POST CONSTRUCTION EVALUATION

OF

U.S. 69 SULPHUR-ASPHALT PAVEMENT TEST SECTIONS

IN

LUFKIN, TEXAS

Interim Report No. 5

FCIP Study No. 1-10-75-512

by

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Prepared For

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Purpose:

To conduct post-construction testing and evaluation of a full scale pavement which utilizes sulphur extended asphalt binder. The test section is located on U.S. 69, 15 miles north of Lufkin, Texas.

Sampling Period:

Eighteen (18) months after opening to traffic.

Background:

During September 1975, a 3,650 foot section of roading being constructed on U.S. 69 in Angelina County, Texas under Project RF 353 (18), Contract No. 199-4 was set aside for a demonstration test of hot-mixed sulphur-asphalt pavement sections. These sections were constructed with a sulphur-asphalt emulsion (SAE) in accordance with a process developed by Societe Nationale des Petroles d' Aquitaine (SNPA).

After the completion of the test pavement placement, cores were obtained by District 11, State Department of Highways and Public Transportation (SDHPT) and testing was completed in accordance with the test matrix shown in Figure 1. This set of cores was designated as "Preliminary" in the identification scheme. Approximately seven months later this segment of U.S. 69 was opened to traffic. At this point in time a second set of field specimens designated "Initial" was taken by District 11 personnel. This second set of cores was received from District 11 in August 1976. The third set of cores was obtained in April 1977, six months after the facility was opened to traffic (twelve months after completion of construction). The results of tests performed on these cores appear in Interim Report

TEST DESCRIPTION	PRELIMINARY	INITIAL	6 MO.	12 MO.	18 MO.	24 MO.	36 MO.
1. TRAFFIC ANALYSIS							
a. AVERAGE DAILY TRAFFIC COUNT		← CONTINUOUS →					
b. TRUCK AND AXLE WEIGHT DISTRIBUTION		○					○
2. VISUAL INSPECTION	△	△	△	△	△	△	△
3. MAYS METER (PSI)	△	△	△	△	△	△	△
4. BENKLEMAN BEAM DEFLECTIONS	△	△	△	△	△	△	△
5. DYNAFLECT DEFLECTIONS	△	△	△	△	△	△	△
6. CORE SAMPLES*							
a. FIELD DENSITY AND RICE SPECIFIC GRAVITY	△	△	△	△	△	△	△
b. STABILITY, MARSHALL	△	△	△	△	△	△	△
c. STABILITY, HVEEM	△	△	△	△	△	△	△
d. RESILIENT MODULUS	△	△	△	△	△	△	△
e. INDIRECT TENSION	△	△	△	△	△	△	△
f. THERMAL EXPANSION	△						
7. SKID RESISTANCE**	△						

LOADMETER SURVEY, 1 WEEK DURATION
EVALUATIONS ON BOTH SULPHUR-ASPHALT AND CONVENTIONAL ASPHALTIC CONCRETE

* SET OF 6 CORES (MINIMUM) AT EACH TEST SECTION PER SAMPLING PERIOD

** SKID RESISTANCE MEASURED ON A SULPHUR-ASPHALT CONCRETE SURFACE PLACED OUTSIDE OF THE TEST SECTION.

FIGURE 1. TEST MATRIX FOR US 69, LUFKIN, TEXAS, SULPHUR-ASPHALT TRIAL

Nos. 1, 2, 3, and 4 published in January 1976, October 1976, May 1977, and October 1977, respectively.

In June 1978, a fifth shipment of cores was obtained from District 11. These cores were taken from the road about eighteen months after the road was opened to traffic (twenty-four months after completion of construction). The latest testing period was designated I+18. Table 1 is the tabulated results of the laboratory tests performed on the cores from the I+18 testing period.

Tables 2A and 2B show both current and previous data from tests performed on cores with respect to binder content and highway location. A comparison of the properties of each mixture type from the initial testing phase, I, to the most recent testing phase, I+18, is shown in Figures 3A and 3B.

