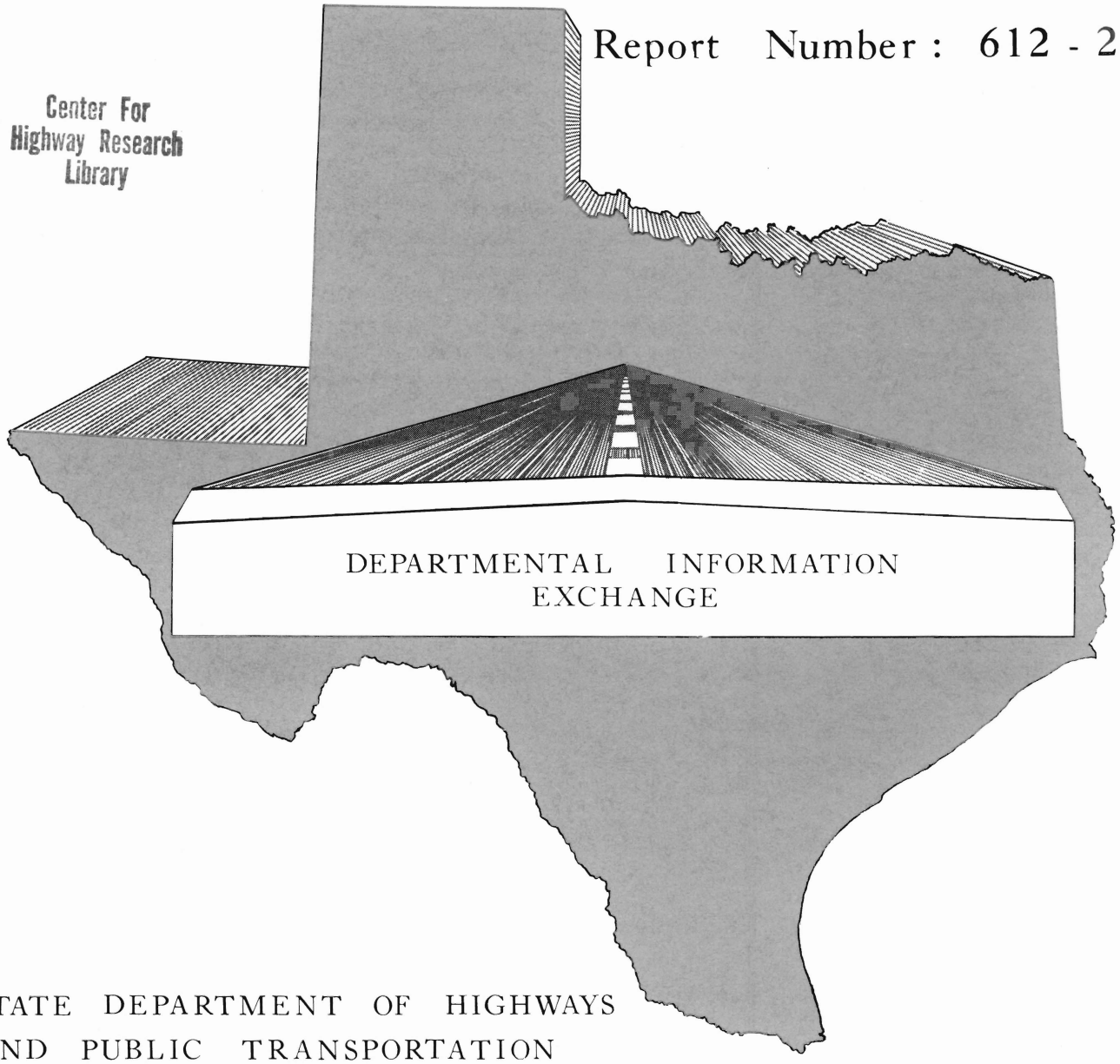
EXPERIMENTAL PROJECTS

SPRINKLE TREATMENT IN WHARTON COUNTY, TEXAS

Report Number : 612 - 2



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AND PUBLIC TRANSPORTATION

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16. Abstract

This report describes the construction of a sprinkle treatment overlay in conjunction with a fine graded asphalt stabilized base. Details of the construction, problems encountered, and post construction skid test data are included.

