Brent Rauhut Engineering Inc

FL SPS-9A File

7 March 1997

Mr. Aramis Lopez
Pavement Performance Division - LTPP
Federal Highway Administration
Turner-Fairbanks Highway Research Center
6300 Georgetown Pike, Room F-215
McLean, Virginia 22101

Subject: Final Report - Construction of SPS-9A Project (1209) on I-10 Eastbound in Columbia County, Florida

Dear Aramis,

Enclosed is the Final Report for the Specific Pavement Studies (SPS-9A) project on I-10 Eastbound in Columbia County, Florida. 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,

Mark P. Gardner, P.E.
Project Engineer, SRCO

MPG:dmj

Enclosure: As stated.

c.w/Enc: Larry Smith, FLDOT
Bill Miley, FLDOT
Gale Page, FLDOT
Jim Musselman, FLDOT
Jamshid Armaghani, FLDOT
Ron McNamara, FLDOT
Gene Pettyjohn, FLDOT
Pat Upshaw, FLDOT

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

FINAL REPORT

SPS-9A PROJECT 1209: SUPERPAVE™ ASPHALT BINDER STUDY I-10, EASTBOUND COLUMBIA COUNTY, FLORIDA

FHWA/LTPP

SOUTHERN REGION COORDINATION OFFICE

March 1997

BRENT RAUHUT ENGINEERING INC.

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

FINAL REPORT

SPS-9A PROJECT 1209: SUPERPAVE™ ASPHALT BINDER STUDY I-10, EASTBOUND COLUMBIA COUNTY, FLORIDA

FHWA/LTPP

SOUTHERN REGION COORDINATION OFFICE

March 1997

LIST OF FIGURES

LIST OF TABLES

FINAL REPORT - SPS-9A PROJECT 1209

SUPERPAVE™ ASPHALT BINDER STUDY
IH-10, EASTBOUND
COLUMBIA COUNTY, FLORIDA

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 IH-10 in Columbia County, Florida, was identified as a potential candidate for inclusion in the SUPERPAVE™ Asphalt Binder Studies (SPS-9A).

SPS-9A General Experiment Design

The experiment is intended to validate the SHRP binder specifications by allowing a direct comparison between the asphalt mixtures designed using state agency procedures and the newly developed SHRP procedures. The SPS-9A experiment will also provide the 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-9A experiment objectives are shown in table 2.

Table 2. SPS-9A 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.

The SPS-9A experiment 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. The temperatures are duplicates of the latest SHRP Performance Grade (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-9A, please refer to "Specific Pavement Studies: Experimental Design and Research Plans for Experiment SPS-9A, SUPERPAVE™ Asphalt Binder Study, September 1994".

Selection/Nomination of IH-10, Eastbound

This project was first offered for consideration by the State of Florida in February 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 31 March 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. Figure 1 is a copy of the Stage Agency's plan title sheet. This sheet depicts the location of the project as well as the project's station limits and length of project. Figure 2 also comes from the State Agency's project plans and denotes the details of a typical section of project roadway.

Specific Project Provisions for IH-10, Eastbound

A copy of the "Technical Special Provisions for SHRP SPS-9A Test Sections" is included in this report. These provisions are included in appendix A.

PRECONSTRUCTION MONITORING

Preconstruction monitoring consisted of rod/level shots, cross-profiles (Dipstick®), longitudinal profiling (profilograph), coring, auguring, and subgrade sampling. The rod/level shots and profiling would serve as an existing reference for elevation and slope in order to attain the thickness and slope of the newly constructed pavement layers. Eight 6-inch cores were collected and used to examine the in situ surface layer and it's corresponding layer thickness. After coring, augering took place in the same respective core holes in order to collect base

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.

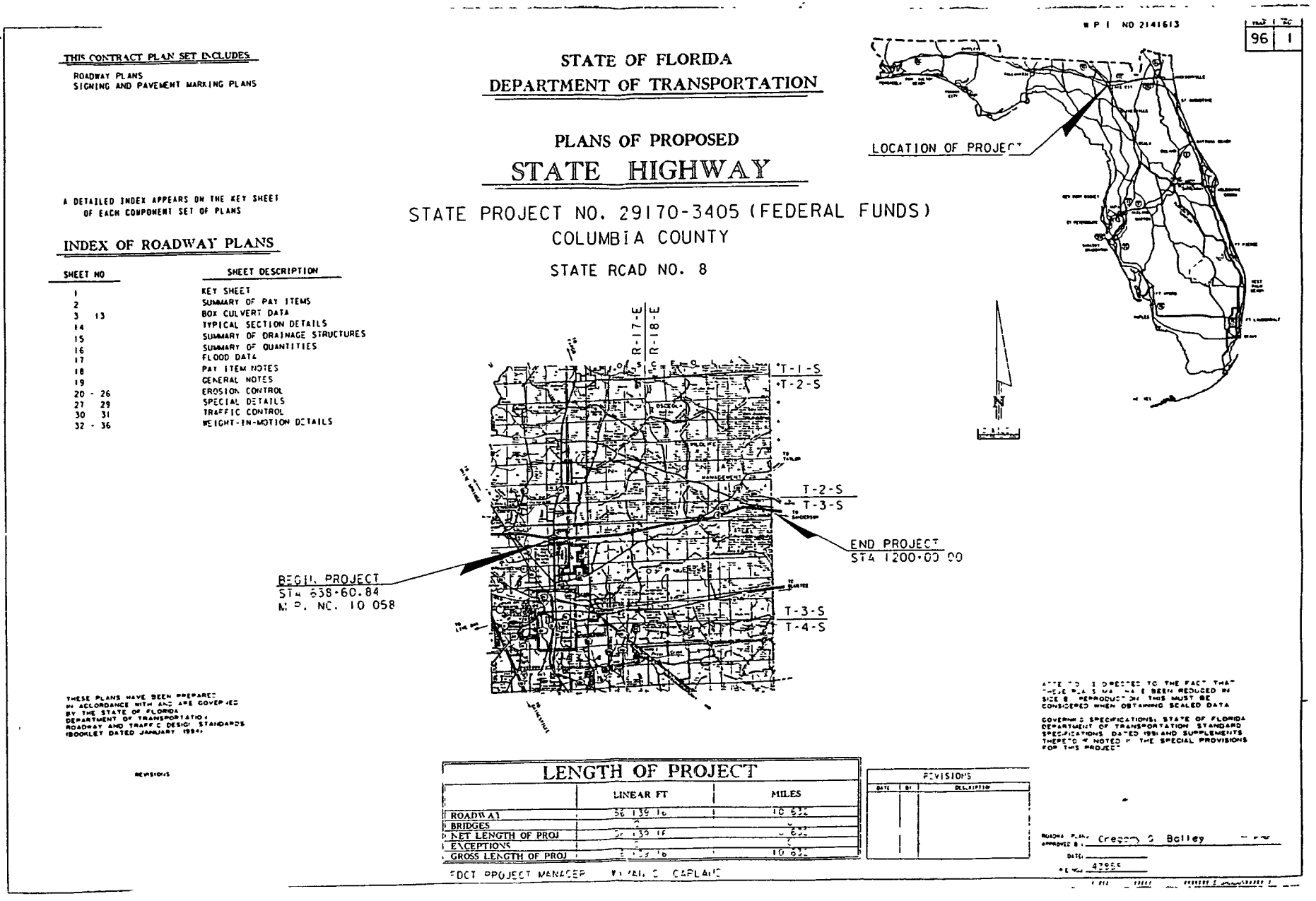
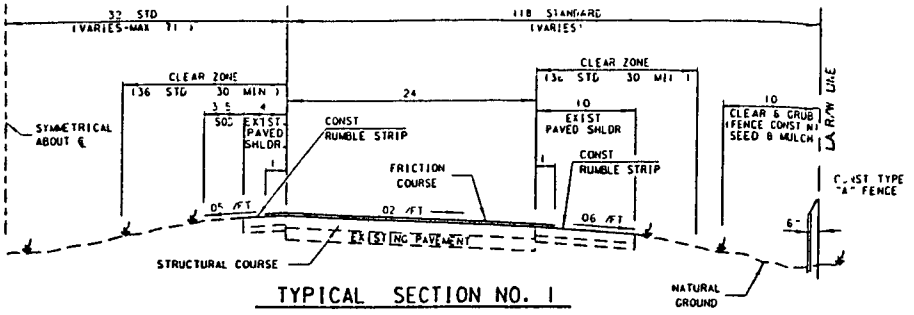


Figure 1. Title sheet.



TYPICAL SECTION NO. 1

MAINLINE I-10 STA.638+60.84 TO STA.1200+00.00

TRAVEL LANES

MILL EXISTING PAVEMENT (3 1/4" AVG DEPTH) ASPHALTIC CONCRETE RUBBER MEMBRANE INTERLAYER (1/2" THICK), TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (325 LBS / S Y. AVG) WITH ASPHALT CONCRETE FRICTION COURSE (FC-2) (5/8" THICK)

OUTSIDE SHOULDERS

MILL EXISTING PAVEMENT (1 1/2" AVG DEPTH) TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (125 LBS./ S.Y AVG.) WITH ASPHALTIC CONCRETE FRICTION COURSE (FC-2) (5/8" THICK)

INSIDE SHOULDERS

MILL EXISTING PAVEMENT (1 1/2" AVG DEPTH) TYPE S ASPHALTIC CONCRETE OVERBUILD COURSE (175 LBS / S.Y AVG) WITH ASPHALTIC CONCRETE FRICTION COURSE (FC-2) (5/8" THICK)

SHRP SPS-9A TEST SECTIONS
THE EASTBOUND OUTSIDE TRAVEL LANE ONLY

SECTION 1: STA 1179+98 88 TO STA 1200+00 00 MILL EXISTING PAVEMENT (3.00" AVG DEPTH), TYPE FC 2 @ 0 63", SUPERPAVE LEVEL 1 MIX W/PG 76-16 BINDER @ 250 LBS/SY @ ARMI

SECTION 2: STA 1159+97.76 TO STA 1179+98 88 MILL EXISTING PAVEMENT (3 00" AVG. DEPTH), TYPE FC-2 @ 0 63", SUPERPAVE LEVEL 1 MIX W/PG 64-16 BINDER @ 250 LBS/SY @ ARMI

SECTION 3: STA 1139+96 64 TO STA 1159+97 76 MILL EXISTING PAVEMENT (3.00" AVG DEPTH), TYPE FC-2 @ 0 63", SUPERPAVE LEVEL 1 MIX W/PG 58-16 BINDER @ 250 LBS/SY @ ARMI

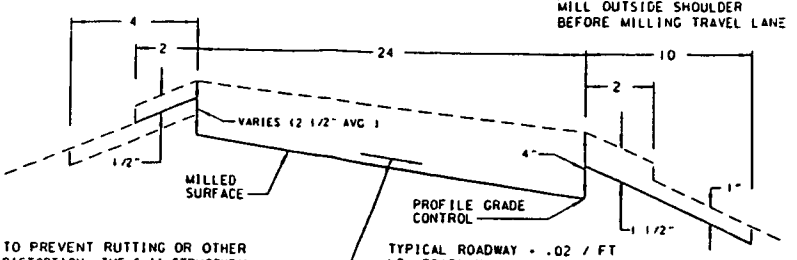
SECTION 4: STA 1119+95 52 TO STA 1139+96 64 MILL EXISTING PAVEMENT (3 00" AVG DEPTH) TYPE FC 2 @ 0 63" TYPE S 2 STRUCTURAL COURSE W/PG 64-16 BINDER @ 250 LBS/SY @ ARMI

NOTES: 1 THE TEST SECTIONS SHOULD BE ADJACENT TO ONE ANOTHER
2. MILL & RESURFACE INSIDE LANE AS SPECIFIED ON TYPICAL SECTION NO 1
3 ASPHALT USED IN TEST SECTIONS SHALL BE VIRGIN ASPHALT MIX

ASPHALT OPERATION DETAILS

29170-3405 14

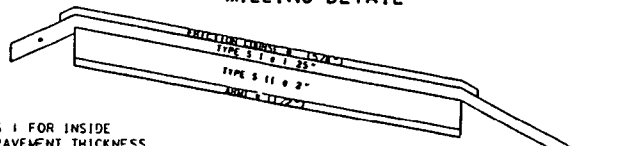
MILL OUTSIDE SHOULDER BEFORE MILLING TRAVEL LANE



TO PREVENT RUTTING OR OTHER DISTORTION THE S-11 STRUCTURAL LAYER SHALL BE PROTECTED FROM TRAFFIC UNTIL THE SURFACE TEMP HAS COOLED BELOW 160° F

TYPICAL ROADWAY - .02 / FT
LT ROADWAY
P C STA.1029+04 61 - 020 / FT (SUPEREL.)
P T STA 1056+31.27
RT ROADWAY
P C STA.1032+43 17 - 020 / FT (SUPEREL)
P T STA 1059+69 83
℄ SURVEY
P C STA 1119 31 56 - 033 / FT (SUPEREL.)
P T STA 1147+96 36

MILLING DETAIL



* - TYPE S I FOR INSIDE SHOULDER PAVEMENT THICKNESS WILL VARY (1 75" AVG)

RESURFACING DETAIL

TRAFFIC DATA
SR 861-(10) FROM SR-47 (US-441) TO BAKER COUNTY LINE
EST 1993 A D T 12 400
EST 1995 A D T 13 300
EST 2000 A D T - 15 600
EST 2010 A D T - 20 200
EST 2015 A D T - 22 500
EST 2020 A D T - 24 800
K 11%
D 55%
T-26%
DT 13%
OMT-1 3%
DHT 11 7%
DESIGN SPEED 65 MPH

TYPICAL SECTION NOTES

1. ALL MAINLINE PAVEMENT THICKNESS TRANSITIONS ARE TO BE CONSTRUCTED ON A 50 1" RATIO
2. ALL PERMANENT GRASS SEED TO BE BERMUDA GRASS OF THE COMMON VARIETY ALL MULCH MATERIAL TO CONSIST OF BERMUDA OAT, WHEAT, AND / OR RYE STRAW
3. SOD SHALL BE COMMON BERMUDA.
4. SOD SHALL BE PLACED AS SOON AS POSSIBLE ON SLOPES TO PREVENT EROSION
5. MILLING DEPTH ON MAIN ROADWAY VARIES FROM 2 50" TO 4 00" (3 25" AVG.) TO ESTABLISH CORRECT PAVEMENT CROSS SLOPE
6. VARIABLE MILLING ON OUTSIDE SHOULDER PAVEMENT FROM 1 5" AT TRAVEL LANE EDGE TO 1 0" AT SHOULDER EDGE MILL FRICTION COURSE (APPROX 0 5" THICK) OFF INSIDE SHOULDER PAVEMENT FROM TRAVEL LANE EDGE TO APPROXIMATELY 2 0 ONTO THE SHOULDER
7. ASPHALT RUBBER MEMBRANE INTERLAYER (ARMI) SHALL CONSIST OF NO 6 STONE PLACED AT 0 26-0 33 C F./SY. AND RUBBER MODIFIED ASPHALT BINDER PLACED AT 0.60-0.80 GALS/SY. TYPE S-11 STRUCTURAL COURSE SHALL BE PLACED IMMEDIATELY FOLLOWING ARMI PLACEMENT
8. STRUCTURAL COURSE SHALL BE PLACED IN TWO LIFTS: TYPE S-11 AT 2 0" AND TYPE S-1 AT 1.25".
9. TURF SHOULDER TO BE BUILT UP AS REQUIRED BY UTILIZATION OF TOPSOIL, SOD AND BORROW EXCAVATION AS REQUIRED.
10. THE AVERAGE MILLING DEPTH SHOWN ON THE PLANS IS APPROXIMATE. IN THE EVENT MILLING DEPTH IS ADJUSTED BASED ON ACTUAL FIELD CONDITIONS DURING CONSTRUCTION, NO COMPENSATION WILL BE MADE
11. PLACE STRUCTURAL COURSE WITH MECHANICAL SPREADER USING ELECTRONIC TRANSVERSE AND LONGITUDINAL SCREED CONTROLS AS RECOMMENDED BY THE DISTRICT MATERIALS OFFICE.
12. SHRP SPS-9A TEST SECTIONS WILL BE IDENTIFIED ON THIS PROJECT FROM MP 19 174 TO 20.690 ON THE EASTBOUND OUTSIDE TRAVEL LANE.

DESCRIPTION | DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION | DATE | BY | DESCRIPTION

FLORIDA DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION

Figure 2. Typical sections.

and subgrade samples. There was only a visual classification of the base material whereas the subgrade was analyzed by the Florida DOT laboratory for Atterberg limits, natural moisture content, classification, and a sieve analysis. Pictures of the preconstruction activities can be found in appendix F.

CONSTRUCTION MONITORING

The following text details any and all unusual features relating to the construction phase of the SPS-9A project. 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 State of Florida retained the services of Post Buckley Shuh & Jernigan (PBS&J) Construction Services, Inc. to oversee the management of the construction of the SPS-9A project. PBS&J (904-961-9619) are located in Lake City, Florida. The construction contractor of the SPS-9A project was Martin Paving Co. (904-761-7050), who has subcontracted the 10.8-mile project to Anderson Columbia Construction Co. (904-752-7585); both companies are located in Lake City, Florida. Representing Anderson Columbia is Ken Murphy of Asphalt Technologies Inc. (904-752-4921) also located in Lake City, Florida. Ken Murphy was responsible for designing the various SUPERPAVE mixes to be constructed on this project.

During a preconstruction meeting, held the day before construction began, Mr. Murphy explained that although originally each of the performance grade binders were to be pumped directly from transport trucks instead of the permanent existing storage tank facilities (eliminating the potential for contamination of one performance grade binder with another) this plan of action would no longer be possible. Mr. Murphy stated that he did have a 10-foot diameter storage tank that could be depleted of binder to within 3 to 6 inches of the tank's bottom, thus minimizing performance grade binder contamination. Concluding the meeting, Mr. Murphy, Mark Sargent of Brent Rauhut Engineering and Pat Upshaw of the Florida DOT agreed that in the interest of personal safety, material collection efforts for the combined aggregates would best be achieved by using a bypass chute that would divert the aggregate from the conveyor belt into a bucket of a front-end loader. From there, the aggregate would be shoveled into 5-gallon buckets for storage. There was some discussion about getting a true representation of the combined aggregates due to a potential problem involving a shakedown of fines in the bucket of the front-end loader.

At the time of writing this report, there is still some question over whether or not a true representation of the aggregate was collected during the sampling efforts. Pat Upshaw of Florida DOT (352-337-3160) has suggested that in order to conduct laboratory testing requirements, the aggregate will either have to be sieved and recreated or else reproduced at the plant. He felt that the sampled aggregate (actually placed into the 5 gallon buckets) was so unrepresentative of the whole, that any lab results would differ greatly from the "as placed" material.

Before construction activities began, test sections 01 and 04 were repositioned in order to avoid a shallow culvert system which was over looked during the initial visit to the project site. Heavy vegetation growth obscured visibility of each headwall on the concrete culvert. Test section 120901 was repositioned 250 feet to the east of its original location. Test section 120904 was repositioned 200 feet to the east of its original location as well. Elevation and cross-profile measurements were then taken on the adjusted test sections (where measurements were not previously taken). It is important to note that for test section 120901, 250 feet of the original preconstruction measurements would still be use as well as 300 feet of test section 120904.

Actual construction took place on the 23rd day of July 1996. The first phase of construction consisted of milling the outside lane approximately 2 inches in depth. Once the lane was milled and broomed, an asphalt rubber membrane interlayer (ARMI) was placed. The crack relief layer filled the 1/2-inch wide longitudinal grooves of the milled surface; then was allowed to "flash off" whereby a stone chip spreader was then utilized to apply a 1-inch nominal size limerock aggregate across the 12-foot lane. After the limerock was placed, two 12-ton pneumatic rollers immediately rolled the aggregate into place. It is important to note that the application of aggregate was somewhat spread thin in places, and in many areas the aggregate appeared to have plenty of space between each individual rock without the intended benefit of consistent contact with other like aggregate.

After the limerock had been spread on the crack relief layer, elevation measurements were taken with the rod and level. Due to the short amount of time available prior to the construction of the hot mix asphalt concrete (HMAC), the elevation measurements were taken at 100 feet intervals instead of the usual 50-foot intervals. It is also note worthy to mention that elevation measurements were not taken on the ARMI itself due to unwanted resin build-up on the bottom of the elevation rod. If resin build-up were to occur, following elevation readings would have been in error.

At approximately 12:20 p.m., the state mix (SII) with performance grade (PG) 64-16 was placed in test section 120901, and by approximately 12:40 p.m. the contractor had reached the end of the test section (5+00). Temperature readings of the uncompacted mat were taken immediately after the laydown machine and were observed at 320° F. The uncompacted mat showed many irregular anomalies and debris (small twigs and sticks). The mix appeared to be very fine and left many pulled areas without material. Because of the (fine) nature of this particular mix, a smaller Dresser 10-ton double steel-drum roller was utilized for initial compaction. Only two static passes were initially conducted as the SII material appeared to become "pushed and shoved" as a result of any compaction effort. Therefore, the rollers lagged behind the laydown machine approximately 20 minutes in order to allow the uncompacted mat ample time to cool, thus reducing the pushing and shoving of material under the compaction effort.

After the Dresser's were finished compacting, a pneumatic roller began the finish compaction effort by rolling approximately 12 passes on the mat to attain the desired 93 percent density. During the collection of rod shot data on the surface of test section 120901, it was noted that the surface of the SII mix was somewhat distressed, whereby a significant amount of stretch marks appeared throughout the 2000-foot test section.

Test section 120903 received the alternate SUPERPAVE mix of PG 58-16. The uncompacted mat appeared to be uniform and unsegregated throughout. Three temperatures of the uncompacted mat were observed at 320°F, 320°F, and 325°F respectively. (While the mix was being place on this test section, the contractor continued on ahead with the ARMI seal and limerock placement on test sections 120902 and 120904 respectively.) The compaction effort consisted of a 12-ton breakdown roller which conducted an initial static path on the uncompacted portions of the mat, followed by two vibratory passes, for a total of three static passes and six vibratory passes across the 12-foot lane. The second 12-ton roller conducted three additional vibratory passes, followed by six static passes. The compacted mat was then allowed to cool to approximately 250°F, whereby a 10-ton steel double-drum roller conducted six additional static passes across the 12-foot lane. This compaction effort was developed as a result of experience through construction of SUPERPAVE mixes on a previous I-75 project in Florida.

During the construction of the previous I-75 project, it was realized that following initial compaction of the mat, finish steel-wheel compaction efforts contributed little to no increase towards final target density requirements. After some frustration on the contractor's part, it was realized that the compaction effort with the steel-wheel 10-ton roller was of no benefit until the initially compacted mat had a chance to cool, whereby continued compaction efforts gained approximately 3 to 4 lbs. per cubic foot in density. Therefore, this roller pattern effort was conducted on the test sections 120902, 120903, and 120904.

Construction began on test section 120902 (PG 64-16) at approximately 4:30 p.m. following a light rain. The accumulation of rain was only slight and therefore a decision was made to continue construction after the short delay. The temperature of the uncompacted mat was observed to be 320°F on average. The texture of the uncompacted mat was uniform and unsegregated. There were no anomalies observed throughout the test section. As a note, the afternoon air temperature was approximately 90°F to 95°F with 90 percent humidity.

