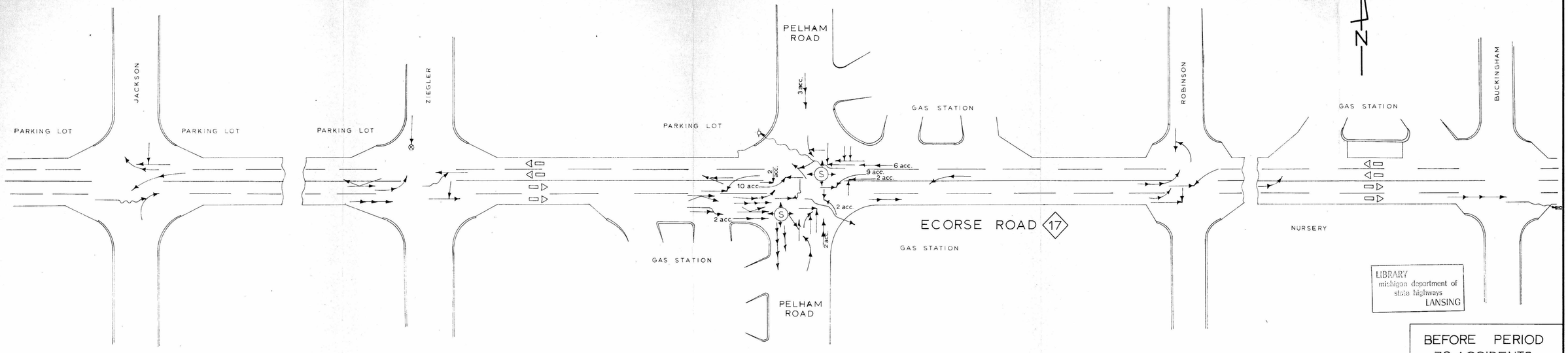
The annual benefit "B" is $51,822.

Conclusion

The cost of the widening project was approximately $66,000 plus 15% for engineering and contingencies for a total cost of approximately $77,000. The City of Allen Park furnished 17½% of the funds and the Michigan Department of State Highways furnished the remainder.

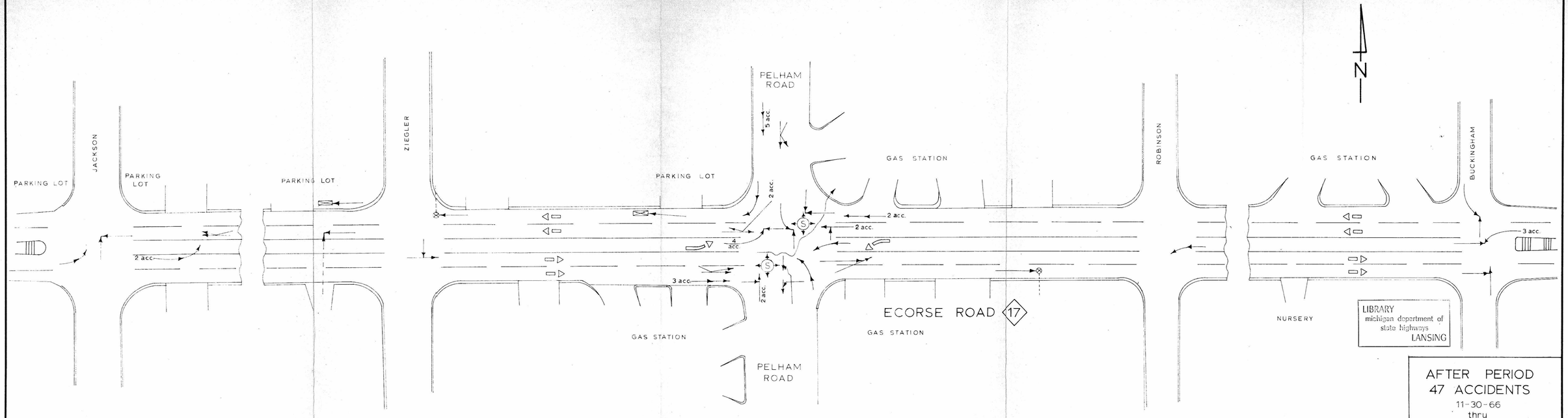
When the total cost of the project ($77,000) is compared to the annual benefit due to the accident reduction ($51,822) it reveals that this improvement should pay for itself in less than two years.

The study revealed that the addition of the center lane for left turns was very effective in reducing the left turn and rear-end accidents at the intersecting roadway.



BEFORE PERIOD
79 ACCIDENTS
8-23-65
thru
8-22-66

FORM 1595-D (REV. 6-65)



AFTER PERIOD
47 ACCIDENTS
11-30-66
thru
11-29-67