TX SPS-9A

Brent Rauhut Engineering Inc.

30 January 1996

Mr. Monte Symons
Pavement Performance Division - LTPP (HNR-40)
Federal Highway Administration
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike, Room F-215
McLean, Virginia 22101

Subject: Final Report - Construction of SPS-9 Project (4809) on FM-1604 in Bexar County, Texas

Dear Monte,

Enclosed is the Final Report for the Specific Pavement Studies (SPS-9) project on FM-1604 in Bexar County, Texas. This report documents the construction of the SUPERPAVE™ Asphalt Binder Study test sections at this location, as well as the monitoring of the project to date.

Please feel free to contact me should you have any questions or comments regarding any of the information included in this report.

Sincerely,

Jerry F. Daleiden, P.E.
Project Engineer, SRCO

JFD:dmj

Enclosure: As stated.

c.w/Enc: Patrick Downey, TXDOT-San Antonio Dist.
Frank Jaster, TXDOT-San Antonio Dist.
Greg Biedeger, TXDOT-San Antonio Dist.
Gary Graham, TXDOT-Austin
Maghsoud Tahmoressi, TXDOT-Austin
John E. Nichols, FHWA-Austin
Robert McGennis, SUPERPAVE™ Center
John Miller, PCS/LAW-Kennesaw, GA

c.w/o Enc: Brent Rauhut, SRCO Morris Reinhardt, RE/SRCO

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FINAL REPORT

SPS-9 PROJECT 4809: SUPERPAVE™ ASPHALT BINDER STUDY FM-1604, SOUTHBOUND BEXAR COUNTY, TEXAS

FHWA/LTPP

SOUTHERN REGION COORDINATION OFFICE

January 1996

BRENT RAUHUT ENGINEERING INC.

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FINAL REPORT

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SOUTHERN REGION COORDINATION OFFICE

January 1996

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FINAL REPORT - SPS-9 PROJECT 4809

SUPERPAVE™ ASPHALT BINDER STUDY
FM-1604, SOUTHBOUND
BEXAR COUNTY, TEXAS

INTRODUCTION

As part of the Strategic Highway Research Program's (SHRP) Long Term Pavement Performance (LTPP) Studies, sections of highway are being selected to apply very specific treatments to study various facets of construction (both new and rehabilitation). These projects are referred to as Specific Pavement Studies (SPS). This particular project, on FM-1604 in Bexar County, Texas, was identified as a potential candidate for inclusion in the SUPERPAVE™ Asphalt Binder Studies (SPS-9A).

SPS-9 General Experiment Design

The experiment is intended to validate the SHRP binder specifications, to allow direct comparison of asphalt mixtures designed using agency procedures and the newly developed SHRP procedures and to provide initial data for use in refining the mixture performance models also developed as part of the SHRP research. The key elements of the SUPERPAVE™ design process are shown in Table 1.

TABLE 1. KEY ELEMENTS OF THE SUPERPAVE™ DESIGN PROCESS

Address Reduction and Control of:
- Permanent deformation
- Fatigue cracking
- Low temperature cracking

Develop Mixture Having Sufficient/Satisfactory:
- Asphalt binder
- Voids
- Workability
- Performance characteristics

Basis of Design
- Volumetric principles
- Evaluation of engineering properties of trial mixes using increasing levels of testing depending upon the reliability (traffic level) desired
- Three levels of design
  - Level 1 - Low traffic (lower reliability)
  - Level 2 - Medium traffic (better reliability)
  - Level 3 - High traffic (best reliability)
- SHRP gyratory used for laboratory compaction

The SUPERPAVE™ mix design system is being validated using a three-stage process. The first stage validation, conducted by SHRP, confirmed that variation of asphalt binder properties identified as probable, significant determinates of pavement performance caused reasonable, meaningful changes in the relevant performance characteristics of asphalt-aggregate mixtures This was accomplished by using specifically designed accelerated laboratory tests and existing accelerated load facilities.

The second stage validation, also conducted under SHRP, established the degree of correlation between the asphalt binder properties shown to significantly affect performance-related characteristics of asphalt-aggregate mixtures and relevant field pavement performance parameters. This process provided data to specification limits for the relevant properties selected to control performance. This effort relied heavily on sampling and testing the LTPP General Pavement Studies (GPS) sections.

Although GPS sections provided valuable and timely information, controlled Specific Pavement Studies of newly constructed and reconstructed or rehabilitated (resurfaced) pavement sections are needed in the third stage to provide an accurate estimate of the relative influence of key pavement elements that affect pavement performance for purposes of specification validation. The importance of this experiment is highlighted by its ability to evaluate the interaction of traffic, structural parameters and climatic factors on pavement performance in a controlled manner. The overall SPS-9 experiment objectives are shown in Table 2.

TABLE 2. SPS-9 OVERALL EXPERIMENT OBJECTIVES

1. To further validate the performance-based asphalt and asphalt-aggregate mixture specifications through controlled field experiments.

2. To provide a direct comparison, in terms of measured performance between existing highway agencies' asphalt specifications, asphalt-aggregate mixture specifications, mixture design procedures and SHRP's performance-based specifications and mix design and analysis system.

3. To provide performance data collected over a long term from controlled field experiments and to provide for modification of specifications at the local, regional or national level.

4. To provide training and assistance to Agency personnel in binder characterization procedures, the mix design process and establish the practicality of implementing the SUPERPAVE™ system.

5. To provide data for SUPERPAVE™ models refinement and modifications.

SPS-9A will focus on two main issues: (1) performance of SUPERPAVE™ mixtures relative to local agency mixtures and (2) verification of the SHRP asphalt binder selection process. The SPS-9A experiment design consists of a moisture/temperature factorial to be filled by test sites

constructed by the participating agencies. The environmental conditions in this factorial for the SPS-9A experiment are defined by the SHRP Asphalt Regional Program in specific rainfall amounts and pavement temperatures as opposed to the global environmental conditions used in the other LTPP experiments. Table 3 depicts the experiment design for the SPS-9A experiment that incorporates the SHRP asphalt environmental factors. Temperatures are duplicates of the latest SHRP PG specification, but limited to more commonly found conditions in the United States, as indicated by the unshaded cells. As shown in Table 3, 32 temperature-moisture combinations result in a total of 32 project sites.

Each test site for SPS-9A shall include three test sections, one using the Agency's current mixture design, one using the SUPERPAVE™, and the other using a SUPERPAVE™ mixture with a SHRP binder grade either higher or lower than required by SUPERPAVE™.

For additional information on general experiment design for SPS-9, please refer to "Specific Pavement Studies: Experimental Design and Research Plans for Experiment SPS-9A, SUPERPAVE™ Asphalt Binder Study, September 1994".

Selection/Nomination of FM-1604

This project was first offered for consideration by the State of Texas in March 1995. After reviewing the details provided by the state on this project and preparation of a tentative layout of the test sections (to ensure that adequate space was available for such a project), the project was officially nominated on 7 April 1995. Appendix A contains the nomination forms which provide information on the project location, significant dates, traffic information and the Agency's pavement structural design for the project in question. The section was officially approved for use by the FHWA/LTPP Division on 21 June 1995.

Specific Experiment Design for FM-1604

Although the plans for this particular project did not originally include the incorporation of an SPS-9A project, the plan's typical section and existing structural features were such that the test sections could be retrofitted into the plans for this project. The title sheet, typical sections, and layout for this particular project are included as Figures 1, 2, and 3, respectively.

The only significant modifications required for incorporation of these test sections into this project was in the modification of asphalt mix design for the two SUPERPAVE™ test sections. To ensure that the SUPERPAVE™ mix design criteria were adequately met, samples of the aggregate and binder proposed for use on these test sections were sent to Advanced Asphalt Technologies (AAT) of Sterling, Virginia, from the contractor's material supplier (Vulcan Materials of Helotes, Texas). Mix designs for each of the three test sections are included in Appendix B.

PRECONSTRUCTION MONITORING

Because of the nature of this particular experiment (being new construction and primarily focused on the performance of the various asphalt mix designs, monitoring of preconstruction pavement

TABLE 3. SPS-9A EXPERIMENT DESIGN FACTORIAL

Moisture		Wet > 635 mm/year of precipitation				Dry < 635 mm/year precipitation			
Average 7 Day Maximum Pavement Design Temperature		<52C	<58C	<64C	<70C	<52C	<58C	<64C	<70C
Minimum Pavement Design Temperature	> -46C								
	> -40C								
	> -34C								
	> -28C								
	> -22C								
	> -16C								
	> -10C								

NOTES: Traffic rate should exceed 50,000 ESAL/year in study lane.
Total traffic for design (design life) is Agency choice.
The Average 7-day maximum pavement design temperature is the average of the highest daily pavement temperatures for the seven hottest consecutive days.
The minimum pavement design temperature is the coldest pavement temperature of the year.

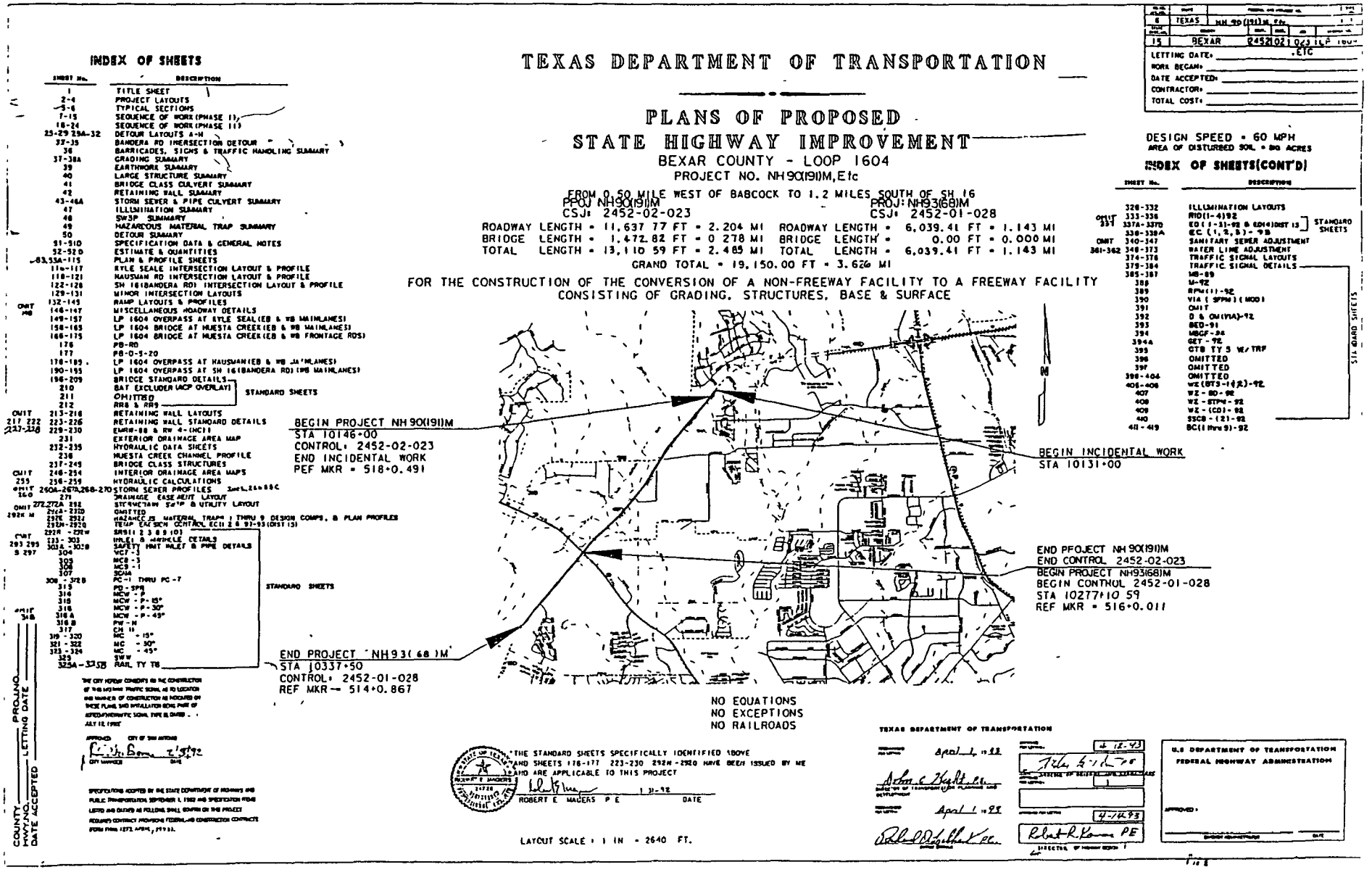

FIGURE 1. TITLE SHEET

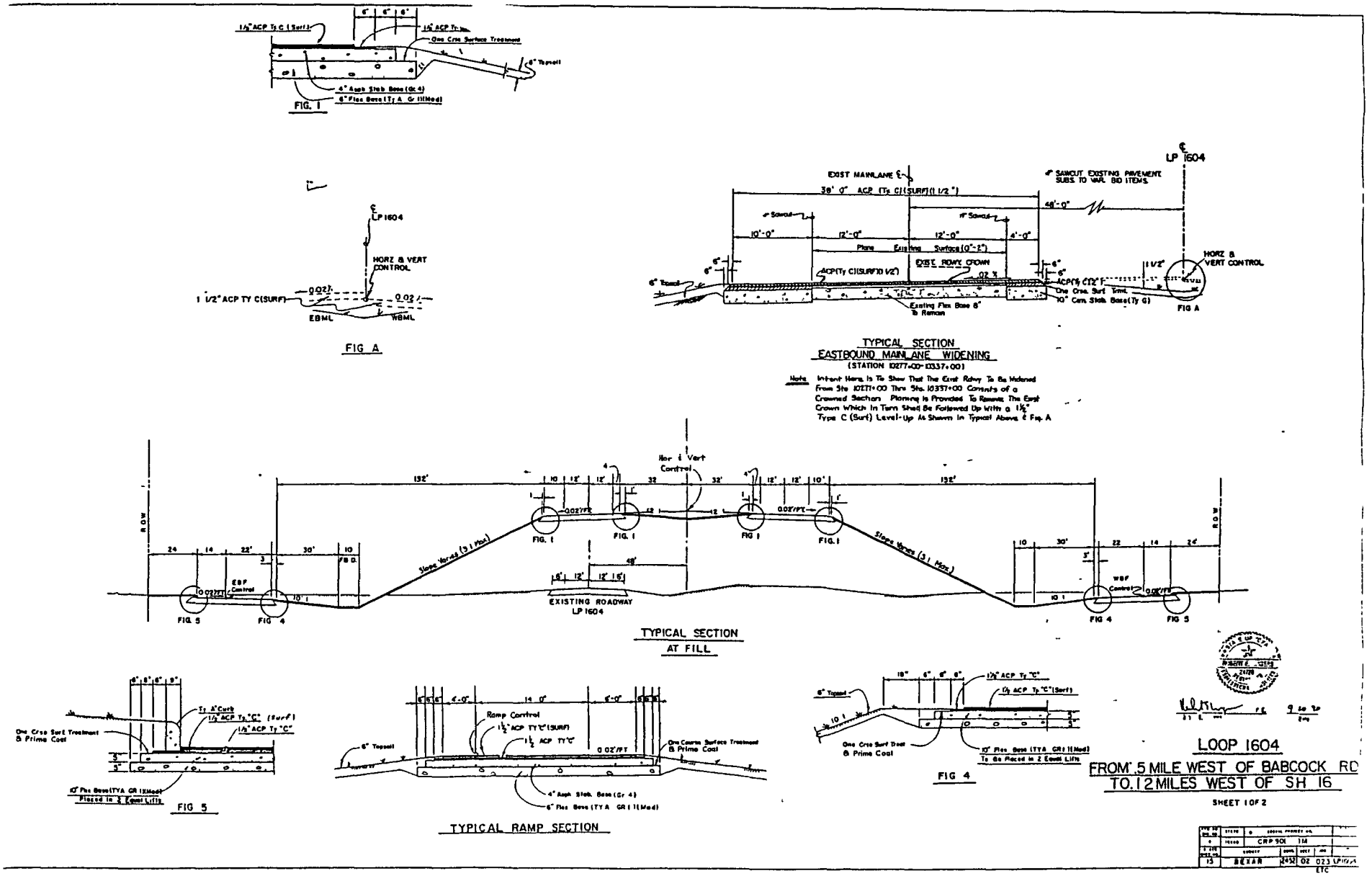

FIGURE 2. TYPICAL SECTIONS

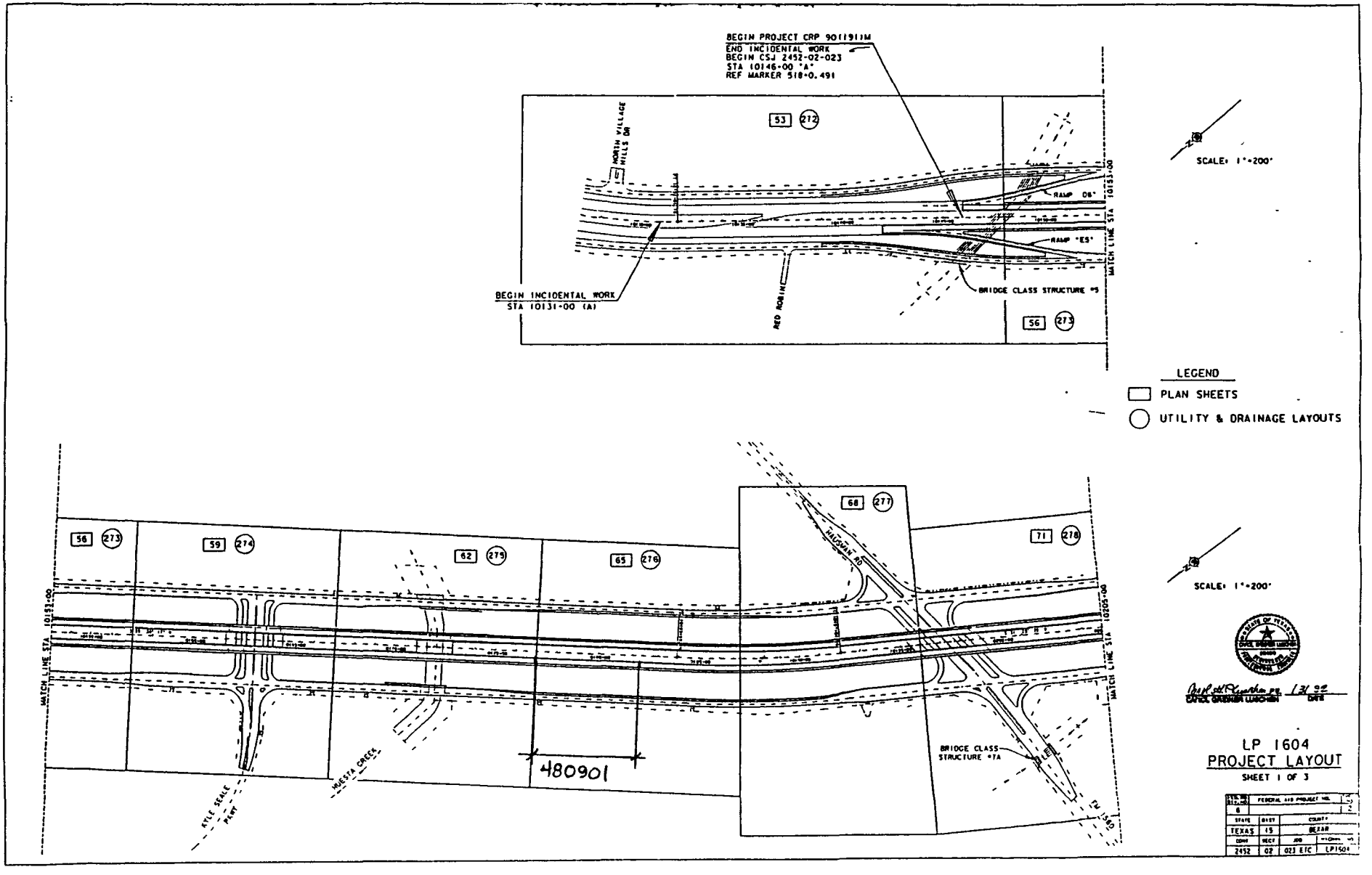

FIGURE 3. SITE LAYOUT

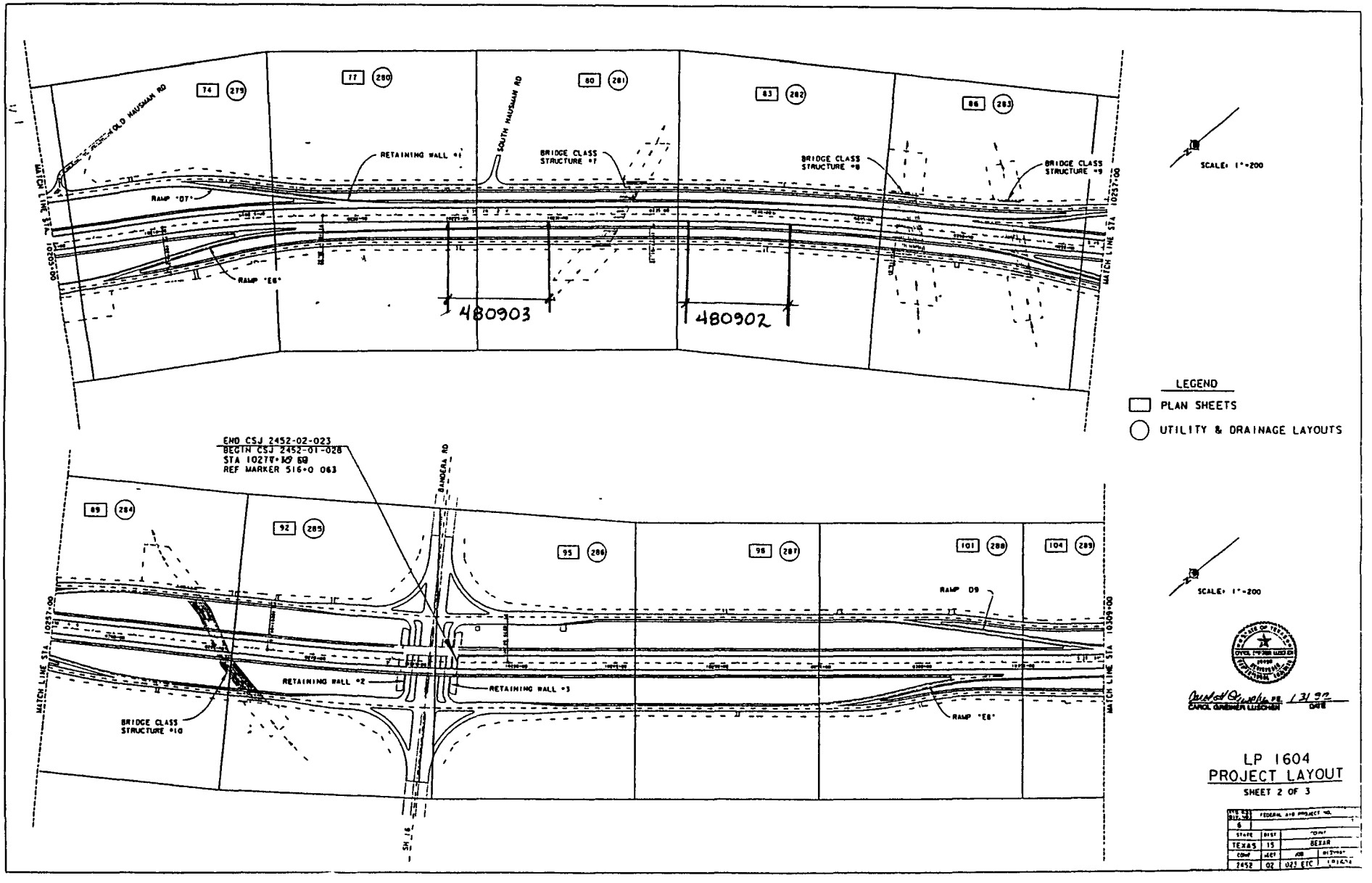

FIGURE 3. SITE LAYOUT (Continued)

surface distress and structural capacity were not required. The primary preconstruction monitoring included rod and level measurements made immediately prior to construction (See Appendix C) to evaluate variability in the thicknesses of each layer placed, and extensive material sampling and testing to document the material properties for each of the layers incorporated in these test sections. As specified for all SHRP test sections, a thorough material sampling and testing program was established for these test sections on FM-1604 in Bexar County, Texas (See Appendix D.) Preconstruction sampling focused on collection of bulk samples from each of the various pavement layers. All sampling was conducted by the Texas DOT and Vulcan Materials with the actual testing work being performed by the Materials and Test Division Office in Austin, Texas, in cooperation with the SUPERPAVE™ Regional Test Center (also located in Austin, Texas).

CONSTRUCTION

The following text details any and all unusual features relating to the construction and completion of the asphalt test sections on FM-1604 in Bexar County, Texas, for inclusion in LTPP's SPS-9A study. For the purposes of discussion here, "unusual" features will be defined as that information which cannot be, or has not been, recorded elsewhere on the data forms associated with this project, or those features which are considered to be particularly unique to this project The construction data forms themselves are included as Appendix E.

The project (NH 90 (191) M, CSJ 2452-02-023) begins 0.5 miles west of Babcock and extends to 1.2 miles south of SH-16, for a total project length of 3.6 miles. The project is approximately 10 miles west of San Antonio, Texas, in Bexar County. The project was let to Gilbert Construction in October 1993 with Vulcan Materials providing the various paving materials for the construction of this project. Although construction had been underway for quite some time prior to the initiation of this project, a coordination meeting was held 2 June 1995, at the Field Office in Helotes, Texas, to address the numerous questions that existed regarding the construction of these test sections. The primary concerns expressed as this meeting were associated with the changes that would be required in the mix from one test section to another In particular, there was considerable discussion associated with the placement of the section in one 3-inch lift versus two 1½-inch lifts (as was the case for most of the remainder of the project Most everyone was more comfortable with placing the same mix in two 1½-inch lifts. The main reason for using the two 1½-inch lifts was to obtain density; however, it was noted that compaction should not be that great a problem with a 3-inch lift (particularly with the SUPERPAVE™ mix). Placement of two 1½-inch lifts would require more changeovers for the materials supplier at the plant. At this first meeting, it was tentatively agreed that two 1½-inch lifts would be used to ease everyone's compaction concerns. This decision was later overturned in September, when construction of the actual surface began.

The other significant concern was associated with the change in the asphalt binder to fill the experimental requirement of using two different PG graded binders in the two SUPERPAVE™ test sections. The existing AC20 being used on the job was already known to be a PG64-22. It was noted, however, that to bring an additional binder to pave 1000 feet would be extremely costly. With this in mind, the Regional Coordination Office (RCO) staff agreed to investigate the possibility of adding a modifier to the AC20 to alter its PG grade. It was later established

that the addition of "Ultra-Pave" latex modifier to the AC20 changed it from a PG grade 64-22 to a PG grade 70-22, which satisfied the requirements for the two SUPERPAVE™ test sections.

Although this is a fairly large construction project, the completion of these three test sections had very few, if any, "unusual" features or "surprises". The subgrade prep was completed in late July Six inches of flex base (granular base) was placed during the first week of August and 4 inches of asphalt stabilized base was placed shortly thereafter (in the second and third weeks of August).

There were some delays for weather in early September. The 1½-inch surface level-up on the control and the non-SUPERPAVE™ portions of the job was placed in mid-September with the final 1½-inch wearing course being placed in late September. This left only the two SUPERPAVE™ surface mixes to be placed. After some discussion between the contractor, Texas DOT, Vulcan Materials and RCO staff, it was agreed that placement of one 3-inch lift on the SUPERPAVE™ sections would best serve the needs of this project. It was agreed that Gilbert Construction would start with the paving of the outside shoulder first, to establish a suitable rolling pattern for this 3-inch mat and then work their way on to the actual main- lanes.

Actual paving of the SUPERPAVE™ mix was done 2 October 1995. Although the contractor was already somewhat familiar with SUPERPAVE™ mixes (having participated in the National Cooperative Highway Research Program Study 9-7 early in this project), there were still some concerns regarding the "rich" appearance of the mix. This has been attributed to the higher quantities of finer materials incorporated in a standard SUPERPAVE™ mix, necessitating higher asphalt binder percentages. Compaction of the SUPERPAVE™ mixes was also somewhat of a concern; however, this turned out to be somewhat of a concern for most of the hot mix placed on this job (from comments made by the contractor, state and materials supplier), so this concern could not be attributed specifically to the SUPERPAVE™ mix. Densities of 90 to 93 percent were noted throughout the project, with the densities on the SUPERPAVE™ sections falling in the lower end of that range. No other significant comments or concerns were noted regarding the placement of these test sections.

With the completion of the paving of these SUPERPAVE™ sections on 2 October, all construction on the SPS-9A test sections was completed. The completed data forms, noting the construction details are provided in Appendix E. The only data not available is the profilograph measurements, as noted on Construction Data Sheet 11.

POSTCONSTRUCTION MONITORING

With the completion of the SUPERPAVE™ construction, postconstruction monitoring will be initiated. It is not anticipated that these sections will be opened to traffic until January 1996, however, and hence some of the performance monitoring is still somewhat premature at this time. As one might expect, there is no surface distress to speak of and none is anticipated for the immediate future; however, surface distress surveys will be scheduled in early 1996 along with measurements of the surface profile and structural capacity. Rod and level measurements have been taken on the surface to complete the evaluations of layer thickness variability throughout the sections and postconstruction coring was completed on 4 October to represent time (T) equals 0 from the materials sampling and testing plan. This coring included eight cores for the control and modified SUPERPAVE™ mix and 36 cores from the standard SUPERPAVE™ test section.

Samples were provided to the testing laboratory, along with those samples collected from preconstruction sampling. All laboratory testing is to begin in late October. Samples have also been provided to the Materials Reference Library (MRL), should these materials be needed in the future for additional testing.

SUMMARY

Having completed the construction and initial monitoring of these test sections, it appears that the test sections on FM-1604 in Bexar County, Texas, will contribute significantly to the evaluation of the SUPERPAVE™ asphalt binder study. This project would not have been possible without the support of the Texas Department of Transportation. In particular, much of the credit is due to the help of Frank Jaster, Darren Marty and Mark Staley from the San Antonio District Lab office, Greg Biedeger from the Area Engineers office and Maghsoud Tamoressi and Lisa Lukefer from the Materials and Test Division. We also want to express our appreciation to Gilbert Construction Co. and Vulcan Materials for their willingness to provide the additional work necessary to make this project possible.

With the construction completed, we now continue to monitor these sections with time, noting changes in the surface distress, surface profile and structural capacity, and compare those changes against the loadings these sections are exposed to (both environmentally and from traffic), and in combination with other projects like this one around the country, to improve on the SUPERPAVE™ mix design procedures.

APPENDIX A

SITE NOMINATION INFORMATION
AND
OTHER PERTINENT PROJECT CORRESPONDENCE

Brent Rauhut Engineering Inc.

30 June 1995

Mr. Gary Graham, D8P
Highway Design Division
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483

Subject: Approval of SPS Nominations

Dear Gary,

Attached is the approval for the SPS-9A project in San Antonio and the SPS-8 project in Bryan. Please note the incentive funds available. As I'm sure you are aware, these funds can be obtained through John Nichols at the FHWA Division office.

Feel free to contact me if I can be of any assistance. Thank you again for all your help in the nomination of these project.

Sincerely,

Jerry F. Daleiden, P.E.
Project Engineer, SRCO

JFD:dmj

Attachments: As stated.

c.w/Att: Patrick Downey, TX-DOT/San Antonio Dist.
Elias Rmeili, TX-DOT/Bryan Dist.
John E. Nichols, FHWA/TX-Div.
Morris Reinhardt, RE/SRCO
Brent Rauhut, SRCO/File

8240 Mopac, Suite 220 • Austin, Texas 78759 • (512) 346-0870 • FAX (512) 346-8750

From: Monte Symons (MSYMONS)
To: MREINHARDT
Date: Wednesday, June 21, 1995 2:52 pm
Subject: SPS Project Nominations

Morris,

I know I'm late in getting this information to you but I want to make sure everyone is aware of the status of the nominations from the Southern LTPP Region. The following is the status of all nomination received as of 6-21-95:

1. AL SPS-6 on I-59 in Etowah county - This project has been approved for inclusion into the LTPP experiment. Incentive funds of $30,000 (FY-95 funds) will be made available to the DOT through the FHWA Division office.

2. TX SPS-9A on FM-1604 near San Antonio - This project is approved for inclusion into the LTPP experiment. Incentive funds of $30,000 (FY-95 funds) will be made available to the DOT through the FHWA Division office.

3. TX SPS-8 on FM 2223 in Brazo county - This project is approved for inclusion into the LTPP experiment. Incentive funds of $30,000 (FY-96 funds) will be available through the FHWA Division office after Oct. 1, 1995.

4. FL SPS-9A on I-10 in Columbia county - This project is approved for inclusion into the LTPP experiment. Incentive fund of $30,000 (FY-95 funds) will be made available through the local FHWA Division Office.

Brent Rauhut Engineering Inc.

7 April 1995

Mr. Monte Symons
Pavement Performance Division - LTPP (HNR-40)
Federal Highway Administration
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike, Room F-215
McLean, Virginia 22101

Subject: Texas SPS-9 Nomination

Dear Monte,

Enclosed are the nomination forms for the SPS-9 project to be located on FM-1604 in San Antonio, Texas, as we had previously discussed. In anticipation of this nomination, we have reviewed the proposed location with Texas DOT personnel from the area and believe that the nominated project would be ideal for an SPS-9 project. There is little if any change in grade, traffic and other similar criteria. This project is currently part of the NCHRP 9-7 study, which should greatly facilitate its use in SPS-9.

If there is any additional information you require, please let us know. I appreciate the opportunity to provide this information to you. If you have any questions or comments, please do not hesitate to contact me. Thank you for your consideration in this matter.

Sincerely,

Jerry Daleiden

Jerry F. Daleiden, P.E.
Project Engineer, SRCO

JFD:dmj

c: Gonzalo Rada, PCS/LAW
Maghsoud Tahmoressi, TX-DOT/D9
Patrick Downey, TX-DOT/San Antonio Dist.
Frank Jaster, TX-DOT/San Antonio Dist.
Ron Cominsky, BRE
Gary Graham, TX-DOT/D8P
John E. Nichols, FHWA/TX Div.
Morris Reinhardt, RE-SRCO
Brent Rauhut, SRCO
Brian Killingsworth, BRE

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dj

Texas Department of Transportation

P.O. BOX 29928 • SAN ANTONIO, TEXAS 78284-3601 • (512) 615-1110

March 31, 1995

NAME	INFO	ACTN	CO
BR			
MG			
MR			
JD		✓	

File:

Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 5

To Jerry Daleiden	From P T Downey
Co. Brent Rauhut	Co. TxDOT
Dept.	Phone # 210-615-5890
Fax # 512-346-8750	Fax # 210-615-6246

Jerry F. Daleiden, P.E.
Project Engineer, SRCO
Brent Rauhut Engineering, Inc.
8240 Mopac, Suite 220
Austin, Texas 78759

Ref: Strategic Highway Research Program (SHRP),
Specific Pavement Studies (SPS)-9A Candidate

Dear Mr. Daleiden;

Attached are the sheets necessary for submission of a section of Loop 1604, in northwest Bexar County, as a SPS-9A SHRP test section. This roadway is currently under construction, work on the chosen section is not currently scheduled till sometime in May 1995.

The location selected for submission provides approximately 3000 feet for placement of the three sections required for a SPS-9A SHRP test section. The District Laboratory and District Construction are aware of this request and have played a major role in the submission of this section.

Should you have any questions concerning this feel free to contact me at (210) 615-5890 or you may page me at (210) 235-1189. Thank you for your aid in this matter.

Sincerely

Patrick T. Downey, P.E.
District Pavement Engineer

An Equal Opportunity Employer

SHEET A. SPS-9A CANDIDATE PROJECT NOMINATION AND INFORMATION

STATE Texas SHRP SECTION NO. 4809

GENERAL PROJECT INFORMATION

PROJECT LOCATION

ROUTE NUMBER 1604

ROUTE SIGNING [ ] Interstate [ ] U.S. [ ] State [ ] County
Other FM / Loop

PROJECT LOCATION Start Milepost 0.523 End Milepost 1.300
Start Station 10250+00 End Station 10220+00

DIRECTION OF TRAVEL [ ] North B. [ ] South B. [ ] West B. [ ] East B.