The construction of test section 120904 (PG 76-16) began at approximately 6:00 p.m. that evening. The temperatures of the uncompacted mat were observed to be 325°F, 325°F, and 330°F, respectively. There were no observed anomalies within this test section during its construction.

On the 25 July 1996, final elevation and cross-profile measurements were taken on the finished surface. Video of the project was also obtained, noting ravelled and pulled portions of the finish mat whereby heavy truck traffic had been allowed to cross immediately following finish compaction efforts. These anomalies were small and should not impact the performance of the SHRP test sections.

Conclusion of the construction phase consisted of taking density, elevation, and cross-profile measurements as well as attaining the required core samples of the finished mat. Let it be noted that it was the intent of the contractor to apply a friction course on top of the HMAC layer within the next few weeks following construction activities. Therefore, there were no data measurements taken for the friction course. Additionally, there are no plans do take any friction measurements in the near future. The only remaining measurements needed is having

a profilograph collect its measurements from the test sections. Hence, postconstruction monitoring will be the next stage in the SPS-9A project.

POSTCONSTRUCTION MONITORING

With the completion of the SPS-9A construction, postconstruction monitoring will be initiated. It is not anticipated that the sections under study will show signs of surface distress at this time or anytime in the near future. The next data to be collected will be coring at 6, 12, 18, 24, and 48-month periods. The 6-month interval coring is being performed in March 1997. There will be 8 cores to obtain per test section. The cores will be tested for volumetric and binder stiffness.

SUMMARY

Having completed the construction and initial monitoring of the SPS-9A project, it appears that the test sections within the project will contribute significantly to the evaluation of the SUPERPAVE asphalt binder study. The test sections will continue to be monitored for surface distress, surface profile, and structural capacity. The results from the monitoring efforts will be compared against other similar projects throughout the country, thus resulting in an increased awareness of how SUPERPAVE asphalt binders work and can be used to improve our country's present highway infrastructure.

Credit is due to those whose direct involvement with this SPS-9A project proved invaluable. First, this project would not have been possible without the support of the Florida DOT. In particular, Gene Pettyjohn, Jim Musselman, and Pat Upshaw of Florida DOT. We would also like to thank Ray Daniel of PBS&J Construction Services, Inc. and Ken Murphy of Asphalt Technologies, Inc. for their active role in the SPS-9A SUPERPAVE project.

APPENDIX A

SITE NOMINATION INFORMATION
AND
OTHER PERTINENT PROJECT CORRESPONDENCE

Brent Rauhut Engineering Inc.

22 May 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: Florida SPS-9A Nomination

Dear Monte,

Attached is a copy of the SPS-9A nomination form submitted to us by Mr. Bill Deyo, State Highway Engineer for the Florida Department of Transportation.

The construction project is located on IH-10, beginning at Milepost 10.058 and ending at Milepost 20.690, in Baker County, Florida. The SPS-9A project begins at Milepost 19.174 and extends to Milepost 20.690, between SR-47 and the Baker County line.

The State of Florida is currently planning to accommodate four test sections, each test section having a length of 2000 feet. A 500-foot monitoring area will be located within each 2000-foot segment. All test sections will be located on fill.

During a conversation with Mr. Gale Page, I learned that the State of Florida is also somewhat concerned about the production process of the SUPERPAVE™ mix, which is not directly addressed in the SPS-9A guides. The quality assurance and quality control of the production process is being addressed by NCHRP 9-7, but tentative results from this research indicate that it is very advantageous to have a control strip of roughly 350 tons to be produced and placed prior to placing the actual SPS-9A test sections.

If you have any questions regarding the above, please call.

Sincerely,

Mark D. Sargent
Project Engineer, SRCO

MDS.dmj

Attachment: As stated.

c.w/Att: Gale Page, FL-DOT/Gainesville
Morris Reinhardt, RE/SRCO
Ron Cominsky, BRE
Gonzalo Rada, PCS/LAW
Brent Rauhut, SRCO/File
Mark Gardner, SRCO

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

FLORIDA DEPARTMENT OF TRANSPORTATIO
LAWTON CHILES
GOVERNOR
605 Suwannee Street Tallahassee Florida 32399-0450
BEN G. WATTS
SECRETARY

March 31, 1995

NAME	INFO	ACTN	COPY
BR			
MG			
MR	✓		✓
MS		✓	
File:			

Mr. Morris C. Reinhardt, P.E.
SHRP LTPP Southern Region
8240 N. MoPac, Suite 250
Austin, Texas 78759

Dear Mr. Reinhardt:

Subject: Nomination SPS-9A SUPERPAVE Asphalt Binder Study

Attached is the nomination form for an SPS-9A project. Also included a copy of a memo to the District outlining the 4 test sections and considerations which should be included in the contract.

Our staff at the State Materials Office have concerns which were discussed with Monty Symons (FHWA/LTPP-DO) regarding the SPS-9A rutting experiment in which Florida is most interested. Mr. Gale Page of our State Materials Office is a member of the FHWA Asphalt TWG and Binder ETG and will assuredly be discussing our concerns with them. In summary, the current experimental plan requires use of the "standard grade" and one grade less stiff (high temperature requirement). This appears to contradict current practice which is to utilize 1 to 2 grades stiffer (high temperature requirement) for high traffic (Intestate) pavement.

Florida currently specifies AC-30 and is concerned about placing a 58-16 binder mixture under Interstate traffic. We realize the mixture (with whatever binder) must meet the SHRP Level I criteria. Gale Page at our State Materials Office is available to discuss this further, phone (904) 372-5304.

Florida is committed to the implementation of the SHRP asphalt program as well as the verification activities of FTPP in order to improve the quality of asphalt pavements in this State. But we want to make sure that the SPS-9A experiment will be successful.

Sincerely,

Bill Deyo, P.E.
State Highway Engineer

BD:gpb
Attachments
cc: J. R. Skinner, Federal Highway Administration - Florida

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

STATE FLORIDA SHRP SECTION NO. _____

GENERAL PROJECT INFORMATION

PROJECT LOCATION

ROUTE NUMBER I-10

ROUTE SIGNING [X] Interstate [ ] U.S. [ ] State [ ] County

Other _____

PROJECT LOCATION Start Milepost 10.058 End Milepost 20.690

Start Station _____ End Station _____

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

PROJECT LOCATION DESCRIPTION SR-8/I-10 from East of SR-47 to Baker County Line.

COUNTY COLUMBIA

HIGHWAY AGENCY DISTRICT NUMBER DISTRICT II

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]	> -34C (-29F)	[ ]		
< 70C (158F)	[ ]	> -28C (-18F)	[ ]	> 625 mm (25 inches)	[X]
		> -22C (-8F)	[ ]		
		> -16C (3F)	[X]		
		> -10C (14F)	[ ]		

SIGNIFICANT DATES

LATEST DATE OF APPROVAL NOTIFICATION FROM FHWA LTPP _____

CONTRACT LETTING DATE 08-30-95

ESTIMATED CONSTRUCTION START DATE 01-08-96

ESTIMATED DATE TEST SECTIONS OPENED TO TRAFFIC _____

ESTIMATED CONSTRUCTION COMPLETION DATE 12-08-96

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

STATE FL SHRP SECTION NO. _____

TEST SECTION LAYOUT

NUMBER OF TEST SECTIONS ENTIRELY ON: FILL 4 CUT _____
SHORTEST TRANSITION BETWEEN CONSECUTIVE TEST SECTIONS (meters) 31
VERTICAL GRADE (Avg %) (+ upgrade; - downgrade) +1.0%
HORIZONTAL CURVATURE (Degrees)___ [X] Tangent
COMMENTS ON DEVIATIONS FROM DESIRED SITE LOCATION CRITERIA NONE

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) 110
TEST SECTION NUMBER OF NEAREST GPS SECTION GPS-3 SHRP ID 123811
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 1
FACTORS TO BE INVESTIGATED Increased 2 binder grades at high temperature end. Some of the asphalts (AC-30) currently used in Florida have graded at PG76-16.

FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
2006 N. E. Waldo Road
Gainesville, Florida 32609
Ph.: 904-372-5304

MEMORANDUM

DATE: February 15, 1995

TO: Mr. Greg Davis, P.E., District II Pavement Design Engineer

FROM: R. C. West, Bituminous Research Engineer

COPIES: State Highway Engineer, J. B. Lairsey, L. L. Smith, B. Dietrich, G. Page, J. Musselman, D. Romano, G. Shiller

SUBJECT: SHRP SPS-9A Test Section

This memo is a revision of the previous memo on the subject dated February 10, 1995. Please note that the binder grades have changed and that an additional test section has been added. Also, added is a statement on mix design for the Superpave test sections.

As agreed at the February 9, 1995 meeting in District II, PN 29170-3405 (I-10, Columbia Co.) appears to be well suited for setting up the test sections for the Special Pavement Studies 9A project to evaluate Superpave mixtures containing SHRP performance-graded binders.

Four test sections are to be constructed within this project:

Section 1	Superpave Level 1 mix design with a PG 76-16 binder
Section 2	Same mix design as in Section 1 except with a PG 64-16 binder
Section 3	Same mix design as in Section 1 except with a PG 58-16 binder
Section 4	S-II mix design with a PG 64-16 binder

Each test section, including transitions, should be a minimum 2000 ft. in length located in the outside traffic lane of the Eastbound roadway. The mixtures in each section are to be the final structural lift prior to the friction course. The mixtures are to be placed in one lift, 65 mm in thickness, to allow for core samples to be taken for testing in the Superpave shear tester. Each section will therefore contain approximately 350 tons of mixture. This length will allow a complete asphalt tanker to be run out for the each test section and will also provide more time to stabilize production and to obtain test samples of the mixtures. Following construction, the 500 ft. evaluation sections will be situated within the test sections in areas without drainage structures.

It will be necessary to require that the mixtures in the test sections consist of only virgin materials (no RAP) to avoid confounding the analysis by eliminating a potential affect caused by the RAP's binder The Contractor shall supply to the State Materials Office proposed component materials for design of the asphalt mixtures for test sections 1, 2 and 3. The proposed materials shall conform to the requirements of the Superpave Mix Design Manual, February, 1994. The Superpave Level 1 mix designs will be performed by the Central Bituminous Laboratory within one month from the time the

ma terials are received. Additional time may be required if the initial mix designs fail. The most economical combination of materials that satisfies the requirements of Superpave Level 1 will be selected for the test sections. Any questions regarding the materials and the design of the mixtures should be addressed to Messrs. Gale Page, Jim Musselman, or Glen Shiller of the State Materials Office, at phone number 392-5304.

From a constructability standpoint, the best location for the sections would be at the Western end of the project and to have the sections adjacent (end to end) to one another. Therefore, the test sections would be located in the outside lane of the Eastbound roadway beginning with Section 1 from MP 20.690 to MP 20.311, Section 2 from MP 20 311 to MP 19.932, Section 3 from MP 19.932 to MP 19.553, and Section 4 from MP 19.553 to MP 19.174.

Also to aid in constructability of the thick lifts, the District may also consider requiring the use of a Material Transfer Vehicle (MTV), although economically this may not be viable if just required for the construction of the test sections.

Thank you very much for your help in setting up this project. If you need any further information please call either Gale Page or myself at the State Materials Office.

RCW:rw

Brent Rauhut Engineering Inc.

23 June 1995

Mr. Ronald L. McNamara
Pavement Evaluation Engineer
State Materials Office
Florida Department of Transportation
2006 N.E. Waldo Road
Gainesville, Florida 32609-8901

Subject: Florida SPS-9A (120900) Project Approval

Dear Ron,

Attached is a copy the correspondence received by our office indicating that the SPS-9A project located on IH-10 in Baker County, Florida, has been approved for inclusion in the LTPP experiments.

Please also be advised that incentive funds are available, as stated in the attached. However, these funds must be requested through the FHWA Division office.

Thank you for your continued support in the LTPP. If you have any questions regarding the above, please call.

Sincerely,

Mark D. Sargent
Project Engineer, SRCO

MDS:dmj

Attachment: As stated.

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.

PREPAVING CONFERENCE
SPN 29170-3405
March 19, 1996

	Name	Firm	Tel. No.
1.	Ray E. Daniel	PBS & J Constr. Svcs.	(904) 961-9619
2.	Ken Murphy	ASP Tech Inc.	(904) 752-4921
3.	John R. Touchton	Anderson Columbia	904-752-7585
4.	SANDRA CHENEY	Administrative Management PBS&J	904-961-9619
5.	Arnett Franck	FDOT	904-758-3715
6.	G.E. Pettyjohn (Gene)	FDOT (Coord for SPS-9)	904-753-7756
7.	C.E Crews	FDOT	904-758-3715
8.	R. S. HARDEE, JR	FDOT	904 961-7050
9.	Aaron Trippensee	FDOT	904 961 7050
10.	David Daigle	MARTIN PAVING Co	904 761-8383
11.	Mark D. Sargent	Brent Rauhut Eng.	512-346-0870
12.	JIM MUSSELMAN	FDOT	(352) 337-3150
13.	Bill Miley	FDOT	352-337-3132
14.	JERRY COLEMAN	PBS&J	961-9619
15.	mike Russell	P.B.S&J	961-96[illegible]
16.	Steven Sheffield	P.B.S.J	"
17.	Frank Crawford	Anderson Columbia	904 752-7585
18.			
19.			
20.			

TECHNICAL SPECIAL PROVISIONS

FOR

SHRP SPS-9A TEST SECTIONS

State Project No. 29170-3405

WPI No. 2141613

Prepared by: James A. Musselman
Date: 6/11/95
Pages 1 thru 7

SHRP SPS-9A TEST SECTIONS

DESCRIPTION.

The work described in this Technical Special Provision includes all activities related to the construction of the Strategic Highway Research Program (SHRP) Specific Pavement Studies SPS-9A Test Sections, (SUPERPAVE Asphalt Binder Study) on this project.

Four SHRP SPS-9A test sections are to be constructed in the locations identified in the plans. Construction in the test sections consists of milling to an average depth of 3.00 inches, followed by the placement of an asphalt rubber membrane interlayer (ARMI) and then 250 lbs/sy of asphaltic concrete mix that is placed in one lift. In Test Sections 1 thru 3 the asphalt mix (and aggregates) must meet all of the requirements for a SHRP SUPERPAVE Level I mix design. (Additional information on SHRP SUPERPAVE aggregate, binder and mix requirements, as well as all pertinent test procedures, are available in two SHRP publications; A-379, "The SUPERPAVE Mix Design System Manual of Specifications, Test Methods and Practices", and A-407, "The SUPERPAVE Mix Design Manual for New Construction and Overlays." These publications are available from the State Materials Office, 2006 N. E. Waldo Road, Gainesville, 32609. Contact Jim Musselman @ 904 372-5304). In Test Section 4, the mix will be a Type S-II structural mix, also placed in one lift. All of the mixes for the four SHRP SPS-9A test sections are to contain virgin aggregates only. The asphalt cement binder in each test section will be Performance Graded (PG) rather than viscosity graded (AC) and will be the grade indicated in the plans. Additional, non-standard requirements of the SHRP SPS-9A test sections include:

The Contractor (or their representative) will be responsible for designing the asphalt mix. The State Materials Office will have four weeks to verify that the aggregate, binder, and mix design, meet all SUPERPAVE requirements. (The State Materials Office can provide Contractors with a list of commercial laboratories that have the capability of designing SUPERPAVE mixes.)

During production of the mix, the Contractor will be required to run a minimum of one extraction/gradation analysis of the mix per day per test section. For gradation analysis, the Contractor must utilize the sieves as required by SUPERPAVE. The Department will also take samples for extraction/gradation analysis per test section. In addition, the Department will monitor the volumetric properties of the mix during production with the SHRP Gyratory Compactor (SGC) in order to determine air voids, VMA, VFA, and dust-to-asphalt ratio. The Contractor will be required to take appropriate corrective actions in order to maintain an air void content between 3.0 and 5.0 percent during production. Extraction tests for acceptance will not be required.

During placement of the mix, the Contractor will be required to provide a 10-12 ton steel-wheeled vibratory breakdown roller, a pneumatic-tired traffic roller and a steel-wheeled final roller. The District Bituminous Engineer will establish the appropriate rolling pattern for

each section. (SHRP SUPERPAVE Level I mix designs may require greater compactive effort than conventional FDOT mix designs.) Density tests for acceptance will not be performed on the test sections.

Following placement of the mix, the Contractor will be required to provide traffic control and cut six-inch cores at various locations throughout the test sections as directed by the Department. In addition, cross-sectional elevations will need to be taken of the surface after the milling operation, and after the placement of the asphalt mixture. This task will be the responsibility of others, but may result in some delays on the project. The Contractor will be responsible to provide traffic control for this operation at the direction of the Department.

Unless otherwise stated in these Technical Special Provisions, the FDOT Standard Specifications for Road and Bridge Construction, 1991, as amended, are to be used in the construction of the SHRP SPS-9A test sections. Specific changes to the FDOT Standard Specifications for Road and Bridge Construction, 1991, as amended, are as follows:

SECTION 331
TYPE S ASPHALTIC CONCRETE

ARTICLE 331-1. The first paragraph is expanded as follows:

The asphalt mixture placed in the SHRP SPS-9A Test Sections 1, 2, and 3 shall meet the requirements for a 19.0 mm SHRP SUPERPAVE Level 1 mix design. SUPERPAVE mixes shall be designed using the materials specifications in the SHRP publication SHRP-A-379, "The SUPERPAVE Mix Design System Manual of Specifications, Test Methods and Practices", as adopted by AASHTO, and mix design procedures contained in the SHRP publication SHRP-A-407, "The SUPERPAVE Mix Design Manual for New Construction and Overlays." These publications are available from the State Materials Office, 2006 N. E. Waldo Road, Gainesville, Florida, 32609. Contact Jim Musselman @ 904 372-5304).

The design ESAL's for the project is 12.1 million, with a highest mean 7-day recorded temperature of 38°C.

Prior to the production and placement of the SHRP SUPERPAVE Level I mix design on this project, the Contractor will be required to produce a limited amount of mix in order to demonstrate the capability of producing the mix as designed.

ARTICLE 331-1. The second paragraph is deleted.

SUBARTICLE 331-2.1 The text is deleted and the following substituted:

331-2.1 General Specifications: The materials used in the SHRP SPS-9A test sections shall conform with the requirements as specified in these Technical Special Provisions. Specific references are as follows:

(1) Asphalt Cement Performance Grade PG 76-16
Asphalt Cement Performance Grade PG 64-16
Asphalt Cement Performance Grade PG 58-16 916-1
(2) Mineral Filler . . . . . 917-1 & 917-2
(3) Coarse Aggregate, Stone, Slag
or Crushed Gravel 901
(4) Fine Aggregate 902

SUBARTICLE 331-2.2.1 The text is expanded as follows:

For the SHRP SPS-9A Test Sections, the use of Reclaimed Asphalt Pavement (RAP) or other recycled aggregate material, such as recycled Portland cement concrete, will not be allowed.

SUBARTICLE 331-4.1 The text is expanded as follows:

For the SHRP SPS-9A Test Sections, the use of Reclaimed Asphalt Pavement (RAP) or other recycled aggregate material, such as recycled Portland cement concrete, will not be allowed.

SUBARTICLE 331-4.2 The text is expanded as follows:

For the SHRP SPS-9A Test Sections 1, 2, and 3, the Job Mix Formula shall meet the gradation requirements for a 19.0 mm SHRP SUPERPAVE mix design. Test Section 4 will be a Type S-II mix with all virgin aggregates.

SUBARTICLE 331-4.3.1 The text is expanded as follows:

For the SHRP SPS-9A test section mixes, the Contractor shall submit representative samples of all component materials to the State Materials Office at least four weeks before the scheduled start of production.

SUBARTICLE 331-4.3.3 The text is expanded as follows:

This subarticle applies only to the Type S-II mix.

SUBARTICLE 331-4.4.2 The first paragraph is expanded as follows:

The standard sieves for the SHRP SPS-9A Test Sections 1 thru 3 are as required by SUPERPAVE. Test Section 4 will use standard FDOT asphalt sieves.

SUBARTICLE 331-4.4.2 The second paragraph is expanded as follows:

The Contractor will be required to run a minimum of one extraction/gradation analysis per SHRP SPS-9A test section per day.

SUBARTICLE 331-5.1 The first paragraph is expanded by the following:

For the SHRP SPS-9A test sections, acceptance will be based on visual inspection only. The Department will run extraction/gradation analysis for informational purposes only. However, the Contractor will be required to make any adjustments necessary (as determined by the Contractor or the Department), in order to produce the mix within close conformity to the mix design.

SUBARTICLE 331-5.5 The text is expanded as follows:

For the SHRP SPS-9A Test Sections 1 thru 3, the Department will monitor the densification properties of the mix during production with the SHRP Gyratory Compactor and will determine volumetric properties of the mix (air voids, VMA, VFA, and dust-to-asphalt ratio). The Contractor will be required to cease production operations if the properties of the mix are not in close conformity with the mix design and/or the SHRP SUPERPAVE mix design requirements. The Contractor will be required to take appropriate corrective actions in order to maintain an air void content between 3.0 and 5.0 percent during production. Should the air void content in the mix not meet these requirements, plant operations shall be stopped until appropriate corrective actions are made. Approval of the District Bituminous Engineer will be required prior to resuming production of the mix.

Cross-sectional elevations will also need to be taken of the surface after the milling operation, and after the placement of the asphalt mixture. This task will be the responsibility of others, but may result in some delays on the project. The Contractor will be responsible to provide traffic control for this operation at the direction of the Department.

SUBARTICLE 331-6.4 The first paragraph is expanded by the following:

The bid price of the 19.0 mm SHRP SUPERPAVE Level I mix design shall be based on an asphalt content of 6.0 percent.

SECTION 330
HOT BITUMINOUS MIXTURES-
GENERAL CONSTRUCTION REQUIREMENTS

SUBARTICLE 330-10.1 The text is expanded by the following paragraph:

For compaction of the SHRP SPS-9A test sections, the Contractor shall be required to furnish a 10-12 ton steel-wheeled vibratory breakdown roller, a pneumatic-tired traffic roller, and a steel-wheeled finish roller. (Any variations from these equipment requirements shall be approved by the District Bituminous Engineer.) The District Bituminous Engineer will establish the appropriate rolling pattern for each section. (SHRP SUPERPAVE Level I mix designs may require greater compactive effort than conventional FDOT mix designs.) Density tests for acceptance will not be performed on the test sections.

SUBARTICLE 330-10.3 The text is deleted.

SECTION 901
COARSE AGGREGATE

SUBARTICLE 901-1.3 The text is expanded as follows:

For the SHRP SPS-9A Test Sections 1 thru 3, the coarse aggregate shall also meet the requirements for a SHRP Level I mix design as detailed in the SHRP publication SHRP-A-407, "The SUPERPAVE Mix Design Manual for New Construction and Overlays."

SECTION 902
FINE AGGREGATE

SUBARTICLE 902-1.1 The text is expanded as follows:

For the SHRP SPS-9A Test Sections 1 thru 3, the fine aggregate shall also meet the requirements for a SHRP Level I mix design as detailed in the SHRP publication SHRP-A-407, "The SUPERPAVE Mix Design Manual for New Construction and Overlays."

