Demonstration Projects Program
Technology Transfer
FHWA-DP-39-5
August 1978

DEMONSTRATION PROJECT NO. 39

RECYCLING ASPHALT PAVEMENTS

Anchorage, Alaska

Prepared for
and
Distributed by

U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION 15
DEMONSTRATION PROJECTS DIVISION
1000 NORTH GLEBE ROAD
ARLINGTON, VIRGINIA 22201

Interim Report

of

Pavement Surface Recycling

on

Parks Highway

between

Little Susitna River and Willow Creek

at

Willow, Alaska

Project RF-F-035-1(24)

Prepared for

FEDERAL HIGHWAY ADMINISTRATION
REGION 15
DEMONSTRATION PROJECT DIVISION
Arlington, Virginia

Division of Highway Design & Construction
Alaska Department of Transportation
and Public Facilities

February 1978
R20424
DOT FH-15-235

By: John W. Henry, P.E.
Asst. Construction Engineer

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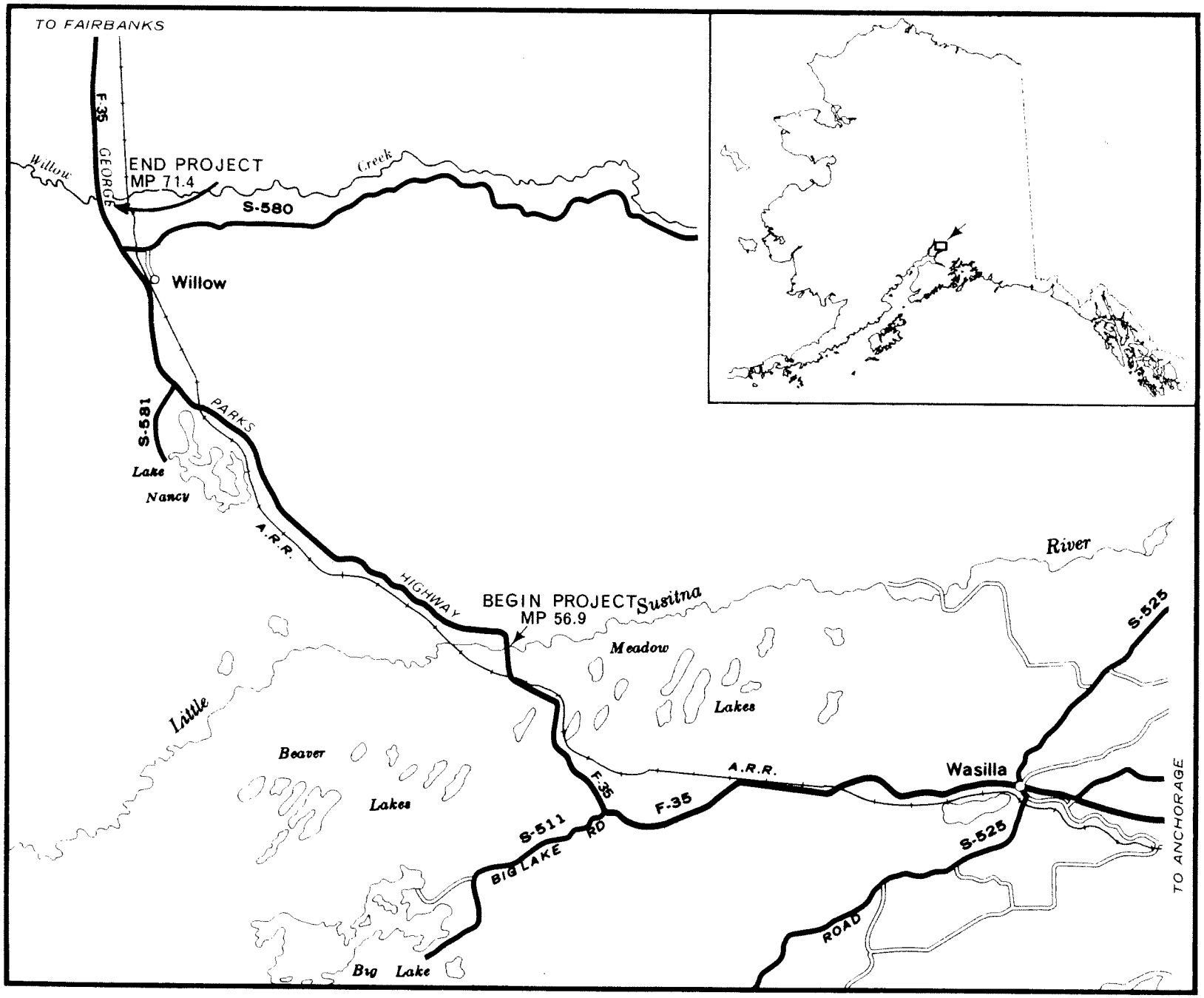
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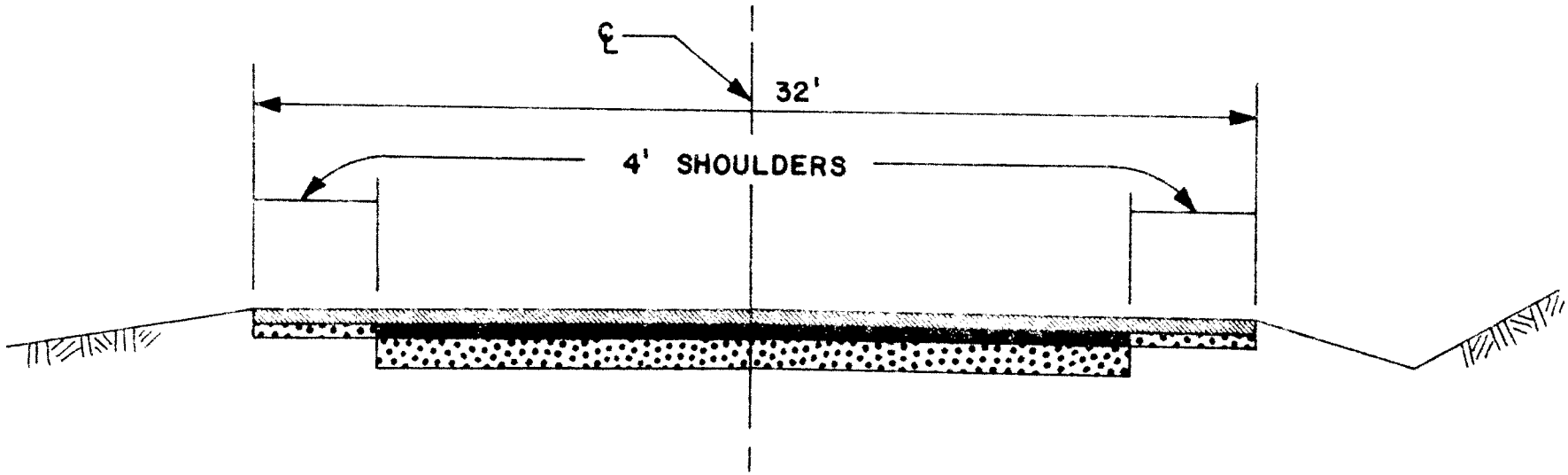


TYPICAL SECTION
Little Susitna River to Willow Creek Paving
(32' Width)

HEATER REMIX EXISTING 24' AC (Nominal 3/4" Depth)

1 1/2" HOT ASPHALT PAVEMENT OVERLAY

EXISTING 24' x 2" AC with B.S.T. SHOULDERS

PRELIMINARY REPORT SURFACE RECYCLING IN ALASKA

Introduction

Rehabilitation had been proposed for 14.5 miles of the Parks Highway (State Rt 3) between the Little Susitna River (MP 56.9) and Willow Creek (MP 71.4) due to severe cracking and aggregate loss.

It had been originally paved 24' wide with 2" of asphalt concrete (AC) on 6" aggregate base (AB) in 1965 when traffic amounted to only 200 vehicles per day.

By 1976, when the pavement evaluation was conducted, traffic had increased to 3,000 VPD with 7% trucks. Over 8,000 VPD are predicted by 1995. The project Traffic Index is 7.5.

The pavement evaluation consisted of a visual condition survey, a deflection survey and core sampling and testing.

The condition survey revealed, 1) extensive wide cracking producing a nominal 5' x 5' block pattern, 2) surface raveling with attendant pocking, 3) localized potholing, rutting and alligatoring, limited to two short cut areas, 4) a good ride with generally no visual fatigue type distress.

Both a deflection and component (R Value) analysis indicated the necessity for a structural overlay. A 1 1/2" AC overlay was recommended.

