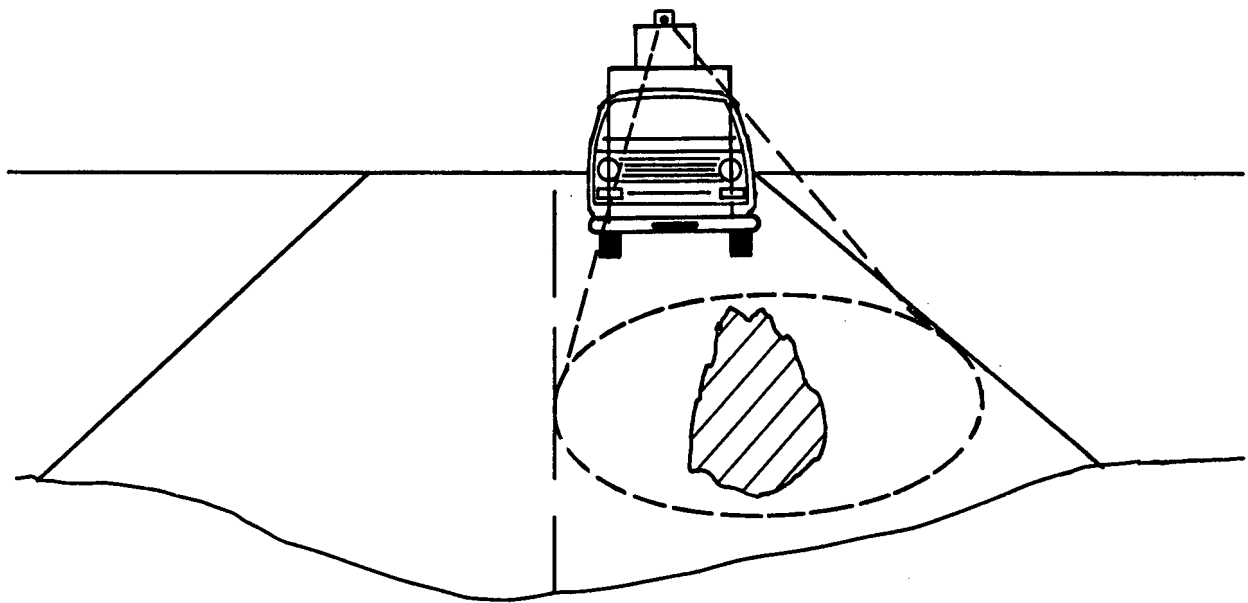


Donohue

IOWA DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION AND IOWA HIGHWAY RESEARCH BOARD

BRIDGE DECK DELAMINATION STUDY INFRARED INSPECTION



1982

RESEARCH PROJECT HR 244

BRIDGE DECK DELAMINATION STUDY
INFRARED INSPECTION
FOR
IOWA DEPARTMENT OF TRANSPORTATION -
HIGHWAY DIVISION
AND
IOWA HIGHWAY RESEARCH BOARD
RESEARCH PROJECT HR-244

Donohue & Associates, Inc.
Engineers & Architects

Project No. 12383.000

Donohue

October 15, 1982

Iowa Department of Transportation
Highway Division
800 Lincoln Way
Ames, Iowa 50010

Attention: Mr. Bernard C. Brown,
Testing Engineer

Re: Bridge Deck Delamination Study -
Infrared Inspection Report
Research Project HR-244
Donohue Project No. 12383.000

Dear Mr. Brown:

We are respectfully submitting our report which summarizes the results of the infrared bridge inspections conducted earlier this year, to identify delamination in the concrete decks. The report, in addition to identifying delamination in the bridge decks inspected, provides a discussion of equipment utilized, procedures, and technical merits of the infrared inspection techniques utilized during this project.

Following your review of this report we would be pleased to meet with you to discuss the material contained herein.

Very truly yours,

DONOHUE & ASSOCIATES, INC.



William D. McElwee, P.E.
Vice President

WDM/pm

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ACKNOWLEDGEMENTS

Iowa Department of Transportation
Highway Division

Bernard C. Brown, Testing Engineer
Vernon J. Marks, Research Engineer

Iowa Highway Research Board

Donohue & Associates, Inc.

William D. McElwee, P.E., Vice President
David W. Baraniak, Technical Specialist
Daniel D. Ulrikson, Project Engineer

RESPONSIBILITY FOR CONTENT

The opinions, findings, and conclusions expressed in this publication are those of the author and not necessarily those of the Highway Division of the Iowa Department of Transportation.

INTRODUCTION

The Iowa Department of Transportation is responsible for maintaining approximately 3800 bridges throughout the State. Of these bridges approximately 3200 have concrete decks. The remaining bridges have been constructed or repaired with a Portland Cement (P.C.) concrete overlay. Surveys of the overlays have indicated a growing incidence of delaminations and surface distress. The need to replace or repair the overlay may be dictated by the amount of delamination in the deck. Additionally, the concrete bridges are periodically inspected and scheduled for the appropriate rehabilitation. Part of this analysis is an assessment of the amount of delamination present in the deck. The ability to accurately and economically identify delamination in overlays and bridge decks is necessary to cost-effectively evaluate and schedule bridge rehabilitation.

There are two conventional methods currently being used to detect delaminations. One is referred to as a chain drag method. The other is an electro-mechanical sounding method (delamtect). In the chain drag method, the concrete surface is struck using a heavy chain. The inspector then listens to the sound produced as the surface is struck. The delaminated areas produce a dull sound as compared to nondelaminated areas. This procedure has proved to be very time consuming, especially when a number of small areas of delamination are present. With the electro-mechanical method, the judgement of the inspector has been eliminated. A device with three basic components, a tapping device, a sonic receiver, and a system of signal interpretation has been developed. This device is wheeled along the deck and the instrument receives and interprets the acoustic signals generated by the instrument which in turn are reflected through the concrete.

A recently developed method of detecting delaminations is infrared thermography. This method of detection is based on the difference in surface temperature which exists between delaminated and nondelaminated concrete under certain atmospheric conditions. The temperature difference can reach 5°C on a very sunny day where dry pavement exists. If clouds are present, or the pavement is wet, then the temperature difference between the delaminated and nondelaminated concrete will not be as great and therefore more difficult to detect.

Infrared thermography was used to detect delaminations in 17 concrete bridge decks, 2 P.C. concrete overlays, and 1 section of continuously reinforced concrete pavement (CRCP) in Iowa. Thermography was selected to assess the accuracy, dependability, and potential of the infrared thermographic technique.

EQUIPMENT

The infrared scanner used for this work was a Model 525 Scanner produced by Inframetrics. This model is a small light-weight field instrument capable of detecting emitted thermal radiation. It produces a standard video signal that allows thermal imagery to be recorded on video tape. This scanner is capable of measuring temperatures in the range of -20°C to 1500°C with a minimum detectable temperature difference of 0.2°C . The Model 525 Scanner is sensitive to the 8 to 12 micron wave length portion of the electromagnetic spectrum. The scanner uses a mercury cadmium telluride (HgCdTe) detector which is cooled by liquid nitrogen. The unit operated in conjunction with a Iso/Line Scan Colorizer produced by Inframetrics so that the full scale, white to black readings, corresponded to a temperature difference of 2.5°C (4.5°F). This was the lowest temperature scale obtainable with this instrument. A 45° expander lens was used, which allowed the operator to view one full pavement lane. A color video camera and recorder were also used to obtain control images of the pavement. This camera is equipped with a zoom lens which allows the field of view of the control image and the infrared image to be matched.

An electronic digital measuring instrument was used to produce footage characters which were superimposed on the infrared picture, and used to reference the imagery to a known starting point. Additionally, a digital contact thermometer was used to measure the temperature differential established between the sound and delaminated pavement.

PROCEDURE

A metal framework was mounted on front of the scanning van. The infrared scanner and the video camera were mounted on the framework and adjusted to a maximum height of 17 feet above the pavement. Black and white video

produced by the infrared camera and color video produced by the control camera were displayed on monitors in the scanning van. From within the van, the operator controlled the quality of the thermographic data being produced. The speed of the scanning van was held constant at approximately two miles per hour.

Once the cameras were in place and the van in position, a reference point at the end of the bridge deck was selected and the distance measuring device was zeroed.

The bridge deck was then scanned. After scanning one or more lanes the van was backed to an area of suspect delamination for the purpose of calibrating the data. The calibration consisted of sounding the pavement with a hammer to confirm the presence of a delamination and taking surface temperature measurements at both a delaminated and non-delaminated area. After the calibration data was collected, the remainder of the deck was scanned.

Traffic control was provided by the Iowa Department of Transportation. This was accomplished by using a combination of arrow trucks and flagmen to alert drivers to move to adjacent lanes. Additionally, emergency flashers, an amber beacon, and a directional arrow were used on the scanning van.

VIDEO ANALYSIS

The analysis procedure involved playback of the video tape produced during the field operation. The video signal was channeled through a series of instruments which produced a photographic strip chart. The infrared and control strip charts were then placed side by side and suspect delaminated areas marked. The delaminated areas show up as white or "hot areas" compared to undelaminated areas which are dark or "cool areas". The control strip chart was then checked to make sure that what was marked as a suspect delamination was not concrete spalling, concrete discoloration caused by oil drippings or other materials, asphalt or concrete patches, or debris along the curb edge. The approximate area of the suspected delaminated area was then calculated along with total bridge surface area, to determine the approximate percentage of deck delamination.

The strip charts showing the conventional and infrared imagery are presented in the appendix to this report. A field data sheet is included with the strip charts for each deck which presents pertinent information as to the weather conditions at the time of the infrared scan and the condition of the deck. The percentage of delamination for each deck is shown on Table 1.

DISCUSSION

During the week of June 14, 1982, Donohue & Associates, Inc. performed an infrared thermographic scan of 19 bridges and 1 section of continuously reinforced concrete pavement. The bridges and pavement were located throughout the northwest quarter and central portion of Iowa. The scanning was undertaken under various environmental conditions to evaluate the technique under typical conditions. During the data collection phase surface temperatures were measured with a digital contact thermometer. Temperature measurements were taken in delaminated and solid areas.

The ability to detect delaminations accurately is dependent upon the temperature differential between the solid and delaminated pavement. The larger the temperature differential the easier it will be detected by the infrared scanner. The temperature differential is dependent upon the depth of the delamination, amount of separation at the delamination, and environmental conditions.

The environmental conditions under which the data was collected is summarized on Table 2 along with the temperature differentials between the solid and delaminated pavement.

The environmental conditions varied on each of the five days that data was collected. These conditions together with the range of temperature differentials are shown in Table 3.

TABLE 1
PERCENT DELAMINATED

<u>Description</u>	<u>Percent</u>
US 65 over US 30 Northbound Lane	30.7%
US 65 over US 30 Southbound Lane	9.8%
Ia 141 over Little Beaver Creek Southbound Driving Lane	4.3%
Ia 141 over Little Beaver Creek Southbound Passing Lane	14.2%
I35 over Raccoon River Southbound Driving Lane	0.2%
I35 over Raccoon River Southbound Passing Lane	1.0%
I35 over Raccoon River Northbound Driving Lane	0.1%
I35 over Raccoon River Northbound Passing Lane	0.2%
9th Street over I-235 Northbound Driving Lane	9.4%
9th Street over I-235 Northbound Passing Lane	23.5%
9th Street over I-235 Southbound Driving Lane	2.4%
9th Street over I-235 Southbound Passing Lane	13.9%
I-235 over Des Moines River Westbound Interchange Lane	29.3%
I-235 over Des Moines River Westbound Driving Lane	23.5%
I-235 over Des Moines River Westbound Center Lane	4.7%
I-235 over Des Moines River Westbound Passing Lane	1.3%

TABLE 1 (cont.)

<u>Description</u>	<u>Percent</u>
I80 over Old Rock Island R.R. Westbound Driving Lane	5.7%
I80 over Old Rock Island R.R. Westbound Passing Lane	7.2%
I80 near Avoca	-0-
Ia 175 over I29 Westbound Lane	12.7%
Ia 175 over I29 Eastbound Lane	3.0%
US 20 over Elliott Creek Westbound Driving Lane	0.5%
US 20 over Elliott Creek Westbound Passing Lane	1.2%
US 75 over Floyd River Southbound Driving Lane	4.8%
US 75 over Floyd River Southbound Passing Lane	4.2%
Ia 3 over Mink Creek Eastbound Lane	0.2%
Ia 3 over Mink Creek Westbound Lane	16.8%
Ia 3 over West Branch Floyd River Eastbound Lane	1.7%
Ia 3 over West Branch Floyd River Westbound Lane	5.3%
Ia 3 over Little Souix River Eastbound Lane	5.7%
Ia 3 over Little Souix River Westbound Lane	6.1%
US 59 over Mill Creek Both Lanes	1.0%

TABLE 1 (cont.)

<u>Description</u>	<u>Percent</u>
US 59 over Gray Creek (225') Both Lanes	9.2%
US 59 over Gray Creek (102') Both Lanes	0.8%
County Road B-63 over Little Souix River Eastbound Lane	13.7%
County Road B-63 over Little Souix River Westbound Lane	15.0%
Kossuth County Road Eastbound Lane	-0-

TABLE 2
SCANNING CONDITIONS BY BRIDGE

<u>Bridge</u>	<u>Date</u>	<u>Time</u>	<u>Ambient Temp. (°F)</u>	<u>Wind Speed (mph)</u>	<u>Sun Conditions</u>	<u>Surface Type</u>	<u>Pavement Solid</u>	<u>Temperature Delamination</u>	<u>Temperature Differential(°F)</u>
US 65 over US 30, Northbound	6/21	10:15 AM	70	10-15	Clear	Concrete	79.5	83.0	3.5
US 65 over US 30, Southbound	6/21	11:00 AM	70	10-15	Clear	Concrete	79.5	83.0	3.5
Ia 141 over Little Beaver Creek, Southbound Driving Lane	6/21	1:30 PM	70	10-15	Partly Cloudy	Concrete	94.0	96.0	2.0
Ia 141 over Little Beaver Creek, Southbound, Passing Lane	6/21	1:45 PM	70	10-15	Partly Cloudy	Concrete	94.0	96.0	2.0
I35 over Raccoon River, Southbound, Driving Lane	6/21	2:30 PM	70	10-15	Cloudy	Concrete	95.0	96.0	1.0
I35 over Raccoon River, Southbound, Passing Lane	6/21	2:45 PM	70	10-15	Cloudy	Concrete	95.0	96.0	1.0
I35 over Raccoon River, Northbound, Driving Lane	6/21	3:00 PM	70	10-15	Partly Cloudy	Concrete	95.0	96.0	1.0
I35 over Raccoon River, Northbound, Passing Lane	6/21	3:20 PM	70	10-15	Partly Cloudy	Concrete	95.0	96.0	1.0
9th Street over I235, Northbound Driving Lane	6/22	10:00 AM	70	Calm	Clear	Concrete	83.0	87.5	4.5
9th Street over I235, Northbound, Passing Lane	6/22	10:15 AM	70	Calm	Clear	Concrete	83.0	87.5	4.5
9th Street over I235, Southbound, Driving Lane	6/22	10:30 AM	70	Calm	Clear	Concrete	83.0	87.5	4.5

TABLE 2 (cont.)
SCANNING CONDITIONS BY BRIDGE

<u>Bridge</u>	<u>Date</u>	<u>Time</u>	<u>Ambient Temp. (°F)</u>	<u>Wind Speed (mph)</u>	<u>Sun Conditions</u>	<u>Surface Type</u>	<u>Pavement Solid</u>	<u>Temperature Delamination</u>	<u>Temperature Differential(°F)</u>
9th Street over I235, Southbound, Passing Lane	6/22	10:40 AM	70	Calm	Clear	Concrete	83.0	87.5	4.5
I235 over Des Moines River, Westbound, Interchange Lane	6/22	11:00 AM	70	Calm	Clear	Concrete	87.5	91.5	4.0
I235 over Des Moines River, Westbound, Driving Lane	6/22	11:30 AM	70	Calm	Clear	Concrete	87.5	91.5	4.0
I235 over Des Moines River, Westbound, Center Lane	6/22	1:00 PM	70	Calm	Clear	Concrete	87.5	91.5	4.0
6 I235 over Des Moines River, Westbound, Passing Lane	6/22	1:10 PM	70	Calm	Clear	Concrete	87.5	91.5	4.0
I80 over Old Rock Island R.R., Westbound Driving Lane	6/22	2:45 PM	80	Calm	Clear	Concrete	96.0	104.5	8.5
I80 over Old Rock Island R.R., Westbound, Passing Lane	6/22	3:05 PM	80	Calm	Clear	Concrete	96.0	104.5	8.5
I80 near Avoca, Both Lanes	6/22	4:30 PM	70	Calm	Clear	CRCP Pavement with overlay	-	-	
Ia 175 over I29, Westbound	6/23	11:00 AM	70	20	Clear	Concrete	82.0	83.0	1.0
Ia 175 over I29, Eastbound	6/23	11:05 AM	70	20	Clear	Concrete	82.0	83.0	1.0
US 20 over Elliott Creek, Westbound, Driving Lane	6/23	12:15 PM	70	20	Clear	Concrete	89.5	91.5	2.0
US 20 over Elliott Creek, Westbound, Passing Lane	6/23	12:45 PM	75	20	Clear	Concrete	89.5	91.5	2.0

TABLE 2 (cont.)
SCANNING CONDITIONS BY BRIDGE

<u>Bridge</u>	<u>Date</u>	<u>Time</u>	<u>Ambient Temp. (°F)</u>	<u>Wind Speed (mph)</u>	<u>Sun Conditions</u>	<u>Surface Type</u>	<u>Pavement Solid</u>	<u>Temperature Delamination</u>	<u>Temperature Differential(°F)</u>
US 75 over Floyd River, Southbound, Driving Lane	6/23	2:30 PM	75	20	Clear	Concrete	97.5	99.5	2.0
US 75 over Floyd River, Southbound, Passing Lane	6/23	2:45 PM	75	20	Clear	Concrete	97.5	99.5	2.0
Ia 3 over Mink Creek, Eastbound	6/23	3:30 PM	75	20	Clear	Concrete	96.5	97.5	1.0
Ia 3 over Mink Creek, Westbound	6/23	3:45 PM	75	20	Clear	Concrete	96.5	97.5	1.0
Ia 3 over West Branch of Floyd River, Eastbound	6/23	4:00 PM	75	20	Clear	Concrete	96.5	97.5	1.0
Ia 3 over West Branch of Floyd River, Westbound	6/23	4:15 PM	75	20	Clear	Concrete	96.5	97.5	1.0
Ia 3 over Little Souix River, Eastbound	6/24	9:00 AM	70	15-20	Partly Cloudy	Concrete	82.0	83.5	1.5
Ia 3 over Little Sioux River, Westbound	6/24	9:15 AM	70	15-20	Partly Cloudy	Concrete	82.0	83.5	1.5
US 59 over Mill Creek, Both Lanes	6/24	9:35 AM	75	15-20	Partly Cloudy	Concrete	-	-	
US 59 over Gray Creek (225'), Both Lanes	6/24	10:00 AM	75	15-20	Partly Cloudy	Concrete	85.0	87.0	2.0
US 59 over Gray Creek (102'), Both Lanes	6/24	10:30 AM	75	15-20	Partly Cloudy	Concrete	86.0	86.5	1.5

TABLE 2 (cont.)

SCANNING CONDITIONS BY BRIDGE

<u>Bridge</u>	<u>Date</u>	<u>Time</u>	<u>Ambient Temp. (°F)</u>	<u>Wind Speed (mph)</u>	<u>Sun Conditions</u>	<u>Surface Type</u>	<u>Pavement Solid</u>	<u>Temperature Delamination</u>	<u>Temperature Differential(°F)</u>
County Road B63 over Little Sioux River, Eastbound	6/24	11:30 AM	80	15-20	Partly Cloudy	Concrete	93.5	95.5	2.0
County Road B63 over Little Sioux River, Westbound	6/24	11:35 AM	80	15-20	Partly Cloudy	Concrete	93.5	95.5	2.0
Kossuth County Road, Eastbound Lane	6/24	3:10 PM	75	20	Partly Cloudy, Rain	Polyster Resizn overlay	-	-	
US 20 Waterloo, Westbound Driving Lane	6/25	Noon	65	Calm	Cloudy	Concrete	-	-	

TABLE 3
SCANNING CONDITIONS BY DAY

<u>Date</u>	<u>Sun Conditions</u>	<u>Wind Speed (mph)</u>	<u>Temperature Differential (°F)</u>
June 21 (Morning)	Clear	10-15	3.5
June 21 (Afternoon)	Partly Cloudy to Cloudy	10-15	1.0-2.0
June 22	Clear	Calm	4.0-8.5
June 23	Clear	20	1.0-2.0
June 24	Partly Cloudy, Cloudy, Rain	15-20	1.0-2.0
June 25	Cloudy	Calm	None

As can be seen from Table 3 the best conditions were experienced on the morning of June 21st and all day on June 22nd. During these times clear skies were experienced with wind conditions less than 15 mph. The temperature differentials ranged from 3.5 to 8.5°F.

The effect of winds above approximately 15 mph can be seen by comparing the June 22nd and June 23rd results. On both days clear conditions were experienced, however on June 22nd the wind was calm and on June 23rd a wind of approximately 20 mph was experienced. The temperature differential on June 22nd ranged between 4.0 to 8.5°F while on June 23rd a temperature differential of only 1.0 to 2.0°F was recorded. It appears that the high winds on June 23rd swept the heat from the pavement, thereby cooling the delaminated areas.

The effect of cloud cover can be seen by comparing the results of June 21 (morning) to June 21 (afternoon), June 24 and June 25. On June 21 (morning) clear conditions were experienced. On June 21 (afternoon), June 24 and June 25 partly cloudy, clouds and rain conditions were experienced. Wind conditions were the same for all three days. On June 21 (morning) a temperature differential of 3.5°F was recorded while on June 21 (afternoon), June 24 and June 25 a temperature differential between 0.0 to 2.0°F was experienced. Clear skies are necessary to heat the pavement surface and establish a temperature differential.

Larger temperature differentials are easier and more accurately identified. This can be seen by comparing the strip charts produced on June 21 (morning) and June 22 to the other days. If we look at the results of US 65 over US 30, 9th Street over I-235 and I-80 over Old Rock Island R.R. it can be seen that the delaminations can be clearly identified. On the other hand, the delaminations of Ia 3 over Mink Creek, Ia 3 over West Branch of Floyd River, or US 59 over Gray Creek, are very difficult to identify, especially if oil droppings, wheel track discolorations and other surface discolorations are present.

The accuracy of the delamination data decreases as the temperature differential decreases. Identification of delaminations on strip charts is difficult on those bridges with a temperature differential of less than 3.5°F. Temperature differentials of 1.0 to 2.0°F produce only subtle differences and cannot be positively differentiated from other surface discolorations.

When inspecting Ia 3 over the West Branch, a build-up of heat along the curb and retaining wall of Floyd River Eastbound Lane, was identified. This bridge is aligned in an East-West direction. A prevailing southerly wind of 20 mph retained heat along the south edge of the deck. This build-up of heat masked any delaminations by causing a complete washout of the infrared image in approximately the first 8 feet of the deck. This can be seen on the infrared strip chart presented in the Appendix.

CONCLUSIONS

The following general conclusions can be made regarding this study:

1. Infrared thermography can be used to accurately detect delamination in concrete surfaces.
2. Proper environmental conditions must be experienced to accurately identify the delaminations. These include dry pavement, clear skies and wind conditions generally less than 15 mph.

APPENDIX A
STRIP CHARTS

Donohue

Engineers & Architects

INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 10:15 a.m.

CREW JSK/DDU

LOCATION US 65 over US 30

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 79.5°F

LANE VIEWING North Bound

DELAMINATED 83.0°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 0 TO 170

FROM 0 TO 170

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

FILM-PICTURE

No patches

Minor debris along curb

Note: Scale differs for each bridge, and must be
calculated based on known length.

Donohue

Engineers & Architects

INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 11:00 am

CREW JSK/DDU

LOCATION US 65 over US 30

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 79.5°F

LANE VIEWING South Bound

DELAMINATED 83.0°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 170 TO 250

FROM 170 TO 260

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

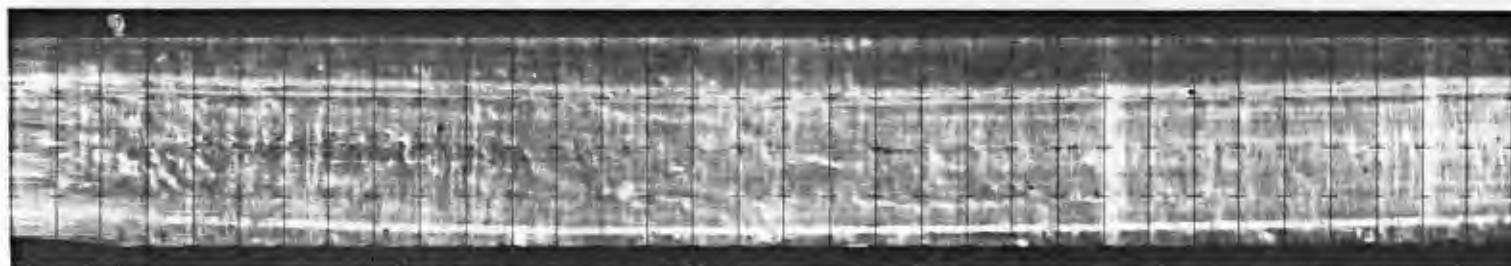
FILM-PICTURE

US 65 OVER US 30
NORTHBOUND LANE

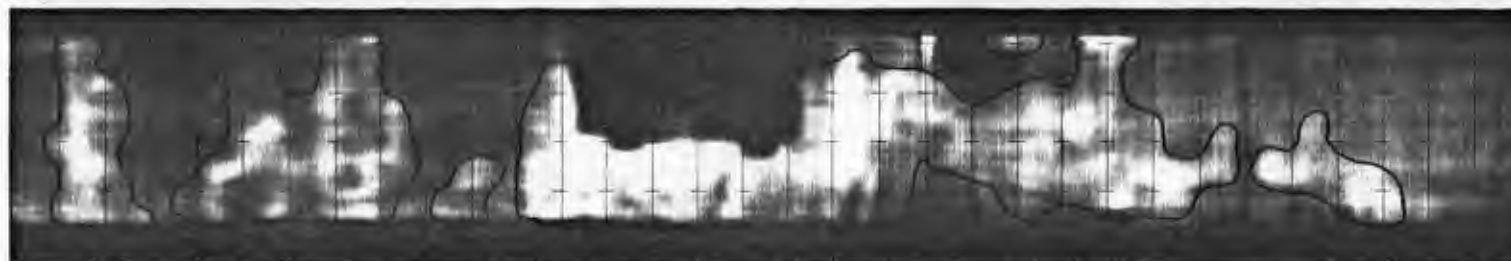


INFRARED IMAGE

A

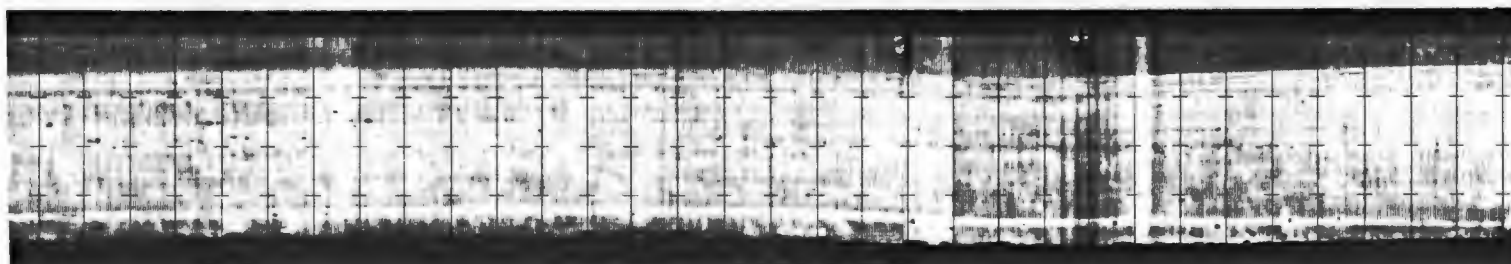


REAL LIFE IMAGE



INFRARED IMAGE

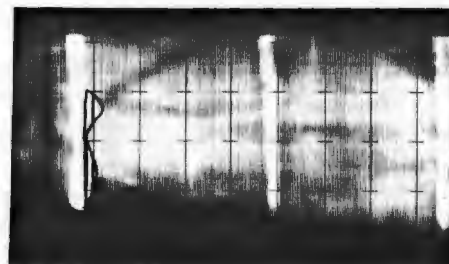
B



REAL LIFE IMAGE

 PATCHES

 SUSPECT DELAMINATIONS



B



Donohue

Engineers & Architects

INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 11:00 am

CREW JSK/DDU

LOCATION US 65 over US 30

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 79.5°F

LANE VIEWING South Bound

DELAMINATED 83.0°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 170 TO 250

FROM 170 TO 260

COLORIZER SETTING .25x/10

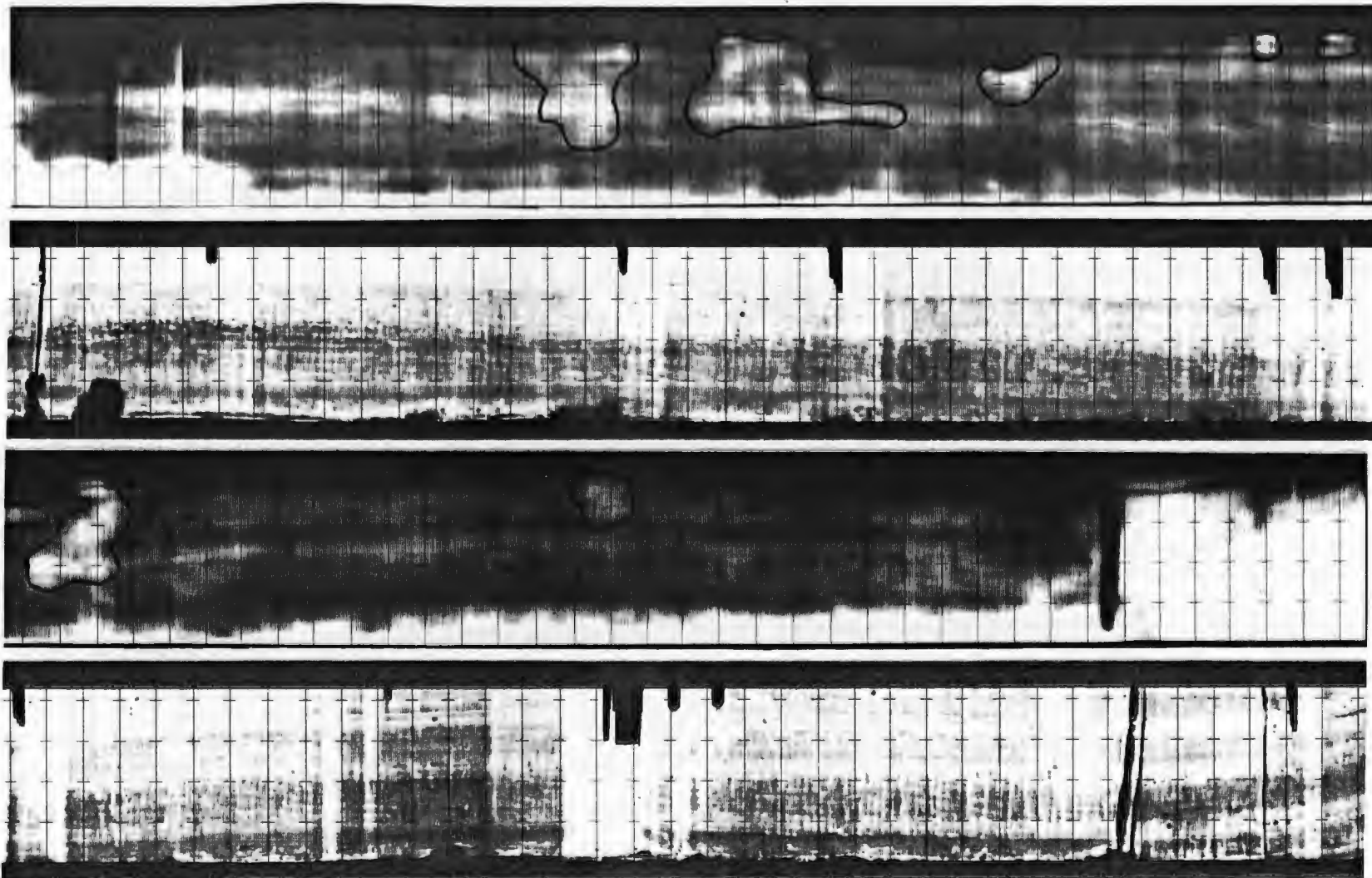
ZERO SETTING Expansion Joint

SKETCH:

REMARKS

FILM-PICTURE

US 65 OVER US 30
SOUTHBOUND LANE



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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 1:30 pm

CREW JSK/DDU

LOCATION Ia 141 over Little Beaver

TEMPERATURE 70°

WIND SPEED Creek

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Partly Cloudy

SOLID 94°F

LANE VIEWING South Bound Driving Lane

DELAMINATED 96°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 251 TO 342

FROM 258 TO 356

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

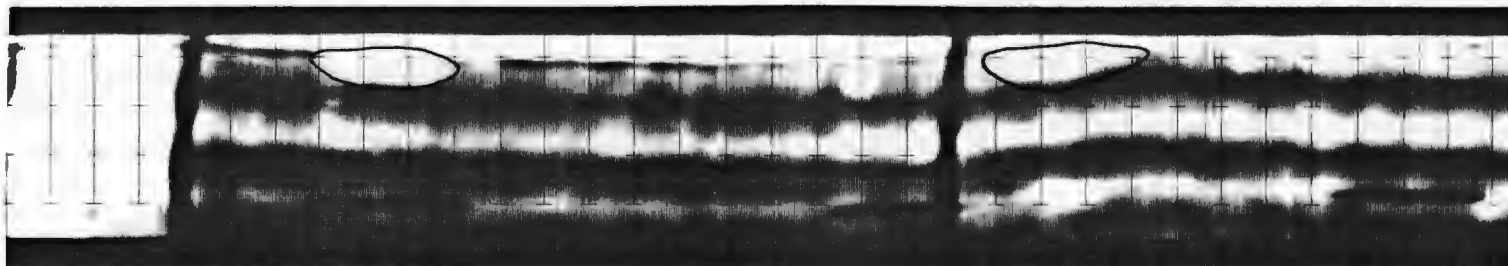
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REMARKS

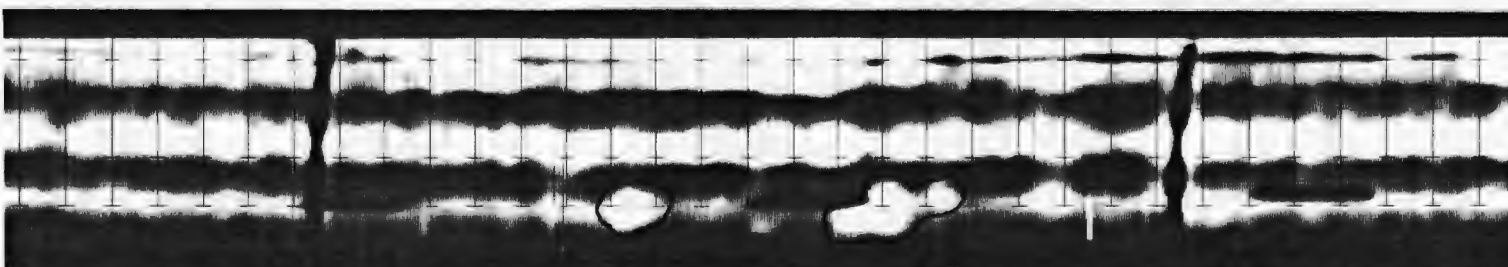
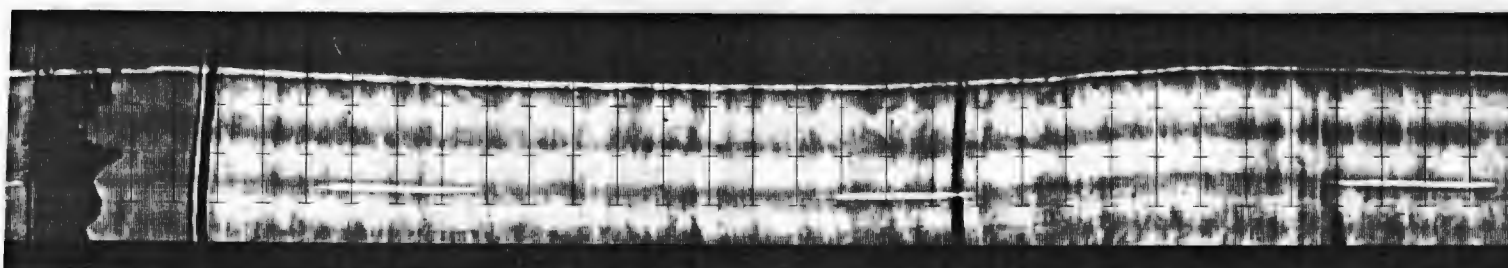
FILM-PICTURE

IOWA 141 OVER LITTLE BEAVER CREEK
SOUTHBOUND DRIVING LANE

1 OF 2

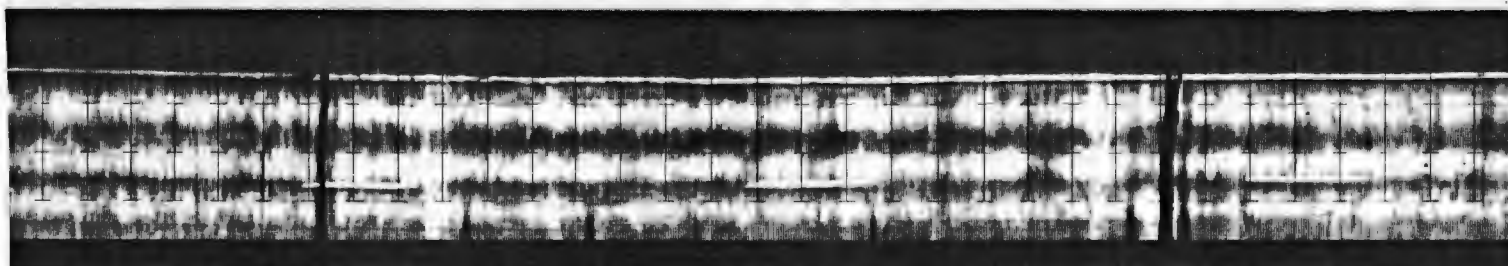


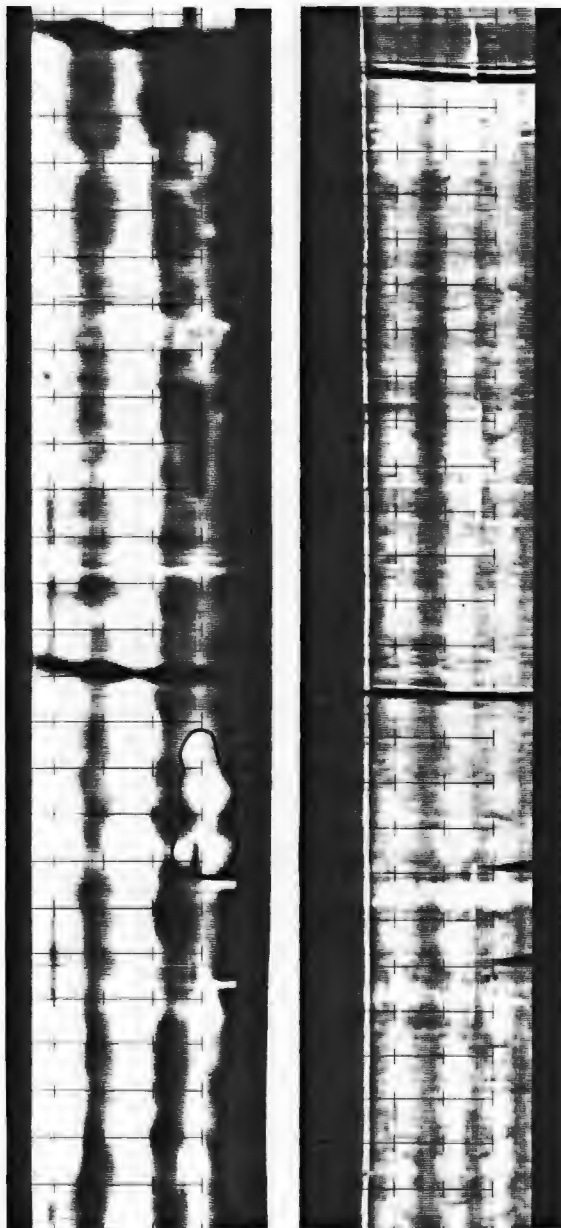
A



A

B





B

Donohue

Engineers & Architects

INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 1:45 pm

CREW JSK/DDU

LOCATION Ia 141 over Little Beaver

TEMPERATURE 70°

WIND SPEED Creek

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Partly Cloudy

SOLID 94°F

LANE VIEWING South Bound Passing Lane

DELAMINATED 96°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 342 TO 449

FROM 356 TO 435

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

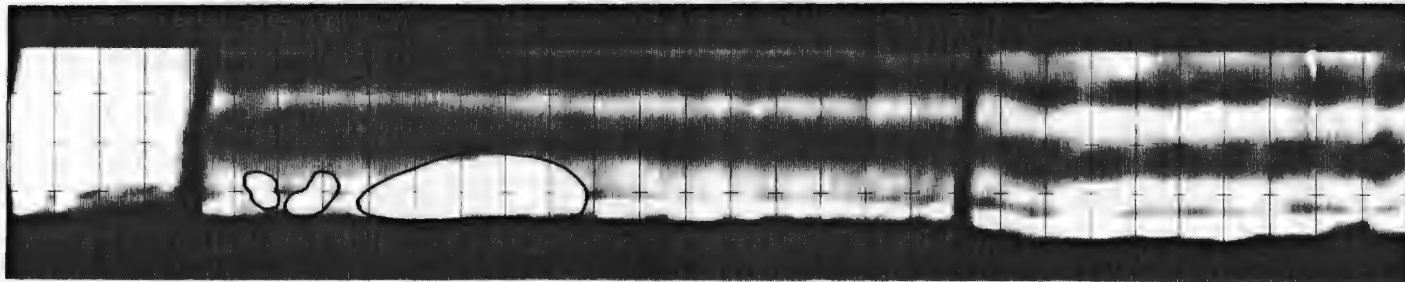
SKETCH:

REMARKS

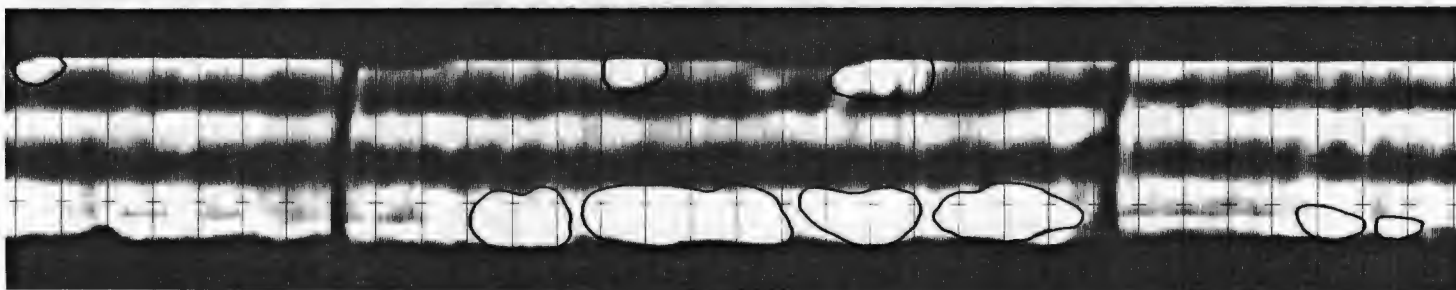
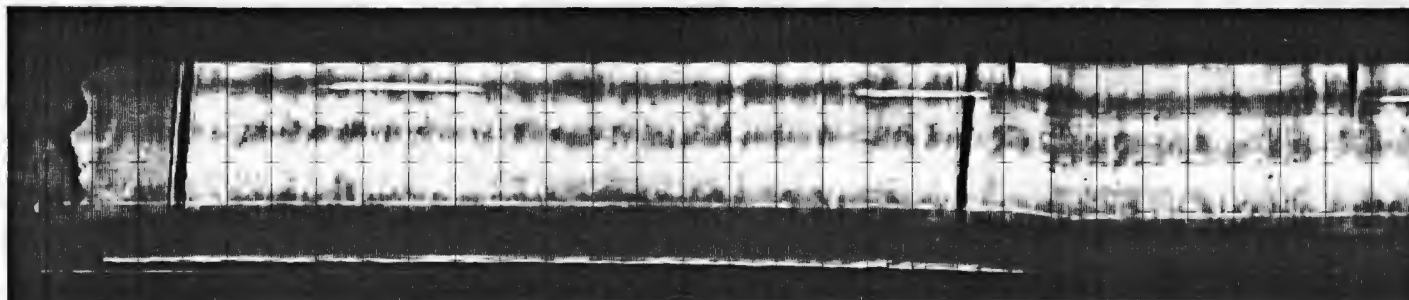
FILM-PICTURE

IOWA 141 OVER LITTLE BEAVER CREEK
SOUTHBOUND PASSING LANE

1 OF 2

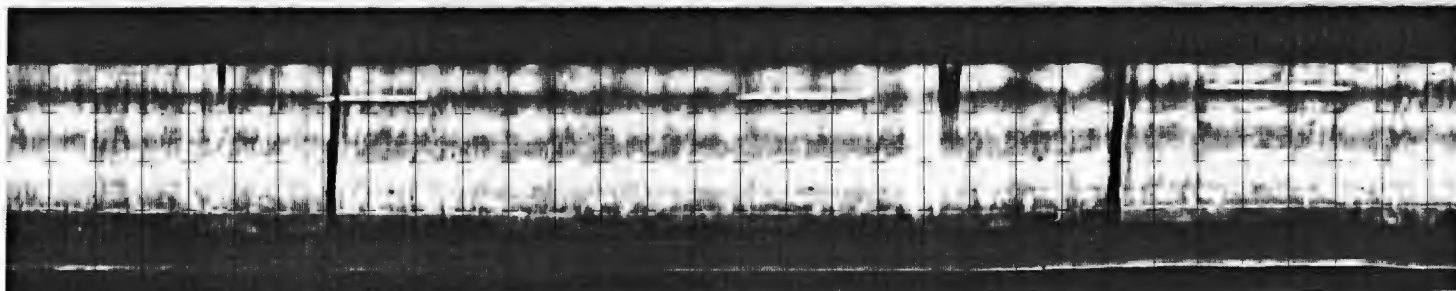


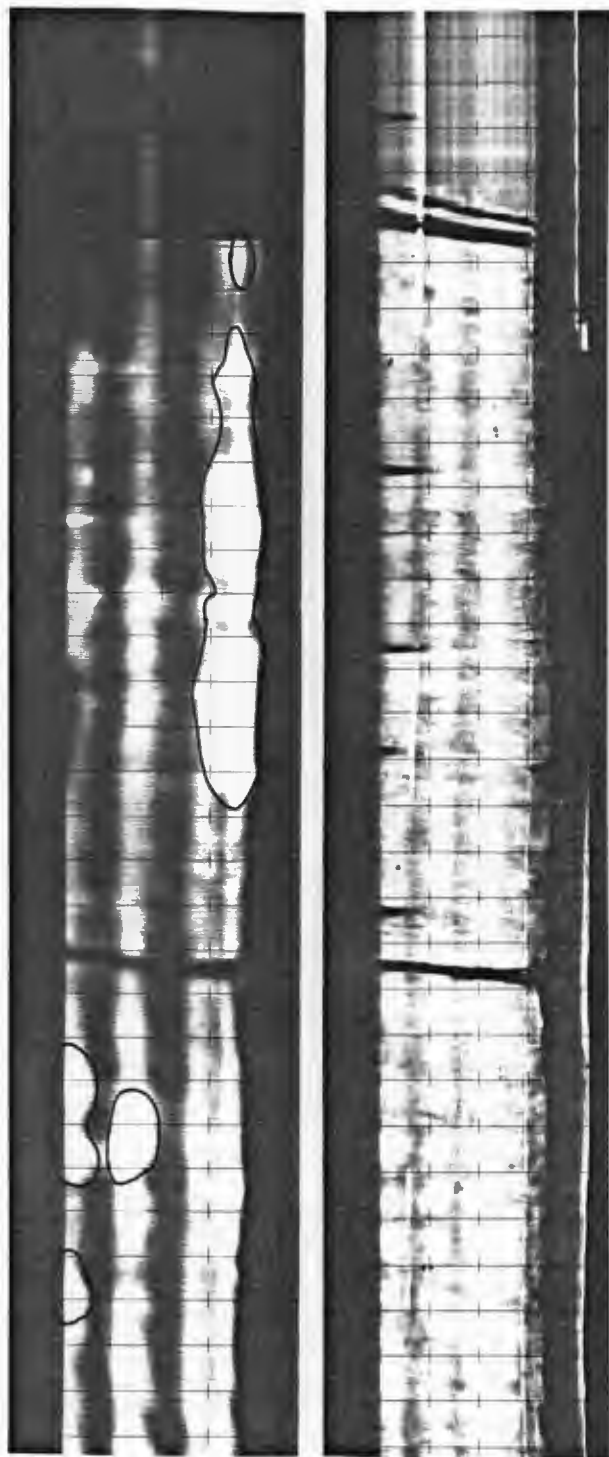
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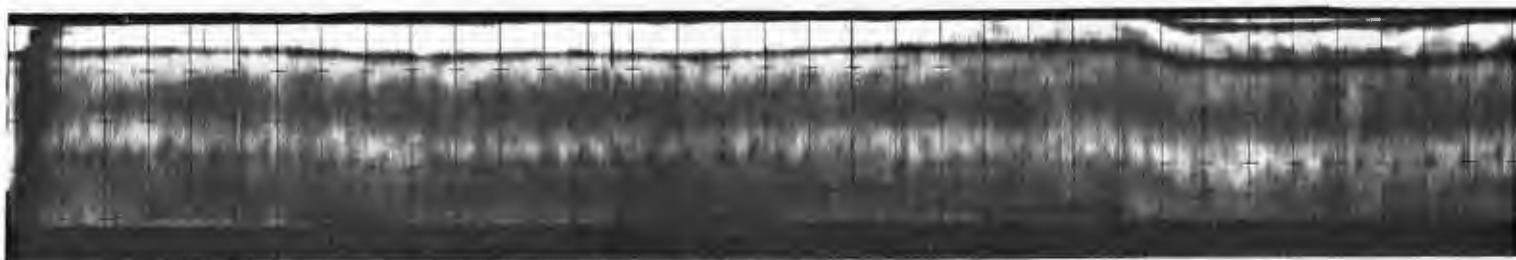
Engineers & Architects

INFRARED DATA REPORT

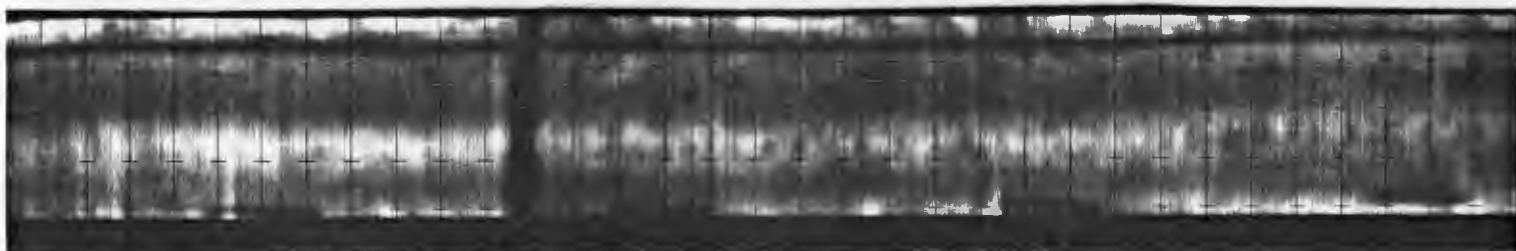
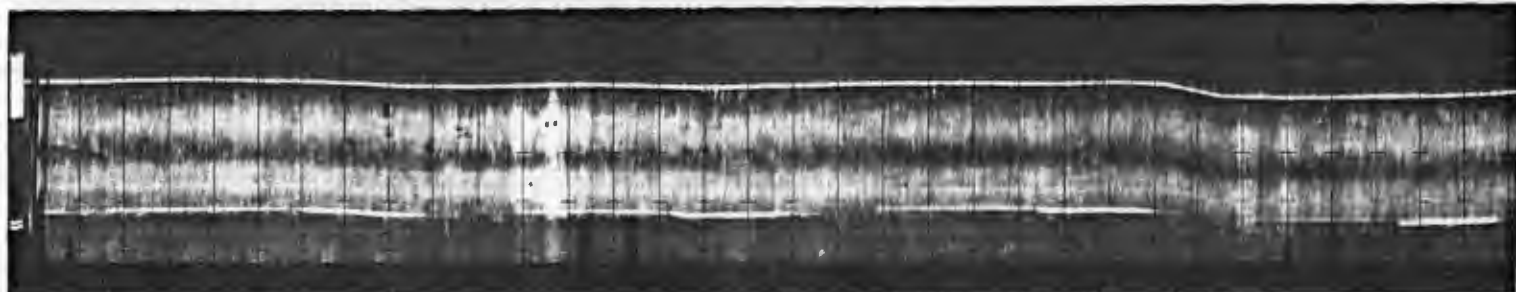
CLIENT <u>IOWA DOT</u>	DATE <u>6/21/82</u>
PROJECT NO. <u>12383.000</u>	TIME <u>2:30 pm</u>
CREW <u>JSK/DDU</u>	LOCATION <u>I 35 South bound over</u> <u>Raccoon River</u>
TEMPERATURE <u>70°</u>	WIND SPEED
SURFACE TYPE <u>Concrete</u>	AND DIRECTION <u>10-15 West</u>
PAVEMENT TEMPERATURE	WEATHER CONDITIONS <u>Cloudy</u>
SOLID <u>95°F</u>	LANE VIEWING <u>South Bound Driving Lane</u>
DELAMINATED <u>96°F</u>	SPEED VIEWING <u>5 mph</u>
INFRARED COUNTER	REAL LIFE COUNTER
FROM <u>437</u> TO <u>577</u>	FROM <u>449</u> TO <u>593</u>
COLORIZER SETTING <u>.25x/10</u>	ZERO SETTING <u>Expansion Joint</u>
SKETCH:	
REMARKS	
FILM-PICTURE	

I-35 OVER RACCOON RIVER
SOUTHBOUND DRIVING LANE

1 OF 3

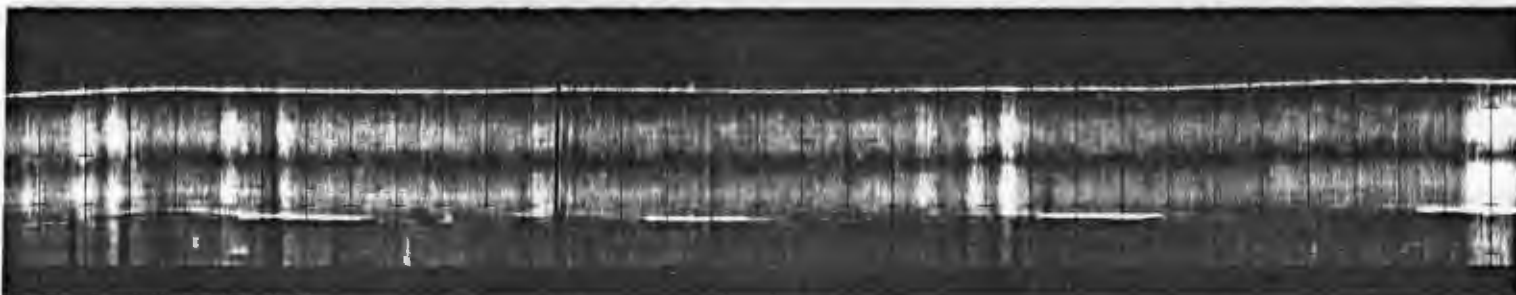


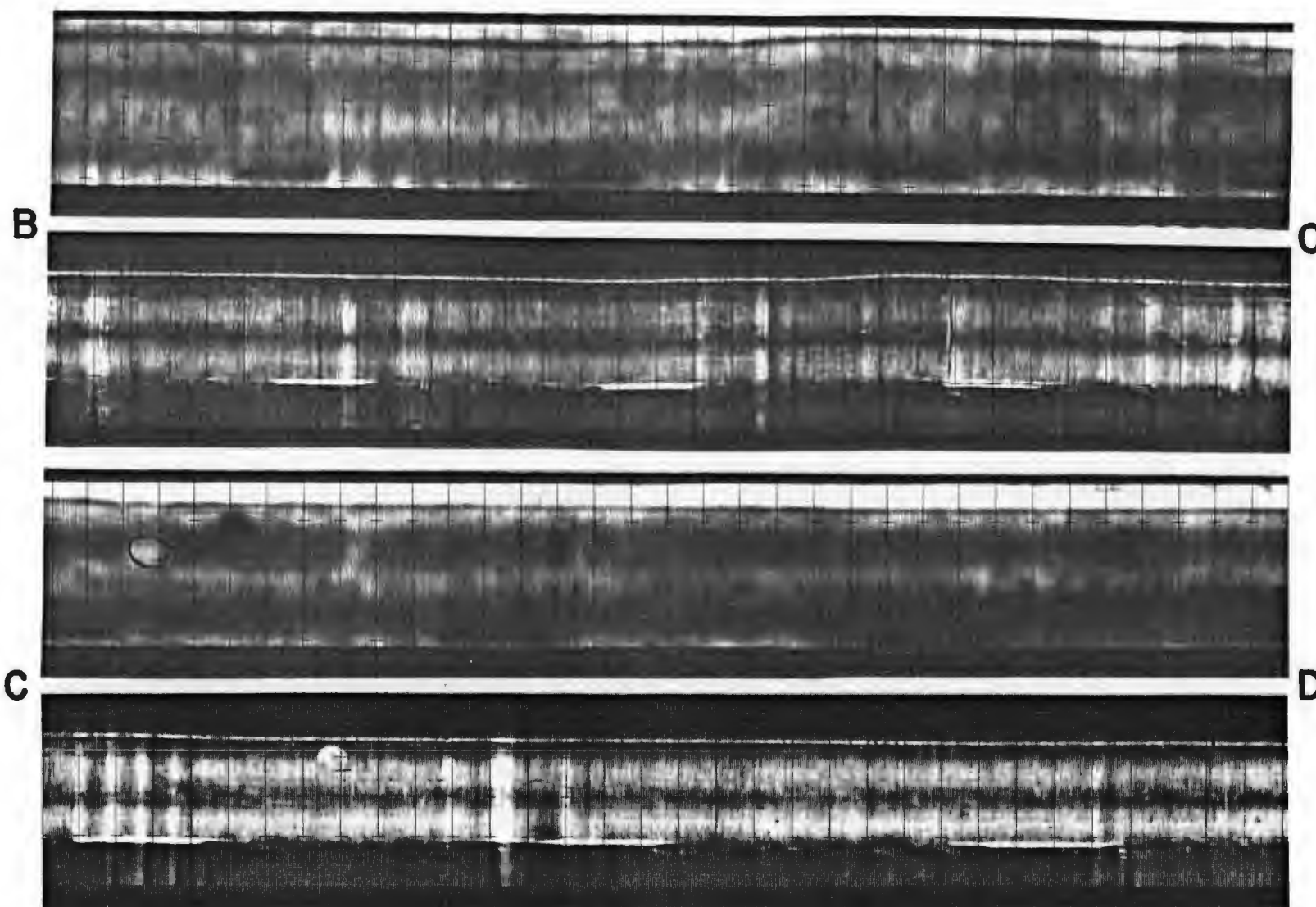
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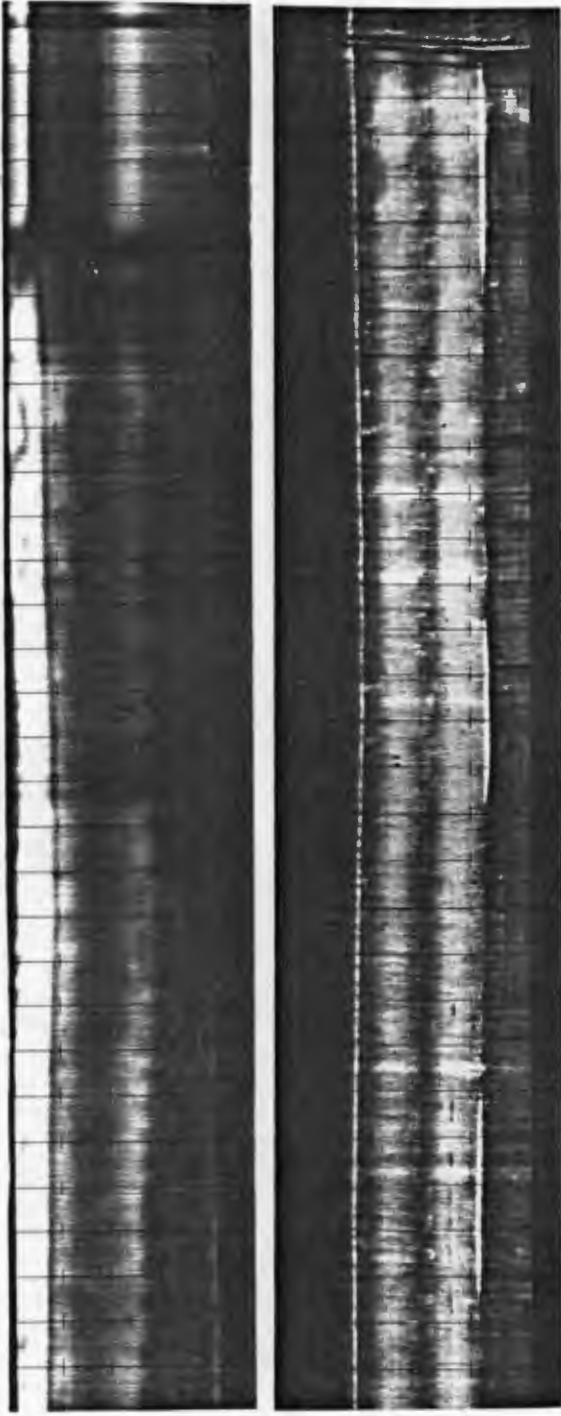


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 2:45 pm

CREW JSK/DDU

LOCATION I 35 Southbound over Raccoon River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 10-15 West

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Cloudy

SOLID 95°F

LANE VIEWING Southbound Passing Lane

DELAMINATED 96°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 577 TO 693

FROM 593 TO 713

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

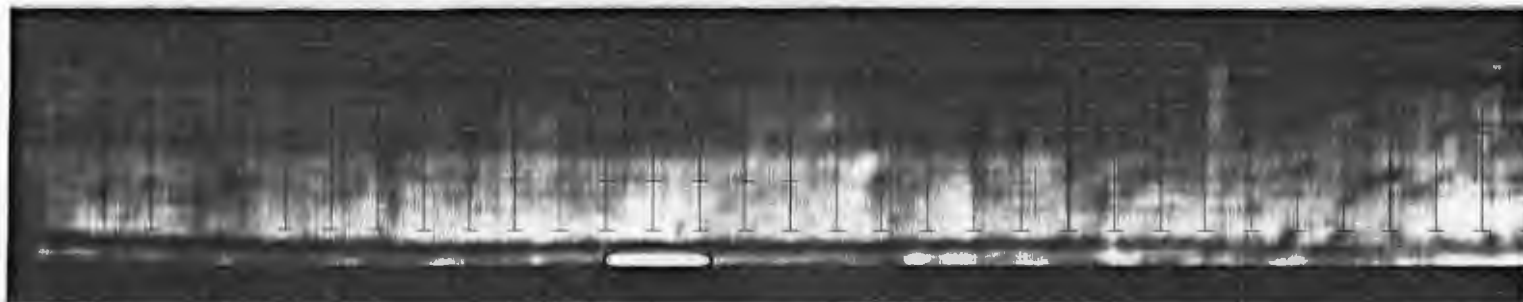
SKETCH:

REMARKS

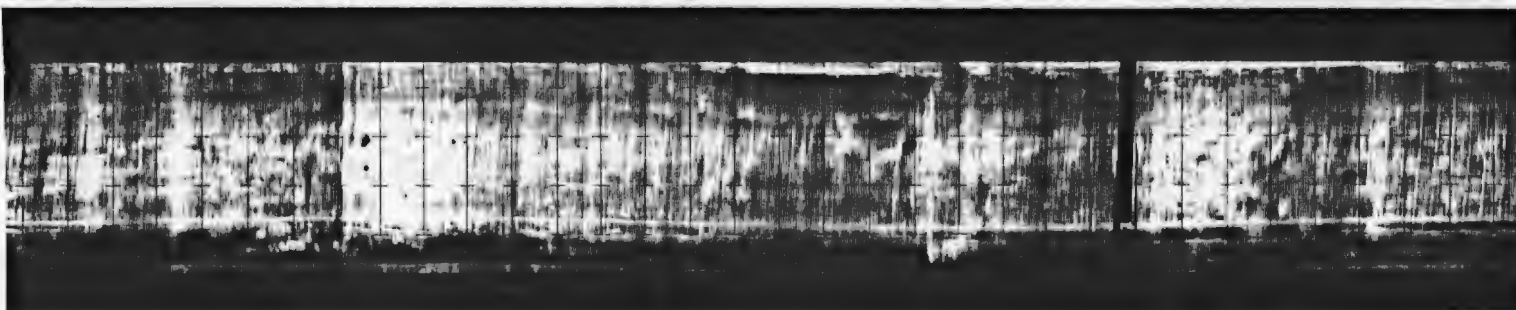
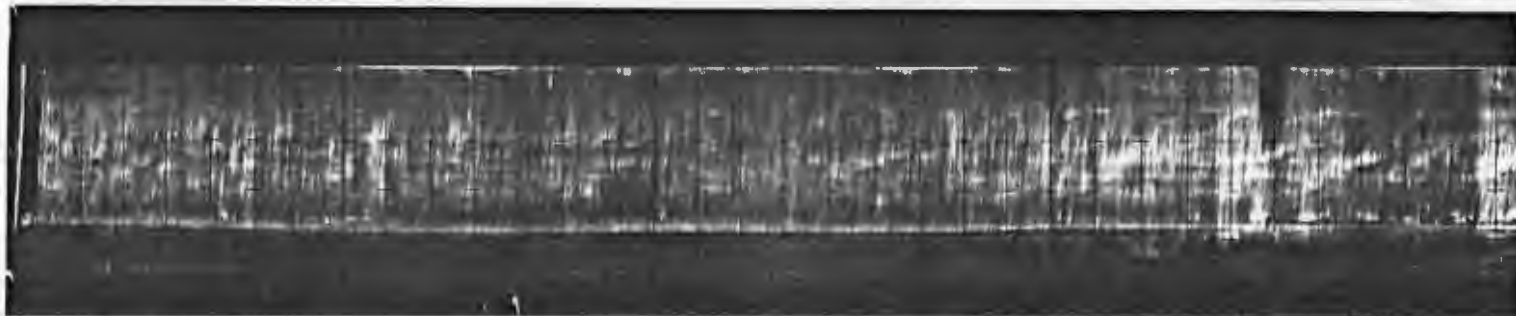
FILM-PICTURE

I-35 OVER RACCOON RIVER - SOUTHBOUND PASSING LANE

I OF 3

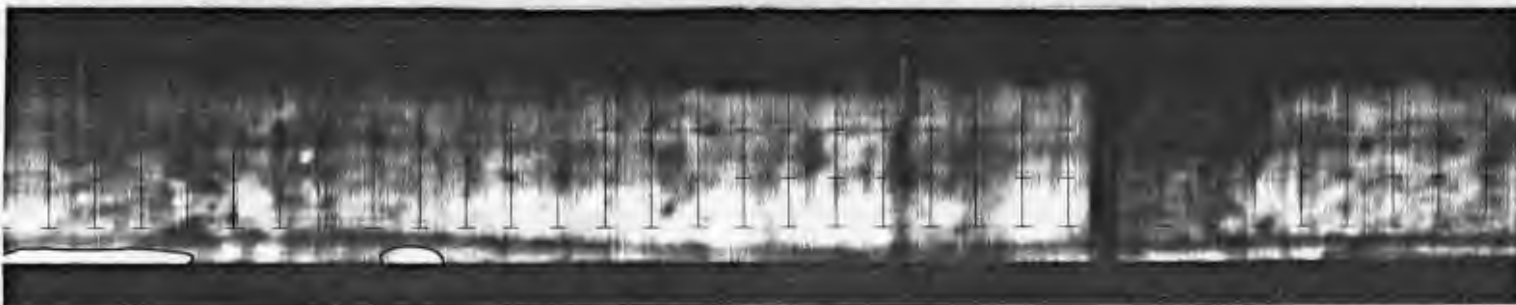


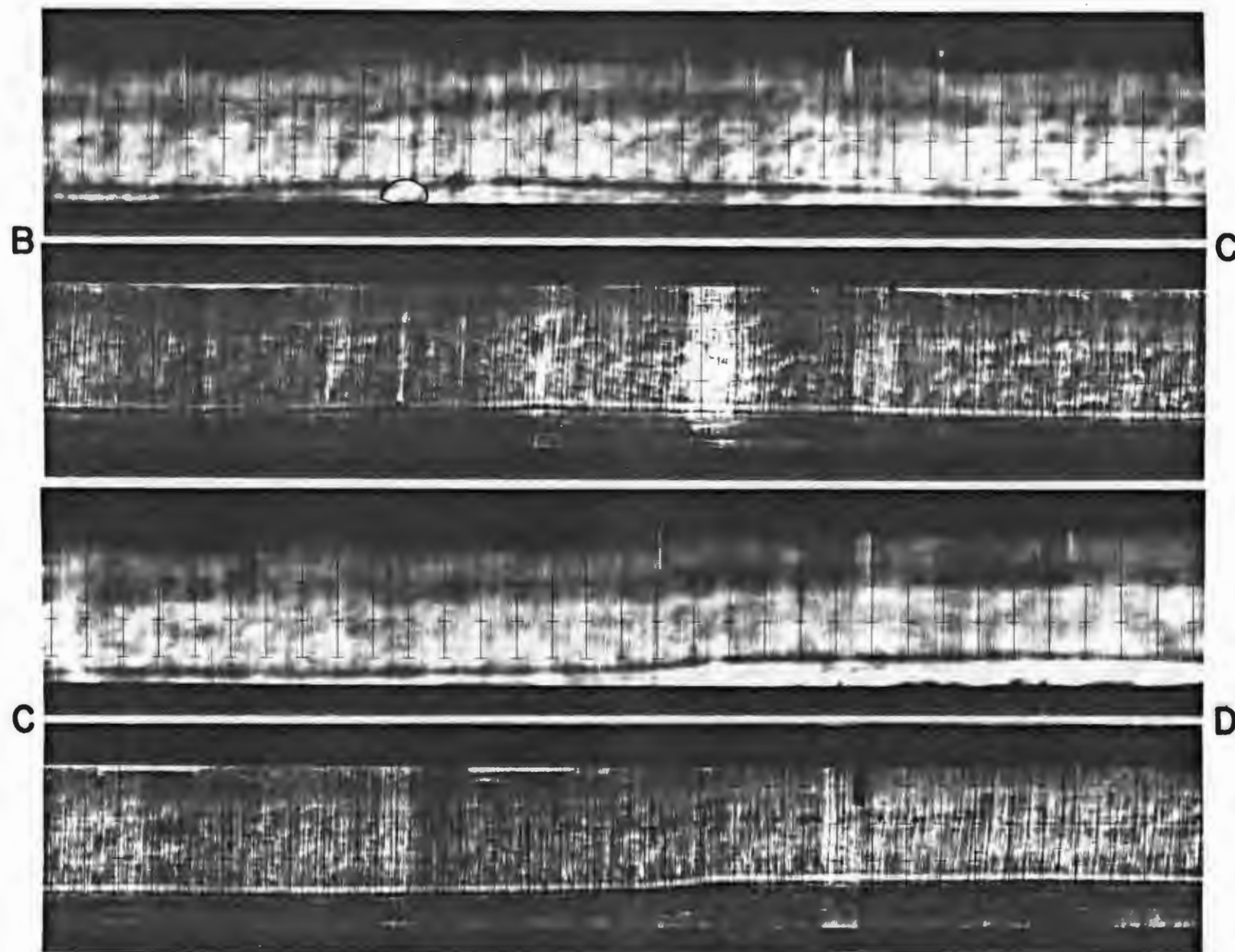
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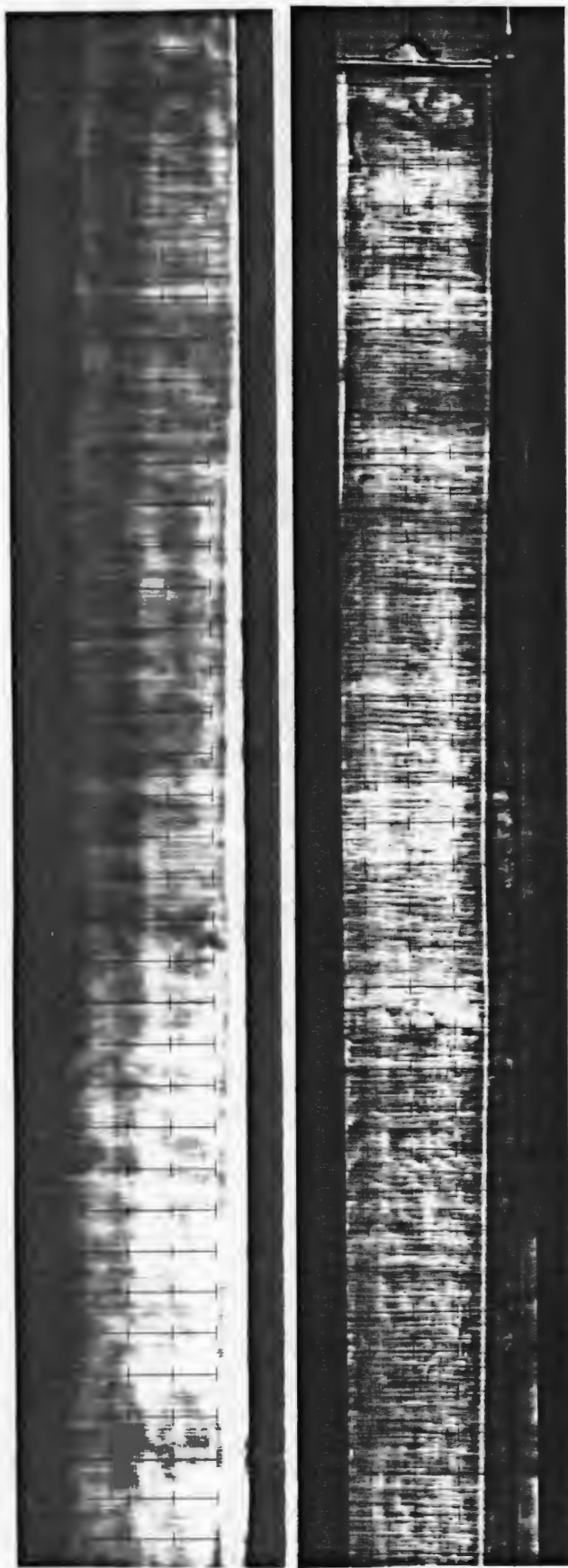


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/21/82

PROJECT NO. 12383.000

TIME 3:00 pm

CREW DDU/JSK

LOCATION I 35 Northbound over
Raccoon River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 10-15 west

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Partly Cloudy

SOLID 95°F

LANE VIEWING Northbound Driving Lane

DELAMINATED 96°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 692 TO 801

FROM 712 TO 830

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

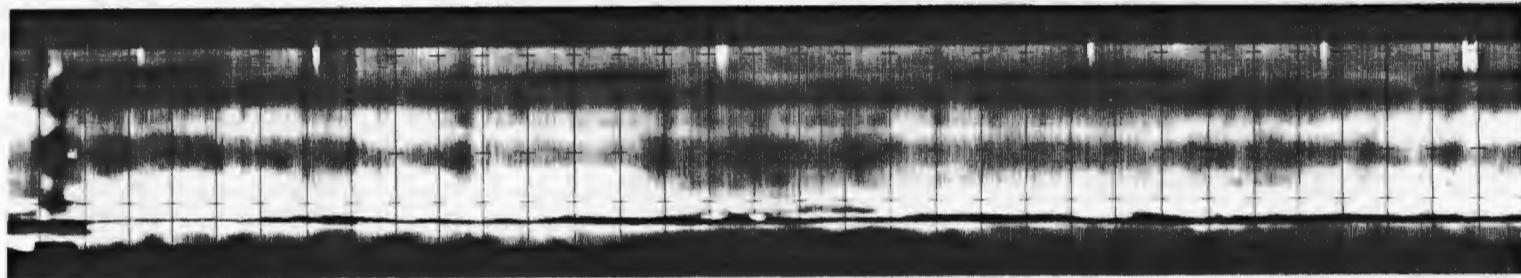
SKETCH:

REMARKS

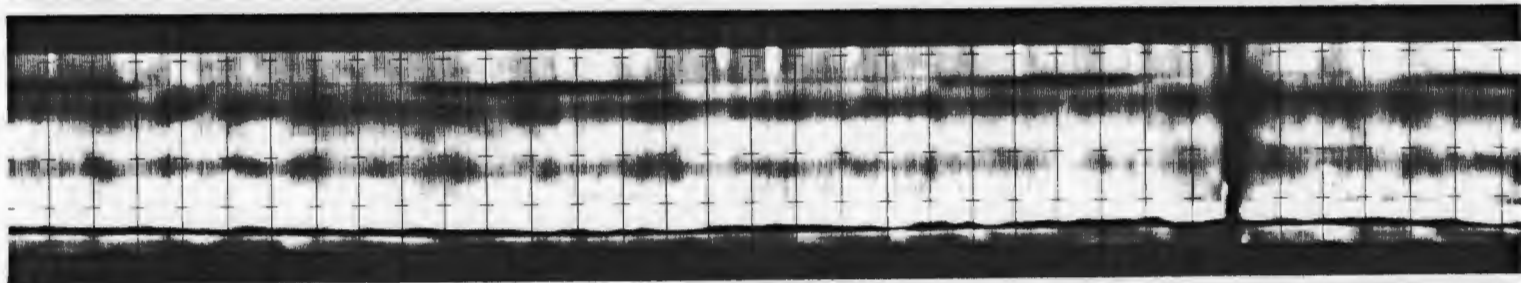
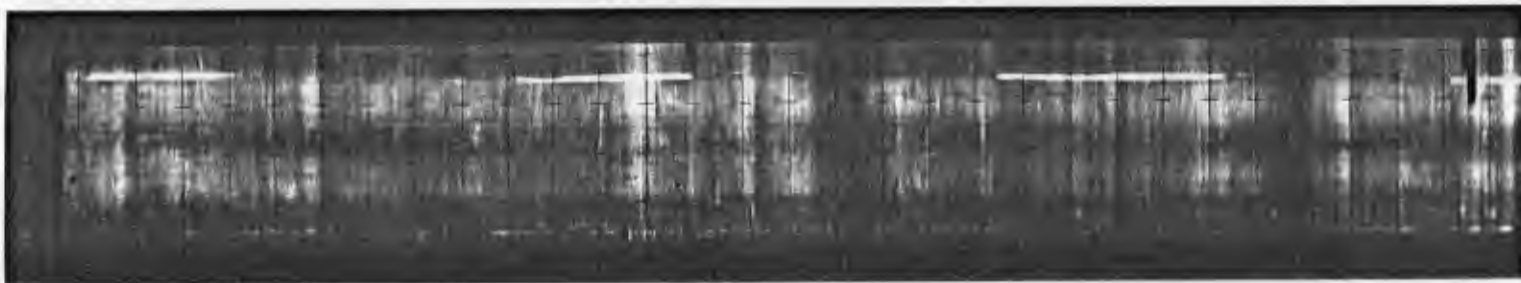
FILM-PICTURE

I-35 NORTHBOUND OVER RACoon RIVER
NORTHBOUND DRIVING LANE

1 OF 3

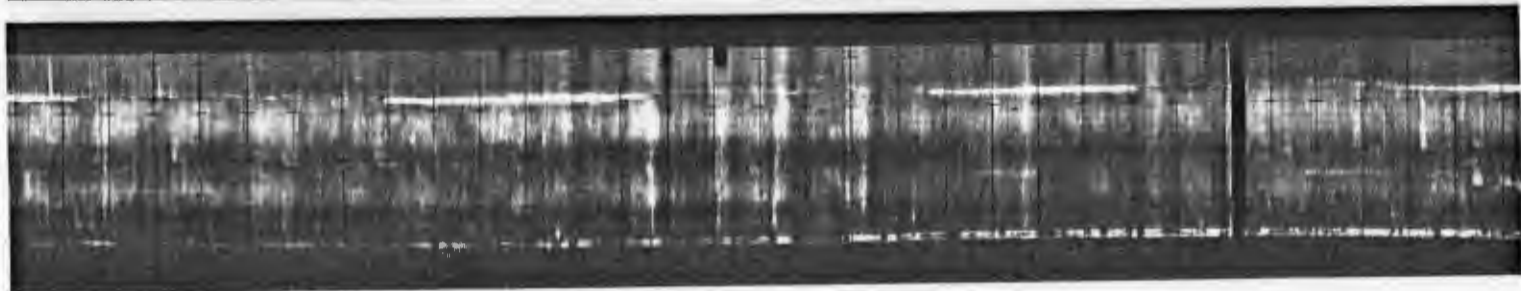


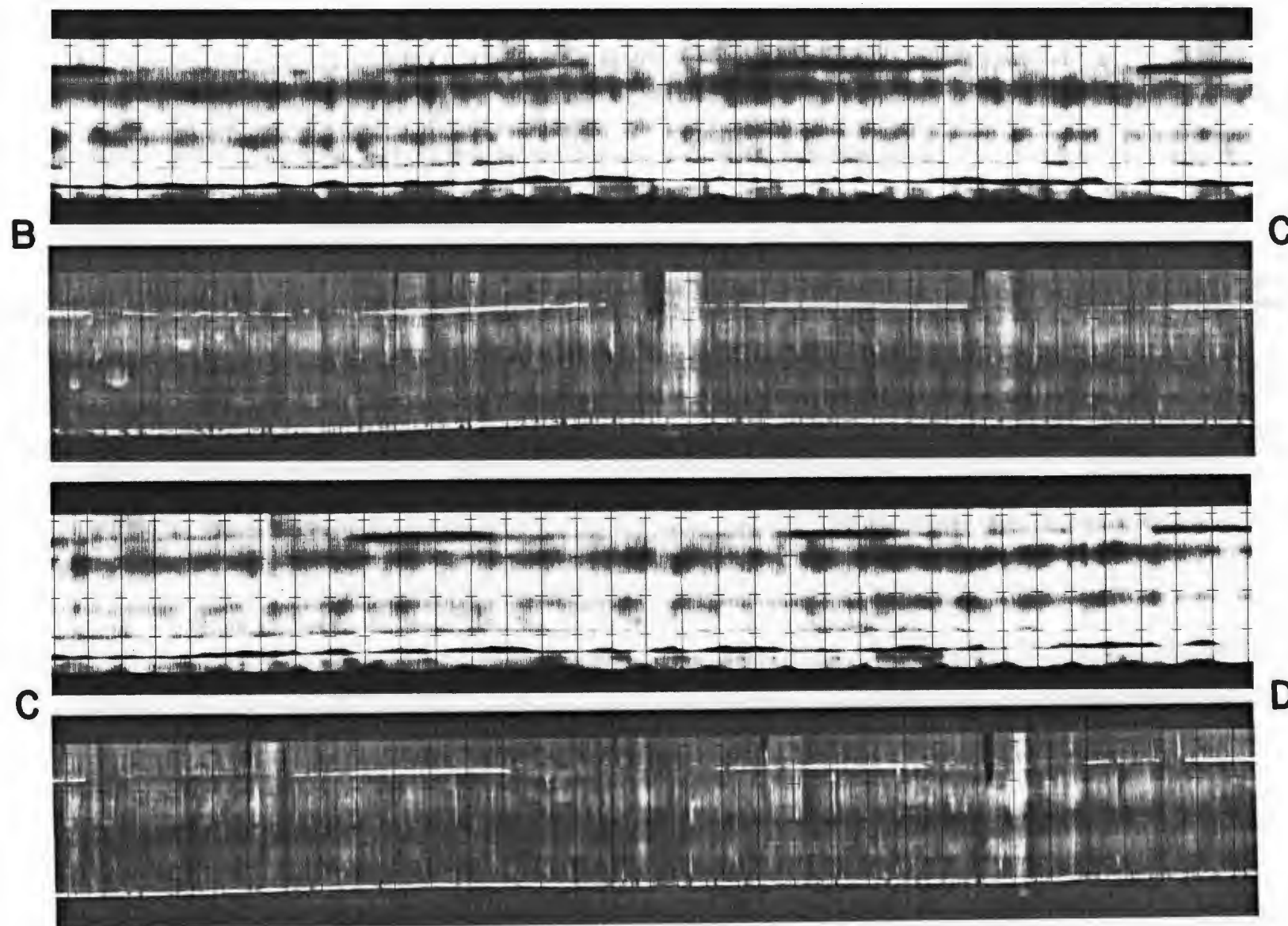
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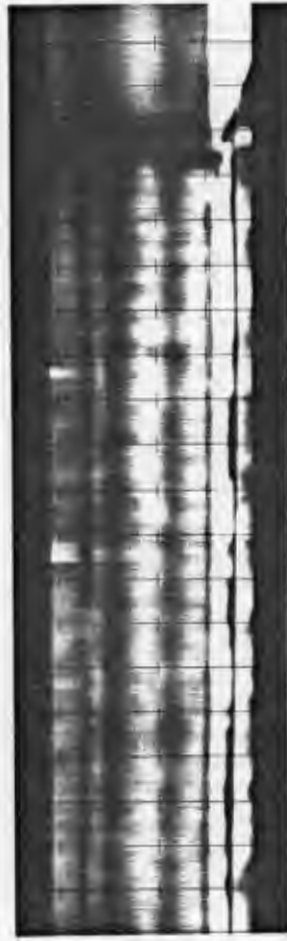






