Long-Term Pavement Performance

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23 August 2001

Mr. Jack Springer
Pavement Performance Division - LTPP
Federal Highway Administration
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike, Room F-209
McLean, Virginia 22101

Subject: SPS-3 Construction Report

Dear Jack,

Per your request, enclosed is a copy of the SPS-3 Construction Report for the Southern Region. Please contact me if you have any questions or comments regarding this report.

Sincerely,

Mark P. Gardner, P.E.
Project Manager

MPG:dmj

Enclosure: As stated.

cc.w/Enc: Gonzalo Rada, LAW PCS

SPS-3 CONSTRUCTION REPORT

SHRP

SOUTHERN REGIONAL COORDINATION OFFICE

January 1991

BRENT RAUHUT ENGINEERING INC.

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SOUTHERN REGION

SUMMARY

The SPS-3 experiment addresses questions regarding the cost-effectiveness and optimum timing for application of preventative maintenance treatments to asphalt surfaced pavements. Four types of preventative maintenance are included in the experiment, crack sealing, chip sealing, slurry sealing and thin asphalt concrete overlays.

This effort was conducted under the supervision of the Texas Transportation Institute (TTI) as part of Strategic Highway Research Program (SHRP) Contract H-101. Seven of the State Highway Agencies (SHA's) from the SHRP Southern Region participated (Alabama, Arkansas, Florida, Mississippi, Oklahoma, Tennessee and Texas). The decision was made that a single contractor using all of the same materials and crew at each site could best assure uniformity of the treatment applications throughout the Region. The contractor selected for this purpose was Bituminous Asphalt Sealing Specialists (B.A.S.S), Inc, of Little Rock, Arkansas. To facilitate administration of this contract, the Federal Highway Administration Eastern Federal Lands Highway Division (EFLHD), agreed to serve as Contract Administrator.

Development of the plans and specifications for this work took just over a year. The Regional Task Group (RTG) of State Highway Representatives first met with the H-101 Contractor and Southern Regional Coordination Office (SRCO) Personnel on June 30, 1989, in Nashville, Tennessee, and the contract got underway July 25, 1989, in Little Rock, Arkansas, with B.A.S.S.'s initiation of the demonstration portion of their contract. Construction of the 27 test sections in the Southern Region took just over 2½ months to complete, with the last section being finished October 19, 1990.

With these sections all complete, every effort was made to have these sites monitored before winter set in. Three of the sections (47A350, 48I350 and 48Q350) have been documented as having lost some of the aggregate in the wheelpaths. However, none of these has progressed to a point where a friction problem is perceived by the State. One of the slurry seal sections (48N320) had lost bond with the original surface and approximately 30′ required some "spot" patching. Other than that, all of the sections appear to be well established going into the first winter.

THE SPS-3 EXPERIMENT IN THE SOUTHERN REGION

DEVELOPMENT

The goals of the Maintenance Cost-Effectiveness Studies (SPS-3) were:

1. To evaluate the effectiveness of common maintenance treatments in prolonging pavement life.

2. Develop methods for evaluating cost-effectiveness of common maintenance treatments.

3. Collect information on the effective timing of the application of maintenance treatments.

The four common treatments selected for observation were crack sealing, chip sealing, slurry sealing, and a thin asphalt concrete overlay (approximately 1¼" thick). These treatments were applied to asphalt pavements in varying stages of condition to evaluate the effect of timing in applying these maintenance treatments. The experiment was designed to include the same environmental, subgrade and traffic factors as those used in the General Pavement Studies (GPS) portion of the SHRP effort. Structural adequacy of the pavement was evaluated using a "structural number (SN) ratio". This is a ratio of the AASHTO design structural number (for the traffic anticipated) versus the actual structural number for the pavement section as built. The experiment design is illustrated in Figure 1. This same figure also shows where each of the 79 test sites across the country fall within the experiment design. Figure 2 shows the general locations of the SPS-3 sites across the continent.

The SPS-3 experiment was designed under the SHRP Contract H-101 by the Texas Transportation Institute, under the direction of Dr. Roger Smith. A RTG was formed with representatives from each of the participating State Highway Agencies (Alabama, Arkansas, Florida, Mississippi, Oklahoma, Tennessee and Texas). A listing of the RTG Members is included in Table 1. These RTG Members met with the SHRP and industry representatives on several occasions to determine specifications, construction and traffic control details, sampling and testing, and data collection needs (see Appendix A for summaries of these three RTG meetings).

To reduce the impact of variation between treatment locations, it was agreed that one contractor with the same crew, equipment, and materials would be used to apply each treatment throughout each of the 27 project sites in the Southern Region. The decision was made, however, that the thin overlay would not be included as part of this "single" contract, but rather each state would be responsible for applying their own thin overlays. This decision was reached in part as an acknowledgement of the fact that it would not be practical to arrange for the same overlay materials to be used at each of the 27 sites. The logistics of arranging for the same hot mix at each of these sites would have been fairly complex if done with one contractor for all 27 sites.

OPTIMIZED STATUS OF H-101

SPS-3: AC MAINTENANCE TREATMENTS

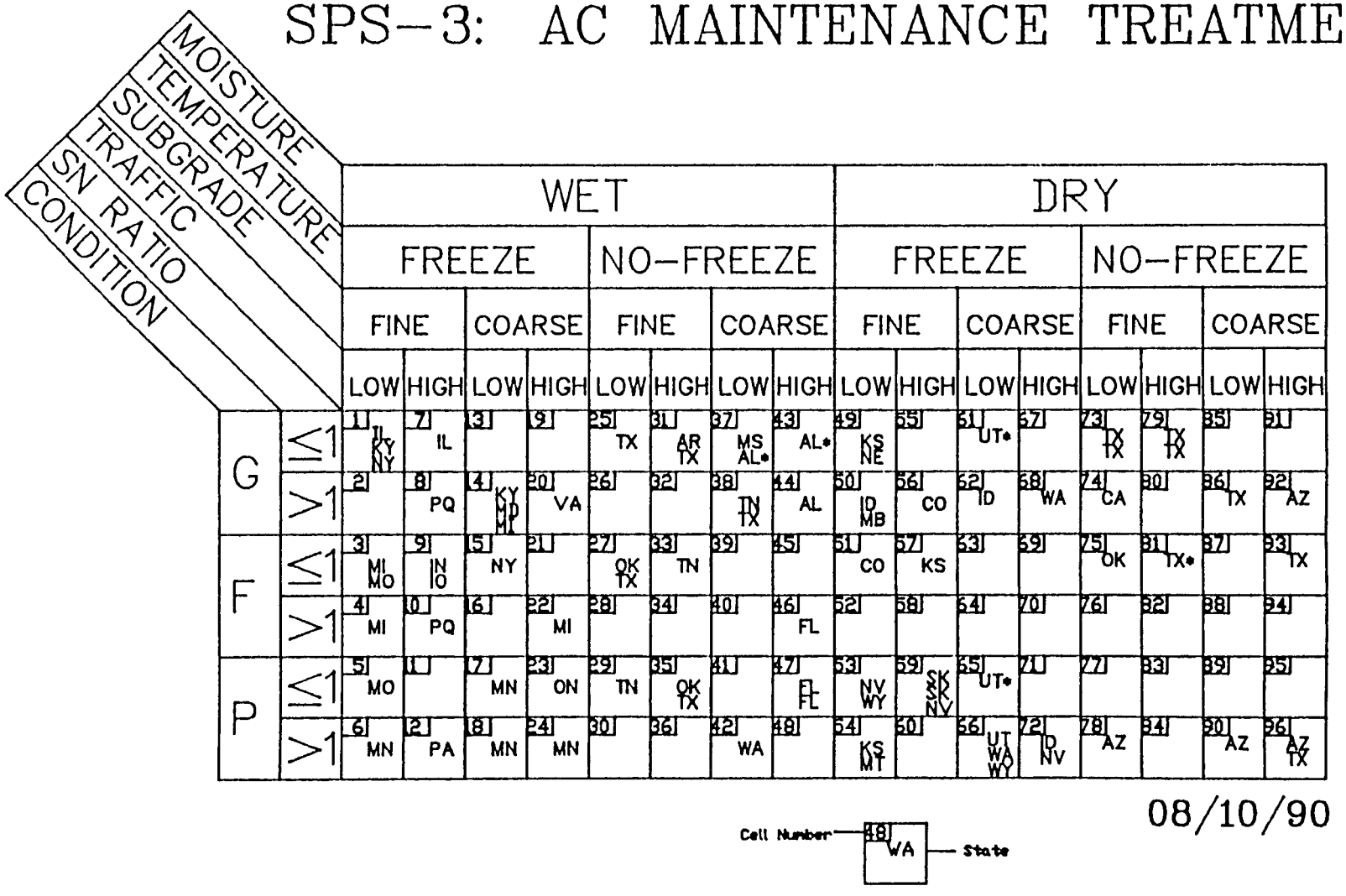


FIGURE 1

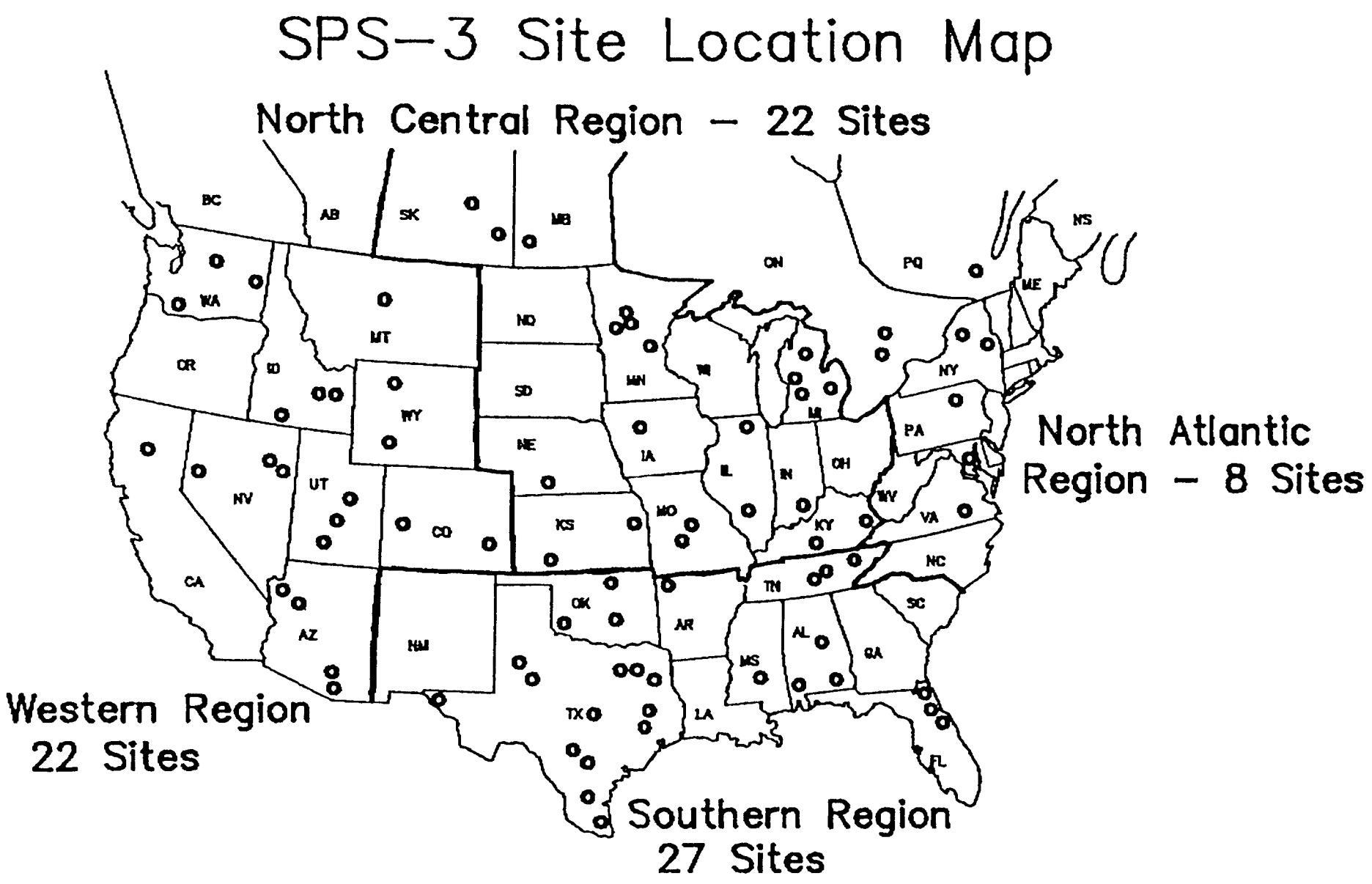

SPS-3 Site Location Map
North Central Region – 22 Sites
North Atlantic Region – 8 Sites
Western Region 22 Sites
Southern Region 27 Sites
BC
AB
SK
MB
ON
PQ
NS
WA
MT
ND
MN
OR
ID
WY
SD
WI
MI
NY
ME
NE
IA
IL
IN
OH
PA
NV
UT
CO
KS
MO
WV
KY
VA
CA
AZ
NM
OK
AR
TN
NC
SC
MS
AL
GA
TX
LA
FL

FIGURE 2

TABLE 1

REGIONAL TASK GROUP MEMBERS

Alabama	Stanley Armstrong
Arkansas	Harold Beaver
Florida	Don Quillo
Mississippi	Al Crawley
Oklahoma	Gary Roach
Tennessee	Jim Norris
Texas	Larry Buttler

One of the primary concerns over the use of one contractor for all 27 sites was how such a contract would be administered. The Western Region suggested use of the FHWA organizations responsible for design and construction of pavements on "federal lands". After some negotiation, the FHWA agreed to undertake this effort and active coordination was initiated between SHRP Southern Region representatives, the H-101 Contractor, and the EFLHD leading to bid documents for this effort.

A prebid meeting was conducted March 27, 1990 in Austin, Texas. This meeting was intended to provide potential bidders with details of the work, introduce the various parties involved, and discuss the fairly unique coordination efforts this research oriented contract would entail.

Technical proposals received by the FHWA were evaluated and reviewed by the various parties involved. Only one proposal was received, but it was considered acceptable after clarifications were made. The one proposal received was from B.A.S.S. of Little Rock, Arkansas. After the proposal clarifications were made, B.A.S.S. was asked to submit their bid, which was received May 25, 1990. A negotiation meeting was held June 22, 1990 between B.A.S.S., FHWA, and SHRP. The Preconstruction Conference with B.A.S.S. was held July 5, 1990. Preconstruction meetings were also held with each of the participating SHA's to clarify what each party's role would be in this operation and assure that close coordination and clear lines of communication were established. The contract was awarded to B.A.S.S. by the FHWA on July 11, 1990. The calibration runs of the equipment and demonstration of the treatment applications were conducted in Little Rock July 25-27, 1990.

SITE SELECTION AND LAYOUT

Each of the AC over flexible base (Experiment 1) and AC over bound base (Experiment 2) sections currently included in the SHRP-LTPP GPS data base were evaluated for use as part of this maintenance effectiveness study. Site selection was limited to these sections, to capitalize on the data already available for these sites (i.e., Inventory Data and Traffic Data). It was also felt that this would simplify collection of the monitoring data required. Based on the data available for each of these sections (distress, age, pavement structure, environmental region, subgrade type, and traffic level), these GPS sections were assigned to SPS-3 cells. States were acquainted with the experiment and asked to establish what level of participation could be expected from them. Some of the considerations included in this decision were:

1. The states would have to pay for the application of the treatments, as no funds were available for this purpose.

2. The states would need to assure that maintenance of these sections was well controlled.

3. Some of these sections would likely be maintained at a less than customary level.

With this information, the H-101 Contractor identified which projects were of greatest interest to them based on the constraints outlined above. Each of the GPS projects was identified as either a primary candidate for SPS-3 or a backup. This information was then forwarded to the Regional Coordination Office (RCO) personnel for their input. These sites were reviewed for availability of space (approximately 1½ miles of highway with comparable earthwork, traffic and pavement structure). It was specified that sections should be relatively straight in horizontal alignment and uniform in profile. Projects in which high degrees of curvature, steep grades, deep cuts or high fills were not considered appropriate for this study. Every effort was also made to avoid having culverts under any of these test sections, or heavily traveled turnouts which might effect performance of these treatment applications.

Once satisfactory locations were identified for these SPS-3 projects, the test sections were laid out and verified. The projects were typically laid out in the same order, thin overlay first, followed by slurry seal, crack seal, control section, and finally the chip seal section. The control section was established at each of these projects to assure that one section would have no maintenance done during the monitoring period. The GPS sections adjacent to these SPS-3 projects were not typically considered appropriate for the control section because GPS guidelines permit some maintenance activities. In some instances (where space was limited), GPS sites were used for the control section. However, this will necessitate that no maintenance be done on these particular GPS projects. The GPS sections identified as suitable for use in SPS-3 are shown in Table 2 along with pertinent information on each. A map of these sections is provided in Figure 3. State Highway Agencies were also encouraged to add supplementary sections incorporating treatments of particular interest to them that were not included in the experiment or comparable treatments with local materials. Layouts of the SPS-3 projects are shown in Table 3.

PRECONSTRUCTION PREPARATION

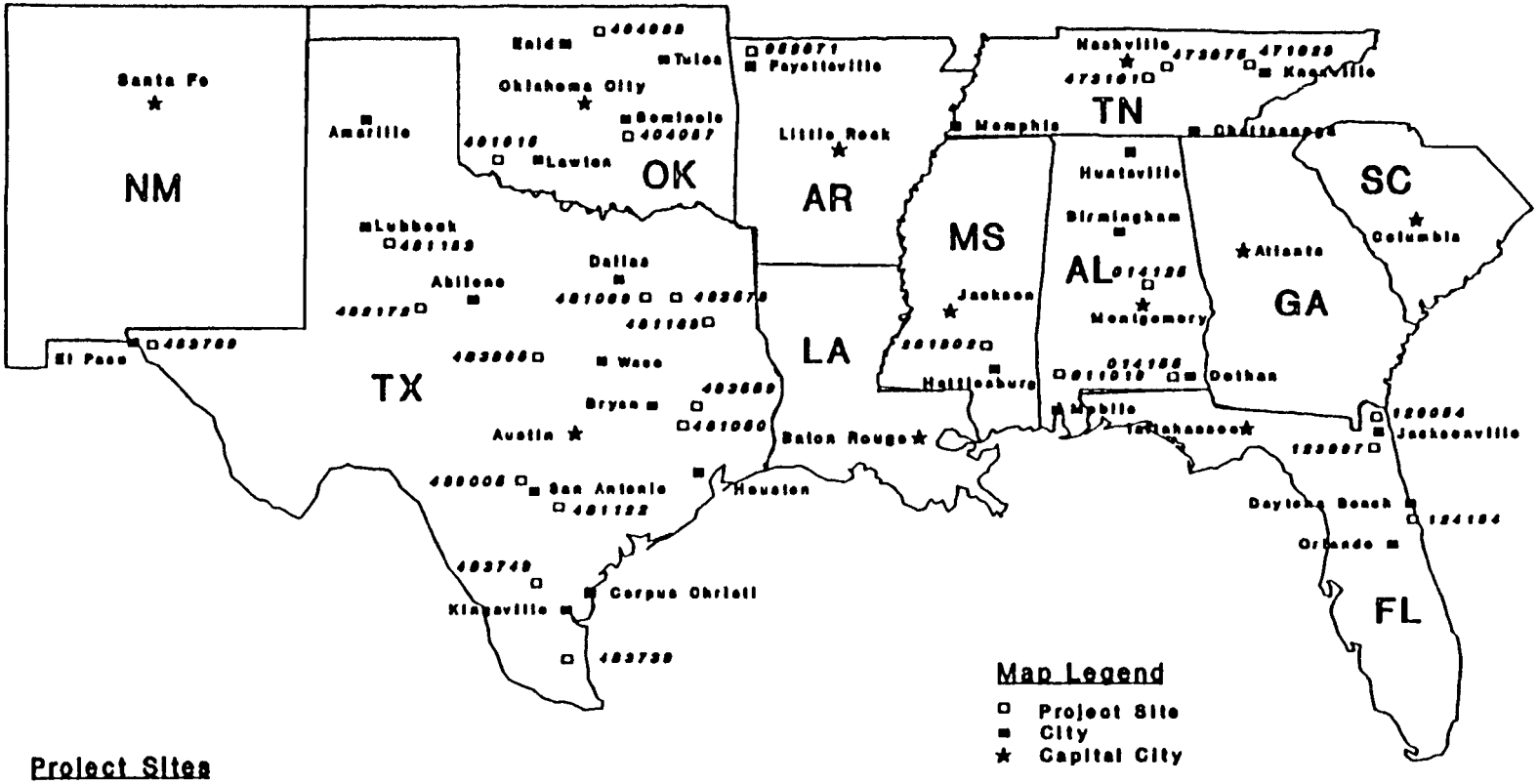
Core samples retrieved from each of the projects during the section verification process were retained for each of the projects and later forwarded to Western Technologies in Phoenix, Arizona, for testing. Other data collected at these sites prior to construction include profile, FWD, distress surveys and skid data. Status of the various data collection efforts are shown in Table 4.

MIX DESIGNS AND MATERIALS

After extensive discussion and testing, it was mutually agreed upon that the chip seal aggregate come from Capital Aggregates in San Antonio, Texas, and the slurry rock would come from Dravo Basic Materials in Columbia, Tennessee. The chip seal aggregate was a crushed, siliceous river gravel. Use of this material required a couple of exceptions from the chip seal aggregate specifications. A polish value of 28 was permitted in lieu of the 32 required, based on the historical records of friction numbers for this material. It has maintained a high friction number (upper 50's) for approximately 5-7 yrs. Unfortunately, when the friction numbers drop off they drop fairly rapidly. Minor modifications were also made in the top size of the aggregate to allow a small percentage (approximately 1%) of the chips to be retained on the ½" sieve. This was originally specified as 100% passing the ½"

TABLE 2 SOUTHERN REGION SPS-3 SITES 10-Jan-91

STATE	GPS SITE NO.	SPS SITE NO.	COUNTY	COND. CAT.	AGE	KESAL /YEAR	EXP. CELL
Alabama	011019	01B3	WASHINGTON	G	4	91	44
	014125	01A3	MONTGOMERY	G	18	155	37
	014155	01C3	HOUSTON	G	13	69	43
Arkansas	053071	05A3	BENTON	G	2	510	31
Florida	123997	12B3	CLAY	P	16	200	47
	124154	12C3	VOLUSIA	F	20	46	47
	129054	12A3	NASSAU	F	16	95	46
Mississippi	281802	28A3	COVINGTON	G	8	60	37
Oklahoma	401015	40B3	SEMINOLE	F	13	73	27
	404087	40A3	JACKSON	F	15	50	75
	404088	40C3	KAY	P	15	190	35
Tennessee	471023	47C3	ANDERSON	F	17	92	33
	473075	47B3	DEKALB	G	19	28	38
	473101	47A3	CANNON	P	9	34	29
Texas	481050	48H3	GRIMES	G	5	40	31
	481069	48B3	KAUFMAN	P	13	170	35
	481094	48A3	BEXAR	G	14	50	86
	481122	48J3	WILSON	G	16	90	79
	481169	48G3	RUSK	G	18	27	38
	481183	48E3	GARZA	B	15	200	96
	482172	48D3	MITCHELL	G	8	530	79
	483559	48I3	WALKER	G	20	28	25
	483579	48F3	VAN ZANDT	F	3	50	27
	483739	48N3	KENEDY	F	8	220	93
	483749	48M3	DUVAL	G	9	40	73
	483769	48L3	EL PASO	G	14	42	86
	483865	48Q3	MILLS	F	21	69	81
	489005	48K3	BEXAR	G	4	15	73



Project Sites

Alabama	3
Arkansas	1
Florida	3
Georgia	0
Louisiana	0
Mississippi	1
New Mexico	0
Oklahoma	3
South Carolina	0
Tennessee	3
Texas	13
Total Sites	27

SITE LOCATION MAP

SOUTHERN REGION

STRATEGIC HIGHWAY RESEARCH PROGRAM

One inch equals 200 miles

FIGURE 3

TABLE 3 SPS-3 SECTION LAYOUTS 24-Jan-91

STATE	HIGHWAY	LOCATION	SECTION ID.	TREATMENT	DATE COMPLETED	REMARKS
Alabama	US 43	Mobile	011019	GPS	1986	
			01B310	Thin Overlay	NOV 1990	
			01B320	Slurry Seal	21-Aug-90	
			01B330	Crack Seal	21-Aug-90	
			01B350	Chip Seal	21-Aug-90	
			01B340	Control	1986	
Alabama	SH 152	Montgomery	014125	GPS	1972	
			01A310	Thin Overlay	July 1990	
			01A320	Slurry Seal	07-Aug-90	
			01A330	Crack Seal	07-Aug-90	
			01A340	Control	1972	
			01A350	Chip Seal	07-Aug-90	
Alabama	US 84	Dothan	014155	GPS	1977	
			01C310	Thin Overlay	July 1990	
			01C320	Slurry Seal	09-Aug-90	
			01C330	Crack Seal	09-Aug-90	
			01C340	Control	1977	
			01C350	Chip Seal	09-Aug-90	
Arkansas	US 71	Rogers	053071	GPS	1988	
			05A310	Thin Overlay	17-Oct-90	
			05A320	Slurry Seal	05-Sep-90	
			05A330	Crack Seal	05-Sep-90	
			05A340	Control	1988	
			05A350	Chip Seal	05-Sep-90	
Florida	US 17	Green Cove Springs	123997	GPS	1974	
			12B310	Thin Overlay		
			12B320	Slurry Seal	15-Aug-90	
			12B330	Crack Seal	15-Aug-90	
			12B350	Chip Seal	15-Aug-90	
			12B351	Double Course Surface Treatment		
			12B352	Mineral Seal		
			12B360	AC (Industry Option)		
			12B311	Modified AC Overlay		
			12B321	Microsurfacing		
Florida	SH 442	Edgewater	12C310	Thin Overlay	19-Nov-90	
			124154	GPS	1970	
			12C320	Slurry Seal	17-Aug-90	
			12C330	Crack Seal	17-Aug-90	
			12C321	Microsurfacing		
			12C350	Chip Seal	17-Aug-90	
			12C351	Double Course Surface Treatment		
			12C352	Mineral Seal		
Florida	SH 200	Yulee	12A360	AC (Industry Option)		
			12A311	Modified AC Overlay		
			12A321	Microsurfacing		
			12A310	Thin Overlay		
			129054	GPS	1974	
			12A320	Slurry Seal	13-Aug-90	
			12A330	Crack Seal	13-Aug-90	
			12A350	Chip Seal	13-Aug-90	
			12A351	Double Course Surface Treatment		
			12A352	Mineral Seal		

(1) As initially laid out and monitored.