17. Key Words	18. Distribution Statement
sprinkle treatment asphalt stabilized base synthetic lightweight aggregate	

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SPRINKLE TREATMENT
In Wharton County, Texas

by

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District Administrative Engineer

State Department of Highways and Public Transportation

District 13

Yoakum, Texas

Experimental Projects Report No. 612-2

Work Done in Cooperation With
U. S. Department of Transportation
Federal Highway Administration

FHWA Experimental Project
No. 064878002

"Sprinkle Mix Treatment Evaluation
for Asphaltic Pavements"

October 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 constitute a standard, specification or regulation.

The material contained in this report is experimental in nature and is published for informational purposes only. Any discrepancies with official views or policies of the State Department of Highways and Public Transportation should be discussed with the appropriate Austin Division prior to implementation of the procedures or results.

Sprinkle Treatment in Wharton County

This construction report describes the application of sprinkle treatment to a fine graded black base. The report is divided into four parts: black base, sprinkle treatment, road application, and problems encountered.

Three sections of sprinkle treated black base were placed on U. S. 59, Wharton County, between El Campo and the Jackson County Line - a total of approximately 34 lane miles. The sections were placed in April 1978.

BLACK BASE (Texas Specification Item 292)

The fine graded black base was comprised of 70% "gem sand" which was produced by Parker Brothers near Altair, Texas; 30% local field sand which was obtained from property of the city of El Campo; and 5.0% AC-20. The combined sieve analysis is shown below:

Sieve Size	% Retained by Weight Combined Analysis	Specification
½"	0%	0%
No. 4	30%	25-45%
No. 10	64%	50-75%
No. 40	70%	65-80%

Tests on the plant mixed material showed a stability of 35% at 5.0% asphalt.

SPRINKLE TREATMENT (Texas Specification Item 3043)

The sprinkle aggregate was a Grade 4 synthetic lightweight.

It had a Los Angeles Abrasion Value of 20, a Polish Value of 47, a unit weight of 58 pounds per cubic foot, and a bulk specific gravity of 1.504.

Sprinkle Treatment Sieve Analysis

% Retained by Weight

Sieve Size	Analysis	Specification
5/8"	0%	0%
1/2"	1%	0-5%
3/8"	28%	20-40%
No. 4	95%	95-100%
No. 10	98%	98-100%

The lightweight aggregate was precoated in a conventional hot mix batch plant using a 3000 pound batch. It was precoated with AC-20 (4.1% by weight). The screens which had been used for asphalt stabilized base were left in place and bin percentages were used to combine two bins of aggregate for each 3000 pound batch.

The contents were dry mixed for five seconds and then wet mixed for 25 seconds. Approximately seven gallons of water were added and mixing was continued for an additional 40 seconds. The coating quality was significantly improved by the addition of the water to the mixing cycle. The mixing temperature of 225°F resulted in well coated aggregate while avoiding the excessive absorbtion which is experienced at higher mixing temperatures. The resulting stockpile of aggregate was also easier to cool to ambient temperature.

Cooling of the stockpiles was accelerated by sprinkling water on them and by using a front end loader to manipulate the aggregate. Also, stockpiles were kept below three feet in height to prevent a heat buildup.

ROAD APPLICATION

The asphalt stabilized base was placed with a conventional Barber Green Paver. The lightweight aggregate sprinkle treatment was applied with a modified Buck-Eye brand drag box aggregate spreader which was attached rigidly to the rear of the paver. The spreader was geared to spread aggregate at a rate of one cubic yard to approximately 495 square yards. A front end loader was used to charge an elevated chute on the spreader. Three or four workers were required to move the aggregate laterally along the spreader to keep the material level in the hopper.

