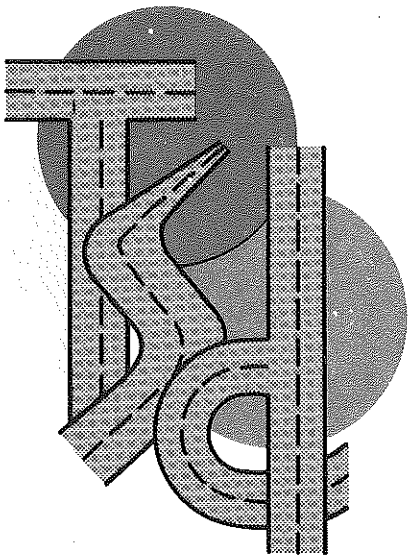
Report TSD 500-82
Project Evaluation of Community Assistance



TRAFFIC and SAFETY DIVISION

MICHIGAN DEPARTMENT OF TRANSPORTATION

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OF
TRANSPORTATION

Report TSD 500-82
Project Evaluation of Community Assistance

Prepared by
Ursel L. Savage
Traffic and Safety Division
Safety Programs Unit
Community Assistance Subunit

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Michigan Department of Transportation

G. J. McCarthy	Deputy Director - Highways
M. E. Witteveen	Engineer of Traffic and Safety
R. L. Blost	Supervising Engineer

Special recognition goes out to Community Assistance staffers Ken Slee, Fuad Kassouf and Al Dewey.

Michigan Office of Highway Safety Planning

Philip Haseltine

FHWA Project MCD-76-001D

Prepared By

Traffic Engineering Services
Traffic and Safety Division
Michigan Department of Transportation

in cooperation with
The Michigan Office of Highway Safety Planning
and
The United States Department of Transportation
Federal Highway Administration

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INTRODUCTION

This report is the fifth Implementation Progress report issued by the Traffic Engineering Services Unit. The study involves a "before" and "after" analysis of 20 projects. Four of the sites (pages 5,8,9, 11) were evaluated in previous reports. As shown in Table I (p. 43), the 20 projects evaluated experienced an accident reduction from 1,094 in the "before" periods to 754 in the "after" periods.

The projects resulted in an overall accident cost savings of $794,190/year. With a total project costs of $3,990,996 the time of return is 5.02 years using 1979-80 National Safety Council accident costs.

Statistical significance was tested where possible using the Poisson curve shown on page 44 of this report.

COMMUNITY ASSISTANCE

The Community Assistance program is funded by a federal grant pursuant to the Highway Safety Act of 1966. The purpose of the act is "to assure the full and proper application of modern traffic engineering principles and uniform standards for traffic control to reduce the likelihood and severity of traffic accidents."

The specific purpose of the Community Assistance program is to provide traffic engineering services to communities throughout the state that lack the resources and expertise necessary to conduct traffic engineering studies themselves. Such services include identifying and analyzing problem accident locations, then recommending operational or geometric improvements that will reduce the number and severity of the accidents.

To obtain these services, a local community submits an explanation of the problem and description of the location at which services are needed to the Safety Programs Unit, Traffic and Safety Division, the Michigan Department of Transportation. The unit then evaluates the location and recommends a solution to the problem. In addition, it identifies potential sources of funding and provides information to aid the community in applying for federal funds. It then conducts "before" and "after" studies for locations at which its recommendations have been implemented.

Stadium Boulevard at Liberty Street
City of Ann Arbor
Washtenaw County

Geometric and Operational Characteristics

The intersection of Stadium Boulevard and Liberty Street is located in the Central Business District (CBD) of the city of Ann Arbor and has an intersectional ADT (Average Daily Traffic) of approximately 25,000 vehicles per day. Both streets are five lanes (60 feet) wide with a center lane for left-turns only. The intersection is signalized and operates 24 hour stop-and-go.

Accident Summary

A total of 41 accidents occurred at this location during the "before" period of August 3, 1978 through August 2, 1979. There were 19 injury accidents with 25 people injured. Thirty six percent (15) of the accidents occurred on wet pavement.

Project Improvement

This improvement involved the installation of a new traffic signal hardware, including controller, calling detectors, 4-way left-turn phase, and hardware for upgrading pedestrian signals. In addition, the intersection was resurfaced (treated for skid resistance). The cost of this work was $165,537.

Results

Total accidents during the "after" period of November 27, 1979 through November 26, 1980, decreased from 41 to 19, injuries from 25 to 4 and wet accidents from 15 to 6. No statistical analysis was done at this location because of the short (one year) "before" and "after" periods. The calculated annual "benefits" associated with this reduction were $136,290 enabling recovery of the initial cost of this project in one year and two months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2006(015) / 14799

CONTROL SECT. / SPOT NO. HES 81609 /

S.I.I. NO. _____

LOCATION: Stadium @ Liberty

1 Yr. Before Vs. 1 Yr. After

CITY/TWP. _____ CO. _____

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Modernize Signal & Skid Resistance Treatment

CONSTRUCTION PERIOD:

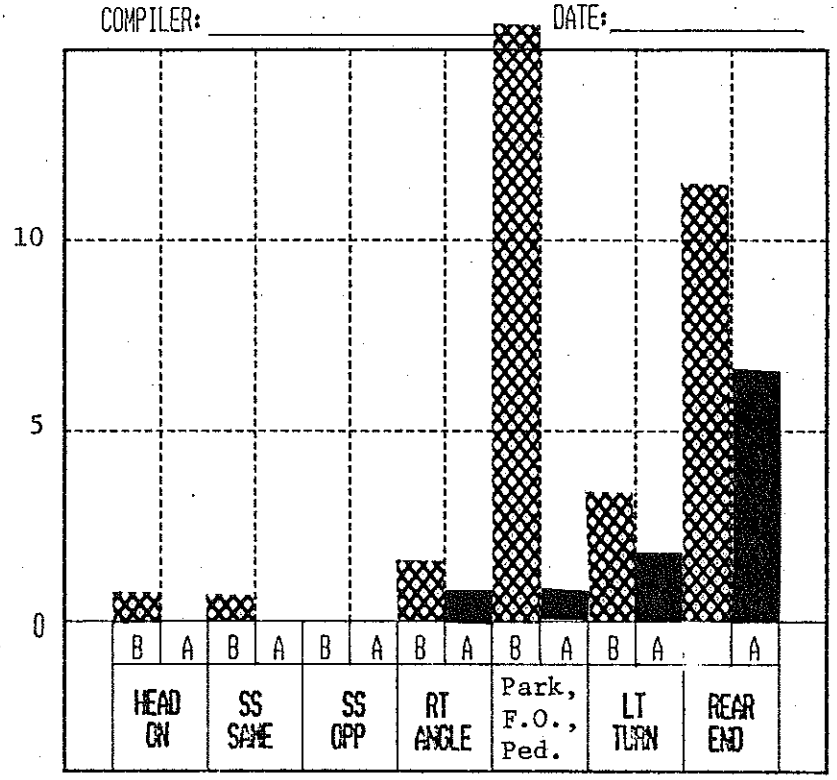
FROM 8 - 3 - 79 TO 11 - 26 - 79

BEFORE PERIOD:

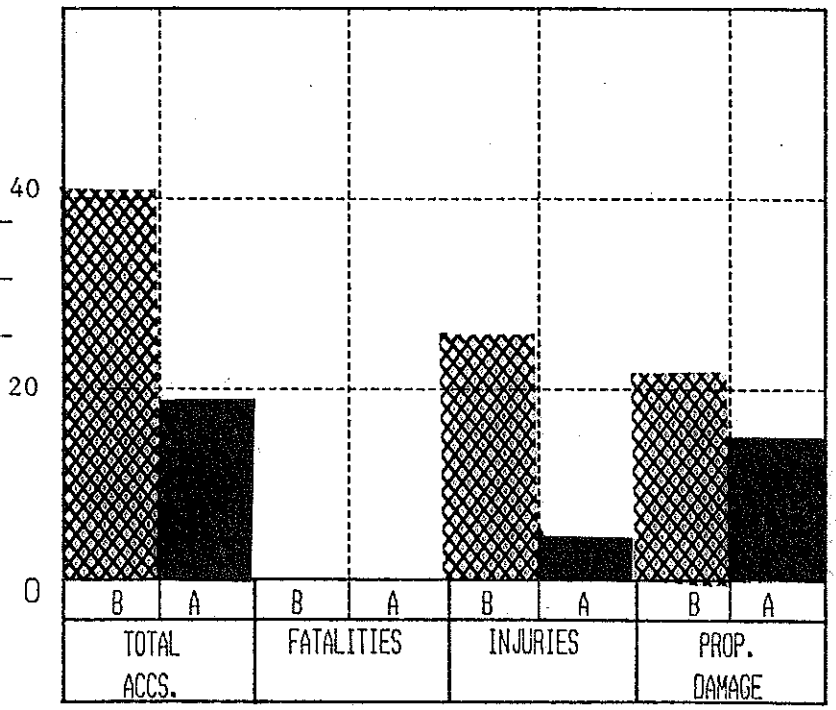
FROM 8 - 3 - 78 TO 8 - 2 - 79

AFTER PERIOD:

FROM 11 - 27 - 79 TO 11 - 26 - 80



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	19(25)	4(4)
PROP. DAMAGE	22	15



COMPUTED T.O.R. 1Yr. 3 Months

PROJECT COST	$165,537.00
BEFORE ACC. COST*	$174,140.00
AFTER ACC. COST*	$ 37,850.00
SAVINGS / Annual	$136,290.00

***BEFORE ACC. COST**

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

*** AFTER ACC. COST**

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY 160,000 INJURY 6,200. PROP. DAMAGE 870.

Southfield Road at 10 Mile Road
City of Southfield
Oakland County

Geometric and Operational Characteristics

The intersection of Southfield Road and 10 Mile Road is located on the fringe of the Central Business District of the city of Southfield and has an intersectional ADT (Average Daily Traffic) of 43,400 vehicles per day. Southfield Road in this area is a five lane (60 feet) wide roadway with a center lane for left turns. Ten Mile Road is a four lane (48 feet) roadway.

This intersection is signalized, including pedestrian signals and operates 24 hour stop-and-go.

Accident Summary

A total of 278 accidents occurred at this location during the before period of April 26, 1974 through April 25, 1977. There were 91 injury accidents with 137 people injured. The most predominant accident types were left-turns (84) and rear-ends (100).

Project Improvement

Ten Mile Road at Southfield Road has perennially been one of the highest accident locations in Oakland County. The accident problem is complicated by an average daily traffic of more than 43,000 vehicles with one out of every five vehicles that enter the intersection making a turn. Many of the turning vehicles are involved in an accident, particularly, the left turn. In an effort to improve the left turn problem an eight-phase signal was proposed.

The improvement involved the installation of new traffic signals, multi-phase controller, calling detectors, and left-turn and right-turn phases plus hardware for upgrading traffic and pedestrian signals. The cost for this work was $53,800.

Results

Total accidents in the after period December 7, 1977 through December 6, 1980 decreased from 278 to 215. This reduction (23 percent) was significant at the 95 percent confidence level using the Poisson curves. Left-turn accidents dropped 76 percent, however rear-end accidents increased 40 percent. Both changes were significant at the 95 percent confidence level. Based on this reduction the calculated annual "benefits" are $177,297 enabling the recovery of the initial cost of this project in less than four months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2059(001) / 10816

CONTROL SECT. / SPOT NO. HHS63609 /

S.I.I. NO. _____

LOCATION: Southfield at 10 Mile Rd.

CITY/TWP. Southfield CO. Oakland

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

The Installation of 8 Phase Signal

CONSTRUCTION PERIOD:
FROM 4 - 26 - 77 TO 12 - 6 - 77

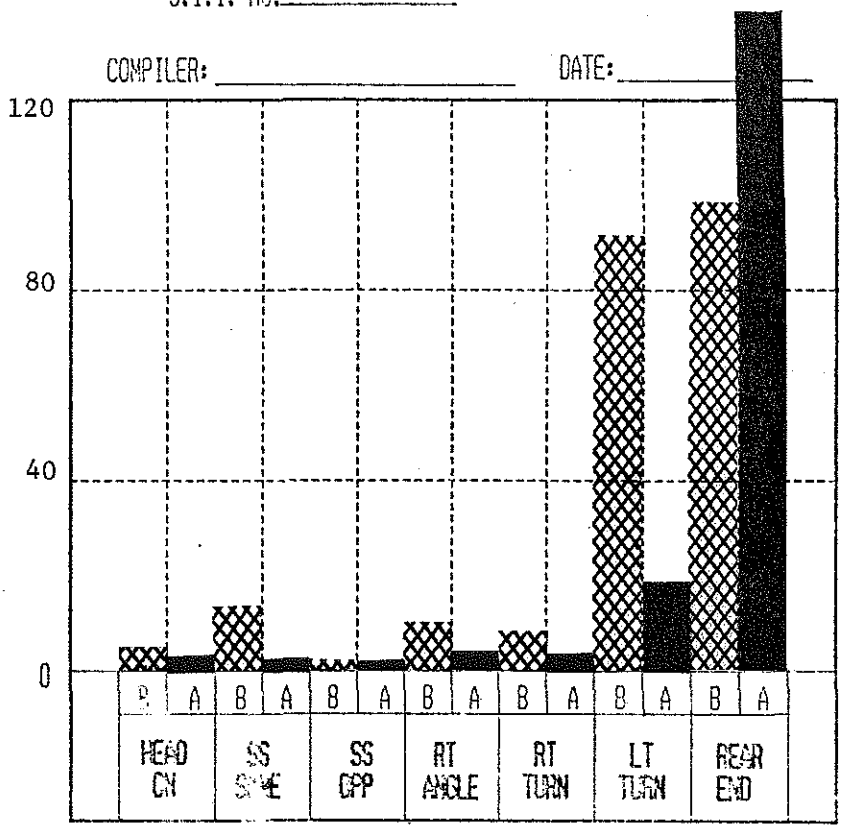
BEFORE PERIOD:
FROM 4 - 26 - 74 TO 4 - 25 - 77

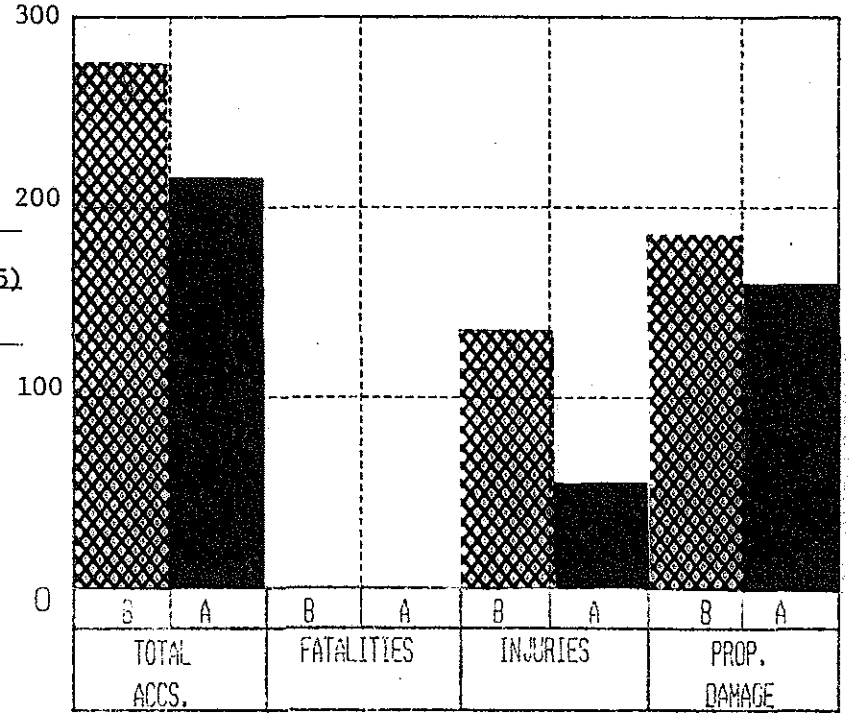
AFTER PERIOD:
FROM 12 - 7 - 77 TO 12 - 6 - 80

TOTAL ACCS.	BEFORE	AFTER
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	91(137)	55(55)
PROP. DAMAGE	187	160

COMPUTED T.O.R. 4 Months

PROJECT COST	$ 53,800.00
BEFORE ACC. COST*	$1,012,090.00
AFTER ACC. COST*	$ 480,200.00
SAVINGS / 3 Years	$ 531,890.00





*BEFORE ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY 160,000 INJURY 6,200 PROP. DAMAGE 870.

Center Road at Maple Avenue
Burton Township
Genesee County

Geometric and Operational Characteristics

The intersection of Center Road and Maple Avenue is located southwest of the city of Burton and has an intersectional ADT (Average Daily Traffic) of approximately 12,500 vehicles per day. Center Road is a two-lane (22 foot) two-way roadway. It operates under STOP sign control. The intersection is located in a semirural area with approach speeds to the intersection relatively high. The speed limit on Center Road is 55 mph northbound and southbound. The speed limit on Maple Avenue is 45 mph.