TABLE 3 SPS-3 SECTION LAYOUTS (Continued) 24-Jan-91

STATE	HIGHWAY	LOCATION	SECTION ID.	TREATMENT	DATE COMPLETED	REMARKS
Mississippi	US 84	Laurel	281802	GPS	1982	
			28A310	Thin Overlay	02-Oct-90	
			28A330	Crack Seal	23-Aug-90	28A320(1)
			28A320	Slurry Seal	23-Aug-90	28A330(1)
			28A350	Chip Seal	23-Aug-90	
Oklahoma	SH 3 & 99	Seminole	401015	GPS	1977	
			40B310	Thin Overlay	16-Nov-90	
			40B320	Slurry Seal	10-Sep-90	
			40B330	Crack Seal	10-Sep-90	
			40B350	Chip Seal	10-Sep-90	
			40B360	Microsurfacing		
			40B351	State Chip Seal		
Oklahoma	US 62	Altus	404087	GPS	1985	
			40A310	Thin Overlay		
			40A320	Slurry Seal	12-Sep-90	
			40A330	Crack Seal	12-Sep-90	
			40A350	Chip Seal	12-Sep-90	
			40A311	Blade HMAC		Wheelpaths Only
			40A321	Microsurfacing		Wheelpaths Only
			40A351	Strip Seal		Wheelpaths Only
Oklahoma	US 60	Tonkawa	40C311	Microsurfacing		
			40C310	Thin Overlay	14-Nov-90	
			404088	GPS	1975	
			40C320	Slurry Seal	07-Sep-90	
			40C330	Crack Seal	07-Sep-90	
			40C350	Chip Seal	07-Sep-90	
Tennessee	IH 75	Knoxville	471023	GPS	1973	
			47C330	Crack Seal	03-Aug-90	
			47C350	Chip Seal	03-Aug-90	
			47C320	Slurry Seal	03-Aug-90	
			47C310	Thin Overlay	11-Jun-90	
Tennessee	SH 56	Smithville	47B320	Slurry Seal	02-Aug-90	
			47B310	Thin Overlay	June 1990	
			473075	GPS	1971	
			47B350	Chip Seal	02-Aug-90	
			47B330	Crack Seal	02-Aug-90	
Tennessee	SH 96	Murfreesboro	47A310	Thin Overlay	June 1990	
			47A320	Slurry Seal	30-Jul-90	
			47A330	Crack Seal	30-Jul-90	
			473101	GPS	1981	
			47A350	Chip Seal	30-Jul-90	
Texas	SH 105	Navasota	48H310	Thin Overlay	29-Oct-90	
			48H320	Slurry Seal	11-Oct-90	
			481050	GPS	1985	
			48H350	Chip Seal	11-Oct-90	48H330(1)
			48H340	Control	1985	
			48H330	Crack Seal	11-Oct-90	48H350(1)
Texas	US 175	Kaufman	48B310	Thin Overlay	19-Sep-90	
			48B320	Slurry Seal	26-Sep-90	
			481069	GPS	1977	
			48B330	Crack Seal	26-Sep-90	
			48B340	Control	1977	
			48B350	Chip Seal	26-Sep-90	

(1) As initially laid out and monitored.

TABLE 3 SPS-3 SECTION LAYOUTS (Continued) 24-Jan-91

STATE	HIGHWAY	LOCATION	SECTION ID.	TREATMENT	DATE COMPLETED	REMARKS
Texas	SH 16	Helotes	48A310	Thin Overlay	05-Dec-89	
			481094	GPS	1976	
			48A320	Slurry Seal	04-Dec-90	
			48A330	Crack Seal	05-Dec-89	
			48A340	Control	1976	
			48A350	Chip Seal	05-Dec-89	
Texas	US 181	Floresville	48J313	Modified AC Overlay		ACP-SBS
			48J312	Modified AC Overlay		ACP-SBR
			48J311	Modified AC Overlay		ACD-NMA
			48J310	Thin Overlay	31-Oct-90	
			48J320	Slurry Seal	16-Oct-90	
			48J330	Crack Seal	16-Oct-90	
			481122	GPS	1974	
			48J340	Control	1974	
			48J350	Chip Seal	16-Oct-90	
			48J321	Microsurfacing		
			48J361	Fog Seal		
			48J360	Rejuvenating Agent		
			48J351	Rubber Seal	12-Jul-90	
			48J352	Block Co-Polymer		SBS Seal
Texas	SH 322	Henderson	48G310	Thin Overlay	05-Oct-90	
			481169	GPS	1972	
			48G320	Slurry Seal	05-Oct-90	
			48G330	Crack Seal	05-Oct-90	
			48G350	Chip Seal	05-Oct-90	
Texas	US 84	Southland	481183	GPS	1975	
			48E310	Thin Overlay	25-Sep-90	
			48E320	Slurry Seal	14-Sep-90	
			48E330	Crack Seal	14-Sep-90	
			48E340	Control	1975	
			48E350	Chip Seal	14-Sep-90	
			48E351	Rubber Asphalt		
			48E352	Double Course Surface Treatment	19-Sep-90	
Texas	IH 20	Colorado City	48D310	Thin Overlay	09-Oct-90	
			48D320	Slurry Seal	18-Sep-90	
			482172	GPS	1982	
			48D330	Crack Seal	18-Sep-90	
			48D350	Chip Seal	18-Sep-90	
Texas	SH 30	Huntsville	483559	GPS	1970	
			481310	Thin Overlay	29-Nov-90	
			481320	Slurry Seal	10-Oct-90	
			481330	Crack Seal	10-Oct-90	
			481340	Control	1970	
			481350	Chip Seal	10-Oct-90	
Texas	SH 19	Canton	483579	GPS	1987	
			48F310	Thin Overlay	04-Oct-90	
			48F320	Slurry Seal	04-Oct-90	
			48F330	Crack Seal	04-Oct-90	
			48F340	Control	1987	
			48F350	Chip Seal	04-Oct-90	

(1) As initially laid out and monitored.

TABLE 3 SPS-3 SECTION LAYOUTS (Continued) 24-Jan-91

STATE	HIGHWAY	LOCATION	SECTION ID.	TREATMENT	DATE COMPLETED	REMARKS
Texas	US 77	Kingsville	483739	GPS	1982	
			48N310	Thin Overlay	13-Aug-90	
			48N320	Slurry Seal	19-Oct-90	
			48N330	Crack Seal	19-Oct-90	
			48N340	Control	1982	
			48N350	Chip Seal	19-Oct-90	
			48N311	Thin Overlay Over a Seal Coat		
			48N360	Rejuvenating Agent		
			48N370	Latex Modified Seal		
Texas	US 59	Freer	483749	GPS	1981	
			48M310	Thin Overlay	08-Aug-90	
			48M320	Slurry Seal	18-Oct-90	
			48M330	Crack Seal	18-Oct-90	
			48M340	Control	1981	
			48M350	Chip Seal	18-Oct-90	
Texas	US 62	El Paso	483769	GPS	1976	
			48L310	Thin Overlay		
			48L320	Slurry Seal	20-Sep-90	
			48L330	Crack Seal	20-Sep-90	
			48L340	Control	1976	
			48L350	Chip Seal	20-Sep-90	
Texas	US 183	Mullin	483865	GPS	1969	
			48Q310	Thin Overlay	25-Sep-90	
			48Q320	Slurry Seal	24-Sep-90	
			48Q330	Crack Seal	24-Sep-90	
			48Q340	Control	1969	
			48Q350	Chip Seal	24-Sep-90	
			48Q353	Surface Treatment		
			48Q321	Microsurfacing		
Texas	FM 1560	Helotes	48K360	Rejuvenating Agent		
			48K361	Fog Seal		
			48K351	Rubber Seal	13-Jul-90	
			48K352	Block Co-Polymer		SBS Seal
			48K321	Microsurfacing		
			48K313	Modified AC Overlay		ACP-SBS
			48K312	Modified AC Overlay		ACP-SBR
			48K311	Modified AC Overlay		ACD-NMA
			48K310	Thin Overlay	31-Oct-90	
			48K320	Slurry Seal	15-Oct-90	
			48K330	Crack Seal	15-Oct-90	
			489005	GPS	1986	
			48K340	Control	1986	
			48K350	Chip Seal	15-Oct-90	

(1) As initially laid out and monitored.

TABLE 4. STATUS OF SHRP LTPP SOUTHERN REGION SPS-3 SECTIONS, PRECONSTRUCTION

22-Jan-91

ST CD	SHRP ID NUMBER	HIGHWAY	DIR	No.	NEAREST GPS SECTION	DATE OF CONSTRUC-TION	DRILLING & SAMPLING DATA TAKEN	R	V	E	FWD DATA TAKEN	R	V	E	PROFILOMETER DATA TAKEN	C	V	E	SKID DATA TAKEN	V	E	T	DISTRESS DATA TAKEN	I R	U E	D R	D V	D E	MAINTENANCE RECEIVED	V	E
AL	01A3	AL-152	WB	5	14125	08/07/90	01/31/90	*							06/07/90	*			06/15/90	*		P	06/08/90								
AL	01B3	US-43	SB	5	11019	08/21/90	02/01/90	*							06/05/90	*			06/14/90	*		P	04/16/90								
AL	01C3	US-84	EB	5	14155	08/09/90	02/02/90	*							06/08/90	*			06/15/90	*		P	06/10/90								
AR	05A3	US-71	NB	4	53071	09/05/90	03/08/90				06/19/90	*			08/31/90	*						P	06/02/90								
FL	12A3	FL-200	WB	9	129054	08/13/90	09/21/89	*			07/24/90	*			06/19/90	*						M	08/13/90								
FL	12B3	US-17	SB	9	123997	08/16/90	09/22/89	*			07/31/90	*			06/20/90	*						M	08/15/90								
FL	12C3	FL-442	EB	7	124154	08/17/90	11/09/89	*			08/06/90	*			07/16/90	*						M	08/17/90								
MS	28A3	US-82	EB	4	281802	08/23/90	02/07/90								08/09/90	*						P	06/19/90								
OK	40A3	US-62	EB	8	404087	09/12/90	10/09/89	*			05/23/90	*			09/11/90	*						P	01/17/90								
OK	40B3	OK-3	NB	6	401015	09/10/90	10/10/89	*			05/14/90	*			09/06/90	*						P	01/08/90								
OK	40C3	US-60	EB	5	404088	09/07/90	10/11/89	*			06/01/90	*			09/05/90	*						P	01/20/90								
TN	47A3	ST-96	EB	4	473101	07/30/90	11/22/90				06/29/90	*			05/16/90	*						P	11/04/89								
TN	47B3	ST-56	SB	4	473075	08/02/90	11/22/90				06/29/90	*			05/16/90	*						P	06/07/90								
TN	47C3	I-75	NB	4	471023	08/03/90	11/22/90								05/11/90	*						P	04/11/90								
TX	48A3	SH-16	WB	5	481094	12/04/89	08/14/89	*			10/08/89	*							10/04/89	*		M	08/14/89								
TX	48B3	US-175	EB	5	481069	09/26/90	11/08/89	*			09/07/90	*			03/13/90	*			06/06/90	*		P	09/17/90								
TX	48D3	IH-20	WB	4	482172	09/18/90	11/16/89	*			08/07/90	*			09/13/90	*			07/20/90	*		P	09/15/90								
TX	48E3	US-84	NB	7	481183	09/14/90	11/17/89	*			08/08/90	*			09/12/90	*			07/12/90	*		P	12/06/90								
TX	48F3	SH-19	NB	5	483579	10/04/90	11/20/89	*			07/25/90	*			08/28/90	*			09/06/90	*		P	09/17/90								
TX	48G3	SH-322	NB	4	481169	10/05/90	11/21/89	*			07/24/90	*			04/23/90	*			09/07/90	*		P	09/17/90								
TX	48H3	SH-105	WB	5	481050	10/11/90	05/01/90	*			07/31/90	*			03/16/90	*			09/06/90	*		P	09/21/90								
TX	48I3	SH-30	EB	5	483559	10/10/90	05/01/90	*			07/30/90	*			03/15/90	*			09/06/90	*		P	09/21/90								
TX	48J3	US-181	NB	13	481122	10/16/90	01/29/90	*			08/07/90	*			04/05/90	*			05/02/90	*		M	10/16/90								
TX	48K3	FM-1560	SB	13	489005	10/15/90	12/04/89	*			08/01/90	*			04/06/90	*			04/23/90	*		M	10/10/90								
TX	48L3	US-62	EB	5	483769	09/20/90	05/17/90	*			09/06/90	*			09/14/90	*			07/18/90	*		P	09/11/90								
TX	48M3	US-59	NB	5	483749	10/18/90	12/21/89	*			09/12/90	*			03/28/90	*			09/13/90	*		P	10/17/90								
TX	48N3	US-77	NB	8	483739	10/19/90	12/20/89	*			09/10/90	*			03/30/90	*			09/10/90	*		P	06/22/90								
TX	48Q3	US-183	NB	7	483865	09/20/90	04/10/90	*			08/14/90	*			09/17/90	*			08/29/90	*		P	09/17/90								

(No.) No. of Sections, (R) REC'D, (V) VER'D, (E) ENT'D, (\) TEMPS, (/) DEFLS, (X) TEMPS & DEFLS, (C) CONVERTED, (T) TECHNIQUE, (D) REDUCED DATA

TABLE 4. STATUS OF SHRP LTPP SOUTHERN REGION SPS-3 SECTIONS, POSTCONSTRUCTION

29-Jan-91

ST CD	SHRP ID NUMBER	HIGHWAY	DIR	No.	NEAREST GPS SECTION	DATE OF CONSTRUC-TION	DRILLING & SAMPLING DATA TAKEN	R	V	E	FWD DATA TAKEN	R	V	E	PROFILOMETER DATA TAKEN	C	V	E	SKID DATA TAKEN	V	E	DISTRESS DATA T	TAKEN	I R	U E	D R	D V	D E	MAINTENANCE RECEIVED	V	E	CONSTRUCTION THIN OVERLAY DONE
AL	01A3	AL-152	WB	5	14125	08/07/90					11/19/90	*			12/11/90	*						M	12/11/90								
AL	01B3	US-43	SB	5	11019	08/21/90					11/26/90	*										M	12/13/90								
AL	01C3	US-84	EB	5	14155	08/09/90					11/20/90	*			12/12/90	*						M	12/12/90								
AR	05A3	US-71	NB	4	53071	09/05/90					12/06/90	*			01/22/91	*						M	12/21/90								
FL	12A3	FL-200	WB	9	129054	08/13/90																M	11/20/90								
FL	12B3	US-17	SB	9	123997	08/16/90					11/08/90	*										M	11/20/90								
FL	12C3	FL-442	EB	7	124154	08/17/90					11/09/90	*										M	11/19/90								
MS	28A3	US-82	EB	4	281802	08/23/90					11/27/90	*										M	12/28/90								10/02/90
OK	40A3	US-62	EB	8	404087	09/12/90					12/11/90	*										M	11/28/90								
OK	40B3	OK-3	NB	6	401015	09/10/90					12/10/90	*			01/11/91	*						M	11/30/90								11/15/90
OK	40C3	US-60	EB	5	404088	09/07/90					12/07/90	*										P	12/07/90								
TN	47A3	ST-96	EB	4	473101	07/30/90					11/16/90	*										M	11/14/90								08/15/90
TN	47B3	ST-56	SB	4	473075	08/02/90					11/15/90	*										M	11/16/90								07/09/90
TN	47C3	I-75	NB	4	471023	08/03/90					11/14/90	*										M	11/14/90								06/11/90
TX	48A3	SH-16	WB	5	481094	12/04/89					08/02/90	*			03/20/90	*			11/09/90	*		P	10/14/90								12/04/90
TX	48B3	US-175	EB	5	481069	09/26/90					01/14/91	*							11/12/90	*		M	12/20/90								09/19/90
TX	48D3	IH-20	WB	4	482172	09/18/90					12/13/90	*							11/14/90	*		M	12/13/90								10/12/90
TX	48E3	US-84	NB	7	481183	09/14/90					12/12/90	*							11/15/90	*		M	09/25/90								09/25/90
TX	48F3	SH-19	NB	5	483579	10/04/90					01/15/91	*							11/12/90	*		M	01/15/91								
TX	48G3	SH-322	NB	4	481169	10/05/90					01/16/91	*							11/13/90	*		M	01/16/91								
TX	48H3	SH-105	WB	5	481050	10/11/90													11/13/90	*		M	11/15/90								10/29/90
TX	48I3	SH-30	EB	5	483559	10/10/90					01/17/91	*							11/13/90	*		M	11/15/90								11/30/90
TX	48J3	US-181	NB	13	481122	10/16/90					01/22/91	*							11/09/90	*		M	12/11/90								10/31/90
TX	48K3	FM-1560	SB	13	489005	10/15/90					01/21/91	*							11/09/90	*		M	12/11/90								10/31/90
TX	48L3	US-62	EB	5	483769	09/20/90																M	12/13/90								
TX	48M3	US-59	NB	5	483749	10/18/90													11/20/90	*		M	12/06/90								08/08/90
TX	48N3	US-77	NB	8	483739	10/19/90													11/16/90	*		M	12/06/90								08/13/90
TX	48Q3	US-183	NB	7	483865	09/20/90					01/11/91	*							11/13/90	*		P	10/27/90						11/20/90	*	*	09/25/90

(No.) No. of Sections, (R) REC'D, (V) VER'D, (E) ENT'D, (\) TEMPS, (/) DEFLS, (X) TEMPS & DEFLS, (C) CONVERTED, (T) TECHNIQUE, (D) REDUCED DATA

sieve to minimize windshield damage. Both modifications were made to minimize the additional cost of having the aggregate specially prepared for this contract. These modifications were made in agreement with all members of the Expert Task Group. The slurry aggregate was an arc furnace slag. The emulsions came from Ergon Asphalt Emulsions in Vicksburg, Mississippi. The emulsion used for the chip seal was a CRS-2 and for the slurry treatments a modified CQS-1h. The oil and rock combinations were checked for compatibility. The chip seal combinations proved adequate, as is. The slurry seal combination needed some adjustment in the emulsion recipe. This was accomplished through the efforts of Ben Benedict (with Alpha Labs in Alpha, Ohio) and Ergon Asphalt.

The mix designs were originally developed by B.A.S.S., or their subcontractors, and submitted to SHRP via the EFLHD for approval. For the chip seal mix design, B.A.S.S. used several methods in combination; MS-13 - '75 edition, MS-19 - '79 edition, the Asphalt Institute program and B.A.S.S. called upon the Texas Highway Dept. San Antonio District Lab and their experience with this material as a chip seal aggregate. Ben Benedict prepared the slurry seal mix design for B.A.S.S. These mix designs were then checked and approved by TTI and SHRP-SRCO personnel, with minor modifications.

The initial chip seal mix design was to shoot for 0.36 gal/sy emulsion and 22 lb/sy of aggregate for a slightly oxidized, slightly porous and pocked pavement (see Figure 4). Adjustments would then be made from site to site to account for varying surface conditions. As the project progressed, the chip seal target emulsion rate was gradually adjusted upwards from 0.36 gal/sy to about 0.40 gal/sy for the standard condition. Our experience showed that 0.36 gal/sy wasn't getting enough percent embedment of the chips in the emulsion. Industry representatives concurred with this adjustment based on their calculations and observations of the material properties and construction.

The initial slurry seal mix design was for 16-18 lb/sy of mix, 13.8% emulsion and 0.50-0.75% cement. This was adjusted slightly during construction of the first three sites based on further testing and field experience. The target aggregate rate remained the same, but the percent emulsion was lowered to 13.2%, the cement was increased to 1%, and 0.1% K-3 additive was recommended. (See Figure 5.)

CALIBRATION/DEMONSTRATION

As part of the contract, the contractor was asked to conduct a calibration and demonstration session at his offices in North Little Rock, Arkansas, prior to initiating work on the test sections, to minimize "surprises" in the field. This session was attended by B.A.S.S., TTI, SHRP-SRCO, and EFLHD personnel. The slurry seal truck was calibrated according to standard ISSA techniques and found to be satisfactory. The rock belt was calibrated at different gate settings and from this a plot was made. The cement counter and emulsion pump were similarly calibrated, referencing the rock belt. The chip seal equipment was calibrated according to guidelines from TTI. The chip spreader was calibrated to verify uniform application of the aggregate, both in the longitudinal and transverse direction. The asphalt emulsion distributor was calibrated with a modified version of the ASTM D 2995 test, and showed very little transverse or longitudinal variation in the distributor output. There was a discrepancy between the target emulsion application rate and the emulsion rate

CHIP SEAL MIX DESIGN

AGGREGATE

Crushed River Gravel From Capital Aggregates, San Antonio, TX
Bulk Specific Gravity (BSG) = 2.565
Loose Unit Weight = 92 lb/CF
Gradation =

Sieve Size	% Passing Dry	Specs
5/8″	100.0	-
1/2″	98.9	100
3/8″	66.7	40-70
1/4″	-	0-15
#4	4.0	-
#10	0.8	0-5
#200	0.0	0-1

The Median Size (D50) = 0.32″
Flakiness Index (FI) = 10%
Average Least Dimension (H) = f (FI,D50) = 0.255″

Aggregate Spread Rate (S) = 37.4 × BSG × H × E = 24.5 to 26.9
where E is the Wastage Factor (Varying From 0-10%)

Targeted 22 lbs/sy (As Proposed by B.A.S.S.)

BINDER

CRS-2 Emulsion From Ergon Asphalt, Vicksburg, MS
% Residual Asphalt In Emulsion (R) = 0.62

Emulsion Application Rate (A) = ((1.122 × T × H) + V)/R = 0.19 to 0.38
where T = Traffic Factor (>2,000 ADT) = 0.60
H = Average Least Dimension of Aggregate (See Above) = 0.255″
V = Adjustment for Surface Condition =
(From Flushed (-0.03) to Badly Pocked, Porous Oxidized (+0.09))

Targeted 0.36 gal/sy (As Proposed by B.A.S.S.)

No Mineral Filler or Additives Were Used

FIGURE 4

SLURRY SEAL MIX DESIGN
(Performed by Ben Benedict)

AGGREGATE

Arc Furnace Slag From Dravo Basic Materials, Columbia, TN
Gradation =

Sieve Size	% Passing Dry[1]	Wet[1]	Dry[2]	Wet[2]	Specs
3/8"	100.0	100.0	-	-	-
5/16"	99.6	99.6	-	-	-
1/4"	-	-	100.0	100.0	70-90
#4	89.7	89.9	93.8	94.0	-
#8	65.9	66.1	55.6	50.1	45-70
#16	44.3	44.7	30.5	31.2	28-50
#30	28.6	29.3	17.8	18.6	19-34
#50	18.6	19.3	11.5	12.5	12-25
#100	12.3	13.2	8.3	9.5	7-18
#200	7.3	8.7	5.5	7.2	5-15
#325	1.4	4.8	2.2	5.1	-

[1] - As of 07/23/90
[2] - As of 08/09/90

Spread Rate Recommended	15 to 21 lbs/sy
Spread Rate From Specifications	15 to 25 lbs/sy
Targeted Spread Rate	16 to 18 lbs/sy

BINDER

CQS - 1h (Slightly Modified) From Ergon Asphalt Emulsions, Vicksburg, MS
62% Residual
Proportioned at 13.5% to 14.5% (Revised to 11.7% to 14.7% on 08/09/90)

ADDITIVE

K-3 (1% Solution) at 1% to 4% (Revised to 0.5% to 1.0% on 08/09/90)

MINERAL FILLER

Type I Portland Cement at 0.4% to 0.75% (Revised to 1.0% to 1.5% on 08/09/90)

WATER

Less Than 30% of Total Liquid

FIGURE 5

that was actually obtained. Attempts were made to shoot a 0.36 gal/sy, resulting in an actual rate of approximately 0.24 gal/sy. This was first suspected to be the difference between the emulsion and the dried residual asphalt cement. Further tests failed to explain the cause of this offset, so it was simply included into the calculations. The offset got worse with time. It was finally established that the tachometer was 35% high and the pump speed indicator was about 6% low. This was a constant struggle throughout the project, but in most cases rates were adequately adjusted to compensate for this offset. The chip spreader was also recalibrated about halfway through the project. It was starting to put down too much rock overall and the transverse variation had increased slightly.

After the calibration activities were completed, B.A.S.S. chose a short section of a county road near their office to demonstrate their operation and equipment. They put down two short sections of chips side by side. Their operation and the materials compatibility proved to be satisfactory, even though it rained hard for 30 min. about an hour after the chips were placed. Although some minor complications were encountered (rain and a limited supply of materials), the slurry seal demonstration also proved satisfactory. B.A.S.S. also demonstrated their crack sealing operation in a nearby parking lot. This operation was considered acceptable, but they were asked to use a 3″ squeegee (which they normally didn't do).

CONSTRUCTION

The following is a brief description of the typical construction sequence.

1. Load the equipment with gas and materials.
2. Test the equipment.
3. Set up traffic control on nontest lane.
4. Shoot the chips, the slurry, then seal the cracks on nontest lane.
5. Reload equipment with materials.
6 Switch traffic control to the test lane. (After approximately 2 hrs. of cure time.)
7. Shoot the chips, the slurry, then seal the cracks on the test lane.
8. Start breaking down and loading equipment while treatments cured.
9. Pull traffic control.

The following day was spent completing equipment loading, traveling to the next site, and unloading the equipment at the next site.

A summary of the application rates at the 27 sites can be found in Table 5. Appendix C contains a detailed listing of the Field Notes for each of the 27 sites constructed. As can be seen in this appendix, there were many problems/discrepancies, but overall the results achieved were good. From Table 5 one can see the attempts that were made at each site to adjust the application rates (as needed) for existing site conditions (i.e., surface texture and anticipated surface absorption of the binder).

