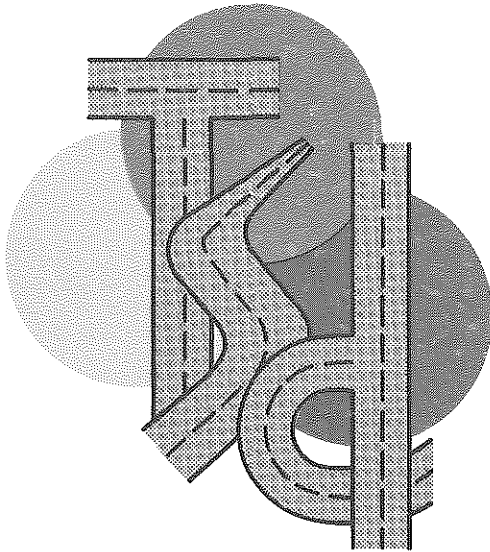


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REPORT ON THE USE OF COLD
PLASTIC PAVEMENT MARKING MATERIALS

TSD-0-148-70



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DIVISION**

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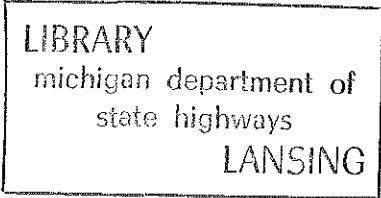
REPORT ON THE USE OF COLD
PLASTIC PAVEMENT MARKING MATERIALS

TSD-0-148-70

Report

By

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Contributor to the Report

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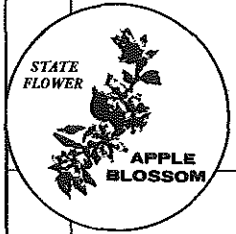
Department of State Highways
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 Lansing, Michigan 48904

December, 1970

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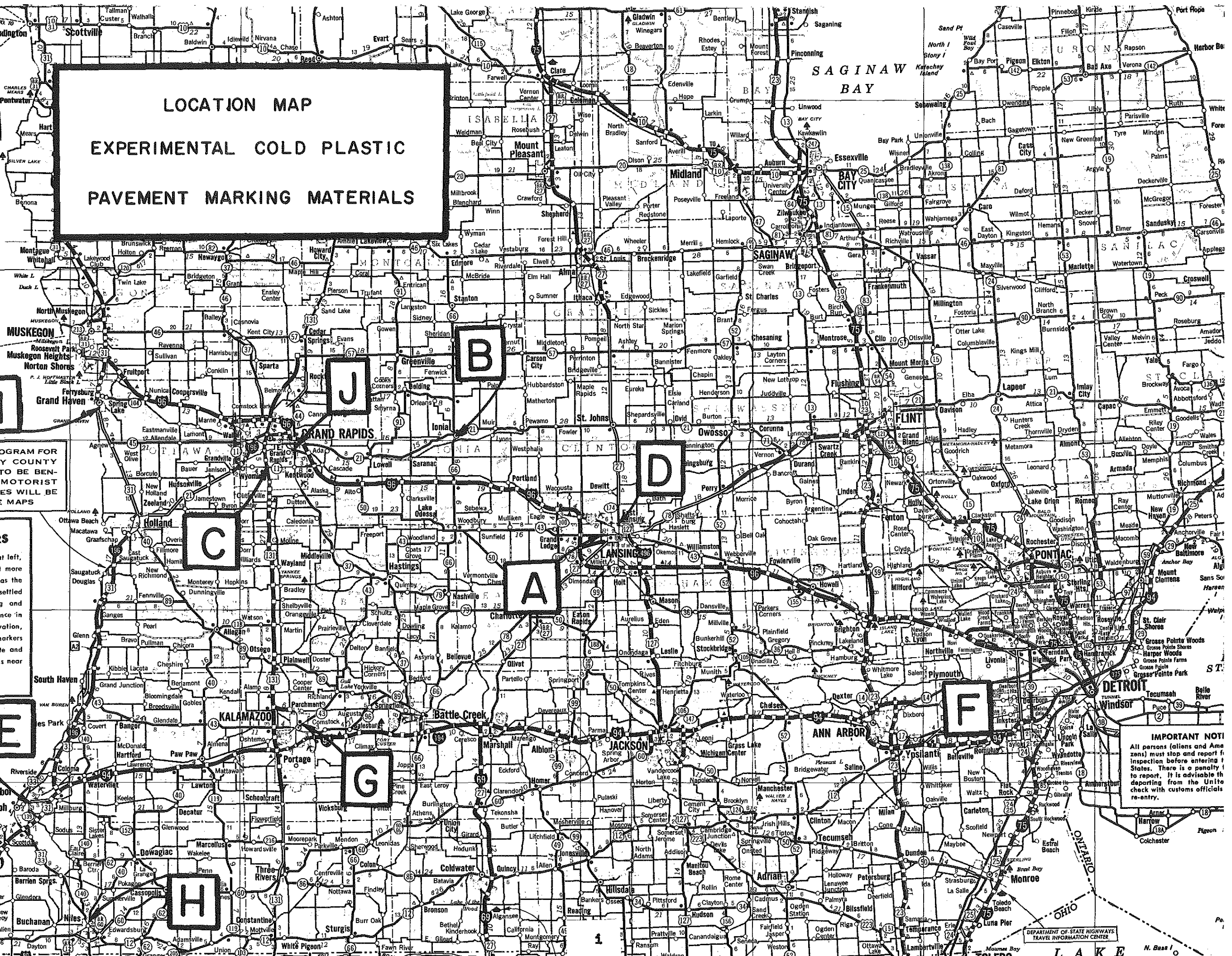


LOCATION MAP EXPERIMENTAL COLD PLASTIC PAVEMENT MARKING MATERIALS

EXPERIMENTAL PROGRAM FOR
IDENTIFYING KEY COUNTY
ROADS-IF FOUND TO BE BENEFICIAL TO THE MOTORIST
ADDITIONAL ROUTES WILL BE
ADDED TO FUTURE MAPS

HISTORICAL MARKERS
markers, similar to the one pictured at left,
Michigan Historical Commission at more
and areas. Included are such topics as the
British, and other groups that have settled
activities, forts, waterways, mining and
ways, Lincoln's only public appearance in
of educational institutions, conservation,
and the automobile industry. The markers
ites and buildings, and also in State and
rks and rest areas and other locations near

IMPORTANT NOTI
All persons (aliens and Am
zens) must stop and report f
inspection before entering t
States. There is a penalty i
to report. It is advisable th
departing from the Unite
check with customs officia
re-entry.



SYNOPSIS

The following is a report on cold plastic pavement marking materials. Our experience to date has been with cold plastic pavement marking arrows which were installed on existing bituminous and portland cement concrete surfaces (overlay process) and also rolled into hot bituminous surfaces (inlay process).

In our judgment, the cold plastic arrows have proven very durable when installed on new bituminous or on smooth portland cement concrete surfaces and will provide year-round service when installed on high volume, urban trunklines. From a break-even cost study, it appears that a cold plastic arrow would have to maintain operational quality for eight months in order to be as economical as a well maintained, conventionally painted arrow. Some of our test arrows have maintained excellent operational quality after three years of service.

The results obtained from the cold plastic inlay process have been very encouraging. From a break-even cost study, it appears that the cold plastic lane lines that have been inlaid into hot bituminous material would have to remain in operational condition for 4.72 years in order to be as economical as conventionally painted lane lines. At some of the test locations, we have observed negligible loss of material after 14 months and anticipate a service life comparable to the life of the new surface.

The distinct advantage of the inlay process is that the top of the cold plastic material is nearly flush with the top of the new pavement and eliminates an exposed edge.

RECOMMENDATIONS

The reflectivity of the cold plastic test materials is not as good as that of well-maintained conventional paints. For this reason, we recommend that the cold plastic pavement marking materials be used only in well-lighted areas.

We recommend that cold plastics be considered when the following criteria are met:

- I. Cold Plastic Arrows (Overlay Process on Existing Pavements)
 - A. Adequate street lighting exists.
 - B. The surface is smooth and unbroken (regardless of surface type).
 - C. Conventional paints, from past experience, have not maintained operational quality for at least six months.
 - D. The operational life of the plastic arrow is expected to be at least eight months.

- II. Cold Plastic Arrows (Inlay Process)
 - A. Use on all heavy volume, well-lighted, urban bituminous projects, including bituminous resurfacing and skidproofing where a conventionally painted arrow would not be expected to last more than six months.

III. Cold Plastic Lane Lines (Inlay Process)

- A. Adequate street lighting exists.
- B. Use on all heavy volume, urban bituminous projects, including bituminous resurfacing and skidproofing where conventional paints would not be expected to last more than six months, or where the quantities involved do not justify the use of hot extruded thermoplastics from an economic standpoint.

INTRODUCTION

Our present method of using conventional paints to mark guide arrows and lane lines on pavements has several limitations. The painted arrows do not provide year-round service and, at many locations, they lose their operational effectiveness in only a few months. It is impractical for the Department of State Highways to repaint arrows and lane lines more than twice annually due to inclement weather conditions in this state. Consequently, several areas in the state are without adequate pavement marking for several months during each year. Heavy traffic volumes, tire studs, de-icing chemicals and snow plow activity have had an adverse effect on the operational life of conventionally painted arrows and lane lines.

A study was recently conducted to determine the feasibility of using cold plastic pavement marking materials in an effort to provide the motorist with a more effective operational device.

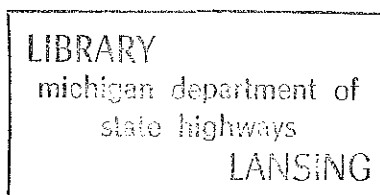
According to manufacturer's laboratory tests and claims, the cold plastic pavement marking materials are impervious to water, oil and salt, and their resiliency and toughness provide outstanding wear. The service life varies to some extent with the nature and condition of the surface to which it is bonded.

Prior to this study, very little was known about the life expectancy of cold plastic pavement marking materials in Michigan. The plastic materials used for this study were manufactured by Holland-Suco Color Company of Holland, Michigan (Presslab materials) and Prismo Safety Corporation of Huntington, Pennsylvania (Prismo materials).

This report generally covers the durability of cold plastic arrows when installed on bituminous and portland cement concrete surfaces and inlaid into hot bituminous surfaces. Cold plastic lane lines are evaluated only for the hot bituminous inlay process.

PROCEDURE

The procedure used for installing the cold plastic test materials was in accordance with the manufacturer's specifications. The paper backing was removed from the cold plastics, pavement cleaner was used when necessary, pavement primer was rolled onto the pavement with a roller and the cold plastics were pressed firmly against the pavement with a rubber roller.



The procedure for the cold plastic inlay process was also simple. This work was coordinated with the bituminous contractor. The cold plastics were installed on the hot bituminous material immediately prior to the final rolling of the new surface. The bituminous roller rolled over the cold plastics about six times.

The locations and installation procedures for the test materials are as follows:

Location A (See Figure #1)

On September 20, 1967, three Holland-Suco arrows were installed on a bituminous surface which was two months old. Pavement cleaner and primer were used, and the arrows were pressed firmly against the pavement. The thickness of all arrows was 0.095 inches. The installation time was approximately twenty minutes per arrow.

Location B (See Figure #2)

On October 14, 1968, six Holland-Suco arrows were installed on an older bituminous surface. Arrows #1 and #2 were installed on a 1959 bituminous surface and were 0.070 inches thick. Arrows #3 through #6 were installed on a 1952 bituminous surface; arrows #3 and #4 were 0.095 inches thick and arrows #5 and #6 were .040 inches thick. Pavement primer was rolled onto the pavement with a roller, pavement cleaner was used when necessary, and the arrows were pressed firmly against the pavement with a rubber roller. It took one and one-half hours to install the six arrows.

Location C (See Figure #3)

On October 14, 1968, four Holland-Suco arrows were installed on a 1962 portland cement concrete surface. Arrows #1 and #2 were 0.095 inches thick, and arrows #3 and #4 were 0.075 inches thick. Pavement primer and cleaner were used, and the arrows were rolled with a rubber roller. Installation time was twenty minutes.

Location D (See Figure #4)

On October 16, two Prismo arrows were installed on a new bituminous surface. Pavement primer and cleaner were used, and the various pieces of plastic were assembled to form right-turn arrows. The Prismo arrows were made up of sixteen pieces. The thickness of each arrow was 0.095 inches. The installation time for the two arrows was approximately two hours.

Location E (See Figure #5)

On August 28, 1969, the following quantities of cold plastic products were inlaid into a 110°F bituminous resurface:

| | <u>Holland-Suco</u> | <u>Prismo</u> |
|-----------------|---------------------|---------------|
| 4" Yellow | 840 Feet | 300 Feet |
| 4" White | 240 Feet | 415 Feet |
| Left-Turn Arrow | 1 | 1 |

This was the Department's first attempt at inlaying cold plastics into a hot bituminous surface. The materials were state-furnished, and the work was coordinated with the bituminous contractor. The materials were installed prior to the final rolling of the bituminous surface. The bituminous roller rolled over the cold plastics approximately six times. Due to the coordination involved and the progression of the new bituminous surface, four Department employees were on the job site for six hours. The thickness of the cold plastic materials was 0.095 inches.

Location F (See Figure #6)

On September 1, 1969, 3500 feet of Prismo 4" white cold plastic lane markings were rolled into a 110°F bituminous resurface. This work was coordinated with the bituminous contractor and was accomplished in one working day. The bituminous roller rolled over the material six times. The thickness of the cold plastic materials was 0.095 inches.