The sprinkle aggregate was placed at ambient temperatures on a mat which was approximately 265°F to 295°F. Initial rolling took place immediately behind the drag box spreader. This was important since the sprinkle aggregate had to be pressed into the mat before the mat had cooled. Excessive cooling of the mat results in less than complete embedment of the sprinkle aggregate and possibly a loss of aggregate under traffic.

A fourteen ton three wheel roller was used as the breakdown roller, and it was followed by a ten ton tandem wheel roller. A pneumatic roller was not used on this surface since the precoated aggregate tended to stick to the tires.

PROBLEMS ENCOUNTERED

Some aggregate degradation (approximately 10-15%) was experienced throughout the project. The exact reason was not known but it was felt that at least one contributing factor was the harshness of the asphalt stabilized base. No experimentation with the gradation of the black base (sand & screenings) was attempted during the progress of this project. The rolling pattern of the break down roller was changed but it had very little effect on the amount of aggregate crushed during compaction.

At the time of this writing, this same producer's aggregate is being used on another project with similar compaction equipment but with better results. There is practically no degradation of the aggregate during compaction.

Problems were also encountered on this project when sprinkle treating irregular widths and curved roadways such as ramps, acceleration lanes, etc. These problems resulted primarily from equipment technology and will be solved by the equipment industry if this method of construction continues to be specified.

CONSTRUCTION SECTION INFORMATION	PAVEMENT, MATERIAL, & SOURCE INFORMATION	CONTROL-SECTION INFO.	SKID HISTORY
HIGHWAY... US 59 ADT.....***,***	PAVEMENT. SPRINKLE TRT.	241 89-06 29.272 39.133	MO/YR TVL-LN SN LO/AV/HI TRAFFIC (000)
CSN LENGTH 9.861 TRAFFIC..***,***,***	PLACED... 06/78 BINDER... 4.40		9/77 W-A 39/53/58 12,843
FROM.. SOUTH END OF EL CAMPO LOOP	PRI AGG.. DIST SELECT SANDSTONE		9/76 W-A 49/53/55 5,700
TO.... JACKSON C/L	2ND AGG.. SILICEOUS		9/76 W-A 47/52/54 7,224
CODE COL-....5...10...15...20...25...30-	SOURCE NUMBERS & NAMES FOLLOW		
COMMENT1 70% PARKER BROS. GEM SAND	P-12903-SANSTONE MAT-PAWELEKVILLE		
COMMENT2 30% EL CAMPO FIELD SAND	S- 4507-PARKER BROS EAGLE LAKE PL		

CONSTANTS THIS TEST - (1) TESTED ON 8/31/78 (3) AIR TEMPERATURE AT TEST WAS 80 DEGREES F.
(2) USING TRUCK NO. 43 (4) TRAVELING ***WITH*** THE FROM/TO DESCRIPTION

WARNING - THIS TEST ALONE IS INSUFFICIENT TO ESTABLISH THE SAFE FRICTION VALUE FOR A HIGHWAY

GENERAL SKID TEST DATA				SN BREAKDOWN BY LANE							SN BREAKDOWN BY COMMENT						
TEST & LANE	SPEED	CUMM. MILES	SN ***	A	B	C	D	E & OVER	*** FLUSH	PATCH	INTER-SECT.	STRUC-TURE	R.R. XING	CURVE	CITY LIMIT	DIST. SELECT
1-B	40	0.0	36 ***		36				***							
2-A	40	0.5	53 ***	53					***							
3-B	39	1.0	42 ***		42				***							
4-A	41	1.5	52 ***	52					***					52		
5-B	41	2.0	42 ***		42				***							
6-A	39	2.5	52 ***	52					***					52		
7-B	39	3.0	43 ***		43				***							
8-A	30	3.5	55 ***	55					***							
9-B	39	4.0	50 ***		50				***							
10-A	39	4.5	63 ***	63					***							
11-B	40	5.0	46 ***		46				***					46		
12-A	39	5.5	65 ***	65					***							
13-A	41	6.0	58 ***	58					***							
14-B	39	6.3	51 ***		51				***							
15-B	40	6.5	49 ***		49				***							
16-A	41	7.0	60 ***	60					***							
17-B	40	7.5	46 ***		46				***							
18-A	40	8.0	54 ***	54					***					54		
19-B	40	8.5	45 ***		45				***							
20-A	40	9.0	59 ***	59					***							
21-B	40	9.5	54 ***		54				***							
22-A	40	9.8	57 ***	57					***							
23-B	40	9.9	51 ***		51				***							
NUMBER OF TESTS....			23 ***	11	12				***					4		
SKID NUMBER - LO...			36 ***	52	36				***					46		
SKID NUMBER - AVG..			51 ***	57	46				***					51		
SKID NUMBER - HI...			65 ***	65	54				***					54		