TABLE 5 SHRP, SRCO, SPS-3 - CONSTRUCTION DATA SUMMARY

						Chip Seal Applications						Slurry Seal Applications									Crack Sealing	
Site	County	Date	Highway	Direction	Lane	Area (sy)	Emulsion used (gal)	Emulsion Rate (gal/sy)	Emulsion Rate * (gal/sy)	Aggregate Rate, IWP (lb/sy)	Aggregate Rate, BWP (lb/sy)	Area (sy)	Aggregate used "dry" (lb)	Emulsion used "strap" (gal)	Emulsion used "belt" (gal)	Cement used (lb)	Slurry Rate "dry" (lb/sy)	Percent Emulsion (%)	Percent Cement (%)	Percent Water (%)	Length Cracks Sealed (ft)	Length sealed by BASS (ft)
47A3	Cannon	07/30/90	SH 96	EB	NONTEST	1089	550	0.505	0.493	---	16.8	1133	18856	390	305	140	16.6	13.7	0.74	13.3	710	710
		07/30/90			TEST	1011	450	0.445	0.433	---	21.2	1133	26851	450	435	210	23.7	13.7	0.78	10.2	4103	4103
47B3	DeKalb	08/02/90	SH 56	SB	NONTEST	997	325	0.326	0.319	17.8	17.5	1068	14786	245	242	84	13.8	13.8	0.57	12.7	0	0
		08/02/90			TEST	997	350	0.351	0.343	23.0	22.8	1068	17324	275	283	98	16.2	13.8	0.56	15.2	0	0
47C3	Anderson	08/03/90	IH 75	NB	NONTEST	1245	400	0.321	0.313	21.5	21.1	1104	10371	205	170	137	9.4	13.8	1.32	18.1	1450	1450
		08/03/90			TEST	1153	425	0.367	0.361	25.5	24.0	1068	19534	320	320	258	18.3	13.8	1.32	15.6	2175	2175
01A3	Montgomery	08/07/90	SH 152	WB	NONTEST	1011	300	0.297	0.289	23.0	22.5	972	19886	290	290	157	20.5	12.3	0.79	11.5	0	0
		08/07/90			TEST	1011	265	0.262	0.256	23.2	21.2	972	19087	270	278	165	19.6	12.3	0.87	13.1	195	195
01C3	Houston	08/09/90	US 84	EB	NONTEST	972	285	0.293	0.286	22.3	22.2	942	20173	290	294	116	21.4	12.3	0.58	12.3	453	453
		08/09/90			TEST	995	375	0.377	0.368	23.5	22.0	942	17995	240	276	112	19.1	13.0	0.62	14.1	1808	1808
12A3	Nassau	08/13/90	SH 200	WB	NONTEST	972	310	0.319	0.310	22.5	25.0	933	12880	220	205	43	13.8	13.4	0.33	10.0	730	730
		08/13/90			TEST	933	295	0.316	0.308	26.5	22.5	958	17567	300	279	49	18.3	13.4	0.28	11.9	210	210
12B3	Clay	08/15/90	US 17	SB	NONTEST	972	355	0.365	0.355	22.0	23.0	933	22368	310	334	48	24.0	12.6	0.21	8.8	215	215
		08/15/90			TEST	933	330	0.354	0.344	25.5	22.0	972	25585	365	376	56	26.3	12.4	0.22	10.4	2905	2905
12C3	Volusia	08/17/90	SH 442	EB	NONTEST	972	365	0.376	0.365	24.0	22.5	933	18188	280	301	183	19.5	14.0	1.00	10.0	2438	2438
		08/17/90			TEST	972	350	0.360	0.352	24.5	23.0	986	21818	325	361	219	22.1	14.0	1.00	9.4	3521	3521
01B3	Washington	08/21/90	US 43	SB	NONTEST	1011	345	0.341	0.332	21.8	20.8	972	13815	230	250	151	14.2	15.2	1.09	10.0	0	0
		08/21/90			TEST	933	295	0.316	0.308	31.0	28.0	972	15876	250	264	159	16.3	14.0	1.00	13.9	0	0
28A3	Covington	08/23/90	US 84	EB	NONTEST	903	315	0.349	0.341	22.5	22.5	885	15507	260	260	155	17.5	14.0	1.00	9.9	230	230
		08/23/90			TEST	881	275	0.312	0.305	25.5	22.5	987	23139	410	384	233	23.4	14.0	1.00	11.1	330	330
05A3	Benton	09/05/90	US 71	NB	NONTEST	1050	450	0.429	0.419	22.0	21.0	1200	22848	350	354	214	19.0	13.1	0.93	16.4	0	0
		09/05/90			TEST	1050	385	0.367	0.359	25.5	22.5	1011	20384	300	308	196	20.2	12.7	0.96	17.4	0	0
40C3	Kay	09/07/90	US 60	EB	NONTEST	1011	340	0.336	0.328	27.5	23.5	1018	19571	285	297	178	19.2	12.8	0.91	14.3	350	35
		09/07/90			TEST	985	395	0.401	0.393	30.0	25.0	1040	19800	315	300	191	19.0	12.8	0.96	12.6	195	30
40B3	Seminole	09/10/90	SH3/SH99	NB	NONTEST	1089	410	0.376	0.367	18.0	14.5	1011	16258	250	246	158	16.1	12.8	0.97	12.8	200	50
		09/10/90			TEST	1018	390	0.383	0.374	22.0	20.0	1069	17155	290	260	167	16.1	12.8	0.97	14.6	610	150
40A3	Jackson	09/12/90	US 62	EB	NONTEST	1031	400	0.388	0.379	21.2	23.1	1133	18636	275	282	182	16.5	12.8	0.98	14.8	0	0
		09/12/90			TEST	1031	395	0.383	0.376	26.5	23.0	1084	19288	305	292	188	17.8	12.8	0.97	16.4	0	0
48E3	Garza	09/14/90	US 84	NB	NONTEST	1076	370	0.344	0.337	23.5	23.0	1011	15362	220	233	148	15.2	12.8	0.96	13.3	150	150
		09/14/90			TEST	1011	360	0.356	0.350	25.0	23.0	998	17060	265	258	165	17.1	12.8	0.97	11.5	0	0
48D3	Mitchell	09/18/90	IH 20	WB	NONTEST	1063	395	0.372	0.363	25.0	23.0	1011	23063	335	349	224	22.8	12.8	0.97	7.6	995	195
		09/18/90			TEST	1020	390	0.382	0.373	23.5	19.5	988	20941	305	317	204	21.2	12.8	0.97	8.0	1480	80
48L3	El Paso	09/20/90	US 62	EB	NONTEST	1042	430	0.413	0.403	25.0	23.0	1011	21058	335	319	204	20.8	12.8	0.97	10.3	275	275
		09/20/90			TEST	1011	400	0.396	0.387	23.0	23.0	1011	21726	330	329	211	21.5	12.8	0.97	11.2	360	360
48D3	Mills	09/24/90	US 183	NB	NONTEST	1063	400	0.376	0.369	21.0	20.0	1062	17773	280	269	171	16.7	12.8	0.96	8.7	0	0
		09/24/90			TEST	985	370	0.376	0.369	22.0	21.5	1026	17055	255	258	166	16.6	12.8	0.97	9.5	0	0
48B3	Kaufman	09/26/90	US 175	EB	NONTEST	1024	420	0.410	0.401	21.5	21.0	1026	18909	280	286	181	18.4	12.8	0.96	12.6	3500	1575
		09/26/90			TEST	1024	415	0.405	0.397	25.5	21.0	1006	19037	290	288	184	18.9	12.8	0.97	11.1	1250	750

* Corrected to 60F
- IWP (In Wheelpaths)
- BWP (Between Wheelpaths)

TABLE 5 SHRP, SRCO, SPS-3 - CONSTRUCTION DATA SUMMARY (Continued)

						Chip Seal Applications						Slurry Seal Applications								Crack Sealing	
Site	County	Date	Highway	Direction	Lane	Area (sy)	Emulsion used (gal)	Emulsion Rate (gal/sy)	Emulsion Rate * (gal/sy)	Aggregate Rate, IWP (lb/sy)	Aggregate Rate, BWP (lb/sy)	Area (sy)	Aggregate used "dry" (lb)	Emulsion used "strap" (gal)	Emulsion used "belt" (gal)	Cement used (lb)	Slurry Rate "dry" (lb/sy)	Percent Emulsion (%)	Percent Cement (%)	Percent Water (%)	Length Cracks Sealed (ft)	Length Sealed by BASS (ft)
48F3	Van Zandt	10/04/90	SH 19	NB	NONTEST	1037	470	0.453	0.445	20.0	19.0	1069	12198	190	190	118.3	11.4	12.77	0.97	13.66	75	75
		10/04/90			TEST	1011	390	0.386	0.378	25.0	23.0	1021	14454	220	219	136	14.2	12.77	0.94	14.98	48	48
48B3	Rusk	10/05/90	SH 322	NB	NONTEST	1037	495	0.477	0.466	23.0	19.0	1011	20117	310	305	192	19.9	12.77	0.96	11.17	0	0
		10/05/90			TEST	1011	475	0.470	0.459	24.0	22.2	998	18307	280	277	175	18.3	12.77	0.96	14.33	0	0
48I3	Walker	10/10/90	SH 30	EB	NONTEST	1037	400	0.386	0.374	24.5	22.0	1026	20696	315	314	199	20.2	12.77	0.96	11.47	0	0
		10/10/90			TEST	1024	420	0.410	0.398	25.0	21.0	1019	19956	300	302	107	19.6	12.77	0.54	11.68	0	0
48H3	Grimes	10/11/90	SH 105	WB	NONTEST	1031	410	0.398	0.387	21.5	24.0	1011	18419	280	279	170	18.2	12.77	0.92	11.10	2700	900
		10/11/90			TEST	1019	400	0.393	0.384	23.0	22.5	1011	17472	260	265	155	17.3	12.77	0.89	13.10	48	48
48K3	Bexar	10/15/90	FM 1560	SB	NONTEST	1037	440	0.424	0.416	22.5	20.0	1013	15679	250	238	143	15.5	12.77	0.91	10.60	0	0
		10/15/90			TEST	1011	435	0.430	0.421	25.0	22.5	1013	18285	290	277	178	18.1	12.77	0.97	8.40	0	0
48J3	Wilson	10/16/90	US 181	NB	NONTEST	1089	495	0.455	0.445	22.5	20.0	1011	25268	370	383	209	25.0	12.77	0.83	7.74	0	0
		10/16/90			TEST	1011	370	0.366	0.358	20.5	21.5	998	17639	270	267	118	17.7	12.77	0.67	10.20	0	0
48M3	Duval	10/18/90	US 59	NB	NONTEST	1011	510	0.504	0.493	24.0	22.0	1000	19477	310	295	167	19.5	12.77	0.86	8.33	0	0
		10/18/90			TEST	1011	465	0.460	0.452	27.0	22.5	1000	17990	290	273	175	18.0	12.77	0.97	8.80	0	0
48N3	Kenedy	10/19/90	US 77	NB	NONTEST	1076	485	0.451	0.441	24.8	22.5	992	21632	325	328	210	21.8	12.77	0.97	10.40	0	0
		10/19/90			TEST	1011	440	0.435	0.427	22.5	21.8	1126	23129	375	350	225	20.5	12.77	0.97	9.72	0	0

* Corrected to 60F
- IWP (In Wheelpaths)
- BWP (Between Wheelpaths)

MATERIALS SAMPLING

When the project began, acceptance samples of all materials to be used were obtained and sent to Western Technologies for testing. Additionally, samples of both aggregates and both emulsions were taken on each of the 27 sites for verification purposes. These samples were sent to Western Technologies, as well. Preliminary indications from testing these samples have shown these materials were generally acceptable.

CONSTRUCTION OBSTACLES ENCOUNTERED

1. Rate Adjustments of the Asphalt Distributor.

   The offset previously noted had to be accounted for in calculating the target rates for each site. Calibration checks were run regularly, to assure rates were still running as anticipated. Checks were run on the ground speed and the pump quantity output.

   Asphalt application rates had to be adjusted for every site based on the surface condition. The existing pavement surface on these projects was everything from dense graded hot mix that was flushed in the wheelpaths to really open porous friction courses. On one site in Tennessee (#47A3), the chip seal was placed over an existing porous friction course "popcorn mix". This site has experienced some loss of aggregate. However, it is not certain that this is due entirely to the existence of the "popcorn mix" surface.

   Rates varied from 0.26 gal/sy to 0.51 gal/sy. The nontest lane was frequently different in surface condition than the test lane. This sometimes robbed us of the advantage of having a practice lane for getting the appropriate asphalt content in the test lane. When the wheelpaths were noticeably flushed, the surface texture also varied transversely. No attempts were made to vary the application rate transversely. The rate selection was typically based on the surface condition between wheelpaths.

   On Site #28A3, emulsion from the chip seal bled over from left to right, because of the super-elevation in the curve. This means the left wheelpath of the right lane (test lane) was rich in asphalt.

2. Differing Moisture Contents of Aggregate Stockpiles.

   A few of the stockpile sites were rained on heavily, so they started tarping the top of the piles. The appropriate adjustments were made for moisture corrections. The slurry aggregate was hampered most by this additional moisture. It could hold more water (up to 7%) which affected the consistency of the mix, whereas the chip seal aggregate could only hold about 1.5% water and could be wet before application anyway.

3. Occasional "Oversized Slurry Seal Aggregate".

   Oversized rocks, which were usually less than 1% of the total, would get hung under the strike-off bar on the slurry spreader box. This would leave streaks in the fresh treatment until a workman freed the oversize rock and hand-worked the streak. On Site #48F3, oversize aggregate locked up the Rock belt and killed the generator. We had to stop and restart. Then the Rock counter broke. This was fixed. Then the box chain on the slurry box broke and the box had to be manually maintained in a perpendicular to the direction of travel.

4. Estimation of Slurry Seal Quantities.

   We had to estimate and backcalculate some of the slurry seal quantities a few times. Once, during a slurry shot (Site #47C3), the rock belt and cement counters were accidentally reset by the operator. Another time (Site #01A3), these counters simply broke and had to be replaced. On occasion, the slurry seal operation would run out of material from laying it down too thick.

5. Early Curing of Slurry Mix.

   The slurry seal mix occasionally would break in the box. In these cases, the operation stopped immediately, pulled off the road, cleaned the material out of the box before it set up, and then scraped and broomed suspect mix off the road, overlapped a little and continued applying slurry.

6. Mechanical Breakdowns of the Slurry Seal Equipment.

   On Site #12C3, the emulsion pump quit, requiring the emulsion pump sprocket to be changed and recalibrated. Occasionally, the emulsion level in the slurry truck got low (< 150 gal.), causing the pump to quit. On Site #40C3 an auger screw in the spreader box came loose, and on Site #12A3 the hydraulics were lost due to carburetor problems and hoses bursting.

7. Mechanical Breakdowns of the Asphalt Distributor and the Chip Spreader.

   The asphalt distributor nozzles on the spraybar would get clogged from time to time, but in most instances this was corrected within the first 100'. At the beginning of the project, numerous problems were encountered with the chip spreader breaking down or having to stop in the middle of a shot. A lot of this was the chip spreader operator starting his run too soon after the asphalt distributor, thus catching up to the distributor before it was finished, thus having to stop spreading chips and restart. The spot where he overlapped chips usually created a small, but permanent bump. Estimation and coordination of ground speeds of the chip and asphalt distributors improved with time.

8. Washboarding in the Chip Seal Aggregate.

The dump truck connects with the chip spreader, and as they progressed, the dump truck bed is lifted higher and higher to pour aggregate into the chip spreader. When the bed got to about 70° from the horizontal, there seemed to be enough downforce on the back end of the chip spreader to make it start bouncing. It always seemed to happen about station 4+00 and would last for 50′ to 75′. This would leave washboard-type corrugations transversely. Additional chips and handbrooming helped somewhat. Occasionally however, a noticeable rumble remained, even after the curing, rolling, brooming and traffic was turned on it.

9. Flat Tires and Load Permits.

These were constant problems that delayed/complicated things from time to time. On one site five vehicles got flats; one vehicle got it twice. The contractor did a good job of keeping this fast-moving and unique combination of construction vehicles properly permitted for site-to-site travel.

10. Broom Breakdown.

On one site (Site #01C3), the drive shaft on the power broom broke and had to be pulled across the chip seal section with a pickup.

11. Running Out of Material.

As all materials were being supplied from sole sources, occasional coordination problems were encountered between the contractor and his suppliers. The only thing to do under these circumstances was to have everyone perform equipment maintenance, run errands, and take the rest of the day off.

12. Rain Outs.

We only had four rainouts; once in Tennessee, twice in Texas, and once in Florida. Florida Site #12B3 was the only site that the rain actually hit us during operations. We had just completed the nontest lane with all treatments and the rains came out of nowhere. Next day, it appeared that the slurry was relatively undamaged, whereas the chip seal in that lane, though in stable condition, was discolored because the extra water made the emulsion binder "float up".

13. Cold Weather in Huntsville (48I3) and Navasota (48H3), Texas.

On these two sites a cold front had just moved in and we waited for the temperature to rise to the minimums specified (60F Pavement, 60F Air). The treatments appeared to go down good, but within a week some noticeable loss of cover aggregate had occurred on the Huntsville site.

14. Timing of Crack Seal Operation.

This project was executed in the last half of the summer, warm weather for the most part, thus the cracks were as closed up as they will get. It would have been preferable for the crack sealing to have been done in the winter, when all cracks are open, but this would not have been appropriate for the placement of the other three treatments.

15. Early Traffic Wear.

On Site #48K3, an 18-wheeler turned across the fresh slurry seal treatment, tearing several tracks through it on one end.

16. Crew Turnover.

Due to burn out, homesickness, or other reasons, we had some crew members replaced during the course of this project. This wasn't a critical problem because the core members of the crew stayed the same throughout the project.

17. Mobilization.

In jumping from site to site, it was difficult to insure the equipment would perform exactly as it had at the last site. There is no solution we found to this problem, except to be aware of it. Extra care was taken to do things similarly and then to "test fire" the equipment each morning with the actual materials of the day.

18. Fog Sprayer Problems.

Sometimes the fogger spray on the front of the slurry truck was not used because the mist would pool in the wheelpaths in some places and this would create "rich" spots in the slurry mat.

19. Windshield Damage.

Soon after construction, a few motorists experienced windshield damage at three of the sites (that we are aware of) due to loose aggregate in the wheelpaths on the chip seal test sections where excessive rutting (greater than 0.5″) existed. If you broomed it hard enough to get the excess chips out of the wheelpaths, then you would be loosening and removing the chips between the wheelpaths. To avoid damaging the chip seal, excessive brooming was not conducted. This did, however, leave some loose aggregate in the ruts. Maintaining reduced speed traffic overnight on these sections may have helped to minimize this problem.

20. Errant Surface Preparation.

On a few sites, the existing cracks were overfilled prior to the surface treatment applications. In some cases, these overfilled cracks bled through the surface treatments.

21. Layout Alternations.

On the I-75 section near Knoxville, Tennessee (Site #47C3), the slurry section was located after the chip section (contrary to other site layouts). These two test sections were also butted up right next to each other. There was heavy, overfilled crack sealant along the left edge stripe. The chips were a little too heavy and the slurry was very thin on the nontest lane. This combination of circumstances caused some initial raveling of the slurry treatment. The left wheels of the traffic were pushed over onto the left edge stripe due to the cones, thus the traffic was tracking sticky, excess aggregate onto the tender, thin slurry and pulling up pieces of it in places. Once traffic was adjusted back into the wheelpaths and the treatments were more cured and swept better, this problem was eliminated.

On two sites, internal test sections were switched. On the Mississippi Site #28A3, the crack seal and the slurry seal sections were switched. This was done because there were no cracks in the crack seal section and there were cracks in the other section. Also, the Navasota Site #48H3, chip seal and crack seal sections were switched for construction expediency.

INDUSTRY AND STATE AGENCY PARTICIPATION

On most of the sites, the SHA's were well represented. The H-101 Contractor responsible for this maintenance cost-effectiveness study (TTI) was also represented at many of the sites, assisting greatly. Ergon Asphalt, who supplied both of the emulsions used, had representatives at about two-thirds of the sites, including the calibration/demonstration session. Their assistance was greatly appreciated. The Asphalt Emulsified Manufacturers Association (AEMA) coordinated with the project personnel and had a representative on most of the sites to sample and take measurements. Their intention was to establish their own database of test results on the asphalts used on this project to provide an independent cross-reference to the SHRP test results. Some of their test results were provided to the SHRP-SRCO. On one of the sites, the FHWA personnel from the Dallas Office were in attendance. Some of the sites were visited by other contractors as well.

POSTCONSTRUCTION MONITORING

Monitoring of these SPS-3 sites has been initiated (see Table 4). This first round of monitoring data is scheduled for completion in early 1991.

Three of the sections (47A350, 48I350 and 48Q350) have been documented as having lost some of the aggregate in the wheelpaths. However, with the possible exception of 47A3,

none of these has progressed to a point where a friction problem is perceived by the State. One of the slurry seal sections (48N320) had experienced some loss of bond with the original surface and approximately 30′ required some "spot" patching. Other than that, all of the sections appear to be well established going into the first winter.

Each test section should be allowed to deteriorate to a fairly low level of condition (as described in Appendix D) to adequately demonstrate the performance of each type of preventive treatment. As the treatment sites age, there will be more chances for the test sections, and especially the control sections, to accidentally be covered or altered unnecessarily. The guidelines in Appendix D describe what maintenance is acceptable and/or expected, and what coordination will be required in advance of such maintenance to assure that sufficient data collection is accomplished to reap the greatest benefits from the SPS-3 test sites.

APPENDIX A

SUMMARIES OF REGIONAL TASK GROUP MEETINGS

NATIONAL RESEARCH COUNCIL

STRATEGIC HIGHWAY RESEARCH PROGRAM

Southern Region, 8240 MoPac Expressway, Suite 250, Austin, TX 78759 Tel (512) 346-7477 Fax (512) 346-8750

HOMER G. WHEELER
Regional Engineer

January 4, 1990

SPS-3/4 Regional Task Group Meeting Attendees

Subject: Notes from the SPS-3/4 Regional Task Group Meeting in San Antonio, Texas on December 14-15, 1989.

We had a productive meeting, thanks to your participation. These notes are provided as summary statements of the decisions reached and assignments made to the various individuals in attendance. Copies of the list of attendees and the Agenda are attached. Since handouts were provided for most of the discussions, the details of the presentations will not be reviewed. The Appendix to this document provides detailed notes of the discussions for those interested in reviewing them.

As a summary, the following notations were made from the meeting minutes:

1. We have a viable experiment for SPS-3, although we need more participation in SPS-4.

2. For SPS-4, there are still many important issues to be resolved. One of these includes the extent of FWD testing to occur. Many of these items need to be resolved and the schedule reviewed to determine whether SPS-4 construction will occur in the summer of 1990.

3. The Eastern Federal Lands Highway Division of the FHWA (previously called Direct Federal) has agreed to design, contract for, and provide construction management. Mr. Gary Klinedinst advised that Mr. Jack Springer would be the FHWA Project Manager. The FHWA will need specific information on sections in the near term for development of the contractual documents, and signed memorandums of agreement from the various SHA's and SHRP prior to issuing RFP's. This will require expedited coordination between BRE and the participating State Highway Agencies (SHA's).

4. We identified a full schedule of events to occur, that will require expeditious activities between now and the beginning of SPS-3 construction. It appears we are still on track for construction in the summer of 1990, as long as there are no significant holdups in our schedule.

5. From the discussion, all states indicated that they want the construction Contractor to be responsible for traffic control, with the stipulation that it is done in accordance with the Manual of Uniform Traffic Control Devices (MUTCD). It must be stated that special requirements by SHA's must be met, where applicable, and that these should be communicated to the SRCO as soon as possible. It was also decided that the contractual agreement will require that the work be done under one traffic control setup.

6. We discussed the materials (aggregate) sources and agreed that the Contractor should be responsible for selection and qualification of the source. His source should be specified in his proposal, and test results included that indicate that the material meets specified requirements. (Waiting until after contract award to start qualifying an aggregate source is too time-consuming.)

7. A delineation of responsibilities among the participating states was presented which may need revision, but did not elicit any protests during the presentation. The participating states need to review this statement of responsibilities and provide comments should they disagree.

8. We learned much from the pilot SPS-3 construction, including potential problems in data collection, coordination needs among participants, time requirements for construction, and traffic control considerations.

9. We decided that early failures are data points and should be considered as such. Consideration must be given to explanation of such failures in the project data.

10. Comments and revisions to the SPS-3 construction specifications were provided by each SHA to Tom Freeman. Tom is to incorporate these comments and revisions and finalize the slurry seal specifications for Gary Klinedinst by January 1, 1990. The specifications for the chip seal will be delayed another two weeks to allow review and input by Jack Hardin.

11. A proposal was made for coordination of supplemental test sections between states, to derive more benefit from these efforts.

We enjoyed a very successful meeting due mostly to the participation of the people in attendance and quality of remarks by those sharing the agenda. For this we are most grateful. If you have any questions or comments, please let me know. Once again, thank you for your interest in this most important of efforts.

Sincerely,

Homer

Homer G. Wheeler
SHRP Regional Engineer, SRCO

HGW:dmj

APPENDIX

Notes, Day 1, 8:30 a.m.

Homer started the meeting by briefing all of the attendees on the meeting objectives and reviewing the meeting agenda to see if anyone had anything to add. Tom Freeman provided a status statement on the SPS-3 activities. He reviewed the current experiment status, the numbering scheme and signing and marking details, and the experiment layout. He identified a specific need for additional projects having course subgrades.

Tom White provided a summary of the SPS-4 status. He reviewed the experiment factorials after removal of the factors for traffic and precondition, and then reviewed the pilot considerations. He indicated that undersealing is now considered optional, primarily dependent on state interest in the treatment and the specific section needs. He reviewed SPS-4 section layout options, and discussed alternatives for FWD testing to determine the need for undersealing vs. the length of time (effort) required. There was some discussion with respect to field testing and the amount of effort which will be required. There was also a brief discussion regarding the use of a cyclic loading device for void detection.

Gary Klinedinst provided a brief overview of the Eastern Federal Lands Highway Division activities, their stated functions and management organization. He provided a handout which discussed the status of that office's activities to date. He briefly reviewed the draft Memorandum of Agreement, which must be signed and completed by all participating states prior to award of the construction contract. Gary asked all of the states to send any lists of contractors that they may want considered in the solicitations. Discussion moved into review of the potential procedure for contract proposal, qualifications, and award. It appears there will be a panel of SHRP, SHA, and expert participants to review the qualifications of the Contractor. There was a general discussion of the contracting procedure, at which time Gary indicated that if there is a problem with specifications for construction, he needs to know about it now. We discussed the schedule at some length, which shows the beginning of construction sometime in June. There is some room to move the schedule, if reviews can be expedited. In short, it was identified that if the schedule gets moved back at all, we may have to wait until the summer of 1991 to perform the construction. Gary Klinedinst said he still has many questions to be resolved, and they must be resolved quickly to meet the time frame stated. Brent indicated that he, Homer, and Gary should get together after our meeting to make a list of assignments (this was done). There was a general discussion of the materials, particularly the aggregates, primarily concerning the selection of the aggregate source. It was generally agreed that the Contractor should select and qualify his source, and state his qualified source in his proposal. Plans are still for one aggregate source from the entire region.

After the morning break, Tom Freeman reviewed an example data packet for an SPS-3 section. This packet would seem to provide the necessary information for the FHWA to include in the contractual documents, and it was decided that the Project Engineers for BRE should prepare these packets for each state. The packets are to provide specific information for each project that should allow the potential contractors to bid the project accurately. After some discussion, it was decided that the RCOC Project Engineers would provide this information (at least in draft form) to Gary Klinedinst by December 22 (this was done).

Jerry Daleiden reviewed the responsibilities of each of the players and quickly went through the tentative SPS-3/4 schedules, noting work done during each phase of the schedule and the participant responsibilities. After review, Jim Brown suggested adding "Public Affairs" as one of the SHA's responsibilities, and everyone agreed. There were no questions or much discussion during this topic.

Don Quilio from the Florida DOT chaired discussion of the responsibilities and schedule that had been presented. One of the things brought out was the big difference between the FHWA schedule and the one provided by BRE, and it appears that the FHWA schedule will be the one we have to meet. It was decided that an estimate of two projects per week for construction seems reasonable, so the estimate of five months to complete construction, as provided in the FHWA schedule, may not be accurate. Jim Brown asked whether Tom White felt there was a need for an SPS-4 pilot. Tom indicated that the pilot construction may be in late January or early February, but he felt that there was sufficient information to be gained from conducting the pilot that it should occur. Jerry Daleiden suggested going on with the pilot and include what we can after construction of the pilot, as we can still begin development of the contract documents in the interim. There was a decision made that the Memorandum of Agreements to be provided to the FHWA should go through Homer Wheeler's office first. It was also stated that there are no interim dollars needed prior to the award of the contract. With regard to development of the contract documents, we discussed the review procedure and decided that the participating states should have the opportunity to review the final submittal. Because of the need for quick review, it was decided that the contract documents would be provided in overnight mail to the State Highway Agencies, who would provide an immediate review and return of their comments. We then moved into a discussion of the identification of the RFP, and Gary indicated that Direct Federal will list the RFP in the Commerce Business Daily (CBD) and also provide a copy of the RFP to any contractors which the states list. During this discussion it was decided that the prime contractor must state in his proposal who his subcontractors will be. It is expected that there will be one contractor performing the slurry seal, one performing the chip seal, and one responsible for the crack seal, as no one expects even a large contractor to be able to do all three of these very specialized treatments.

After lunch, we traveled out to the pilot SPS-3 site to look over the sections. After a brief drive-thru, we walked along the side of the road to review the treatments as they were placed. We returned to the meeting at approximately 3:35 p.m., where Jerry Daleiden discussed the lessons learned from the pilot construction. There was discussion as to how to determine the application rate for the treatments, whether cores or strips of material should be used. There was also a discussion on the measurement and marking of cracks to be sealed. Most of the discussion regarding the SPS-3 pilot concerned the chip seal, and reasons for its removal after placement. What this did allow us to explore was the need for prior planning and a thorough shakedown prior to test application. The thin overlay test section was discussed at some length, with questions as to who will sample and test the materials. It was suggested that the State Highway Agencies will be responsible for this testing with guidance given by the Regional Coordination Office Contractor (RCOC). There was also some question regarding the material variability if the SHA's use local HMAC materials rather than a tight specification with one Regional Contractor. It was decided that since the study is for consideration of the performance of the pavement in response to the thin overlay, and not for the performance of the thin overlay itself (material characteristics), then this should not be a serious consideration.

After some discussion, Brent Rauhut suggested that the FHWA Inspector should be very experienced in seal coats of the types being placed. There was some confusion as to who may be responsible for providing this expertise. After some discussion, everyone agreed that we really needed to have someone very experienced in seals on site as an observer, and we must decide who will ultimately provide this expertise.

James Sassin discussed the need for communication, planning, and designation of a clear chain of command on site prior to work.

We discussed how the work is to be paid for, by section or by treatment. The question primarily revolves around the crack sealing section, and what is to be done if no cracks are to be sealed. Tom Freeman indicated he would need to consider this further.

The final item discussed was a review of the participant responsibilities by Brent Rauhut. There was more discussion on who will provide the expert technical advice on site, needs for clear lines of communication, and a clear schedule of work to be done. Once the delineation of responsibilities is made, the Memorandum of Agreement may have to be slightly revised, since it does list these agency responsibilities.

Notes, Day 2, 8:00 a.m.

