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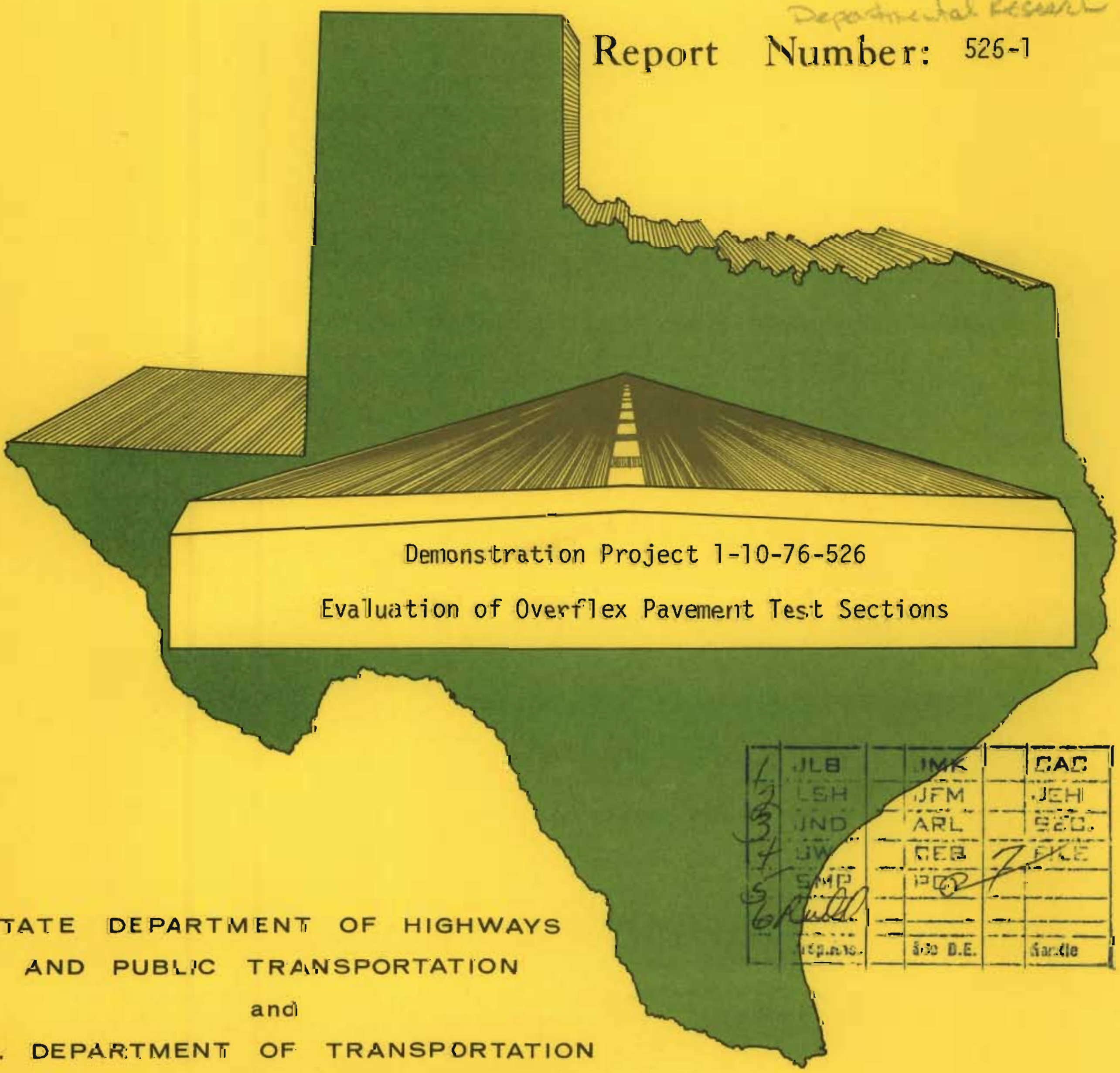
EXPERIMENTAL SEAL COAT CONSTRUCTION
INCLUDING OVERFLEX



Departmental Research

Report Number: 526-1

Demonstration Project 1-10-76-526

Evaluation of Overflex Pavement Test Sections

STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION
and
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

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16. Abstract

This report discusses the initial testing, construction and testing immediately after construction of experimental seal coats, including several sections of tire rubber-asphalt. This report, for the sake of continuity, also discusses findings from FCIP Project 1-24D-76-523, "Discarded Tires in Highway Construction."

A total of 26 test sections of eight different binder types including Overflex, Eastabond (polypropylene), AC-3 Latex and Emulsion Latex were laid in three districts across the State. The three districts represent a good cross-section of the State's rainfall patterns and offer a multi-regional dimension to the study.

Various tests, such as dynaflect (deflection), skid resistance and roughness with the Mays Ride Meter were run and the results are presented herein. Visual and photographic ratings were also conducted and are reported.

17. Key Words
Rubber-Asphalt, Polypropylene-asphalt, Asphalt Binders, Pavement Roughness, Seal Coat, Pavement Rating, Pavement Deflection, Skid Resistance

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXPERIMENTAL SEAL COAT CONSTRUCTION INCLUDING OVERFLEX

Introduction

This report includes the initial testing, construction and the testing immediately after construction of an experimental project of seal coat type placement. Even though this is primarily an interim report for Demonstration Project 1-10-76-526 "Evaluation of Overflex Pavement Test Sections", the report will also cover portions of Demonstration Project 1-24D-76-523 "Discarded Tires in Highway Construction". The reasons for this dual coverage is to provide continuity. Project 1-10-76-526 includes construction in Districts 19 (Atlanta - Northeast Texas) and 9 (Waco - Central Texas). Project 1-24D-76-523 is concerned with the construction in District 24 (El Paso - West Texas). Including information from both projects provides data from East Texas to West Texas. Contour lines of annual rainfall quantities tend to be North - South across the state and vary from some 40 to 50 inches per year in the East to about 6 to 10 inches per year in the West. Therefore, the three districts form a multi-regional type of study approach.