CONSTRUCTION SECTION INFORMATION

HIGHWAY... US 59 ADT.....***,***
CSN LENGTH 3.574 TRAFFIC..***,***,***
FROM.. NORTH END OF LOUISE LOOP
TO.... SOUTH END OF LOUISE LOOP
CODE COL-....5...10...15...20...25...30-
COMMENT1 NORTHBOUND LANE
COMMENT2

PAVEMENT, MATERIAL, & SOURCE INFORMATION

PAVEMENT. SPRINKLE TRT.
PLACED... 06/78 BINDER... 4.40
PRI AGG.. DIST SELECT SANDSTONE
2ND AGG.. SILICEOUS
-- SOURCE NUMBERS & NAMES FOLLOW --
P-12903-SANSTONE MAT-PAWELEKVILLE
S- 4507-PARKER BROS EAGLE LAKE PL

CONTROL-SECTION INFO.

CO.	C-S	BMP	EMP
241	89-06	34.117	37.691

SKID HISTORY

MO/YR	TVL -LN	SN LO/AV/HI	TRAFFIC (000)
8/78	W-B	45/53/64	***,***
8/78	W-A	57/62/69	***,***

CONSTANTS THIS TEST - (1) TESTED ON 8/08/78 (3) AIR TEMPERATURE AT TEST WAS 88 DEGREES F.
(2) USING TRUCK NO. 43 (4) TRAVELING *OPPOSITE* THE FROM/TO DESCRIPTION

WARNING - THIS TEST ALONE IS INSUFFICIENT TO ESTABLISH THE SAFE FRICTION VALUE FOR A HIGHWAY

GENERAL SKID TEST DATA / SN BREAKDOWN BY LANE / SN BREAKDOWN BY COMMENT

TEST & LANE	SPEED	CUMM. MILES	SN	A	B	C	D	E & OVER	FLUSH	PATCH	INTER-SECT.	STRUC-TURE	R.R. XING	CURVE	CITY LIMIT	DIST. SELECT
1-A	40	0.0	53	53												
2-B	40	0.2	48		48									48		
3-A	40	0.4	69	69												
4-B	41	0.6	46		46											
5-A	41	0.8	61	61												
6-B	41	1.1	49		49									49		
7-A	41	1.3	56	56										56		
8-B	40	1.4	46		46											
9-A	41	1.6	60	60												
10-B	41	1.9	47		47											
11-A	40	2.0	53	53												
12-B	40	2.2	46		46											
13-A	39	2.4	51	51										51		
14-A	40	2.7	54	54												
15-B	41	2.9	42		42											
16-A	41	3.2	54	54										54		
7-B	40	3.3	52		52											
18-A	40	3.4	59	59												
NUMBER OF TESTS....			18	10	8									5		
SKID NUMBER - LO...			42	51	42									48		
SKID NUMBER - AVG..			53	57	47									52		
SKID NUMBER - HI...			69	69	52									56		