Homer Wheeler opened the meeting, after which Brent Rauhut reviewed the activities to date, and work needs before, during, and after construction. There was no discussion.

Tom Freeman began the review of the proposed specifications for SPS-3 construction. He indicated these specifications would have to be revised in the FHWA format, but he could take state comments at this time and do all the revisions at once. There was a lengthy discussion of the state comments as the specifications were reviewed page by page. Most of the states, and Mr. Jack Hardin of the AEMA provided comments. Discussions considered topics of materials, limitations of operations, provisions for standby time, and the basis for payment. Tom indicated he would make the necessary revisions and get the revised specifications to Gary Klinedinst by January 1st. While the discussion of specifications went on much longer than anticipated, everyone agreed that it was most productive.

S.C. Shah made some general comments. He indicated that the time line of events is very critical, and the Memorandum of Agreement must be started through channels now to have sufficient time for resolution of any problems which may occur.

Gary Fitts provided a very brief discussion on supplemental sections, which followed his handout. A question was raised as to whether the RCOC representative will be on site during construction of the supplemental sections. This will be resolved at a later date.

Mark Gardner basically summarized the items discussed during the meeting, and was followed by Homer Wheeler who summarized the meeting in more general terms and then adjourned the meeting.

AGENDA

SOUTHERN REGION WORKSHOP
PAVEMENT MAINTENANCE EFFECTIVENESS
SPS-3 FLEXIBLE PAVEMENT TREATMENTS
SPS-4 RIGID PAVEMENT TREATMENTS

DECEMBER 14-15, 1989
SAN ANTONIO, TEXAS

<u>December 14, 1989</u>

8:00 a.m.	Welcoming Remarks & Workshop Objectives	Homer Wheeler, SHRP
8:30 a.m.	SPS-3 Program Status	Tom Freeman, TTI
8:50 a.m.	SPS-4 Program • Status • Modifications	Tom White, Purdue
9:15 a.m.	Direct Federal Responsibilities & Needs	Gary Kleindinst, FHWA
10:00 a.m.	**BREAK**	
10:15 a.m.	Tasks, Responsibilities, and Schedules (SHRP, Direct Federal, RCOC, SHA's) • Nominations/Verification Phase • Review of Specifications • Design/Contracting Phase • Construction Phase • Monitoring Phase • Overall Schedules	Jerry Daleiden, BRE
10:45 a.m.	Discuss/Refine Task Responsibilities and Schedules	Don Quilio, FL-DOT
11:30 a.m.	SPS-3 Pilot - Description	Larry Buttler, TX-SDHPT
12:00 noon	**LUNCH**	
1:00 p.m.	Travel to SPS-3 Pilot	
1:45 p.m.	Inspect/Review SPS-3 Pilot in the Field	
3:15 p.m.	Return to Hotel	
4:00 p.m.	SPS-3 Pilot - Lessons Learned	Jerry Daleiden, BRE
4:20 p.m.	Discussion of SPS-3 Pilot (Emphasis on *Implementation of* Lessons Learned)	James Sassin, TX-SDHPT
5:00 p.m.	Adjourn for the Evening	
5:15 p.m.	SHRP Reception	

December 15, 1989

8:30 a.m.	Accomplishing SPS-3/SPS-4 Construction in 1990	Brent Rauhut, BRE
8:45 a.m.	Review of Proposed Specifications	Tom Freeman, TTI
9:15 a.m.	Supplemental Sections	Gary Fitts, BRE
10:00 a.m.	**BREAK**	
10:15 a.m.	Discussion/Planning/Assignments to Support Direct Federal Activities	Homer Wheeler, SHRP
10:45 a.m.	General Discussion of Progress & Work To Be Done	Mark Gardner, BRE
11:15 a.m.	Summarize Meeting	Homer Wheeler, SHRP
11:45 a.m.	**ADJOURN**	

SHRP SPS-3/4 RTG MEETING, DECEMBER 14-15, 1989

ATTENDANCE LIST

Name	Affiliation	Phone No.	Fax No.
Mark Gardner	Brent Rauhut Engr. Inc.	512/346-0870	512/346-8750
Larry Buttler	Texas SDHPT	512/465-6103	
Phil Cooper	Texas SDHPT	512/694-5867	
Harold Beaver	Arkansas Hwy. Dept.	501/569-2266	501/569-2366
Mike Sebren	Arkansas Hwy. Dept.	501/569-2484	
Tom Freeman	Texas Trans. Institute	409/845-9923	409/845-9848
Shashikant Shah	SHRP-DC	202/334-1438	202/223-2875
Thomas D. White	Purdue University	317/494-2215	317/494-0395
Gary L. Klinedinst	FHWA-Virginia	703/285-0002	703/285-0011
Brent Rauhut	Brent Rauhut Engr. Inc.	512/346-0870	512/346-8750
Jerry Daleiden	Brent Rauhut Engr. Inc.	512/346-0870	512/346-8750
James Sassin	Texas SDHPT	512/465-6106	512/465-6187
James L. Brown	Texas SDHPT	512/465-6108	512/465-6159
Kenneth J. Boehme	Texas SDHPT	512/465-6344	512/465-6380
John Bohuslav	Texas SDHPT	512/465-6256	512/465-6380
Kevin Kosobud	FHWA	512/346-0870	
Stanley Armstrong	Alabama	205/242-6527	205/264-2042
Jim Norris	Tennessee DOT	615/741-2027	615/741-2508
Gary Roach	Oklahoma DOT	405/521-2557	405/521-2524
A.F. Quilio, Jr.	Florida DOT	904/758-0454	904/752-3300
Jack Hardin	AEMA	813/623-3941	813/626-4103
Avery D. Adcock	Brent Rauhut Engr. Inc.	512/346-0870	512/346-8750
Gary Fitts	Brent Rauhut Engr. Inc.	512/346-0870	512/346-8750
Homer Wheeler	SHRP	512/346-7477	512/346-8750
Henry Hardy	Texas SDHPT, San Antonio	512/694-6050	512/694-5851

NATIONAL RESEARCH COUNCIL

STRATEGIC HIGHWAY RESEARCH PROGRAM

818 Connecticut Avenue, N.W., Washington D.C., 20006; Tel (202) 334-3774, Fax (202) 223-2875

PROGRAM CORRESPONDENCE

ADDRESS REPLY TO

Thomas J. Freeman, P.E.
Engineering Research Associate
Texas Transportation Institute
Texas A&M University
College Station, TX 77843-3135

Mr. Brent Rauhut
Brent Rauhut Engineering, Inc.
8240 Mopac, Suite 220
Austin, Texas 78759

Dear Mr. Rauhut,

Enclosed you will find the minutes of the Southern Regional Task Group Meeting held in Austin, TX on August 1-2, 1989. The meeting was well received by the diverse group of people who attended. The H-101 and SHRP staff wish to thank each one of you for your participation and comments during the meeting. Many decisions regarding the H-101 program in the Southern region were finalized and the approaches that will be taken on many key issues were determined.

The minutes from the meeting have been arranged by subject rather than chronologically. This method should better summarize the actual proceedings, especially for those who where not in attendance. If you have any questions regarding these minutes or the H-101 program in general, please don't hesitate to call me at (409) 845-7511.

Please note that one copy of these minutes will be sent to the State Coordinators and one copy will be sent to a member agency of the RTG. When more than one representative from an individual member agency attended, only one copy of these minutes was sent. Please distribute these minutes to interested parties throughout your agency.

Thank you,

Thomas J. Freeman, P.E.

Enclosures

cc: Southern Region State Coordinators
Southern RTG Attendees
ISSA
AEMA
TAI
NAPA
SHRP Regional Engineers (SRE) - Homer Wheeler, SRCO
SHRP Regional Office Coordination Contractors (RCOC)
SHRP P-001 Contractor
SHRP Staff
H-101 ETG

NOTES FROM SOUTHERN REGIONAL MEETING
AUGUST 1-2, 1989
AUSTIN, TEXAS

The minutes from the meeting have been arranged by subject rather than chronologically. This method should better summarize the actual proceedings, especially for those who where not in attendance.

GENERAL

Meeting called to order by Homer Wheeler, Southern Region SHRP Regional Engineer (SRE)

Welcoming Remarks by Byron Blaschke, Texas

List of Attendees (Attachment 1)

Decisions from Nashville meeting and Workshop Objectives were reviewed (Attachment 2)

Crack sealing test section will be kept sealed. New cracks will be sealed every fall, old cracks that become unsealed will be resealed.

Only safety related maintenance allowed on control section. No crack sealing.

Next RTG after Texas pilot sections have been placed so we can iron out contract, specifications, boilerplate, contractor selection. Probably early December.

Summary of action prepared from day one (Attachment 3).

Send out draft maintenance policy guidelines.

RESPONSIBILITIES

Responsibilities of the participants were discussed (Attachment 4).

Traffic control is a State option. A state may make it the responsibility of the contractor, provide it with their own forces, or contract for it themselves.

States will be responsible for surface preparation. RCOC will mark areas.

The state in which the aggregate is located will be responsible for obtaining samples of the proposed material, testing it and sending samples to the Regional Materials Testing lab.
QA is the responsibility of the states.

Construction monitoring checklists will be supplied by TTI and Purdue and filled out by RCOC.

BRE "RCOC role in SPS-3/SPS-4" (Attachment 5).

Tom Freeman (TTI) will do AC Specs send to Jerry Daleiden.
Jerry Daleiden does PCC Specs send to Purdue.
Jerry Daleiden sends both to L. Buttler who adds boilerplate.
Tom Freeman will do Notes from Meeting.

PILOT

The pilot agency will be Texas. This was proposed and approved. Tennessee will be the backup. If the section in Tennessee can be accomplished this year using the regional contractor, it will be done.

The sites for pilot need to be identified within next two weeks. Pick sites that need some surface preparation repair so we can get experience on all phases.

Pilot sites will be separate, uncoupled from the national experiment.

SPECIFICATIONS

Larry Butler (Texas SDHPT) discussed questions regarding specifications. The questions and answers are Attachment 6, the AC and PCC specifications will be revised based upon these comments.

Traffic control is a State option. A state may make it the responsibility of the contractor, provide it with their own forces, or contract for it themselves.

States will be responsible for surface preparation. RCOC will mark areas. Need more direction on patching.

The state in which the aggregate is located will be responsible for obtaining samples of the proposed material, testing it and sending samples to the Regional Materials Testing lab.

Texas would like to have a 1/2 mile to 1 mile warm up section for the treatments. However, there is not enough room on most sites. Also, we cannot just select 500' out of the long distance because we would not have the site verification information (cores, survey) for the whole mile. We will treat the lane adjacent to the SPS site (Left lane) first as a warmup/calibration lane.

If Tennessee or Texas has on site acceptance tests, provide to Tom Freeman.

Should jobs be paid lump sum or by quantities?

Acceptance is final. When state accepts, job is OK'd. If two days later, job fails, state still pays. Mostly because we are requiring materials, process, specifications, etc.

What about damage to shoulders during work? If contractor causes damage or damage is caused, state must repair.

2' onto shoulder for continuation of treatment is OK.

Each state will address restriping. State option.

Tom Freeman will write up action on each specification item.

We will not be able to use HCA lance as part of surface preparation since states will be doing surface preparation.

Proposed crack seal material sent to lead agency and Regional Materials Testing Laboratory.

Not much on site testing of crack sealant.

Chip seal. Before construction, each state accepts emulsion supplier (does acceptance testing). On site, take samples, state does tests, provide information back to RCOC

All emulsion manufacturers chosen must provide samples of base AC and emulsion to State agency Regional Materials Testing Laboratory.

Proposed chip seal aggregate sent to lead agency and Regional Materials Testing Laboratory.

Proposed chip seal emulsion sent to lead agency and Regional Materials Testing Laboratory.

Chip seal aggregate will be sole source within a region.

Chip seal emulsion will be purchased locally, but meet our specification of AC-10 for the base asphalt in a CRS-2 or RS-2.

Slurry seal emulsion and aggregate will be sole source within a region.

TTI, Tennessee, Texas, BRE, SHRP, and ISSA will put together Slurry seal specifications. Call Gary Head, contact person from Tennessee, get phone from Nashville meeting.

Contractor must provide QC on slurry seal.

Contractor will perform Slurry seal mix design.

Slurry seal contractor selects materials, sends to labs identified by ISSA.

Contractor will work with labs to get a range of application rates. Depending on surface, dry, oxidized or new surface, work within range.

ISSA will recommend aggregate source for slurry.

Slurry calibration on site and take samples of aggregate, emulsion, and mix. Tennessee will confirm whether we need the mix.

Remove reference to THIN on SPS sign for overlay.

State sends sample of thin overlay aggregate, asphalt, mix to Regional Materials Testing Laboratory.

Proposed silicone sealant material sent to lead agency and Regional Materials Testing Laboratory.

Check samples of underseal material. Make cubes.

PCC asphalt sealant not required to be same as for AC.

Mix Designs
- Overlay - State
- Slurry - One of four labs
- Chip - Lead state (Texas)
- Underseal - Lead state (Texas)

Will flyash and cement be sole source within a region? Tom White will decide.

Training in February.

CONTRACTS

Don Harriott believes that FHWA will allow states to use construction funds to pay for these treatments. Some questions concerning FHWA restrictions on sole source or negotiated contracts were brought up. Don Harriott will contact FHWA to clear up problem.

Homer Wheeler will write a letter to the states, that is acceptable to FHWA, describing the FHWA policy.

Some options for getting around the competitive bid requirements were discussed. For example, a state may contract with the state university to be prime and require the university to sub out to regional contractor, or use a competitive bid, but require the firm selected to sub out to the regional contractor, or call it a research project.

States should receive from SHRP, a copy of the LTPP Distress Identification Manual.

RES discussed a possible model for selecting a contractor (Attachment 7).

Industry folks suggested that it may be difficult to get one contractor to go throughout the region. However, there is some excitement in the industries about contractors becoming regional contractors in a national experiment, and we should get some participation.

The need for a project engineer or technical representative on site during construction was discussed. No decision was reached.

Industry will mail this information to its members. Interested parties will respond to RCOC. RCOC will distribute responses to RTG. RTG will make final selection.

An outline of the Statement of work was developed and introduced (Attachment 8). Make sure Tom Freeman's phone number appears so questions can be answered. This will be sent out through industry reps and returned by September 30 to RCOC.

Send to list (Attachment 9)

Prequalification information.
Experience in each type of work to be performed.
Years
Volume
Quality,
Bondability,
Experience in specific states
Willingness to work all over the region.
Staffing and equipment.

ISSA send names of labs to TTI.

Contractor will negotiate bonding, insurance, mobilization with each state.

Northeast state trying to even out mobilization $ so that distant states and nearby states pay equal.

Can bonding be waived? If it can, your state will be less expensive since the contractor will have to pass this on.

Texas is not flexible. Bonding and insurance required.

Probably have to go to each state to find out these requirements.

There is a need to require that some of the Construction Contractors key personnel be on all jobs throughout the region.

Maybe have one contractor be prime for SPS 3,4 so he goes through bonding for all subs.

Maybe a joint venture that encompasses all states or most states.

SRE, RCOC, State, and contractor determine sequencing.

Texas Boiler plate must be sent around to other states so we can find out what must be changed.

Performance bonding may not be required, but Texas payment bonds (contractor must pay subs and suppliers) will be required.

States will find out about bonds and send to Homer.

VERIFICATION

Roger Smith reviewed the Site Verification and Confirmation Status.

The GPS site selection requirements will be relaxed somewhat. Especially in the area of cut-fill and cut-fill transition, grades, culverts, etc.

If the SPS site verification coring indicates that the subgrade type is different than the GPS site (from Granular to Fine or from Fine to Granular) try to move the sections to where the SG type is the same. If this is impossible (length, availability, etc.) put the test sections where possible, and determine new SG type. The database will reflect this difference.

RCOC will layout test sections in the office with respect to culverts, curves, etc.

State drill cores and bores 5' into the subgrade.
Cores sent to Regional Materials Testing Labs, video tape of the base, subbase, and subgrade.

We need to develop core layout plan.

Can distress survey be done during verification and just before treatments are placed. For example, while treatment is being places or is curing in the adjacent (left) lane RCOC could perform distress survey. This would give us the before surface preparation and after surface preparation/pre-treatment condition.

Add section number painted on roadway to signing requirements. Check on requirements for painting crosses on the roadway at 100' intervals.

Signing is approved in southern region. Send copy to states as part of proceedings (Attachment 10)

Order SHRP decals so states can make signs.

States have not yet begun skid testing.

Talk to TRDF about skid. (This was done. TRDF will be sending out a memo to states asking that Skid testing be done at least every two years. This may not be often enough for H-101.)

TTI developed a SPS numbering scheme. TRDF has developed a different scheme. Need to resolve this.

Texas needs to perform skid testing before and after treatments are placed.

SPS-4 may collapse reinforced versus plain jointed, may reduce undersealing commitment.

Need commitment from states by Aug 30. A number of sites they will do, and information about sites we have suggested that they don't like. Sites on this list need to be protected from maintenance.

Attachment 1

STRATEGIC HIGHWAY RESEARCH PROGRAM
SPS 3-4 Regional Task Group
Austin, TX August 1-2, 1989

Name	Organization	Phone
Byron C. Blaschke	TDHPT	
Ed Davis	TDHPT	512-465-6711
Richard Kirby	TDHPT	512-465-6529
Larry Buttler	TDHPT	512-465-6268
Don O'Conner	TDHPT	512-465-7352
Joe S. Graff	TDHPT	512-465-6345
Don Quilio	Florida DOT	904-758-0454
G. E. Pettyjohn	Florida DOT	904-752-3300
Harold Beaver	Arkansas TD	501-569-2266
Jim Norris	Tennessee DOT	615-741-2027
Al Crawley	Mississippi HD	601-359-1174
Gary Roach	Oklahoma DOT	405-521-2557
Dwight Hixon	Oklahoma DOT	405-521-2671
Steven L. Cumbaa	Louisiana DOT	504-767-9106
Don M. Harriott	SHRP - D.C.	202-334-1410
Shashikant C. Shah	SHRP - D.C.	202-334-1438
Homer G. Wheeler	SHRP - Austin	512-346-7477
Roger E. Smith	Texas Trans. Inst.	409-845-7511
Thomas J. Freeman	Texas Trans. Inst.	409-845-7511
Brent Rauhut	BRE Inc.	512-346-0870
Jerry Daleiden	BRE Inc.	512-346-0870
Mark P. Gardner	BRE Inc.	512-346-0870
Gary Fitts	BRE Inc.	512-346-0870
Ron Hudson	Univ of Texas	512-471-4532
Keith Hoernschemeyer	FHWA Trainee	512-327-4211
S. P. LaHue	ACPA	817-572-2367
Jack Hardin	AEMA	813-921-6530
Bob McGennis	TAI	512-258-1961
Jim Warren	NAPA	301-779-4880
Larry Day	ISSA	913-825-5303
W. Chas. Gagnon	ISSA	913-825-5303
John German	TRDF	512-327-4211
Skip McComas	ISSA	202-857-1160

Attachment 2
Decisions From Nashville
June 27-28, 1989

- Formed a decision making group titled, "Regional Task Group (RTG)." Only the SHA's will have a vote. Only one vote per state.

- Committed to the installation of one SPS-3 and one SPS-4 experiment during 1989.

- Use a Regional Contractor and one set of material sources region wide for each treatment (except Thin Overlays). One contractor can probably perform the Crack Seal and Slurry Seal, and another can do the Chip Seal.

- The state highway agency will contract with a local contractor and use local materials to place the Thin Overlay (1 1/4" ± 1/4").

- Develop an overall set of specifications and contracting procedures.

- Include applicable industries as participants in the decision-making process and invite representatives to the August 1-2 meeting in Austin.

- Define the term, "Pilot Agency" as the state highway agency who will propose procedures for contracts, plans and specifications and will implement the pilot experiments. Texas volunteered to the the Pilot Agency for the Southern Region. Tennessee volunteered as back-up.

- All of the work in the Pilot and regular SPS program is regarded as experimental by the Federal Highway Administration (FHWA). Therefore, the rules on using proprietary products/methods or acquiring services from a single source should not present a barrier.

- Federal aid funding is eligible for use in the SPS program.

- The states may include their experiments as state supplements to the SPS program.

- Training sessions are to be planned and included.

- The contractor is to use "Trial Sections" so that adjustments can be made before the treatments are applied to the test sections. The "inside" lane will be treated first and the "outside" test lane second.

Attachment 2
Workshop Objectives
Austin, TX August 1-2, 1989

- Agreeing that time is of the essence, decided to meet in Austin August 1-2 and set out a number of topics for a tentative agenda.
- Review decisions from the Nashville meeting (June 27-28, 1989).
- Formalize selection of the Pilot Agency.
- Discuss proposals from the Pilot Agency for criteria to include in the contractual documents, plans and specs.
- Formalize the procedure for selecting contractors.
- Identify contractors and determine parameters that represent the better potentials for successful applications.
- Define the responsibilities of:
  1) The contractors who will apply the treatments,
  2) SHRP's Technical and Coordination Contractors such as RCOC, H-101, P-001,
  3) The state highway agencies.
- Refine QA/QC plans.
- Advance the planning on materials sampling and testing.
- Outline the near term tasks, responsibilities, and assignments.

Attachment 3
Summary of Action for August 1
Austin, TX August 1-2, 1989

Summary of Actions - August 1, 1989

- Specifications have been resolved.
- Notes to be distributed with the minutes indicating specification resolutions.
- For selection of Contractor:
  - + Statement of Work by Mid-August will include (Attachment 8).
  - + Will be distributed to (Attachment 9).
- Contractor response to Statement of Work by September 30 to H-101 Contractor (Dr. Smith et al).
- Texas will be the Pilot State.
- Pilot sites are uncoupled from national experiment.
- Texas to negotiate separately for their Pilot Sites.

Attachment 4
Responsibilities of State Highway Agencies
Austin, TX August 1-2, 1989

1. PRE-CONTRACT DEVELOPMENT
    1. Identify possible test sections using matrix information from Roger Smith.

    2. Take core samples of test sections to assure test sections are substantiallt the same as GPS sections. (Do cores need to be sent to Rauhut Engr. for storage?) (Yes, but send to TTI).

2. DEVELOP PLANS AND CONTRACT FOR TEST SECTION
    1. Show location of test section in plans.
    2. Develop quantities based upon section conditions
        a. Length and width, number of joints and cracks, voids, etc.
    3. Time period that work is to be accomplished (require co-ordination of SHRP, and contractor to develop a schedule).
    (Add RCOC to list).
    4. Responsibility of traffic control.
    State or Contractor.
    (State option).
    5. Responsibility of pavement markings.
    State or Contractor? If contractor then time of placement, materials, and standards need to be included.
    (State is responsible).
    6. Include Specifications developed by this Regional Task Group.
    7. Labor rates if applicable and other Boiler Plate required by ecah agency including Bonding if necessary.
    8. Negotiate Contract and execute.

3. DISTRESS SURVEYS
    By RCOC prior to surface preparation. After distress surveys install signs to reference section.
    (Survey will be within 90 days of treatment).

4. SURFACE PREPARATION
    1. When? After distress survey but at least 60 days prior to installation of the surface treatments.
    (Within 90 days).
    2. Seal cracks > 1/4" (on all cracks except crack seal section).
    (seal cracks > 1/8").
    3. Patch all cracks > 1 1/2" wide.

Attachment 4
Responsibilities of State Highway Agencies
Austin, TX August 1-2, 1989

5. CONSTRUCTION ACTIVITIES
   1. Provide inspection of projects for quality assurance.
      a. Documentation of quantities.
      b. Performance of work according to specifications.
      c. Checking of equipment prior to commencement.
      d. Gradations of aggregate.
      e. Sampling and testing of bituminous products.
      f. Etc.

   2. Construct the thin overlay either with own forces or by local contractor.
      a. Mix design by State agency? (Yes).
      b. Provide quality assurance for records and payment. (TTI will add collection information. Submit to BRE).
   3. Payment to Contractor 100% responsibility of State.

6. POST CONSTRUCTION
   1. Skid testing.
      a. Frequency? (1 mos., 6 mos., 1 yr., and then annually)
         (In regular GPS pattern. It was thought that this would be every 6 months. It now appears to be every 2 years. TTI may have to modify this).
   2. Limit maintenance activities in accordance with recommendations made by H-101.
   3. Co-ordinate any major maintenance with RCOC prior to performing.
   4. Maintain signs and markings at all sections.

Attachment 5
RCOC Role in SPS-3/SPS-4 Project Selection
Austin, TX August 1-2, 1989

- Advise TTI staff on potential limitations of specific projects.
- Coordinate/assist SHA's in project selection.
- Assist SHA's, SHRP, and TTI any way we can.

RCOC Role in SPS-3/SPS-4 Project Selection

- Visit proposed site with SHA representatives.
- Verify that projects meet objectives and requirements of the experiment.
- If a project is satisfactory:
  - Locate and temporarily mark test sections
  - Perform detailed visual distress survey
  - Videotape the test sections for Regional Video Tape Library
- Prepare report of site visit.
- If a project is not satisfactory:
  - Coordinate with SHA's and TTI to locate another suitable project
  - Repeat the site verification visit to the new site.

Attachment 5 (Continued)
RCOC Role in SPS-3/SPS-4 During Contract Preparation
Austin, TX August 1-2, 1989

- Assist Pilot Agency in identifying potential contractors
- Review specifications and assist Pilot Agency in identifying required refinements.
- Assist Pilot Agency as desired in coordinating questions or proposals with other SHA's, TTI, SHRP or others.
- Assist with coordination of contract documents for Regional Construction Contracts:
  - Review by other agencies
  - Compromises to meet SHA contracting needs
  - Other

RCOC Role in SPS-3/SPS-4 After Contract Award

- Participate in review and approval of regional material sources.
- Coordinate with various agencies to secure material sampling and testing, monitoring activities, etc.
- Participate in identification of areas to be patched and cracks to be sealed.
- Participate in monitoring treatment applications to insure that quality of construction meets project needs.
- Record required data during construction.
- Work with SHA representatives to mark the test sections after construction is complete. (This may have to be delayed until after sections cure)
- Conduct deflection, profile measurements, and distress surveys as required.
- Enter all data into the data base
- Other duties as assigned.

Attachment 6
Questions Regarding Specifications
Austin, TX August 1-2, 1989

AC Crack Sealing

Page 2.

1.01 Surface Preparation

- This work appears to be minimal.

- Recommend that this work be done by state forces. (Yes, state forces will do surface preparation).

- More clarity is needed on permissible materials for this work.
  (The patching material will be Hot-mix, Hot laid asphalt mix from a local hot-mix plant).

2. Are holes and depressions permissible in sections? If so, specify repair technique (i.e., must be repaired by squaring up edges).
   (Some repair is expected on the sections in the "Poor" category. The areas will be marked by the RCOC's. This clause was developed to indicate that some patching will be required, however this will be removed from the specs and put in special provisions for the states).

3. Is the 1 1/2 inch width for cracks or surface spalls.
   (The crack width, as defined in the LTPP Distress Identification Manual, is the width at the surface. If this is greater that 1 1/2 inches the area should be marked and patched).

Page 3

1.02 Equipment

2. Is there real need for 2000°F cleaning tool.
   (Yes, a "LA Hot AIr Lance or equivalent will be specified).

Page 4

1.05 Sealant

Recommend that the material supplier and grade be specified.
(The contractor will pick the sealant and we will test and approve his choice).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

AC Crack Sealing

1.06 Types of Crack to Seal
- Does crack width indicate width of surface spall? (Yes, as defined in LTPP Distress ID Guide).
- Need alternative for cracks less than 1/4" wide. (Cracks greater than 1/8" wide will be sealed).

Page 5

1.07 Crack Preparation and Sealing

1. Vote on whether to follow Ontario recommendations or use "Band-Aid"seals.
   (A band aid will be used, however routing in the Southern region was eliminated).

3. Recommend note to limit wipe zone (i.e. Care shall be taken to limit wipe zone as close to 1" as possible).
   (A 2" wide (± 1/4") squeegee will be used. The wipe zone will vary with the crack width).