PROJECT LOCATION DESCRIPTION Loop 1604, Main lanes between SH 16 and old Hausman Rd, FM 1560

COUNTY Bexar

HIGHWAY AGENCY DISTRICT NUMBER 15

ENVIRONMENTAL CONDITIONS

AVERAGE 7-DAY MAXIMUM PAVEMENT DESIGN TEMPERATURE		MINIMUM PAVEMENT DESIGN TEMPERATURE		MOISTURE (Annual Precipitation)	
< 52C (126F)	[ ]	> -46C (-51F)	[ ]		
< 58C (136F)	[ ]	> -40C (-40F)	[ ]	< 625 mm (25 inches)	[ ]
< 64C (147F)	[X] (61.2)	> -34C (-29F)	[ ]		
< 70C (158F)	[ ]	> -28C (-18F)	[ ]	> 625 mm (25 inches)	[X]
		> -22C (-8F)	[ ]		
		> -16C (3F)	[ ]		
		> -10C (14F)	[X] (-2.6		

$T_{zero} = [(T_{air} - 0.00618\,LAT^2 + 0.2289\,LAT + 42.4) \times (0.9545)] - 17.78$

LAT = 29.6
T_{air} = 102°F (39°C

$T_{min} = 0.859\,(T_{air}) + 1.7°C$

ASSUMED COLDEST AIR TEMP OF -5°C (25°F

SIGNIFICANT DATES

LATEST DATE OF APPROVAL NOTIFICATION FROM FHWA LTPP 5/31/95
CONTRACT LETTING DATE 10/93
ESTIMATED CONSTRUCTION START DATE 12/93
ESTIMATED DATE TEST SECTIONS OPENED TO TRAFFIC 01/96
ESTIMATED CONSTRUCTION COMPLETION DATE 01/96

SHEET A. SPS-9 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM (Continued)

PROJECT DESCRIPTION

PROJECT TYPE [X] New Route [ ] Resurfacing Flexible [ ] Resurfacing Rigid

Other_____

FACILITY [X] Divided [ ] Undivided NUMBER OF LANES (One Way) 2

DESIGN TRAFFIC DATA

ANNUAL AVERAGE DAILY TRAFFIC (TWO DIRECTIONS)	14,900
% HEAVY TRUCKS AND COMBINATIONS (OF AADT)	10.0
EST. 18K ESAL RATE IN STUDY LANE (1,000 ESAL/YR)	16
TOTAL DESIGN 18K ESAL APPLICATIONS IN DESIGN LANE	327,060
DESIGN PERIOD (Years)	20

SPS-9A Nomination F m/Jul, 9

SHEET 6. SPS-9 CANDIDATE PROJECT NOMINATION AND INFORMATION FORM

STATE Texas SHRP SECTION NO. 4809

AGENCY'S PAVEMENT STRUCTURE DESIGN FOR SITE

LAYER[1] NO.	LAYER[2] DESCRIPTION CODE	MATERIAL TYPE[3] CLASS CODE	THICKNESS[4] (mm)	STRUCTURAL[5] COEFFICIENT
1	SUBGRADE (7)	51	— — —	0.11
2	06	23	152.4	0.14
3	05	28	101.6	0.44
4	04	01	38.1	0.44
5	03	01	38.1	0.44
6	— —	— —	— — . —	0.— —
7	— —	— —	— — . —	0.— —
8	— —	— —	— — . —	0.— —
9	— —	— —	— — . —	0.— —

STRUCTURAL DESIGN METHOD

[ ] 1972 AASHTO [X] 1986 AASHTO [ ] 1993 AASHTO [ ] Modified AASHTO

Other_____

AASHTO DESIGN RELIABILITY FACTORS R%_____ S_o_____

OUTSIDE SHOULDER TYPE

[ ] Turf [ ] Granular [X] Asphalt Concrete [ ] Surface Treatment

[ ] PCC [ ] Curb and Gutter Other_____

OUTSIDE SHOULDER WIDTH (Feet) 10 FT

SUBSURFACE EDGE DRAINS [ ] Yes [X] No

NOTES

1. Layer 1 is the natural occurring subgrade soil. The pavement surface will have the largest assigned layer number.
2. Layer description codes:

Surface Layer:	03	Base Layer:	05	Subgrade:	07
Subsurface HMAC:	04	Subbase Layer:	06	Embankment (Fill):	11

3. Refer to Tables A-1 through A-4 for material class codes.
4. If subgrade depth to a rigid layer is known, enter this depth for subgrade thickness, otherwise leave subgrade layer thickness blank.
5. Enter AASHTO structural layer coefficient value, as appropriately modified, used in pavement design or typical coefficient used by agency for this material. For the subgrade, enter either AASHTO soil support value or resilient modulus value (psi) used in design.

SHEET C. SPS-9A UPDATE PROJECT NOMINATION AND INFORMATION FORM

STATE Texas SHRP SECTION NO. 4809

TEST SECTION LAYOUT

NUMBER OF TEST SECTIONS ENTIRELY ON: FILL ALL CUT ____

SHORTEST TRANSITION BETWEEN CONSECUTIVE TEST SECTIONS (meters) ____

VERTICAL GRADE (Avg %) (+ upgrade; - downgrade) ____

HORIZONTAL CURVATURE (Degrees)____ [ ] Tangent

COMMENTS ON DEVIATIONS FROM DESIRED SITE LOCATION CRITERIA____

OTHER SHRP TEST SECTIONS

DOES AGENCY DESIGN CONFORM TO GPS-1, GPS-2, GPS-6 OR GPS-7 PROJECT CRITERIA? [X] YES [ ] NO

DISTANCE TO NEAREST GPS TEST SECTION ON SAME ROUTE (Miles) None

TEST SECTION NUMBER OF NEAREST GPS SECTION 481094 } 5 mi west 484005

ARE OTHER SPS SECTIONS LOCATED ON SAME PROJECT? [ ] YES [X] NO

IF YES: [ ] SPS-1 [ ] SPS-5 [ ] SPS-6 [ ] OTHER

SUPPLEMENTAL TEST SECTIONS

IF SUPPLEMENTAL EXPERIMENTAL TEST SECTIONS ARE PROPOSED, COMPLETE THE FOLLOWING:

TOTAL NUMBER OF SUPPLEMENTAL TEST SECTIONS ____

FACTORS TO BE INVESTIGATED ____

APPENDIX B

MIX DESIGNS

	Page Nº.
"TYPE C" FLINT SURFACE MIX (480901)	B.2
"TYPE C" LEVEL-UP (480901)	B 15
SUPERPAVE™ MIX 1, PG64-22 (480902)	B 30
SUPERPAVE™ MIX 2, PG70-22 (480903)	B.36
ASPHALT STABILIZED BASE (4809XX)	B 54

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 12 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

ITEM 3834
"TYPE C" FLINT SURFACE MIX

PLANT MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [5]

COMPOSITION OF COARSE AGGREGATE		TYPE	PERCENT
* 2. Crushed Stone.....1	Crushed Slag.....4	[1]	[1 0 0.]
* 3. Gravel.....2	Manufactured	[_]	[_ _ _.]
* 4. Crushed Gravel.....3	Lightweight.....5	[_]	[_ _ _.]
Other (Specify)_____6			

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE [0 9.]
(SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9)

COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
* 6. Natural Sand.....1	[2]	[_ 7 4.]
* 7. Crushed or Manufactured Sand (From	[1]	[_ 2 6.]
* 8. Crushed Gravel or Stone).....2	[_]	[_ _ _.]
Recycled Concrete.....3		
Other (Specify)_____4		

* 9. TYPE OF MINERAL FILLER [_]

Stone Dust.....1 Portland Cement....3
Hydrated Lime.....2 Fly Ash.....4
Other (Specify)_____5

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

TYPE OF AGGREGATE___	TYPE OF TEST	RESULTS
10. Coarse	_ _	_ _ _._ _ _
11. Coarse	_ _	_ _ _._ _ _
12. Coarse	_ _	_ _ _._ _ _
13. Coarse	_ _	_ _ _._ _ _

14. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 13 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

AGGREGATE PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [5]

* 2. GRADATION OF COMBINED AGGREGATES

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2".....	[_ _ _]	No. 4.....	[5 3]
1 1/2".....	[_ _ _]	No. 8.....	[_ _]
1".....	[_ _ _]	No. 10.....	[3 4]
7/8".....	[1 0 0]	No. 16.....	[_ _]
3/4 ".....	[_ _ _]	No. 30.....	[_ _]
5/8".....	[1 0 0]	No. 40.....	[1 7]
1/2".....	[_ _ _]	No. 50.....	[_ _]
3/8".....	[7 2]	No. 80.....	[_ 8]
		No. 100.....	[_ _]
		No. 200.....	[_ 4]

BULK SPECIFIC GRAVITIES: $(0.24 + 0.15 + 0.22)/(0.24/2.609 + 0.15/2.552 + 0.22/2.588)$

* 3. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.5 8 7]

$(0.29 + 0.10)/(0.29/2.621 + 0.10/2.608)$

* 4. Fine Aggregate (AASHTO T84 or ASTM C128) [2.6 1 8]

* 5. Mineral Filler (AASHTO T100 or ASTM D854) [_._ _ _]

* 6. Aggregate Combination (Calculated) [2.5 9 9]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) 2.6 0 7

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 14 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [5]

* 2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [0 4]
(IF OTHER, SPECIFY _____)

* 3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [6 2]
(IF OTHER, SPECIFY _____)

* 4. SPECIFIC GRAVITY OF ASPHALT CEMENT
(AASHTO T228) [1.0 2 6]

ORIGINAL ASPHALT CEMENT PROPERTIES

* 5. VISCOSITY OF ASPHALT AT 140°F (POISES)
(AASHTO T202) [_ _ _ _ _ _.]

* 6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES)
(AASHTO T201) [_ _ _ _._ _]

* 7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM)
(100 g., 5 sec.) [_ _ _.]

ASPHALT MODIFIERS (SEE TYPE CODE, TABLE A.15)

	TYPE	QUANTITY(%)
* 8. MODIFIER #1	[_ _].	[_ _].
* 9. MODIFIER #2	[_ _].	[_ _].

(IF OTHER, SPECIFY TYPE _____)

10. DUCTILITY AT 77°F (CM)
(AASHTO T51) _ _ _.

11. DUCTILITY AT 39.2°(CM)
(AASHTO T51) _ _ _.

12. TEST RATE FOR DUCTILITY MEASUREMENT
AT 39.2°F (CM/MIN) _ _ _.

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM)
(200 g., 60 sec.) _ _ _.

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) _ _ _.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 15 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ASPHALT CEMENT PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [5]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS _

ASTM D1754 - THIN FILM OVEN TEST.....1
ASTM D2872 - ROLLING THIN FILM OVEN TEST...2
OTHER (SPECIFY)_____3

3. VISCOSITY OF ASPHALT AT 140°F (POISE) (AASHTO T202) _ _ _ _ _ _.

4. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T201) _ _ _ _._ _

5. DUCTILITY AT 77°F (CM) (AASHTO T51) _ _ _.

6. DUCTILITY AT 39.2°F (CM) (AASHTO T51) _ _ _.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (CM/MIN) _ _._

8. PENETRATION AT 77°F, 100 g., 5 Sec. (TENTHS OF A MM) (AASHTO T49) _ _ _.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec. (TENTHS OF A MM) (AASHTO T49) _ _.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53) _ _ _.

11. WEIGHT LOSS (PERCENT) _._

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 16 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [5]

* 2. TYPE OF SAMPLES [1]
SAMPLES COMPACTED IN LABORATORY.....1
SAMPLES TAKEN FROM TEST SECTION.....2

* 3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS)
(AASHTO T209 OR ASTM D2041) [2.4 1 5]

BULK SPECIFIC GRAVITY (ASTM D1188)

* 4. MEAN .....[2.3 1 8] NUMBER OF TESTS ..... _ _.
5. MINIMUM ..... _._ _ _ MAXIMUM ..... _._ _ _
6. STD. DEV..... _._ _ _

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172)

* 7. MEAN .....[_ 5.2] NUMBER OF SAMPLES .... _ _.
8. MINIMUM ..... _ _._ MAXIMUM ..... _ _.
9. STD. DEV. ..... _ _.

PERCENT AIR VOIDS

*10. MEAN .....[_ 4.0] NUMBER OF SAMPLES .... _ _.
11. MINIMUM ..... _ _.
12. STD. DEV. ..... _ _.

13. VOIDS IN MINERAL AGGREGATE (PERCENT) 15.0

14. EFFECTIVE ASPHALT CONTENT (PERCENT) _ _.

15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) _ _ _ _.

16. NUMBER OF BLOWS _ _

17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) _ _ _ _.
(AASHTO T245 OR ASTM D1559)

18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) _ _ _.

19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM D1561) _ _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 17 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

CONTINUED

* 1. LAYER NUMBER (FROM SHEET 3) [5]

* 2. TYPE ASPHALT PLANT [2]

BATCH PLANT.....1 DRUM MIX PLANT.....2

OTHER (SPECIFY)_____3

* 3. TYPE OF ANTISTRIPPING AGENT USED NONE
(SEE TYPE CODES, TABLE A.21) [_ _]
(Other, Specify_____)

* 4. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [_]

* 5. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [_ _._]

6. MOISTURE SUSCEPTIBILITY TEST TYPE 3

1 - AASHTO T165 (ASTM D1075)
2 - TEXAS FREEZE-THAW PEDESTAL TEST (REF. 21)
3 - TEXAS BOILING TEST (REF. 22)
4 - REVISED LOTTMAN PROCEDURE (AASHTO T283)
5 - OTHER (SPECIFY) _____

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. _ _

8. PERCENT STRIPPED _ 2

9. TENSILE STRENGTH RATIO (AASHTO T283) _._ _

10. INDEX OF RETAINED STRENGTH (AASHTO T165) _ _ _.

Texas Department of Transportation

District Laboratory Building No. 5 ◊ 4615 NW Loop 410 ◊ PO Box 29928
San Antonio, Texas 78284-3601 ◊ (210) 615-6042

February 13, 1995

TO: Vulcan Helotes
Attn: Clay Smith

SUBJECT: Hot Mix Design Approval
Sample No. 15-94-1246

Our office has reviewed your specification 3834 Type "C" Flint Surface Mix design, VHCFR-101. The VMA and stripping charateristics were evaluated and meet verification requirements. We have also verified gradation and stability of the moled specimens and these meet your design criteria.

Ray Williams

Ray Williams
San Antonio District Level II
Certified Technician

Project	: NH 90(191)M
C.S.J.	: 2492-02-023
Highway	: Loop 1604
County	: Bexar
Contractor	: Gilbert
Producer	: Vulcan Helotes
Sample Number	: 15-94-1246

Effect Of Water On Bituminous Mixes

Results of the strip test performed on the type "C" Flint Surface HMAC indicates no stripping to the aggregate.

The test was run on plant run material.

Distribution : Lab Files Only

F. M. Jaster, P.E.

Vulcan

Materials Company

11 January 1995

To : Frank M. Jaster

From : Richard D. Leach

Subject : **Type "C" Flint Surface Hot Mix Design Information**

Project : NH 90 (191) M

Item : 3834

Design No. : VHCFR-101

Attached is a design for Type "C" Flint Surface HMAC to be produced by Vulcan Materials using Grade 3 Flint, Capitol Aggregate, Grade 4. Grade 5 and Manufactured sand from Vulcan Helotes Quarry, and Silica from Jet Road Quarry. The batch plant is locacted on F.M. 1560 near Helotes.

Richard D. Leach

Richard D. Leach
Certified Level II
No. 184

'ulcan Materials Co. Helotes Type C Flint Surface 01-07-95
'roject NH 90 (191) M
em 3834
'esign No. VHCFR 101

ORIGINAL SCREEN ANALYSIS

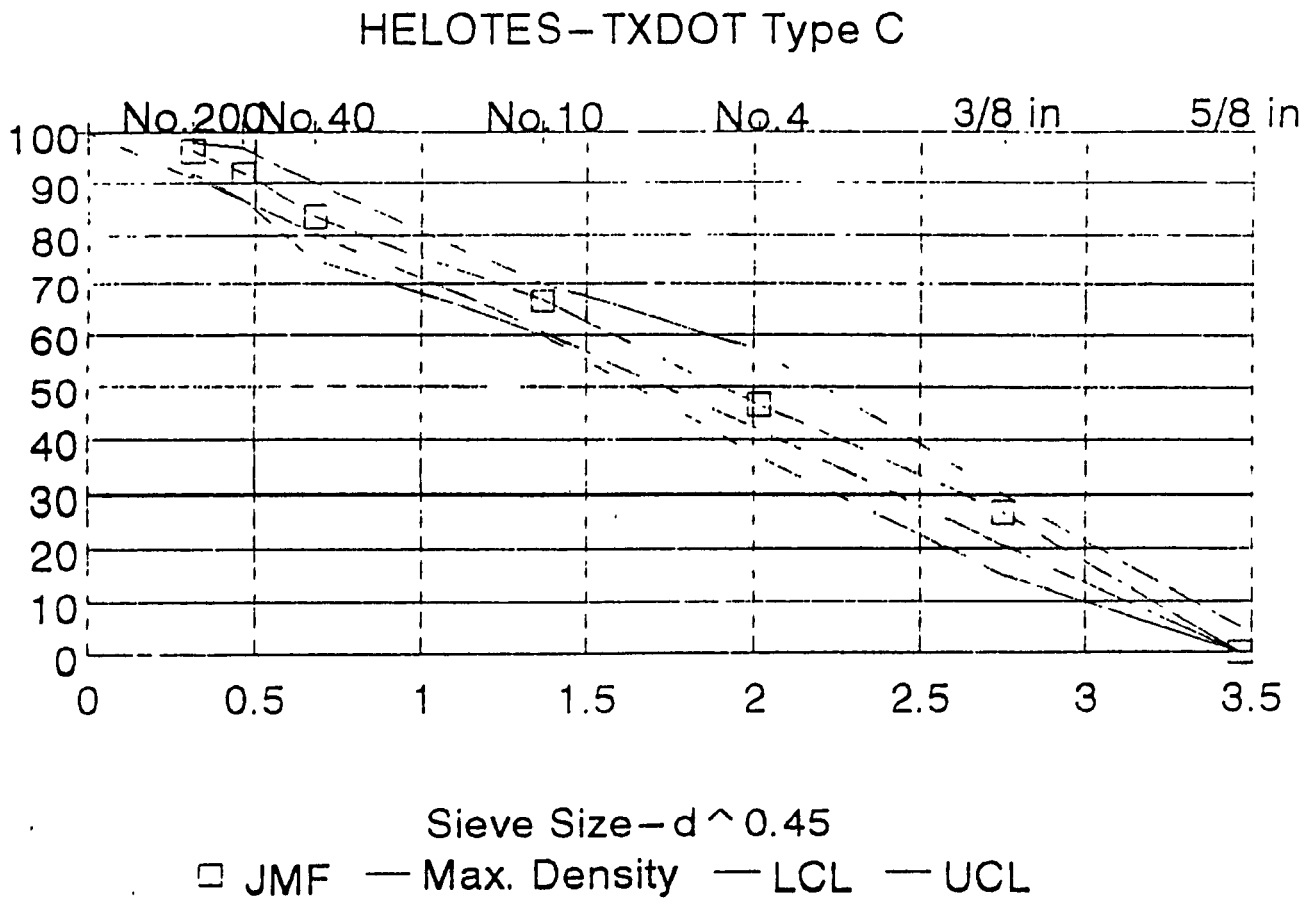
ource ize	Flint Grade 3	Helotes Grade 4	Helotes Grade 5	Helotes M-Sand	Jett Silica
ieve Size	(% Ret)	(% Ret)	(% Ret)	(% Ret)	(% Ret)
7/8 in	0 0	0.0	0 0	0 0	0 0
5/8 in	0 5	0.0	0 0	0 0	0 0
3/8 in	97 4	33 5	0 0	0 0	0 0
No 4	99 0	97 4	37 1	0 5	0 0
No. 10	99 3	98 2	97 3	22 5	0 2
No. 40	99 5	98.5	98.9	76 8	8 3
No 80	99 5	98 6	99.0	89 4	58.1
No 200	99 6	98 7	99 1	93 2	88 7

AGGREGATE DESIGN

ource ize	Flint Grade 3		Helotes Grade 4		Helotes Grade 5		Helotes M-Sand		Silica		Combined Analysis	Spec Range
Blend (%/100)	1 00	0 24	1 00	0 15	1 00	0 22	1 00	0 29	1 00	0 10	1 00	
ieve Size		(% Ret)		(% Ret)		(% Ret)		(% Ret)		(% Ret)	(% Ret)	(% Ret)
7/8 in	0 0	0.0	0 0	0 0	0.0	0 0	0 0	0 0	0 0	0.0	0 0	0
5/8 in	0 5	0 1	0 0	0.0	0 0	0 0	0 0	0 0	0 0	0 0	0 1	0 - 5
3/8 in	97 4	23 4	33 5	5 0	0 0	0 0	0 0	0 0	0 0	0 0	28 4	15 - 30
No 4	99 0	23 8	97 4	14 6	37 1	8 2	0 5	0 1	0 0	0 0	46 7	37 - 57
No. 10	99 3	23 8	98.2	14 7	97 3	21 4	22 5	6 5	0 2	0 0	66 5	60 - 70
No. 40	99.5	23.9	98.5	14 8	98.9	21.8	76 8	22 3	8.3	0 8	83 5	75 - 90
No. 80	99.5	23.9	98.6	14.8	99.0	21 8	89.4	25 9	58.1	5 8	92 2	87 - 97
No 200	99 6	23 9	98 7	14 8	99 1	21 8	93 2	27 0	88.7	8 9	96 4	92 - 98

50.5 % Flint Retained on the + 4

Vulcan Materials Co. Helotes Type C Flint Surface 1-11-95
Project NH 90 (191) M
Item No. 3834
Design No. VHCFR 101



Vulcan Materials Co. Helotes Type C Flint Surface 1-11-95
Project NH 90 (191) M
Item No. 3834
Design No. VHCFR 101

Individual Specific Gravities:

Sieve Size:	Flint Grade 3	Grade 4	Grade 5	M-Sand	Silica
5/8 in x 3/8 in	2.609	2.533			
3/8 in x No.4		2.562	2.575		
No.4 x No.10			2.596	2.602	
No.10 x No.80				2.618	2.629
Minus No. 80				2.678	2.580
Bulk Specific Gravit	2.609	2.552	2.588	2.621	2.608

Specific Gravitiy of Asphalt	=	1.026
Average Bulk Specific Gravitiy	=	2.599
Effective Specific Gravitiy	=	2.607
VMA @ Optimum AC Content	=	15
Minimum Required VMA	=	13

Asphalt Content	Actual Gravity (Ga)	Rice Gravity (Gr)	Rice Effective (Ge)	Rice Theoretical (Gt)	Rice Density (%)	Hveem Stability
3.0	2.261			2.492	90.7	
4.0	2.291	2.450	2.600	2.456	93.3	
5.0	2.315	2.418	2.604	2.421	95.6	
6.0	2.332	2.395	2.618	2.387	97.7	
7.0	2.345			2.353	99.6	

Optimum Asphalt Content @ 96.0%	=	5.2
Percent Asphalt Absorption	=	0
Stability At Optimum AC Content	=	

Stripping	Results	%Stripped
5.0% AC	No Antistrip	2%

50.5 % Flint Retained on the +4

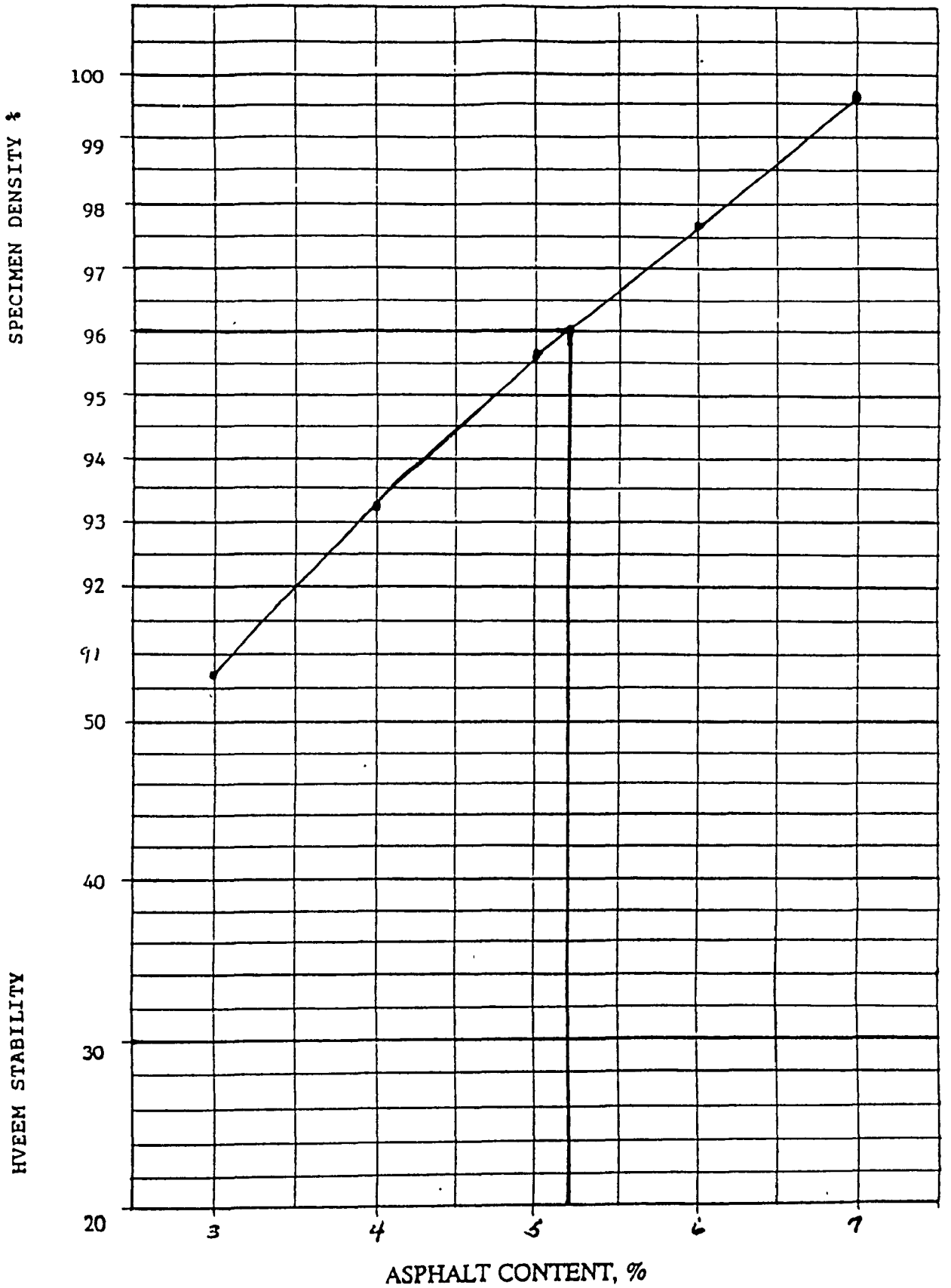

SPECIMEN DENSITY %
100
99
98
97
96
95
94
93
92
91
50
40
30
20
HVEEM STABILITY
3
4
5
6
7
ASPHALT CONTENT, %

FIGURE 2

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 12 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

ITEM 3834
"TYPE C" LEVEL-UP

PLANT MIXED ASPHALT BOUND LAYERS
AGGREGATE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

COMPOSITION OF COARSE AGGREGATE		TYPE	PERCENT
* 2. Crushed Stone.....1	Crushed Slag.....4	[1]	[1 0 0.]
* 3. Gravel.....2	Manufactured	[_]	[_ _ _.]
* 4. Crushed Gravel.....3	Lightweight.....5	[_]	[_ _ _.]
Other (Specify)_____6			

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE [0 9.]
(SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9)

COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
* 6. Natural Sand.....1	[2]	[_ 8 8.]
* 7. Crushed or Manufactured Sand (From	[1]	[_ 1 2.]
* 8. Crushed Gravel or Stone).....2	[_]	[_ _ _.]
Recycled Concrete.....3		
Other (Specify)_____4		

* 9. TYPE OF MINERAL FILLER [_]

Stone Dust.....1 Portland Cement....3
Hydrated Lime.....2 Fly Ash.....4
Other (Specify)_____5

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
10. Coarse	_ _	_ _ _.__
11. Coarse	_ _	_ _ _.__
12. Coarse	_ _	_ _ _.__
13. Coarse	_ _	_ _ _.__

14. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 13

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 1]

PLANT MIXED ASPHALT BOUND LAYERS

AGGREGATE PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. GRADATION OF COMBINED AGGREGATES

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2".....	[_ _ _]	No. 4.....	[5 2]
1 1/2".....	[_ _ _]	No. 8.....	[_ _]
1".....	[_ _ _]	No. 10.....	[3 4]
7/8".....	[1 0 0]	No. 16.....	[_ _]
3/4 ".....	[_ _ _]	No. 30.....	[_ _]
5/8".....	[_ 9 9]	No. 40.....	[1 8]
1/2".....	[_ _ _]	No. 50.....	[_ _]
3/8".....	[7 7]	No. 80.....	[1 1]
		No. 100.....	[_ _]
		No. 200.....	[_ 5]

BULK SPECIFIC GRAVITIES: $(0.45 + 0.15)/(0.45/2.633 + 0.15/2.612)$

* 3. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.6 2 8]
$(0.35 + 0.05)/(0.35/2.646 + 0.05/2.607)$

* 4. Fine Aggregate (AASHTO T84 or ASTM C128) [2.6 4 1]

* 5. Mineral Filler (AASHTO T100 or ASTM D854) [_._ _ _]

* 6. Aggregate Combination (Calculated) [2.6 3 3]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) 2.6 2 7

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 14 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [0 4]
(IF OTHER, SPECIFY _____)

* 3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [6 2]
(IF OTHER, SPECIFY _____)

* 4. SPECIFIC GRAVITY OF ASPHALT CEMENT
(AASHTO T228) [1.0 2 6]

ORIGINAL ASPHALT CEMENT PROPERTIES

* 5. VISCOSITY OF ASPHALT AT 140°F (POISES)
(AASHTO T202) [_ _ _ _ _ _.]

* 6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES)
(AASHTO T201) [_ _ _ _._ _]

* 7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM)
(100 g., 5 sec.) [_ _ _.]

ASPHALT MODIFIERS (SEE TYPE CODE, TABLE A.15)

	TYPE	QUANTITY(%)
* 8. MODIFIER #1	[_ _].	[_ _].
* 9. MODIFIER #2	[_ _].	[_ _].

(IF OTHER, SPECIFY TYPE _____)

10. DUCTILITY AT 77°F (CM)
(AASHTO T51) _ _ _.

11. DUCTILITY AT 39.2°(CM)
(AASHTO T51) _ _ _.

12. TEST RATE FOR DUCTILITY MEASUREMENT
AT 39.2°F (CM/MIN) _ _ _.

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM)
(200 g., 60 sec.) _ _ _.

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) _ _ _.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 15 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ASPHALT CEMENT PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS _

ASTM D1754 - THIN FILM OVEN TEST.....1
ASTM D2872 - ROLLING THIN FILM OVEN TEST...2
OTHER (SPECIFY)_____3

3. VISCOSITY OF ASPHALT AT 140°F (POISE) (AASHTO T202) _ _ _ _ _ _.

4. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T201) _ _ _ _._ _

5. DUCTILITY AT 77°F (CM) (AASHTO T51) _ _ _.

6. DUCTILITY AT 39.2°F (CM) (AASHTO T51) _ _ _.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (CM/MIN) _ _._

8. PENETRATION AT 77°F, 100 g., 5 Sec. (TENTHS OF A MM) (AASHTO T49) _ _ _.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec. (TENTHS OF A MM) (AASHTO T49) _ _.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53) _ _ _.

11. WEIGHT LOSS (PERCENT) _._

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 16 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 1]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. TYPE OF SAMPLES [1]
SAMPLES COMPACTED IN LABORATORY.....1
SAMPLES TAKEN FROM TEST SECTION.....2

* 3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS)
(AASHTO T209 OR ASTM D2041) [2.4 6 2]

BULK SPECIFIC GRAVITY (ASTM D1188)

* 4. MEAN .....[2.3 4 7] NUMBER OF TESTS ..... _ _.
5. MINIMUM ..... _._ _ _ MAXIMUM ..... _._ _ _
6. STD. DEV..... _._ _ _

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172)

* 7. MEAN .....[_ 4.3] NUMBER OF SAMPLES .... _ _.
8. MINIMUM ..... _ _._ MAXIMUM ..... _ _._
9. STD. DEV. ..... _ _._

PERCENT AIR VOIDS

*10. MEAN .....[_ 4.7] NUMBER OF SAMPLES .... _ _.
11. MINIMUM ..... _ _._ MAXIMUM ..... _ _._
12. STD. DEV. ..... _ _._

13. VOIDS IN MINERAL AGGREGATE (PERCENT) 15.0

14. EFFECTIVE ASPHALT CONTENT (PERCENT) _ _._

15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) _ _ _ _.

16. NUMBER OF BLOWS _ _

17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) _ _ _ _.
(AASHTO T245 OR ASTM D1559)

18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) _ 53.

19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM D1561) _ _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 17

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 1]

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

CONTINUED

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. TYPE ASPHALT PLANT [2]

BATCH PLANT.....1 DRUM MIX PLANT.....2

OTHER (SPECIFY)_____3

* 3. TYPE OF ANTISTRIPPING AGENT USED (SEE TYPE CODES, TABLE A.21) (Other, Specify_____) None [_ _]

* 4. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [_]

* 5. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [_ _._]

6. MOISTURE SUSCEPTIBILITY TEST TYPE 3

1 - AASHTO T165 (ASTM D1075)
2 - TEXAS FREEZE-THAW PEDESTAL TEST (REF. 21)
3 - TEXAS BOILING TEST (REF. 22)
4 - REVISED LOTTMAN PROCEDURE (AASHTO T283)
5 - OTHER (SPECIFY) _____

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. _ _

8. PERCENT STRIPPED _ 0

9. TENSILE STRENGTH RATIO (AASHTO T283) _._ _

10. INDEX OF RETAINED STRENGTH (AASHTO T165) _ _ _.

Texas Department of Transportation

District Laboratory Building No. 5 ◊ 4615 NW Loop 410 ◊ PO Box 29928
San Antonio, Texas 78284-3601 ◊ (210) 615-6042

August 29, 1995

Project: NH 90 (191)M
C.S.J.: 2452-02-023
Highway: Lp 1604
Contractor: Gilbert Const.
Producer: Vulcan Helotes
Sample Number: 15-95-836
Design Number: VHCL--1003

Effect Of Water On Bituminous Mixes
Tex Method 530-C

Results of the test method Tex-530-C on item 3834 Type "C" Level Up that was designed by Vulcan Helotes; indicates no significant stripping. A plant run sample was used to perform the test procedure. .

Frank M. Jaster
San Antonio District Laboratory Engineer

Distribution: District Lab Files
Jimmy Vogel

Texas Department of Transportation

District Laboratory Building No. 5 ◊ 4615 NW Loop 410 ◊ PO Box 29928
San Antonio, Texas 78284-3601 ◊ (210) 615-6042

August 29, 1995

TO: Vulcan Helotes
Attn. Clay Smith

SUBJECT: Hot Mix Design Approval
PROJECT: NH 90(191)M

Reference Design Number:VHCL--1003
District Lab Sample Number: 15-95-836
Item: 3834

Our office has received your Type "C" Level Up mix design produced by Vulcan Helotes..This design uses 45% -5/8" Rock, 15% - Grade #5, 35%-Man Sand from Vulcan Helotes and 5% Silica (Jet Road Pit). The VMA and stripping characteristics were evaluated and meets verification requirements. We have also run the stability of the molded specimens and these meet your design criteria.

If your office has any questions regarding this matter, please contact me at (210) 615-6044.

Ray Williams
Ray Williams
San Antonio District Level II
Certified Technician

Distribution: Lab Files
Ray Williams

MEMORANDUM

Texas Department of Transportation

TO: David Balli, P. E. Date August 29, 1995

FROM: Frank M. Jaster, P. E.

SUBJECT: HMAC Design Information
PROJECT: NH 90 (191)M

Originating Office: **San Antonio District Laboratory**

Attached Is the hot mix design information for the above mentioned project. It has been reviewed by one of the district laboratory's Level II certified technicians and has been accepted.

Item 3834 Type " C" Level Up
Design Number :VHCL-1003
Sample Number: 15-95-836

If you have any questions concerning this matter, please call our office at (210)615-6042.

PE.

Frank M. Jaster, P.E.
San Antonio District Laboratory Engineer

Distribution : District Lab Files
Construction Engineer
Area Office
Ray Williams
Jim Vogel

Vulcan

Materials Company

August 24, 1995

To	*: Frank M. Jaster*
From	*: Clay Smith*
Subject	***: Type C Level Up Design Information***
Project	*: NH 90(191)M*
Item	*: 3834*
Design No.	*: VHCL–1003*

Attached is a design for Type C Hot Mix to be produced by Vulcan Helotes Quarry using 5/8 in. rock, Grade 5, and Manufactured Sand from Vulcan Helotes pit and Silica from Vulcan Jet Road pit. Plant is located in Helotes Tx. on FM 1560 North.