Experiment Information

Table I shows the Districts involved, the number of sections involved and the type of binder used in each District. Figure 1 shows the general location of the sections. The Overflex is a mixture of reclaimed tire rubber (approximately 25%) and asphaltic cement (about 75%). About 5-1/2 to 7-1/2 percent of a diluent (kerosene) is added to make the material workable. The tire rubber used has been ground into particles passing the No. 16 sieve and retained on the No. 25 sieve. Further information concerning specifications for the Overflex material may be found in the FHWA Implementation Package 73-1 "Rubber-Asphalt Binder for Seal Coat Construction".

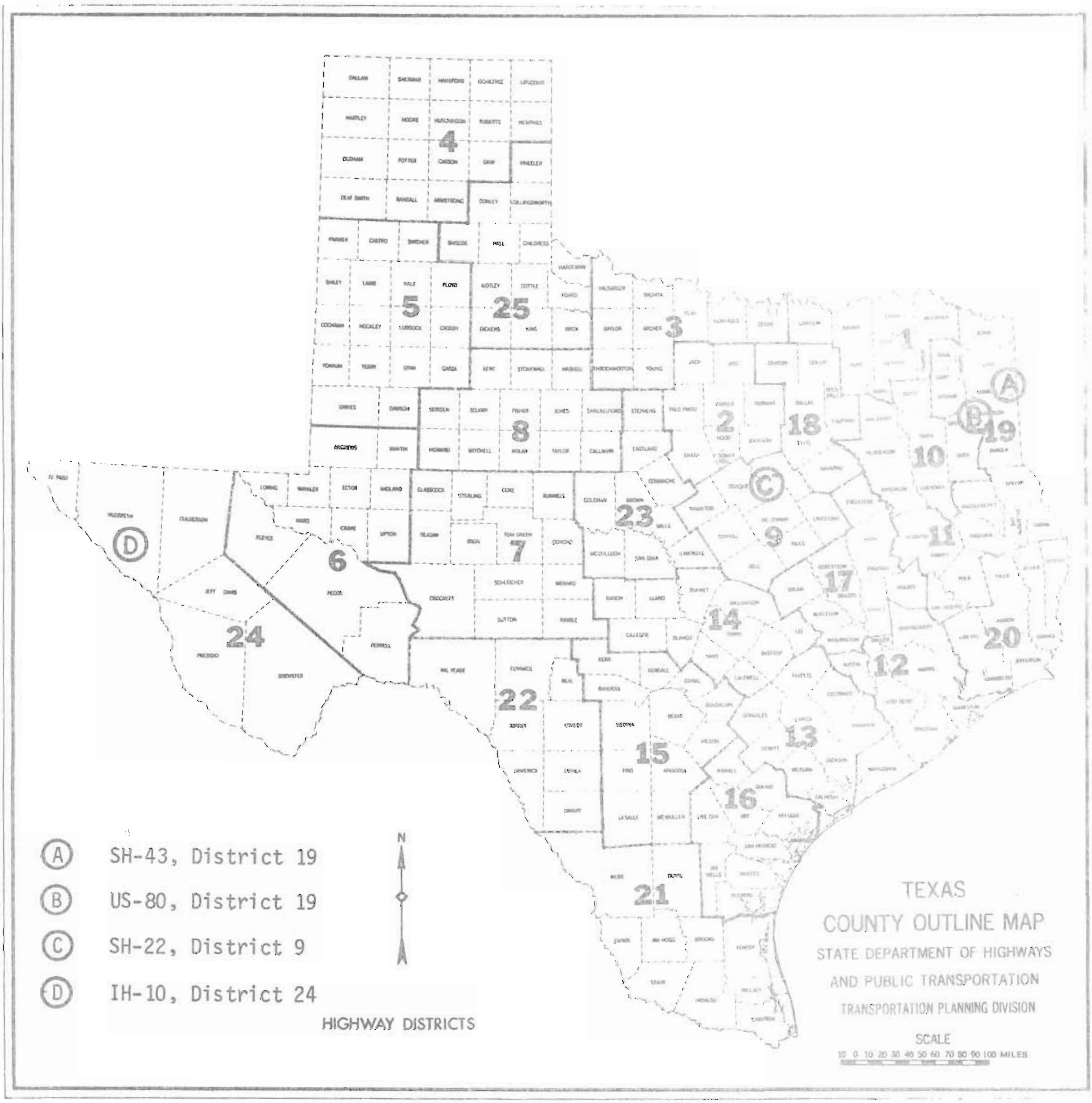
The Eastabond is a polypropylene material obtained from Texas Eastman Co. near Longview, Texas. About ten percent was mixed with an AC-3. The Eastabond is available in 50 pound solid blocks or the (liquid) material can be mixed with asphalt at a refinery. The solid blocks must be heated to a liquid state. This heating and mixing caused some difficulty when the material was being prepared for SH-22 in Dist. 9 (Waco - Central Texas). The other AC and emulsion binders, even with latex additives, are common and will not be described.

The sections with various binders were placed end to end at any one highway location (See figures 2 through 5). Note there were two locations of Overflex, Eastabond and AC-10 on US-80 in District 19. Table II shows the pavement structures on each of the highways. The area treated on SH-22 in Dist. 9 was alligator cracked with some transverse and longitudinal cracks. The distance between cracks was about four to five feet (the slabs formed were about 4 to 5 feet in diameter). Previous maintenance operations had included crack sealing with a heavy asphalt. Some cracking, estimated to be about 40 percent of the total cracking, had occurred after the crack sealing operation.