Accident Summary

A total of 23 accidents occurred at this intersection during the three year before period of 1975, 1976 and 1977. The right-angle accident was the most predominant type representing 63 percent of the total accidents and 61 percent of the injuries.

Project Improvement

As a result of the right-angle accident pattern and the increasing approach volumes to the intersection, traffic signal control and pavement widening was proposed.

The improvements at this location included specifically, installation of a traffic signal, widening of the approaches including curb and gutter, and the realignment of curves on Center Road south of the intersection. The cost of this work was $304,374.

Results

Total accidents in the after period (August 14, 1978 - August 13, 1981) decreased from 23 to 15. This reduction (35 percent) was not significant at the 95 percent confidence level using the Poisson curves. Right-angle accidents decreased from 14 to five. This change was significant at the 95 percent confidence level. The calculated annual "benefits" associated with this reduction were $16,207 enabling recovery of the initial cost of this project in 18.8 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2002(010) / 12573
CONTROL SECT. / SPOT NO. HHS25609 /
S.I.I. NO. _____

LOCATION: Maple & Center

CITY~~OR~~ Burton CO. Genesee

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widening of intersection of Center Road and Maple Ave. and realignment of curves 1000'S plus installation of a traffic signal.

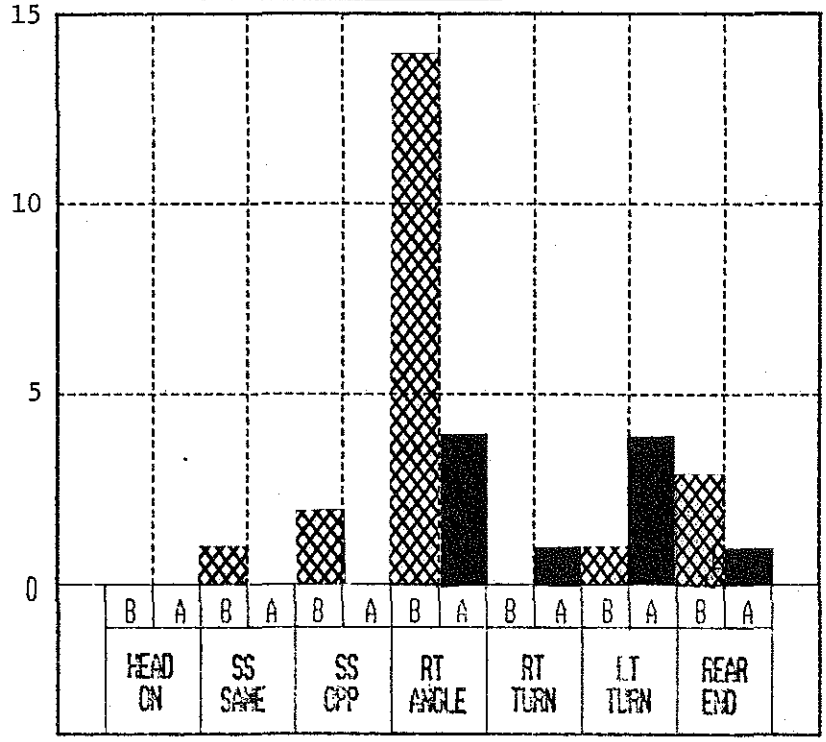
CONSTRUCTION PERIOD:
FROM 11-17 - 77 TO 8 -13 -78

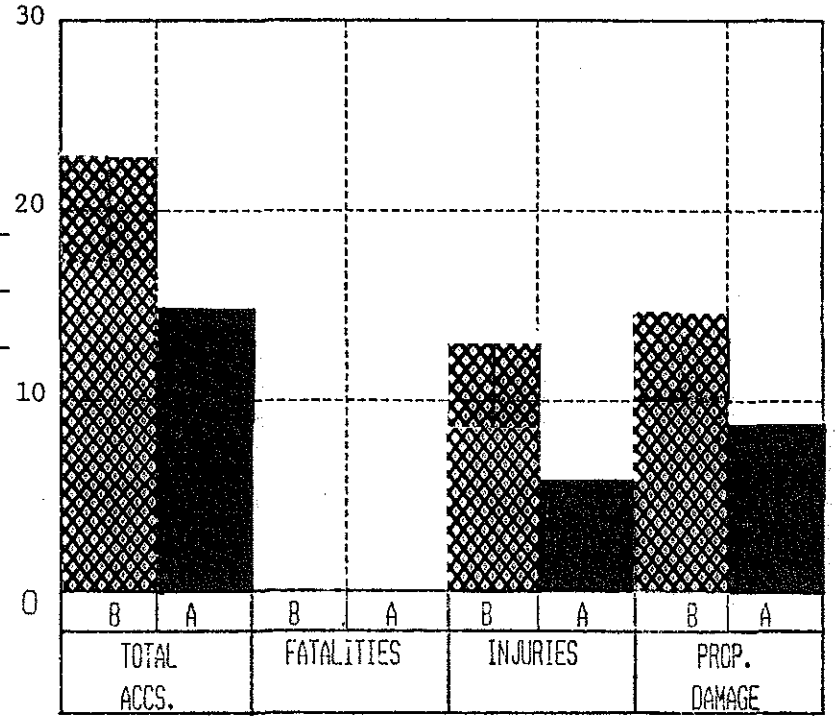
BEFORE PERIOD:
FROM 11 - 16 - 74 TO 11 - 16 77

AFTER PERIOD:
FROM 8 - 14 - 78 TO 8 - 13 - 81

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	8(13)	6(6)
PROP. DAMAGE	15	9

COMPUTED T.O.R. 18,8 Yrs.
PROJECT COST $304,374.00
BEFORE ACC. COST* $ 93,650.00
AFTER ACC. COST* $ 45,030.00
SAVINGS / 3 Years $ 48,620.00





*BEFORE ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY $160,000 INJURY $6,200 PROP. DAMAGE $870.

Napier Avenue at Union Street
Benton Township
Berrien County

Geometric and Operational Characteristics

The intersection of Napier and Union Street is located within the Benton Harbor-St. Joseph Urban Area in Benton Township. Napier Avenue was a four-lane (48 feet) wide roadway while Union Street is a three-lane (33 feet) wide roadway. This intersection operates under STOP sign control with Union Street stopping.

Accident Summary

A total of 81 accidents occurred at this location during the "before" period of May 1, 1976 through April 30, 1979. Fifteen of these were injury accidents with 19 people injured. The predominant accident types were right-angle (15), left-turn (24) and rear-end (16).

Project Improvement

A major problem at this location was that traffic volumes on Napier Avenue were so heavy, particularly during the afternoon peak, that traffic on Union Street incurred excessive delay in entering or crossing Napier Avenue. The delay tended to cause impatience on the part of drivers, consequently, they attempted to cross Napier Avenue without a proper gap causing serious right-angle accidents. As a result of this problem, traffic signal control and pavement widening was proposed.

The intersection improvement involved widening Napier Avenue from four lanes (48 feet) to five lanes (60 feet) with the center lane for left turns and installing a traffic signal. The cost of this work was $85,480.

Result

There were 81 total accidents in the three year "before" period. Total accidents in the "after" period August 1, 1979 through December 30, 1980 (one year, five months) were 24. Projecting over a three-year period total "after" accidents would number 50. No statistical tests were done to determine the significance of the change based on the projected figures. Based on the above, the calculated annual "benefits" associated with this reduction would be $13,160 enabling recovery of the initial cost of this project in six years and six months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2013(004) / 14275

CONTROL SECT. / SPOT NO. HHS 11609 /

S.I.I. NO. _____

LOCATION: Napier @ Union

CITY/TWP. Benton Twp. CO. Berrien

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widen Napier from 4 to 5 lanes
300' E & W of Union and install
~~a stop and go traffic signal~~

CONSTRUCTION PERIOD:
FROM 5 - 7 - 79 TO 7 - 12 - 79

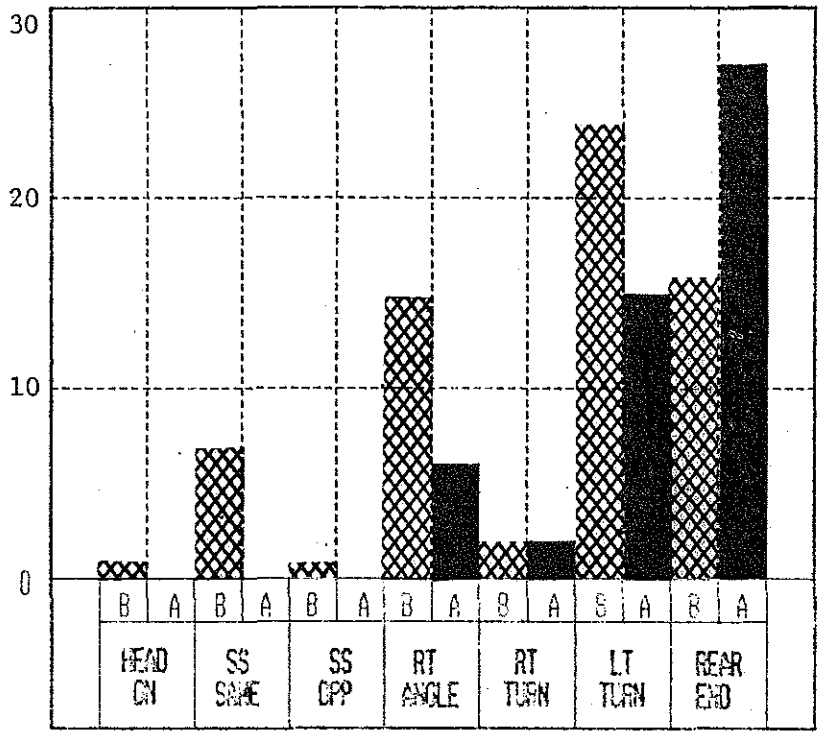
BEFORE PERIOD:
FROM 5 - 1 - 76 TO 4 - 30 - 79

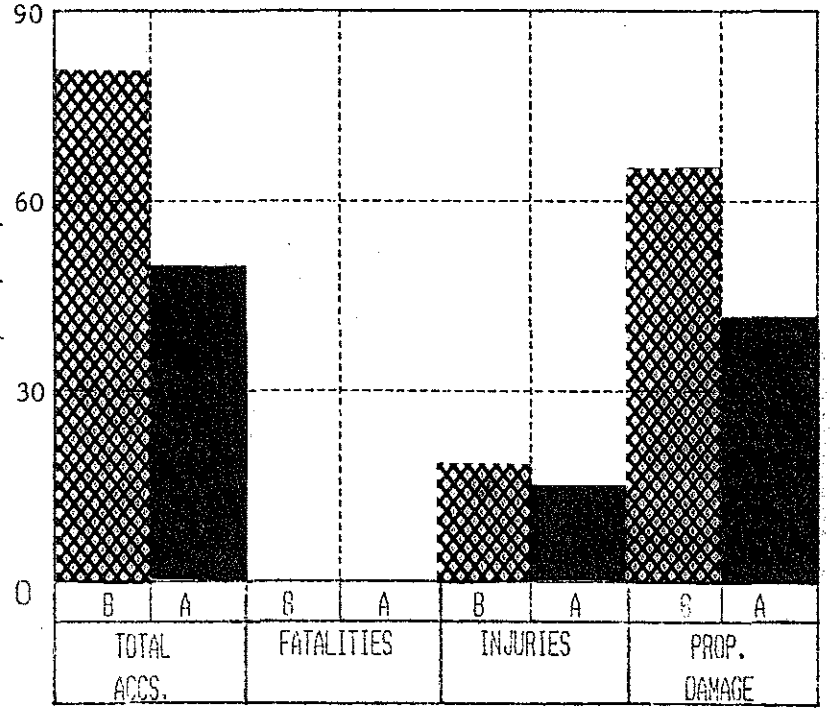
AFTER PERIOD:
FROM 8 - 1 - 79 TO 12 - 31 - 80
(projected 3 Yr.)

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	15(19)	8(16)
PROP. DAMAGE	66	42

COMPUTED T.O.R. 6 Yrs. 6 Months

PROJECT COST	$85,480.00
BEFORE ACC. COST*	$175,220.00
AFTER ACC. COST*	$135,740.00
SAVINGS / 3 Years	$ 39,480.00





*BEFORE ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY 160,000 INJURY 6,200 PROP. DAMAGE 870

PROEVLSHT C60481 61,4

Napier Avenue at Colfax Avenue
Benton Township
Berrien County

Geometric and Operational Characteristics

The intersection of Napier Avenue and Colfax Avenue is located in an outlying business district south of the city of Benton Harbor and has an intersectional ADT (Average Daily Traffic) of approximately 20,000 vehicles per day. Napier Avenue was a four-lane (44 feet) wide roadway through the intersection. Colfax Avenue was a four-lane (44 feet) roadway.

This intersection operates under traffic signal control.

Accident Summary

A total of 64 accidents occurred at this location during the "before" period of September 16, 1971 through September 15, 1974. There were 14 injury accidents with 19 people injured. The predominant accident types were rear-end (22), driveway (13), and left-turn (11).

Project Improvement

One problem at this location was congestion caused by vehicles desiring to turn at the intersection. Others were head-on, left-turn and rear-end accidents. As a result, widening of all legs of the intersection to five lanes was proposed. The cost of this work was $426,000.

Results

Total accidents in the "after" period December 7, 1974 through December 6, 1977, increased from 64 to 82. This increase (28 percent) was significant at the 95 percent confidence level using the Poisson curves.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 247(001) / 05623
CONTROL SECT. / SPOT NO. HHS 11-89 /
S.I.I. NO. _____

LOCATION: Napier at Colfax

CITY/TWP. _____ CO. Berrien

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

4 - 5 Lane Widening On All Legs

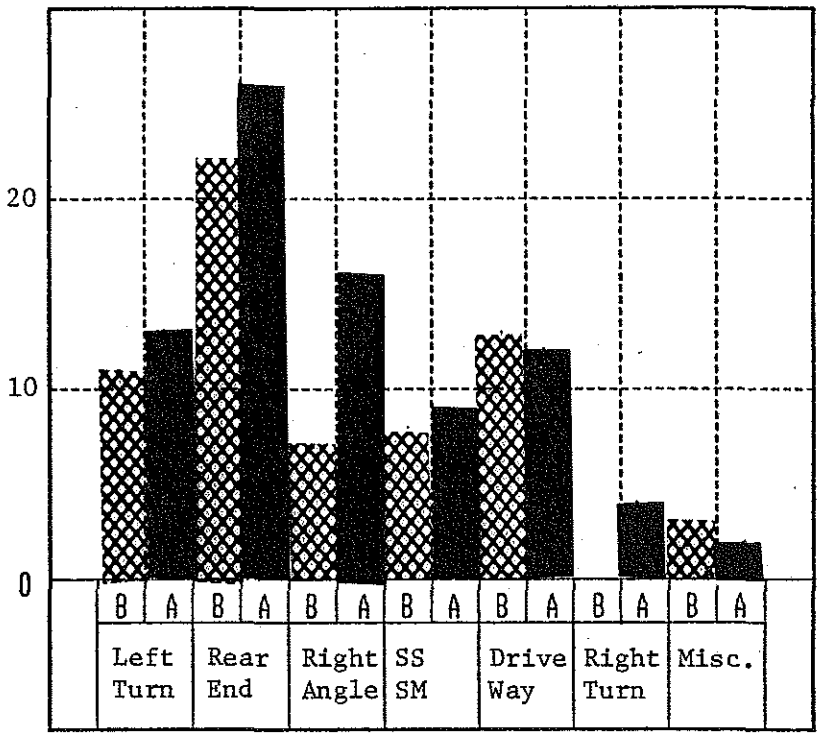
CONSTRUCTION PERIOD:
FROM 9 - 16 - 74 TO 12 - 6 - 74

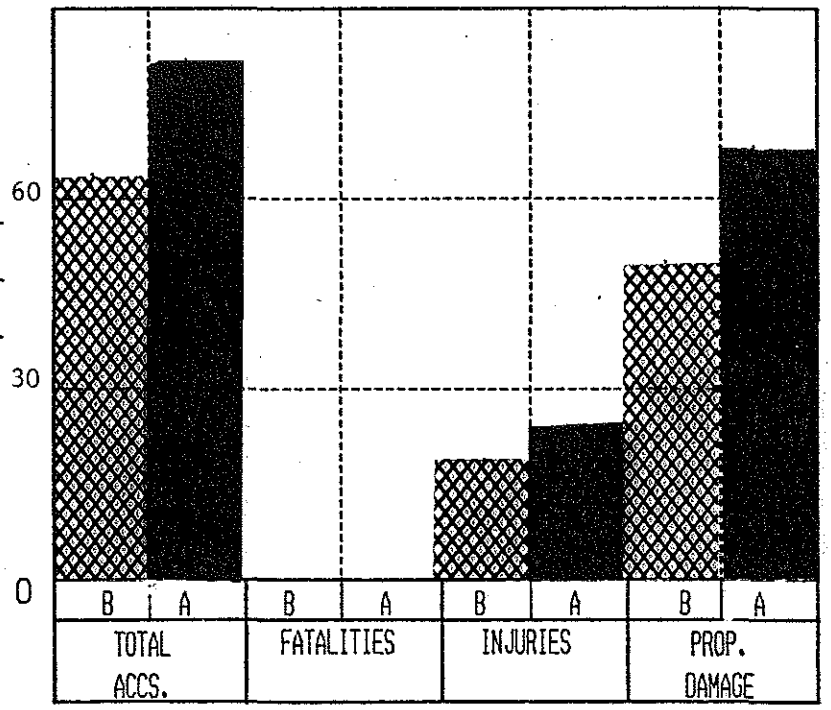
BEFORE PERIOD:
FROM 9 - 16 - 71 TO 9 - 15 - 74

AFTER PERIOD:
FROM 12 - 7 - 74 TO 12 - 6 - 77

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	14(19)	14(24)
PROP. DAMAGE	50	68

COMPUTED T.O.R. _____
PROJECT COST $426,303.
BEFORE ACC. COST* $144,500.
AFTER ACC. COST* $186,400
SAVINGS / 3 Years _____





*BEFORE ACC. COST
BASED ON 1977 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1977 NATIONAL SAFETY COUNCIL:
FATALITY 135,000 INJURY 5,500 PROP. DAMAGE 800,

Salzburg Road at Three Mile Road
Frankenlust Township
Bay County

Geometric and Operational Characteristics

The intersection of Salzburg Road and Three Mile Road is located in a rural area southwest of the city of Bay City. Each road was two-lanes (24 feet) wide. Three Mile Road is controlled by STOP signs.

