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16. Abstract

This report describes the 53 month observations of several binder types used in penetration or chip seal coat type construction. Originally it was desired to place and observe a tire rubber-asphalt section but other binders were also included. After 53 months several areas are in need of rehabilitation and very little difference can be observed between binder types. This will be the last observation period.

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FOLLOW UP REPORT ON DEMONSTRATION PROJECT 1-10-76-526 (DOT-FH-15-194) "EVALUATION OF OVERFLEX PAVEMENT TEST SECTIONS" (The Fifty-Three Month Observation)

by

Kenneth D. Hankins

Research Report 187-7

Research Study 1-10-77-187

Demonstration and Field Test Support

Conducted By

Transportation Planning Division
Research Section
State Department of Highways
and Public Transportation

In Cooperation With The

U.S. Department of Transportation
Federal Highway Administration

June, 1978

The contents of this report reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the views or policies of the Federal Highway Administration. This report does not constiture a standard, specification or regulation.

The United States Government and the State Department of Highways and Public Transportation do not endorse products or manufacturers. Trade or manufacturer's names appear herein solely because they are considered essential to the object of this report.

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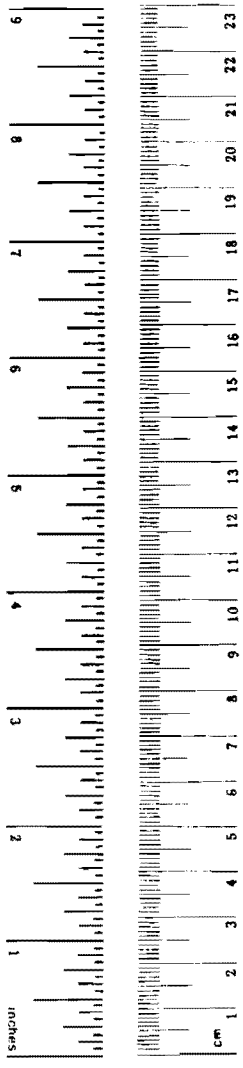
METRIC CONVERSION FACTORS

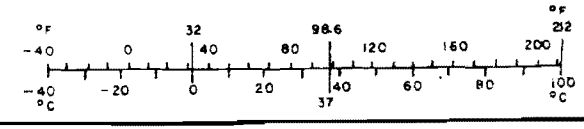
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5.9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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IMPLEMENTATION

The results of this study suggest that for Central and East Texas it is not practical to use seal coat binders which are more costly than the normal AC or emulsion type asphalts. New and improved binders should be tested before extended use in seal coat construction.

FOLLOW UP REPORT ON
DEMONSTRATION PROJECT 1-10-76-526 (DOT-FH-15-194)
"EVALUATION OF OVERFLEX PAVEMENT TEST SECTIONS"
(THE FIFTY-THREE MONTH OBSERVATION)

Background

In 1976 a Demonstration Project was initiated to study "Discarded Tires in Highway Construction." The project used several binder types as a chip or penetration seal coat type construction. Tire-rubber asphalt or a Sahuaro Petroleum and Asphalt Company material called Overflex was included as a binder.

Three locations were selected to place the various binders with one location in District 9 (Waco) and two locations in District 19 (Atlanta). The materials were placed in the summer of 1976. Testing and observations were initiated before placement and continued for a two-year period. The object was to observe the performance of each material with particular emphasis placed on observing the development of reflective cracking. Construction, cost and other information may be found in Reports 526-1 and 526-2F.

Objective

The object of this report is to present the results of visual inspection data obtained about four and one-half years after placement.

Data Collection

The forms and examples of data collected may be found in Appendices A, B, and C. The data has been summarized in Table I and further reduced and shown in Table II.

Analysis and Results

At the present time all sections are receiving maintenance and those with the poorer subgrade will probably receive some type of rehabilitation in the near future. This will be the last observation to be reported.

Throughout the observation time period there has been little difference in the performance of the binder types. The Overflex material flushed initially causing a reduction in skid numbers. However, after a few months of traffic the skid numbers were considerably higher and the appearance of the Overflex sections had improved.

There were mistakes in the initial placement generally caused by using borrowed or unfamiliar equipment. These sections proved to have poorer ratings initially and this trend remains at present.