Laboratory testing of the extracted asphalt from core samples showed the

original 120-150 penetration asphalt cement had hardened to a penetration of 32 to 48. (Witco found even lower values of 21 and 24.)

It was obvious that severe reflective cracking would occur within a very short time after placement of the overlay unless the brittle, cracked pavement was pretreated or replaced. (Cracking on the contiguous section of highway easterly to Wasilla had reflected through within 1 1/2 years after a 1 1/2" overlay was placed without pretreatment.)

The only certain way to prevent reflection cracking is to remove and replace the cracked pavement with either recycled or virgin material. However, the expense of removal and replacement was considered prohibitive and surface pretreatment was recommended for use. Pretreatments considered were surface recycling, slurry seal and/or an asphalt embedded fabric all in combination with the 1 1/2" structural overlay.

Surface recycling, using a heater-scarifier-rejuvenator was selected as best suited to the project conditions.

Region 15 of the Federal Highway Administration, agreed to participate in the project through its Demonstration Project No. 39, Recycling Asphalt Pavements. Contract DOT-FH-15-235 was executed on June 1, 1977, to provide partial funding for the construction and evaluation phases of the project.

Establishment of Control

Low level aerial photography and numerous individual photographs were taken of the entire project prior to commencement of work to permit

visual crack monitoring in the ensuing years. The southerly half of the project (MP 56.9 to 66.5) was also photo-logged.

Two separate control sections were established where no surface recycling was conducted before the overlay.

Control Section 1 MP 0.20 to 0.27 - 12' x 350'; Northbound Lane Sta. 10+50 to 14+00

Control Section 2 MP 0.32 to 0.38 - 24' x 300'; Sta. 17+00 to 20+00

Laboratory testing was performed on the existing pavement before recycling.

Detailed crack counts were conducted in the vicinity of MP 58, MP 61 & MP 70. (See attachments and appendix.)

Contract Details

Six bid proposals were received with M-B Contracting Company of Anchorage, Alaska submitting the sucessful bid. Mr. Ray Turnow was Project Superintendent.

Asphalt Treatment Corp of Emeryville, California subcontracted the heater scarification work and furnished the only specialized equipment required (The Heater-Scarifier). Mr. Wally Regnolds was Superintendent-Operator.

Mr. Alan Jelten, Special Products Engineer, represented the Golden Bear Division of Witco Chemical who furnished the rejuvenating agent - "Reclamite".

Mr. Chuck Fletcher was Project Engineer for the State of Alaska.

The heater scarification work began on the morning of August 16, 1977 at a rate of approximately 26 linear feet of 12 foot width per minute. The scarification work was completed in 106 hours over an eight day period. Diesel fuel was used for firing the gang burners. Scarification was followed promptly with a tandem steel wheel roller followed by a pnuematic roller. Temperature of the mat 20 feet behind the heater scarifier ranged from 220° - 265°F.

Reclamite was applied at the rate of 0.11 gal/SY (as recommended by the supplier) after rolling was completed. The application rate had been determined by the supplier from State furnished samples of the existing pavement. Their recommended treatment was intended to raise the original penetration from the low 20's to a penetration of about 75. (Goal Not Attained.)

Specifications required that the recycled surface be overlayed within 48 hours to prevent undue raveling by traffic.

Documentations

A short (10 minutes) video film was prepared which depicts the entire heater-scarification construction process. Copies of the tape have been furnished to the five Alaska Transportation Regions for training and orientation purposes.

A slide presentation was also prepared for use with larger audiences

such as the joint AGC/State Construction Seminar to be held in March 1978 at Anchorage.

A report, of surface recycling in Alaska, along with a photo record, was furnished to the FHWA October 1977 for possible inclusion in a special issue of "Highway Focus".

Summary

The project was well executed and documented, although some difficulty was experienced in the sampling-testing phase. (Samples lost and required retesting).

Preliminary data indicates the planned degree of asphalt softening did not occur as measured by penetration at 77°F. However, test results did indicate an improved viscosity and ductility. (This is somewhat puzzling since improving or decreasing the viscosity is generally accompanied by an increase in penetration.) We were trying to obtain a penetration in the range of 75 but the highest measured was 58 with a viscosity of 2,000. Further investigation will be conducted into the unusual test results reported.

The cost comparison from Table 1 shows an initial savings of $408,300 by using the surface recycling process instead of removing and replacing the existing surfacing.

Table 2 shows surface recycling consumed only about one-fifth the energy which would have been required by removing and replacing the existing surface.

An annual inspection will be conducted for the next four years and a report submitted on performance as determined by progress of reflection cracking.

STATE OF ALASKA

Department of Highways

Compilation of Bids

Project [illegible]

Location LITTLE SUSITNA RIVER to WILLOW CREEK

Type [illegible]

Dimension [illegible]

Open at Douglas, Alaska

By B. D. Scougal, Commissioner of Highways

Date May 19, 1977

Compiled by [illegible] Checked by [illegible]

Certified True and Correct

[signature]

for B. D. Scougal, Commissioner, Department of Highways

Sheet of Sheets

Item No.	ITEM	Approx. Quantity	UNIT	Engineers Estimate Unit Price	Engineers Estimate AMOUNT	Rob Contracting Co., 7101 Bedner Road, Anchorage, AK 99504 Unit Price	AMOUNT	Green Construction Co., P.O. Box 2060, Anchorage, AK 99510 Unit Price	AMOUNT	Assoc. Asphalt Paving & [illegible] Contractors, Inc., P.O. Box 60266, Fairbanks, AK 997.. Unit Price	AMOUNT
[illegible]	[illegible] and Maintaining [illegible] Facilities	All Req'd	Lump Sum	L.S.	5,000.00	L.S.	3,850.00	L.S.	5,000.00	L.S.	[illegible]
[illegible]	[illegible]	All Req'd	Lump Sum	L.S.	95,000.00	L.S.	71,000.00	L.S.	[illegible]	L.S.	72,[illegible]
[illegible]	[illegible] and [illegible]	All Req'd	Lump Sum	L.S.	2,000.00	L.S.	2,000.00	L.S.	[illegible]	L.S.	2,000.00
[illegible]	Traffic Maintenance	All Req'd	Lump Sum	L.S.	35,000.00	L.S.	45,000.00	L.S.	25,[illegible]	L.S.	[illegible]
[illegible]	Unclassified Excavation	3,556	Cubic Yard	4.00	14,224.00	2.50	6,890.00	3.00	10,668.20	3.00	10,668.00
[illegible]	[illegible] Material	5,508	Tons	7.00	38,556.00	3.25	17,901.00	3.00	16,524.00	4.00	22,032.00
[illegible]	Crushed Aggregate Base Course	3,980	Tons	11.00	43,780.00	9.15	36,417.00	14.00	55,720.00	5.00	19,900.00
[illegible]	[illegible] Asphalt Pavement, Class [illegible]	23,[illegible]	Tons	19.00	446,60[illegible].00	13.00	306,94[illegible].00	[illegible]	363,220.40	15.55	435,622.45
[illegible]	[illegible] Asphalt Cement	[illegible]	Tons	150.00	202,540.00	109.00	1[illegible],822.00	110.00	171,[illegible].00	147.00	229,805.00
[illegible]	[illegible] Additive	All Req'd	Cont. Sum	C.S.	11,685.00	C.S.	11,685.00	C.S.	11,685.00	C.S.	11,685.00
[illegible]	[illegible] Mixed Asphalt	758	Station	90.00	[illegible],424.00	92.00	69,756.00	110.00	83,380.00	119.52	90,576.16
[illegible]	[illegible] Rejuvenating Agent	170	Tons	320.00	[illegible].00	256.00	43,520.00	450.00	76,500.00	302.00	51,340.00
[illegible]	[illegible] Patches	20	Square Yard	30.00	600.00	100.00	2,000.00	200.00	4,000.00	80.00	1,600.00
[illegible]	[illegible] Asphalt [illegible]	31	Tons	225.00	6,975.00	244.00	7,564.00	300.00	9,300.00	[illegible]	9,421.95
612(1)	Railroad Crossing	All Req'd	Lump Sum	L.S.	20,000.00	L.S.	5,900.00	L.S.	12,000.00	L.S.	10,000.00
670(1)	Painted Traffic Markings	All Req'd	Lump Sum	L.S.	29,000.00	L.S.	56,000.00	L.S.	18,000.00	L.S.	22,935.00
[illegible]	[illegible]	121	Each	250.00	30,250.00	21.00	2,541.00	465.00	56,265.00	250.00	30,250.00
	TOTAL AMOUNT BID				$1,104,213.00		[illegible]9,909.00		1,044,642.40		1,07[illegible],0[illegible].06

Contractor
Ketzon Bros. Const. Inc.
P.O. Box Q
Palmer, AK 99645
Total Bid [illegible]

Contractor
Peter Kiewit Sons' Inc.
P.O. Box 1777
Vancouver, WA 98663
Total Bid 1,[illegible]

Contractor
Wilder Const. Co. Inc.
1040 State Street
Bellingham, WA 98225
Total Bid 1,293,523.50

Contractor

Total Bid ________

Contractor

Total Bid ________

Contractor

Total Bid ________

Contractor

Total Bid ________

BID SUMMARY

TABLE I

Comparison of Costs

Option 1 Surface Recycle*		
Heater-Scarify @ $92/Sta (746 STA)		68,700
Rejuvenation Agent @ $256/Ton (85T)		21,700
	Total	$90,400
Option 2 Pulverize & Replace*		
Pulverize Exist @ $68/Sta** (746 STA)		50,700
Place 2" Replacement Mat @ $20/Ton (22,400T)		448,000
	Total	$498,700
Initial Savings ----------		$408,300

* Note a 1 1/2" overlay is common to both options and therefore not used in cost comparisons.