In addition to the laboratory data obtained from the cores furnished by SDHPT this report also contains a summary of other field data taken by District 11 personnel. Tables 4A and 4B contains the rebound deflections data from the Benkleman Beam test with respect to location, pavement thickness, material and testing period. Dynaflect data reported in the form of maximum Dynaflect deflection, surface curvature index (SCI), stiffness coefficient of the subgrade (AS^2), and stiffness coefficient of the pavement (AP^2) as computed by the SDHPT's STIF 2 computer program are tabulated in Tables 5A and 5B. Mays Ride Meter data has been reduced and reported in the form of of serviceability index in Tables 6A and 6B. Table 7 summarizes the visual inspection up to the present and the traffic analysis as projected through 1979. All field data is reported by lane. Lane A

TABLE 1. TEST RESULTS FOR EACH MIX DESIGN FOR THE INITIAL + 18 TESTING PHASE

SAMPLE TYPE	BINDER CONTENT (%)	DENSITY PCF	AIR VOID (%)	HVEEM STABILITY (%)	MARSHALL STABILITY (LBS)	MARSHALL FLOW (0.01 in)	SPLITTING TENSILE (PSI)	RESILIENT MODULUS ($\times 10^6$ psi)
HMAC (AC)	4.8	144	7	28	1200	14	150	0.60
HMAC (SAE)	4.8	143	8	29	970	14	115	0.74
	5.65	144	7	27	1410	13	145	0.61
HOT SAND (AC)	5.4	122	18	23	1310	15	110	0.32
HOT SAND (SAE)	6.0	122	19	19	1080	16	90	0.27
	6.35	123	12	21	680	13	90	0.25
	7.1	124	16	21	570	13	85	0.24

Table 2A. TEST RESULTS FOR PRELIMINARY, INITIAL, I+6, I+12, AND I+18 SAMPLINGS

MIXTURE TYPE	BINDER CONTENT (%)	STATION					DENSITY (PCF)					AIR VOIDS (%)					RICE SPECIFIC GRAVITY
		P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18	
HMAC (AC)	4.8	202+58	202+26	202+23	202+20	202+17	138	139	143	132	145	8	9	5	16	5	2.43
	4.8		201+26	201+23	201+20	201+17		140	144	143	143		8	4	9	6	2.44
	4.8	164+59	169+56	169+53	168+50	169+47		141	142	140	145		5	5	9	4	2.41
	4.8		168+56	168+53	168+51	168+47		141	142	141	145		6	5	9	4	2.42
HMAC (SAE)	4.8	172+59	172+56	172+53	172+50	172+47	138	140	142	140	143	8	11	7	11	6	2.44
	4.8		175+56	175+53	175+50	175+46		140	142	137	143		10	5	13	7	2.46
	5.65	175+60	175+56	175+53	175+50	175+46	134	142	144	142	143	11	8	4	9	6	2.44
	5.65		172+56	172+53	172+50	172+47		143	144	143	143		7	4	8	6	2.44
	5.65	197+10	198+26	198+23	198+20	198+17	137	140	142	146	144	8	11	5	8	6	2.44
	5.65		195+26	195+23	195+20	195+17		143	143	143	146		7	6	8	5	2.46
HOT SAND (AC)	5.4	202+59	202+26	202+23	202+20	202+16	119	119	119	133	121	21	22	22	10	21	2.44
	5.4		201+26	201+23	201+20	201+17		119	122	121	120		21	19	18	21	2.43
	5.4	179+60	179+56	179+53	178+50	179+47	113	124	121	123	124	22	20	19	17	19	2.44
	5.4		178+56	178+53	178+51	178+47		117	125	118	123		20	17	20	18	2.39
HOT SAND (SAE)	6.0	183+59	183+42	183+39	183+50	183+47	113	121	121	121	124	23	21	20	19	18	2.42
	6.0		182+56	182+53	182+51	182+47		118	121	123	123		27	17	18	20	2.46
	6.0	195+60	195+26	195+20	195+20	195+17		118	119	120	120		22	22	20	21	2.44
	6.0		198+26	198+20	198+20	198+18		118	119	119	118		24	21	20	23	2.46
	6.35	186+59	186+26	186+23	186+20	186+16	115	121	121	130	123	21	20	22	7	18	2.40
	6.35		185+26	185+21	185+21	185+17		122	123	127	123		19	12	9	19	2.44
	7.1	189+59	189+26	189+21	189+21	189+17	117	122	125	125	124	20	20	16	16	17	2.40
	7.1		191+26	191+20	191+20	191+17		121	125	126	125		22	17	15	17	2.43