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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 70°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 95°F

DELAMINATED 96°F

INFRARED COUNTER

FROM 801 TO 918

COLORIZER SETTING .25x/10

DATE 6/21/82

TIME 3:20 pm

LOCATION I35 Northbound over
Raccoon River

WIND SPEED

AND DIRECTION 10-15 West

WEATHER CONDITIONS Partly Cloudy

LANE VIEWING Northbound Passing Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 830 TO 942

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

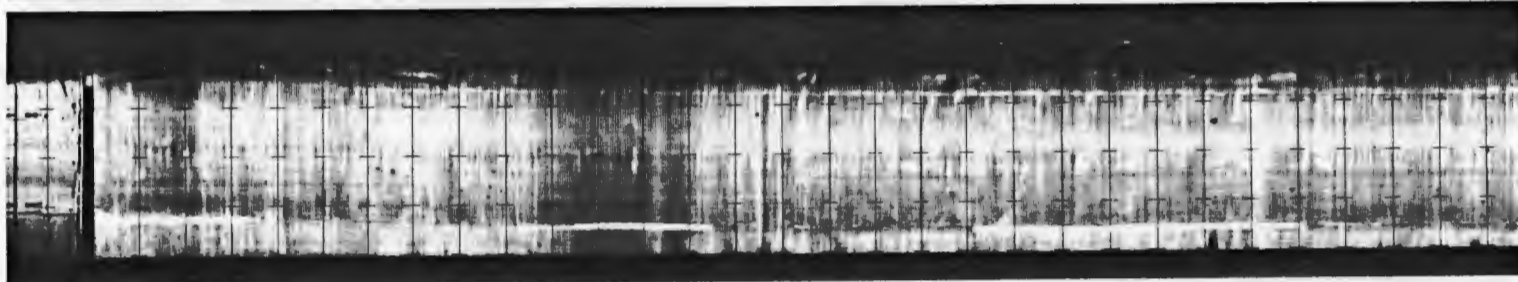
FILM-PICTURE

I-35 OVER RACCOON RIVER
NORTHBOUND PASSING LANE

1 OF 3

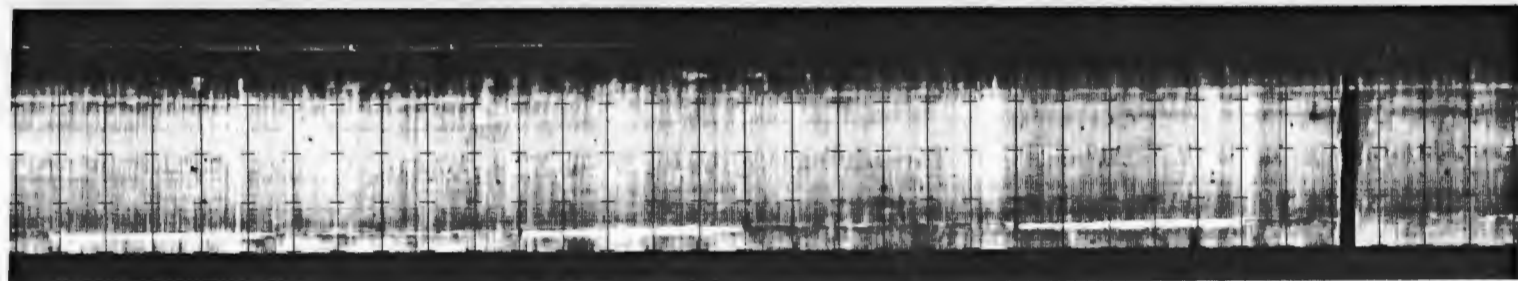


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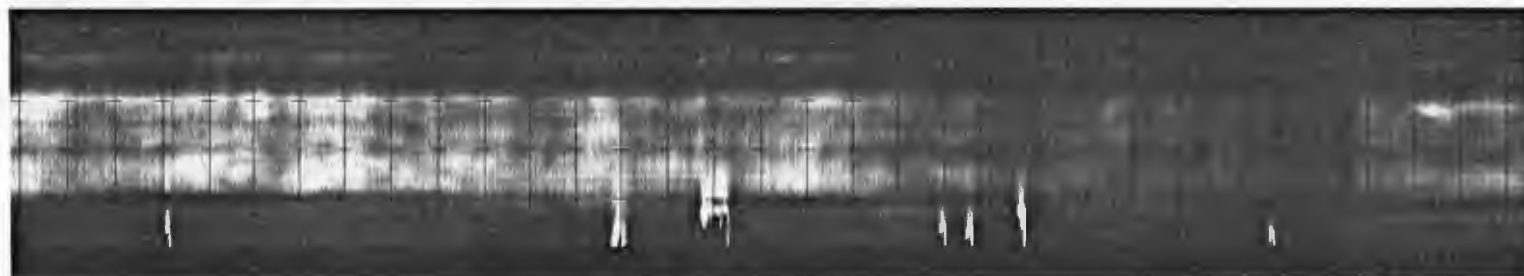


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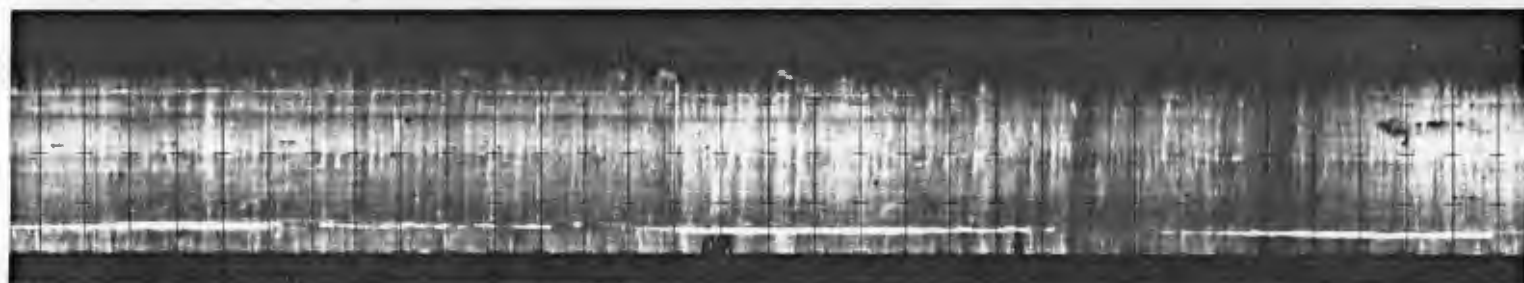
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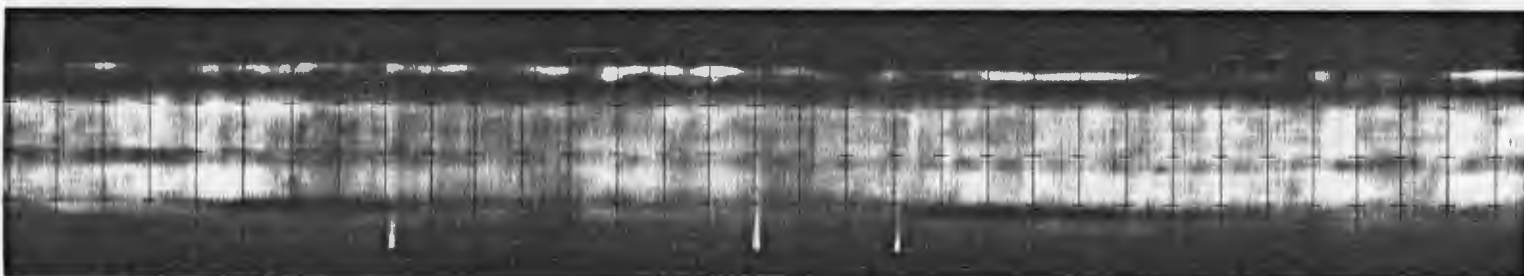
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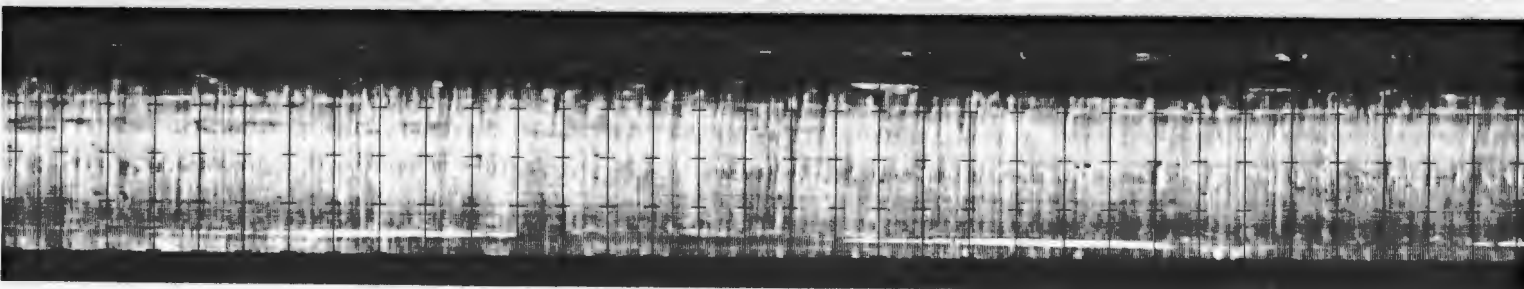
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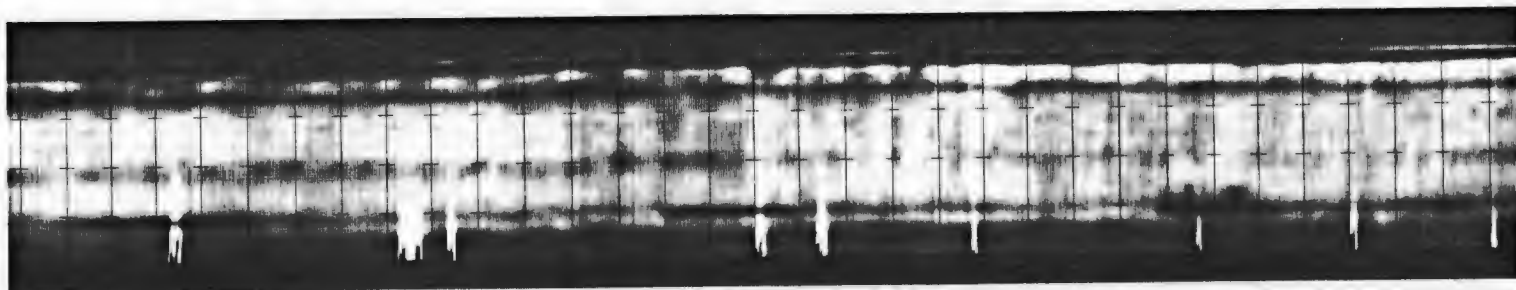
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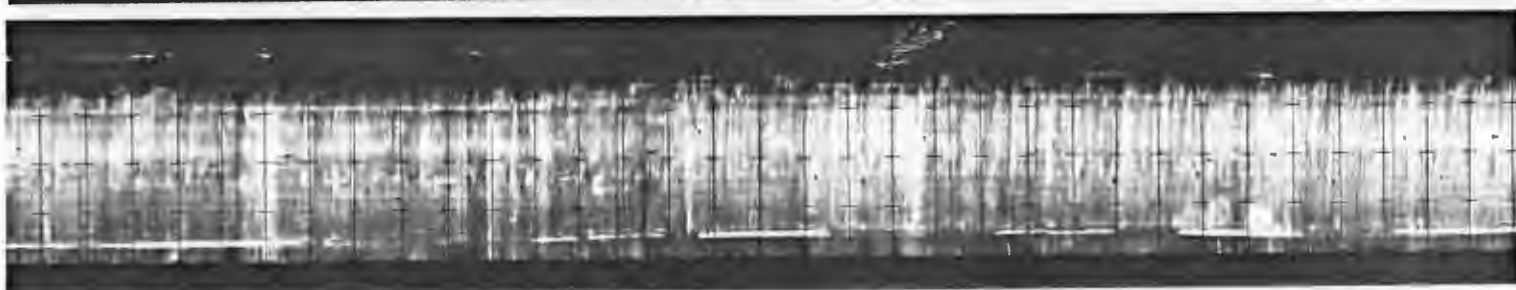
D



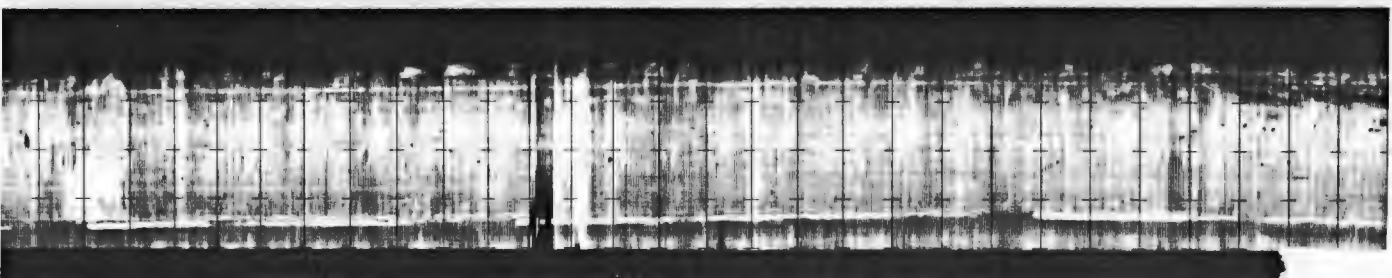
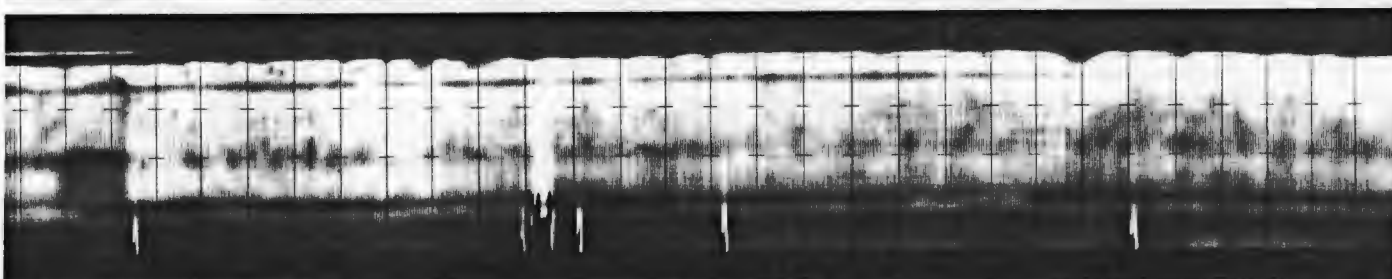
D



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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 70°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 83°F

DELAMINATED 87.5°F

INFRARED COUNTER

FROM 918 TO 998

COLORIZER SETTING .25x/10

DATE 6/22/82

TIME 10:00 am

LOCATION 9th Street over I235

WIND SPEED

AND DIRECTION None

WEATHER CONDITIONS Clear

LANE VIEWING Northbound Driving Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 942 TO 1030

ZERO SETTING Expansion Joint

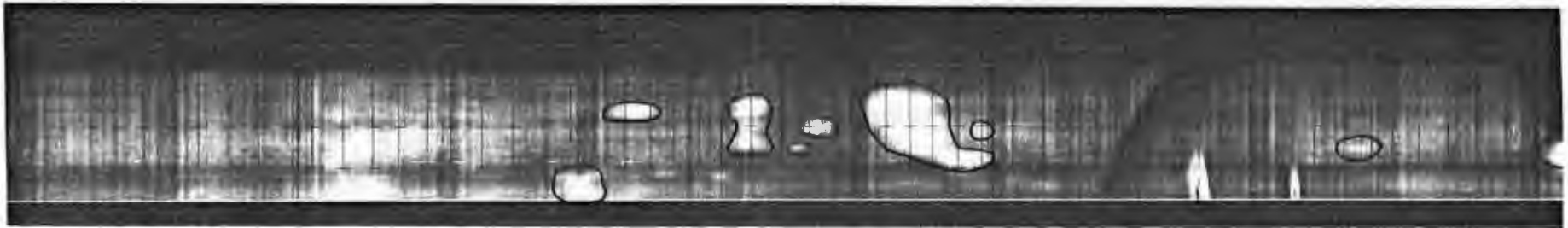
SKETCH:

REMARKS

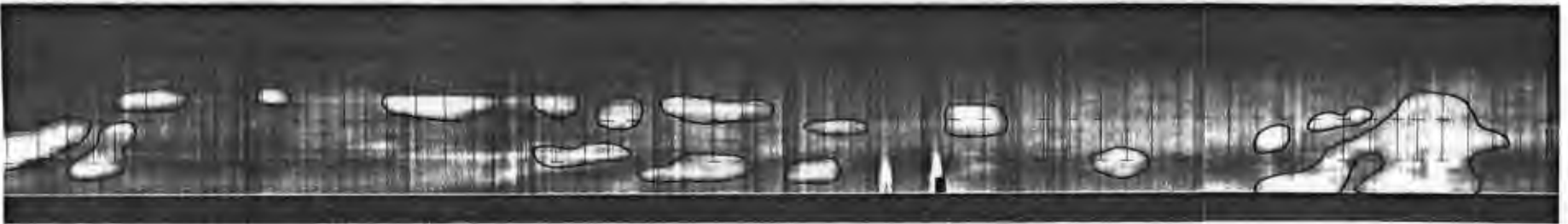
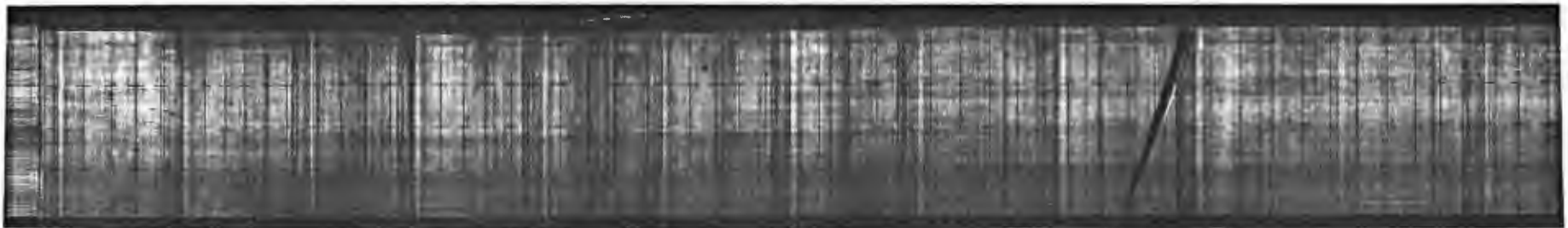
FILM-PICTURE

9TH STREET OVER I-235
NORTHBOUND DRIVING LANE

1 OF 2



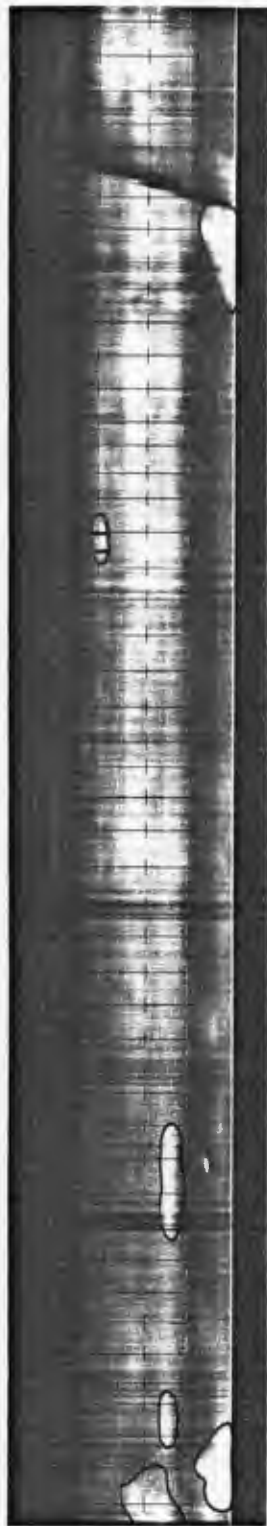
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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 10:15 am

CREW DDU/JSK

LOCATION 9th Street over I235

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 83°F

LANE VIEWING Northbound Passing Lane

DELAMINATED 87.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 998 TO 1072

FROM 1030 TO 1108

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

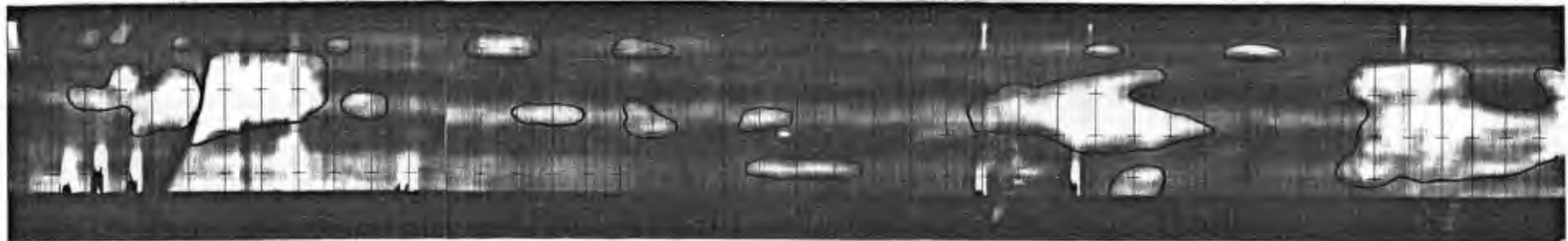
SKETCH:

REMARKS

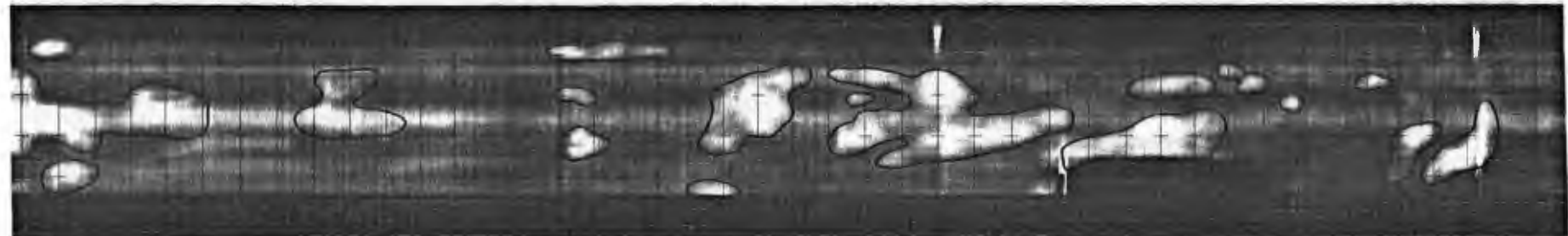
FILM-PICTURE

9TH STREET OVER I-235
NORTHBOUND PASSING LANE

1 OF 2



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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 10:30 am

CREW DDU/JSK

LOCATION 9th Street over I235

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 83°F

LANE VIEWING Southbound Driving Lane

DELAMINATED 87.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1072 TO 1131

FROM 1108 TO 1169

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

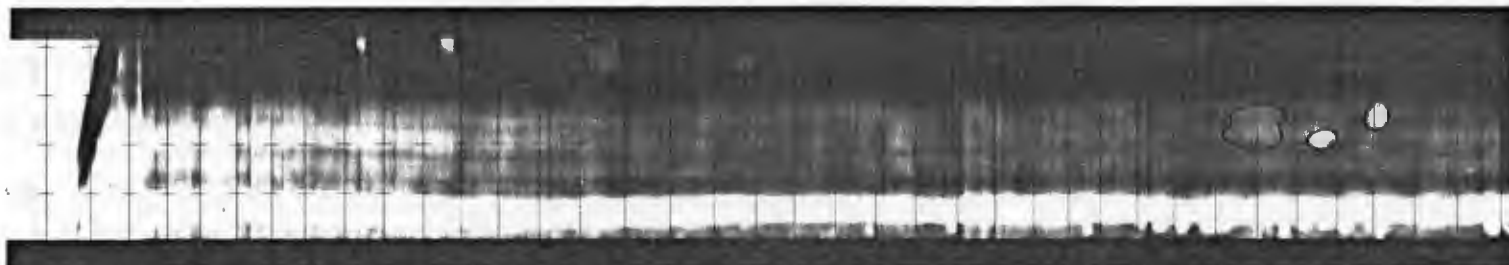
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REMARKS

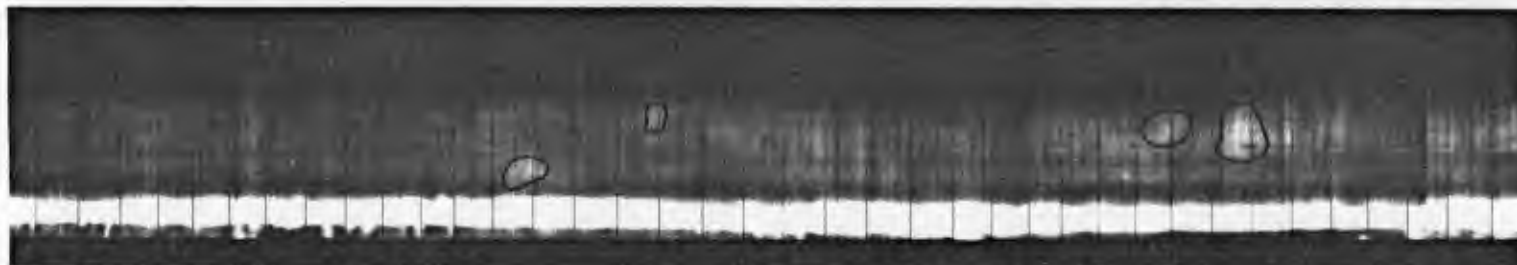
FILM-PICTURE

9TH STREET OVER I-235
SOUTHBOUND DRIVING LANE

1 OF 2

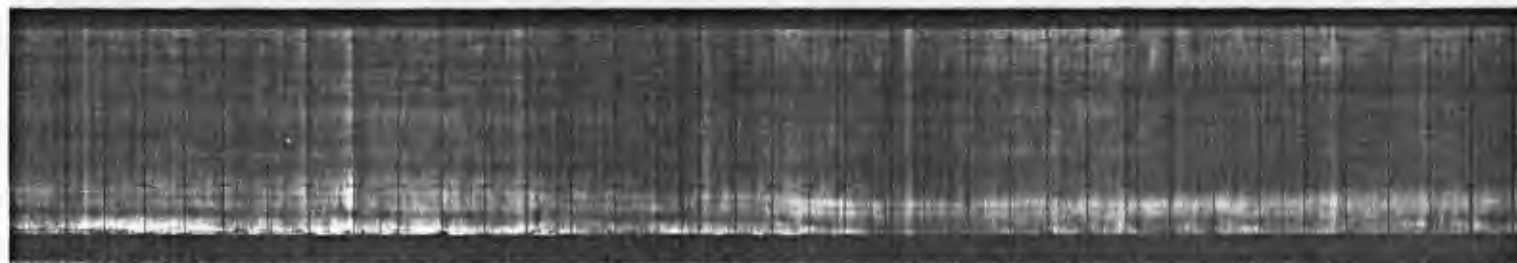


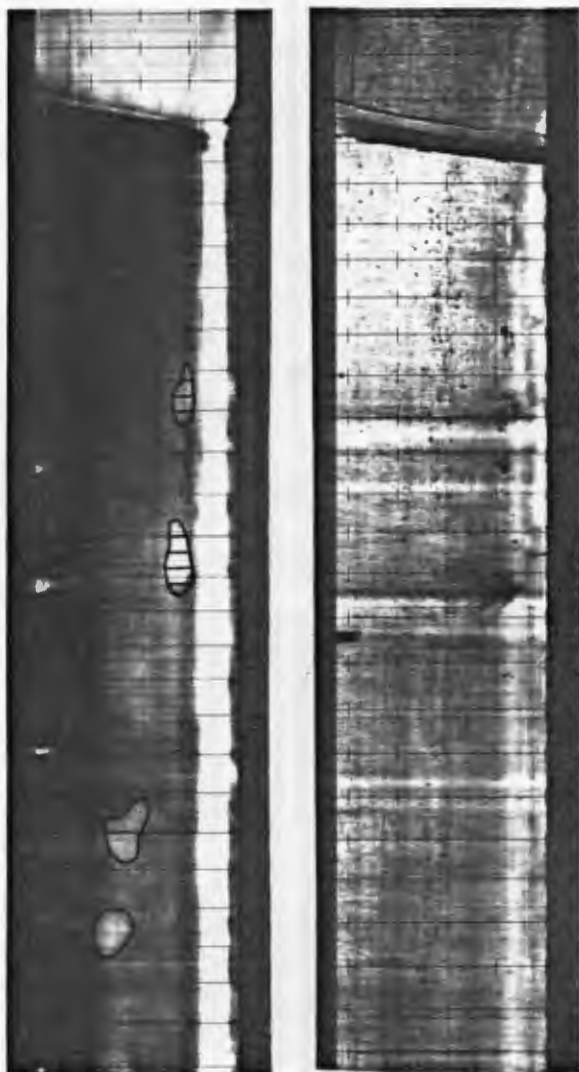
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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 10:40 am

CREW DDU/JSK

LOCATION 9th Street over I235

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 83°F

LANE VIEWING Southbound Passing Lane

DELAMINATED 87.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1131 TO 1178

FROM 1169 TO 1217

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

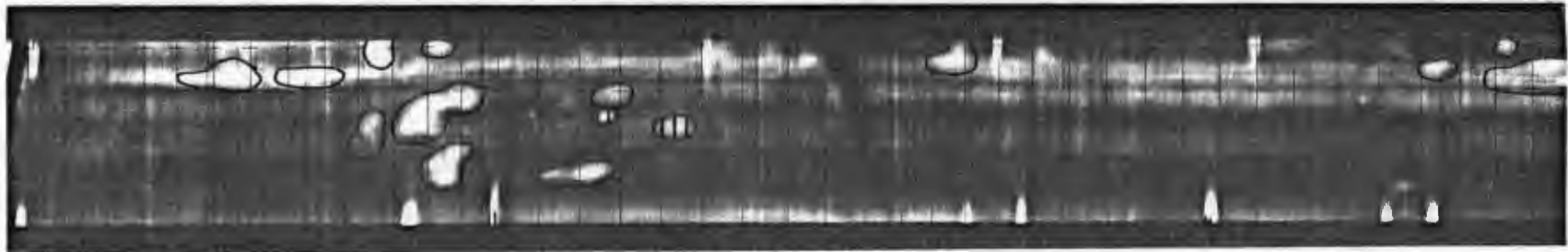
SKETCH:

REMARKS

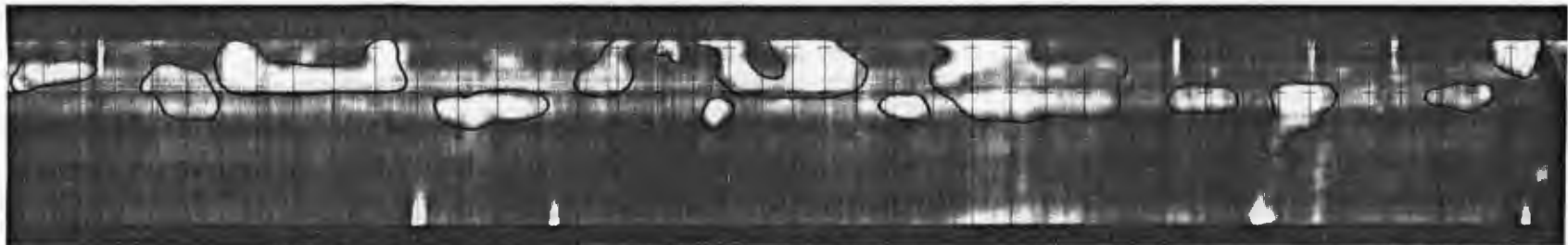
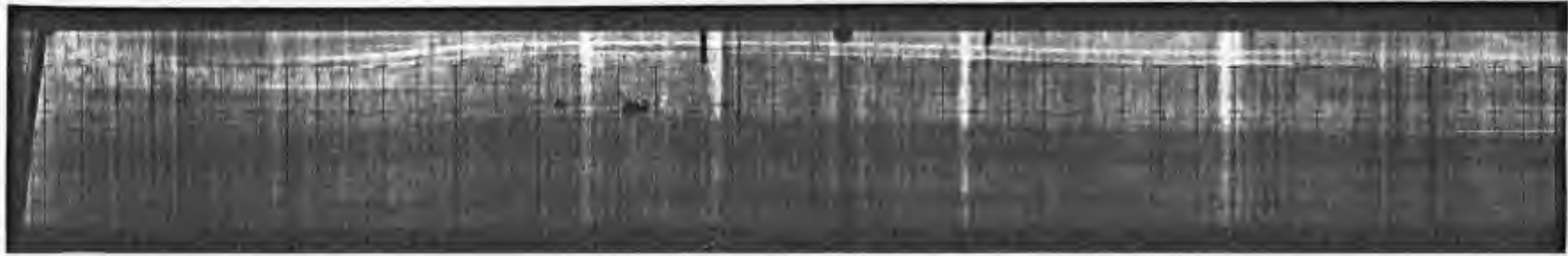
FILM-PICTURE

9TH STREET OVER I-235
SOUTHBOUND PASSING LANE

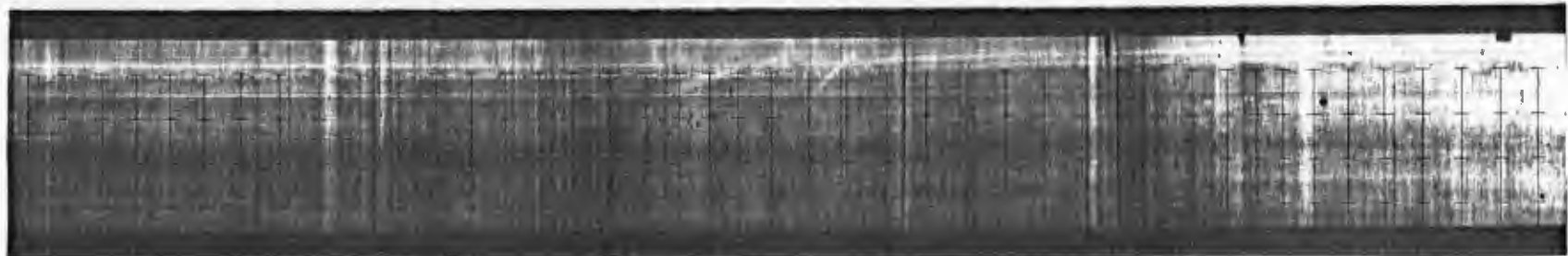
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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 11:00 a.m.

CREW DDU/JSK

LOCATION I235 over Des Moines River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 87.5°F

LANE VIEWING Westbound Interchange
Lane

DELAMINATED 91.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1178 TO 1252

FROM 1217 TO 1293

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

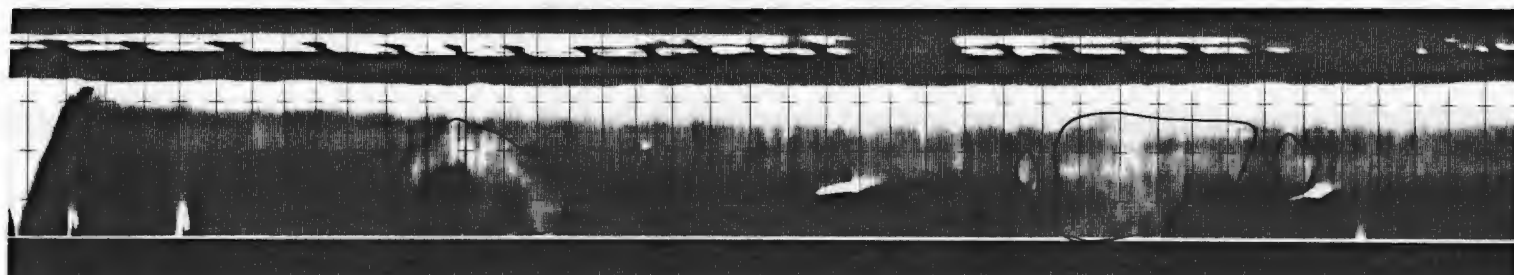
SKETCH:

REMARKS

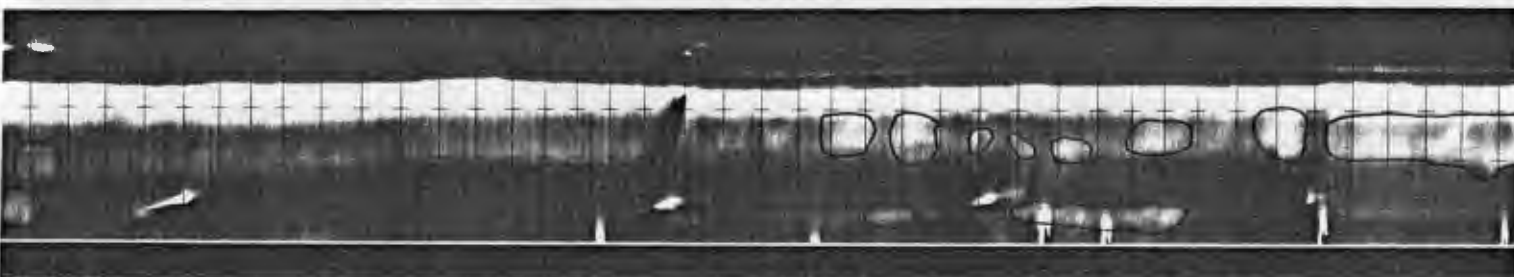
FILM-PICTURE

I-235 OVER DES MOINES RIVER
WESTBOUND INTERCHANGE LANE

1 OF 3



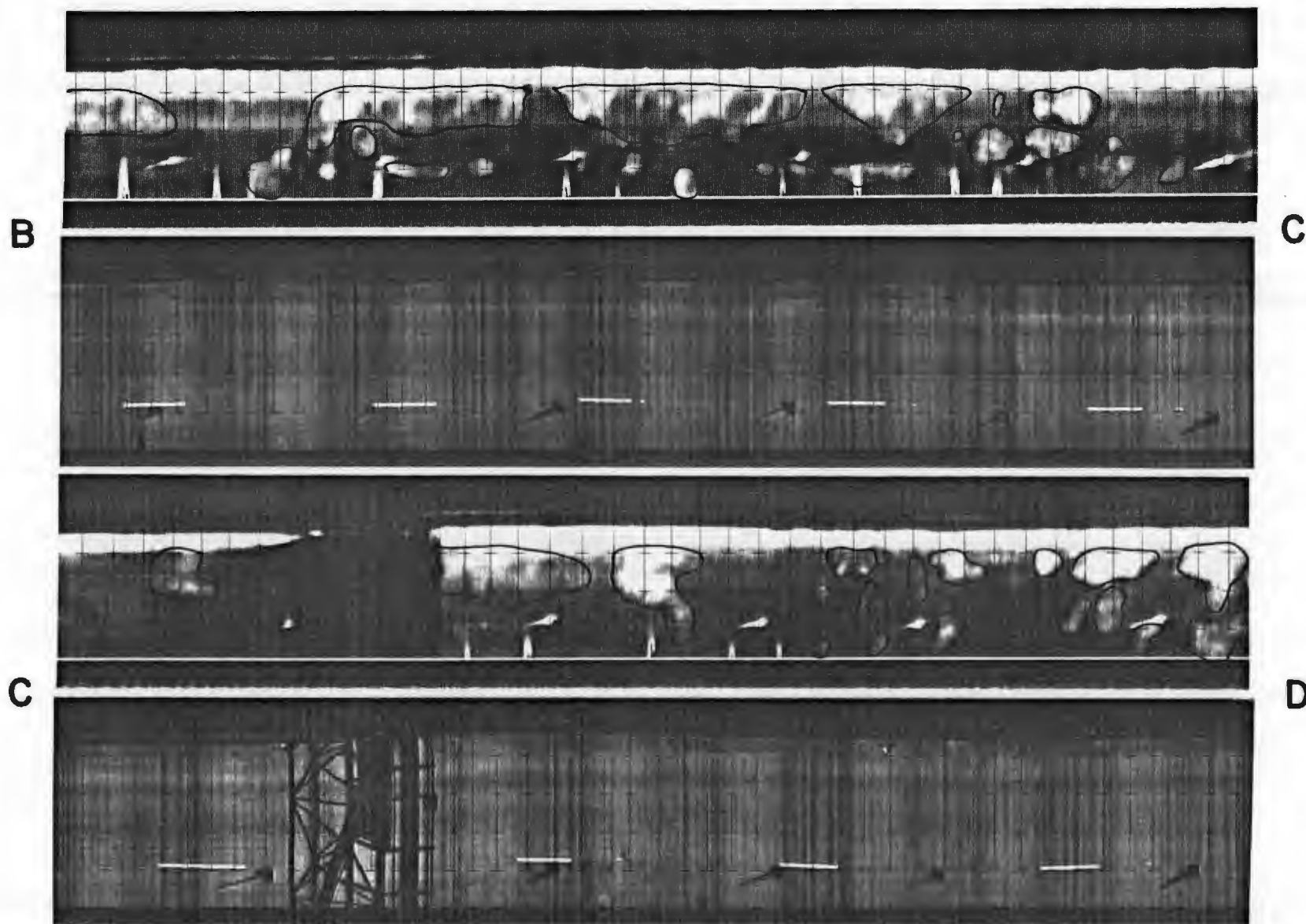
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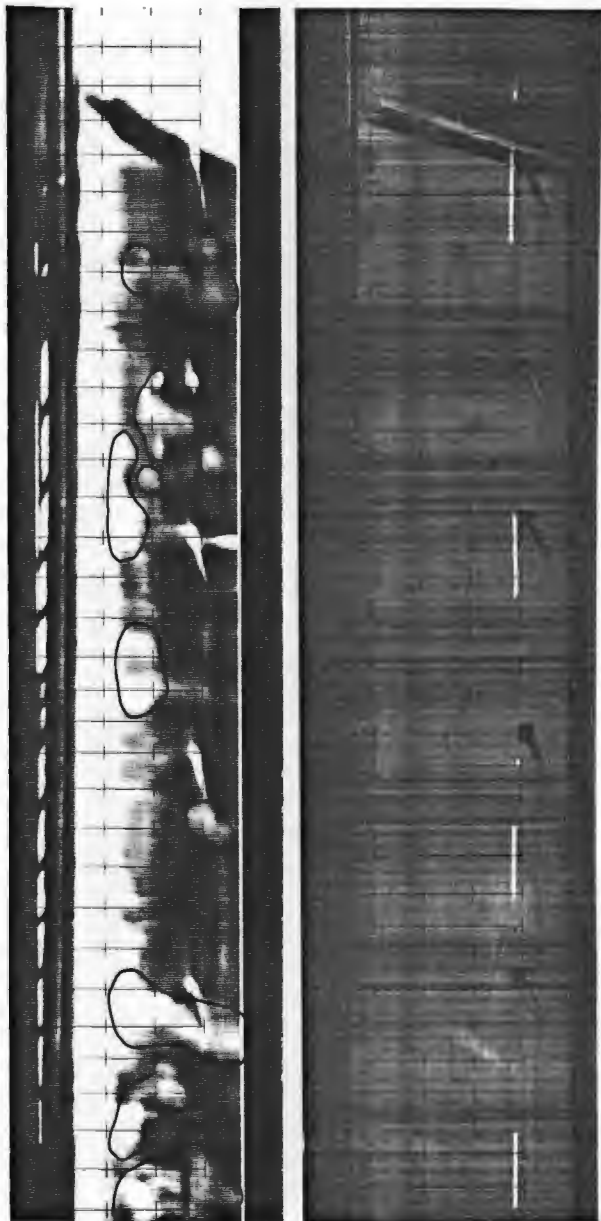


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 11:30 a.m.