SECTION 916
BITUMINOUS MATERIALS

ARTICLE 916-1 The text is expanded as follows:

For the SHRP SPS-9A test sections, the Performance Graded binder shall meet the requirements as detailed in the SHRP publication SHRP-A-379, "The SUPERPAVE Mix Design System Manual of Specifications, Test Methods, and Practices."

SUBARTICLE 916-1.2 The text is expanded as follows:

For the SHRP SPS-9A test sections, the asphalt supplier shall certify that the binder materials meet the requirements as specified above.

APPENDIX B

MATERIALS SAMPLING AND TESTING PLAN

Brent Rauhut Engineering Inc.

22 March 1996

Mr. Gale C. Page
State Bituminous Materials Engineer
State Materials Office
Florida Department of Transportation
2006 N.E. Waldo Road
Gainesville, Florida 32609-8901

Subject: Florida SPS-9A Project (120900) Materials Sampling and Testing Plan

Dear Mr. Page:

Enclosed is the plan for materials sampling and testing activities for the Florida SPS-9A project, located in the eastbound lanes of IH-10 in Columbia County, Florida. 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,

Mark D. Sargent
Project Engineer, SRCO

MDS:dmj

Enclosure: As stated.

c.w/Enc: Jamshid Armaghani, FL-DOT
Jim Musselman, FL-DOT
Monte Symons, FHWA/LTPP-DC
File: 120900 (Grn)
Bill Miley, FL-DOT
Ron McNamara, FL-D0T
Gonzalo Rada, PCS/LAW

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

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

MATERIAL SAMPLING
AND
TESTING PLAN

FLORIDA SPS-9A PROJECT 120900
COLUMBIA COUNTY, FLORIDA
IH-10, EASTBOUND

PREPARED BY:

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

MARCH 1996

MATERIAL SAMPLING AND TESTING PLAN
FLORIDA SPS-9A PROJECT (120900), IH-10 EASTBOUND
COLUMBIA COUNTY, FLORIDA

INTRODUCTION

As part of their participation in the FHWA/LTPP studies, the State of Florida 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 IH-10, in the eastbound lane, in Columbia County, Florida. It is the intent of this document to provide a complete plan for the material sampling, testing, and laboratory material testing that will occur on behalf 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, June 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. In addition, Florida has elected to construct a fourth section as a supplement, to evaluate a wider array of the PG graded binders. 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 Florida 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 - Preconstruction

C. Materials Sampling and Testing - During Construction

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.

The referenced project stationing was provided by the Florida DOT in the form of preliminary project sketches. If there are significant changes in alignment or stationing, this plan should be reviewed closely to determine if revisions are warranted.

TABLE A-1. TEST SECTION LAYOUT

Section (Cell ID)	Overlay Material	Begin Station	End Station
120901	State S-II Mix (PG64-16)	1119 + 95.52	1139 + 96.64
120903	Alternate SUPERPAVE™ Binder (PG58-16)	1139 + 96.64	1159 + 97.76
120902	SUPERPAVE™ Binder (PG64-16)	1159 + 97.76	1179 + 98.88
120904	SUPERPAVE™ Level I Mix (PG76-16)	1179 + 98	1200 + 00

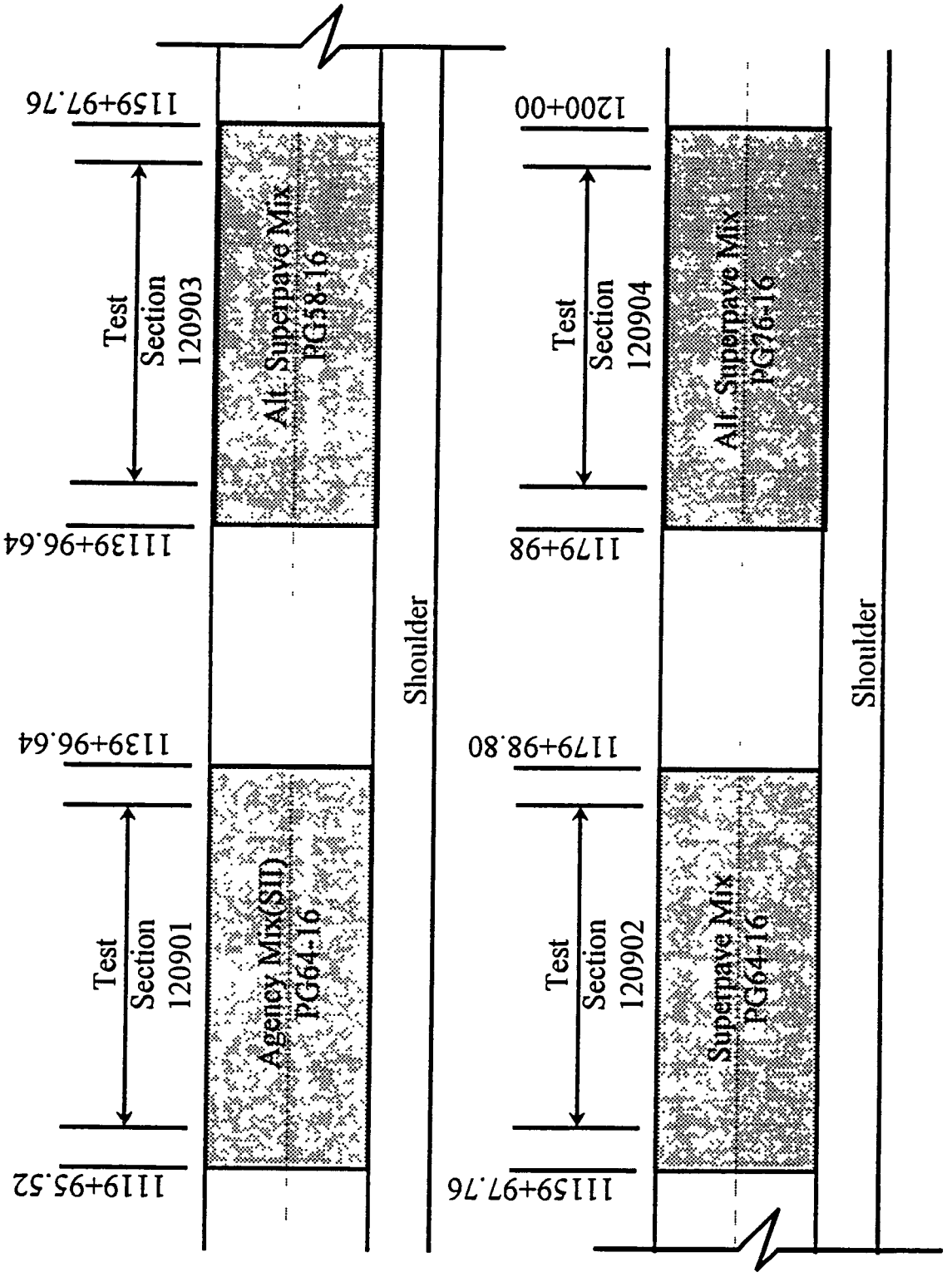


FIGURE A-1. LAYOUT OF TEST SECTIONS FLORIDA SPS-9A (120900)

SECTION B

MATERIAL SAMPLING AND TESTING

PRECONSTRUCTION

SECTION B

MATERIAL SAMPLING AND TESTING

PRECONSTRUCTION

This section of the plan provides for the material sampling and testing activities that occur prior to construction. As the Florida SPS-9A project will be an overlay, the objective of this sampling will be to confirm the type and thickness of existing pavement materials and obtain samples of the subgrade for classification testing.

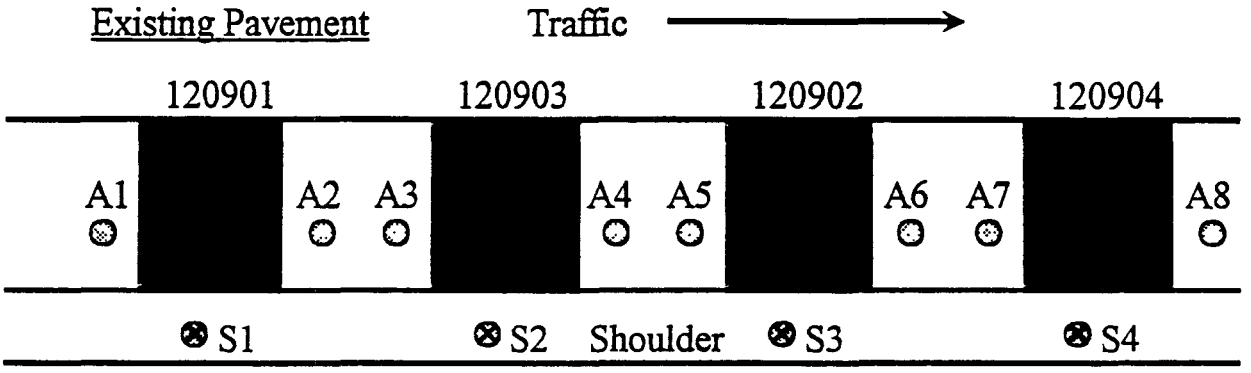
Table B-1 provides the scope of preconstruction material sampling. As may be seen, only minimal sampling is proposed, consisting of cores of the existing asphalt concrete, visual observation of the existing base materials and sampling of the subgrade. There are a total of 8 sampling locations, numbered A1 through A8. 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 preconstruction samples will be conducted by the Florida DOT or their Designee. Table B-2 provides an indication of the laboratory tests to be performed on the preconstruction samples.

TABLE B-1. SCOPE OF PRECONSTRUCTION MATERIAL SAMPLING

Material And Sample Description	Nº. Of Samples	Sample Location	Sample Number
Asphalt Concrete Coring - 6" Min. O.D. Cores	8	A1-A8	CA01-CA08
Unbound Granular Base	8	A1-A8	BG01-BG08
Subgrade Bulk Sampling Moisture Content Samples	 8 8	 A1-A8 A1-A8	 BS01-BS08 MS01-MS08



⊙ 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. PRECONSTRUCTION SAMPLING LAYOUT FLORIDA SPS-9A (120900)

TABLE B-2. PRECONSTRUCTION MATERIALS TESTING

Test Type	LTPP Designation	LTPP Protocol	Min. Nº. of Tests	Sample Designation
Surface Bound Layers:				
Core Examination/Thickness	AC01	P01	8	A1-A8
Base:				
Classification (Visual)	UG08	Note 1	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 2	3	S1,S2,S3,S4

Notes:

1. Visually classify materials in accordance with Appendix C of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling.

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

SECTION C

MATERIAL SAMPLING AND TESTING

DURING CONSTRUCTION

SECTION C

MATERIAL SAMPLING AND TESTING DURING CONSTRUCTION

This portion of the sampling and testing plan deals with field material sampling and laboratory testing during overlay construction. Most of the "during-construction" 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. For the Florida SPS-9A project, this will include one lift of overlay material. 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 120902, 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, 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 four 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. Volumetric testing on these samples is shown on Table C-3 for Test Sections 01, 03 and 04, and on Table C-2 for Test Section 02.

3. Field Performance Tests - For the SUPERPAVE™ mix placed at Section 120902, 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 four 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-6.

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-7 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, 03 and 04 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, 03 and 04 during Interval A, immediately following construction. Testing to be performed on these cores is shown in Table C-8. 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-9.

The final "during-construction" field testing activities include elevation and Dipstick® cross-profile measurements before and after overlay placement. 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 overlay placement, to ensure accurate calculation of the overlay thickness. Dipstick® cross-profile measurements will be obtained prior to construction. A second set of measurements will be taken just prior to the placement of the surfacing layers (milled surface). A third and final set of measurements will be taken after completion of the surfacing placement. Collection of elevation and Dipstick® cross-profile 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
120901	Agency S-II Mix (PG64-16)	Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Aggregate & Binder Tests	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Mix Design Verification (Volumetric)	Use Materials Obtained per Table C-4	SHA	C-5
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-6
120902	SUPERPAVE™ (PG64-16)	Lab Mix Design (Volumetric & Performance)	300 kg Mix	SHA	C-2
		Quality Control (Volumetric)	60 kg Mix	SHA	C-2
		Performance Testing (Volumetric & Performance)	360 kg Mix	SHA, LTPP Contract, SUPERPAVE™ Reg. Test Center	C-2
		Aggregate & Binder Tests	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Materials Ref Library	20 liter Asphalt 250 kg Aggregate	MRL	C-6
120903	Alt. SUPERPAVE™ Binder (PG58-16)	Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Aggregate & Binder Tests	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Mix Design Verification (Volumetric)	Use Materials Obtained per Table C-4	SHA	C-5
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-6
120904	Supplemental Binder (PG76-16)	Quality Control (Volumetric)	60 kg Mix	SHA	C-3
		Aggregate & Binder Tests	10 liter Asphalt 250 kg Aggregate	SHA	C-4
		Mix Design Verification (Volumetric)	Use Materials Obtained per Table C-4	SHA	C-5
		Materials Ref. Library	20 liter Asphalt 250 kg Aggregate	MRL	C-6

TABLE C-2. TESTS ON COMPACTED BULK SAMPLES OF HMA FROM TEST SECTION 02 ON ALL PROJECTS

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source/ Material Sample
HMA Specimen Compaction by Participating Highway Agency				
Gyratory Compaction @ N_{Max} (Lab samples)		AASHTO M002	6	NA01A02 - NA06A02[a]
Gyratory Compaction @ 3% AV (Lab samples)		AASHTO M002	2	NA07A02 - NA08A02[a]
Gyratory Compaction @ 7% AV (Lab samples)		AASHTO M002	32	NA09A02 - NA40A02[a]
Gyratory Compaction @ 3% AV (Field samples)		AASHTO M002	2	BA01A02 - BA34A02[a]
Gyratory Compaction @ N_{Max} (Field samples)		AASHTO M002	6	BA02A02 - BA04A02[a] BA31A02 - BA33A02[a]
Gyratory Compaction @ 7% AV (Field samples)		AASHTO M002	26	BA05A02 - BA30A02[a]
Volumetric Tests by Participating Highway Agency				
Bulk Specific Gravity	AC02	LTPP P02	18	LA01A02 - LA07A02, LA15A02, LA38A02 DA02A02 - DA04A02, DA06A02, DA16A02, DA22A02, DA31A02 - DA33A02
Asphalt Content (Extraction) (Uncompacted material)	AC04	LTPP P04	6	BA01A02, BA06A02, BA11A02 BA16A02, BA22A02, BA34A02
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	2	BA06A02, BA22A02
Maximum Specific Gravity	AC03	LTPP P03	3	NA15A02, BA06A02, BA22A02
Moisture Susceptibility	AC05	LTPP P05	6	LA09A02 - LA14A02
Volumetric Calculations by Participating Highway Agency				
AV, VMA, VFA		AASHTO PP19	6[d]	LA01A02 - LA06A02
LTPP Performance Tests by LTPP Contract Laboratory				
Indirect Tensile Strength	AC07	LTPP P07	2[e]	LA15A02, DA09A02
Resilient Modulus	AC07	LTPP P07	2[b,e]	LA16A02 - LA18A02 DA05A02, DA17A02, DA29A02
Creep Compliance	AC06	LTPP P06	8[e]	LA19A02 - LA22A02 DA15A02, DA16A02, DA18A02, DA30A02
SUPERPAVE™ Shear Tester Performance Tests by SUPERPAVE™ Regional Test Center				
Frequency Sweep at Constant Height & Simple Shear at Constant Height	SST-1	AASHTO M003, P005	6 2[e]	LA23A02 - LA26A02 DA06A02, DA10A02, DA24A02, DA28A02
Volumetric Test & Uniaxial Strain	SST-2	AASHTO M003, P005	6 2[e]	LA27A02 - LA30A02 DA07A02, DA11A02, DA23A02, DA27A02
Repeated Shear at Constant Stress Ratio	SST-3	AASHTO M003, P005	4	LA07A02, LA08A02 DA01A02, DA34A02
SUPERPAVE™ Indirect Tensile Tests by SUPERPAVE™ Regional Test Center				
Indirect Tensile Creep Compliance & Indirect Tensile Strength	SP-IT	AASHTO M005	18 2[e]	LA31A02 - LA40A02 DA08A02, DA12A02 - DA14A02, DA19A02 - DA22A02, DA25A02, DA26A02

TABLE C-2. TESTS ON COMPACTED BULK SAMPLES OF HMA FROM TEST SECTION 02 ON ALL PROJECTS (Continued)

Notes:

a. For purposes of this table, a single specimen is compacted from each bulk sample. Test specimen DA01A02 is produced from BA01A02 and LA01A02 is produced from NA01A02, etc. Up to three specimens can be produced from the sample, depending on its size.

b. Three specimens are needed for one test.

c. Test specimen of 100 mm diameter will be cored from compacted 150 mm specimens produced by the gyratory compactor.

d. The corrected bulk density at N_{design} shall be estimated from the gyratory compaction curves for calculation of the volumetric properties.

e. Spare specimens (one laboratory and one field compacted sample).

TABLE C-3. QUALITY CONTROL RELATED TESTS ON COMPACTED SPECIMENS FROM TEST SECTIONS 01, 03, AND 04 OTHER NON-LEVEL III STUDY TEST SECTIONS (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}		AASHTO M002	6	BA01AXX - BA06AXX[a]
Volumetric Tests				
Bulk Specific Gravity	AC02	LTPP P02	6	DA01AXX - DA06AXX
Asphalt Content (Extraction)	AC04	LTPP P04	2	BA02AXX, BA04AXX
Aggregate Gradation (Extracted Aggregate)	AG04	LTPP P14	2	BA02AXX, BA04AXX
Maximum Specific Gravity	AC03	LTPP P03	2	BA02AXX, BA04AXX
Volumetric Calculations				
Volume Percent of AV		AASHTO PP19	6	BA01AXX - BA06AXX
Percent Voids in Mineral Aggregate		AASHTO PP19	6	BA01AXX - BA06AXX
Voids Filled with Asphalt		AASHTO PP19	6	BA01AXX - BA06AXX

Notes:

a. A single test specimen is produced from each bulk HMA mix sample. Test specimen DA01AXX is produced from sample BA01AXX, etc.

b. Estimate the corrected bulk specific gravity from gyratory compaction curves at N_{Design} and use this value for the volumetric computations.

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

Test Name	Test Desig.	Protocol	No. of Tests	Material Source
Aggregate Tests[a]				
Aggregate Gradation	AG04	LTPP P14	1	BU10AXX
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	1[e]	BC01AXX
Penetration @ 25°C & 46°C	AE02	LTPP P22	1[e]	
Viscosity @ 60°C & 135°C	AE05	LTPP P25	2	
Specific Gravity @ 16°C	AE03	LTPP P23	2	
Dynamic Shear @ 3 Temperatures		AASHTO TP5	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[d]		AASHTO TP5	3	
Pressure Aging (PAV) of RTFOT Residue		AASHTO PP1	b	
Creep Stiffness of RTFOT-PAV Residue @ 2 Temperatures - 24 h Conditioning[c,d]		AASHTO TP1	2	
Creep Stiffness of RTFOT-PAV Residue @ 2 Temperatures[d]		AASHTO TP1	2	
Dynamic Shear on RTFOT-PAV Residue @ 3 Temperatures[d]		AASHTO TP5	2	
Direct Tension on RTFOT-PAV Residue @ 2 Temperatures[d]		AASHTO TP3	2	

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.

c. Conditioning time extended to 24 h ± 10 min at 10°C above the minimum performance temperature.

d. See section 4.5.1.2 for temperature selection guidelines.

e. Three penetration values obtained from each test.

TABLE C-5. SUPERPAVE™ MIXTURE DESIGN TESTS ON HMA SURFACE LAYER MATERIALS FROM SECTIONS 01, 03 AND 04 (To Be Performed by Participating Highway Agency)

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source
Mixed and Compacted HMA				
Gyratory Compaction @ Design Asphalt Content @ N_{Max}		AASHTO M002	3	BC01AXX BU01AXX-BU03AXX
Gyratory Compaction @ 7% AV		AASHTO M002	6	BC01AXX BU04AXX-BU09AXX
Bulk Specific Gravity	AC02	LTPP P02	3	LA01AXX-LA03AXX
Maximum Specific Gravity	AC03	LTPP P03	1	NA01AXX
Moisture Susceptibility	AC05	LTPP P05	6	LA04AXX-LA09AXX
Volumetric Calculations				
Volume Percent of AV		AASHTO PP19	3	LA01AXX - LA03AXX
Percent Voids in Mineral Aggregate		AASHTO PP19		
Voids Filled With Asphalt		AASHTO PP19		

Notes:

(i) NA01AXX is laboratory mixed HMA, combining BC01AXX and BU01AXX.

(ii) LA??AXX is a laboratory compacted specimen produced from BC??AXX and BU??AXX.

(iii) Estimate the corrected bulk specific gravity from the gyratory compaction curves at N_{Design} and use this value for the Volumetric Calculations.

TABLE C-6. 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-7. NUMBER OF CORES AND CORING TIME INTERVALS FROM SPS-9A STUDY TEST SECTIONS

Project Type	Test Section №.	Time After Paving, Months - Interval Identifier -					
		0 -A-	6 -B-	12 -C-	18 -D-	24 -E-	48 -F-
Main Study	Section 120901 Agency S-II Mix (PG64-16)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)
	Section 120902 SUPERPAVE™ Binder (PG64-16)	34 (S*)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)
	Section 120903 Alternate SUPERPAVE™ Binder (PG58-16)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)	8 (V)
	Section 120904 Supplemental Binder (PG76-16)	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.

TABLE C-8. LABORATORY TESTS TO BE PERFORMED ON CORES FROM MAIN STUDY TEST SECTIONS 01, 03 AND 04 SUPPLEMENTAL SECTIONS AT TIME INTERVAL A AND ON SECTION 02 AT ALL INTERVALS AFTER A (To Be Performed by the Participating Highway Agency)

Test Name	Test Desig.	Protocol	Nº. 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	2	CA01*t*XX, CA08*t*XX
Volumetric Calculations[a]				
Volume Percent of AV		AASHTO PP19	2	CA01*t*XX, CA08*t*XX
Percent Voids in Mineral Aggregate		AASHTO PP19	2	CA01*t*XX, CA08*t*XX
Voids Filled with Asphalt		AASHTO PP19	2	CA01*t*XX, CA08*t*XX
Recovered Asphalt Cement				
Abson Recovery	AE01	LTPP P21	8	CA01*t*XX - CA08*t*XX
Penetration @ 5°C		AASHTO T49	1[d]	
Penetration @ 25°C & 46°C	AE02	LTPP P22	1[d]	
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. Estimate the maximum theoretical specific gravity using the extracted AC content and aggregate effective specific gravity determined during construction.

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 CA01E03 is obtained and tested 24 months after construction from Section 03.

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.

d. Three penetration readings required from a single container.