Clay Smith

Clay Smith
Leavel II No. 106

Vulcan : Helotes C–Mix State

Optimum Density	=	96.0
Design Asphalt Content	=	4.3
Design Stability	=	53.0

Sand Equivalent	=	Greater than 45
Plasticity Index for the Manufacture Sand	=	Less than 6
Plasticity Index for the Slica	=	Less than 6

Aggregate Analysis	:	Helotes 5/8 in.	Helotes Grade 5
Decantation	:	0.7%	0.6%
Los Angeles Abrasion	:	34%	34%
Soundness Test	:	27%	27%
Flakiness Index	:	0%	0%
Percent Deleterious Material	:	0%	0%
Percent Crushed Faces	:	100%	100%

Sepcified Polish Value	=	N / A
RSVP of Non–Polishing Aggregate	=	N / A
RSVP of Polishing Aggregate	=	N / A
Percent Non–Polishing Aggregate Required + #10	=	N / A

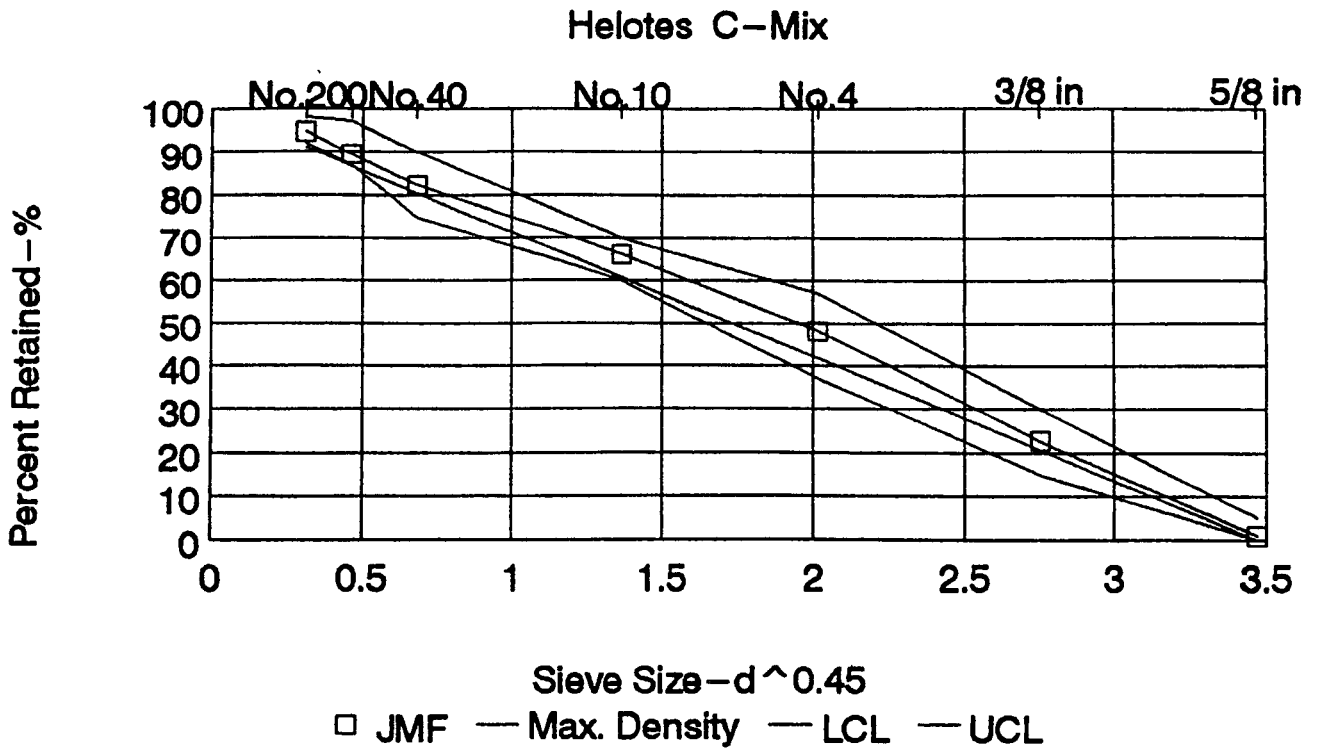
Effective Specific Gravity (Ge)	=	2.627
Asphalt Specific Gravity	=	1.026
Asphalt Producer	:	TF&A
Mold Weight at the Optimum Asphalt Content	=	950.0

ORIGINAL SCREEN ANALYSIS

Source: Size:	Helotes 5/8 Rock	Helotes Grade 5	Helotes M-Sand	J.R. Silica
Sieve Size	(% Ret.)	(% Ret.)	(% Ret.)	(% Ret.)
7/8 in	0.0	0.0	0.0	0.0
5/8 in	2.2	0.0	0.0	0.0
3/8 in	50.4	0.0	0.0	0.0
No. 4	94.7	37.3	0.0	0.0
No. 10	97.8	95.6	22.0	0.3
No. 40	98.6	98.3	64.8	9.5
No. 80	98.8	98.6	78.3	55.4
No. 200	99.0	98.7	88.2	89.6

AGGREGATE DESIGN

Source: Size:	Helotes 5/8 Rock		Helotes Grade 5		Helotes M-Sand		J.R. Silica		Combined Analysis	Spec. Range
Blend (%/100):	1.00	**0.45**	1.00	**0.15**	1.00	**0.35**	1.00	**0.05**	1.00	
Sieve Size	(% Ret.)		(% Ret.)		(% Ret.)		(% Ret.)		(% Ret.)	(% Ret.)
7/8 in	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0 – 0
5/8 in	2.2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0 – 5
3/8 in	50.4	22.7	0.0	0.0	0.0	0.0	0.0	0.0	22.7	15 – 30
No. 4	94.7	42.6	37.3	5.6	0.0	0.0	0.0	0.0	48.2	37 – 57
No. 10	97.8	44.0	95.6	14 3	22.0	7.7	0.3	0.0	66.1	60 – 70
No. 40	98.6	44.4	98.3	14.7	64.8	22.7	9.5	0.5	82.3	75 – 90
No. 80	98.8	44.5	98.6	14.8	78.3	27.4	55.4	2.8	89.4	87 – 97
No. 200	99.0	44.6	98.7	14.8	88.2	30.9	89.6	4.5	94.7	92 – 98


Helotes C-Mix
No.200
No.40
No.10
No.4
3/8 in
5/8 in
Percent Retained-%
100
90
80
70
60
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
Sieve Size-d^0.45
JMF
Max. Density
LCL
UCL

Vulcan Materials Co. Helotes Type C Level up

Individual Specific Gravities:

Sieve Size:	5/8 Rock	Grade 5	M-Sand	Silica
5/8 in x 3/8 in	2.629			
3/8 in x No.4	2.638	2.603		
No.4 x No.10		2.617	2.586	
No.10 x No.80			2.647	2.629
Minus No. 80			2.709	2.580
Bulk Specific Grav.	2.633	2.612	2.646	2.607

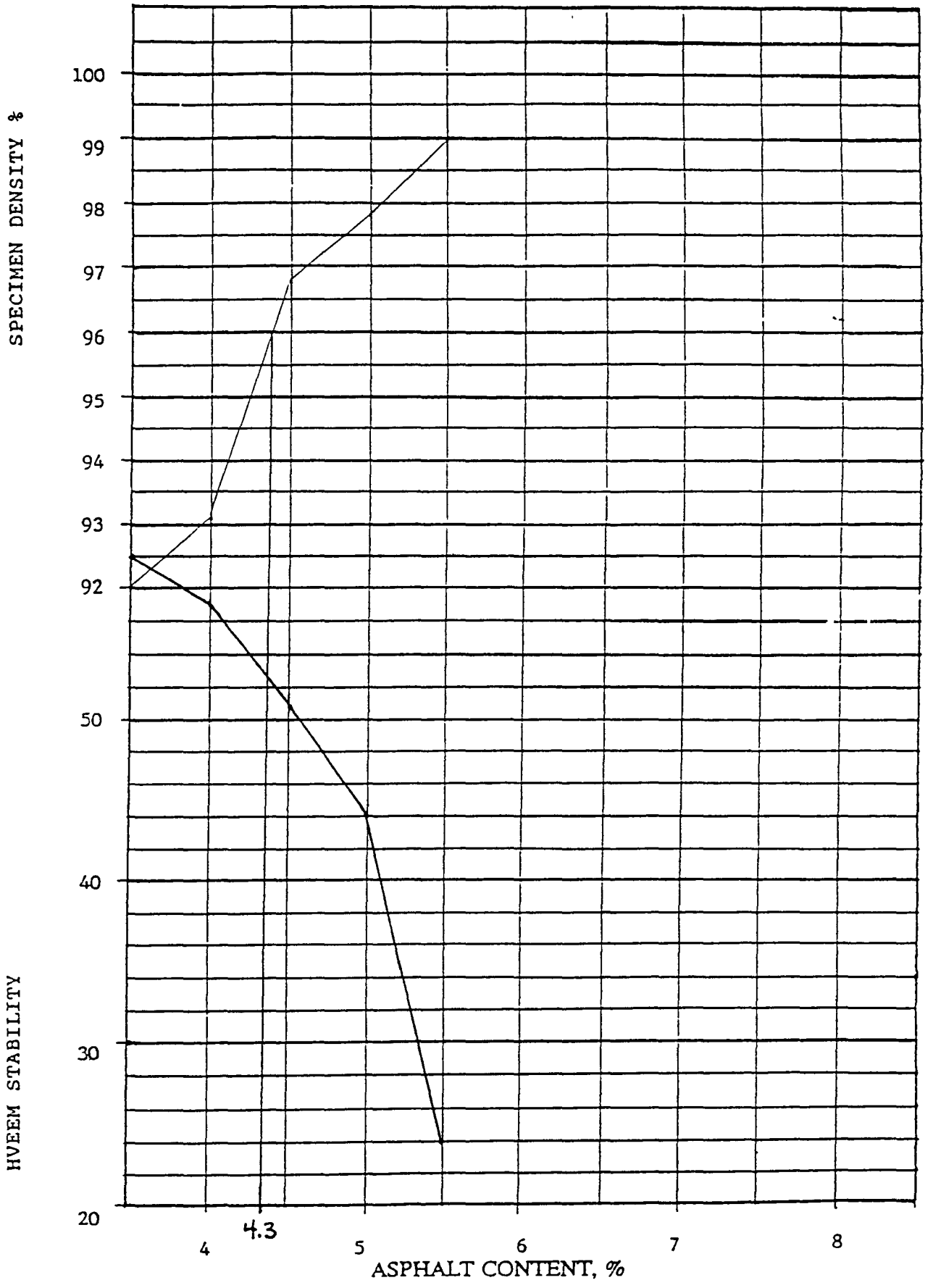
Specific Gravitiy of Asphalt	=	1.026
Average Bulk Specific Gravitiy	=	2.633
Effective Specific Gravitiy	=	2.627
VMA @ Optimum AC Content	=	15
Minimum Required VMA	=	14

Asphalt Content	Actual Gravity (Ga)	Rice Gravity (Gr)	Rice Effective (Ge)	Rice Theoretical (Gt)	Rice Density (%)	Hveem Stability
3.5	2.291			2.491	92.0	60
4.0	2.302	2.474	2.629	2.473	93.1	57
4.5	2.377	2.451	2.623	2.455	96.8	51
5.0	2.383	2.439	2.630	2.437	97.8	44
5.5	2.394			2.419	99.0	24

Optimum Asphalt Content @ 96.0%	=	4.3
Percent Asphalt Absorption	=	0.0%
Stability at Optimum AC Comtent	=	53

Stripping	Results	%Stripped
4.5 % AC	No Antistrip	0%

DENSITY-STABILITY CURVES



Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 12 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 2]

LTPP PROGRAM

SUPERPAVE MIX 1
PG64-22

PLANT MIXED ASPHALT BOUND LAYERS
AGGREGATE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

COMPOSITION OF COARSE AGGREGATE		TYPE	PERCENT
* 2. Crushed Stone.....1	Crushed Slag.....4	[1]	[1 0 0.]
* 3. Gravel.....2	Manufactured	[_]	[_ _ _.]
* 4. Crushed Gravel.....3	Lightweight.....5	[_]	[_ _ _.]
Other (Specify)_____6			

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE [0 9.]
(SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9)

COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
* 6. Natural Sand.....1	[2]	[_ 5 5.]
* 7. Crushed or Manufactured Sand (From	[1]	[_ 4 5.]
* 8. Crushed Gravel or Stone).....2	[_]	[_ _ _.]
Recycled Concrete.....3		
Other (Specify)_____4		

* 9. TYPE OF MINERAL FILLER [_]

Stone Dust.....1 Portland Cement....3
Hydrated Lime.....2 Fly Ash.....4
Other (Specify)_____5

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
10. Coarse	_ _	_ _ _._ _ _
11. Coarse	_ _	_ _ _._ _ _
12. Coarse	_ _	_ _ _._ _ _
13. Coarse	_ _	_ _ _._ _ _

14. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 13

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 2]

PLANT MIXED ASPHALT BOUND LAYERS

AGGREGATE PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. GRADATION OF COMBINED AGGREGATES

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2".....	[_ _ _]	No. 4.....	[5 6]
1 1/2".....	[_ _ _]	No. 8.....	[2 9]
1".....	[_ _ _]	No. 10.....	[_ _]
7/8".....	[_ _ _]	No. 16.....	[1 8]
3/4 ".....	[1 0 0]	No. 30.....	[1 2]
5/8".....	[_ _ _]	No. 40.....	[_ _]
1/2".....	[_ 9 1]	No. 50.....	[_ 8]
3/8".....	[7 6]	No. 80.....	[_ _]
		No. 100.....	[_ 6]
		No. 200.....	[_ 5]

BULK SPECIFIC GRAVITIES: $(0.20 + 0.35 + 0.12)/(0.20/2.589 + 0.35/2.492 + 0.12/2.541)$

* 3. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.5 2 9]
$(0.15 + 0.18)/(0.15/2.639 + 0.18/2.622)$

* 4. Fine Aggregate (AASHTO T84 or ASTM C128) [2.6 3 0]

* 5. Mineral Filler (AASHTO T100 or ASTM D854) [_._ _ _]

* 6. Aggregate Combination (Calculated) [2.5 6 1]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) 2.6 4 0

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 14 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 2]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [0 4]
(IF OTHER, SPECIFY _____)

* 3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [6 2]
(IF OTHER, SPECIFY _____)

* 4. SPECIFIC GRAVITY OF ASPHALT CEMENT
(AASHTO T228) [1.0 2 6]

ORIGINAL ASPHALT CEMENT PROPERTIES

* 5. VISCOSITY OF ASPHALT AT 140°F (POISES)
(AASHTO T202) [_ _ _ _ _ _.]

* 6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES)
(AASHTO T201) [_ _ _ _._ _]

* 7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM)
(100 g., 5 sec.) [_ _ _.]

ASPHALT MODIFIERS (SEE TYPE CODE, TABLE A.15)

	TYPE	QUANTITY(%)
* 8. MODIFIER #1	[_ _].	[_ _].
* 9. MODIFIER #2	[_ _].	[_ _].

(IF OTHER, SPECIFY TYPE _____)

10. DUCTILITY AT 77°F (CM)
(AASHTO T51) _ _ _.

11. DUCTILITY AT 39.2°(CM)
(AASHTO T51) _ _ _.

12. TEST RATE FOR DUCTILITY MEASUREMENT
AT 39.2°F (CM/MIN) _ _ _.

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM)
(200 g., 60 sec.) _ _ _.

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) _ _ _.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 15 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 2]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ASPHALT CEMENT PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS _

ASTM D1754 - THIN FILM OVEN TEST.....1
ASTM D2872 - ROLLING THIN FILM OVEN TEST...2
OTHER (SPECIFY)_____3

3. VISCOSITY OF ASPHALT AT 140°F (POISE) (AASHTO T202) _ _ _ _ _ _.

4. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T201) _ _ _ _._ _

5. DUCTILITY AT 77°F (CM) (AASHTO T51) _ _ _.

6. DUCTILITY AT 39.2°F (CM) (AASHTO T51) _ _ _.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (CM/MIN) _ _._

8. PENETRATION AT 77°F, 100 g., 5 Sec. (TENTHS OF A MM) (AASHTO T49) _ _ _.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec. (TENTHS OF A MM) (AASHTO T49) _ _.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53) _ _ _.

11. WEIGHT LOSS (PERCENT) _._

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 16

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 2]

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. TYPE OF SAMPLES [1]
SAMPLES COMPACTED IN LABORATORY.....1
SAMPLES TAKEN FROM TEST SECTION.....2

* 3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS)
(AASHTO T209 OR ASTM D2041) [2.4 2 9]

BULK SPECIFIC GRAVITY (ASTM D1188)

* 4. MEAN .....[2.3 3 2] NUMBER OF TESTS ..... _ _.
5. MINIMUM ..... _._ _ _ MAXIMUM ..... _._ _ _
6. STD. DEV..... _._ _ _

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172)

* 7. MEAN .....[_ 5.7] NUMBER OF SAMPLES .... _ _.
8. MINIMUM ..... _ _._ MAXIMUM ..... _ _.
9. STD. DEV. ..... _ _.

PERCENT AIR VOIDS

*10. MEAN .....[_ 4.0] NUMBER OF SAMPLES .... _ _.
11. MINIMUM ..... _ _.
12. STD. DEV. ..... _ _.

13. VOIDS IN MINERAL AGGREGATE (PERCENT) 14.4

14. EFFECTIVE ASPHALT CONTENT (PERCENT) _ _.

15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) _ _ _ _.

16. NUMBER OF BLOWS _ _

17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) _ _ _ _.
(AASHTO T245 OR ASTM D1559)

18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) _ _ _.

19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM D1561) _ _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 17

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 2]

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

CONTINUED

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. TYPE ASPHALT PLANT [2]

BATCH PLANT.....1 DRUM MIX PLANT.....2

OTHER (SPECIFY)_____3

* 3. TYPE OF ANTISTRIPPING AGENT USED NONE
(SEE TYPE CODES, TABLE A.21) [_ _]
(Other, Specify_____)

* 4. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [_]

* 5. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [_ _._]

6. MOISTURE SUSCEPTIBILITY TEST TYPE _

1 - AASHTO T165 (ASTM D1075)
2 - TEXAS FREEZE-THAW PEDESTAL TEST (REF. 21)
3 - TEXAS BOILING TEST (REF. 22)
4 - REVISED LOTTMAN PROCEDURE (AASHTO T283)
5 - OTHER (SPECIFY) _____

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. _ _

8. PERCENT STRIPPED _ _

9. TENSILE STRENGTH RATIO (AASHTO T283) _._ _

10. INDEX OF RETAINED STRENGTH (AASHTO T165) _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 12 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 3]

LTPP PROGRAM

SUPERPAVE MIX 2
PG70-22

PLANT MIXED ASPHALT BOUND LAYERS AGGREGATE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

COMPOSITION OF COARSE AGGREGATE		TYPE	PERCENT
* 2. Crushed Stone.....1	Crushed Slag.....4	[1]	[1 0 0.]
* 3. Gravel.....2	Manufactured	[_]	[_ _ _.]
* 4. Crushed Gravel.....3	Lightweight.....5	[_]	[_ _ _.]
Other (Specify)_____6			

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE [0 9.]
(SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9)

COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
* 6. Natural Sand.....1	[2]	[_ 5 5.]
* 7. Crushed or Manufactured Sand (From	[1]	[_ 4 5.]
* 8. Crushed Gravel or Stone).....2	[_]	[_ _ _.]
Recycled Concrete.....3		
Other (Specify)_____4		

* 9. TYPE OF MINERAL FILLER [_]

Stone Dust.....1 Portland Cement....3
Hydrated Lime.....2 Fly Ash.....4
Other (Specify)_____5

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
10. Coarse	_ _	_ _ _._ _ _
11. Coarse	_ _	_ _ _._ _ _
12. Coarse	_ _	_ _ _._ _ _
13. Coarse	_ _	_ _ _._ _ _

14. POLISH VALUE OF COARSE AGGREGATES _ _.
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 13

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 3]

PLANT MIXED ASPHALT BOUND LAYERS

AGGREGATE PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. GRADATION OF COMBINED AGGREGATES

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2".....	[_ _ _]	No. 4.....	[5 6]
1 1/2".....	[_ _ _]	No. 8.....	[2 9]
1".....	[_ _ _]	No. 10.....	[_ _]
7/8".....	[_ _ _]	No. 16.....	[1 8]
3/4 ".....	[1 0 0]	No. 30.....	[1 2]
5/8".....	[_ _ _]	No. 40.....	[_ _]
1/2".....	[_ 9 1]	No. 50.....	[_ 8]
3/8".....	[7 6]	No. 80.....	[_ _]
		No. 100.....	[_ 6]
		No. 200.....	[_ 5]

BULK SPECIFIC GRAVITIES:

* 3. Coarse Aggregate (AASHTO T85 or ASTM C127) [2.5 2 9]

* 4. Fine Aggregate (AASHTO T84 or ASTM C128) [2.6 3 0]

* 5. Mineral Filler (AASHTO T100 or ASTM D854) [_._ _ _]

* 6. Aggregate Combination (Calculated) [2.5 6 1]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) 2.6 4 0

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 14

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 3]

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [0 4]
(IF OTHER, SPECIFY _____)

* 3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [6 2]
(IF OTHER, SPECIFY _____)

* 4. SPECIFIC GRAVITY OF ASPHALT CEMENT
(AASHTO T228) [1.0 2 6]

ORIGINAL ASPHALT CEMENT PROPERTIES

* 5. VISCOSITY OF ASPHALT AT 140°F (POISES)
(AASHTO T202) [_ _ _ _ _ _.]

* 6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES)
(AASHTO T201) [_ _ _ _._ _]

* 7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM)
(100 g., 5 sec.) [_ _ _.]

ASPHALT MODIFIERS (SEE TYPE CODE, TABLE A.15)

	TYPE	QUANTITY(%)
* 8. MODIFIER #1 ULTRA-PAVE	[0 8].	[0 3].
* 9. MODIFIER #2	[_ _].	[_ _].

(IF OTHER, SPECIFY TYPE _____)

10. DUCTILITY AT 77°F (CM)
(AASHTO T51) _ _ _.

11. DUCTILITY AT 39.2°(CM)
(AASHTO T51) _ _ _.

12. TEST RATE FOR DUCTILITY MEASUREMENT
AT 39.2°F (CM/MIN) _ _ _.

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM)
(200 g., 60 sec.) _ _ _.

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) _ _ _.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 15 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 3]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ASPHALT CEMENT PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [4]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS _

ASTM D1754 - THIN FILM OVEN TEST.....1
ASTM D2872 - ROLLING THIN FILM OVEN TEST...2
OTHER (SPECIFY)_____3

3. VISCOSITY OF ASPHALT AT 140°F (POISE) (AASHTO T202) _ _ _ _ _ _.

4. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T201) _ _ _ _._ _

5. DUCTILITY AT 77°F (CM) (AASHTO T51) _ _ _.

6. DUCTILITY AT 39.2°F (CM) (AASHTO T51) _ _ _.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (CM/MIN) _ _._

8. PENETRATION AT 77°F, 100 g., 5 Sec. (TENTHS OF A MM) (AASHTO T49) _ _ _.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec. (TENTHS OF A MM) (AASHTO T49) _ _.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53) _ _ _.

11. WEIGHT LOSS (PERCENT) _._

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 16 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 3]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [4]

* 2. TYPE OF SAMPLES [1]
SAMPLES COMPACTED IN LABORATORY.....1
SAMPLES TAKEN FROM TEST SECTION.....2

* 3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS)
(AASHTO T209 OR ASTM D2041) [2.4 2 1]

BULK SPECIFIC GRAVITY (ASTM D1188)

* 4. MEAN .....[2.3 2 4] NUMBER OF TESTS ..... _ _.
5. MINIMUM ..... _._ _ _ MAXIMUM ..... _._ _ _
6. STD. DEV..... _._ _ _

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172)

* 7. MEAN .....[_ 5.7] NUMBER OF SAMPLES .... _ _.
8. MINIMUM ..... _ _.__ MAXIMUM ..... _ _.__
9. STD. DEV. ..... _ _.__

PERCENT AIR VOIDS

*10. MEAN .....[_ 4.0] NUMBER OF SAMPLES .... _ _.
11. MINIMUM ..... _ _.__ MAXIMUM ..... _ _.__
12. STD. DEV. ..... _ _.__

13. VOIDS IN MINERAL AGGREGATE (PERCENT) 1 4.4

14. EFFECTIVE ASPHALT CONTENT (PERCENT) _ _.__

15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) _ _ _ _.

16. NUMBER OF BLOWS _ _

17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) _ _ _ _.
(AASHTO T245 OR ASTM D1559)

18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) _ _ _.

19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM D1561) _ _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 17 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 3]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

CONTINUED

* 1.LAYER NUMBER (FROM SHEET 3) [4]

* 2.TYPE ASPHALT PLANT [2]

BATCH PLANT.....1 DRUM MIX PLANT.....2

OTHER (SPECIFY)_____3

* 3.TYPE OF ANTISTRIPPING AGENT USED NONE
(SEE TYPE CODES, TABLE A.21) [_ _]
(Other, Specify_____)

* 4.AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [_]

* 5. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [_ _._]

6.MOISTURE SUSCEPTIBILITY TEST TYPE _

1 - AASHTO T165 (ASTM D1075)
2 - TEXAS FREEZE-THAW PEDESTAL TEST (REF. 21)
3 - TEXAS BOILING TEST (REF. 22)
4 - REVISED LOTTMAN PROCEDURE (AASHTO T283)
5 - OTHER (SPECIFY) _____

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. _ _

8. PERCENT STRIPPED _ _

9. TENSILE STRENGTH RATIO (AASHTO T283) _._ _

10. INDEX OF RETAINED STRENGTH (AASHTO T165) _ _ _.

MIX DESIGN

Advanced Aspahlt Technogogies, LP
Laboratory and Technical Services

Work Order	213
Mix-Design ID	141
Date	8/28/95

15.5	19.1	25.6	39.1	
15.5	23.1	31.6	39.1	

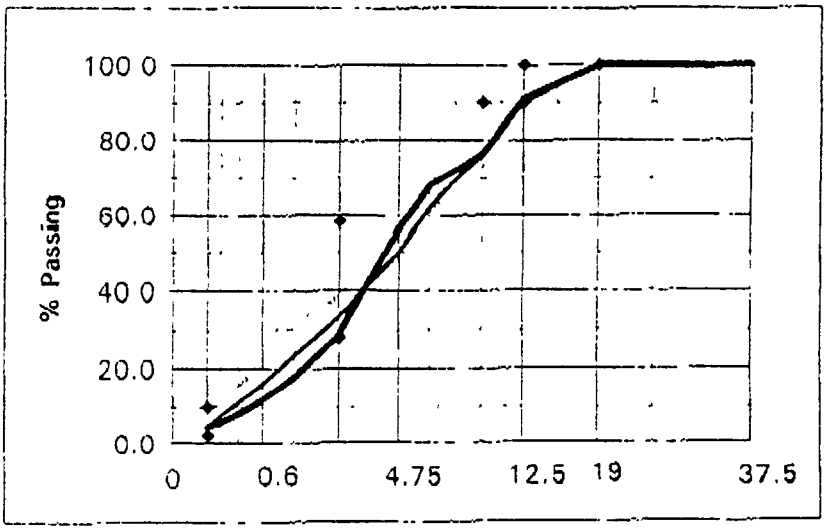
Max. aggregate size

19

Design Spec. Range

		AG112.1	AG115.1	AG46.1	AG116.1	AG114.1
	mm	Flint R	Grade5N	Screen	ManufS	Grade4
1 1/2 in	37.5	100.0	100.0	100.0	100.0	100.0
1 in	25.4	100.0	100.0	100.0	100.0	100.0
3/4 in	19	100.0	100.0	100.0	100.0	100.0
1/2 in	12.5	57.1	100.0	100.0	99.8	87.4
3/8 in	9.5	43.3	100.0	100.0	99.7	58.7
1/4 in	6.3	31.2	96.6	100.0	99.5	6.4
4	4.75	20.8	65.9	100.0	98.8	2.1
8	2.36	10.6	5.0	78.8	82.8	1.6
16	1.18	10.5	1.0	55.9	48.1	1.4
30	0.6	10.5	0.8	42.8	27.3	1.4
50	0.3	10.5	0.7	33.7	13.8	1.4
100	0.15	10.5	0.6	27.7	6.1	1.3
200	0.075	10.5	0.6	23.0	3.2	1.3
%		20	35	15	18	12
					Total, %	100

mm	Target TX-1	Blend 141
37.5	100	100.0
25.4	100	100.0
19	100	100.0
12.5	[illegible]	91.1
9.5	[illegible]	76.0
6.3	62.3	68.0
4.75	50	56.3
2.36	33.3	28.8
1.18	23.3	17.7
0.6	[illegible]	11.9
0.3	11.1	8.1
0.15	7.8	5.7
0.075	[illegible]	4.5



Post-it™ Fax Note 7671	Date 9/18/95 # of pages ▸ 1
To CLAY/ERV	From VINCE AURILIO
Co./Dept VULCAN	Co AAT
Phone #	Phone # ~~ST~~ (703) 441-9200
Fax # (210) 695-9813	Fax #

cc: Ron Cominsky, BRE

"Post-it" Fax Note 7671	Date 9/15/95	# of pages ▶ 2
To RON COMINSKY	From VINCE AURILIO	
Co./Dept. BRE	Co. AAT	
Phone #	Phone # (703) 444-4200	
Fax #	Fax #	

screen below | Waiting

```
Blend Agyregate Stockpiles

Mix Design ID:213_TX_IC    Blend ID:213_141E
Type of optimization                  :  T & E
Nominal sieve size for mix design     :  12.5
(A)bove or (B)elow restricted zone?   :      B
Enter target gradation? (Y/N)         :      N
```

4.4.3.0 | ? | Move cursor to desired cell & select a Method | Selecting

Evaluate Blend Properties

Mix Design ID: 213_TX_1C

BLENDS

Blend ID	Trial AC % AC	Trial AC Air Voids	Trial AC VMA	Est. Des Mix. % AC	Est. Des Mix. VMA	Est. Dens Initial @ 8 GYR	Est. Dens Maximum 160 @ GYR
213_141A	5.0	5.4	14.0	5.6	13.7	83.9	97.4
213_141B	5.5	4.5	14.1	5.7	14.0	84.1	97.8
213_141C	6.0	3.5	14.3	5.8	14.3	83.7	98.0
213_141D	6.5	2.6	14.5	5.9	14.4	83.7	98.1
213_141E	5.7	5.9	15.6	6.5	15.2	84.0	97.5
SFCCS					14.0	89.0	98.0

Enter-select blend for design agg. structure | F6-plot density curve

4.5.0.0 | ? | Enter/edit data on the screen below | Waiting

Volumetric Properties

Mix Design ID: 213_TX_1C Blend ID: 213_141E

% AC Content	Air Voids	VMA %	VFB %	Filler:AC Ratio	Gmm	Gmb
5.7	5.9	15.9	63	0.782	2.429	2.283
0.0						
0.0						
0.0						
0.0						

NOTE BLENDS 141 A - D INCLUSIVE incorporated modified binder

F6-graphs

BLEND 141 E with conventional asphalt.

Post-it™ Fax Note 7671	Date 9/15/95 # of pages ▶ 2
To RON COMINSKY	From VINCE AURILIO
Co./Dept. BRE	Co AAT
Phone #	Phone # (703) 444-4200
Fax #	Fax #

screen below | Waiting

Blend Aggregate Stockpiles

Mix Design ID:213_TX_IC Blend ID:213_141E

Type of optimization :	T & E
Nominal sieve size for mix design :	12.5
(A)bove or (B)elow restricted zone?:	B
Enter target gradation? (Y/N) :	N

Stockpiles in blend	Limit	Result
STOCKPILE ID #1 => 213_TX_F19	20 %	20 %
STOCKPILE ID #2 => 213_TX_G5	35 %	35 %
STOCKPILE ID #3 => 168_TX_Sand	15 %	15 %
STOCKPILE ID #4 => 213_TX_G15	18 %	18 %
STOCKPILE ID #5 => 213_TX_G4	12 %	12 %
Σ	100 %	100 %

Trial asphalt content (%) : 5.7

F3-save/end | F4-print | F5-blend grad-tions | F6-view graph | F8-calculate blend

NOTE. 1) BLEND 141E represents testing with conventional binder.

2) ROTAREX (CENTRIFUGE) EXTRACTION YIELDS – 0.3 % BINDER (WITH 7 WASHES). LOSS LIKELY DUE TO ABSORPTION.

3) ∴ WE RECOMMEND USING BLEND 141 WITH 6.1 % conventional binder & with 5.7% Modified Binder.