Crack sealing prior to applying a seal coat appears to aid in the reduction of reflective cracking (at least in increasing the time before reflection). The additional asphalt appears to migrate or flush to the surface along the crack length. This excess asphalt or "fat" mix near the crack either slows cracking through the seal or provides "healing" under traffic. At one

location, when the excess asphalt reached the surface, this asphalt was tracked along the roadway. The tracked asphalt gave the surface a flushed appearance and probably reduced the skid number slightly.

Reflective cracking began to appear first on the sections having larger crack widths or the locations with larger distances between cracks. The smaller crack widths, generally those associated with alligator cracks, reflected through later. However, soon after the first reflective cracking occurred, the alligator type cracking was reflected through at certain spots or locations. Also, additional or new alligator cracking was observed. These spots proved to be locations with very weak subgrade or base failure areas. Probably no binder, when used in a seal coat operation, would prevent reflection cracking or failure in these locations. Attempts were made to eliminate these spots from analysis and observe reflective cracking at only the locations with relatively strong pavement structures. This stratification of spots became increasingly difficult as time passed because the spots grew into larger areas.

At the present time there is little difference between sections using different binders. Within reason, all binder types indicate about the same amount of reflective cracking. At any one location the appearance, aggregate degradation, and aggregate retention are essentially the same considering the above comments.

Conclusions

It is concluded that when good construction techniques are used, there is no difference in the service life of the binders used in this project.

Observed January 13, 1981

Project 1-10-76-526

4 1/2 Year Observation

TABLE I
EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES

Reviewer	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist.9, SH-22 Hill Co, Placed 7/76	Overflex	7	9	9	8	85/65	33
KH	"	"	8	9	9	7	80/60	33
RLM[C]	"	"	7	9	7	6	95/85	29
							AVG	32
BH	"	AC-5	6	9	6	6	60/40	27
KH	"	"	6	9	7	9		31
RLM[C]	"	"	5	9	5	8	75/55	27
							AVG	28
BH	"	Eastabond	6	7	7	7	85/65	27
KH	"	"	7	7	9	8	75/65	31
RLM[C]	"	"	7	9	8	7	85/65	31
							AVG	30
BH	"	AC-3	8	8	8	8	65/50	32
KH	"	"	7	7	8	8	65/55	30
RLM[C]	"	"	8	9	7	8	80/65	32
							AVG	31

Observed January 13, 1981

Project 1-10-76-526

4 1/2 Year Observation

TABLE I

EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES
(Continued)

Reviewer	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist.9, SH-22	EA-HVRS (Emulsion)	6	7	7	3	90/70	23
KH	Hill Co, Placed 7/76	"	7	7	8	7	80/60	29
RLM [c]	"	"	7	9	8	8	85/65	32
							AVG	28
BH	"	Emulsion and Latex	5	7	7	4	80/65	23
KH	"	"	7	7	8	8	70/55	30
RLM[c]	"	"	8	9	8	8	80/65	33
							AVG	29

Estimate all sections greater than 50% reflective cracked. On some sections quite a bit of new cracking probably due to weak subgrade. Evidence of pumping around cracks. Eastbound and the two emulsion sections probably have less reflective cracking.

Observed January 13, 1981

Project 1-10-76-526

4 1/2 Year Observation

TABLE I
EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES

Reviewer	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist. 19, US-80, Gregg Co., Placed 8/76	EA-HVRS (Emulsion)	9	10	10	9	40/30	38
KH	"	"	9	9	9	9	55/50	36
							AVG	37
BH	"	EA-HVRS + Latex	9	10	10	10	50/40	39
KH	"	"	9	9	8	9	55/50	35
							AVG	37
BH	"	AC-3 + Latex	6	7	5	6	70/50	24
KH	"	"	7	9	7	6	75/60	29
							AVG	27
BH	"	AC-10	9	8	9	9	60/50	35
KH	"	"	8	9	8	9	55/50	34
							AVG	35
BH	"	Eastabond	6	8	7	7	65/55	28
KH	"	"	9	9	9	9	55/50	36
							AVG	32
BH	"	Overflex	7	7	7	5	80/65	26
KH	"	"	7	7	9	6	80/65	29
							AVG	28

4 1/2 Year Observation

TABLE I
EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES
(Continued)

Reviewed	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist. 19, US-80, Gregg Co., Placed 8/76	Eastabond	8	9	8	8	75/60	33
KH		"	8	8	7	7	70/55	30
							AVG	32
BH	"	AC-10	9	9	9	8	65/55	35
KH	"	"	8	9	8	8	60/50	33
							AVG	34
BH	"	Overflex	7	9	9	6	85/65	31
KH	"	"	8	8	8	8	80/70	32
							AVG	32

The overall appearance of all sections is good. Overflex shows some flushing. Estimate 75 to 100 percent of cracks have reflected through on inside lane. Much smaller percentage of reflective cracking on travel lanes because crack have healed. The above cracking information true for all binder types. One doesn't show to be any better than another binder. Cracking is relatively large block (long & trans.) cracking.