TABLE I

NUMBER OF EXPERIMENTAL SECTIONS

LOCATION	OVERFLEX	EASTABOND (POLY PROPYLENE)	AC - 10	AC - 3 LATEX	EMULSION	EMULSION LATEX	AC - 5	AC - 3
Dist. 9 SH - 22	1	1			1	1	1	1
Dist. 19 SH - 43	1	1	1		1	1		
Dist. 19 US - 80	2	2	2		1	1		
Dist. 24 IH - 10	1	1	3	1			1	



LOCATION OF EXPERIMENTAL SECTIONS

FIGURE 1

FIGURE 2

SCHEMATIC OF EXPERIMENTAL SECTIONS

ON SH - 22 IN DISTRICT 9

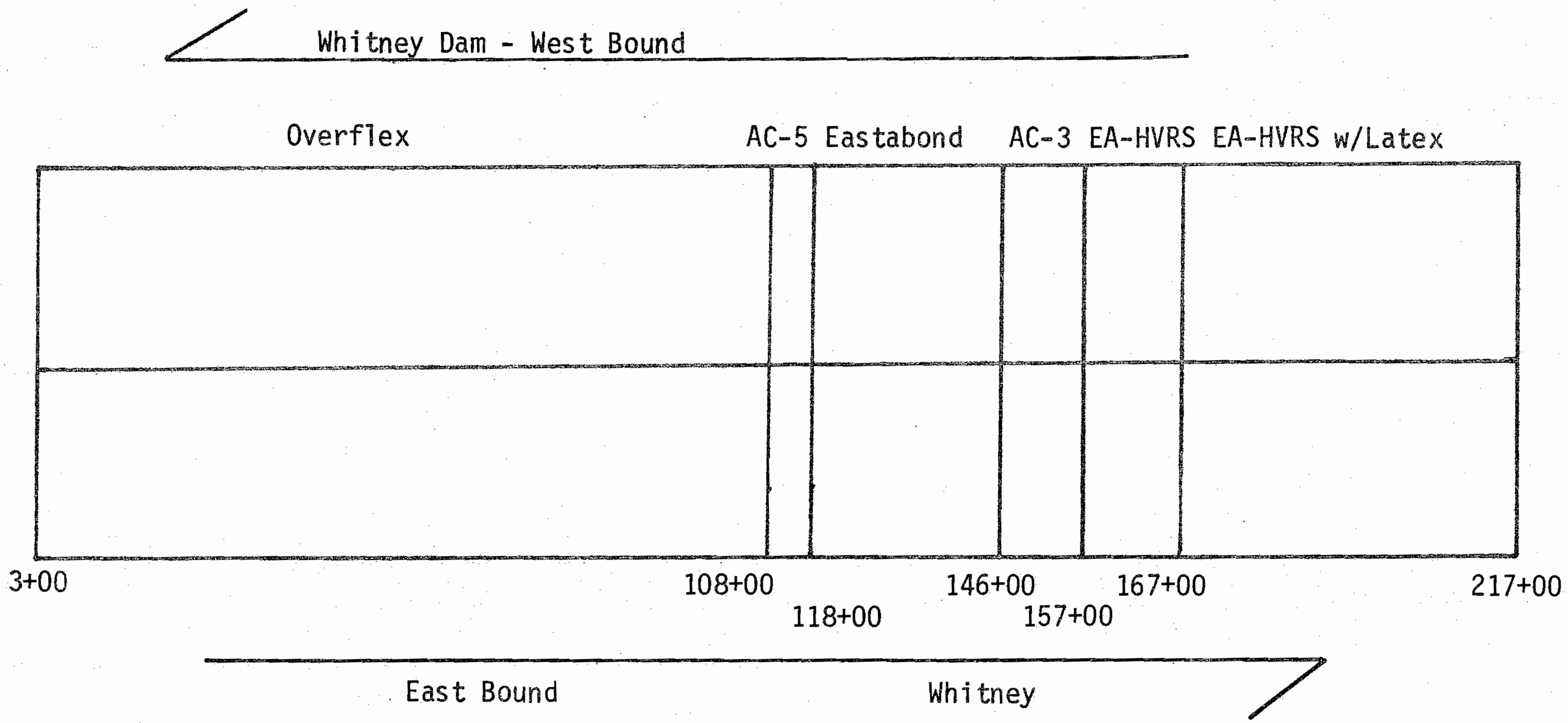
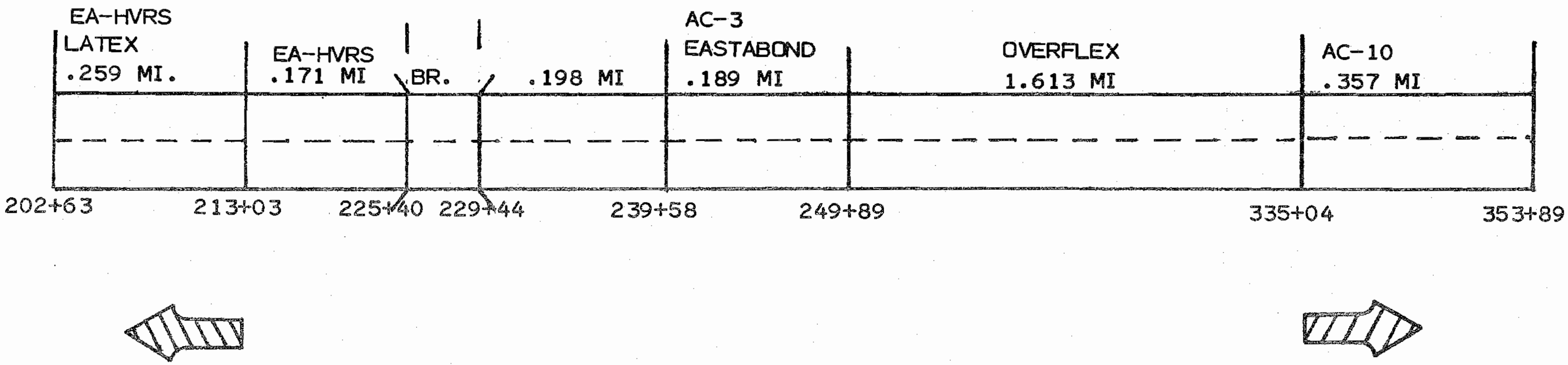