SUPERPAVE MIX DESIGN SUMMARY SHEET

Advanced Asphalt Technologies, LP
Laboratory and Technical Services

Work Order No.	213	Design EASLs	9,199,000	$N_{initial}$	8
Mix Type	BRE-TX3	Avg. Design Temp	40°C	N_{design}	106
Date	8/30/95	Traffic Level	4	$N_{maximum}$	169
Agg. Nominal Size	12.5 mm	Level	1		

TRIAL GRADATIONS

Blend No.	Designated Sieve Size (mm)												
	37.5	25	19	12.5	9.5	6.3	4.75	2.36	1.18	0.6	0.3	0.15	0.075
139			100	91.1	75.5	67.2	56.3	30.1	19.0	13.2	9.3	6.9	5.5
140			100	91.0	74.3	64.4	53.3	28.0	17.0	11.2	7.4	5.0	3.9
141			100	91.1	76.0	68.0	56.3	28.8	17.7	11.9	8.1	5.7	4.5

AGGREGATE PROPERTIES

Blend No./ Aggregate Type	139	140	141			Bulk S_G	App. S_G	Absorption
Flint Rock	20	20	20			2.589	2.638	0.71
Grade 5	32	32	35			2.492	2.678	2.79
Screenings	20	12	15			2.639	2.639	0.00
Manf. Sand	15	20	18			2.622	2.674	0.75
Grade 4	13	16	12			2.541	2.636	0.73

Gsb JMF	2.565	2.562	2.561		
Estimated G_{se}	2.640	2.641	2.641		
Calculated G_{se}	2.642	2.642	2.640		

VOLUMETRIC PROPERTIES OF TRIAL GRADATIONS

Blend No.	Binder Content (%)	Theo. Max. Density	Air Voids (%)			VMA (%)	VFA (%)
			$N_{initial}$	N_{design}	N_{max}		
139	5.2	2.440	16.2	4.2	2.4	13.6	69
140	5.2	2.440	15.2	5.7	4.0	14.8	61
141	5.5	2.428	16.6	4.5	2.3	14.4	69

AAT -01-August, 1995

VOLUMETRICS AT ESTIMATED BINDER CONTENT

Trail Blend	Estimated % AC	Estimated % VMA	Estimated % VFA	Estimated % Gmm
139	5 3	13 4	70	97.7
140	5 9	14.3	72	97.4
141	5.7	14.0	71	97 8

VOLUMETRIC PROPERTIES OF SELECTED MIX DESIGN

Blend No.	Binder Content (%)	Theo. Max. Density	Bulk Density	Air Voids (%)			VMA (%)	VFA (%)
			N_{design}	$N_{initial}$	N_{design}	N_{max}		
141	5.7	2.421	2.324	16 0	4.0	2.0	14 4	72

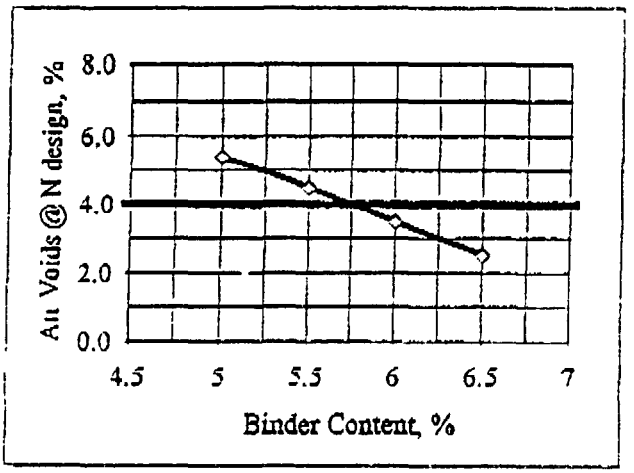
DUST/ASPHALT RATIO

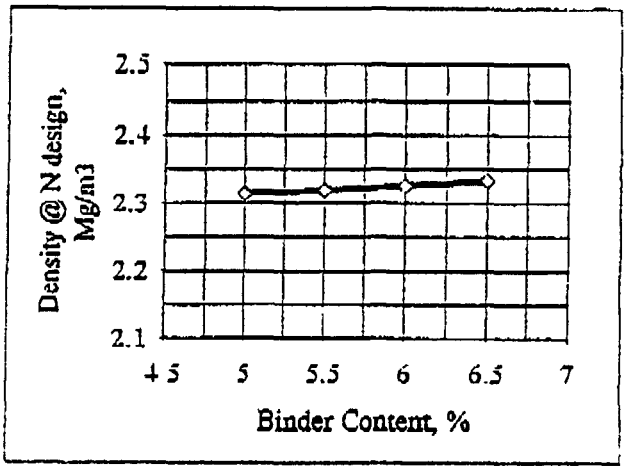
Trial Blend	Effective % AC	Dust/AC Ratio	Criteria for All Traffic
141	4 58	0 98	0.6 - 1.2

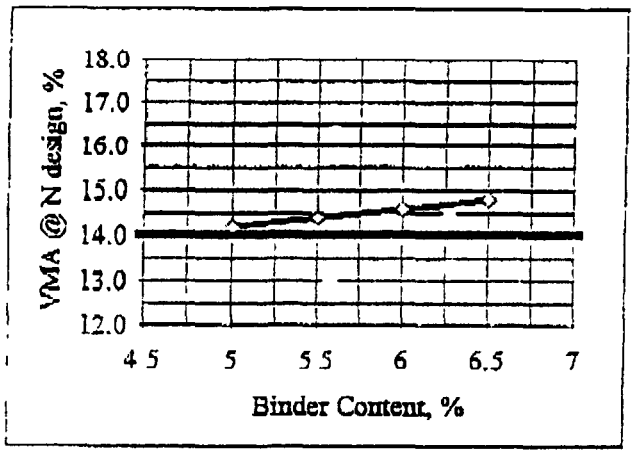
Volumetric Properties of the Superpave Design Mixture

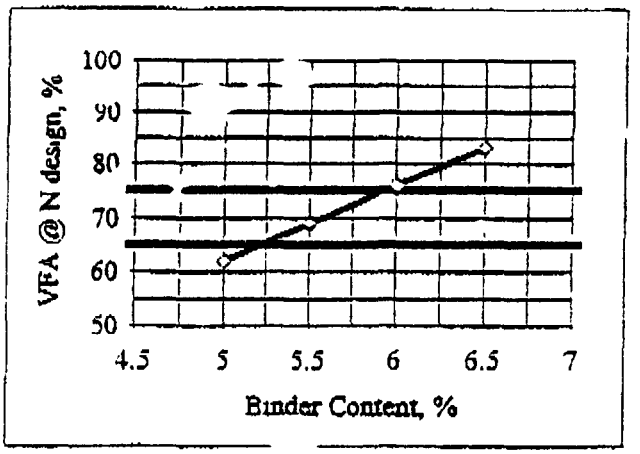
Trial Blend T141

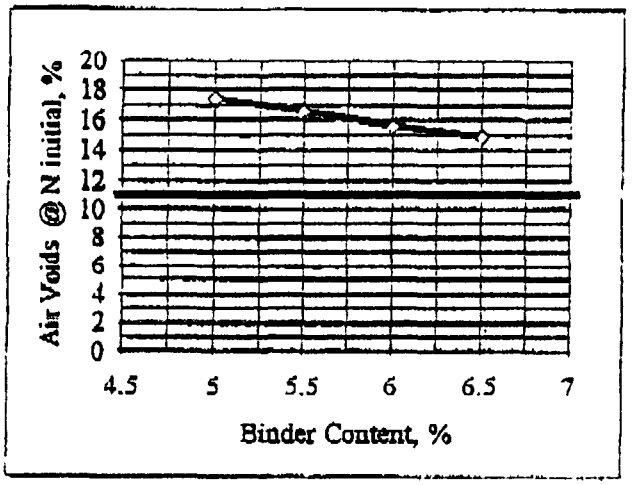
Design Number of Gyrations = 106

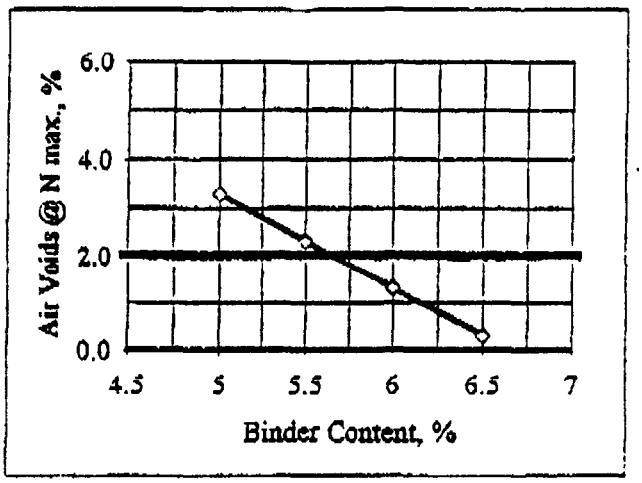








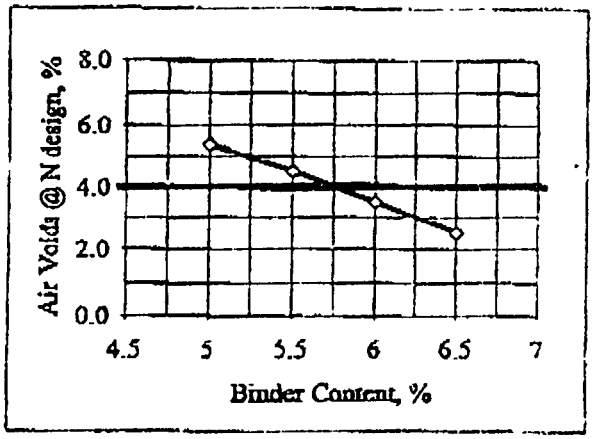


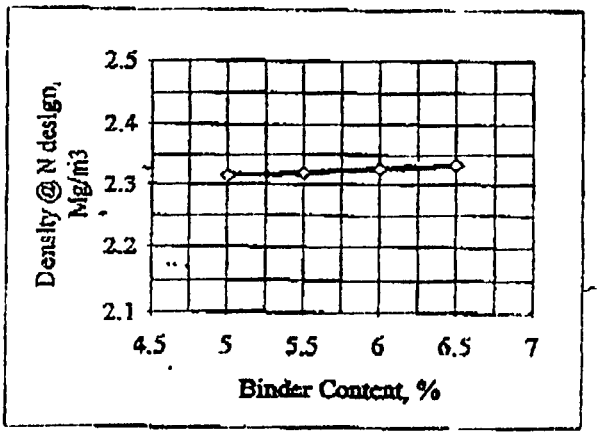


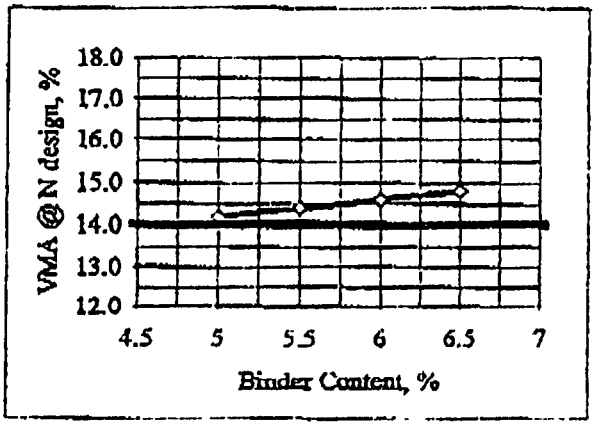
Volumetric Properties of the Superpave Design Mixture

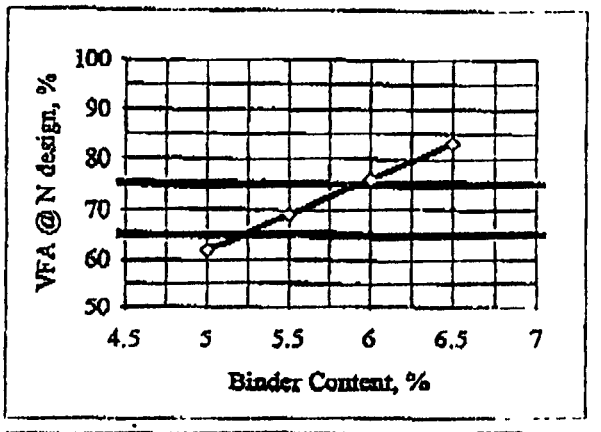
Trial Blend T141

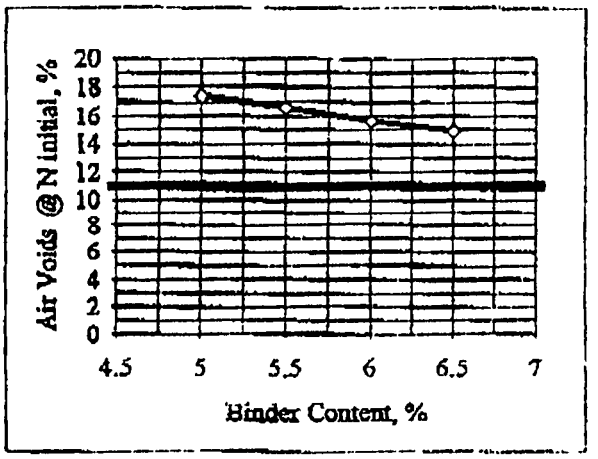
Design Number of Gyrations = 106

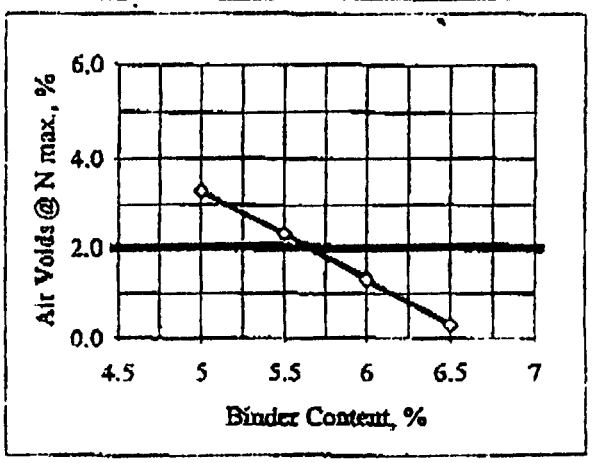












VOLUMETRICS AT ESTIMATED BINDER CONTENT

Trail Blend	Estimated % AC	Estimated % VMA	Estimated % VFA	Estimated % Gmm
139	5.3	13.4	70	97.7
140	5.9	14.3	72	97.4
141	5.7	14.0	71	97.8

VOLUMETRIC PROPERTIES OF SELECTED MIX DESIGN

Blend No.	Binder Content (%)	Theo. Max Density	Bulk Density	Air Voids (%)			VMA (%)	VFA (%)	
			N_{design}	$N_{initial}$	N_{design}	N_{max}			
141	5.7	2.421	2.324	16.0	4.0	2.0	14.4	72	w/ latex compact well
141 w/o latex	~~6.1~~ 5.7	2.429	2.332		4.0 2.285				w/o latex did not compact as well, G15 holder absorbed

DUST/ASPHALT RATIO

Trial Blend	Effective % AC	Dust/AC Ratio	Criteria for All Traffic
141	4.58	0.98	0.6 - 1.2

SUPERPAVE MIX DESIGN SUMMARY SHEET

Advanced Asphalt Technologies, LP
Laboratory and Technical Services

Work Order No.	213	Design EASLs	9,199,000	$N_{initial}$	8
Mix Type	BRE-TX3	Avg. Design Temp	40°C	N_{design}	106
Date	8/30/95	Traffic Level	4	$N_{maximum}$	169
Agg. Nominal Size	12.5 mm	Level	1		

TRIAL GRADATIONS

Blend No.	Designated Sieve Size (mm)												
	37.5	25	19	12.5	9.5	6.3	4.75	2.36	1.18	0.6	0.3	0.15	0.075
139			100	91.1	75.5	67.2	56.3	30.1	19.0	13.2	9.3	6.9	5.5
140			100	91.0	74.3	64.4	53.3	28.0	17.0	11.2	7.4	5.0	3.9
141			100	91.1	76.0	68.0	56.3	28.8	17.7	11.9	8.1	5.7	4.5
			3/4	1/2	3/8	#4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	

AGGREGATE PROPERTIES

Blend No./ Aggregate Type	139	140	141			Bulk S_G	App. S_G	Absorption
Flint Rock	20	20	20			2.589	2.638	0.71
Grade 5	32	32	35			2.492	2.678	2.79
Screenings	20	12	15			2.639	2.639	0.00
Manf. Sand	15	20	18			2.622	2.674	0.75
Grade 4	13	16	12			2.541	2.636	0.73

Gsb JMF	2.565	2.562	2.561		
Estimated G_{se}	2.640	2.641	2.641		
Calculated G_{se}	2.642	2.642	2.640		

VOLUMETRIC PROPERTIES OF TRIAL GRADATIONS

Blend No.	Binder Content (%)	Theo. Max. Density	Air Voids (%)			VMA (%)	VFA (%)
			$N_{initial}$	N_{design}	N_{max}		
139	5.2	2.440	16.2	4.2	2.4	13.6	69
140	5.2	2.440	15.2	3.7	4.0	14.8	61
141	5.5	2.428	16.6	4.5	2.3	14.4	69

SUPERPAVE MIX DESIGN No. 3
FOR TEXAS DOT
NCHRP PROJECT 9-7
SUMMARY SHEET

ADVANCED ASPHALT TECHNOLOGIES, L.P.
108 Powers Court, Suite 100
Sterling VA 20166-9321
Fax: (703) 444-4368 Verification: (703) 444-4200

=======TRANSMITTAL=======

FAX [X] FAX & MAIL [ ] MAIL [ ] FED EX [ ] COURIER [ ]

TO: Brian Killingsworth **COMPANY:** BRE

FROM: Terhi Pellinen

DATE: November 16, 1995 **TIME:**

RECIPIENT'S FAX NUMBER: 1 (512) 346-8750 **NO. OF PAGES:** 1

SUBJECT: Texas 3 Ultrapave

MESSAGE:

Texas 3 binder:

3 % UP70, Anionic SBR Latex, 70.0 % solids.

This is the only information we have.

If you wish to contact the supplier the number is:

Ultrapave
714- 521-2233

Terhi

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 12 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 _]

LTPP PROGRAM

ITEM 292
ASB

PLANT MIXED ASPHALT BOUND LAYERS
AGGREGATE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [3]

COMPOSITION OF COARSE AGGREGATE		TYPE	PERCENT
* 2. Crushed Stone.....1	Crushed Slag.....4	[1]	[_ 7 4.]
* 3. Gravel.....2	Manufactured	[6]	[_ 2 6.]
* 4. Crushed Gravel.....3	Lightweight.....5	[_]	[_ _ _.]
Other (Specify) RAP 6			

* 5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE [0 9.]
(SEE GEOLOGIC CLASSIFICATION CODES, TABLE A.9)

COMPOSITION OF FINE AGGREGATE	TYPE	PERCENT
* 6. Natural Sand.....1	[1]	[1 0 0.]
* 7. Crushed or Manufactured Sand (From	[_]	[_ _ _.]
* 8. Crushed Gravel or Stone).....2	[_]	[_ _ _.]
Recycled Concrete.....3		
Other (Specify)_____4		

* 9. TYPE OF MINERAL FILLER [_]

Stone Dust.....1	Portland Cement....3
Hydrated Lime.....2	Fly Ash.....4
Other (Specify)_____5	

AGGREGATE DURABILITY TEST RESULTS
(SEE DURABILITY TEST TYPE CODES, TABLE A.13)

TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
10. Coarse	_ _	_ _ _.__
11. Coarse	_ _	_ _ _.__
12. Coarse	_ _	_ _ _.__
13. Coarse	_ _	_ _ _.__

14. POLISH VALUE OF COARSE AGGREGATES [_ _.]
SURFACE LAYER ONLY (AASHTO T279, ASTM D3319)

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 13

INVENTORY DATA

LTPP PROGRAM

*STATE CODE [4 8]

*SHRP SECTION ID [0 9 0 _]

PLANT MIXED ASPHALT BOUND LAYERS

AGGREGATE PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [3]

* 2. GRADATION OF COMBINED AGGREGATES

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2".....	[_ _ _]	No. 4.....	[_ _]
1 1/2".....	[_ _ _]	No. 8.....	[_ _]
1".....	[_ _ _]	No. 10.....	[_ _]
7/8".....	[_ _ _]	No. 16.....	[_ _]
3/4 ".....	[_ _ _]	No. 30.....	[_ _]
5/8".....	[_ _ _]	No. 40.....	[_ _]
1/2".....	[_ _ _]	No. 50.....	[_ _]
3/8".....	[_ _]	No. 80.....	[_ _]
		No. 100.....	[_ _]
		No. 200.....	[_ _]

BULK SPECIFIC GRAVITIES:

* 3. Coarse Aggregate (AASHTO T85 or ASTM C127) [_._ _ _]

* 4. Fine Aggregate (AASHTO T84 or ASTM C128) [_._ _ _]

* 5. Mineral Filler (AASHTO T100 or ASTM D854) [_._ _ _]

* 6. Aggregate Combination (Calculated) [_._ _ _]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) _._ _ _

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 14 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 _]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [3]

* 2. ASPHALT GRADE (SEE ASPHALT CODE SHEET, TABLE A.16) [0 4]
(IF OTHER, SPECIFY_____)

* 3. SOURCE (SEE SUPPLY CODE SHEET, TABLE A.14) [6 2]
(IF OTHER, SPECIFY _____)

* 4. SPECIFIC GRAVITY OF ASPHALT CEMENT
(AASHTO T228) [1.0 2 6]

ORIGINAL ASPHALT CEMENT PROPERTIES

* 5. VISCOSITY OF ASPHALT AT 140°F (POISES)
(AASHTO T202) [_ _ _ _ _ _.]

* 6. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES)
(AASHTO T201) [_ _ _ _._ _]

* 7. PENETRATION AT 77°F (AASHTO T49) (TENTHS OF A MM)
(100 g., 5 sec.) [_ _ _.]

ASPHALT MODIFIERS (SEE TYPE CODE, TABLE A.15)

	TYPE	QUANTITY(%)
* 8. MODIFIER #1	[_ _].	[_ _].
* 9. MODIFIER #2	[_ _].	[_ _].

(IF OTHER, SPECIFY TYPE _____)

10. DUCTILITY AT 77°F (CM)
(AASHTO T51) _ _ _.

11. DUCTILITY AT 39.2°(CM)
(AASHTO T51) _ _ _.

12. TEST RATE FOR DUCTILITY MEASUREMENT
AT 39.2°F (CM/MIN) _ _ _.

13. PENETRATION AT 39.2°F (AASHTO T49) (TENTHS OF A MM)
(200 g., 60 sec.) _ _ _.

14. RING AND BALL SOFTENING POINT (AASHTO T53) (°F) _ _ _.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 15 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 _]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ASPHALT CEMENT PROPERTIES (CONTINUED)

* 1. LAYER NUMBER (FROM SHEET 3) [3]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS _

ASTM D1754 - THIN FILM OVEN TEST.....1
ASTM D2872 - ROLLING THIN FILM OVEN TEST...2
OTHER (SPECIFY)_____3

3. VISCOSITY OF ASPHALT AT 140°F (POISE) (AASHTO T202) _ _ _ _ _ _.

4. VISCOSITY OF ASPHALT AT 275°F (CENTISTOKES) (AASHTO T201) _ _ _ _._ _

5. DUCTILITY AT 77°F (CM) (AASHTO T51) _ _ _.

6. DUCTILITY AT 39.2°F (CM) (AASHTO T51) _ _ _.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (CM/MIN) _ _._

8. PENETRATION AT 77°F, 100 g., 5 Sec. (TENTHS OF A MM) (AASHTO T49) _ _ _.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec. (TENTHS OF A MM) (AASHTO T49) _ _.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53) _ _ _.

11. WEIGHT LOSS (PERCENT) _._

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties".

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 16 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 _]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

* 1. LAYER NUMBER (FROM SHEET 3) [3]

* 2. TYPE OF SAMPLES [1]
SAMPLES COMPACTED IN LABORATORY.....1
SAMPLES TAKEN FROM TEST SECTION.....2

* 3. MAXIMUM SPECIFIC GRAVITY (NO AIR VOIDS)
(AASHTO T209 OR ASTM D2041) [_._ _ _]

BULK SPECIFIC GRAVITY (ASTM D1188)

* 4. MEAN .....[_._ _ _] NUMBER OF TESTS ..... _ _.
5. MINIMUM ..... _._ _ _ MAXIMUM ..... _._ _ _
6. STD. DEV..... _._ _ _

ASPHALT CONTENT (PERCENT WEIGHT OF TOTAL MIX)
(AASHTO T164 OR ASTM D2172)

* 7. MEAN .....[_ 4.1] NUMBER OF SAMPLES .... _ _.
8. MINIMUM ..... _ _._ MAXIMUM ..... _ _._
9. STD. DEV. ..... _ _._

PERCENT AIR VOIDS

*10. MEAN .....[_ 4.1] NUMBER OF SAMPLES .... _ _.
11. MINIMUM ..... _ _._ MAXIMUM ..... _ _._
12. STD. DEV. ..... _ _._

13. VOIDS IN MINERAL AGGREGATE (PERCENT) _ _._

14. EFFECTIVE ASPHALT CONTENT (PERCENT) _ _._

15. MARSHALL STABILITY (LBS) (AASHTO T245 OR ASTM D1559) _ _ _ _.

16. NUMBER OF BLOWS _ _

17. MARSHALL FLOW (HUNDREDTHS OF AN INCH) _ _ _ _.
(AASHTO T245 OR ASTM D1559)

18. HVEEM STABILITY (AASHTO T246 OR ASTM D1561) _ _ _.

19. HVEEM COHESIOMETER VALUE (GRAMS/25 MM OF WIDTH)
(AASHTO T246 OR ASTM D1561) _ _ _ _.

Revised June 13, 1988

*STATE ASSIGNED ID [_ _ _ _]

SHEET 17 *STATE CODE [4 8]

INVENTORY DATA *SHRP SECTION ID [0 9 0 _]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS

ORIGINAL MIXTURE PROPERTIES

CONTINUED

* 1. LAYER NUMBER (FROM SHEET 3) [3]

* 2. TYPE ASPHALT PLANT [2]

BATCH PLANT.....1 DRUM MIX PLANT.....2

OTHER (SPECIFY)_____3

* 3. TYPE OF ANTISTRIPPING AGENT USED NONE
(SEE TYPE CODES, TABLE A.21) [_ _]
(Other, Specify_____)

* 4. AMOUNT OF ANTISTRIPPING AGENT USED LIQUID OR SOLID CODE [_]

* 5. (If liquid, enter code 1, and amount as percent of asphalt cement weight. If solid, enter code 2 and amount as percent of aggregate weight.) [_ _._]

6. MOISTURE SUSCEPTIBILITY TEST TYPE _

1 - AASHTO T165 (ASTM D1075)
2 - TEXAS FREEZE-THAW PEDESTAL TEST (REF. 21)
3 - TEXAS BOILING TEST (REF. 22)
4 - REVISED LOTTMAN PROCEDURE (AASHTO T283)
5 - OTHER (SPECIFY) _____

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. _ _

8. PERCENT STRIPPED _ _

9. TENSILE STRENGTH RATIO (AASHTO T283) _._ _

10. INDEX OF RETAINED STRENGTH (AASHTO T165) _ _ _.

MEMORANDUM

TO: David Balli, P. E. August 23,1995

FROM: Frank M. Jaster, P. E.

SUBJECT: ASB Design Item 292
Project: Nh 90(191)M

Originating Office: **San Antonio District Laboratory**

Shown below is compaction data for Asphalt Stabilized Base produced by Vulcan Helotes, from Stockpile 646. This design uses 70% base, 5.0% silica sand, and 25.0% Rap.

Sample Number	15-95-823
Design Number	NA
Date Molded	08-23-95
Maximum Density	149.4 pcf
Percent Air Voids	4.1%
Required Compaction	95.5%
Field Density	142.7 pcf
Asphalt Content	4.1%

Tests Performed By District 15 Laboratory Personnel

Distribution: District Lab Files
DistrictConstruction Engineer
Ray Williams
Doug Echterhoff
Jimmy Vogel
Kane Mattke
Bexar Central Nuclear Operater

P.E.

Frank M. Jaster, P.E.
San Antonio District Laboratory Engineer

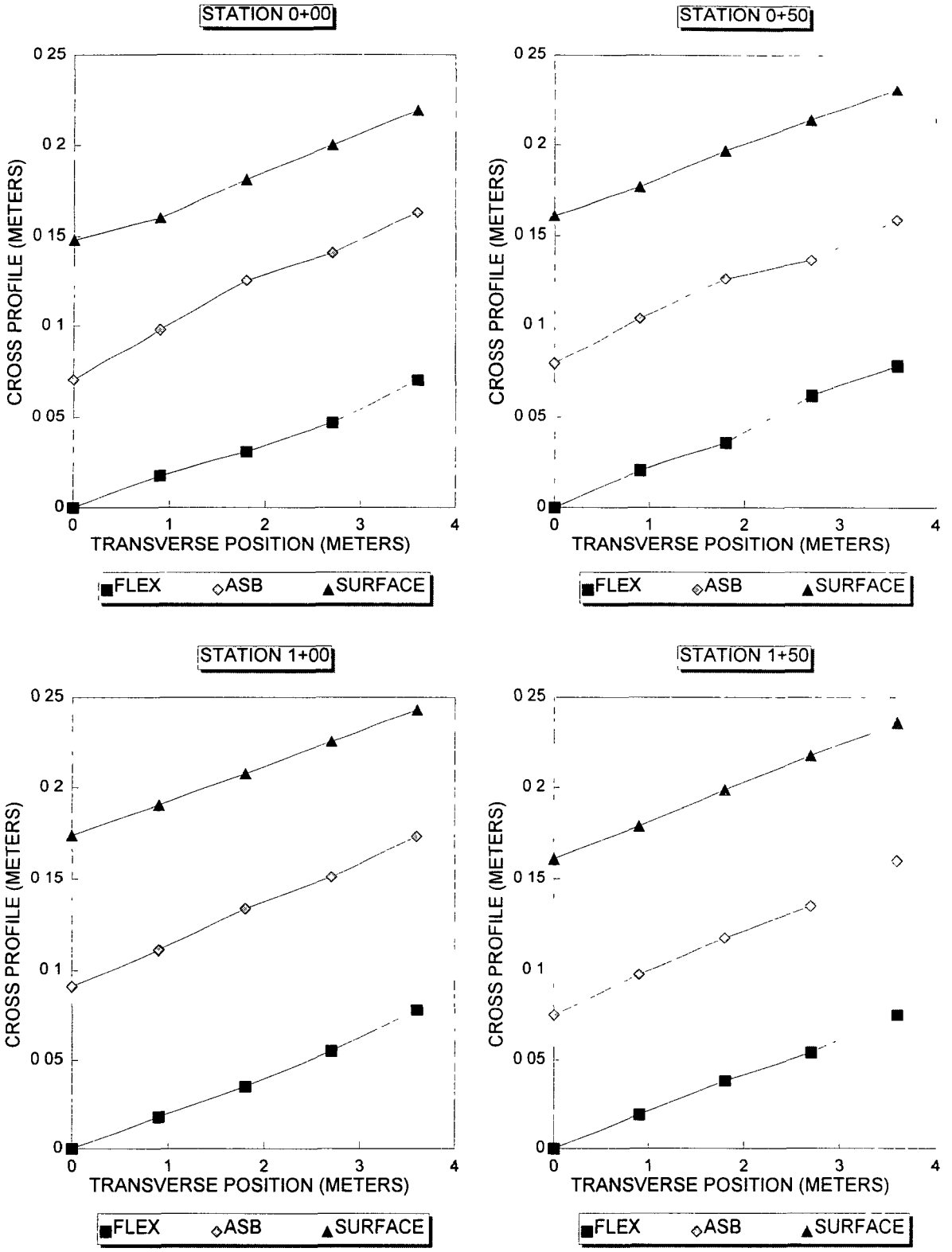
APPENDIX C

SURFACE PROFILE DATA

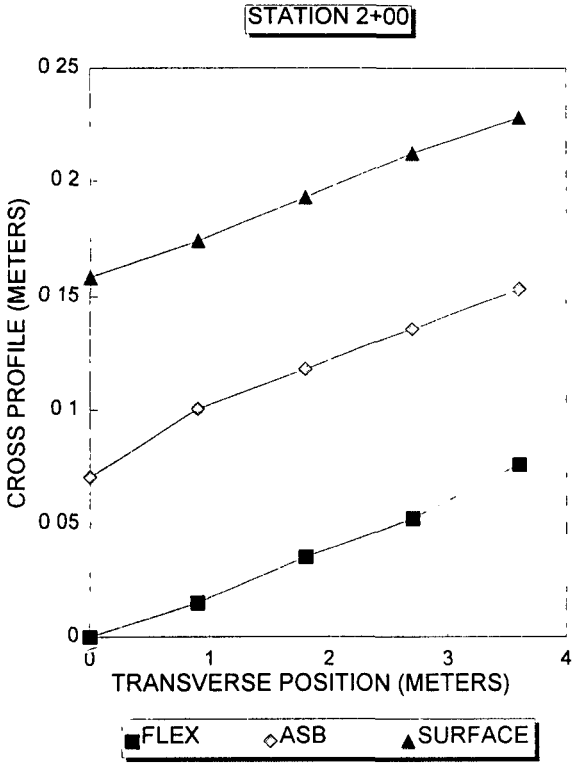
SECTION 480901 TEXAS

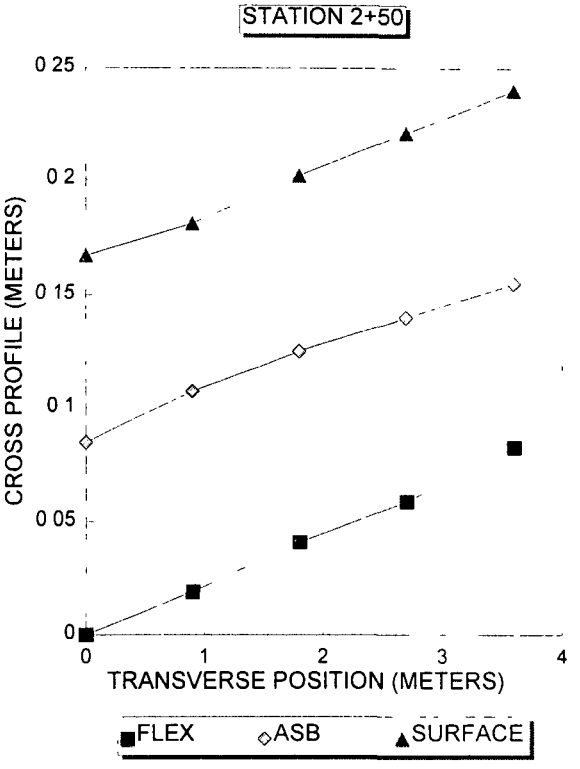
Trans Offset	LAYER	0 0M	Blackbase Thickness (M)	Surface Thickness (M)	0 9M	Blackbase Thickness (M)	Surface Thickness (M)	1 8M	Blackbase Thickness (M)	Surface Thickness (M)	2 7M	Blackbase Thickness (M)	Surface Thickness (M)	3 6M	Blackbase Thickness (M)	Surface Thickness (M)
0+00	FLEX	97 227	0 071	0 077	97 245	0 080	0 062	97 258	0 095	0 056	97 274	0 093	0 059	97 297	0 093	0 056
	BLACK	97 298			97 325			97 353			97 368			97 390		
	SURFACE	97 375			97 387			97 408			97 427			97 446		
0+50	FLEX	97 566	0 079	0 082	97 587	0 083	0 073	97 602	0 090	0 071	97 628	0 074	0 077	97 644	0 081	0 072
	BLACK	97 645			97 670			97 693			97 703			97 725		
	SURFACE	97 727			97 743			97 763			97 780			97 797		
1+00	FLEX	97 944	0 091	0 083	97 962	0 093	0 080	97 979	0 098	0 075	97 999	0 096	0 075	98 022	0 096	0 069
	BLACK	98 035			98 055			98 078			98 095			98 118		
	SURFACE	98 118			98 135			98 152			98 170			98 187		
1+50	FLEX	98 390	0 075	0 086	98 409	0 079	0 081	98 428	0 080	0 082	98 444	0 081	0 083	98 465	0 085	0 076
	BLACK	98 465			98 488			98 508			98 525			98 550		
	SURFACE	98 551			98 569			98 589			98 608			98 626		
2+00	FLEX	98 842	0 071	0 088	98 857	0 085	0 074	98 877	0 083	0 075	98 894	0 083	0 076	98 918	0 077	0 075
	BLACK	98 913			98 943			98 960			98 978			98 995		
	SURFACE	99 000			99 016			99 035			99 054			99 070		
2+50	FLEX	99 280	0 085	0 082	99 299	0 088	0 074	99 321	0 084	0 077	99 339	0 081	0 081	99 363	0 072	0 085
	BLACK	99 365			99 388			99 405			99 420			99 435		
	SURFACE	99 447			99 461			99 482			99 501			99 520		
3+00	FLEX	99 719	0 093	0 084	99 741	0 089	0 083	99 751	0 101	0 077	99 783	0 095	0 072	99 805	0 095	0 068
	BLACK	99 813			99 830			99 853			99 878			99 900		
	SURFACE	99 897			99 913			99 930			99 950			99 968		
3+50	FLEX	100 143	0 092	0 085	100 161	0 104	0 073	100 186	0 099	0 073	100 210	0 092	0 077	100 223	0 099	0 074
	BLACK	100 235			100 265			100 285			100 303			100 323		
	SURFACE	100 320			100 338			100 358			100 379			100 397		
4+00	FLEX	100 562	0 113	0 078	100 582	0 113	0 077	100 606	0 109	0 074	100 629	0 103	0 078	100 649	0 111	0 068
	BLACK	100 675			100 695			100 715			100 732			100 760		
	SURFACE	100 753			100 772			100 789			100 810			100 828		
4+50	FLEX	101 004	0 091	0 080	101 022	0 098	0 074	101 039	0 106	0 067	101 057	0 107	0 067	101 072	0 115	0 063
	BLACK	101 095			101 120			101 145			101 164			101 188		
	SURFACE	101 175			101 194			101 212			101 231			101 250		
5+00	FLEX	101 392	0 113	0 063	101 411	0 109	0 065	101 430	0 111	0 063	101 448	0 107	0 068	101 468	0 105	0 068
	BLACK	101 505			101 520			101 541			101 555			101 573		
	SURFACE	101 568			101 585			101 604			101 623			101 641		
	AVG		0 088	0 081		0 093	0 074		0 096	0 072		0 092	0 074		0 094	0 070
	MIN		0 071	0 063		0 079	0 062		0 080	0 056		0 074	0 059		0 072	0 056
	MAX		0 113	0 088		0 113	0 083		0 111	0 082		0 107	0 083		0 115	0 085
	STD		0 014	0 006		0 011	0 006		0 010	0 007		0 011	0 007		0 013	0 007