Accident Summary

A total of 12 accidents occurred at this location during the two year before period of July 9, 1977 through July 8, 1979. There were six injury accidents resulting in 11 people injured.

Project Improvement

Part of the problem at this location was the "jog" in the alignment of Three Mile Road. Consequently a project was proposed to improve the alignment and widen all legs of this intersection to three lanes. The project involved realigning Three Mile Road 700 feet north and south of Salzburg Road.

Results

Total accidents in the after period November 16, 1979 through November 15, 1981 decreased from 12 to nine and injuries from 11 to seven. The 25 percent reduction in total accidents was not significant at the 95 percent confidence level using the Poisson curves. The calculated annual "benefits" associated with this reduction were $13,890 enabling the recovery of the initial cost of this project in 25.9 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2008(009) / 14891
CONTROL SECT. / SPOT NO. HES 09609 /
S.I.I. NO.

LOCATION: 3 Mile Road @ Salzburg Road

CITY/TWP. Frankenlust CO. Bay

COMPILER: A. H. Dewey DATE: 6-17-82

PROJECT DESCRIPTION:

Realign the north and south legs of 3 Mile Rd. to form a common intersection with Salzburg Rd. All legs widened to three lanes to provide a center lane for left turns.

CONSTRUCTION PERIOD:

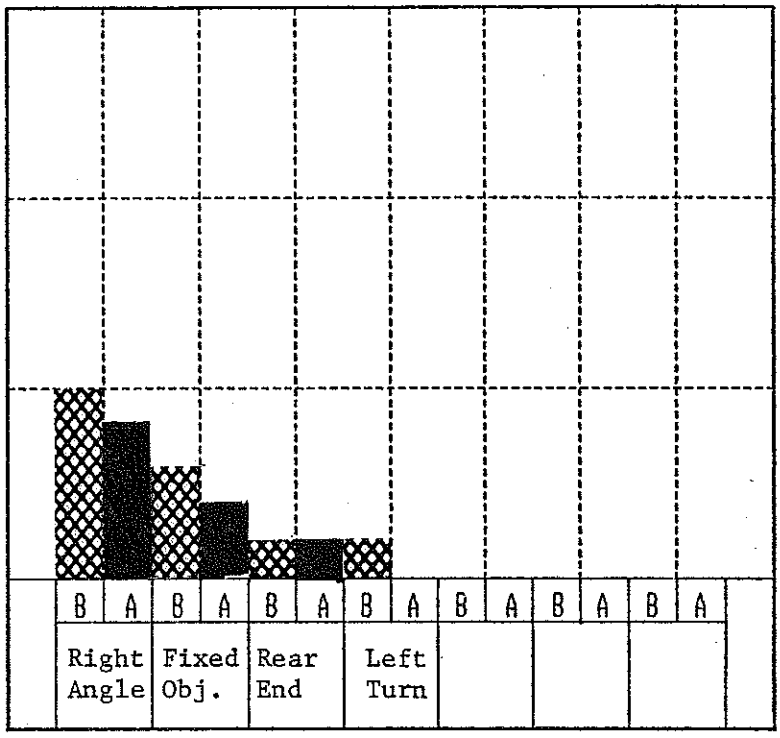
FROM 7-9-79 TO 11-15-79

BEFORE PERIOD:

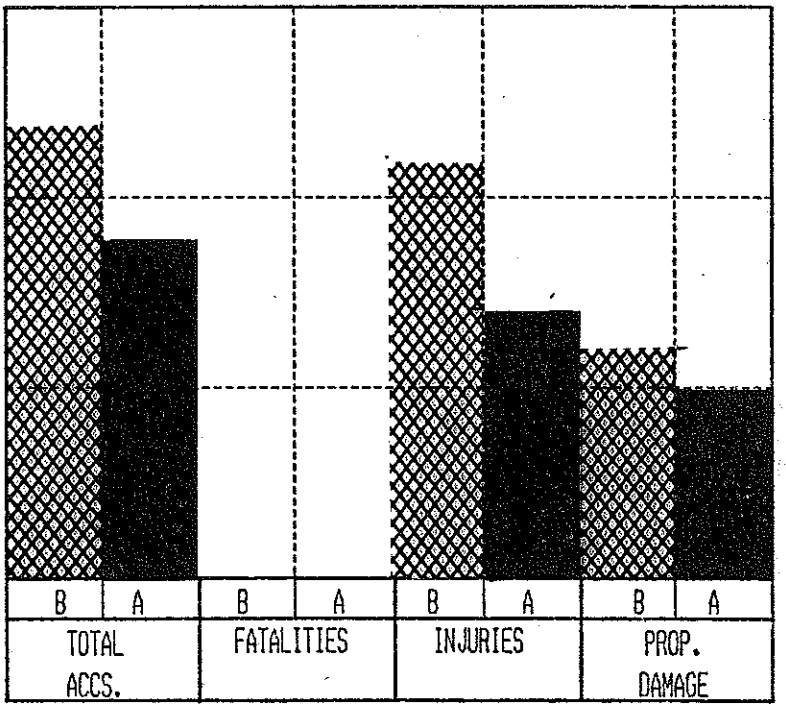
FROM 7-9-77 TO 7-8-79

AFTER PERIOD:

FROM 11-16-79 TO 11-15-81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	6(11)	4(7)
PROP. DAMAGE	6	5



COMPUTED T.O.R. 25.9
PROJECT COST $360,667
BEFORE ACC. COST* $ 79,580
AFTER ACC. COST* $ 51,800
SAVINGS / 2 Years $27,780

*BEFORE ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY 170,000 INJURY 6,700 PROP. DAMAGE 980.

M-15 (Trumbull) at M-25 (Center)
City of Bay City
Bay County

Geometric and Operational Characteristics

The intersection of M-15 (Trumbull) and M-25 (Center) is located in the north central section of the city of Bay City. This intersection has an ADT (Average Daily Traffic) in excess of 30,000 vehicles per day. M-25 (Center) is five lanes (60 feet) wide through the intersection while M-15 (Trumbull) was two lanes (30 feet) wide. This intersection is controlled by traffic signals, including pedestrian signals 24 hours a day.

Accident Summary

A total of 24 accidents occurred at this location during the "before" period of July 23, 1979 through July 24, 1980. There were 10 injury accidents with 13 people injured. The predominant accident type was the right-angle (11).

Project Improvement

Trumbull Street had only one approach lane to the intersection. Consequently turning vehicles impeded through traffic from clearing the intersection. To improve this situation and to reduce accidents, a center lane for left-turns was proposed.

The proposed improvement involved widening Trumbull Street from two lanes (30 feet) to three lanes (36 feet) north and south of M-25 (Center) for approximately 500 feet. The cost of this work was $157,000.

Results

Total accidents in the after period of November 15, 1980 through November 14, 1981, decreased from 24 to 17. No statistical tests were done due to the short (one year) "before" and "after" periods. Right-angle accidents decreased from 11 to two. The calculated annual "benefits" associated with this reduction was $10,620 enabling recovery of the initial cost of this project in 14.18 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 000S (077)/ 13597
CONTROL SECT. / SPOT NO. HHS 09071 /
S.I.I. NO. _____

LOCATION: M-15 (Trumbull) from 5th - 6th

CITY/TWP. Bay City CO. Bay

COMPILER: _____ DATE: _____

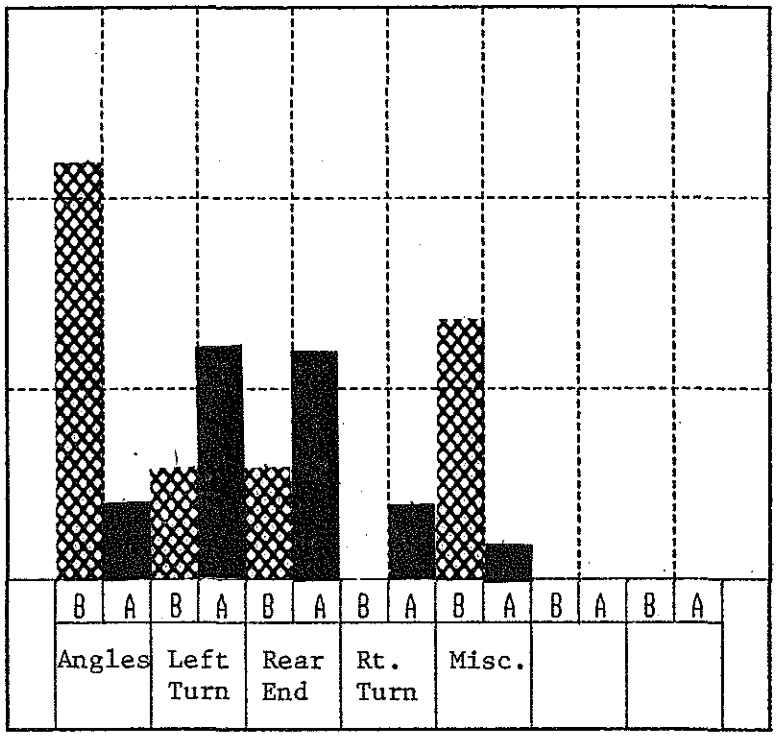
PROJECT DESCRIPTION:

2 - 3 Lane Widening Center Left Turn Lane

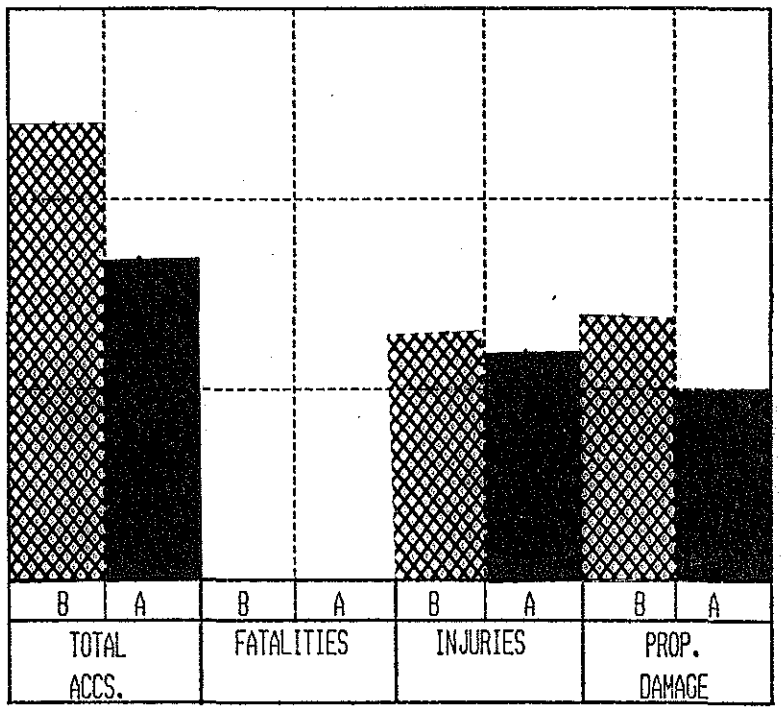
CONSTRUCTION PERIOD:
FROM 7- 29 - 80 TO 11- 14- 80

BEFORE PERIOD:
FROM 7 - 23- 79 TO 7 - 24- 80

AFTER PERIOD:
FROM 11 - 15 - 80 TO 11 - 14- 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	10(13)	7(12)
PROP. DAMAGE	14	10



COMPUTED T.O.R. 14.8
PROJECT COST $157,000
BEFORE ACC. COST* $100,820.
AFTER ACC. COST* $ 90,200.
SAVINGS / Annual $ 10,620.

*BEFORE ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY 6,700 PROP. DAMAGE 980

Waverly Road at Willow Highway
Delhi Township
Ingham County

Geometric and Operational Characteristics

The intersection of Waverly Road and Willow Highway is located on the west side of the city of Lansing and has an intersectional ADT (Average Daily Traffic) of approximately 26,900 vehicles per day. Waverly Road is a four-lane (44 feet) wide roadway and Willow Highway is also four-lanes (40 feet). The intersection operates under a stop-and-go traffic signal.

Accident Summary

A total of 104 accidents occurred at this location during the before period of June 17, 1973 through June 17, 1976. There were 40 injury accidents with 70 people injured. The predominant accident type was the head-on, left-turn.

Project Improvement

As a result of the head-on, left-turn accident pattern a new signal system with left-turn phasing was proposed. The project involved modernizing the existing signal system with new signal heads, hardware and controller with phasing capability. The cost of this project was $13,800.

Results

Total accidents in the "after" period July 27, 1976 through July 26, 1979, decreased from 104 to 53. This reduction (49 percent) was statistically significant at the 95 percent confidence level using the Poisson curves. Head-on, left-turns decreased from 52 to 7. The calculated annual "benefits" associated with this reduction were $124,180 enabling recovery of the initial cost of this project in less than two months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2003(001)/ 10752
CONTROL SECT. / SPOT NO. HHS 33609 /
S.I.I. NO. _____

LOCATION: Waverly @ Willow

CITY/TWP. Delta Twp. CO. Ingham Co.

COMPILER: _____ DATE: _____

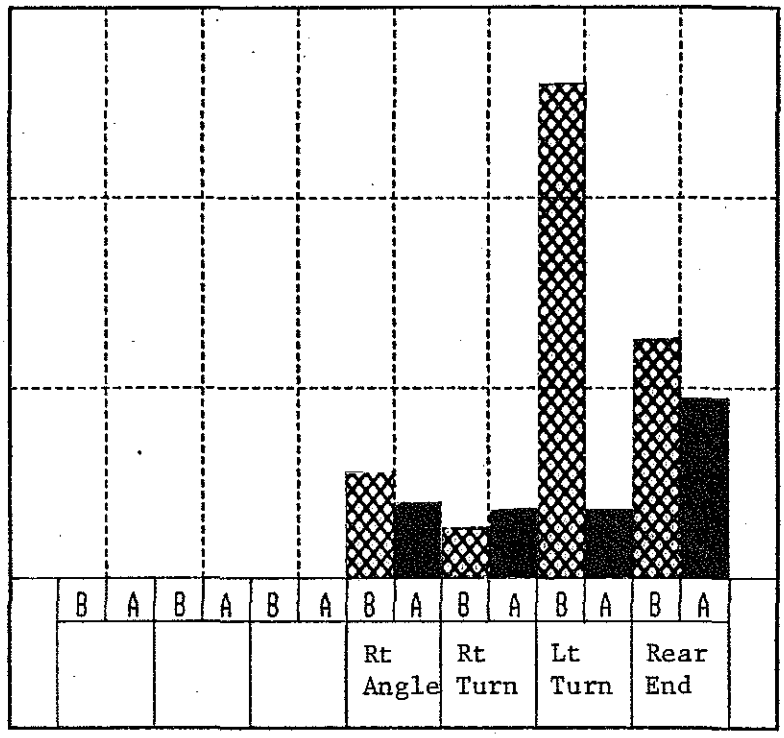
PROJECT DESCRIPTION:

Signal modernization with left turn phasing for Waverly Rd.