CREW DDU/JSK

LOCATION I235 over Des Moines River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 87.5°F

LANE VIEWING Westbound Driving Lane

DELAMINATED 91.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1252 TO 1323

FROM 1293 TO 1365

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

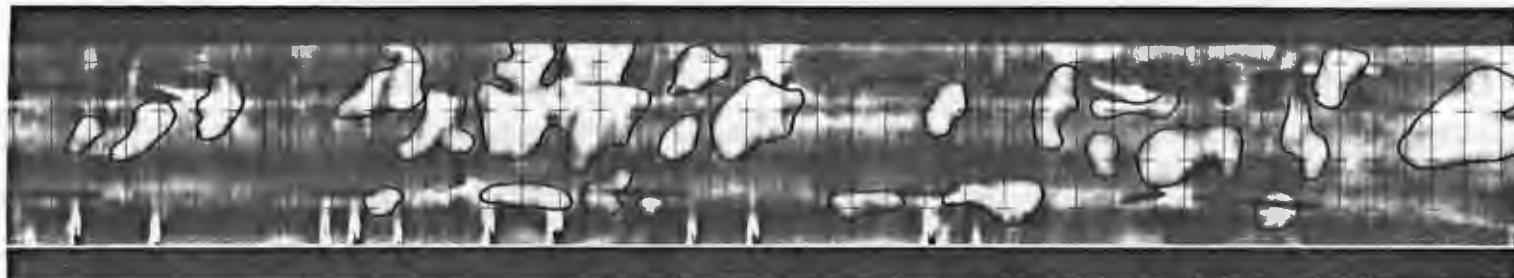
SKETCH:

REMARKS

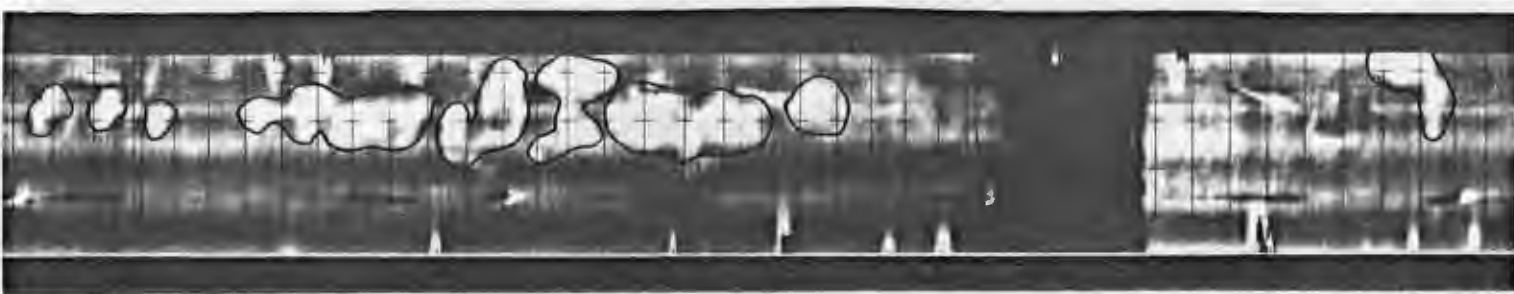
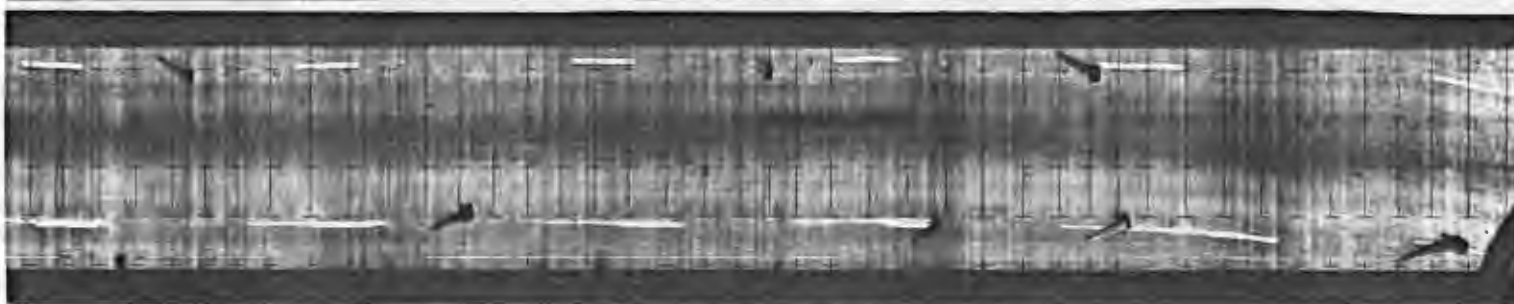
FILM-PICTURE

I-235 OVER DES MOINES RIVER
WESTBOUND DRIVING LANE

1 OF 2

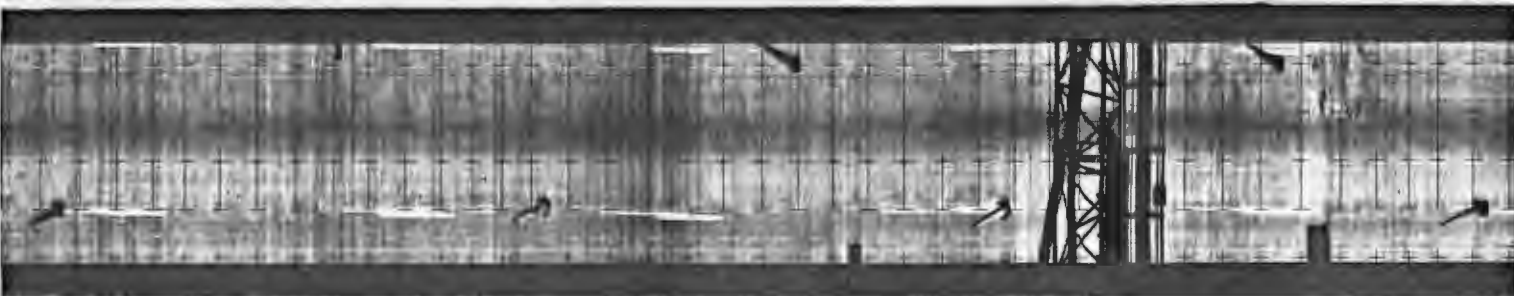


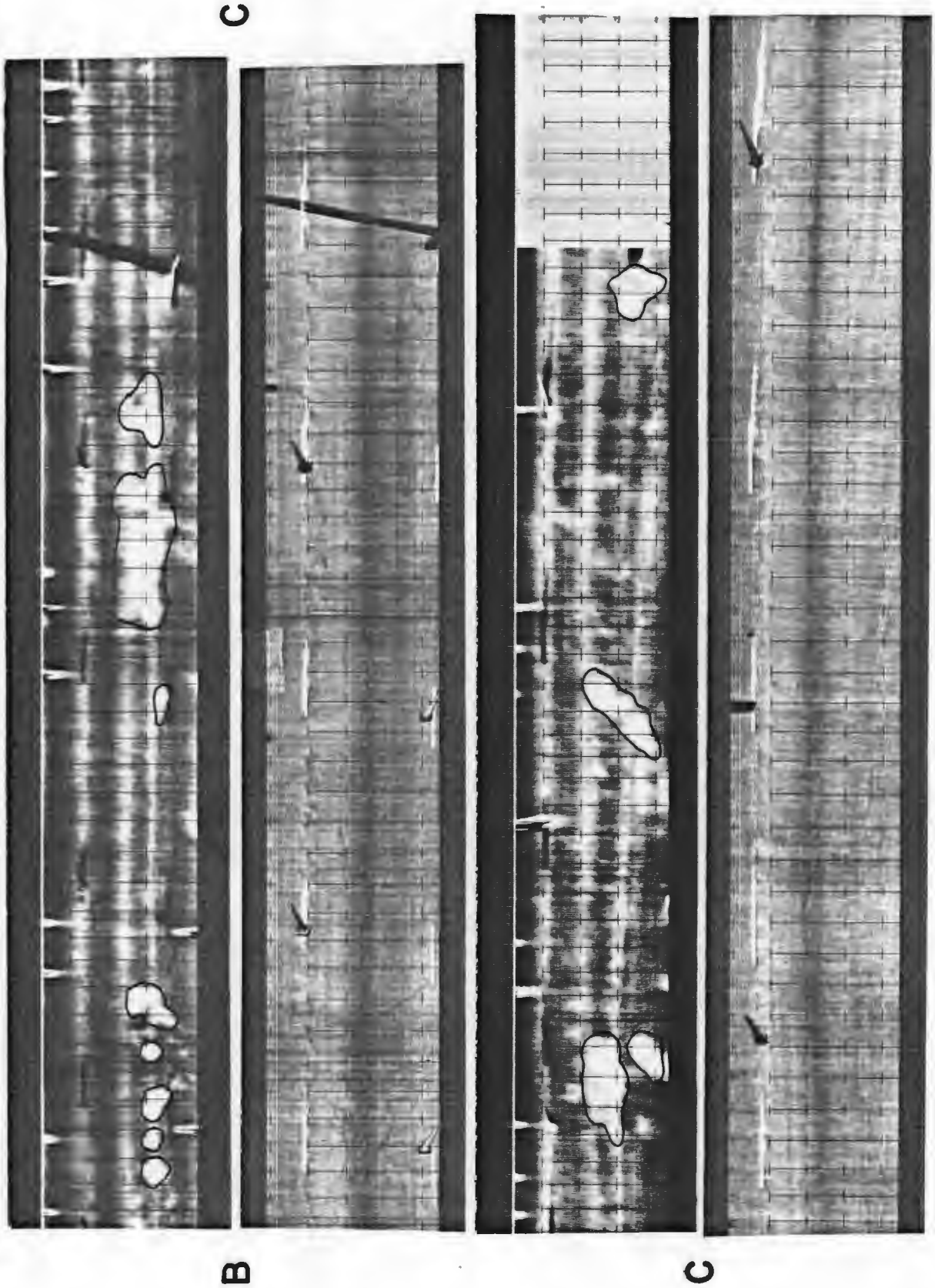
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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 1:00 p.m.

CREW DDU/JSK

LOCATION I235 over Des Moines River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 87.5°F

LANE VIEWING Westbound Center Lane

DELAMINATED 91.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1323 TO 1383

FROM 1365 TO 1426

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

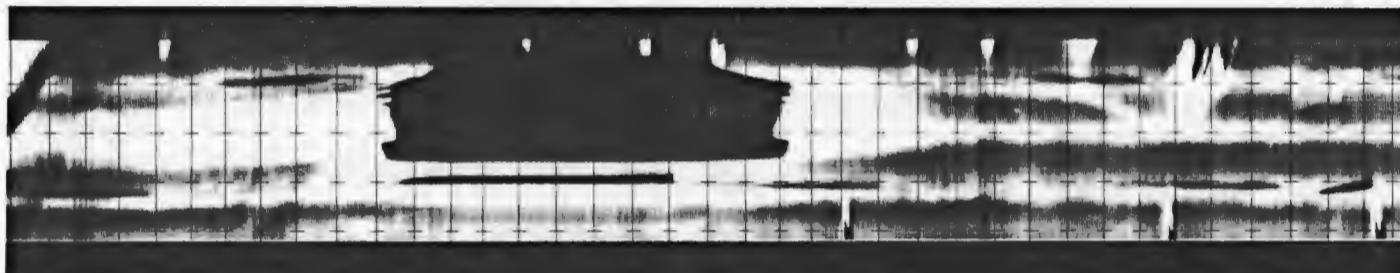
SKETCH:

REMARKS

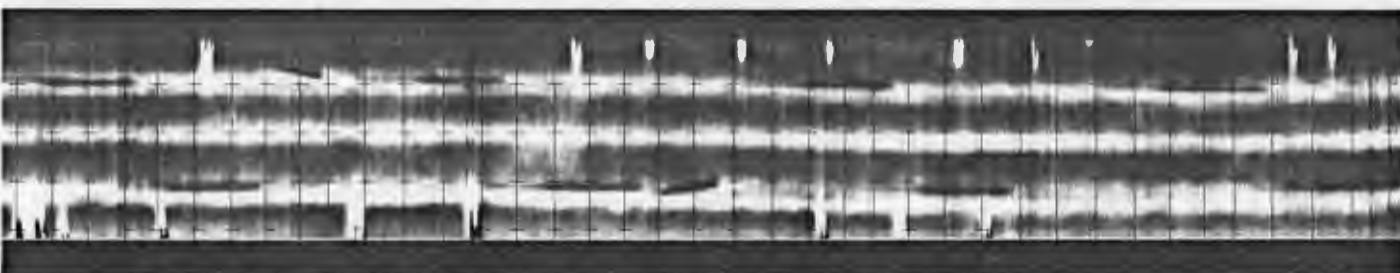
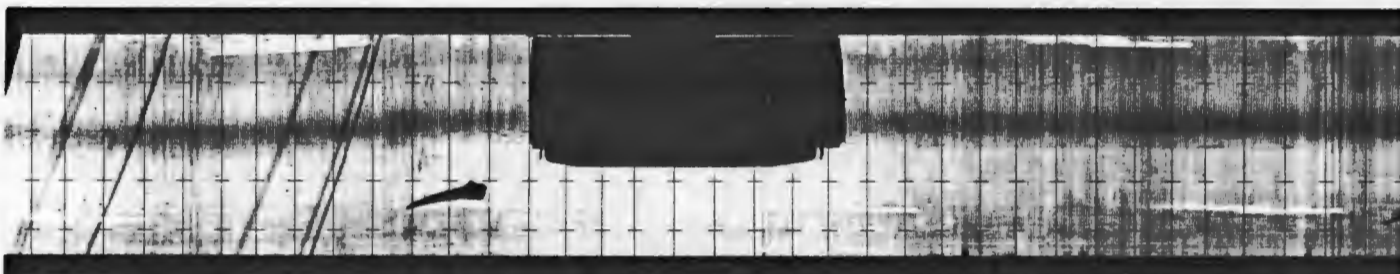
FILM-PICTURE

I-235 OVER DES MOINES RIVER
WESTBOUND CENTER LANE

1 OF 3



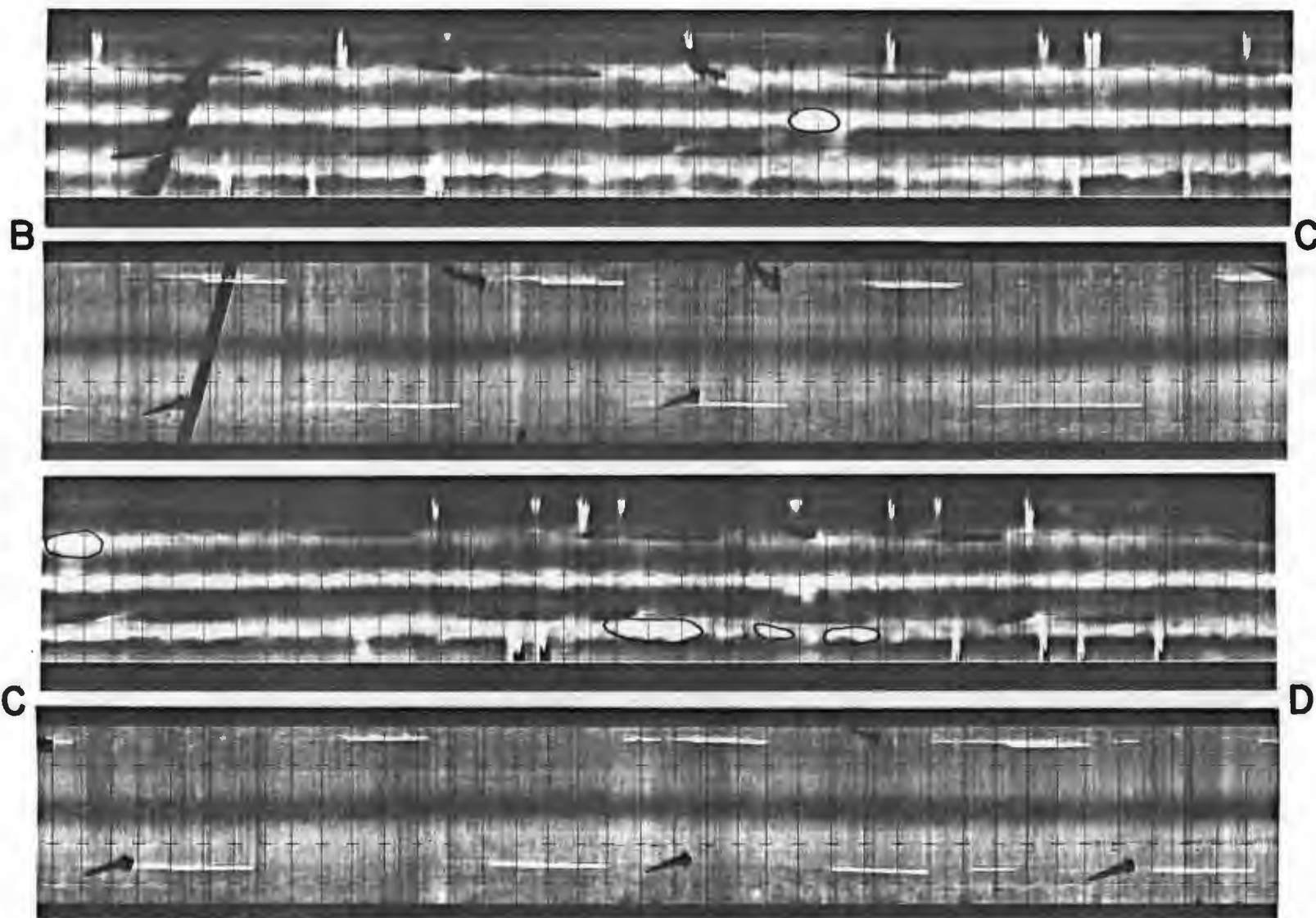
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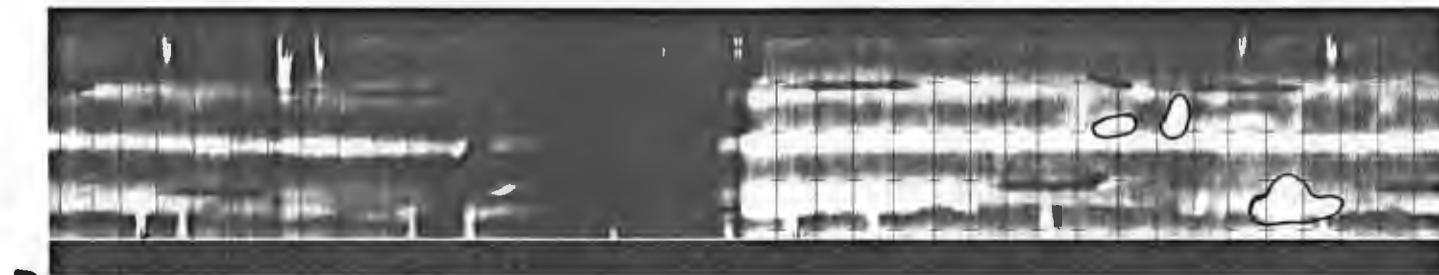


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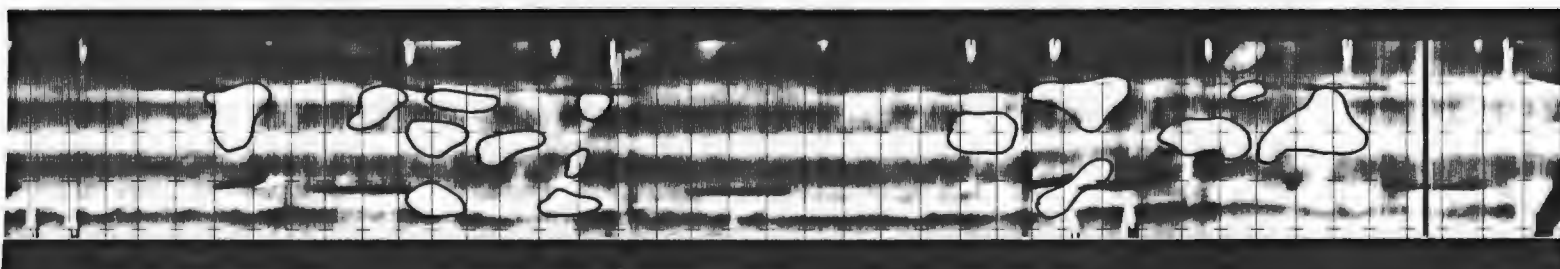
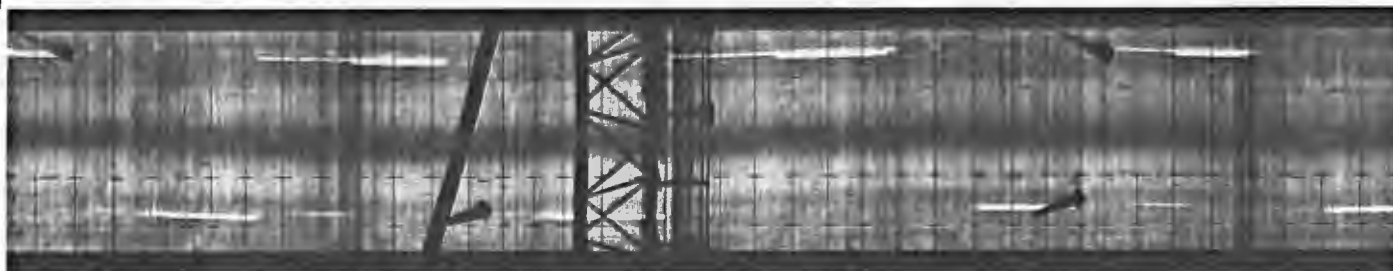




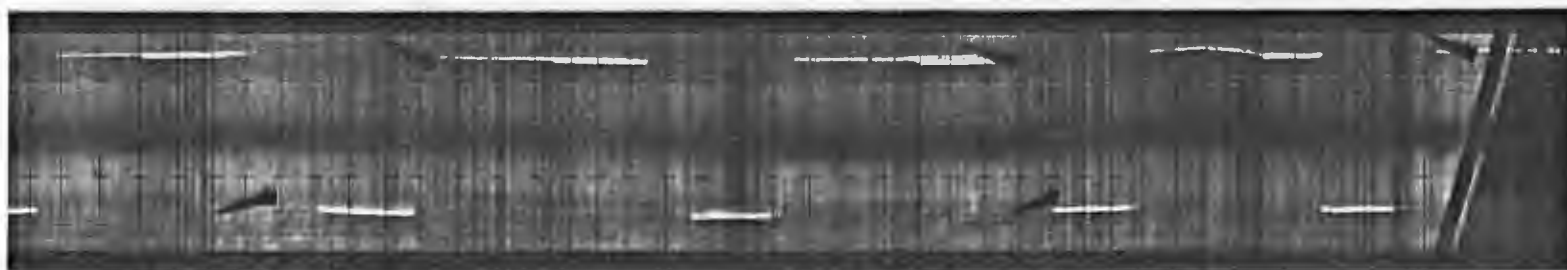


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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 70°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 87.5°F

DELAMINATED 91.5°F

INFRARED COUNTER

FROM 1383 TO 1450

COLORIZER SETTING .25x/10

DATE 6/22/82

TIME 1:10 p.m.

LOCATION I235 over Des Moines River

WIND SPEED

AND DIRECTION None

WEATHER CONDITIONS Clear

LANE VIEWING Westbound Passing Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 1426 TO 1495

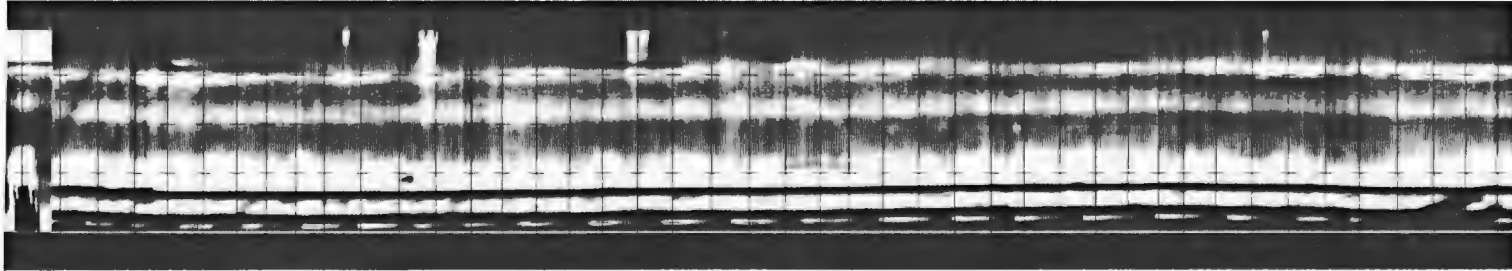
ZERO SETTING Expansion Joint

SKETCH:

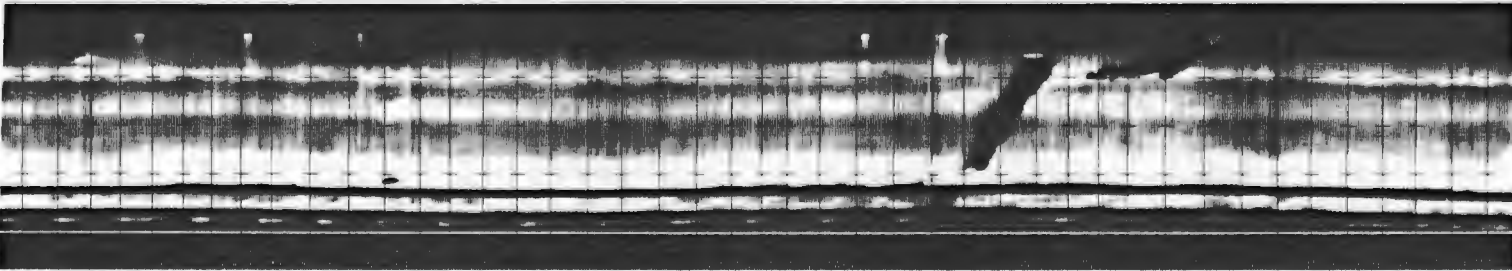
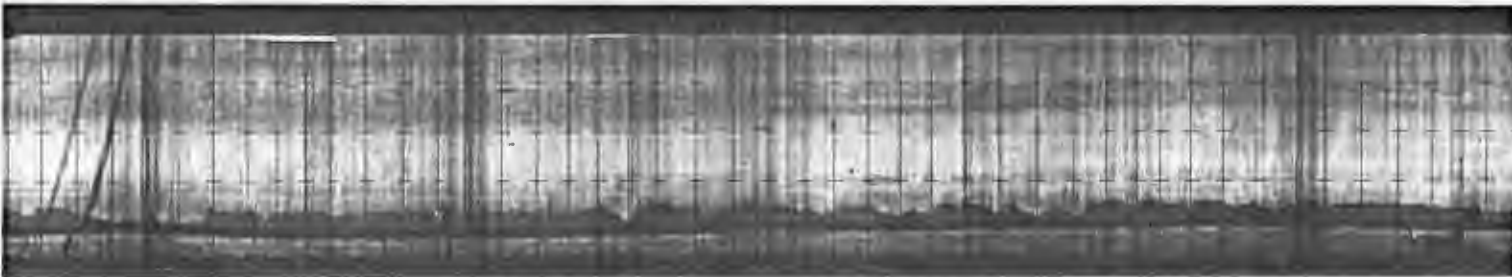
REMARKS

FILM-PICTURE

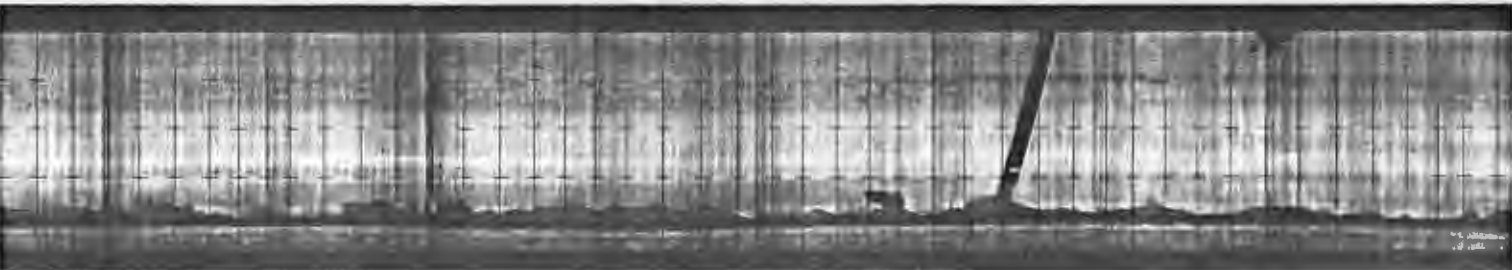
I-235 OVER DES MOINES RIVER
WESTBOUND PASSING LANE



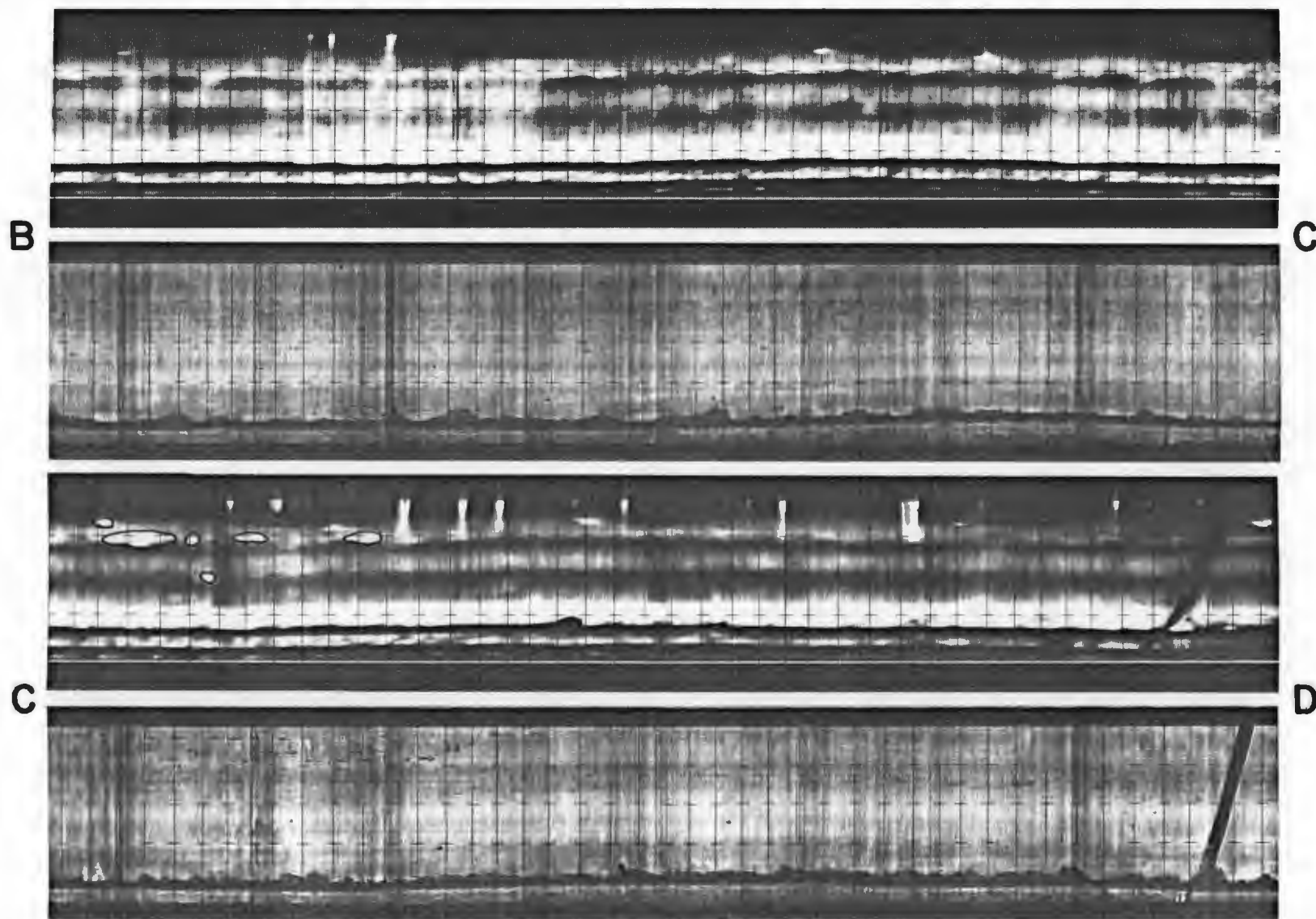
A

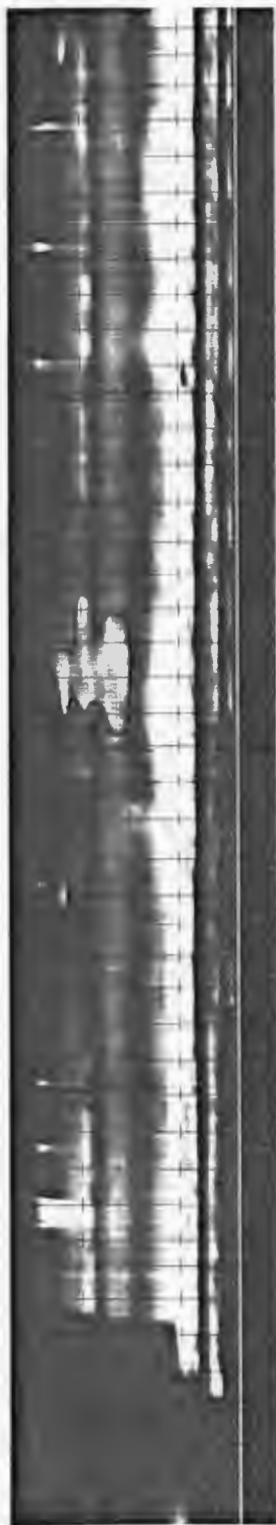


A



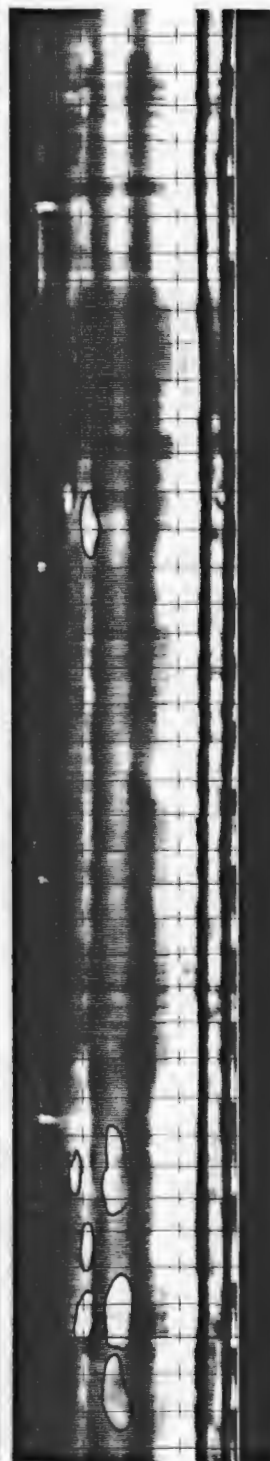
B





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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 80°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 96°F

DELAMINATED 104.5°F

INFRARED COUNTER

FROM TO

COLORIZER SETTING .25x/10

DATE 6/22/82

TIME 2:45 p.m.

LOCATION I80 over Old Rock Island R.R.

WIND SPEED
AND DIRECTION None

WEATHER CONDITIONS Clear

LANE VIEWING Westbound Driving Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM TO

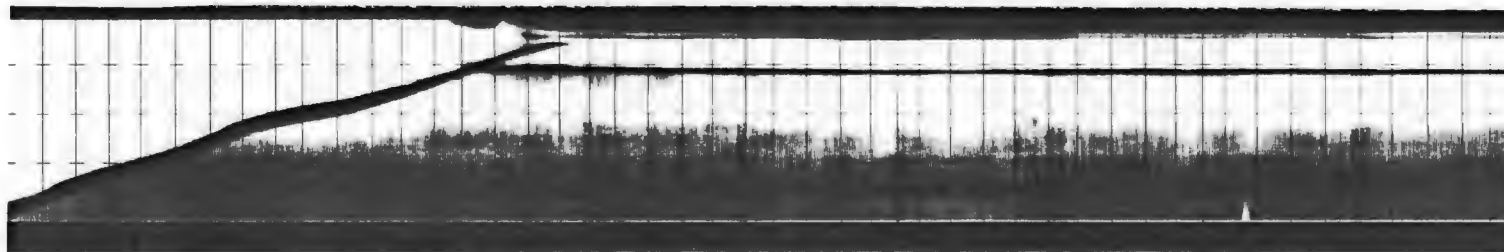
ZERO SETTING Expansion Joint

SKETCH:

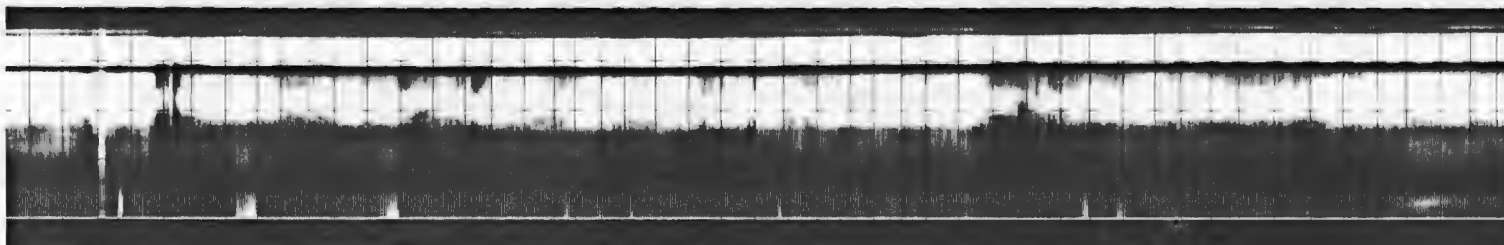
REMARKS

FILM-PICTURE

I-80 OVER OLD ROCK ISLAND RAILROAD TRACKS WESTBOUND DRIVING LANE

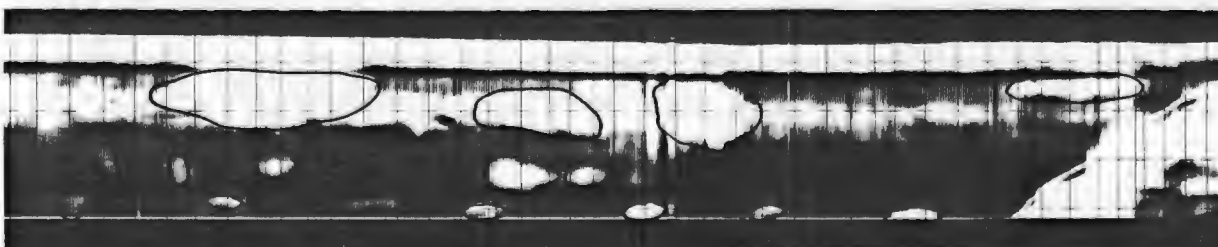


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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW JSK/DDU

TEMPERATURE 80°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE
SOLID 96°F

DELAMINATED 104.5°F

INFRARED COUNTER
FROM TO

COLORIZER SETTING .25x/10

DATE 6/22/82

TIME 3:05 p.m.