TABLE C-9. TESTS ON CORE SAMPLES FROM MAIN STUDY TEST SECTION 02 AT INTERVAL A AND ALL LEVEL III STUDY TEST SECTION AT ALL INTERVALS

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	8	CA02*t*XX, CA06*t*XX, CA11*t*XX, CA15*t*XX, CA19*t*XX, CA24*t*XX, CA28*t*XX, CA33*t*XX
Bulk Specific Gravity	AC02	LTPP P02	8	CA02*t*XX, CA06*t*XX, CA11*t*XX, CA15*t*XX, CA19*t*XX, CA24*t*XX, CA28*t*XX, CA33*t*XX
Asphalt Content (Extraction)[a]	AC04	LTPP P04	8	CA02*t*XX, CA06*t*XX, CA11*t*XX, CA15*t*XX, CA19*t*XX, CA24*t*XX, CA28*t*XX, CA33*t*XX
Aggregate Gradation (Extracted Aggregate)[a]	AG04	LTPP P14	2	CA11*t*XX, CA24*t*XX
Maximum Specific Gravity	AC03	LTPP P03	2	CA11*t*XX, CA24*t*XX
Volumetric Calculations by Participating Highway Agency				
Volume Percent of AV		AASHTO PP19	2	CA11*t*XX, CA24*t*XX
Percent Voids in Mineral Aggregate				
Voids Filled with Asphalt				
Recovered Asphalt Cement Tests by Participating Highway Agency				
Abson Recovery	AE01	LTPP P21	8	CA02*t*XX, CA06*t*XX, CA11*t*XX, CA15*t*XX, CA19*t*XX, CA24*t*XX, CA28*t*XX, CA33*t*XX
Penetration @ 5°C		AASHTO T49	1[d]	
Penetration @ 25°C & 46°C	AE02	LTPP P22	1[d]	
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 @ 2 Temperatures		AASHTO TP1	2	
Direct Tension @ 2 Temperatures		AASHTO TP3	2	
Replacement Cores to Replace Damaged Cores				CA05*t*XX, CA25*t*XX
LTPP Performance Tests by LTPP Contract Laboratory				
Creep Compliance	AC06	LTPP P06	4[e]	CA03*t*XX, CA14*t*XX, CA23*t*XX, CA32*t*XX,
Indirect Tensile Strength	AC07	LTPP P07	1[e]	CA16*t*XX
Resilient Modulus	AC07	LTPP P07	1[b,e]	CA07*t*XX, CA21*t*XX, CA31*t*XX
SUPERPAVE™ Shear Tester Performance Tests by SUPERPAVE™ Regional Test Center				
Frequency Sweep at Constant Height & Simple Shear at Constant Height	SST-1	AASHTO M003, P005	2	CA04*t*XX, CA30*t*XX
Volumetric Test & Uniaxial Strain	SST-2	AASHTO M003, P005	2	CA12*t*XX, CA22*t*XX
Repeated Shear at Constant Stress Ratio	SST-3	AASHTO M003, P005	2	CA09*t*XX, CA26*t*XX

TABLE C-9. TESTS ON CORE SAMPLES FROM MAIN STUDY TEST SECTION 02 AT INTERVAL A AND ALL LEVEL III STUDY TEST SECTION AT ALL INTERVALS (Continued)

Test Name	Test Desig.	Protocol	Nº. of Tests	Material Source/ Material Sample[b]
SUPERPAVE™ Indirect Tensile Tests by SUPERPAVE™ Regional Test Center				
Indirect Tensile Creep Compliance & Indirect Tensile Strength	SP-IT	AASHTO M005	10	CA01*t*XX, CA08*t*XX, CA10*t*XX, CA13*t*XX, CA17*t*XX, CA18*t*XX, CA20*t*XX, CA27*t*XX, CA29*t*XX, CA34*t*XX

Notes:

a. These cores are 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.

b. Three specimens are needed for one test.

c. Specimens of 100 mm diameter will be cored from 150 mm field cores.

d. Three penetration readings must be taken from each test can.

3.4.1 Sampling Location Designations

Sampling locations are designated on the LTPP forms and material sampling plans with the following six- digit code format:

L##tXX

where

L = Location type:
- B - Bulk sample location
- A - 150 mm diameter core and/or auger locations
- S - Shoulder auger probe 6 m below the pavement surface
- C - 150 mm diameter core locations
- T - Nuclear density/moisture gauge
- F - Field bulk HMA sample
- H - Samples obtained from the Hot Mix Plant.

= Location number. Up to a two-digit location number is assigned sequentially to each location type on each test section. For the SUPERPAVE™ mixtures, when obtaining bulk samples of plant mix materials use sample location numbers of 01-09 for the topmost layer (wearing course) and 11.19 for the binder course. (This explicitly limits sampling and testing to a maximum of two SUPERPAVE™ materials, layers, in a test section.)

t = Sampling time interval. This time interval is used for samples taken at specified time intervals referenced to the construction date. The single letter designating the time from paving is as follows:
- A - Prior, during or immediately after construction
- B - 6 months
- C - 12 months
- D - 18 months
- E - 24 months
- F - 48 months

XX = Section number. Use the two-digit test section number, e.g., 01, 02, 03. This makes the sample location unique to that test section.

Examples of valid sample location numbers include:

BA01A01 Bulk sample 01 from Test Section 01.

A02A03 Auger location 02 from Test Section 03.

XX = Section number. Use the two-digit test section number, e.g., 01, 02, 03. This makes the sample location unique to that test section.

The following are examples of valid samples code numbers:

CA24A02 Asphalt concrete cores obtained at the time interval A, immediately following paving, from Test Section 02.

CA01D01 An example of HMA core sample numbering taken from Test Section 01 during interval "D" (18 months after construction).

CT02A03 Treated base core 02 from Test Section 03.

BG01A01 Bulk sample 01 of granular base from Test Section 01. Assign numbers consecutively as samples are obtained from each test section.

BA01A02 Bulk sample 01 of uncompacted HMA from Test Section 02. Assign numbers consecutively as samples are obtained from each test section, BA01A02, BA02A02, etc.

DA01A01 Compacted specimen number 01 of plant-mixed HMA from Section 01 interval A (during construction).

NA01A02 Uncompacted sample of laboratory-mixed HMA made from constituent materials obtained from the plant used in Section 02.

LA01A01 Compacted specimen 01 of laboratory-mixed HMA made from constituent materials obtained from the plant destined for mixture placed in Section 01.

BS01A02 Bulk subgrade sample of material from Test Section 02 obtained prior to construction. Assign sample numbers consecutively for multiple samples from the same test section.

MS01A02 Subgrade moisture content sample 01 obtained from bulk sampling location on Test Section 02.

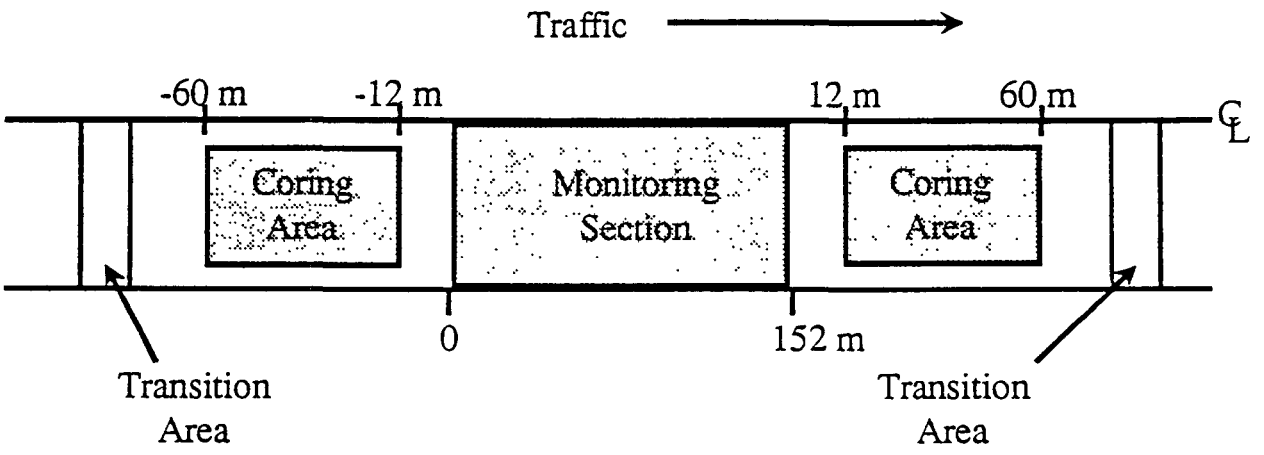


FIGURE C-1. CORING AREAS FOR SPS-9A TEST SECTIONS FLORIDA SPS-9A (120900)

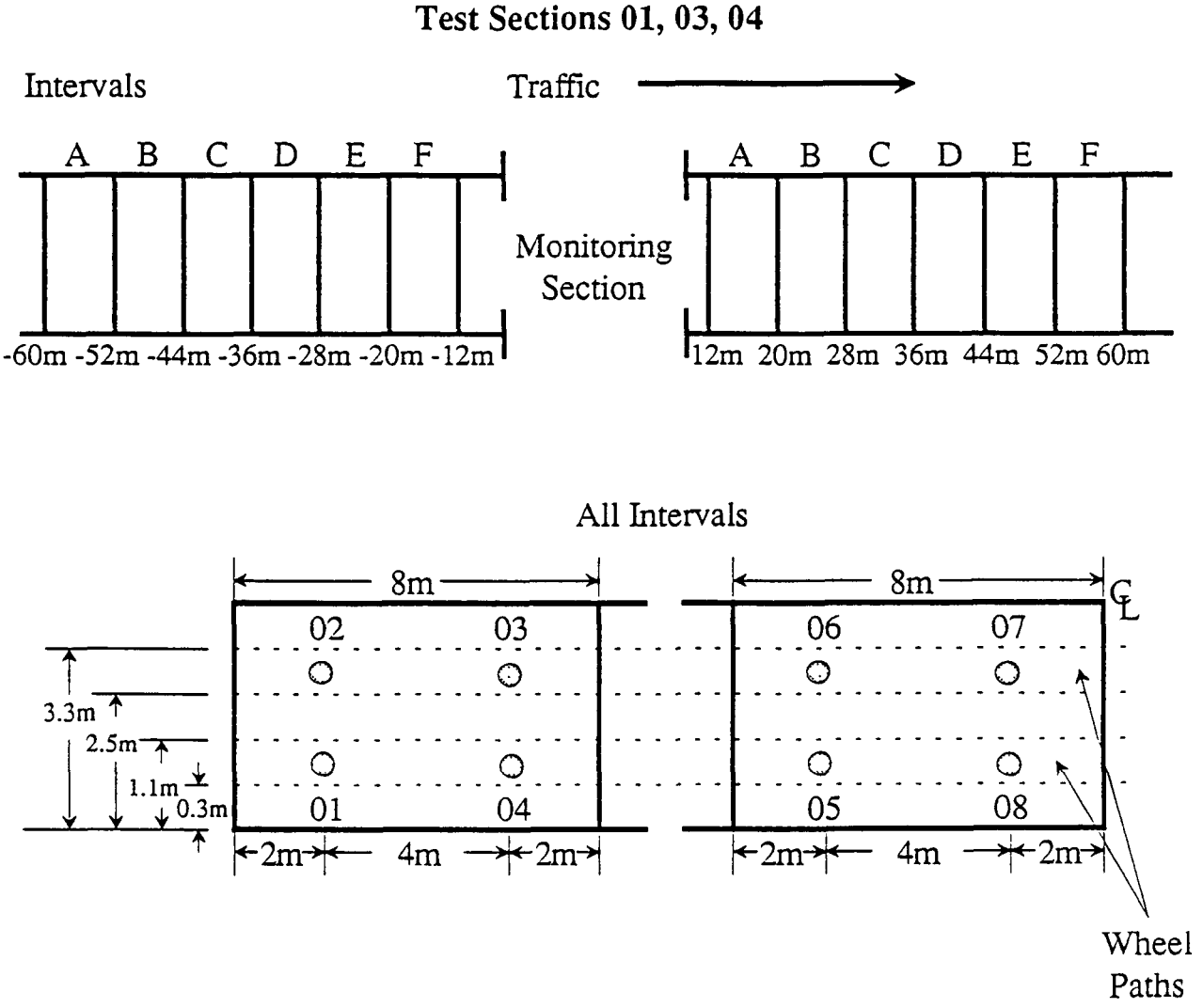


FIGURE C-2. CORING PLAN FOR MAIN STUDY TEST SECTIONS 01, 03 AND 04 FLORIDA SPS-9A (120900)

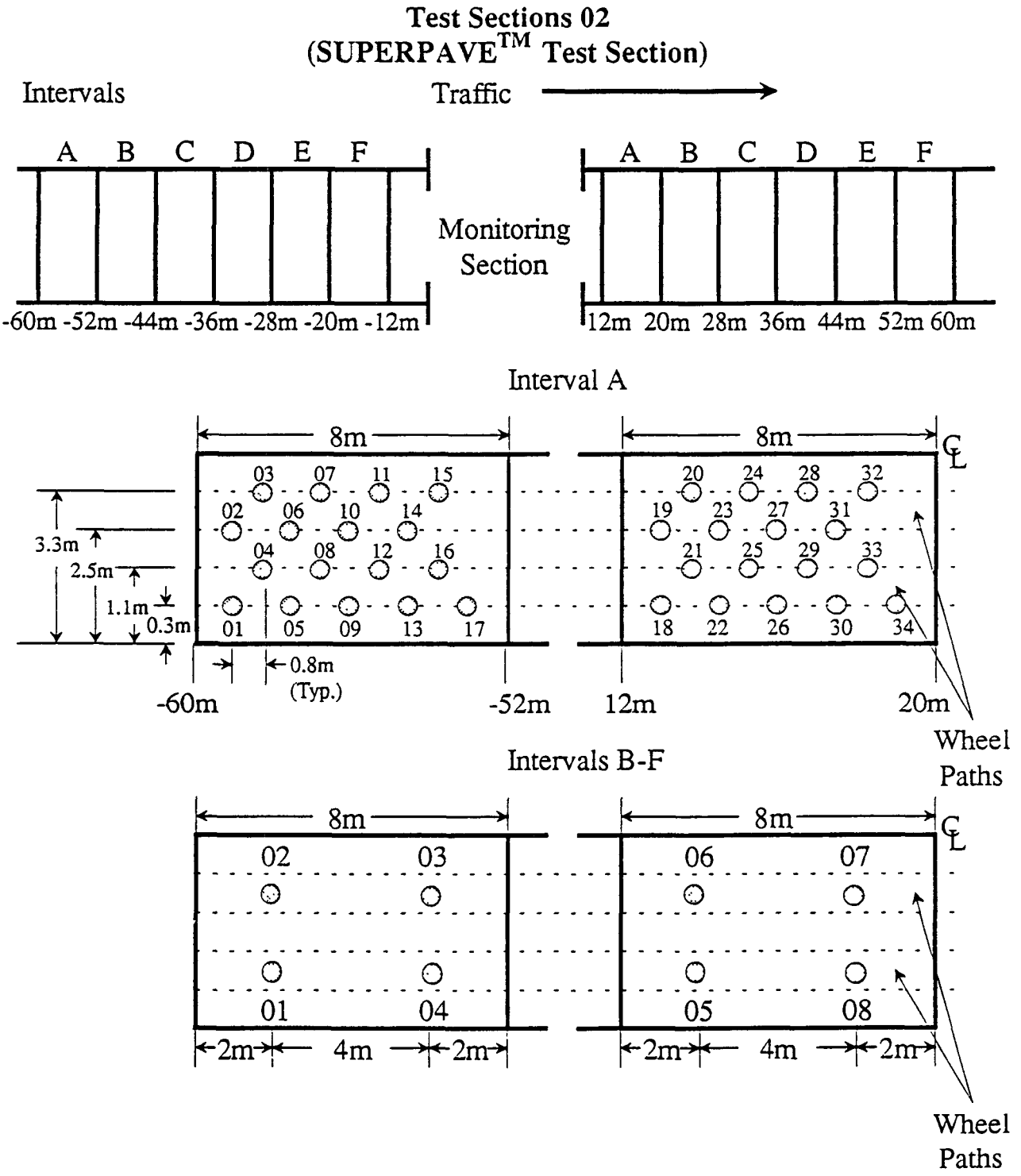


FIGURE C-3. CORING PLAN FOR MAIN STUDY TEST SECTION 02 (SUPERPAVE™ MIXTURE) FLORIDA SPS-9A (120900)

TABLE C-10. TRACKING TABLE OF AGGREGATE AND BINDER TESTING ON ALL TEST SECTIONS - PRECONSTRUCTION
(To Be Performed by the Participating Highway Agency or Their Designee)

Sample Location Nº.	Sample Nº.	Lab Test Nº.	Steps Involved in Laboratory Handling and Testing Sequence							
			Required Laboratory Tests Per Layer					Extra Sample	Sample Storage	Sample Disposed ?
			First	Second	Third	Fourth	Fifth			
H01AXX	NA01AXX	3	AC03/P03			AASHTO T96 AASHTO T104	AASHTO T112 AASHTO T176 ASTM D4791	Yes	(b)	No
H01AXX	BC01AXX	3	AASHTO T49[c] AE02/P22[e] AE05/P25 AE03/P23	ASTM D4402 AASHTO TP5[d,f]	ASTM T240 AASHTO TP5[d,g]	AASHTO PP1 AASHTO TP5[d,h] AASHTO TP1[d] AASHTO TP1[d,e]	AASHTO TP3[d]	Yes	(a)	No

c: Three penetration readings are taken for each test.

d: Temperature selection, see Section 4.

e. Conditioning time extended to 24 hrs ± 10 min at 10°C above the minimum performance temperature.

f. Original (tank) binder.

g. After RTFOT conditioning.

h. After RTFOT and PAV conditioning.

TABLE C-11. TRACKING TABLE OF ASPHALT MIXTURE TESTING ON TEST SECTIONS 01, 03 AND 04 - PRECONSTRUCTION
(To Be Performed by the Participating Highway Agency or Their Designee)

Sample Location Nº.	Sample Nº.	Lab Test Nº.	Steps Involved in Laboratory Handling and Testing Sequence					
			Required Laboratory Tests Per Layer			Extra Sample	Sample Storage	Sample Disposed ?
			First	Second	Third			
H01AXX	NA01AXX	3	AC03/P03			No	(a)	Yes
H01AXX	LA01AXX	3	AASHTO M002[c]	AC02/P02	AASHTO PP19[e]	No	(a)	Yes
H01AXX	LA02AXX	3	AASHTO M002[c]	AC02/P02	AASHTO PP19[e]	No	(a)	Yes
H01AXX	LA03AXX	3	AASHTO M002[c]	AC02/P02	AASHTO PP19[e]	No	(a)	Yes
H01AXX	LA04AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes
H01AXX	LA05AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes
H01AXX	LA06AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes
H01AXX	LA07AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes
H01AXX	LA08AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes
H01AXX	LA09AXX	3	AASHTO M002[d]	AC02/P05		No	(a)	Yes

c: Gyratory compaction at N_{Max}.

d: Gyratory compaction at 7% AV (Number of gyrations estimated from the gyratory compaction curve).

e. Estimate the corrected bulk density at N_{Design} for use in volumetric calculations.

TABLE C-12. TRACKING TABLE OF COMPACTED LABORATORY PREPARED ASPHALT CONCRETE SAMPLES FROM TEST SECTION 02 ON ALL PROJECTS
(To Be Performed by the Participating Highway Agency or Their Designee)

Compact Bulk Samples to Conditions and Label Compacted Specimens									
Sample Location Nº.	Initial Sample Nº.	Air Voids	Ht. (mm)	Final Sample Nº.	First[c,d]	Second[c,d]	Extra Sample	Store Sample	Dispose Sample
H01A02	NA01A02	N/A	115	LA01A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA02A02	N/A	115	LA02A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA03A02	N/A	115	LA03A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA04A02	N/A	115	LA04A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA05A02	N/A	115	LA05A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA06A02	N/A	115	LA06A02	P02	PP19[f]	No	(a)	Yes
H01A02	NA07A02	3	140	LA07A02	P02	SRTC	No	(a)	No
H01A02	NA08A02	3	140	LA08A02	SRTC		No	(a)	No
H01A02	NA09A02	7	140	LA09A02	P05[e]		No	(a)	Yes
H01A02	NA10A02	7	140	LA10A02	P05[e]		No	(a)	Yes
H01A02	NA11A02	7	140	LA11A02	P05[e]		No	(a)	Yes
H01A02	NA12A02	7	140	LA12A02	P05[e]		No	(a)	Yes
H01A02	NA13A02	7	140	LA13A02	P05[e]		No	(a)	Yes
H01A02	NA14A02	7	140	LA14A02	P05[e]		No	(a)	Yes
H01A02	NA15A02	7	140	LA15A02	P02	LCL	No	(a)	No
H01A02	NA15A02				P03		No	(a)	Yes
H01A02	NA16A02	7	140	LA16A02	LCL		No	(a)	No
H01A02	NA17A02	7	140	LA17A02	LCL		No	(a)	No
H01A02	NA18A02	7	140	LA18A02	LCL		No	(a)	No
H01A02	NA19A02	7	140	LA19A02	LCL		No	(a)	No
H01A02	NA20A02	7	140	LA20A02	LCL		No	(a)	No
H01A02	NA21A02	7	140	LA21A02	LCL		No	(a)	No
H01A02	NA22A02	7	140	LA22A02	LCL		No	(a)	No
H01A02	NA23A02	7	140	LA23A02	SRTC		No	(a)	No
H01A02	NA24A02	7	140	LA24A02	SRTC		No	(a)	No
H01A02	NA25A02	7	140	LA25A02	SRTC		No	(a)	No
H01A02	NA26A02	7	140	LA26A02	SRTC		No	(a)	No
H01A02	NA27A02	7	140	LA27A02	SRTC		No	(a)	No
H01A02	NA28A02	7	140	LA28A02	SRTC		No	(a)	No
H01A02	NA29A02	7	140	LA29A02	SRTC		No	(a)	No
H01A02	NA30A02	7	140	LA30A02	SRTC		No	(a)	No

TABLE C-12. TRACKING TABLE OF COMPACTED LABORATORY PREPARED ASPHALT CONCRETE SAMPLES FROM TEST SECTION 02 ON ALL PROJECTS (To Be Performed by the Participating Highway Agency or Their Designee) (Continued)

Compact Bulk Samples to Conditions and Label Compacted Specimens									
Sample Location №.	Initial Sample №.	Air Voids	Ht. (mm)	Final Sample №.	First[c,d]	Second[c,d]	Extra Sample	Store Sample	Dispose Sample
H01A02	NA31A02	7	140	LA31A02	SRTC		No	(a)	No
H01A02	NA32A02	7	140	LA32A02	SRTC		No	(a)	No
H01A02	NA33A02	7	140	LA33A02	SRTC		No	(a)	No
H01A02	NA34A02	7	140	LA34A02	SRTC		No	(a)	No
H01A02	NA35A02	7	140	LA35A02	SRTC		No	(a)	No
H01A02	NA36A02	7	140	LA36A02	SRTC		No	(a)	No
H01A02	NA37A02	7	140	LA37A02	SRTC		No	(a)	No
H01A02	NA38A02	7	140	LA38A02	P02	SRTC	No	(a)	No
H01A02	NA39A02	7	140	LA39A02	SRTC		No	(a)	No
H01A02	NA40A02	7	140	LA40A02	SRTC		No	(a)	No

Notes:

c: In the above table, LCL and SRTC indicates that the core is to be packaged and shipped to the LTPP Contract Laboratory and SUPERPAVE™ Regional Test Center, respectively.

d: The specimens are to be labeled and marked with the direction of compaction. The top of the specimen shall be marked with a "T". Upon arrival at the labs, appropriate sample preparations for testing shall be performed by the testing lab.

e: Trim 140 mm sample to the proper height.

f: Determine the corrected bulk density from the gyratory compaction curves at N_{Design} for use in volumetric calculations.