Table 2B. TEST RESULTS FOR PRELIMINARY, INITIAL, I+6, I+12, AND I+18 SAMPLINGS

MIXTURE TYPE	BINDER CONTENT (%)	HVEEM STABILITY (%)					MARSHALL STABILITY (LBS)					MARSHALL FLOW (0.01 IN.)					SPLITTING TENSILE STRENGTH (Psi)					RESILIENT MODULUS (x 10^6 psi)				
		P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18	P	I	I+6	I+12	I+18
HMAC (AC)	4.8	21	28	31	26	27	390	550	1010	1300	1400	16	14	12	12	15		170	120	220	155	0.24	0.84	0.59	0.68	0.46
	4.8		26	38	26	29		620	1140	1520	1400		13	12	14	12		150	125	185	165		0.67	0.59	0.68	0.51
	4.8		27	28	31	28		500	1280	680	1130		15	13	15	16	50	160	130	160	150		0.78	0.56	0.65	0.62
	4.8		26	28	25	28		760	1370	1050	1240		14	13	13	13		135	110	160	160		0.78	0.48	0.52	0.63
HMAC (SAE)	4.8	22	27	25	29	28	430	490	1100	600	970	15	15	13	13	14	35	90	135	140	114	0.29	1.22	0.52	0.64	0.69
	4.8		25	29	23	22		600	1350	380	630		16	13	16	12		95	95	110	122		1.00	0.50	0.76	0.55
	5.65	19	22	26	26	16	220	630	1550	400	350	14	14	13	14	15	35	135	120	170	124	0.21	0.67	0.57	1.06	0.70
	5.65		28	30	36	30		710	1270	800	800		12	12	12	14		140	120	175	140		0.89	0.57	0.73	0.77
	5.65	18	31	32	30	29	200	720	1190	620	1540	14	12	14	15	13		115	90	150	140	0.26	0.45	0.60	0.75	0.63
	5.65		31	33	30	24		710	1040	800	1140		12	15	14	13		140	90	175	150		0.66	0.61	0.74	0.57
HOT SAND (AC)	5.4	15	21	19	19	19	350	650	620	740	1270	14	14	15	17	18	30	90	100	95	110	0.16	0.31	0.24	0.26	0.28
	5.4		21	22	43	19		720	860	1190	1250		14	14	20	15		90	90	105	104		0.24	0.30	0.28	0.29
	5.4		19	21	23	27	70	1480	1480	770	1490	15	16	13	17	16		90	90	150	105	0.11	0.35	0.28	0.51	0.32
	5.4		16	24	24	26		1020	1480	910	1230		23	14	13	14		95	105	110	115		0.15	0.36	0.28	0.35
HOT SAND (SAE)	6.0	21	24	22	25	20	170	340	960	590	1220	13	12	12	12	17		80	65	85	80	0.13	0.28	0.24	0.58	0.25
	6.0		24	19	23	20		1400	850	380	1081		13	13	13	15		80	75	105	106		0.32	0.22	0.22	0.23
	6.0		32	20	25	20		560	960	500	1075		14	13	17	20	30	70	60	80	80		0.31	0.29	0.35	0.34
	6.0		22	21	19	17		630	860	380	940		16	14	17	16		70	75	90	70		0.35	0.28	0.28	0.32
	6.35	20	23	20	20	21	20	610	730	400	660	15	14	13	10	11		95	85	115	80	0.14	0.36	0.18	0.24	0.27
	6.35		24	20	24	21		1350	950	600	690		12	13	9	14		90	85	100	90		0.25	0.28	0.24	0.24
	7.1	24	22	23	24	21	140	510	850	560	570	18	13	13	11	14	30	135	70	115	85	0.20	0.37	0.26	0.28	0.25
	7.1		22	27	20	23		520	850	520	530		15	12	12	11		100	80	115	95		0.21	0.26	0.25	0.24

