

EXPERIMENTAL USE OF AN
ASPHALT RUBBER SURFACE TREATMENT
INTERIM REPORT 83-6
SEPTEMBER 1983

Follow-up To Initial Report 79-6
And Interim Report 81-4

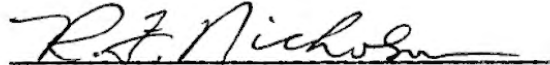
Reporting On
Category III Work Plan 79-R-6
SPRINGFIELD-WEATHERSFIELD IR-F 91-1(4)

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16. Abstract <p>This interim report discusses the condition and performance of a highway treated in 1979 with experimental applications of OVER-FLEX asphalt rubber. The material, applied as an asphalt rubber surface treatment (ARST) on 8.54 miles of roadway and as an asphalt rubber interlayer (ARI) on 0.97 miles of roadway, is compared with a bituminous concrete pavement placed on the adjacent lanes as the control system.</p> <p>The ARST has stabilized following significant stone losses through the first eight months of exposure to traffic.</p> <p>100 percent of the original cracks reflected through the ARST within the first 30 months of exposure, 97 percent of the cracks had reflected through the ARI and 58 percent had reflected through the standard bituminous overlay through June, 1983, a 47 month period of exposure.</p> <p>The riding quality of the surfaces recorded in inches per mile with a Mays Ride Meter in 1982 averaged 79 on the ARST, 47 on the ARI, and 50 on the standard bituminous overlay.</p>			
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EXPERIMENTAL USE OF ASPHALT RUBBER SURFACE TREATMENT

Interim Report No. 2 For The Period
June 1981 - September 1983

INTRODUCTION

This interim report discusses the condition and performance of a highway treated in 1979 with experimental applications of OVER-FLEX asphalt rubber. The material was applied on Interstate 91 Southbound, between the Ascutney and Springfield interchanges, as an asphalt rubber surface treatment (ARST) on 8.54 miles of roadway between mile-markers 51/24 and 42/70 and as an asphalt rubber interlayer (ARI) on 0.97 miles of roadway between milemarkers 42/70 and 41/73. The control treatment consisted of two one-inch courses of bituminous concrete pavement placed on the adjacent 9.5 mile Northbound lane.

For detailed information on the construction phase and the initial performance of the experimental treatment, refer to Initial Report 79-6 and Interim Report 81-4.

PROJECT CONDITION AND PERFORMANCE

LOSS OF COVER STONE

A detailed inspection made at half mile intervals on August 19, 1982 revealed no increase in stone loss over that noted on 12/9/80. Loss at that time was recorded at 20% on the passing lane and 14% on the travel lane with the 3/8" cover stone and 9% loss on the passing lane and 8% on the travel lane treated with 1/2" stone. The inspection revealed the presence of more fractured stone particles in the surface of the treatment. The identification of total stone loss had become more difficult to determine, due to slight movement of the rubber particles resulting in partial filling of the voids left by previous stone losses.

The project was inspected again in detail on June 21, 1983. There was no appearance of additional stone loss or loose stones on the roadway or shoulders. However, an actual count of stone loss was not possible, due to partial or complete filling of the voids left by previous stone loss with asphalt rubber material. There has been no significant loss of cover stone or asphalt rubber along the edge of cracks in the surface treatment.

The asphalt rubber, or more specifically the rubber, has become more visible in some areas, resulting in a black or dark appearing surface. The condition is more apparent towards the edges of the initial spraybar application. It has occurred frequently at a point 7± feet right of centerline in the travel lane. The condition has not occurred with any regularity in the wheel paths of either lane nor has it occurred at any location in the 1 mile section treated with 1/2 inch cover stone.

REFLECTIVE CRACKING

Treatment	Original Crack Count	% Reflective Cracking					
		2/80	3/80	4/80	4/81	8/82	6/83
ARST (4 test sections totaling 4240Lf)	182'/100Lf	50	65	76	89	100	100
*ARI (2 test sections totaling 798Lf)	131'/100Lf	44	53	56	82	93	97
**Control Section (4 test sections totaling 2122Lf)	244'/100Lf	12	14	15	42	51	58

*(1) 1" bituminous surface course

** (2) 1" courses bituminous pavement

See Appendix for type of cracks on Crack Count Summary Sheets

PAVEMENT RUTTING

Treatment	Location	Pre-construction	12/80	6/81	6/83
ARST	Travel Lane	4/8" - 5/8"	2/32	3/32	3/32
	Passing Lane	3/8"	1/32	2/32	2/32
ARI	Travel Lane	4/8" - 5/8"	(1)	(1)	2/32
	Passing Lane	3/8"	(1)	(1)	1/32
Control Section	Travel Lane	5/8"	(1)	(1)	5/32
	Passing Lane	3/8"	(1)	(1)	3/32

(1) No readings taken

RIDING QUALITY

Riding quality as measured in inches of roughness per mile with a Mays Ride Meter.