5. Why was sanding disallowed?
   (sanding not required with D3405 material).

Appears to be a need for a measurement clause. Recommend use of a wheel to measure by the foot for this small area. (Length will be measured, we can make it a pay item).

Chip Seals

Page 7

Description
- For 1000 gallon distributor truck (smallest available):
  - o Need to do approximately 24,000SF at 0.4Gal/SY to empty truck.
  - o Should not specify exactly 700 feet.

  (If materials are purchased locally, the contractor can obtain less than full load. If we do not determine in advance the length of the chip seal, we will not be able to locate the other treatments).

1.01 Preparation
- Who will be doing prep work? (Recommend state forces or crack sealing contractor)
  (State forces).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

Chip Seal

Page 10

1.02 Equipment

4 Recommend reduced flow rates in wheelpaths.
(This is covered in the spec).

Page 11

1.03 Samples

- Recommend the local state agency sample and test material which originates from its state.
(This provision approved).

1.05 Placement Limitations

- Seasonal limitations for the applicable state will be shown in the plan notes.

1.06 Traffic Control

- Are the pilot vehicles for this short section reasonable?
(They will be removed).

1.07 Asphalt

- Specify grade for emulsified asphalt not AC with emulsifier.
(The current specification for emulsions are much too broad. Specifying the viscosity range of the base asphalt will tighten the range considerably. For southern region AC-10 specs will be used).

1.08 Mineral Aggregate

- Recommend AASHTO gradation size number 7.
(A modified number 7 with 100% passing 1/2" sieve will be used).
- Are AASHTO durability requirements strict enough to limit degradation of aggregate over these long hauls?
(A provision for the maximum LA Abrasion value of 25 and a Polish Value will be added. Also, no carbonate aggregates will be allowed).

Page 13

1.10 Application of the Emulsified Asphalt Binder

- Should be around 0.4 Gal/SY for emulsified asphalt.
(Actual rate will be determined after aggregate source determined).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

Chip Seal

Page 14

1.11 Application of the Mineral Aggregate

- Adjust rate for recommended gradation revisions
  (Actual rate will be determined after aggregate source determined).
- Should we wait until emulsion breaks before applying aggregate?
  (No).

Page 15

1.12 Method of Measurement

2 Mineral aggregate measured in CY in Texas.
(Pay by Lump Sum, but measure what is actually applied in Lb/SY).

3 Preparation of surface will not need to be included here if done by state forces or crack sealing contractor as recommended.
(Done by state forces).

Slurry Seal

Page 17

1.01 Preparation of Existing Paved Road Surface

- All questions regarding preparation of surface for Chip Seal apply here as well.
  (A tack coat may be required, so it will be left in as an option for the engineer).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

PCC Undersealing

Clarify Titles for Responsible Contractors
- Refer to SHRP Regional Construction Contractors and SHRP Regional Coordination Office Contractor (RCOC). (Tom White and Jerry Daleiden will develop legal descriptions for use in the contract).

Page 2

1.03.6 Material Proposal
- Reference is made to the SHRP Regional Contractor being in charge of inspection. Aren't states in charge of inspection?
  (States are in charge of inspection).

1.04.7 Vertical Movement Testing
- Recommend that SHRP select and provide the piece of equipment for monitoring lift rather than leaving that up to the states.
  (Yes, contractor will provide Benkleman Beam).

1.05 Testing
- Why is Benkleman Beam recommended in lieu of FWD.
- 20 Mils is a big deflection for upper limit.
- Many sections will not require undersealing.
  (Dynaflect may be better, Jerry Daleiden, Larry Buttler and Tom White will work out details).

Page 5

1.06.1 Drilling Holes
- Who will recommend drilling pattern?
- Shouldn't this be a standard pattern(s) shown in the plans?
  (Should provide a standard, or as modified by the engineer, since one standard will not cover all cases).

Page 6

1.06.2 Washing Holes
- If consistency is desired, holes should either be washed or not. Which is it?
- These items should not be left up to the contracting agency.
  (Holes will be washed).

  (A time of day versus season or temperature recommendation will be developed by Jerry Daleiden and sent to ACPA).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

PCC Undersealing

1.06.3 Subsealing
- "Maximum allowable pressure shall not exceed 40 to 60 pounds per square inch or other values specified by the contracting agency." Do we want 40 to 60 PSI?
- Don't we all want to use the same procedure?
(The phrase "other values specified by the contracting agency" will be deleted).

Page 8

1.08.1.3 Testing
- Isn't testing to be done by the Regional Coordination Office Contractor (RCOC)?
(Jerry Daleiden will straighten out).

1.08.1.7 Research Study Measurements
- This section indicates that the "Contractor" is to provide all equipment and readings, contrary to Page 4, Section 1.05.1, "Preliminary Testing".
(Jerry Daleiden, Larry Buttler and Tom White will work out details).

PCC Joint and Crack Sealing

Page 10

2.01 Description
- Where is "Section 4" which is referred to for repair requirements?
(Should read "Section 3").

2.02.1 Materials
- Recommend that the desired sealant and a manufacturer be selected and specified, for consistency.
(Width of some cracks and joints > than 1" may disqualify silicone. Tom White will reply. The spec should read something like "an appropriate shape factor for the selected sealant". A low modulus, self leveling sealant will be used. Remove reference to Dow 888.

Page 11

2.02.3.3 Repair of Defective Concrete
- This article refers to "Section 3", contrary to that shown under "Description".
(A state has the option of specifying that the contractor do repairs. For a tied PCC shoulder, treat as a longitudinal joint. No shoulder, no problem).

Attachment 6 (Continued)
Questions Regarding Specifications
Austin, TX August 1-2, 1989

PCC Joint and Crack Sealing

Page 13

2.02.3.9 Installation of Sealants
- Recommend that the surface of the sealant be 1/8" to 1/4" below the adjacent surface.
(Yes)

2.03.1 Materials
- Recommend that the desired sealant and a manufacturer be selected for consistency.
(The contractor will select and we will approve).

Page 16

2.03.3.10 Sealant Installation
- Recommend that the surface of the sealant be 1/8" to 1/4" below the adjacent surface.
(Yes)

Page 18

2.04.3.5 Blocking Medium
- Recommend that a blocking medium be used.
- This should not be at the option of the SHRP Regional Coordination Contractor.
(A blocking medium will be used).

General Comment

There is a need to require that some of the Construction Contractors key personnel be on all jobs throughout the region.

Attachment 7
A Possible Model for Selecting a Contractor
Austin, TX August 1-2, 1989

Possible Model

Get List From Industry

Issue RFP/RFQ (Statement of Work, Sites, Time Constraint)

Rate Responses Based on:
- Description of Approach
- Equipment Available
- Experience (Overall and in Required States)
- Past Performance
- Cost of Common Bid Items

Select and Negotiate on a State by State Basis Final Costs of Items Such as:
- Bonding
- Insurance
- Licensing

Attachment 8
Outline of Statement of Work
Austin, TX August 1-2, 1989

Statement of Work

A. Scope

B. Specifications

C. Locations of SItes

D. Timing (Schedule)

E. Treatment Layout

F. General Boilerplate

G. Prequalification Information

H. Contact Points - TTI
- Purdue

Attachment 9
List of Agencies to Receive Statement of Work
Austin, TX August 1-2, 1989

ISSA

AEMA

TAI

NAPA

ARTBA

AGC

ACPA

State Representatives

SHRP Regional Engineers (SRE)

Regional Coordination Office Contractor (RCOC)

Attendees

Attachment 10
Proposed Signing Requirements
Austin, TX August 1-2, 1989

H-101 SIGNING REQUIREMENTS

Advantages:

- Same Format as for GPS Signs
- Contains Essential Information
- Different Enough from GPS Signs to Avoid Confusion
- Reduces Number of Signs Compared to Other Alternatives

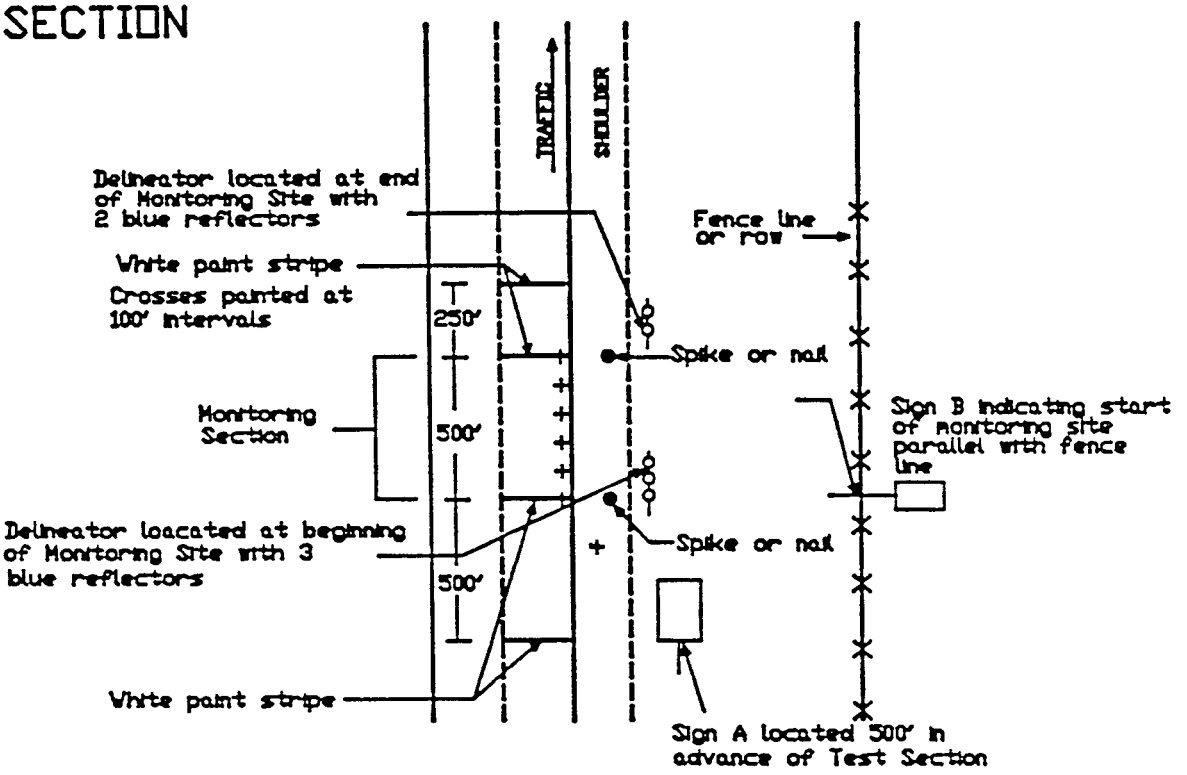
Disadvantages:

- Many Large Signs Along Roadway

EXHIBIT 1

GENERAL LAYOUT OF TEST SECTION SHOWING SIGN LOCATIONS

GPS SECTION



H-101 SECTION (PROPOSED)

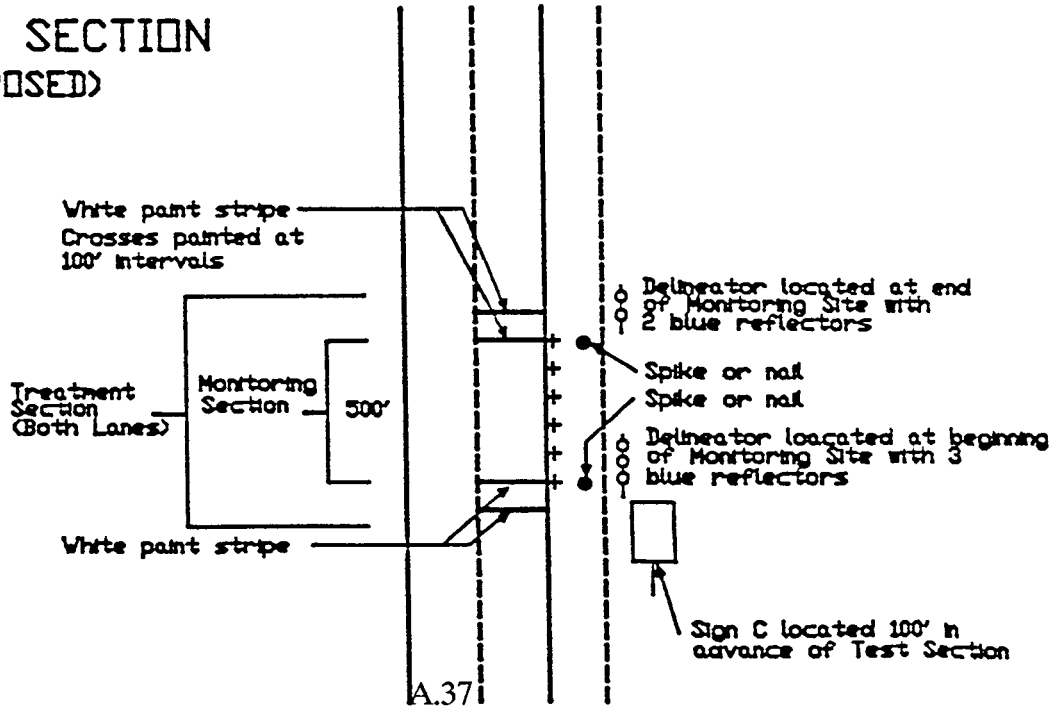
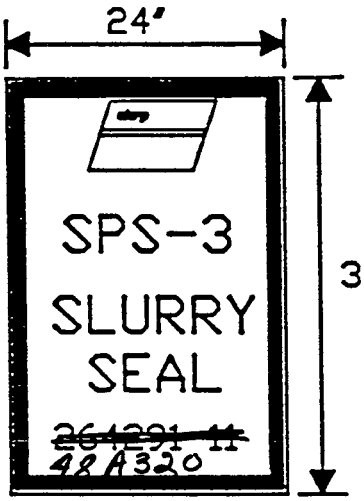


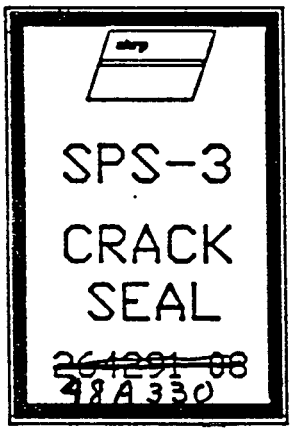
EXHIBIT 2

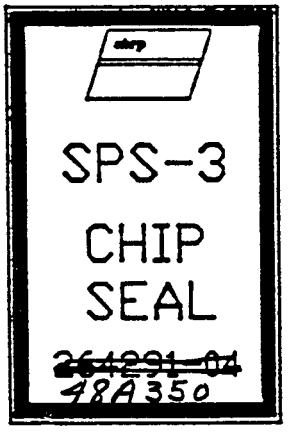
PROPOSED H-101 SIGN

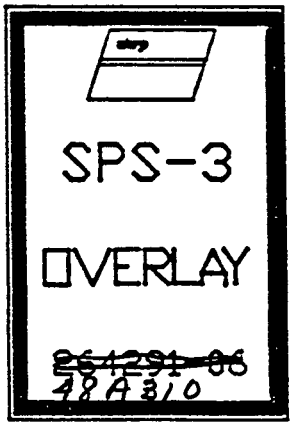


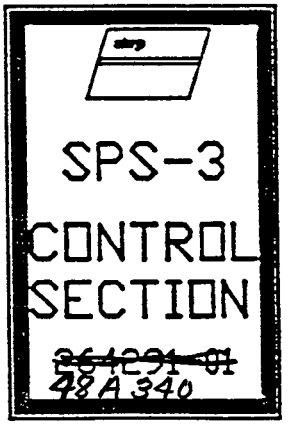
Notes:

- o Blue Background
- o White letters
- o White Border, 1' wide
  1/2" offset from edge
- o Letters 3" high
- o Numbers 2" high
- o SHRP logo 6"x9"









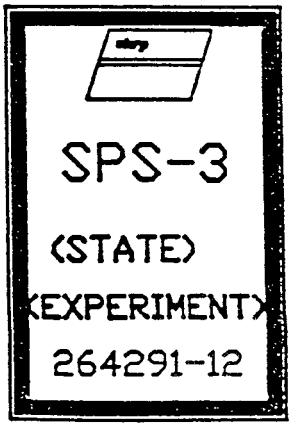
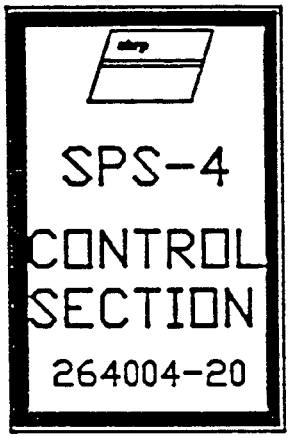
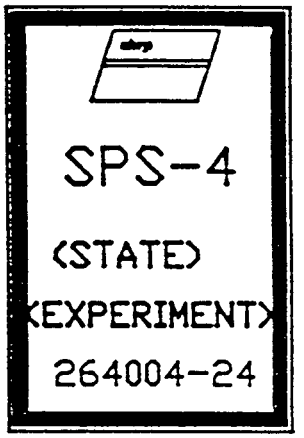
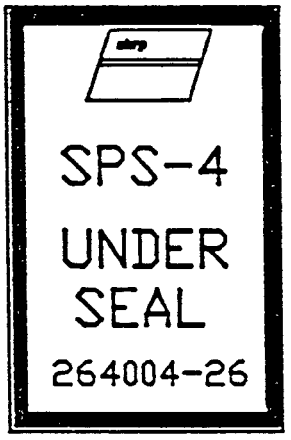


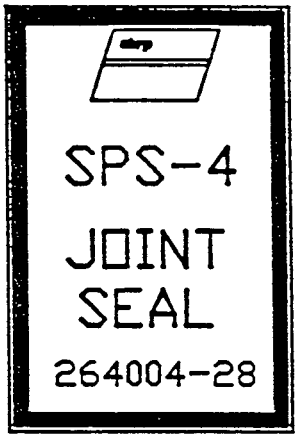
EXHIBIT 2 (Cont.)

PROPOSED H-101 SIGN









MEMORANDUM

Project No.: SH-1 Date: June 29, 1989

Project: "LTPP" Regional Coordination Office, Southern Region

To: SH-1 Staff and Homer G. Wheeler

Author: Brent Rauhut

Subject: Results from SPS-3 and SPS-4 Meeting in Nashville, June 27-28, 1989.

This first SPS-3 and SPS-4 meeting in the Southern Region was both a Working Group meeting for the Southern Region states that will participate and the "pilot" Regional Meeting for SHRP. Attached you will find a list of attendees and an agenda.

While the attached agenda is not long, the subjects were very complex in resolution, and I believe that everyone was a little bit amazed that all the necessary decisions were reached. The Working Group was chaired by Dwight Hixon of Oklahoma DOT, with presentations and technical discussion of the projects from H-101 Contractor and the SHRP personnel.

The meeting started with a discussion of the objectives of the meeting and the key issues. The objectives were as follows:

1. To come to an agreement on the schedule of activities for this 1989 construction season.

2. To resolve which contracting plan to use and other key issues to help reach agreements.

The key issues identified were :

1. Contracting Plan.
2. Quality Assurance and Quality Control.
3. Inspection.
4. Specifications.
5. Materials Sampling and Testing.
6. Responsibilities.
7. Coordination.
8. Training.
9. Data Collection.
10. Schedule.
11. Other.

The handouts for this meeting are in the file, and each of the Project Engineers received one. However, I have attached a sheet with the experiment designs from one of the handouts and two factorials that were not in the handouts that show the potential GPS

sites by state that could fit in the various cells. It should be noted that potential sites do not equate to commitments from the State Highway Agencies, which is a subject to be dealt with right away. In this regard, Georgia says that they are not going to participate in these studies and Florida is having something of a problem politically with it also. However, I believe that Florida and SHRP worked out some correspondence that will allow Florida to relate this to research and avoid some of their contracting problems concerning the use of sole-source contracting to gain uniformity regionwide. Tennessee has already committed to two projects and are open to having as many as five, if necessary. I believe that Texas is planning to have at least eight and the others are open to helping out where they need to, except that Louisiana will be unable to commit until after October, if at all.

The actual factorials are unbalanced with no projects required in some cells, one in others, and two in others. As can be seen, there are some gaps that will need to be filled to the extent possible. In this regard, the outlook is so poor for JRCP in the wet-no freeze zone that it was decided to let that go as a co-variable with the option of substituting JPCP to fill some cell where it was needed, in lieu of JRCP. The net result will probably be a few JRCP projects in the Southern Region, but no effort will be made to fill out the factorial.

On SPS-3, five cells need projects in the wet-no freeze zone, of which Florida can fill two, if they can work out their limitations. Other lesser problems exist.

The morning of June 28 was spent in identifying what had to be done and general briefing by SHRP and H-101 on what was planned and what decisions were needed from the Working Group.

The primary decision sought by SHRP was a Contracting Plan. The recommended approach was to have regional contractors to gain uniformity in the construction of the treatments from one location to another. There are serious problems involved and most of these were discussed, but there was unanimous agreement that we should use Regional Contractors and that the Regional Task Group (which will following from this Working Group) would make these selections for sole-source negotiations by a "pilot agency". The pilot agency will be Texas, who will also plan to construct the pilot test sections this fall.

We have volunteered to help pull together a screened list of contractors to choose from. Several industry groups are already well advanced in identifying capable contractors and we will arrange through SHRP for them to work with us to the extent they can without upsetting their contractor members. This will need to be initiated right away, and I will be talking to some of you about this.

Larry Buttler, the Texas SDHPT Maintenance Administration Engineer, was the participant for Texas in the Working Group and will take the lead on the pilot effort. This will involve identifying which projects will be included as pilots, trips to verify and mark the test sections, refinement and modifications to the specifications proposed by H-101, close coordination with the other State Highway Agencies to produce legal language that is compatible with their systems, negotiating and contracting with the contractors to be involved, funding the pilot projects, preparation of the test sections prior to arrival of the contractors, inspection of the work, acceptance of the work, and perhaps some coring to be done, either by state forces, by the contractor, or by the Regional Materials Sampling and

Testing Contractors. We will be working closely with Larry and others in bringing this about.

In addition to helping screen potential contractors, we will be involved directly in the selection of test sections and the verification in the field, will observe the construction in the field and fill out check lists provided to us by H-101, work with the SHA Inspector on Quality Assurance, conduct distress surveys before and after the construction, as well as after six months, one year, and periodically thereafter. We will also receive the data as it is produced and enter it into the data base. In short, the support of SPS-3 and SPS-4 will represent quite a bit of work for Jerry this year, and the other Project Engineers will be involved in verification and site visits in other states. These projects alone could represent a very major amount of effort for all of as construction progresses ~~~ next year, when it is expected that the great bulk of the test sections are to be constructed.

Returning to selection of contractors, the intent is to have Regional Contractors that are very experienced in slurry seals, crack sealing, and chip seals. There are a very limited number of contractors that are qualified to do these specialized construction jobs. It is expected that the same contractor can handle crack-sealing and slurry seals, but chip-sealing is a separate specialty and we will be fortunate if we can get competence in all three in the same contractor. We discussed the viable possibility of joint ventures or one contractor being the general and subbing to another with the needed specialty. Larry also pointed out that these contractors, with the expertise that is needed, often are subcontractors to large general contractors.

The Regional Contractors will also utilize one set of material sources regionwide, hauling the materials from one site to another. This does not mean that application rates, as an example, will be exactly the same from one site to another, as these are dependent on surface conditions, size of existing aggregate, etc. It is expected that trial sections will be laid down and adjustments made before the treatments are applied to the test sections. The inside lane will be treated first and the outside test lane second. This gives the opportunity to get the operation "down pat" before the actual test sections are laid.

As the Regional Contractors will be moving from location to location throughout the region, it apparently will function to some extent much like the materials sampling and field testing exercise that we now have underway. Subject to discussion, I now perceive that the Project Engineers will travel with the construction train within their states. This should not prove onerous as there generally will not be that many locations in a particular state.

Training sessions are planned so that everyone involved will know what their responsibilities are. It is expected that industry representatives will play a strong role in this as far as the actual laydown procedures and what we should be watching for. I think it is also quite probable that industry representative will be on site when this is done.

You may notice that I have not discussed yet the thin overlay test sections in SPS-3. This was because it was not considered feasible to use the same materials for the overlays regionwide, so the approach will be for the State Highway Agencies to be responsible for this, utilizing local contractors and materials. There are some draft guidelines for thin overlays that they are to follow. These thin overlays will be 1½-inches thick, with a

tolerance of ± ¼ inch. Our role during construction for the thin overlays is not clear to me as yet.

It was noted that Federal Aid funding is available for these, just as for the GPS.

There are a number of questions that are yet to be answered on the materials sampling and testing. Much like GPS, there will be verification, coring and drilling in the transition zones early on to evaluate the variability between these test sections and the "parent GPS test section" and each other. I believe this will be primarily collecting the cores of the asphalt concrete (we will not throw them away this time, as we have some uses for them) and establishing the thicknesses for base and subbase. We will need to auger into the subgrade far enough to ascertain that it is pretty much the same materials as the GPS test sections.

H-101 wishes to collect samples for conducting extractions and for other specialized tests related to aging, etc. They tentatively expect to conduct these tests at this time and periodically core again and conduct tests over the life of the project. I will again mention that there is funding for this in H-102. As there is no strength testing planned, it really does not matter much how the cores are taken, so this does not necessarily need to be done by the Materials Sampling and Field Testing Contractor, but may be more desirable. SHRP and H-101 are going to discuss this further and will provide additional advice soon.

A question arose as to what width cracks were to be sealed. H-101 had homed in on cracks that were ¼ inch or wider, but cracks this wide are not that common in the Southern Region. We might very well end up with experiments where no cracks were sealed at all. Larry Buttler indicated that they seal cracks that are 1/8-inch wide or wider. H-101 had homed in on routing cracks to be sealed a width of 2 inches and a depth of ¼ inch, utilizing a procedure that is in common use in Ontario and is being used experimentally in Colorado. It was generally accepted that wide cracks were more common in the northern areas and that a different "bandaid seal" that did not involved routing might be more appropriate for the Southern Region. This will be considered further and decisions reached.

I pointed out that we probably need to probe the shoulders of these test sections to verify depth of rigid layer, just as we do for GPS, because H-101 plans to include deflection testing (as is being done for GPS) so will have the same needs for recognizing depths to rigid layers.

One very important issue was the establishment of a Regional Task Group as a decision-making body for these projects in the Southern Region. It was generally agreed that it would be most efficient if the members of the Working Group continued as members of the Regional Task Group. A letter will go to the Chief Executive Officers of the State Highway Agencies, aimed at formalizing this group and encouraging participation of others (perhaps representing construction divisions, etc.) in future meetings, as required. Various industry groups have indicated a desire to participate, and they will be invited to the next meeting, which is scheduled August 1 in Austin, Texas.

A tentative agenda for the August 1 meeting includes the following:

1. Development of the contractual documents.

2. Development of contractual selection process (we later discussed evaluation criteria, as we really need to have advanced the selection process so selections can be made August 1).

3. Finalize specifications.

4. Develop Quality Assurance and Quality Control Procedures.

5. Formalize the Pilot State Selection.

6. Refine the definition of responsibilities for SHRP, the Contractors, and the State Highway Agencies.

7. Advance the planning on materials sampling and testing.

It was agreed that each state would have one vote on the Regional Task Group, and that the industry and contractor participants would function as associates with no vote.

SPS-3 and SPS-4 may generate a need for more signs along the highway than the entire GPS in the Southern Region; therefore, we will need to get more SHRP logos to distribute to the participating State Highway Agencies.

Some general contract evaluation criteria were developed by the group as follows:

1. Contractor experience, including years in business, volume of business, demonstrated quality, and bondability.

2. Willingness to work all over the region.

3. Ownership of satisfactory equipment.

You will note that I do not discuss SPS-4 very much as far as details are concerned. This is partly due to the fact that there was quite a lot less discussion of SPS-4 during the meeting, but the general procedures will apply for joint sealing and undersealing as well. There was quite a bit of discussion as to what joint sealer would be selected and whether it should be the same one throughout the region. The approach seems to be that they want to use a good seal that will last for a reasonable period of time, but the emphasis is on the joint being sealed rather than comparing various joint sealing materials. There was also a discussion whether failures should be noted and immediate resealing conducted to maintain a seal on a continuing basis. I believe that the jury is still out on this.