Table 3A. TEST RESULTS FOR EACH MIX DESIGN FOR INITIAL, I+6, I+12, I+18, SAMPLING PERIODS

MIXTURE TYPE	BINDER CONTENT (%)	DENSITY (PCF)				AIR VOIDS (%)				HVEEM STABILITY			
		I	I+6	I+12	I+18	I	I+6	I+12	I+18	I	I+6	I+12	I+18
HMAC (AC)	4.8	140	143	139	144	7	5	11	7	27	31	27	28
HMAC (SAE)	4.8	140	142	139	143	11	6	12	8	26	27	26	29
	5.65	142	144	144	144	8	5	8	7	28	30	31	27
HOT SAND (AC)	5.4	120	122	124	122	21	19	16	18	19	22	27	23
	6.0	119	120	121	122	23	20	19	19	26	21	23	19
HOT SAND (SAE)	6.35	122	122	129	123	20	22	8	12	24	20	22	21
	7.1	122	125	126	124	21	17	16	16	22	25	22	21

Table 3B. TEST RESULTS FOR EACH MIX DESIGN FOR INITIAL, I+6, I+12, I+18, SAMPLING PERIODS

MARSHALL STABILITY (LBS)				MARSHALL FLOW (0.01 IN)				SPLITTING TENSILE STRENGTH (psi)				RESILIENT MODULUS ($x10^{-6}$ psi)			
I	I+6	I+12	I+18	I	I+6	I+12	I+18	I	I+6	I+12	I+18	I	I+6	I+12	I+18
610	1200	1140	1200	14	13	13	14	155	120	180	150	0.07	0.55	0.63	0.60
50	1230	490	470	16	13	13	14	95	115	125	115	1.11	0.51	0.70	0.74
690	1260	660	1410	13	14	14	13	135	105	170	145	0.66	0.59	0.82	0.61
970	1110	900	1310	17	14	17	15	90	95	115	110	0.26	0.29	0.33	0.32
730	910	460	1080	14	13	15	16	75	70	90	90	0.31	0.26	0.36	0.27
980	840	500	880	13	13	10	13	95	85	110	90	0.30	0.23	0.24	0.25
510	850	540	570	14	13	12	13	20	75	115	85	0.29	0.26	0.27	0.24