** This is a bid price from a similar project in the Anchorage area. It is interesting to note it would have cost $24 per station less to totally pulverize, mix and compact than to heat and scarify the upper 3/4".

TABLE 2

COMPARISON OF MATERIALS & ENERGY CONSUMED

(Energy Units from Asphalt Institute, Misc - 75-3, April 1975)
(Gasoline = 125,000 BTU/GAL)

Surface Recycling — Option 1	Equiv. Gals. of Gas (BTU/125,000)
Diesel (Heat & Fuel) 8,045 gals @ 139,000 BTU/GAL	8,946
Gas (Fuel) 291 gals @ 125,000 BTU/GAL	291
Reclamite 22,460 gals @ 2,000 BTU/GAL	360
Distributor Truck 22,500 gal @ 144 BTU/GAL	26
Rollers (4 passes) 204,000 SY @ 120 BTU/SY	196
Scarifier Teeth (1,008 - 1" dia x 6") 504 LF @ 28,000 BTU/FT	115
Springs (24 - 2 1/2" x 5/16" x 3') 72 LF @ 28,000 BTU/FT	16
Option 1 Total	9,950
Pulverize — Option 2	
Pulverize (24' x 2" x 14.5 Mi.) 22,400T @ 3,000 BTU/T	540
Recondition Base 204,000 SY @ 400 BTU/SY	655
Produce MC-30 Prime 41,000 gal @ 70,000 BTU/GAL	22,960
Spread Prime 41,000 gal @ 444 BTU/GAL	145
Pulverize Subtotal	24,300
Replace 2" AC	
Asphalt Production 1,480 T @ 587,500 BTU/T	6,955
Aggregate Production 22,400 T @ 40,000 BTU/T	7,170
Plant Mixing 22,400 T @ 19,800 BTU/T	3,550
Hauling Aggregate 22,400 T for 3.5 Mi. @ 3,800 BTU/TM	2,385
Hauling Asphalt 1480 T for 70 Mi. @ 1960 BTU/TM	1,625
Replace Subtotal	21,685
Option 2 Total	45,985

TABLE 3

AC PROPERTIES BEFORE HEATER SCARIFICATION

Sample Ident.	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	1087
MP/STA	57.1	57.9	59.0	60.1	61.0	63.0	64.0	67.0	69.5	69.3	67.3	65.2	63.1	
Sieve Size 3/4"	100	100	100	100	100	100	100	100	100					
3/8"	77	78	75	78	72	80	76	74	71					
#4	58	58	55	59	53	62	59	54	52					
#10	44	45	43	46	40	47	45	41	40					
#40	22	19	20	21	20	27	24	22	22					
#200	7	6	6	6	7	10	8	8	8					
Asphalt	5.5	6.3	6.5	5.7	5.7	6.1	5.7	5.6	5.8					
Thickness	2"	2.25"	2.37"	2.5"	2"	2.25"	2.75"	2.25"	2"					
Pen @ 77°F	21			24						35	48	34	32	41
Pen @ 40°F										4	6	5	4	3
ABS VISC										5427	2706	5222	5695	3406

1976 Cores-Averages (Before)

Thickness	Gradation		Spec.	% Asphalt	Spec.	Pen @ 77°F	Absolute Viscosity	Ductility
2 1/4"	3/4"	100	100	5.9%	5.6-6.2	38	4,500	
	3/8"	76	64-78			*23	*19,400	*19
	#4	57	49-57					
	#10	43	37-45					
	#40	22	17-25					
	#200	7	5-7					

* From Appendix Test Report (78F-7 thru 12) Page A-5

TABLE 4

AC PROPERTIES AFTER HEATER SCARIFICATION

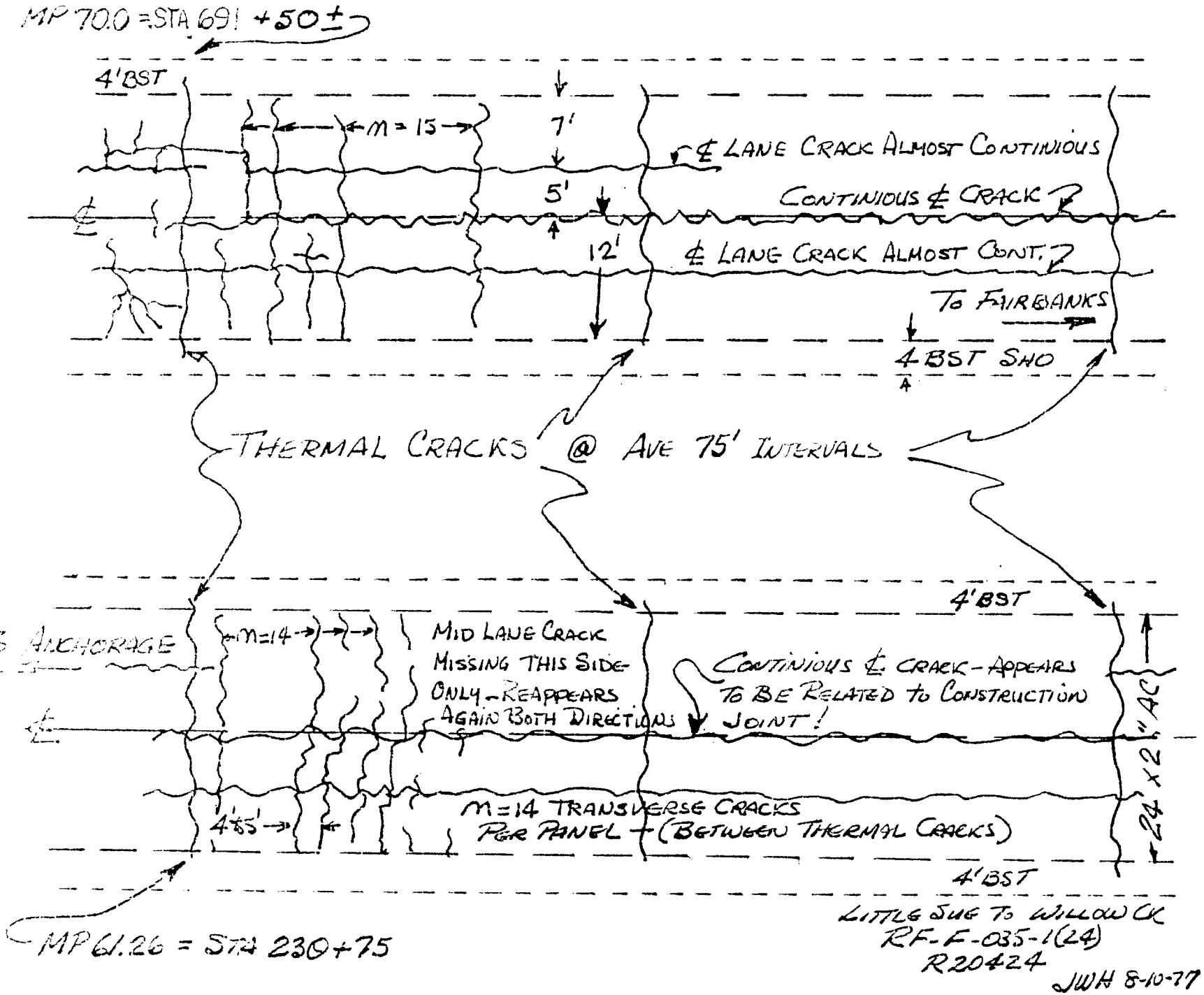
Sample Ident	77F-979 Sta. 361+25		77F-980 Sta. 641+00	
	Top 1/2" Treated	Bottom (No Treatment)	Top 1/2" Treated	Bottom (No Treatment)
3/4	100	100	100	100
1/2	94	89	91	89
3/8	81	76	76	76
#4	59	55	58	59
#10	45	42	44	44
#40	24	22	23	23
#200	8	8	9	8
% ASPH	* 6.3	5.7	6.3	5.6
PEN @ 77°F	* 58	49	25	26
PEN @ 40°F	2	2	1	1
ABSO VISC	* 1888	2284	8882	8219

* This is the only test result obtained which approximated the desired goals.