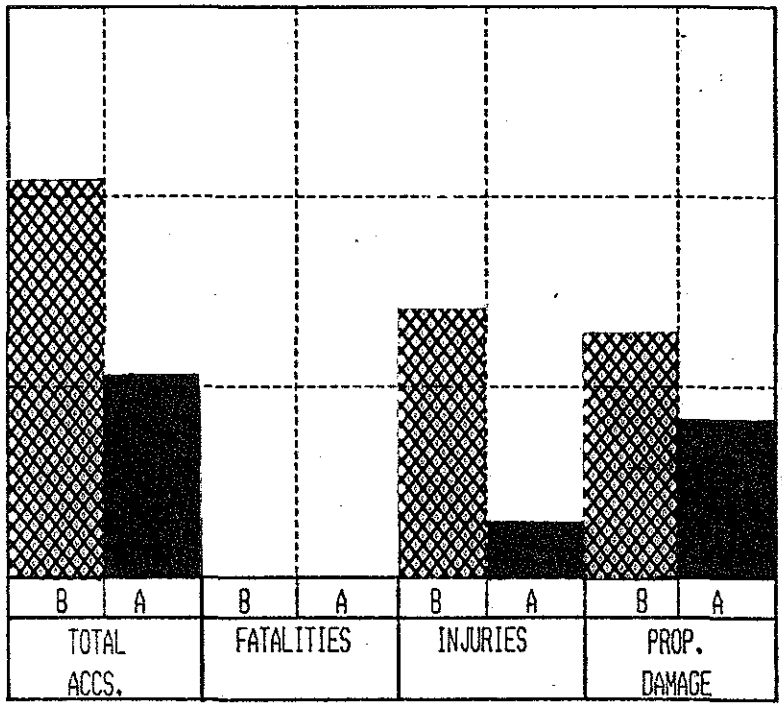
CONSTRUCTION PERIOD:
FROM 6-17-76 TO 7-26-76

BEFORE PERIOD:
FROM 6-17-73 TO 6-17-76

AFTER PERIOD:
FROM 7-27-76 TO 7-26-79



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	40(72)	11 (15)
PROP. DAMAGE	64	42



COMPUTED T.O.R. Less than 2 months
PROJECT COST $ 13,800.00
BEFORE ACC. COST* $502,080.00
AFTER ACC. COST* $129,540.00
SAVINGS / 3 Years $372,540.00

*BEFORE ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY 160,000. INJURY 6,200. PROP. DAMAGE 870.

Cedar Street at Aurelius Road
Lansing Township
Ingham County

Geometric and Operational Characteristics

The intersection of Cedar Street and Aurelius Road is located south of the city of Lansing and has an intersectional ADT (Average Daily Traffic) of approximately 27,800 vehicles per day. Cedar Street is four lanes (44 feet) wide through the intersection and Aurelius Road is four lanes (44 feet).

Accident Summary

A total of 65 accidents occurred at this location during the before period of June 17, 1973 through June 16, 1976. There were 16 injury accidents with 26 people injured. The predominant accident type was the left turn.

Project Improvement

Because of the left-turn accident problem a traffic signal with left-turn phasing was proposed. The project improvement included new signals, hardware and controller with phasing capabilities.

The cost of the work for the project was $13,800.

Results

Total accidents during the after period of July 27, 1976 through July 26, 1979 decreased from 65 to 61. This decrease (six percent) was not significant at the 95 percent confidence level using the Poisson curves. Left-turn accidents decreased from 24 to 0. Based on 1979 National Safety Council costs, reduced accidents associated with this project resulted in calculated annual "benefits" of $12,600. This enabled the initial expenditure for the project to be recovered in 1.1 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2003(001) / 10752

CONTROL SECT. / SPOT NO. HHS 33609 /

S.I.I. NO.

LOCATION: Cedar St. @ Aurelius Rd.

CITY/TWP. Holt CO. Ingham

COMPILER: DATE:

PROJECT DESCRIPTION:

Signal modernization with phasing.

CONSTRUCTION PERIOD:

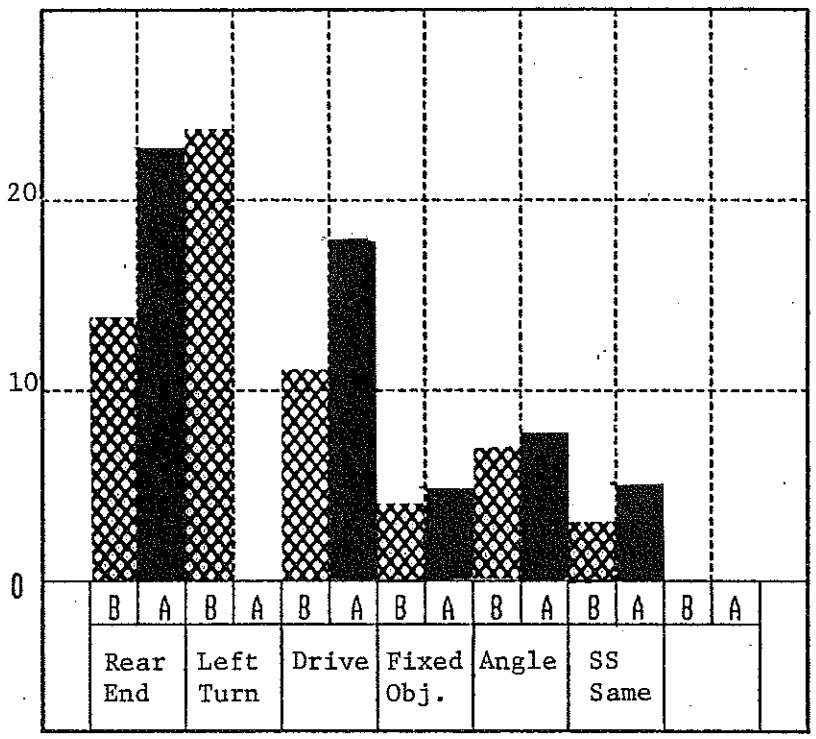
FROM 6-17-76 TO 7-26-76

BEFORE PERIOD:

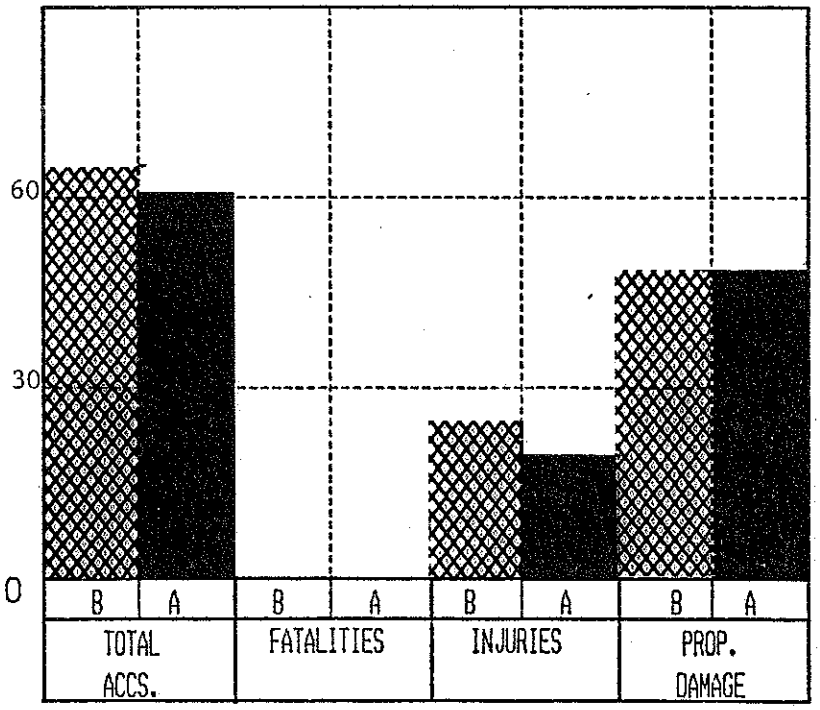
FROM 6-17-73 TO 6-16-76

AFTER PERIOD:

FROM 7-27-76 TO 7-26-79



TOTAL ACCS.	BEFORE	AFTER
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	16(26)	12(20)
PROP. DAMAGE	49	49



COMPUTED T.O.R.	1.1 Years
PROJECT COST	13,800.
BEFORE ACC. COST*	203,830.
AFTER ACC. COST*	166,630.
SAVINGS /3 Years	37,200.

*BEFORE ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY ____ INJURY ____ PROP. DAMAGE ____

* AFTER ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY 160,000 INJURY 6,200 PROP. DAMAGE 870.

Cedar Street at Holt Road
Lansing Township
Ingham County

Geometric and Operational Characteristics

The intersection of Cedar Street and Holt Road is located south of the city of Lansing and has an intersectional ADT (Average Daily Traffic) of approximately 27,000 vehicles per day. Cedar Street is four lanes (44 feet) through the intersection. Holt Road is also four lanes (44 feet) through the intersection. This intersection operated under a stop-and-go traffic signal with a two-phase fixed-time controller.

Accident Summary

A total of 50 accidents occurred at this location during the before period of March 3, 1975 thru March 2, 1978. There were 15 injury accidents with 18 people injured. The predominant accident type was the left turn (22).

Project Improvement

Because of the left turn accident pattern a traffic signal with a left-turn phase was proposed. The project improvement included the installation of a three-phase, modular controller, traffic-actuated signal.

The cost of the work for this project was $15,975.

Results

Total accidents during the after period of May 13, 1978 thru May 12, 1981 decreased from 50 to 40. This reduction (twenty percent) was not statistically significant at the 95 percent confidence level using the Poisson curves. Injuries remained constant at 18 but left-turn accidents decreased from 22 to three. The calculated annual "benefits" associated with this reduction was $1,633 enabling recovery of the initial cost of this project in 9.8 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 0003(38) / 12732

CONTROL SECT. / SPOT NO. 33609 /

S.I.I. NO. _____

LOCATION: Cedar St. at Holt Rd.

CITY/~~TWP.~~ ~~XXXX~~ Holt CO. ~~Ingham~~

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Signal modernization with 3 Ø operation

CONSTRUCTION PERIOD:

FROM 3 - 3 - 78 TO 5 - 12 - 78

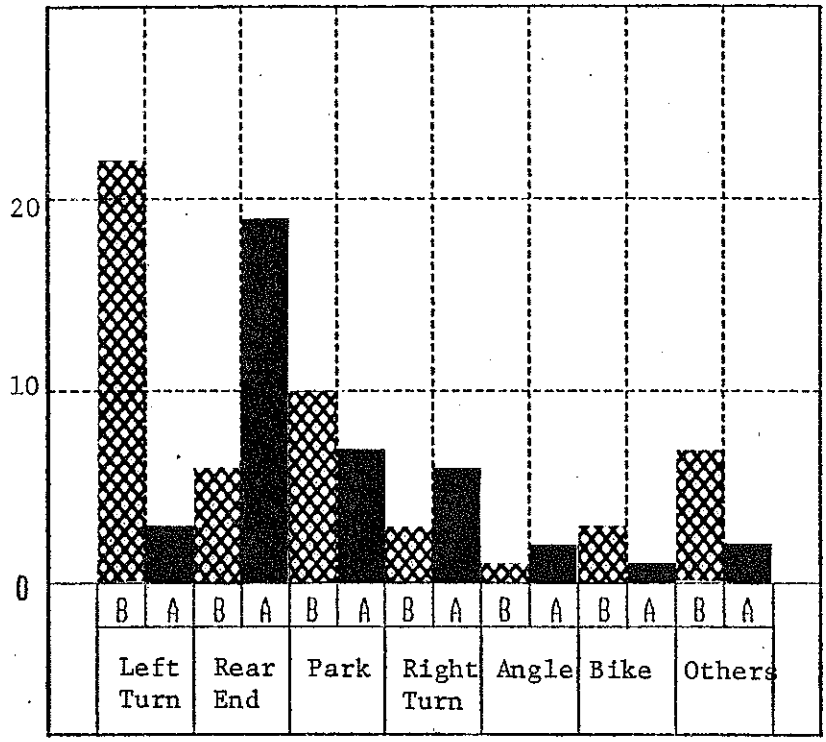
BEFORE PERIOD:

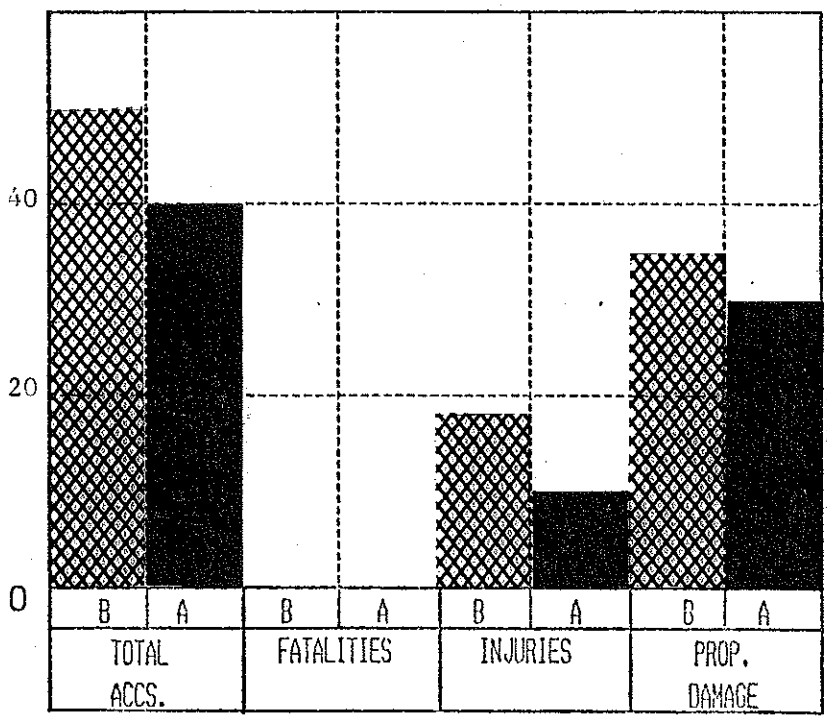
FROM 3 - 3 - 75 TO 3 - 2 - 78

AFTER PERIOD:

FROM 5 - 13 - 78 TO 5 - 12 - 81

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0(0)	0(0)
INJURY (INJ'D)	~~15(18)~~	10(18)
PROP. DAMAGE	35	30





COMPUTED T.O.R. 9.8 Years

PROJECT COST $15,975.

BEFORE ACC. COST* $154,900.

AFTER ACC. COST* $150,000.

SAVINGS / 3 Years 4,900.

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY 170,000 INJURY 6,700. PROP. DAMAGE 980

Columbia Avenue at Main Street
Emmet Township
Calhoun County

Geometric and Operational Characteristics

The intersection of Columbia Avenue and Main Street is located in an urbanized area southeast of the city of Battle Creek and has an intersectional ADT (Average Daily Traffic) of approximately 26,400 vehicles per day. Columbia Avenue was four lanes (44 feet) wide through the intersection. Main Street was two lanes (22 feet) wide through the intersection. The intersection operates under traffic signal control and is commercially developed in two of the four quadrants.

Accident Summary

A total of 140 accidents occurred at this location during the before period of September 1, 1971 through August 31, 1974. There were 39 injury accidents with 56 people injured. Rear-end (48) and head-on, left-turn (52) accidents were the predominant types.

Project Improvement

Because of the high incidence of left-turn and rear-end accidents a center lane for left turns was proposed for all legs of the intersection.

The project improvement involved widening, (55 feet) with curb and gutter, and resurfacing all legs of the intersection. In addition, the existing signal was modernized, including new signal heads and controller. The cost of this work was $420,430.