TABLE C-13. TRACKING TABLE OF COMPACTED FIELD ASPHALT CONCRETE BULK SAMPLES FROM TEST SECTION 02 ON ALL PROJECTS
(To Be Performed by the Participating Highway Agency or Their Designee)

Compact Bulk Samples to Conditions and Label Compacted Specimens									
Sample Location Nº.	Initial Sample Nº.	Air %	Ht. (mm)	Final Sample Nº.	First[c,d]	Second[c,d]	Extra Sample	Store Sample	Dispose Sample
F01A02	BA01A02	3	140	DA01A02	SRTC		No	(a)	No
F01A02	BA01A02				P04		No	(b)	Yes
F02A02	BA02A02	N_{Max}	115	DA02A02	P02		No	(a)	Yes
F03A02	BA03A02	N_{Max}	115	DA03A02	P02		No	(a)	Yes
F04A02	BA04A02	N_{Max}	115	DA04A02	P02		No	(a)	Yes
F05A02	BA05A02		140	DA05A02	LCL		No	(a)	No
F06A02	BA06A02	7	140	DA06A02	P02	SRTC	No	(a)	No
F06A02	BA06A02				P03	P04 & P14	No	(b)	Yes
F07A02	BA07A02	7	140	DA07A02	SRTC		No	(a)	No
F08A02	BA08A02	7	140	DA08A02	SRTC		No	(a)	No
F09A02	BA09A02	7	140	DA09A02	LCL		No	(a)	No
F10A02	BA10A02	7	140	DA10A02	SRTC		No	(a)	No
F11A02	BA11A02	7	140	DA11A02	SRTC		No	(a)	No
F11A02	BA11A02				P04		No	(a)	Yes
F12A02	BA12A02	7	140	DA12A02	SRTC		No	(a)	No
F13A02	BA13A02	7	140	DA13A02	SRTC		No	(a)	No
F14A02	BA14A02	7	140	DA14A02	SRTC		No	(a)	No
F15A02	BA15A02	7	140	DA15A02	LCL		No	(a)	No
F16A02	BA16A02	7	140	DA16A02	P02	LCL	No	(a)	No
F16A02	BA16A02				P04		No	(b)	Yes
F17A02	BA17A02	7	140	DA17A02	LCL		No	(a)	No
F18A02	BA18A02	7	140	DA18A02	LCL		No	(a)	No
F19A02	BA19A02	7	140	DA19A02	SRTC		No	(a)	No
F20A02	BA20A02	7	140	DA20A02	SRTC		No	(a)	No
F21A02	BA21A02	7	140	DA21A02	SRTC		No	(a)	No
F22A02	BA22A02	7	140	DA22A02	P02	SRTC	No	(a)	No
F22A02	BA22A02				P03	P04 & P14	No	(b)	Yes
F23A02	BA23A02	7	140	DA23A02	SRTC		No	(a)	No
F24A02	BA24A02	7	140	DA24A02	SRTC		No	(a)	No
F25A02	BA25A02	7	140	DA25A02	SRTC		No	(a)	No
F26A02	BA26A02	7	140	DA26A02	SRTC		No	(a)	No

TABLE C-13. TRACKING TABLE OF COMPACTED LABORATORY PREPARED ASPHALT CONCRETE SAMPLES FROM TEST SECTION 02 ON ALL PROJECTS (To Be Performed by the Participating Highway Agency or Their Designee) (Continued)

Compact Bulk Samples to Conditions and Label Compacted Specimens									
Sample Location Nº.	Initial Sample Nº.	Air %	Ht. (mm)	Final Sample Nº.	First[c,d]	Second[c,d]	Extra Sample	Store Sample	Dispose Sample
F27A02	BA27A02	7	140	DA27A02	SRTC		No	(a)	No
F28A02	BA28A02	7	140	DA28A02	SRTC		No	(a)	No
F29A02	BA29A02	7	140	DA29A02	LCL		No	(a)	No
F30A02	BA30A02	7	140	DA30A02	LCL		No	(a)	No
F31A02	BA31A02	N_{Max}	115	DA31A02	P02		No	(a)	Yes
F32A02	BA32A02	N_{Max}	115	DA32A02	P02		No	(a)	Yes
F33A02	BA33A02	N_{Max}	115	DA33A02	P02		No	(a)	No
F34A02	BA34A02	3	140	DA34A02	SRTC		No	(a)	No
F34A02	BA34A02				P04		No	(b)	Yes

Notes:

c: In the above table, LCL and SRTC indicates that the core is to be packaged and shipped to the LTPP Contract Laboratory and SUPERPAVE™ Regional Test Center, respectively.

d: The specimens are to be labeled and marked with the direction of compaction. The top of the specimen shall be marked with a "T". Upon arrival at the labs, appropriate sample preparations for testing shall be performed by the testing lab.

e: Trim 140 mm sample to the proper height.

f: Determine the corrected bulk density from the gyratory compaction curves at N_{Design} for use in volumetric calculations.

TABLE C-14. TRACKING TABLE OF COMPACTED LABORATORY ASPHALT SPECIMENS FROM TEST SECTION 02 (To Be Performed by the SUPERPAVE™ Regional Test Center)

Sample Location Nº.	Final Sample Nº.	First	Second[c,d]	Extra Sample	Sample Storage	Sample Disposed
H01A02	LA07A02	P02	SST-3		(a)	Yes
H01A02	LA08A02	P02	SST-3		(a)	Yes
H01A02	LA23A02	P02	SST-1		(a)	Yes
H01A02	LA24A02	P02	SST-1		(a)	Yes
H01A02	LA25A02	P02	SST-1		(a)	Yes
H01A02	LA26A02	P02	SST-1	Yes[f]	(a)	No
H01A02	LA27A02	P02	SST-2		(a)	Yes
H01A02	LA28A02	P02	SST-2		(a)	Yes
H01A02	LA29A02	P02	SST-2		(a)	Yes
H01A02	LA30A02	P02	SST-2	Yes[f]	(a)	No
H01A02	LA31A02	P02	SP-IT		(a)	Yes
H01A02	LA32A02	P02	SP-IT		(a)	Yes
H01A02	LA33A02	P02	SP-IT		(a)	Yes
H01A02	LA34A02	P02	SP-IT		(a)	Yes
H01A02	LA35A02	P02	SP-IT		(a)	Yes
H01A02	LA36A02	P02	SP-IT		(a)	Yes
H01A02	LA37A02	P02	SP-IT		(a)	Yes
H01A02	LA38A02	P02	SP-IT		(a)	Yes
H01A02	LA39A02	P02	SP-IT		(a)	Yes
H01A02	LA40A02	P02	SP-IT	Yes[f]	(a)	No

Notes:

c: The test designations in the table are keyed as follows:

SST-1 - SUPERPAVE™ Shear Tester Frequency Sweep and Simple Shear.

SST-2 - SUPERPAVE™ Shear Tester Volumetric and Uniaxial Strain.

SST-2 - SUPERPAVE™ Shear Tester Repeated Stress.

SP-IT - Indirect Tensile Strength and Creep Compliance.

d: The 140 mm cylinders are to be cut into two replicate samples and labeled "A: for the top and "B" for the base of the specimen.

e: For the "A" specimen, the base of the sample is to be mounted to the movable top platten while the top of "B" specimen shall be mounted to the movable platten.

f: Specimens are to be used to replace possible damaged or suspect specimens.

TABLE C-15. TRACKING TABLE OF COMPACTED FIELD ASPHALT CONCRETE TESTING (To Be Performed by the SUPERPAVE™ Regional Test Center)

Sample Location Nº.	Final Sample Nº.	First	Second[c,d]	Extra Sample	Sample Storage	Sample Disposed
F01A02	DA01A02	P02	SST-3			Yes
F06A02	DA06A02	P02	SST-1			Yes
F07A02	DA07A02	P02	SST-2			Yes
F08A02	DA08A02	P02	SP-IT			Yes
F10A02	DA10A02	P02	SST-1	Yes		No
F11A02	DA11A02	P02	SST-2			Yes
F12A02	DA12A02	P02	SP-IT			Yes
F13A02	DA13A02	P02	SP-IT			Yes
F14A02	DA14A02	P02	SP-IT	Yes		No
F19A02	DA19A02	P02	SP-IT			Yes
F20A02	DA20A02	P02	SP-IT			Yes
F21A02	DA21A02	P02	SP-IT			Yes
F22A02	DA22A02	P02	SP-IT			Yes
F23A02	DA23A02	P02	SST-2	Yes		No
F24A02	DA24A02	P02	SST-1			Yes
F25A02	DA25A02	P02	SP-IT			Yes
F26A02	DA26A02	P02	SP-IT			Yes
F27A02	DA27A02	P02	SST-2			Yes
F28A02	DA28A02	P02	SST-1			Yes
F34A02	DA34A02	P02	SST-3			Yes

Notes:

c: The test designations in the table are keyed as follows:

SST-1 - SUPERPAVE™ Shear Tester Frequency Sweep and Simple Shear.

SST-2 - SUPERPAVE™ Shear Tester Volumetric and Uniaxial Strain.

SST-2 - SUPERPAVE™ Shear Tester Repeated Stress.

SP-IT - Indirect Tensile Strength and Creep Compliance.

d: The 140 mm cylinders are to be cut into two replicate samples and labeled "A: for the top and "B" for the base of the specimen.

e: For the "A" specimen, the base of the sample is to be mounted to the movable top platten while the top of "B" specimen shall be mounted to the movable platten.

f: Specimens are to be used to replace possible damaged or suspect specimens.

TABLE C-16. TRACKING TABLE OF COMPACTED ASPHALT CONCRETE TESTING (To Be Performed by the LTPP Contract Laboratory)

Sample Location Nº.	Final Sample Nº.	First	Second[c,d]	Extra Sample	Sample Storage	Sample Disposed
Compacted HMA Samples from Laboratory Prepared Samples						
H01A02	LA15A02	P02	P07		(a)	Yes
H01A02	LA16A02	P02	P07		(a)	Yes
H01A02	LA17A02	P02	P07		(a)	Yes
H01A02	LA18A02	P02	P07		(a)	Yes
H01A02	LA19A02	P02	P06		(a)	Yes
H01A02	LA20A02	P02	P06		(a)	Yes
H01A02	LA21A02	P02	P06		(a)	Yes
H01A02	LA22A02	P02	P06		(a)	Yes
Compacted HMA Samples from Field Samples						
F05A02	DA05A02	P02	P07		(a)	Yes
F09A02	DA09A02	P02	P07		(a)	Yes
F15A02	DA15A02	P02	P06		(a)	Yes
F16A02	DA16A02	P02	P06		(a)	Yes
F17A02	DA17A02	P02	P07		(a)	Yes
F18A02	DA18A02	P02	P06		(a)	Yes
F29A02	DA29A02	P02	P07		(a)	Yes
F30A02	DA30A02	P02	P06		(a)	Yes

Notes:

c: Trim the 150 mm diameter, 140 mm height specimens to 100 mm and 65 mm height.

TABLE C-17. TRACKING TABLE FOR QUALITY CONTROL OF COMPACTED ASPHALT CONCRETE FOR 01, 03, 04 AND OTHER NON-LEVEL III TEST SECTIONS (To Be Performed by the Participating Highway Agency or Their Designee)

Sample Location Nº.	Sample Nº.	Lab. Test Nº.	First	Second	Third	Fourth	Fifth	Extra Sample	Sample Storage	Sample Disposed
F02AXX	BA01AXX	3				M002[c]	AC02/P02	No	(a)	Yes
F02AXX	BA02AXX	3	AC03/P03	AC04/P04	AG04/P14	M002[c]	AC02/P02	No	(a)	Yes
F02AXX	BA03AXX	2				M002[c]	AC02/P02	No	(a)	Yes
F02AXX	BA04AXX	3	AC03/P03	AC04/P04	AG04/P14	M002[c]	AC02/P02	No	(a)	Yes
F02AXX	BA05AXX	3				M002[c]	AC02/P02	No	(a)	Yes
F02AXX	BA06AXX	3				M002[c]	AC02/P02	No	(a)	Yes

c: AASHTO provisional specification, compacted at N_{Max} samples are to be prepared to obtain a height of approximately 115 mm with a diameter of 150 mm.

TABLE C-18. TRACKING TABLE OF AC CORES FROM MAIN STUDY TEST SECTION 02 - INTERVAL A AND ALL TEST SECTIONS OF LEVEL III STUDY - ALL INTERVALS

Sample Location Nº.	Initial Sample Nº.	Ship To	Extra Sample	Sample Storage	Sample Disposed
C01*t*XX	CA01*t*XX	SRTC	No	(a)	Yes
C02*t*XX	CA02*t*XX	SL	No	(a)	Yes
C03*t*XX	CA03*t*XX	LTPP	No	(a)	Yes
C04*t*XX	CA04*t*XX	SRTC	No	(a)	Yes
C05*t*XX	CA25*t*XX	SL	No	(a)	No
C06*t*XX	CA06*t*XX	SL	No	(a)	No
C07*t*XX	CA07*t*XX	LTPP	No	(a)	No
C08*t*XX	CA08*t*XX	SRTC	No	(a)	No
C09*t*XX	CA09*t*XX	SRTC	No	(a)	No
C10*t*XX	CA10*t*XX	SRTC	No	(a)	No
C11*t*XX	CA11*t*XX	SL	No	(a)	No
C12*t*XX	CA12*t*XX	SRTC	No	(a)	No
C13*t*XX	CA13*t*XX	SRTC	No	(a)	No
C14*t*XX	CA14*t*XX	LTPP	No	(a)	No
C15*t*XX	CA15*t*XX	SL	No	(a)	No
C16*t*XX	CA16*t*XX	LTPP	No	(a)	No
C17*t*XX	CA17*t*XX	SRTC	No	(a)	No
C18*t*XX	CA18*t*XX	SRTC	No	(a)	No
C19*t*XX	CA19*t*XX	SL	No	(a)	No
C20*t*XX	C020*t*XX	SRTC	No	(a)	No
C21*t*XX	CA21*t*XX	LTPP	No	(a)	No
C22*t*XX	CA22*t*XX	SRTC	No	(a)	No
C23*t*XX	CA23*t*XX	LTPP	No	(a)	No
C24*t*XX	CA24*t*XX	SL	No	(a)	No
C25*t*XX	CA25*t*XX	SL	No	(a)	No
C26*t*XX	CA26*t*XX	SRTC	No	(a)	No
C27*t*XX	CA27*t*XX	SRTC	No	(a)	No
C28*t*XX	CA28*t*XX	SL	No	(a)	No
C29*t*XX	CA29*t*XX	SRTC	No	(a)	No
C30*t*XX	CA30*t*XX	SRTC	No	(a)	No
C31*t*XX	CA31*t*XX	LTPP	No	(a)	Yes
C32*t*XX	CA32*t*XX	LTPP	No	(a)	Yes
C33*t*XX	CA33*t*XX	SL	No	(a)	No
C34*t*XX	CA34*t*XX	SRTC	No	(a)	No

Notes: In the above table, the cores are to be labeled; marked for direction and top , and sent to the following labs for testing:

LTPP LTPP Contract Laboratory SL State Laboratory
SRTC SUPERPAVE™ Regional Test Center

TABLE C-19. TRACKING TABLE FOR AC CORES FROM MAIN STUDY TEST SECTION 02 AT INTERVAL A AND ON ALL INTERVALS AND SECTIONS FOR LEVEL III STUDY (To Be Performed by the Participating Highway Agency or Their Designee)

Sample Location Nº.	Sample Nº	Steps Involved in Laboratory Handling and Testing Sequence										
		Required Laboratory Tests Per Layer								Extra Sample	Store Sample	Dispose Sample
		First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth			
C02*t*XX	CA02*t*XX	P01	P02	P04	P21		Blend Recovered Asphalt from Cores	Run the following tests on the blended asphalt T49[c,d] P22[d] P25 P23 TP5[f] TP1[f] TP3		No	(a)	Yes
C06*t*XX	CA06*t*XX	P01	P02	P04	P21					No	(a)	Yes
C11*t*XX	CA11*t*XX	P01	P02	P03	P04	P21			P14	No	(a)	Yes
C15*t*XX	CA15*t*XX	P01	P02	P04	P21					No	(a)	Yes
C19*t*XX	CA19*t*XX	P01	P02	P04	P21					No	(a)	Yes
C24*t*XX	CA24*t*XX	P01	P02	P03	P04	P21			P14	No	(a)	Yes
C28*t*XX	CA28*t*XX	P01	P02	P04	P21					No	(a)	Yes
C33*t*XX	CA33*t*XX	P01	P02	P04	P21					No	(a)	Yes
C05*t*XX	CA05*t*XX	Replacement Cores, If Needed								Yes[c]	(a)	No
C25*t*XX	CA25*t*XX	Replacement Cores, If Needed								Yes[c]	(a)	No

Notes:

c: Use the last two cores for possible replacement of damaged or suspect cores. Dispose of cores after all testing has been completed and reviewed.

d: AASHTO Specification

e: Three penetration readings required per test can.

f. See Section 4.5 1.2 for temperature selection.

TABLE C-20. TRACKING TABLE OF ASPHALT CONCRETE CORES TESTING (To Be Performed by the SUPERPAVE™ Regional Test Center)

Sample Location Nº.	Sample Nº.	Lab Test Nº.	Steps Involved in Laboratory Handling and Testing Sequence					
			Required Laboratory Tests Per Layer			Extra Sample	Sample Storage	Sample Disposed
C01*t*XX	CA01*t*XX	2	P01	P02	SS-IT	No	(a)	No
C04*t*XX	CA04*t*XX	2	P01	P02	SST-1	No	(a)	No
C08*t*XX	CA08*t*XX	2	P01	P02	SP-IT	No	(a)	No
C09*t*XX	CA09*t*XX	2	P01	P02	SST-3	No	(a)	No
C10*t*XX	CA10*t*XX	2	P01	P02	SP-IT	No	(a)	No
C12*t*XX	CA12*t*XX	2	P01	P02	SST-2	No	(a)	No
C13*t*XX	CA13*t*XX	2	P01	P02	SP-IT	No	(a)	No
C17*t*XX	CA17*t*XX	2	P01	P02	SP-IT	No	(a)	No
C18*t*XX	CA18*t*XX	2	P01	P02	SP-IT	No	(a)	No
C20*t*XX	CA20*t*XX	2	P01	P02	SP-IT	No	(a)	No
C22*t*XX	CA22*t*XX	2	P01	P02	SST-2	No	(a)	No
C26*t*XX	CA26*t*XX	2	P01	P02	SST-3	No	(a)	No
C27*t*XX	CA27*t*XX	2	P01	P02	SP-IT	No	(a)	No
C29*t*XX	CA29*t*XX	2	P01	P02	SP-IT	No	(a)	No
C30*t*XX	CA30*t*XX	2	P01	P02	SST-1	No	(a)	No
C34*t*XX	CA34*t*XX	2	P01	P02	SP-IT	Yes	(a)	No

Notes:

The specimens shall be tested in the following order: The core examination and thickness shall be performed on the untrimmed core. Next, trim the core to testing geometry and determine the bulk density. Lastly, prepare and mount the specimen for the noted testing.

The following convention was used to define the tests:

SST-1 Frequency Sweep and Simple Shear

SST-2 Volumetric and Uniaxial Strain

SST-3 Repeated Shear Testing

SP-IT SUPERPAVE™ Indirect Tensile Strength and Creep.

TABLE C-21. TRACKING TABLE OF ASPHALT CONCRETE CORES TESTING (To Be Performed by the LTPP Contract Laboratory)

Sample Location Nº.	Sample Nº.	Lab Test Nº.	Steps Involved in Laboratory Handling and Testing Sequence			
			Required Laboratory Tests Per Layer	Extra Sample	Sample Storage	Sample Disposed
C03*t*XX	CA03*t*XX	1	AC06/P06	No	(a)	Yes
C07*t*XX	CA07*t*XX	1	AC07/P07[d]	No	(a)	Yes
C014*t*XX	CA14*t*XX	1	AC06/P06	No	(a)	Yes
C016*t*XX	CA16*t*XX	1	AC07/P07[d]	No	(a)	Yes
C21*t*XX	CA21*t*XX	1	AC07/P07[c]	No	(a)	Yes
C23*t*XX	CA23*t*XX	1	AC06/P06	No	(a)	Yes
C31*t*XX	CA31*t*XX	2	AC07/P07[d]	No	(a)	Yes
C32*t*XX	CA32*t*XX	2	AC06/P06	No	(a)	Yes

Notes:

c: Indirect tensile strength test.

d: Resilient modulus test.