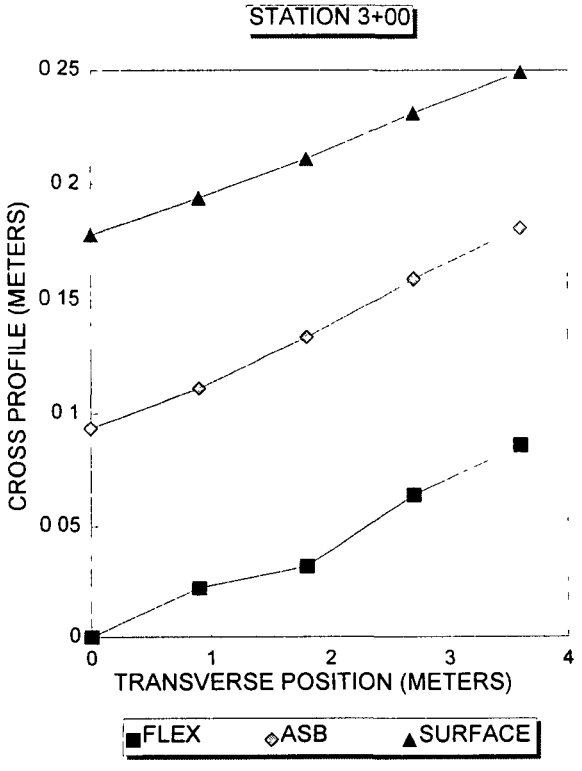
SECTION 480901

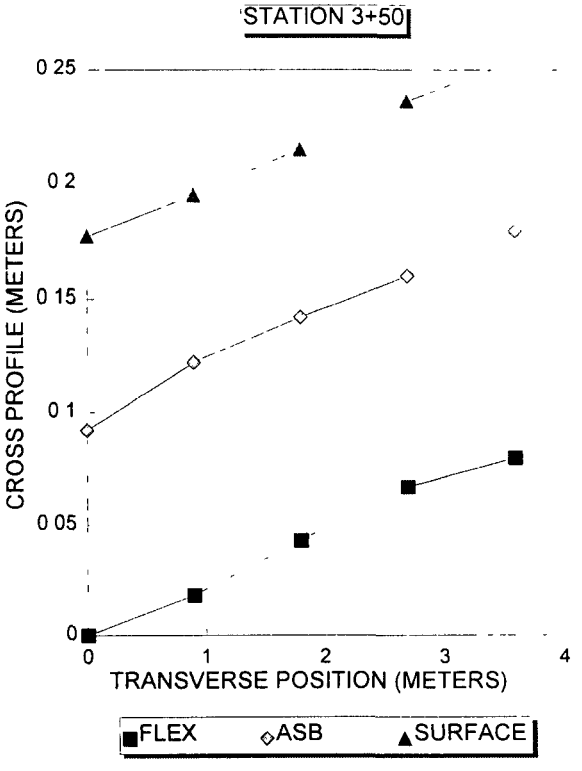


SECTION 480901

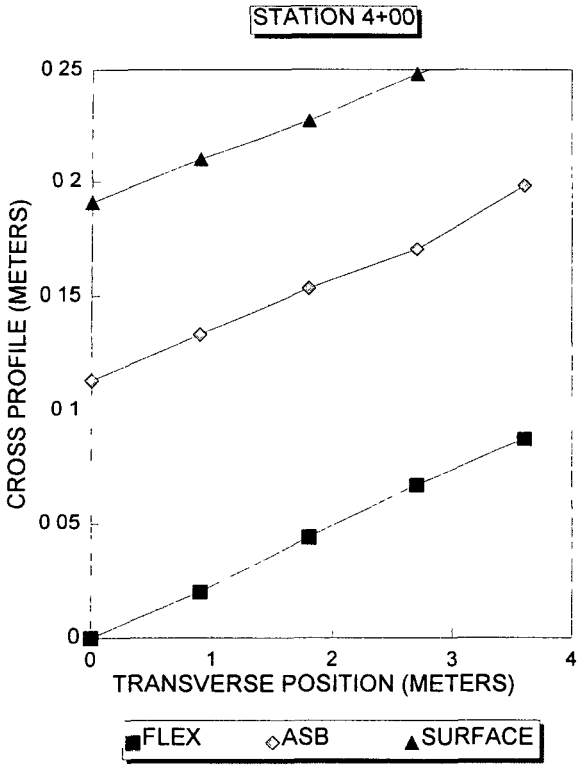


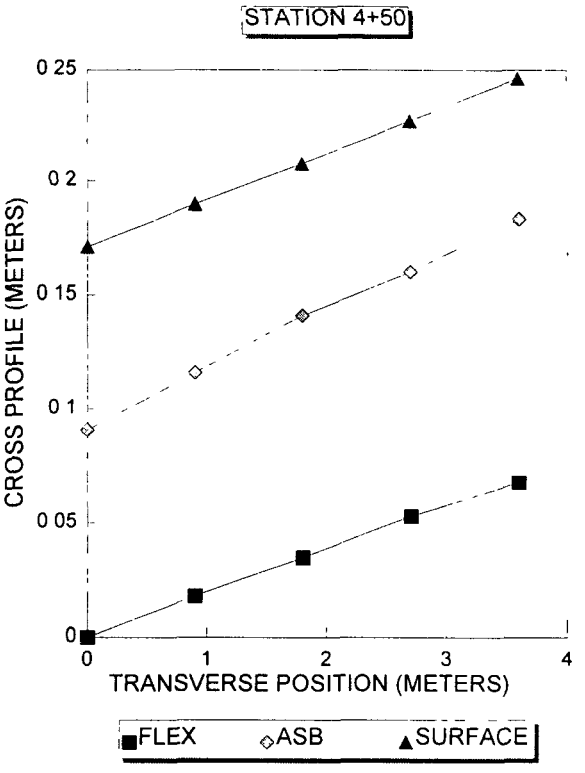


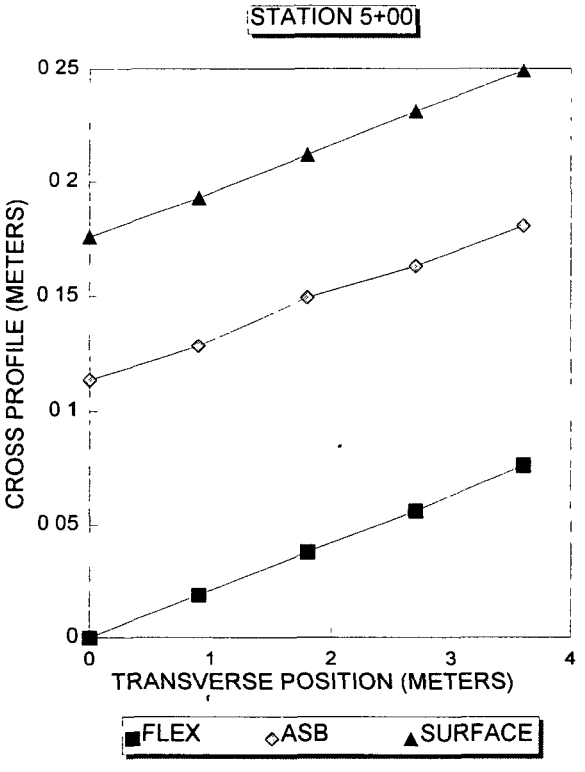




SECTION 480901



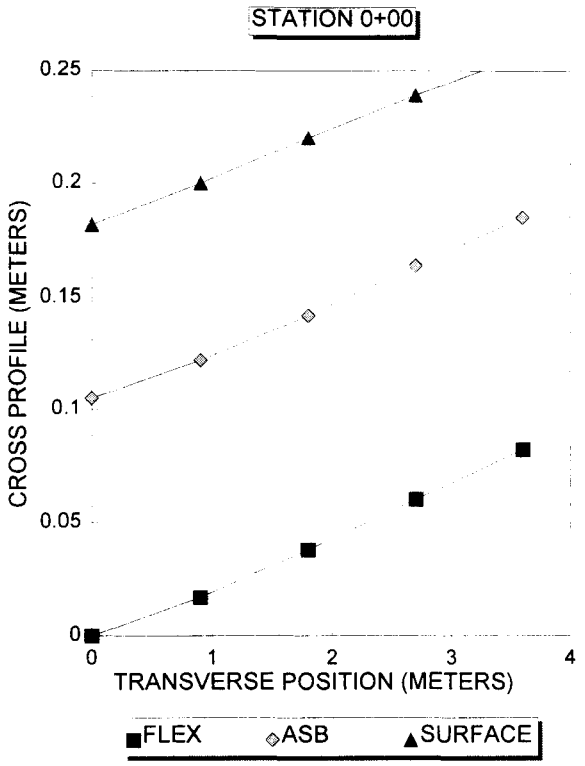


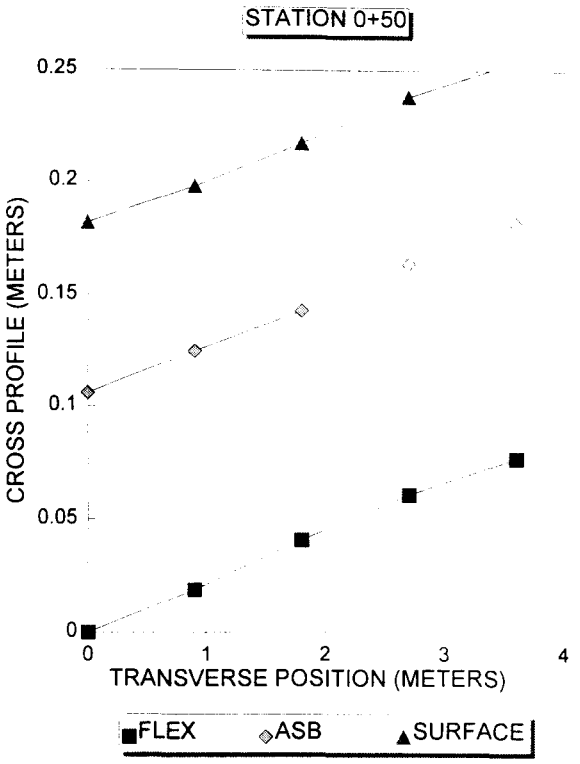


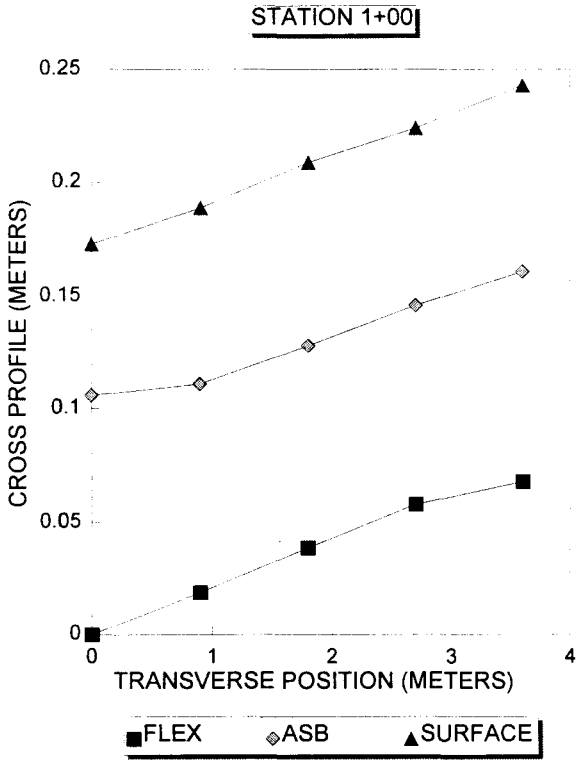
SECTION 480902 TEXAS

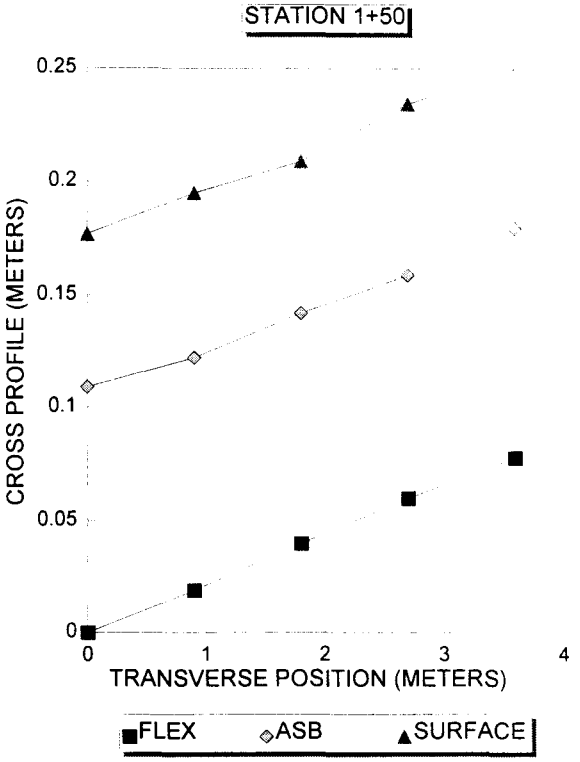
Trans Offset	LAYER	0 0M	Blackbase Thickness (M)	Surface Thickness (M)	0 9M	Blackbase Thickness (M)	Surface Thickness (M)	1 8M	Blackbase Thickness (M)	Surface Thickness (M)	2 7M	Blackbase Thickness (M)	Surface Thickness (M)	3 6M	Blackbase Thickness (M)	Surface Thickness (M)
0+00	FLEX	99 740	0 105	0 077	99 757	0 105	0 078	99 778	0 104	0 078	99 800	0 104	0 075	99 822	0 103	0 072
	BLACK	99 845			99 862			99 882			99 904			99 925		
	SURFACE	99 922			99 940			99 960			99 979			99 997		
0+50	FLEX	99 631	0 106	0 076	99 650	0 106	0 073	99 672	0 102	0 074	99 692	0 103	0 074	99 708	0 105	0 072
	BLACK	99 737			99 756			99 774			99 795			99 813		
	SURFACE	99 813			99 829			99 848			99 869			99 885		
1+00	FLEX	99 539	0 106	0 067	99 558	0 092	0 078	99 578	0 089	0 081	99 597	0 088	0 078	99 607	0 093	0 082
	BLACK	99 645			99 650			99 667			99 685			99 700		
	SURFACE	99 712			99 728			99 748			99 763			99 782		
1+50	FLEX	99 453	0 109	0 068	99 472	0 103	0 073	99 493	0 102	0 067	99 513	0 099	0 075	99 531	0 102	0 070
	BLACK	99 562			99 575			99 595			99 612			99 633		
	SURFACE	99 630			99 648			99 662			99 687			99 703		
2+00	FLEX	99 379	0 103	0 070	99 393	0 106	0 073	99 405	0 118	0 070	99 431	0 107	0 076	99 456	0 103	0 071
	BLACK	99 482			99 499			99 523			99 538			99 559		
	SURFACE	99 552			99 572			99 593			99 614			99 630		
2+50	FLEX	99 290	0 105	0 067	99 308	0 100	0 071	99 329	0 091	0 078	99 349	0 096	0 071	99 358	0 105	0 068
	BLACK	99 395			99 408			99 420			99 445			99 463		
	SURFACE	99 462			99 479			99 498			99 516			99 531		
3+00	FLEX	99 189	0 106	0 071	99 205	0 105	0 070	99 222	0 101	0 077	99 241	0 104	0 072	99 256	0 104	0 072
	BLACK	99 295			99 310			99 323			99 345			99 360		
	SURFACE	99 366			99 380			99 400			99 417			99 432		
3+50	FLEX	99 094	0 111	0 068	99 111	0 109	0 071	99 132	0 101	0 078	99 153	0 102	0 074	99 172	0 098	0 077
	BLACK	99 205			99 220			99 233			99 255			99 270		
	SURFACE	99 273			99 291			99 311			99 329			99 347		
4+00	FLEX	99 001	0 122	0 062	99 023	0 107	0 072	99 045	0 098	0 078	99 064	0 103	0 076	99 086	0 099	0 074
	BLACK	99 123			99 130			99 143			99 167			99 185		
	SURFACE	99 185			99 202			99 221			99 243			99 259		
4+50	FLEX	98 925	0 110	0 065	98 939	0 108	0 067	98 961	0 099	0 073	98 984	0 101	0 068	99 004	0 099	0 069
	BLACK	99 035			99 047			99 060			99 085			99 103		
	SURFACE	99 100			99 114			99 133			99 153			99 172		
5+00	FLEX	98 847	0 108	0 062	98 862	0 105	0 063	98 881	0 096	0 072	98 894	0 101	0 073	98 912	0 103	0 070
	BLACK	98 955			98 967			98 977			98 995			99 015		
	SURFACE	99 017			99 030			99 049			99 068			99 085		
	AVG		0 108	0 068		0 104	0 072		0 100	0 075		0 101	0 074		0 101	0 072
	MIN		0 103	0 062		0 092	0 063		0 089	0 067		0 088	0 068		0 093	0 068
	MAX		0 122	0 077		0 109	0 078		0 118	0 081		0 107	0 078		0 105	0 082
	STD		0 005	0 005		0 004	0 004		0 007	0 004		0 005	0 003		0 003	0 004

SECTION 480902









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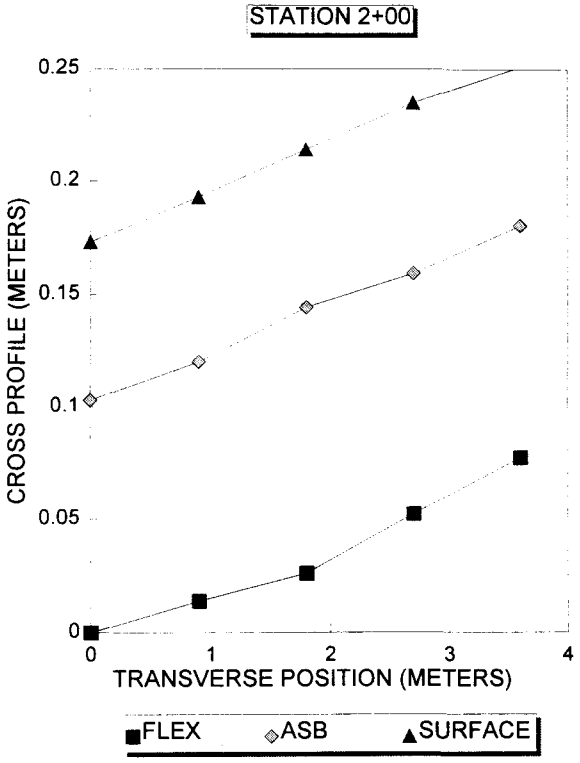

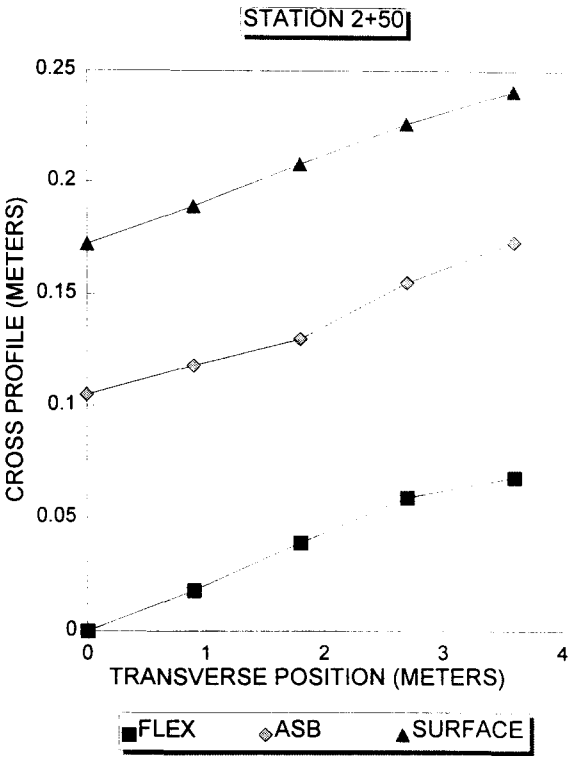

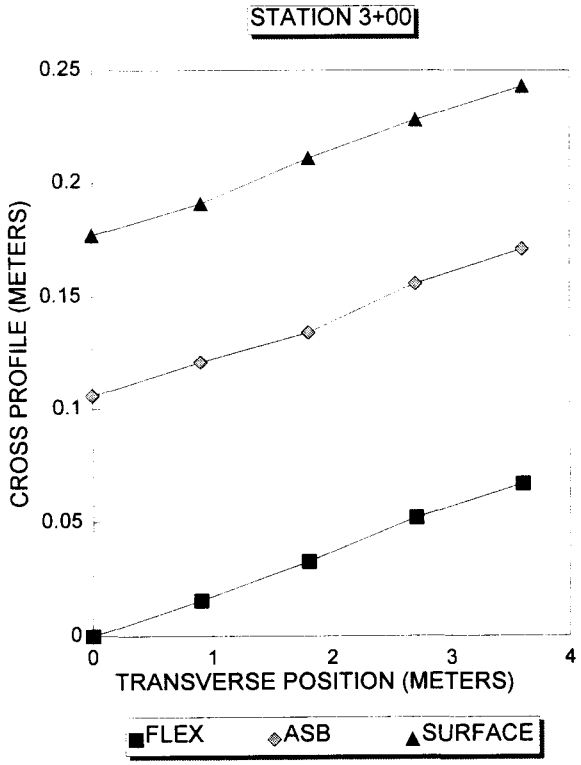

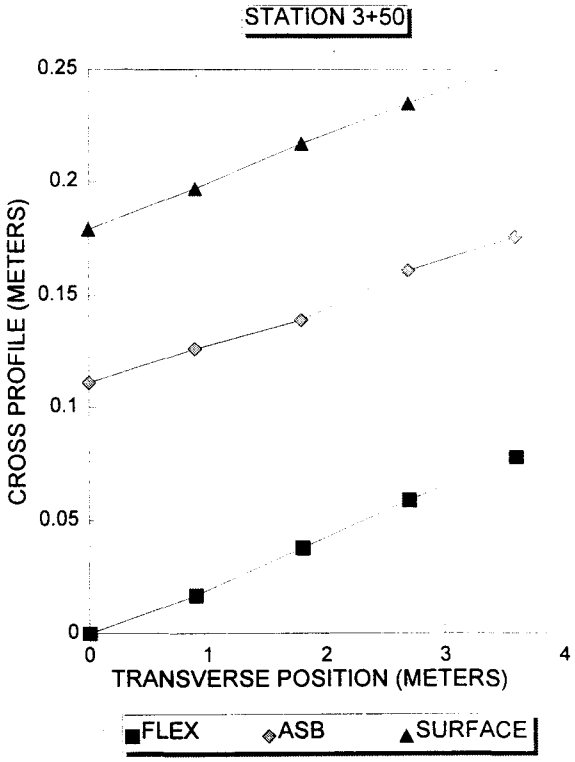

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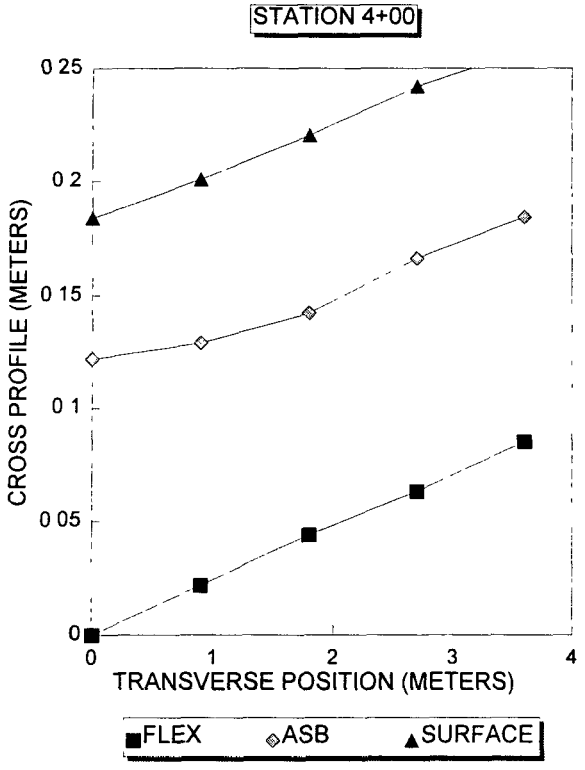
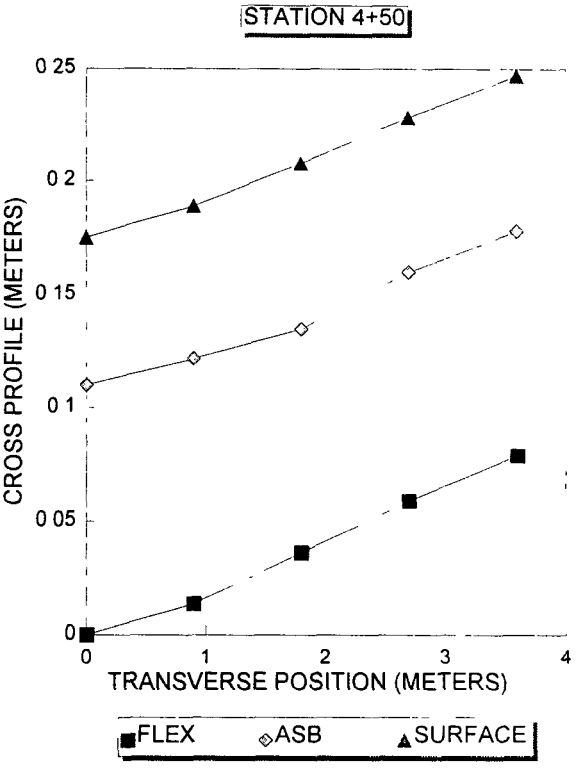
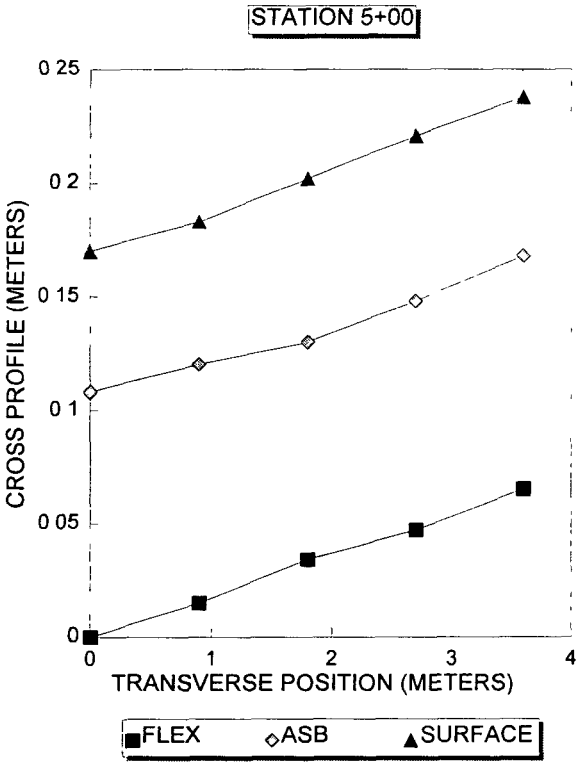


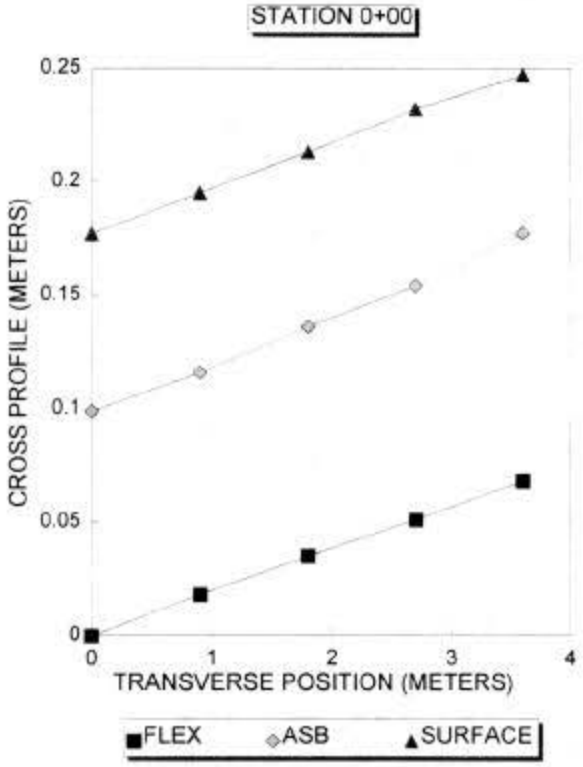


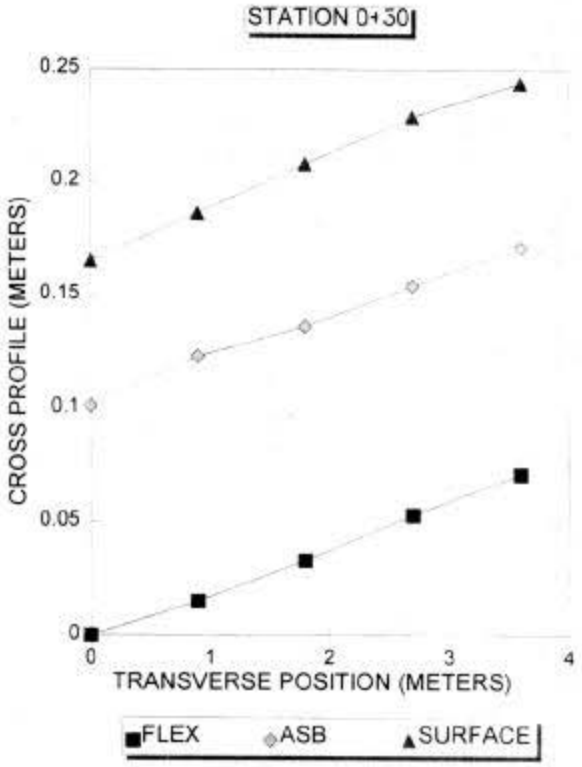


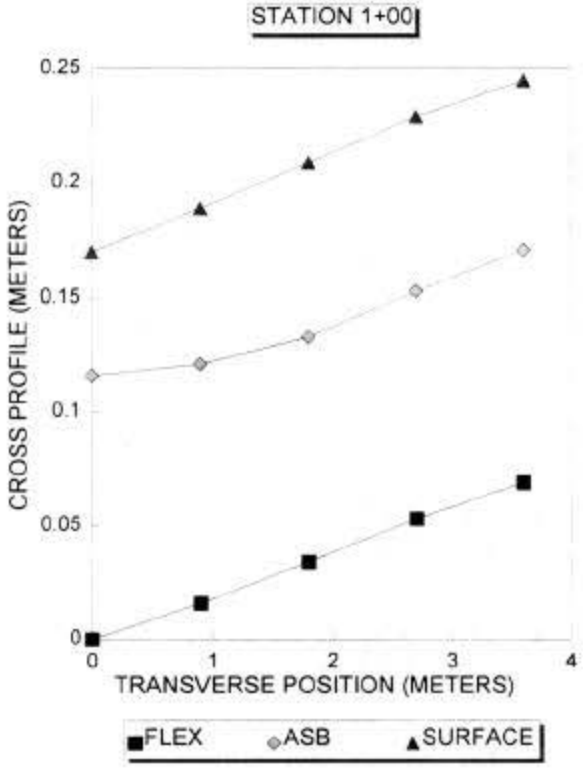
SECTION 480903 TEXAS

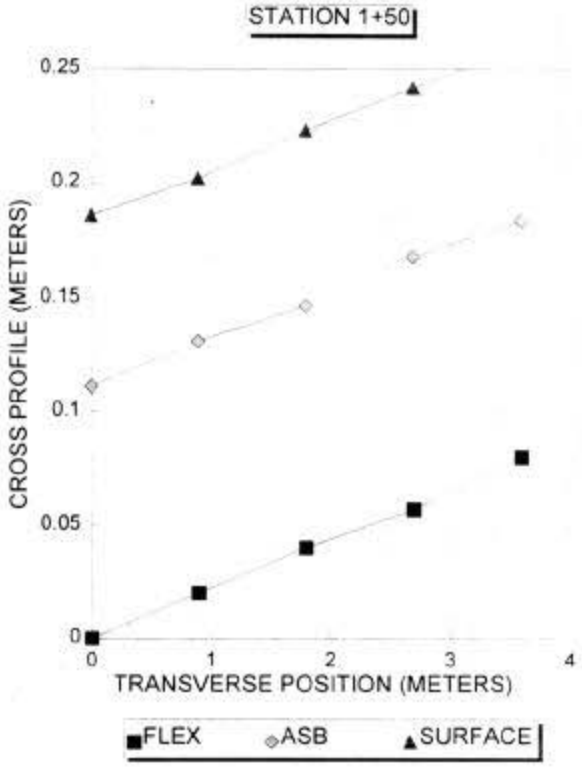
Trans Offset	LAYER	0 0M	Blackbase Thickness (M)	Surface Thickness (M)	0 9M	Blackbase Thickness (M)	Surface Thickness (M)	1 8M	Blackbase Thickness (M)	Surface Thickness (M)	2 7M	Blackbase Thickness (M)	Surface Thickness (M)	3 6M	Blackbase Thickness (M)	Surface Thickness (M)
0+00	FLEX	99 811	0 099	0 078	99 829	0 098	0 079	99 846	0 101	0 077	99 862	0 103	0 078	99 879	0 109	0 070
	BLACK	99 910			99 927			99 947			99 965			99 988		
	SURFACE	99 988			100 006			100 024			100 043			100 058		
0+50	FLEX	99 724	0 101	0 064	99 739	0 108	0 063	99 757	0 103	0 072	99 777	0 101	0 075	99 795	0 100	0 073
	BLACK	99 825			99 847			99 860			99 878			99 895		
	SURFACE	99 889			99 910			99 932			99 953			99 968		
1+00	FLEX	99 649	0 116	0 054	99 665	0 105	0 068	99 683	0 099	0 076	99 702	0 100	0 076	99 718	0 102	0 074
	BLACK	99 765			99 770			99 782			99 802			99 820		
	SURFACE	99 819			99 838			99 858			99 878			99 894		
1+50	FLEX	99 541	0 111	0 075	99 561	0 111	0 071	99 581	0 106	0 076	99 598	0 111	0 074	99 621	0 104	0 076
	BLACK	99 652			99 672			99 688			99 709			99 725		
	SURFACE	99 727			99 743			99 764			99 783			99 801		
2+00	FLEX	99 449	0 106	0 077	99 468	0 110	0 071	99 488	0 105	0 075	99 501	0 116	0 071	99 519	0 118	0 066
	BLACK	99 555			99 578			99 593			99 617			99 637		
	SURFACE	99 632			99 649			99 668			99 688			99 703		
2+50	FLEX	99 348	0 132	0 065	99 378	0 120	0 064	99 399	0 111	0 072	99 421	0 111	0 070	99 439	0 116	0 063
	BLACK	99 480			99 498			99 510			99 532			99 555		
	SURFACE	99 545			99 562			99 582			99 602			99 618		
3+00	FLEX	99 264	0 118	0 070	99 282	0 125	0 061	99 308	0 114	0 072	99 330	0 110	0 066	99 355	0 107	0 068
	BLACK	99 382			99 407			99 422			99 440			99 462		
	SURFACE	99 452			99 468			99 494			99 506			99 530		
3+50	FLEX	99 172	0 125	0 062	99 190	0 110	0 072	99 209	0 106	0 074	99 231	0 099	0 078	99 250	0 102	0 071
	BLACK	99 297			99 300			99 315			99 330			99 352		
	SURFACE	99 359			99 372			99 389			99 408			99 423		
4+00	FLEX	99 080	0 120	0 063	99 099	0 101	0 076	99 118	0 097	0 075	99 139	0 098	0 074	99 162	0 088	0 075
	BLACK	99 200			99 200			99 215			99 237			99 250		
	SURFACE	99 263			99 276			99 290			99 311			99 325		
4+50	FLEX	99 004	0 111	0 065	99 023	0 102	0 066	99 040	0 097	0 068	99 059	0 096	0 068	99 074	0 096	0 070
	BLACK	99 115			99 125			99 137			99 155			99 170		
	SURFACE	99 180			99 191			99 205			99 223			99 240		
5+00	FLEX	98 893	0 114	0 070	98 914	0 103	0 073	98 928	0 102	0 073	98 950	0 097	0 076	98 968	0 099	0 072
	BLACK	99 007			99 017			99 030			99 047			99 067		
	SURFACE	99 077			99 090			99 103			99 123			99 139		
	AVG		0 114	0 068		0 108	0 069		0 104	0 074		0 104	0 073		0 104	0 071
	MIN		0 099	0 054		0 098	0 061		0 097	0 068		0 096	0 066		0 088	0 063
	MAX		0 132	0 078		0 125	0 079		0 114	0 077		0 116	0 078		0 118	0 076
	STD		0 009	0 007		0 008	0 005		0 005	0 003		0 007	0 004		0 008	0 004