Results

Total accidents in the after period of June 27, 1975 through May 31, 1978 decreased from 140 to 66. This reduction (53 percent) was statistically significant at the 95 percent confidence level using the Poisson curves. Left turn crashes decreased from 52 to 19 and rear-ends from 48 to 16. Based on 1979 National Safety Council accident costs, reduced accidents resulted in annual "benefits" of $76,500. This enabled the initial cost of the project to be recovered in five years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 1820(001) / 05626

CONTROL SECT. / SPOT NO. HHS-13601 /

S.I.I. NO. _____

LOCATION: Columbia @ Main

CITY/TWP. Emmett CO. Calhoun

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widen & Surface all Legs
(4 to 5 lanes)

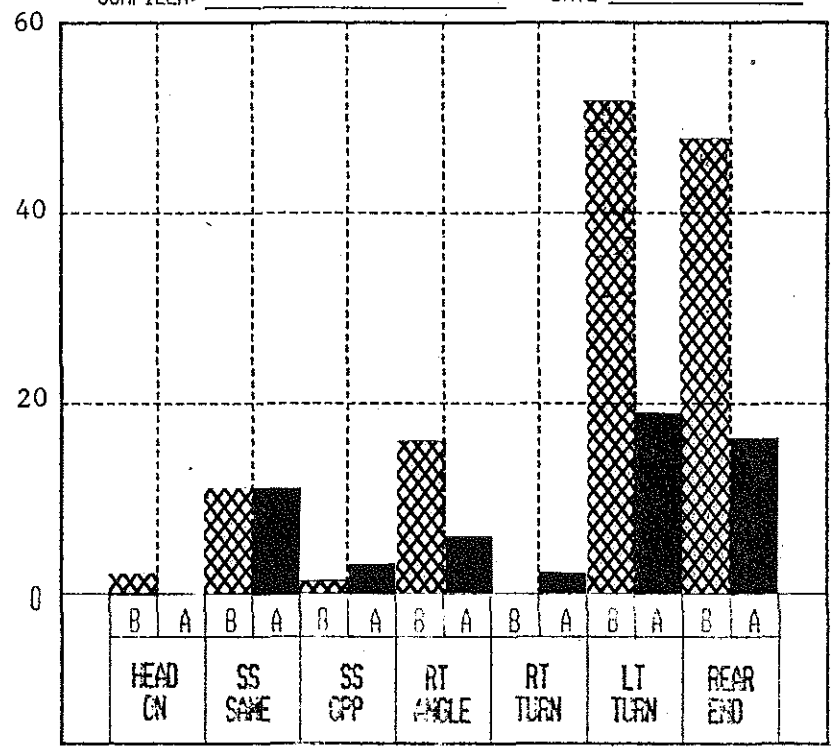
CONSTRUCTION PERIOD:
FROM 9 - 23 - 74 TO 6 - 26 - 75

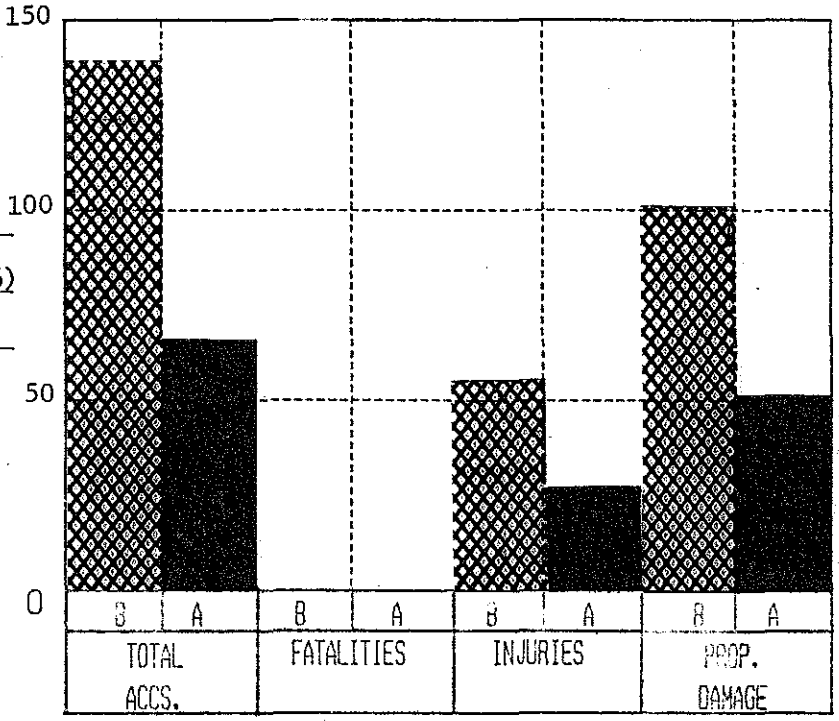
BEFORE PERIOD:
FROM 9 - 1 - 71 TO 8 - 31 - 74

AFTER PERIOD:
FROM 6 - 27 - 75 TO 5 - 31 - 78

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	39(56)	15(26)
PROP. DAMAGE	101	51

COMPUTED T.O.R. 5.5 Yrs.
PROJECT COST $420,431.00
BEFORE ACC. COST* $435,070.00
AFTER ACC. COST* $205,570.00
SAVINGS / 2 Years $229,500.00





*BEFORE ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY ____ INJURY ____ PROP. DAMAGE ____

* AFTER ACC. COST
BASED ON 1979 NATIONAL SAFETY COUNCIL:
FATALITY 160,000 INJURY 6,200. PROP. DAMAGE 870.

Eastern Avenue at 68th Street
Byron Township
Kent County

Geometric and Operational Characteristics

The intersection of Eastern Avenue and 68th Street is located just south of the city of Kentwood and has an intersectional ADT (Average Daily Traffic) of approximately 11,000 vehicles per day. 68th Street is a four-lane (44 feet) wide roadway through the intersection while Eastern Avenue was a two-lane (20 feet) wide road with short turning flares at the intersection. This location operates under stop control with Eastern Avenue under stop condition.

Accident Summary

A total of 22 accidents occurred at this location during the before period of August 13, 1977 thru August 12, 1979. There were eight injury accidents with 10 people injured. The predominant accident types were right-angle (eight) and left-turn (six).

Project Improvement

As a result of the right-angle accident pattern and the increasing approach volumes to the intersection, traffic signal control and pavement widening was proposed.

The improvements at this location included a widening of the Eastern Avenue approaches to 68th Street to 44 feet and the installation of a traffic signal. The cost of this work was $38,315.

Results

Total accidents in the after period of September 29, 1979 thru September 28, 1981 decreased from 22 to nine. This reduction (59 percent) was statistically significant at the 95 percent confidence level using the Poisson curves. Right-angles decreased from eight to five and left-turns from six to three. The calculated annual "benefits" associated with this reduction were $4,900 enabling recovery of the initial cost of this project in 7.8 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 2001(036) / 14191

CONTROL SECT. / SPOT NO. HHS 41609 /

S.I.I. NO. _____

LOCATION: Eastern Ave. @ 68th St.

CITY/TWP. Byron CO. Kent

COMPILER: _____ DATE: _____

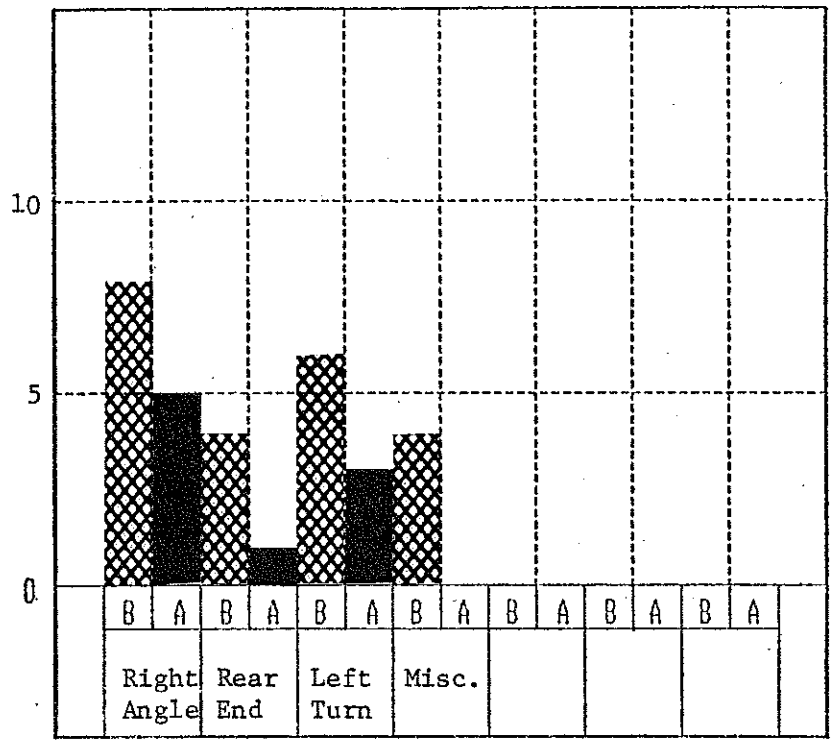
PROJECT DESCRIPTION:

Widen Eastern Ave. approaches to 4 lanes and install traffic signal

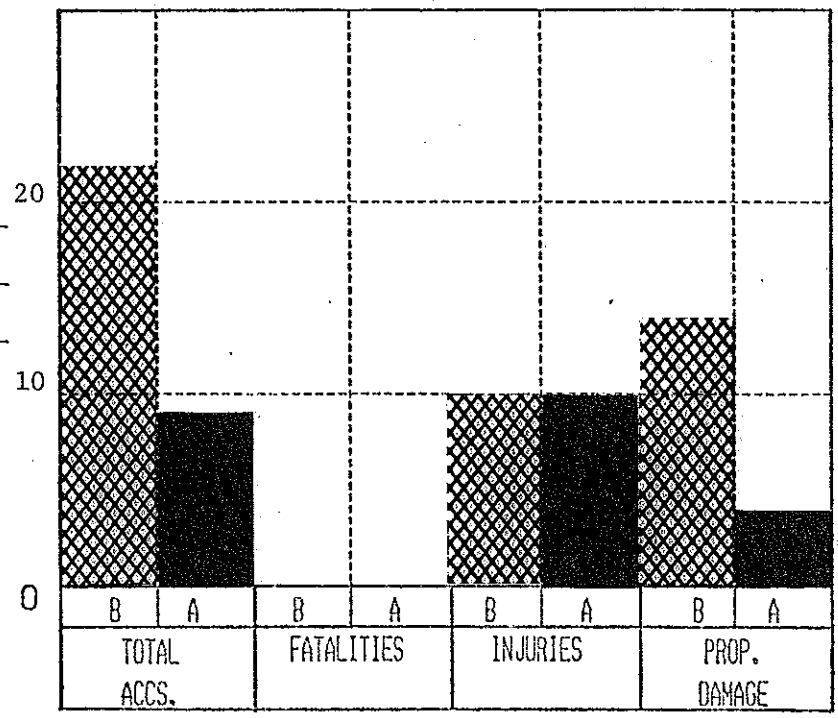
CONSTRUCTION PERIOD:
FROM 8 - 13 - 79 TO 9 - 28 - 79

BEFORE PERIOD:
FROM 8 - 13 - 77 TO 8 - 12 - 79

AFTER PERIOD:
FROM 9 - 29 - 79 TO 9 - 28 - 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0(0)	0(0)
INJURY (INJ'D)	8(10)	5(10)
PROP. DAMAGE	14	4



COMPUTED T.O.R. 7.8 years

PROJECT COST $38,315.

BEFORE ACC. COST* $80,720.

AFTER ACC. COST* $70,920.

SAVINGS / 2 Years $9,800.

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY 6,700. PROP. DAMAGE 980

US-131 (Mitchell) from Cobb Street to South Street
City of Cadillac
Wexford County

Geometric and Operational Characteristics

The intersections of Cobb Street and South Street with US-131 (Mitchell Street) are located just south of the CBD in the city of Cadillac and have intersectional ADTs (Average Daily Traffic) of approximately 19,600 vehicles per day. US-131 (Mitchell) is a 44-foot wide four-lane roadway while Cobb Street was a 28-foot wide two-lane roadway that "tees" into Mitchell from the east. South Street was a 35-foot wide two-lane roadway that "tees" into Mitchell from the west. It is located approximately 200 feet north of Cobb Street. Both Cobb and South Streets are the stem portion of these "T" intersections.

Accident Summary

A total of 53 accidents occurred at these intersections and the short stretch between them during the two year "before" period of August 9, 1977 through August 8, 1979. There were 16 injury accidents during this period producing 17 injuries. The predominant accident patterns were left-turns (26 percent), angles (25 percent), rear-ends (23 percent), and parking related accidents (13 percent). The left-turn accidents produced the most injuries (8 or 47 percent).

Project Improvements

As a result of the left-turn accident pattern, and the delays caused by vehicles waiting to turn left, a street widening project to incorporate a center lane for left turns was proposed for both Cobb and South Street approaches. The cost of this work was $45,000.

Results

Total accidents in the "after" period from November 2, 1979 through November 1, 1981, decreased from 53 to 43. This decrease (19 percent) was not statistically significant at the 95 percent confidence level using the Poisson charts. Injuries decreased from 17 to 11, and property damage accidents decreased from 37 to 33. Left-turn accidents decreased from 14 to 4.

The calculated annual "benefits" associated with this reduction was $23,530 enabling recovery of the initial project cost in one year and 11 months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 000S(55) / 16836

CONTROL SECT. / SPOT NO. HES 83609 /

S.I.I. NO. _____

LOCATION: US-131 (Mitchell) from Cobb to South

CITY/TWP. Cadillac CO. Cadillac

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widen Cobb & South Sts. from 2-3 lanes.

CONSTRUCTION PERIOD:

FROM 8 - 9 - 79 TO 11 - 1 - 79

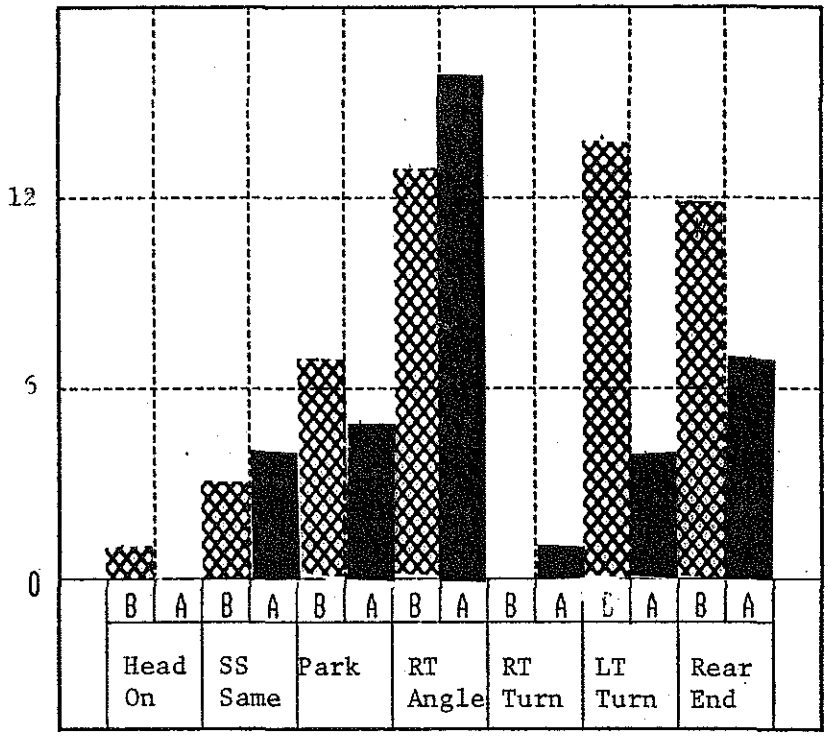
BEFORE PERIOD:

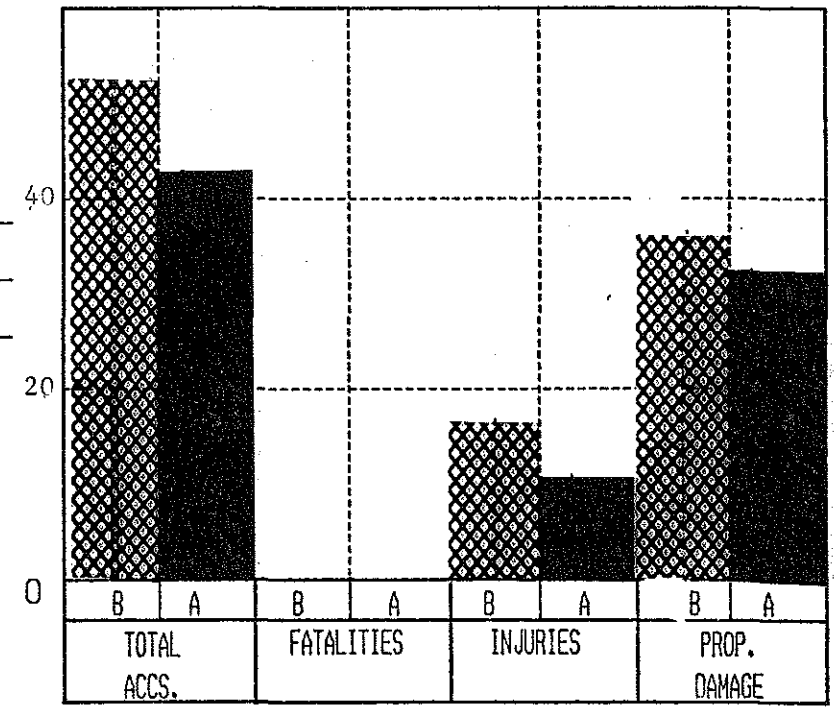
FROM 8 - 9 - 77 TO 8 - 8 - 79

AFTER PERIOD:

FROM 11 - 2 - 79 TO 11 - 1 - 81

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	16(17)	10(11)
PROP. DAMAGE	37	33





COMPUTED T.O.R. 2 Yrs

PROJECT COST 45,000

BEFORE ACC. COST* 150,160

AFTER ACC. COST* 106,040

SAVINGS / 2 Years 44,120

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY ~~170,000~~ INJURY 6,700 PROP. DAMAGE 980

River-Wright Street at US-131 (Mitchell)
City of Cadillac
Wexford County

Geometric and Operational Characteristics

This intersection is located on the south side of the Clam River approximately one-half mile north of the central business district. Northbound Mitchell Street is a 66 foot wide, five-lane wide roadway. Southbound Mitchell Street is a four-lane, 46 foot roadway with left turns prohibited. Wright Street is the 56 foot, five-lane eastbound leg to this intersection. Westbound River Street was a 24 foot two-lane - two-way roadway. This intersection is under traffic signal control installed in July of 1977. At the time of the signal installation the approximate ADT was 24,000 vehicles per day and backups and delays here being experienced.