It was decided that Roger Smith would prepare an equitable strawman distribution of the projects throughout the region, and that this would be submitted fairly soon to the State Highway Agencies so that they could get the approvals of their administrations that would be required to finalize the commitments at the August 1 meeting. This will be an important step so we can plan our visits to the State Highway Agencies and get them underway as soon as possible.

It was agreed that we would need to establish some polishing limit for the aggregates in use in the specifications.

I have told Larry Buttler that we would stand ready to help him out any way we could, and encouraged him to set up a meeting as soon as feasible to include Jerry, Roger Smith or Tom Freeman, and probably Homer and myself. He would probably have a representative of the Materials Division and others. He thought this might occur after July 4.

I believe that we will need to have at least one meeting on SPS-3 and SPS-4 next week, as Homer and I will be going to the RCOC meeting in Washington the following week, and the primary topic for it will be SPS. Therefore, each of you should give some thought to the types of questions you would like answered. This should include a reasonable review of the handout material that was furnished each of the Project Engineers.

As you might expect, I lobbied for use of video documentation during the verification and marking of the test sections and the creation of a video library, much as we did for GPS. I believe that we will need to do a fairly substantial coverage during the distress surveys as the PASCO will not be able to service the busy schedule for these before and during the first year after the construction. Everyone seemed to agree to this concept.

JBR:dmj

NASHVILLE

H-101 SPS-3 & 4

June 27-28, 1989

Steven L. Cumbaa	LA DOTD	504/767-9106
Ross B. Dindio	SHRP	202/334-3774
Richard Duemler	FHWA-TN	615/736-7107
Gerald Gooding	FHWA-TN	615/736-5361
Homer G. Wheeler	SHRP-Southern Region	512/346-7477
S. C. Shah	SHRP-Washington,D.C.	202/334-1438
Jim Norris	TN-DOT	615/741-2027
Brent Rauhut	Brent Rauhut Engr.Inc.	512/346-0870
Ken Arnold	TN-DOT	615/741-1816
Don Harriott	SHRP-Washington, DC	202/334-1410
Brian Cox	SHRP-DC	202/334-1436
Travis Chapin	Purdue SPS-4	317/494-2255
Roger Smith	TTI-H101	409/845-7511
G. E. Pettyjohn	Florida DOT	904/752-3300
A. F. Quilio, Jr.	Florida DOT	904/758-0454
Larry J. Buttler	Texas-SDHPT	512/465-6268
Warren Willis	MS State Highway Dept.	601/683-3341
Wayburn Crabtree	TN DOT	615/741-0781
Gary Head	TN DOT	615/320-8201
Harold Beaver	Ark.Hwy. & Trans.Dept	501/569-2251
C. Dwight Hixon	OK DOT	405/521-2671

SOUTHERN REGION WORKSHOP AGENDA
PAVEMENT MAINTENANCE EFFECTIVENESS
SPS-3 FLEXIBLE PAVEMENT TREATMENTS
SPS-4 RIGID PAVEMENT TREATMENTS

JUNE 27-28, 1989
NASHVILLE, TN

Tuesday, June 27, 1989

8:00	Continental Breakfast - Registration	SHRP Staff
8:30	Welcoming Remarks	Jimmy Evans, Commissioner, TN DOT Don Harriott, SHRP
8:45	Workshop Objectives	Dwight Hixon, OK DOT
9:00	Introduction o Study Objectives o Study Design o Status and Consequence of Site Availability	T.T.I./Purdue
9:45	Coffee Break	
10:00	Presentation of Key Issues	
	o Specification on materials (use of sole source to minimize material variability), design and construction.	Dwight Hixon, OK DOT
	o Contracting procedure options for construction of treatments (preferred option: sole source contractor in each region for maximum uniformity between sections)	Dwight Hixon, OK DOT
	o Responsibilities of state, SHRP, SHRP regional contractors, etc.	Dwight Hixon, DOT
	o Signing	Dwight Hixon, DOT
	o Schedule for installation	Dwight Hixon, DOT

	o Inspection, quality assurance and quality control (who, when, how, etc.)	TTI
	o Training on inspection, QA & QC	TTI
	o Data collection	TTI
12:00	Lunch	
1:00	Discussion on Key Issues	All participants
3:00	Coffee Break	
3:15	Discussion on Key Issues, continued	
5:00	Adjourn	

Wednesday, June 28, 1989

8:00	Continental Breakfast	
8:30	Summary of Workshop Conclusions	Dwight Hixon
10:00	Coffee	
10:15	Timetable For Future Activities	SHRP Staff
12:00	Adjourn	

For both Wet and Dry

TEMP. / SUBGRADE / TRAFFIC / STRUCTURE / CONDITION		Freeze				No-Freeze			
		Fine		Coarse		Fine		Coarse	
		Low	High	Low	High	Low	High	Low	High
A	<-1	1	2	1	2	1	1	1	1
	>1	2	1	2	1	1	1	1	1
B	<-1	2	2	2	2	2	1	2	1
	->1	2	2	2	2	1	2	1	2
C	<-1	0	1	0	2	0	2	0	1
	>1	0	2	0	1	0	1	0	2

Figure 1. Proposed Design with Replication for Treatments to Flexible Pavements

For both Wet and Dry plain and Wet reinforced sections

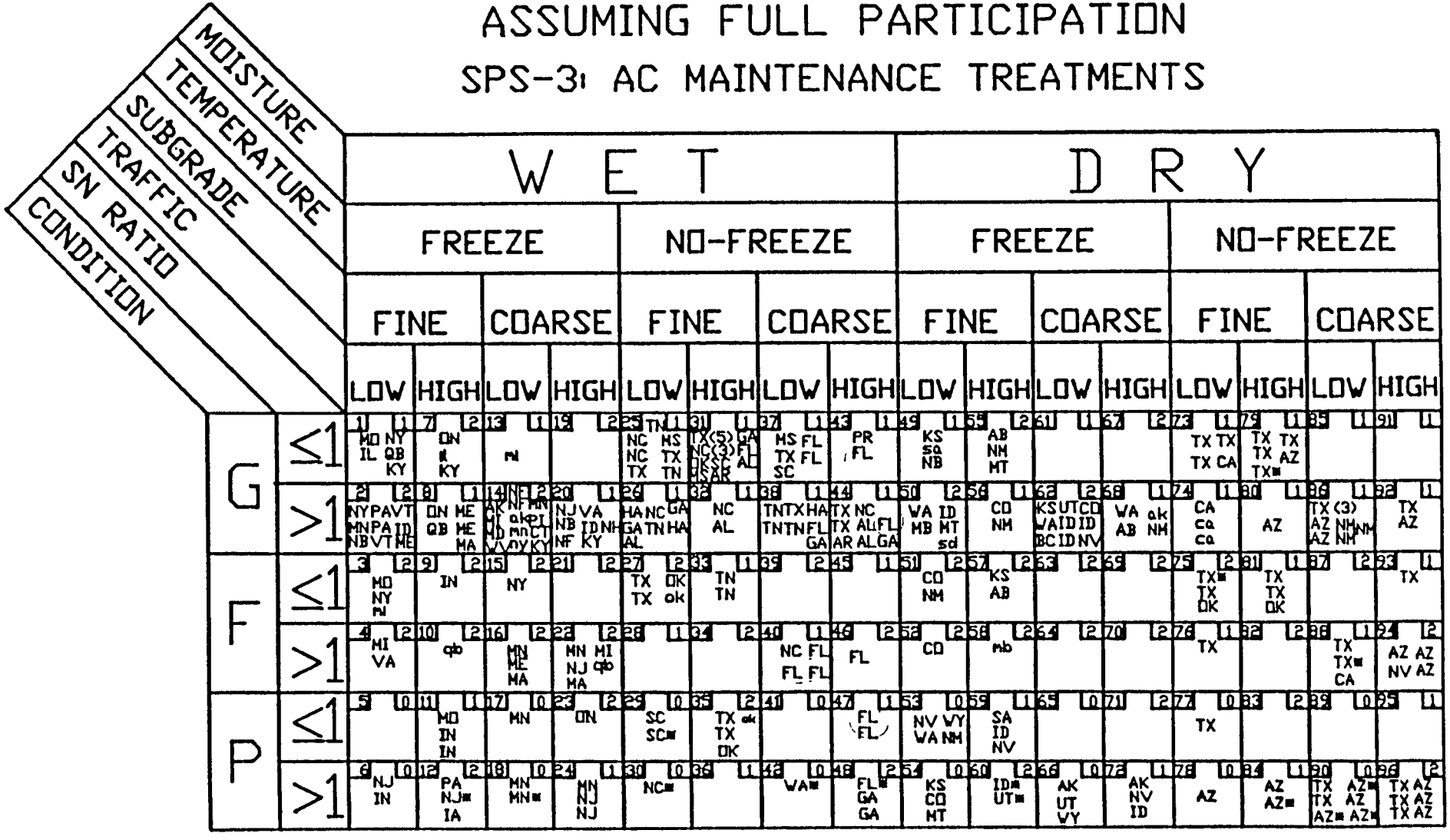
TEMP. / SUBGRADE / TRAFFIC / SUBBASE / CONDITION		Freeze				No-Freeze			
		Fine		Coarse		Fine		Coarse	
		Low	High	Low	High	Low	High	Low	High
A	G	1	2	1	2	1	2	1	2
	S	1	2	1	2	1	2	1	2
B	G	2	2	2	2	1	1	1	2
	S	2	2	2	2	1	1	1	2
C	G	0	1	0	1	0	1	0	1
	S	0	1	0	1	0	1	0	1

Figure 2. Proposed Design with Replication for Treatments to Rigid Pavements

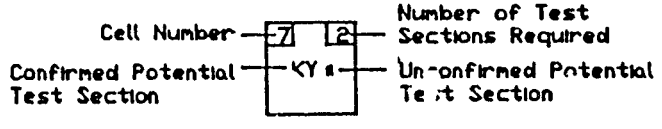
CURRENT STATUS OF H-101

ASSUMING FULL PARTICIPATION

SPS-3: AC MAINTENANCE TREATMENTS



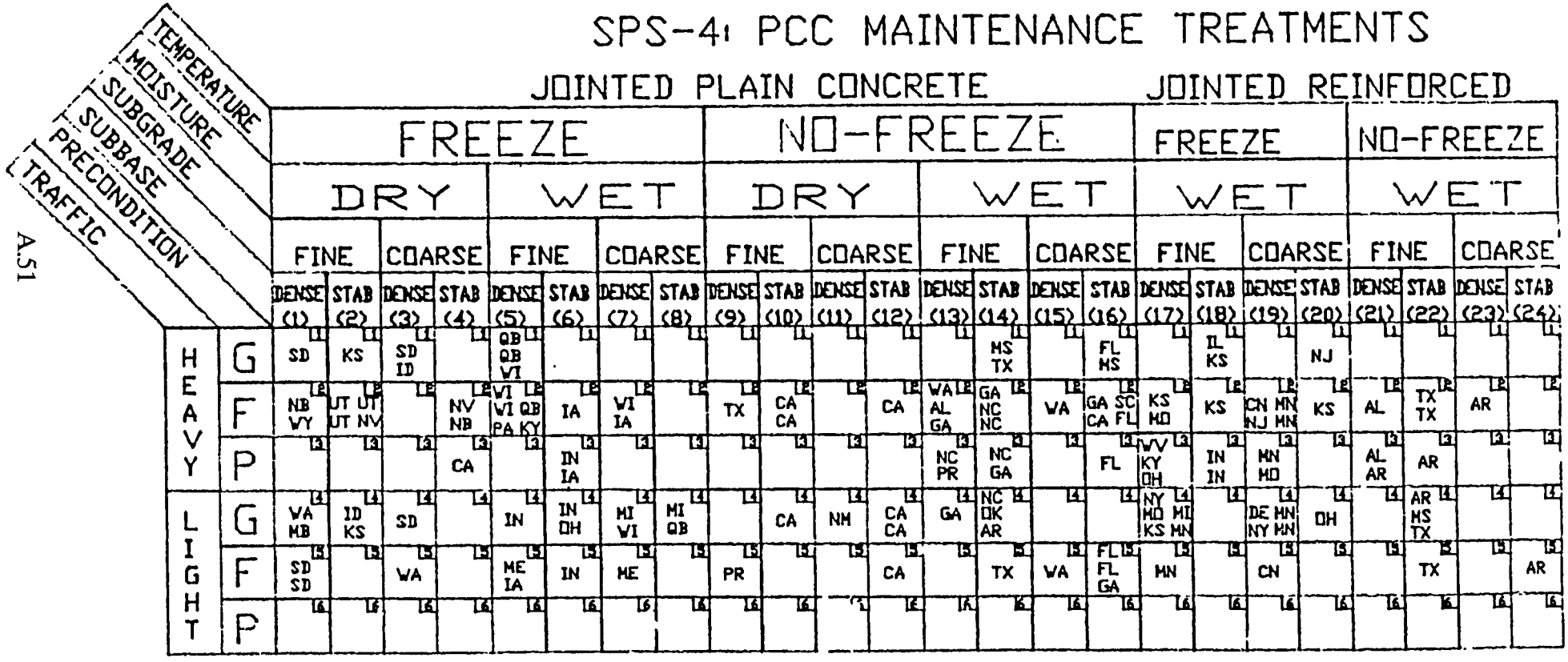
LEGEND



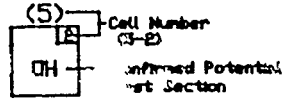
5-24-89

CURRENT STATUS OF H-101

SPS-4: PCC MAINTENANCE TREATMENTS



LEGEND



APPENDIX B

FINAL SPECIFICATIONS USED FOR:

CHIP SEAL, SLURRY SEAL, AND CRACK SEAL

PART 400 - ASPHALT PAVEMENTS AND SURFACE TREATMENTS

Section 407.--CHIP SEAL

Description

407.01 This work consists of furnishing all materials, equipment, and labor for constructing the asphalt chip seal surface treatment areas. The treatment areas shall be constructed on the existing pavement in accordance with these specifications and in conformance with details and at the locations shown in the site descriptions. There is one treatment area for chip sealing at each project site and the demonstration site.

Equipment

407.02 The equipment used by the Contractor shall include but not be limited to the following:

(a) Power broom. A motorized power broom, center mount only, shall be used for removing loose material from the surface to be treated and for removing loose aggregate after work is completed.

(b) Rollers. A sufficient number of self-propelled, pneumatic-tired rollers shall be used for rolling aggregates after spreading such that the entire lane width of the treatment area is covered in one pass of the rollers. Each pneumatic-tired roller shall have a compacting width of not less than 60 inches and a minimum ground contact pressure of 80 pounds per square inch. If 60 inch wide rollers were used, then the contractor would be required to have 3 rollers to roll the 13 foot wide test sections.

(c) Asphalt distributer. A pressure distributor shall be used for applying the asphalt material. It shall be designed and operated to distribute the asphalt material in a uniform spray at the specified rate without atomization. It shall be equipped with a bitumeter having a dial registering feet of travel per minute. The dial shall be visible to the operator in order to maintain the constant speed required for the application at the specified rate. The pump shall be equipped with a tachometer having a dial registering gallons (or liters) per minute passing through the nozzles. The dial shall be readily visible to the operator. The distributor shall be provided with a full circulatory system that includes the spray bar. The distributor shall be provided with heaters that can be used to bring the asphalt material to spray application temperature. Means shall be provided for accurately indicating the temperature of the asphalt material at all times. The thermometer well shall not be in contact with the heating tube. The normal width of application of the spray bar shall be 13 feet with provision for greater or lesser width when necessary. A hose and spray nozzle attachment shall be provided for applying asphalt material to patches and areas inaccessible to the spray bar. The spray bar height, nozzle angle, and pump pressure will be

calibrated weekly or as required by the Engineer.

The calibration shall be performed in accordance with TAI Manual Series No. 19(MS-19), 2nd Edition. The allowable deviation shall be not more than 10 percent in the longitudinal and transverse directions. The longitudinal and transverse spread rates shall be checked using ASTM D2995.

(d) Aggregate spreader. The aggregate spreader shall be a self-propelled mechanical spreader with and operational scalper screen capable of uniformly distributing aggregate at the prescribed rate. The aggregate spreader will be checked weekly or as required by the Engineer. The calibration shall be performed in accordance with TAI Manual Series No. 19(MS-19), 2nd Edition. The allowable deviation in the amount of aggregate spread shall not be more than 10 percent (by weight) in the longitudinal or transverse directions.

(e) Hauling Equipment. Trucks used for hauling aggregate shall have a cover of canvas or other suitable material of such size as to protect the aggregate from weather. Truck bed shall be covered and securely fastened when delivering aggregate to the project sites.

(f) Auxiliary Equipment. Shovels and other equipment shall be used as necessary to perform the work. Cleaning equipment including but not limited to power brooms, air compressors, water flushing equipment, and hand brooms shall be adequate for surface preparation.

Materials

407.03 Asphalt. The base asphalt to be emulsified shall be an AC-10, meeting the requirements of AASHTO M226, Table 2. The emulsified asphalt shall conform to Subsection 702.03 for emulsified asphalt grade CRS-2.

Acceptance sampling, point of acceptance, and test methods are specified in Subsection 106.06.

407.04 Mineral Aggregates. Aggregates shall meet the requirements of Subsection 703.13(a).

Acceptance sampling, point of acceptance, and test methods are specified in Subsection 106.06.

407.05 Water. All water shall be potable and compatible with the chip seal. Compatibility must be ensured by the Contractor.

407.06 Mix Design. The chip seal surface treatment shall be designed in accordance with TAI design method found in Manual Series No. 19 (MS-19), 2nd Edition. The contractor shall have the design of the chip seal prepared by qualified personnel, approved by the Engineer, experienced in asphalt surface treatment design.

The chip seal surface treatment design shall be based on traffic of over 2,000 vehicles per day and assume a slightly pocked, porous oxidized surface.

Application rate for the emulsified asphalt binder shall be from 0.25 and 0.40 gallon per square yard. The final application rate shall be determined after the source of materials is known.

Spread rate for the aggregate, based on weight of dry aggregate, shall be from 18 to 25 pounds per square yard. The final application rate shall be determined after the source of materials is known.

The design of the surface treatment shall be submitted to the Engineer for approval 15 working days prior to any work being accomplished. The design will include the following information:

(a) Aggregate gradation
(b) Bulk specific gravity of aggregate
(c) Loose unit weight of aggregate
(d) Emulsified asphalt rate of application and type
(e) Aggregate rate of application

In addition to the above data, the contractor is to submit with the design of the surface treatment a sample of the aggregate and the emulsion for use to the Engineer for verifying test results. The design may be verified by the government.

Construction Requirements

407.07 Weather Limitations. The chip seal surface treatment shall be placed only when the surface to be treated is dry or slightly damp, when the temperature of the road surface and the air temperature are 60 degrees F and rising, and when the weather is not foggy or rainy.

407.08 Preparation of Surface, General. All roadway surfaces to be treated shall be cleaned by the Contractor. The Contractor shall sweep the pavement with a motorized power broom to remove all loose material. All depressions not reached by the power broom will be cleaned by the Contractor using hand brooming. The Contractor shall ensure that the outer edges of the pavement to be treated including the 1 foot of the shoulder width, if a paved shoulder exists, are thoroughly cleaned. Work will not continue until the surface is approved by the Engineer.

407.09 Temporary Centerline Markings. Prior to the placement of the chip seal surface treatment, temporary centerline markings meeting the requirements of Section 635 shall be installed by the contractor.

407.10 Application of Emulsified Asphalt Binder. The rate of application for the emulsified asphalt binder shall be at the rate determined by the surface treatment design. See Subsection 407.06. The Engineer will make adjustments to the rate of application if necessary. Application of the emulsified asphalt binder shall be made uniformly at this rate with the pressure distributor, one full lane width at a time (including shoulder).

Further adjustments in the rate of application shall be made by the Engineer, if needed, during the course of the work. The emulsified asphalt binder shall be applied at a temperature between 125 and 185 degrees F. The final spray temperature will be specified by the Engineer.

Before beginning application, building paper shall be spread over the surface, from the beginning point back and from the endpoint forward, for a sufficient distance for the spray bar to be at full force when the surface to be treated is reached. The spray bar shall be shut off instantaneously at the endpoint to ensure a straight line and the full application of binder up to the endpoint. After the asphalt is applied, the building paper shall be removed and disposed of properly. A hand sprayer shall be used to apply asphalt binder necessary to touch up all spots missed by the distributor.

407.11 Application of Mineral Aggregates. After the asphalt binder has been spread evenly over the roadway surface, aggregates of the type specified shall be evenly applied to the roadway surface by self propelled spreader equipment. The aggregate shall be distributed uniformly by a spreader within 1 minute of the emulsified asphalt application.

All aggregate shall be watered down before placement, but not immediately before, to provide aggregates that are uniformly damp as approved by the Engineer at the time of placement on the roadway.

The aggregate shall be spread in one operation in such a manner that an 8 inch strip of the emulsified asphalt is left exposed along the longitudinal joint to form a lap for succeeding applications of the emulsified asphalt. If necessary, thin or bare spots in the spread of aggregates shall be corrected by hand spreading or other methods subject to the approval of the Engineer.

The aggregate shall be spread at the rate determined by the surface treatment design. See Subsection 407.06. The Engineer will make adjustments to the rate of application if necessary.

The aggregate shall be rolled following spreading. A maximum time of 3 minutes will be allowed between the spreading of the aggregate and completion of the initial rolling of that aggregate. The rollers shall proceed in a longitudinal direction at a speed less than or equal to 5 miles per hour. The rollers shall make three complete coverages of the aggregate with the final pass in the direction of traffic.

Immediately prior to opening to traffic, the surface of the roadway shall be swept, at the direction of the Engineer, with a power broom at adequate pressure to remove loose aggregate.

Trucks hauling aggregate shall be operated in a manner that shall not damage the roadway or the freshly applied surface.

Method of Measurement and Basis of Payment

407.12 All materials and work required by this Section will be measured and paid for in accordance with Section 410.

Section 408.--SLURRY SEAL

Description

408.01 This work consists of furnishing all materials, equipment, and labor for constructing the asphalt slurry seal treatment areas. The treatment areas shall be constructed on existing pavement in accordance with these specifications and in conformance with details and at the locations shown on the plans. There is one treatment area for slurry sealing at each project site and the demonstration site.

Equipment

408.02 The equipment used by the Contractor shall include but not be limited to the following:

(a) Slurry Seal Mixer. The slurry seal mixing machine shall be a continuous flow mixing unit with calibrated controls capable of delivering accurately predetermined proportions of aggregate, water, and asphalt emulsion to the mixing chamber and of discharging the thoroughly mixed product on a continuous basis. Each machine shall be equipped with metering devices, easily readable, that will accurately measure all raw materials prior to entering the pugmill. Each machine shall have an automated system capable of automatically sequencing in all raw materials to insure constant slurry mixture. The mixing chamber shall be capable of thoroughly blending all ingredients together. No violent mixing will be permitted. The aggregate shall be pre-wetted in the pugmill immediately prior to mixing with the emulsion.

The mixer shall be equipped with an approved fines feeder having an accurate metering device or other approved means to introduce a predetermined quantity of mineral filler into the mixer at the time and location that the aggregate is introduced into the mixing machine. The fines feeder shall be used whenever mineral filler is a part of the aggregate blend.

The mixing machine shall be equipped with a water pressure system and a fog-type spray bar adequate for complete fogging of the surface immediately ahead of the spreading equipment. Rate of fog application shall be 0.03 to 0.06 gallon of water per square yard.

The mixer shall be capable of mixing all materials at preset proportions regardless of the engine speed without changing the mixing machine settings.

The machine shall be capable of a minimum speed of 60 feet per minute and shall not exceed 130 feet per minute while in operation. The mixing machine shall have sufficient storage capacity to properly mix and apply a minimum of 7 tons of slurry seal.

Approved means of measuring all materials used in each slurry seal batch shall be provided, properly calibrated, and made accessible to the Engineer by the Contractor. The slurry seal mixer shall be checked weekly or as required by the Engineer. The calibration of the slurry seal mixer shall be performed in accordance with TAI Manual Series No. 19 (MS-19), 2nd Edition. The Engineer may use the recorders and measuring facilities of the slurry seal unit to determine application rates, asphalt emulsion content, and mineral filler content of individual loads.

(b) Spreading Equipment. Attached to the mixing machine shall be a mechanical type single squeegee distributor equipped with flexible material in contact with the surface to prevent loss of slurry and adjustable to assure a uniform spread of varying grades and crowns. It shall be steerable and adjustable in width with a flexible strike-off.

The box shall not cause grooving of the slurry by any of its parts. It shall be kept clean, and build-up of material on the spreader will not be permitted. The type drag, burlap, or other textile will be approved by the Engineer and it shall be cleaned or changed as frequently as needed or as designated by the Engineer. The drag shall be wetted at the beginning of each application.

(c) Hauling Equipment. Trucks used for hauling aggregate shall have a cover of canvas or other suitable material of such size as to protect the aggregate from weather. Truck beds shall be covered and securely fastened when delivering aggregate to the project sites.

(d) Auxiliary Equipment. Hand squeegees, shovels, and other equipment shall be used as necessary to perform the work. Cleaning equipment including but not limited to power brooms, air compressors, water flushing equipment, and hand brooms shall be adequate for surface preparation.

Materials

408.03 Asphalt. The emulsified asphalt shall be quick-set emulsified asphalt conforming to Subsection 702.03, Table 702-1.

Acceptance sampling and point of acceptance are specified in Subsection 106.06.

408.04 Mineral Aggregates. Aggregate shall meet the requirements of Section 703.13(b).

Point of acceptance is specified in Subsection 106.06.

408.05 Mineral Filler. Mineral filler shall meet the requirements of Subsection 703.11.

Acceptance of mineral filler is specified in Subsection 106.06.

408.06 Water. All water shall be potable and compatible with the slurry seal. Compatibility must be ensured by the Contractor.

408.07 Mix Design. The slurry mixture shall be designed in accordance with requirements of ASTM D 3910, as applicable. The Contractor shall have a mix design prepared by one of the following laboratories:

Alpha Labs P.O. Box 74 Alpha, OH 45301 (513) 298-6647 Contact: Ben Benedict	ScanRoad, Inc. P.O. Box 7677 Waco, TX 76714 (817) 772-7677 Contact: Tony Ng
Asphalt Technologies, Inc. 9890 B Elder Creek Road Sacramento, CA 95829 (916) 381-8033 Contact: Jim Stevens	Valley Slurry Seal Lab P.O. Box 1620 W. Sacramento, CA 95691 (916) 373-1500 Contact: Jim Harriman
Koch Materials 1194 Zinns Quarry Road Reading, PA 17404 (717) 843-0975 Contact: Ron Kohlar	Sahuaro Labs P.O. Box 6536 Phoenix, AZ 85005 (602) 252-3061 Contact: Mike Doyle

The mix design shall be based upon the requirement that the treated area will be opened to traffic within 2 hours after placement of the slurry seal mixture.

Residual asphalt content, percent weight of dry aggregate, shall be from 7.5 to 13.5 percent as determined by AASHTO T 59.

Application rate of slurry mixture, based on weight of dry aggregate, shall be from 15 to 25 pounds per square yard.

The mix design will be submitted to the Engineer for approval 15 working days before work begins. The mix design will include the following information:

(a) Aggregate gradation.

(b) Mineral filler to be used if needed, percentage by weight of aggregate.

(c) Emulsified asphalt percentage and type.

(d) Sand equivalent of aggregate.

(e) Setting time (40 minutes maximum).

(f) Water resistance test results; pass or fail.

(g) Results of Wet Track Abrasion Test (max. loss of 75 grams per sq ft).

In addition to the above data, the Contractor is to submit with the mix design a sample of the aggregate, the emulsified asphalt, and the mineral filler, for use to the Engineer for verifying test results.