Location G (See Figure #7)

On June 22, 1970, 130 feet of Holland-Suco 4" white skip line and 130 feet of Prismo 4" white skip line were rolled into a 110°F bituminous resurface. This work was coordinated with the bituminous contractor and was accomplished in one working day. The bituminous roller rolled over the cold plastics several times. The thickness of the lane lines was 0.095 inches.

Location H (See Figure #8)

On June 19, 1970, the following quantities of cold plastic lane lines were inlaid into a 115°F bituminous resurface:

| | <u>Holland-Suco</u> | <u>Prismo</u> |
|-----------|---------------------|---------------|
| 4" Yellow | 400 Feet | 400 Feet |
| 4" White | 600 Feet | 600 Feet |

The materials were state-furnished, and the work was coordinated with the bituminous contractor. The work was accomplished during one working day. The thickness of the cold plastic materials was 0.095 inches.

Location I (See Figure #9)

On June 25, 1970, and June 29, 1970, the following quantities of cold plastic materials were inlaid into the bituminous resurface:

| | <u>Holland-Suco</u> | <u>Prismo</u> |
|------------------|---------------------|---------------|
| Left-Turn Arrow | 3 | 3 |
| Right-Turn Arrow | 1 | 2 |
| 4" White | 100 Feet | 100 Feet |

Arrow #10 (Holland-Suco) was installed after the new bituminous surface had cooled. The materials were state-furnished, and the work was coordinated with the bituminous contractor. The bituminous roller rolled over the cold plastics several times. The thickness of all of the cold plastics at this location was 0.095 inches. Two Department employees were on the job site two working days to accomplish the cold plastic installations.

Location J (See Figure #10)

On September 3, 1969, three Holland-Suco and three Prismo left-turn arrows were rolled into a 110^oF bituminous resurfacing. The materials were state-furnished, and the installation was coordinated with the bituminous contractor. Due to the progression of the new surface, it was necessary for two Department employees to be on the job site for two working days. The thickness of the arrows was 0.095 inches.

RESULTS.

A survey was made of all of the cold plastic test materials on October 27 and 28, 1970. Refer to Figures #11 through #23 for photographs taken at the various locations. Due to the different installation dates, the findings at the various locations shall be discussed separately.

Location A (See Figure #11)

After three years of service, the three arrows at this location have maintained excellent operational quality. Each arrow has only small pieces of the material missing. There are some tire marks on each arrow but not enough to impair the operational quality.

Location B (See Figure #12)

The six arrows at this location were painted over subsequent to installation. However, the photographs depict the remaining cold plastic material. Arrow #6 is completely

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missing, and arrows #1 through #5 are practically all missing. Probably due to the older, uneven surface upon which they were installed, these arrows were completely ineffective after two months of service. After the first snow plow activity of December 1968, the arrows looked about like they do today.

Location C (See Figure #13)

After two years of service, only one of these arrows maintained good operational quality. The arrows at this location had been painted over prior to obtaining the photographs in Figure #13 and, for that reason, the condition of each arrow shall be described separately:

Arrow #1 has the entire shaft missing; Arrow #2 was completely intact except for very small pieces missing; Arrow #3 was badly broken up; and Arrow #4 had the entire head missing. All of the arrows were quite badly tire-marked. The effective operational life of the arrows at this location was fifteen months.

Location D (See Figure #14)

After two years of service, Arrow #2 maintained excellent operational quality. Arrow #1 showed considerable loss of material from the head. The material was lost shortly after installation and, since that time, has remained nearly 100% intact. This was probably due to a poor initial bond.

Location E (See Figures #15 and #16)

After fourteen months of service, the results at this location were very good. There were only three noticeable failures at this location. The 4" yellow Prismo transition line (Item #6 in Figure #16) shows a 15-foot section of raveling, and the Holland-Suco 4" white skip line (Item #3 in Figure #15) shows a small removal of material on the leading edge. A small portion of the leading edge of Arrow #1 (Figure #15) was missing. All the remaining materials at this location were 100% intact.

Location F (See Figure #17)

After fourteen months, the cold plastics at this location were in excellent operational quality. There was only a loss of three feet of material at this location. All of the material was free from tire marks.

Location G (See Figure #18)

After four months of service, the Prismo and Holland-Suco 4" lane lines maintained excellent operational quality. All the materials at this location were 100% intact and completely free from tire marks.

Location H (See Figure #19)

After four months, the lane lines at this location were 100% intact and free from tire marks.

Location I (See Figures #20, 21, and 22)

After four months, the cold plastic materials at this location were 100% intact. There was minor tire-marking on some of the arrows but not enough to impair their operational quality.

Location J (See Figure #23)

After fourteen months of service, the six arrows at this location were in excellent condition. Arrow #3 was the only arrow that had lost any material. There was very minor tire-marking on some of the arrows at this location.

DISCUSSION

Our experience with cold plastic pavement marking arrows has been encouraging. Test arrows installed on new bituminous surfaces have maintained excellent operational quality for three years. Those installed on a smooth portland cement concrete surface were in very good condition after fifteen months. Those arrows which were inlaid into hot bituminous material have remained in excellent condition after fourteen months.

The arrows which were installed on the older, rough bituminous surface had a service life of less than two months. The critical parameter in the service life of the cold plastic arrow seems to be its bonding strength to the pavement, and the bonding strength is dependent upon the nature and condition of the surface to which

it is bonded. Snow plow activity and high traffic volumes appear to be the worst enemies of the pressure-sensitive bond.

The results obtained from the cold plastic inlay process have been very good. The distinct advantage of this method of installation is the lack of exposed edges of the materials. The materials are inlaid to the extent that the top of the cold plastic material is flush with the top of the pavement. It is felt that cold plastic lane lines should not be installed unless they can be inlaid into hot bituminous.

It appears that the well maintained conventional paints have much better reflectivity than the cold plastic materials, although the cold plastics show up very well when installed proximate to street lighting.

Tire marks visible on many of the cold plastic test arrows indicate that occasional cleaning might be desirable. However, the fact that the materials are only slightly tire-marked indicates that they may be self-cleaning to some extent.

Several criteria must be taken into account when comparing cold plastic pavement markings with conventional painted markings. Making a comparative cost study would require that the conventionally painted markings be maintained at the same level of quality as the cold plastic markings. The traffic delay and increased accident potential that result from the more frequent maintenance of the conventionally painted markings at some locations must be a prime consideration.

BREAK-EVEN COST ESTIMATE

The following is a cost comparison to determine the number of years that cold plastic arrows and lane lines would have to remain in an effective operational condition in order to be as economical as conventionally painted arrows and lane lines. Previous experience supports our assumption that the conventionally painted arrow and lane lines would require painting three times annually to ensure operational quality.

A. Cold Plastic Arrow Vs. Conventionally Painted Arrow

| <u>Plastic Arrow</u> | <u>Painted Arrow</u> |
|------------------------|------------------------|
| Material - \$22.00 | Material - \$ 2.00 |
| Labor - <u>\$ 8.00</u> | Labor - <u>\$13.00</u> |
| Total \$30.00 | Total \$15.00 |

a = Number of applications required annually to maintain operational quality for the painted arrow = 3

b = Cost of one application of paint = \$15.00

c = Cost of one plastic arrow installation = \$30.00

Y = Service life (in years) for the plastic arrow to meet the break-even cost of the painted arrow.

$$Y = \frac{c}{ab} = \frac{\$30.00}{3(\$15.00)} = 0.67 \text{ years}$$

B. Cold Plastic Lane Line Vs. Conventionally Painted Lane Line

For this break-even cost estimate, Location E (Figure #5) was selected.

Cold Plastic Lane Lines

Time to complete project = 6 hours

Materials:

1795 feet of 4" lane line @ \$0.36 per foot = \$646.20

Labor Charges:

1 Project Superintendent 6 hours @ \$5.50 = \$ 33.00

3 Laborers 18 hours @ \$2.77 = \$ 49.86

Fringe Benefit Allowance:

34.07% of Labor Charges = \$ 28.23

Equipment Charges:

1 Automobile for 6 hours @ \$0.91 = \$ 5.46

Total Cost of Cold Plastic Markings = \$762.75

Conventionally Painted Lane Lines

If conventional paints had been used to mark the lane lines at Location E, the cost estimate would be as follows:

The cost for painting one foot of four-inch lane line in an urban area is at least three cents.

This cost includes equipment, materials, labor, fringe benefits and subsistence for employees.

1795 feet @ \$0.03 = \$53.85

a = Number of conventional paint applications annually to maintain operational quality for the lane lines
= 3.

b = Cost of one application of paint = \$53.85.

c = Cost of cold plastic lane lines at Location E
= \$762.75.

Y = Service life (in years) for the cold plastic
lane lines to meet the break-even cost of
conventionally painted lane lines:

$$Y = \frac{c}{ab} = \frac{\$762.75}{3(\$53.85)} = 4.72 \text{ years}$$

CONCLUSIONS

1. Cold Plastic Arrows (Overlay Type Installation)

Our tests to date have revealed that cold plastic arrows applied to new bituminous surfaces can be expected to remain in operational condition for at least three years if properly applied. The operational life of cold plastic arrows applied to smooth portland cement concrete surfaces can be expected to maintain operational quality 1.25 years if properly applied. When applied to rough, broken surfaces, the operational life of the cold plastic arrow seems to be less than that of a conventionally painted arrow.

From a break-even cost estimate, a cold plastic arrow which has been installed on an existing pavement (overlaid) should maintain operational quality for eight months in order to be as economical as a conventionally painted arrow.

2. Cold Plastic Lane Lines (Inlay Type Installation)

As the break-even cost estimate revealed, cold plastic lane lines that have been rolled into hot bituminous surfaces would have to remain in operational condition for 4.72 years in order to be as economical as conventionally painted lane lines.

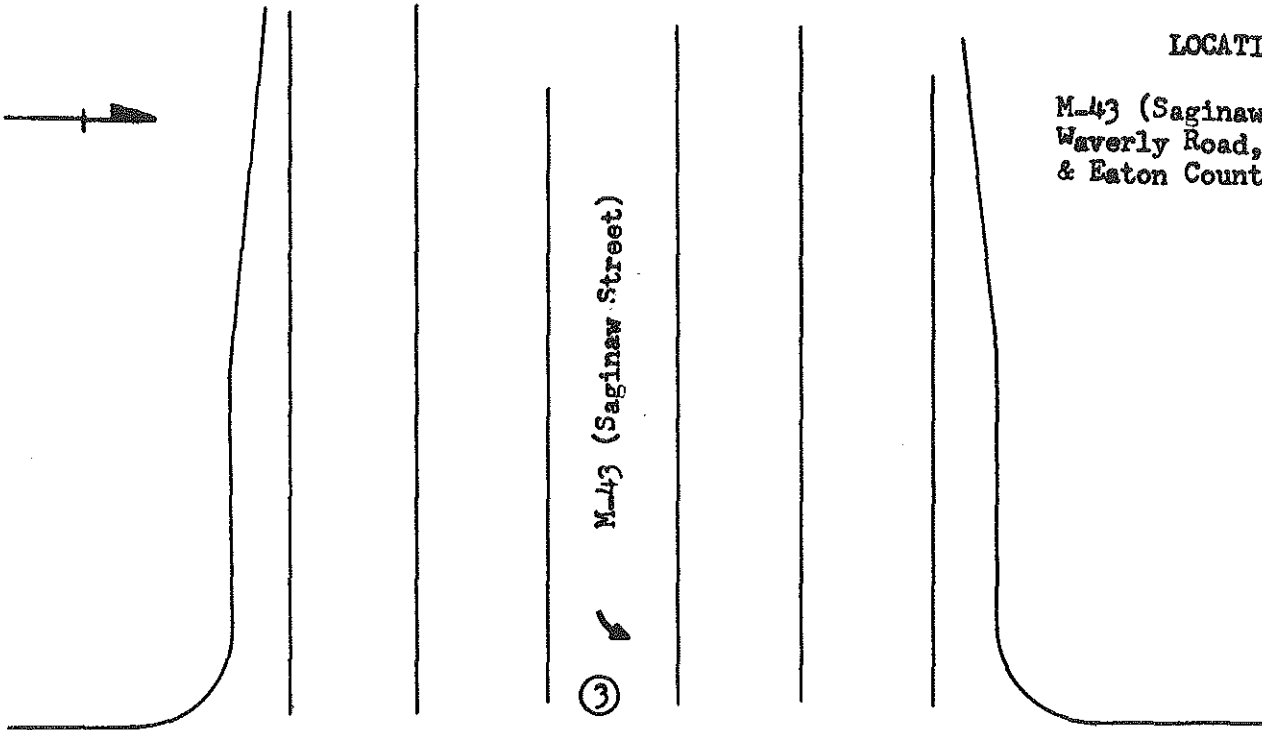
The operational life of inlaid cold plastic lane lines is anticipated to be very close to the life of the new bituminous surface. With the final rolling of the new bituminous surface, the cold plastics are impacted into the hot bituminous material, becoming an integral part of the finished surface.

The other distinct advantage of the cold plastic inlay process is the elimination of temporary pavement marking after completion of the new bituminous surface.