SECTION D

MATERIAL SAMPLING AND TESTING

POSTCONSTRUCTION

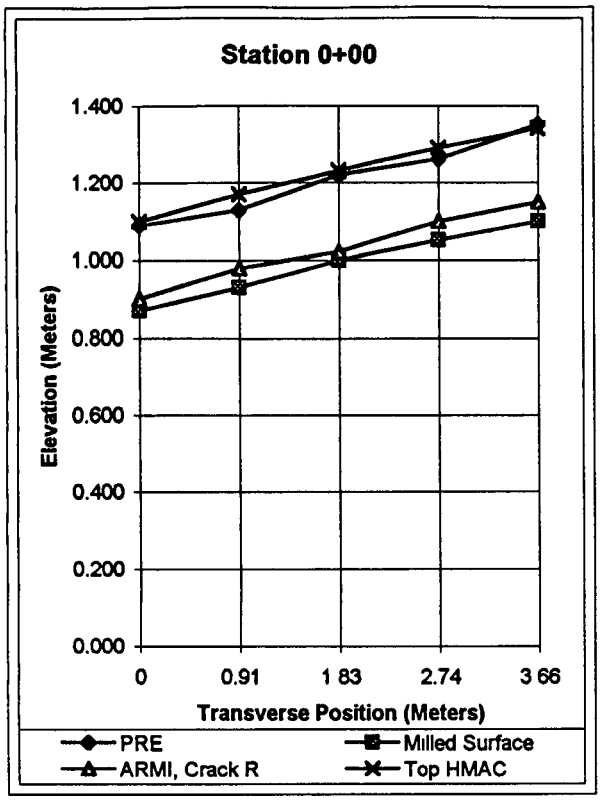
SECTION D

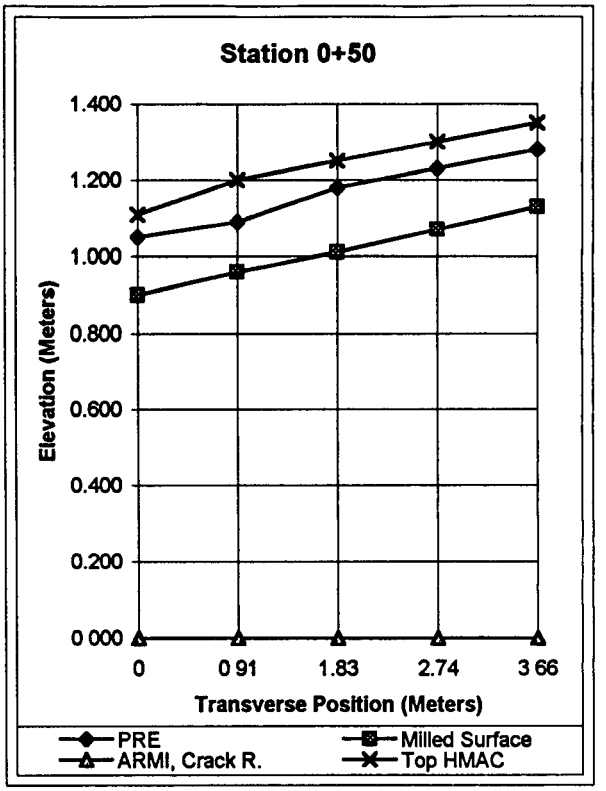
MATERIAL SAMPLING AND TESTING POSTCONSTRUCTION

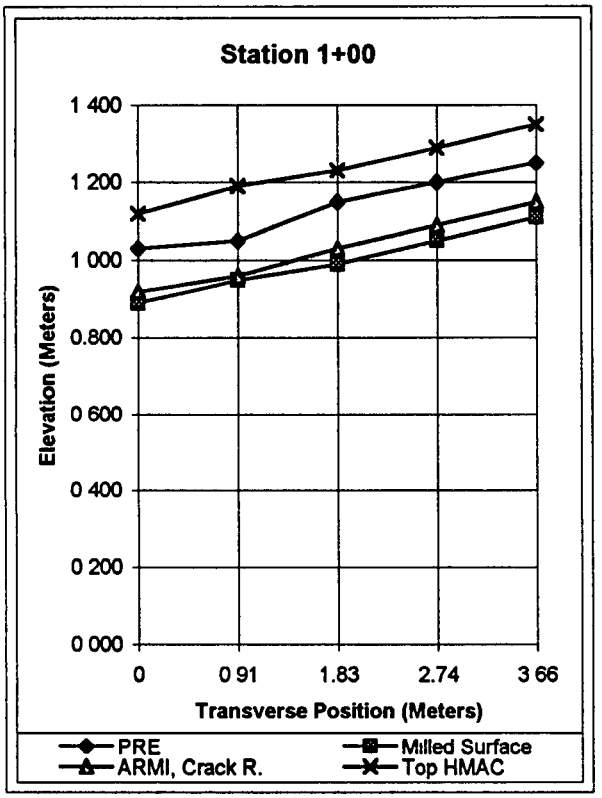
Materials sampling after construction consists solely of coring at time intervals of 6 months, 12 months, 18 months, 24 months and 48 months. These time periods correspond to intervals B-F, as discussed in Section C of this document and presented in Figures C-2 and C-3. These core samples will be tested 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.

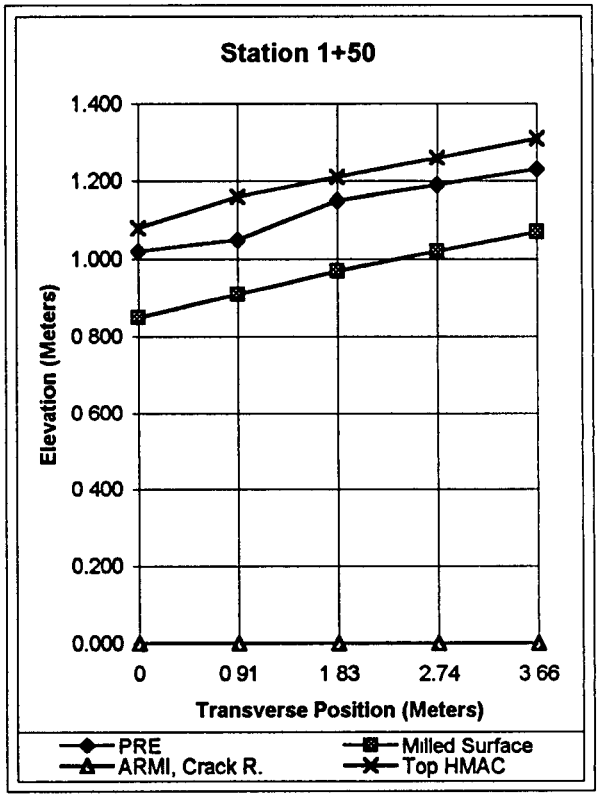
APPENDIX C

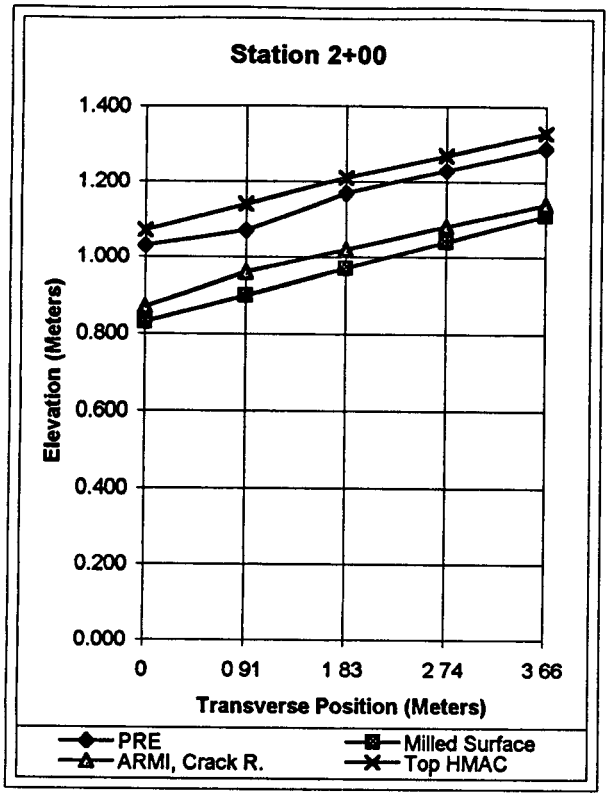
SURFACE PROFILE DATA

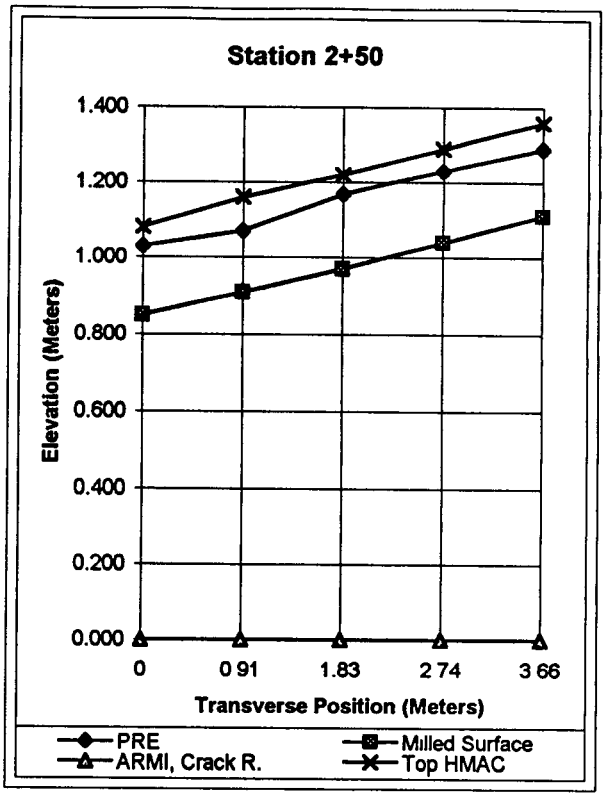

Station 0+00
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Elevation (Meters)
0
0.91
1 83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R
Top HMAC

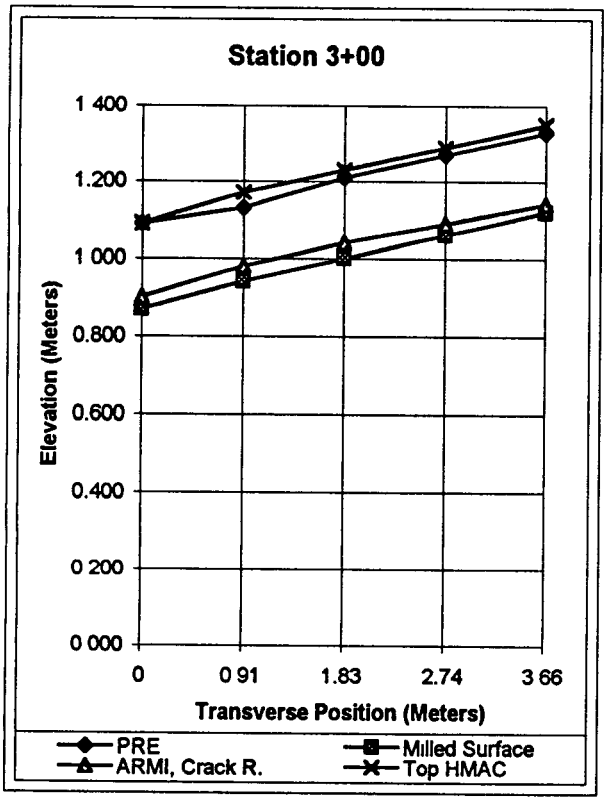

Station 0+50
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0 000
Elevation (Meters)
0
0 91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

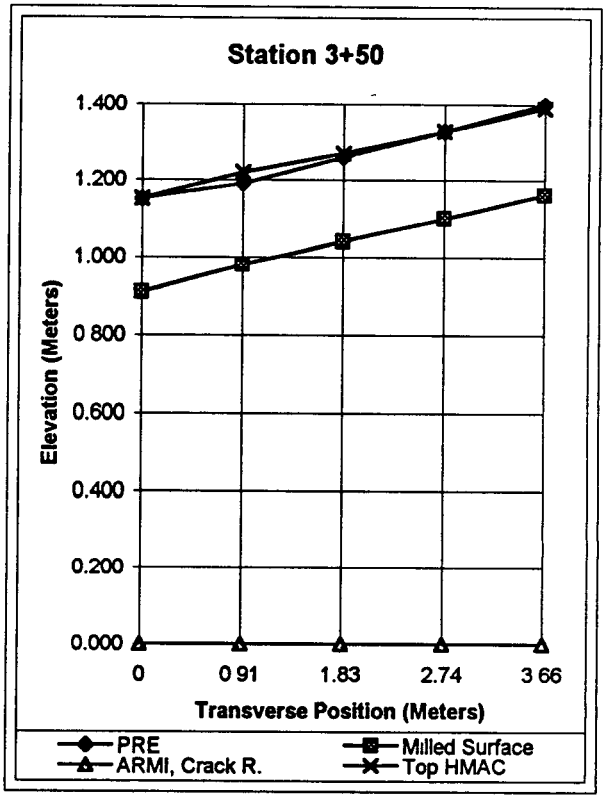

Station 1+00
1 400
1 200
1 000
0.800
0 600
0 400
0 200
0 000
Elevation (Meters)
0
0 91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

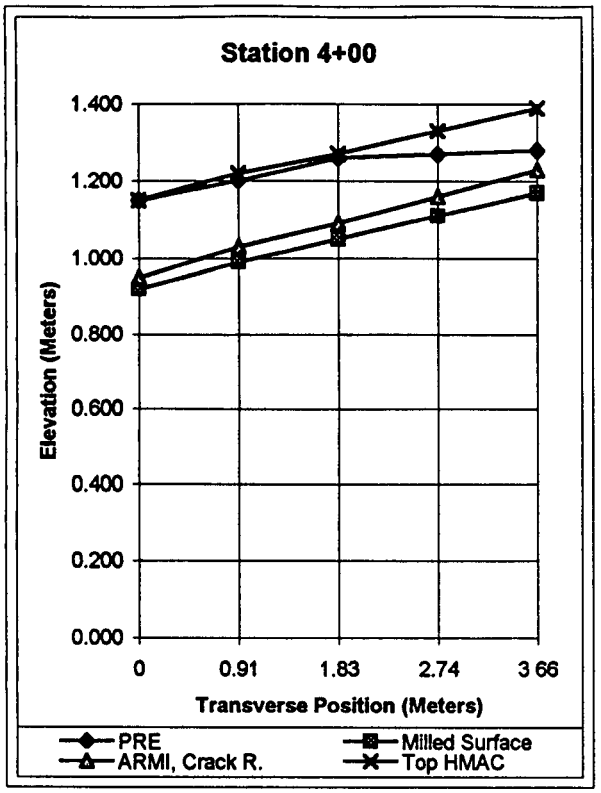

Station 1+50
1.400
1.200
1.000
0 800
0 600
0 400
0.200
0.000
Elevation (Meters)
0
0 91
1 83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

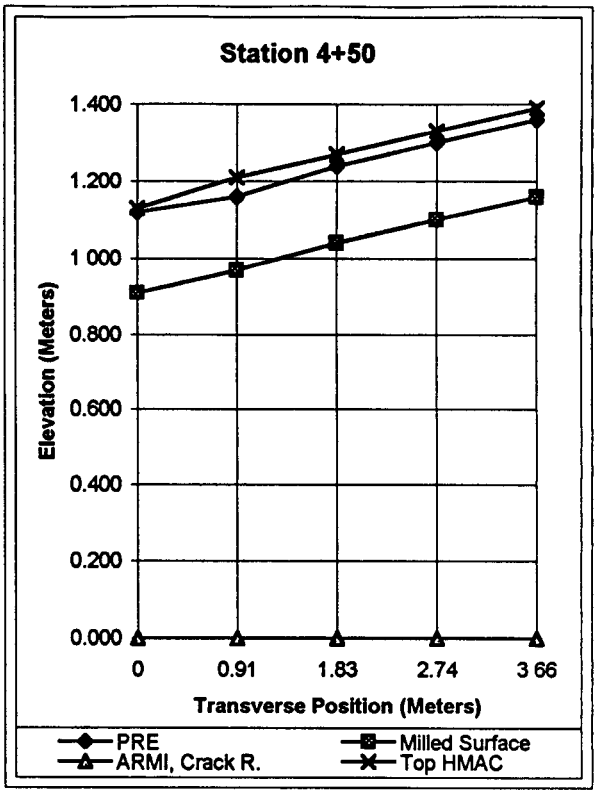

Station 2+00
Elevation (Meters)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
0 91
1 83
2 74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

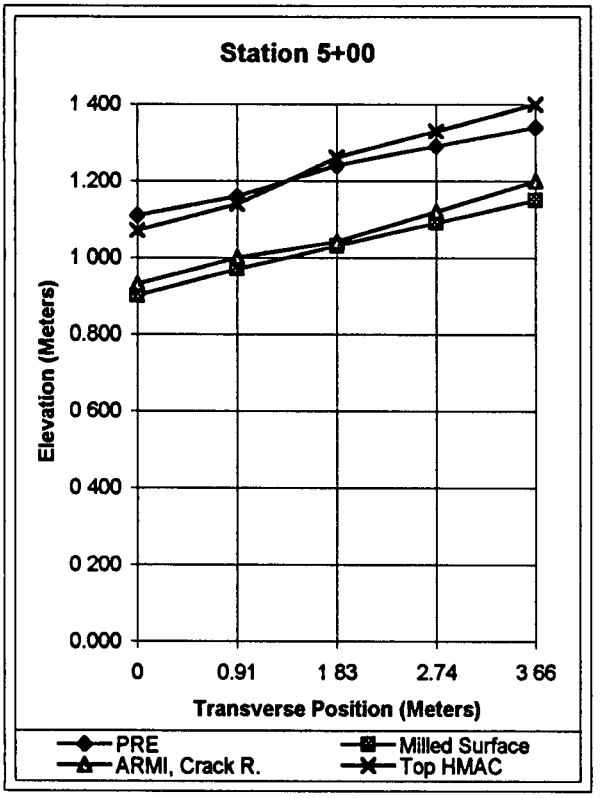

Station 2+50
Elevation (Meters)
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
0
0 91
1.83
2 74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

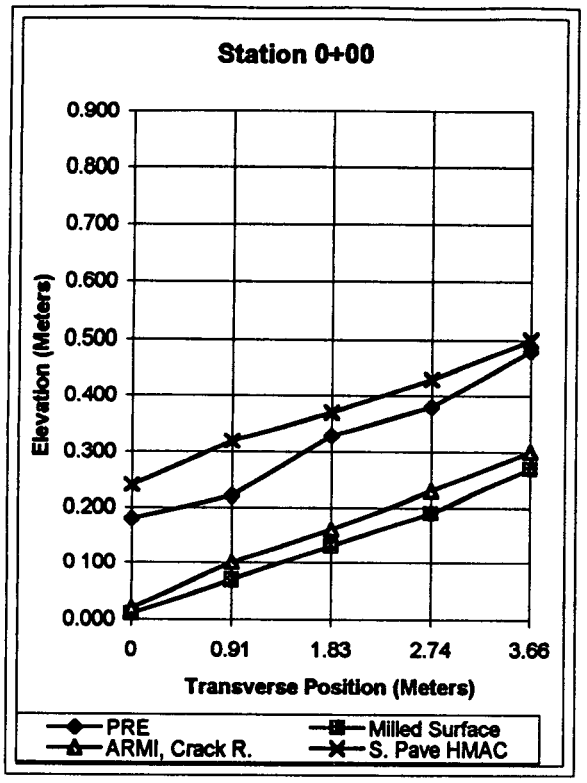

Station 3+00
Elevation (Meters)
1 400
1.200
1 000
0.800
0.600
0.400
0 200
0 000
0
0 91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

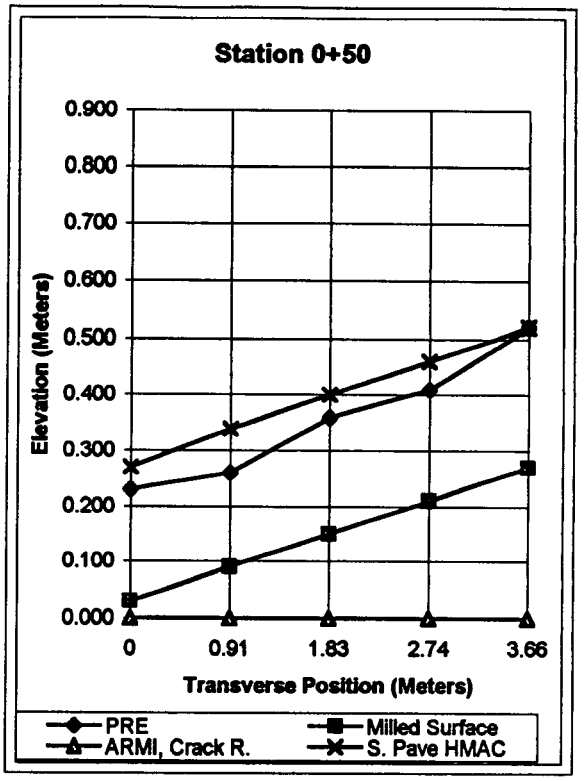

Station 3+50
Elevation (Meters)
1.400
1.200
1.000
0 800
0.600
0.400
0.200
0.000
0
0 91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

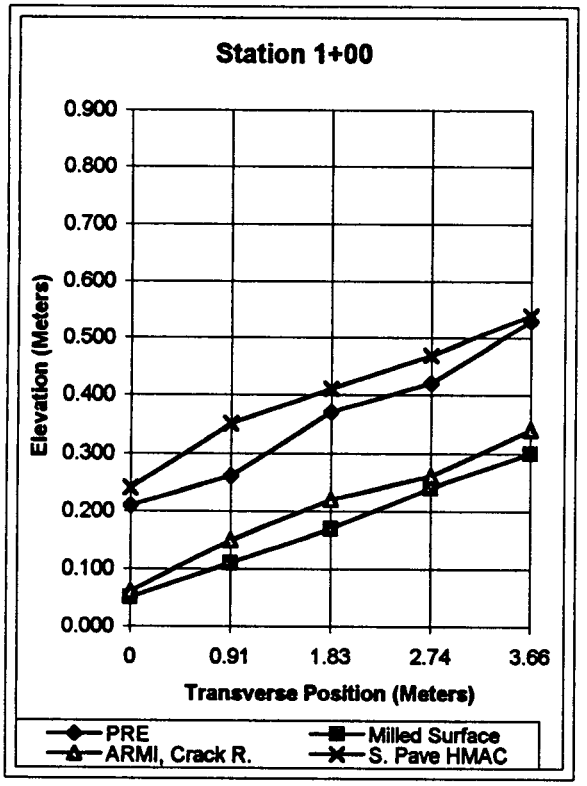

Station 4+00
1.400
1.200
1.000
0.800
0.600
0.400
0.200
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

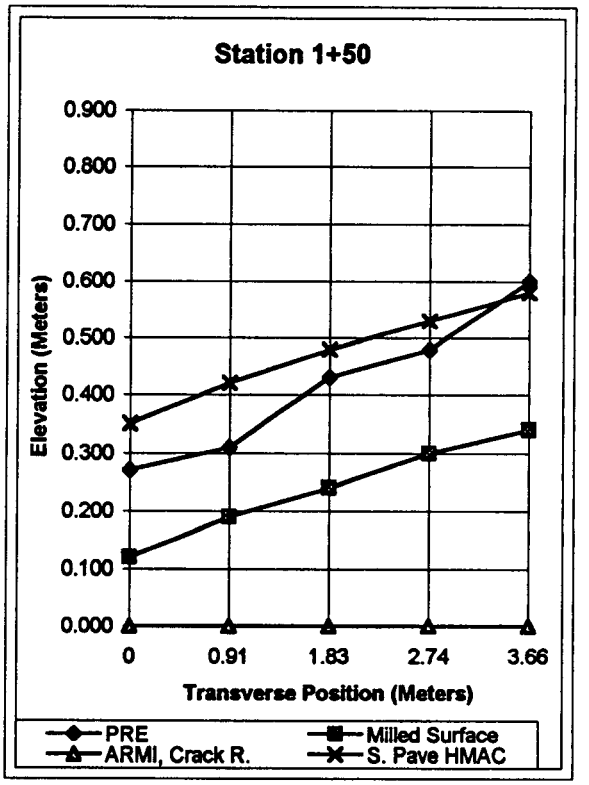

Station 4+50
1.400
1.200
1 000
0.800
0.600
0.400
0.200
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

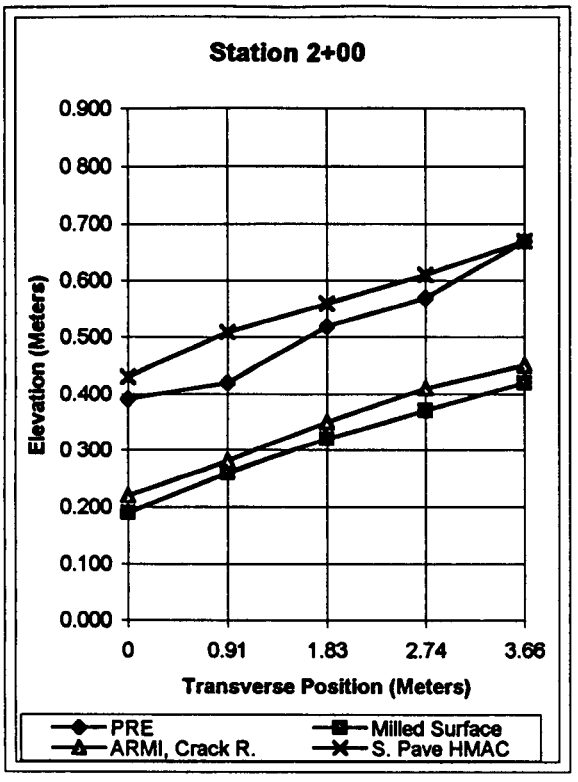

Station 5+00
1 400
1.200
1 000
0.800
0 600
0 400
0 200
0.000
Elevation (Meters)
0
0.91
1 83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
Top HMAC