LOCATION I80 over Old Rock Island RR

WIND SPEED
AND DIRECTION None

WEATHER CONDITIONS Clear

LANE VIEWING Westbound Passing Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER
FROM TO

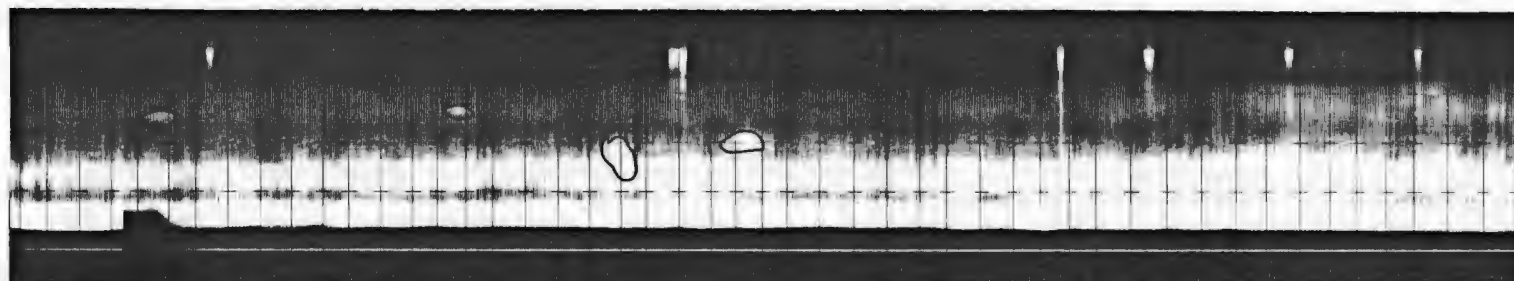
ZERO SETTING Expansion Joint

SKETCH:

REMARKS

FILM-PICTURE

I-80 OVER OLD ROCK ISLAND RAILROAD TRACKS WESTBOUND PASSING LANE



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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/22/82

PROJECT NO. 12383.000

TIME 4:30 p.m.

CREW DDU/JSK

LOCATION I80 near Avoca

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE CRCP - 3" overlay

AND DIRECTION None

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID

LANE VIEWING Both

DELAMINATED

SPEED VIEWING 10 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1449 TO End Tape #1
0 1132 Tape #2

FROM 1495 TO End Tape #1
0 1060 Tape #2

COLORIZER SETTING .25x/10

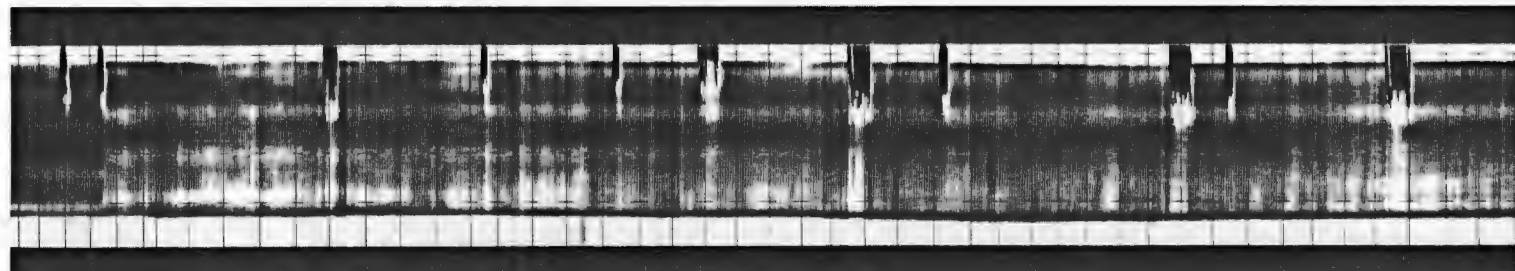
ZERO SETTING Mile Marker 35.10

SKETCH:

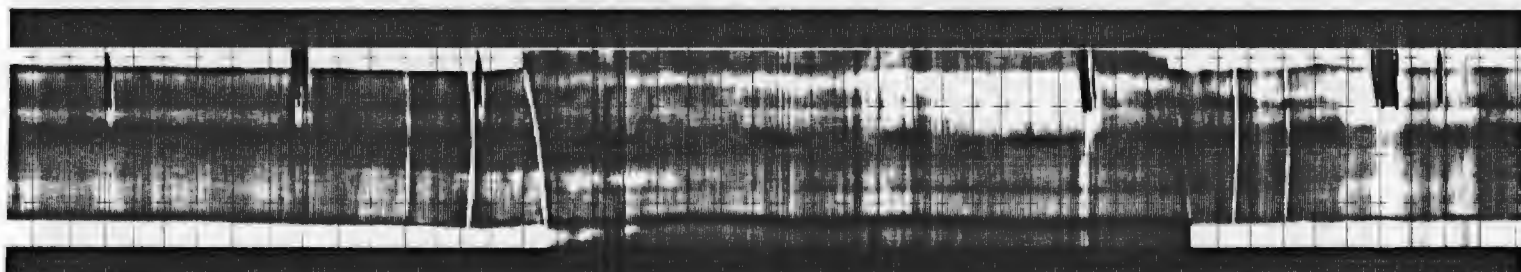
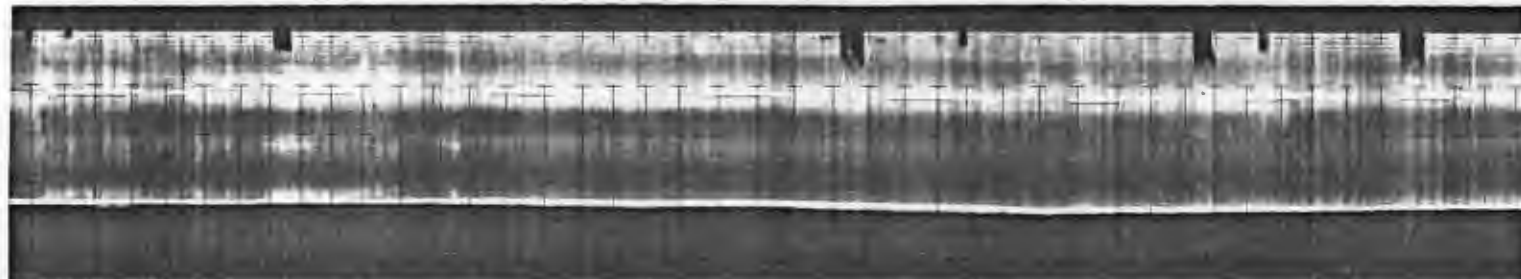
REMARKS

FILM-PICTURE

I-80
0'—1970'

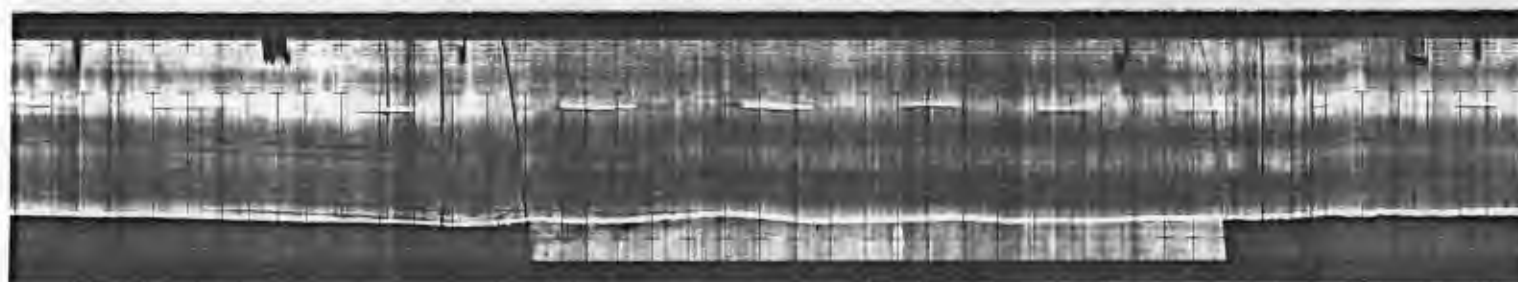


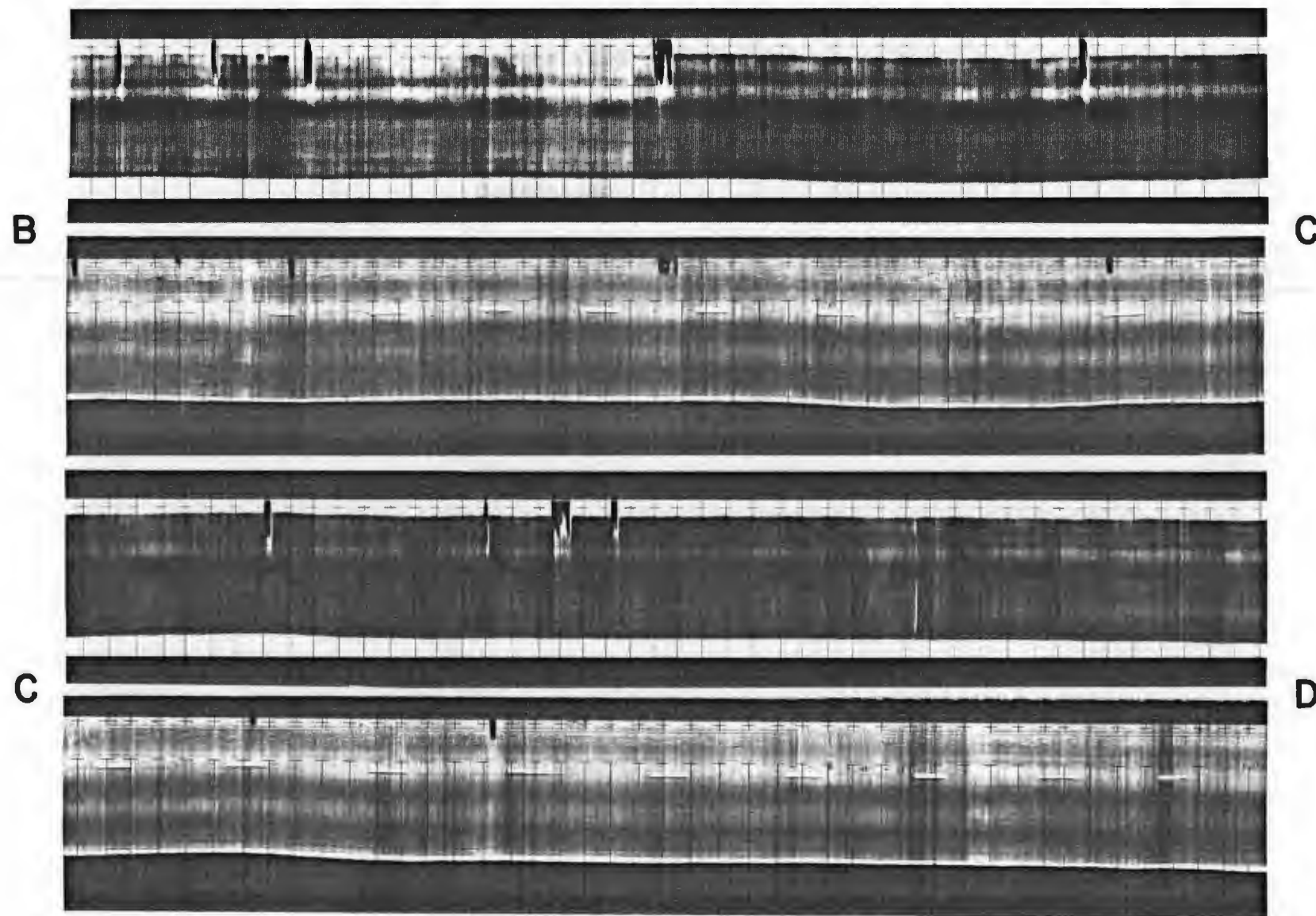
A

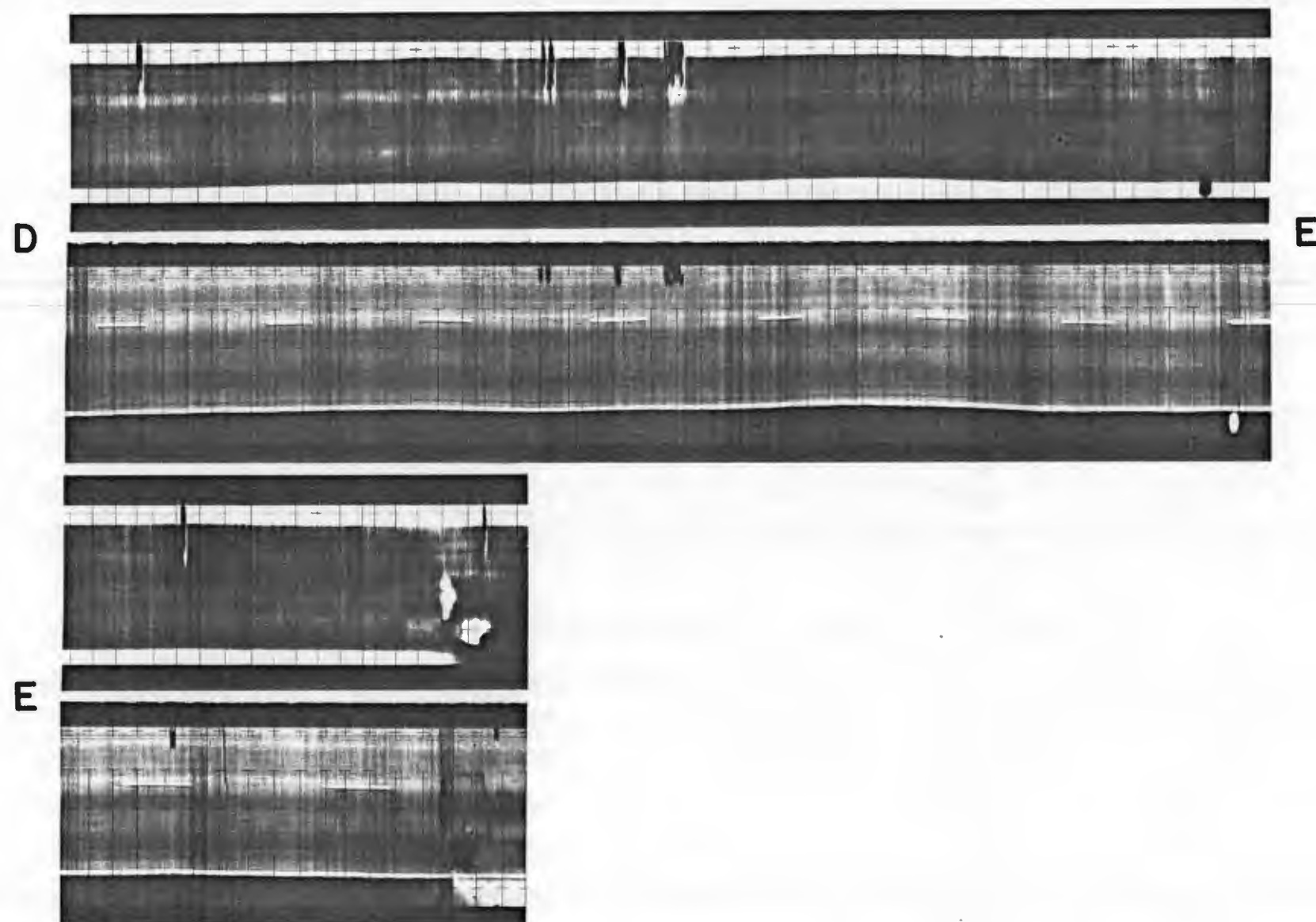


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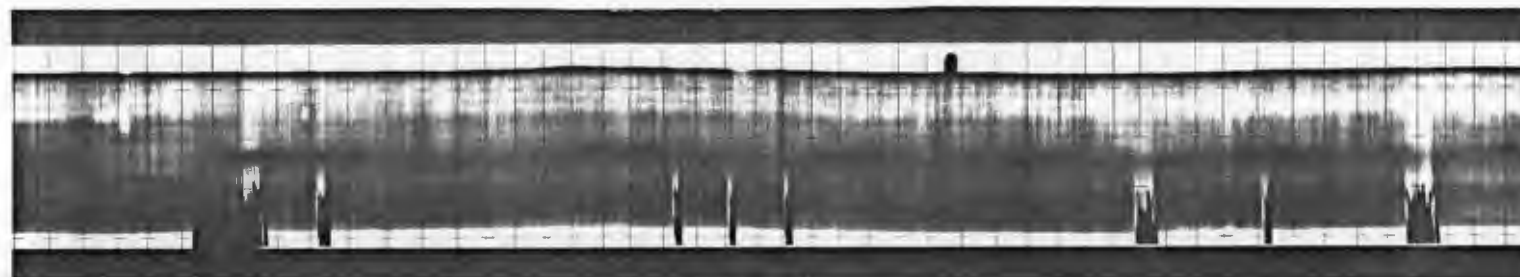




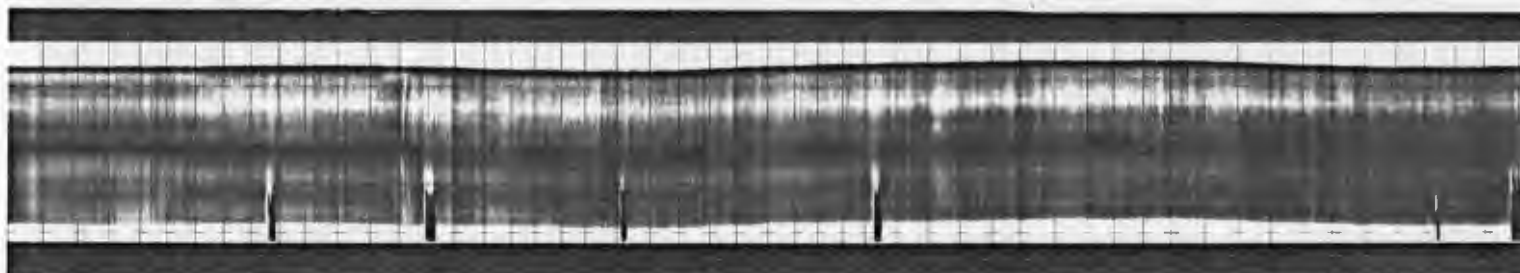
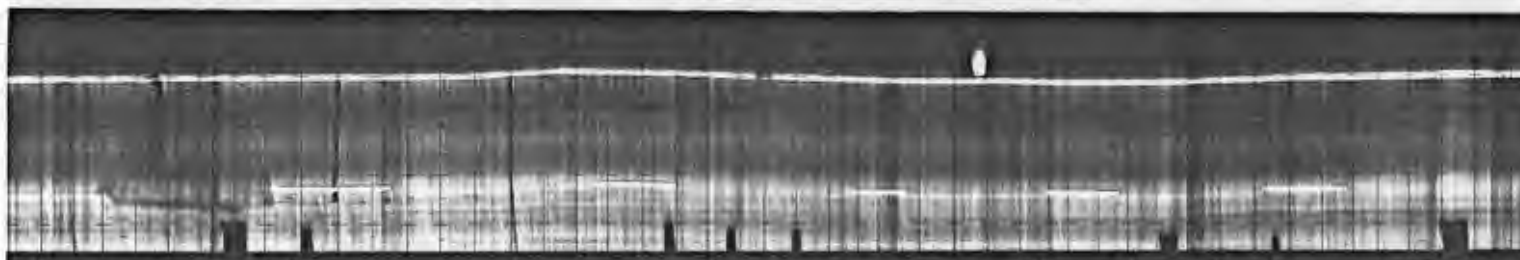
I-80
2745' — 2921'



I-80
3228'—4685'



A

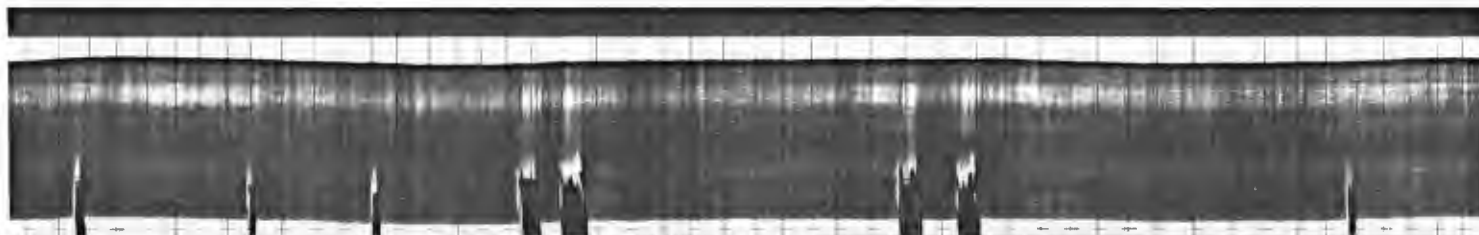


A

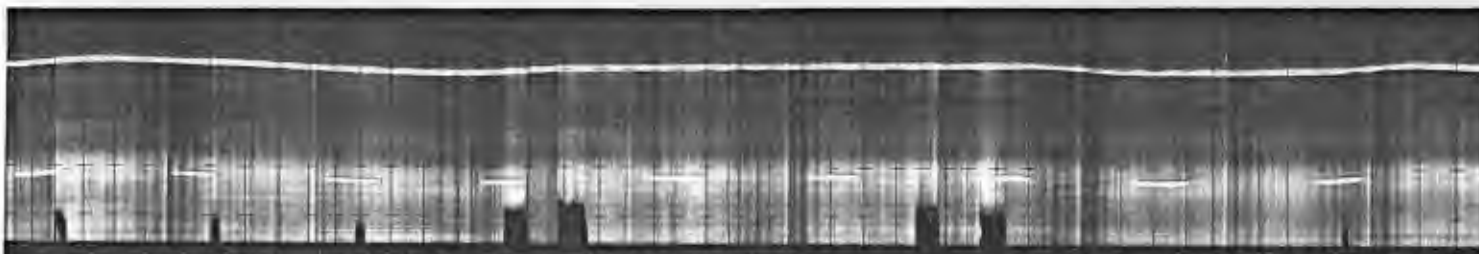
B



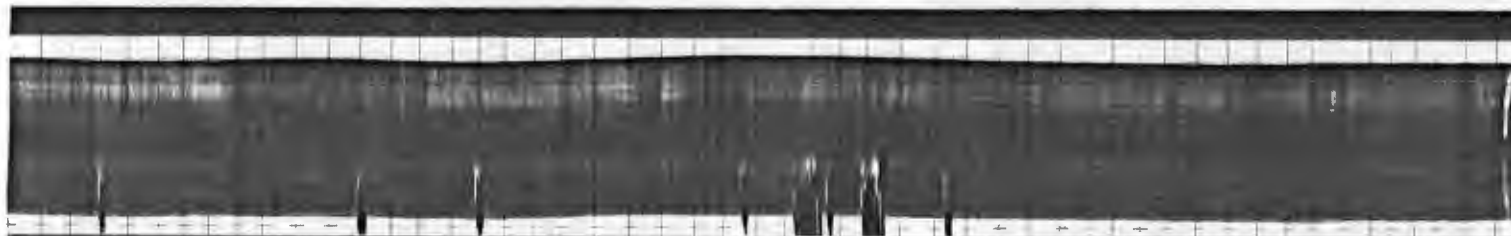
B



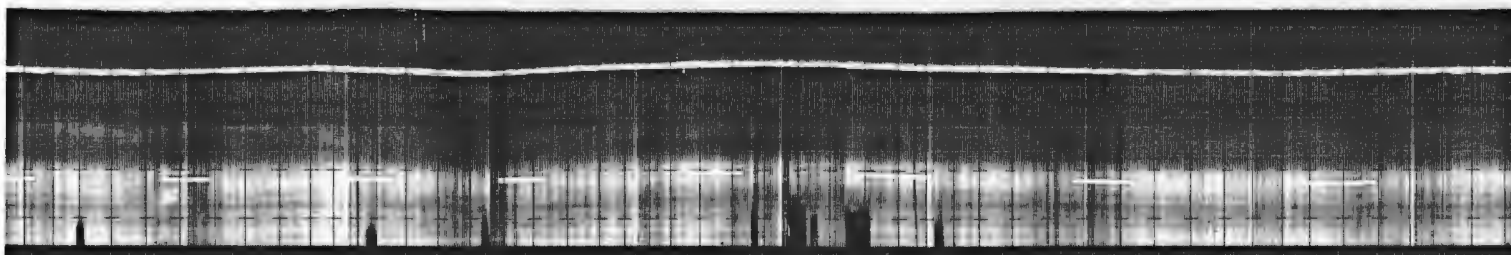
C

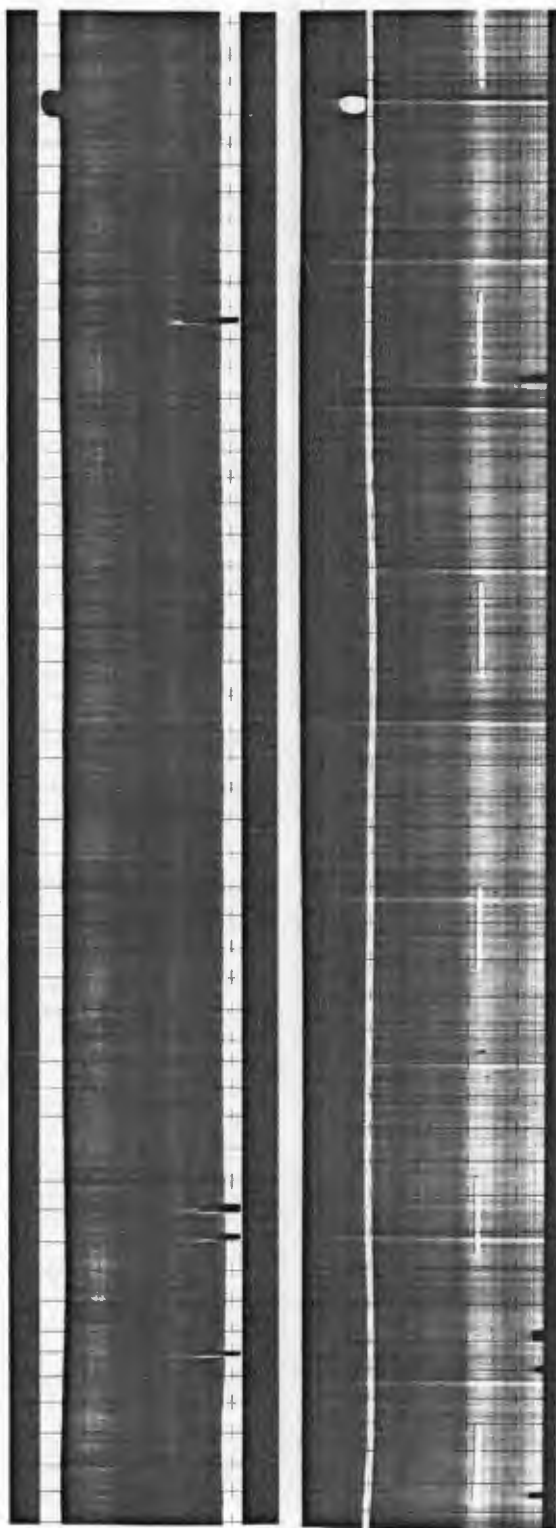


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 11:00 a.m.

CREW DDU/JSK

LOCATION Ia 175 over I29

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 82°F

LANE VIEWING Westbound Lane

DELAMINATED 83°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1132 TO 1200

FROM 1060 TO 1130

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

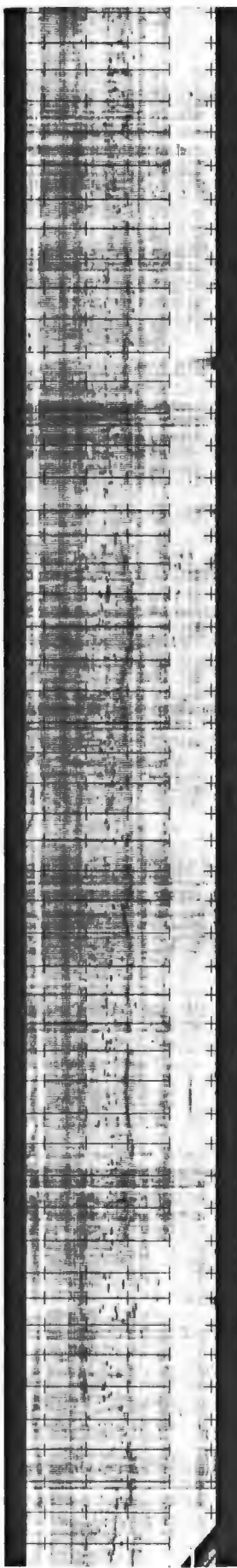
FILM-PICTURE

IOWA 175 OVER I-29
WESTBOUND LANE

1 OF 2

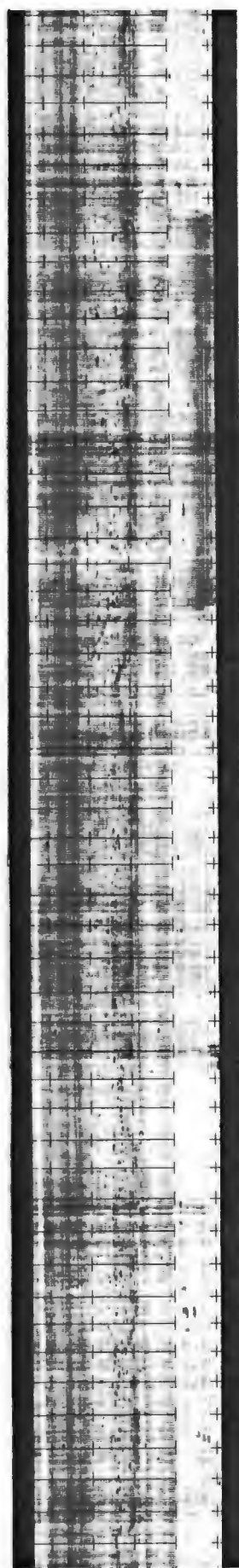


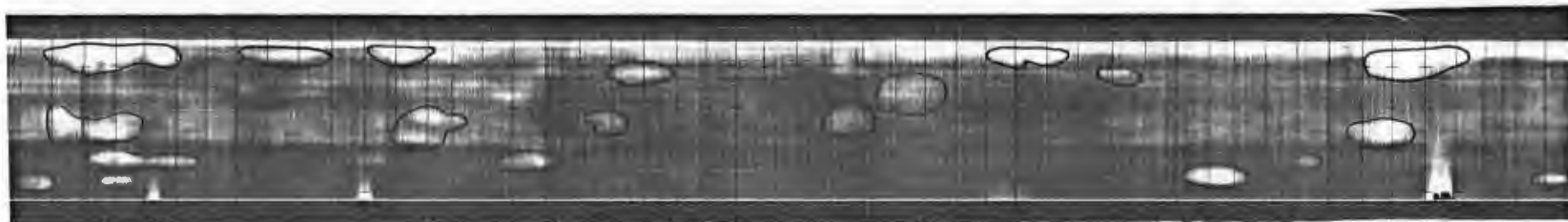
A



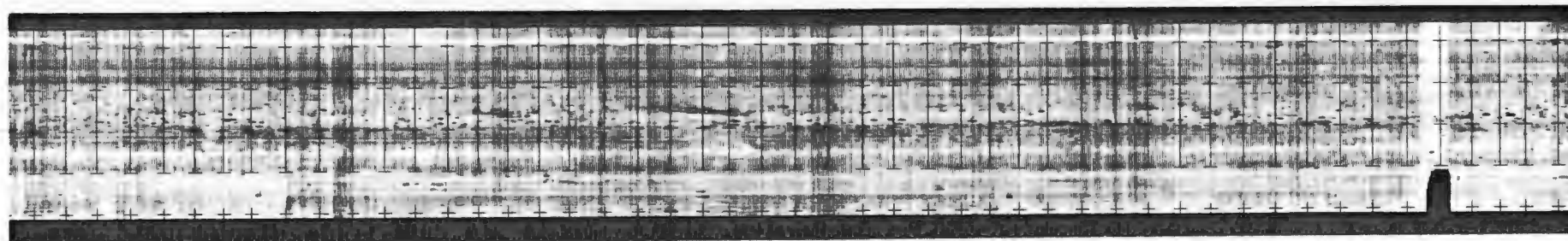
B

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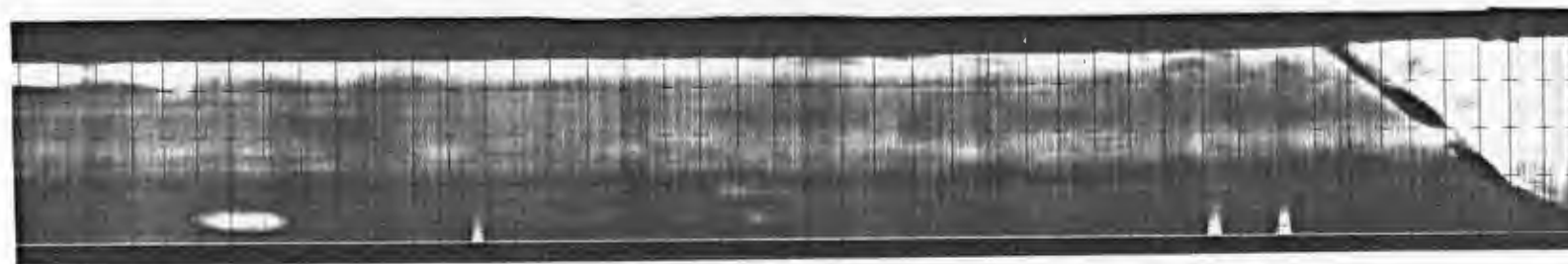




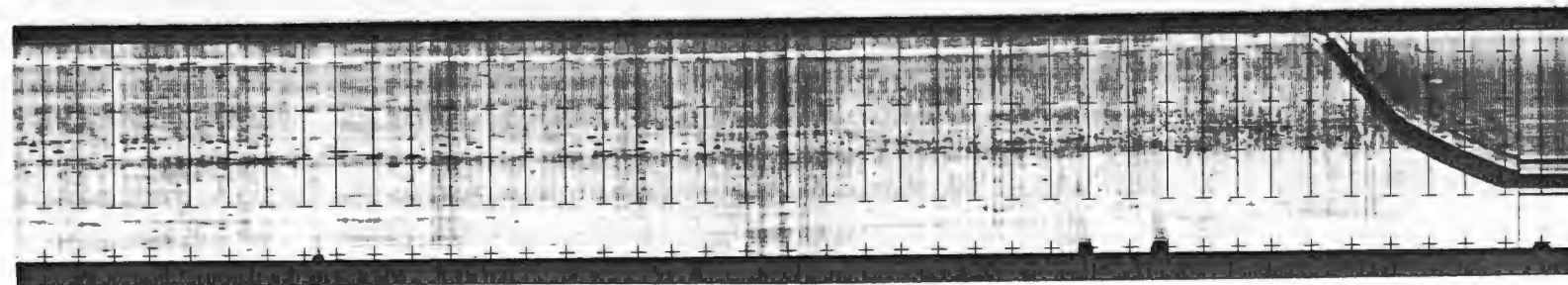
B



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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 11:05 a.m.

CREW DDU/JSK

LOCATION Ia 175 over I29

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 82°F

LANE VIEWING Eastbound Lane

DELAMINATED 83°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1200 TO 1242

FROM 1131 TO 1176

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

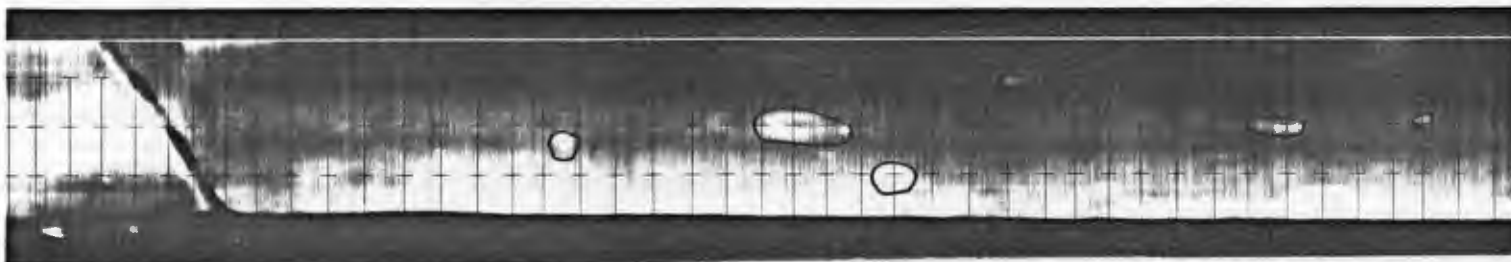
SKETCH:

REMARKS

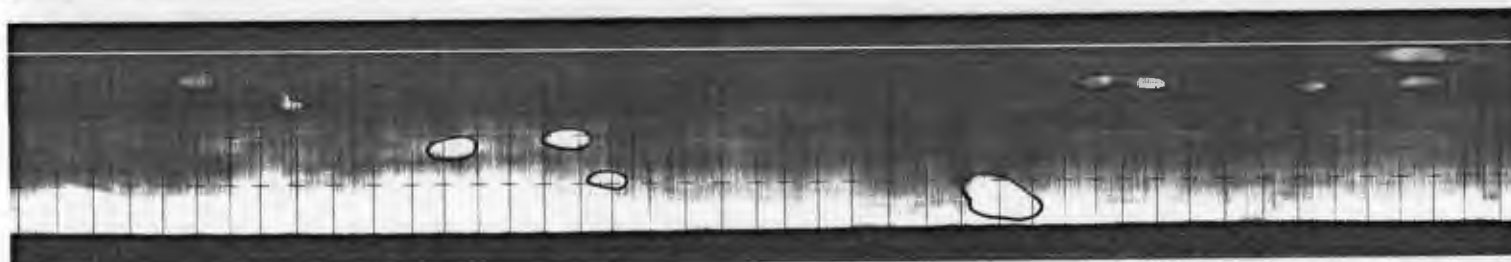
FILM-PICTURE

IOWA 175 OVER I-29
EASTBOUND LANE

1 OF 2



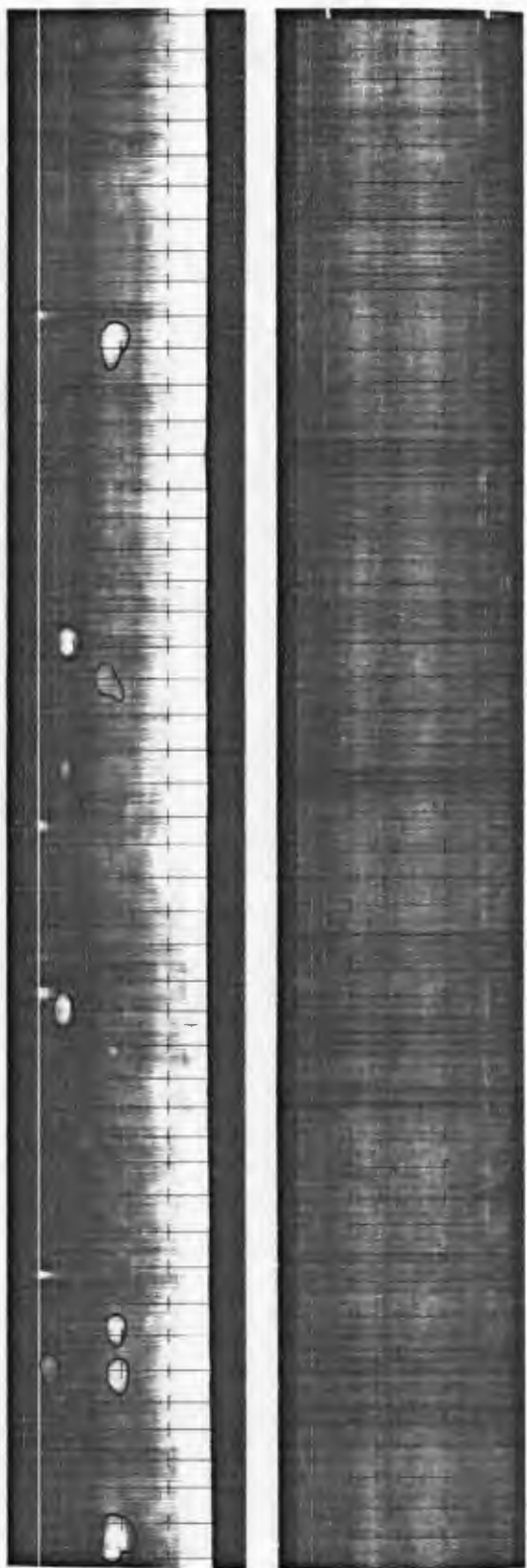
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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 70°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 89.5°F

DELAMINATED 91.5°F

INFRARED COUNTER

FROM 1242 TO 1279
1279 1317

COLORIZER SETTING .25x/10

DATE 6/23/82

TIME 12:15 p.m. & 12:30 p.m.