Table 4A. BENKLEMAN BEAM REBOUND DEFLECTIONS FOR P, I, I+6, I+12, & I+18 SAMPLING PERIODS

STATION	TOTAL PAVEMENT DEPTH (in)	MATERIAL	THICKNESS (in)	REBOUND DEFLECTIONS LANE A LEFT WHEEL PATH	LANE A RIGHT WHEEL PATH	LANE B LEFT WHEEL PATH	LANE B RIGHT WHEEL PATH	DATE
167 + 00				0.0085	0.0072	0.0080	0.0088	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.0082	0.0058	0.0102	0.0047	I
170 + 50		4.8% H.C. HMAC	7.00	0.0105	0.0080	0.0067	0.0063	I+6
				0.0067	0.0063	0.0057	0.0053	I+12
				0.0095	0.0087	0.0077	0.0068	I+18
				0.0073	0.0078	0.0098	0.0117	P
170 + 50		8% A.C. LT.WT. HMAC	1.00	0.0092	0.0073	0.0115	0.0067	I
to	8.00	5.65% S/A HMAC	3.00	0.0114	0.0108	0.0117	0.0110	I+6
177 + 50		4.8% S/A HMAC	4.00	0.0085	0.0061	0.0084	0.0083	I+12
				0.0099	0.0095	0.0113	0.0111	I+18
				0.0072	0.0085	0.0092	0.0105	P
				0.0077	0.0074	0.0043	0.0048	I
177 + 50		8% A.C. LT.WT. HMAC	1.00	0.0126	0.0104	0.0088	0.0097	I+6
to	6.00	5.4% A.C. HOT SAND	5.00	0.0091	0.0074	0.0073	0.0095	I+12
181 + 00				0.0099	0.0092	0.0094	0.0096	I+18
				0.0087	0.0075	0.0077	0.0088	P
181 + 00				0.0060	0.0055	0.0058	0.0043	I
to	6.00	8% A.C. LT.WT. HMAC	1.00	0.0085	0.0087	0.0063	0.0068	I+6
184 + 50		6% S/A HOT SAND	5.00	0.0073	0.0058	0.0065	0.0070	I+12
				0.0175	0.0145	0.0120	0.0112	I+18
				0.0078	0.0082	0.0095	0.0100	P
184 + 50				0.0062	0.0052	0.0068	0.0058	I
to	6.00	8% A.C. LT.WT. HMAC	1.00	0.0078	0.0070	0.0078	0.0085	I+6
188 + 00		6.35% S/A HOT SAND	5.00	0.0088	0.0058	0.0068	0.0085	I+12
				0.0233	0.0177	0.0128	0.0162	I+18
				0.0083	0.0068	0.0064	0.0075	P
188 + 00				0.0040	0.0031	0.0059	0.0040	I
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.0062	0.0057	0.0058	0.0060	I+6
193 + 00		7.1% S/A HOT SAND	7.00	0.0053	0.0038	0.0057	0.0063	I+12
				0.0172	0.0143	0.0130	0.0112	I+18

Table 4B. BENKLEMAN BEAM REBOUND DEFLECTIONS CONTINUED

STATION	TOTAL PAVEMENT DEPTH (in)	MATERIAL	THICKNESS (in)	REBOUND DEFLECTIONS LANE A LEFT WHEEL PATH	LANE A RIGHT WHEEL PATH	LANE B LEFT WHEEL PATH	LANE B RIGHT WHEEL PATH	DATE
				0.0078	0.0082	0.0095	0.0100	P
193 + 00		8% A.C. LT.WT. HMAC	1.00	0.0047	0.0042	0.0070	0.0053	I
to	8.00	5.65% S/A HMAC	3.00	0.0075	0.0077	0.0075	0.0065	I+6
200 + 00		6% S/A HOT SAND	4.00	0.0075	0.0057	0.0080	0.0070	I+12
				0.0125	0.0162	0.0140	0.0118	I+18
				0.0076	0.0087	0.0092	0.0092	P
200 + 00		8% A.C. LT.WT. HMAC	1.00	0.0052	0.0058	0.0070	0.0063	I
to	8.00	4.8% A.C. HMAC	3.00	0.0083	0.0067	0.0082	0.0090	I+6
203 + 50		5.4% A.C. HOT SAND	4.00	0.0067	0.0062	0.0075	0.0083	I+12
				0.0138	0.0130	0.0130	0.0130	I+18