Accident Summary

A total of 44 accidents occurred at this intersection during the two-year before period. The rear-end (17), left turn (7), and right angle (6) accident types accounted for 68 percent of the total accidents and 83 percent of the injuries.

Project Improvement

As a result of the left turn and rear-end type accidents, which could be probably attributed to vehicles stopped to turn left, the River Street approach was widened from 24 feet to 37 feet. This widening provides an exclusive center lane for left turns. The project cost was $22,125.

Results

Total accidents in the after period (November 2, 1979 - November 1, 1981) decreased from 44 to 33. This reduction (25 percent) was not statistically significant at the 95 percent confidence level using the Poisson curves. Left turn accidents decreased from seven to four. The calculated annual "benefits" associated with this reduction were $8,250 enabling recovery of the initial cost of this project in two years, eight months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 000S(55) / 16836

CONTROL SECT. / SPOT NO. HES 83609 /

S.I.I. NO. _____

LOCATION: US-131 (Mitchell) @ River

CITY/~~TWP~~x Cadillac CO. Cadillac

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widen River St. approaches to 3 lanes

CONSTRUCTION PERIOD:

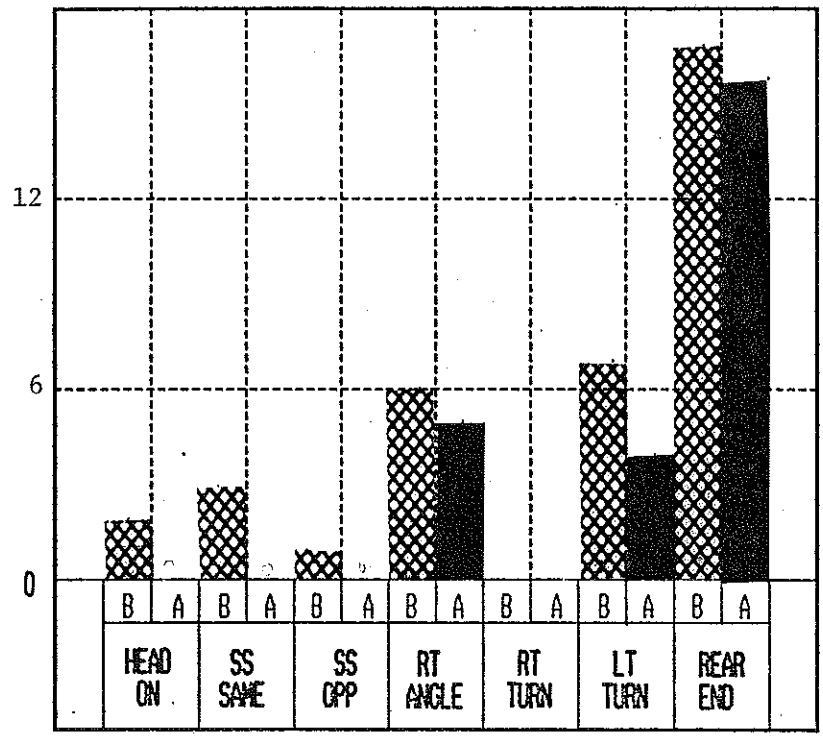
FROM 8 - 9 - 79 TO 11 - 1 - 79

BEFORE PERIOD:

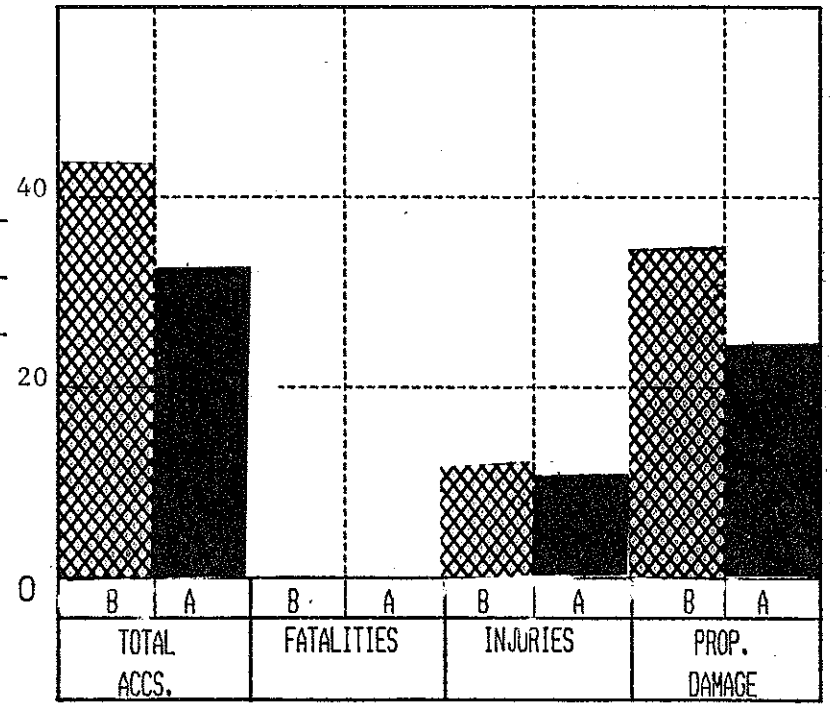
FROM 8 - 9 - 77 TO 8 - 8 - 79

AFTER PERIOD:

FROM 11 - 2 - 79 TO 11 - 1 - 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	9(12)	8(11)
PROP. DAMAGE	35	25



COMPUTED T.O.R. 2 Years 8 Months

PROJECT COST $22,125.

BEFORE ACC. COST* $114,700.

AFTER ACC. COST* $98,200.

SAVINGS / 2 Years $16,500.

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY 170,000 INJURY 6,700 PROP. DAMAGE 980

Norris Road at Guernsey Lake Road
Orangeville Township
Barry County

Geometric and Operational Characteristics

The Norris Road and Guernsey Lake Road intersection is located in a rural area of Barry County. It is a "T" intersection with two-lane (22 feet) two-way cross sections on all legs. North and South of the intersection there are sharp curves on Guernsey Lake Road. This intersection operates under stop control.

Accident Summary

A total of nine accidents occurred at this location during the before period of August 23, 1978 through August 22, 1979. There were five injury accidents with five people injured.

Project Improvement

Less than desirable horizontal and vertical alignment was the reason for this project. The project involved realigning horizontal and vertical curves and improving the superelevation along Guernsey Lake Road.

The cost of this project was $205,000.

Results

Total accidents in the after period of August 16, 1980 through August 15, 1981 decreased from nine to three. The "before" and "after" periods were too short to permit any test of statistical significance. The reduced accident cost of $31,870 per year will enable the amortization of the initial cost of this project in six years, five months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 0821(202) / 16236

CONTROL SECT. / SPOT NO. HES 08609 /

S.I.I. NO. _____

LOCATION: Norris Rd. from Keller-Guernsey 1 Yr. Before Vs. 1 Yr. After

CITY/TWP. Orangevilla CO. Barry

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Realigning of horizontal and vertical curves and improving super-elevation on Guernsey Lake Road.

CONSTRUCTION PERIOD:

FROM 8 - 23 - 79 TO 8 - 15 - 80

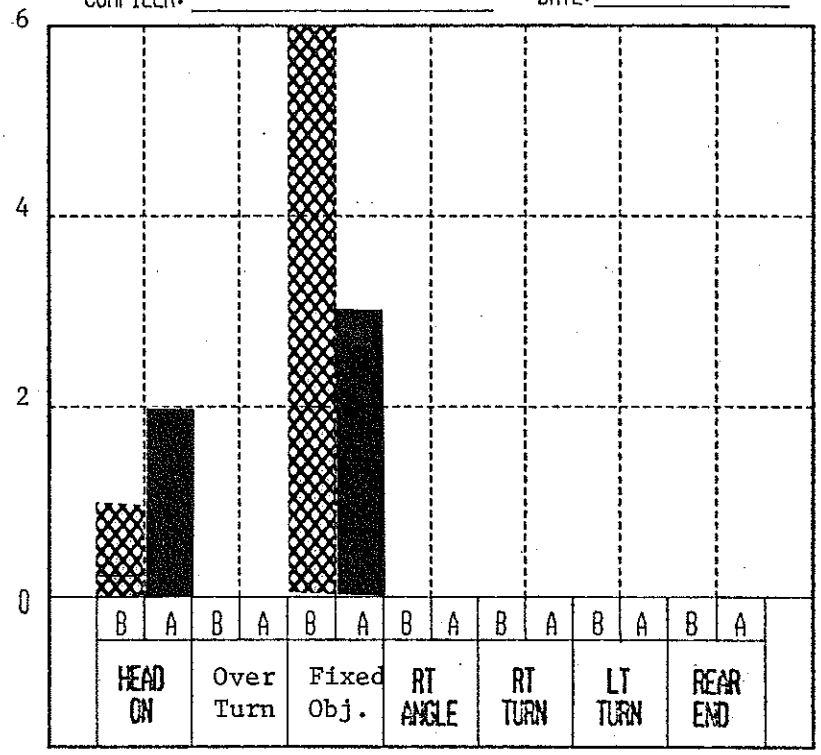
BEFORE PERIOD:

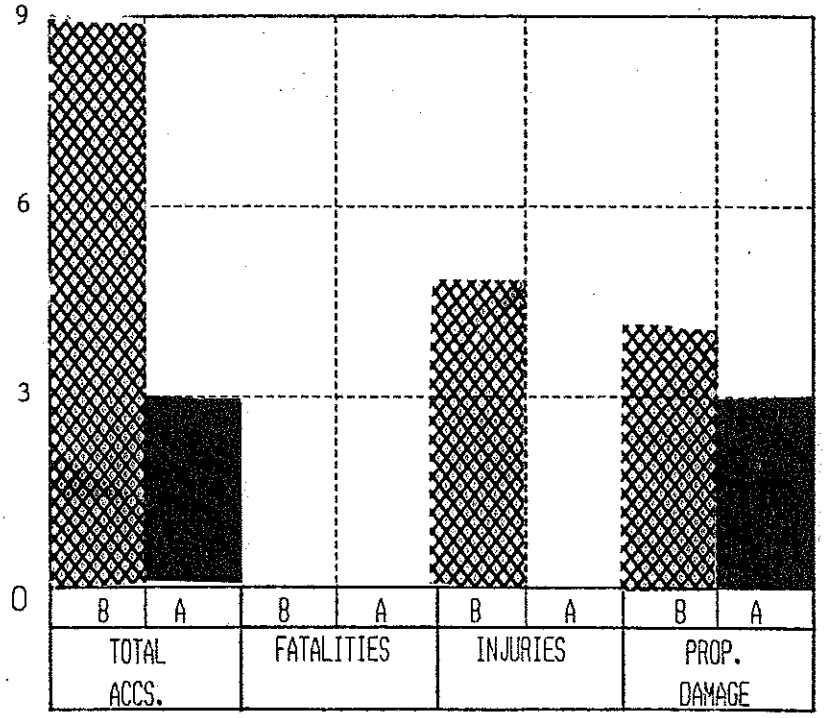
FROM 8 - 23 - 78 TO 8 - 22 - 79

AFTER PERIOD:

FROM 8 - 16 - 80 TO 8 - 15 - 81

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	5(5)	0(0)
PROP. DAMAGE	4	3





COMPUTED T.O.R. 6 Years 5 Months

PROJECT COST $205,000.00

BEFORE ACC. COST* $ 34,480.00

AFTER ACC. COST* $ 2,610.00

SAVINGS / Annual $ 31,870.00

*BEFORE ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY 160,000 INJURY 6,200 PROP. DAMAGE 870.

Red Bud Trail at Shawnee Road
Oronoko Township
Berrien County

Operational and Geometric Characteristics

The intersection of Red Bud Trail and Shawnee Road is located in a semi rural area near the center of Berrien County. Shawnee Road is a two-lane (22 feet) two-way road operating under stop control. Red Bud Trail is a two-lane (22 feet) two-way roadway and is considered the through street. The speed limit on Red Bud trail is 50 MPH and the speed limit on Shawnee Road is 55 MPH.

Accident Summary

A total of 34 accidents occurred at this location during the before period of 8-17-73 thru 8-16-76. There were 18 injury accidents with 40 persons injured. The predominant accident type was the right angle (23).

Location Improvement

Because of the high incidence of right angle accidents and the relatively high speeds in the area a flashing beacon was proposed.

The improvement included the installation of a four-way 12 inch flashing beacon with the red indication facing Shawnee Road and the yellow indication facing Red Bud Trail. The cost of this work was $2,500.

Results

Total accidents decreased from 34 to nine in the after period of 10-19-76 thru 10-18-79. This reduction (74 percent) was significant at the 95 percent confidence level using the Poisson curve. Injury accidents decreased from 18 to four and injuries from 40 to six. There was one fatality during this period. The calculated annual "benefits" associated with this reduction were $20,413 enabling recovery of the initial cost of this project in less than two months.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 000S(002) / 08859

CONTROL SECT. / SPOT NO. HHS 11609 /

S.I.I. NO. _____

LOCATION: Red Bud & Shawnee

CITY/TWP. Omonoka Twp. CO. Berrien

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Installation of a Flashing Beacon with 12" lenses

CONSTRUCTION PERIOD:

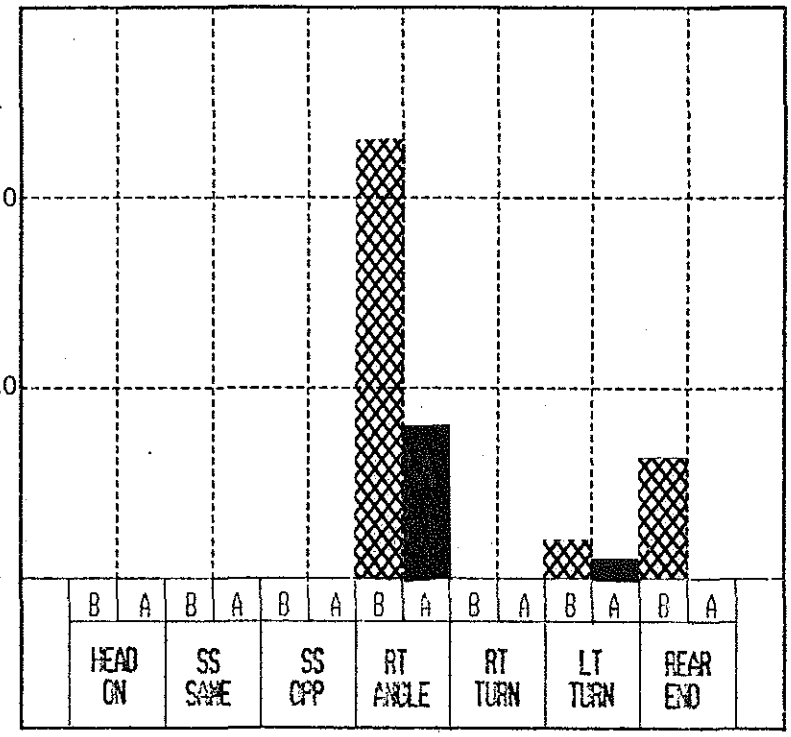
FROM 8- 17 - 76 TO 10 -18 - 76

BEFORE PERIOD:

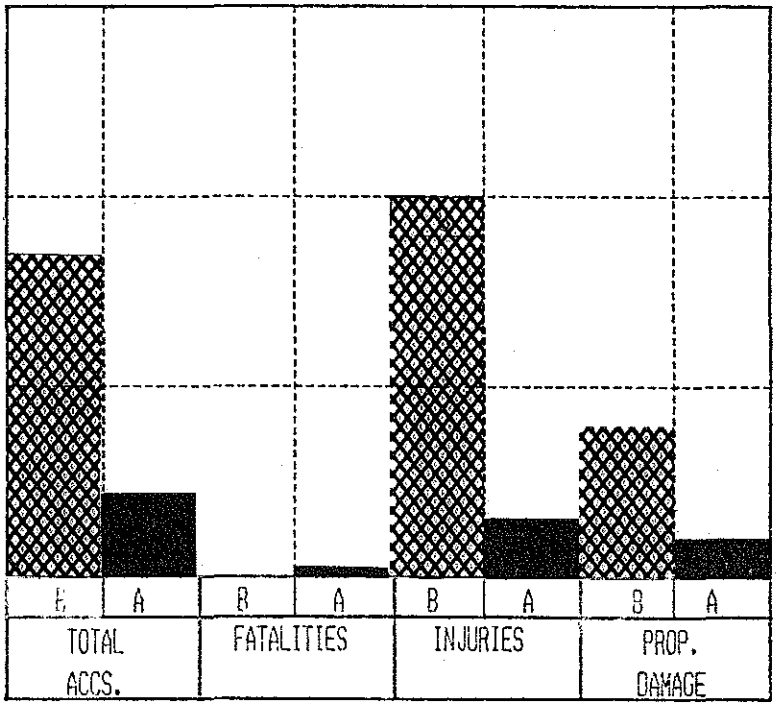
FROM 8 - 17 - 73 TO 8 -16 - 76

AFTER PERIOD:

FROM 10 - 19 - 76 TO 10 - 18 - 79



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	1(1)
INJURY (INJ'D)	18(40)	4(6)
PROP. DAMAGE	16	4



COMPUTED T.O.R.	Less than 2 Months
PROJECT COST	2,500.00
BEFORE ACC. COST*	261,920.00
AFTER ACC. COST*	200,680.00
SAVINGS / 3 Years	61,240.00

*BEFORE ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1979 NATIONAL SAFETY COUNCIL:

FATALITY 160,000 INJURY 6,200 PROP. DAMAGE 870

Novi Road at Grand River Avenue
City of Novi
Oakland County

Operational and Geometric Characteristics

The intersection of Novi Road and Grand River Avenue is located in the city of Novi and operates under traffic signal control. Grand River Avenue was a four-lane (44 feet) wide roadway while Novi Road was flared to four lanes (44 feet) at the intersection and became two lanes (22 feet) north and south of the intersection.