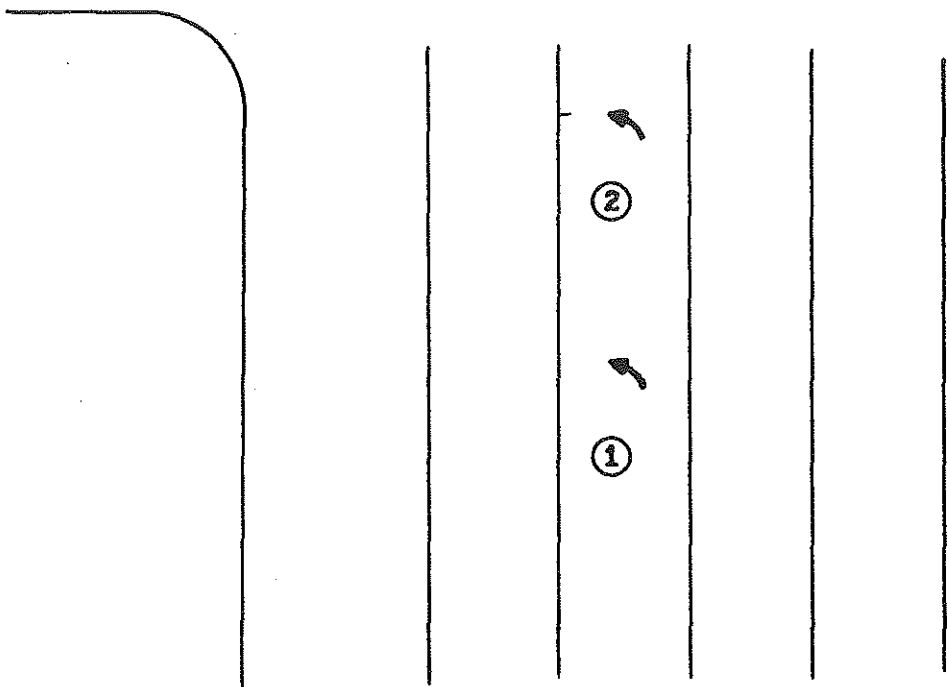
There is no delay in opening the street as is experienced with conventional paints. It is impractical for the Michigan Department of State Highways to schedule highway striping with conventional paints in conjunction with resurfacing projects. For this reason, many freshly paved streets are without markings from three days to three weeks. The cold plastic inlay process eliminates unmarked streets during bituminous surfacing projects. A further advantage of the cold plastic inlay process is the fact that the pavement marking could be included in resurfacing contracts.

LOCATION A

M-43 (Saginaw St.) @
Waverly Road, Ingham
& Eaton Counties



Waverly Road



DESCRIPTION

- ① Holland-Suco
- ② Holland-Suco
- ③ Holland-Suco

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INSTALLATION METHOD

All three arrows were in-
stalled on a bituminous sur-
face which was two months old.

INSTALLATION DATE: 9/20/67

Figure # 1



LOCATION B

West Junction M-66 & M-21, City of Ionia

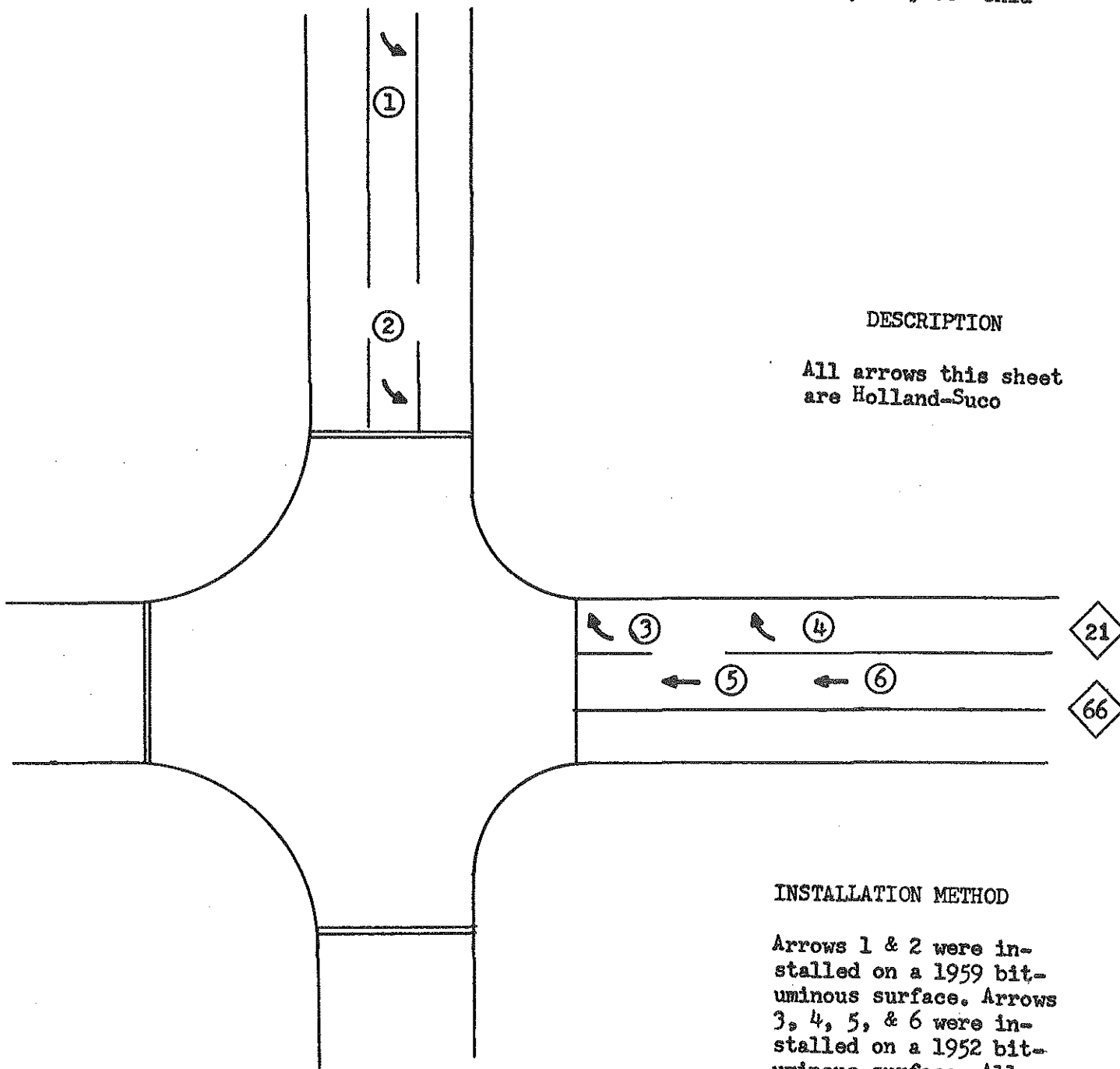
66

1

2

DESCRIPTION

All arrows this sheet are Holland-Succo



21

66

INSTALLATION METHOD

Arrows 1 & 2 were installed on a 1959 bituminous surface. Arrows 3, 4, 5, & 6 were installed on a 1952 bituminous surface. All arrows were rolled with a rubber roller.

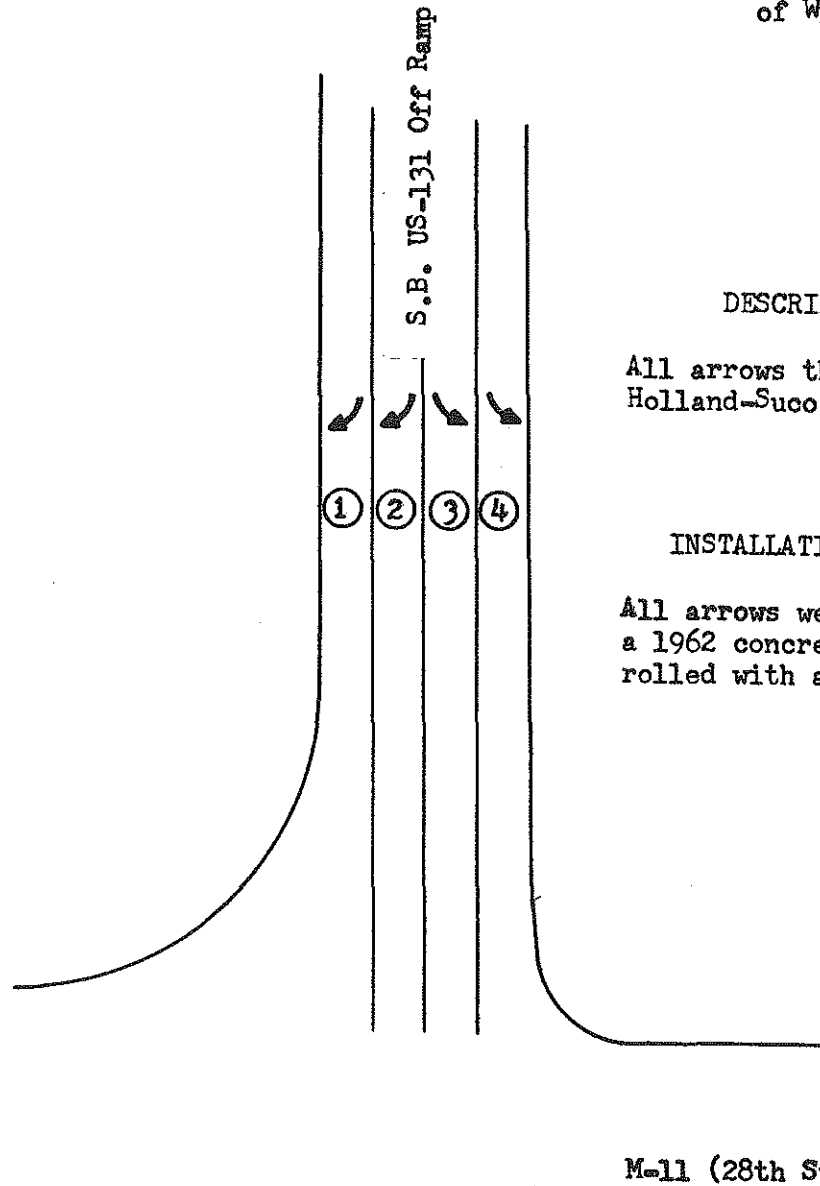
INSTALLATION DATE: 10/14/68

Figure # 2



LOCATION C

S. B. US-131 Off Ramp
to 28th Street, City
of Wyoming



DESCRIPTION

All arrows this sheet are
Holland-Succo

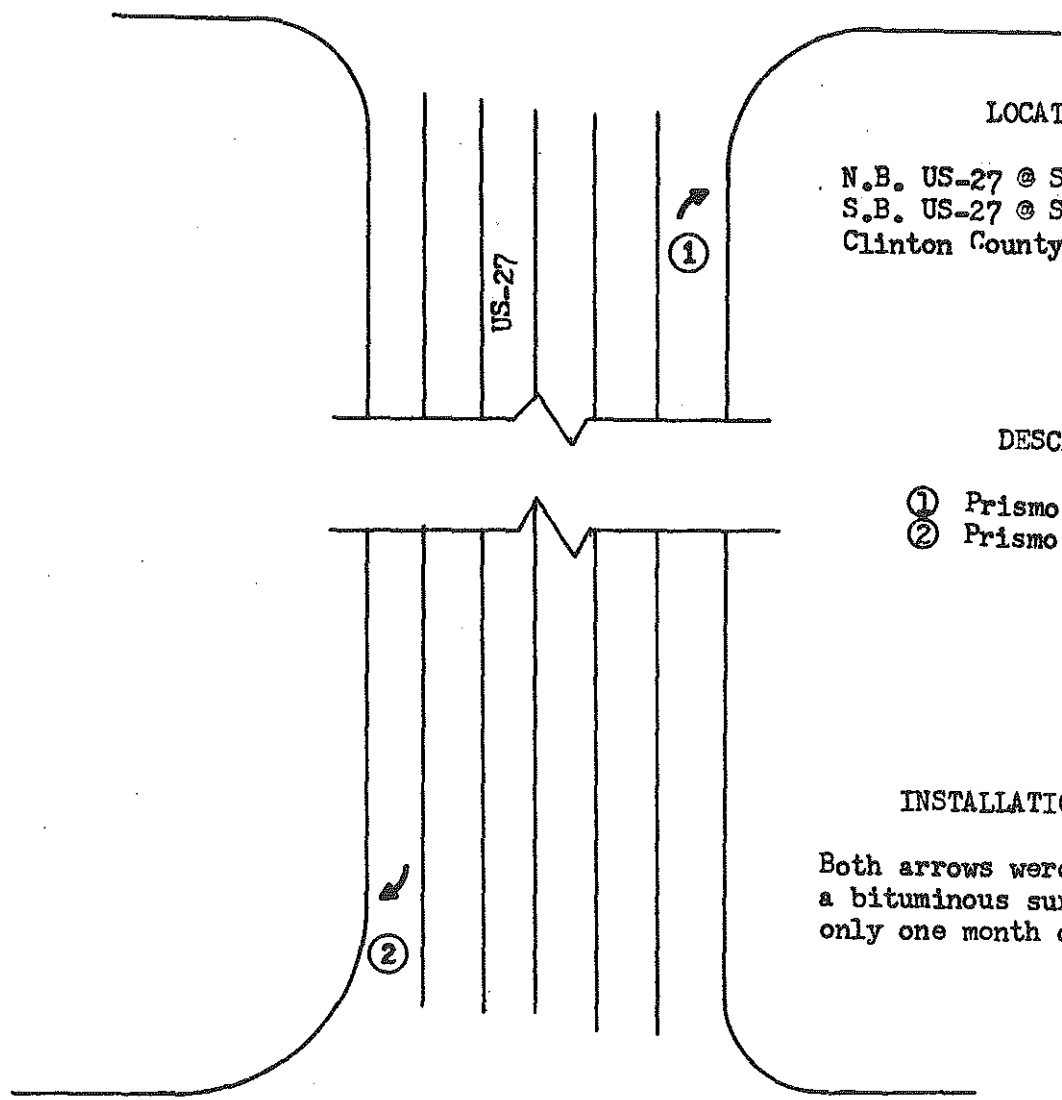
INSTALLATION METHOD

All arrows were installed on
a 1962 concrete surface and
rolled with a rubber roller.