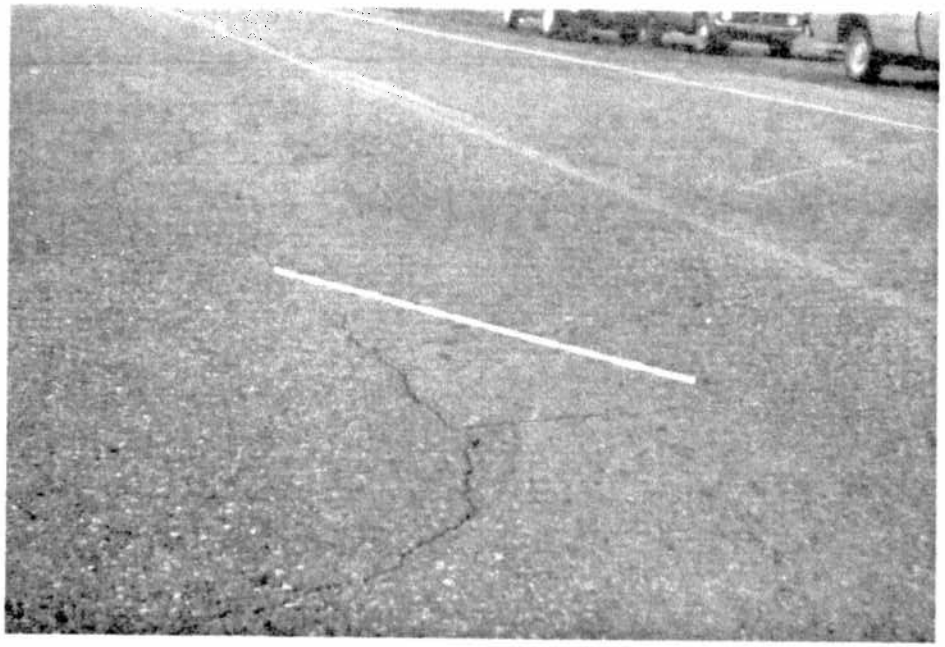
1976 Cores-Averages (After)
(Top 3/4" Only)

Thickness	Gradation		% ASPH	PEN @ 77°F	Absolute Viscosity	Ductility
No Change	3/4	100	6.3%	42	5,400	
	3/8	76		*26	*8,600	*100+
	#4	58				
	#10	44				
	#40	23				
	#200	9				