CONSTRUCTION SECTION INFORMATION	PAVEMENT, MATERIAL, & SOURCE INFORMATION	CONTROL-SECTION INFO.	SKID HISTORY
		CO. C-S BMP EMP	MO/YR TVL-LN SN LO/AV/HI TRAFFIC (000)
HIGHWAY... US 59 ADT.....***,***	PAVEMENT. SPRINKLE TRT.	241 89-06 34.117 37.691	
CSN LENGTH 3.574 TRAFFIC..***,***,***	PLACED... 06/78 BINDER... 4.40		
FROM.. NORTH END OF LOUISE LOOP	PRI AGG.. DIST SELECT SANDSTONE		
TO.... SOUTH END OF LOUISE LOOP	2ND AGG.. SILICEOUS		
CODE COL-....5...10...15...20...25...30	- SOURCE NUMBERS & NAMES FOLLOW --		
COMMENT 1 NORTHBOUND LANE	P-12903-SANSTONE MAT-PAWELEKVILLE		
COMMENT 2	S- 4507-PARKER BROS EAGLE LAKE PL		

CONSTANTS THIS TEST - (1) TESTED ON 8/09/78 (3) AIR TEMPERATURE AT TEST WAS 95 DEGREES F.
(2) USING TRUCK NO. 43 (4) TRAVELING ***WITH*** THE FROM/TO DESCRIPTION

WARNING - THIS TEST ALONE IS INSUFFICIENT TO ESTABLISH THE SAFE FRICTION VALUE FOR A HIGHWAY

GENERAL SKID TEST DATA				SN BREAKDOWN BY LANE						SN BREAKDOWN BY COMMENT							
TEST & LANE	SPEED	CUMM. MILES	SN	***	A	B	C	D	E & OVER	*** FLUSH	PATCH	INTER-SECT.	STRUC-TURE	R.R. XING	CURVE	CITY LIMIT	DIST. SELECT
1-B	40	0.0	50	***		50				***							
2-A	40	0.3	59	***	59					***					59		
3-B	40	0.4	53	***		53				***							
4-A	40	0.7	66	***	66					***							
5-B	40	0.8	45	***		45				***							
6-A	40	1.0	64	***	64					***					64		
7-B	41	1.2	56	***		56				***					56		
8-A	41	1.4	57	***	57					***							
9-B	39	1.6	52	***		52				***							
10-A	41	1.8	57	***	57					***							
11-B	41	2.0	51	***		51				***							
12-B	41	2.2	64	***		64				***							
13-B	39	2.4	57	***		57				***							
14-A	41	2.6	63	***	63					***							
15-B	40	2.8	56	***		56				***							
16-A	40	3.0	69	***	69					***							
17-B	41	3.2	52	***		52				***					52		
18-A	40	3.4	59	***	59					***							
19-B	40	3.6	48	***		48				***							
NUMBER OF TESTS....			19	***	8	11				***					4		
SKID NUMBER - LO...			45	***	57	45				***					52		
SKID NUMBER - AVG..			57	***	62	53				***					58		
SKID NUMBER - HI...			69	***	69	64				***					64		

CONSTRUCTION SECTION INFORMATION	PAVEMENT, MATERIAL, & SOURCE INFORMATION	CONTROL-SECTION INFO.	SKID HISTORY
HIGHWAY... US 59 ADT.....***,***	PAVEMENT. PLANT MIX SEAL	CO. C-S BMP EMP	MO/YR TVL-LN SN LO/AV/HI TRAFFIC (000)
CSN LENGTH 1.602 TRAFFIC..***,***,***	PLACED... 06/78 BINDER... 4.40	241 89-06 30.498 32.100	8/78 W-B 47/51/55 ***,***
FROM.. NORTH END OF HILLJE LCOP	PRI AGG.. DIST SELECT SANDSTONE		8/78 W-A 56/60/65 ***,***
TO.... SOUTH END OF HILLJE LCOP	2ND AGG.. SILICEOUS		
CODE CCL-....5...10...15...20...25...30	SOURCE NUMBERS & NAMES FOLLOW		
COMMENT1 NORTHBOUND LANE	P-12903-SANSTONE MAT-PAWELEKVILLE		
COMMENT2	S- 4507-PARKER BROS EAGLE LAKE PL		