M-11 (28th Street)

INSTALLATION DATE: 10/14/68

State Road



LOCATION D

N.B. US-27 @ State Road &
S.B. US-27 @ Sheridan Road,
Clinton County

DESCRIPTION

- ① Prismo Arrow
- ② Prismo Arrow

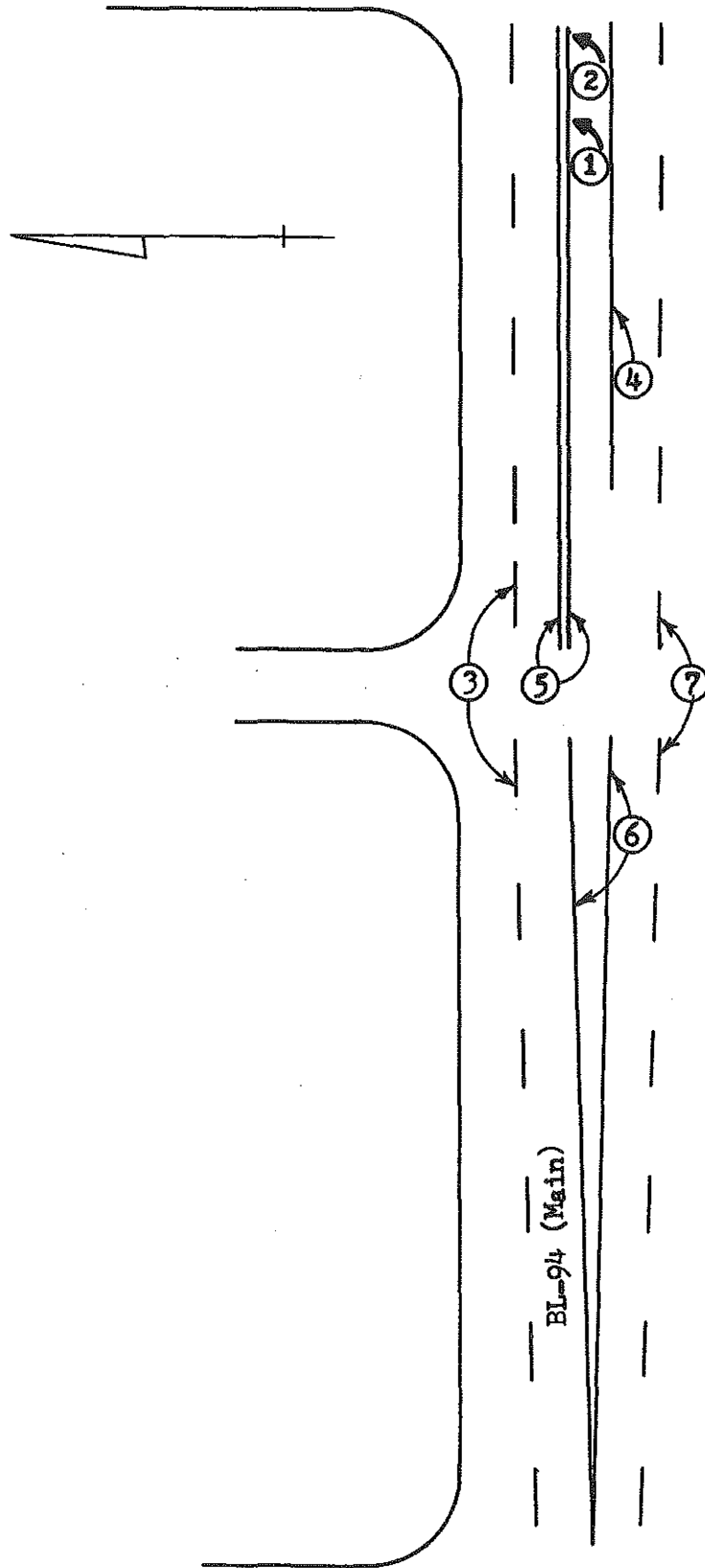
INSTALLATION METHOD

Both arrows were installed on
a bituminous surface which was
only one month old.

Sheridan Road

INSTALLATION DATE: 10/16/68

Figure # 4



LOCATION E

BL-94 (Main) @ East Junction
M-139 (Fair), City of Benton
Harbor

DESCRIPTION

- 1 Holland-Suco Arrow
- 2 Prismo Arrow
- 3 Holland-Suco 4" White Skip Line
- 4 Prismo 4" White Line
- 5 Holland-Suco 4" Double Yellow
- 6 Holland-Suco 4" Yellow-Left
Prismo 4" Yellow-Right
- 7 Prismo 4" White Skip Line

INSTALLATION METHOD

All materials were rolled into 110° F
bituminous during final rolling of the
new surface.

INSTALLATION DATE: 8/28/69

Figure # 5

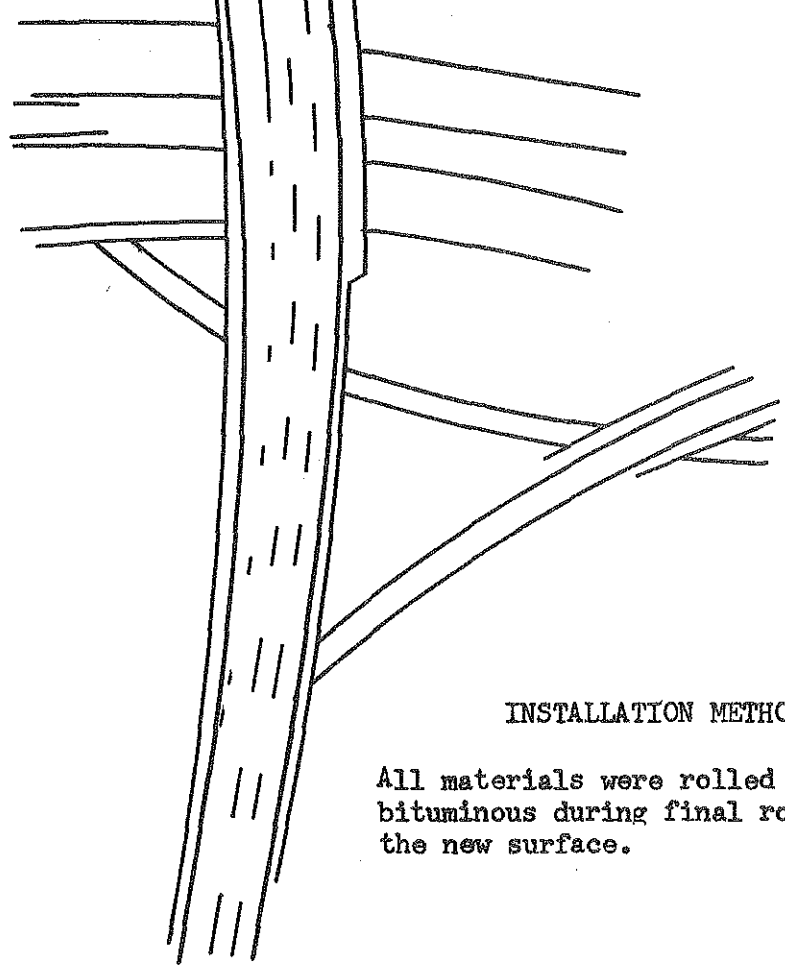


LOCATION F

N.B. Lodge Freeway (US-10)
@ Davison Avenue, City of
Detroit

DESCRIPTION

All of the lane lines, edge lines,
and gore markings shown on this
sheet are Prismo Cold Plastics



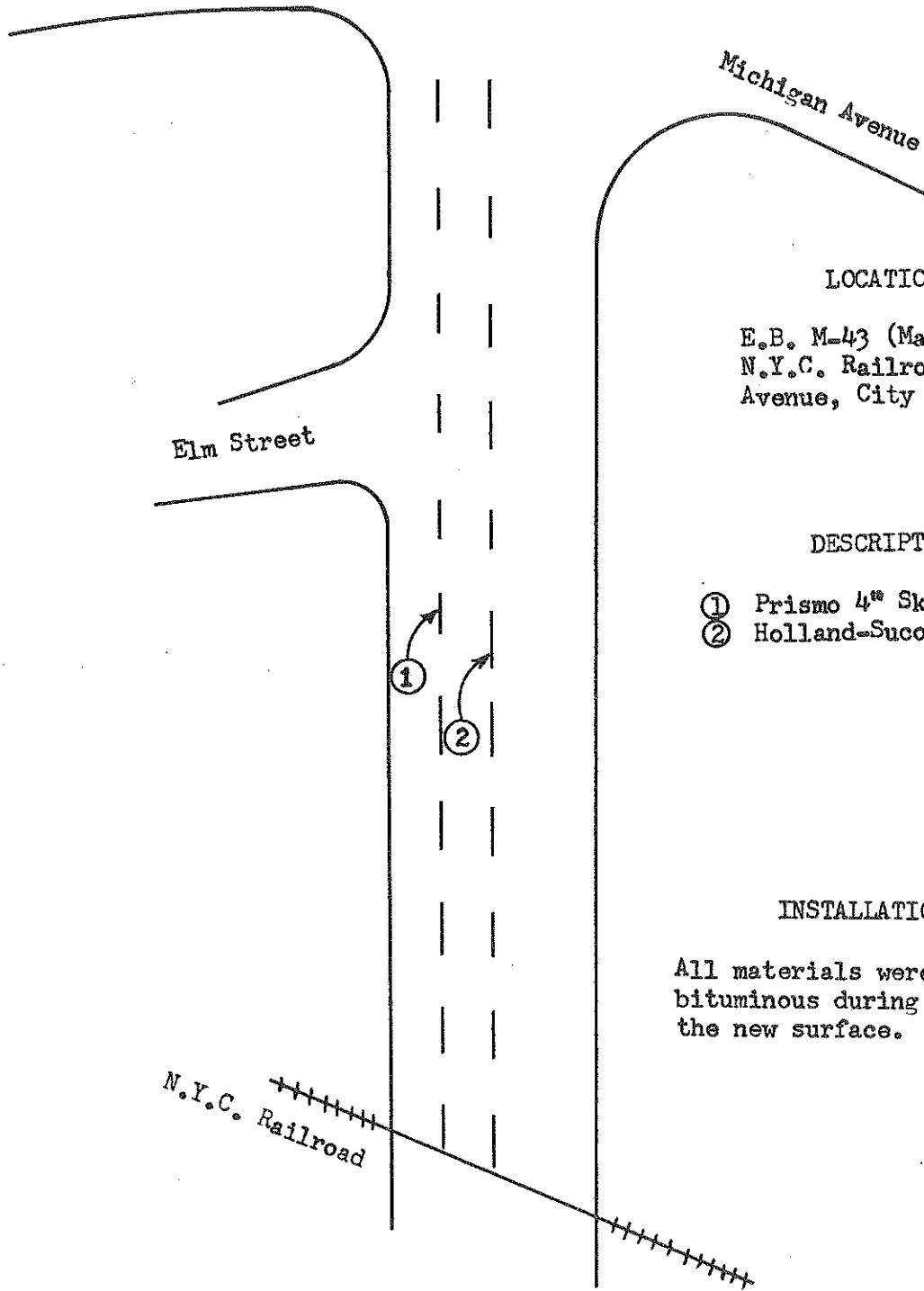
INSTALLATION METHOD

All materials were rolled into 110° F
bituminous during final rolling of
the new surface.

INSTALLATION DATE: 9/1/69

Figure # 6

Z ← +



LOCATION G

E.B. M-43 (Main) Between
N.Y.C. Railroad & Michigan
Avenue, City of Kalamazoo

DESCRIPTION

- ① Prismo 4th Skip Line
- ② Holland-Suco 4th Skip Line

INSTALLATION METHOD

All materials were rolled into 110° F
bituminous during final rolling of
the new surface.