After the design mix has been established, the mixture supplied to the project shall conform thereto within the following tolerances:

Passing U.S. No. 4 and larger sieves	± 7%
Passing U.S. No. 8 to U.S. No. 100 sieve	± 4%
Passing U.S. No. 200 sieve	± 2%
Residual Asphalt (by extraction)	± 0.4%
Mineral filler (portland cement)	± 0.5%

The Engineer may adjust the emulsified asphalt content during construction to account for the amount of asphalt absorbed by the pavement.

Construction Requirements

408.08 Weather Limitations. Slurry seal shall be applied only when the surface to be treated is dry or slightly damp, when the temperature of the road surface and the air temperature are 60°F and rising, and when the weather is not foggy or rainy.

408.09 Preparation of Surface, General. All roadway surfaces to be treated shall be cleaned by the Contractor. The Contractor shall sweep the pavement with a motorized power broom to remove all loose material. All depressions not reached by the power broom will be cleaned by the Contractor using hand brooming. The Contractor shall ensure that the outer edges of the pavement to be treated, including the 1 foot of the shoulder width if a paved shoulder exists, are thoroughly cleaned.

408.10 Temporary Centerline Markings. Following placement of the slurry seal surface treatment, temporary centerline marking meeting the requirements of Section 635 shall be installed by the contractor.

408.09 Application of Slurry Seal. The surface shall be fogged with water immediately preceding the spreader. The slurry seal mixture shall be of the desired consistency as it leaves the mixer. The mixture furnished shall conform to the established design mix. The total mixing time shall not exceed 4 minutes. A sufficient amount of slurry seal mixture shall be carried in all parts of the spreader such that complete coverage of the base surface is effected.

In areas not accessible to the slurry mixer, the slurry seal mixture shall be hand worked with approved squeegees.

Treated areas will be allowed to cure until such time as the Engineer permits these treated areas to be opened to traffic.

The following will not be permitted:

(a) Lumping, balling, or unmixed aggregate.

(b) Segregation of the emulsified asphalt and aggregate fines from the coarse aggregate. If the coarse aggregate settles to the bottom of the slurry seal mix, the slurry seal mix shall be removed from the base surface.

(c) Excessive breaking of the emulsified asphalt in the spreader box.

(d) Streaks or other unsightly appearances. The shoulder line shall be uniform and straight.

(e) Excessive build-up of slurry seal mix on longitudinal or transverse joints.

(f) If oversize materials are encountered, final screening prior to placement will be required.

Method of Measurement and Basis of Payment

408.10 All materials and work required by this Section will be measured and paid for in accordance with Section 410.

Section 409.--CRACK SEALING

Description

409.01 This work consists of furnishing all materials, equipment, and labor for sealing cracks in the existing pavement in the treatment areas. Crack sealing shall be in accordance with these specifications and in conformance with details and at the locations shown on the plans. There is one treatment area for crack sealing at each project site and the demonstration site.

Equipment

409.02 The equipment used by the Contractor shall include but not be limited to the following:

(a) Hot-Compressed Air-Lance (HCA). The hot-compressed air-lance shall provide clean, oil-free compressed air at a volume of 100 cubic feet per minute at a pressure of 120 pounds per square inch and at a temperature of 2000 degree F.

(b) Application Wand. The crack sealant applicator wand shall be attached to a heated hose, attached to a heated sealant chamber. Temperature controls shall be capable of maintaining the temperature of the sealant within manufacturer's tolerances.

(c) Heating Kettle. The equipment for heating the sealant material shall be constructed as an indirect heating type double boiler using oil or other heat transfer medium and shall be capable of constant agitation. Additionally, the heating equipment shall be capable of controlling the sealant material temperature within the manufacturer's recommended temperature range and shall be equipped with a calibrated thermometer capable of $\pm$ 5°F accuracy from 200°F to 600°F. This thermometer shall be located such that the engineer may safely check the temperature of the sealant material.

(c) Squeegee. A hand held squeegee shall be used to ensure that the crack is filled to the existing surface. The squeegee shall be of the size and shape to ensure that a 3 inch wide band is centered on the finished sealed crack.

Materials

409.03 The crack sealant shall conform to the requirements of Subsection 705.01.

Acceptance of crack sealant is specified in Subsection 106.06.

Construction Requirements

409.04 Preparation of Cracks The pavement area to be treated shall be clean and dry with no standing or flowing water on the surface.

All cracks greater than 12 inches in length, and greater than 1/8 inch width shall be sealed.

All cracks shall be blown clean and dry using the HCA lance. Care shall be exercised to keep the HCA lance moving at a pace that will avoid burning the surrounding pavement.

409.05 Sealing the Crack. For each crack, the crack sealant shall be placed and finished within 5 minutes after heating with the HCA lance. Each crack shall be filled flush and squeegeed so that the finished sealed crack is approximately 3 inches wide and centered on the existing crack.

409.06 Acceptance. Following the application of the crack sealant and before opening the roadway to traffic, the job will be visually inspected by the Engineer for areas exhibiting adhesion failure, damage to the sealant from construction equipment or personnel, missed cracks, foreign objects in the sealant, or other problems which will accelerate failure or indicate the job is not acceptable. Portions of the job identified by the Engineer that do not meet these acceptable criteria will be prepared and resealed until satisfactory to the Engineer.

Method of Measurement and Basis of Payment

409.07 All materials and work required by this Section will be measured and paid for in accordance with Section 410.

PART 700 MATERIALS

Section 702. -- BITUMINOUS MATERIALS

702.01 and 702.02 Reserved.

702.03 Emulsified Asphalts.

(a) The emulsified asphalts for chip sealing shall be cationic, grade CRS-2, and conform to the AASHTO M 208 Table 1. The base asphalt to be emulsified shall conform to AASHTO M 226, Table 2 for an AC-10.

The sieve test specified under AASHTO M 208 is not required.

(b) Emulsified asphalts for slurry sealing shall conform to the requirement of Table 702-1 below:

Table 702-1
Quick-Set Emulsified Asphalts

Property	Specification	AASHTO Test Method
Viscosity, 77° F, Saybolt Furol, sec	20 - 100	T 59
Residue by Distillation, %	57 min.	T 59
Sieve Test	0.10 max.	T 59
Tests on Residue from Distillation		
Penetration, 77° F, 100g, 5 sec	40 - 110	T 49
Solubility in Trichloroethylene, %	97.5 min.	T 44
Ductility, 77° F, cm	40 min.	T 51

702.04 Acceptance Procedures for Asphalts.

(a) General Acceptance Procedures. Acceptance of asphalt is subject to the following:

(1) Laboratory Tests. The supplier shall test all material intended for shipment to the Government.

(2) Examination of Shipping Container. Before loading, the supplier shall examine the shipping container and shall remove all remnants of previous cargos that might contaminate the material to be loaded.

(3) Delivery Ticket. The Contractor shall furnish with each shipment two copies of the delivery ticket. The delivery ticket shall contain the following information:

Consignees
Project No.
Grade
Net gallons
Net weight
Type and amount of antistripping agent
Identification No. (truck, car, tank, etc.)
Destination
Date
Loading temperature
Specific gravity at 60° F

(4) Test Results and Certification. The Contractor, or authorized supplier, shall deliver to the Engineer the applicable test results obtained from (1) above and a certification signed by an authorized supplier to cover the quality and quantity of material and the condition of container for each shipment. The certification shall be essentially in the following form and may be stamped, written, or printed on the delivery ticket:

"This is to certify that this shipment of _____ tons/gallons of _____ asphalt meets all contract specifications and the shipping container was clean and free from contaminating material when loaded."

Supplier:
Signed:

Failure to sign the certification will be cause to withhold use of the material until it can be sampled and tested for compliance.

(5) Acceptance Sampling Procedures. Samples of asphalt materials shall be taken by the Engineer in accordance AASHTO T 40, from the shipping containers at the point of delivery. Samples shall be taken of each separate tank at the time of discharge into distributors or other conveyances on the project.

(b) Alternate Acceptance Procedures. Asphalt will be accepted by certification under (a)(1) through (a)(4). Quality control reviews may be conducted by the Government or an authorized representative at the point of production to determine the reliability of the supplier's certifications.

If the certifications are not reliable, acceptance by certification will be discontinued and the contents of each shipping container will be sampled at the point of delivery in accordance with (a)(5), and tested for compliance prior to incorporation in the work. This procedure will be followed until the supplier's quality control and testing procedures are such that material meeting contract specifications is being consistently produced.

(c) Requirements for Asphalt Containing Antistripping Additives. In addition to either (a) or (b), the Contractor or authorized supplier shall furnish the Engineer on delivery of the initial shipment of fortified asphalt to the project and with subsequent shipments when ordered by the Engineer, a one quart sealed sample of the asphalt taken at time of loading at the refinery and prior to introduction of the additive, along with a separate 1 pint sample of the antistripping additive.

(d) Nonspecification Asphalt. Asphalt not conforming to the specifications will either be rejected or accepted in accordance with the following:

* The Engineer will evaluate the qualities of the nonconforming material and determine whether the deficiencies are such as to require complete removal of the material, or if in the interest of the Government, the nonconforming material may be accepted at a reduced price and permitted to be used or to remain in the completed work.

* All rejected asphalt shall be immediately removed from the work, including all portions of the work in which such rejected asphalt has been incorporated, and shall be replaced with specification material at no additional cost to the Government.

* When the nonconforming asphalt is permitted to remain in the work, the Engineer will determine the quantity of material represented and an appropriate adjustment in contract price based on engineering judgment.

Section 703. -- AGGREGATES

703.01 through 703.10 Reserved

703.11 Filler. Filler material for asphaltic mixtures shall meet the requirements of AASHTO M 17.

703.12 Reserved

703.13 Aggregate for Chip Seals and Slurry Seals. Aggregates shall meet the following requirements for grading and quality:

(a) Aggregates for Chip Seal. Aggregate shall be hard, durable particles or fragments of crushed stone or crushed gravel. Aggregates shall conform to the grading requirements in Table 703-1 below.

Table 703-1
Grading Requirements for Chip Seal Aggregate
(Percentage by Weight Passing U.S. Standard Sieves,
AASHTO T 27 and T 11)

Sieve Designation	Percent Passing
1/2" square	100
3/8" square	40 - 70
1/4" square	0 - 15
U.S. No. 10	0 - 5
U.S. No. 200	0 - 1.0

Not less than 75 percent by weight of the aggregate shall be particles having at least one fractured face. The fracture requirement shall apply to material retained on each sieve size No. 10 and above if that sieve retains more than 5 percent of the total sample.

The portion of aggregate retained on the 3/8 inch sieve shall not contain more than 15 percent of particles by weight that are flat or elongated or both, when tested in accordance with ASTM D 4791 using a dimensional ratio of 1 : 5.

The aggregate shall have a minimum polish value of 32 as determined by AASHTO T 279.

The aggregate shall pass the static stripping test as determined by AASHTO T 182.

The aggregate shall show a durability factor not less than 35 (coarse and fine aggregate) as determined by AASHTO T 210.

Coarse aggregate shall have a percent of wear of not more than 30 at 500 revolutions as determined by AASHTO T 96.

The finished product shall be clean, uniform in quality, and free from wood, bark, roots, and other deleterious materials.

(b) Aggregates for Slurry Seal. Aggregate shall consist of manufactured sand or crusher fines, or other approved mineral aggregate or combination thereof. Aggregates shall conform to the grading requirements in Table 703-2 below.

Table 703-2
Grading Requirements for Slurry Seal Aggregate
(Percentage by Weight Passing U.S. Standard Sieves,
AASHTO T 27 and T 11)

Sieve Designation	Percent Passing
5/16" square	99 - 100
U.S. No. 4	70 - 90
U.S. No. 8	45 - 70
U.S. No. 16	28 - 50
U.S. No. 30	19 - 34
U.S. No. 50	12 - 25
U.S. No. 100	7 - 18
U.S. No. 200	5 - 15

Smooth, textured sand of less than 1.25 percent water absorption shall not exceed 50 percent of the total combined aggregate as determined by the AASHTO T 84.

The aggregate shall have a minimum sand equivalent of 55 as determined by AASHTO T 176, Alternate Method No. 2.

The finished product shall be clean, uniform in quality, and free from wood, bark, roots, and other deleterious materials.

The aggregate shall show a durability factor not less than 35 as determined by AASHTO T 210.

Material used in the production of the aggregate shall have a percent of wear of not more than 35 at 500 revolutions as determined by AASHTO T 96.

Section 705 - JOINT MATERIALS

705.01 Crack Sealant. The crack sealant shall be a polymer modified rubber asphalt conforming to the requirements of ASTM D 3405 when tested in accordance with ASTM D 3407.

APPENDIX C

FIELD NOTES

This appendix contains a brief set of "Field Note" sheets for each of the 27 sites. These "Field Notes" are the SHRP-SRCO representative's observations of the most notable problems and irregularities that occurred during construction of each site. Also, included are his impressions of how "good" the treatments actually looked when they were applied. The EFLHD Project Engineer kept the official job diary and this should be referenced for additional construction information.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

47A3, Cannon Co., TN., SH-96-SB, 7/30/90

NON-TEST LANE

Chip
- Oil open graded friction course surface "Popcorn Mix". Shot .35 gal/sy Emulsion - looked way too light, we shot .16 gal/sy more. It looked better, so we then put the chips on. Chip spreader broke down a few times in mid operation, but we finally finished.

Slurry
- Looked good, but a little light on application rate. We did it in 2 pulls.

Cracks
- A few cracks to seal.

TEST LANE

Chips
- We shot less oil. Right lane looked more smooth on the surface. Oil looked light when we were done. Chips looked adequate.

Slurry
- Looked a little heavy. We did it in 3 pulls. Ran out of material & broke down once.

Cracks
- Lots of cracks to seal.

General Notes - We missed the 50' lead-in on crack sealing. They went back the next day and sealed these. I lost my mat for aggregate spread rate in the wheelpath, both lanes. The distributor had Emulsion on the wheels and picked it up. The lead out on the chip seal section is a dense graded, smooth, hot-mix overlay and will probably bleed after we shoot our chips onto it. We must shoot a lot of oil to cover the popcorn mix & we couldn't change our rate in the last 100'.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

47B3, Dekalb Co., TN., SH-56-SB, 8/1-2/90

NON-TEST LANE

Chip
- Everything pulled smoothly. Oil looked light. Rock looked light.

Slurry
- Looked good. Ran out of rock & reloaded. Looked a little light on application rate.

Cracks
- None.

TEST LANE

Chips
- Looked good. Oil & rock heavier than last lane. Pulled smoothly.

Slurry
- Looked good.

Cracks
- None.

General Notes - Did the slurry seal section, both lanes, Wednesday. Did not have chip rock. Did chip seal section, both lanes, Thursday.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

47C3, Anderson Co., TN., IH75-NB, 8/3/90

NON-TEST LANE

Chip
- oil looked light, rock looked good.

Slurry
- Very light application rate. The old sealed cracks showed through immediately.

Cracks
- Cracks were sealed.

TEST LANE

Chips
- oil looked good, rock looked heavy.

Slurry
- Application rate looked good. It had to be estimated & back calculated because rock & cement counters were accidently reset during the shot.

Cracks
- Cracks were sealed.

General Notes - Slight rutting/flushing in right lane. Heavy, overfilled crack sealant along left edge stripe bled through the chip & slurry & caused some minor raveling when traffic was initially placed.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

01A3, Montgomery Co., Ala., 8/7/90, SH 152, WB

NON-TEST LANE

Chip Seal

.34 gal/sy target
.296 gal/sy actual
22.7 lb/sy

Cleaned spray bar screens on distributor & shot 75' lead in to check application rate. Not very accurate.

Slight aggregate wash boarding on lead out. Carburetor cut out on Chip Spreader. We stopped for 1 min. and then restarted.

Slurry Seal

Rock Counter Broke <
Estimate 15 lb/sy, from amount of aggregate in truck before and after. Will need to back-calculate rock from cement counter and cross-reference with Emulsion strap.

Oversize rocks leaving streaks. We patched as we went along. Longitudinal joint 1/4" dropoff. We need to feather down the overlap better.

Crack Seal

None

TEST LANE

Chip - Oil looked light, rock looked right.

<targets> .32 gal/sy
<Actual> .262 gal/sy
Aggregate 22.2 lb/sy

Slurry - Looked good.

> Rock, 19.6 lb/sy 18.0 target.
Emulsion, 12.3% - 14.0% target.
Cement, 1.0% - 1.0% target.

Cracks

200 lin. ft.
Low Sev. Long.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

01C3, Houston Co., Ala, 8/9/90, US84, EB

NON-TEST LANE

Chips
Oil was light - looked good, otherwise.

Slurry
Looked good.

Cracks
Some cracks to seal.

TEST LANE

Chips
Looked good.

Slurry
Looked good.

Cracks
Fair amount of cracks were sealed.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

12A3, Nassau Co., SH 200, WB 8/13/90

NON-TEST LANE

Chip Seal Treatment
8:32 - 8:45AM
700' x 12.5' (972sy)
.340 (.324) (.315)
315 gal @ 170F
22.5 - 25.0, lb/sy
81, 84, 93

Slurry Seal Treatment
9:25 - 9:35AM
700'x12' (933sy)
0-2055 0-2300* counts-rock
3.875", 5 turns
0-1273, 0-1426 counts-cement
220 gal Emulsion
155 gal Water
833 sy, 933 sy
13.8 lb/sy, dry rock
13.4%, 205 gal - Emulsion
43lb, 0.33% - Cement
1 gal, % - K-3

Didn't reset counters until 75' was laid. Quantities have been calculated on 625'x12' and adjusted up to reflect the actual 700'x12' that was laid.

Cracks
Some cracks to seal.

TEST LANE

Chip
1:50 - 12:05PM
700' x 12.0' (933sy)
.340 (.321) (.312)
300 gal @ 168F
26.5 - 22.5, lb/sy
95, 106,52

Changed spreader box from 12' wide on the first 250' of the shot, to 12.5' wide on remaining 450' of shot.

Slurry
12:40 - 12:45, 1:05 - 1:14
700'x12' (933sy)
0-1189-3137 counts
0-661-1645 counts

12A3, Nassau Co., SH 200, WB 8/13/90 continued...

Slurry cont...

3.9", 5 turns
Straps - 300 gal Emulsion/250 gal Water
958 sy
18.3 lb/sy, dry rock
13.4%, 279 gal - Emulsion
49lb, 0.28% - Cement
1 gal, % - K3

Lost a belt & thus, all hydraulics @ stat 1+50, we shot 250'. Fixed the slurry truck & shot the remaining 450' by transitioning onto the previous layer of slurry about 25'. The right edge was not very straight during the 1st 250'. It was due to the right skid being out of adjustment. It was fixed on the remaining 450'.

Cracks

Very few cracks to seal.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

12B3, Clay Co., 8/15/90, US 17, 5B

NON-TEST LANE (Wednesday)

Chip Seal - Oil looked a little heavy & rock a little light. We will try to cut back on oil & go up on rock in right lane.

Slurry Seal - Rate of 24 lb/sy was high but was probably the right thickness because there was significant rutting (1/2") in the wheelpaths. I estimate we shot 18 lb/sy except in the wheelpaths.

Cracks - There certainly is not 6000' of cracks. It is summer so most cracks are closed up. Very few cracks to seal on this side.

Rained - Light, then hard. 12:00 - 1:00PM.
1:00 - 2:00 - Paper work, drying out.
2:00 - 3:30 - More sprinkling rain and standing water in chip seal & slurry wheelpaths. Quit for the day.

TEST LANE (Thursday)

Chips

Hard to broom chip seal treatment w/1/2" ruts/too much or too little aggregate is removed. This is one source of loose chips when we leave the job.

Slurry

Looked good.

Cracks

Lots of cracks to seal.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

12C3, Volusia Co., 8/17/90, SH 442, EB

NON-TEST LANE

Chips

Oil was a little heavy, rock was right. Bleeding in wheelpath because too much crack sealant underneath.

Slurry

Looked good.

Cracks

Lots of cracks to seal. Sealed - 1+00 to 3+00 → Cracks in non test lane. Let stand 1 hr. & switched traffic. Will seal other 1/2 later.

TEST LANE

Chips

Looked good.

Slurry

Looked good.

Cracks

Lots of cracks to seal.

General Notes -

1. Lots of surf prep - cracks sealed - all were overfilled by .15" or more.
2. Cracks sealed under chip seal & slurry seal treatments bled through. It is too high & too many.
3. Broke drive shaft on sweeper between 1st & 2nd lanes.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

28A3, Covington Co., MS, US 84-EB, 8/23/90

NON-TEST LANE

Chips
Oil from chip bled 2' over into right lane because of super elevation in curve.

Slurry
Looked good.

Cracks
2 big cracks in left lane.

TEST LANE

Chips
Looked good.

Slurry
Slurry broke down twice in right lane. (4+80 - too little water, broke in the box & built up). (0+00 - 0+75, ran out of asphalt).

Cracks
3 big (4.5" - 10" deep & 0.8" - 1.0" wide) cracks in right.

General Notes -
Pulled slurries E → W.
Pulled chips W → E.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

05A3, Benton Co., Ark., 9/5/90, US 71, NB

NON-TEST LANE

Chip

Looked good. Washboarding from station 3+50 - 4+00.
Pulled S→N

Slurry

Didn't look too good, 2 overlays were done. Shot -1+00 to 4+25, then stopped, too much water, slurry too thin. Pulled again about 70' of lead in & stopped→ slurry mix too dry, scraped off about 40' of it & restarted.

Cracks

None.

TEST LANE

Chips

Looked good. Chips stopped/restarted @ 1+50.
Bill Staggar - held up traffic during shot (5 min).
Oil shot was too wide - 13.5' instead of 13.0', we forgot to reset bar so we shot low on asphalt but left lane is looking good, so we may be about right with low asphalt.

Slurry

Looked fair. Pulled 5+60 (left a 20' low spot) - to 3+10 - 250'.
Banked up & reshot, overlapped 60' (engine died).
Shot 3+60 to -1+10, 470'.

Cracks

None.

General Notes - Porous friction course surface.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

40C3, Kay Co., OK., US 60-EB, 9/7/90

NON-TEST LANE

Chip
- oil looked good, rock a little heavy.

Slurry
- didn't reset cement water - estimated.
- adjusted skids after 150', looked right.

Cracks
- 90% of cracks already sealed. We sealed an additional 8% that they missed or didn't do very well.

TEST LANE

Chips
- oil looked good, rock a little heavy.

Slurry
- Slurry broke down → @ 5+25 625', auger spindle broke. Fixed, 5+10 → 6+05, 95' 625+95' = 720'

Cracks
- 85% of cracks already sealed. We sealed an additional 13% that they missed or didn't do very well.

General Notes - All cracks in all sections had been sealed before we got there by a slurry contractor. They were large, transverse crack (depressions, and were filled with a slurry grout & squeezed smooth. The finished product was about 18-24" wide.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

40B3, Seminole County, OK., SH3/SH99 - NB, 9/10/90

NON-TEST

Chip Seal

→ Oil just right .371 gal/sy - our target was .370. Chips were light 14.5 - 18.0 to 16.7 lb/sy average.

Slurry

Looked great → 16.7 lb/sy, 12.77% E, .97% C
→ had 3 oversize aggregate chunks leave 20-30' scars, but we patched & healed.

Cracks

They had been sealed before but we touched up what they had done & filled a few new ones.

TEST LANE

Chip

→ slight washboarding @ 5+10 - 5+60

Slurry

→ cut water too low, broke in box & shot 1 down @ 5+50 - 5+90, reshot lost 50' of lead out.

Cracks

They had been sealed before but we touched up what they had done & filled a few new ones.

General Notes -

1. Shot everything S → N.
2. → Cracks in control section were already sealed when we got there. (Done by state as surf. prep. by accident). (Slight wash boarding in both lanes, chip aggregate).
   Left 5 - 5+50.
   Right 4+50 - 5+00).

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

40A3, Jackson Co., OK., US 62-EB, 9/12/90

NON-TEST LANE

Chips
Looked fine.

Slurry
Shot first 85 of lead - in.
Asphalt valve got stuck, we stopped, scraped off the last 50', & started again.

Cracks
None.

TEST LANE

Chips
Looked fine.

Slurry
Stopped early; 30' short. Shot again with 10' overlap.

Cracks
None.

General Notes - Pulled everything W → E.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48E3, Garza Co., TX., US84-NB, 9/14/90

NON-TEST LANE

Chip Seal - Wheelpaths were flushed before we shot. Oil Looks good (no problems) and rock looks good (no problems).

Slurry Seal - Looked good. No problems.

Crack Seal - Very few cracks.

TEST LANE

Chip Seal - Looked good.

Slurry Seal - Shouldn't have used the foggers, water was pooling in wheelpaths and made slurry mix too soupy in wheelpaths, especially the right. → oversize aggregate & cement lumps were prevalent, but we prechecked & patched.

Crack Seal - None.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48D3, Mitchell Co., TX., IH20, WB 9/18/90

NON-TEST LANE

Chip Seal - Looked good - oil was light because Vance figured rate on 13'4" bar & we actually shot a 13'8" wide spray of oil.

Slurry Seal - 27 lb/sy - 1st half, 18 #/sy - 2nd half. We raised skids halfway through the shot. We got 22.8 lb/sy, on average.

Crack Seal - Mostly longitudinal cracks along centerline, goes through the 1/2" deep surface treatment. 80-90% were already sealed, we sealed the remaining 10-20%.

TEST LANE

Chip Seal - Looked good, we got a little more oil.

Slurry Seal - Looked good, we got a little lower application rate.

Crack Seal - Sealed a few, most were already sealed.

General Notes - Was decided that since I-20 traffic was not going @ a very reduced speed, that 30 min. of reduced speed traffic would be ineffective; therefore, no reduced traffic was placed on right lane.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48L3, El Paso Co., TX, US 62-EB, 9/20/90

NON-TEST LANE

Chips
- 5 nozzles were stuck for 1st 150 ft, but were fixed.
- Rock a little heavy, oil a little light.
- → Looked good, no other problems.

Slurry
- Looked good. Little heavy (21 lb/sy).

Cracks
- 95% of med. sev. long. cracks were on centerline and was probably the chip seal long. joint.

TEST LANE

Chips
- Oil looked great.

Slurry
- Looked good. Some oversize material left scars, but we patched.

Cracks
- A few transverse cracks in the 1st 300; but mostly it was longitudinal centerline cracking.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48Q3, Mills Co., TX., US183,NB, 9/24/90

NON-TEST LANE

Chip Seal - Looked good. Oil a little light. Rock was little light, too. Pulled N → S.

Slurry Seal - Emulsion pump cut out & we stopped about 3+30. Fixed, backed up & feathered in, starting @ 3+60. Pulled N → S. Some oversize aggregate noticed.

Crack Seal - None.

TEST LANE

Chip Seal - Looked good.

Slurry Seal - Looked good. Some oversize aggregate.

Crack Seal - None.

General Notes - No reduced traffic placed, not enough traffic or reduction in speed to be effective.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48B3, Kaufman Co., TX, US 175-EB, 9/26/90

NON-TEST LANE

Chips
Looked good.

Slurry
Looked good, very little oversize.

Cracks
2 passes, got all of them. 80% - them - already done - 1-2 years ago. Lot had shown through. 20% us.

TEST LANE

Chips
Looked good.

Slurry
Looked good.

Cracks
40% Them
60% Us

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48F3, Van Zandt Co., TX., SH19, NB 10/4/90

NON-TEST LANE

Chip Seal - Oil looked a little heavy & rocks looked a little light.

Slurry Seal - 1+10 → 0+90 - Oversize locked up rock belt & killed generator. Stopped, restarted, overlapped. Counter also was set @ 0,but never was 0.
0+75 → 6+00 - Counter is broke.

Crack Seal - 3 patches of alligator cracking (we sealed) & 4 or 5 small long. cracks.

TEST LANE

Chip Seal - Oil looked a little heavy but better than last lane. Chips were heavier than other lane. Looked good.

Slurry Seal - Heavier than last lane, looked good. Box chain broke @ beginning, we had to manually hold it straight.