FIGURE 3

SCHEMATIC OF EXPERIMENTAL SECTIONS

ON SH - 43 IN DISTRICT 19



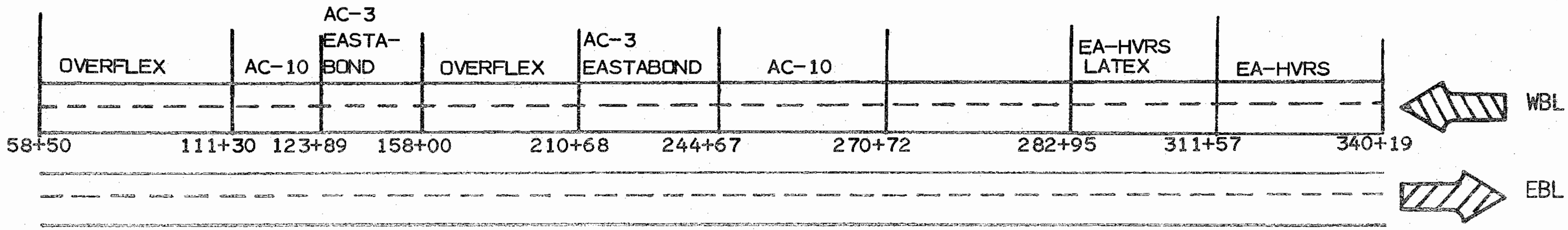
Big Cypress Creek Bridge

Atlanta

FIGURE 4

SCHEMATIC OF EXPERIMENTAL SECTIONS

ON US - 80 IN DISTRICT 19



Only westbound side treated.

FIGURE 5

SCHEMATIC OF EXPERIMENTAL SECTIONS

ON IH - 10 IN DISTRICT 24

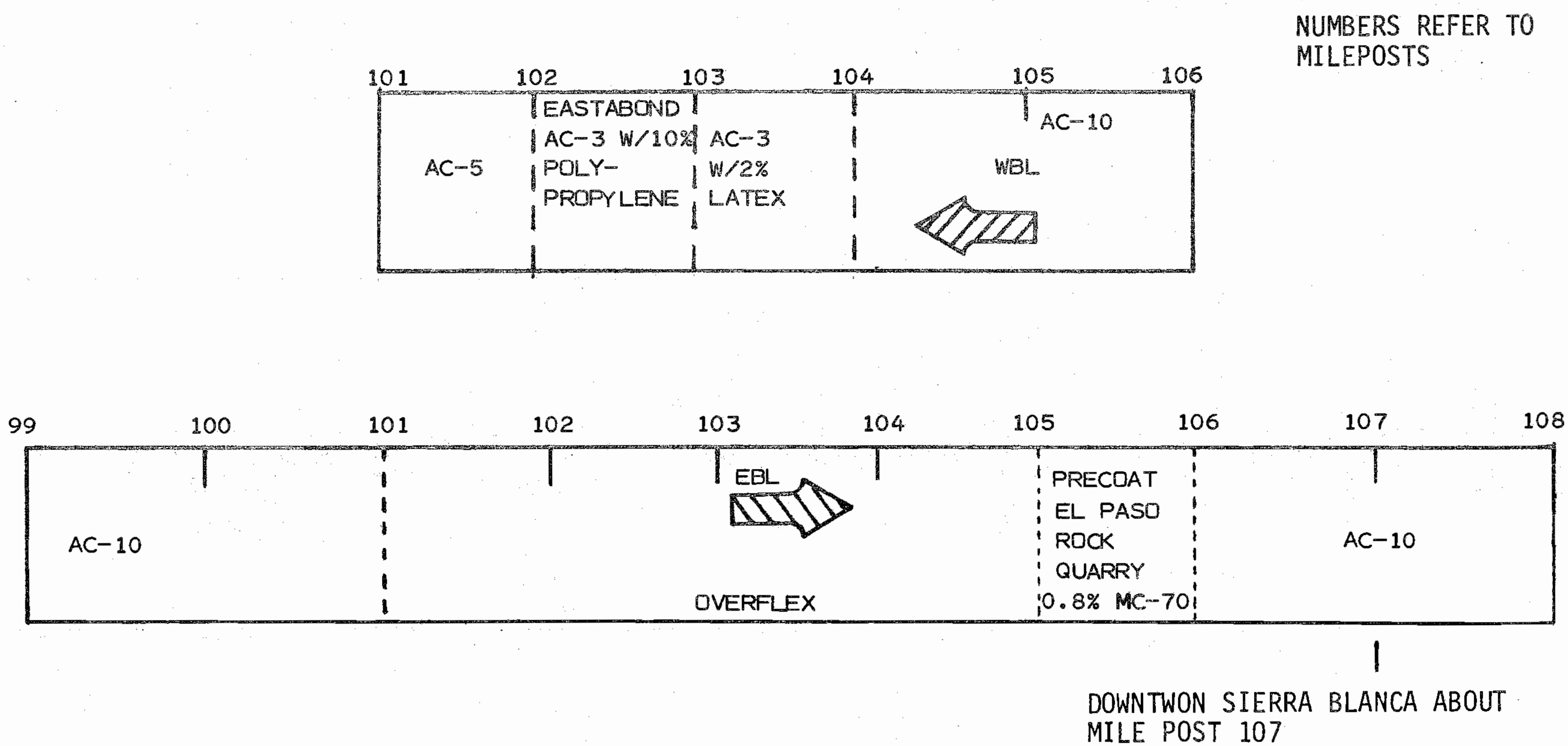
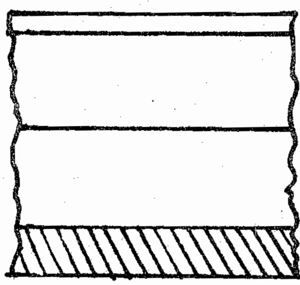


TABLE II

SCHEMATIC OF PAVEMENT STRUCTURES

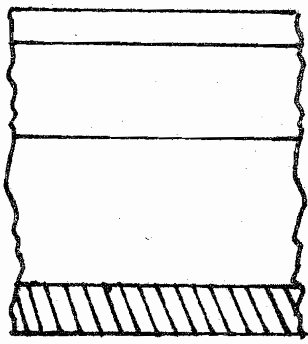
District 9, SH - 22



- 1.5" Type D HMAC Silicious Aggregate
- 8.0" Crush Limestone Flexible Base
- 8.0" Foundation Course
- Subgrade