SECTION 490903

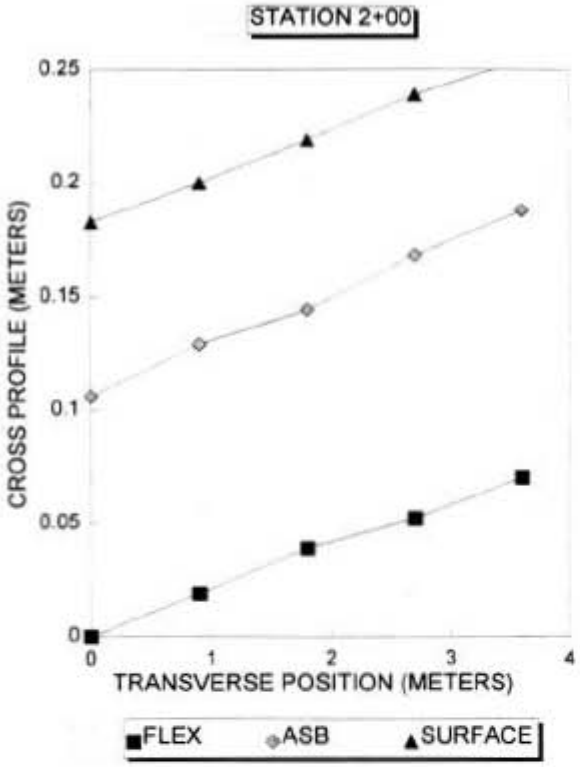


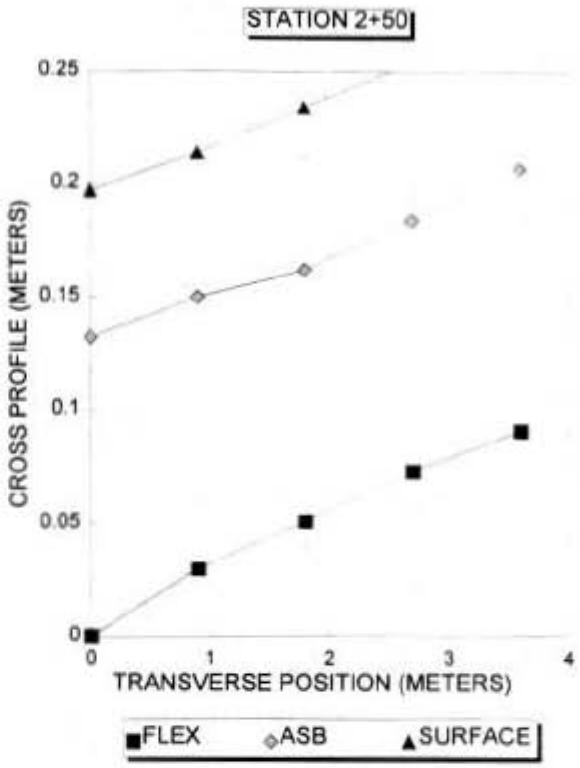


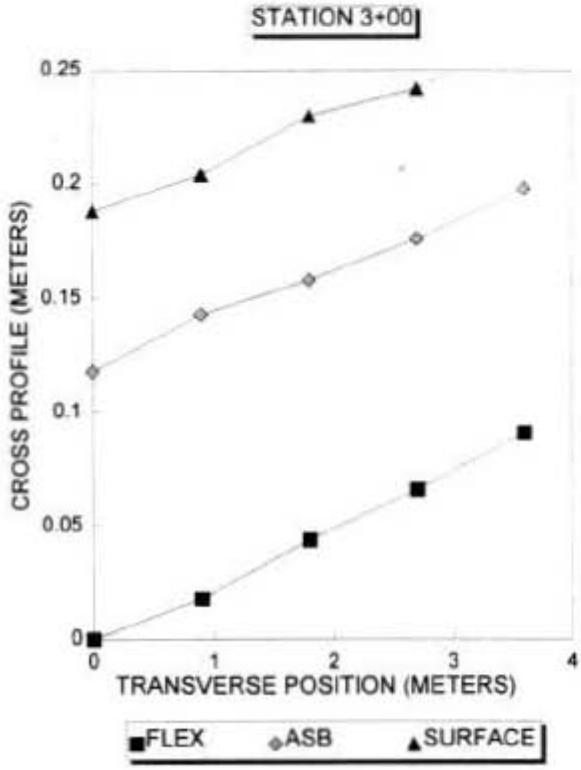


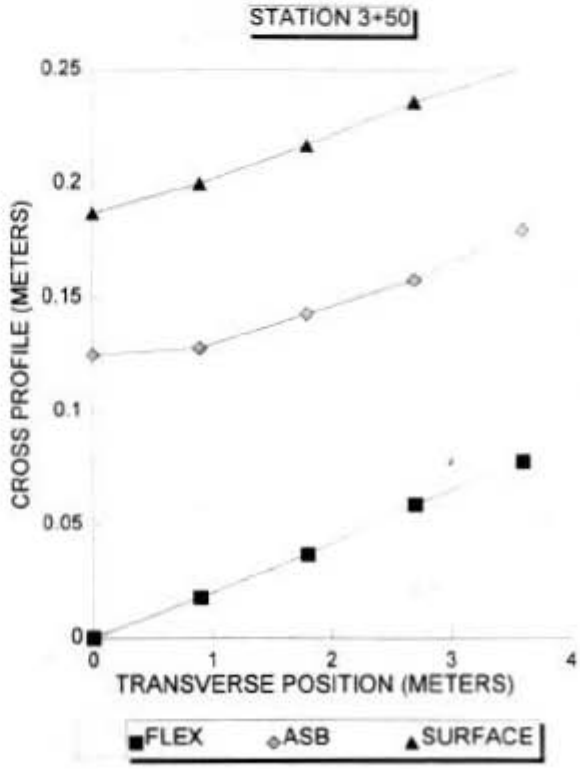


SECTION 490903









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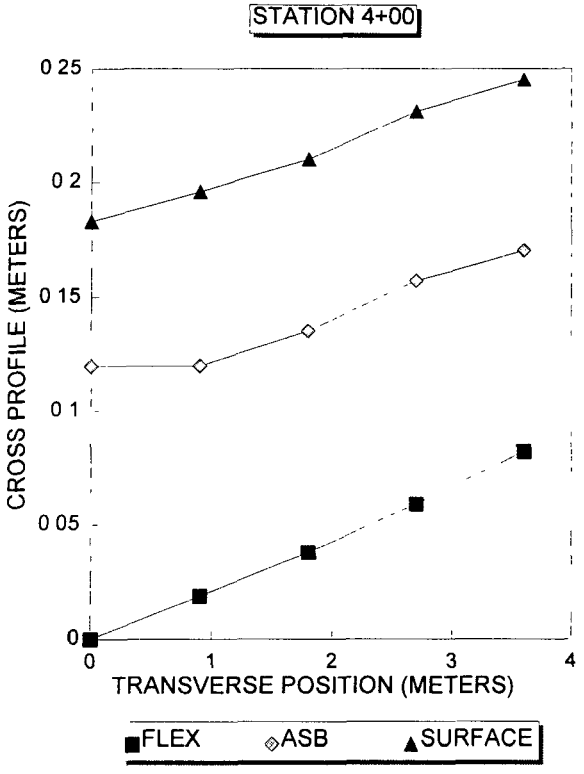
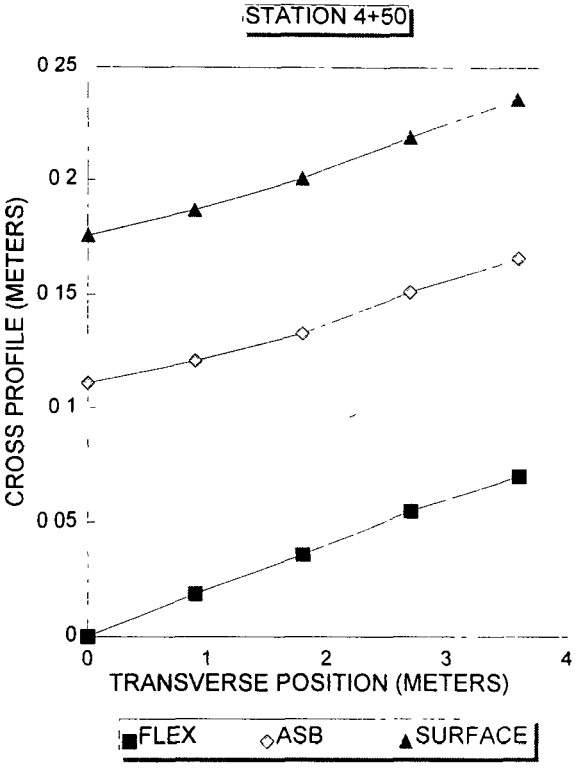
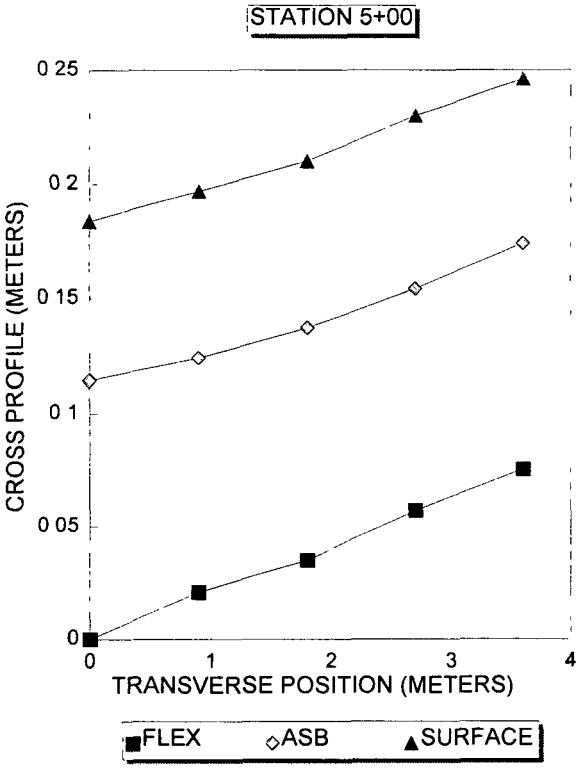






APPENDIX D

MATERIALS SAMPLING AND TESTING PLAN

Brent Rauhut Engineering Inc.

29 August 1995

Mr. Frank Jaster
District Lab Engineer
Texas DOT - San Antonio District
P.O Box 29928
San Antonio, Texas 78284-3601

Subject: Texas SPS-9A Project (480900) Materials Sampling and Testing Plan

Dear Mr. Jaster:

Enclosed is the plan for materials sampling and testing activities for the Texas SPS-9A project, located in the southbound lanes of Loop 1604, Bexar County, Texas. This plan has been prepared to identify details of the materials sampling, field testing, and laboratory materials testing to occur as part of the SPS-9A project construction.

If you have any questions or comments regarding the information provided in this plan, please do not hesitate to contact me. A copy of this document is also being provided to Mr. Monte Symons of the FHWA, for review and approval.

Sincerely,

Jerry F. Daleiden, P.E.
Project Engineer, SRCO

JFD:dmj

Enclosure: As stated.

c.w/Enc: Monte Symons, FHWA/LTPP-DC
Gonzalo Rada, PCS/LAW

c.w/o Enc: Greg Biediger, TX-DOT/San Antonio District
Morris Reinhardt, RE-SRCO

8240 Mopac, Suite 220 • Austin, Texas 78759 • (512) 346-0870 • FAX (512) 346-8750

MATERIAL SAMPLING
AND
TESTING PLAN

TEXAS SPS-9A PROJECT 480900
BEXAR COUNTY, TEXAS
LOOP 1604, SOUTHBOUND

PREPARED BY:

BRENT RAUHUT ENGINEERING INC.
FHWA/LTPP SOUTHERN REGION COORDINATION OFFICE
8240 MOPAC, SUITE 220
AUSTIN, TEXAS 78759

AUGUST 1995

MATERIAL SAMPLING AND TESTING PLAN
TEXAS SPS-9A PROJECT (480900), LOOP 1604 SOUTHBOUND
BEXAR COUNTY, TEXAS

INTRODUCTION

As part of their participation in the FHWA/LTPP studies, the State of Texas will construct an SPS-9A project to validate the SHRP asphalt specification and mix design. This project will consist of four test sections with similar details and materials on Loop 1604, in the Southbound lane, in Bexar County, Texas. It is the intent of this document to provide a complete plan for the material sampling, testing, and laboratory material testing that will occur as a part of this project.

This document has been prepared in accordance with **draft** guidelines provided by the Federal Highway Administration entitled "Specific Pavement Studies Material Sampling and Testing Requirements for Experiment SPS-9A, SUPERPAVE™ Asphalt Binder Study, February 1995". Recognizing the apparent variability in the construction of roadway projects, the goal of this effort is to develop a sampling and testing plan for the project materials that will be consistent with other projects in this experiment, and therefore make the information obtained suitable for analysis.

The SPS-9A experiment is the first part of a multi-stage approach to the SPS-9 experiment, "Validation of SHRP Asphalt Specification and Mix Design". The experiment is designed for immediate implementation to provide agencies with hands-on experience with methods and requirements developed under the SHRP program. The primary objectives of SPS-9A are to validate the SHRP binder specifications, to allow direct comparison of asphalt mixtures designed using Agency procedures and the newly developed SUPERPAVE™ procedures, and to provide initial data for use in refining the mixture performance models also developed as part of the SHRP research. In order to accomplish these objectives, three basic test sections are included within each project; one using the Agency's current mix design, one using the SUPERPAVE™ mix design system, and one using a SUPERPAVE™ Alternate binder. The SPS-9A experiment requires the construction of test sections at a given project with similar details, materials, and construction quality. It is anticipated that some variation between sections will exist. The purpose of the sampling and testing plan is to provide the information necessary to evaluate such variations and their effect on performance.

This sampling and testing plan has been developed by Brent Rauhut Engineering, Inc. the Southern Region Coordination Office under contract to the Federal Highway Administration. If, during the construction activities, any questions arise regarding the sampling and/or testing to be conducted, one should first coordinate these questions with the Texas Department of Transportation, who may refer them to the Southern Region Coordination Office.

This document has been prepared in four distinct parts, each covering a particular area of this rather formidable exercise. The sections are:

A. General Layout Information

B. Materials Sampling and Testing - Unbound Layers

C. Materials Sampling and Testing - Bound Layers

D. Materials Sampling and Testing - Postconstruction

"Preconstruction" sampling activities are defined as those occurring for the purpose of defining existing conditions and material properties prior to placement of the overlay. "During construction" activities begin once material production and placement activities are underway, and continue through the coring activities at time t = 0 (to be explained in Section C). "Postconstruction" sampling and testing activities include sampling of the overlay materials over time (cores) to document changes in material properties. Specific samples to be obtained, and laboratory testing needs for each sample, are defined for each of these time periods in Sections B, C and D.

SECTION A

GENERAL LAYOUT INFORMATION

SECTION A

GENERAL LAYOUT INFORMATION

This section of the plan provides a description of the SPS-9A project in terms of the location of the test sections along the roadway. Table A-1 lists the test sections in order of project stationing, providing an indication of the overlay mix to be used.

Figure A-1 depicts the layout of the test sections along the roadway and shows the placement of each material type and the location of each test section within the material placement.

TABLE A-1. TEST SECTION LAYOUT

Section (Cell ID)	Overlay Material	Begin Station	End Station
480901	Agency Mix	10287 + 50	10292 + 50
480902	SUPERPAVE™ Mix (PG64-22)	10224 + 50	10229 + 50
480903	Alternate SUPERPAVE™ Binder (PG70-22)	10236 + 50	10241 + 50

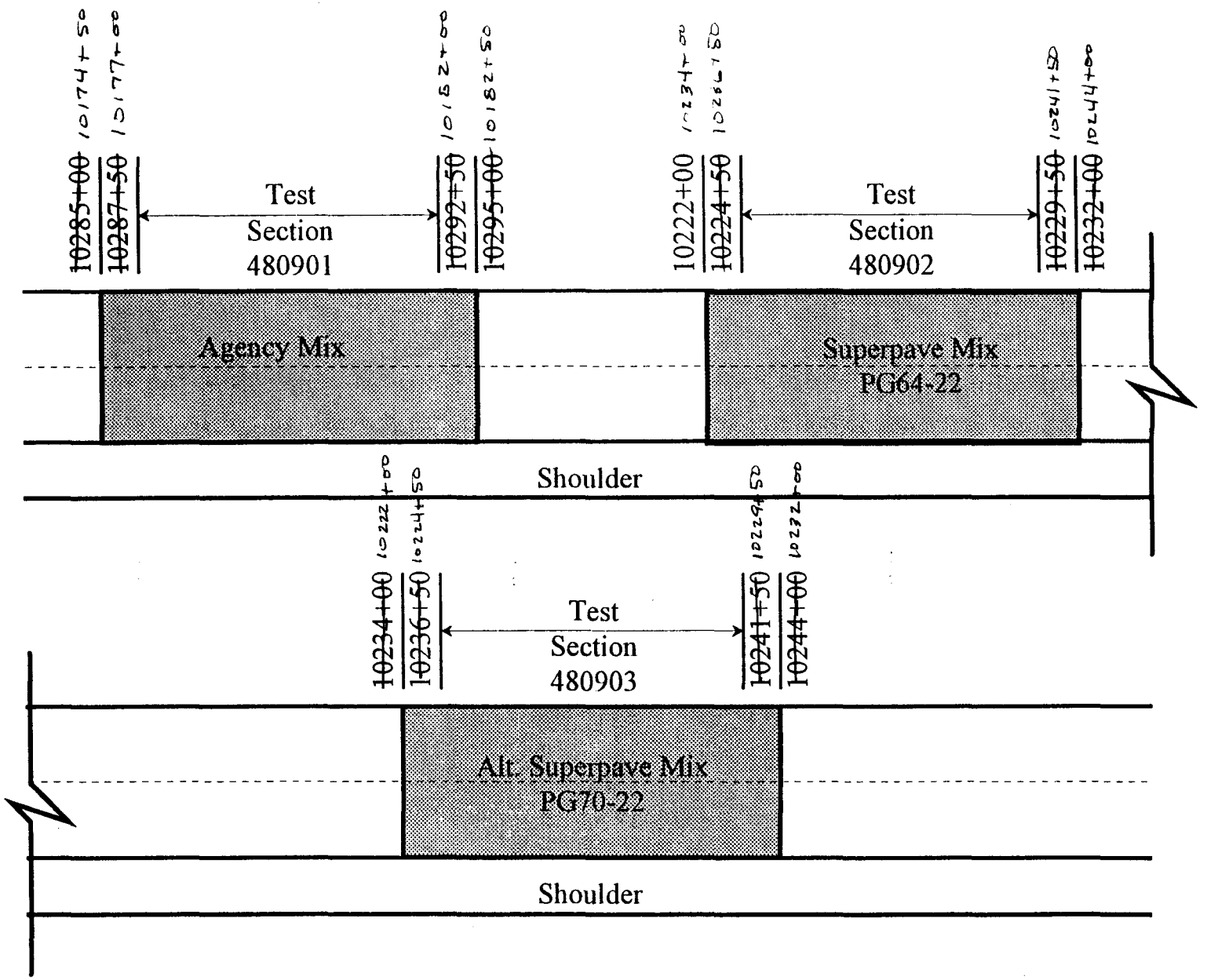


FIGURE A-1. LAYOUT OF TEST SECTIONS
TEXAS SPS-9A (480900)

SECTION B

MATERIAL SAMPLING AND TESTING FOR UNBOUND LAYERS

SECTION B

MATERIAL SAMPLING AND TESTING FOR UNBOUND LAYERS

This section of the plan provides for the material sampling and testing activities that occur prior to construction. The objective of this sampling will be to confirm the type and thickness of the pavement materials and obtain samples for classification testing.

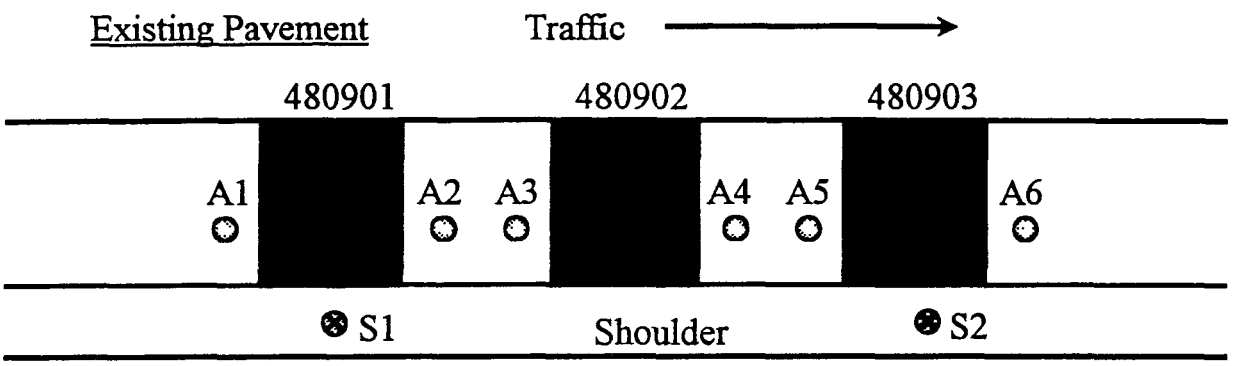
Table B-1 provides the scope of unbound layer material sampling. As may be seen, only minimal sampling is proposed for the base materials and the subgrade. There are a total of 6 sampling locations, numbered A1 through A6. The sampling locations are shown in Figure B-1.

Samples that are obtained should be labeled accordingly and wrapped in protective wrapping to prevent damage in transit. Sample labels will be provided by the Southern Region Coordination Office, who will have a representative on site to assist with the sampling and data collection activities. Plastic, resealable bags should be used for subgrade samples, to retain the moisture content for testing. Bubble-wrap or similar material should be used to protect the core samples.

All laboratory testing for the unbound layer samples will occur at the Texas DOT laboratory. Table B-2 provides an indication of the laboratory tests to be performed on the unbound layer samples.

TABLE B-1. SCOPE OF MATERIAL SAMPLING FOR UNBOUND LAYERS

Material And Sample Description	Nº. Of Samples	Sample Location	Sample Number
Unbound Granular Subbase	6	A1-A6	BG01, 02, 03, 04, 05, 06
Subgrade			
Bulk Sampling	6	A1-A6	BS01-BS06
Moisture Content Samples	6	A1-A6	MS01-MS06



A-type core locations - 152 mm OD core of bound layers, auger to 1.2m below top of subgrade

Shoulder augerprobe to 6m below surface

FIGURE B-1. SAMPLING LAYOUT FOR UNBOUND LAYERS TEXAS SPS-9A (480900)

SECTION C

MATERIAL SAMPLING AND TESTING

FOR BOUND LAYERS

TABLE B-2. MATERIALS TESTING FOR UNBOUND LAYERS

Test Type	LTPP Designation	LTPP Protocol	Min. №. of Tests	Sample Designation
Unbound Base:				
Particle Size Analysis	UG01	P41	3	A2,A4,A6
Sieve Analysis (Washed)	UG02	P41	3	A2,A4,A6
Atterberg Limits	UG04	P43	3	A2,A4,A6
Classification (Visual)	UG08	P47	3	A2,A4,A6
Subgrade:				
Sieve Analysis	SS01	P51	3	A1,A3,A5
Atterberg Limits	SS03	P43	3	A1,A3,A5
Classification	SS04	P52	3	A1,A3,A5
Natural Moisture Content	SS09	P49	3	A1,A3,A5
Depth to Rigid Layer		Note 1	3	S1,S2

Notes:

1. Follow procedures contained in Appendix C of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling.

SECTION C

MATERIAL SAMPLING AND TESTING FOR BOUND LAYERS

This portion of the sampling and testing plan deals with field material sampling and laboratory testing of the HMAC layers. Most of this sampling involves collection of bulk samples from the plant during mix production. Other sampling and testing activities include elevation measurements for documentation of layer thickness and coring just subsequent to construction to evaluate as-placed properties. It is important to note that only the HMAC surface materials are to be sampled and tested. HMAC binder and/or base layers will not be tested and are not included in the following discussions. Samples will be used to evaluate the properties of the paving mixtures produced and will be compared to properties measured from core samples after material placement.

The goal of this phase of the sampling effort is to investigate differences in material properties from mix design, production and placement. As such, the scope of the sampling activities requires collection of bulk samples at various times in the process, for preparation as test specimens. Samples of the constituent materials and the resulting HMAC mixtures are to be collected. These samples are to be compacted in the SHRP Gyratory Compactor (SGC) for volumetric and performance testing. It is anticipated that performance testing will be conducted at SUPERPAVE™ Regional Test Centers, once they are "on-line". At this time, there is no mechanism in place for conducting the performance testing. As such, samples should be stored in a safe environment awaiting testing. If the SHA does not have suitable storage available, then the samples may be transported to the Materials Reference Library (MRL) for storage.

A summary of the bulk sampling activities by test section is provided in Table C-1. For discussion purposes, bulk sampling activities are divided into five general areas. These are:

1. Laboratory Testing - For the SUPERPAVE™ mix to be used on Section 480902, once the final mix design is complete, a bulk sample should be blended in the laboratory to final mix design proportions and compacted in the SHRP Gyratory Compactor (SGC) to 7% air voids into 34, ~~152~~ 150 mm diameter by 115 mm height cylindrical specimens. These specimens will be used for volumetric and performance testing, as shown in Table C-2.

2. Quality Control Tests - For each of the three surface mixtures, a 60 kg sample of the mix should be obtained from the haul vehicle on site. These samples will be reheated and compacted in the SGC to N_{max} gyrations to form 6 test specimens of each mix. Testing on these samples is shown on Table C-3.

3. Field Performance Tests - For the SUPERPAVE™ mix placed at Section 480902, 360 kg of mix should be sampled from the haul vehicles. These samples will be compacted in the SGC to 7% air voids into 34 test specimens for volumetric and performance testing, as shown on Table C-2.

4. Mix Design Verification - For each of the three test sections, samples of the constituent materials should be sampled at the plant and shipped to the laboratory to be mixed and tested. One 10-liter sample of the asphalt cement and ten 25 kg samples of the combined aggregate will be required for each surface mix. Testing to be performed on these samples is shown on Table C-4.

5. MRL Sampling - Sampling and information related to the handling of bulk samples for the LTPP Materials Reference Library (MRL) is itemized on Table C-5.

In addition to the bulk samples, cores of the HMAC materials are needed just after placement for volumetric and/or performance testing, to quantify as-placed properties. Table C-6 provides an indication of the number of cores and time intervals for each of the test sections. Figure C-1 provides an indication of the general coring area for each section at an SPS-9A project. Each coring area is further subdivided into six coring "intervals", as depicted in Figure C-2. Each interval corresponds to a time period, with Interval A corresponding to the immediate postconstruction cores. Intervals B-F correspond to time periods of 6 months, 12 months, 18 months, 24 months and 48 months, respectively. The sampling for these intervals (B-F) will be discussed in Section D of this document.

The coring layout within each interval for Sections 01 and 03 is also shown on Figure C-2. The coring layout within each interval for Section 02 (the SUPERPAVE™ section) is shown in Figure C-3. The thirty-four cores scheduled in Interval A will be used for volumetric and performance testing.

In summary, 8 cores will be obtained from each of Section 01 and 03 during Interval A, immediately following construction. Testing to be performed on these cores is shown in Table C-7. Thirty-four cores shall be obtained from Test Section 02 during Interval A, immediately following construction. Testing to be performed on these cores is shown in Table C-8.

The final HMAC field testing activities include elevation measurements before and after placement of the surface mix. Elevation measurements should be performed at 15 m intervals, across the pavement surface at intervals of 0, 0.9, 1.8, 2.7 and 3.6 m from the outside lane edge. Care should be taken to measure the elevation at the same location before and after placement of the surface mix, to ensure accurate calculation of the thickness. Collection of elevation data will be conducted by the Regional Coordination Office representative on site and as such are not itemized in the following tables or figures.

TABLE C-1. SUMMARY OF BULK SAMPLING BY TEST SECTION

Test Section	Material Type	Testing	Bulk Sampling	Testing Lab	Ref. Table
480901	Agency Mix (PG64-22 HTSC)	Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Mix Design Verification (Volumetric)	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-5
480902	SUPERPAVE™ (PG64-22)	Lab. Mix Design (Volumetric & Performance)	300 kg Mix	SHA	C-2
		Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Performance Testing (Volumetric & Performance)	360 kg Mix	SHA, LTPP Contract, SUPERPAVE™ Reg. Test Center	C-2
		Mix Design Verification (Volumetric)	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-5
480903	Alt. SUPERPAVE™ Binder (PG70-22)	Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Mix Design Verification (Volumetric)	10 liter Asphalt 150 kg Aggregate	SHA	C-4
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-5

TABLE C-2. TESTS ON COMPACTED BULK SAMPLES OF MATERIALS FROM TEST SECTION 02

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source/ Material Sample
HMA Specimen Compaction by Participating Highway Agency				
Gyratory Compaction @ 7% Air Voids (Lab samples)		AASHTO M002	34	BA01-BA34[a]
Gyratory Compaction @ N_{Max} (Field samples)		AASHTO M002	6	BA35-BA40[a]
Gyratory Compaction @ 7% Air Voids (Field samples)		AASHTO M002	34	BA41-BA74[a]
Volumetric Tests by Participating Highway Agency				
Bulk Specific Gravity	AC02	LTPP P02	12	DA01,DA18,DA34, DA35-DA41, DA58,DA74
Asphalt Content (Extraction) (Performed on uncompacted material from bulk sample)	AC04	LTPP P04	9	BA01,BA18,BA34, BA35,BA37,BA40, BA41,BA58,BA74
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	3	BA18,BA37,BA58
Maximum Specific Gravity	AC03	LTPP P03	3	BA18,BA37,BA58
Volumetric Calculations by Participating Highway Agency				
Volume Percent of Air Voids		AASHTO PP19	74	All Compacted Specimens
Percent Voids in Mineral Aggregate		AASHTO PP19	74	
Voids Filled with Asphalt		AASHTO PP19	74	
LTPP Performance Tests by LTPP Contract Laboratory				
Creep Compliance	AC06	LTPP P06	16	DA01-DA04, DA31-DA34, DA41-DA44, DA71-DA74
Indirect Tensile Strength	AC07	LTPP P07	4	DA05,DA30,DA45,DA70
Resilient Modulus	AC07	LTPP P07	4	DA06,DA29,DA46,DA69
SUPERPAVE™ Shear Tester Performance Tests by SUPERPAVE™ Regional Test Center				
Frequency Sweep at Constant Height		AASHTO M003, P005	4	DA11,DA24,DA51,DA64
Simple Shear at Constant Height		AASHTO M003, P005	4	DA10,DA25,DA50,DA65
Uniaxial Strain		AASHTO M003, P005	4	DA08,DA27,DA48,DA67
Volumetric Test		AASHTO M003, P005	4	DA07,DA28,DA47,DA68
Repeated Shear at Constant Stress Ratio		AASHTO M003, P005	4	DA09,DA26,DA49,DA66
SUPERPAVE™ Indirect Tensile Tests by SUPERPAVE™ Regional Test Center				
Indirect Tensile Creep Compliance		AASHTO M005	12	DA12-DA14, DA21-DA23, DA52-DA54, DA61-DA63
Indirect Tensile Strength		AASHTO M005	12	DA15-DA20, DA55-DA60

Notes:

a For purposes or this table, a single specimen is compacted from each bulk sample. Test specimen DA01 is produced from BA01, etc Up to three specimens can be produced from the sample, depending on its size.

TABLE C-3. QUALITY CONTROL RELATED TESTS ON COMPACTED SPECIMENS FROM TEST SECTIONS 01 AND 03 (To Be Performed by the Participating Highway Agency)

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source/ Material Sample
HMA Specimen Compaction				
Gyratory Compaction @ N_{Max} (Field samples)		AASHTO M002	6	BA01-BA06[a]
Volumetric Tests				
Bulk Specific Gravity	AC02	LTPP P02	6	DA01-DA06
Asphalt Content (Extraction)	AC04	LTPP P04	2	BA02, BA04
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	2	BA02, BA04
Maximum Specific Gravity	AC03	LTPP P03	2	BA02, BA04
Volumetric Calculations				
Volume Percent of Air Voids		AASHTO PP19	6	DA01-DA06
Percent Voids in Mineral Aggregate		AASHTO PP19	6	
Voids Filled with Asphalt		AASHTO PP19	6	

Notes:

a A single test specimen is produced from each bulk HMA mix sample Test specimen DA01 is produced from sample BA01, etc

TABLE C-4. SUPERPAVE™ AGGREGATE, BINDER AND MIXTURE DESIGN TESTS ON HMAC SURFACE LAYER MATERIALS FROM ALL TEST SECTIONS (To Be Performed by Participating Highway Agency)

Test Name	Test Desig.	Protocol	№. Tests	Material Source
Aggregate Tests[a]				
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	1	BU01
Specific Gravity of Coarse Aggregate	AG01	LTPP P11	1	
Specific Gravity of Fine Aggregate	AG02	LTPP P12	1	
Specific Gravity of -200 Material		AASHTO T100	1	
Coarse Aggregate Angularity		Penn DOT TM 621	1	
Fine Aggregate Angularity		ASTM C1252	1	
Toughness		AASHTO T96	1	
Soundness		AASHTO T104	1	
Deleterious Materials		AASHTO 112	1	
Clay Content		AASHTO T176	1	
Thin, Elongated Particles		ASTM D4791	1	
Asphalt Cement				
Penetration @ 5°C		AASHTO T49	3	BC01
Penetration @ 25°C & 46°C	AE02	LTPP P22	3	
Viscosity @ 60°C & 135°C	AE05	LTPP P25	2	
Specific Gravity @ 16°C	AE03	LTPP P23	2	
Dynamic Shear @ 3 Temperatures		AASHTO TP5	2	
Creep Stiffness		AASHTO TP1	2	
Brookfield Viscosity @ 135°C & 165°C		ASTM D4402	1	
Rolling Thin Film Oven (RTFOT)		AASHTO T240	b	
Dynamic Shear on RTFOT Residue @ 3 Temperatures		AASHTO TP5	3	
Pressure Aging (PAV) of RTFOT Residue		AASHTO PP1	b	
Creep Stiffness of RTFOT-PAV Residue @ 2 Temperatures		AASHTO TP1	2	
Dynamic Shear on RTFOT-PAV Residue @ 3 Temperatures		AASHTO TP5	2	
Direct Tension on RTFOT-PAV Residue @ 2 Temperatures		AASHTO TP3	2	
Mixed and Compacted HMA				
Gyratory Compaction @ Design Asphalt Content @ N_{Design}		AASHTO M002	3	BC01,BU01-BU03
Gyratory Compaction @ 7% Air Voids		AASHTO M002	6	BC01,BU04-BU09
Moisture Susceptibility	AC05	AASHTO T283	1	DA04-DA09
Bulk Specific Gravity	AC02	LTPP P02	3	DA01,DA03
Maximum Specific Gravity	AC03	LTPP P03	1	BC01,BU10
Volumetric Calculations				
Volumetric Percent of Air Voids		AASHTO PP19	3	DA01,DA02,DA03
Percent Voids in Mineral Aggregate		AASHTO PP19	3	
Voids Filled With Asphalt		AASHTO PP19	3	

Notes:

a Only one set of aggregate tests required for each unique aggregate combination used on the project.

b Sufficient material should be conditioned for the required tests.

TABLE C-5. BULK MATERIAL SAMPLES TO BE SHIPPED TO THE LTPP MATERIAL REFERENCE LIBRARY

Material	Number
Asphalt Cement Collected from the Plant in 20-Liter Pails (Surface Mix Only)	1 for Each Type of Binder
Combined Coarse and Fine Aggregate Obtained from the Plant and Stored in 20-Liter Pails (Surface Mix Only)	10 for Each Aggregate Combination

Notes:

The MRL will provide containers and will pay for shipping costs.

Contact the MRL at (702) 358-7574 prior to construction to make arrangements for sample containers and to receive specific shipping instructions.

Only one sample of each unique asphalt binder used in the SPS-9A mixes is needed. If the same binder is used in more than one mix, then only one sample of that binder should be obtained.

A copy of LTPP Field Operations Information Form 1 should be completed and attached to all MRL shipments. Another copy of the form should be mailed separately to the MRL.

TABLE C-6. NUMBER OF CORES AND CORING TIME INTERVALS FROM SPS-9A STUDY TEST SECTION

Project Type	Test Section Nº.	Time After Paving, Months - Interval Identifier -					
		0 -A-	6 -B-	12 -C-	18 -D-	24 -E-	48 -F-
Main Study	Section 480901 Agency Binder (PG64-22-HTSC)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)
	Section 480902 SUPERPAVE™ Binder (PG64-22)	34 (S*)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)
	Section 480903 Alternate SUPERPAVE™ Binder (PG70-22)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)

Note: The numbers in the cells represent the number of 152 mm diameter cores needed to perform the required tests.

V = Volumetric and binder stiffness tests on cores

S* = Performance testing at t=0 months will be performed on 3 sets of specimens;

- compacted specimen from design mixtures produced in the laboratory
- compacted specimen from bulk samples obtained during construction
- cores obtained immediately following construction.