LOCATION US 20 over Elliott Creek

WIND SPEED

AND DIRECTION 20 South

WEATHER CONDITIONS Clear

LANE VIEWING Westbound Driving Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 1176 TO 1213
1213 1256

ZERO SETTING Expansion Joint

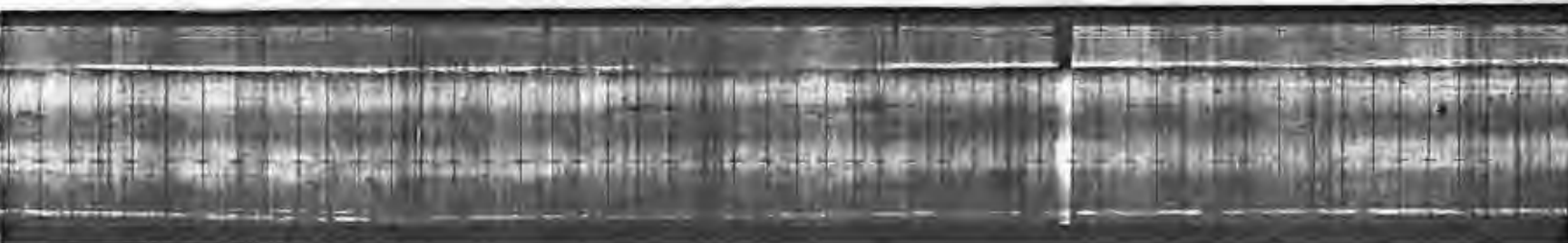
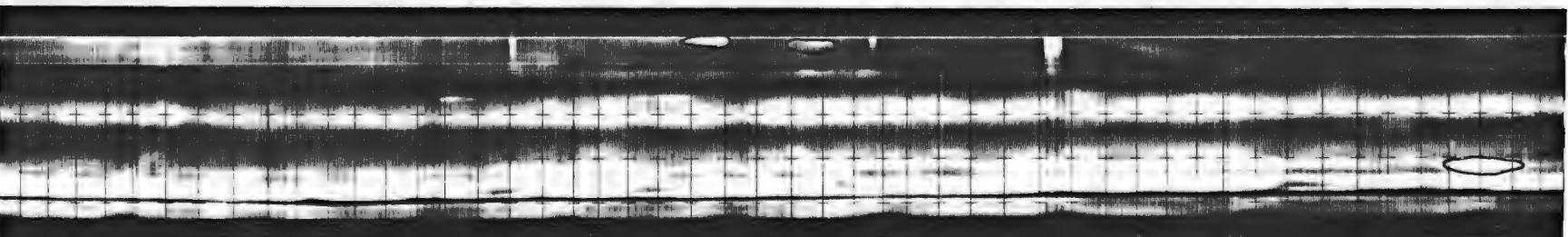
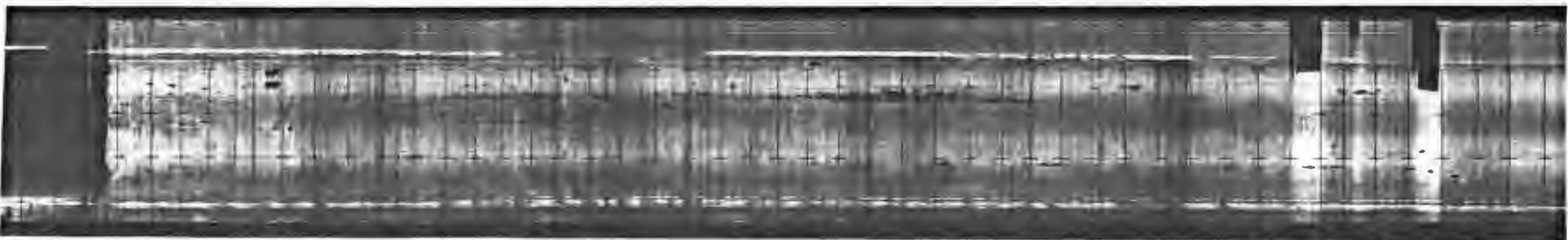
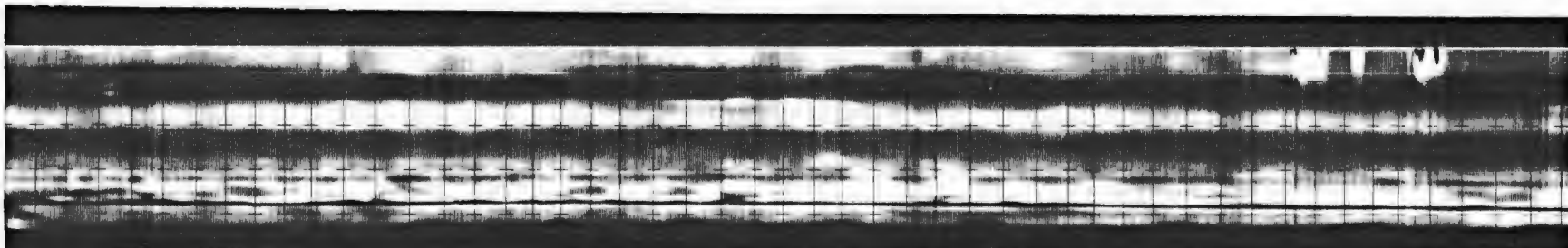
SKETCH:

REMARKS

FILM-PICTURE

US 20 OVER ELLIOTT CREEK
WESTBOUND DRIVING LANE

1 OF 1



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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 75°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 89.5°F

DELAMINATED 91.5°F

INFRARED COUNTER

FROM 1317 TO 1363

COLORIZER SETTING .25x/10

DATE 6/23/82

TIME 12:45 p.m.

LOCATION US 20 over Elliott Creek

WIND SPEED

AND DIRECTION 20 South

WEATHER CONDITIONS Clear

LANE VIEWING Westbound Passing Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 1256 TO 1304

ZERO SETTING Expansion Joint

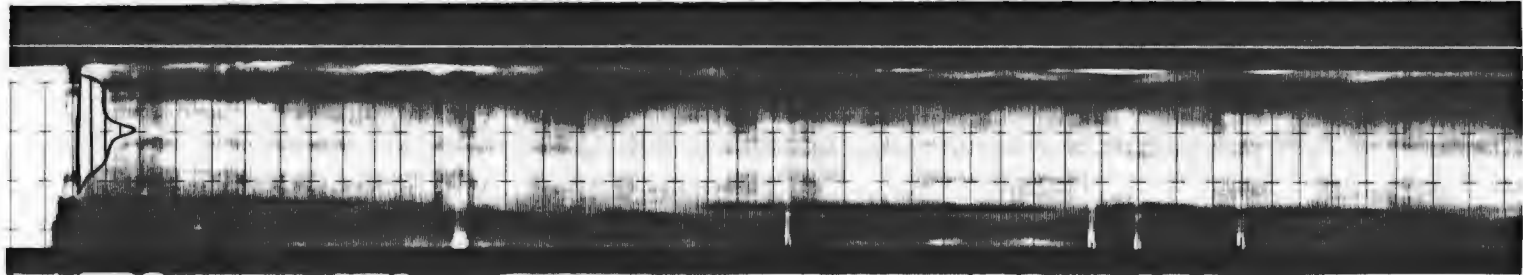
SKETCH:

REMARKS

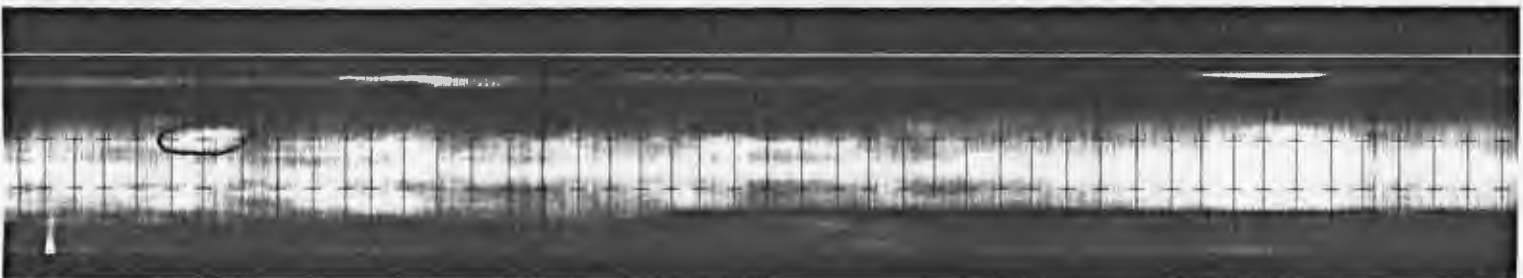
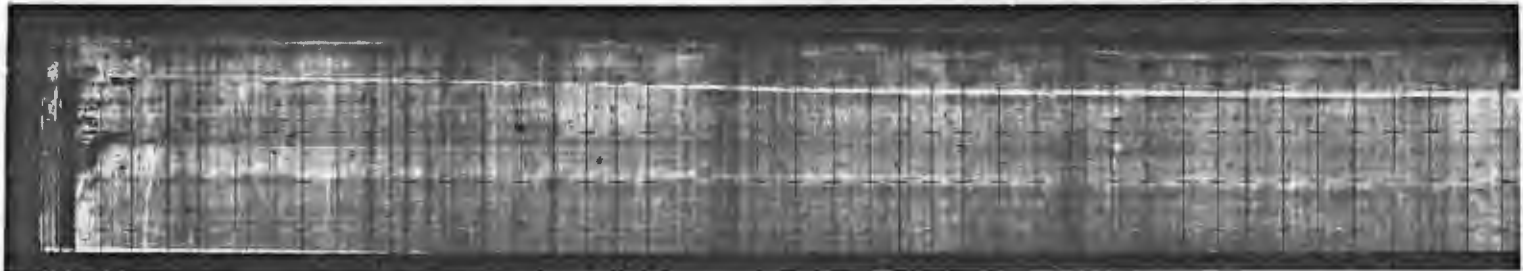
FILM-PICTURE

US 20 OVER ELLIOTT CREEK
WESTBOUND PASSING LANE

1 OF 2



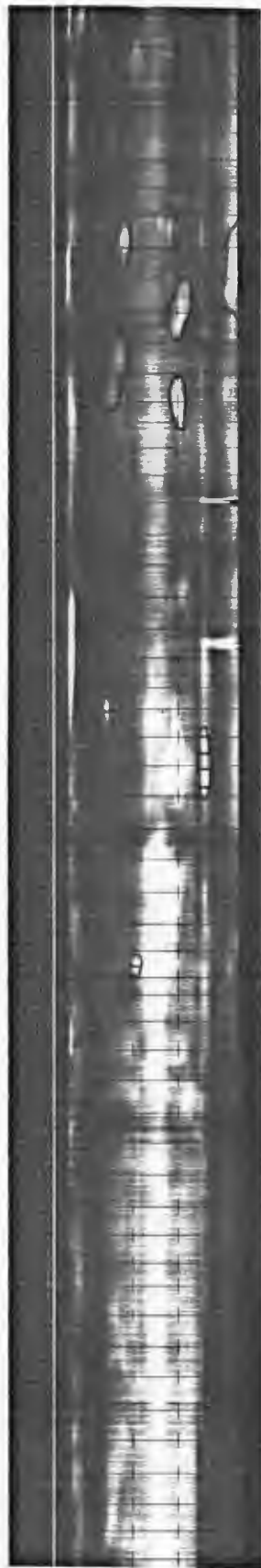
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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 75°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 97.5°F

DELAMINATED 99.5°F

INFRARED COUNTER

FROM 1382 TO 1446

COLORIZER SETTING .25x/10

DATE 6/23/82

TIME 2:30 p.m.

LOCATION US 75 Southbound over
Floyd River

WIND SPEED

AND DIRECTION 20 South

WEATHER CONDITIONS Clear

LANE VIEWING Southbound Driving Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 1304 TO 1390

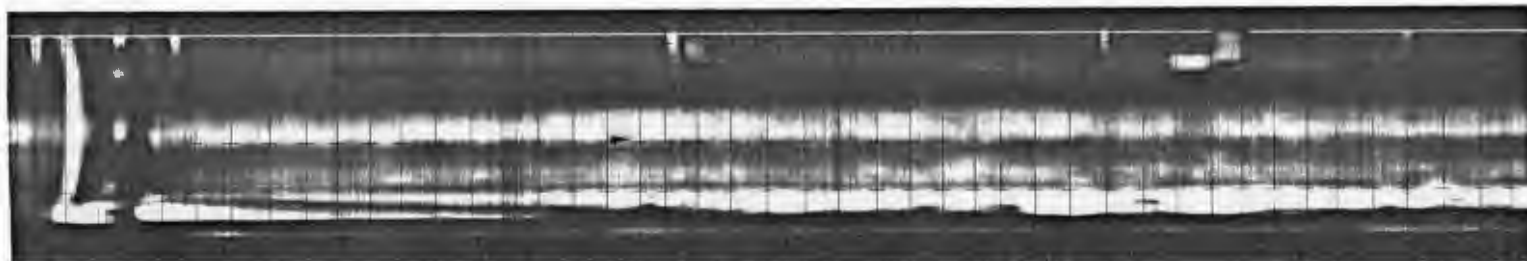
ZERO SETTING Expansion Joint

SKETCH:

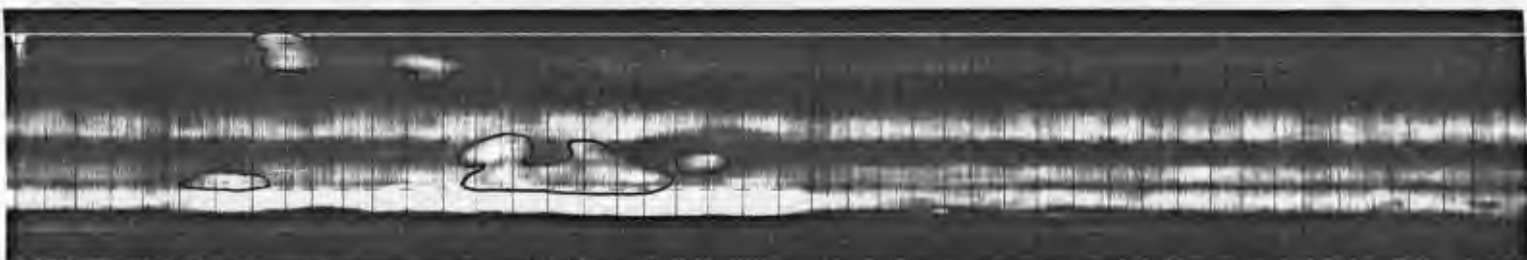
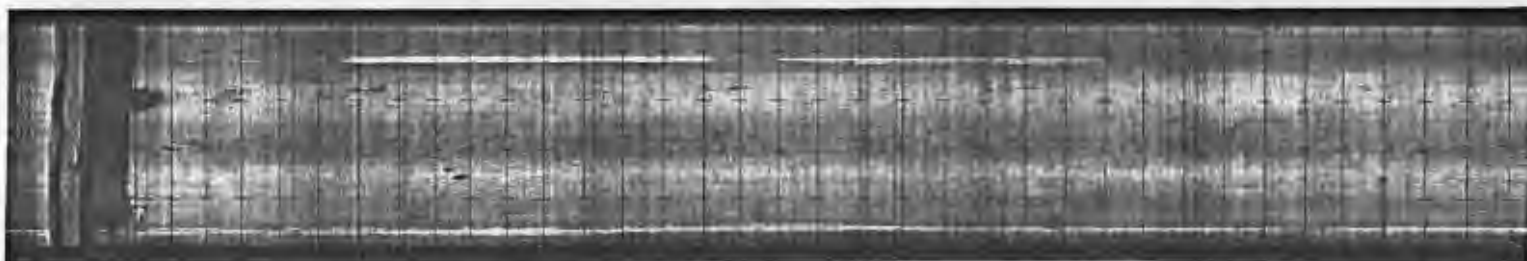
REMARKS

FILM-PICTURE

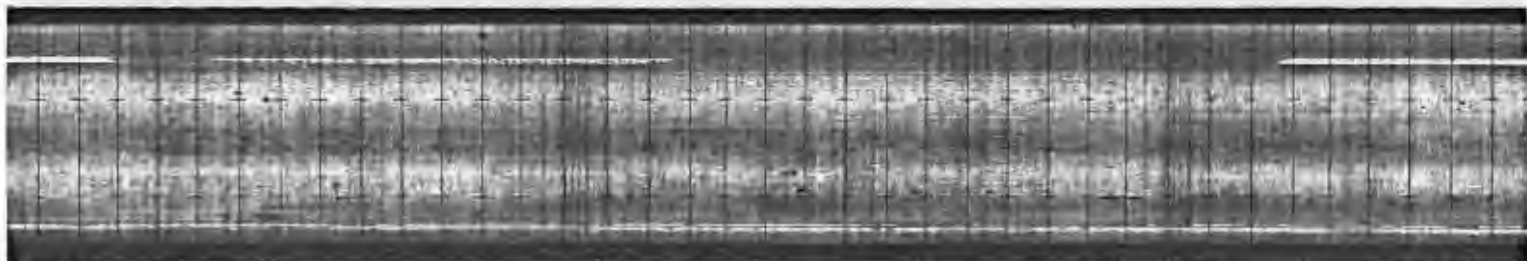
US 75 OVER FLOYD RIVER
SOUTHBOUND DRIVING LANE



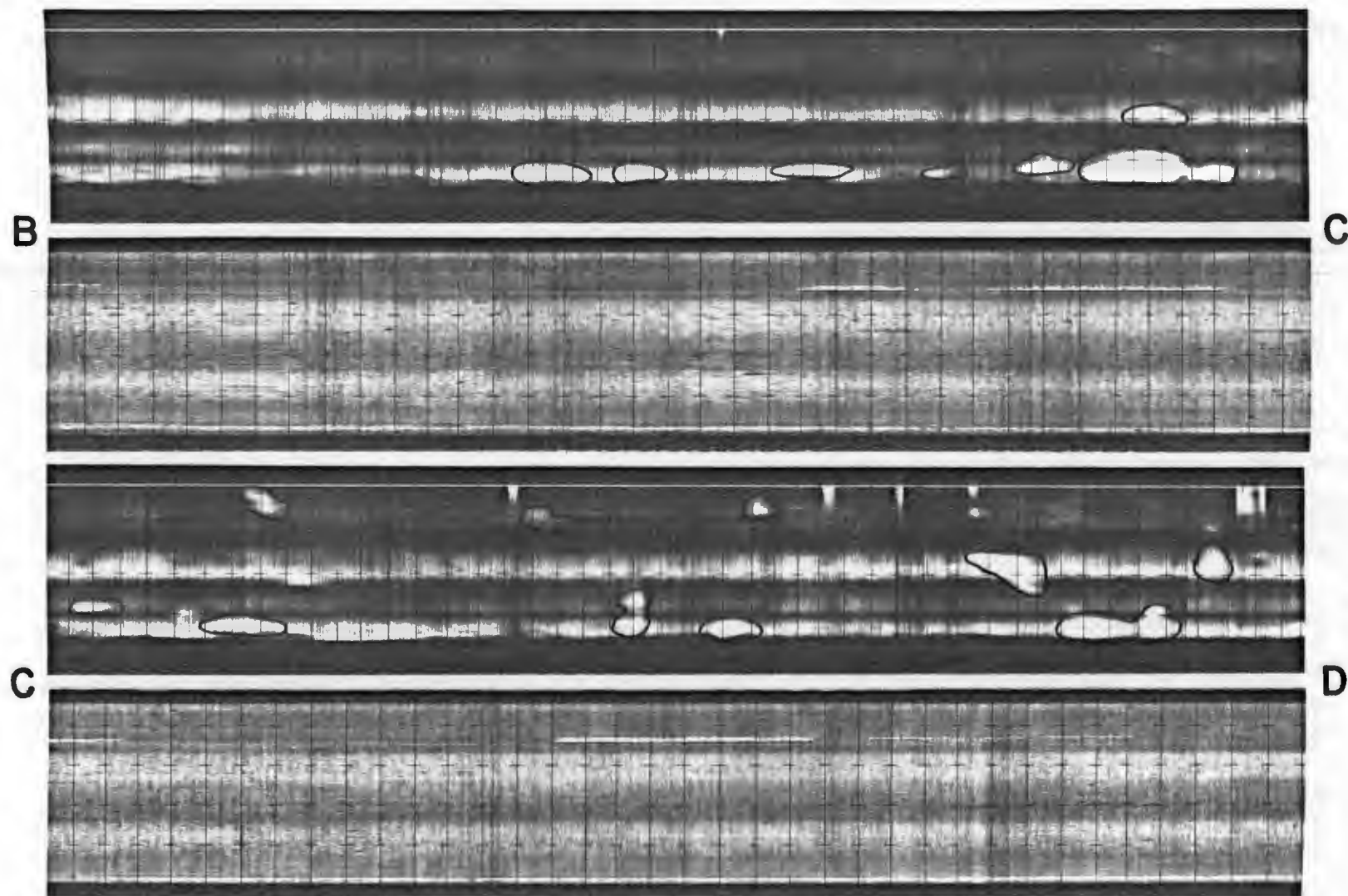
A

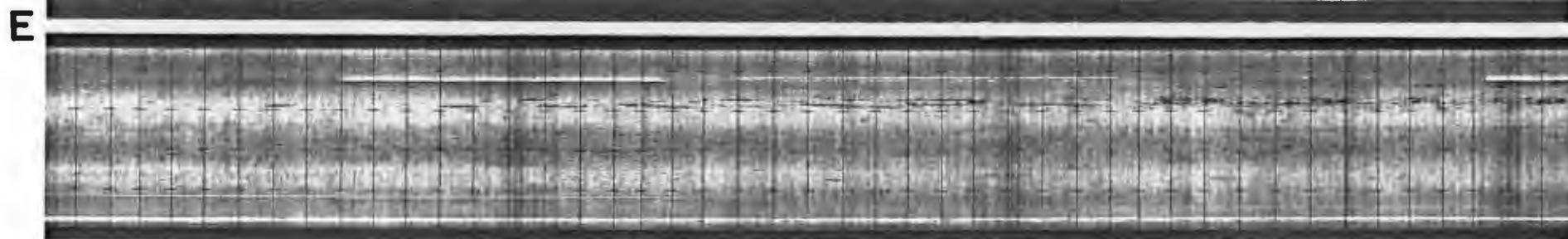
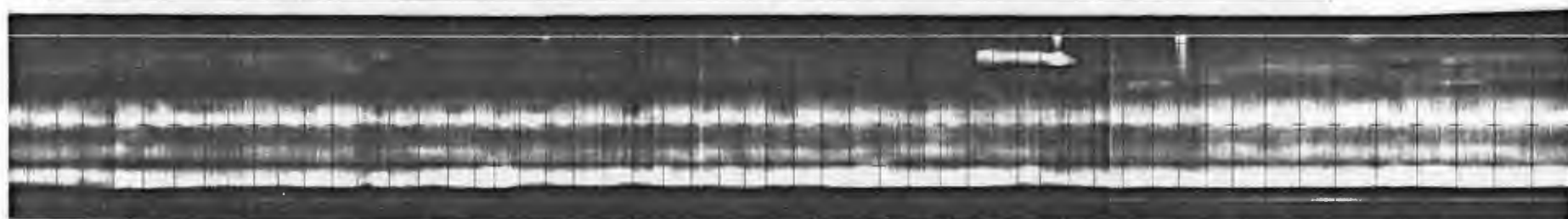
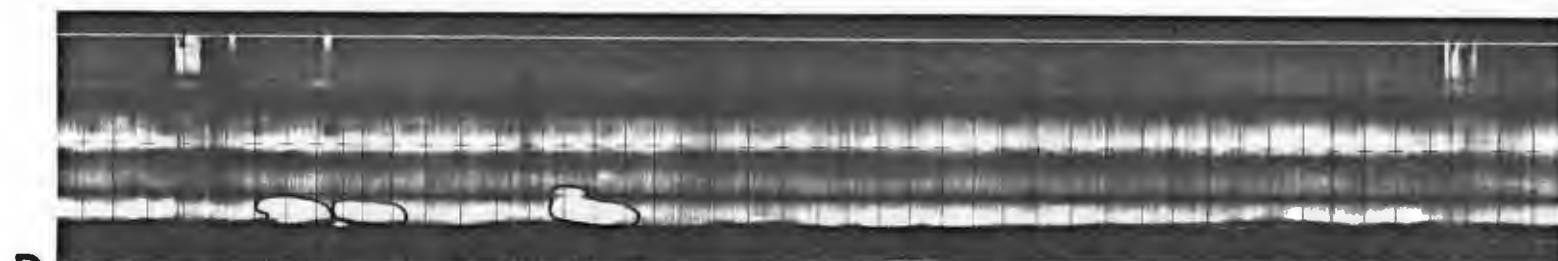


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 2:45 p.m.

CREW DDU/JSK

LOCATION US 75 Southbound over
Floyd River

TEMPERATURE 75°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 97.5°F

LANE VIEWING Southbound Passing Lane

DELAMINATED 99.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1446 TO 1531

FROM 1390 TO 1478

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

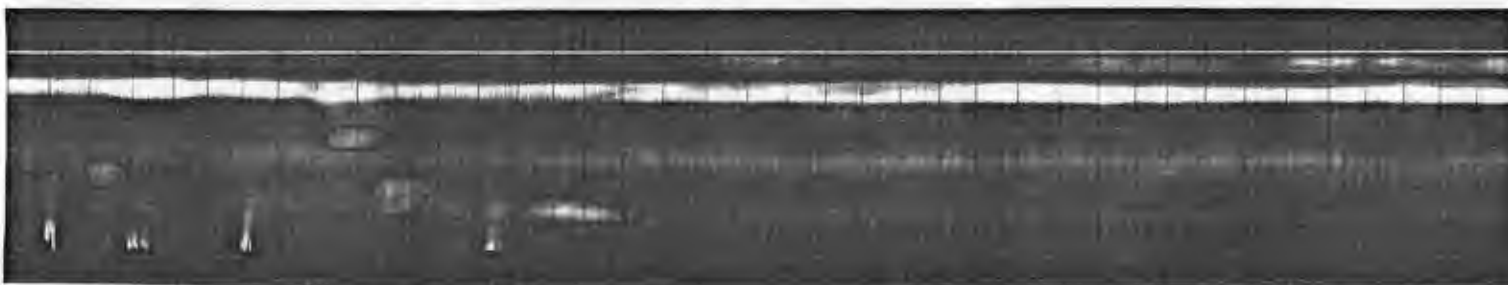
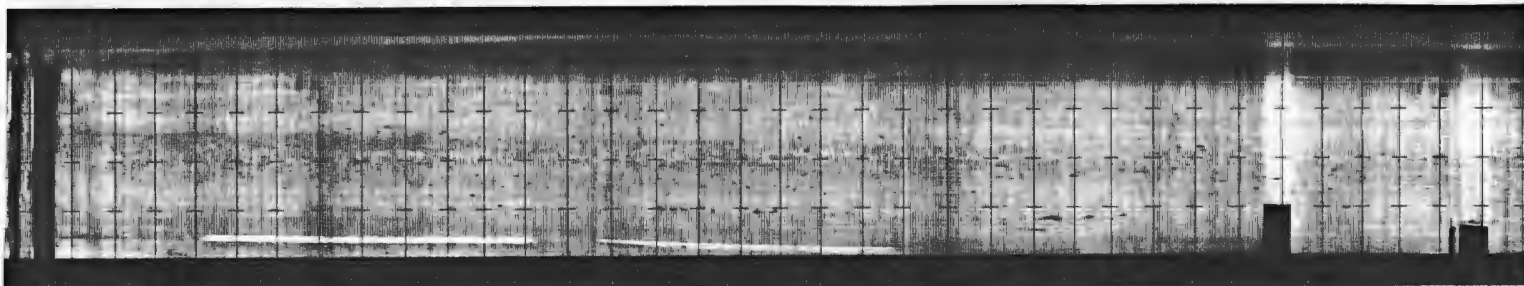
FILM-PICTURE

US 75 OVER FLOYD RIVER
SOUTHBOUND PASSING LANE

1 OF 4

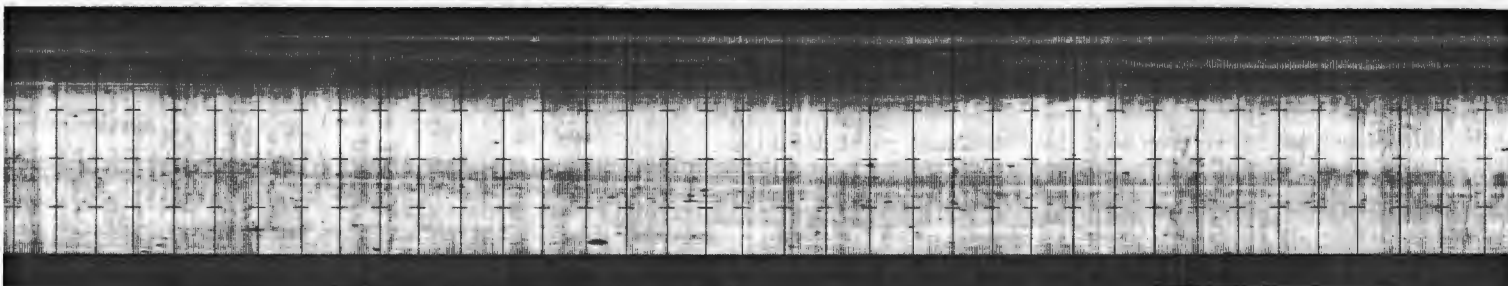


A

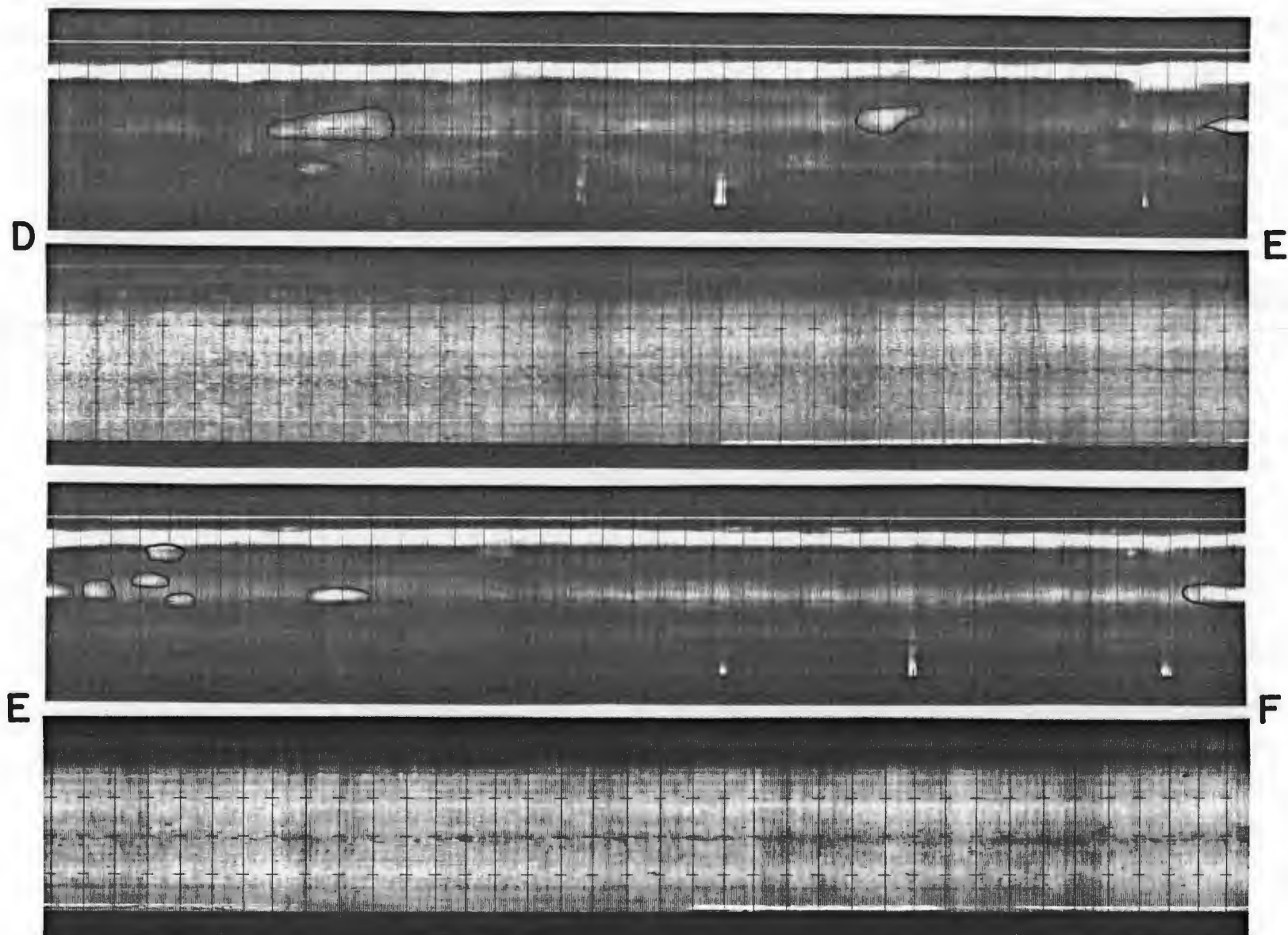


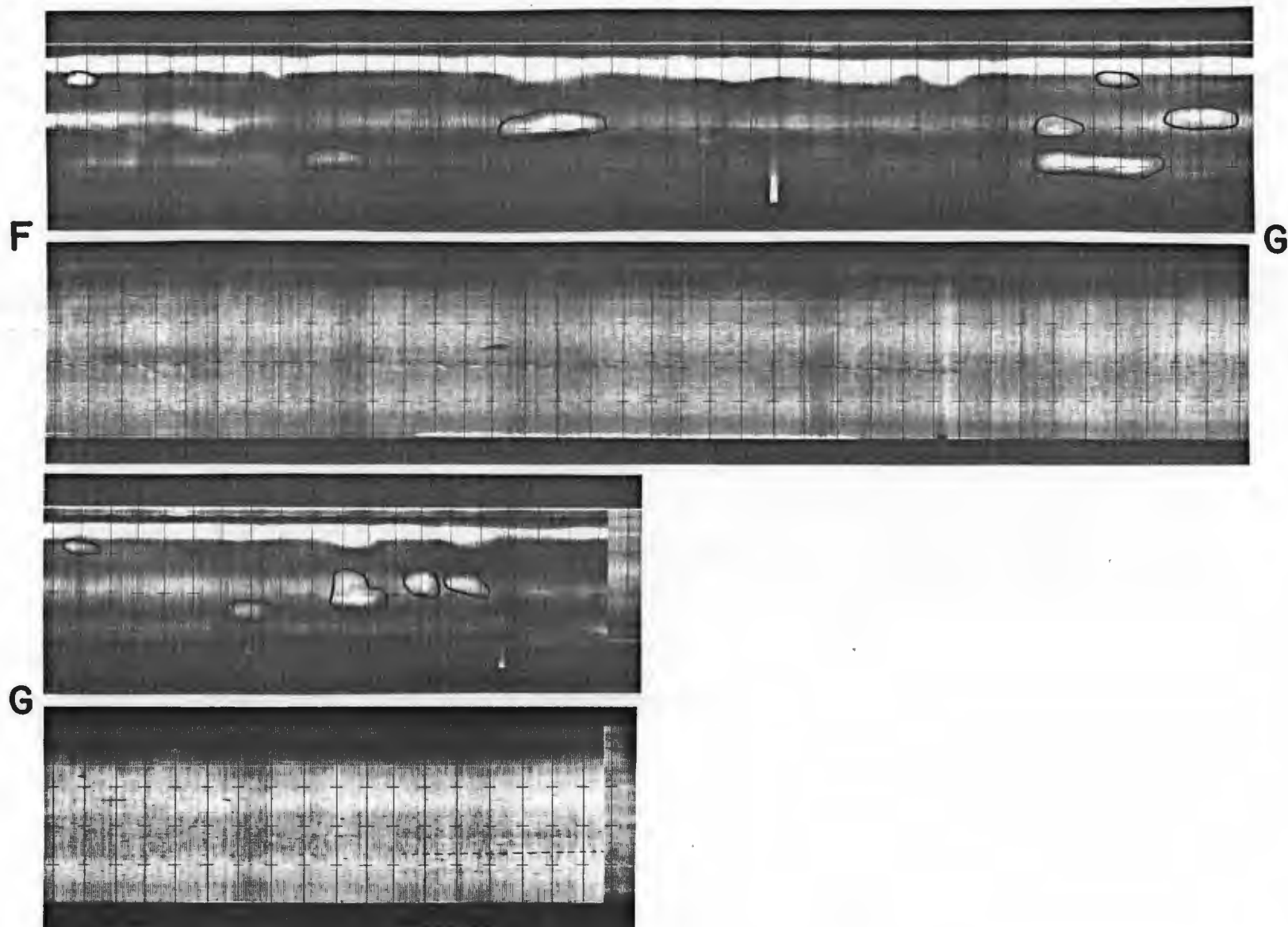
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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 3:30 p.m.

CREW DDU/JSK

LOCATION Ia 3 over Mink Creek

TEMPERATURE 75°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 96.5°F

LANE VIEWING Eastbound Lane

DELAMINATED 97.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1528 TO 1570

FROM 1478 TO 1522

COLORIZER SETTING .25x/10

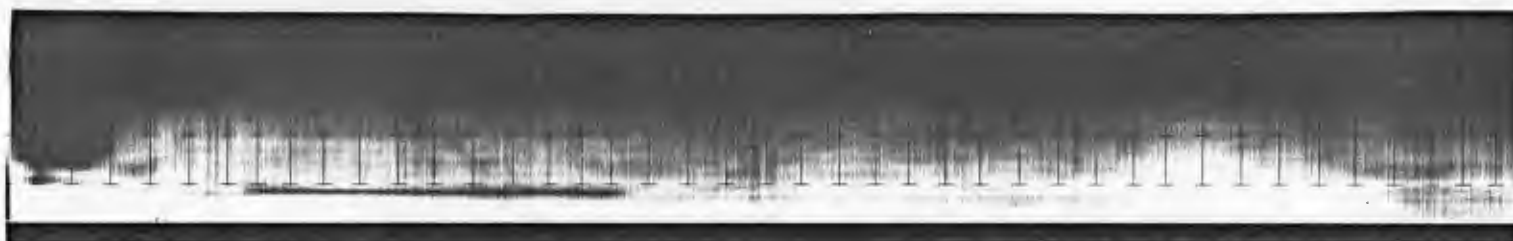
ZERO SETTING Expansion Joint

SKETCH:

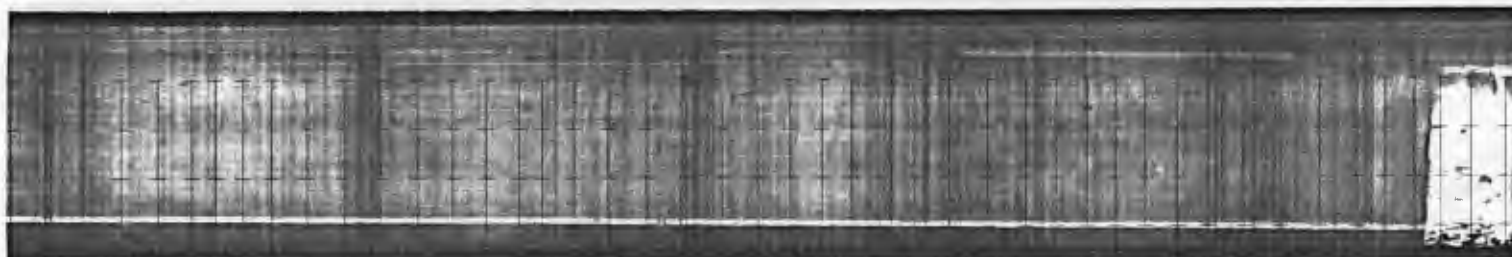
REMARKS

FILM-PICTURE

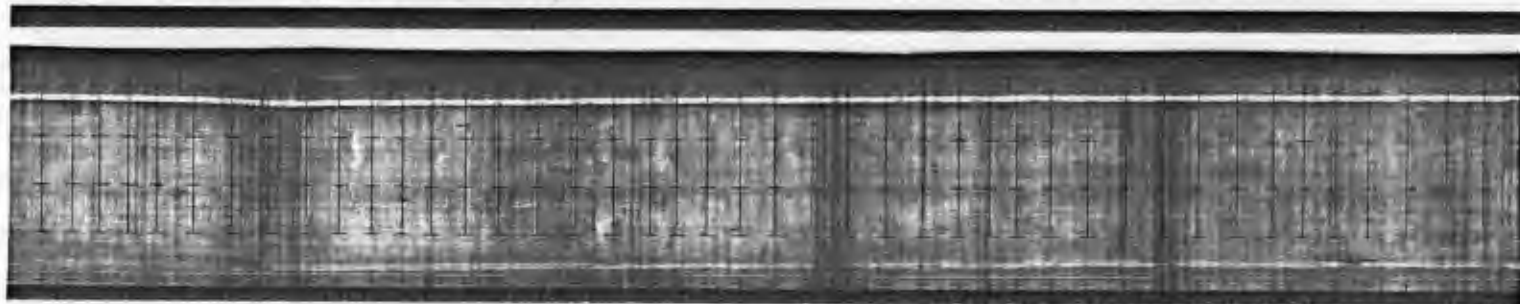
IOWA 3 OVER MINK CREEK EASTBOUND LANE



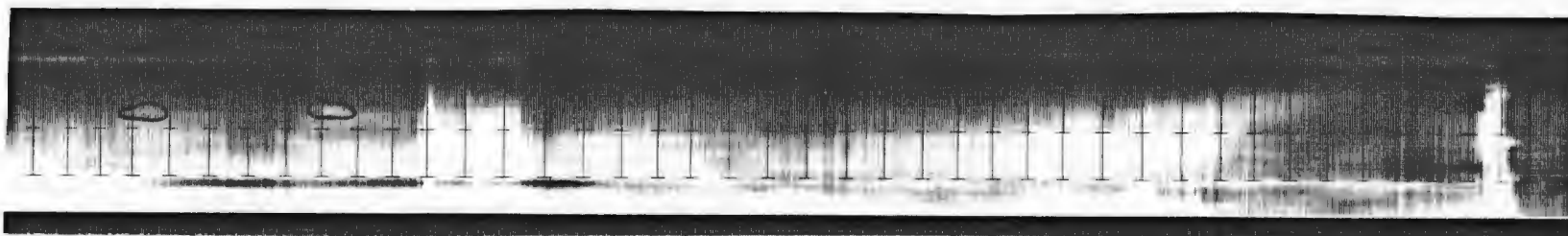
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**B**

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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 3:45 p.m.