Treatment	Inches per Mile				
	<u>1978</u>	<u>11/79</u>	<u>11/80</u>	<u>11/81</u>	<u>10/82</u>
ARST	140	30	47	63	79
ARI		21	28	45	47
Control Section	193	16	31	32	50

FRICTION VALUES

Friction values obtained with a locked wheel friction trailer operating at 40 mph were as follows:

Treatment	Average Friction Value				
	<u>10/79</u>	<u>9/80</u>	<u>9/81</u>	<u>9/82</u>	<u>9/83*</u>
ARST (3/8" stone)	46	50	47	47	43
ARST (1/2" stone)	46	50	49	48	48
ARI		45	42	47	45
Control Section		50	30	43	42

*1983 values may be subject to slight change when calibration factor is established

MAINTENANCE REQUIREMENTS

There have been no maintenance requirements on the asphalt rubber surface treatment, interlayer, or northbound control section during this reporting period.

PROJECTED REQUIREMENTS

Since the problem with cover stone loss has stabilized, the Agency does not anticipate a need for any corrective changes or maintenance requirements in the near future.

SUMMARY OF PROJECT CONDITION AND PERFORMANCE

Loss of Cover Stone

The surface treatment has stabilized following significant stone losses through the first eight months of exposure to traffic.

Reflective Cracking

100% of the original cracks have reflected through the ARST, 97% on the ARI, and 58% on the standard bituminous overlay.

Pavement Rutting

Rutting has been insignificant on all three treatments.

Riding Quality

1982 Mays Ride Meter readings averaged 79 inches per mile on the ARST, 47 inches per mile on the ARI, and 50 inches per mile on the standard bituminous overlay.

Friction Values

1983 readings averaged 43 on the ARST with 3/8" stone, 48 on the 1/2" stone, 45 on the ARI, and 42 on the bituminous pavement control section, (See note, Page 4).

Maintenance Requirements

There were no maintenance requirements during this reporting period and no corrective changes or maintenance is anticipated in the near future.

CONCLUSIONS

The following preliminary conclusions can be drawn from the project, following 50 months of observation:

- (1) The OVER-FLEX asphalt rubber surface treatment is performing satisfactorily as a riding surface, following a significant loss of cover stone during the first eight months of exposure to traffic.
- (2) Neither the surface treatment nor the asphalt rubber interlayer were as successful as a 2 inch bituminous overlay in preventing reflective cracking.

RECOMMENDATIONS

- (1) Asphalt rubber surface treatments could be considered for use and evaluated for performance as a substitute for a thin bituminous overlay or a standard chip seal surface treatment on medium or low volume roadways.
- (2) If the system is to be tried again, greater emphasis should be placed on the selection of a single sized stone which would insure adequate embedment and cover without a build-up of stone which makes it subject to loss under traffic.

The Agency will continue to monitor the experimental and control sections until retreatment is required. A final report, which will include life cycle costs, will be prepared at that time.

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STONE LOSS SUMMARY SHEET

Location & Route SPRINGFIELD/WEATHERSFIELD I-91 SB

Experimental Feature ASPHALT RUBBER SURFACE TREATMENT

Percent Stone Loss Based on Field Count

Mile Marker Location	Travel Lane			Passing Lane		
	12/80	6/81	8/82	12/80	6/81	8/82
50/95	13	15	17	15	19	21
50/50	12	12	20	18	24	22
50/00	10	12	13	10	12	13
49/50	8	9	14	15	19	18
49/00	7	7	4	10	14	12
48/50	13	12	18	22	17	20
48/00	10	9	12	20	17	18
47/50	14	14	10	21	17	14
47/00	18	9	18	24	25	17
46/50	28	22	22	27	20	20
46/00	19	13	14	21	16	20
45/50	13	12	14	19	22	21
45/00	18	9	10	21	17	13
44/00	15	16	12	22	17	14
43/50	17	14	14	27	25	19
43/00	16	10	11	25	16	19
AVERAGE =	14	12	14	20	19	18

Values above are for areas with 3/8" cover stone which averaged 45 stones per 2" square area.