Observed January 13, 1981

Project 1-10-76-526

4 1/2 Year Observation

TABLE I
EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES

Reviewer	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist. 19, SH-43, Marion Co., Placed 8/76	AC-10	10	10	10	10	50/40	40
KH	"	"	9	9	9	9	55/50	36
							AVG	38
BH	"	Overflex	8	9	9	8	70/50	34
KH	"	"	8	8	9	9	60/50	34
							AVG	34
BH	"	Eastabond	8	9	9	7	60/45	33
KH	"	"	8	9	9	8	55/50	34
							AVG	34
BH	"	AC-3	7	9	8	5	50/40	29
KH	"	+ Latex	7	8	8	6	60/50	29
							AVG	29
BH	"	EA-HVRS	7	9	8	8	50/40	32
KH	"	(Emulsion)	8	8	9	8	55/50	33
							AVG	33

Observed January 13, 1981

Project 1-10-76-526

4 1/2 Year Observation

TABLE I
EVALUATION SUMMARY OF OVERFLEX
PAVEMENT TEST SECTIONS
AND
OTHER BINDER TYPES
(Continued)

Reviewer	Location	Binder Type	Visual Inspection	Aggregate Degradation	Aggregate Retention	Bleeding	Emb.	Score
BH	Dist. 19, SH-43, Marion Co., Placed 8/76	EA-HVRS	8	9	9	9	50/40	35
KH		+ Latex	7	8	7	7	60/50	29
							AVG	32

The general appearance of these sections are good. The pavement is beginning to require maintenance and there are a few patches evident some as long as 150 feet in length. Close inspection shows a significant amount of reflective cracking which seems to become worse on the South end of the experiment. Extent of reflective cracking seems to be subject more to subgrade conditions rather than binder type.

TABLE II
RATING SCORES
OF MATERIALS AND LOCATIONS

Material	SH-22 District 9	US-80 District 19	SH-43 District 19
Overflex	32	30*	34
AC-5	28		
Eastabond	30	32*	34
AC-3	31		
Emulsion	28	37	33
Emulsion + Latex	33	37	32
AC-3 + Latex	29	27	29
AC-10		35*	38

* Average of two sections

APPENDIX

EXAMPLE OF
VISUAL INSPECTION DATA

Overall x Section

A. JOB IDENTIFICATION

District No. 9 Highway No. SH-22 County Hill Co.

Control No. 121 Section No. 02 Job No. _____

3 miles N S E (W) of Whitney (nearest town);

Mile Post _____ to Mile Post _____.

Trial Field Section No. 401 - 402 Date Sealed 6/76

B. MATERIALS AND DESIGN

Aggregate Source Synthetic - Superock Aggregate Quantity 1/52

Asphalt Source Suahara Petroleum Asphalt Quantity 0.64 (gal./sq. yd.)

Length of Section Evaluated 2 miles

C EVALUATION

1. VISUAL INSPECTION

0 2 4 6 8 10

Very Poor | Poor | Fair | Good | Very Good

2. AGGREGATE DEGRADATION

0 2 4 6 8 10

Excessive Heavy | Moderate | Slight | None

3. AGGREGATE RETENTION

0 2 4 6 8 10

Entire Aggregate Loss | Aggregate Loss In Wheel Path | Some Aggregate Loss In Wheel Path | Slight Aggregate Loss

4. BLEEDING

0 2 4 6 8 10

Excessive and Extensive Bleeding | Bleeding in Wheel Path | Slight Bleeding in Wheel Path | Slight Discoloration in Wheel Path

5. AGGREGATE EMBEDMENT

Outer Wheel Path 95 %
Between Wheel Path 85 %

TOTAL SCORE 29

COMMENTS:

Visible [illegible] (small width)

Slight [illegible]