CREW DDU/JSK

LOCATION Ia 3 over Mink Creek

TEMPERATURE 75°F

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 96.5°F

LANE VIEWING Westbound Lane

DELAMINATED 97.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1570 TO 1593

FROM 1522 TO 1545

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

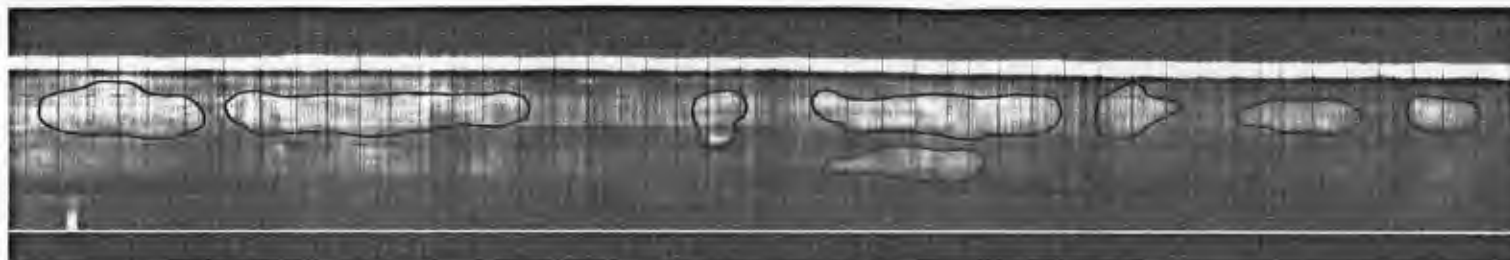
SKETCH:

REMARKS

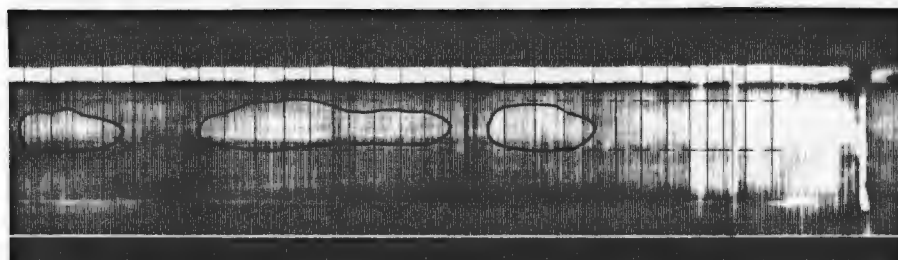
FILM-PICTURE

IOWA 3 OVER MINK CREEK
WESTBOUND LANE

I OF I



A



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INFRARED DATA REPORT

CLIENT IOWA DOT
PROJECT NO. 12383.000
CREW DDU/JSK
TEMPERATURE 75°F
SURFACE TYPE Concrete
PAVEMENT TEMPERATURE
SOLID 96.5°F
DELAMINATED 97.5°F
INFRARED COUNTER
FROM 1593 TO 1652
COLORIZER SETTING .25x/10

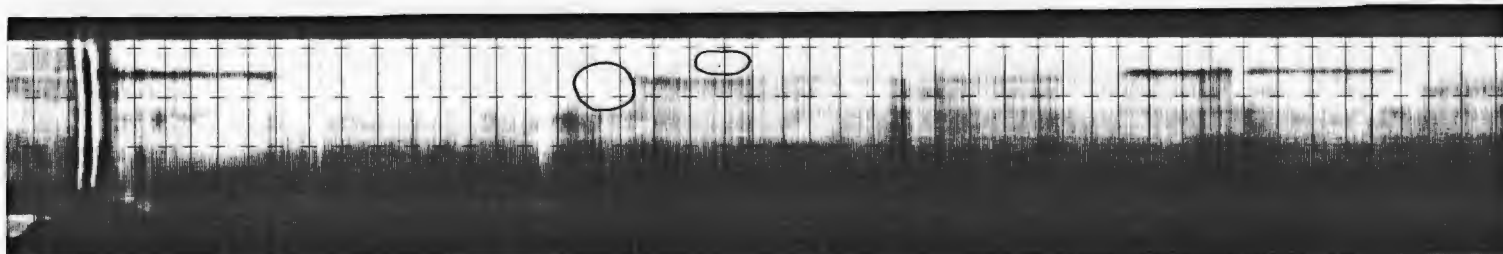
DATE 6/23/82
TIME 4:00 p.m.
LOCATION Ia 3 over W. Branch of Floyd River
WIND SPEED 20 South
AND DIRECTION Clear
WEATHER CONDITIONS Clear
LANE VIEWING Eastbound Lane
SPEED VIEWING 5 mph
REAL LIFE COUNTER
FROM 1545 TO 1606
ZERO SETTING Expansion Joint

SKETCH:

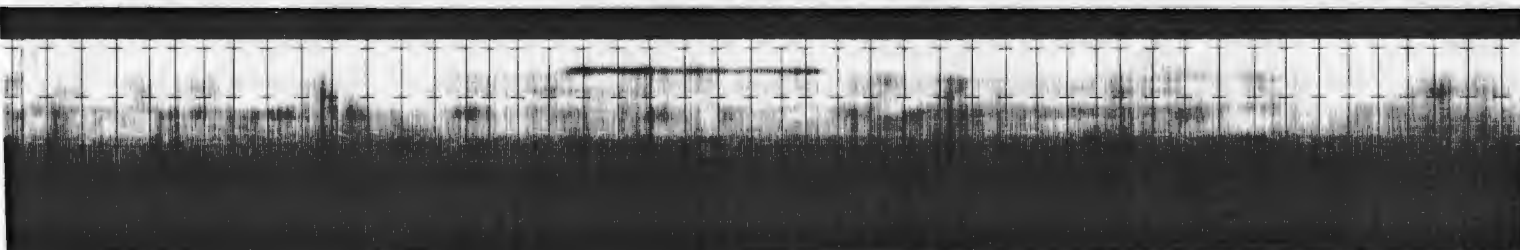
REMARKS

FILM-PICTURE

IOWA 3 OVER WEST BRANCH OF FLOYD RIVER
EASTBOUND LANE



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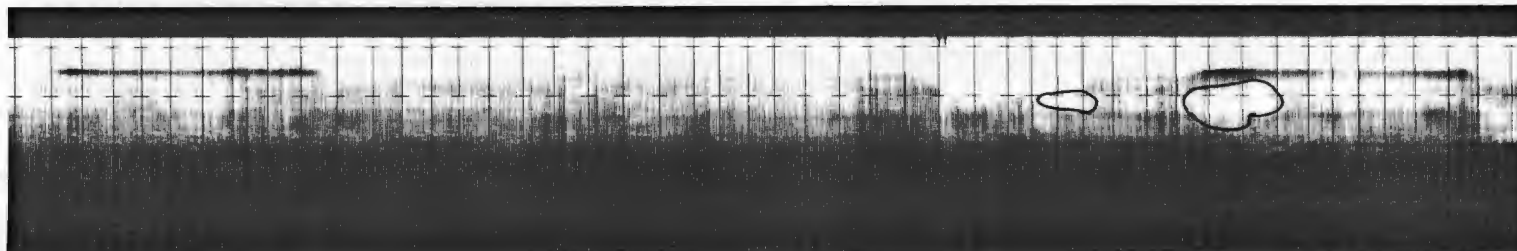


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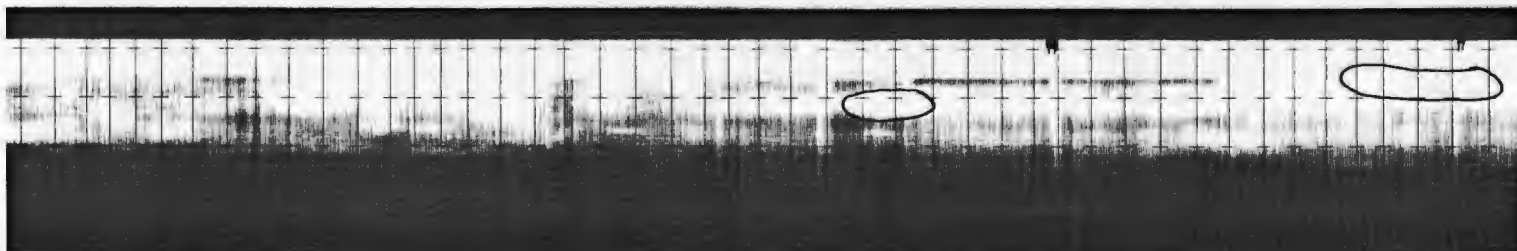
B



C

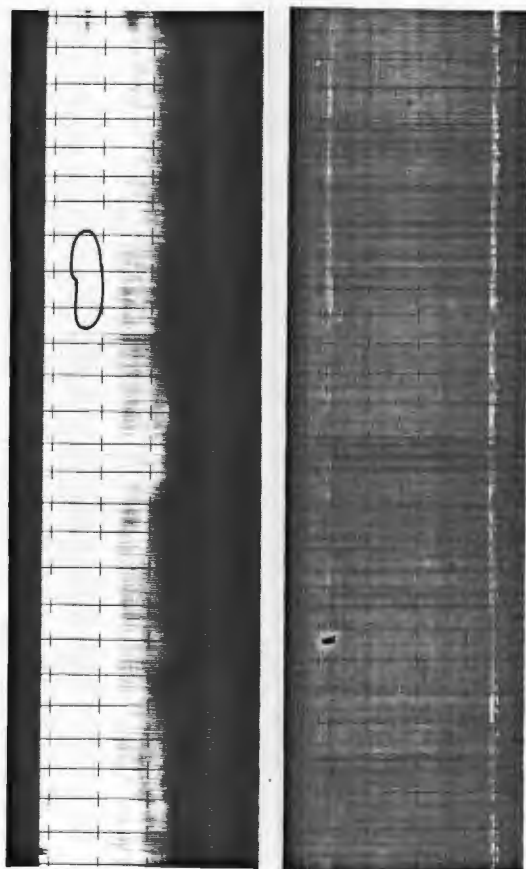


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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/23/82

PROJECT NO. 12383.000

TIME 4:15 p.m.

CREW DDU/JSK

LOCATION Ia 3 over W. Branch of Floyd River

TEMPERATURE 75°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 20 South

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Clear

SOLID 96.5°F

LANE VIEWING Westbound Lane

DELAMINATED 97.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1652 TO 1694

FROM 1606 TO 1649

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

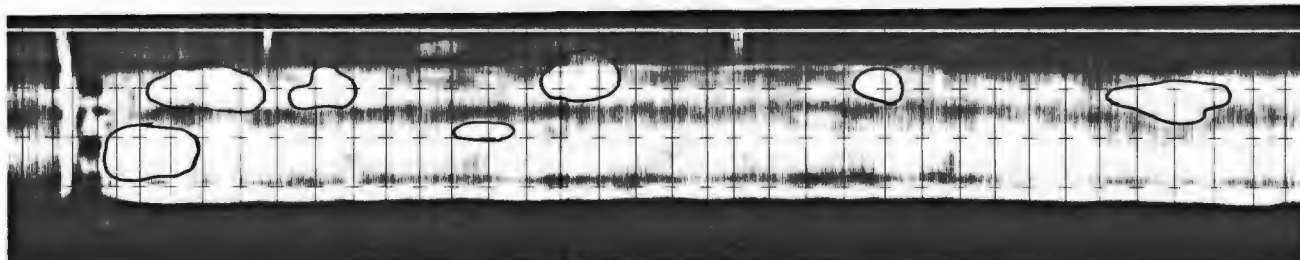
SKETCH:

REMARKS

FILM-PICTURE

IOWA 3 OVER WEST BRANCH OF FLOYD RIVER
WESTBOUND LANE

1 OF 2

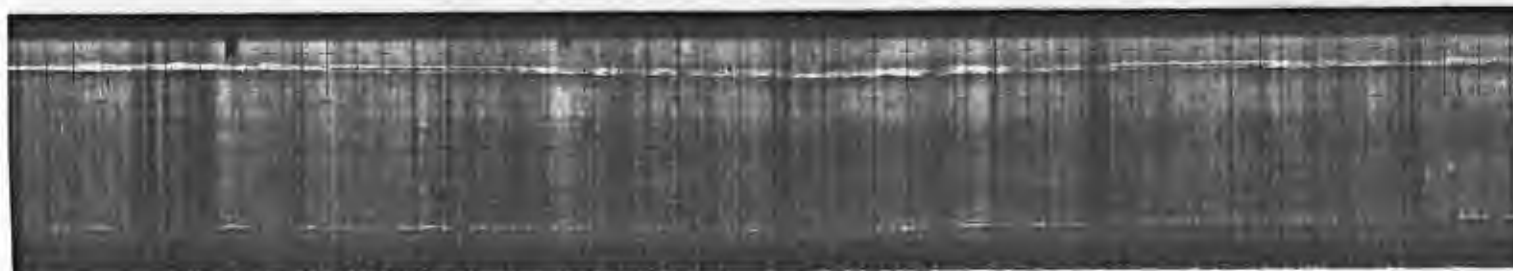


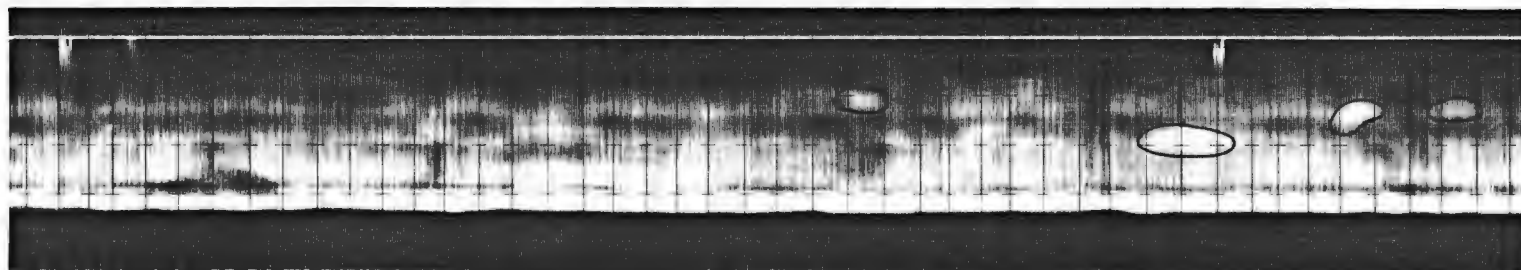
A



A

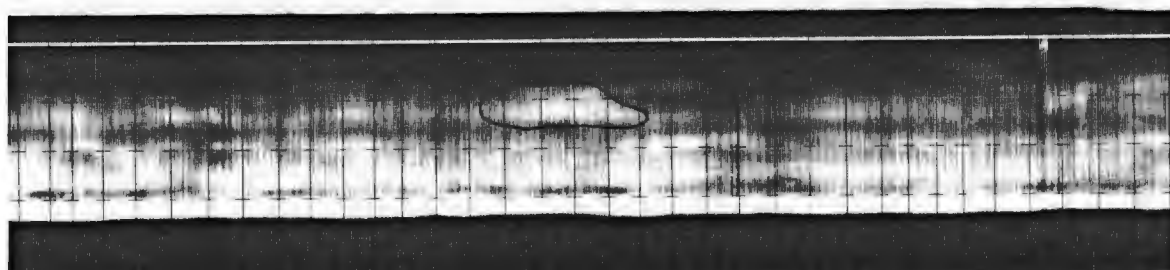
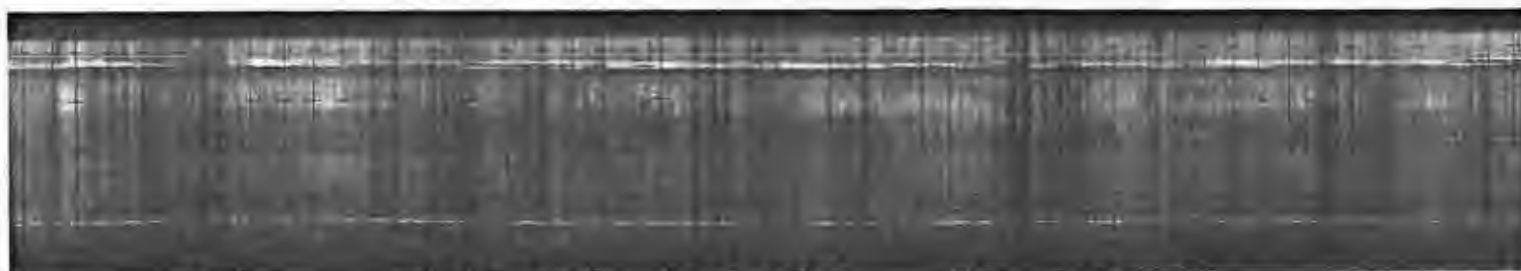
B





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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/24/82

PROJECT NO. 12383.000

TIME 9:00 a.m.

CREW DDU/JSK

LOCATION Ia 3 over Little Souix River

TEMPERATURE 70°

WIND SPEED

SURFACE TYPE Concrete

AND DIRECTION 15-20 Northwest

PAVEMENT TEMPERATURE

WEATHER CONDITIONS Partly Cloudy

SOLID 82°F

LANE VIEWING Eastbound Lane

DELAMINATED 83.5°F

SPEED VIEWING 5 mph

INFRARED COUNTER

REAL LIFE COUNTER

FROM 1693 TO 1746

FROM 1649 TO 1705

COLORIZER SETTING .25x/10

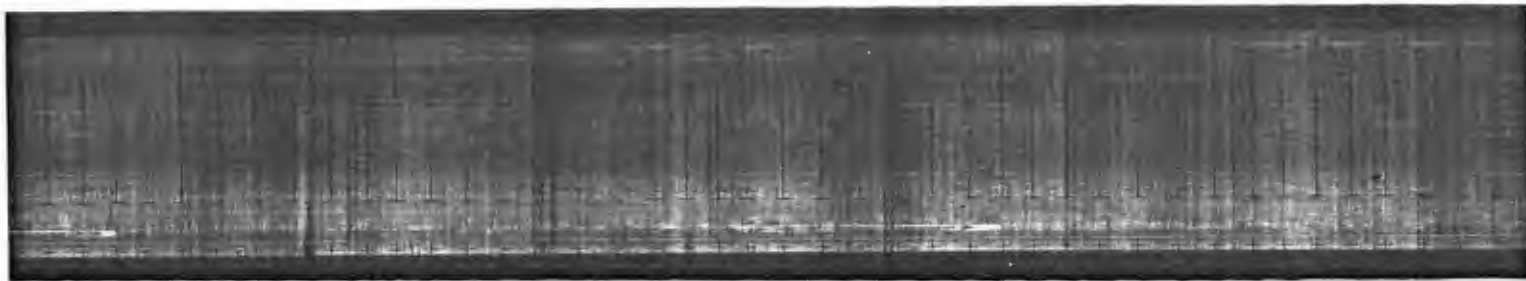
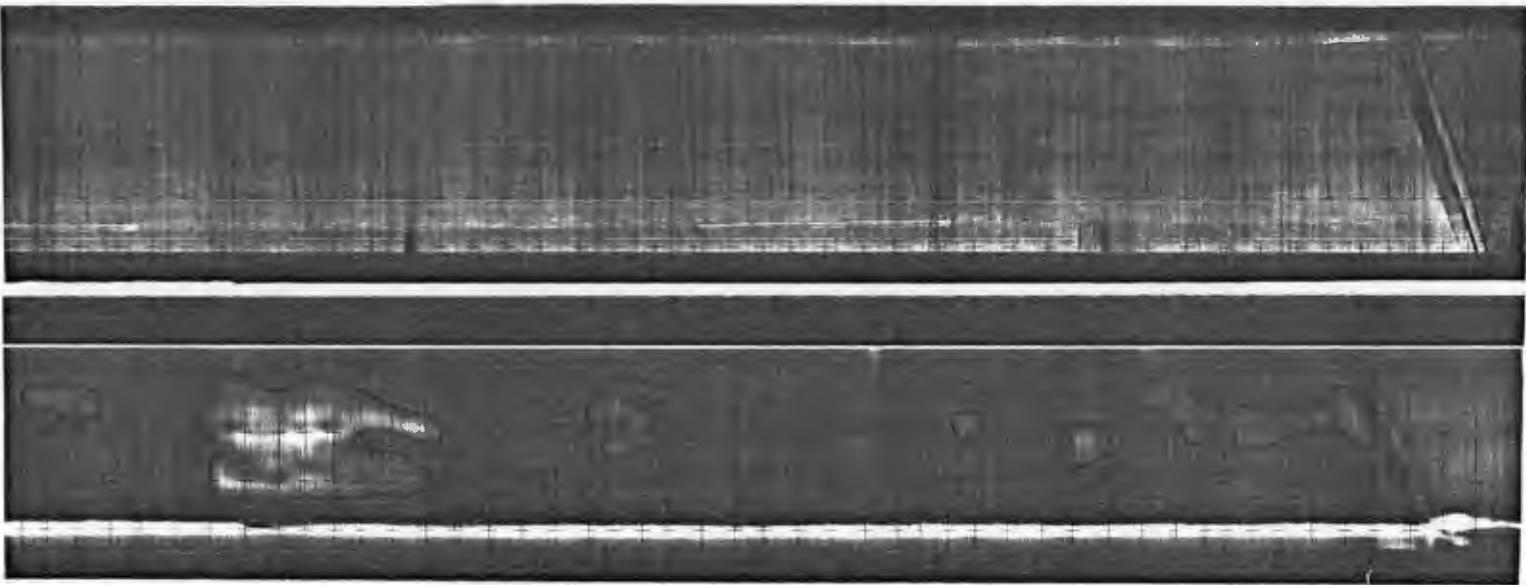
ZERO SETTING Expansion Joint

SKETCH:

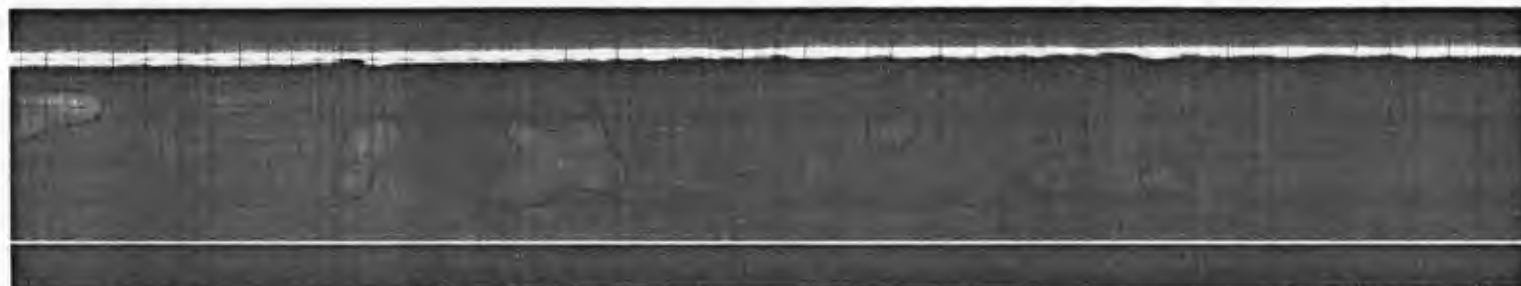
REMARKS

FILM-PICTURE

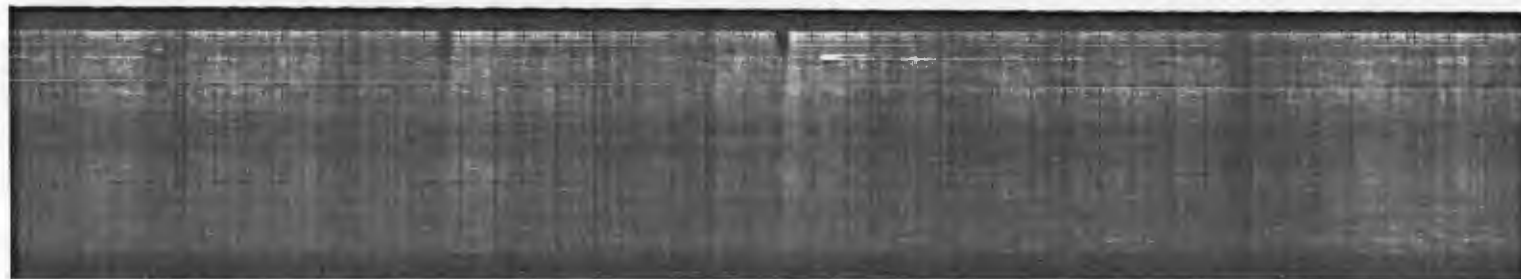
IOWA 3 OVER LITTLE SOUX RIVER
EATBOUND LANE



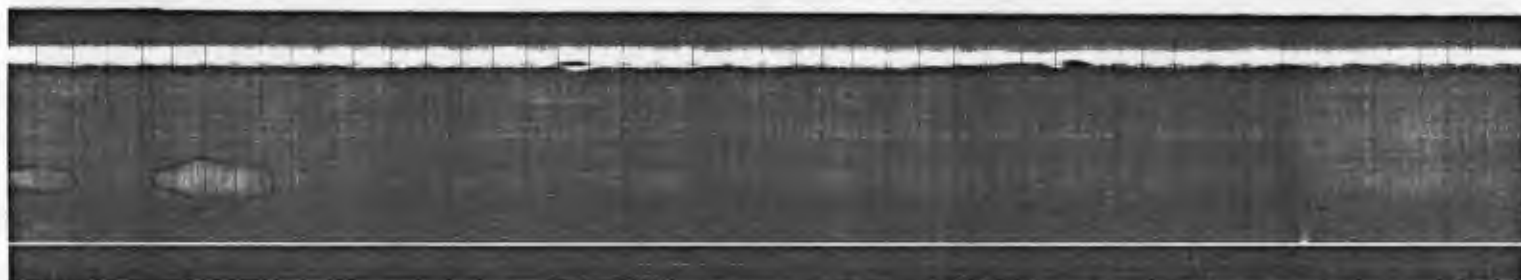
B



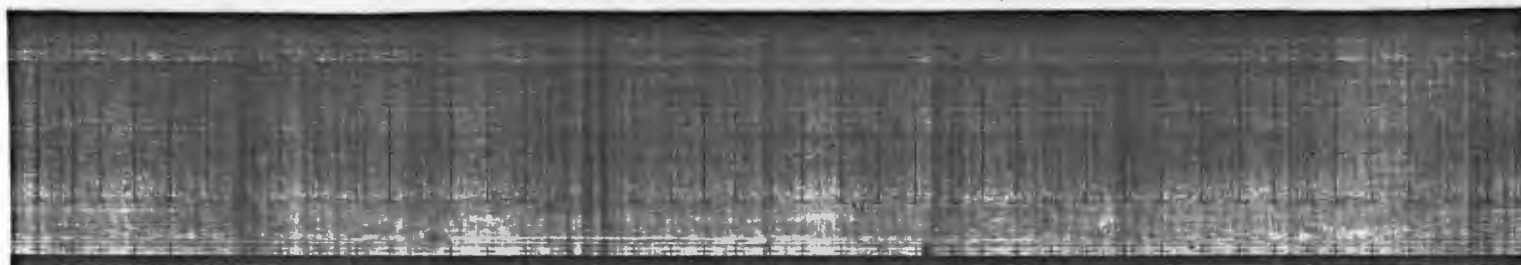
C

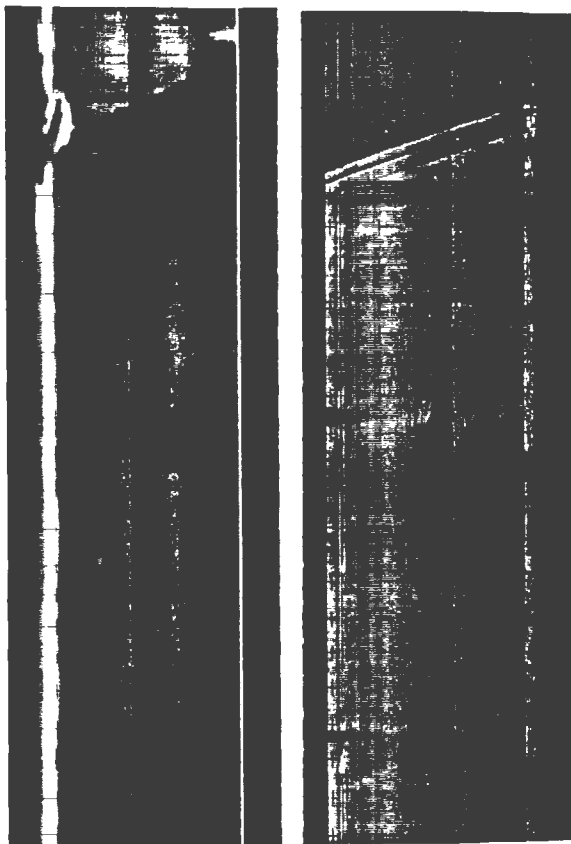


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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 70°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 82°F

DELAMINATED 83.5°F

INFRARED COUNTER

FROM 1746 TO 1801

COLORIZER SETTING .25x/10

DATE 6/24/82

TIME 9:15 a.m.

LOCATION Ia 3 over Little Souix River

WIND SPEED

AND DIRECTION 15-20 Northwest

WEATHER CONDITIONS Partly Cloudy

LANE VIEWING Westbound Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 1705 TO 1762

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

FILM-PICTURE

IOWA 3 OVER LITTLE SOUX RIVER
WESTBOUND LANE

1 OF 3



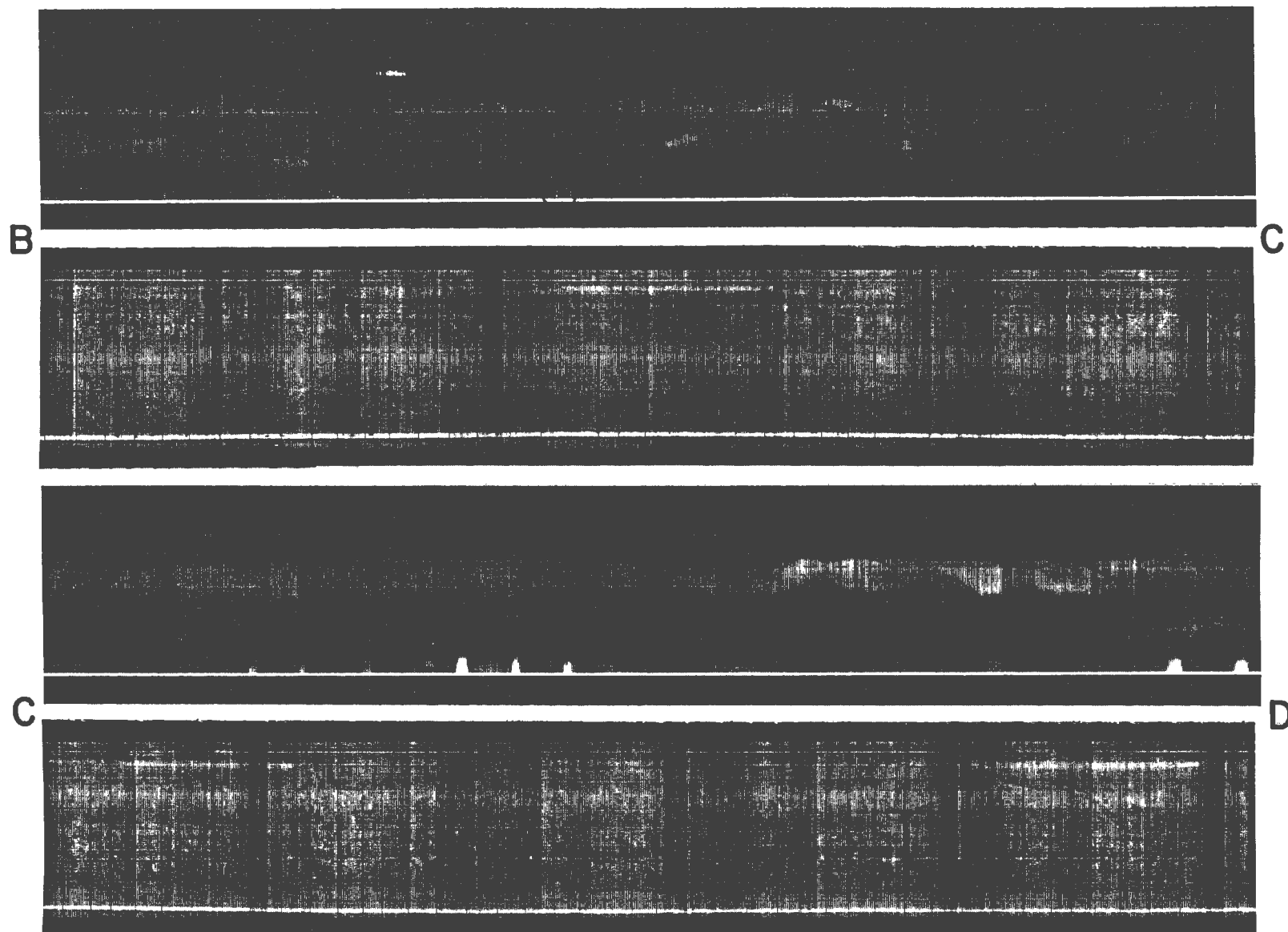
A



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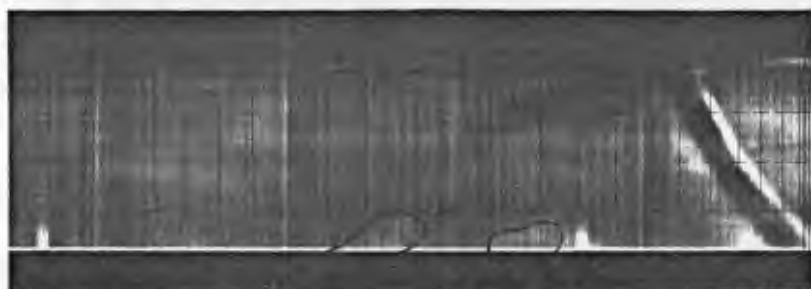
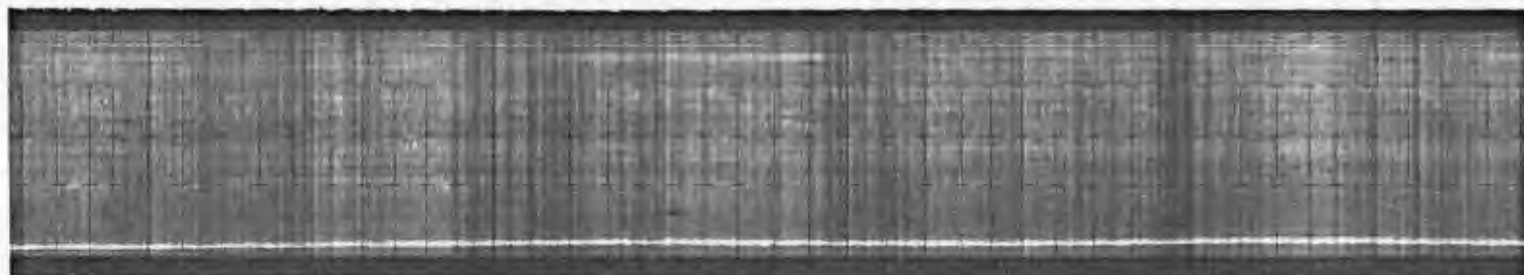




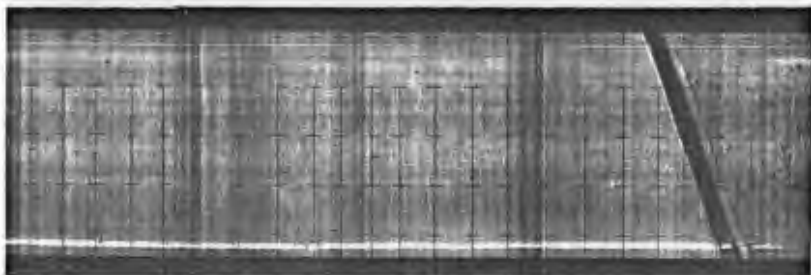


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INFRARED DATA REPORT

CLIENT <u>IOWA DOT</u>	DATE <u>6/24/82</u>
PROJECT NO. <u>12383.000</u>	TIME <u>9:35 a.m.</u>
CREW <u>DDU/JSK</u>	LOCATION <u>US 59 over Mill Creek</u>
TEMPERATURE <u>75°</u>	WIND SPEED
SURFACE TYPE <u>Concrete</u>	AND DIRECTION <u>15-20 Northwest</u>
PAVEMENT TEMPERATURE	WEATHER CONDITIONS <u>Partly Cloudy</u>
SOLID <u>---</u>	LANE VIEWING <u>Both</u>
DELAMINATED <u>---</u>	SPEED VIEWING <u>5 mph</u>
INFRARED COUNTER	REAL LIFE COUNTER
FROM <u>0</u> TO <u>161</u>	FROM <u>0</u> TO <u>163</u>
COLORIZER SETTING <u>.25x/10</u>	ZERO SETTING <u>Expansion Joint</u>

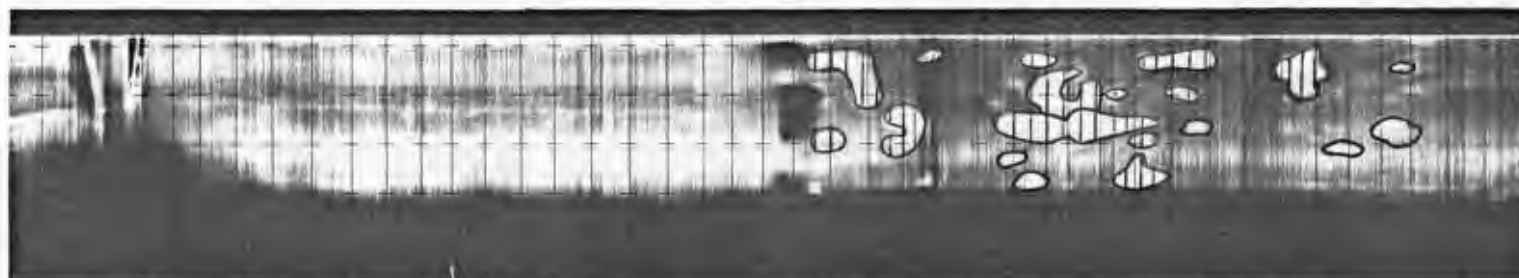
SKETCH:

REMARKS

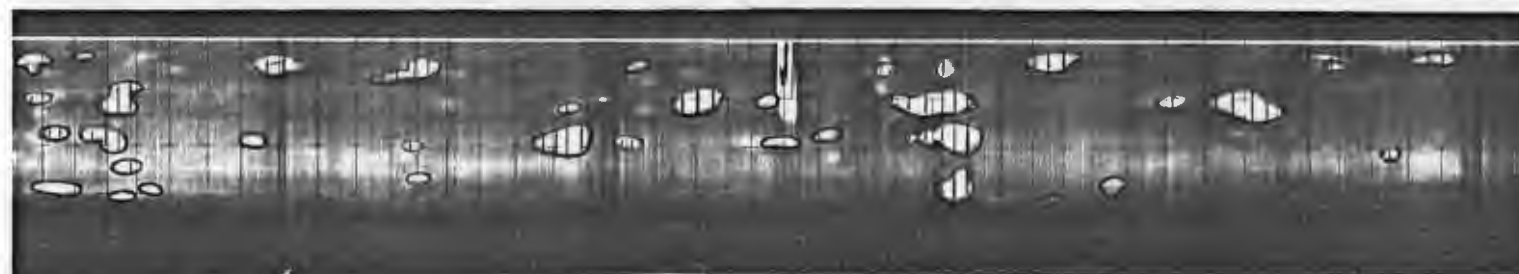
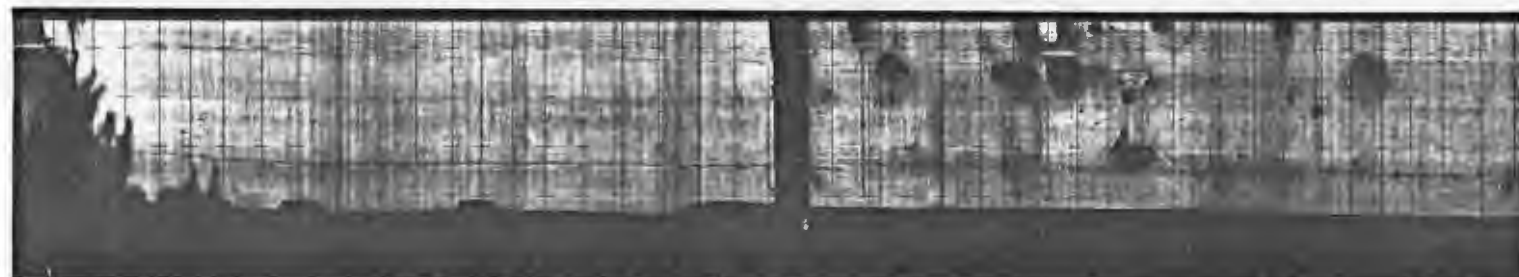
FILM-PICTURE

Patches on Deck

US 59 OVER MILL CREEK
BOTH LANES



A

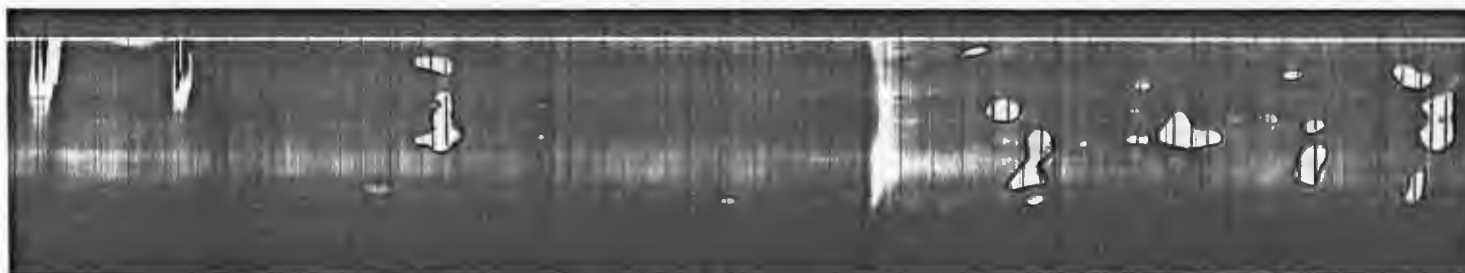


B



A

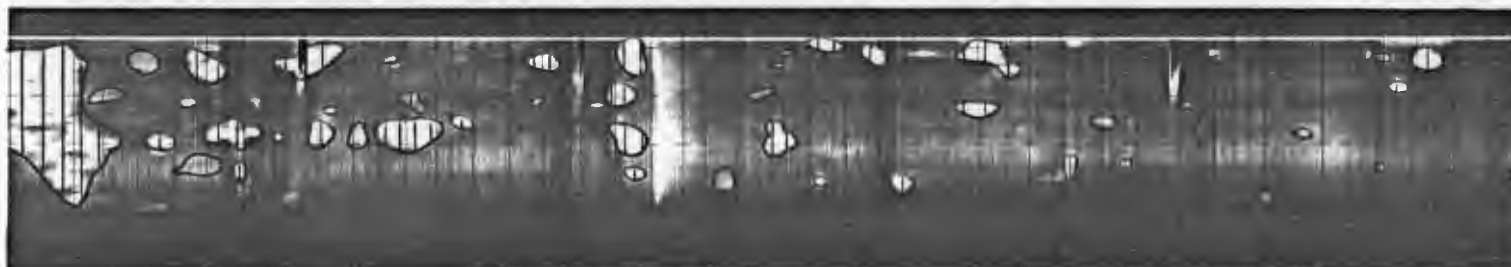
B



C

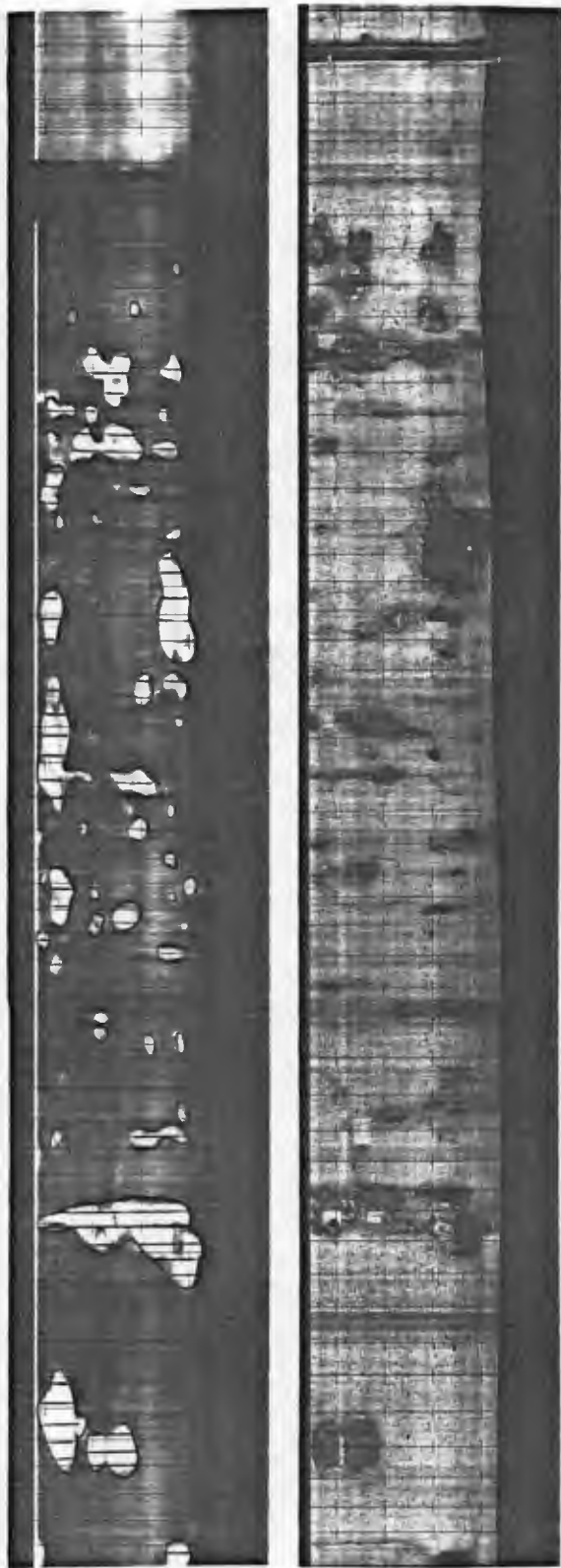


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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 75°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 85°F

DELAMINATED 87°F

INFRARED COUNTER

FROM 161 TO 268

COLORIZER SETTING .25x/10

DATE 6/24/82

TIME 10:00 a.m.