44/50 8 12 10 9 12 12

Location 44/50 has 1/2" cover stone which averaged 22 stones per 2" square area.

CRACK COUNT SUMMARY SHEET

Appendix B

Location & Route SPRINGFIELD-WEATHERSFIELD I-91 Job Number IRF 91-1(4)
Experimental Feature ASPHALT RUBBER SURFACE TREATMENT Width of Roadway 24'

Code for Crack Type

Type A = Transverse from shoulder to shoulder
Type B = All other cracks of transverse nature
Type C = Longitudinal of any nature
Type D = Miscellaneous

SOUTH BOUND

Date	Original 10/18/79	2/4/80	3/10/80	4/16/80	4/8/81	8/5/82	1/1	1/1
Section #								
43/15 Type A	1680	1413	1413	1413	1584	1658		
43/15 Type B	497	683	843	876	706	895		
43/25 Type C	2659	125	906	1525	1804	2082		
43/25 Type D	20	130	179	202	108	304		
2650' Total	4856	2351	3341	4016	4202	4939		
Avg./100' of roadway	183.2	88.7	126.1	151.5	158.6	186.4		
Section #								
45/40 Type A	121	220	220	220	216	216		
45/40 Type B	232	109	154	171	198	238		
45/30 Type C	480	7	17	81	608	670		
45/30 Type D	306	0	0	0	0	15		
534' Total	1139	336	391	472	1022	1139		
Avg./100' of roadway	213.3	62.9	73.2	88.4	191.4	213.3		
Section #								
50/70 Type A	201	175	175	175	264	288		
50/70 Type B	153	174	212	221	134	162		
50/60 Type C	356	65	123	134	214	395		
50/60 Type D	53	36	48	65	70	82		
528' Total	763	450	558	595	682	927		
Avg./100' of roadway	144.5	85.2	105.7	112.7	129.2	175.6		
Section #								
51/100 Type A	343	282	282	282	312	312		
51/100 Type B	132	156	167	170	166	196		
50/100 Type C	482	238	290	301	488	545		
50/100 Type D	10	8	8	8	8	23		
528' Total	967	684	747	761	974	1076		
Avg./100' of roadway	183.1	129.5	141.5	144.1	184.5	203.8		
WEIGHTED AVE./100' OF ROADWAY (ALL SECTIONS)	181.0	91.6	111.6	124.2	165.9	194.8		

CRACK COUNT SUMMARY SHEET

Location & Route SPRINGFIELD-WEATHERSFIELD I-91

Job Number IRF 91-1(4)

Experimental Feature ASPHALT RUBBER INTERLAYER

Width of Roadway 24'

Code for Crack Type

Type A = Transverse from shoulder to shoulder
Type B = All other cracks of transverse nature
Type C = Longitudinal of any nature
Type D = Miscellaneous

SOUTHBOUND

Date	Original 10/18/79	2/4/80	3/10/80	4/16/80	4/8/81	8/5/82	6/8/83	1 1
Section #								
Type A	336	221	245	245	432	432	432	
^{42/50} Type B	140	36	84	110	65	105	105	
^{42/40} Type C	150	0	0	0	36	46	46	
^{42/50} Type D	40	0	6	6	75	95	95	
Total	666	257	335	361	608	678	678	
528' Avg./100' of roadway	126.1	48.7	63.4	68.4	115.2	128.4	128.4	
A.R.I.								
Section #								
Type A	194	96	96	96	192	192	192	
Type B	53	106	118	121	15	44	46	
^{42/55} Type C	115	0	0	0	34	51	91	
^{42/50} Type D	15	0	1	4	4	6	6	
Total	377	202	215	221	245	293	335	
270' Avg./100' of roadway	139.6	74.8	79.6	81.9	90.7	108.5	124.1	
A.R.I.								
Section #								
Type A								
Type B								
Type C								
Type D								
Total								
Avg./100' of roadway								
Section #								
Type A								
Type B								
Type C								
Type D								
Total								
Avg./100' of roadway								
WEIGHTED AVE./100' OF ROADWAY (ALL SECTIONS)	132.9	61.8	71.5	75.2	103.0	118.5	126.3	12

CRACK COUNT SUMMARY SHEET

Location & Route SPRINGFIELD-WEATHERSFIELD I-91
Experimental Feature CONTROL-BIT. CONC. PAVEMENTJob Number IRF 91-1(4)
Width of Roadway 24'

Code for Crack Type

Type A = Transverse from shoulder to shoulder
Type B = All other cracks of transverse nature
Type C = Longitudinal of any nature
Type D = MiscellaneousNORTHBOUND