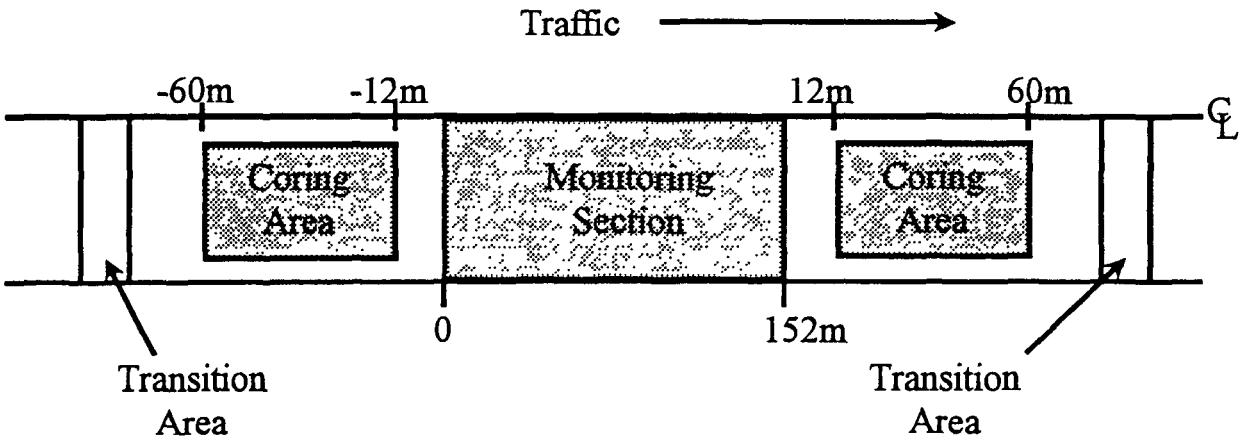


FIGURE C-1. CORING AREAS FOR SPS-9A TEST SECTIONS TEXAS SPS-9A (480900)

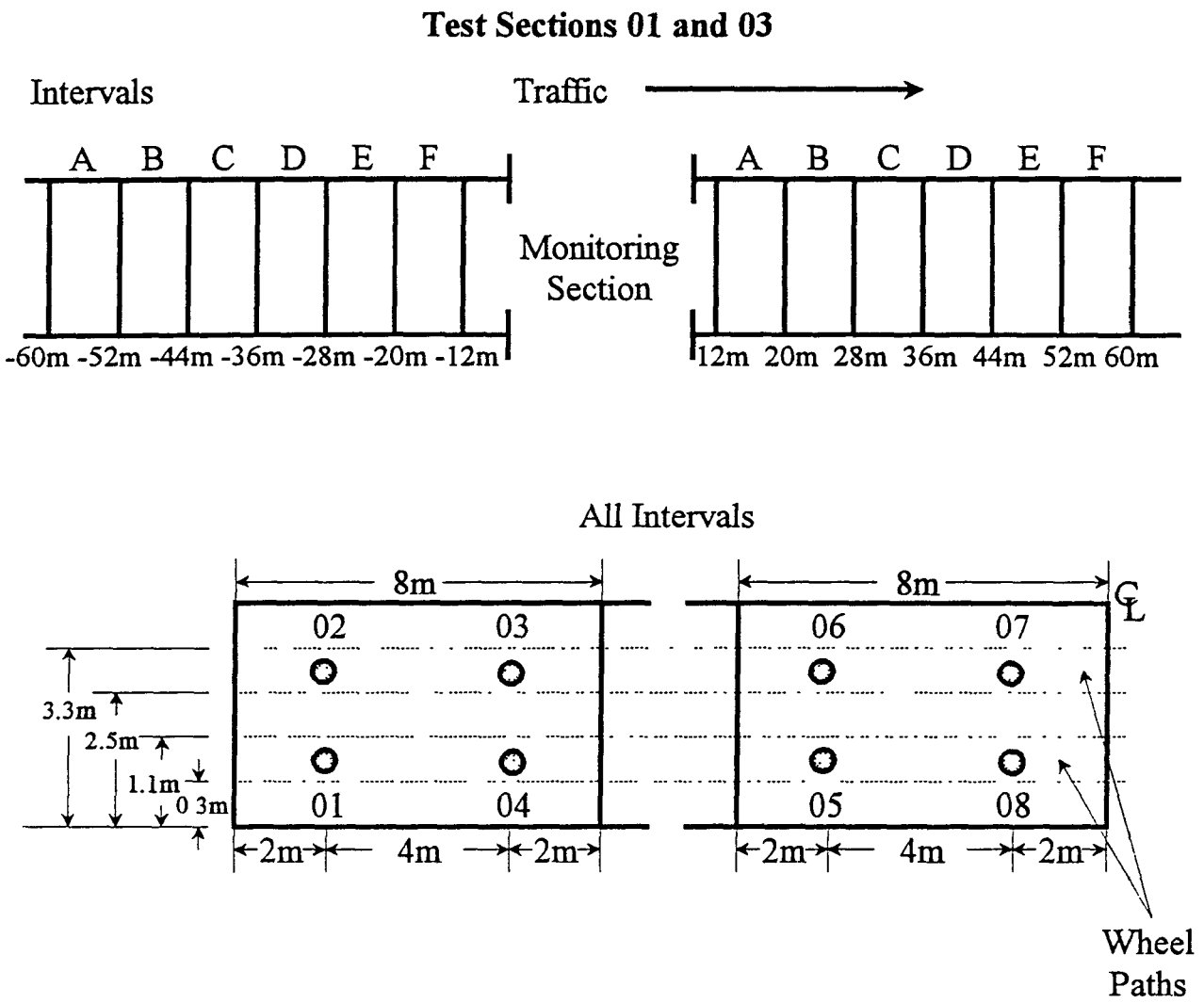


FIGURE C-2. CORING PLAN FOR MAIN STUDY TEST SECTIONS 01 AND 03 TEXAS SPS-9A (480900)

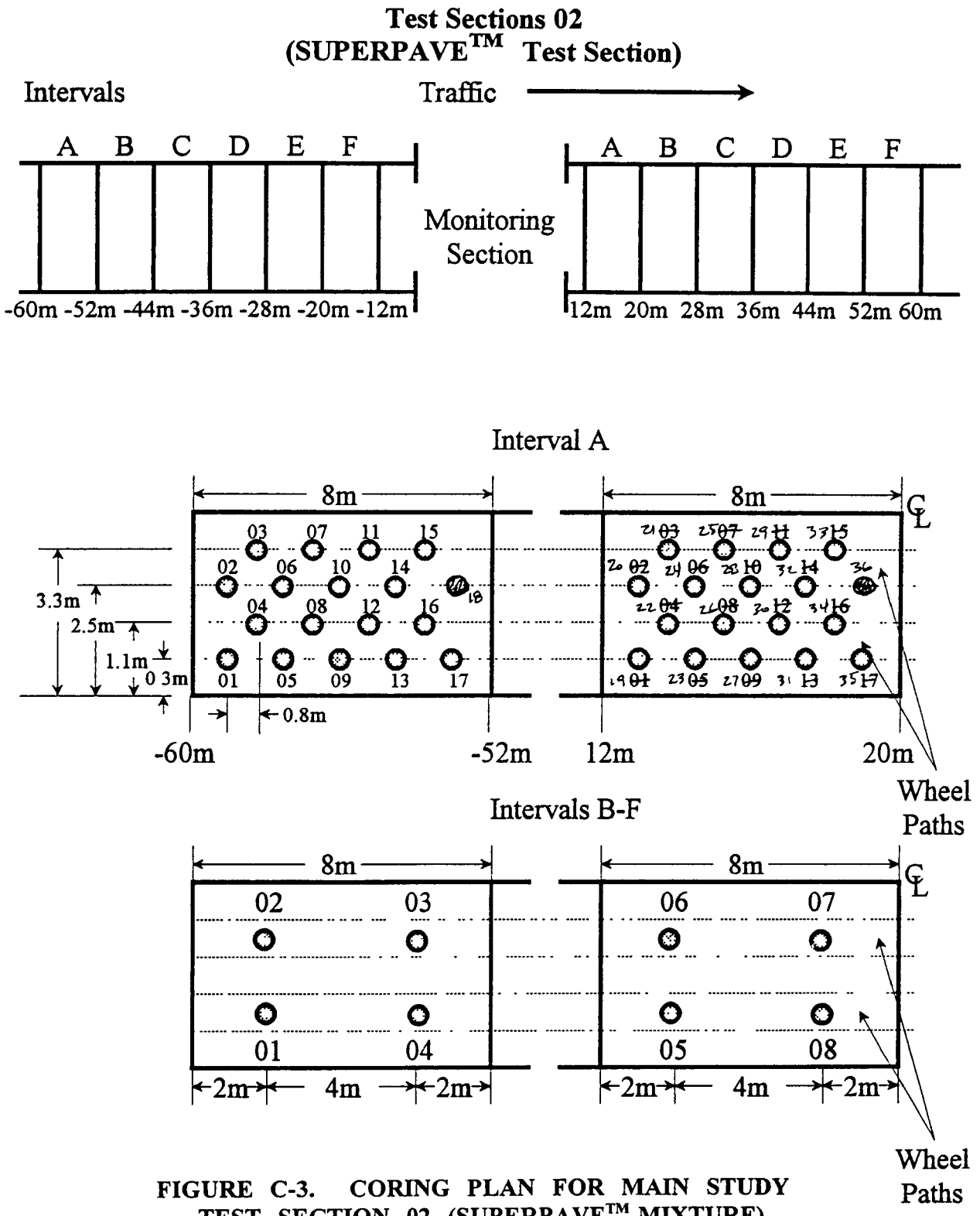


FIGURE C-3. CORING PLAN FOR MAIN STUDY TEST SECTION 02 (SUPERPAVE™ MIXTURE) TEXAS SPS-9A (480900)

TABLE C-7. LABORATORY MATERIAL TESTS TO BE PERFORMED ON CORES FROM TEST SECTIONS 01 AND 03 IMMEDIATELY AFTER CONSTRUCTION
(To Be Performed by the Participating Highway Agency)

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source[b]
Core Examination/Thickness	AC01	LTPP P01	8	All Cores
Volumetric Analysis				
Bulk Specific Gravity	AC02	LTPP P02	8	All Cores
Asphalt Content (Extraction)	AC04	LTPP P04	8	All Cores
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	1	C01*t*
Volumetric Calculations[a]				
Volume Percent of Air Voids		AASHTO PP19	8	C01*t*-C08*t*
Percent Voids in Mineral Aggregate		AASHTO PP19	8	
Voids Filled with Asphalt		AASHTO PP19	8	
Recovered Asphalt Cement				
Abson Recovery	AE01	LTPP P21	8	C01*t*-C08*t*
Penetration @ 5°C		AASHTO T49	3	
Penetration @ 25°C & 46°C	AE02	LTPP P22	3	
Viscosity @ 60°C & 135°C	AE05	LTPP P25	2	
Specific Gravity @ 16°C	AE03	LTPP P23	2	
Dynamic Shear @ 3 Temperatures[c]		AASHTO TP5	2	
Creep Stiffness @ 2 Temperatures[c]		AASHTO TP1	2	
Direct Tension @ 2 Temperatures[c]		AASHTO TP3	2	

Notes:

a. Use the maximum theoretical specific gravity determined from tests on bulk uncompacted samples obtained during construction. Use specific gravity of aggregate components from tests on unmixed aggregates.

b. The cores shown in this table are for each test section to be tested at each designated testing time interval *t*, where *t* represents the sampling time interval after construction as follows:

t = A at time 0 immediately following construction
t = B at 6 months after construction
t = C at 12 months after construction
t = D at 18 months after construction
t = E at 24 months after construction
t = F at 48 months after construction

For example, core C01E is obtained and tested 24 months after construction.

c. The test temperatures should be the same as those used for the tests on the RTFOT-PAV conditioned samples performed during the initial binder grading.

TABLE C-8. TESTS TO BE RUN ON CORE SAMPLES FROM TEST SECTION 02 IMMEDIATELY AFTER CONSTRUCTION

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source/ Material Sample[b]
Volumetric Tests by Participating Highway Agency				
Core Examination and Thickness	AC01	LTPP P01	34	All Cores
Bulk Specific Gravity	AC02	LTPP P02	34	All Cores
Asphalt Content (Extraction)[a]	AC04	LTPP P04	8	C07-C12 C24-C29 ~~C01t-C04t, C31t-C34t~~
Aggregate Gradation (Extracted Aggregate)[a]	AG04	LTPP P14	2	C13, C23 ~~C02t, C33t~~
MAX SPECIFIC GRAVITY	AC03	LTPP P03	2	C13, C23
Volumetric Calculations by Participating Highway Agency				
Volume Percent of Air Voids		AASHTO PP19	34	All Cores
Percent Voids in Mineral Aggregate		AASHTO PP19	34	
Voids Filled with Asphalt		AASHTO PP19	34	
Recovered Asphalt Cement Tests by Participating Highway Agency				
Abson Recovery	AE01	LTPP P21	8	C07-C12, C24-C29 ~~C01t-C04t, C31t-C34t~~
Penetration @ 5°C		AASHTO T49	3	
Penetration @ 25°C & 46°C	AE02	LTPP P22	3	
Viscosity @ 60°C & 135°C	AE05	LTPP P25	2	
Dynamic Shear @ 3 Temperatures		AASHTO TP5	2	
Creep Stiffness @ 2 Temperatures		AASHTO TP1	2	
Direct Tension @ 2 Temperatures		AASHTO TP3	2	
LTPP Performance Tests by LTPP Contract Laboratory				
Creep Compliance	AC06	LTPP P06	8	C01t-C04t, C32-C35 ~~C31t-C34t~~
Indirect Tensile Strength	AC07	LTPP P07	2	C05t, ~~C30t~~ C31
Resilient Modulus	AC07	LTPP P07	2	C06t, ~~C29t~~ C30
SUPERPAVE™ Shear Tester Performance Tests by SUPERPAVE™ Regional Test Center				
Frequency Sweep at Constant Height		AASHTO M003, P005	2	C11t, ~~C24t~~ C25
Simple Shear at Constant Height		AASHTO M003, P005	2	C10t, ~~C25t~~ C26
Uniaxial Strain		AASHTO M003, P005	2	C08t, ~~C27t~~ C28
Volumetric Test		AASHTO M003, P005	2	C07t, ~~C28t~~ C29
Repeated Shear at Constant Stress Ratio		AASHTO M003, P005	2	C09t, ~~C26t~~ C27
SUPERPAVE™ Indirect Tensile Tests by SUPERPAVE™ Regional Test Center				
Indirect Tensile Creep Compliance		AASHTO M005	4	C12t-C14t, C22-C24 ~~C21t-C23t~~
Indirect Tensile Strength		AASHTO M005	4	C15t-C17t, C19-C21 ~~C18t-C20t~~

Notes:

a These tests to run on cores after completion of the LTPP performance tests performed by the LTPP contract laboratory

b These are cores from each test section at time intervals t = A (0 months), t = C (12 months), t = E (24 months) and t = F (48 months) after construction.

SECTION D

MATERIAL SAMPLING AND TESTING

POSTCONSTRUCTION

SECTION D

MATERIAL SAMPLING AND TESTING POSTCONSTRUCTION

Materials sampling after construction consists solely of coring at time intervals of 6 months, 12 months, 18 months, 24 months and 48 months. These time periods correspond to intervals B-F, as discussed in Section C of this document and presented in Figures C-2 and C-3. These core samples will be tested to determine volumetric and binder stiffness properties, to evaluate their change with time. The testing to be performed on these core samples is shown in Table D-1.

TABLE D-1. LABORATORY MATERIAL TESTS TO BE PERFORMED ON CORES FROM ALL TEST SECTIONS AT TIME INTERVALS B-F AFTER CONSTRUCTION
(To Be Performed by the Participating Highway Agency)

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source[b]
Core Examination/Thickness	AC01	LTPP P01	8	All Cores
Volumetric Analysis				
Bulk Specific Gravity	AC02	LTPP P02	8	All Cores
Asphalt Content (Extraction)	AC04	LTPP P04	8	All Cores
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	1	C01*t*
Volumetric Calculations[a]				
Volume Percent of Air Voids		AASHTO PP19	8	C01*t*-C08*t*
Percent Voids in Mineral Aggregate		AASHTO PP19	8	
Voids Filled with Asphalt		AASHTO PP19	8	
Recovered Asphalt Cement				
Abson Recovery	AE01	LTPP P21	8	C01*t*-C08*t*
Penetration @ 5°C		AASHTO T49	3	
Penetration @ 25°C & 46°C	AE02	LTPP P22	3	
Viscosity @ 60°C & 135°C	AE05	LTPP P25	2	
Specific Gravity @ 16°C	AE03	LTPP P23	2	
Dynamic Shear @ 3 Temperatures[c]		AASHTO TP5	2	
Creep Stiffness @ 2 Temperatures[c]		AASHTO TP1	2	
Direct Tension @ 2 Temperatures[c]		AASHTO TP3	2	

Notes:

a. Use the maximum theoretical specific gravity determined from tests on bulk uncompacted samples obtained during construction. Use specific gravity of aggregate components from tests on unmixed aggregates.

b. The cores shown in this table are for each test section to be tested at each designated testing time interval *t*, where *t* represents the sampling time interval after construction as follows:

t = A at time 0 immediately following construction
t = B at 6 months after construction
t = C at 12 months after construction
t = D at 18 months after construction
t = E at 24 months after construction
t = F at 48 months after construction

For example, core C01E is obtained and tested 24 months after construction.

c. The test temperatures should be the same as those used for the tests on the RTFOT-PAV conditioned samples performed during the initial binder grading.

APPENDIX E

CONSTRUCTION DATA

Page Nº

APPLICABLE CONSTRUCTION DATA SHEETS FOR SECTIONS:

480901 . . . . . E 2

480902 . . . . . E.15

480903 . . . . . E.28

SPS CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. DATE OF DATA COLLECTION OR UPDATE (Month/Year) [1 0/9 5]

*2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [4 8.]

*3. COUNTY OR PARISH BEXAR [0 2 9.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) RURAL, PRINCIPAL ARTERIAL, OTHER [0 2.]

*5. ROUTE SIGNING (NUMERIC CODE) FM [4.]
Interstate... 1 U.S.... 2 State... 3
Other... 4

*6. ROUTE NUMBER [_ 1 6 0 4.]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [0 1.]

8. NUMBER OF THROUGH LANES (ONE DIRECTION) [2.]

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [1 0/9 5]

*10. DATE OPENED TO TRAFFIC (Month/Year) [_ 1/9 6]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) [_ _ _ _ _.]

12. DIRECTION OF TRAVEL [4.]
East Bound... 1 West Bound... 2 North Bound... 3
South Bound... 4

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [_ _ _._ _]

*14. ELEVATION [_ 1 0 0 0]

*15. LATITUDE [2 9° 3 3' _ _ . _ _"]

*16. LONGITUDE [_ 9 8° 4 0' _ _ . _ _"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [CSJ 2452-02-023, SECTION BEGINS 1.9 MILES NORTH OF SH 16]

18. HPMS SAMPLE NUMBER (HPMS ITEM 28) [_ _ _ _ _ _ _ _ _ _ _ _ _]

19. HPMS SECTION SUBDIVISION (HPMS ITEM 29) [_.]

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. LANE WIDTH (FEET) [1 2.]

2. MONITORING SITE LANE NUMBER [1.]
(LANE 1 IS OUTSIDE LANE, NEXT TO SHOULDER
LANE 2 IS NEXT TO LANE 1, ETC.)

*3. SUBSURFACE DRAINAGE LOCATION [3.]
Continuous Along Test Section... 1 Intermittent... 2 None... 3

*4. SUBSURFACE DRAINAGE TYPE [1.]
No Subsurface Drainage... 1 Longitudinal Drains... 2
Transverse Drains... 3 Drainage Blanket... 4 Well System... 5
Drainage Blanket with Longitudinal Drains... 6
Other (Specify)... 7 _____

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
*5. SURFACE TYPE Turf... 1 Granular.... 2 Asphalt Concrete... 3 Concrete... 4 Surface Treatment... 5 Other (Specify)... 6 _____	[3]	[3]
*6. TOTAL WIDTH (FEET)	[5.]	[1 1.]
*7. PAVED WIDTH (FEET)	[4.]	[1 0.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[2 8.]	[2 8.]
9. SURFACE THICKNESS (INCHES)	[3. 0]	[3. 0]
10. SHOULDER BASE THICKNESS (INCHES)	[4. 0]	[4. 0]
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[N/A]
12. SPACING OF LATERALS (FEET)		[N/A.]

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS- CONSTRUCTION DATA SHEET 3 REFERENCE PROJECT STATION TABLE	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [* *]

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER		*4 CUT-FILL[1]	
		*2 START	*3 END	TYPE	STATION
1	480901	0+00	5+00	2	+
2	480903	47+50	52+50	2	+
3	480902	59+50	64+50	2	+
4		+	+		+
5		+	+		+
6		+	+		+
7		+	+		+
8		+	+		+
9		+	+		+
10		+	+		+
11		+	+		+
12		+	+		+
13		+	+		+
14		+	+		+
15		+	+		+
16		+	+		+
17		+	+		+
18		+	+		+
19		+	+		+
20		+	+		+

*5 INTERSECTIONS BETWEEN TEST SECTION ON THE PROJECT

ROUTE	PROJECT STATION NO.	RAMPS EXIT	RAMPS ENT	INTERSECTION STOP	INTERSECTION SIGNAL	INTERSECTION UNSIG
Hausman Rd (FM 1560)	43+00		✓			
	+					
	+					

Note 1. Indicate the type of subgrade section the test section is located on:
Cut.... 1 Fill..... 2 At-Grade..... 3 Cut and Fill..... 4
If cut-fill transition is located in a test section, enter test section station of the cut-fill transition location.

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 1]				
2	[6]	[2 3]	[6.0]	.....	.....	.....
3	[5]	[2 8]	[3.6]	2.8	4.5	0.5
4	[4]	[0 1]	[1.5]	.....	.....	.....
5	[3]	[0 1]	[1.5]	.....	.....	.....
6	[ ]	[ ]	[.....]	.....	.....	.....
7	[ ]	[ ]	[.....]	.....	.....	.....
8	[ ]	[ ]	[.....]	.....	.....	.....
9	[ ]	[ ]	[.....]	.....	.....	.....
10	[ ]	[ ]	[.....]	.....	.....	.....
11	[ ]	[ ]	[.....]	.....	.....	.....
12	[ ]	[ ]	[.....]	.....	.....	.....
13	[ ]	[ ]	[.....]	.....	.....	.....
14	[ ]	[ ]	[.....]	.....	.....	.....
15	[ ]	[ ]	[.....]	.....	.....	.....

FLEX BAS (TYA, GR1) ASB, GR4

*5 DEPTH BELOW SURFACE TO "RIGID" LAYER (FEET) [4.0]
(Rock, Stone, Dense Shale)

NOTES:

1. Layer 1 is the subgrade soil, the highest numbered layer is the pavement surface.

2. Layer description codes:

Overlay.....01	Base Layer.....05	Porous Friction Course..09
Seal/Tack Coat.....02	Subbase Layer.....06	Surface Treatment.....10
Original Surface.....03	Subgrade.....07	Embankment (Fill).....11
HMAC Layer (Subsurface).04	Interlayer.....08	

3. The material type classification codes are presented in Tables A.5, A.6, A.7 and A.8 of the Data Collection Guide for Long Term Pavement Performance Studies, dated January 17, 1990.

4. Enter the average thickness of each layer and the minimum, maximum and standard deviation of the thickness measurements, if known.

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [08-24-95]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [09-29-95]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers		
Plant 1	[2]	VULCAN MATERIALS	[_ _ 4]	[_ 7]	[3]	[4]	[_]
Plant 2	[_]	HELOTES	[_ _ _]	[_ _]	[_]	[_]	[_]
Plant 3	[_]		[_ _ _]	[_ _]	[_]	[_]	[_]

Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify_____

4. MANUFACTURER OF ASPHALT CONCRETE PAVER BLAW KNOX

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF-200B

6. SINGLE PASS LAYDOWN WIDTH (Feet) [12.0]

7. AC BINDER COURSE LIFT
   Layer Number [03]
   Nominal First Lift Placement Thickness (Inches) [4.0]
   Nominal Second Lift Placement Thickness (Inches) [_._]

8. AC SURFACE COURSE LIFT
   Layer Number UNCOMPACTED [04]
   Nominal First Lift Placement Thickness (Inches) 1.7 [1.5]
   Nominal Second Lift Placement Thickness (Inches) 1.7 [1.5]

9. SURFACE FRICTION COURSE (If Placed)
   Layer Number [_ _]
   Nominal Placement Thickness (Inches) [_._]

10. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
    Binder Course [_ + _ _]
    Surface Course [_ + _ _]
    Surface Friction Course [_ + _ _]

11. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
    Between lanes.. 1 Within lane.. 2
    (specify offset from O/S feet) [_ _ _]

12. SIGNIFICANT EVENTS DURING CONSTRUCTION (disruptions, rain, equip. problems, etc.)_____

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 _]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 9-1 8-9 5]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [0 9-2 9-9 5]
*3. LAYER NUMBER [4]

*4. MIXING TEMPERATURE (°F) [3 0 0.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... _ _ _.
Minimum..... _ _ _.
Standard Deviation... _ _.
Number of Tests ..... _ _.
Maximum..... _ _ _.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	1 1.7				
7	B	Steel-Whl Tandem	1 3.0				
8	C	Steel-Whl Tandem	_ _._				
9	D	Steel-Whl Tandem	_ _._				
10	E	Pneumatic-Tired	_ _._	_ _ _ _.			
11	F	Pneumatic-Tired	_ _._	_ _ _ _.			
12	G	Pneumatic-Tired	_ _._	_ _ _ _.			
13	H	Pneumatic-Tired	_ _..	.			
14	I	Single-Drum Vibr.	1 1.7		_ _ _ _.	._ _ _	_ _._
15	J	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
16	K	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
17	L	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
18	M	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
19	N	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
20	O	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
21	P	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	I	_	_
24	Coverages	_ 2.	_ 2.	_ _.	_ _.
	INTERMEDIATE				
25	Roller Code (A-Q)	A	A	_	_
26	Coverages	_ 2.	_ 2.	_ _.	_ _.
	FINAL				
27	Roller Code (A-Q)	B	B	_	_
28	Coverages	_ 1.	_ 1.	_ _.	_ _.
29	Air Temperature (°F)	_ 8 6.	_ 9 4.	_ _ _.	_ _ _.
30	Compacted Thickness (In)	1.5	1.5	_._	_._
31	Curing Period (Days)	1 1.0	_ _._	_ _._	_ _._

PREPARER [signature] EMPLOYER RRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 8 - 2 5 - 9 5]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [0 8 - 2 5 - 9 5]
*3. LAYER NUMBER [3]

*4. MIXING TEMPERATURE (°F) [2 9 0.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 2 5 0.
Minimum..... 2 4 0.
Standard Deviation... _ _.
Number of Tests ..... 3.
Maximum..... 2 5 7.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	1 1 . 7				
7	B	Steel-Whl Tandem	_ _. _				
8	C	Steel-Whl Tandem	_ _. _				
9	D	Steel-Whl Tandem	_ _. _				
10	E	Pneumatic-Tired	3 0 . 0	_ _ _ _.			
11	F	Pneumatic-Tired	_ _. _	_ _ _ _.			
12	G	Pneumatic-Tired	_ _. _	_ _ _ _.			
13	H	Pneumatic-Tired	_ _. _	_ _ _ _.			
14	I	Single-Drum Vibr.	1 1 . 7		_ _ _ _.	_ _ _	_ _. _
15	J	Single-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
16	K	Single-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
17	L	Single-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
18	M	Double-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
19	N	Double-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
20	O	Double-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
21	P	Double-Drum Vibr.	_ _. _		_ _ _ _.	_ _ _	_ _. _
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	_	_	_
24	Coverages	_ 2.	_ _.	_ _.	_ _.
	INTERMEDIATE				
25	Roller Code (A-Q)	A	_	_	_
26	Coverages	_ 2.	_ _.	_ _.	_ _.
	FINAL				
27	Roller Code (A-Q)	E	_	_	_
28	Coverages	_ 1.	_ _.	_ _.	_ _.
29	Air Temperature (°F)	_ _ _.	_ _ _.	_ _ _.	_ _ _.
30	Compacted Thickness (In)	4.0	_._	_._	_._
31	Curing Period (Days)	_ _._	_ _._	_ _._	_ _._

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]		A	
Number of Measurement		3	
Average (pcf)		141.0	
Maximum (pcf)		141.4	
Minimum (pcf)		140.5	
Standard Deviation (pcf)		0.5	
Layer Number		5	

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE TROXLER

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3430

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2
Profile Index (Inches/Mile)
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3
Height of Blanking Band (Inches)
Cutoff Height (Inches)

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO)

PREPARER [signature] EMPLOYER BRE DATE 11/20/95

Project : NH 90(191)M
Control/Section/Job : 2452-02-023
Highway : Lp 1604
County : Bexar
Type of Material . Type "C" Surface (Test Section)
Producer : Vulcan Helotes (Plant #2)

Date : 10-Oct-95

Sample Number	Core Number	Location of Sample	Percent Relative Compaction	Percent Air Voids	
15-95-1083	1A	100+00 SB Hausman 35' R	92.7%	7.3%	
"	2A	101+00 SB Hausman 29' R	90.5%	9.5%	*
"	3A	101+00 NB Hausman 21' L	91.5%	8.5%	
		Averages =	91.6%	8.4%	

*** This denotes failure to meet specified air voids!**

Core Number	Rice Gravity	Core Density	Nuclear Density	Date Laid or Cored
1A	2.482	143.5	141.0	10/09/95
2A	"	140.2	140.5	"
3A	"	141.7	141.4	"
	Averages =	141.8	141.0	

Distribution : District Laboratory Files
Construction Office Files
Area Office Files (David Balli)

Darren B. Marty

SPS CONSTRUCTION DATA
SHEET 12
LAYER THICKNESS MEASUREMENTS

* STATE CODE [4 8]
* SPS PROJECT CODE [0 9]
* TEST SECTION NO. [0 1]

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	0		2.8	3.1	
	36		3.2	2.4	
	72		3.7	2.2	
	108		3.7	2.3	
	144		3.7	2.2	
0+50	0		3.1	3.2	
	36		3.3	2.9	
	72		3.6	2.8	
	108		2.9	3.1	
	144		3.2	2.8	
1+00	0		3.6	3.3	
	36		3.7	3.2	
	72		3.9	2.9	
	108		3.8	3.0	
	144		3.8	2.7	
1+50	0		3.0	3.4	
	36		3.1	3.2	
	72		3.1	3.2	
	108		3.2	3.3	
	144		3.3	3.0	
2+00	0		2.8	3.4	
	36		3.4	2.9	
	72		3.3	3.0	
	108		3.3	3.0	
	144		3.0	3.0	
2+50	0		3.3	3.2	
	36		3.5	2.9	
	72		3.3	3.0	
	108		3.2	3.2	
	144		2.8	3.3	
3+00	0		3.7	3.3	
	36		3.5	3.3	
	72		4.0	3.1	
	108		3.7	2.9	
	144		3.7	2.7	
LAYER NUMBER			3	5	

PREPARER [signature] EMPLOYER BRC DATE 11/16/95

SPS CONSTRUCTION DATA
SHEET 12
LAYER THICKNESS MEASUREMENTS

* STATE CODE [4 8]
* SPS PROJECT CODE [0 9]
* TEST SECTION NO. [0 1]

SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3-50	0		3.6	3.3	
	36		4.1	2.9	
	72		3.9	2.9	
	108		3.6	3.0	
	144		3.9	2.9	
4-00	0		4.4	3.1	
	36		4.4	3.0	
	72		4.3	2.9	
	108		4.1	3.1	
	144		4.4	2.7	
4-50	0		3.6	3.2	
	36		3.9	2.9	
	72		4.2	2.6	
	108		4.2	2.6	
	144		4.5	2.5	
5-00	0		4.4	2.5	
	36		4.3	2.6	
	72		4.4	2.5	
	108		4.2	2.7	
	144		4.1	2.7	
--		AVG.	3.6	2.9	
		MIN.	2.8	2.2	
		MAX.	4.5	3.4	
		STD.	0.5	0.3	
+					
+					
LAYER NUMBER			3	5	

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [08-04-95]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [08-11-95]

*3. LAYER NUMBER (From Sheet 4) [2]

PRIMARY COMPACTION EQUIPMENT

*4. CODE TYPE [1]

COMPACTION TYPE CODES
Pneumatic - Tired... 1 Steel Wheel Tandem... 2 Single Drum Vibr.... 3
Double Drum Vibr.... 4
Other (Specify)... 5 _____

*5. GROSS WEIGHT (TONS) [30.0]

*6. LIFT THICKNESSES
Nominal First Lift Placement Thickness (inches) [6]
Nominal Second Lift Placement Thickness (inches) [ ]
Nominal Third Lift Placement Thickness (inches) [ ]
Nominal Fourth Lift Placement Thickness (inches) [ ]

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

7. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 1]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [0 7-1 0-9 5]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [0 7-2 5-9 5]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [2]

COMPACTION EQUIPMENT TYPE CODES
Sheepsfoot... 1 Pneumatic Tired... 2 Steel Wheel Tandem... 3
Single Drum Vibr.... 4 Double Drum Vibr.... 5
Other (Specify)... 6 _____

*4. GROSS WEIGHT (TONS) [3 0.0]

	TYPE	PERCENT
*5. STABILIZING AGENT 1	[__]	[__ __ __]
*6. STABILIZING AGENT 2	[__]	[__ __.__]

STABILIZING AGENT TYPE CODES
Portland Cement... 1 Lime... 2 Fly Ash, Class C... 3
Fly Ash, Class N... 4
Other (Specify)... 5 _____

*7. TYPICAL LIFT THICKNESS (INCHES) [__ __]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

PREPARER [signature] EMPLOYER BRS DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [48] * SPS PROJECT CODE [09] * TEST SECTION NO. [02]

*1. DATE OF DATA COLLECTION OR UPDATE (Month/Year) [10/95]

*2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [48.]

*3. COUNTY OR PARISH BEXAR [029.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) RURAL, PRINCIPAL ARTERIAL, OTHER [02.]

*5. ROUTE SIGNING (NUMERIC CODE) [4.]
Interstate... 1 U.S.... 2 State... 3 FM
Other... 4

*6. ROUTE NUMBER [1604.]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [01.]

8. NUMBER OF THROUGH LANES (ONE DIRECTION) [2.]

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [10/95]

*10. DATE OPENED TO TRAFFIC (Month/Year) [1/96]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) [_____.]

12. DIRECTION OF TRAVEL [4.]
East Bound... 1 West Bound... 2 North Bound... 3
South Bound... 4

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [___.__]

*14. ELEVATION [1000]

*15. LATITUDE [29° 33' __ . __"]

*16. LONGITUDE [98° 40' __ . __"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [CSJ 2452-02-023, SECTION BEGINS 0.7 MILES NORTH OF SH 16]

18. HPMS SAMPLE NUMBER (HPMS ITEM 28) [_____]

19. HPMS SECTION SUBDIVISION (HPMS ITEM 29) [__.]

PREPARER [signature] EMPLOYER [illegible] DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. LANE WIDTH (FEET) [1 2.]

2. MONITORING SITE LANE NUMBER [1.]
(LANE 1 IS OUTSIDE LANE, NEXT TO SHOULDER
LANE 2 IS NEXT TO LANE 1, ETC.)

*3. SUBSURFACE DRAINAGE LOCATION [3.]
Continuous Along Test Section... 1 Intermittent... 2 None... 3

*4. SUBSURFACE DRAINAGE TYPE [1.]
No Subsurface Drainage... 1 Longitudinal Drains... 2
Transverse Drains... 3 Drainage Blanket... 4 Well System... 5
Drainage Blanket with Longitudinal Drains... 6
Other (Specify)... 7 _____

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
*5. SURFACE TYPE Turf... 1 Granular.... 2 Asphalt Concrete... 3 Concrete... 4 Surface Treatment... 5 Other (Specify)... 6 _____	[3]	[3]
*6. TOTAL WIDTH (FEET)	[5.]	[1 1.]
*7. PAVED WIDTH (FEET)	[4.]	[1 0.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[2 8.]	[2 8.]
9. SURFACE THICKNESS (INCHES)	[3.0]	[3.0]
10. SHOULDER BASE THICKNESS (INCHES)	[4.0]	[4.0]
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[N/A]
12. SPACING OF LATERALS (FEET)		[N/A.]

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS· CONSTRUCTION DATA SHEET 3 REFERENCE PROJECT STATION TABLE	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [X X]

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER		*4 CUT-FILL[1]	
		*2 START	*3 END	TYPE	STATION
1	480901	0 + 00	5 + 00	2	+
2	480903	47 + 50	52 + 50	2	+
3	480902	59 + 50	64 + 50	2	+
4		+	+		+
5		+	+		+
6		+	+		+
7		+	+		+
8		+	+		+
9		+	+		+
10		+	+		+
11		+	+		+
12		+	+		+
13		+	+		+
14		+	+		+
15		+	+		+
16		+	+		+
17		+	+		+
18		+	+		+
19		+	+		+
20		+	+		+

*5 INTERSECTIONS BETWEEN TEST SECTION ON THE PROJECT

ROUTE	PROJECT STATION NO.	RAMPS EXIT	RAMPS ENT	INTERSECTION STOP	INTERSECTION SIGNAL	INTERSECTION UNSIG
Hausman Rd (FM 1560)	43+00		✓			
	+					
	+					

Note 1. Indicate the type of subgrade section the test section is located on:
Cut.... 1 Fill..... 2 At-Grade..... 3 Cut and Fill..... 4
If cut-fill transition is located in a test section, enter test section station of the cut-fill transition location.

PREPARED: [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 1]				
2	[6]	[2 3]	[6.0]	---.-	---.-	---.-
3	[5]	[2 8]	[4.1]	3.5	4.8	0.2
4	[3]	[0 1]	[2.8]	2.4	3.2	0.2
5	[ ]	[ ]	[---.-]	---.-	---.-	---.-
6	[ ]	[ ]	[---.-]	---.-	---.-	---.-
7	[ ]	[ ]	[---.-]	---.-	---.-	---.-
8	[ ]	[ ]	[---.-]	---.-	---.-	---.-
9	[ ]	[ ]	[---.-]	---.-	---.-	---.-
10	[ ]	[ ]	[---.-]	---.-	---.-	---.-
11	[ ]	[ ]	[---.-]	---.-	---.-	---.-
12	[ ]	[ ]	[---.-]	---.-	---.-	---.-
13	[ ]	[ ]	[---.-]	---.-	---.-	---.-
14	[ ]	[ ]	[---.-]	---.-	---.-	---.-
15	[ ]	[ ]	[---.-]	---.-	---.-	---.-

FLEX BASE (TVA, GR1 MOD ASB, GR4

*5 DEPTH BELOW SURFACE TO "RIGID" LAYER (FEET) [4.0]
(Rock, Stone, Dense Shale)

NOTES:

1. Layer 1 is the subgrade soil, the highest numbered layer is the pavement surface.

2. Layer description codes:

Overlay.....01	Base Layer.....05	Porous Friction Course..09
Seal/Tack Coat.....02	Subbase Layer.....06	Surface Treatment.....10
Original Surface.....03	Subgrade.....07	Embankment (Fill).....11
HMAC Layer (Subsurface).04	Interlayer.....08	

3. The material type classification codes are presented in Tables A.5, A.6, A.7 and A.8 of the Data Collection Guide for Long Term Pavement Performance Studies, dated January 17, 1990.

4. Enter the average thickness of each layer and the minimum, maximum and standard deviation of the thickness measurements, if known.

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [08-30-95]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-02-95]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers		
Plant 1	[2]	Vulcan Materials	[4]	[7]	[3]	[4]	[ ]
Plant 2	[ ]	Helotes	[ ]	[ ]	[ ]	[ ]	[ ]
Plant 3	[ ]		[ ]	[ ]	[ ]	[ ]	[ ]

Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify_____

4. MANUFACTURER OF ASPHALT CONCRETE PAVER Blaw Knox

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER PF-200B

6. SINGLE PASS LAYDOWN WIDTH (Feet) [12.0]

7. AC BINDER COURSE LIFT
   Layer Number [03]
   Nominal First Lift Placement Thickness (Inches) [4.0]
   Nominal Second Lift Placement Thickness (Inches) [.]