Crack Seal - None.

General Notes - Foggy - Medium heavy - 7:00-9:30AM - burned off. Mixed Traffic Control - State & BASS - Thin Overlay done today too. Calibrated - Asphalt distributor - after correcting spray bar valves - #7-8.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48G3, Rusk Co., TX., SH322, NB 10/5/90

NON-TEST LANE

Chip Seal - Looked good.

Slurry Seal - Looked good.

Crack Seal - None.

TEST LANE

Chip Seal - Looked good. Will have loose chips because of rutting in right lane.

Slurry Seal - Looked good, stopped 10' too soon.

Crack Seal - None.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48I3, Walker Co., TX., SH30 EB 10/10/90

NON-TEST LANE

Chip Seal - Looked good. Rock was good, oil a little light and warm. Pulled W → E. Marginal weather conditions.

Slurry Seal - Looked good. 23.5 lb/sy - 1st 200'
18-19 lb/sy - last 500'
Pulled W → E.

Crack Seal - None.

TEST LANE

Chip Seal - Looked good.

Slurry Seal - Looked good.

Crack Seal - None.

General Notes - Rained hard yesterday. Stock piles were covered.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48H3, Grimes Co., TX., SH105-WB 10/11/90

NON-TEST LANE

Chip Seal - Looked good. We switched the chip & crack sections, because of 32' width @ end of chip section (transition).

Slurry Seal - Looked good, except there was unmixed aggregate coming out of pugmill during the entire shot (approx. 10%).

Crack Seal - Section had already been partially crack sealed with RC250+sand grout. We did the reset w/Hot Pour Rubber. Mostly low severity alligator & longitudinal.

TEST LANE

Chip Seal - Looked good.

Slurry Seal - Looked good.

Crack Seal - Very few.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48K3, Bexar Co., TX., FM1560-SB 10/15/90

NON-TEST LANE

Chip Seal - No mist - overcast. Looked heavy on the oil → no brooming.

Slurry Seal - Looked good - little light on lb/sy. Foggy & misting rain - foggers off. (18 wheeler drove across practice lane & turned @ approximately 1+25 driveway).

Crack Seal - None.

TEST LANE

Chip Seal - Looked good. Oil was heavy.

Slurry Seal - Looked good.

Crack Seal - None.

General Notes - No slurry rock @ 7AM. have enough in slurry truck for non-test lane. Foggy & misting 7:00AM - 10:00AM. Didn't broom until after 30 min reduced traffic on test lane. Then lightly broomed both sides (after traffic for awhile).

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48J3, Wilson Co., TX., US181 NB 10/16/90

NON-TEST LANE

Chip Seal - Very porous old chip seal - original surface. Looked good (oil looked light).

Slurry Seal - Looked good, 25 lb/sy were heavy but it probably took 4-5 lb/sy to fill in voids in old chip seal surface.

Crack Seal - None.

TEST LANE

Chip Seal - Right lane, old chip seal is very flushed. Looked good. Chips were a little light.

Slurry Seal - Looked good.

Crack Seal - None.

General Notes - None.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48M3, Duval Co., TX., US 59-NB 10/18/90

NON-TEST LANE

Chip Seal - Looked heavy on the Emulsion. Chips looked good (bumped at 1 notch).

Slurry Seal - Looked good.

Crack Seal - None.

TEST LANE

Chip Seal - Looked good. Chip spreader stopped & restarted @ 3+50.

Slurry Seal - Looked good.

Crack Seal - None.

General Notes - Pulled w/traffic both ways.

SHRP, SPS-3, Southern Region - Field Notes by Avery Adcock

48N3, Kenedy Co., TX., US 77-NB 10/19/90

NON-TEST LANE

Chip Seal - Looked good.

Slurry Seal - Looked good.

Crack Seal - None.

TEST LANE

Chip Seal - Looked good.

Slurry Seal - Emulsion quantity got low in tank. Emulsion pump quit pumping. Stopped @ 4+50, overlapped 20'. Straightened again & Emulsion pumped for another 30', then quit, so lat 100' was low in percent. Emulsion stopped 5' short. (Reason: They tried to run w/ball before they caught it.) They tried to load only enough to make last shot, so they wouldn't have to pump it back in, or waste it. They guessed low. Scraped & broomed last 75' off, reloaded with Emulsion & reshot.

Crack Seal - None.

General Notes - None.

APPENDIX D

MAINTENANCE GUIDELINES

ALLOWABLE MAINTENANCE ON MAINTENANCE EFFECTIVENESS (SPS-3 AND SPS-4) TEST SECTIONS

As we complete the initial application of the treatments, we must address the maintenance allowable on the SPS-3 and SPS-4 test sites. Early in the project, a policy governing the safety related maintenance and failure of the test sections was developed. In addition, it was decided that the cracks in the SPS-3 crack sealing test section and the cracks and joints in the SPS-4 crack and joint sealing test section would be resealed as needed. Additional guidance has been developed after consulting with the H-101 Expert Task Group (ETG). The following summarizes this guidance for each SPS-3 and SPS-4 test section.

SUMMARY OF ALLOWABLE MAINTENANCE ON SPS-3 AND SPS-4 TEST SECTIONS

Safety Related Maintenance

Safety related localized maintenance may be performed according to the governing highway authority standards at any time; however, information concerning the application of that maintenance must be recorded on applicable data sheets from Chapter 6, Maintenance Data, of the SHRP "Date Collection Guide for Long Term Pavement Performance Studies", and provided to the SHRP RCOC. Safety related items include spot patching of potholes, deteriorated areas, or other surface defects which might pose a potential hazard to the traveling public.

SPS-3

Control Sections - No maintenance is to be applied.

Crack Sealing Section - Each agency is asked to check the condition of the crack seal test sections of SPS-3 and reseal the cracks as needed. The cracks and joints are to be resealed with the same type of material used in the original sealing. It is asked that the reinspection and resealing be conducted semi-annually. It is especially important that it occur before the wet or freeze periods to which the test sections are subjected.

Chip Seal, Slurry Seal, and Thin Overlay Sections - Small areas of the chip seal that have been stripped off by traffic or that come loose due to other problems should be repaired by covering them with spot seals or spot patches. This "spot maintenance" would include any area larger than one square foot for patching. Any cracks that develop in these sections should be left as is (**please** do not seal these cracks).

SPS-4

Control Sections - No maintenance is to be applied.

Undersealing and Crack and Joint Sealing Section - Each agency is asked to check the condition of the crack and joint sealant in the crack and joint seal test sections of SPS-4 and reseal them when needed. The cracks and joints should be resealed with the same type of material used in the original sealing. It is asked that the reinspection and resealing be conducted semi-annually. It is especially important that it occur before the wet or freeze periods to which the test sections are subjected.

CONTROL FUTURE MAINTENANCE AND COORDINATE MAJOR MAINTENANCE OR REHABILITATION

The participating agency must control the maintenance and rehabilitation applied to the SPS-3 and SPS-4 sites. Maintenance, as described above, is permissible on these sections, however, we ask that such work be coordinated with the Regional Coordination Office personnel in advance, so that adequate record of the section's condition with time can be maintained.

Removal of Sections From the Test - When the pavement section reaches a condition level which is unacceptable to the responsible highway authority and cannot be repaired with the spot maintenance described above, the agency should contact the Regional SHRP RCOC or Regional Engineer. They will review the condition of the section with the agency, and if it is agreed that the section should be removed from service, they will arrange a mutually agreeable date after which the agency can apply their desired rehabilitation treatment. This will help ensure that sections are allowed to reach a common condition as well as provide the time for the SHRP staff to collect a final set of data prior to removing the section from the study. Some lead time will be required to arrange for the required testing and data collection.

Each test section should be allowed to deteriorate to a reasonably low level of condition to adequately define the impact of applying preventive maintenance treatments; however, that level should not be to a level which might pose a potential safety hazard. A general description of the suggested minimum condition for SPS-3 sites includes:

1. a PSI of 2.0,

2. an unsafe skid level as defined by the agency within which the section is located, or

3. criteria normally used by the responsible highway authority.

A general description of the minimum condition for SPS-4 sites includes:

1. a PSI of 2.0, or

2. criteria normally used by the responsible highway authority.

After the last inspection is made by the SHRP staff, the section will no longer be considered an SPS-3 or SPS-4 test section.

It is believed that the control sections will reach the terminal condition first. However, the procedures apply to sections with treatments, as well. Each individual test section at a test location should be allowed to reach the reduced level of condition and removed from the test individually. The entire test site should not be rehabilitated just because one or two of the individual test sections has reached a level which requires rehabilitation.

APPENDIX E

LIST OF PHOTOGRAPHS

Photo 1. Chip Spreader Calibration

Photo 2. A One Square Yard Mat of Aggregate

Photo 3. A 1/3 Square Yard Mat of Aggregate

Photo 4. Placing Aggregate Into Container and Weighing

Photo 5. Chip Sealing Near Helotes, TX (48K3)
(Asphalt Distributor, Chip Spreader and Pneumatic Rollers)

Photo 6. Fresh Mat of Chips Near Huntsville, TX (48I3)

Photo 7. Asphalt Distributor in Action Near Springdale, AR (05A3)

Photo 8. Chip Spreader in Action Near Altus, OK (40A3)

Photo 9. Rolling the Fresh Chips Near Mobile, AL (01B3)

Photo 10. Brooming the Chip Seal Section Near Pleasanton, TX (48J3)

Photo 11. Checking the Aggregate and Cement Counters on the Slurry Truck

Photo 12. B.A.S.S.' Slurry Seal Truck in Action

Photo 13. Fresh Slurry Seal Going Down Near Huntsville, TX (48I3)

Photo 14. Cured and Fresh Slurry Seal Near Cookeville, TN (47B3)

Photo 15. Slurry Seal Spreader Box in Action

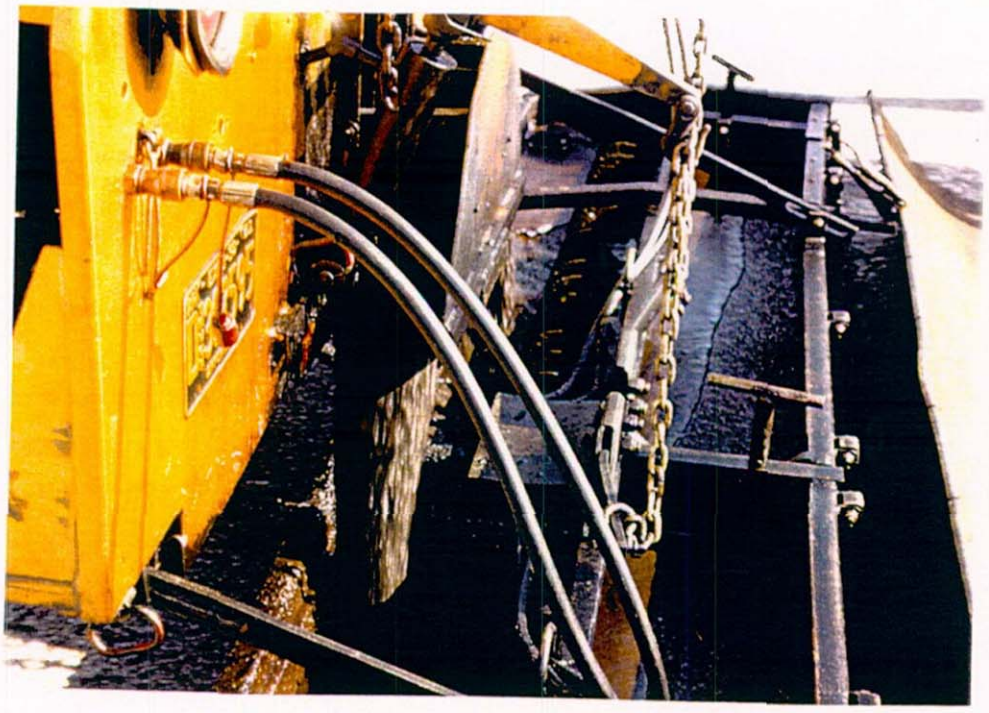


Photo 16. Slurry Seal Spreader Box in Action With Flexible Rubber Strikeoff and Burlap Drag

Photo 17. Crack Sealing Operations Near El Paso, TX (48L3)
(Hot Air Lance, Crack Sealer and Squeegee)

Photo 18. Crack Sealant Going Into Crack From Tip of Wand and
Being Squeeged Flush With the Pavement Surface

Photo 19. Crack Sealing Operation Near Jacksonville, FL (12B3)

Photo 20. Crack Sealing Operation Near Navasota, TX (48H3)
(Note: TTI Sponsored "Movie Man" to the Left.)

Photo 21. A Very Deep Crack On Site Near Collins, MS (28A330)

Photo 22. Crack Seal Section in Orange Park, FL (12B330)

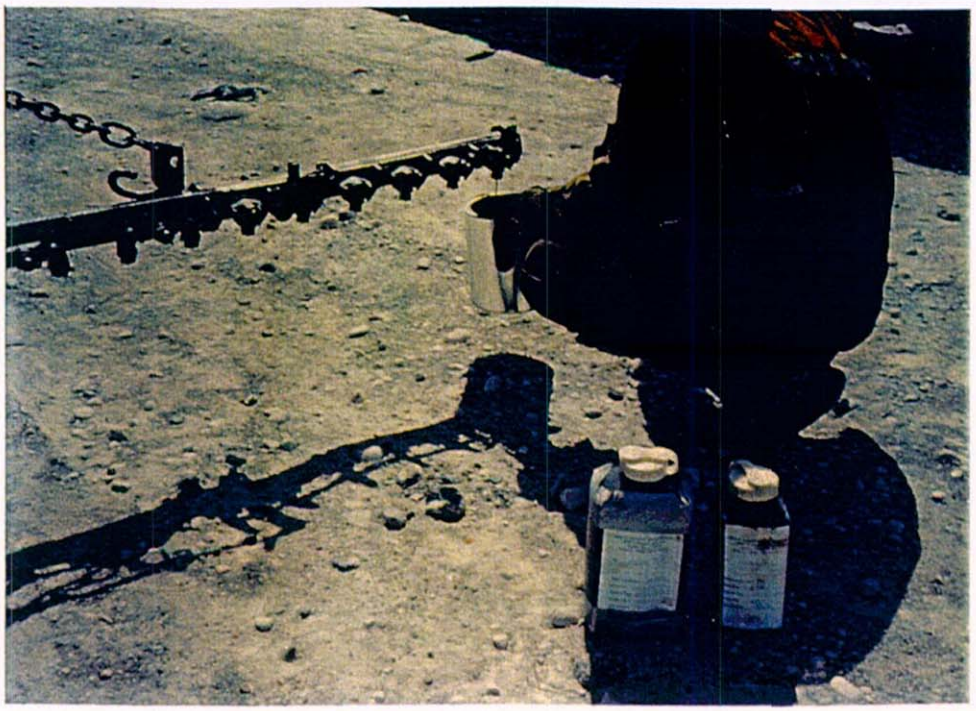


Photo 23. Sampling of the Chip Seal Emulsion From Spraybar Nozzle

Photo 24. Sampling Slurry Seal Emulsion From Slurry Truck

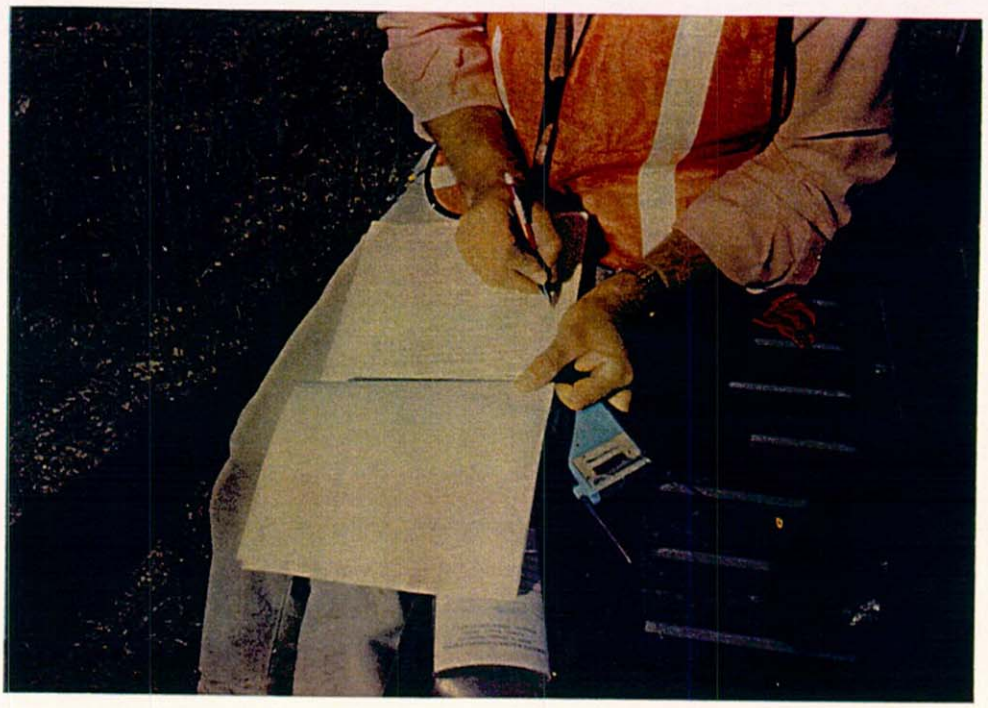


Photo 25. Recording the Required Data for SHRP

Photo 26. Taking a Pavement Surface Temperature

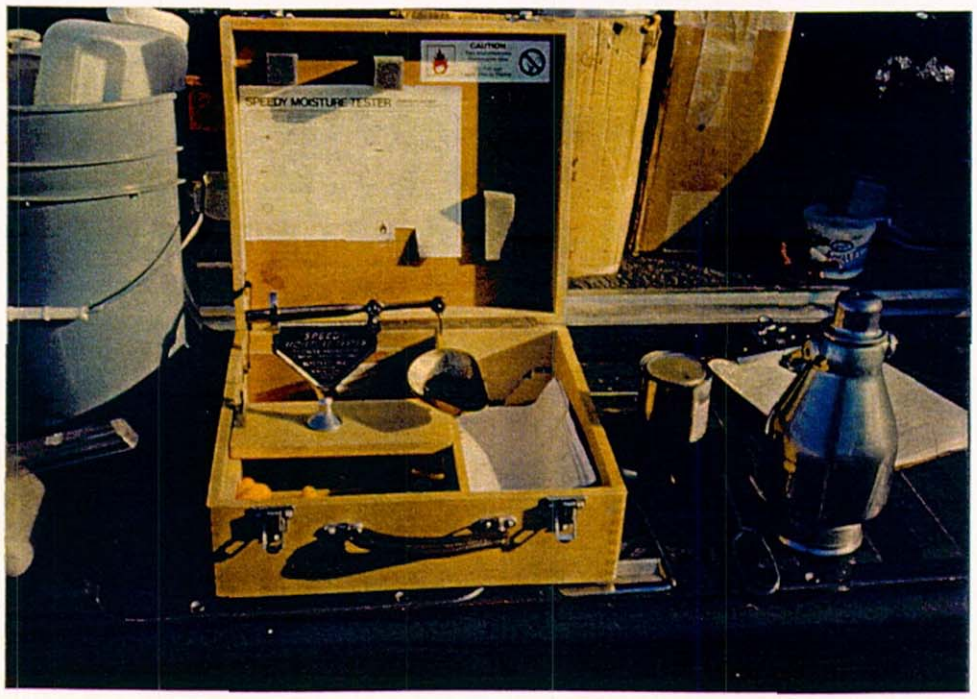


Photo 27. Testing the Moisture Content of Aggregates

Photo 28. Aggregate Stockpiles in Staging Area for the Chip Seal (Foreground) and Slurry Seal (Being Dumped)

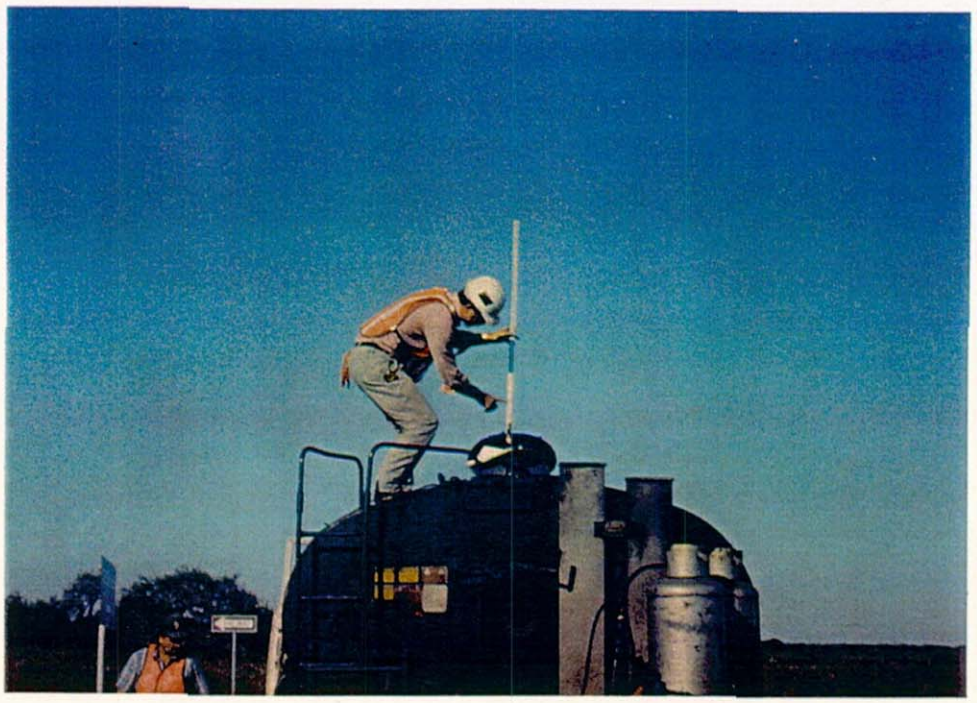


Photo 29. "Strapping" or "Stabbing" the Asphalt Distributor
(Measuring the Volume Level of Emulsion With Calibrated Rod)

Photo 30. Checking the Emulsion Temperature in the Distributor

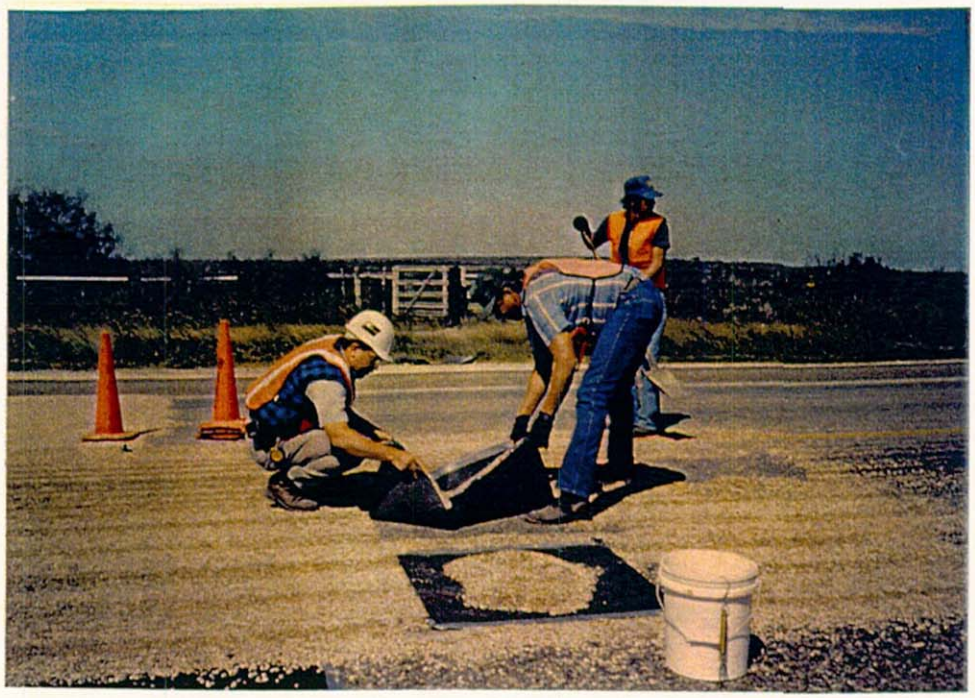


Photo 31. Checking the Aggregate Spread Rate After a Chip Seal Shot

Photo 32. This Should be Reading "22 lb/sy"!

Photo 33. Aggregate Spread Rate Measurement in Progress

Photo 34. Checking the Temperature of a Fresh Chip Seal Application

Photo 35. "Strapping" or "Stabbing" the Slurry Seal Truck After a Shot (Measuring the Volumes of Emulsion and Water Left)

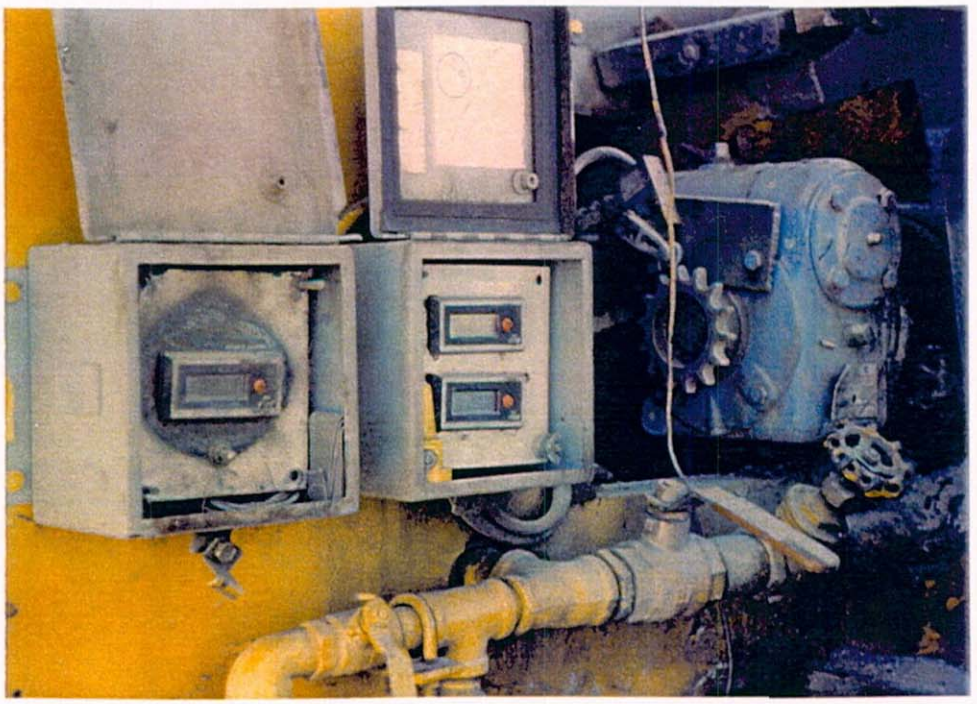


Photo 36. The Rock and Cement Counters on the Slurry Truck

Photo 37. The GPS Section, 483749, Preceding the SPS-3 Site Near Freer, TX (48M3)

Photo 38. The Thin Overlay on the Freer, TX Site (48M310)

Photo 39. The Slurry Seal Treatment on the Freer, TX Site (48M320)

Photo 40. The Crack Seal Section Near Daytona Beach, FL (12C3)

Photo 41. The Control Section Near Freer, TX (48M340)

Photo 42. The Chip Seal Treatment on Orange Park, FL Site (12B350) (Note Difference in Coloration Due to Rain on the Fresh Treatment of the Inside Lane the Previous Day)

Photo 43. Most of the "Convoy" at Staging Area in Alabama

Photo 44. The SPS-3 Southern Region Crew, B.A.S.S.' Crew and Reps. From EFLHD, SHRP-SRCO and TTI (On the King Ranch in South Texas)

Photo 45. Slippage Cracks on 48N320 South of Kingsville, TX

Photo 46. Different Perspective of Photo 45

Photo 47. Loss of Aggregate at 47A3 in Tennessee

Photo 48. Loss of Aggregate at 47A3 in Tennessee