ADT = 2400

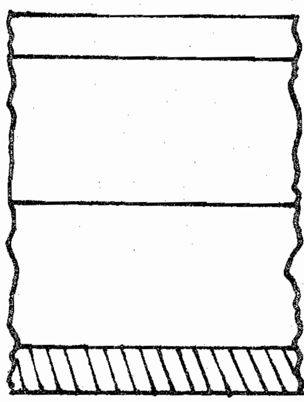
District 19, SH - 43



- 2.75" Limestone Rock Asphalt Mix
- 8.00" Iron Ore Flexible Base
- 12.00" Select Material
- Subgrade

ADT = 700

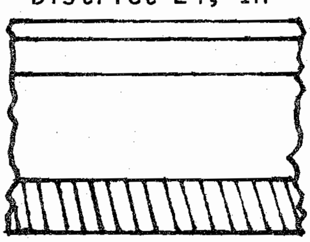
District 19, US - 80



- 3.50" Type C HMAC
- 12.00" Iron Ore Flexible Base
- 12.00" Select Material
- Subgrade

ADT = 7400

District 24, IH - 10



- 1.14" Type D HMAC
- 3.00" Type C HMAC
- 9.00" Flexible Base
- Subgrade

ADT = 5000

SH-43 in Dist. 19 was badly alligator cracked, especially in the wheel paths. The distance between cracks was about three to four inches. In some areas patching occured where small blocks of pavement had been dislodged by traffic.

The outside lane of US-80 in Dist. 19 was alligator cracked with some transverse and longitudinal cracks. The distance between cracks was about four to five feet. The inside lane was alligator cracked with longitudinal and transverse cracks but was in much better shape in comparison to the outside lane.

Both the outside and inside lanes of IH-10 in Dist. 24 were alligator cracked with some longitudinal and transverse cracking. Again the inside lane was in much better shape in comparison to the outside lane.
The lanes had been cracked-sealed, except the area which received the Overflex.

Construction Information

Tables III, IV, V and VI show the construction information for each highway and each test section. Note a skid resistant aggregate was used on each section but the size of the aggregate used in the District 19 job was different than that used in the other Districts. The gradation may be found in Appendix A; however, the Grade 3 aggregate is larger than the Grade 4 aggregate.

The cost of the Overflex material varied from $0.68/SY to $0.91/SY. The $0.91 price was associated with the sections using the larger aggregate. This cost was for the binder in place. Traffic control, tack coat,aggregate, aggregate placement, rolling, sweeping, etc. were extra. Sahuaro Petroleum and Asphalt Company of Phoenix, Arizona placed the tire-rubber asphalt.

The Sahuaro Petroleum and Asphalt Company personnel requested the rock spreader be in very close proximity to the distributor. When the spreader was delayed, perhaps for a truck to resupply the spreader with rock, the distributor would stop and wait for the spreader. This pause was accomplished without the benefit of paper. When the spreader caught up, the distributor would back up slightly then again resume the asphalt shot. This action resulted in a lap or double shot of asphalt over a length of about one foot. Texas personnel are not familiar with this technique and were disappointed in the result. This overlap resulted in immediate heavy flushing in the lap area. With age, the laps are still noticeable, especially to motorists driving along the roadway, and there is a slight bump experienced as the vehicle passes over them. However, the roughness is not excessive.

Evaluation Methods

The types of measurements and the equipment used may be found in Table VII. ASTM E274 refers to the type of equipment. Skid resistance tests were obtained at 40 mph. Several pictures, other than those collected vertically from an eight foot height, were obtained. The screen upon which

TABLE III

CONSTRUCTION INFORMATION

DISTRICT 9 SH - 22

	OVERFLEX	EASTA-BOND	AC - 3	EMULSION	EMULSION WITH LATEX	AC - 5
ASPHALT RATE GAL/SY	0.64	0.32	0.34	0.48	0.41	0.26
AGGREGATE RATE CY/SY	1/52	1/125	1/134	1/132	1/131	1/107
TYPE OF ASPHALT	SPECIAL SUAHARO PETRO-LEUM CO.	AC - 3 + 10% POLYPRO-PYLENE	AC - 3	EA-HVRS	EA-HVRS 2.5% LATEX	AC - 5
TYPE OF ROCK	SYNTHETIC LIGHTWEIGHT GRADE 4					

TABLE IV

CONSTRUCTION INFORMATION

DISTRICT 19 SH - 43

	OVERFLEX	EASTA-BOND	AC - 10	EMULSION	EMULSION + LATEX
ASPHALT RATE GAL/SY	0.716	0.544	.502	0.615	0.558
AGGREGATE RATE CY/SY	1/52	1/77	1/76.0	1/72.9	Not Known At Present
TYPE OF ASPHALT	SPECIAL SUAHARO PETRO-LEUM CO.	AC - 3 + 10% POLYPRO-PYLENE	AC - 10	EA-HVRS	EA-HVRS + % LATEX
TYPE OF ROCK	SYNTHETIC - IRON SLAG GRADE 3				

TABLE V

CONSTRUCTION INFORMATION

DISTRICT 19 US-80

	OVERFLEX	EASTABOND	AC-10	EMULSION	EMULSION + LATEX
ASPHALT RATE GAL/SY	0.794 0.832	0.516 0.459	0.520 0.529	0.594	.581
AGGREGATE RATE CY/SY	1/54 1/58	1/81 1/81	1/86 1/86	1/75	1/75
TYPE OF ASPHALT	SPECIAL+ KEROSENE 75% AC 25% TIRE RUBBER	AC - 3 + 10% POLY-PROPYLENE	AC - 10	EA - HVRS	EA-HVRS + % LATEX
TYPE OF ROCK	SYNTHETIC - IRON SLAG GRADE 3				

TABLE VI

CONSTRUCTION INFORMATION

DISTRICT 24 IH-10

	OVERFLEX	EASTABOND	AC - 5	AC - 3 + LATEX	AC - 10
ASPHALT RATE GAL/SY	0.600 0.700	.35 IN .30 OUT	0.35 IN 0.30 OUT	0.35 IN 0.30 OUT	0.35 IN 0.30 OUT
AGGREGATE RATE CY/SY	1/70	1/120	1/120	1/120	1/120
TYPE OF ASPHALT	SPECIAL 75% AC 25% TIRE RUBBER	AC - 3 + 10% POLYPRO-PYLENE	AC - 5	AC - 3 + LATEX	AC - 10
TYPE OF ROCK	RHYOLITE, TYPE B, GRADE 4 MODIF. 20% OF OVERFLEX SECTION USED PRECOATED RHYOLITE				