INSTALLATION DATE: 6/22/70

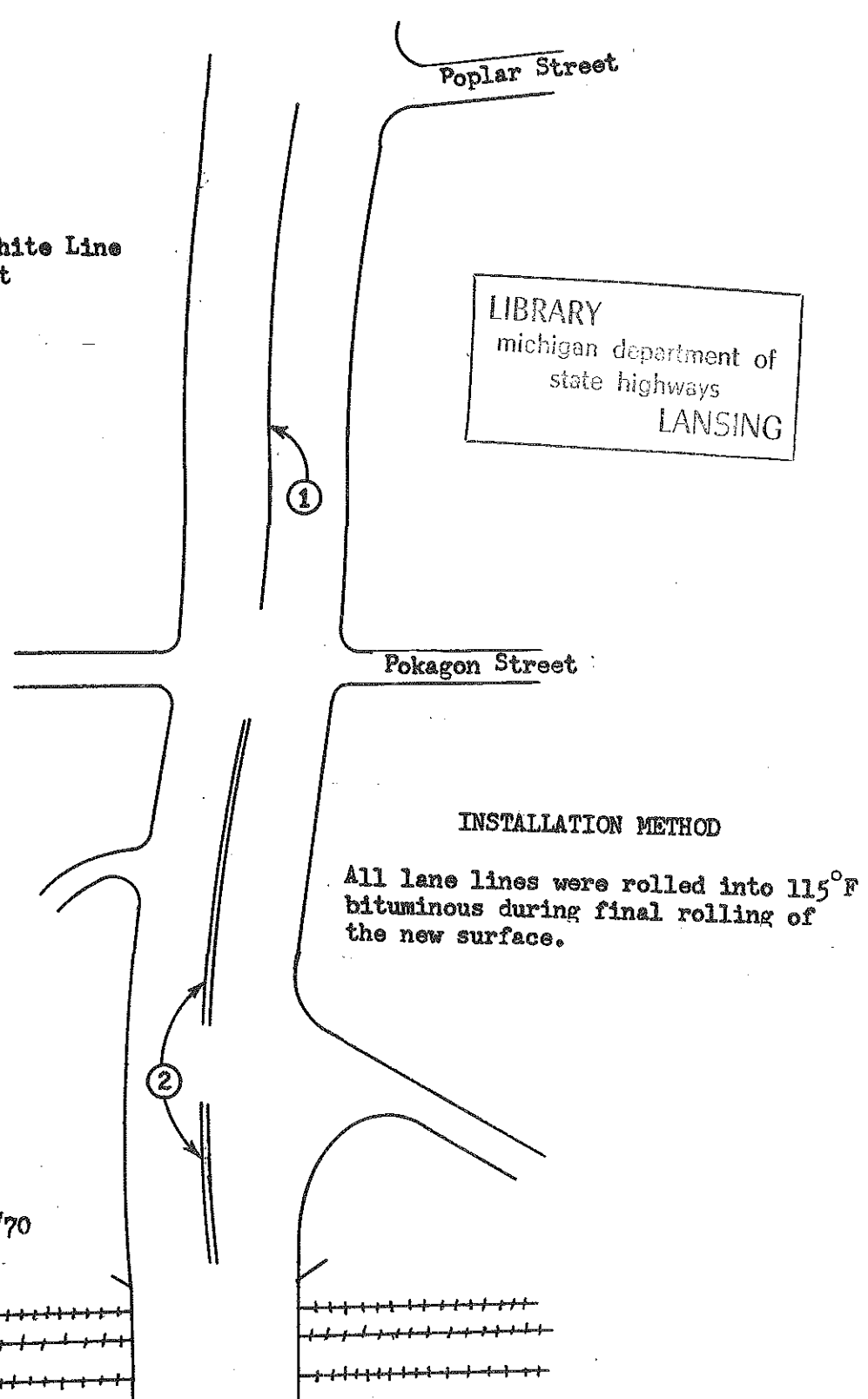
Figure # 7

LOCATION H

M-40 Between Railroad Bridge
& Poplar Street, City of Niles

DESCRIPTION

- 1 Prismo & Holland-Suco 4th White Line
- 2 Holland-Suco 4th Yellow-Left
Prismo 4th Yellow-Right

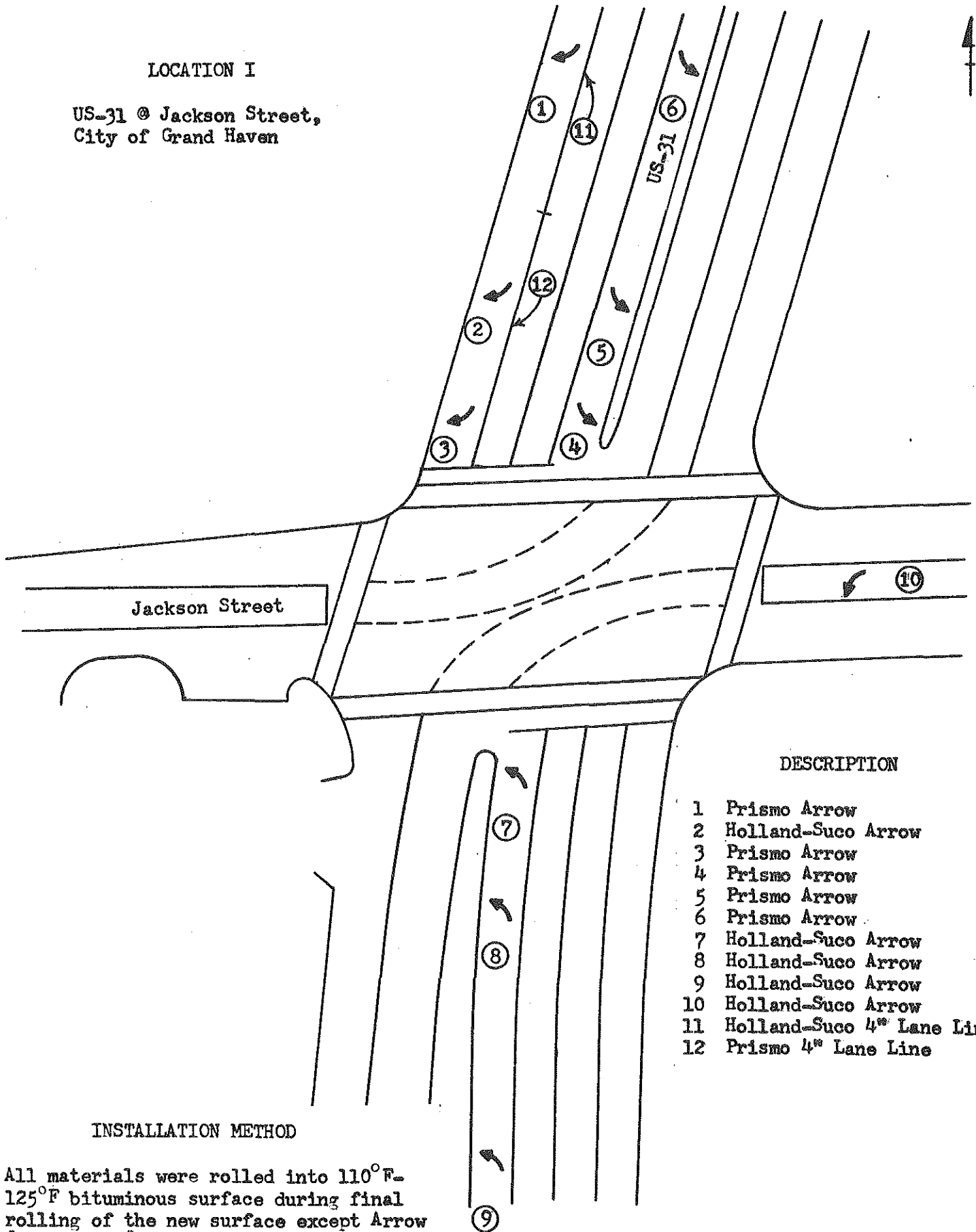


INSTALLATION DATE: 6/19/70

Figure # 8

LOCATION I

US-31 @ Jackson Street,
City of Grand Haven



DESCRIPTION

- 1 Prismo Arrow
- 2 Holland-Suco Arrow
- 3 Prismo Arrow
- 4 Prismo Arrow
- 5 Prismo Arrow
- 6 Prismo Arrow
- 7 Holland-Suco Arrow
- 8 Holland-Suco Arrow
- 9 Holland-Suco Arrow
- 10 Holland-Suco Arrow
- 11 Holland-Suco 4" Lane Line
- 12 Prismo 4" Lane Line

INSTALLATION METHOD

All materials were rolled into 110°F-125°F bituminous surface during final rolling of the new surface except Arrow #10. Arrow #10 was installed on the new bituminous surface after it had cooled.

INSTALLATION DATE: 6/29/70

Figure # 9

N
4
+

LOCATION J

M-37, M-44 @ M-45, City
of Grand Rapids

DESCRIPTION

- 1 Holland-Suco Arrow
- 2 Prismo Arrow
- 3 Holland-Suco Arrow
- 4 Prismo Arrow
- 5 Holland-Suco Arrow
- 6 Prismo Arrow

INSTALLATION METHOD

All six arrows were rolled
into 110°F- 125°F bit-
uminous during the final
rolling of the new surface.

INSTALLATION DATE: 9/3/69

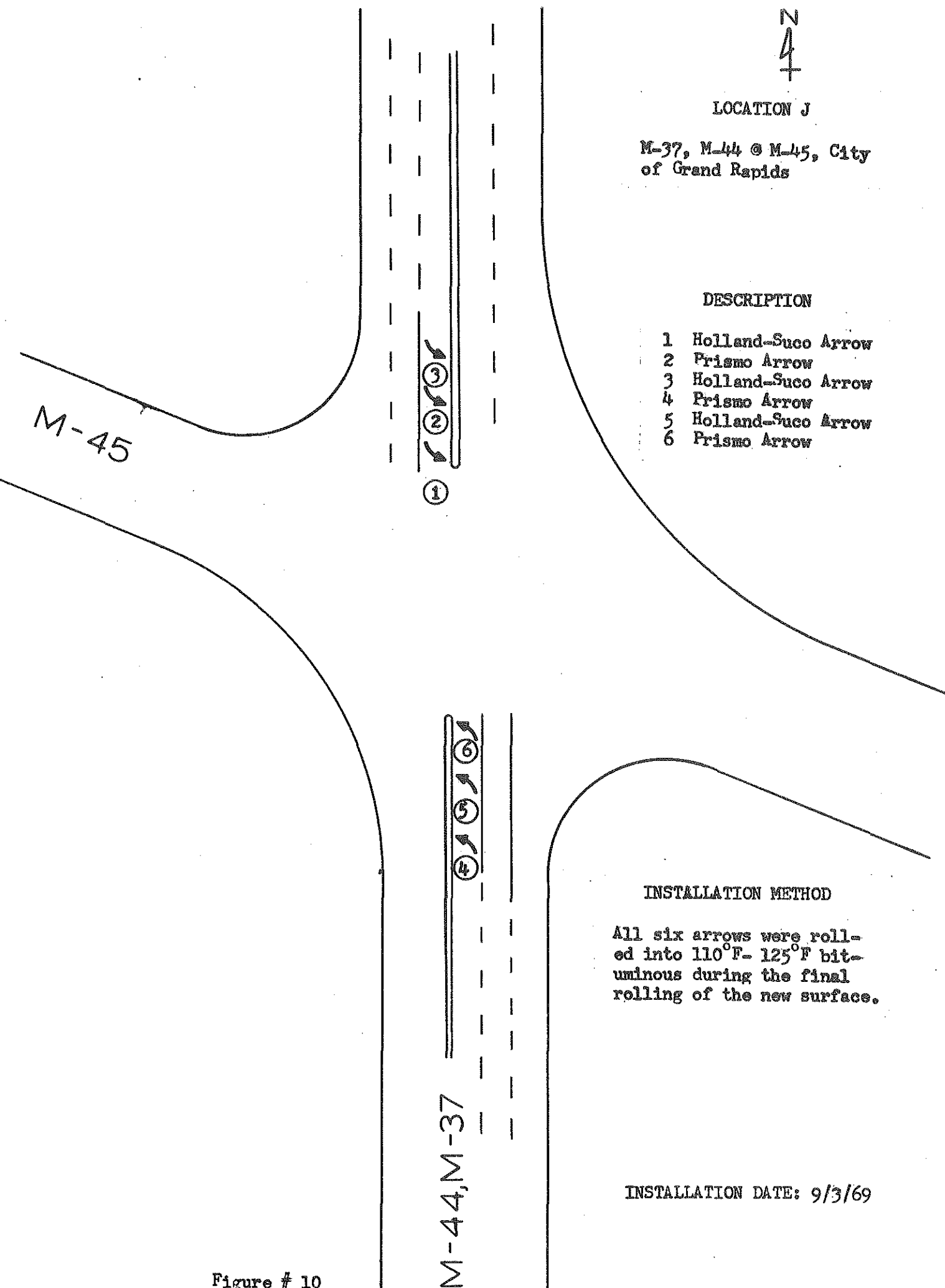


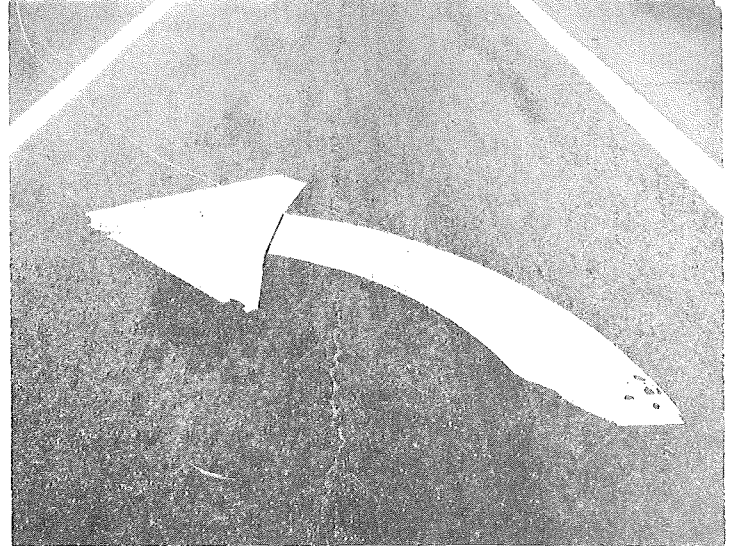
Figure # 10

HOLLAND-SUCO PRESSLAB
LEFT TURN ARROWS
INSTALLED SEPT. 20, 1967
LOCATION A

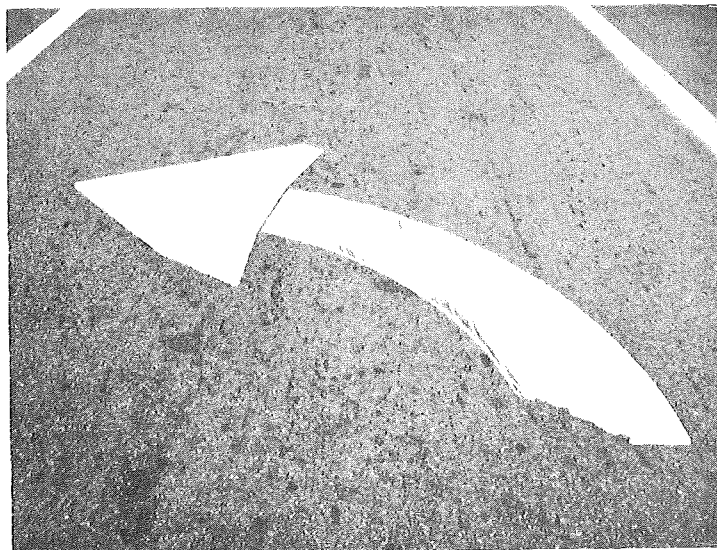
M-43 (Saginaw St.) @
Waverly Road, Ingham
& Eaton Counties