Date	Original	10/18/79	2/4/80	3/10/80	4/16/80	4/8/81	8/5/82	6/8/83	1 1
Section # 3									
42/40 Type A	360	72	72	72	414	414	414		
42/50 Type B	204	136	183	210	91	173	192		
528' Type C	735	0	0	0	136	174	330		
Type D	260	0	0	0	0	30	30		
Total	1559	208	255	282	641	791	966		
Avg./100' of roadway	295.3	39.4	48.3	53.4	121.4	149.8	183.0		
Section # 2									
45/30 Type A	336	0	0	0	244	244	244		
Type B	99	54	82	84	71	102	114		
45/40 Type C	455	0	0	0	0	10	55		
528' Type D	140	0	0	0	32	32	32		
Total	1030	54	82	84	347	388	445		
Avg./100' of roadway	195.1	10.2	15.5	15.9	65.7	73.5	84.3		
Section # 4									
50/60 Type A	336	0	0	0	318	318	318		
50/70 Type B	174	45	57	86	150	218	226		
528' Type C	758	0	0	0	5	51	71		
Type D	170	0	0	0	0	9	9		
Total	1438	45	57	86	473	596	624		
Avg./100' of roadway	272.3	8.5	10.8	16.3	89.6	112.9	118.2		
Section # 1									
50/70 Type A	288	98	98	98	250	274	274		
Type B	168	187	211	236	229	241	248		
51/00 Type C	524	0	0	0	201	339	421		
528' Type D	150	0	0	0	12	17	17		
Total	1130	285	309	334	692	871	960		
Avg./100' of roadway	214.0	54.0	58.5	63.2	131.1	165	182.0		
TOTAL AVG./100' OF RD. (ALL SECTIONS)	244.2	28.0	33.3	37.2	102.0	125.3	141.8		13

ARST
MM 43/00
DEC 1980



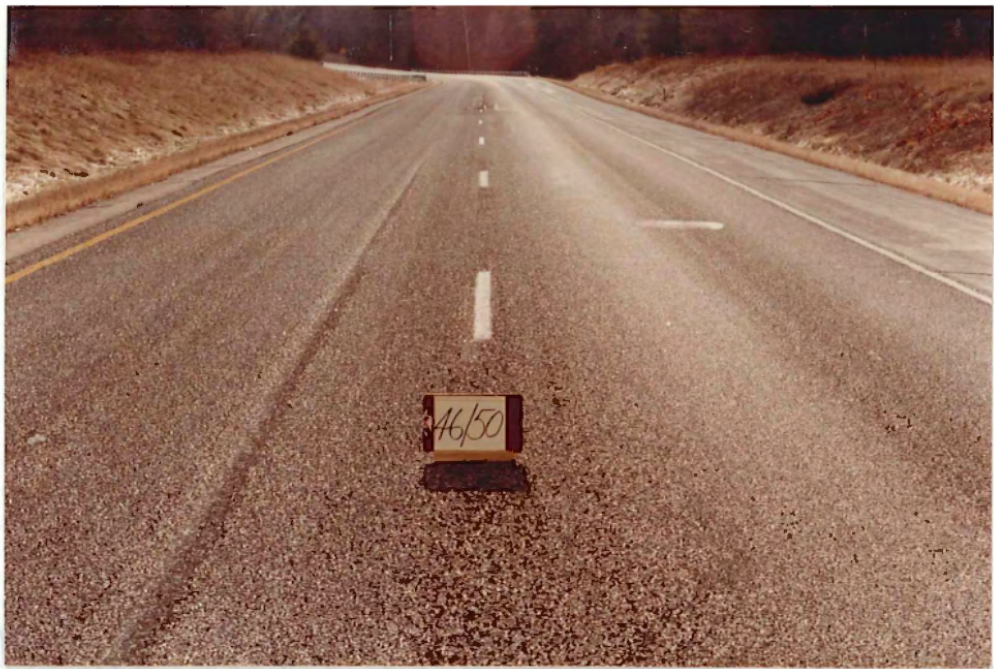
ARST
MM 43/00
AUG. 1982



ARST

MM 46/50

DEC. 1980



ARST

MM 46/50

AUG. 1982



ARST

MM 46/50

JUNE 1983



ARST

MM 44/50

1/2" Stone

Dec. 1980



ARST

MM 44/50

1/2" Stone

June 1983



ARST

MM 44/10

3/8" & 1/2"

Stone

June 1983