TABLE VII

TYPE OF MEASUREMENTS

DEFLECTION (Dynaflect)

SKID RESISTANCE (ASTM E-274)

PICTURES (Vertical from eight foot height)

RATING TEAM (Six man team)

DISTRESS RATING (Visual rating)

ROUGHNESS (Mays Road Meter)

CRACK SIZE (Graduated microscope)

the slides were projected was marked into 100 equal sections. Using this grid system, the roadway surface depicted in the vertical photograph may be subdivided into small areas and cracking in terms of percent of sections containing cracks may be obtained. This method was first noted in the report "Prevention of Reflective Cracking in Arizona Minnetonka - East" by George B. Way.

Of the measurements obtained, the deflection and roughness were not expected to show improvement because of the construction. However, future measurements may indicate a prolonged structural life. The crack size or width was included in an effort to study the relation of crack width size to reflective cracking history.

The skid resistance, the reflective cracking obtained from pictures and the team and distress ratings are expected to produce values which will be influenced by the construction.

Initial Testing

Deflection Table VIII reveals the results of the deflection tests which were gathered before treatment. The standard analysis treatment in Texas produces a stiffness coefficient for two layers (in this case(1) the pavement structure from the subgrade up and(2) that of the subgrade). The surface curvature index (SCI) is also reported. The SCI is the difference in the deflection near the load and the deflection approximately one foot from the load. It may be noted that SH-43 in Dist. 19 is the more distressed of the highway sections with a SCI of 1.03. Because of the small distance between cracks and lack of slab size, the SH-43 data also shows the subgrade stiffness coefficient to be greater than the pavement stiffness coefficient. The deflection results show SH-22 in Dist. 9 to be the most structurally sound of the highway sections. It should be noted that the deflection results shown in Table VIII are average values and the actual deflection values vary along the roadway.

The average roughness is reported in Table IX. The roughness values tend to be similar to the deflection with some of the lower values on SH-43 in Dist. 19 but with IH-10 in Dist. 24 having the smoothest sections.

Table X shows the crack size. The number of crack width locations varied from 80 to 120 at any one highway location. For example there were 80 locations on SH-43 in Dist. 19. The spot along a crack at which a measurement was obtained was arbitrarily selected. The spot was marked and is visible in the verticle pictures obtained. Future study will attempt to obtain average crack widths by scaling the values obtained at the marked location and then estimating crack widths at other locations. At present, little significance should be placed on the values in Table X.

Testing After Construction

The tests after construction were actually obtained some three months after construction. The Overflex in all three districts was placed in

TABLE VIII

RESULTS OF TESTS

DEFLECTION

LOCATION	AVG. PAVEMENT STIFF COEF.	AVG. SUBGRADE STIFF COEF.	AVG. SCI
DIST. 9 SH - 22	0.46	0.35	0.33
DIST. 19 SH - 43	0.31	0.34	1.03
DIST. 19 US - 80	0.39	0.30	0.49
DIST. 24 IH - 10	0.46	0.27	0.52

TABLE IX

RESULTS OF TESTS

ROUGHNESS

SERVICEABILITY INDEX

LOCATION	OVERFLEX	EASTABOND	AC - 10	AC - 3 LATEX	EMULSION	EMULSION LATEX	AC - 5	AC - 3
DIST. 9 SH - 22	3.2	3.0			3.2	3.2	3.3	3.4
DIST. 19 SH - 43	3.7	3.7	2.9		3.1	3.3		
DIST. 19 US - 80	3.2	3.2	3.3		3.5	3.5		
DIST. 24 IH - 10	4.8 (4.7)	4.4 (4.6)	4.6 (4.4)	4.4 (4.6)			4.4 (4.6)	

Numbers in parenthesis were obtained immediately after construction. Other values were collected prior to construction.

TABLE X

RESULTS OF TESTS

CRACK SIZE (WIDTH IN INCHES)

MEASURED BEFORE OVERLAY

LOCATION	OVERFLEX	EASTABOND	AC-10	AC - 3 LATEX	EMULSION	EMULSION LATEX	AC - 5	AC - 3
DIST. 9 SH - 22	0.026	0.043			0.035	0.039	0.045	0.028
DIST. 19 SH - 43	0.033	0.043	0.037		0.025	0.037		
DIST. 19 US - 80	0.069	0.028	0.049		0.055	0.051		
DIST. 24 IH - 10								

June, 1976. However, some of the last of the other sections in which different binders were used were not completed until September, 1976. At the time the rating team collected information, the most striking feature about the experimental sections was the flushed areas of Overflex. SH-22 in District 9 and the outside lanes of US-80 and IH-10 in Dist. 19 had flushed Overflex sections. The lanes where flushing occurred were heavily traveled in comparison to the lanes where flushing did not occur. The lanes carrying less tafffic were those of SH-43 in Dist. 19 and the inside lanes of US-80 and IH-10 in Dist. 24. These lanes were not flushed. By comparison the Eastabond, asphaltic cements and emulsions were not flushed.

Some of the sections on SH-22 in Dist. 9 having binders other than Overflex were beginning to darken in the wheel paths because of excess asphalt. On these sections flushing was evident at the crack seals. In other words the irregular crack seal pattern was visible due to flushing near the crack. Close inspection revealed the darkened wheel paths were due to excess asphalt being tracked from the flushed crack sealed strips.

All of the sections on IH-10 in Dist. 24, including Overflex, revealed reflected cracking. Even though a quantitative measure of cracking was not obtained, it is possible that the reflective cracking in the Overflex was less than that in the sections using other binders. The reflective cracking was noted by a "white" area near the crack which was believed to be base or subgrade material deposited by water from the crack area. Even though the pavements in question are flexible this section is generally termed "pumping". District 24 personnel indicated the cracks closed up or sealed after a period of hot weather soon after the visit of the rating team. There was no cracking on any experimental section in District 9 or 19.