Arrow # 1 Location A 10/27/70



Arrow # 2 Location A 10/27/70



Arrow # 3 Location A 10/27/70

HOLLAND-SUCO PRESSLAB ARROWS
INSTALLED OCTOBER 14, 1968
LOCATION B

West Junction M-66 &
M-21, City of Ionia

Arrow # 1 Location B 10/27/70



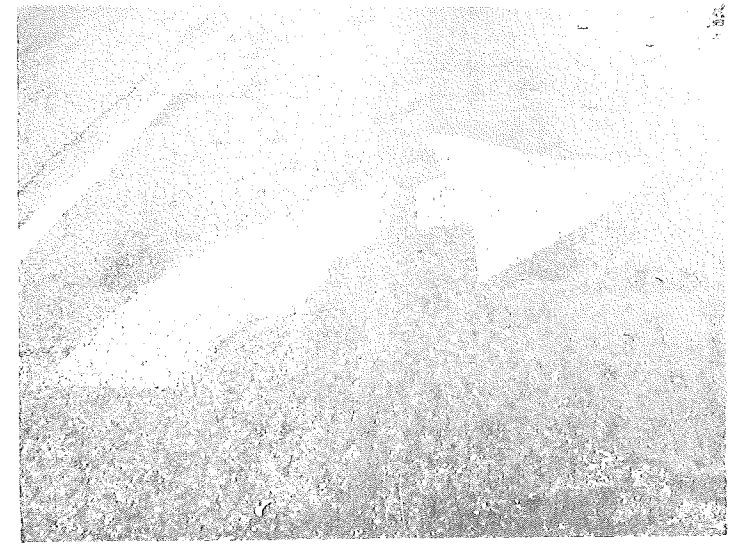
Arrow # 2 Location B 10/27/70



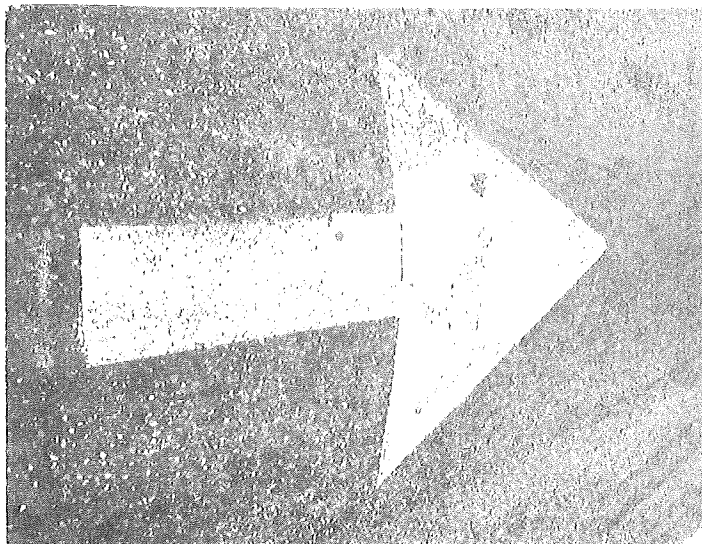
Arrow # 3 Location B 10/27/70



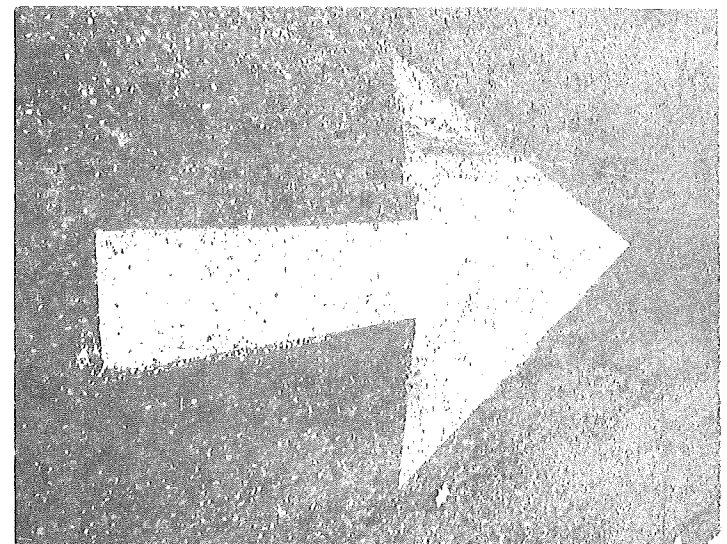
Arrow # 4 Location B 10/27/70



Arrow # 5 Location B 10/27/70



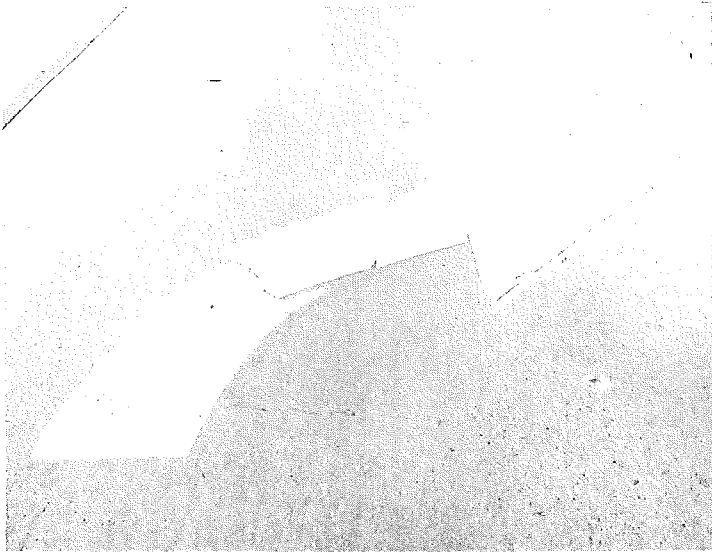
Arrow # 6 Location B 10/27/70



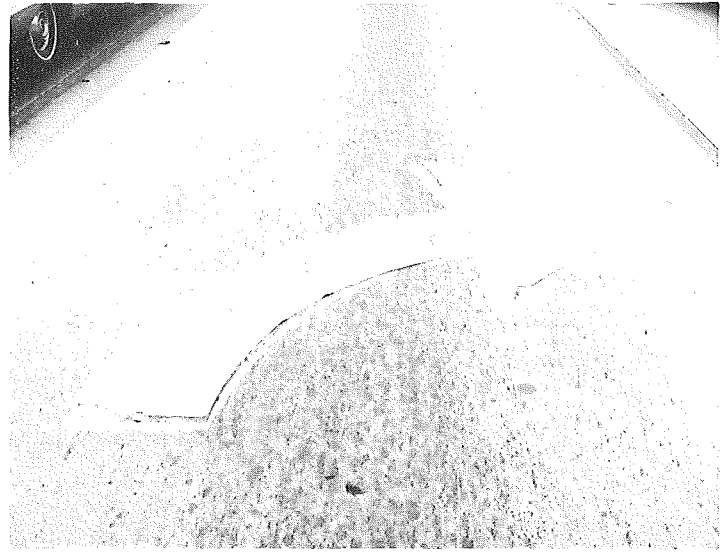
HOLLAND-SUCO PRESSLAB ARROWS
INSTALLED OCTOBER 14, 1968
LOCATION C

S. B. US-131 Off Ramp
to 28th Street, City
of Wyoming

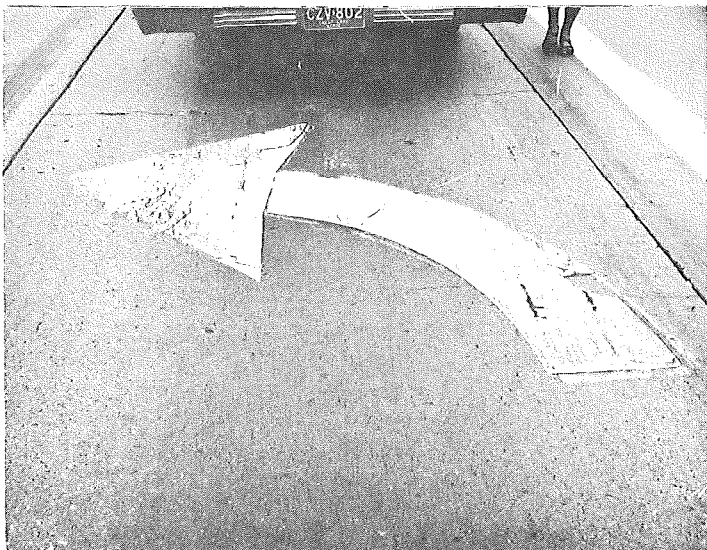
Arrow # 1 Location C 10/27/70



Arrow # 2 Location C 10/27/70



Arrow # 3 Location C 10/27/70



Arrow # 4 Location C 10/27/70



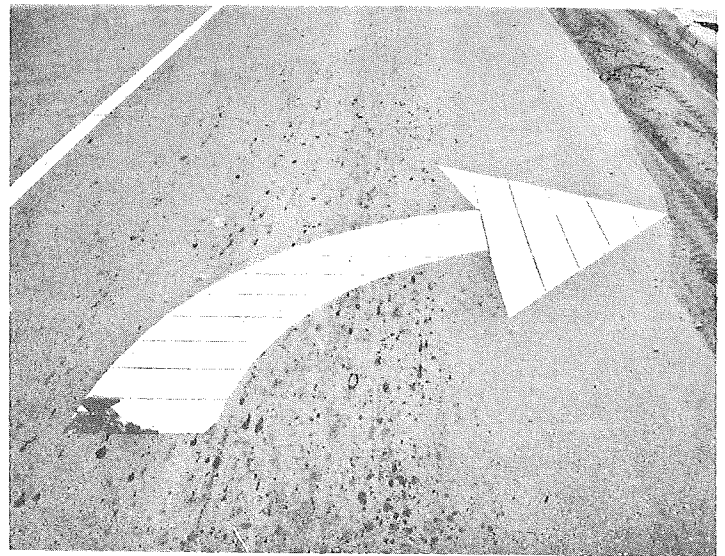
PRISMO COLD PLASTIC
RIGHT TURN ARROWS
INSTALLED OCT. 16, 1968
LOCATION D

N. B. US-27 @ State Road &
S. B. US-27 @ Sheridan Road,
Clinton County

Arrow # 1 Location D 10/27/70

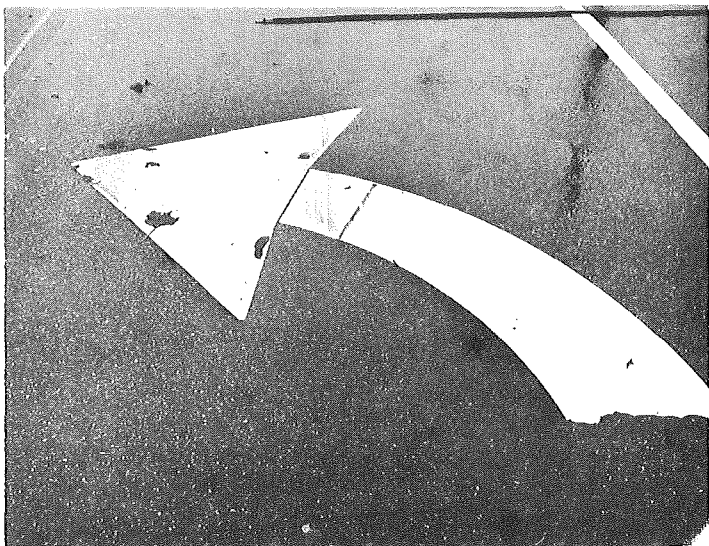


Arrow # 2 Location D 10/27/70

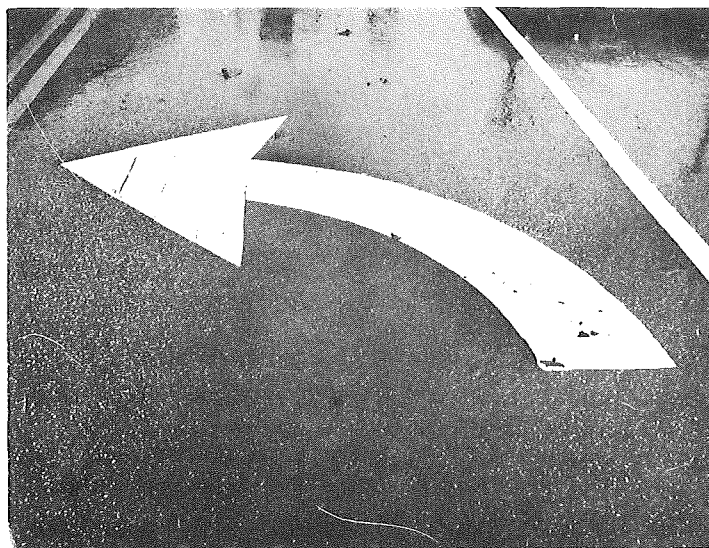


COLD PLASTIC ARROWS AND LANE LINES
INSTALLED AUG. 28, 1969
LOCATION E

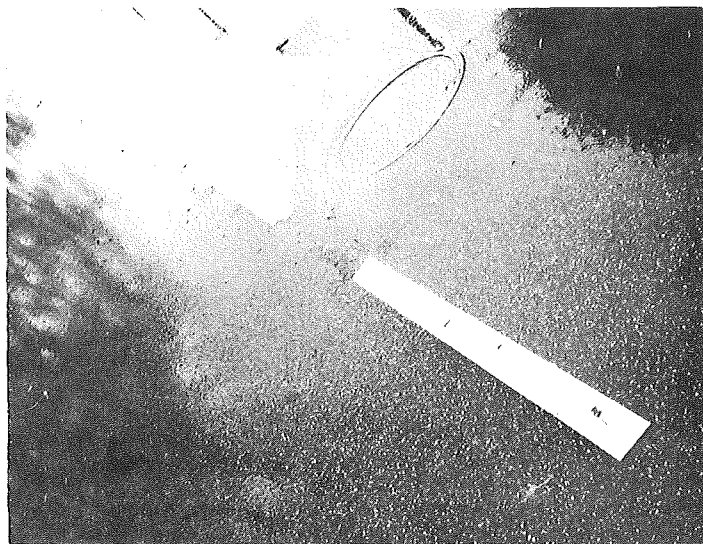
BL-94 (Main) @ East Junction
M-139 (Fair), City of Benton
Harbor