Table 5A.(1) DYNAFLECT DATA AS COMPUTED BY STIF 2
BENCHMARK 167 + 00 TO 184 + 50

STATION	TOTAL PAVEMENT DEPTH (IN)	MATERIAL	THICKNESS (IN)	MAXIMUM DYNAFLECT DEFLECTION (10^{-3} IN)		SURFACE CURVATURE INDEX		DATE
				LANE A	LANE B	LANE A	LANE B	
167 + 00				0.900	0.900	0.175	0.195	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	1.020	1.008	0.268	0.226	I
170 + 50		4.8% A.C. HMAC	7.00	0.753	0.880	0.130	0.188	I+6
				0.963	0.900	0.163	0.108	I+12
				0.797	0.817	0.135	0.145	I+18
170 + 50				0.978	0.942	0.212	0.192	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	1.130	1.160	0.353	0.307	I
177 + 50		5.65% S/A HMAC	3.00	0.785	0.975	0.148	0.227	I+6
		4.8% S/A HMAC	4.00	0.900	0.920	0.195	0.160	I+12
				0.825	0.752	0.177	0.133	I+18
177 + 50				0.850	0.885	0.205	0.250	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	1.075	0.065	0.368	0.375	I
181 + 00		5.4% A.C. HOT SAND	5.00	0.895	1.000	0.223	0.332	I+6
				1.020	0.915	0.283	0.268	I+12
				1.030	0.823	0.273	0.223	I+18
181 + 00				0.840	0.825	0.190	0.230	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	1.000	0.910	0.352	0.310	I
184 + 50		6% S/A HOT SAND	5.00	0.862	0.865	0.245	0.248	I+6
				0.895	0.825	0.267	0.207	I+12
				0.906	0.717	0.282	0.188	I+18

TABLE 5A.(2) DYNAFLECT DATA AS COMPUTED BY STIF 2
BENCHMARK 167 + 00 TO 184 + 50

STATION	TOTAL PAVEMENT DEPTH (IN)	MATERIAL	THICKNESS (IN)	STIFFNESS COEFFICIENT OF SUBGRADE		STIFFNESS COEFFICIENT OF PAVEMENT		DATE
				LANE A	LANE B	LANE A	LANE B	
167 + 00				0.24	0.25	1.26	1.16	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.26	0.26	0.86	0.98	I
170 + 50		4.8% A.C. HMAC	7.00	0.25	0.25	1.19	1.02	I+6
				0.22	0.21	1.36	1.54	I+12
				0.24	0.24	1.20	1.18	I+18
170 + 50				0.25	0.24	1.15	1.20	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.26	0.25	0.74	0.86	I
177 + 50		5.65% S/A HMAC	3.00	0.25	0.25	1.12	0.96	I+6
			4.00	0.25	0.23	1.02	1.21	I+12
				0.25	0.25	1.03	1.17	I+18
177 + 50				0.26	0.27	1.50	1.31	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	0.28	0.28	0.89	0.85	I
181 + 00		5.4% A.C. HOT SAND	5.00	0.26	0.28	1.19	0.91	I+6
				0.26	0.27	1.12	1.04	I+12
				0.26	0.27	1.16	1.14	I+18
181 + 00				0.26	0.27	1.54	1.29	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	0.28	0.29	0.85	0.88	I
184 + 50		6% S/A HOT SAND	5.00	0.27	0.29	1.06	0.87	I+6
				0.27	0.27	1.03	1.19	I+12
				0.28	0.28	0.97	1.14	I+18

Table 5B.(1). DYNAFLECT DATA AS COMPUTED BY STIF 2
BENCHMARK 184 + 50 TO 203 + 50

STATION	TOTAL PAVEMENT DEPTH (IN)	MATERIAL	THICKNESS (IN)	MAXIMUM DYNAFLECT DEFLECTION (10^{-3} IN)		SURFACE CURVATURE INDEX		DATE
				LANE A	LANE B	LANE A	LANE B	
184 + 50				0.990	0.885	0.265	0.240	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	1.020	1.015	0.347	0.367	I
188 + 00		6% S/A HOT SAND	5.00	0.847	0.935	0.240	0.352	I+6
				0.890	0.950	0.272	0.308	I+12
				0.900	0.803	0.268	0.237	I+18
188 + 00				0.695	0.680	0.150	0.162	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.840	0.778	0.295	0.260	I
193 + 00		7.1% S/A HOT SAND	7.00	0.692	0.695	0.190	0.227	I+6
				0.722	0.632	0.198	0.148	I+12
				0.723	0.625	0.185	0.147	I+18
193 + 00				0.788	0.768	0.215	0.217	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.955	0.847	0.353	0.292	I
200 + 00		5.65% S/A HMAC	3.00	0.782	0.798	0.212	0.263	I+6
		6% S/A HOT SAND	4.00	0.793	0.762	0.273	0.263	I+12
				0.722	0.693	0.180	0.173	I+18
200 + 00				0.810	0.885	0.195	0.250	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	1.005	1.000	0.368	0.343	I
203 + 50		4.8% A.C. HMAC	3.00	0.845	0.950	0.232	0.300	I+6
		5.4% A.C. HOT SAND	4.00	0.742	0.855	0.173	0.217	I+12
				0.783	0.783	0.193	0.202	I+18