LOCATION US 59 over Gray Creek (225')

WIND SPEED

AND DIRECTION 15-20 Northwest

WEATHER CONDITIONS Partly Cloudy

LANE VIEWING Both

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 163 TO 273

ZERO SETTING Expansion Joint

SKETCH:

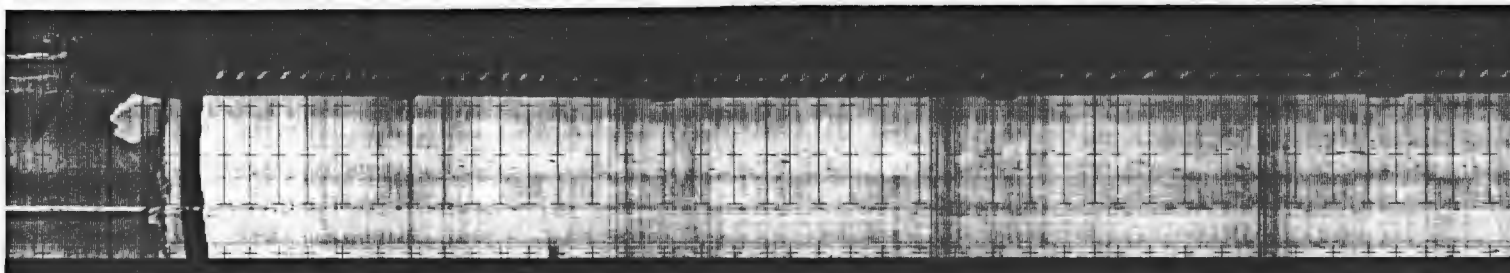
REMARKS

FILM-PICTURE

US 59 OVER GRAY CREEK
BOTH LANES (225')



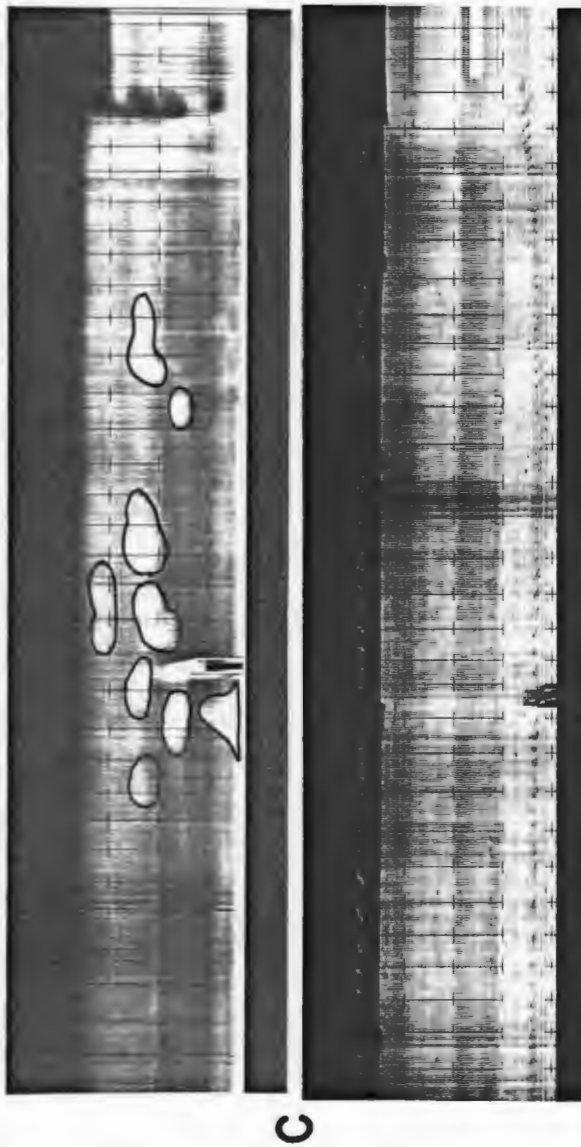
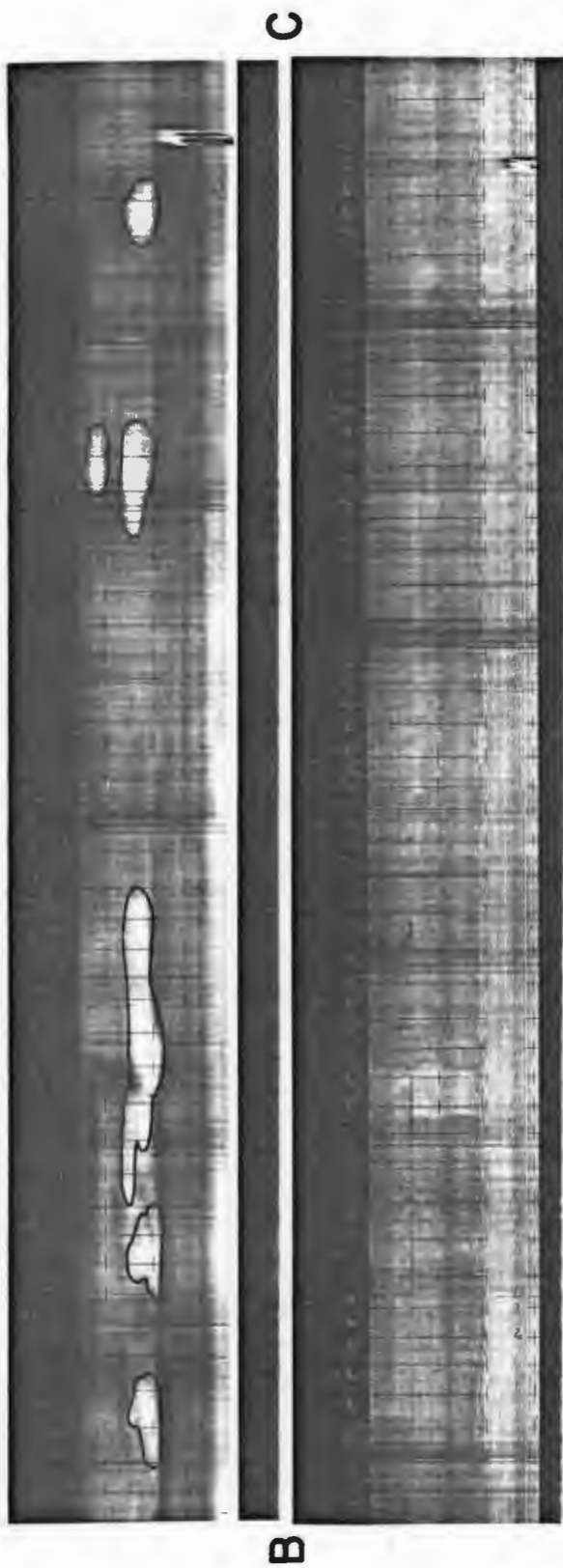
A



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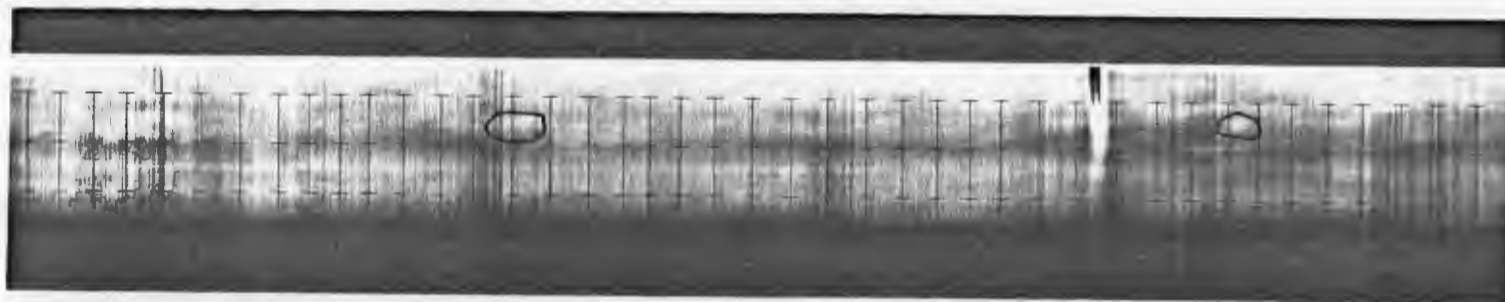
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INFRARED DATA REPORT

CLIENT <u>IOWA DOT</u>	DATE <u>6/24/82</u>
PROJECT NO. <u>12383.000</u>	TIME <u>10:30 a.m.</u>
CREW <u>DDU/JSK</u>	LOCATION <u>US 59 over Gray Creek (102')</u>
TEMPERATURE <u>75°</u>	WIND SPEED
SURFACE TYPE <u>Concrete</u>	AND DIRECTION <u>15-20 Northwest</u>
PAVEMENT TEMPERATURE	WEATHER CONDITIONS <u>Partly Cloudy</u>
SOLID <u>86°F</u>	LANE VIEWING <u>Both</u>
DELAMINATED <u>86.5°F</u>	SPEED VIEWING <u>5 mph</u>
INFRARED COUNTER	REAL LIFE COUNTER
FROM <u>268</u> TO <u>330</u>	FROM <u>272</u> TO <u>335</u>
COLORIZER SETTING <u>.25x/10</u>	ZERO SETTING <u>Expansion Joint</u>
SKETCH:	
REMARKS	
FILM-PICTURE	

US 59 OVER GRAY CREEK
BOTH LANES (102')

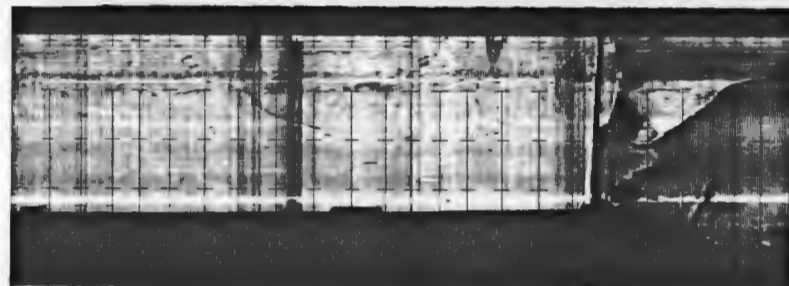
1 OF 1



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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 80°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 93.5°F

DELAMINATED 95.5°F

INFRARED COUNTER

FROM 330 TO 545

COLORIZER SETTING .25x/10

DATE 6/24/82

TIME 11:30 a.m.

LOCATION County Road B63 over Little
Souix River

WIND SPEED
AND DIRECTION 15-20 Northwest

WEATHER CONDITIONS Partly Cloudy

LANE VIEWING Eastbound Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 334 TO 553

ZERO SETTING Expansion Joint

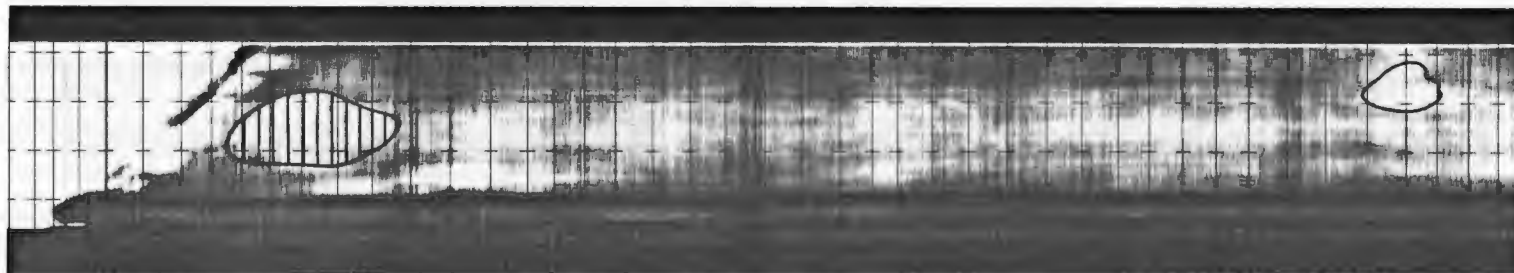
SKETCH:

REMARKS

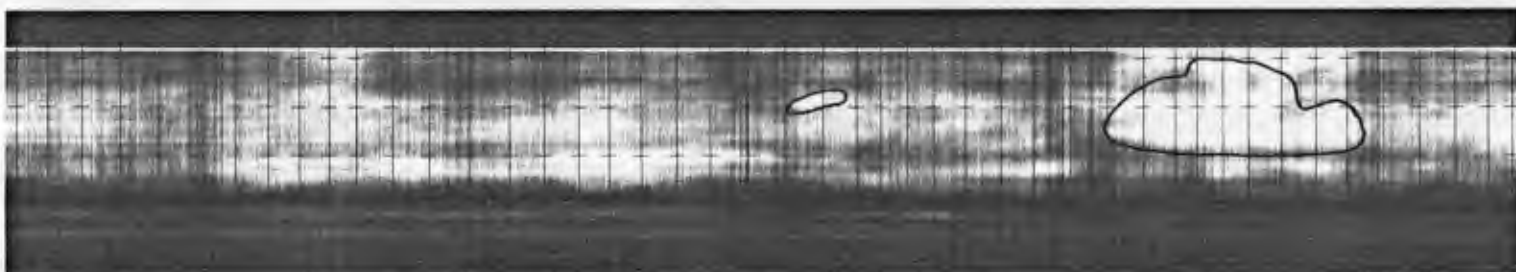
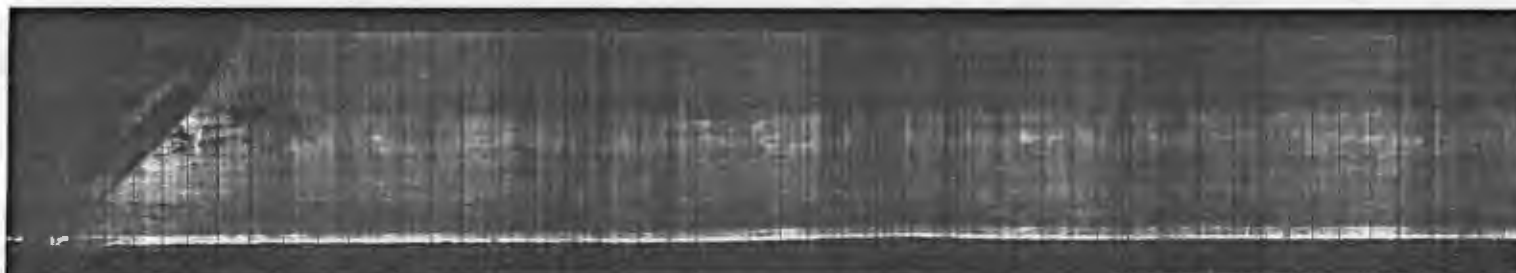
FILM-PICTURE

COUNTY ROAD B-63 OVER LITTLE SOUX RIVER
EASTBOUND LANE

1 OF 4

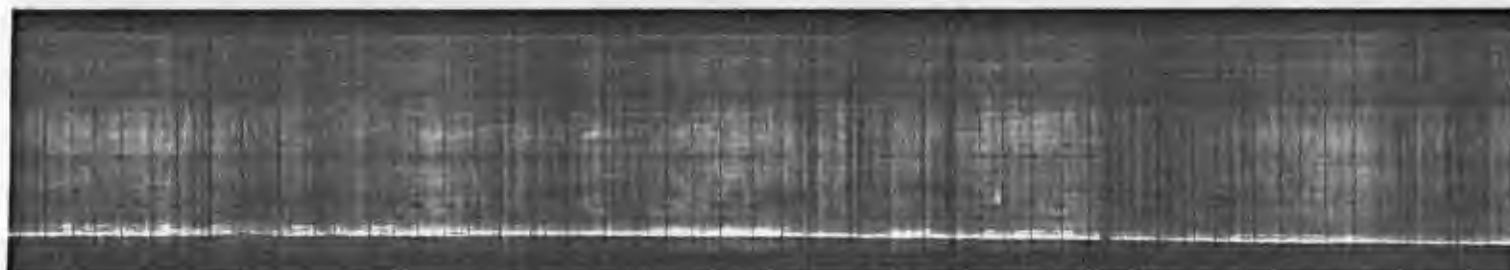


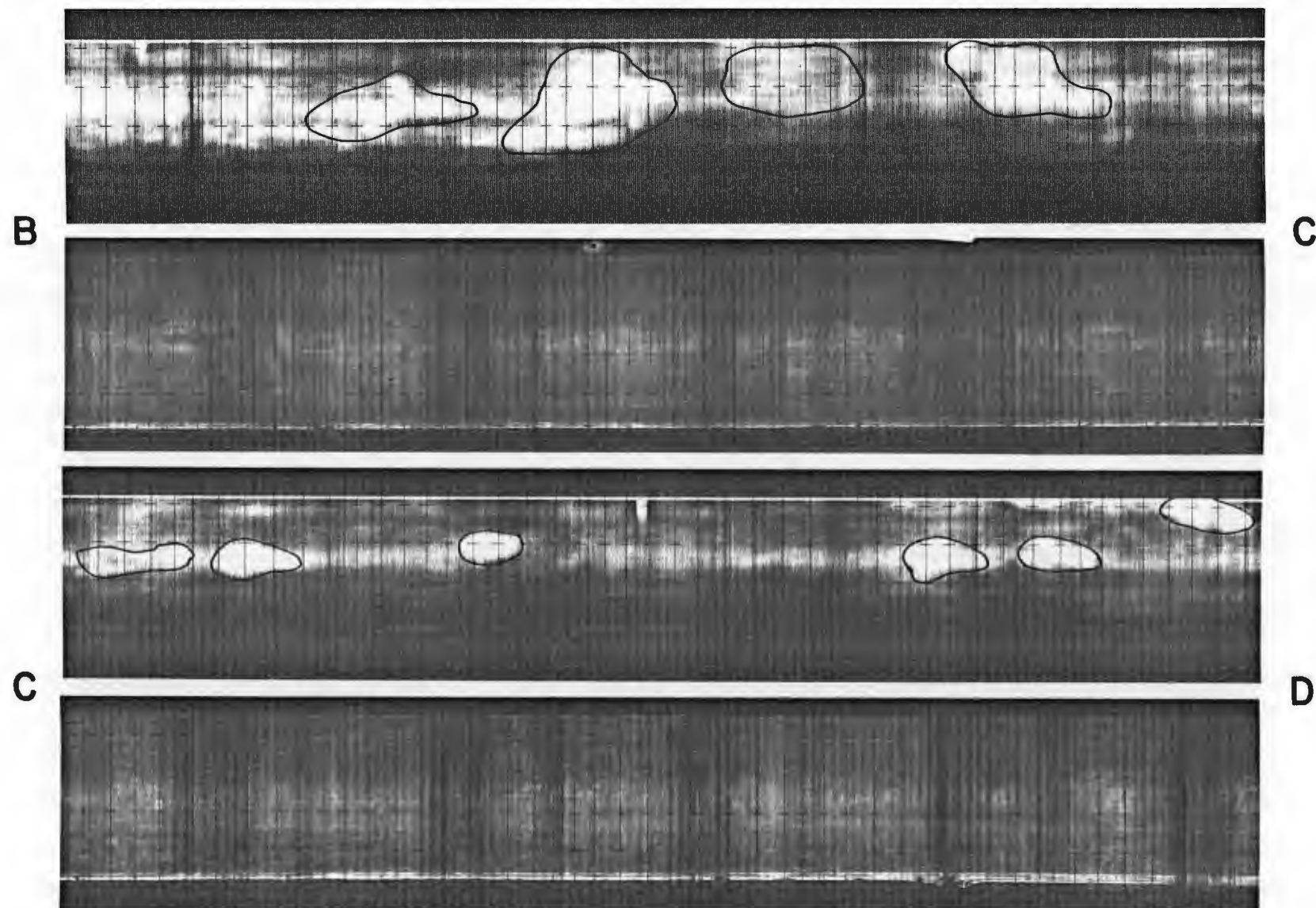
A

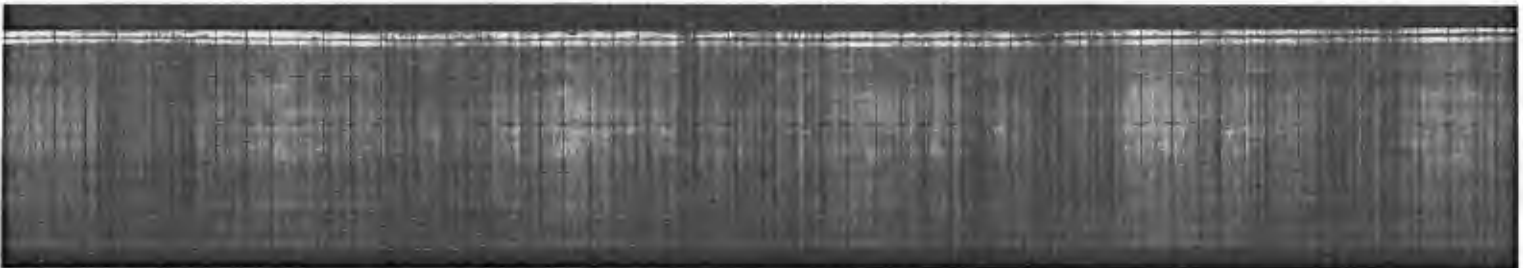


B

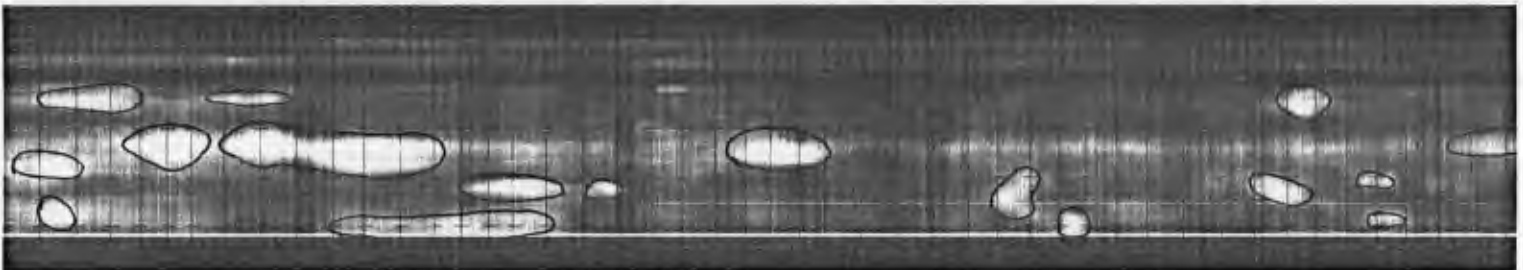
A



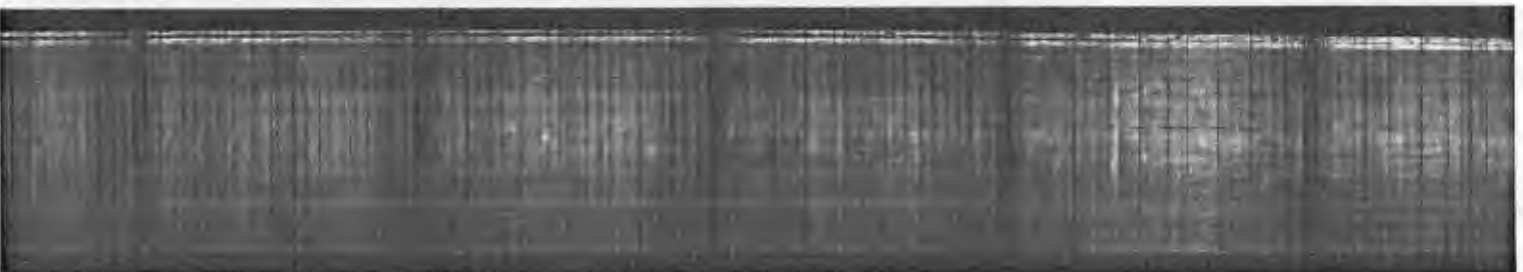




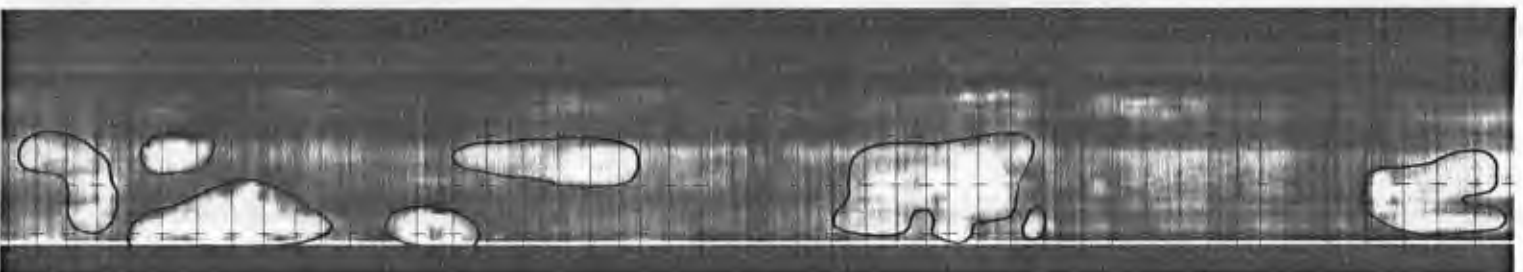
E



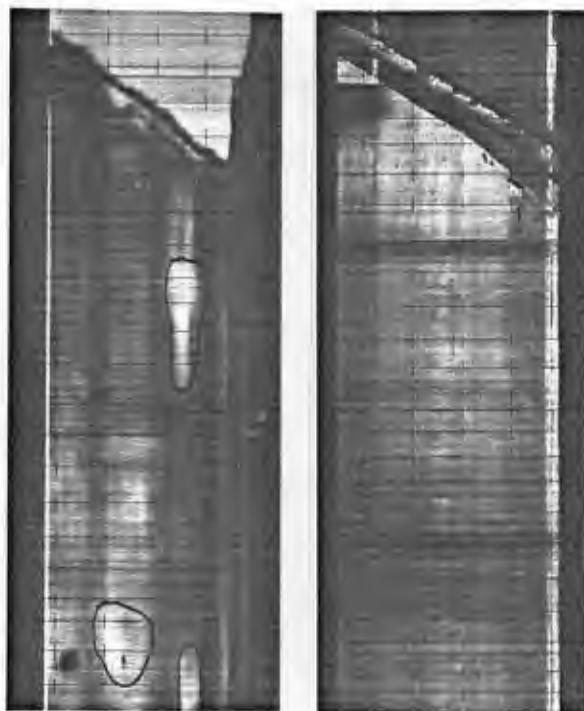
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INFRARED DATA REPORT

CLIENT IOWA DOT

PROJECT NO. 12383.000

CREW DDU/JSK

TEMPERATURE 80°

SURFACE TYPE Concrete

PAVEMENT TEMPERATURE

SOLID 93.5°F

DELAMINATED 95.5°F

INFRARED COUNTER

FROM 545 TO 682

COLORIZER SETTING .25x/10

DATE 6/24/82

TIME 11:35 a.m.

LOCATION County Road B63 over Little
Souix River

WIND SPEED

AND DIRECTION 15-20 Northwest

WEATHER CONDITIONS Partly Cloudy

LANE VIEWING Westbound Lane

SPEED VIEWING 5 mph

REAL LIFE COUNTER

FROM 553 TO 691

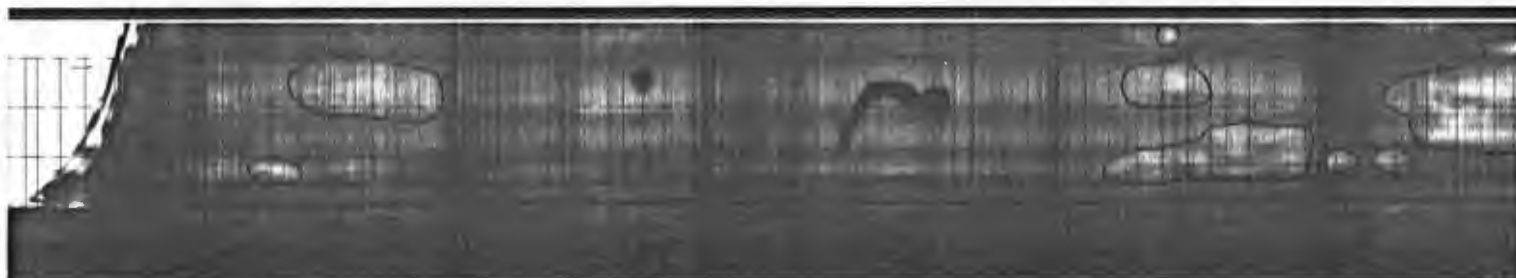
ZERO SETTING Expansion Joint

SKETCH:

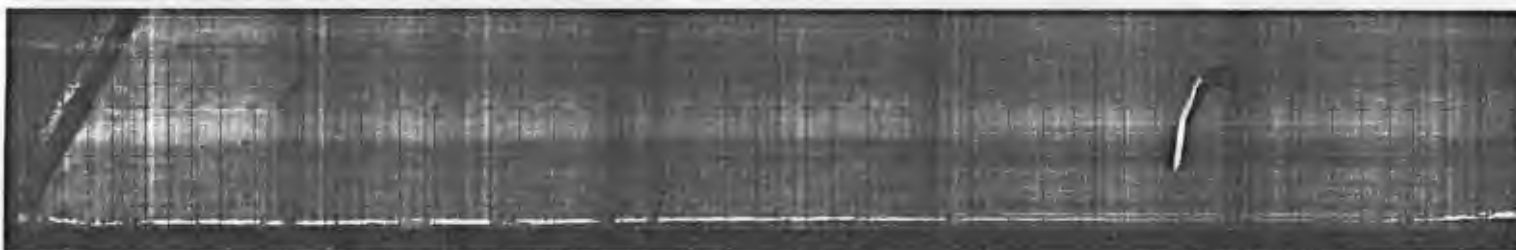
REMARKS

FILM-PICTURE

COUNTY ROAD B-63 OVER LITTLE SOUX RIVER
WESTBOUND LANE

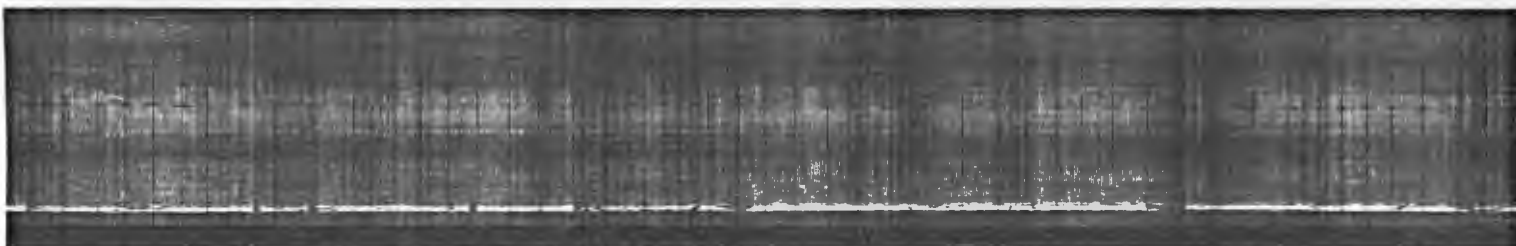


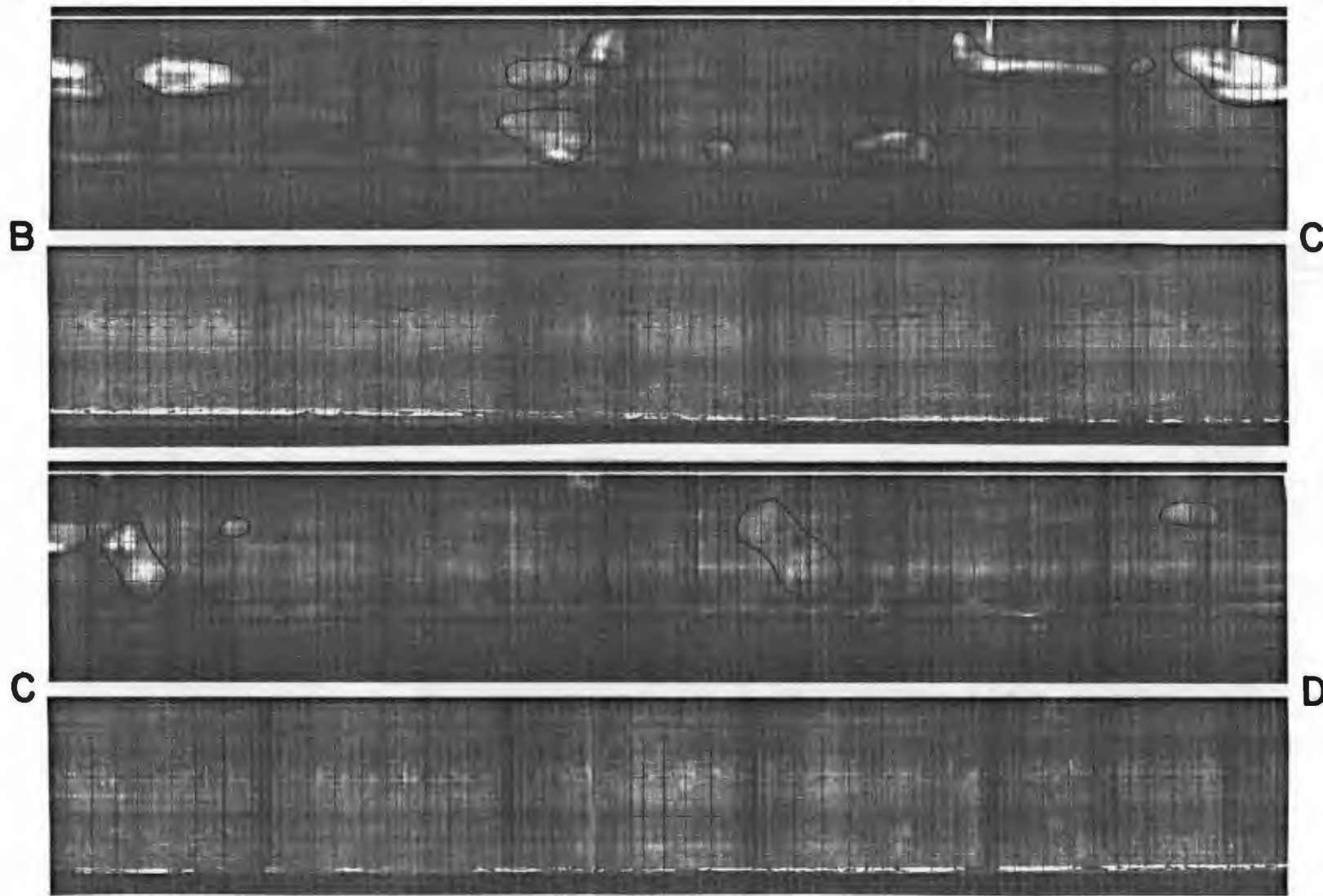
A

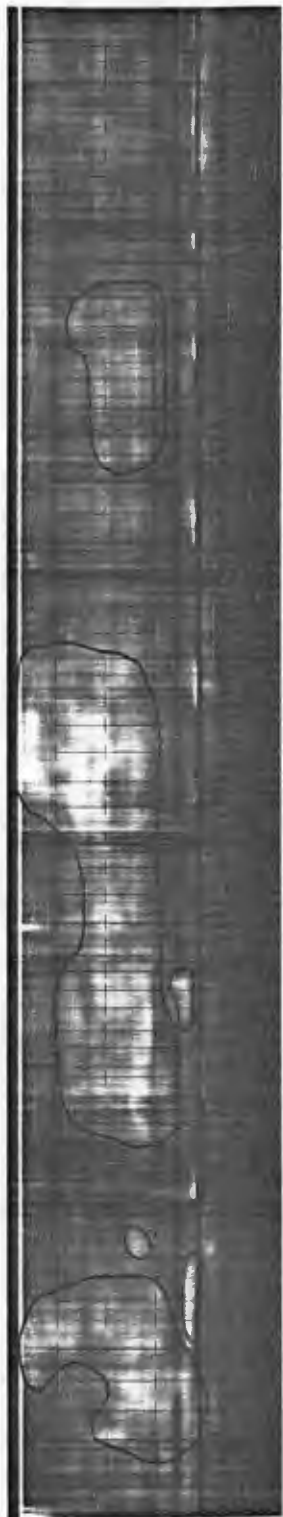


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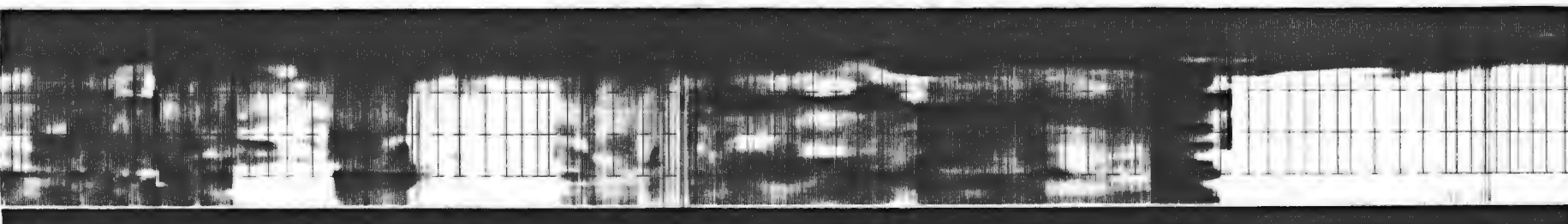
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INFRARED DATA REPORT

CLIENT <u>IOWA DOT</u>	DATE <u>6/24/82</u>
PROJECT NO. <u>12383.000</u>	TIME <u>3:10 p.m.</u>
CREW <u>DDU/JSK</u>	LOCATION <u>Kossuth County Road</u>
TEMPERATURE <u>75°</u>	WIND SPEED <u>20 Northwest</u>
SURFACE TYPE <u>Polyester Resin Overlay</u>	AND DIRECTION <u>20 Northwest</u>
PAVEMENT TEMPERATURE	WEATHER CONDITIONS <u>Partly Cloudy & Rainy</u>
SOLID <u> </u>	LANE VIEWING <u>Eastbound Lane</u>
DELAMINATED <u> </u>	SPEED VIEWING <u>5 mph</u>
INFRARED COUNTER	REAL LIFE COUNTER
FROM <u>682</u> TO <u>745</u>	FROM <u>694</u> TO <u>755</u>
COLORIZER SETTING <u>.25x/10</u>	ZERO SETTING <u>Expansion Joint</u>
SKETCH:	
REMARKS	
FILM-PICTURE	
Rained approximately 30 minutes prior to scanning the deck.	

KOSSUTH COUNTY ROAD
EASTBOUND LANE

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INFRARED DATA REPORT

CLIENT IOWA DOT

DATE 6/25/82

PROJECT NO. 12383.000

TIME 12:00 noon

CREW DDU/JSK

LOCATION US 20 Waterloo
Sta 1094.08 -- Sta 1109.00

TEMPERATURE 65°

WIND SPEED
AND DIRECTION Calm

SURFACE TYPE Concrete

WEATHER CONDITIONS Cloudy

PAVEMENT TEMPERATURE
SOLID

LANE VIEWING Westbound Driving Lane

DELAMINATED

SPEED VIEWING 5 mph

INFRARED COUNTER
FROM 746 TO

REAL LIFE COUNTER
FROM 759 TO

COLORIZER SETTING .25x/10

ZERO SETTING Expansion Joint

SKETCH:

REMARKS

FILM-PICTURE