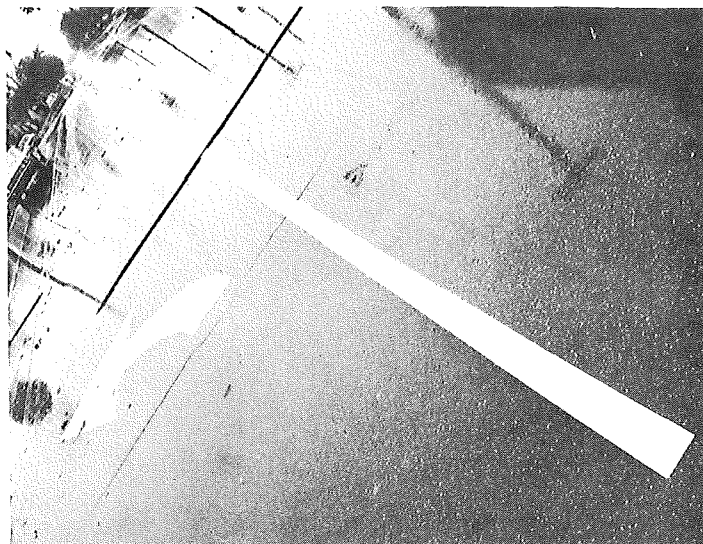
Arrow # 1 Location E 10/28/70
Holland-Suco Left Turn Arrow



Arrow # 2 Location E 10/28/70
Prismo Left Turn Arrow



3 Location E 10/28/70
Holland-Suco 4th White Skip



#4 Location E 10/28/70
Prismo 4th Solid White

COLD PLASTIC LANE LINES
INSTALLED AUG. 28, 1969
Location E

BL-94 (Main) @ East Junction
M-139 (Fair), City of Benton
Harbor



5 Location E 10/28/70
Holland-Suco 4" Double Yellow



#6 Location E 10/28/70
Holland-Suco 4" Yellow-Left
Prismo 4" Yellow-Right

PRISMO COLD PLASTIC LANE
LINES, EDGE LINES AND
GORE MARKINGS
INSTALLED SEPT. 1, 1969
LOCATION F

N.B. Lodge Freeway (US-10)
@ Davison Avenue, City of
Detroit



Location F Looking North 10/28/70

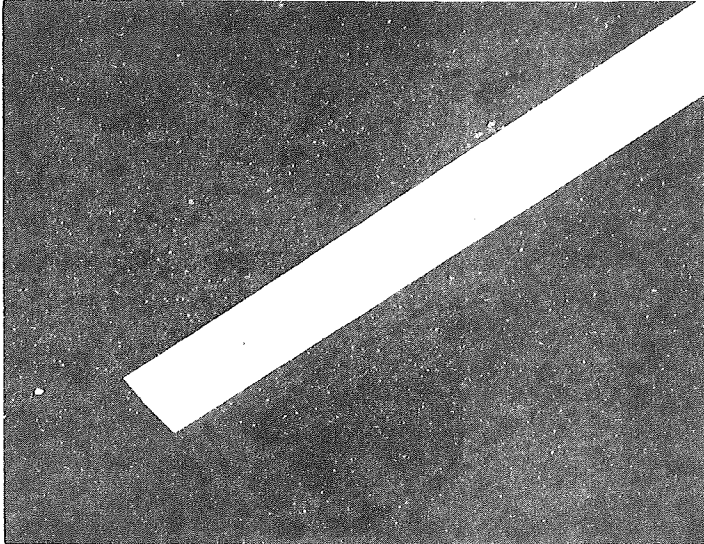


Location F Looking South 10/28/70

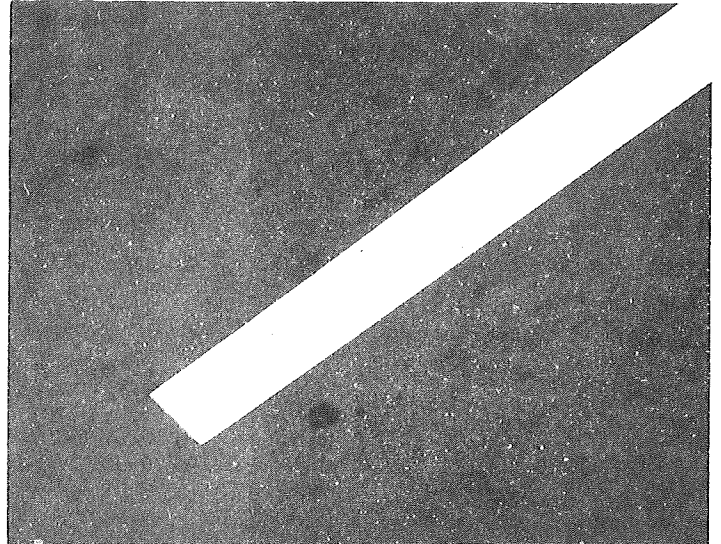
LIBRARY
michigan department of
state highways
LANSING

PRISMO AND HOLLAND-SUCO LANE LINES
INSTALLED JUNE 22, 1970
LOCATION G

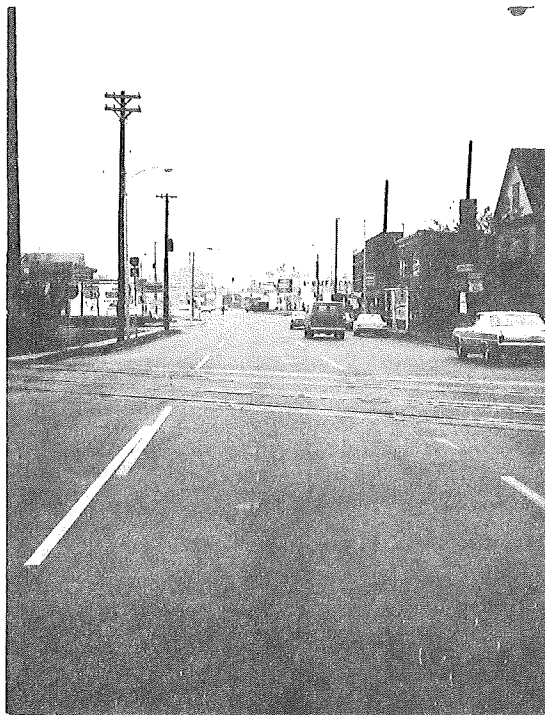
E.B. M-43 (Main) Between
N.Y.C. Railroad & Michigan
Avenue, City of Kalamazoo



1 Location G 10/28/70
Prismo 4" White Skip Line



2 Location G 10/28/70
Holland-Suco 4" White Skip Line



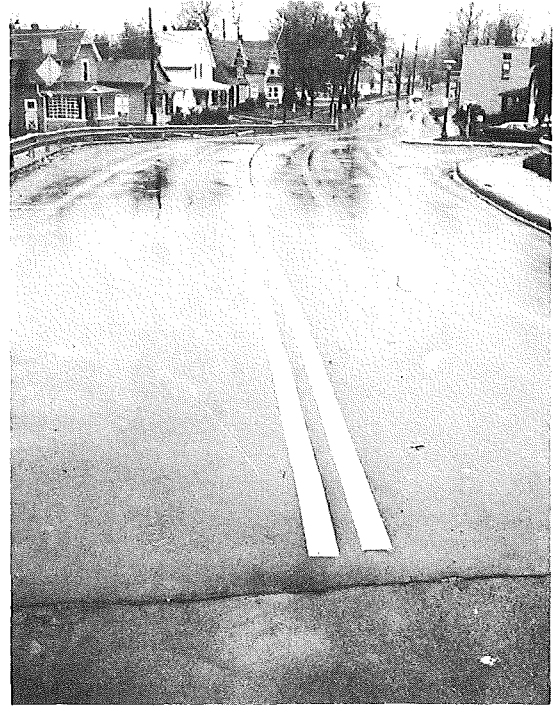
Location G Looking East 10/28/70

HOLLAND-SUCO AND PRISMO LANE LINES
INSTALLED JUNE 19, 1970
LOCATION H

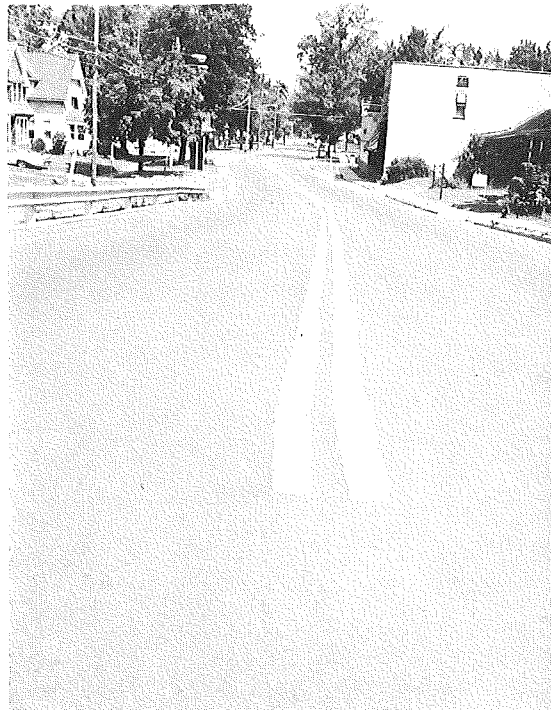
M-40 Between Railroad
Bridge & Poplar Street,
City of Niles



1 Location H 10/28/70
Prismo & Holland-Suco 4" White



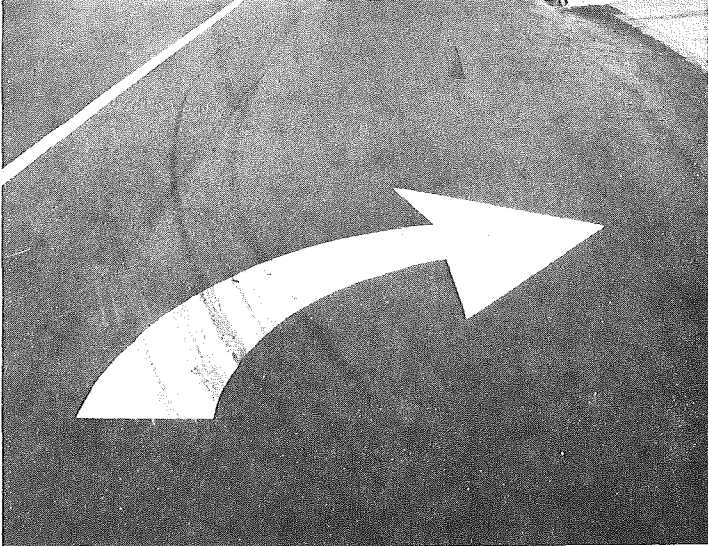
2 Location H 10/28/70
Holland-Suco 4" Yellow Left
Prismo 4" Yellow Right