8. AC SURFACE COURSE LIFT
   Layer Number [04]
   Nominal First Lift Placement Thickness (Inches) [3.0]
   Nominal Second Lift Placement Thickness (Inches) [.]

9. SURFACE FRICTION COURSE (If Placed)
   Layer Number [ ]
   Nominal Placement Thickness (Inches) [.]

10. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
    Binder Course [-]
    Surface Course [+]
    Surface Friction Course [+]

11. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
    Between lanes.. 1 Within lane.. 2
    (specify offset from O/S feet) [.]

12. SIGNIFICANT EVENTS DURING CONSTRUCTION (disruptions, rain, equip. problems, etc.)_____

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [10-02-95]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-02-95]
*3. LAYER NUMBER [4]

*4. MIXING TEMPERATURE (°F) [300.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 260.
Minimum..... 250.
Standard Deviation... __.__
Number of Tests ..... 7.
Maximum..... 270.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	11.7				
7	B	Steel-Whl Tandem	13.0				
8	C	Steel-Whl Tandem	__.__				
9	D	Steel-Whl Tandem	__.__				
10	E	Pneumatic-Tired	__.__	____.			
11	F	Pneumatic-Tired	__.__	____.			
12	G	Pneumatic-Tired	__.__	____.			
13	H	Pneumatic-Tired	__.__	____.			
14	I	Single-Drum Vibr.	11.7		____.	____.	__.__
15	J	Single-Drum Vibr.	__.__		____.	____.	__.__
16	K	Single-Drum Vibr.	__.__		____.	____.	__.__
17	L	Single-Drum Vibr.	__.__		____.	____.	__.__
18	M	Double-Drum Vibr.	__.__		____.	____.	__.__
19	N	Double-Drum Vibr.	__.__		____.	____.	__.__
20	O	Double-Drum Vibr.	__.__		____.	____.	__.__
21	P	Double-Drum Vibr.	__.__		____.	____.	__.__
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	__	__	__
24	Coverages	__2.	__.__	__.__	__.__
	INTERMEDIATE				
25	Roller Code (A-Q)	A	__	__	__
26	Coverages	__2.	__.__	__.__	__.__
	FINAL				
27	Roller Code (A-Q)	B	__	__	__
28	Coverages	__1.	__.__	__.__	__.__
29	Air Temperature (°F)	__86.	___.	___.	___.
30	Compacted Thickness (In)	3.0	__.__	__.__	__.__
31	Curing Period (Days)	__.__	__.__	__.__	__.__

PREPARER [signature] EMPLOYER RSRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [0 8-3 0-9 5]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [0 8-3 0-9 5]
*3. LAYER NUMBER [3]

*4. MIXING TEMPERATURE (°F) [2 9 0.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 2 5 0.
Minimum..... 2 4 0.
Standard Deviation... _ _._
Number of Tests ..... 3.
Maximum..... 2 5 7.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	1 1.7				
7	B	Steel-Whl Tandem	_ _._				
8	C	Steel-Whl Tandem	_ _._				
9	D	Steel-Whl Tandem	_ _._				
10	E	Pneumatic-Tired	3 0.0	_ _ _ _.			
11	F	Pneumatic-Tired	_ _._	_ _ _ _.			
12	G	Pneumatic-Tired	_ _._	_ _ _ _.			
13	H	Pneumatic-Tired	_ _._	.			
14	I	Single-Drum Vibr.	1 1.7		_ _ _ _.	._ _ _	_ _._
15	J	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
16	K	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
17	L	Single-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
18	M	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
19	N	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
20	O	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
21	P	Double-Drum Vibr.	_ _._		_ _ _ _.	._ _ _	_ _._
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	_	_	_
24	Coverages	_ 2.	_ _.	_ _.	_ _.
	INTERMEDIATE				
25	Roller Code (A-Q)	A	_	_	_
26	Coverages	_ 2.	_ _.	_ _.	_ _.
	FINAL				
27	Roller Code (A-Q)	E	_	_	_
28	Coverages	_ 1.	_ _.	_ _.	_ _.
29	Air Temperature (°F)	_ _ _.	_ _ _.	_ _ _.	_ _ _.
30	Compacted Thickness (In)	4.0	_._	_._	_._
31	Curing Period (Days)	_ _._	_ _._	_ _._	_ _._

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]	__	A	__
Number of Measurement	__ __	__ 3	__ __
Average (pcf)	__ __ __.__	1 4 1.0	__ __ __.__
Maximum (pcf)	__ __ __.__	1 4 2.4	__ __ __.__
Minimum (pcf)	__ __ __.__	1 3 9.2	__ __ __.__
Standard Deviation (pcf)	__ __ __.__	__ 1.7	__ __ __.__
Layer Number	__ __	__ 4	__ __

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE TROXLER

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3430

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER _____

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION __ __ __ __ __

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2 __
Profile Index (Inches/Mile) __ __
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3 __
Height of Blanking Band (Inches) __.__ __
Cutoff Height (Inches) __.__ __

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO) __

PREPARER [signature] EMPLOYER BRE DATE 11/20/95

Project : NH 90(191)M
Highway : LP 1604
CSJ : 2452-02-023 Supra Pave
Material : Type "C" Surface
Producer : Vulcan Helotes
County : Bexar

Date : 10/05/95

Sample Number	Core Number	Location	% Relative Compaction	% Air Voids	Measured Depth	Rice (Gr)
15-95-1072	1	240.90 WBML 42' Rt	93.6%	6.4%	2.9"	2.416
"	2	240+90 WBML 62' Rt	95.1%*	4.9%	2.8"	2.416
"	3	241+00 WBML 48' Rt	93.3%	6.7%	2.8"	2.416
		Averages =	94.0%	6.0%		

* This denotes failure to meet specified air voids!

Sample Number	Core Number	Nuclear Density	Core Density	Date Laid Or Cored
15-95-1072	1	139.2	141.1	10/03/95
"	2	142.4	143.3	"
"	3	141.5	140.7	"
Averages =		141.0	141.7	

Distribution : David Balli
Construction Engineer
District Lab Files
Nuclear Gauge Operator

F. M. Jaster

SPS CONSTRUCTION DATA
SHEET 12
LAYER THICKNESS MEASUREMENTS

* STATE CODE [4 8]
* SPS PROJECT CODE [0 9]
* TEST SECTION NO. [0 2]

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	0		4.1	3.0	
	36		4.1	3.1	
	72		4.1	3.1	
	108		4.1	3.0	
	144		4.1	2.8	
0+50	0		4.2	3.0	
	36		4.2	2.9	
	72		4.0	2.9	
	108		4.1	2.9	
	144		4.1	2.8	
1+00	0		4.2	2.6	
	36		3.6	3.1	
	72		3.5	3.2	
	108		3.5	3.1	
	144		3.7	3.2	
1+50	0		4.3	2.7	
	36		4.1	2.9	
	72		4.0	2.6	
	108		3.9	3.0	
	144		4.0	2.8	
2+00	0		4.1	2.8	
	36		4.2	2.9	
	72		4.6	2.8	
	108		4.2	3.0	
	144		4.1	2.8	
2+50	0		4.1	2.6	
	36		3.9	2.8	
	72		3.6	3.1	
	108		3.8	2.8	
	144		4.1	2.7	
3+00	0		4.2	2.8	
	36		4.1	2.8	
	72		4.0	3.0	
	108		4.1	2.8	
	144		4.1	2.8	
LAYER NUMBER			3	4	

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3-50	0		4.4	2.7	
	36		4.3	2.8	
	72		4.0	3.1	
	108		4.0	2.9	
	144		3.9	3.0	
4-00	0		4.8	2.4	
	36		4.2	2.8	
	72		3.9	3.1	
	108		4.1	3.0	
	144		3.9	2.9	
4-50	0		4.3	2.6	
	36		4.3	2.6	
	72		3.9	2.9	
	108		4.0	3.7	
	144		3.9	2.7	
5-00	0		4.3	2.4	
	36		4.1	2.5	
	72		3.8	2.8	
	108		4.0	2.9	
	144		4.1	2.8	
--		AVG =	4.1	2.8	
		MIN =	3.5	2.4	
		MAX =	4.8	3.2	
		STD =	0.2	0.2	
--					
--					
LAYER NUMBER			3	4	

PREPARER [signature] EMPLOYER BLE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [08-04-95]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [08-11-95]

*3. LAYER NUMBER (From Sheet 4) [2]

PRIMARY COMPACTION EQUIPMENT

*4. CODE TYPE [1]

COMPACTION TYPE CODES
Pneumatic - Tired... 1 Steel Wheel Tandem... 2 Single Drum Vibr.... 3
Double Drum Vibr.... 4
Other (Specify)... 5 _____

*5. GROSS WEIGHT (TONS) [30.0]

*6. LIFT THICKNESSES
Nominal First Lift Placement Thickness (inches) [6]
Nominal Second Lift Placement Thickness (inches) [ ]
Nominal Third Lift Placement Thickness (inches) [ ]
Nominal Fourth Lift Placement Thickness (inches) [ ]

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

7. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 2]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [0 7 - 1 0 - 9 5]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [0 7 - 2 5 - 9 5]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [2]

COMPACTION EQUIPMENT TYPE CODES
Sheepsfoot... 1 Pneumatic Tired... 2 Steel Wheel Tandem... 3
Single Drum Vibr.... 4 Double Drum Vibr.... 5
Other (Specify)... 6 _____

*4. GROSS WEIGHT (TONS) [3 0.0]

	TYPE	PERCENT
*5. STABILIZING AGENT 1	[__]	[__ __.__]
*6. STABILIZING AGENT 2	[__]	[__ __.__]

STABILIZING AGENT TYPE CODES
Portland Cement... 1 Lime... 2 Fly Ash, Class C... 3
Fly Ash, Class N... 4
Other (Specify)... 5 _____

*7. TYPICAL LIFT THICKNESS (INCHES) [__ __]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

PREPARER [signature] EMPLOYER BRS DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 1 PROJECT IDENTIFICATION	* STATE CODE [48] * SPS PROJECT CODE [09] * TEST SECTION NO. [03]

*1. DATE OF DATA COLLECTION OR UPDATE (Month/Year) [10/95]

*2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER [48.]

*3. COUNTY OR PARISH BEXAR [029.]

4. FUNCTIONAL CLASS (SEE TABLE A.2, APPENDIX A) RURAL, PRINCIPAL ARTERIAL, OTHER [02.]

*5. ROUTE SIGNING (NUMERIC CODE) FM [4.]
Interstate... 1 U.S.... 2 State... 3
Other... 4

*6. ROUTE NUMBER [1604.]

7. TYPE OF PAVEMENT (01 for Granular Base, 02 for Treated Base) [01.]

8. NUMBER OF THROUGH LANES (ONE DIRECTION) [2.]

*9. DATE OF CONSTRUCTION COMPLETION (Month/Year) [10/95]

*10. DATE OPENED TO TRAFFIC (Month/Year) [1/96]

11. CONSTRUCTION COSTS PER LANE MILE (In $1000) [_____.]

12. DIRECTION OF TRAVEL [4.]
East Bound... 1 West Bound... 2 North Bound... 3
South Bound... 4

PROJECT STARTING POINT LOCATION

*13. MILEPOINT [___.__]

*14. ELEVATION [1000]

*15. LATITUDE [29° 33' __ . __"]

*16. LONGITUDE [98° 40' __ . __"]

17. ADDITIONAL LOCATION INFORMATION (SIGNIFICANT LANDMARKS): [CSJ 2452-02-023, SECTION BEGINS 1.0 MILES NORTH OF SH 16]

18. HPMS SAMPLE NUMBER (HPMS ITEM 28) [_____]

19. HPMS SECTION SUBDIVISION (HPMS ITEM 29) [_.]

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 2 GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION	* STATE CODE * SPS PROJECT CODE * TEST SECTION NO.	[4 8] [0 9] [0 3]

*1. LANE WIDTH (FEET) [1 2.]

2. MONITORING SITE LANE NUMBER [1.]
(LANE 1 IS OUTSIDE LANE, NEXT TO SHOULDER
LANE 2 IS NEXT TO LANE 1, ETC.)

*3. SUBSURFACE DRAINAGE LOCATION [3.]
Continuous Along Test Section... 1 Intermittent... 2 None... 3

*4. SUBSURFACE DRAINAGE TYPE [1.]
No Subsurface Drainage... 1 Longitudinal Drains... 2
Transverse Drains... 3 Drainage Blanket... 4 Well System... 5
Drainage Blanket with Longitudinal Drains... 6
Other (Specify)... 7 _____

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
*5. SURFACE TYPE Turf... 1 Granular.... 2 Asphalt Concrete... 3 Concrete... 4 Surface Treatment... 5 Other (Specify)... 6 _____	[3]	[3]
*6. TOTAL WIDTH (FEET)	[5.]	[1 1.]
*7. PAVED WIDTH (FEET)	[4.]	[1 0.]
8. SHOULDER BASE TYPE (CODES-TABLE A.6)	[2 8.]	[2 8.]
9. SURFACE THICKNESS (INCHES)	[3. 0]	[3. 0]
10. SHOULDER BASE THICKNESS (INCHES)	[4. 0]	[4. 0]
11. DIAMETER OF LONGITUDINAL DRAINPIPES (INCHES)		[N/A]
12. SPACING OF LATERALS (FEET)		[N/A.]

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 3 REFERENCE PROJECT STATION TABLE	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [X X]

ORDER	*1 TEST SECTION ID NO	REFERENCE PROJECT STATION NUMBER		*4 CUT-FILL[1]	
		*2 START	*3 END	TYPE	STATION
1	480901	0 + 00	5 + 00	2	+
2	480903	47 + 50	52 + 50	2	+
3	480902	59 + 50	64 + 50	2	+
4		+	+		+
5		+	+		+
6		+	+		+
7		+	+		+
8		+	+		+
9		+	+		+
10		+	+		+
11		+	+		+
12		+	+		+
13		+	+		+
14		+	+		+
15		+	+		+
16		+	+		+
17		+	+		+
18		+	+		+
19		+	+		+
20		+	+		+

*5 INTERSECTIONS BETWEEN TEST SECTION ON THE PROJECT

ROUTE	PROJECT STATION NO.	RAMPS EXIT	RAMPS ENT	INTERSECTION STOP	INTERSECTION SIGNAL	INTERSECTION UNSIG
Hausman Rd (FM 1560)	43+00		✓			
	+					
	+					

Note 1. Indicate the type of subgrade section the test section is located on:
Cut.... 1 Fill..... 2 At-Grade..... 3 Cut and Fill..... 4
If cut-fill transition is located in a test section, enter test section station of the cut-fill transition location.

PREPARED: [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 4 LAYER DESCRIPTIONS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

*1 LAYER NUMBER	*2 LAYER DESCRIPTION	*3 MATERIAL TYPE CLASS	*4 LAYER THICKNESSES (Inches)			
			AVERAGE	MINIMUM	MAXIMUM	STD. DEV.
1	SUBGRADE(7)	[5 1]				
2	[6]	[2 3]	[6.0]	---.-	---.-	---.-
3	[5]	[2 8]	[4.2]	3.5	5.2	0.3
4	[3]	[0 1]	[2.8]	2.1	3.1	0.2
5	[ ]	[ ]	[---.-]	---.-	---.-	---.-
6	[ ]	[ ]	[---.-]	---.-	---.-	---.-
7	[ ]	[ ]	[---.-]	---.-	---.-	---.-
8	[ ]	[ ]	[---.-]	---.-	---.-	---.-
9	[ ]	[ ]	[---.-]	---.-	---.-	---.-
10	[ ]	[ ]	[---.-]	---.-	---.-	---.-
11	[ ]	[ ]	[---.-]	---.-	---.-	---.-
12	[ ]	[ ]	[---.-]	---.-	---.-	---.-
13	[ ]	[ ]	[---.-]	---.-	---.-	---.-
14	[ ]	[ ]	[---.-]	---.-	---.-	---.-
15	[ ]	[ ]	[---.-]	---.-	---.-	---.-

FLEX BASE (TVA, GRI MOD ASB, GR4)

*5 DEPTH BELOW SURFACE TO "RIGID" LAYER (FEET) [4 . 0]
(Rock, Stone, Dense Shale)

NOTES:

1. Layer 1 is the subgrade soil, the highest numbered layer is the pavement surface.

2. Layer description codes:

Overlay.....01	Base Layer.....05	Porous Friction Course..09
Seal/Tack Coat.....02	Subbase Layer.....06	Surface Treatment.....10
Original Surface.....03	Subgrade.....07	Embankment (Fill).....11
HMAC Layer (Subsurface).04	Interlayer.....08	

3. The material type classification codes are presented in Tables A.5, A.6, A.7 and A.8 of the Data Collection Guide for Long Term Pavement Performance Studies, dated January 17, 1990.

4. Enter the average thickness of each layer and the minimum, maximum and standard deviation of the thickness measurements, if known.

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 9 PLANT-MIXED ASPHALT BOUND LAYERS PLACEMENT DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [08-30-95]

*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10-02-95]

*3 ASPHALT CONCRETE PLANT AND HAUL

	Type	Name	Haul Distance (Mi)	Time (Min)	Layer Numbers		
Plant 1	[2]	Vulcan Materials	[4]	[7]	[3]	[4]	[ ]
Plant 2	[ ]	Metlons	[ ]	[ ]	[ ]	[ ]	[ ]
Plant 3	[ ]		[ ]	[ ]	[ ]	[ ]	[ ]

Plant Type: Batch..... 1 Drum Mix.... 2 Other...3 Specify ____

4. MANUFACTURER OF ASPHALT CONCRETE PAVER: Blaw Knox

5. MODEL DESIGNATION OF ASPHALT CONCRETE PAVER: PF-200B

6. SINGLE PASS LAYDOWN WIDTH (Feet) [12.0]

7. AC BINDER COURSE LIFT
   - Layer Number [03]
   - Nominal First Lift Placement Thickness (Inches) [4.0]
   - Nominal Second Lift Placement Thickness (Inches) [.]

8. AC SURFACE COURSE LIFT
   - Layer Number [04]
   - Nominal First Lift Placement Thickness (Inches) [3.0]
   - Nominal Second Lift Placement Thickness (Inches) [.]

9. SURFACE FRICTION COURSE (If Placed)
   - Layer Number [ ]
   - Nominal Placement Thickness (Inches) [.]

10. TEST SECTION STATION OF TRANSVERSE JOINTS (within test section)
    - Binder Course [+]
    - Surface Course [+]
    - Surface Friction Course [+]

11. LOCATION OF LONGITUDINAL SURFACE JOINT [1]
    - Between lanes.. 1 Within lane.. 2
    - (specify offset from O/S feet) [.]

12. SIGNIFICANT EVENTS DURING CONSTRUCTION (disruptions, rain, equip. problems, etc.) ____

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [10.02.95]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [10.02.95]
*3. LAYER NUMBER [4]

*4. MIXING TEMPERATURE (°F) [300.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 260.
Minimum..... 250.
Standard Deviation... __.__
Number of Tests ..... 7.
Maximum..... 270.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	11.7				
7	B	Steel-Whl Tandem	13.0				
8	C	Steel-Whl Tandem	__.__				
9	D	Steel-Whl Tandem	__.__				
10	E	Pneumatic-Tired	__.__	____.			
11	F	Pneumatic-Tired	__.__	____.			
12	G	Pneumatic-Tired	__.__	____.			
13	H	Pneumatic-Tired	__.__	____.			
14	I	Single-Drum Vibr.	17.7		____.	___	__.__
15	J	Single-Drum Vibr.	__.__		____.	___	__.__
16	K	Single-Drum Vibr.	__.__		____.	___	__.__
17	L	Single-Drum Vibr.	__.__		____.	___	__.__
18	M	Double-Drum Vibr.	__.__		____.	___	__.__
19	N	Double-Drum Vibr.	__.__		____.	___	__.__
20	O	Double-Drum Vibr.	__.__		____.	___	__.__
21	P	Double-Drum Vibr.	__.__		____.	___	__.__
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	__	__	__
24	Coverages	__2.	__.__	__.__	__.__
	INTERMEDIATE				
25	Roller Code (A-Q)	A	__	__	__
26	Coverages	__2.	__.__	__.__	__.__
	FINAL				
27	Roller Code (A-Q)	B	__	__	__
28	Coverages	__1.	__.__	__.__	__.__
29	Air Temperature (°F)	__86.	___.	___.	___.
30	Compacted Thickness (In)	3.0	__.__	__.__	__.__
31	Curing Period (Days)	__.__	__.__	__.__	__.__

PREPARER [signature] EMPLOYER RSRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 10 PLANT-MIXED ASPHALT BOUND LAYERS COMPACTION DATA	* STATE CODE [48] * SPS PROJECT CODE [09] * TEST SECTION NO. [03]

*1. DATE PAVING OPERATIONS BEGAN (Month-Day-Year) [08-30-95]
*2. DATE PAVING OPERATIONS COMPLETED (Month-Day-Year) [08-30-95]
*3. LAYER NUMBER [3]

*4. MIXING TEMPERATURE (°F) [290.]

5. LAYDOWN TEMPERATURES (°F)
Mean..... 250.
Minimum..... 240.
Standard Deviation... __.__
Number of Tests ..... 3.
Maximum..... 257.

ROLLER DATA

	Roller Code #	Roller Description	Gross Wt (Tons)	Tire Press. (psi)	Frequency (Vibr./Min)	Amplitude (Inches)	Speed (mph)
6	A	Steel-Whl Tandem	11.7				
7	B	Steel-Whl Tandem	__.__				
8	C	Steel-Whl Tandem	__.__				
9	D	Steel-Whl Tandem	__.__				
10	E	Pneumatic-Tired	30.0	____.			
11	F	Pneumatic-Tired	__.__	____.			
12	G	Pneumatic-Tired	__.__	____.			
13	H	Pneumatic-Tired	__.__				
14	I	Single-Drum Vibr.	11.7		____.	___	__.__
15	J	Single-Drum Vibr.	__.__		____.	___	__.__
16	K	Single-Drum Vibr.	__.__		____.	___	__.__
17	L	Single-Drum Vibr.	__.__		____.	___	__.__
18	M	Double-Drum Vibr.	__.__		____.	___	__.__
19	N	Double-Drum Vibr.	__.__		____.	___	__.__
20	O	Double-Drum Vibr.	__.__		____.	___	__.__
21	P	Double-Drum Vibr.	__.__		____.	___	__.__
22	Q	Other					

	COMPACTION DATA	First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23	Roller Code (A-Q)	I	__	__	__
24	Coverages	__2.	__.__	__.__	__.__
	INTERMEDIATE				
25	Roller Code (A-Q)	A	__	__	__
26	Coverages	__2.	__.__	__.__	__.__
	FINAL				
27	Roller Code (A-Q)	E	__	__	__
28	Coverages	__1.	__.__	__.__	__.__
29	Air Temperature (°F)	___.	___.	___.	___.
30	Compacted Thickness (In)	4.0	__.__	__.__	__.__
31	Curing Period (Days)	__.__	__.__	__.__	__.__

PREPARER [signature] EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 11 PLANT-MIXED ASPHALT BOUND LAYERS DENSITY AND PROFILE DATA	* STATE CODE 48 * SPS PROJECT CODE 09 * TEST SECTION NO. 03

1. NUCLEAR DENSITY MEASUREMENTS

LAYER TYPE	Binder Course	Surface Course	Surface Friction Layer
Measurement Method (A, B, C)[1]		A	
Number of Measurement		3	
Average (pcf)		140.9	
Maximum (pcf)		142.4	
Minimum (pcf)		140.1	
Standard Deviation (pcf)		1.3	
Layer Number		4	

[1] Measurement Method Backscatter... A Direct Transmission... B Air Gap... C

2. MANUFACTURER OF NUCLEAR DENSITY GAUGE TROXLER

3. NUCLEAR DENSITY GAUGE MODEL NUMBER 3430

4. NUCLEAR DENSITY GAUGE IDENTIFICATION NUMBER

5. NUCLEAR GAUGE COUNT RATE FOR STANDARDIZATION

6. PROFILOGRAPH MEASUREMENTS

Profilograph Type California... 1 Rainhart... 2
Profile Index (Inches/Mile)
Interpretation Method Manual.. 1 Mechanical.. 2 Computer.. 3
Height of Blanking Band (Inches)
Cutoff Height (Inches)

7. SURFACE PROFILE USED AS BASIS OF INCENTIVE PAYMENT? (YES, NO)

PREPARER [signature] EMPLOYER BRE DATE 11/20/95

Project : NH 90(191)M
Control/Section/Job : 2452-02-023
Highway : LP 1604
County : Bexar
Type of Material : Type "C" W/Latex
Producer : Vulcan Helotes

Date : 05-Oct-95

Sample Number	Core Number	Location of Sample	Percent Relative Compaction	Percent Air Voids	
15-95-1073	1	228+65 WBML 30' Rt	93.2%	6.8%	
"	2	228+65 WBML 60' Rt	99.4%	0.6%	*
"	3	228+65 WBML 43' Rt	95.4%	4.6%	*
		Averages =	96.0%	4.0%	*

*** This denotes failure to meet specified air voids!**

Core Number	Rice Gravity	Core Density	Nuclear Density	Date Laid or Cored
1	2.416	140.5	140.3	10/03/95
2	"	149.8	142.4	"
3	"	143.9	140.1	"
	Averages =	144.7	140.9	

Distribution : District Laboratory Files
Construction Office Files
Area Office Files (Balli)

Larry Zamora

SPS CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

SHEET 1 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
0+00	0		3.9	3.1	
	36		3.9	3.1	
	72		4.0	3.0	
	108		4.1	3.1	
	144		4.3	2.8	
0+50	0		4.0	2.5	
	36		4.3	2.5	
	72		4.1	2.8	
	108		4.0	3.0	
	144		3.9	2.9	
1+00	0		4.6	2.1	
	36		4.1	2.7	
	72		3.9	3.0	
	108		3.9	3.0	
	144		4.0	2.9	
1+50	0		4.4	3.0	
	36		4.4	2.8	
	72		4.2	3.0	
	108		4.4	2.9	
	144		4.1	3.0	
2+00	0		4.2	3.0	
	36		4.3	2.8	
	72		4.1	3.0	
	108		4.6	2.8	
	144		4.6	2.6	
2+50	0		5.2	2.6	
	36		4.7	2.5	
	72		4.4	2.8	
	108		4.4	2.8	
	144		4.6	2.5	
3+00	0		4.6	2.8	
	36		4.9	2.4	
	72		4.5	2.8	
	108		4.3	2.6	
	144		4.2	2.7	
LAYER NUMBER			3	4	

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 12 LAYER THICKNESS MEASUREMENTS	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

SHEET 2 OF 2

STATION NUMBER	OFFSET (Inches)	LAYER THICKNESS MEASUREMENTS (Inches)			
		DENSE GRADED AGGREGATE BASE	ASPHALT STABILIZED BASE	ASPHALT SURFACE AND BINDER	SURFACE FRICTION LAYER
3-50	0		4.9	2.4	
	36		4.3	2.8	
	72		4.2	2.9	
	108		3.9	3.1	
	144		4.0	2.8	
4+00	0		4.7	2.5	
	36		4.0	3.0	
	72		3.8	3.0	
	108		3.9	2.9	
	144		3.5	3.0	
4-50	0		4.4	2.6	
	36		4.0	2.6	
	72		3.8	2.7	
	108		3.8	2.7	
	144		3.8	2.8	
5-00	0		4.5	2.8	
	36		4.1	2.9	
	72		4.0	2.9	
	108		3.8	3.0	
	144		3.9	2.8	
+__		AVG	4.2	2.8	
		MIN	3.5	2.1	
		MAX	5.2	3.1	
		STD	0.3	0.2	
+__					
+__					
LAYER NUMBER			3	4	

PREPARER [signature] EMPLOYER BRE DATE 11/16/95

SPS CONSTRUCTION DATA SHEET 13 UNBOUND AGGREGATE BASE MATERIAL PLACEMENT	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

*1. UNBOUND BASE MATERIAL PLACEMENT BEGAN (Month-Day-Year) [0 8-0 4-9 5]

*2. UNBOUND BASE MATERIAL PLACEMENT COMPLETED (Month-Day-Year) [0 8-1 1-9 5]

*3. LAYER NUMBER (From Sheet 4) [2]

PRIMARY COMPACTION EQUIPMENT

*4. CODE TYPE [1]

COMPACTION TYPE CODES
Pneumatic - Tired... 1 Steel Wheel Tandem... 2 Single Drum Vibr.... 3
Double Drum Vibr.... 4
Other (Specify)... 5 _____

*5. GROSS WEIGHT (TONS) [3 0.0]

*6. LIFT THICKNESSES
Nominal First Lift Placement Thickness (inches) [6]
Nominal Second Lift Placement Thickness (inches) [ ]
Nominal Third Lift Placement Thickness (inches) [ ]
Nominal Fourth Lift Placement Thickness (inches) [ ]

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

7. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

EMPLOYER BRE DATE 10/11/95

SPS CONSTRUCTION DATA SHEET 14 SUBGRADE PREPARATION	* STATE CODE [4 8] * SPS PROJECT CODE [0 9] * TEST SECTION NO. [0 3]

*1. SUBGRADE PREPARATION BEGAN (Month-Day-Year) [0 7 - 1 0 - 9 5]

*2. SUBGRADE PREPARATION COMPLETED (Month-Day-Year) [0 7 - 2 5 - 9 5]

PRIMARY COMPACTION EQUIPMENT

*3. CODE TYPE [2]

COMPACTION EQUIPMENT TYPE CODES
Sheepsfoot... 1 Pneumatic Tired... 2 Steel Wheel Tandem... 3
Single Drum Vibr.... 4 Double Drum Vibr.... 5
Other (Specify)... 6 _____

*4. GROSS WEIGHT (TONS) [3 0.0]

	TYPE	PERCENT
*5. STABILIZING AGENT 1	[__]	[__ __ __]
*6. STABILIZING AGENT 2	[__]	[__ __.__]

STABILIZING AGENT TYPE CODES
Portland Cement... 1 Lime... 2 Fly Ash, Class C... 3
Fly Ash, Class N... 4
Other (Specify)... 5 _____

*7. TYPICAL LIFT THICKNESS (INCHES) [__ __]
(For Fill Sections Only)

DENSITY DATA IS RECORDED ON SAMPLING DATA SHEET 8-1

8. SIGNIFICANT EVENTS DURING CONSTRUCTION (DISRUPTIONS, RAIN, EQUIPMENT PROBLEMS, ETC.) _____

PREPARER [signature] EMPLOYER BRS DATE 10/11/95

APPENDIX F

PHOTOGRAPHS

		Page Nº
1	SHOULDER PROBES, 6 JUN 95	F 1
2	SUBGRADE PREPARATION AND SAMPLING, 6 JUN 95	F.1
3	PRIMED FLEXIBLE BASE SURFACE, 3 AUG 95	F 2
4	FLEXIBLE BASE SAMPLING, 3 AUG 95	F 2
5	SURFACE OF 4″ ASPHALT STABILIZED BASE, 18 SEP 95	F 3
6	LAYDOWN OPERATION, 2 OCT 95	F 3
7	CLOSE-UP OF BLAW KNOX PF-200B PAVER AND BARBER GREENE BG-650 FEEDER, 2 OCT 95	F 4
8	HYPAC STEEL-WHEEL ROLLER, 2 OCT 95	F.4
9	NUCLEAR DENSITY MEASUREMENT, 2 OCT 95	F.5
10	COLD JOINTS, 2 OCT 95	F 5
11	STAN STEEL SE-80A DRUM MIX ASPHALT PLANT (4-TON BATCH) VULCAN MATERIALS, HELOTES, TEXAS, 2 OCT 95	F.6
12	CORING AT END OF SUPERPAVE™ SECTION, 6 OCT 95	F.6

Photo 1. Shoulder Probes, 6 June 1995

Photo 2. Subgrade Preparation and Sampling, 6 June 1995

Photo 3. Primed Flexible Base Surface, 3 August 1995

Photo 4. Flexible Base Sampling, 3 August 1995

Photo 5. Surface of 4″ Asphalt Stabilized Base, 18 September 1995

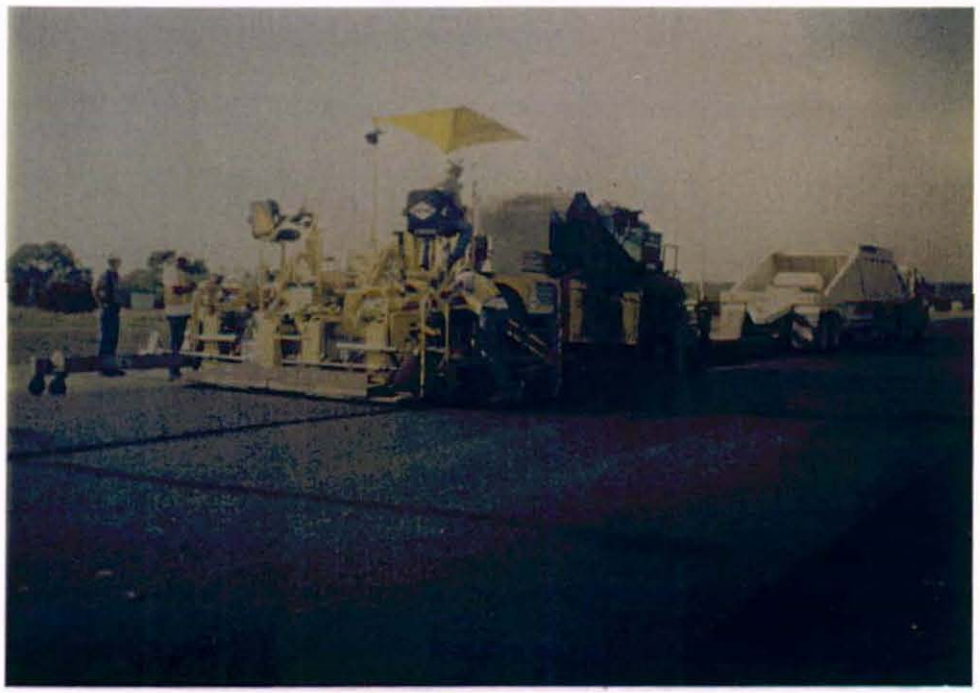


Photo 6. Laydown Operation, 2 October 1995

Photo 7. Close-up of Blaw Knox PF-200B Paver and Barber Greene BG-650 Feeder, 2 October 1995

Photo 8. Hypac Steel-Wheel Roller, 2 October 1995

Photo 9. Nuclear Density Measurement, 2 October 1995

Photo 10. Cold Joints, 2 October 1995

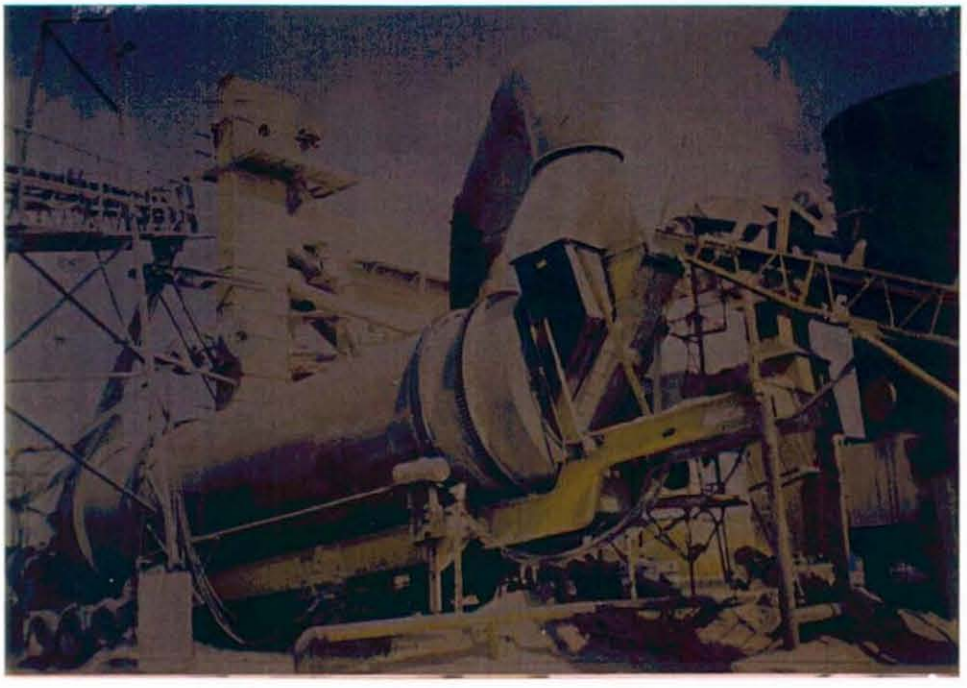


Photo 11. Stan Steel SE-80A Drum Mix Asphalt Plant (4-Ton Batch) Vulcan Materials, Helotes, Texas, 2 October 1995

Photo 12. Coring at End of SUPERPAVE™ Section, 6 October 1995