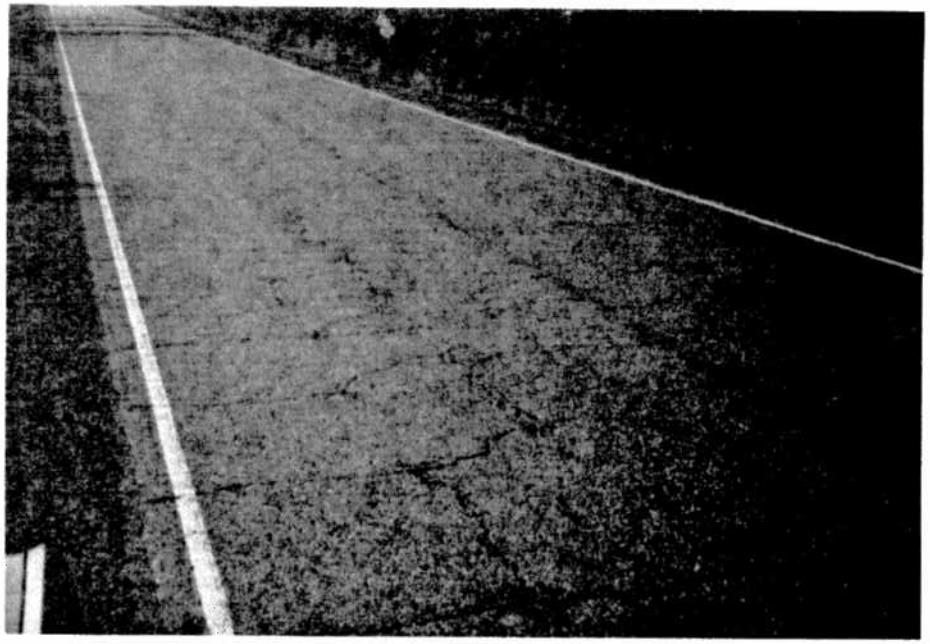
* From Appendix Test Report
Page A-5



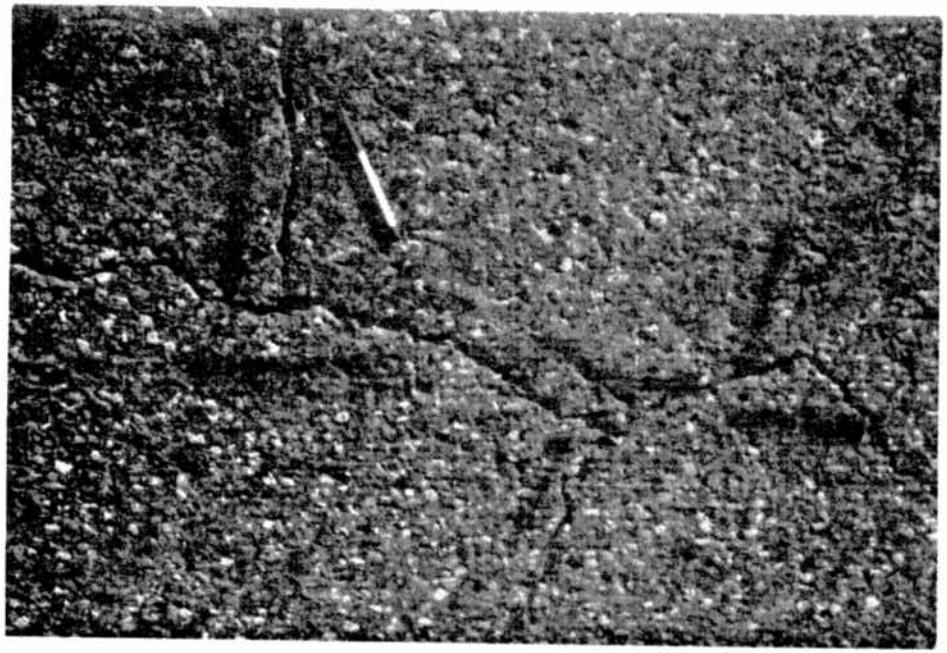
CRACK RECORD



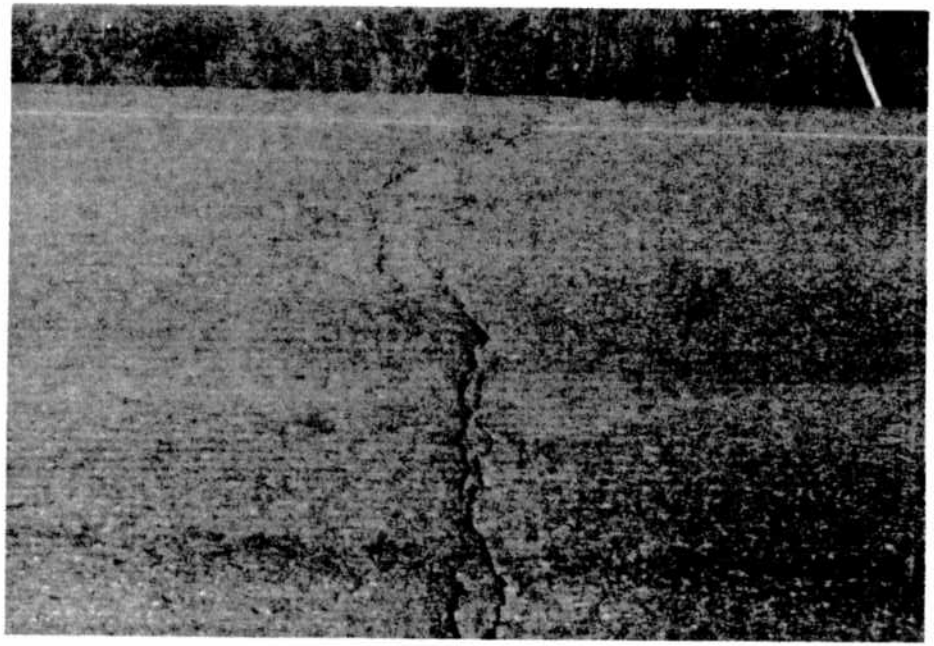
TYPICAL BLOCK CRACKING



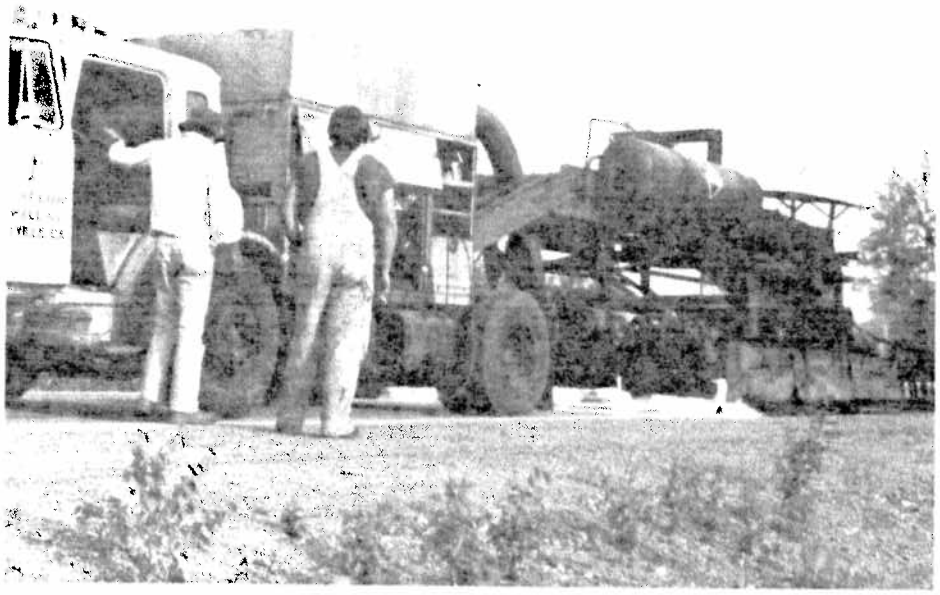
TYPICAL BLOCK CRACKING



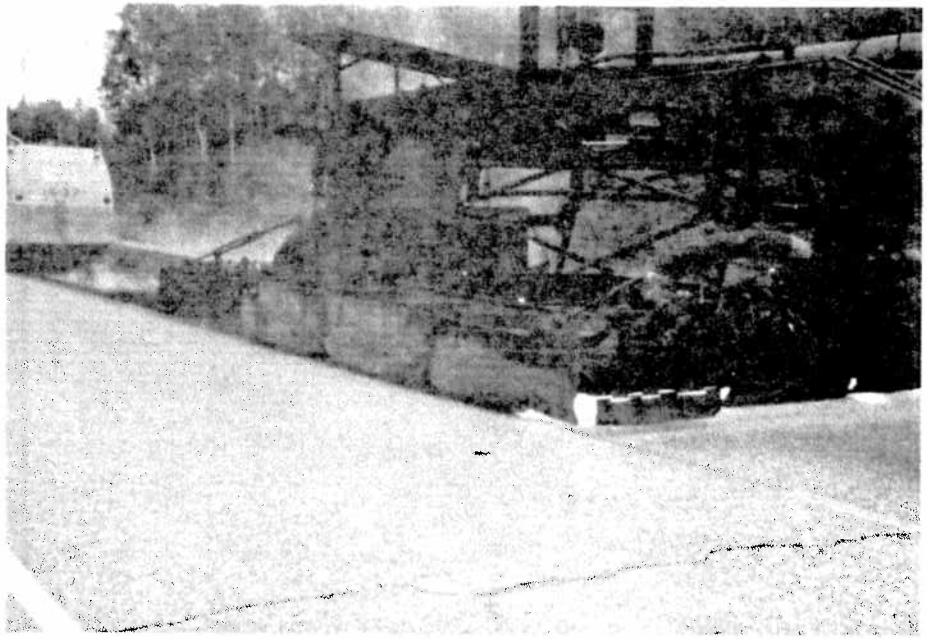
CLOSE UP OF CRACKING & RAVELING



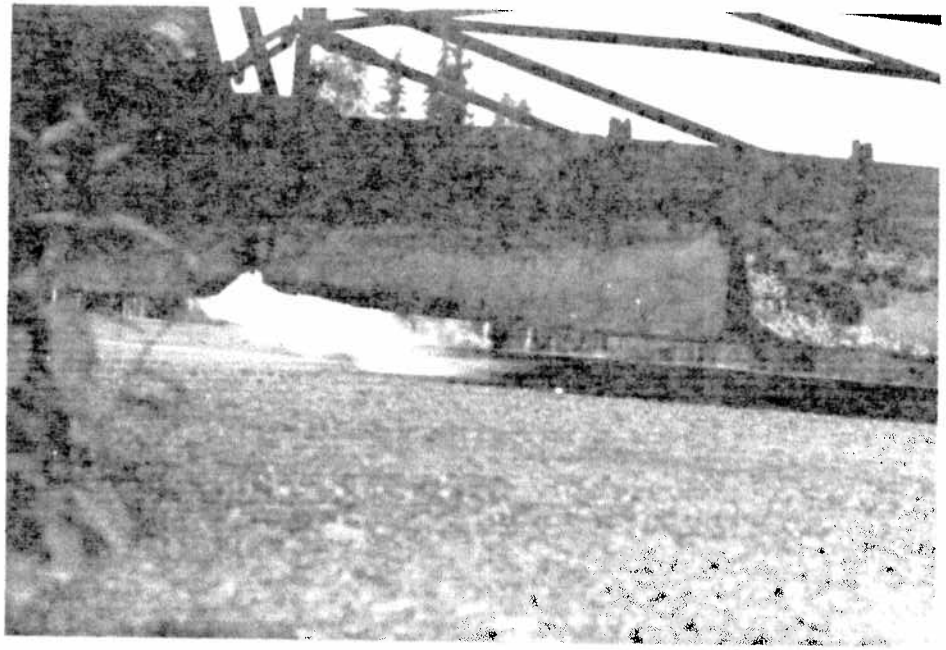
TYPICAL THERMAL CRACK



HEATER–SCARIFIER IN ACTION

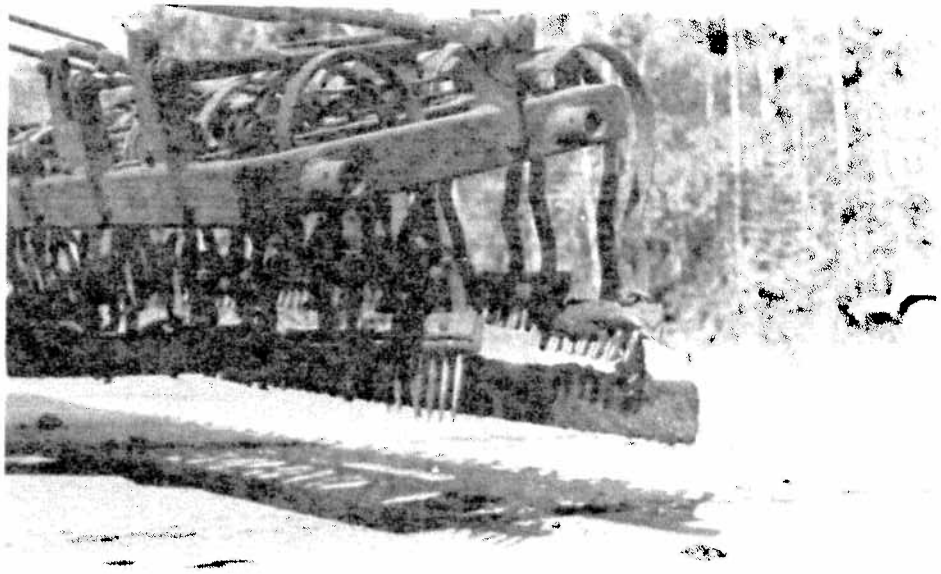


VIEW OF BURNER, SCARIFIER & ROLLER



EYE–LEVEL VIEW OF BURNER

VAPOR PRODUCED BY HEATER– SCARIFIER

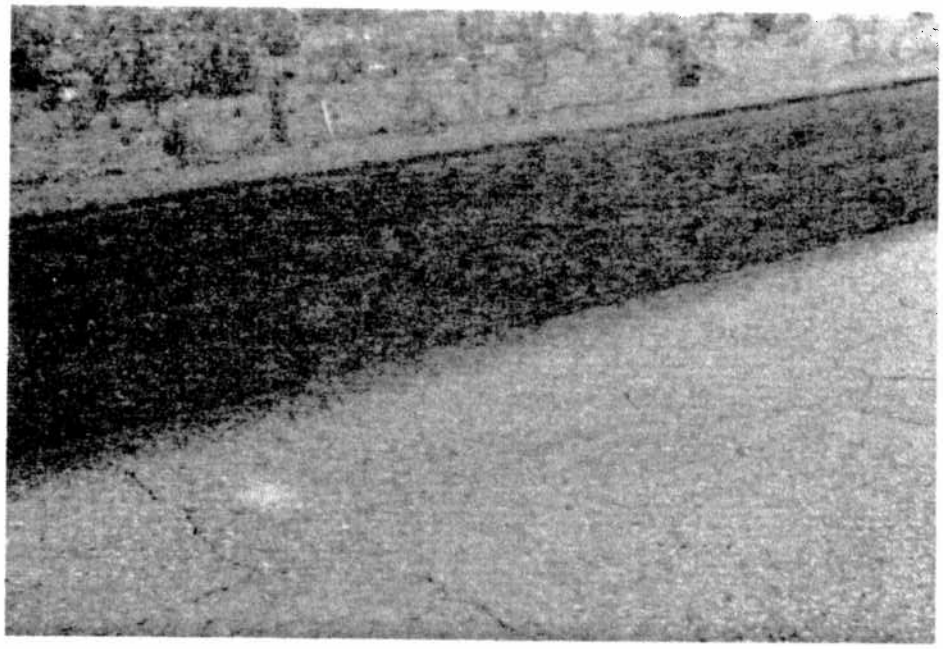


SCARIFIER TEETH & DRAG RAISED

SCARIFIER AND DRAG IN ACTION

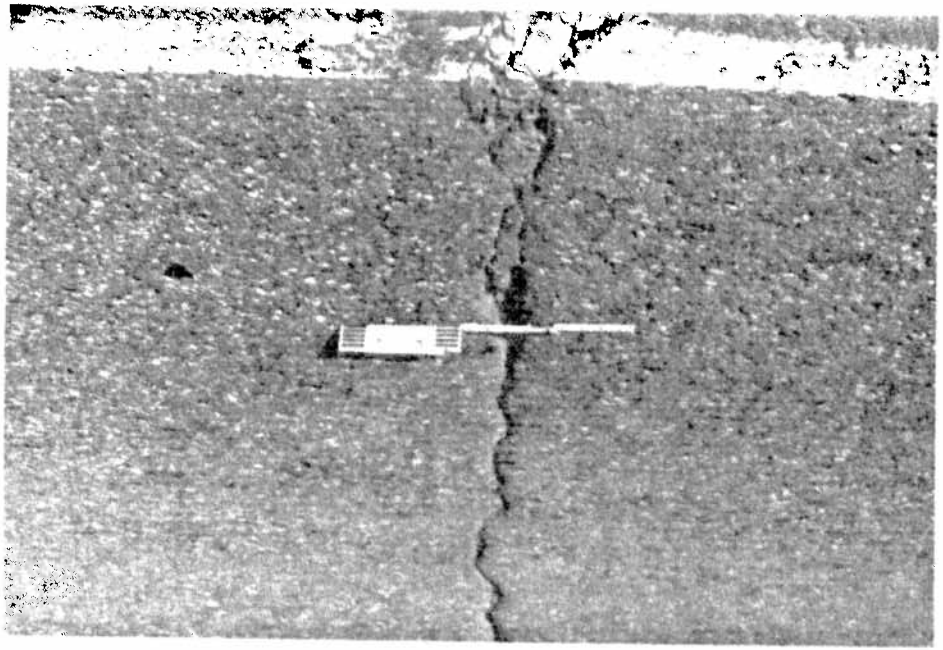
MATERIAL AFTER HEATING & SCARIFYING

NOTE GROOVES IN SCARIFIED MATERIAL

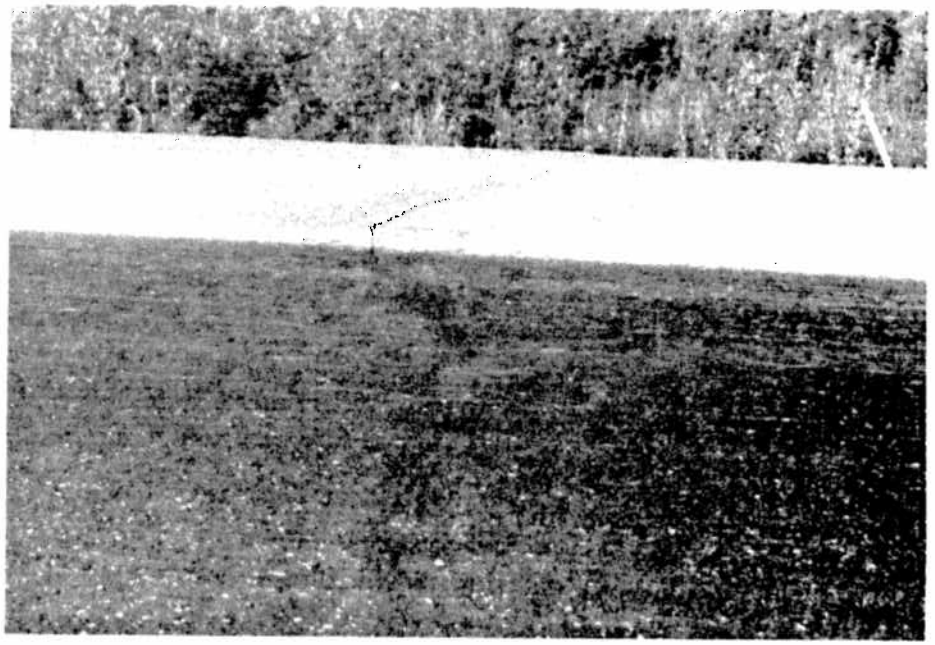


FAR LANE TREATED–NEAR LANE STILL CRACKED

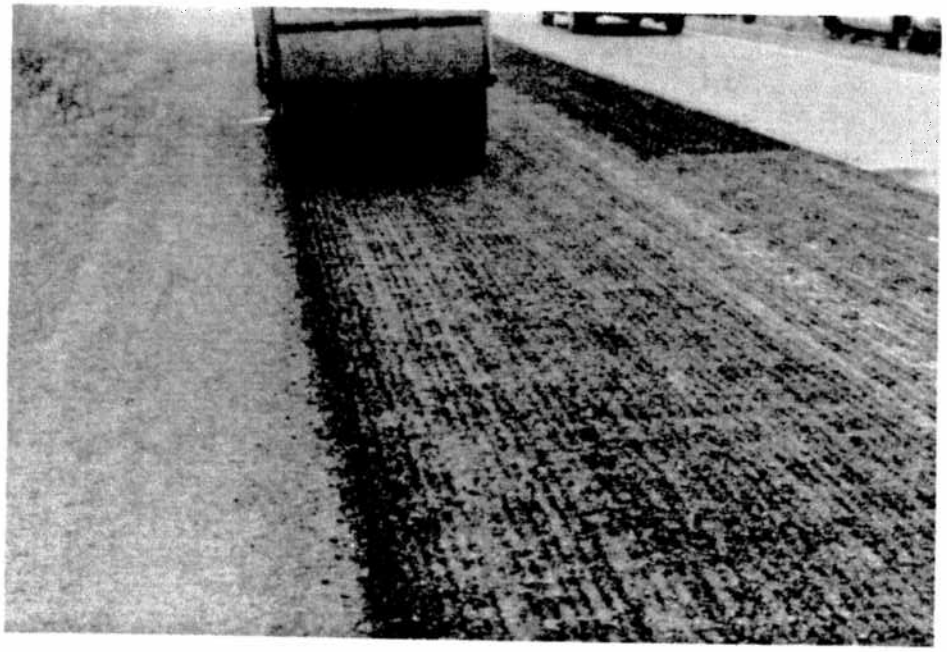
PAVEMENT AFTER TREATMENT



THERMAL CRACK SPALLING



THERMAL CRACK AFTER TREATMENT



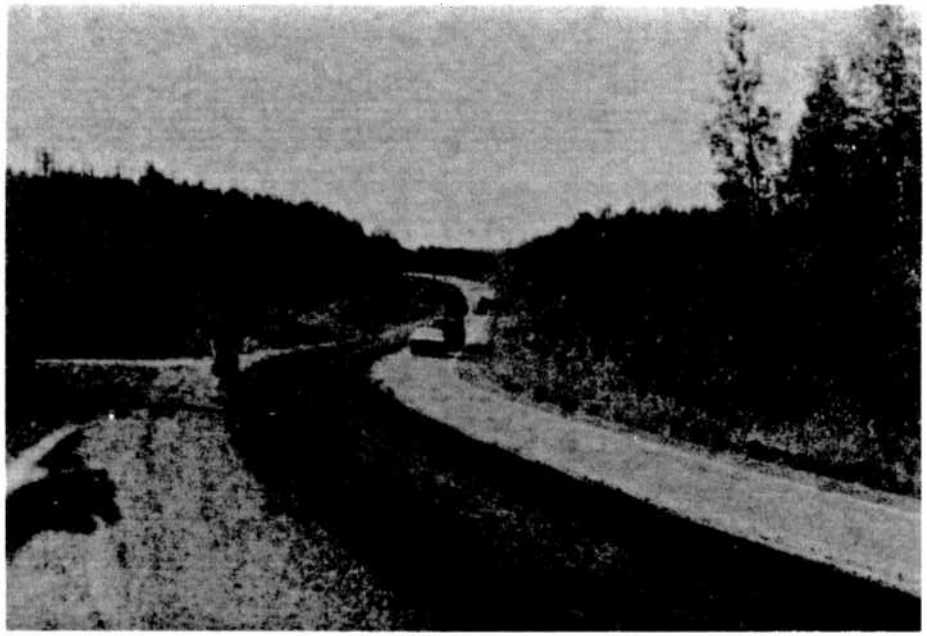
STEELWHEEL ROLLER AT WORK

VIEW OF RUBBER AND STEEL ROLLERS AT WORK

APPLICATION OF " RECLAMATE" REJUVENATOR

PLACING 1½" AC OVERLAY

TRAFFIC WAITING FOR PILOT CAR



TRAFFIC PASSING THRU PROJECT

ONE SIDE TREATED

BOTH SIDES TREATED

APPENDIX A

Witco Chemical

Re: Little Susitna to Willow Creek
Overlay

February 25, 1977

Mr. Dan W. Herman
Central Division Materials Engineer
State of Alaska
Department of Highways
P. O. Box 6750
Anchorage, Alaska 99502

Dear Mr. Herman:

Attached are several copies of the test results on the two cores you submitted to this office from the above-referenced project.

You will note the procedure used to determine the effect of RECLAMITE on the existing pavement, so I'll not go into any detail. However, if there are any questions, please do not hesitate to contact me at this office.

You will note that the RECLAMITE reacted very favorably with this pavement, and from the data shown it would be my recommendation that the RECLAMITE be set up to be spread at a rate of 0.10 to 0.12 gallons per square yard of RECLAMITE concentrate. We know from many years of experience that the actual field data will be one-half to three-quarters higher than our laboratory data, or in other words an application of 0.10 gsy will result in a penetration value of somewhere around 100.