Table 5B.(2) DYNAFLECT DATA AS COMPUTED BY STIF 2
BENCHMARK 184 + 50 TO 203 + 50

STATION	TOTAL PAVEMENT DEPTH (IN)	MATERIAL	THICKNESS (IN)	STIFFNESS COEFFICIENT OF SUBGRADE		STIFFNESS COEFFICIENT OF PAVEMENT		DATE
				LANE A	LANE B	LANE A	LANE B	
184 + 50				0.26	0.27	1.35	1.33	P
to	6.00	8% A.C. LT.WT. HMAC	1.00	0.28	0.28	0.88	0.82	I
188 + 00		6% S/A HOT SAND	5.00	0.27	0.29	1.07	0.79	I+6
				0.28	0.28	1.02	0.95	I+12
				0.27	0.28	1.04	1.05	I+18
188 + 00				0.26	0.27	1.15	1.07	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.29	0.29	0.67	0.71	I
193 + 00		7.1 S/A HOT SAND	7.00	0.28	0.30	0.84	0.73	I+6
				0.28	0.28	0.86	0.98	I+12
				0.28	0.27	0.89	1.01	I+18
193 + 00				0.27	0.28	0.96	0.93	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.29	0.29	0.63	0.68	I
200 + 00		5.65% S/A HMAC	3.00	0.27	0.29	0.85	0.71	I+6
		6% S/A HOT SAND	4.00	0.29	0.29	0.73	0.80	I+12
			q	0.27	0.28	0.91	0.91	I+18
200 + 00				0.26	0.28	1.06	0.89	P
to	8.00	8% A.C. LT.WT. HMAC	1.00	0.29	0.28	0.63	0.68	I
203 + 50		4.8% A.C. HMAC	3.00	0.27	0.28	0.84	0.74	I+6
		5.4% A.C. HOT SAND	4.00	0.27	0.26	0.97	0.91	I+12
				0.27	0.27	0.92	0.90	I+18

Table 6A. MAYS RIDE METER RESULTS EXPRESSED AS SERVICEABILITY
BENCHMARK 167 + 00 TO 184 + 50

STATION	TOTAL PAVEMENT DEPTH (IN).	MATERIAL	THICKNESS (IN.)	SERVICEABILITY INDEX		DATE
				LANE A	LANE B	
167 + 00 to	8.00	8% A.C. LT.WT. HMAC	1.00	4.0	4.9	P
170 + 50		4.8% A.C. HMAC	7.00	3.9	4.5	I
				4.4	4.3	I+6
				4.4	4.1	I+12
				4.1	3.9	I+18
				4.2	4.3	I+24
170 + 50 to	8.00	8% LT.WT. HMAC	1.00	4.7	4.7	P
177 + 50		5.65% S/A HMAC	3.00	4.7	4.4	I
		4.8% S/A HMAC	4.00	4.5	4.6	I+6
				4.5	4.2	I+12
				4.0	3.7	I+18
				4.4	4.2	I+24
177 + 50 to	6.00	8% A.C. LT.WT. HMAC	1.00	3.7	4.4	P
181 + 00		5.4% A.C. HOT SAND	5.00	3.7	4.8	I
				3.4	4.2	I+6
				4.2	4.0	I+12
				3.7	4.0	I+18
		q		4.2	4.2	I+24
181 + 00 to	6.00	8% A.C. LT.WT. HMAC	1.00	3.9	4.5	P
184 + 50		6% S/A HOT SAND	5.00	4.1	4.6	I
				3.8	4.4	I+6
				3.9	4.0	I+12
				4.0	3.9	I+18
				4.1	4.0	I+24