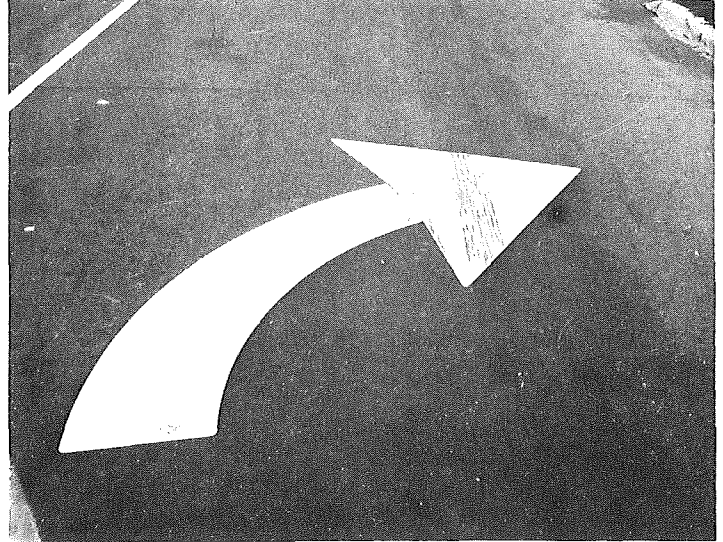
Location H Looking North 10/28/70

PRISMO AND HOLLAND-SUCO ARROWS
INSTALLED JUNE 29, 1970
LOCATION I

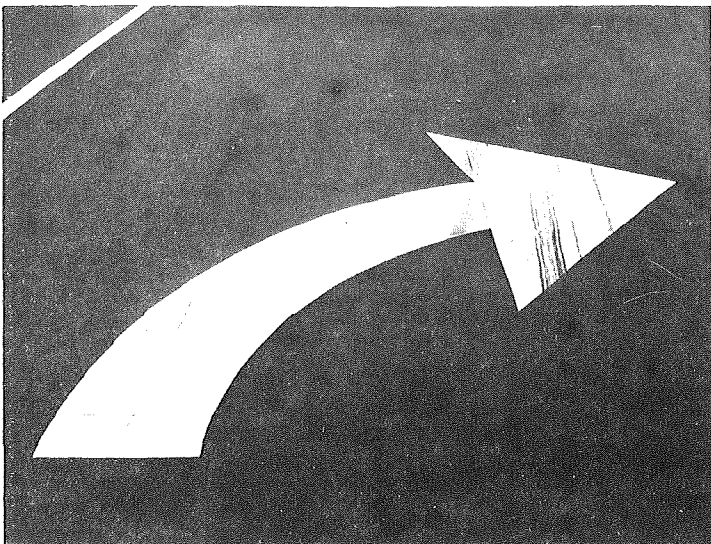
US-31 @ Jackson Street,
City of Grand Haven



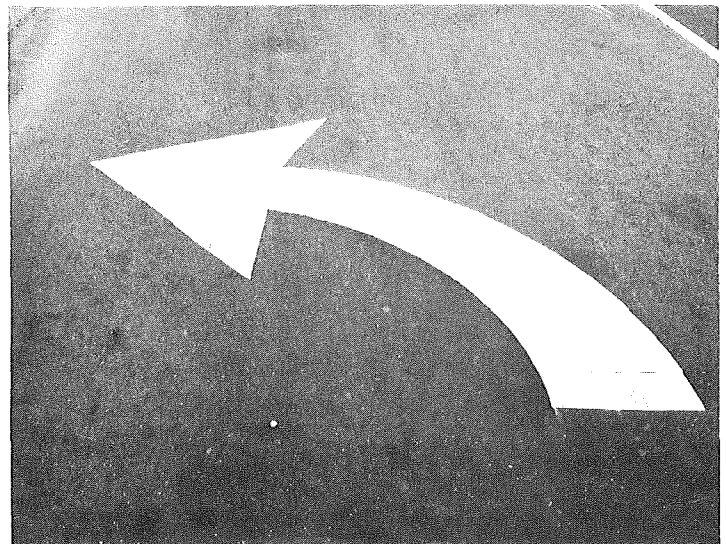
Arrow # 1 Location I 10/27/70
Prismo Right Turn Arrow



Arrow # 2 Location I 10/27/70
Holland-Suco Right Turn Arrow



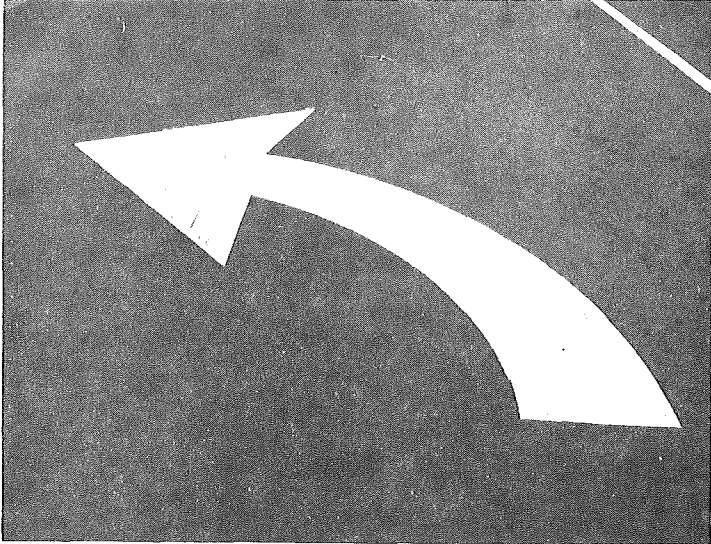
Arrow # 3 Location I 10/27/70
Prismo Right Turn Arrow



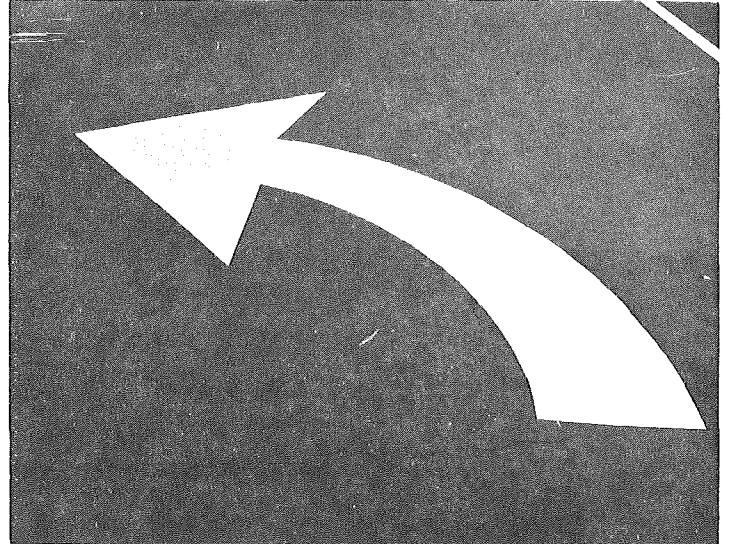
Arrow # 4 Location I 10/27/70
Prismo Left Turn Arrow

PRISMO AND HOLLAND-SUCO ARROWS
INSTALLED JUNE 29, 1970
LOCATION I

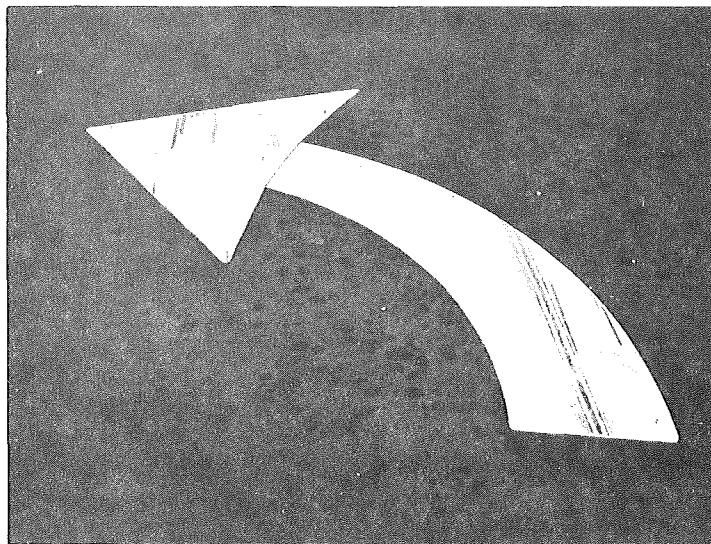
US-31 @ Jackson Street,
City of Grand Haven



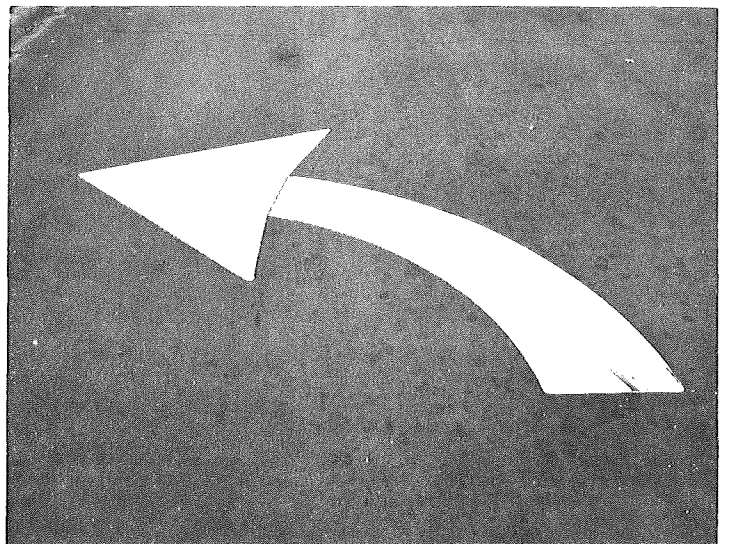
Arrow # 5 Location I 10/27/70
Prismo Left Turn Arrow



Arrow # 6 Location I 10/27/70
Prismo Left Turn Arrow



Arrow # 7 Location I 10/27/70
Holland-Suco Left Turn Arrow



Arrow # 8 Location I 10/27/70
Holland-Suco Left Turn Arrow

PRISMO AND HOLLAND-SUCO COLD PLASTICS
INSTALLED JUNE 29, 1970
LOCATION I

US-31 @ Jackson Street,
City of Grand Haven



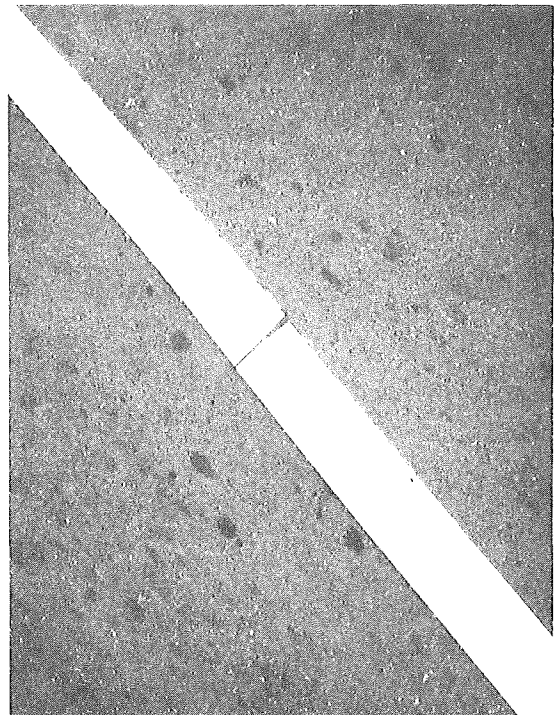
Arrow # 9 Location I 10/27/70
Holland-Suco Left Turn Arrow



Arrow # 10 Location I 10/27/70
Holland-Suco Left Turn Arrow



11 & 12 Location I 10/27/70
Holland-Suco 4" White - Near
Prismo 4" White - Far

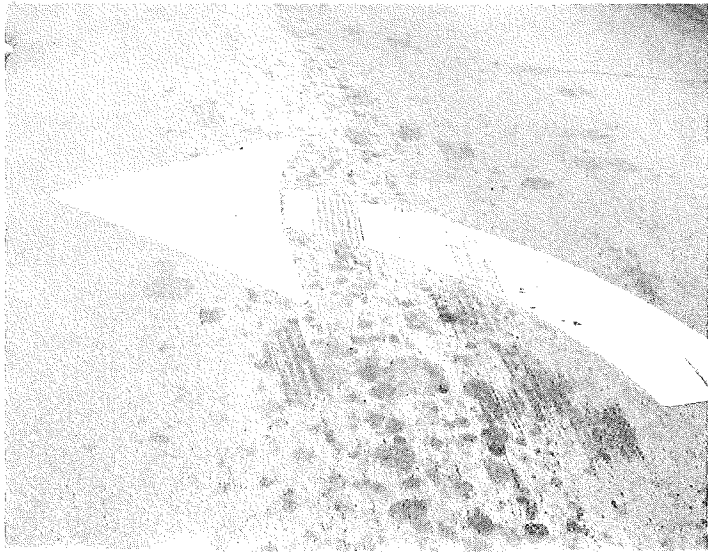


11 & 12 Location I 10/27/70
Holland-Suco 4" White - Lower
Prismo 4" White - Upper

PRISMO AND HOLLAND-SUCO ARROWS
INSTALLED SEPT. 3, 1969
LOCATION J

M-37, M-44 @ M-45, City
of Grand Rapids

Arrow # 1 Location J 10/27/70



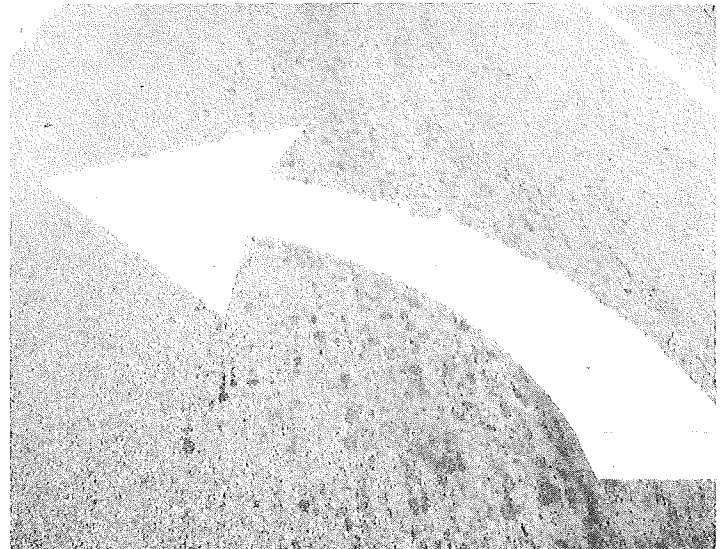
Arrow # 2 Location J 10/27/70



Arrow # 3 Location J 10/27/70



Arrow # 4 Location J 10/27/70



Arrow # 5 Location J 10/27/70



Arrow # 6 Location J 10/27/70