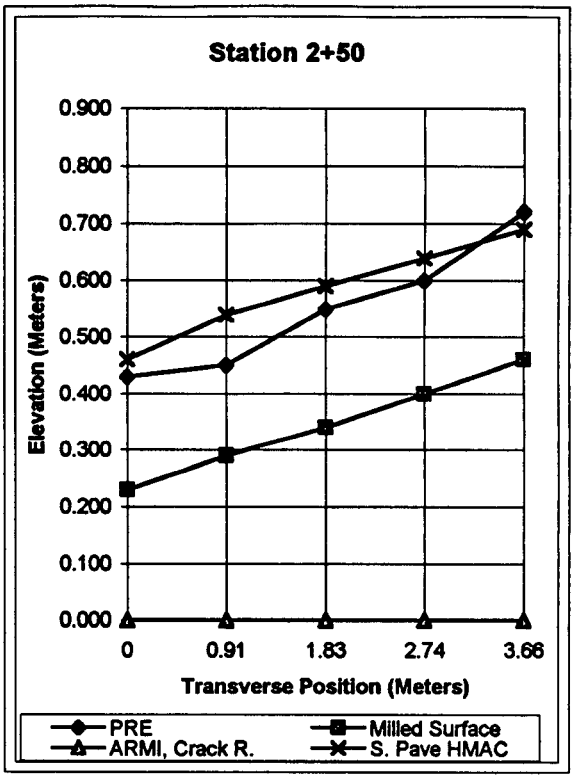

Station 0+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0 100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

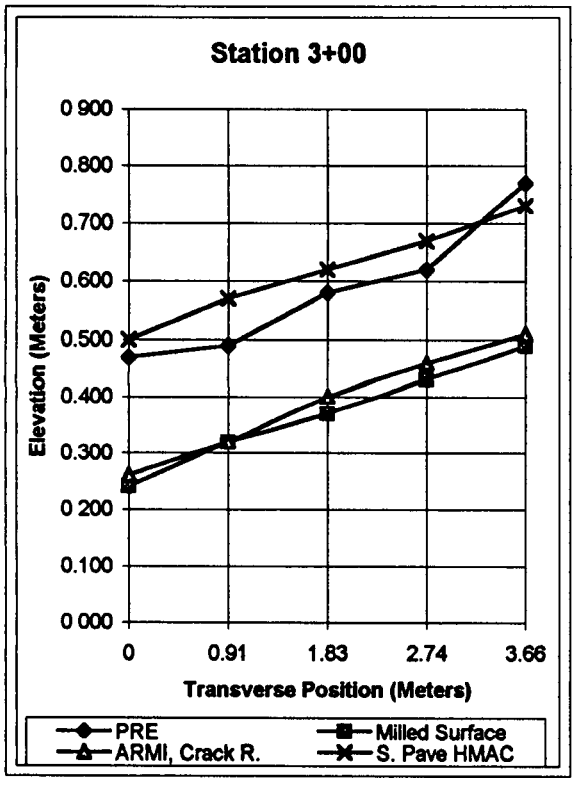

Station 0+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

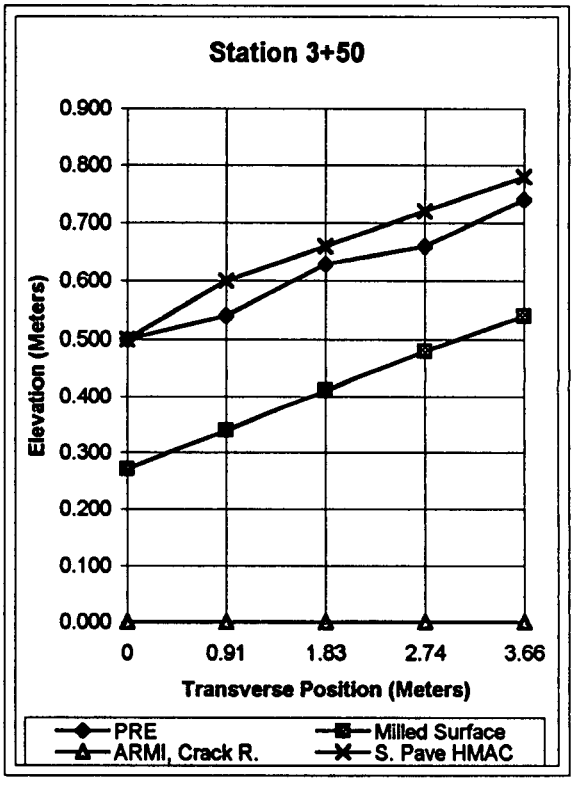

Station 1+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

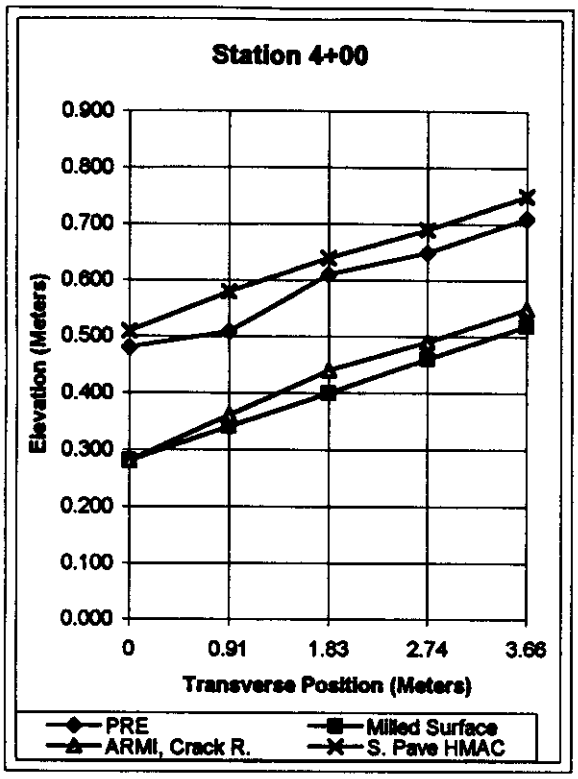

Station 1+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

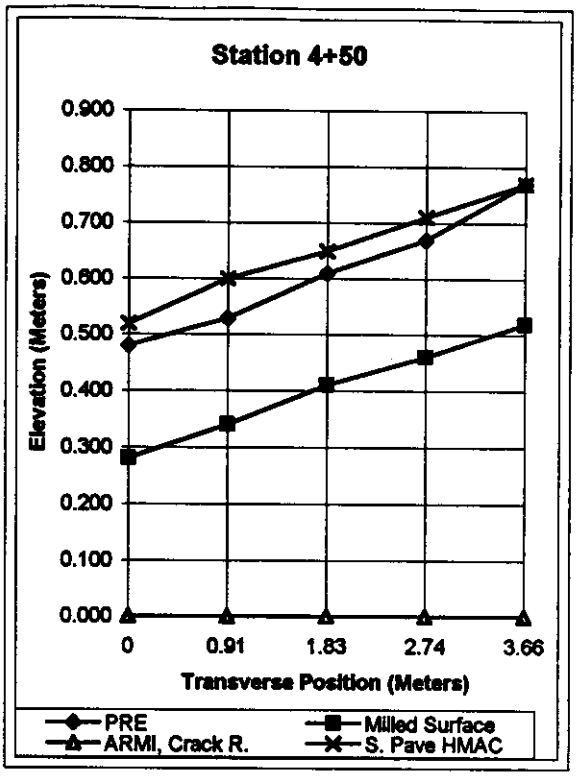

Station 2+00
Elevation (Meters)
0.900
0 800
0.700
0.600
0.500
0.400
0 300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

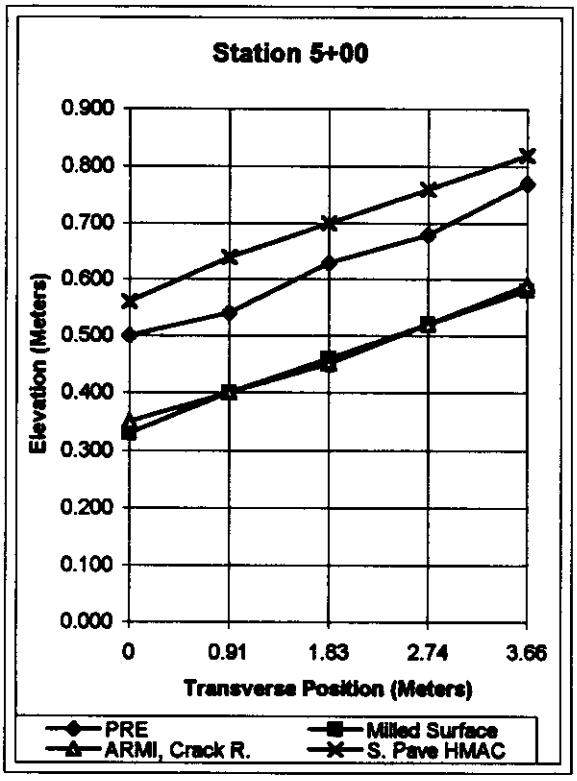

Station 2+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

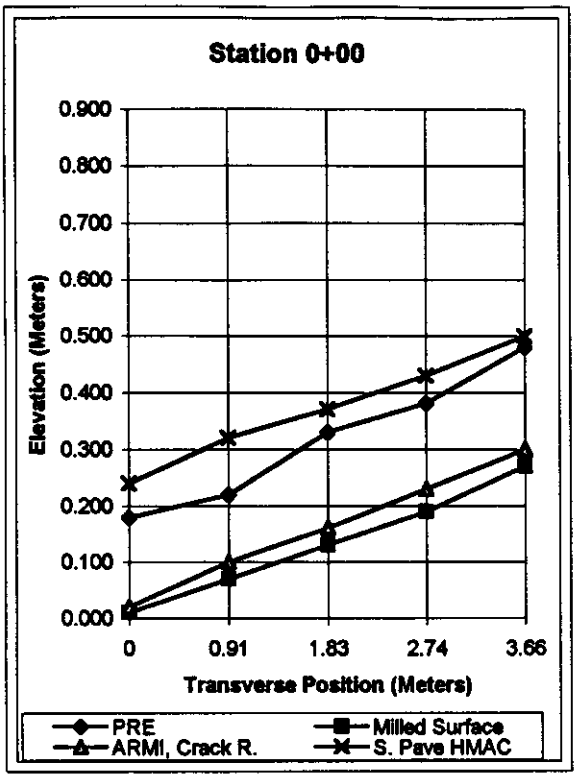

Station 3+00
Elevation (Meters)
0 900
0.800
0.700
0.600
0.500
0.400
0.300
0 200
0.100
0 000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