Table 6B. MAYS RIDE METER RESULTS EXPRESSED AS SERVICEABILITY
BENCHMARK 185 + 50 TO 203 + 50

STATION	TOTAL PAVEMENT DEPTH (IN)	MATERIAL	THICKNESS (IN.)	SERVICEABILITY INDEX			DATE
				LANE A	LANE B		
184 + 50 to	6.00	8% A.C. LT.WT. HMAC	1.00	4.1	4.3		P
188 + 00		6.35% S/A HOT SAND	5.00	4.1	4.5		I
				3.5	4.3		I+6
				4.0	3.7		I+12
				3.6	3.9		I+18
				3.9	4.0	q	I+24
188 + 00 to	8.00	8% A.C. LT.WT. HMAC	1.00	4.4	4.6		P
193 + 00		7.1% S/A HOT SAND	7.00	4.4	3.9		I
				3.9	4.2		I+6
				3.7	4.1		I+12
				3.7	3.8		I+18
				3.8	4.0		I+24
193 + 00 to	8.00	8% A.C. LT.WT. HMAC	1.00	4.4	4.4		P
200 + 00		5.65% S/A HMAC	3.00	4.5	4.5		I
		6% S/A HOT SAND	4.00	4.0	4.2		I+6
				4.2	4.2		I+12
				3.7	3.8		I+18
				4.3	4.1		I+24
200 + 00 to	8.00	8% A.C. LT.WT. HMAC	1.00	4.4	4.5		P
203 + 50		4.8% A.C. HMAC	3.00	4.9	4.7		I
		5.4% A.C. HOT SAND	4.00	4.1	4.2		I+6
				4.2	4.2		I+12
				3.4	4.4		I+18
				4.3	4.0		I+24

is the inside lane south bound on U.S. 69 and Lane B is the outside lane.

Discussion of Results

From Table 1 it appears that the properties of the conventional HMAC pavement and those of the 5.65 percent SAE binder are about the same with the exception of the SAE having a higher Marshall Stability. The Marshall Stability and the Splitting Tensile Strength for the 4.8 percent SAE binder appear to be lower than the 5.65 percent SAE binder and the conventional HMAC while maintaining a higher resilient modulus. In comparing the hot sand mixes it appears that properties remain about the same with the exception that the hot sand SAE mixtures decrease in Marshall Stability and Resilient Modulus with increased binder content, and in general the hot sand asphaltic concrete demonstrates some what higher strength properties.

In a subsequent report statistical methods will be used to evalute the data in Table 2 through 7. The amount of data in these tables makes it difficult to analyze without using statistical methods.

Proposed Work:

Statistical work will continue for the duration of the project. The I+24 testing phase will begin in October of this year. Another interim report will be forthcoming as soon as the field data is gathered and the laboratory work is complete on the next testing phase.

Table 7. VISUAL INSPECTION & TRAFFICE ANALYSIS

FOR HIGHWAY DESIGN

U.S. 69

LUFKIN

FROM: The Cheeokee County Line

TO: SH 7

	1975	1977	1978	1979
ADT:		4950	5200	0450
DIRECTIONAL DISTRIBUTION FACTOR:			60-40%	60-40%
DESIGN HOURLY VOLUME:			11.5%	11.5%
PERCENT TRUCKS				
1) ADT:			20.3	20.3
2) DHY:			14.0	14.0
ANTICIPATED ANNUAL GROWTH RATE:			5.1%	5.1%
AVERAGE TEN HEAVIEST WHEEL LOADS(ATHWLD), lbs			11,300	11,300
PERCENT TANDEM AXLES IN ATHWLD			60%	60%
TOTAL NO. OF EQUIVALENT 18K SINGLE				
AXLE LOAD APPLICATIONS, ONE DIRECTION:				
1) FLEXIBLE PAVEMENT (1 YEAR)			142,000	203,000
2) RIGID PAVEMENT (2 YEARS)			291,000	416,000
VISUAL INSPECTION:				
1) SULFUR	100%	95%		
2) CONTROL	100%	90%		