In a location near a weigh station on IH-10, there was an area where the Overflex material had been torn or stripped from the surface by the breaking action of a tractor-trailer unit(s). There appeared to be some two to three separate locations and there were skips of about 5 to 10 feet between torn spots along the highway. District 24 personnel recently indicated the Overflex is spreading or flowing over the stripped area. It is believed this distress occurred soon after construction and does not occur after the material has toughened with age (after perhaps one to three months).

Table XI shows the before and after skid resistance values. The flushed lanes of the Overflex should be noted. SH-22 has an average friction number of 35. The outside lane of US-80 is 29 and the outside lane of IH-10 is 24. Values on the other materials are greater than 45.

The cracking in terms of percent of the area is shown in Table XII. The cracking before construction ranged from 34 percent of the area to 68 percent of the area. There has been no cracking noted after construction in Districts 9 and 19. Cracking in District 24 was not measured as in the other districts but has been discussed previously.

The team rating was accomplished with the aid of a rating method established in Research Project 2-6-71-83 "Synthetic Aggregates for Seal Coats - An Exploratory Study". An example of the form used may be found in Appendix B. Note the highest possible score is 40. The results of the

TABLE XI

RESULTS OF TESTS

SKID RESISTANCE

	OVERFLEX		EASTABOND		AC - 10		AC - 3 + LATEX		EMULSION		EMULSION + LATEX		AC - 5		AC - 3	
LOCATION	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
DIST. 9 SH - 22		(25) 35		(22) 56						(23) 46		(23) 57		(25) 56		(22) 48
DIST. 19 SH - 43		(55) 56		(59) 57		(50) 55				(54) 58		(56) 57				
DIST. 19 US - 80	(45) 49	(39) 29	(46) 55	(41) 48	(45) 56	(39) 47			(44) 57	(38) 51	(44) 59	(42) 48				
DIST. 24 IH - 10	(60) 56	(53) 24	(60) 55	(55) 51	(60) 56	(52) 47	(58) 55	(55) 49					(63) 58	(59) 48		

Numbers in parenthesis refer to values obtained before construction. Others are values collected after construction.

TABLE XII

RESULTS OF TESTS

PICTURES

LOCATION		BEFORE % CRACKED	AFTER CONSTRUCTION % CRACKED	AFTER CONSTRUCTION % REFLECTED	1 YR. AFTER CONSTRUCTION % CRACKED	1 YR. AFTER CONSTRUCTION % REFLECTED	2 YRS. AFTER CONSTRUCTION % CRACKED	2 YRS. AFTER CONSTRUCTION % REFLECTED
DIST. 9 SH - 22	NEB	47	0	0				
	SWB	46	0	0				
DIST. 19 SH - 43	NB	65	0	0				
	SB	63	0	0				
DIST. 19 US - 80	OUT LANE	68	0	0				
	IN LANE	34	0	0				
DIST. 24 IH - 10	← NOT OBTAINED →							

rating are shown in Table XIII. The lower scores associated with the Overflex are due to the flushed surface.

Summary

All the heavily traveled sections where Overflex was constructed have flushed. The lightly traveled Overflex sections including the inside lanes have not flushed. Those sections of Overflex using the larger cover stone may be slightly superior (less flushing) to those with the smaller stone. Also those sections using precoated aggregate (See Table VI) may have slightly less flushing than those using non-precoated stone. Since the aggregate was precoated and traffic was not permitted for 36 hours on this section in District 24, it is not known which factor reduced the flushing. However, banning traffic for a time may be helpful in reducing flushing.

The sections with binders other than Overflex generally have a good appearance and are performing well at present. No difference can be noted between the asphaltic cements and the emulsions or between those not using latex and those using latex.

Eastabond is a new material. At the time the sections were placed the material had been used in only one other district. The cost of Eastabond is about the same as asphalt and approximately ten percent was blended with an AC-3. There were exceptions to the percentages and asphalt type because of the trouble experienced in liquifying the material in block form and in the equipment used in blending asphalts. Since the placement of the material reported herein, Eastabond has been used in block form by other districts, and the problem of liquifying the material has been overcome. However, considerable time is involved in melting the material. There could be some problem with separation of the materials (Eastabond from asphalt) since minor separation was noted. The separation was noted after binder placement and before the stone was placed. The stone was placed and no difficiencies have since been noted. After placement, the Eastabond asphalt is similar to the latex-asphalt. For example, the material is rubbery and "strings" when aggregates are removed from the completed surface.

At the present time the general feeling of Departmental personnel concerning Overflex is:

1. The flushing problem can probably be overcome by modifying materials and construction techniques.

2. There is some question concerning the cost-effectiveness. The overall cost of Overflex is about three times that of a normal seal. Personnel from one district believe three seals would perform longer than Overflex. Personnel from another district believe the opposite would be true. All agree definite conclusions cannot be developed at this time and a continued study of the pavement performance will be required.

TABLE XIII

RESULTS OF TESTS

TEAM RATING OF CONSTRUCTION

Scored from 0 - 40

LOCATION	OVERFLEX	EASTA-BOND	AC - 10	AC - 3 LATEX	EMUL-SION	EMULSION & LATEX	AC - 5	AC - 3
DIST. 9 SH - 22	24.2	32.2			30.8	32.3	31.9	32.3
DIST. 19 SH - 43	33.0	36.5	35.5		35.7	35.7		
DIST. 19 US - 80	29.6	36.7	36.8		37.3	37.2		
DIST. 24 IH - 10	25.2	35.4	35.8	35.1			35.7	

APPENDIX A

Texas Standard Specificcations

Item 302 and 303

ITEM 302

AGGREGATE FOR SURFACE TREATMENTS
(Class B)

302.1. Description. This item establishes the requirements for aggregate to be used in the construction of surface treatments.

302.2. Materials. Aggregates shall be composed of clean, tough and durable particles of gravel, crushed gravel, crushed stone, crushed slag or natural limestone rock asphalt. These materials shall not contain more than 5 percent by weight of soft particles and other deleterious material as determined by Test Method Tex-217-F, Part I.