If the conditions of this pavement are such that only the surface is deteriorated and there are no base problems, the heater-scarifier-RECLAMITE-overlay approach will be ideally suited. If there are some areas that have base problems, these should be taken care of prior to the heater work. But if the entire project has base failures, then of course the heater-scarifier approach is not recommended.

If there are any further questions regarding this matter, please do not hesitate to contact this office.

Very truly yours,

William Canessa, P.E.
Manager
Products Engineering

WC:hf
Enc.
cc: John Henry ← FOR
Ed Lynch
Steve Beckett

A-1

Witco Chemical Corporation
Golden Bear Division, P.O. Box 378, Bakersfield, California 93302 Area Code 805 Telephone 399-9501

Witco Chemical

TECHNICAL SERVICE REPORT
REPORT NO. TSR-A8/760203
DATE February 24, 1977
CUSTOMER Alaska Highway Department
Little Susitna to Willow Creek Overlay
SUBJECT VISCOSITY AND PENETRATION
DETERMINATION BY MICROVISCOMETER

INTRODUCTION - Two (2) pavement core samples were submitted to the laboratory for analysis. These samples were labeled 1 & 4.

OBJECTIVE - To determine viscosity @ 77°F and equivalent penetration of asphalt before and after heater scarifier and Reclamite Concentrate treatment.

EXPERIMENTAL - A section of each core was saved for untreated analysis. Core 1 was scarified 3/4" and treated with 0.10 gal/yd^2 Reclamite Concentrate. Core 4 was scarified 3/4" and treated with 0.20 gal/yd^2 Reclamite Concentrate. Treated samples were aged for three (3) days @ 140°F. The asphalt was extracted from the above pavement core samples and viscosity @ 77°F and equivalent penetration were determined.

RESULTS

Sample	Depth	Microviscosity, Megapoises 0.05 Sec.$^{-1}$	0.001 Sec.$^{-1}$	Equivalent Penetration
No. 1 Untreated	Top 3/4"	21.7	34.8	21
No. 1 Treated 0.10 gal/yd^2	Top 3/4"	1.43	1.51	75
No. 4 Untreated	Top 3/4"	17.1	30.5	24
No. 4 Treated 0.20 gal/yd^2	Top 3/4"	.375	.435	138

HB/dr
Harold Brown

APPROVED BY: J.L. Eberly 2/25/77 Date; S.J. Escobar 2-24-77 Date

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DISTRIBUTION: D.D. Davidson J.L. Eberly

STATE
of ALASKA

MEMORANDUM

TO: John Henry
Bituminous Engineer
Douglas

AND: D.W. Herman
District Materials Engineer
Central

FROM: David C. Esch
Engineer of Tests
College Laboratory

DATE: February 2, 1978

FILE NO:

TELEPHONE NO:

SUBJECT: Little Susitna to Willow
RF-F-035-1(24)