Accident Summary

A total of 34 accidents occurred at this location during the before period of 8-14-78 thru 8-14-79. There were 16 injury accidents with 18 persons injured. The predominant accident types were left-turns (13), right angles (5) and rear-ends (5).

Location Improvement

Because of the left-turn accident pattern and the increased demand for left-turns, center lanes for left-turns on all legs were proposed. The improvements at this location included the modernizing of the existing signal system, the widening of Grand River Avenue from four lanes (44 feet) to five lanes (60 feet) and Novi Road from two lanes (22 feet) to five lanes (60 feet). The cost of this work was $775,193.

Results

Total accidents at this location decreased from 34 accidents to 22 during the after period of 7-09-80 thru 7-09-81. No statistical tests were done due to the short before and after periods. Injury accidents decreased from 16 to six and injuries from 18 to nine. The calculated annual "benefits" associated with this reduction were $62,260 enabling recovery of the initial cost of this project in 12.5 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. _____ /11127A

CONTROL SECT. / SPOT NO. HHS 63609 / _____

S.I.I. NO. _____

LOCATION: Grand River - Novi Rd.

Intersection

~~CITY~~/TWP. Novi CO. Oakland

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

Widen to five lanes on all legs and modernize traffic signal

CONSTRUCTION PERIOD:

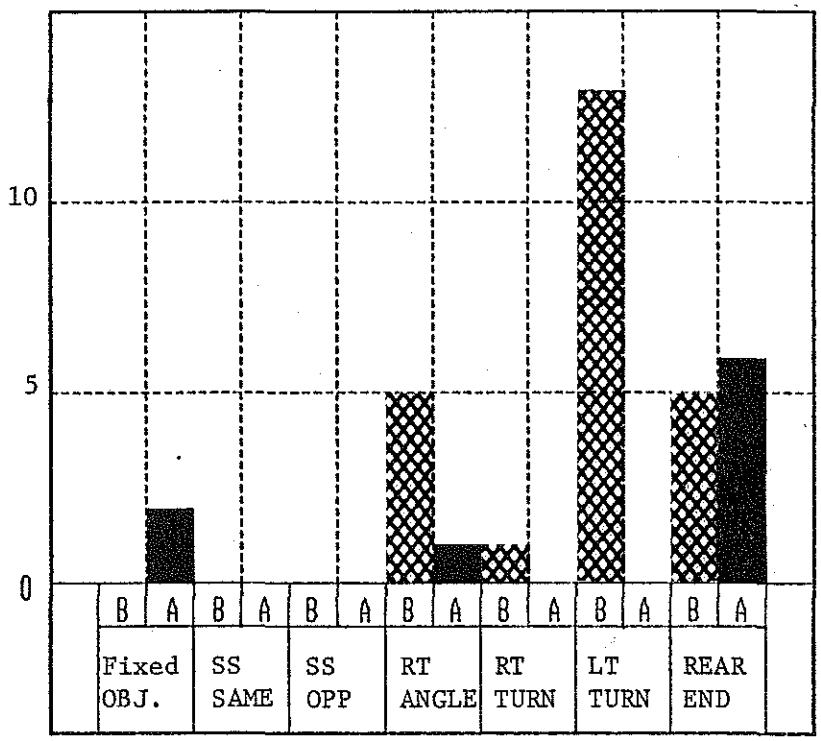
FROM 8 - 15 - 79 TO 7 - 8 - 80

BEFORE PERIOD:

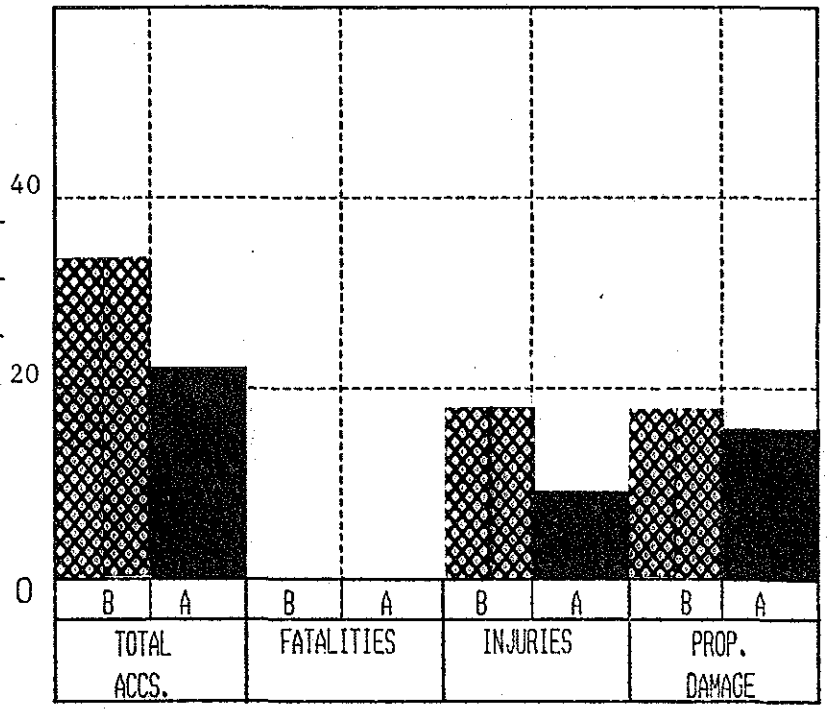
FROM 8 - 14 - 78 TO 8 - 14 - 79

AFTER PERIOD:

FROM 7 - 9 - 80 TO 7 - 9 - 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	16(18)	6(9)
PROP. DAMAGE	18	16



COMPUTED T.O.R.	12.5 Yrs
PROJECT COST	775,193
BEFORE ACC. COST*	138,240.00
AFTER ACC. COST*	75,980.00
SAVINGS / Annual	62,260.00

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY 170,000 INJURY 6,700 PROP. DAMAGE 980

Milan-Oakville Road from 1700' East of
Whittaker Road to 900' West of Tattlehill Road
London Township, Monroe County

Geometric and Operational Characteristics

Milan-Oakville Road is a two-lane (22 feet) low volume farm to market rural road located in northwest Monroe County. This 0.41 mile section of road encompasses a series (three) of sharp curves. These curves along with the narrow shoulders (3.0 feet) were considered inconsistant with rural speeds.

Accident Summary

A total of five accidents occurred at this location during the before period of 5-28-79 thru 5-28-80. There was one injury accident with two persons injured. There were three run-off-the-roadway accidents.

Project Improvement

The accident history used to determine the type of improvement needed for this location differs from that of the before period used to determine the TOR for the project. The study period used to determine the type of improvement needed was 1973 thru 1977. During this period a total of 31 accidents occurred at this location. The predominant type was the run-off-the-road (24). Because of this pattern an improvement in roadway alignment was proposed. The project incorporated the three sharp curves into a single six degree curve. The cost of this work was $260,521.

Results

Total accidents during the after period of 12-05-80 thru 12-05-81 decreased from five to one. No statistical tests were done due to the short before and after periods. The calculated annual "benefits" associated with this reduction was $16,340 enabling the initial cost of this project to be recovered in 15.9 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. _____ / 15960A

CONTROL SECT. / SPOT NO. HES 58609 / _____

S.I.I. NO. _____

LOCATION: Milan-Oakville Rd. from 1700' East of Whittaker Rd. to 900' West of Tuttlehill Rd.

~~CITY~~/TWP. London CO. Monroe

COMPILER: _____ DATE: _____

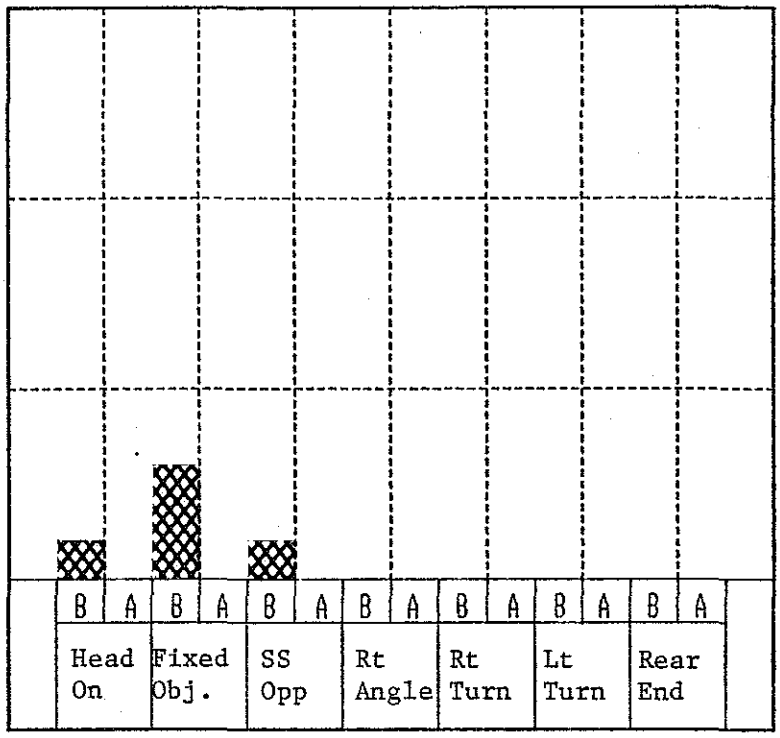
PROJECT DESCRIPTION:

Realignment - elimination of three sharp curves.

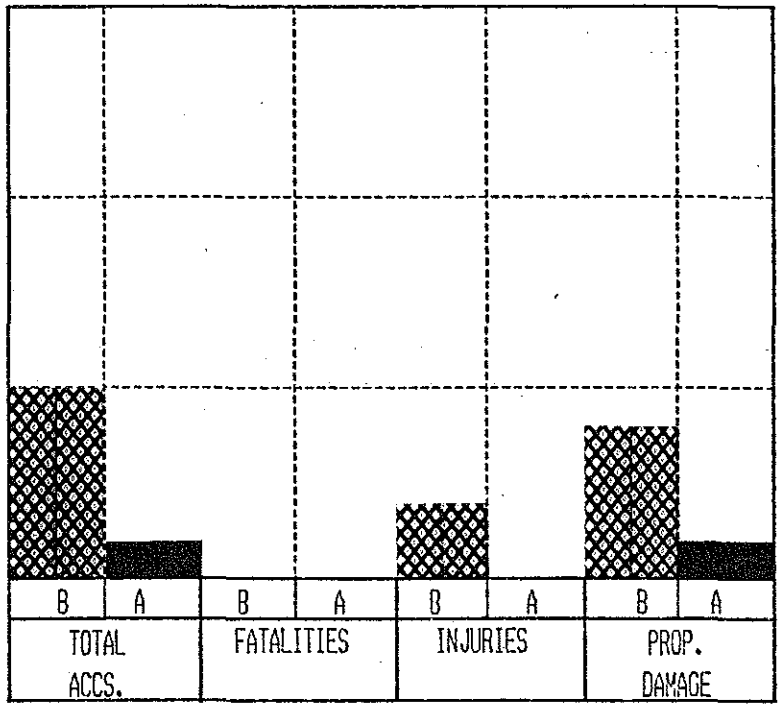
CONSTRUCTION PERIOD:
FROM 5 - 29 - 80 TO 12 - 4 - 80

BEFORE PERIOD:
FROM 5 - 28 - 79 TO 5 - 28 - 80

AFTER PERIOD:
FROM 12 - 5 - 80 TO 12 - 5 - 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)		
INJURY (INJ'D)	1(2)	0
PROP. DAMAGE	4	1



COMPUTED T.O.R.	15.9 Yrs.
PROJECT COST	260,521
BEFORE ACC. COST*	17,320.00
AFTER ACC. COST*	980.00
SAVINGS / Annual	16,340.00

*BEFORE ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY 170,000 INJURY 6,700 PROP. DAMAGE 980

Wilder Road at Two Mile Road
Monitor and Bangor Townships
Bay County

Operational and Geometric Characteristics

The intersection of Wilder Road and Two Mile Road is located northwest of the city of Bay City. Two Mile Road was a two-lane (22 feet) two-way roadway. It operates under stop control. Wilder Road was a two-lane (22 feet) two-way roadway and operated as the through street. The intersection is located in a semirural area with moderately high approach speeds. The speed limit on Two Mile Road is 40 MPH both north and southbound. The speed limit on Wilder Road is 45 MPH to the west and 35 MPH to the east.

Accident Summary

Because this project has just recently been completed the study period and the before period differs. During the study period of 1975-1978, 29 accidents occurred at this intersection. The predominant accident types were right angles (10) and rear-ends (11). A total of eight accidents occurred at this location during the before period of 6-05-79 thru 6-04-80. There were three injury accidents with five persons injured.

Project Improvement

As a result of the right angle accident pattern and the increased approach volumes to the intersection, traffic signal control and pavement widening were proposed.

The improvements at this intersection included the installation of a traffic signal, the widening of Wilder Road from two lanes (22 feet) to five lanes (55 feet) and Two Mile Road from two lanes (22 feet) to three lanes (33 feet). The cost of this work was $344,004.