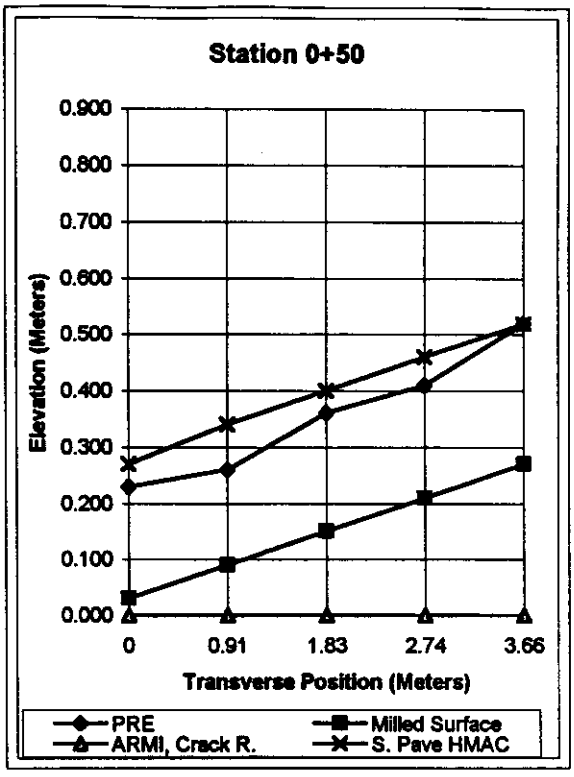

Station 3+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

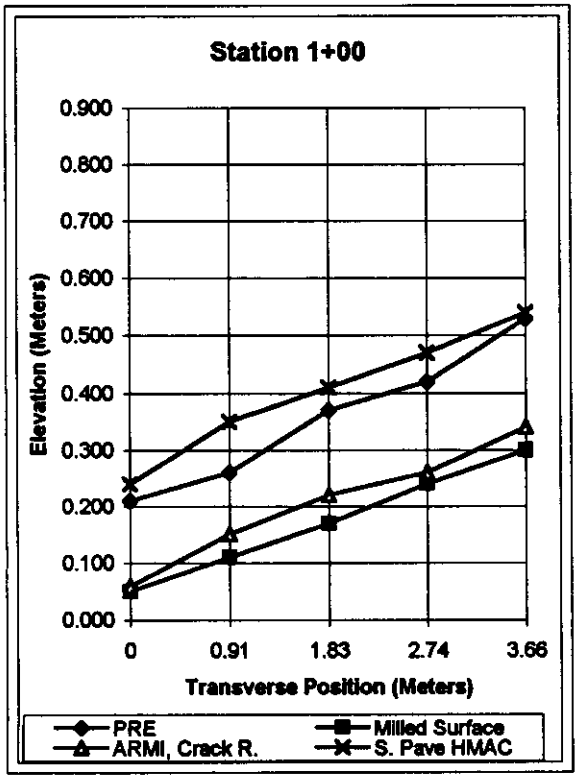

Station 4+00
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

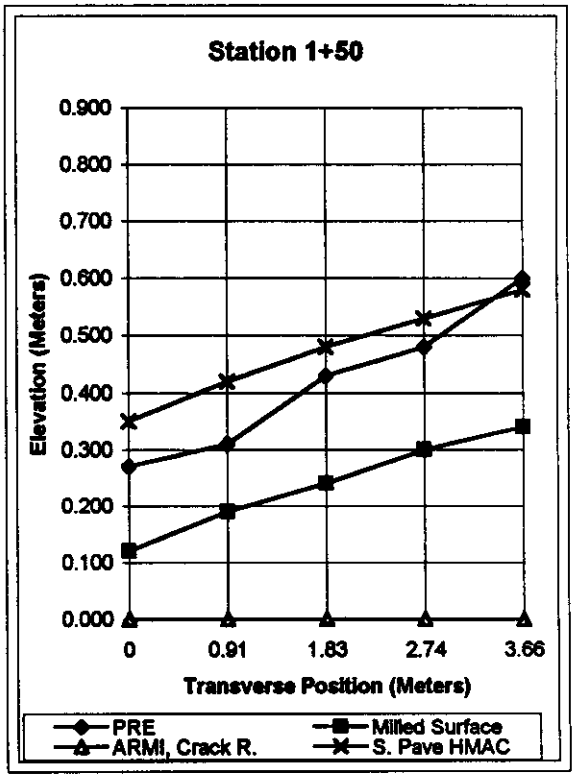

Station 4+50
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

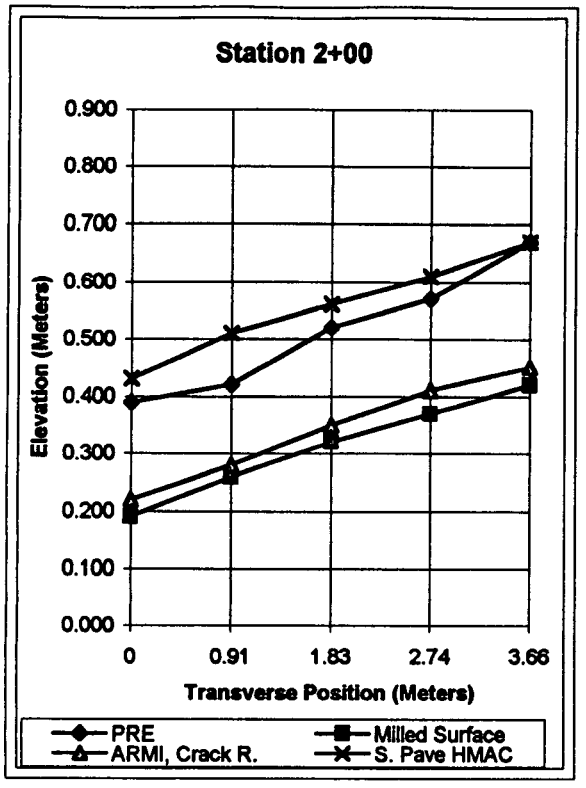

Station 5+00
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

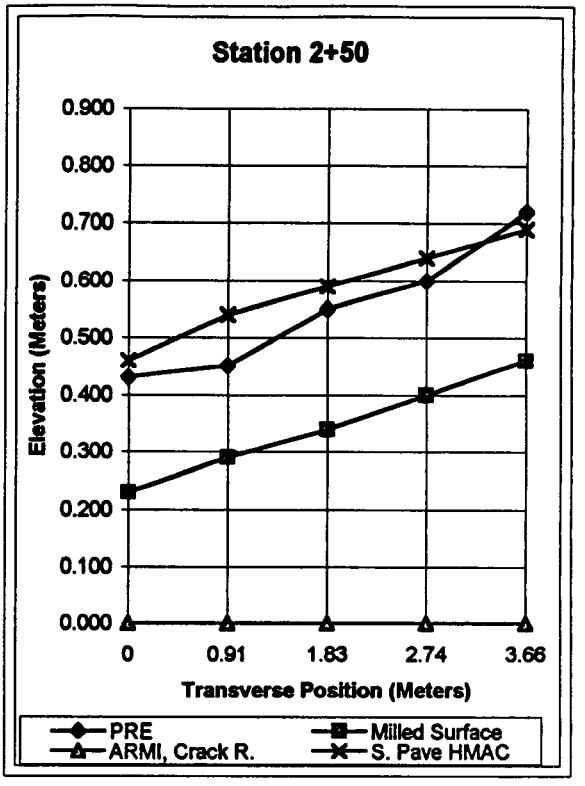

Station 0+00
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

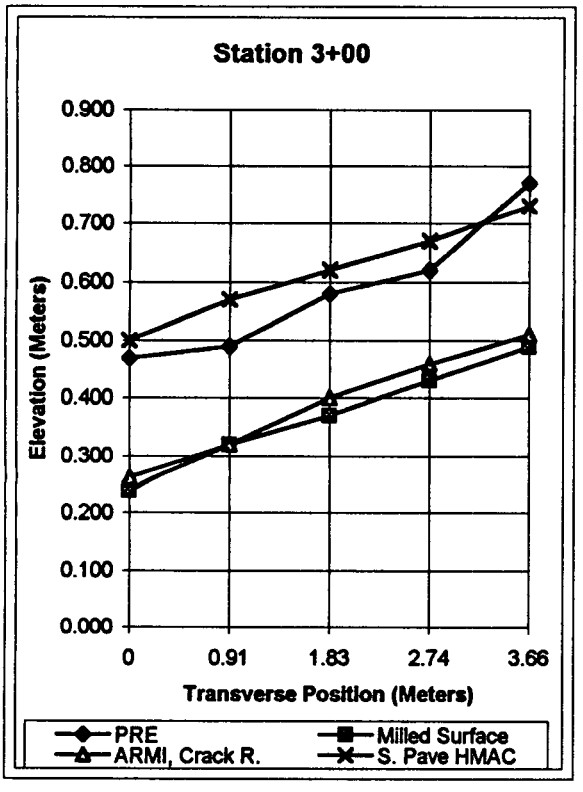

Station 0+50
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

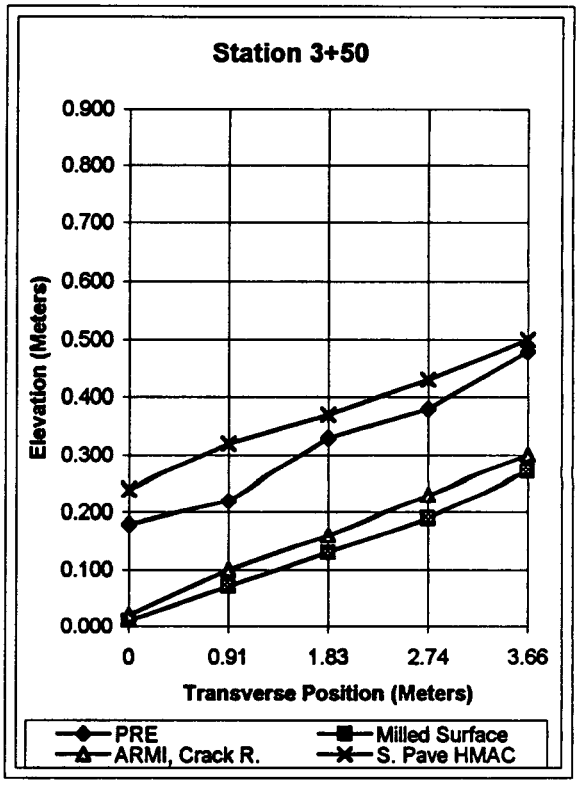

Station 1+00
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

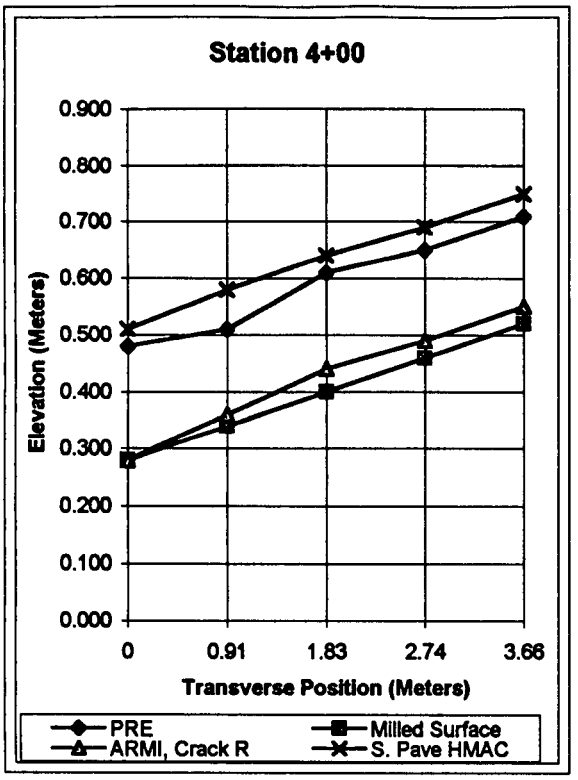

Station 1+50
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

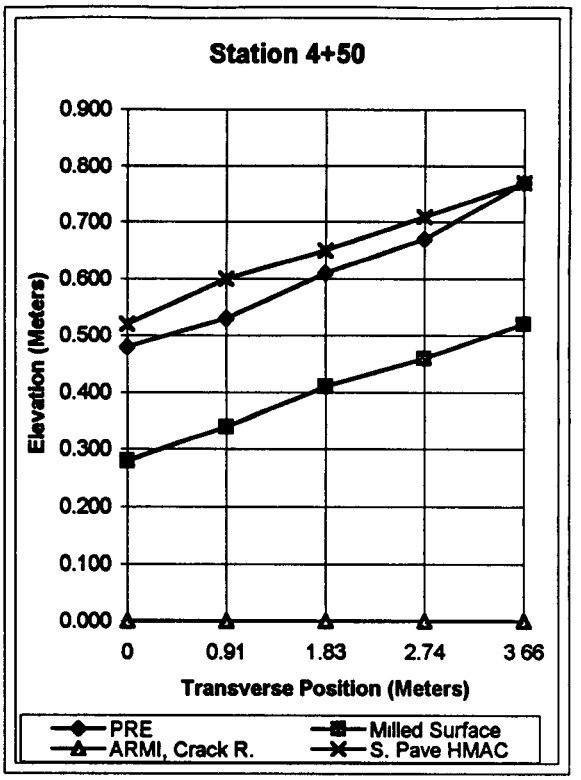

Station 2+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

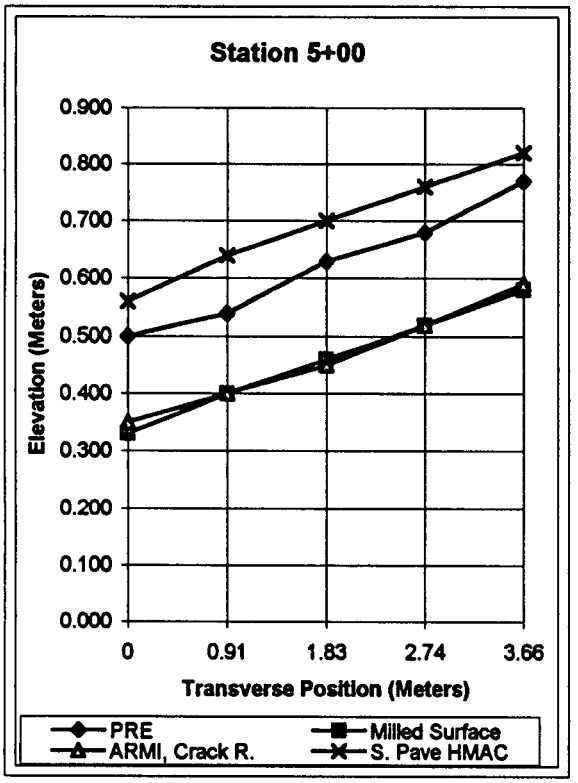

Station 2+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

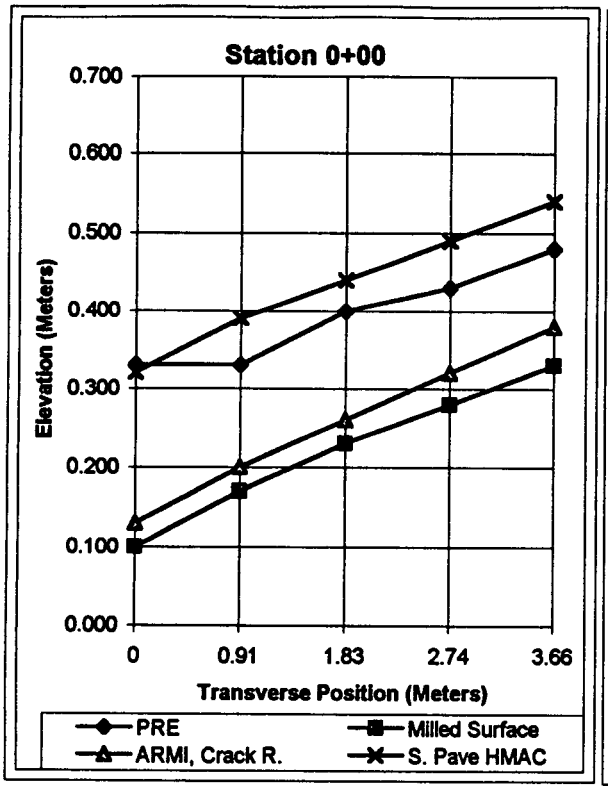

Station 3+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

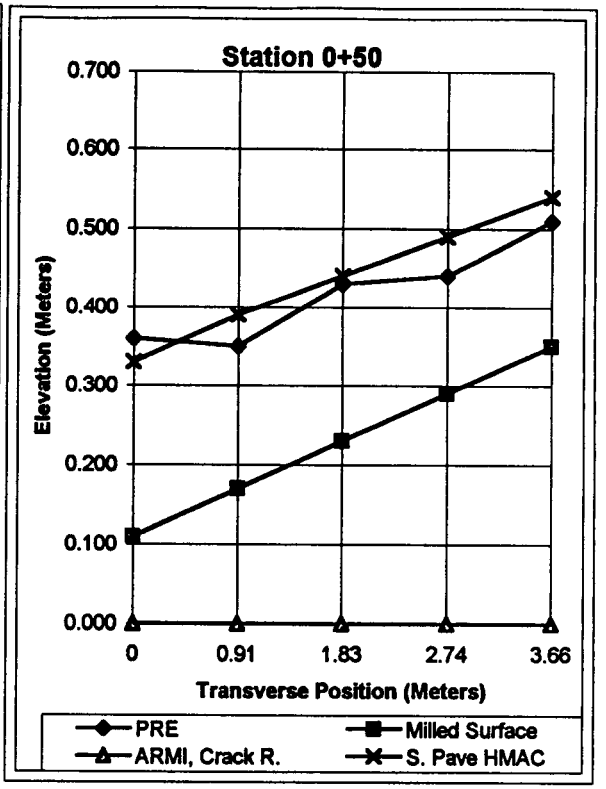

Station 3+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

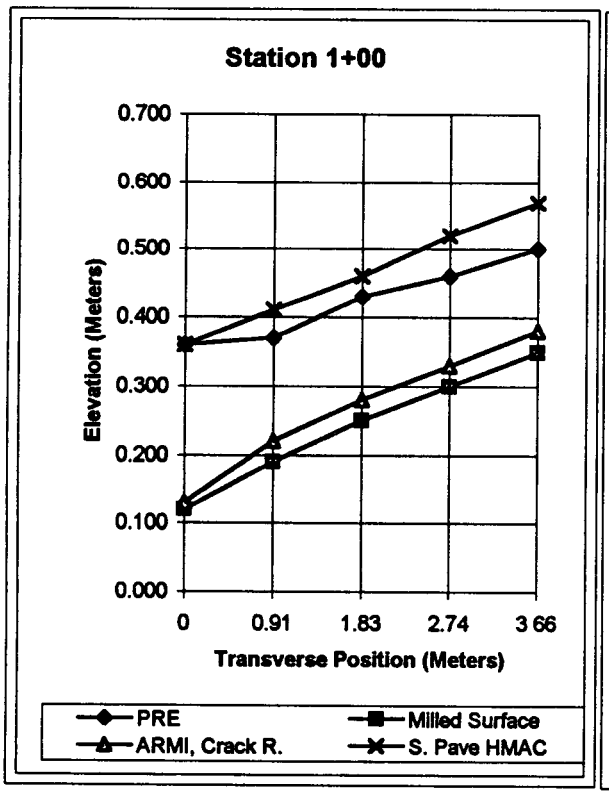

Station 4+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R
S. Pave HMAC

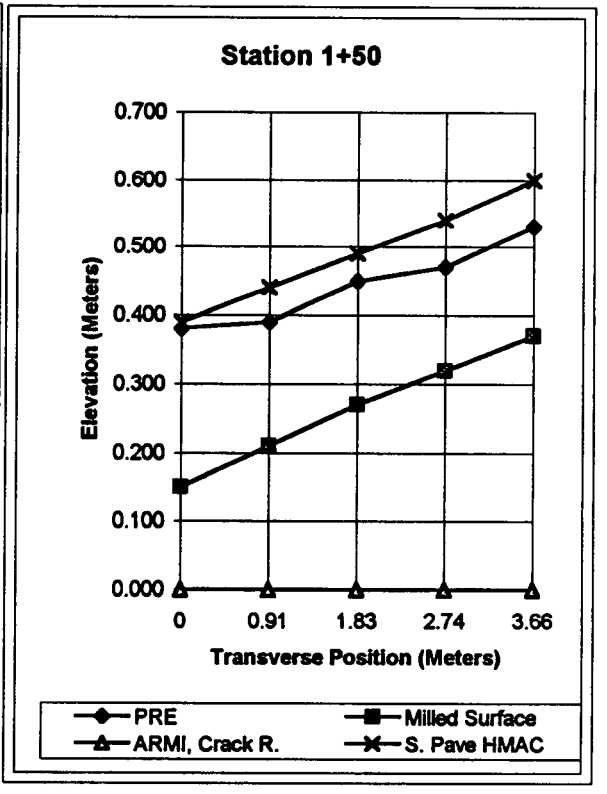

Station 4+50
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

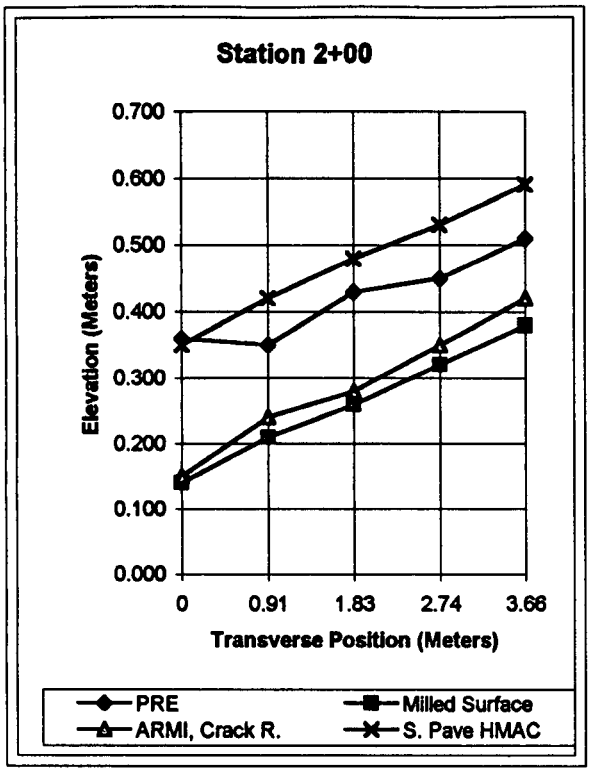

Station 5+00
Elevation (Meters)
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

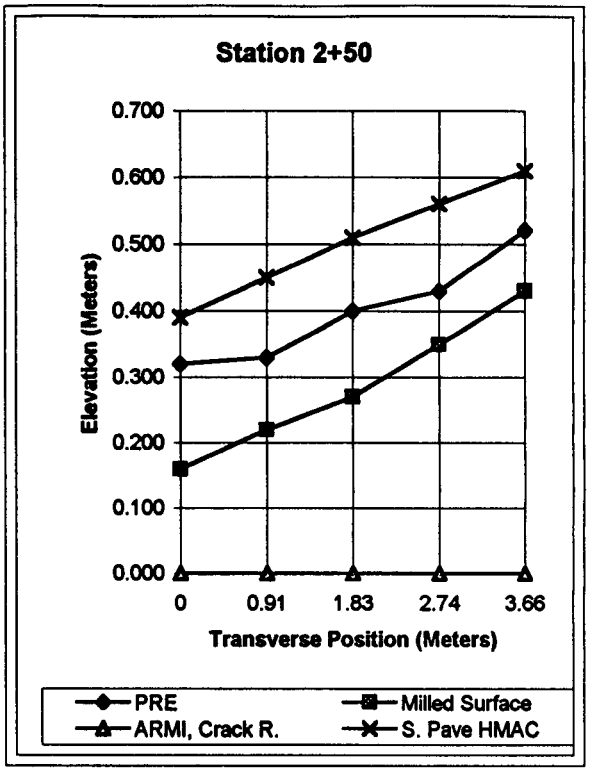

Station 0+00
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

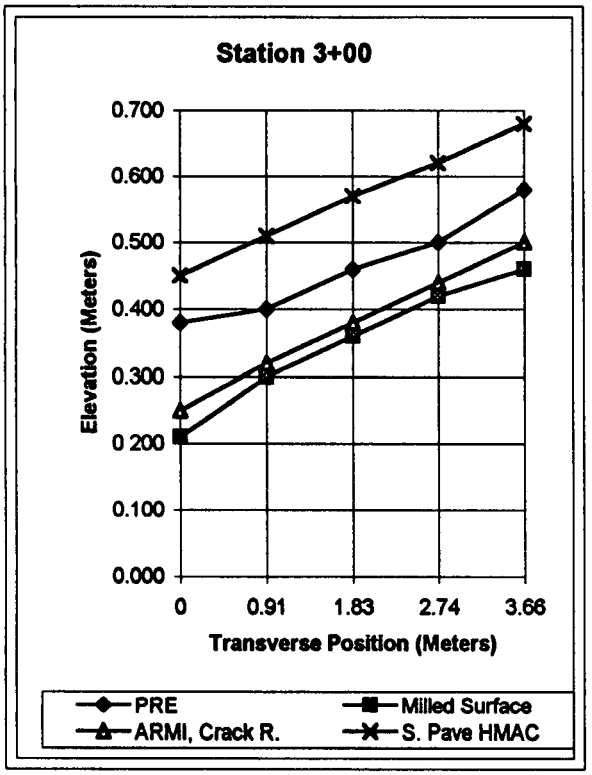

Station 0+50
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

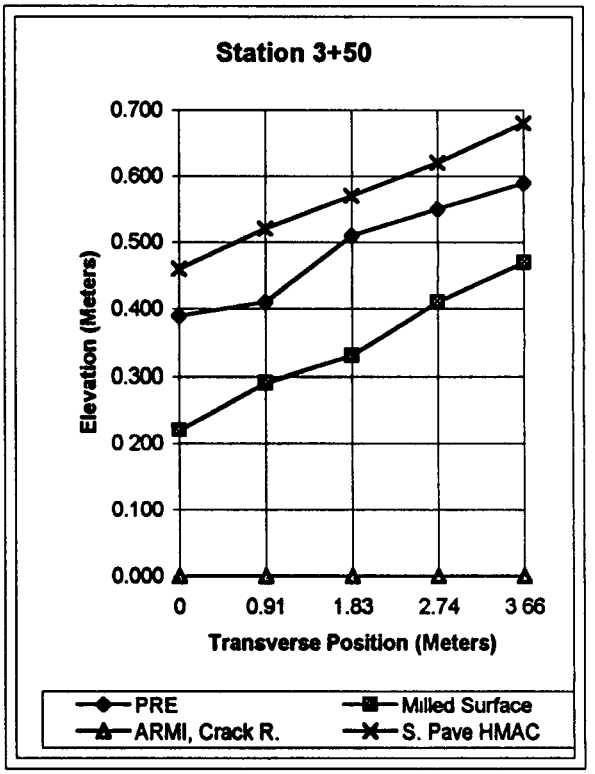

Station 1+00
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

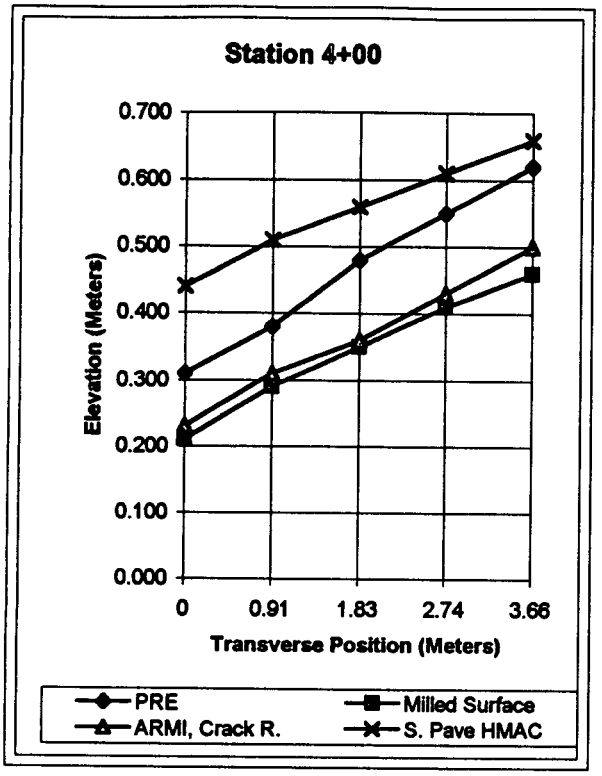

Station 1+50
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

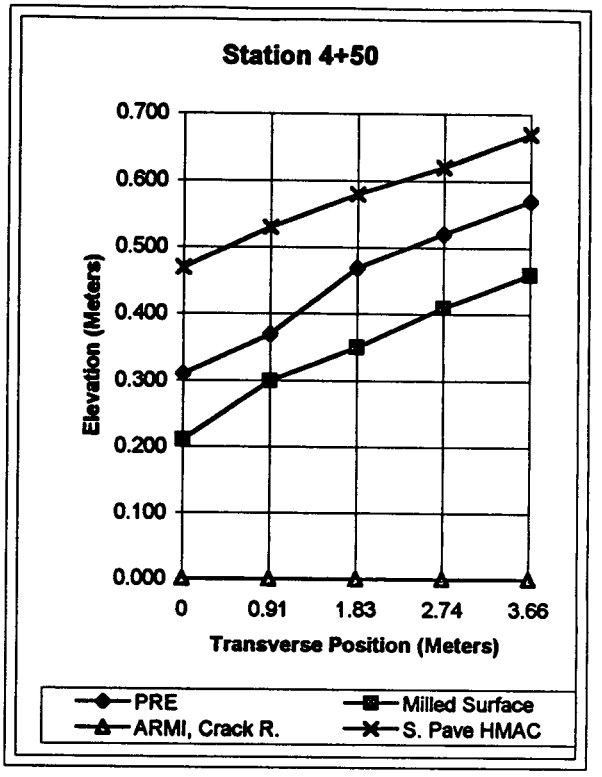

Station 2+00
Elevation (Meters)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

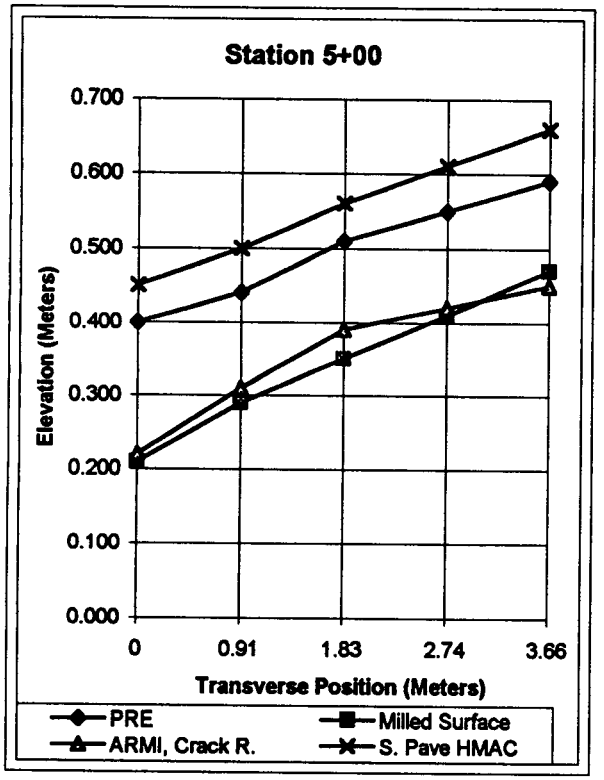

Station 2+50
Elevation (Meters)
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC


Station 3+00
Elevation (Meters)
0.700
0.600
0.500
0.400
0.300
0 200
0.100
0.000
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC


Station 3+50
Elevation (Meters)
0.700
0.600
0.500
0.400
0.300
0 200
0.100
0.000
0
0.91
1.83
2.74
3 66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC


Station 4+00
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC


Station 4+50
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC


Station 5+00
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
Elevation (Meters)
0
0.91
1.83
2.74
3.66
Transverse Position (Meters)
PRE
Milled Surface
ARMI, Crack R.
S. Pave HMAC

APPENDIX D

PHOTOGRAPHS

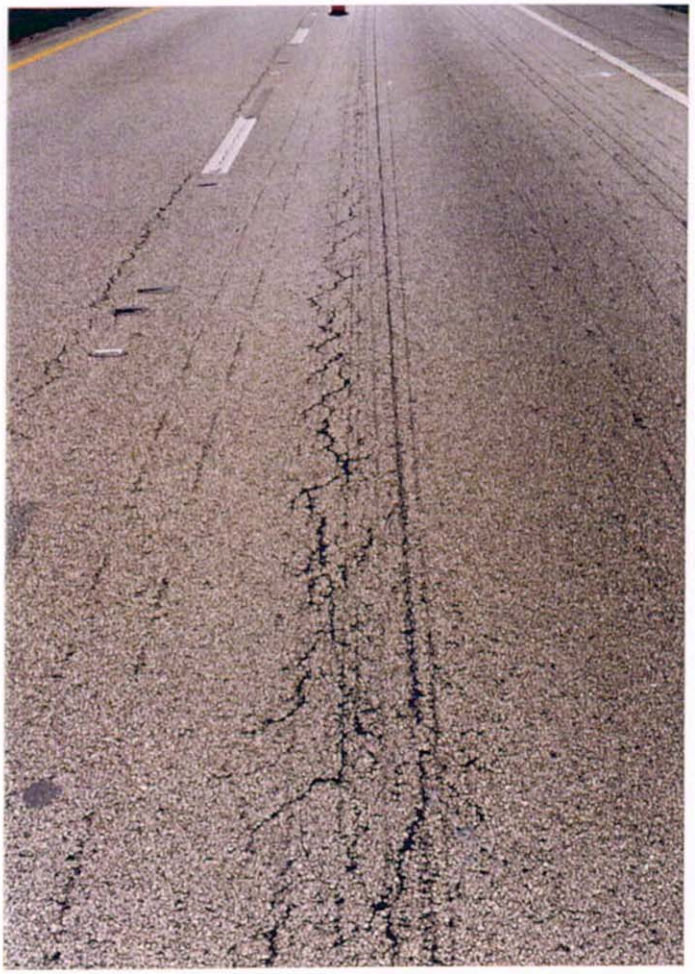


Photo 1. Florida SPS-9A (120900), Fatigue in Wheelpath-Preconstruction

Photo 2. Section 120900, Heavy Vegetation Growth at Right-of-Way

Photo 3. Section 120902-19′ Below Surface, Augered Subgrade "Grey Clay"

Photo 4. Section 120903, Augered Subgrade "Grey Clay" at 14′ Below Surface

Photo 5. Section 120909, Temporary Benchmark on Headwall

Photo 6. Preconstruction Cross-Profiling Using Dipstick®

Photo 7. Preconstruction Coring, I-10 Eastbound

Photo 8. Shoulder Probe - Preconstruction

Photo 9. Shoulder Probe - Preconstruction

Photo 10. Preconstruction Core Sample

Photo 11. Preconstruction Deflection Testing