Testing has been completed on a series of six pavement cores sets taken at random locations on the subject project. The purpose of this testing was to determine the benefits of last season's trial project, which involved heater-searification of the top 3/4" of the existing pavement, followed by an application of Reclamite (TM) asphalt rejuvenating agent.

Preparation of these cores for testing consisted of first visually locating the joint between the new overlay and the old pavement, and then making two diamond saw cuts to remove the new pavement and to separate the top 3/4 inch from the bottom portion of the old pavement. The top (heater scarified and Reclamite surface treated) portions of each adjacent pair of cores were combined and the asphalt extracted. Bottom halves of adjacent cores were also combined and extracted. The properties of the extracted asphalt were then determined after following the Abson recovery procedure. Test results are presented on the attached report sheet. Also attached are prior test results related to this project, which represented too few samples to be conclusive (Table I).

Results of this project, as judged only by the most recent coring program, appear somewhat on the positive side. Very minor changes in asphalt penetration were achieved, while viscosity values showed better than 100% improvement, and ductility improved by about 150%. Test results indicated that changes were extremely variable, however.

When previous test data is included in this analysis, the benefits become less apparent. Test results on asphalt extracted from pavement cores taken late in 1976, prior to any pavement reconstruction, are presented in Table I. These data indicate that the asphalt had less hardening prior to the 1977 treatment than it now exhibits.

Little Susitna to Willow Creek RF-F-035-1(24)

Tests on Old Pavement

Sample Type	Sample No.	Pen. @ 39.2	Pen. @ 77	Visc. @ 140
Anchorage Extract Samples:	76F-1028	4	32	5695
	-1027	4	35	5427
	-1026	6	48	2706
	-1025	4	35	5427
Slab of Old Pavement	77F-1087	3	41	3406
	Avg. of Old Pavement	4.2	38.2	4532
From Cores Taken after Heater Scarification:	77F-979	2	49	2284
Bottoms	-980	1	26	8219
Bottom	Avg.		37.5	5251
Cores Taken after Heater Scarification	77F-979	2	58	1888
Tops	-980	1	25	8882
Top	Avg.		41.5	5385
Original Asphalt Used for Overlay - 1977	77F-946		167	1621
	-974		147	972
	-975		139	1086
	-978		143	1152

Table I

14-212
(11/71)

STATE OF ALASKA
DEPARTMENT OF HIGHWAYS
MATERIALS DIVISION
TEST REPORT

PRE-CONSTRUCTION ( )
CONSTRUCTION ( )
OUTSIDE TEST ( )

FIELD CONTROL ( )
CHECK SAMPLE ( )
PROGRESS RECORD ( )
FINAL RECORD ( )
INFORMATION (X)
QUALITY ( )