Results

Total accidents in the after period of 12-10-80 thru 12-10-81 decreased from eight to six. No statistical tests were done due to the short before and after periods. Injuries decreased from five to one. The calculated annual "benefits" associated with this reduction were $26,800 enabling recovery of the initial cost of this project in 12.8 years.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. _____ / 16308A
CONTROL SECT. / SPOT NO. HES 09609 / _____
S.I.I. NO. _____

LOCATION: Wilder Rd. @ 2 Mile

CITY/TWP. Monitor & Bangor Bay

COMPILER: _____ DATE: _____

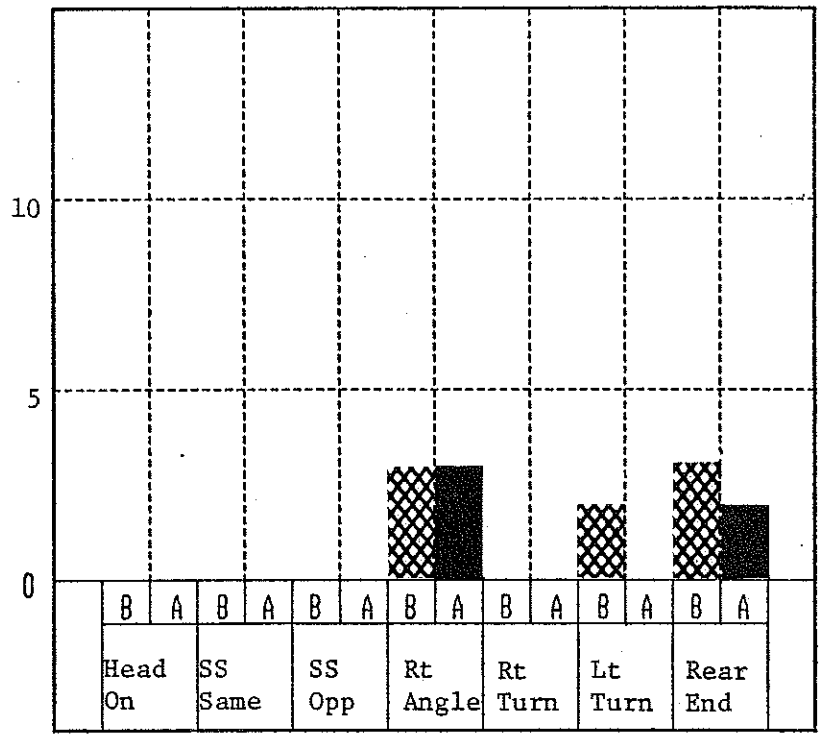
PROJECT DESCRIPTION:

Widen Wilder and 2 Mile Rd. from two to five and three lanes respectively and install a traffic signal

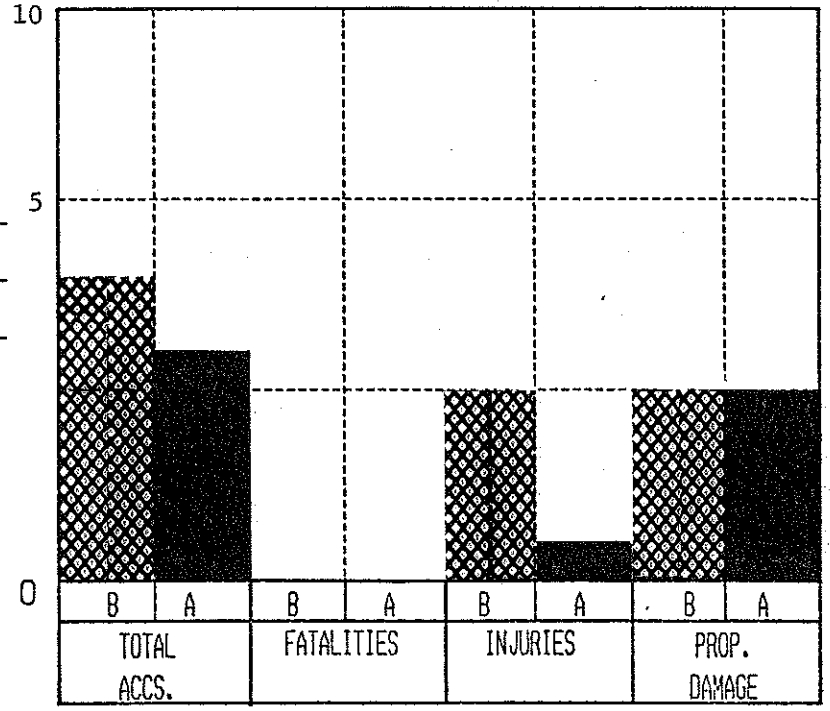
CONSTRUCTION PERIOD:
FROM 6 - 5 - 80 TO 12 - 9 - 80

BEFORE PERIOD:
FROM 6 - 5 - 79 TO 6 - 4 - 80

AFTER PERIOD:
FROM 12 - 10 - 80 TO 12 - 10 - 81



	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	_____	_____
INJURY (INJ'D)	3(5)	1(1)
PROP. DAMAGE	5	5



COMPUTED T.O.R. 12.8 yrs.
PROJECT COST 344,004.
BEFORE ACC. COST* 38,400
AFTER ACC. COST* 11,600
SAVINGS / Annual 26,800

*BEFORE ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY _____ INJURY _____ PROP. DAMAGE _____

* AFTER ACC. COST
BASED ON 1980 NATIONAL SAFETY COUNCIL:
FATALITY 160,000 INJURY 6,700 PROP. DAMAGE 980

North Avenue (Six Mile Road) at T Drive North
Pennfield and Bedford Townships
Calhoun County

Geometric and Operational Characteristics

The intersection of North Avenue and T Drive North is located in a rural area of northern Calhoun County. These two-lane (22 feet) low volume rural roads intersect to form a T intersection near two sharp curves.

Accident Summary

Because this project has just recently been completed the study period and after period differs. During the six year study period of 1972 thru 1977, 19 accidents occurred at this intersection. There were 12 injury accidents with 19 people injured and two accidents with two people killed. A total of three accidents occurred at this location during the before period of 8-06-78 thru 8-06-79. All of these accidents involved people being injured.

Location Improvement

As a result of the accident experience at this location improvement in roadway alignment was proposed. The improvements included the realignment of two curves, grading, drainage, paving, signing and pavement marking. The cost of this work was $281,474.

Results

Total accidents at this location decreased from three to one during the after period of 5-16-81. Injury accidents decreased from three to 0. No statistical tests were done due to the short before and after periods. The calculated annual "benefits" associated with this reduction were $19,120.

PROJECT EVALUATION SHEET

FEDERAL PROJ. NO. / JOB NO. 1317(201) / 14892

CONTROL SECT. / SPOT NO. HES 13609 /

S.I.I. NO. _____

LOCATION: 6 Mile Rd. (North Ave.) from South of T-Drive to North of U-Dr. North

CITY/TWP. _____ CO. _____

COMPILER: _____ DATE: _____

PROJECT DESCRIPTION:

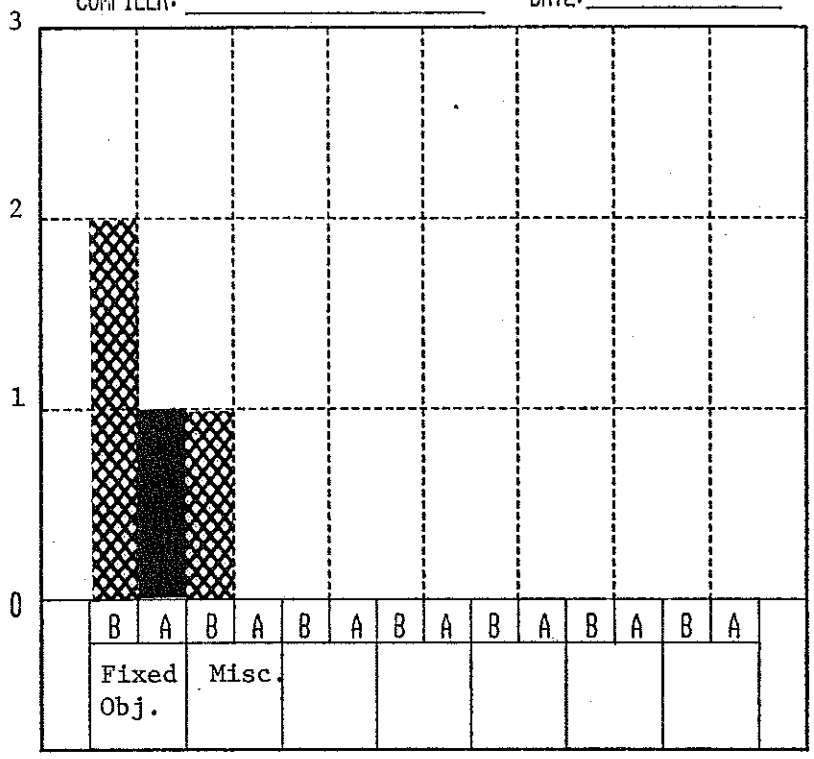
Realign 2 curves

CONSTRUCTION PERIOD:

FROM 8 - 7 - 79 TO 5 - 15 - 80

BEFORE PERIOD:

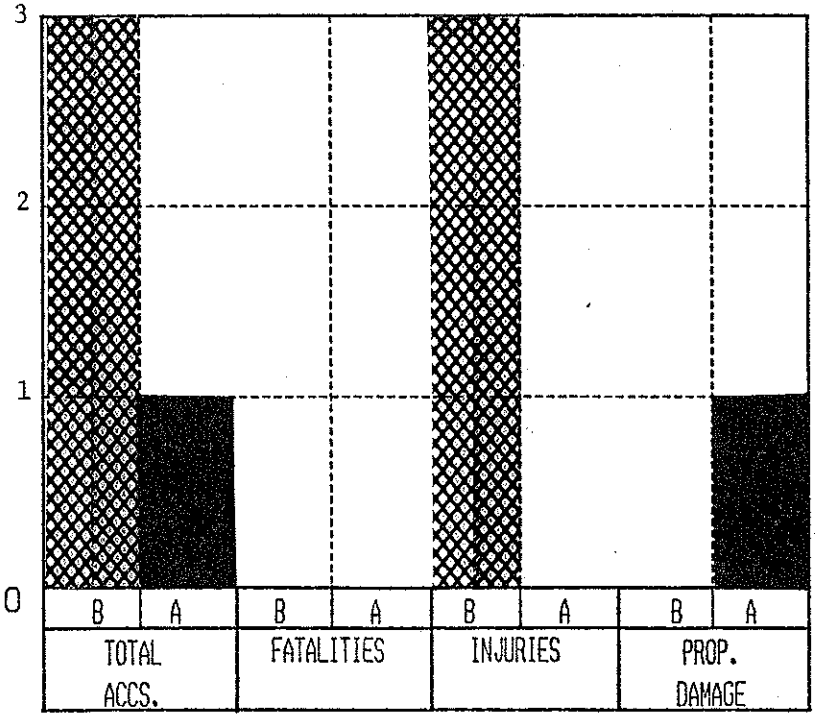
FROM 8 - 6 - 78 TO 8 - 6 - 79



AFTER PERIOD:

FROM 5 - 16 - 80 TO 5 - 16 - 81

	BEFORE	AFTER
TOTAL ACCS.		
FATAL ACCS. (KILLED)	0	0
INJURY (INJ'D)	3(3)	
PROP. DAMAGE		1



COMPUTED T.O.R.	14.72
PROJECT COST	281,474.00
BEFORE ACC. COST*	20,100
AFTER ACC. COST*	980
SAVINGS	19,120

***BEFORE ACC. COST**

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY _____ PROP. DAMAGE _____

***AFTER ACC. COST**

BASED ON 1980 NATIONAL SAFETY COUNCIL:

FATALITY _____ INJURY 6,700 PROP. DAMAGE 980

TABLE I

Location	# of Accidents Before	After	% Reduction	Accident Savings $ Per Year	Project Cost	Time of Return
Napier @ Colfax	64	82	+28	---	426,000	---
Center @ Maple	23	15	35	16,207	304,374	18.8 yrs.
Salzburg @ Three Mile	12	9	25	13,890	360,667	25.9 yrs.
M-15 (Trumbull) @ M-25 (Center)	24	17	29	10,620	157,000	14.8 yrs.
Eastern @ 68th	22	9	59	4,900	38,315	7.8 yrs.
Napier @ Union	81	50 (projected)	39	13,160	85,480	6.5 yrs.
Norris @ Guernsey	9	3	66	31,870	205,000	6.4 yrs.
Columbia @ Main	140	66	53	76,500	420,431	5.5 yrs.
US-131 (Mitchell) @ River-Wright	44	33	25	8,250	22,125	2.7 yrs.
US-131 (Mitchell) @ Cobb to South	53	43	19	22,060	45,000	2.0 yrs.
Stadium @ Liberty	41	19	54	136,290	165,537	1.3 yrs.
Cedar @ Aurelius	65	61	6	12,400	13,800	1.1 yrs.
Cedar @ Holt	50	40	20	1,633	15,975	9.8 yrs.
Southfield @ 10 Mile	278	215	23	177,297	53,800	.3 yrs.
Willow @ Waverly	104	53	49	124,180	13,800	.1 yrs.
Novi Road @ Grand River	34	22	35	62,260	775,193	12.5 yrs.
Milan-Oakville Road	5	1	80	16,340	260,521	15.9 yrs.
Wilder Road @ Two Mile Road	8	6	25	26,800	344,004	12.8 yrs.
Red Bud Trail @ Shawnee Road	34	9	74	20,413	2,500	.16 yrs.
North Avenue @ T Drive North	3	1	66	19,120	281,474	14.72 yrs.
TOTAL	1,094	754	31	794,190	3,990,996	5.25 yrs.

STATISTICAL SIGNIFICANCE
OF
ACCIDENT REDUCTION VALUES

(at 95% confidence level)

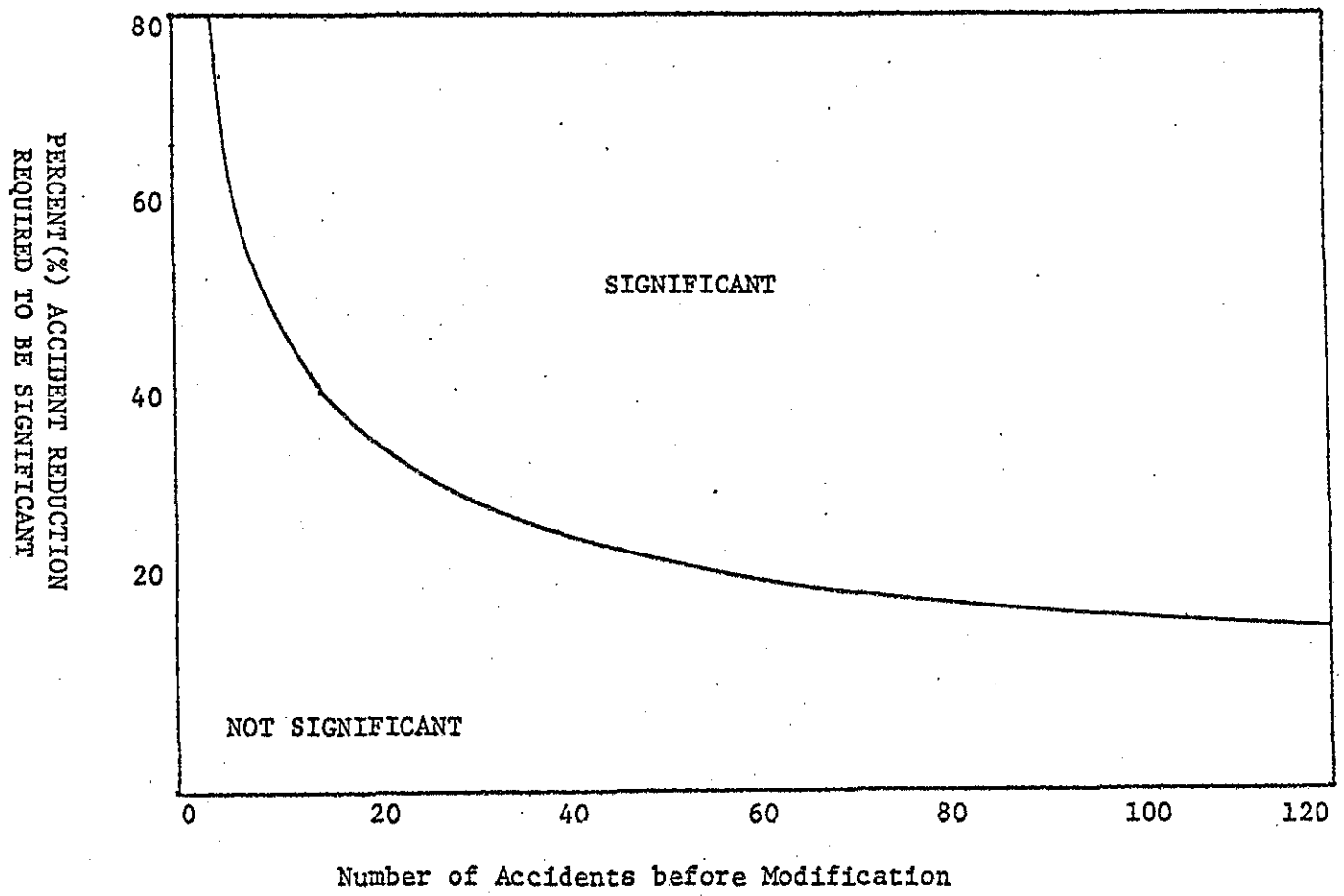


CHART I

SOURCE: Manual on Identification, Analysis, and Correction of High Accident Locations, Missouri State Highway Commission, 1976 Ed.

Cost/Benefit Analysis for Accident Reduction

Methodology

The method of evaluating accident costs used by the Michigan Department of Transportation is a modified version of the method specified by Roy Jorgensen's report of Highway Safety Improvement Criteria, 1966 edition. This method is also outlined in the Federal Highway Administration Report PP21-16 (March 7, 1969).

The National Safety Council has provided the following accident costs to be used in this analysis:

Fatal Accident	$160,000
Injury Accident	6,200
Property Damage Accident (no injuries)	870

Costs are in 1979 dollars

The benefit gained by an improvement is equal to:

$$B = \frac{ADT_a}{ADT_b} \times (QR_1 + 870\ R_2) \times 1/n$$

where

B = annual benefit in dollars

R_1 = reduction in fatalities and injuries combined

R_2 = reduction in property damage accidents

Q = 6200 if no fatal accidents occurred, or

$= \frac{160,000 + (I/F \times 6200)}{1 + I/F} = 7930$ if at least one fatality occurred

where

$I/F = \frac{162,571}{1849} = 98.9$ = ratio of injuries to fatalities that occurred statewide during the year of 1979

n = no. of years of data

ADT_a = Average traffic volume after the improvement

ADT_b = Average traffic volume before the improvement

Because accurate ADT values were unavailable, they were assumed to be unchanged from the "before" period to the "after" period.

The cost/benefit ratio is thus:

C/B = the number of years to recover the project cost, C.