CONSTANTS THIS TEST - (1) TESTED ON 8/08/78 (3) AIR TEMPERATURE AT TEST WAS 88 DEGREES F.
(2) USING TRUCK NO. 43 (4) TRAVELING *OPPOSITE* THE FROM/TO DESCRIPTION

WARNING - THIS TEST ALONE IS INSUFFICIENT TO ESTABLISH THE SAFE FRICTION VALUE FOR A HIGHWAY

GENERAL SKID TEST DATA				SN BREAKDOWN BY LANE					SN BREAKDOWN BY COMMENT						
TEST & LANE	SPEED	CUMM. MILES	SN ***	A	B	C	D	E & OVER	FLUSH	PATCH	INTER-SECT.	STRUC-TURE	R.R. XING	CURVE	CITY LIMIT	DIST. SELECT
1-A	40	0.0	60	60										60		
2-B	41	0.2	47		47											
3-A	41	0.4	59	59										59		
4-A	41	0.6	44	44												
5-A	41	0.8	53	53												
6-B	41	1.0	47		47									47		
7-A	41	1.2	56	56												
8-B	40	1.4	58		58									58		
NUMBER OF TESTS			8	5	3									4		
SKID NUMBER - LO			44	44	47									47		
SKID NUMBER - AVG			53	54	51									56		
SKID NUMBER - HI			60	60	58									60		

CONSTRUCTION SECTION INFORMATION

HIGHWAY... US 59 ADT.....***,***
CSN LENGTH 1.602 TRAFFIC..***,***,***
FROM.. NORTH END OF HILLJE LOOP
TO.... SOUTH END OF HILLJE LOOP
CODE COL-....5....10....15....20....25....30-
COMMENT 1 NORTHBOUND LANE
COMMENT 2

PAVEMENT, MATERIAL, & SOURCE INFORMATION

PAVEMENT. PLANT MIX SEAL
PLACED... 06/78 BINDER... 4.40
PRI AGG.. DIST SELECT SANDSTONE
2ND AGG.. SILICEOUS
-- SOURCE NUMBERS & NAMES FOLLOW --
P-12903-SANSTONE MAT-PAWELEKVILLE
S- 4507-PARKER BROS EAGLE LAKE PL

CONTROL-SECTION INFO.

CO.	C-S	BMP	EMP
241	89-06	30.498	32.100

SKID HISTORY

MO/YR	TVL -LN	SN LO/AV/HI	TRAFFIC (000)

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'RNING - THIS TEST ALONE IS INSUFFICIENT TO ESTABLISH THE SAFE FRICTION VALUE FOR A HIGHWAY

GENERAL SKID TEST DATA — SN BREAKDOWN BY LANE — SN BREAKDOWN BY COMMENT

TEST & LANE	SPEED	CUMM. MILES	SN	***	A	B	C	D	E & OVER	*** FLUSH	PATCH	INTER-SECT.	STRUC-TURE	R.R. XING	CURVE	CITY LIMIT	DIST. SELECT
1-A	39	0.0	59	***	59					***					59		
2-B	40	0.1	47	***		47				***							
3-A	41	0.4	62	***	62					***					62		
4-B	40	0.6	52	***		52				***					52		
5-A	41	0.7	58	***	58					***							
6-B	40	0.9	53	***		53				***					53		
7-A	40	1.1	65	***	65					***							
8-B	39	1.3	55	***		55				***					55		
9-A	40	1.5	56	***	56					***							
10-B	30	1.6	48	***		48				***							
NUMBER OF TESTS			10	***	5	5				***					5		
SKID NUMBER - LO			47	***	56	47				***					52		
SKID NUMBER - AVG			56	***	60	51				***					56		
SKID NUMBER - HI			65	***	65	55				***					62		