SAMPLE OF Bituminous Cores

ITEM NO. _____

Laboratory SML No. 78F-7 thru 12

Project Name & No. Little Susitna to Willow RF-F-035-1(24) Date 1/31/78

Quantity represented -- Identification _____ Received 1/10/78

Source of material _____ Submitted by Jim Gamblin

Sampled from _____ Specification No. _____

		TEST RESULTS		SPECIFICATIONS	
Lab. No.	Core No.	Pen.@ 77°F ~~77~~	Pen.@ 39.2°F ~~39.2~~	Abs. Visc.	Ductility
78F-7 Top 3/4"	59	18	2	50,000+	7
Bottom		18	2	37,503	11
8 Top 3/4"	63	27	2	7,245	100+
Bottom		25	2	19,400	19
9 Top 3/4"	65	26	2	10,527	94
Bottom		18		27,011	16
10 Top 3/4"	68	25		8,597	100+
Bottom		23		14,963	27
11 Top 3/4"	73	40	3	4,105	100+
Bottom		36	2	5,735	100+
12 Top 3/4"	75	250+	30	189	100+
Bottom		26	2	7,591	100+
Avg. of #8 to 11 Top 3/4"		29.5	2.2	7,620	99
Avg. of #8 to 11 Bottom		25.5	1.8	16,780	40.5
* Median of #7 to 11 Top 3/4"		26	2	8,597	100+
* Median of #7 to 11 Bottom		23	2	19,400	19

Copies to:

David C. Esch
Signature
David C. Esch, Engineer of Tests
Title

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STATE
of ALASKA

MEMORANDUM

TO

John Henry
Bituminous Pavements Engineer
Headquarters

DATE July 28, 1977

FILE NO

TELEPHONE NO.

FROM Robert McHattie
Asst. Soils Engineer
College

SUBJECT Pavement Study Sections, South End of Parks Highway

We have only one ½ mile section within the limits of Project RF-F-035-1(24) Little Susitna River to Willow Creek. For reference, Little Susitna River is at approximately mile 56.6 and Willow Creek at mile 71.3. Our study section extends from mile 58.4 to 58.9 and was selected to study a cut section with rather poor pavement performance. It has been suggested by some of the Anchorage people that the problem has been caused by ground water in this area and subsequent saturation of the embankment.

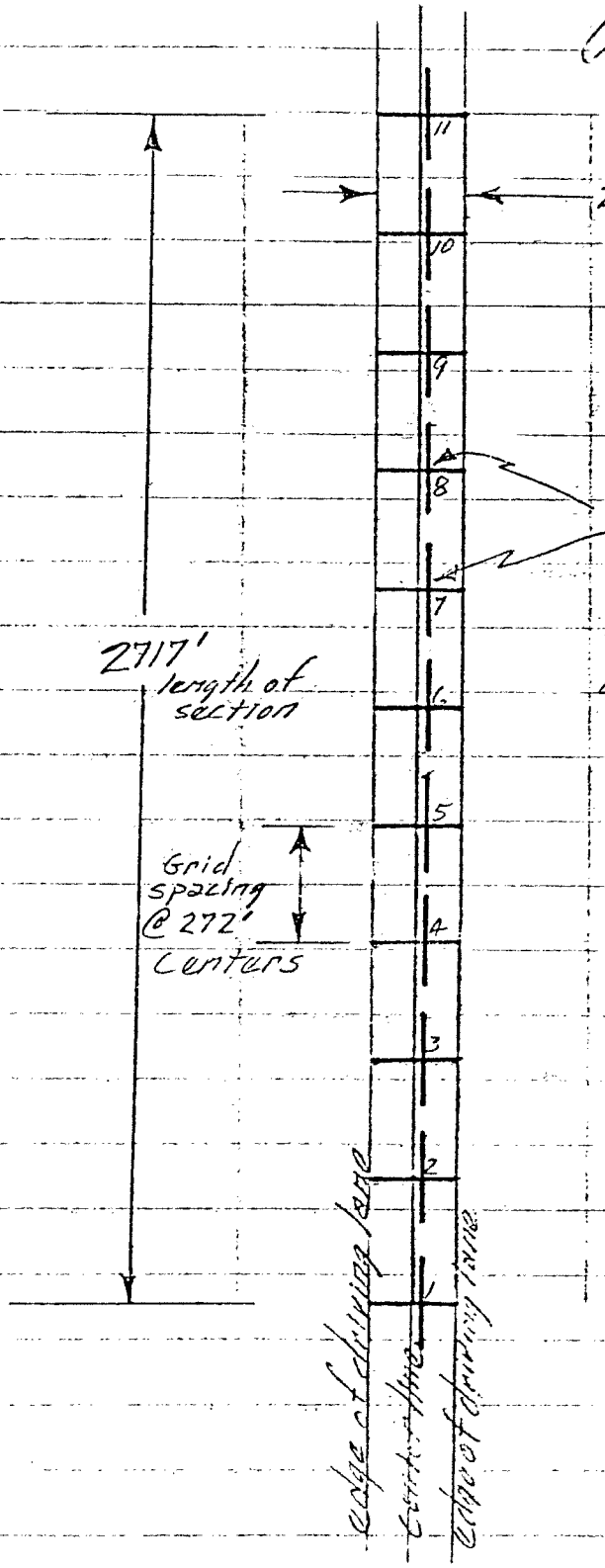
A Mays Ride Meter run indicated 102.4 inches of vertical rear axle movement per section length or 199 inches per mile.

The pavement was rated as indicated on the enclosed rating form. We are attempting to keep this type of rating as objective as possible for later use in regression analysis. The rut measurements are self explanatory as are the number of patched and unpatched major transverse cracks per section. Patched and nonpatched cracks were differentiated as an attempt to attach a severity number to the condition of full width thermal cracks. Actual locations of alligator cracked sections and transverse crack locations were noted in case we wanted to look closer into their distribution. Longitudinal cracks (major) were counted at each grid location if they extended across the transverse ordinate of the grid (see layout sheet).

Thermal type cracking, including short length longitudinals were measured on the basis of number of intersections with purpendicular grid lines centered at the 11 grid center locations. One line of the grid extends from shoulder to shoulder of roadway while the other is parrallel to the centerline but offset from the C.L. by 1 foot into the lane being studied. The cracks intersecting the transverse ordinate of the grid area then counted in the "transverse " column and similarly for intersections across the longitudinal direction which are totaled under the "longit." heading. The sums derived from counting "longitudinal" and "thermal" cracks will be used in our analysis simply as total per section since all sections contain 11 counting grids regardless of section length. The size of a crack counting grid varies somewhat with the width of the road but is 24'x24' for a normal width road surface. We also have 2 more sections on the south end of the Parks Highway although not contained within the Little Su to Willow Creek project. They are at miles 37.75-38.25 and 74.0-75.0 and were chosen for their thermal type cracking. These also represent a more uniform section-length surface condition than the one you have been sent. I hope that our rating information is of some use to your study even though parts of the condition survey format have been designed toward our own analyses.

Diagram of Crack Count Grid for Section #515 @ mile 58.4-56.9 Parks Hwy.

(not to scale)



Pavement Surface Survey

Date: 7/14/77 Section Number 515

Location of Study Section: Parks Highway; Mile 58.4-58.9

Length of Study Section: 2,717 ft Direction North Bound Lane

Ord. #	Longitudinal Cracks: Regular	Spalled	Edge	Thermal Cracks: Transv.	Longit.		Wheel Path Ruts: L outer	L inner	R inner	R outer
1	1	0	0	4	5				0.068	0.206
2	1	0	0	5	4				0.151	0.204
3	1	0	0	2	1				0.169	0.143
4	1	0	0	1	3			→	0.330	0.257
5	1	0	0	2	0	Top of hill, deep rutting			0.683	0.178
6	0	0	0	0	0			→	1.095	0.659
7	1	0	0	2	5				0.192	0.081
8	1	0	0	2	0				0.229	0.275
9	1	0	0	2	0				0.056	0.199
10	1	0	0	2	4				0.064	0.197
11	1	0	0	2	2				0.040	0.225
Σ	10	0	0	24	24					
									X → 0.282	0.241
									S → 0.326	0.149

Patches

Full Width none ft

Pot Hole 3 #

Alligator Cracked Areas

Linear feet/test sec.

Inner W.P.	Outer W.P.
615	454

% of total outer W.P. length 11.7%

% of total inner W.P. length 22.6%

Major Transverse Cracks

cracks/mile

Patched 19

Unpatched 35

② Average depth of patched cks. Not Taken

standard deviation from avg.

Each portion of section is @ top of hill, ie, central portion of section.

① Basis for measurement; 11-24'x24' reference coordinates

② measured on every 10th major transverse crack