The natural limestone rock asphalt aggregate furnished shall have an average bitumen content from 4 to 8 percent by weight of naturally impregnated asphalt, as determined by Test Method Tex-215-F, and shall contain not more than 2 percent by weight of any one of or combination of iron pyrites, or other objectionable matter, as determined by Test Method Tex-217-F, Part I.

No aggregate shall contain a total of more than 5 percent by weight of impurities or objectionable matter listed above.

The percent of wear, as determined by test Method Tex-410-A, for each of the materials shall not exceed 35 percent.

The percent of wear on natural limestone rock asphalt aggregate as determined by Test Method Tex-410-A shall be made on that portion of the material retained on the No. 4 sieve, having a naturally impregnated asphalt content of less than 1 percent.

Crushed gravel shall have a minimum of 85 percent of the particles retained on the No. 4 sieve with at least one crushed face, as determined by Test Method Tex-413-A.

302.3. Types. The various types of aggregates are identified as follows:

Type A. Type A aggregate shall consist of gravel, crushed slag, crushed stone or natural limestone rock asphalt.

Type B. Type B aggregate shall consist of crushed gravel, crushed slag, crushed stone or natural limestone rock asphalt.

Type C. Type C aggregate shall consist of gravel, crushed slag or crushed stone.

Type D. Type D aggregate shall consist of crushed gravel, crushed slag or crushed stone.

Type E. Type E aggregate shall consist of natural limestone rock asphalt.

302.4. Grades. When tested by Test Method Tex-200-F, Part I, the gradation requirements for the several grades of aggregate shall be as follows:

		Percent by Weight
Grade 1:	Retained on 1" sieve	0
	Retained on 7/8" sieve	0-2
	Retained on 3/4" sieve	20-35
	Retained on 5/8" sieve	85-100
	Retained on 3/8" sieve	95-100
	Retained on No. 10 sieve	99-100

		Percent by Weight
Grade 2:	Retained on 7/8" sieve	0
	Retained on 3/4" sieve	0-2
	Retained on 5/8" sieve	20-35
	Retained on 1/2" sieve	85-100
	Retained on 3/8" sieve	95-100
	Retained on No. 10 sieve	99-100
Grade 3:	Retained on 3/4" sieve	0
	Retained on 5/8" sieve	0-2
	Retained on 1/2" sieve	20-35
	Retained on 3/8" sieve	85-100
	Retained on 1/4" sieve	95-100
	Retained on No. 10 sieve	99-100
Grade 4:	Retained on 5/8" sieve	0
	Retained on 1/2" sieve	0-2
	Retained on 3/8" sieve	20-35
	Retained on No. 4 sieve	95-100
	Retained on No. 10 sieve	99-100
Grade 5:	Retained on 3/8" sieve	0
	Retained on 1/4" sieve	0-5
	Retained on No. 10 sieve	99-100

The aggregate shall not contain more than 1.0 percent by weight of fine dust, clay-like particles and/or silt present when tested in accordance with Test Method Tex-217-F, Part II.

302.5. Measurement And Payment. Aggregates will be measured and paid for in accordance with the governing specifications for the items of construction in which these materials are used.

ITEM 303

AGGREGATE FOR SURFACE TREATMENTS
(Lightweight)

303.1. Description. This item establishes the requirements for lightweight aggregates to be used in the construction of surface treatments.

303.2. Materials. Aggregates shall be composed predominantly of lightweight cellular and granular inorganic material produced by fuzing raw shale or clay in a rotary kiln under intense heat into predominantly amorphous silicate. All aggregate for use on this project shall be produced from the same plant and source.

The dry loose unit weight of coarse lightweight aggregates shall not be less than 35 and shall not exceed 55 pounds per cubic foot unless otherwise specified on the plans. If the unit weight of any shipment of lightweight aggregate differs by more than 4 percent from that of the sample submitted for acceptance tests, the aggregates in the shipment may be rejected. Tests shall be in accordance with Test Method Tex-404-A, Part C. The percent of wear, as determined by Test Method Tex-410-A shall not exceed 35 percent.

The Aggregate Freeze Thaw Loss shall not exceed 7 percent when tested in accordance with Texas Test Method Tex-432-A (Tentative).

The Pressure Slaking Value shall not exceed 4 percent when tested in accordance with Test Method Tex-431-A, (Tentative).

303.3. Grades. When tested by Test Method Tex-200-F, Part I, the gradation requirements for the several grades of aggregate shall be as follows:

		Percent by Weight
Grade 3:	Retained on 3/4" sieve	0
	Retained on 5/8" sieve	0-5
	Retained on 1/2" sieve	30-50
	Retained on 3/8" sieve	85-100
	Retained on 1/4" sieve	95-100
	Retained on No. 10 sieve	98-100
Grade 4:	Retained on 5/8" sieve	0
	Retained on 1/2" sieve	0-5
	Retained on 3/8" sieve	20-40
	Retained on No. 4 sieve	95-100
	Retained on No. 10 sieve	98-100
Grade 5:	Retained on 1/2" sieve	0
	Retained on 3/8" sieve	0-2
	Retained on No. 4 sieve	60-80
	Retained on No. 10 sieve	98-100

The aggregate shall not contain more than 1.0 percent by weight of fine dust, clay-like particles and/or silt present when tested in accordance with Test Method Tex-217-F, Part II.

303.4. Measurement And Payment. Aggregates will be measured and paid for in accordance with the governing specifications for the items of construction in which these materials are used.

APPENDIX B

Team Rating Form

A. JOB IDENTIFICATION

District No. ____________ Highway No. ____________ County ____________

Control No. ____________ Section No. ____________ Job No. ____________

________ miles N S E W of ____________________ (nearest town);

Mile Post ________ to Mile Post ____________ .

Trial Field Section No. ______________________ Date Sealed ________

B. MATERIALS AND DESIGN

Aggregate Source ____________________ Aggregate Quantity ____________

Asphalt Source ____________________ Asphalt Quantity ____________
(gal./sq. yd.)

Length of Section Evaluated ______________________ 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 Discolor-ation in Wheel Path	

5. AGGREGATE EMBEDMENT

Outer Wheel Path ___%
Between Wheel Path ___%

TOTAL SCORE ____________

COMMENTS: