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August 23, 1994
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Mr. Monte Symons
FHWA-LTPP Division
Turner Fairbanks Resource Center HNR-40
6300 Georgetown Pike Room F215
McLean, Virginia 22101-2296

RE: NC DOT SPS-2 Project 370200, Lexington, NC: Construction Report

Dear Mr. Symons:

Forwarded enclosed is a report prepared by Alex Rutka, the North Atlantic Region Construction Inspection Representative present during the construction of the SPS-2 project, Lexington, NC, Fall and Winter 1993.

The report is intended principally to outline the differences and variations from the SPS-2 Guidelines. Other details, results, records, photographs and slides of the construction activities are assembled in a binder which is held in the Amherst Office.

These reports will in time be complemented by laboratory materials tests, and initial performance monitoring tests reported in the RIMS/NIMS data base.

Yours Sincerely,

William A. Phang

William A. Phang
Project Manager, FHWA-LTPP
Pavement Management Systems Limited

WP/tf

enclosure

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CONSTRUCTION REPORT on SPS-2 PROJECT
North Carolina Department of Transportation
State Highway Administration

Project 370200
(Contract No: 8 T600406)
US RTE. 52 Lexington, NC By-Pass
Fall and Winter of 1993

Report Prepared by: Alex Rutka
Edited by: Trang Hoang and William A. Phang
North Atlantic Region Contractor
Pavement Management Systems Limited
Under Contract DTFH 61-92-C00007

Submitted To:
DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
Long Term Pavement Performance Division

PAVEMENT MANAGEMENT SYSTEMS LIMITED
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August 1994

Technical Report Documentation Page

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15. Supplementary Notes

This report of construction of the SPS-2 project is intended to essentially cover the differences or variances from the SPS-2 Guidelines, and to provide specifics of actual construction parameters compared with the experimental design. More detailed information can be provided by the North Atlantic Regional Office

16. Abstract

This SPS-2 Project 370200 is located on the Southbound US Rte 52 Lexington By-Pass, in North Carolina. It conforms to the N series for fine subgrades in the wet no-freeze zone of the SPS-2 Experiment for Structural Factors in Rigid Pavements of the FHWA-Long Term Pavement Performance Program The project consists of twelve 500 ft. monitoring test sections plus two supplemental sections. It was constructed in the fall and winter of 1993, and opened to traffic in July 1994 The contractor was Southern Road Builders Inc., a Division of APAC in Atlanta, GA.

The report includes descriptions of the layout of the test sections, details of materials sampling and field and laboratory testing plans, and some results of measurements taken during and shortly after completion of construction.

Construction equipment used on the project are named and construction dates and sequences are described. Some QA results taken of non-test-section construction areas are listed

Variances from experiment guidelines such as location of pavement drains near the pavement edge instead of at the shoulder edge are described for each test section. Actual average pavement thicknesses are provided. Thin pavement sections prone to early failures are located on an add-on third lane.

17. Key Words	18. Distribution Statement
SPS-2, high-strength concrete, 14 ft. lane widths, 15 ft. joint spacings, add-on lane, econocrete shoulders, lime stabilization edge drains, permeable asphalt treated base, load reponse instrumentation.	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price

SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	25 4	millimeters	mm
ft	feet	0 305	meters	m
yd	yards	0 914	meters	m
mi	miles	1 61	kilometers	km
	AREA			
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0 093	square meters	m^2
yd^2	square yards	0 836	square meters	m^2
ac	acres	0 405	hectares	ha
mi^2	square miles	2 59	square kilometers	km^2
	VOLUME			
fl oz	fluid ounces	29 57	milliliters	ml
gal	gallons	3 785	liters	l
ft^3	cubic feet	0 028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
NOTE: Volumes greater than 1000 l shall be shown in m^3.				
	MASS			
oz	ounces	28 35	grams	g
lb	pounds	0 454	kilograms	kg
T	short tons (2000 lb)	0 907	megagrams	Mg
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5(F-32)/9 or (F-32)/1 8	Celcius temperature	°C
	ILLUMINATION			
fc	foot-candles	10 76	lux	l
fl	foot-Lamberts	3 426	candela/m^2	cd/m^2
	FORCE and PRESSURE or STRESS			
lbf	poundforce	4 45	newtons	N
psi	poundforce per square inch	6 89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
mm	millimeters	0 039	inches	in
m	meters	3 28	feet	ft
m	meters	1 09	yards	yd
km	kilometers	0 621	miles	mi
	AREA			
mm^2	square millimeters	0 0016	square inches	in^2
m^2	square meters	10 764	square feet	ft^2
m^2	square meters	1 195	square yards	ac
ha	hectares	2 47	acres	mi^2
km^2	square kilometers	0 386	square miles	
	VOLUME			
ml	milliliters	0 034	fluid ounces	fl oz
l	liters	0 264	gallons	gal
m^3	cubic meters	35 71	cubic feet	ft^3
m^3	cubic meters	1 307	cubic yards	yd^3
	MASS			
g	grams	0 035	ounces	oz
kg	kilograms	2 202	pounds	lb
Mg	megagrams	1 103	short tons (2000 lb)	T
	TEMPERATURE (exact)			
°C	Celcius temperature	1 8C + 32	Fahrenheit temperature	°F
	ILLUMINATION			
lx	lux	0 0929	foot-candles	fc
cd/m^2	candela/m^2	0 2919	foot-Lamberts	fl
	FORCE and PRESSURE or STRESS			
N	newtons	0 225	poundforce	lbf
kPa	kilopascals	0 145	poundforce per square inch	psi

* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380

(Revised August 1992)

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1993

INTRODUCTION

This SPS-2 project is in the Wet-No Freeze Environmental Zone of the Federal Highway Administration's Long Term Pavement Performance (FHWA-LTPP) program and conforms to the N series for Fine Subgrades in the experiment design. The NC DOT SPS 2 project involves the construction of 12 test sections and 2 supplemental test sections. The project is located on the southbound lanes of US 52, North Carolina; from SR 1232, Lexington, to existing US 52, Welcome; a distance of 4.85 miles (7.8 km) (Fig. 1). It is a 4 lane divided highway; consisting of two 12 foot (3.7 m) lanes in each direction and a 68 foot (20.7 m) median. There is an interchange to US 64 at Sta. 193+00. Thirteen of the test sections are located north of the Hwy. 64 interchange. Section 370204 is south of Hwy. 64.

Several adjustments in the project layout were made during the early construction stages. Changes include the addition of a new state test section, 370260, a 100 foot (30.5 m) shift of section 370208 to Sta. 215+00 - 220+00 and a relocation of section 370212 from Sta. 147+05-152+05 to Sta. 222+00-227+00. The test section layout is shown in Figure 2, and details of layer structure are provided in Table 1.

With the possibility of early failure of the six 8 inch (203 mm) thick concrete pavement sections in mind, approval was given to group and construct these sections as an add-on lane. Traffic would use the add-on lane and only the outside lane of the mainline pavement until performance of the add-on lane becomes unacceptable. Traffic would then be redirected to the 2 mainline lanes.

The subgrade is primarily a silt which becomes soupy when wet. The earth grading for this project was completed in 1992. The add-on lane required the widening of some deep cuts and high embankments, and this was done as part of the paving contract. Most of the alignment is tangent with slight grades. There are 3 curves on which 5 test sections are entirely and 1 section is partially located.

The annual average daily traffic, in both directions, was estimated to be 23,500 to 26,100 vehicles per day with 13 % being trucks The estimated 18,000 lbs. (80 kN) equivalent single axle load (ESAL) rate in the SPS 2 lane was estimated to be 539 (1,000 ESAL/yr.), with the total design of 18K ESAL applications to be 10,784,326 over the 20 year design period. Test section, 370204, south of Hwy. 64 will be monitored by automatic vehicle classification (AVC) of four 7-day periods per year, since it would have different traffic characteristics.

The paving project including the SPS test sections was advertised in the summer of 1992 with the bid closing on September 15, 1992. The contract was awarded to Southern Road Builders Inc. a Division of APAC, in Atlanta, Georgia. The Contractor's team included Carl Larkins as Manager, John Manning as initial Superintendent, also responsible for subcontractor activities, Dennis Ramsey as subsequent Superintendent, Roy Mowell as overall Foreman and John Range as grade Foreman.

The Subcontractors were J.A. Long Inc. of Gainsville, GA for subgrade stabilization, granular base and shoulders; APAC Carolina, Thompson-Arthur Division of Winston-Salem, NC for asphalt paving; APG of Ripplemead, VA supplied quick lime for the stabilization and Lime-Slurry Pazzolank Porta-Batch-Lime Slaking System did the application; AC Construction of Faison, NC for edge drains; and Eaton Construction Co. of Circleville, OH, for joint sawing and sealing.

Personnel of NC DOT included D. Walters as division 9 District Engineer, Mike Patton as Construction Engineer, Keith Raulston as Resident Engineer, Tom Vickers as Assistant Resident Engineer, since the summer of 1993 and Dalton Bennett as Chief Inspector. H. Landrum, Geotechnical section, prepared designs for subgrade stabilization.

Dr. Shin Wu of NC DOT's Pavement Management Unit, was the liaison between the construction staff, materials laboratories and the Federal Highway Administration/North Atlantic Regional Office (FHWA/NARO). He was assisted by Judith Corley-Lay. Ed Arrowood was the area Pavement Coordinator. Tasks within the NC DOT were assigned as followed. Ed Arrowood performed the 5 point levels, nuclear density tests, beam and cylinder preparation, breaking of the 14 and 28 day beams and transportation arrangements of samples to the Raleigh Laboratory. Lynda Tysinger performed the majority of the field slump and air content tests. Darrel Wise provided the profilographs information. Paul Russel assisted with the plate bearing tests. Danny Beaver assisted with the beam preparations. Jim Turley provided assistance during the early stage of construction.

On-site construction inspection of the SPS-2 project was carried out by Alex Rutka of Pavement Management Systems Limited, (PMSL), the FHWA-LTPP North Atlantic Region Contractor.

The asphalt mixes; asphalt concrete (AC), black base (RHB) and permeable asphalt treated base (PATB), were produced at the APAC plant #10 Jamestown Asphalt Plant, Thompson-Arthur Division in Jamestown, NC, about 24 miles from the junction of US 52 with US 64. The batch plant is a Cedar Rapids model H-60C, with a rated capacity of 4 ton. The job mix and compaction test report for I-2 and RHB is shown in Table 11. The job mix and compaction test report for PATB is shown in Table 12.

The automated concrete plant, an Erie Strayer and aggregate stockpiles were located at the north end of the project. The concrete plant produced 9 yd^3 (6.9 m^3) batches for the 550 psi (3790 KPa) concrete. Due to the limitation of the cement scale, the Erie Strayer produced only 6.5 yd^3 (5.0 m^3) batches of 900 psi (6201 KPa) concrete.

The concrete mixes were designed during the summer of 1993 by APAC Georgia Inc. The cement, used for the designs, came from Holant (Santee) Holly Hill, SC; the intended supplier. During the northbound paving, Holant (Santee) terminated the supply of cement. The cement source moved to Tarmac Roanoke, Roanoke, VA. Since this new cement had a higher alkali content, the fly ash content exceeded the 15 % by weight of cement to result in an allowable lower seven day flexural strength. The mix designs were revised and by the start of the southbound lane paving, the 14 and 28 day flexural strength tests met the minimum requirements (Tables 14.1 through 14.6). The field laboratory was only capable of breaking up to 28 day, 550 psi (3.790 MPa) beams, therefore 900 psi (6.201 MPa) were, and 365 day beams are to be tested at the Raleigh testing laboratories.

The asphalt paving equipment consisted of a track mounted Blawknox spreader, model PF510 and 3 rollers; a 10 ton (9.1 tonne) Hyster C766, 10 to 12 ton (9.1 to 10.9 tonne) Dynapac CC 421 and 10 ton (9.1 tonne) Ingersoll-Rand. The mainline lane concrete paving equipment included a 24 foot (7.3 m) wide Maxon spreader and an adjustable 26 foot (7.9 m) wide Gomaco GP 3500 finisher. A Gomaco 2500 finisher was utilized for the add-on lane. Other equipment included a lime slurry mixing and holding tank, slurry spreading trucks, pulvi mixers, graders, vibratory sheepsfoot rollers, aggregate spreaders, side dump trucks, graders, a 3 steel wheeled roller, a steel wheeled tandem vibratory roller, saws and a water truck.

Test sections, 370201, 370205, 370208 and 370212 were instrumented with seasonal monitoring sensors and strain gauges. At section 370201, linear variable differential transducers (LVDT) were installed and at sections 370205, 370208 and 370212, preparations were made for other LVDT installations for the load response program. Strain gauges and multiple depth displacement (MDD) transducers were also installed at 4 other locations for North Carolina's research program. A weather station site was prepared and constructed by NC DOT. Installation of the equipment was completed in August, 1994.

PROJECT DETAILS

Layout:

All six of the 8 inch (203 mm) thick concrete pavement sections are located in the add-on lane between two curves towards the north end of the project. The 11 inch (279 mm) thick concrete pavement is located at the southern end. The 14 foot (4.3 m) wide lane is in the middle of the project. The sections with concrete strengths of 550 or 900 psi (3.790 MPa or 6.201 MPa) were grouped in 3's or 4's. The longitudinal layout of the test sections is shown in Figure 2. Table 1 provides a summary of the arrangement of the test sections, their layer structure, pavement width, inclusion of edge drain and typical section type (Figures 25a, and 25b).

Layout of Joints and Dowels:

This project requires each test section to begin 5 feet (1.5 m) after a joint. Minor adjustments to the normal joint spacing outside the test sections were required. Fifteen foot (4.6 m) spacings could not be placed within the 200 foot (61 m) transition zone. The revised joint layout plan consist of 15 foot (4.6 m) joint spacings extending from 50 feet (15.3 m) before to 50 feet (15.3 m) after a test section, a total of 600 feet (183 m), while the majority of the remaining joints between the test sections would be spaced at 20 foot (6.1 m) (Table 19).

Since 5 of the 14 test sections were entirely on curves which require corrections to joint spacings (3 on the mainline lanes and 2 on the add-on lane), this meant the start of the 15 foot joint spacing beginning at Sta. 0-50 (with respect to the test sections) would not result in a joint at Sta. 0-05 nor at Sta. 5+05 as would be the case for tangent alignment.

At the 3 seasonal monitoring sections, the joint layout plan began at Sta. 5+00 so that the instrumentation holes were located at Sta. 5+12.5 and the mid-point of the first full slabs past each test section. The spacing was worked backwards to Sta. 0-50, allowing the joint near Sta. 0+00 to marginally vary in location. For monitoring purposes, Sta. 0+00 could be adjusted to fit the required distance to the joint, see Table 20.

Dowel baskets for the 14 ft. (4.3m) lanes were made up by adding two more dowels to the regular dowel assemblies used in 12 ft. (3.7m) lanes, see Photo 5.

Material Sampling and Testing:

The testing was performed at NC DOT "Blue Ridge Road" laboratory #3721 in Raleigh, NC, except for 14 and 28 day 550 psi (3.790 MPa) concrete flexural beam tests, which were performed at the field laboratory located at the concrete plant. Test results on molded samples of LCB and PCC are summarized in Table 16. R.W. Reaves was the State Materials Engineer. Laboratory tests were done under the supervision of the Soil Engineer, Mehdi Haeri, Bituminous Design Engineer, C.A. Clippard Jr. and Physical Testing Engineer (concrete), V.O. Cordle. The coefficient of thermal expansion and static modulus of elasticity tests was performed by FHWA in McLean, VA and the University of NC, respectively. Samples were taken for the Materials Reference Library at 1625 Crane Way in Sparks, NV 89431.

Figures 3 to 7 show the layout of field material sampling and testing by layers. A.) All cores were 4 inches (102 mm) in diameter (OD). Arrangements were made for the paving contractor to take the 14 and 28 day cores. Several core locations were subsequently moved to avoid problems with the instrumentation equipment. B.) Tables 2 and 3 summarize the field and laboratory testing plan and the locations of the samples to be tested, as described in Figures 3 through 21. Table 5 provides information regarding the bulk material sampling for the material reference library. C.) a.) Figures 8-21, for each of the test sections show the locations of field sampling and testing for each material layer.

b.) Table 4 is a schedule for post-construction coring which details the timing for taking the cores, where the cores are to be taken from, and what laboratory testing is to be done.
c.) Dates when field sampling and testing were done, and when materials samples were taken during construction are summarized in Table 6.

NOTES ON CONSTRUCTION OPERATIONS

Subgrade Stabilization

To control spreading of lime slurry at 24 lbs/yd^2 (13.05 kg/m^2), the area to be covered by a particular batch (7 1/2 to 8 slurry truck loads) was delineated by twigs set 2" (0.6m) beyond the edges of the roadbed. The soil is first loosened to a depth of 8" (203mm) by ripping with a grader. The pulvi-mixer then follows the slurry discharge truck in each of three passes to evenly distribute the batch over the area and to the depth of 8" (203mm), see Photo 1. Compaction was with a Dynapac CA25 vibratory sheepsfoot and vibratory steel wheel rollers. The following day the material is again ripped, pulvi-mixed, grader shaped and re-compacted prior to final grading with a CMI and the same compaction equipment.

The subgrade in two areas containing sections 370204 and sections 370207, 370260, were stabilized in the top 7" (178mm) by first spreading 300 lbs/sq yd. (163 kg/m^2) of granular base material with a spreader box, ripping with a grader, spreading Portland cement at the rate of 60 lbs/sq yd. (32.6 kg/m^2) adding water, pulvi-mixing, and compacting. Final grading with a CMI and re-compacting followed.

Compaction test results on the stabilized subgrade in the test sections are shown in Table 8, while Quality Assurance QA, compaction checks are shown in Table 7. It should be noted that in sections 370209 and 370210, 3" (76mm) of the 8" (203mm) of stabilized subgrade in the add-on lane had to be removed to allow the pavement structure to fit the finished profile grade. The finished subgrade was sealed with CRS-1 emulsion at the rate of 0.15-0.20 gal/yd^2 (0.6 l/m^2), see Photo 3. Shelby tube sampling of the subgrade is illustrated in Photo 2. Plate load testing was carried out on subgrades in sections 370205 and 370208.

Dense Graded Aggregate Base (DGAB)

The aggregate bases for sections 370209 and 370210 on the add-on lane were placed initially (3" (76mm) thick) up to the level of the I-2 asphalt layer, of the main-line lanes. They were not brought up to the required 4" (102mm) thickness until after the main-line lanes had been paved and the concrete cured. The DGAB in these sections were overlaid by permeable asphalt treated bases (PATB). Because the porous asphalt overlay would allow a flow-through of water into the aggregate base, perhaps carrying fines as it exits the DGAB to create voids, a heavy prime coat of CRS-1 emulsion was specified to be applied on the surface of the DGAB. However, because of the late construction date, November 12, 1993, the prime coat was omitted. See Table 6 for construction dates. Plate load testing was carried out on DGAB bases in sections 370203 and 370204.

Asphalt Mixes

Supplemental section 370259 represents the NC DOT design pavement structure for this highway project. Ten inches of concrete pavement on 4" (102mm) of permeable asphalt treated base sits on 1" (25.4mm) of I-2 asphalt concrete over 8" (203mm) of lime stabilized silt or clayey silt.

Supplemental section 370260 substitutes 5" (127mm) of black base (RHB) for the 4" (102mm) of PATB for comparison with the 6" (152mm) of Lean Concrete Base, LCB in the LTPP experimental sections (370207).

Mix design details of the I-2 and RHB mixes are given in Table 9. Both of these mixes contain about 14% of recycled asphalt pavement (RAP).

The permeable asphalt treated base was laid with a track mounted Blawnox spreader, and compaction was not started until the mix had cooled to around 150-170° F (66-77° C) to minimize shoving. One coverage with a 10 ton (9.1 tonne) Dynapac steel wheel tandem roller seemed to be enough. The next day a 28' (8.5m) roller screed as is used in finishing concrete bridge decks, and a 16 ft. (4.9m) straight edge were used to find high spots. These were marked out and leveled with the screed or with the help of a 10 ton (9.1 tonne) Ingersoll-Rand steel wheel tandem roller.

Light vehicles traveling on the PATB after a few days did not damage the surface except during turning movements. Details of the asphalt mixes are given in Tables 10, 11, and 12. Plate load testing was carried out on PATB layers in sections 370259, 370210, 370211, and 370212.

Edge Drains

Edge drains were laid in sections 370259, 370209, 370210, 370211, and 370212 before the PATB layer was placed (also on 370260 before the black base mix was placed), see Table 13.

The edge drains were located about 2 ft. (0.6m) away from the pavement edge rather than 8 ft. further away at the edge of the shoulder. The drains were wrapped in filter fabric and consist of stones around a 4" (102mm) slotted pipe. The ends of the 9 ft. (2.7m) wide roll of filter fabric were placed so that the inside edge would lie at the level of the lower surface of the PATB while the farther (outer) edge of the fabric around the drain would be folded over and around so that it would contact the outer end of the PATB and can be fastened to it's top by nails before placement of the econocrete shoulders. See Figure 22, and Photo 7.

Concrete Paving

The main-line lanes (24 ft. or 26 ft.); (7.3m or 7.9m) were constructed by a Maxon spreader and a Gomaco GP 3500 finisher. Side dump trucks placed concrete mix ahead of the spreader with a front end loader to help even distribution ahead of the spreader. However, when the spreader was overloaded, a sprinkle of water would soften the concrete and allow it to be spread properly. This was particularly so with the stiff 900 psi (6.2MPa)concrete mix, and also with the passage of the finisher.

At some loose spots along the shoulder causing the tracks to slip, the equipment had to be supported on planks, and in section 370208, the spreader had to be pulled ahead with the front end loader.

Concrete mix for the add-on lane was side-dumped from trucks driving on the cured main-line lanes. Spreading was done with an arm attached to a front end loader, see Photo 6. Finishing was with a Gomaco 2500.

Concrete paving of the main-line test sections started on October 24, and was completed on November 26, while paving of the add-on lane was carried out between November 21, and November 23, 1993. The same equipment was used between November 9, and November 13, to place the LCB layer.

Construction joints were formed in sections 370204 (sta. 138+75) and 370260 (sta. 245+20) because of oncoming nightfall darkness. Air temperatures at the time of fresh concrete sampling were 44° F (7°C), 54° F (2°C) (Nov. 9), 38° F (3°C) (Nov. 11), 68° F (20°C) (Nov. 13), 56° F (13°C) (Nov. 18), 54° F (12°C), 58° F (14°C) (Nov. 21), and 44° F (7°C) (Nov. 22).

Samples of fresh concrete were molded into cylinders and beams and tested in accordance with scheduled dates shown in Table 15. Results of these tests are listed in Table 16.

Tests on 4" (102mm) O.D. post-construction Portland Cement Concrete, PCC cores are listed in Table 17 together with test results. PCC layer thicknesses developed from measurements of cores and 5 point levels are shown in Table 18.

Concrete Shoulders

Econocrete shoulders with no ties to the concrete pavement were approved instead of asphalt surfaced shoulders. These were constructed December 14-20, 1993. A concrete gutter outside of the shoulder was constructed for embankment erosion control in sections 370203, 370206, 370202, 370210, and 370209.

Seasonal Monitoring and Load Response Instrumentation:

Test sections 370201, 370205, 370208 and 370212 were selected to receive "seasonal monitoring and load response" instrumentation (Figures 23a and 23b). These sections contain strain gauges, time-domain reflectometry (TDR) and thermistor probes, and LVDT instrumentation. North Carolina also selected sections 370209, 370210, 370211

The TDR and thermistor probes were installed by Brandt Henderson and Mike Zawisa of PMSL, John Klemunes of FHWA and Shin-Wu and Judith Corley-Lay, NC DOT personnel. At each test section, 370201, 370205 and 370208, 4 thermocouples were placed in the LCB or DGAB layer at 0, 2, 4 and 6 inch (0, 51, 102 and 152 mm) depths. A 12 inch (305 mm) length thermistor probe was placed 0.75 inch (19 mm) into the PCC on an angle. The thermocouples and thermistor probes were temporarily protected during the placement of LCB with a sand bag. After the passage of the paving train, the thermocouples were positioned at required levels in the LCB and the hole left by the sandbag was patched with fresh concrete. The stainless steel thermistor probe was pulled up into position in the fresh concrete by a string before the concrete had set.

The moisture probe installed in the DGAB layer of section 370201, could not be compacted without shattering the probe. Compaction was avoided in an area about 20 ft^2 (1.9 m^2) around the staked location of the probe.

NC DOT installed the majority of the thermocouples in the LCB layers, the thermistors in the PCC layers and the strain gauges, during the construction of these layers. These strain gauges and wiring in the PCC were secured with concrete patches 1 to 3 hours prior to paving. The MDD instrumentation was also installed by NC DOT. The MDD core holes were capped and the wiring was placed in a shallow cut and carried through the shoulder to join with the strain gauges wiring .

The preliminary LVDT preparation was performed for sections 370201, 370205, 370208 and 370212 by NC DOT and PCS/Law Engineering. This preparation involved boring fourteen 4 inch diameter holes at each test section and installing an encased anchor rod about 10 feet (3.1 m) below the subgrade. The LVDT installation began on May 4, 1994 in order for the load response test to be observed at the May 9th Open House. Since the installation was difficult and time consuming, PCS/Law will try to redesign the LVDT components for subsequent installations. Section 370201 is the only section to have the LVDT actually installed to date. PMSL installed and tested the seasonal sensor instrumentation cabinet at section 370201. A separate cabinet will be installed to house the LVDT and strain gauge instruments.

The locations of core samples were shifted into an area 50 feet (15.3 m) outside the instrumentation area. Small adjustments to core locations were required to avoid joints shifted by curvature corrections.

CONSTRUCTION OF TEST SECTIONS

Subgrade Stabilization

Eight inches (203 mm) of lime stabilization or 7 inches (178 mm) of cement aggregate stabilization which was used on sections (370204, 370207, and 370260) depending on the subgrade soil to improve the characteristics of the subgrade. Lime stabilization was accomplished by spraying lime slurry at the rate of 24 lbs/yd^2 ($9kg/m^2$). Cement at 69 lbs/yd^2 ($26.2kg/m^2$) and aggregate at 300 lbs/yd^2 ($114kg/m^2$) were used for cement/aggregate stabilization.

370201:

Section 370201 is located on the add-on lane. From Sta. 299+00 to 303+20, the section lies in cut material; from Sta. 303+20 to 304+00, the section lies in fill material. The lane is 12 feet (3.7 m) wide with a 10 foot (3.1 m) untied econocrete shoulder. The pavement structure consists of 6 inch (152 mm) DGAB and 8 inch (203 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. This section lies adjacent to the 2 southbound (SB) mainline lanes which consist of 1 inch (25 mm) AC, 3 inch (76mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section, the average inplace thickness of DGAB and PCC were 6 and 9 inches, (152 and 229 mm) respectively.

Inplace thickness measurements were established by the 5 point level layer thickness measurements. Minimum, maximum, and average thicknesses are shown in Table 18.

The sampling and testing was carried out according to plan except bulk subgrade samples were taken to a depth of 12 inch (305 mm) below subgrade prior to lime stabilization for laboratory testing purposes. No lime treated samples of the subgrade were submitted. Shelby tube, A1, was moved from Sta. 303+00 to Sta. 302+00 to place the sample all in cut material. Shoulder probe, S3, was not performed due to prior soil surveys, which indicated rock was not within 20 feet (6.1 m) of the subgrade surface. Plate load test, T44, on the DGAB was not done due to the construction schedule. The core sampling was moved from Sta. 298+75 (5+25) to Sta. 298+40 (5+60) to avoid the seasonal monitoring sensors and NC's strain gauges of the load response research program.

After the placement of the PCC in the mainline lanes, in the add-on lane, unprimed DGAB and PCC followed. An area of 20 ft^2 (1.9 m^2) was not compacted due to the possibility of crushing the TDR probe by the compactors.

Problems were encountered after a heavy rain. Seepage entered the shoulder at Sta. 298+00 and 298+80. Water entered the PATB along the inside shoulder, not yet sloped. Sta. 298+00 is the transition point for sections 370209 (PATB) and 370201 (DGAB). The contractor replaced the partially crushed drainage outlet pipe at Sta. 298+00. At Sta. 298+80, the contractor could not install a drainage outlet pipe due to the proximity of seasonal monitoring instrumentation, therefore, the Contractor increased the DGAB thickness at this location.

Other deviations from the SPS 2 construction guidelines include the DGAB base extending only 2 feet (0.6 m) beyond the pavement edge and not to the full shoulder width as required by SPS 2 guidelines, 1 inch (25 mm) dowels used in the 8 inch (203 mm) PCC instead of 1 1/4 inch (32 mm) and non-uniform pavement structure across the lanes. The latter deviation had prior approval.

370202:

Section 370202 is a 14 foot (4.3 m) add-on lane with an 8 foot (2.4 m) untied econocrete shoulder. The pavement consists of 6 inch (152 mm) unprimed DGAB and 8 inch (203 mm) 900 psi (6.201 MPa) PCC on 8 inch (2.4 m) lime treated subgrade. It adjoins the mainline lanes consisting of 1 inch (25 mm) AC, 3 inch (76 mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) PCC. Average inplace thickness of DGAB and PCC in the test section were 6 and 8 inches (152 and 203 mm), respectively.

Sampling and testing was carried out according to plan except that shoulder probe, S6, was not performed. Prior soil survey information did not reveal rock within 20 feet of the subgrade surface. Plate load test, T53, was not performed due to the construction schedule.

The subgrade between Sta. 279+50 and 280+00 may be deficient in lime due to the lime slurry distributor getting stuck and being turned off. The section was then exposed to light traffic until the DGAB was laid. PCC was placed with 5/8 inch (16 mm) tie bars spaced at 30 foot (9.2 m) intervals. An 18 inch (457 mm) dowel basket was added to the 11.5 foot (3.5 m) basket to cover the 14 foot (4.3 m) wide pavement. Since the concrete was hard to finish, water was added behind the finisher when required. The curing membrane, tining and burlap drag followed and was done by hand.

Other deviations include 1 inch (25 mm) dowels used in the 8 inch (203 mm) PCC instead of 1 1/4 inch (32 mm), DGAB not extended through the entire shoulder and non-uniformity of the pavement structure across lanes.

370203:

Section 370203 is located on a slight curve and in fill material. The pavement is 26 feet (7.9 m) wide with the SHRP lane being 14 feet (4.3 m) and the untied econocrete shoulder being 8 feet (2.4 m). The structure consists of 6 inch (152 mm) DGAB and 11 inch (279 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. The average inplace thickness of the DGAB and PCC were 5.6 and 11.2 inches (142 and 285 mm), respectively.

Sampling and testing was carried out according to plan except that shoulder probe, S8, was not performed due to prior soil survey results indicating that rock was not within 20 feet (6.1 m) of the subgrade surface. Plate load test, T56, was moved from Sa. 258+50 - 259+00 due to a gravel obstruction.

A heavy rain caused severe seepage problems in a trough from Sta. 263+00 and 264+00. The water entered the PATB on the inside shoulder since the final shoulder had not been placed and was trapped by the LCB on the add-on lane. With the water being under considerable pressure, a trench was dug along side the pavement to relieve the pressure. A few days later, it was observed that water continued to flow through a LCB contraction crack at Sta. 264+03. A contraction joint is located at Sta. 264+04.

Other deviations include the DGAB did not extend to the full shoulder width.

370204:

Section 370204 is located on a tangent and in a cut. The pavement is 24 feet (7.3 m) wide with the SHRP lane being 12 feet (3.7 m) and untied econocrete shoulder being 10 feet (3.1 m). The structure consists of 11 inch (279 mm) 900 psi (6201 KPa) PCC and 6 inch (152 mm) primed DGAB on 7 inch (178 mm) of cement aggregate treated subgrade. In the test section the average inplace thickness of DGAB and PCC were 5.4 and 11.2 inches (137 and 285 mm), respectively.

Sampling and testing was carried out according to plan. FWD test was performed since plate load testing equipment was unavailable at that time. Subsequent plate load test, T68 was performed with a spot FWD test at sta. 139+50. The 28 day core C'121 from Sta. 136+75 was sent to FHWA for the Coefficient of Thermal Expansion Test. Nuclear density and moisture tests of the subgrade were taken after priming.

During paving, the 900 psi (6.201 MPa) PCC was difficult to discharge and finish. When the finisher became overloaded, the mix was often softened with water. Water was also used after the finisher, when necessary, to obtain a smooth finish. A construction joint replaced a contraction joint at sta. 138+75. The DGAB extended only 2 feet (0.6 m) beyond the pavement edge and not to the full shoulder width.

370205:

Section 370205 is located on a curve of the add-on lane. The lane is 12 foot (3.7 m) wide, with a 10 foot (3.1 m) untied econocrete shoulder. The structure consists of 6 inch (152 mm) LCB and 8 inch (203 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. It adjoins the SB mainline lanes consisting of 1 inch (25 mm) AC, 3 inch (76 mm) PATB and 10 inch (254 mm) 550 psi (3.90 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of LCB and PCC were 6.5 and 8.4 inches (165 and 213 mm), respectively. A shoulder probe was not performed.

Sampling and testing was carried out according to plan except that core sampling at Sta. 305+75 was moved to Sta. 305+40 due to seasonal monitoring instrumentation and core sampling at Sa. 311+25 was moved to Sta. 311+27 (28 day cores) due to a contraction joint. Fourteen day LCB core, C1, was not taken since the LCB was overlaid by PCC in 9 days.

LCB was laid to a width of 14 feet (4.3 m) which is 2 feet (0.6 m) beyond the pavement edge. Contraction cracks were noted in the LCB. These cracks were covered with 12 inch (305 mm) tar paper strips prior to the paving operations at Sta. 306+39, 307+40, 308+70, 309+10 and 310+80. Several cracks reflected through the PCC. The following slabs were subsequently repaired.

sta. 307+30	--	15ft x 12ft (4.6m x 3.7m) within the test section
sta. 308+24	--	15ft x 12ft (4.58m x 3.66m) within the test section
sta. 312+57	--	8.5ft x 12ft (2.59m x 3.66m) outside of the test section
sta. 313+88	--	13ft x 12ft (3.97m x 3.66m) outside of the test section

Other deviations include the DGAB not extending for the full shoulder width, non-uniformity in transverse pavement structure and 1 inch (25 mm) dowels used in 8 inch (203 mm) PCC instead of 1 1/4 inch (32 mm).

370206:

Section 370206 is located in the add-on lane. The lane width is 14 feet (4.3 m) with an 8 foot (2.4 m) untied econocrete shoulder. The structure consists of 6 inch (152 mm) LCB and 8 inch (203 mm) 900 psi (6.201 MPa) PCC on 8 inch (203 mm) lime treated subgrade. It adjoins the SB mainline lanes consisting of 1 inch (25 mm) AC, 3 inch (76 mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of LCB and PCC were 6.7 and 8.4 inches (170 and 213 mm), respectively.

Sampling and testing was carried out according to plan except that shoulder probe, S7, was not performed due to availability of prior soil survey information and 14 day LCB cores, C2 and C3 were not taken due to coverage of LCB by PCC in 9 days. However, LCB cores were taken with the PCC cores later on.

LCB was laid to a width of 14.7 feet (4.5 m). Contraction cracks developed and were covered with 12 inch (305 mm) wide tar paper at Sta. 272+65, 274+70 and 275+40 prior to placing the PCC. The 900 psi PCC was difficult to finish therefore water was applied behind the finisher when necessary, to produce a smooth finish.

Other deviations include the non-uniformity in pavement structure due to the shift between the add-on lane and the mainline lanes, LCB extending only 8 inches (203 mm) beyond the pavement edge rather than the full width and 1 inch (25 mm) dowels used in the 8 inch (203 mm) PCC instead of 1 1/4 inch (32 mm) dowels.

370207:

The pavement is 26 feet (7.9 m) wide with the SHRP lane being 14 feet (4.3 m) and the untied econocrete shoulder being 8 feet (2.4 m). The structure consists of 6 inch (152 mm) LCB and 11 inch (279 mm) 550 psi (3.790 MPa) PCC on 7 inch (17.8 mm) cement aggregate treated subgrade. In the test section the average inplace thickness of LCB and PCC were 5.6 and 11.6 inches (142 and 295 mm), respectively.

Sampling and testing was carried out according to plan except for the 14 day LCB core, C4 (not taken). The LCB layer was covered 7 days after placement.

The subgrade was soft and rutted between Sta. 250+00 - 251+00, however it tightened up after the cement aggregate treatment. No contraction cracks were observed following the LCB placement. PCC paving followed, starting at the construction joint at Sta. 255+05. At the start of the paving operation the finisher was overloaded, so the front end loader removed the excess concrete. During paving, water was added when necessary to soften the concrete when the finisher continued to overload.

Other deviations include the LCB not extending for the full shoulder width, but to the width of the PCC.

370208:

Section 370208 is located on a curve. From Sta. 214+00 to 217+00 and 219+00 to 220+00, the section is in cut. Sta. 217+00 to 219+00 consist of at grade, shallow cut, or fill material. The pavement is 24 feet (7.3 m) wide with the SHRP lane being 12 feet (3.7 m) and the untied econocrete shoulder, 10 feet (3.1 m). The structure consists of 6 inch (152 mm) LCB and 11 inch (279 mm) 900 psi (6.201 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of LCB and PCC were 5.9 and 11.2 inches (150 and 285 mm), respectively.

There were several exceptions to the sampling and testing plan. Core sampling at Sta. 214+75 was moved to Sta. 214+40 due to instrumentation. Bulk subgrade sample, B6, was taken at Sta. 221+25 (0+125), outside the sample area, in similar soil condition. Subsequently, the test section was moved 100 feet (30.5 m) to the north, however a new subgrade sample was not taken. The Shelby tube sample, T16, at Sta. 219+00 (1+00) was moved to Sta. 219+25 (0+75) to ensure that the full sample would be in cut.

An 8 inch (203 mm) boulder was encountered at Sta. 215+00 in the passing lane putting a pulvi mixer out of action, thus slowing the lime stabilization operation. Heavy rain stopped the fine grading operation for 2 hours, however this did not affect the subgrade.

LCB was placed to a width of 24 feet (7.3 m) with the finisher being overloaded at times by the spreader. The spinning of the finisher's tracks was overcome by adding water to soften the concrete. The spreader broke down at Sta. 214+75, causing the finisher to stop at Sta. 215+00, ahead of the seasonal monitoring sensors at Sta. 214+87.5. The remainder of the concrete was placed with a front end loader to Sta. 214+00.

The PCC was placed to a width of 24 feet (7.3 m), the same width of the LCB. Both shoulders were built up to the top of the LCB with loose material, since the spreader could not be adjusted. Traction of spreader and finisher was poor, causing spinning when they became overloaded. Spinning was overcome by planking and softening of concrete by water. The concrete was stiff and difficult to handle. Numerous stops occurred during finishing, due to the slow supply of the concrete. Haul trucks carried 6.5 yd^3 (5.0 m^3) of 900 psi (6.201 MPa) concrete rather than the normal 9 yd^3 (6.9 m^3).

Other deviations include the LCB not extending for the full shoulder width.

370209:

Section 370209 is located on the add-on lane. Sta. 292+00 to 294+00 consist of deep fill, while Sta. 294+00 to 297+00 is at grade or shallow fill. The pavement is 12 feet (3.7 m) wide with a 10 foot (3.1 m) untied econocrete shoulder. The structure consists of 4 inch (102 mm) unprimed DGAB, 5 inch (127 mm) PATB and 8 inch (203 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. The PATB was placed at 5 inches (127 mm) instead of 4 inches (102 mm) for construction purposes. It adjoins the SB mainline lanes consisting of 1 inch (25 mm) AC, 3 inch (76 mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of DGAB, PATB and PCC were 5.0, 5.6 and 8.6 inches, (127, 142 and 218 mm) respectively.

Sampling and testing was carried out according to plan except that the core sampling at Sta. 291+75 was moved to Sta. 291+60 due to strain gauge instrumentation.

The subgrade of all 3 lanes were lime treated to a depth of 8 inches (203 mm). Three inches (76 mm) of the lime treated subgrade was removed from the add-on lane to accommodate the 4 inch (102 mm) DGAB that is required to be flushed with the 1 inch (25 mm) AC on the SB mainline lanes. This then required 5 inches (127 mm) of PATB and 8 inches (203 mm) of PCC to meet the elevation of the mainline lanes.

There were no problems with laying the DGAB, PATB, or PCC. Three inches (76 mm) of DGAB was placed to form an even subgrade for the placement of 1 inch (25 mm) of AC on the mainline lanes. After several months, the DGAB was lightly scarified and the remaining 1 inch of DGAB was placed on the add-on lane and leveled out to 2 feet (0.6 m) beyond the pavement edge.

The PATB was placed on sections 370209 and 370210 on the same day. The mixing temperature was 303 ^{o}F (150.6 ^{o}C), the laydown temperature was 266 ^{o}F (130 ^{o}C) and air temperature was 50 ^{o}F (10 ^{o}C). One pass with a roller was performed and indicated no shoving. A 28 foot (8.5 m) screed was used the following day to detect high spots, which could be rolled out with a 10 ton roller.

Four inch (102 mm) edge drain was placed with 4 inch (102 mm) outlets at 250 feet (76.3 m) intervals. The edge drain trenches were placed 2 feet (0.6 m) from the pavement edge and not at the shoulder edge. Drainage filter fabric exposed from June 29th to November 22nd, appeared somewhat deteriorated. Any deteriorated fabric was covered with a 2.5 foot (0.8 m) strip of new fabric prior to paving.

Dowels were 1 inch (25 mm) OD, not 1 1/4 inch (32 mm). Other deviations include the base layers not extending for the full shoulder width and the non-uniform pavement structure.

370210:

Section 370210 is located in a fill and is on the add-on lane. The pavement is 14 feet (4.3 m) wide with an 8 foot (2.4 m) untied econocrete shoulder. The pavement structure consists of 4 inch (102 mm) unprimed DGAB, 5 inch (127 mm) PATB and 8 inch (203 mm) 900 psi (6.201 MPa) PCC on 8 inch (203 mm) lime treated subgrade. It adjoins the 2 SB mainline lanes consisting of 1 inch (25 mm) AC, 3 inch (76 mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of DGAB, PATB and PCC were 4.7, 5.3 and 8.4 inches (119, 135 and 213 mm), respectively.

Sampling and testing was carried out according to plan except for shoulder probe, S5, which was omitted due to earlier soil survey information indicating no rock was present within 20 feet of the subgrade surface and the line of borings at Sta. 290+75 was moved to Sta. 290+60 due to strain gauge instrumentation.

The subgrade, DGAB and PATB were prepared as in section 370209. The mix temperature of the PATB was at 279 ^{o}F (137 ^{o}C), the laydown temperature of the PATB was 252 ^{o}F (122 ^{o}C) and the air temperature was 50 ^{o}F (10 ^{o}C). Checks were made by the screed the following day for high spots.

The PCC was laid with no difficulties. Eighteen inch (457 mm) dowel basket extensions were added to the 11.5 foot (3.5 m) baskets to cover the 14 foot (4.3 m) wide pavement. One inch (25 mm) OD instead of 1 1/4 inch (32 mm) OD dowels were used. Excess shoulder material was hauled to median.

The filter fabric for the edge drains was somewhat deteriorated due to too long exposure, therefore 2.5 (0.8 m) foot fabric strips were placed over the deteriorated areas.

Other deviations include the DGAB and PATB not extending for the full shoulder width, but only to 2 to 3 feet (0.6 to 0.9 m) beyond the pavement edge, the edge drain being placed 2 feet (0.6 m) from pavement edge rather than at shoulder edge and the non-uniformity of the pavement structure.

370211:

Section 370211 is located in a fill and partially on a curve. The pavement is 14 feet (4.3 m) wide with an 8 foot (2.4 m) untied econocrete shoulder. The pavement structure consists of 4 inch (102 mm) DGAB, 4 inch (102 mm) PATB and 11 inch (279 mm) 550 psi (3.790 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section, the average inplace thickness of DGAB, PATB and PCC were 4.1, 3.6 and 11.4 inches (104, 91 and 290 mm), respectively.

Sampling and testing was carried out according to plan except that shoulder probe, S11, was omitted due to available information in prior soil surveys and the sampling of cores at Sta. 230+90 was moved to Sta. 230+65 due to strain gauge installation. The duct outlet for the strain gauge is at Sta. 230+98.

DGAB was placed and primed at the rate of 0.3 gals/yd^2 (1.0 liters/m^2) rather than the normal 0.15-0.20 gals/yd^2 (0.5-0.6 liters/m^2). The DGAB prime wore away under light traffic. Prior to PATB placement, silt from rain storms, was removed by a grader/power sweeper from the pavement edge. This created much dust.

Mixing temperature for the PATB was 265 ^{o}F (129 ^{o}C), laydown temperature was 245 ^{o}F (118 ^{o}C) and air temperature was 90 ^{o}F (32 ^{o}C). The PATB was placed to a width of 30 feet (9.2 m) with 2 passes. Rolling commenced at 170 ^{o}F (77 ^{o}C) to avoid pushing. The PATB was then exposed to traffic. This dislodged some aggregate. Turning wheel marks were also present.

As shown in Figure 22, where the soil of the inside shoulder is higher than the PATB, a 5 foot (1.5 m) wide filter fabric was used as a barrier to prevent the intrusion of soil into the PATB layer. The top lip of the fabric was folded over the top of the PATB and secured by the PCC layer.

The stones loosened by traffic on the PATB were rolled in prior to laying the PCC to a width of 26 feet (7.9 m). An 18 inch (457 mm) dowel basket assembly was added to the 11.5 feet (3.5 m) dowel basket between the spreader and the finisher. The aggregate and PATB base did not extend to the full shoulder width but only 2 feet (0.6 m) beyond the pavement edge.

The 4 inch (102 mm) edge drain with filter fabric was placed from Sta. 235+00 - 238+50 on the outside of the lane while edge drain was installed along the inside of the lane from Sta. 235+00 - 221+00. There is also a drain from Sta. 235+00 - 238+50 which connects to a drainage box at Sta. 238+50 in the median. The edge drains were placed 2 feet (0.6 m) from the pavement edge, rather than at the shoulder edge.

370212:

Section 370212 is located on a curve. From Sta. 222+00 - 223+00, the section is in cut material, from sta. 223+00 - 226+00, the section is in fill and from Sta. 226+00 to 227+00, the section is at grade or in shallow cut. The lane width is 12 feet (3.7 m) with 10 feet (3.1 m) untied econocrete shoulder. The structure consists of 4 inch (102 mm) primed DGAB, 4 inch (102 mm) PATB and 11 inch (279 mm) 900 psi (6.201 MPa) PCC on 8 inch (203 mm) lime treated subgrade. In the test section the average inplace thickness of DGAB, PATB and PCC were 3.8, 4.3 and 10.9 inches, (97, 109 and 277 mm) respectively. Edge drain was placed along the inside lane.

Sampling and testing was carried out according to plan except that Shelby tube sample, A15, was moved from Sta. 223+00 - 222+75 to ensure that the full sample is in cut material and core sampling at Sta. 221+75 was moved to Sta. 221+40 due to instrumentation. The plate load test was carried out on the PATB surface which had a super elevation. Bulk soil sample, B5, was taken at Sta. 227+25 (0+25), in a shallow cut. The material was classified as a silty sand, however, the subgrade appeared to be rather a silty clay or clayey silt. Therefore this sample may not adequately represent the subgrade material. Water was added prior to the in situ nuclear density and moisture test. Results were 134.9 lb./ft^3 (16.8 N./m^3) for density and 6.1 % for moisture.

Light traffic was carried on DGAB prior to the PATB placement, wearing out the prime in some areas. The PATB mixing temperature was 275 ^{o}F (135 ^{o}C), laydown temperature was 267 ^{o}F (131 ^{o}C) and air temperature was 90 ^{o}F (32 ^{o}C). Rolling began when the PATB temperature neared 170 ^{o}F(77 ^{o}C). On the inside shoulder where the soil is higher than the PATB, a 5 foot (1.5 m) wide filter fabric was used as a barrier to prevent the intrusion of soil into the PATB, as shown in Figure 22.

The curing membrane and tining of the PCC were done by hand. However, the curing membrane was not sprayed on the outside edge. Other deviations include the aggregate and PATB layers placed only to a width 2 feet (0.6 m) beyond the pavement edge and not to the full width of the shoulder.

Supplemental 370259:

The section is on a curve and located in cut and fill. From Sta. 328+00 - 332+50, the section is in fill material while from Sta. 332+50 - 333+00, the section is in cut. The lane width is 12 feet (3.7 m) with a 10 foot (3.1 m) wide untied econocrete shoulder. The pavement structure consists of 1 inch (25 mm) AC, 4 inch (102 mm) PATB and 10 inch (254 mm) 550 psi (3.790 MPa) with 3000 psi (20.7 MPa) compression PCC on 8 inch (203 mm) lime treated subgrade. Four inch diameter (102 mm) edge drains were placed on the inside lane with outlets to catch basins at sta. 324+75 and 331+00.

Sampling and testing was carried out according to plan except that shoulder probe S1 was omitted due to prior soil surveys. Plate load test was carried out on the PATB at a super elevation. Twenty eight day core C'15 from 327+75 was sent to FHWA for Thermal Expansion Test. Nuclear density and moisture tests of the subgrade were taken after priming.

One inch (25 mm) of AC was placed as an impervious membrane on the subgrade. PATB was placed and exposed to traffic. Dislodged stones were rolled back into the mat prior to laying the PCC. A 5 foot (1.5 m) wide filter fabric was used as a barrier to prevent the intrusion of soil into the PATB. Deviations include the AC and PATB: extending only 2 feet (0.6 mm) beyond the pavement edge.

Supplemental 370260:

This section consist of a 14 foot (4.3 m) lane width with an 8 foot (2.4 m) wide untied econocrete shoulder. The pavement structure consists of 1 inch (25 mm) AC, 5 inch (127 mm) RHB and 11 inch (279 mm) PCC on 8 inch (203 mm) cement-aggregate treated subgrade. In the test section, the average thickness of the AC, RHB and PCC were 1.3, 5.5, 11.5 inches (33, 140, 292 mm), respectively.

One inch (25 mm) of AC was placed as an impervious membrane on the subgrade. Compaction included one pass with a static roller and 3 passes with a vibratory roller. A 28 foot (8.5 m) roller screed was used to locate any high spots. A construction joint was placed at Sta. 245+20 (due to darkness). A 5 foot (1.5 m) wide filter fabric was used along the inside pavement edge to prevent soil intrusion into the pavement layers. Other deviations include the AC and RHB not extending to the full shoulder width and the edge drain placed 2 feet (0.6 m) from the pavement edge, not shoulder edge.

TRAFFIC

The Lexington By-Pass was opened to traffic on July 01, 1994.

CONCLUDING REMARKS

Certain locations had problems during construction. The majority of the problems were due to rainstorms encountered during paving. These locations may present post-construction problems which can influence the pavement's performance. Observations during the initial performance of the pavement may be required.

At sections 370201, 370202, 370205 and 370206, there is a possibility for water to enter along the inside shoulder and be trapped by the impervious DGAB (or LCB of the add-on lane) layer. The sloping of the shoulder with earth is intended to prevent such entry.

Significant seepage was noted during shoulder construction at Sta. 298+00, along the transition of PATB and DGAB and at Sta. 298+80, through the DGAB layer (this is at an instrumentation location). From Sta. 263+00 - 264+00 (outside the test section, in a trough) water may seep through joint or crack.

Other potential problems include two construction joints within sections 370204 and 370260, at Sta. 138+75 and 245+20, respectively and no DGAB compaction around the TDR instrumentation at section 370201, which may result in significant settlement and subsequently, pavement cracks. The high embankment between Sta. 288+00 and 290+00, at test section 370210, has a slope failure. If the failure progresses, the shoulder and driving lane may be affected. A soils investigation is proposed.

TABLE 1
NC DOT SPS-2: Test Section Layout: US 52 SB, Lexington

Station	Length Ft.	Sec. No.	Concrete Pav't		Lane	BASE		Typical Section	Remarks	Monitor Station	Suggested Construction Station
			Flexural Strength	Thickness Inches	Width Ft.	Type	Thickness Inches				
130+70										5	137+00
	1230'	370204	900	11" (11 2")	12'	DGAB	6" (5 4")	E		0	142+00
143+00								t=17"			
						PATB	4"	t=17"	edge		
214+00	7100'			10"	12'	HMAC	1"	G	drain		
	700'	370208	900	11" (11 2")	12'	LCB	6" (5.9")	F		5	215+00
221+00								t=17"		0	220+00
	850'	370212	900	11" (10 9")	12'	PATB	4" (4 3")	A	edge	5	222+00
229+50						DGAB	4" (3 8")	t=19"	drain	0	227+00
	914.8'	370211	550	11" (11.4")	14'	PATB	4" (3.6")	A	edge	5	231+15
238+64.8						DGAB	4" (4.1")	t=19"	drain	0	236+15
240+48.3											
	751.7'	370260	550	11" (11.5")	14'	RHB	5" (5 5")	G	edge	5	242+00
248+00						I-2	1" (1.3")	t=17"	drain	0	247+00
	700'	370207	550	11" (11 6")	14'	LCB	6" (5 6")	F		5	249+00
255+00								t=17"		0	254+00
								t=17"		5	256+00
262+00	700'	370203	550	11" (11 2")	14'	DGAB	6" (5 6")	E		0	261+00
	1500'	370206	900	8" (8.4")	14'	LCB	6" (6 7")	D*		5	271+00
277+00					*			t=14"		0	276+00
	700'	370202	900	8" (10 2")	14'	DGAB	6" (6")	C*		5	278+00
284+00					*			t=14"		0	283+00
	700'	370210	900	8" (8.4")	14'	PATB	4" (5.3")	B*	edge	5	285+00
291+00					*	DGAB	4" (4.7")	t=17"	drain	0	290+00
	700'	370209	550	8" (8 6")	12'	PATB	4" (5 6")	B*	edge	5	292+00
298+00					*	DGAB	4" (5.0")	t=17"	drain	0	297+00
	700'	370201	550	8" (9")	12'	DGAB	6" (6")	C*		5	299+00
305+00					*			t=14"		0	304+00
	1300'	370205	550	8" (8.4")	12'	LCB	6" (6 5")	D*		5	306+00
318+00					*			t=14"		0	311+00
	6500'	370259		10" (10.2")	12'	PATB	4" (4.4")	G	edge	5	328+00
387+00						I-2	1" (1 2")	t=17"	drain	0	333+00

* ADD-ON LANE

t= total pavement depth

( ) = 5 point avg. actual thickness

NC DOT	LTPP
PADL	PATB
RHB	HMAC
ABC	DGAB
I-2	HMAC

TABLE 2
NC DOT SPS-2: Field and Laboratory Materials Testing Plan

Material Type and Properties	SHRP Test Designation	SHRP Protocol	Tests Per Layer	Materials Source/ Test Location	Comments
SUBGRADE					
Sieve Analysis	SS01	P51	6	B1-B6	
Hydrometer to 0.01mm	SS02	P42	6	B1-B6	
Atterberg Limits	SS03	P43	6	B1-B6	
Classification and Type of Subgrade	SS04	P52	24	A1-A18, B1-B6, Note 1	Visual manual classification ONLY
Moisture-Density Relations	SS05	P55	6	B1-B6	
Resilient Modulus	SS07	P46	6	A2, A5, A8, A11, A14, A17	
Unit Weight	SS08	P56	18	A1-A18	
Natural Moisture Content	SS09	P49	6	B1-B6	
Unconfined Comp. Strength	SS10	P54	6	A1, A4, A7, A10, A13, A16	
Permeability	SS11	P57	3	B1, B4, B6	
In-Place Density		SHRP-LTPP	48	B1-B6, T1-T39	
Depth to Rigid Layer		SHRP-LTPP	14	S1-S14	
Plate Bearing Test	SS13	P59	2	T5, T38	FWD or Plate Test
UNBOUND GRANULAR BASE					
Particle Size Analysis	UG01	P41	3	B7, B8, B9	
Sieve Analysis (washed)	UG02	P41	3	B7, B8, B9	
Atterberg Limits	UG04	P43	3	B7, B8, B9	
Moisture-Density Relations	UG05	P44	3	B7, B8, B9	
Resilient Modulus	UG07	P46	3	B7, B8, B9	
Classification	UG08	P47	3	B7, B8, B9	
Permeability	UG09	P48	3	B7, B8, B9	
Natural Moisture Content	UG10	P49	3	B7, B8, B9	
In-Place Density		SHRP-LTPP	27	T43-T69	
Plate Bearing Test	SS13	P59	4	T44, T53, T56, T68	FWD or Plate Test
PERMEABLE ASPHALT TREATED BASE					
Core Examination/Thickness	AC01	P01			Cores will likely not be obtainable
Bulk Specific Gravity	AC02	P02			
Maximum Specific Gravity	AC03	P03	3	BT-01, BT-02, BT-03	
Asphalt Content (extraction)	AC04	P04	3	BT-01, BT-02, BT-03	
Moisture Susceptibility	AC05	P05	3	BT-01, BT-02, BT-03	
Resilient Modulus	AC07	P07			Cores will likely not be obtainable
Indirect Tensile Strength	AC07	P07			
Permeability/Flow	TBA	TBA	0	Not Required	
Plate Bearing Test	SS13	P59	3	T70-T72	

TABLE 2 (cont.)
NC DOT SPS-2: Field and Laboratory Materials Testing Plan

Material Type and Properties	SHRP Test Designation	SHRP Protocol	Tests Per Layer	Materials Source/ Test Location	Comments
LEAN CONCRETE BASE					
Compressive Strength	PC01	P61			
14 day			6	C1-C6	Obtain C cores for 14 day testing 10-13 days after placement
28 day			4	C20, C60, C77, C109	
1 year			4	C"19, C"59, C"76, C"108	Use LCB portion of C and C" cores for 28 day and 1 year testing
PORTLAND CEMENT CONCRETE AS PLACED					
Compressive Strength	PC01	P61			
14 day			14	C7, C16, C24, C32, C40, C48, C56, C64 C73, C81, C89, C97, C105, C113	Obtain C cores for 14 day testing 10-13 days after placement
28 day			14	C'8, C'17, C'25, C'33, C'41, C'49, C'57 C'65, C'74, C'82, C'90, C'98, C'106, C'114	Obtain C' cores for 28 day testing 21-24 days after placement
1 year			14	C"13, C"22, C"30, C"38, C"46, C"54, C"62 C"70, C"79, C"87, C"95, C"103, C"111, C"119	Obtain C" cores for 1 year testing 350-360 days after placement
Splitting Tensile Strength	PC02	P62			
14 day			14	C11, C20, C28, C36, C44, C52, C60, C68 C77, C85, C93, C101, C109, C117	Obtain C cores for 14 day testing 10-13 days after placement
28 day			14	C'12, C'21, C'29, C'37, C'45, C'53, C'61 C'69 C'78, C'86, C'94, C'102, C'110, C'118	Obtain C' cores for 28 day testing 21-24 days after placement
1 year			14	C"10, C"19, C"27, C"35, C"43, C"51, C"59, C"67 C"76, C"84, C"92, C"100, C"108, C"116	Obtain C" cores for 1 year testing 350-360 days after placement
PCC Unit Weight	PC05	P65	42	Cores for compressive strength testing	
Static Modulus of Elasticity	PC04	P64			
28 day			14	C'9, C'18, C'26, C'34, C'42, C'50, C'58, C'66 C'75, C'83, C'91, C'99, C'107, C'115	Obtain C' cores for 28 day testing 21-24 days after placement
1 year			14	C"14, C"23, C"31, C"39, C"47, C"55, C"63, C"71 C"80, C"88, C"96, C"104, C"112, C"120	Obtain C" cores for 1 year testing 350-360 days after placement
Air Content	PC08	P68			
28 day			3	C'9, C'66, C'115	Obtain C' cores for 28 day testing 21-24 days after placement
PCC Coefficient of Thermal Expansion	PC03	P63	3	C'15, C'72, C'121	Obtain C' cores for 28 day testing 21-24 days after placement

TABLE 2 (cont.)
NC DOT SPS-2: Field and Laboratory Materials Testing Plan

Material Type and Properties	SHRP Test Designation	SHRP Protocol	Tests Per Layer	Materials Source/ Test Location			Comments
LEAN CONCRETE BASE							
AS DELIVERED	PC01	P61					
Compressive Strength							
7 day			6	BP1, BP2			Mold 9-6" diameter x 12"
28 day			6	BP1, BP2			specimen from each
1 year			6	BP1, BP2			sample BP1, BP2
PORTLAND CEMENT CONCRETE				550 psi Flexural Strength Concrete	900 psi Flexural Strength Concrete	3000 psi Compr. Strength	
AS DELIVERED							
Compressive Strength	PC01	P61					
14 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	Mold 6-6" diameter x 12"
28 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	and 3-6x6"x20" beam specimen
1 year			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	from each sample FC1-FC-7
Splitting Tensile Strength	PC02	P62					
14 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
28 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
1 year			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
Flexural Strength - Beam	PC09	P69					
14 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
28 day			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
1 year			6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
Air Content	ASTM	SHRP-LTPP	6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
Slump	ASTM	SHRP-LTPP	6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	
Temperature	ASTM	SHRP-LTPP	6	FC1, FC2, FC3	FC4, FC5, FC6	FC7	

TABLE 3
NC DOT SPS-2: Material Sampling Requirements

Material and Sample Description	Number of Samples	Sample Location
Portland Cement Concrete		
Coring - 4" diameter cores	115	C7-C121
Bulk Sampling (molded into test specimens)	7	FC1-FC7
Unbound Base/Subbase Layers (per layer)		
Bulk Sampling	3	B7-B9
Moisture content samples	3	B7-B9
Lean Concrete Base		
Coring - 4" diameter cores	6	C1-C6
[sampled together with PCC cores]	[30]	[C'17, C'18, C'21, C'57, C'58, C'61, C'74, C'75, C'78, C'82, C'83, C'86, C'106 C'107, C'110 C"19, C"22, C"23, C"59, C"62, C"63, C"76, C"79, C"80 C"84, C"87, C"88, C"108, C"111, C"112
Bulk Sampling (molded into test specimens)	6	BP-01, BP-02 From Site
Permeable Asphalt Treated Base		
Coring - 4" diameter cores [sampled together with PCC cores]		Cores unlikely to be obtained
Bulk Sampling (100 pounds per sample, uncompacted)	3	BT-01, BT-02, BT-03 From Plant
Subgrade		
Thin-walled tube sampling	36	A1-A18
Splitspoon sampling (to replace any thin-walled tube samples that cannot be obtained)		A1-A18
Bulk Sampling (400 pounds each sample)	6	B1-B6
Moisture Content samples	6	B1-B6
Shoulder Auger Probes (Depth to Rigid Layer)	14	S1-S14

TABLE 4
NC DOT SPS-2, LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

July 01, 1993 Sheet 1/5

DAYS AFTER PLACEMENT	CORE # 0+00 END	SECTION NO.	CORE # 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB. TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.
10-13 days		370205	C1	2	6	LCB	P61	305+70	2'
		370206	C2	2	6	LCB	P61	270+70	2'
			C3	2	6	LCB	P61	270+70	3.5'
		370207	C4	2	6	LCB	P61	248+70	2'
		370208	C5	2	6	LCB	P61	214+70	2'
			C6	2	6	LCB	P61	214+70	3.5'
10-13 days	C7	370259		4	10	PCC 3000	P65, P61	333+25	2'
			C11	4	10	PCC 3000	P62	327+75	2'
	C16	370205		3	8	PCC 550	P65, P61	311+25	2'
				2	6	LCB	N/A		
			C20	3	8	PCC 550	P62	305+75	2'
				2	6	LCB	P61		
	C24	370201		3	8	PCC 550	P65, P61	304+25	2'
			C28	3	8	PCC 550	P62	298+75	2'
	C32	370209		4	8	PCC 550	P65, P61	297+25	2'
			C36	4	8	PCC 550	P62	291+75	2'
	C40	370210		4	8	PCC 900	P65, P61	290+25	2'
			C44	4	8	PCC 900	P62	284+75	2'
	C48	370202		3	8	PCC 900	P65, P61	283+25	2'
			C52	3	8	LCB	P62	277+75	2'
	C56	370206		3	8	PCC 900	P65, P61	276+25	2'
				2	6	LCB	N/A		
			C60	3	8	PCC 900	P62	270+75	2'
				2	6	LCB	P61		
	C64	370203		3	11	PCC 550	P65, P61	261+25	2'
			C68	3	11	PCC 550	P62	255+75	
	C73	370207		3	11	PCC 550	P65, P61	254+25	2'
				2	6	LCB	N/A		
			C77	3	11	PCC 550	P62	248+75	2'
				2	6	LCB	P61		

TABLE 4 (Cont.)
NC DOT SPS-2, LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

July 01, 1993 Sheet 2/5

DAYS AFTER PLACEMENT	CORE # 0+00 END	SECTION NO.	CORE # 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB. TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.
10-13 days	C81	370260		3	11	PCC 550	P65, P61	247+25	2'
				2	5	BL. BASE			
			C85	3	11	PCC 550	P62	241+75	2'
				2	5	BL. BASE			
	C89	370211		4	11	PCC 550	P65, P61	236+40	2'
			C93	4	11	PCC 900	P62	230+90	2'
	C97	370212		4	11	PCC 900	P65, P61	227+25	2'
			C101	3	11	PCC 900	P62	221+75	2'
	C105	370208		3	11	PCC 900	P65, P61	220+25	2'
				2	6	LCB	N/A		
			109	3	11	PCC 900	P62	214+75	2'
				2	6	LCB	P61		
	C113	370204		3	11	PCC 900	P65, P61	142+25	2'
			C117	3	11	PCC 900	P62	136+75	2'
21-24 days	C'8	370259		4	10	PCC 3000	P65, P61	333+25	3.5'
	C'9			4	10	PCC 3000	P64, P68	333+25	5.0'
			C'12	4	10	PCC 3000	P62	327+75	3.5'
			C'15	4	10	PCC 3000	P63*	327+75	8.0'
	C'17	370205		3	8	PCC 550	P65, P61	311+25	3.5'
				2	6	LCB	N/A		
	C'18			3	8	PCC 550	P64	311+25	5.0'
				2	6	LCB	N/A		
			C'21	3	8	PCC 550	P62	305+75	3.5'
				2	6	LCB	N/A		
	C'25	370201		3	8	PCC 550	P65, P61	304+25	3.5'
	C'26			3	8	PCC 550	P64	304+25	5.0'
			C'29	3	8	PCC 550	P62	298+75	3.5'
	C'33	370209		4	8	PCC 550	P65, P61	297+25	3.5'
	C'34			4	8	PCC 550	P64	297+25	5.0'
			C'37	4	8	PCC 500	P62	291+75	3.5'
	C'41	370210		4	8	PCC 900	P65, P61	290+25	3.5'
	C'42			4	8	PCC 900	P64	290+25	5.0'
			C'45	4	8	PCC 900	P62	284+75	3.5'

TABLE 4 (Cont.)
NC DOT SPS-2, LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

July 01, 1993 Sheet 3/5

DAYS AFTER PLACEMENT	CORE # 0+00 END	SECTION NO.	CORE # 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB. TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.
21-24 days	C'49	370202		3	8"	PCC 900	P65, P61	283+25	3.5'
	C'50			3	8"	PCC 900	P64	283+25	5.0'
			C'53	3	8"	PCC 900	P62	277+75	3.5'
	C'57	C70206		3	8"	PCC 900	P65, P61	276+25	3.5'
				2	6"	LCB	N/A		
	C'58			3	8"	PCC 900	P64	276+25	5.0'
				2	6"	LCB	N/A		
			C'61	3	8"	PCC 900	P62	270+75	3.5'
				2	6"	LCB	N/A		
	C'65	C70203		3	11"	PCC 550	P65, P61	261+25	3.5'
	C'66			3	11"	PCC 550	P64, P68	261+25	5.0'
			C'69	3	11"	PCC 550	P62	255+75	3.5'
			C'72	3	11"	PCC 550	P63*	255+75	8.0'
	C'74	C70207		3	11"	PCC 550	P65, P61	254+25	3.5'
				2	6"	LCB	N/A		
	C'75			3	11"	PCC 550	P64	254+25	5.0'
				2	6"	LCB	N/A		
			C'78	3	11"	PCC 550	P62	248+75	3.5'
				2	6"	LCB	N/A		
	C'82	C70260		3	11"	PCC 550	P65, P61	247+25	3.5'
				2	5"	BL. BASE	P07		
	C'83			3	11"	PCC 550	P64	247+25	5.0'
				2	5"	BL. BASE	P07		
			C'86	3	11"	PCC 550	P62	241+75	3.5'
				2	5"	BL. BASE	P07		
	C'90	C70211		4	11"	PCC 550	P65, P61	236+40	3.5'
	C'91			4	11"	PCC 550	P64	236+40	5.0'
			C'94	4	11"	PCC 550	P62	230+90	3.5'
	C'98	C70212		4	11"	PCC 900	P65, P61	227+25	3.5'
	C'99			4	11"	PCC 900	P64	227+25	5.0'
			C'102	4	11"	PCC 900	P62	221+75	3.5'

TABLE 4 (Cont.)
NC DOT SPS-2, LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

July 01, 1993 Sheet 4/5

DAYS AFTER PLACEMENT	CORE # 0+00 END	SECTION NO.	CORE # 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB. TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.
21-24 days	C'106	370208		3	11"	PCC 900	P65, P61	220+25	3.5'
				2	6"	LCB	N/A		
	C'107			3	11"	PCC 900	P64	220+25	5.0'
				2	6"	LCB	N/A		
			C'110	3	11"	PCC 900	P62	214+75	3.5'
				2	6"	LCB	N/A		
	C'114	370204		3	11"	PCC 900	P65, P61	142+25	3.5'
	C'115			3	11"	PCC 900	P64, P68	142+25	5.0'
			C'118	3	11"	PCC 900	P62	136+75	3.5'
			C'121	3	11"	PCC 900	P63*	136+75	8.0'
350-360 days	C"10	370259		4	10"	PCC 3000	P62	333+25	6.5'
			C"13	4	10"	PCC 3000	P65, P61	327+75	5.0'
			C"14	4	10"	PCC 3000	P64	327+75	6.5'
	C"19	370205		3	8"	PCC 550	P62	311+25	6.5'
				2	6"	LCB	P61		
			C"22	3	8"	PCC 550	P65, P61	305+75	5.0'
				2	6"	LCB	N/A		
			C"23	3	8"	PCC 550	P64	305+75	6.5'
				2	6"	LCB	N/A		
	C"27	370201		3	8"	PCC 550	P62	304+25	6.5'
			C"30	3	8"	PCC 550	P65, P61	298+75	5.0'
			C"31	3	8"	PCC 550	P64	298+75	6.5'
	C"35	370209		4	8"	PCC 550	P62	297+25	6.5'
			C"38	4	8"	PCC 550	P65, P61	291+75	5.0'
			C"39	4	8"	PCC 550	P64	291+75	6.5'
	C"43	370210		4	8"	PCC 900	P62	290+25	6.5'
			C"46	4	8"	PCC 900	P65, P61	284+75	5.0'
			C"47	4	8"	PCC 900	P64	284+75	6.5'
	C"51	370202		3	8"	PCC 900	P62	283+25	6.5'
			C"54	3	8"	PCC 900	P65, P61	277+75	5.0'
			C"55	3	8"	PCC 900	P64	277+75	6.5'

TABLE 4 (Cont.)
NC DOT SPS-2, LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

July 01, 1993 Sheet 5/5

DAYS AFTER PLACEMENT	CORE # 0+00 END	SECTION NO.	CORE # 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB. TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.
350-360 days	C"59	370206		3	8"	PCC 900	P62	276+25	6.5'
				2	6"	LCB	P61		
			C"62	3	8"	PCC 900	P65, P61	270+75	5.0'
				2	6"	LCB	N/A		
			C"63	3	8"	PCC 900	P64	270+75	6.5'
				2	6"	LCB	N/A		
	C"67	370203		3	11"	PCC 550	P62	261+25	6.5'
			C"70	3	11"	PCC 550	P65, P61	255+75	5.0'
			C"71	3	11"	PCC 550	P64	255+75	6.5'
	C"76	370207		3	11"	PCC 550	P62	254+25	6.5'
				2	6"	LCB	P61		
			C"79	3	11"	PCC 550	P65, P61	248+75	5.0'
				2	6"	LCB	N/A		
			C"80	3	11"	PCC 550	P64	248+75	6.5'
				2	6"	LCB	N/A		
	C"84	370260		3	11"	PCC 550	P62	247+25	6.5'
				2	5"	BL. BASE	P07		
			C"87	3	11"	PCC 550	P65, P61	241+75	5.0'
				2	5"	BL. BASE	P07		
			C"88	3	11"	PCC 550	P64	241+75	6.5'
				2	5"	BL. BASE	P07		
	C"92	370211		4	11"	PCC 550	P62	236+40	6.5'
			C"95	4	11"	PCC 550	P65, P61	230+90	5.0'
			C"96	4	11"	PCC 550	P64	230+90	6.5'
	C"100	370212		4	11"	PCC 900	P62	227+25	6.5'
			C"103	4	11"	PCC 900	P65, P61	221+75	5.0'
			C"104	4	11"	PCC 900	P64	221+75	6.5'
	C"108	370208		3	11"	PCC 900	P62	220+25	6.5'
				2	6"	LCB	P61		
			C"111	3	11"	PCC 900	P65, P61	214+75	5.0'
				2	6"	LCB	N/A		
			C"112	3	11"	PCC 900	P64	214+75	6 5'
				2	6"	LCB	N/A		
	C"116	370204		3	11"	PCC 900	P62	142+25	6.5'
			C"119	3	11"	PCC 900	P65, P61	136+75	5.0'
			C"120	3	11"	PCC 900	P64	136+75	6.5'

TABLE 5
NC DOT SPS-2: MATERIALS LIBRARY SAMPLING
US 52 SB, LEXINGTON, NC

SHRP Region:	N.A.	**State:**	North Carolina	**State Code:**	37
Highway:	US 52			**SPS Project:**	02
Direction:	SB	**Location:**	Lexington	**Test Section:**	00

Coarse and Fine Aggregates

Materials	Sample Location	Sample Size	Remarks
Concrete Aggregate	Stockpile	4-5 gal. pails	
Fine Concrete Aggregate	Stockpile	4-5 gal. pails	Manufactured Sand
Fine Concrete Aggregate	Stockpile	4-5 gal. pails	Screenings

Additives

Cement	Tank Truck	1-5 gal. pail	
Fly Ash	Tanker Plant	1-5 gal. pail	
Air Entrainment	Plant	1 qt.	2 L plastic jar
Water Reducing Agent	Plant	1 qt.	2 L plastic jar

TABLE 6
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Sampling, Field Testing and Construction Dates
TEST SECTIONS

ACTIVITY	59	5	1	9	10	2	6	3	7	60	11	12	8	4
SUBGRADE														
Bulk Samples			5/18		5/18		5/18		5/18			6/16	5/18	
Shelby Tubes			6/22		6/22		6/22		6/23			6/22	6/21	
Shoulder Probe				6/23					6/23			6/23	6/23	6/23
Stabilization Completed		7/01	7/01	7/01	7/01	7/07	7/07	7/07	6/30	6/30	6/28, 6/29	6/28	6/29	5/18
BLK Stab Samples			7/01		7/01				6/30			6/28	6/29	
Primed	6/12	7/02	7/02	7/07	7/07	7/08	7/08	7/08	7/01	7/01	7/01	6/30	6/30	5/18
Nuclear Moist & Density	6/25	7/07	7/07	7/06	7/06	7/07	7/08	7/08	6/30	7/01	6/30	6/29	6/29	5/19
5 Point Levels	6/24	7/07	7/07	7/06	7/06	7/07	7/07	708	7/01	7/01	6/30	6/29	6/29	6/16
FWD		7/15											7/15	
Plate Bearing & FWD		9/15											9/15	
ASPHALT BASES (HMAC)														
I-2	7/9									7/16				
Moist & Density										7/26				
5 Point Levels	7/13									7/26				
Black Base (RHB)										9/02				
Moist & Density										9/03				
5 Point Levels	7/13									9/02				
FWD														
ABC (DGAB)														
Placed			11/12	11/12, 7/14	11/12, 7/14	11/12		7/15			7/13	7/13		6/19
Bulk Sample			11/12			11/12								6/19
Primed			No	No	No	No					7/15	7/15		6/25
Moist & Density			11/18	11/18	11/18	12/18		7/15			7/13	7/13		6/24
5 Point Levels			11/17	11/16	11/16	11/17		7/15			7/13	7/13		6/24
FWD														7/15
Plate Bearing & FWD			No			No		9/15						9/14
CB														
Placement		11/13					11/13		11/11				11/9	
5 Point Levels		11/17					11/17		11/13				11/11	
PATB														
Placed	8/30			11/22	11/22						9/02	9/03		
Bulk Samples				11/22							9/02	9/03		
5 Point Levels	8/31			11/23	11/23						9/03	9/03		
Edge Drain	7/30			7/29	7/29						7/23	7/23		
FWD														
Plate Bearing & FWD	9/15				9/14						9/14	9/14		
PCC														
Placed	10/24	11/22	11/22	11/23	11/23	11/21	11/21	11/11	11/18	11/11, 11/1	11/12	11/09	11/20	11/04, 11/08
Air Temps. Degrees F (FC Samples)	52		44			54	58		56	38		54		
Joint Sawing (HRS)	15	15												12
5 Point Levels	11/10	12/07	12/07	12/07	12/07	12/07	12/07	11/13	11/20	11/13	11/17	11/11	12/07	11/10
Profile Index (in/mile)	0	1	0	0	0	0	1	5	2	0	1	0	2	2

TABLE 7
NC DOT SPS-2 US 52 SB LEXINTGON BY-PASS, NC
Compaction Tests for Quality Assurance
(By Greg Smith - NC DOT Inspector)

LAYER	TEST #	DATE	STATION	LANE	DIST. FROM CNT. LINE	LT OR RT	RESULTS (%)	REMARKS
Embankment	1	5/19/93	266+00	SBL	2 ft	LT	98 5	
	2	6/18/93	282+00	SBL	44 ft	LT	98 5	
	3	6/21/93	284+00	SBL	45 ft	LT	98 5	
	4	6/22/93	286+00	SBL	44 ft	LT	98 5	
	5	6/22/93	287+00	SBL	45 ft	LT	97 7	
Subgrade								
	1	5/18/93	134+00	SBL	1 ft		109 2	Cement Stab
(370204)	2	5/18/93	142+00	SBL	5 ft.	RT	113 0	Cement Stab
	30	6/17/93	385+00	SBL	4 ft		97 7	Lime Stab
	31	6/17/93	381+00	SBL	8 ft	RT	100 0	Lime Stab
	32	6/17/93	371+00	SBL	4 ft	LT	100 0	Lime Stab
	33	6/17/93	361+00	SBL	3 ft	RT	98 5	Lime Stab
	36	6/21/93	351+00	SBL	5 ft	LT	98 5	Lime Stab
	37	6/21/93	341+00	SBL	4 ft	LT	98 5	Lime Stab
	38	6/21/93	331+00	SBL	0 ft		99 2	Lime Stab
(370259)	39	6/21/93	332+00	SBL	5 ft	RT	98 5	Lime Stab
	40	6/24/93	149+00	SBL	6 ft	LT	100 8	Lime Stab
	41	6/24/93	158+00	SBL	4 ft	RT	100 0	Lime Stab
	42	6/25/93	163+00	SBL	5 ft	RT	97 7	Lime Stab
	43	6/25/93	170+00	SBL	3 ft	LT	97 7	Lime Stab
	44	6/25/93	180+00	SBL	4 ft	RT	99 2	Lime Stab
	45	6/25/93	190+00	SBL	8 ft	LT	101 5	Lime Stab
	46	6/29/93	200+00	SBL	1 ft	RT	100 0	Lime Stab
	47	6/29/93	210+00	SBL	5 ft	RT	100 8	Lime Stab
(370208)	48	6/29/93	220+00	SBL	4 ft	RT	100 0	Lime Stab
(370212)	49	6/30/93	230+00	SBL	3 ft	RT	97 8	Lime Stab
(370260)	50	6/30/93	245+00	SBL	3 ft	RT	113 0	Lime Stab
	51	6/30/93	253+00	SBL	5 ft	RT	112 2	Lime Stab
	52	7/1/93	315+00	SBL	5 ft	RT	98 5	Lime Stab
(370205)	53	7/1/93	309+00	SBL	4 ft	RT	100 0	Lime Stab
(370201)	54	7/2/93	303+00	SBL	3 ft	RT	99.2	Lime Stab
(370202)	55	7/2/93	277+90	SBL	6 ft	RT	98 5	Lime Stab
(370209)	56	7/6/93	291+50	SBL	4 ft	RT	99 2	Lime Stab
(370210)	57	7/6/93	285+50	SBL	1 ft	RT	99 2	Lime Stab
	58	7/7/93	295+50	SBL	4 ft	RT	98 5	Lime Stab
(370206)	59	7/7/93	265+50	SBL	7 ft	RT	97.0	Lime Stab
	60	7/7/93	255+50	SBL	3 ft	RT	98 5	Lime Stab
	61	7/8/93	8+00 Ramp A	SBL	2 ft.	RT	99 2	Lime Stab
	62	7/8/93	8+00 Ramp B	SBL	0 ft		99 2	Lime Stab
Stone (ABC)								
	1	6/23/93	133+00	SBL	8 ft	RT	102 0	
	2	6/24/93	141+00	SBL	5 ft	LT	107 0	
	3	7/15/93	223+00	SBL	8 ft	RT	102 8	
(370211)	4	7/15/93	236+00	SBL	5 ft	RT	103 8	
(370207)	5	7/16/93	257+00	SBL	6 ft	RT	101 2	
(370203)	6	11/18/93	298+50	SBL			102 9	
	7	11/18/93	277+50	SBL			107 8	

AASHTO T99
#1 subgrade
#1A embankment
#2 stone (ABC)

TABLE 8
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Nuclear Density/Moisture Tests

TEST SECTION	SUBGRADE				ABC, I-2 and RHB		
	STABILIZING AGENT	STABILIZED DEPTH, ins.	DRY DENSITY * lb./cu. ft.	MOISTURE %	THICKNESS OF ABC, ins.	DRY DENSITY * lbs./cu. ft.	MOISTURE %
370201	Lime	8"	81.2	40.4	6"	146 8	6.8
370202	Lime	8"	86.6	32.9	6"	144 8	5 0
370203	Lime	8"	91.8	26.7	6"	132.3	6 6
370204	Cement, ABC	7"	96 8	22.7	6"	133 1	5 4
370205	Lime	8"	88.2	28.6			
370206	Lime	8"	83.1	34.0			
370207	Cement, ABC	7"	107.3	16.7			
370208	Lime	8"	88.4	29 4			
370209	Lime	5"	83 6	33.9	4"	143 2	4 5
370210	Lime	5"	83 6	33.9	4"	143 3	4 5
370211	Lime	8"	91.1	27.3	4"	131 1	5 3
370212	Lime	8"	91 0	28 9	4"	134.9	6 1
370259	Lime	8"	89.7	22.1	1" I-2		
370260	Cement, ABC	7"	101 5	17 1	1" I-2 5" RHB	124 8 141 6	

* Average of 3 locations per section

TABLE 9
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Mix Design and Materials Data

MARSHALL DESIGN	I-2	RHB
Asphalt Content % (TOT)	* 6.1	* 4.0
Grade	AC 20	AC 20
EST. Ash	0.8	0.8
Max. S.G.	2.470	2.510
Lab S.G.	2.320	
Voids in Total Mix		
Min % Compaction	95.0	92.0
Mix Temperature F	285	285
Flow (0.01 in.)	12	
Stability (LBS)	2080	
Non-Strip Additives %	0.50	0.50
Modifiers %	0.00	0.00
	* 5.4% AC-20 Additional	* 3.3 % AC-20 Additional
	0.7 % AC from RAP	0.7 % from RAP
	6.1 % Total	4.00 % Total

AGGREGATE SOURCES AND BLEND PERCENTAGES I-2

SUPPLIER	LOCATION/SOURCE	MATERIAL	BLEND %
Thompson-Arthur	Stockpile	RAP	14 2
Martin Marietta	Jamestown Quarry	# 78M	25 0
Martin Marietta	Jamestown Quarry	SCRGS	40 8
Thompson-Arthur	Candor Pit	Sand	20 0
			100%

AGGREGATE SOURCES AND BLEND PERCENTAGES RHB

SUPPLIER	LOCATION	MATERIAL	BLEND %
Thompson-Arthur	Stockpile	RAP	13 9
Martin Marietta	Jamestown Quarry	# 467 TN	65 0
Martin Marietta	Jamestown Quarry	R. SCRGS	11 0
Thompson-Arthur	Candor Pit	Sand	10 1
			100%

TABLE 10
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Asphalt Mixes - Placement Data

TEST SECTION	PLACE DATE	DESIGN THICKNESS (in.)	AIR TEMP.	MIX TEMP. (avg.)	LAY TEMP. (avg.)	REMARKS
			PATB			
370211	9/2/93	4	90	265	245	wait 3 hrs. to compact
370212	9/3/93	4	90	275	267	wait 4 hrs. to compact
370209	11/22/93	5	50	303	266	wait to complete N10 before rolling 7 hr. wait
370210	11/22/93	5	50	279	252	wait 2 hrs. to compact
370259	8/30/93	4	85	285	252	wait 5 hrs to compact
			I-2			
370259	7/9/93	1	80	290	260	Hyster C766 Dynapac CC421
370260	7/26/93	1	80	290	260	Hyster Roller
			RHB			
370260	9/2/93	5	90	290	278	1 coverage static 3 coverages vibratory

TABLE 11
SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Asphalt Plant Inspectors Daily Report - I-2 and RHB

SIEVE SIZE	JOB MIX FORMULA	I-2 JOB MIX NO. 92-670-051						RHB - MIX NO. 92-298-051	
		370259			370260			JOB MIX	370260
		7/9/93			7/16/93			FORMULA	9/2/93
		SA #9	SA # 10	SA #11	SA #21	SA #22	SA #23		
2								100	100
1 1/2								95	100
1									
3/4	100	100	100	100	100	100	100	69	75
1/2	98	100	100	100	100	100	100		
3/8	95	98	98	98	98	98	97		
No. 4	77	77	79	80	79	77	76	34	38
8	63	61	63	62	63	59	60	28	31
16	51	49	49	48	51	48	48	23	27
40	29	32	31	31	32	30	30	15	18
80	14	16	16	17	14	14	14		
200	6.6	7.2	8.3	8.8*	6.2	6.4	6.7	4.0	3.5
% AC (total)	6.1	6.5	6.7*	6 6	6.2	6.5	6.3	4.0	3.6
% ASH	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	0.8
AC Grade	AC 20	AC 20	AC 20	AC 20	AC 20	AC 20	AC 20	AC 20	AC 20
AC Source	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal	Coastal
Non-Strip Addit.	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250

AC 20 COASTAL FUELS, TAPCO 250

Compaction Test

Type	Sample No.	Specific Gravity		% Comp.	Thickness
		Actual	JMF		
I-2	18	2 215	2.320	95 5	1 1/2
	19	2 213		95.4	1 3/8
	20 pc	2 246		96 8	1 1/2
	21 pc	2 169	Avg.	93 5*	17/16
	22 pc	2 298		99 0	1 1/4
	Control Strip			96 4	
	23	2.202		94.4*	1 3/8
RHB	1	2 472	2 51	98 5	5 1/8
	2	2 458		97 9	5 1/4
	3	2 396		95.5	5 1/4

*out of specification

TABLE 12
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC
Asphalt Plant Inspectors Daily Report - PATB

	PATB MIX - JOB MIX NO. 652-055-051							
	GRADATION		370259	370211	370212		370209	370210
SIEVE SIZE	SHRP REC'D.	JOB MIX TOLERANCE	8/30/93 SA #19	9/2/93 SA # 23	9/3/93 SA # 24	9/3/93 SA # 25	11/22/93 SA #34	11/22/93 SA # 35
1	100	100	100					
1 1/2	100	100	100	100	100	100	100	100
1	95-100	95-100	100	100	100	100	100	100
1/2	25-60	25-60	45	49	52	48	59	60
No 4	0-10	0-10	10	10	11*	10	11*	7
8	0-5	0-5	5	6*	5	5	6*	3
200	0-2	0-3	1.9	2 4	1.6	1 8	2.1	1.2
% AC	2-2 5	2	2.4	2.4	2 2	1.9	2.1	2
% Ash			0.3	0.3	0.2	0.3	0 6	0.6
Type AC			AC 20	AC 20	AC 20	AC 20	AC 20	AC 20
Source AC			Coastal Fuels	Coastal Fuels	Coastal Fuels	Coastal Fuels	Coastal Fuels	Coastal Fuels
Non-Strip Additive			Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250	Tapco 250

AGGREGATE - #57 stone from Martin-Marietta Quarry Jamestown

* Out of Specification

TABLE 13
NC DOT SPS-2 US 52 SB LEXINGTON BY-PASS, NC SBL
Edge Drain Installations

TEST SECTION	STATIONS		REMARKS
	INSIDE LANE	OUTSIDE LANE	
370259	328+00 - 333+00		NC DOT test section inside edge drain installed on curve 304+00 - 340+00 pavement is 1" 1-2, 4" PATB 10" PCC
370209 and 370210		284+00 - 298+00	add-on lane, on tangent main lanes - 1" I-2, 3" PATB 10" PCC add-on lane - 4" DGAB 4" PATB, 8" PCC
370260		240+50 - 248+00	NC DOT test section 1" I-2, 5" RHB, 11" PCC
370211	229+50 - 235+00	233+50 - 238+50	on tangent on curve 4" DGAB, 4" PATB, 11" PCC TS 231+16 - 236+16
370212	221+00 - 229+50		on curve 4" DGAB, 4" PATB 11" PCC

TABLE 14.1
NC DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
STATEMENT OF CONCRETE MIX DESIGN AND SOURCE OF MATERIALS

Project #	S.T600406 STPNH-37-1 (48)	**R.M. Producer:**	APAC-Georgia, Inc.
County:	Davidson	**Plant Location:**	Job Site
Resident Engineer:	Keith Raulston	**Contractor:**	APAC-Georgia, Inc.

Mix Design-One Cubic Yard Based on SSD Condition

Class of Concrete:	Econocrete Base 550 PSI reg.	**Size of Coarse Aggregate:**	57M
Lab Mix Design Number:	EB 2-R	**Designed Air Content:**	5.0%

Material		Source	Material Producer/Location
Cement Type I	493 lbs.	Tarmac Roanoke	Roanoke, VA
Flyash	148 lbs.	Monex Class F	Bellews Creek, NC
Fine Agg. +M			
Fine Agg. +M	1228 lbs.	Martin Marietta, Sand, 2MS	Woodlief Quarry
Coarse Agg. +M	1924 lbs.	Martin Marietta, #57M	Thomasville Quarry
Total Water Per C.Y.	30.5 gal.		
Admixture (AE)	5 0 lbs.	Hunt Process (Air-In)	Ridgeland, MS
Admixture (Retarder)			
Admixture (Water Red)	27.35	Hunt Process (HPS-R)	Ridgeland, MS

The quality of mixing water shown is designed to produce a 1.5" slump

The maximum water permitted by specifications is 41.4 gallons per cu. yd NOTE: if it is found that more than the maximum water permitted by the specifications is required to produce workability, additional cement will be required to maintain the maximum water cement ratio.

(1) The quantities of fine and coarse aggregates necessary to conform to specifications in regard to consistency and workability shall be determined by the method described in "Recommended Practice for Selecting Proportions for Concrete" (ACI 211.1-74), and "Pumping Concrete by Pumping Methods" (ACI 304), using the absolute volume basis. The w/c ratio, slump, cement, and air content shall conform to Section 1000 of the Standard Specifications (1990) for the class of concrete desired.

(2) Admixtures used must be from the current approved list of air-entraining agents, water reducers and retarders.

MIX DESIGN DATA

F.A.-FM-	2.56	F A.-Abs %	0.10	C.A.-Sp.Gr.-	2.77
F A -Sp.Gr.-	2 85	C A.-Abs %	0.70	C.A.-Unit Wt.-	98
Mortar-Cu. Ft. per Cu. Yd	15 87				

Prepared by APAC Georgia, Inc.

Date: October 12, 1993
Mix #2-B Revised

TABLE 14.2
NC DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
STATEMENT OF CONCRETE MIX DESIGN AND SOURCE OF MATERIALS

Project #	S.T600406 STPNH-37-1 (48)	**R.M. Producer:**	APAC-Georgia, Inc.
County:	Davidson	**Plant Location:**	Job Site
Resident Engineer:	Keith Raulston	**Contractor:**	APAC-Georgia, Inc.

Mix Design-One Cubic Yard Based on SSD Condition

Class of Concrete:	Concrete Pavement 550 PSI reg.	**Size of Coarse Aggregate:**	57M
Lab Mix Design Number:	PF-57M-100-102-REV	**Designed Air Content:**	5 0%

Material		Source	Material Producer/Location
Cement Type I	493 lbs.	Tarmac Roanoke	Roanoke, VA
Flyash	148 lbs.	Monex Class F	Bellews Creek, NC
Fine Agg. +M	1155 lbs.	Martin Marietta, Sand, 2MS	Woodlief Quarry
Fine Agg. +M			
Coarse Agg. +M	1924 lbs.	Martin Marietta, #57M	Thomasville Quarry
Total Water Per C.Y.	30.5 gal.		
Admixture (AE)			
Admixture (Retarder)	5.0 lbs.	Hunt Process (Air-In)	Ridgeland, MS
Admixture (Water Red)	27.35	Hunt Process (HPS-R)	Ridgeland, MS

The quality of mixing water shown is designed to produce a 1 5" slump

The maximum water permitted by specifications is 41.4 gallons per cu. yd. NOTE: If it is found that more than the maximum water permitted by the specifications is required to produce workability, additional cement will be required to maintain the maximum water cement ratio.

(1) The quantities of fine and coarse aggregates necessary to conform to specifications in regard to consistency and workability shall be determined by the method described in "Recommended Practice for Selecting Proportions for Concrete" (ACI 211.1-74), and "Pumping Concrete by Pumping Methods" (ACI 304), using the absolute volume basis The w/c ratio, slump, cement, and air content shall conform to Section 1000 of the Standard Specifications (1990) for the class of concrete desired.

(2) Admixtures used must be from the current approved list of air-entraining agents, water reducers and retarders

MIX DESIGN DATA

F.A.-FM-	2.56	F.A.-Abs %	0.10	C A -Sp.Gr -	2 77
F.A.-Sp.Gr.-	2.85	C A -Abs %	0 70	C.A.-Unit Wt.-	98
Mortar-Cu. Ft. per Cu. Yd.	15.87				

Prepared by APAC Georgia, Inc.

Date: November 03, 1993
Mix #2-B Revised

TABLE 14.3
NC DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
STATEMENT OF CONCRETE MIX DESIGN AND SOURCE OF MATERIALS

Project #	S.T600406 STPNH-37-1 (48)	**R.M. Producer:**	APAC-Georgia, Inc
County:	Davidson	**Plant Location:**	Job Site
Resident Engineer:	Keith Raulston	**Contractor:**	APAC-Georgia, Inc

Mix Design-One Cubic Yard Based on SSD Condition

Class of Concrete:	Concrete Pavement SHRP 550 PSI	**Size of Coarse Aggregate:**	57M
Lab Mix Design Number:	PF-57M-100-102-R REV	**Designed Air Content:**	5.0%

Material		Source	Material Producer/Location
Cement Type I	421 lbs.	Tarmac Roanoke	Roanoke, VA
Flyash	126 lbs.	Monex Class F	Bellews Creek, NC
Fine Agg. +M	1241 lbs.	Martin Marietta, Sand, 2MS	Woodlief Quarry
Fine Agg. +M			
Coarse Agg. +M	1924 lbs.	Martin Marietta, #57M	Thomasville Quarry
Total Water Per C Y	30.5 gal		
Admixture (AE)			
Admixture (Retarder)	5.24 oz.	Hunt Process (Air-In)	Ridgeland, MS
Admixture (Water Red)	27.35 oz	Hunt Process (HPS-R)	Ridgeland, MS

The quality of mixing water shown is designed to produce a 1.5" slump.

The maximum water permitted by specifications is 35.3 gallons per cu yd. NOTE If it is found that more than the maximum water permitted by the specifications is required to produce workability, additional cement will be required to maintain the maximum water cement ratio.

(1) The quantities of fine and coarse aggregates necessary to conform to specifications in regard to consistency and workability shall be determined by the method described in "Recommended Practice for Selecting Proportions for Concrete" (ACI 211.1-74), and "Pumping Concrete by Pumping Methods" (ACI 304), using the absolute volume basis The w/c ratio, slump, cement, and air content shall conform to Section 1000 of the Standard Specifications (1990) for the class of concrete desired.

(2) Admixtures used must be from the current approved list of air-entraining agents, water reducers and retarders

MIX DESIGN DATA

F A.-FM-	2.56	F.A.-Abs %	0.10	C.A.-Sp.Gr.-	2 77
F.A.-Sp.Gr.-	2.68	C A.-Abs %	0.70	C.A.-Unit Wt -	98
Mortar-Cu. Ft. per Cu. Yd.	15.87				

Prepared by APAC Georgia, Inc.

Date: November 03, 1993
Mix #2 Revised

TABLE 14.4
NC DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
STATEMENT OF CONCRETE MIX DESIGN AND SOURCE OF MATERIALS

Project #	S.T600406 STPNH-37-1 (48)	**R.M. Producer:**	APAC-Georgia, Inc.
County:	Davidson	**Plant Location:**	Job Site
Resident Engineer:	Keith Raulston	**Contractor:**	APAC-Georgia, Inc

Mix Design-One Cubic Yard Based on SSD Condition

Class of Concrete:	Concrete Pavement 900 PSI	**Size of Coarse Aggregate:**	57M
Lab Mix Design Number:	900-2	**Designed Air Content:**	5.0%

Material		Source	Material Producer/Location
Cement Type I	772 lbs.	Tarmac Roanoke	Roanoke, VA
Flyash	232 lbs.	Monex Class F	Bellews Creek, NC
Fine Agg. +M	743 lbs.	Martin Marietta, Sand, 2MS	Woodlief Quarry
Fine Agg. +M			
Coarse Agg. +M	1900 lbs.	Martin Marietta, #57M	Thomasville Quarry
Total Water Per C Y.	35.0 gal.		
Admixture (AE)			
Admixture (Retarder)	5 0 oz.	Hunt Process (Air-In)	Ridgeland, MS
Admixture (Water Red)	60.2 oz.	Hunt Process (HPS-R)	Ridgeland, MS

The quality of mixing water shown is designed to produce a 1 5" slump

The maximum water permitted by specifications is 35.0 gallons per cu. yd. NOTE: if it is found that more than the maximum water permitted by the specifications is required to produce workability, additional cement will be required to maintain the maximum water cement ratio.

(1) The quantities of fine and coarse aggregates necessary to conform to specifications in regard to consistency and workability shall be determined by the method described in "Recommended Practice for Selecting Proportions for Concrete" (ACI 211.1-74), and "Pumping Concrete by Pumping Methods" (ACI 304), using the absolute volume basis The w/c ratio, slump, cement, and air content shall conform to Section 1000 of the Standard Specifications (1990) for the class of concrete desired

(2) Admixtures used must be from the current approved list of air-entraining agents, water reducers and retarders

MIX DESIGN DATA

F.A.-FM-	2.56	F.A -Abs %	0.10	C A -Sp.Gr.-	2 77
F A -Sp.Gr.-	2.68	C.A.-Abs %	0 70	C.A.-Unit Wt.-	98
Mortar-Cu. Ft. per Cu. Yd.	15.87				

Prepared by APAC Georgia, Inc.

Date: November 04, 1993
Mix #900 Revision #3

TABLE 14.5
NC DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY
STATEMENT OF CONCRETE MIX DESIGN AND SOURCE OF MATERIALS

Project #	S.T600406 STPNH-37-1 (48)	**R.M. Producer:**	APAC-Georgia, Inc.
County:	Davidson	**Plant Location:**	Job Site
Resident Engineer:	Keith Raulston	**Contractor:**	APAC-Georgia, Inc.

Mix Design-One Cubic Yard Based on SSD Condition

Class of Concrete:	Econocrete Shoulder/Base	**Size of Coarse Aggregate:**	57
Lab Mix Design Number:	EB/S-1-R	**Designed Air Content:**	5 0%

Material		Source	Material Producer/Location
Cement Type I	360 lbs.	Tarmac Roanoke	Roanoke, VA
Flyash	108 lbs.	Monex Class F	Bellews Creek, NC
Fine Agg. +M			
Fine Agg. +M	1464 lbs.	Martin Marietta, Screenings	Thomasville Quarry
Coarse Agg. +M	1750 lbs.	Martin Marietta, #57M	Thomasville Quarry
Total Water Per C.Y.	32 gal.		
Admixture (AE)	1.9 oz.	Hunt Process (Air-In)	Ridgeland, MS
Admixture (Retarder)			
Admixture (Water Red)	23 4 oz	Hunt Process (HPS-R)	Ridgeland, MS

The quality of mixing water shown is designed to produce a 1.5" slump.

The maximum water permitted by specifications is 33 gallons per cu. yd. NOTE. if it is found that more than the maximum water permitted by the specifications is required to produce workability, additional cement will be required to maintain the maximum water cement ratio.

(1) The quantities of fine and coarse aggregates necessary to conform to specifications in regard to consistency and workability shall be determined by the method described in "Recommended Practice for Selecting Proportions for Concrete" (ACI 211.1-74), and "Pumping Concrete by Pumping Methods" (ACI 304), using the absolute volume basis. The w/c ratio, slump, cement, and air content shall conform to Section 1000 of the Standard Specifications (1990) for the class of concrete desired.

(2) Admixtures used must be from the current approved list of air-entraining agents, water reducers and retarders.

MIX DESIGN DATA

F.A.-FM-	2 56	F.A -Abs %	0.10	C.A.-Sp Gr.-	2.77
F A.-Sp.Gr.-	2.66	C.A -Abs %	0.70	C.A.-Unit Wt.-	98
Mortar-Cu Ft. per Cu. Yd.	16.88				

Prepared by APAC Georgia, Inc.

Date: September 28, 1993
Mix #5

TABLE 14.6
NC DOT SPS-2 US 52 LEXINGTON BY-PASS, NC SBL
Concrete Mix Design Dates - LCB and PCC

TABLE	CLASS OF CONC.	DATE OF MIX	MIX #	REMARKS
14.1	Regular 550 PSI	October 12	2B	Used on non-SHRP sections and N59 prior to November 3
14.2	Regular 550 PSI	November 3	#2B Revised	Used on all non-SHRP sections after Nov. 3
14.3	SHRP 550 PSI	November 3	#2 Revised	
14.4	SHRP 900 PSI	November 3	#900 Revised #3	First used on test section #4 on November 4
14.5	Econocrete	September 28	#5	Bases and Shoulders

TABLE 15
NC DOT SPS-2 PROJECT LEXINGTON, NC
Tracking Table for Testing Molded PCC Cylinders and Beams

TEST SECTION	STA. & SAMPLE NO.	DATES MOLDED (FILL IN)	SPECIMEN NUMBER									CURING PROTOCOL
			14 DAYS			28 DAYS			365 DAYS			
			P61	P62	P69	P61	P62	P69	P61	P62	P69	
LCB AS DELIVERED			LX02			LY02			LZ02			Fill In Test Dates
370206	273+50	11/13/93	LX01			LY01			LZ01			
	BP1		TEST	11/27/93		TEST	12/11/93		TEST	11/13/94		
370208	217+50		LX04			LY04			LZ04			
			LX03			LY03			LZ03			
	BP2	11/9/93	TEST	11/23/93		TEST	12/7/93		TEST	11/9/94		Test Dates
PCC AS DELIVERED												
370259	327+75		GX01	GX02	FX01	GY01	GY02	FY01	GZ01	GZ02	FZ01	
	FC7	10/24/93	TEST	11/7/93		TEST	11/21/93		TEST	10/24/94		Test Dates
370201	301+50		GX03 & 3A	GXD4 & 4A	FX02	GY03 & 3A	GY04 & 4A	FY02	GZ03 & 3A	GZ04 & 4A	FZ02	
	FC1	11/22/93	TEST	12/6/93		TEST	12/20/93		TEST	11/22/94		Test Dates
370202	280+50		GX05 & 5A	GX06 & 6A	FX03	GY05 & 5A	GY06 & 6A	FY03	GZ05 & 5A	GZ06 & 6A	FZ03	
	FC4	11/21/93	TEST	12/5/93		TEST	12/19/93		TEST	11/21/94		Test Dates
370206	273+50		GX07 & 7A	GX08 & 8A	FX04	GY07 & 7A	GY08 & 8A	FY04	GZ07 & 7A	GZ08 & 8A	FZ04	
	FC5	11/21/93	TEST	12/5/93		TEST	12/19/93		TEST	11/21/94		Test Dates
370207	251+50		GX09 & 9A	GX10 & 10A	FX05	GY09 & 9A	GY10 & 10A	FY05	GZ09 & 9A	GZ10 & 10A	FZ05	
	FC2	11/18/93	TEST	12/2/93		TEST	12/16/93		TEST	11/18/94		Test Dates
370260	244+50		GX11	GX12	FX06	GY11	GY12	FY06	GZ11	GZ12	FZ06	
	FC3	11/12/93	TEST	11/26/93		TEST	12/10/93		TEST	11/12/94		Test Dates
370212	224+50		GX13 (2)	GX14 (2)	FX07	GY13 (2)	GY14 (2)	FY07 (2)	GZ13 (2)	GZ14 (2)	FZ07 (2)	
	FC6	11/9/93	TEST	11/23/93		TEST	12/7/93		TEST	11/9/94		Test Dates

P61 - COMPRESSION TESTING OF MOLDED CYLINDERS 152mm DIA x 305mm (6" dia x 12")
P62 - SPLITTING TENSILE TESTING OF MOLDED CYLINDERS 152mm DIA x 305mm (6" dia x 12")
P69 - FLEXURAL STRENGTH (1/3 POINT LOADING) OF BEAM 152mm x 152mm x 508mm (6" x 6" x 20")

TABLE 16
NC DOT SPS-2 US 52 LEXINGTON BY-PASS, NC SBL
Concrete Test Results - LCB and PCC

								PC09-P69			PC01-P61			PC02-P62		
TEST	STATION &	DATE	TYPE	FIELD TESTS				FLEXURAL, psi SHRP, NC			COMPRESSION, psi			TENSILE, psi		
SECTION	SAMPLE #	SAMPLED	CONC.	AIR	SLUMP	CONC. T	AIR T.	14 DAY	28 DAY	365 DAY	14 DAY	28 DAY	365 DAY	14 DAY	28 DAY	365 DAY
LCB																
370206	273+50 BP1	11/13/93	ECON	3 8	1	69	68	-	-	-	3468 (16)	4160				
370208	217+50 BP2	11/9/93	ECON	5 6	1.2	58	44	-	-	-	2975	3785				
PCC																
370259	327+75 FC7	10/24/93	3000 psi 550 psi	4 4	0.7	75	52	578 (15)	616		3950 (15)	4560		338 (15)	502	
370201	301+50 FC1	11/22/93	550 psi	5 6	1	62	44	736 (15)	564 (30)		3900 (15)	4565 (30)		389 (15)	485 (30)	
370202	280+50 FC4	11/21/93	900 psi	5 2	1 1/4	68	54	-	1020 (29)		6560 (15)	7824 (29)		527 (15)	573 (29)	
370206	273+50 FC5	11/21/93	900 psi	5 2	1 1/2	68	58	-	994 (29)		6585 (15)	7297 (29)		550 (15)	550 (29)	
370207	251+50 FC2	11/18/93	550 psi	5 2	1 1/4	68	56	650	736		4495	5331		-	494	
370260	244+50 FC3	11/12/93	550 psi	4 4	1	58	38	663 (17)	642		5750 (17)	6285		526 (17)	546	
370212	224+50 FC6	11/9/93	900 psi	5 5	1 2	63	54	884	-		5908	6470		466	520	

( ) Age, days

TABLE 17

NC DOT SPS-2 LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

Revised December 9, 1993 Sheet 1/5

TEST AGE DAYS	CORE # 0+00 END	SECTION NO.	CORE# 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.	DATE PLACED	TEST DATE	AGE DAYS	P61 COMP psi	P62 TENS. psi	P64 MODULUS psi x1000
10-13 days		370205	C1	2	6	LCB	P61	305+35	2'	11/13/93					
		270206	C2	2	6	LCB	P61	270+70	2'	11/13/93					
			C3	2	6	LCB	P61	270+70	3 5'	11/13/93					
		370207	C4	2	6	LCB	P61	248+70	2'	11/11/93					
		370208	C5	2	6	LCB	P61	214+35	2'	11/9/93	11/29	20	2815		
			C6	2	6	LCB	P61	214+35	3 5'	11/9/93	11/29	20	2891		
10-13 days	C7	370259		4	10	PCC3000	P65, P61	333+25	2'	10/24/93	11/8	15	3116		
			C11	4	10	PCC3000	P62	327+75	2'	10/24/93	11/8	15		383	
	C16	370205		3	8	PCC550	P65, P61	311+25	2'	11/22/93	12/6	14	2250		
				2	6	LCB	P61				12/13	21	3226		
			C20	3	8	PCC550	P62	305+40	2'	11/22/93	12/6	14	2253		
				2	6	LCB	P61								
	C24	370201		3	8	PCC550	P65, P61	304+25	2'	11/22/93	12/6	14	3190		
			C28	3	8	PCC550	P62	298+40	2'	11/22/93	12/6	14		326	
	C32	370209		4	8	PCC550	P65, P61	297+25	2'	11/23/93	12/7	14	2480		
			C36	4	8	PCC550	P62	291+60	2'	11/23/93	12/7	14		270	
	C40	370210		4	8	PCC900	P65, P61	290+60	2'	11/23/93	12/7	14	5035		
			C44	4	8	PCC900	P62	284+75	2'	11/23/93	12/7	14		534	
	C48	370202		3	8	PCC900	P65, P61	283+25	2'	11/21/93	12/5	14	4936		
			C52	3	8	PCC900	P62	277+75	2'	11/21/93	12/5	14		505	
	C56	370206		3	8	PCC900	P65, P61	276+25	2'	11/21/93	12/5	14	5173		
				2	6	LCB	P61				12/13	22	3349		
			C60	3	8	PCC900	P62	270+75	2'	11/21/93	12/5	14	2695		
				2	6	LCB	P61								
	C64	370203		3	11	PCC550	P65, P61	261+25	2'	11/11/93	11/29	18	3891		
			C68	3	11	PCC550	P62	255+75	2'	11/11/93	11/29	18		416	
	C73	370207		3	11	PCC550	P65, P61	254+25	2'	11/18/93	12/2	14	3459		
				2	6	LCB	P61								
			C77	3	11	PCC550	P62	248+75	2'	11/18/93	12/2	14		327	
				2	6	LCB	P61			11/11/93					

* If not covered with PCC

TABLE 17 (cont.)

NC DOT SPS-2 LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

Revised June 21, 1994 Sheet 2/5

TEST AGE DAYS	CORE # 0+00 END	SECTION NO.	CORE# 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.	DATE PLACED	TEST DATE	AGE DAYS	P61 COMP psi	P62 TENS. psi	P64 MODULUS psi x1000
10-13 days	C81	370260		3	11	PCC550	P65, P61	247+50	2'	11/11/93	11/29	18	3553		
				2	5	BL BASE									
			C85	3	11	PCC550	P62	241+70	2'	11/12/93	11/29	17		459	
				2	5	BL BASE									
	C89	370211		4	11	PCC550	P65, P61	236+40	2'	11/12/93	11/29	17	4170		
			C93	4	11	PCC550	P62	230+65	2'	11/12/93	11/29	17		450	
	C97	370212		4	11	PCC900	P65, P61	227+25	2'	11/9/93	11/29	20	5946		
			C101	4	11	PCC900	P62	221+40	2'	11/9/93	11/29	20		541	
	C105	370208		3	11	PCC900	P65, P61	220+25	2'	11/20/93	12/3	13	6369		
				2	6	LCB	P61			11/9/93					
			C109	3	11	PCC900	P62	214+40	2'	11/20/93	12/3	13		622	
				2	6	LCB	P61			11/9/93					
	C113	370204		3	11	PCC900	P65, P61	142+25	2'	11/4/93	11/29	25	6362		
			C117	3	11	PCC900	P62	136+75	2'	11/8/93	11/29	21		634	
21-24 days	C8	370259		4	10	PCC3000	P65, P61	333+25	3.5'	10/24/93	11/29	36	3698		
	C9			4	10	PCC3000	P64, P68	333+25	5.0'	10/24/93	11/21	28	4445		3868
				4	10	PCC3000	62	327+75	3.5'	10/24/93					
			C15	4	10	PCC3000	P63*	327+75	8.0'	10/24/93					
	C17	370205		3	8	PCC550	P65, P61	311+27	3.5'	11/22/93	12/20	28	3626		
	C17A			2	6	LCB	P61								
	C18			3	8	PCC550	P64	311+27	5.0'	11/22/93	12/20	28	3256		5697
	C18A			2	6	LCB	P61								
			C21	3	8	PCC550	P62	305+40	3.5'	11/22/93	12/20	28		359	
			C21A	2	6	LCB	P61								
	C25	370201		3	8	PCC500	P65, P61	304+25	3.5'	11/22/93	12/20	28	3938		
	C26			3	8	PCC500	P64	304+25	5.0'	11/22/93	12/20	28	3846		4701
			C29	3	8	PCC500	P62	298+40	3.5'	11/22/93	12/20	28		496	
	C33	370209		4	8	PCC500	P65, P61	297+25	3.5'	11/23/93	12/21	28	3170		
	C34			4	8	PCC500	P64	297+25	5.0'	11/23/93	12/21	28	3015		fail
			C37	4	8	PCC500	P62	291+60	3.5'	11/23/93	12/21	28		357	
	C41	370210		4	8	PCC900	P65, P61	290+60	3.5'	11/23/93	12/21	28	5073		
	C42			4	8	PCC900	P64	290+60	5.0'	11/23/93	12/21	28	5592		3445
			C45	4	8	PCC900	P62	284+75	3.5'	11/23/93	12/21	28		552	

* Package and ship cores to designated FHWA laboratory (C15, C72, C121)

TABLE 17 (cont.)

NC DOT SPS-2 LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

Revised June 21, 1994

TEST AGE DAYS	CORE # 0+00 END	SECTION NO.	CORE# 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.	DATE PLACED	TEST DATE	AGE DAYS	P61 COMP psi	P62 TENS. psi	P64 MODULUS psi x1000
21-24 days	C'49	370202		3	8"	PCC 900	P65, P61	283+25	3.5'	11/21/93	12/20	29	6283		
	C'50			3	8"	PCC 900	P64	283+25	5.0'	11/21/93	12/19	28	7000		5555
			C'53	3	8"	PCC 900	P62	277+75	3 5'	11/21/93	12/20	29		567	
	C'57	370206		3	8"	PCC 900	P65, P61	276+25	3.5'	11/21/93	12/20	29	5687		
	C'57A			2	6"	LCB	P61				12/20		3291		
	C'58			3	8"	PCC 900	P64	276+25	5.0'	11/21/93	12/19	28	6240		6500
				2	6"	LCB	P61				12/20		3445		
			C'61	3	8"	PCC 900	P62	270+75	3 5'	11/21/93	12/20	29		534	
			C'61A	2	6"	LCB	P61				12/20		3478		
	C'65	370203		3	11"	PCC 550	P65, P61	261+25	3.5'	11/11/93	12/9	28	4495		
	C'66			3	11"	PCC 550	P64, P68	261+25	5.0'	11/11/93	12/9	28	6150		5771,P68 0.08
			C'69	3	11"	PCC 550	P62	255+75	3 5'	11/11/93	12/9	28		431	
			C'72	3	11"	PCC 550	P63*	255+75	8 0'	11/11/93					
	C'74	370207		3	11"	PCC 550	P65, P61	254+25	3 5'	11/18/93	12/16	28	3980		
	C'74A			2	6"	LCB	P61			11/09/93	12/16		2842		
	C'75			3	11"	PCC 550	P64	254+25	5 0'	11/18/93	12/16	28	3700		4287
	C'75A			2	6"	LCB	P61			11/11/93					
			C'78	3	11"	PCC 550	P62	248+75	3.5'	11/18/93	12/16	28		452	
			C'78A	2	6"	LCB	P61			11/11/93	12/16		3230		
	C'82	370260		3	11"	PCC 550	P65, P61	247+50	3.5'	11/11/93	12/9	28	4367		
				2	5"	BL. BASE	P07								
	C'83			3	11"	PCC 550	P64	247+50	5.0'	11/11/93	12/9	28	5068		5623
				2	5"	BL. BASE	P07								
			C'86	3	11"	PCC 550	P62	241+70	3 5'	11/12/93	12/10	28		405	
				2	5"	BL. BASE	P07								
	C'90	370211		4	11"	PCC 550	P65, P61	236+40	3.5'	11/12/93	12/10	28	3921		
	C'91			4	11"	PCC 550	P64	236+40	5 0'	11/12/93	12/10	28	5383		4652
			C'94	4	11"	PCC 550	P62	230+65	3 5'	11/12/93	12/10	28		445	
	C'98	370212		4	11"	PCC 900	P65, P61	227+25	3.5'	11/9/93	12/7	28	6185		
	C'99			4	11"	PCC 900	P64	227+25	5.0'	11/9/93	12/7	28	5874		5594
			C'102	4	11"	PCC 900	P62	221+40	3 5'	11/9/93	12/7	28		660	

TABLE 17 (cont.)

NC DOT SPS-2 LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

Revised December 9, 1993

TEST AGE DAYS	CORE # 0+00 END	SECTION NO.	CORE# 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.	DATE PLACED	TEST DATE	AGE DAYS	P61 COMP psi	P62 TENS. psi	P64 MODULUS psi x1000
21-24 days	C'106	370208		3	11"	PCC 900	P65, P61	220+25	3 5'	11/20/93	12/20	30	6766		
	C'106A			2	6"	LCB	P61			11/9/93	12/20		4541		
	C'107			3	11"	PCC 900	P64	220+25	5 0'	11/20/93	12/18	28	6597		5999
	C'107A			2	6"	LCB	P61			11/9/93	12/20		4477		
			C'110	3	11"	PCC 900	P62	214+40	3 5'	11/20/93	12/20	30		627	
				2	6"	LCB	P61			11/9/93	12/20		4787		
	C'114	370204		3	11"	PCC 900	P65, P61	142+25	3 5'	11/4/93	12/2	28	6023		
	C'115			3	11"	PCC 900	P64, P68	142+25	5 0'	11/4/93					Lost
			C'118	3	11"	PCC 900	P62	136+75	3 5'	11/8/93	12/6	28		541	
			C'121	3	11"	PCC 900	P63*	136+75	8 0'	11/8/93					
											Date core can be taken				Test Date
350-360 days	C"10	370259		4	10"	PCC 3000	P62	333+25	6 5'	10/24/93	10/9-19/94				10/24/93
			C"13	4	10"	PCC 3000	P65, P61	327+75	5 0'	10/24/93	10/9-19/94				10/24/93
			C"14	4	10"	PCC 3000	P64	327+75	6 5'	10/24/93	10/9-19/94				10/24/93
	C"19	370205		3	8"	PCC 550	P62	311+27	6 5'	11/22/93	11/7-17/94				11/22/93
				2	6"	LCB	P61								
			C"22	3	8"	PCC 550	P65, P61	305+40	5 0'	11/22/93	11/7-17/94				11/22/93
				2	6"	LCB	P61								
			C"23	3	8"	PCC 550	P64	305+40	6 5'	11/22/93	11/7-17/94				11/22/93
				2	6"	LCB	P61								
	C"27	370201		3	8"	PCC 550	P62	304+25	6 5'	11/22/93	11/7-17/94				11/22/93
			C"30	3	8"	PCC 500	P65, P61	298+40	5 0'	11/22/93	11/7-17/94				11/22/93
			C"31	3	8'	PCC 550	P64	298+40	6 5'	11/22/93	11/7-17/94				11/22/93
	C"35	370209		4	8"	PCC 550	P62	297+25	6 5'	11/23/93	11/8-18/94				11/23/93
			C"38	4	8"	PCC 550	P65, P61	291+75	5 0'	11/23/93	11/8-18/94				11/23/93
			C"39	4	8"	PCC 550	P64	291+60	6 5'	11/23/93	11/8-18/94				11/23/93
	C"43	370210		4	8"	PCC 900	P62	290+60	6 5'	11/23/93	11/8-18/94				11/23/93
			C"46	4	8"	PCC 900	P65, P61	284+75	5 0'	11/23/93	11/8-18/94				11/23/93
			C"47	4	8"	PCC 900	P64	284+75	6 5'	11/23/93	11/8-18/94				11/23/93
	C"51	370202		3	8"	PCC 900	P62	283+25	6.5'	11/21/93	11/6-14/94				11/21/93
			C"54	3	8"	PCC 900	P65, P61	277+75	5 0'	11/21/93	11/6-14/94				11/21/93
			C"55	3	8"	PCC 900	P64	277+75	6 5'	11/21/93	11/6-14/94				11/21/93

TABLE 17 (cont.)

NC DOT SPS-2 LEXINGTON, NC
SCHEDULE FOR POST-CONSTRUCTION CORING OF PCC & LCB
4" O.D. CORES

Revised December 9, 1993 Sheet 5/5

TEST AGE DAYS	CORE # 0+00 END	SECTION NO.	CORE# 5+00 END	LAYER NO.	LAYER THICK INS.	MATERIAL DESCRIP-TION	LAB TEST PROTOCOL	APPROX. CONSTR. STA.	OFFSET FT.	DATE PLACED	DATE CORE CAN BE OBTAINED	DATE CORE WAS OBTAINED	DATE CORE IS TO BE TESTED
350-360 days	C"59	370206		3	8"	PCC 900	P62	276+25	6.5'	10/24/93	10/9-19/94		10/24/94
				2	6"	LCB	P61						
			C"62	3	8"	PCC 900	P65, P61	270+75	5 0'	10/24/93	10/9-19/94		10/24/94
				2	6"	LCB	P61						
			C"63	3	8"	PCC 900	P64	270+75	6.5'	10/24/93	10/9-19/94		10/24/94
				2	6"	LCB	P61						
	C"67	370203		3	11"	PCC 550	P62	261+25	6.5'	11/11/93	10/27-11/6/94		11/11/94
			C"70	3	11"	PCC 550	P65, P61	255+75	5.0'	11/11/93	10/27-11/6/94		11/11/94
			C"71	3	11"	PCC 550	P64	255+75	6.5'	11/11/93	10/27-11/6/94		11/11/94
	C"76	370207		3	11"	PCC 550	P62	254+25	6.5'	11/18/93	11/3-13/94		11/18/94
				2	6"	LCB	P61						
			C"79	3	11'	PCC 550	P65, P61	248+75	5 0'	11/18/93	11/3-13/94		11/18/94
				2	6"	LCB	P61						
			C"80	3	11"	PCC 550	P64	248+75	6.5'	11/18/93	11/3-13/94		11/18/94
				2	6"	LCB	P61						
	C"84	370260		3	11"	PCC 550	P62	247+50	6 5'	11/11/93	10/27-11/6/94		11/11/94
				2	5"	BL BASE	P07						
			C"87	3	11"	PCC 550	P65, P61	241+70	5 0'	11/12/93	10/28-11/7/94		11/11/94
				2	5"	BL. BASE	P07						
			C"88	3	11"	PCC 550	P64	241+70	6 5'	11/12/93	10/28-11/7/94		11/11/94
				2	5"	BL BASE	P07						
	C"92	370211		4	11"	PCC 500	P62	236+40	6 5'	11/12/93	10/28-11/7/94		11/11/94
			C"95	4	11"	PCC 550	P65, P61	230+90	5 0'	11/12/93	10/28-11/7/94		11/11/94
			C"96	4	11"	PCC 550	P64	230+90	6.5'	11/12/93	10/28-11/7/94		11/11/94
	C"100	370212		4	11'	PCC 900	P62	227+25	6 5'	11/9/93	10/25-11/4/94		11/9/94
			C"103	4	11"	PCC 900	P65, P61	221+40	5 0'	11/9/93	10/25-11/4/94		11/9/94
			C"104	4	11"	PCC 900	P64	221+40	6 5'	11/9/93	10/25-11/4/94		11/9/94
	C"108	370208		3	11"	PCC 900	P62	220+25	6.5'	11/20/93	11/5-11/4/94		11/20/94
				2	6"	LCB	P61						
			C"111	3	11"	PCC 900	P65, P61	214+40	5 0'	11/20/93	11/5-11/4/94		11/20/94
				2	6"	LCB	P61						
			C"112	3	11"	PCC 900	P64	214+40	6 5'	11/20/93	11/5-11/4/94		11/20/94
				2	6"	LCB	P61						
	C"116	370204		3	11"	PCC 900	P62	142+25	6 5'	11/4/93	10/20-30/94		11/20/94
			C"119	3	11"	PCC 900	P65, P61	136+75	5 0'	11/8/93	10/24-11/3/94		11/4/94
			C"120	3	11"	PCC 900	P64	136+75	6 5'	11/8/93	10/24-11/3/94		11/8/94

TABLE 18
NC DOT SPS-2
Summary of Layer Thicknesses (Ins.)

TEST SECTION	LAYER		DESIGN	5 POINT MEASUREMENTS			AVERAGE POST CONTS. CORES
	NATERIAL	NO.		MIN.	MAX.	AVERAGE	
370201	DGAB	3	6	5.5	9.2	6.0	
	PCC	6	8	7.7	10.2	9.0	9.3
370202	DGAB	3	6	4 3	7 4	6.0	
	PCC	6	8	7.3	12.1	10.2	8.5
370203	DGAB	3	6	4.8	6.8	5 6	
	PCC	6	11	9.7	12.5	11.2	11.4
370204	DGAB	3	6	4.8	5 9	5 4	
	PCC	6	11	10.8	11.9	11.2	11 3
370205	LCB	5	6	5 5	7 2	6.5	6 9
	PCC	6	8	6 7	9 4	8.4	8.7
370206	LCB	5	6	6.1	7.4	6.7	6.5
	PCC	6	8	7.3	8 9	8.4	8 8
370207	LCB	5	6	3.6	6.4	5 6	5.7
	PCC	6	11	11.0	13.0	11.6	11.7
370208	LCB	5	6	5.3	6.7	5.9	5 9
	PCC	6	11	10.6	12.0	11.2	11 2
370209	DGAB	3	4	3 8	6 7	5 0	
	PATB	4	5	4 8	7 7	5 0	
	PCC	6	8	7.7	10 2	8.6	9 4
370210	DGAB	3	4	3.6	6 7	4 7	
	PATB	4	5	4.4	6 8	5 3	
	PCC	6	8	6.8	10.0	8.4	9.7
370211	DGAB	3	4	3.2	4.9	4 1	
	PATB	4	4	3.1	4.2	3.6	
	PCC	6	11	11 2	12.8	11.4	11.7
370212	DGAB	3	4	3.2	4.9	3.8	
	PATB	4	4	4.1	5.0	4 3	
	PCC	6	11	10.6	11 8	10.9	11 2
370259	I-2	3	1	0.8	1 7	1.2	
	PATB	4	4	3 7	5 2	4 4	
	PCC	6	10	8.6	10 7	10.2	10 0
370260	I-2	3	1	0.7	1.7	1.3	
	RHB	4	5	5.2	7 0	5 5	5.5
	PCC	6	11	10 2	12 2	11 5	11 4

TABLE 19
NC DOT SPS-2; US 52 LEXINGTON BY PASS
Summary of Joint Spacings for SHRP Test Sections

Joint spacing for SHRP sections shall be 15'. SHRP required that the beginning of the test section shall be five feet from the previous joint. To satisfy these requirements, minor adjustment to the normal joint spacing outside the test sections is required. Following is a list of joint spacing arrangements. This list affects SBL only.

1	139+70 to 136+50 (18', 19', 21', 22' normal joint spacing) 136+30 to 136+50 (20' joint spacing) 136+50 to 142+50 (15' joint spacing) 142+50 to 215+50 (normal spacing)	
2	214+50 to 220+50 (15') 220+50 to 221+50 (20')	
3	221+50 to 227+50 (15') 227+50 to 230+50 (20') 230+30 to 230+50 (20')	
4	230+50 to 236+65 (15') 236+65 to 237+04 (19' & 20' joint spacing) 237+04 to 238+60 (normal spacing)	
5	240+70 to 254+50 (15') 254+50 to 255+50 (20')	**Note:** expansion joints at 241+15 & 241+75
6	255+50 to 261+50 (15') 261+50 to 270+30 (normal spacing) 270+30 to 270+50 (15')	
7	270+50 to 276+50 (15') 276+50 to 277+50 (20')	
8	277+50 to 283+50 (15') 283+50 to 284+50 (20')	
9	284+50 to 290+50 (15') 290+50 to 291+50 (20')	
10	291+50 to 297+50 (15') 297+50 to 298+50 (20')	
11	298+50 to 304+50 (15') 304+50 to 305+50 (20')	
12	305+50 to 311+50 (15') 311+50 to 327+50 (normal spacing)	
13	327+50 to 333+50 (15') 333+50 to end project (normal spacing)	

Please contact Shin-Wu at (919) 250-4094 for further information.
In order to accomodate expansion joints at bridge over Y-16, minor adjustments of the joint locations between 236+50 to 248+50 is needed. This is an updated list.

TABLE 20
NC DOT SPS-2 US 52 LEXINGTON BY-PASS
PCC
CHAINAGE ADJUSTMENTS AND INSTRUMENTATION STATIONS

STATION	CORE STATION ADJUSTMENT		INSTRUMENTATION STATIONS	
	FROM	TO	SEASONAL	ST. GAUGE OUTLETS
370201	298+75	298+40	298+87.5	298+65
370205	305+75 311+25	305+40 311+75	305+87.5	305+65
370212	221+75	221+40	221+87 5	221+65
370208	214+75	214+40	214+87 5	214+65
370210	290+75	290+60		290+35*
370219	291+75	291+60		291+82*
370260	247+28 241+75	247+50 241+70		241+30*
370211	230+90	230+65		230+98*

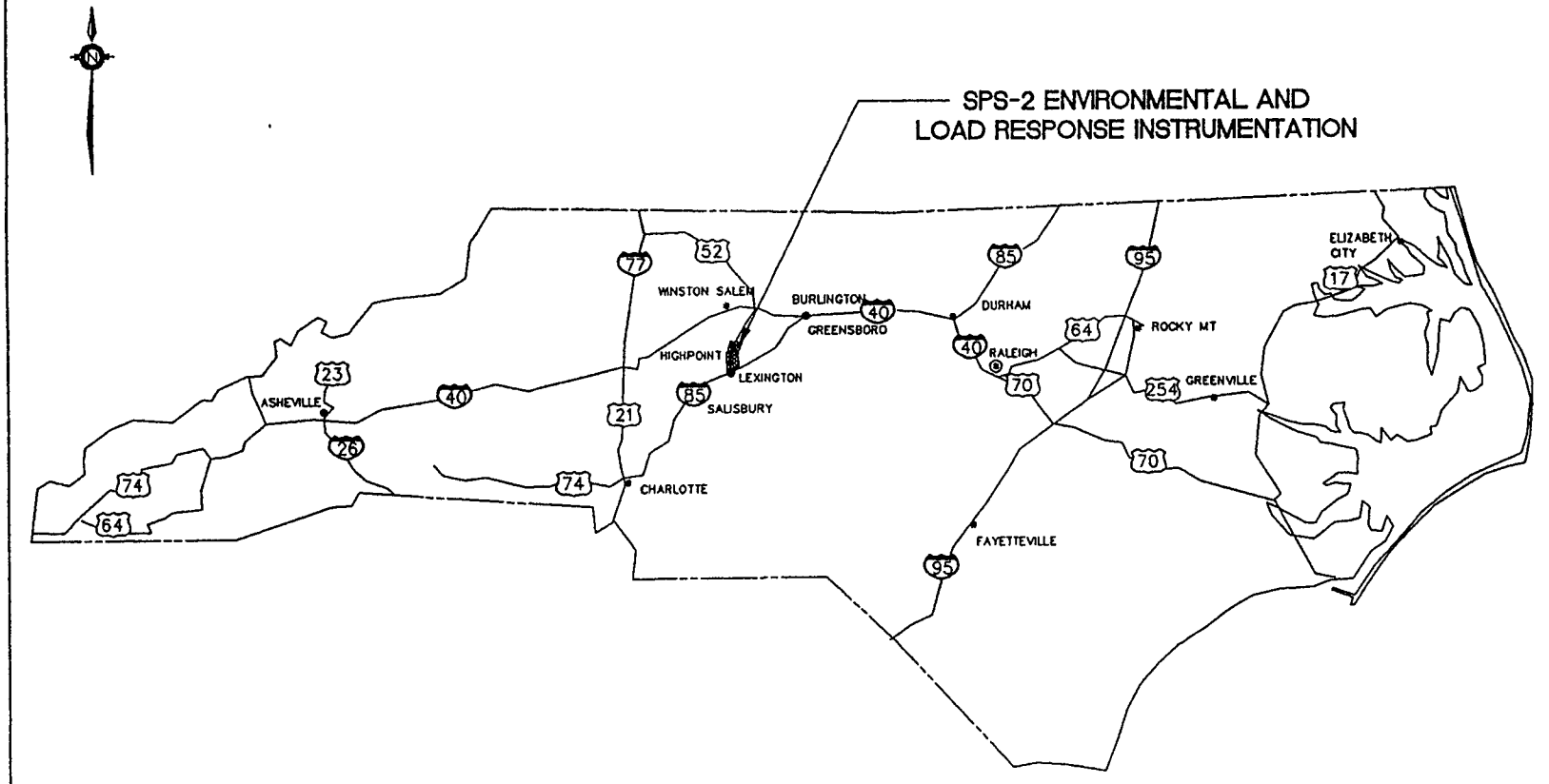
* Also outlets for the wiring for the MDD instrumentation

shrp

FHWA–LTPP SPS–2 NORTH CAROLINA LOCATION PLAN

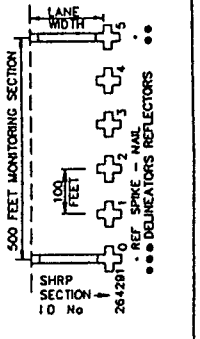
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS™ PAVEMENT MANAGEMENT SYSTEMS LIMITED



CAPITAL CITIES
MAJOR CENTRES
65 INTERSTATE
44 U S HIGHWAYS
36 STATE HIGHWAY
AGENCY BORDER

TYPICAL SITE SIGNING & MARKING



SPS 2 CHIPSEAL 36B350

ROAD TEST 264291

NORTH CAROLINA

SCALE 1:50

FIGURE 1 - LOCATION PLAN OF NORTH CAROLINA SPS-2 PROJECT ON US 52 SB LEXINGTON BY-PASS, NC. (from SR 1232 at Lexington to Existing US 52 at Welcome)

shrp

FHWA-LTPP SPS-2 NORTH CAROLINA SCHEMATIC LAYOUT
STRUCTURE FACTORS FOR RIGID PAVEMENTS

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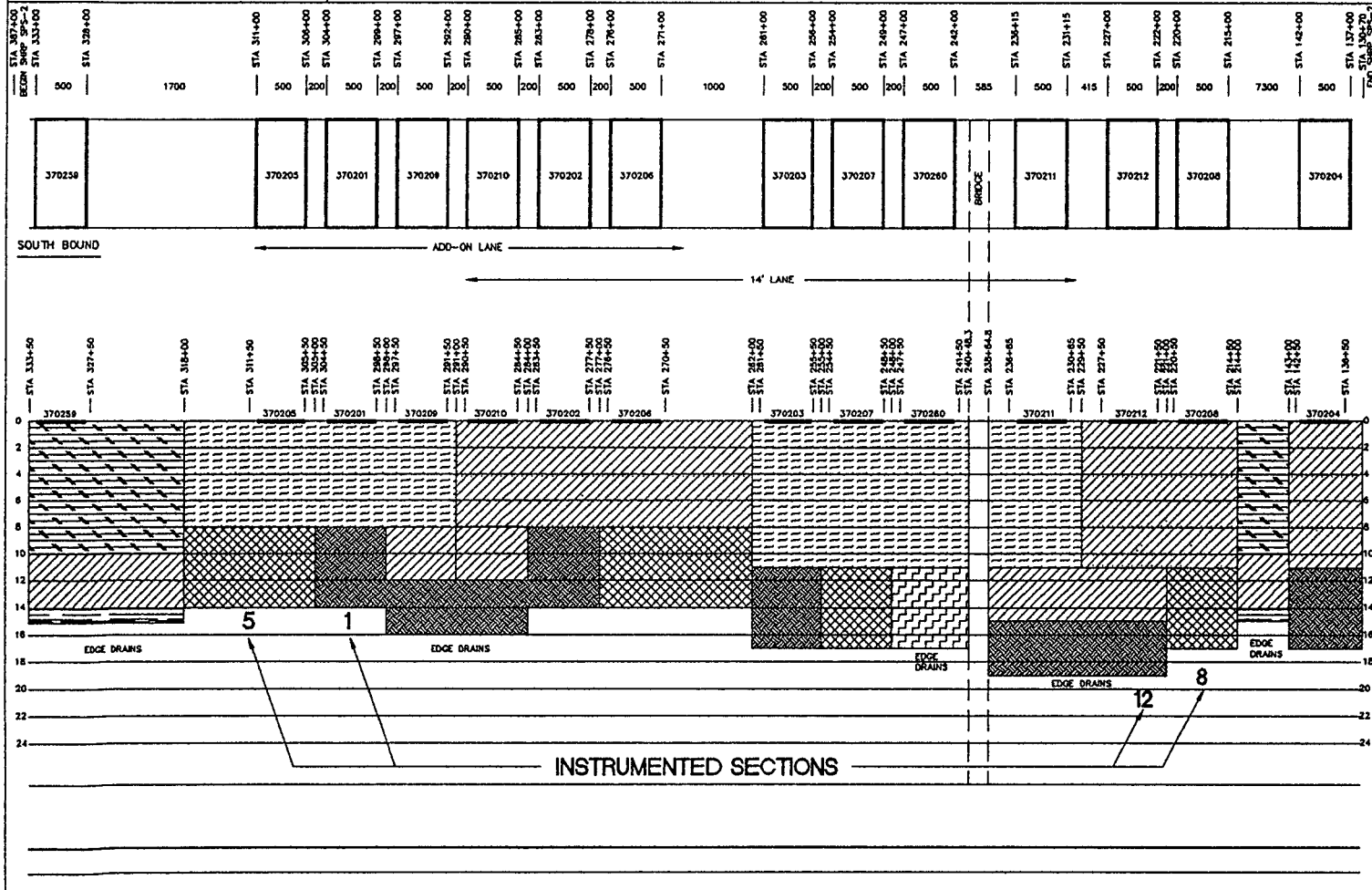


LEGEND

- PCC**-3000 psi COMPRESSIVE
- PCC*-900 psi FLEXURAL
- PCC-550 psi FLEXURAL
- PATB-PERMEABLE ASPHALT TREATED BASE
- LCB-LEAN CONCRETE BASE
- DGAB-DENSE GRADED AGGREGATE BASE
- BLACK BASE(HRB)
- AC-ASPHALT CONCRETE

FIGURE 2 - LONGITUDINAL LAYOUT OF TEST SECTIONS

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: JULY 29/94

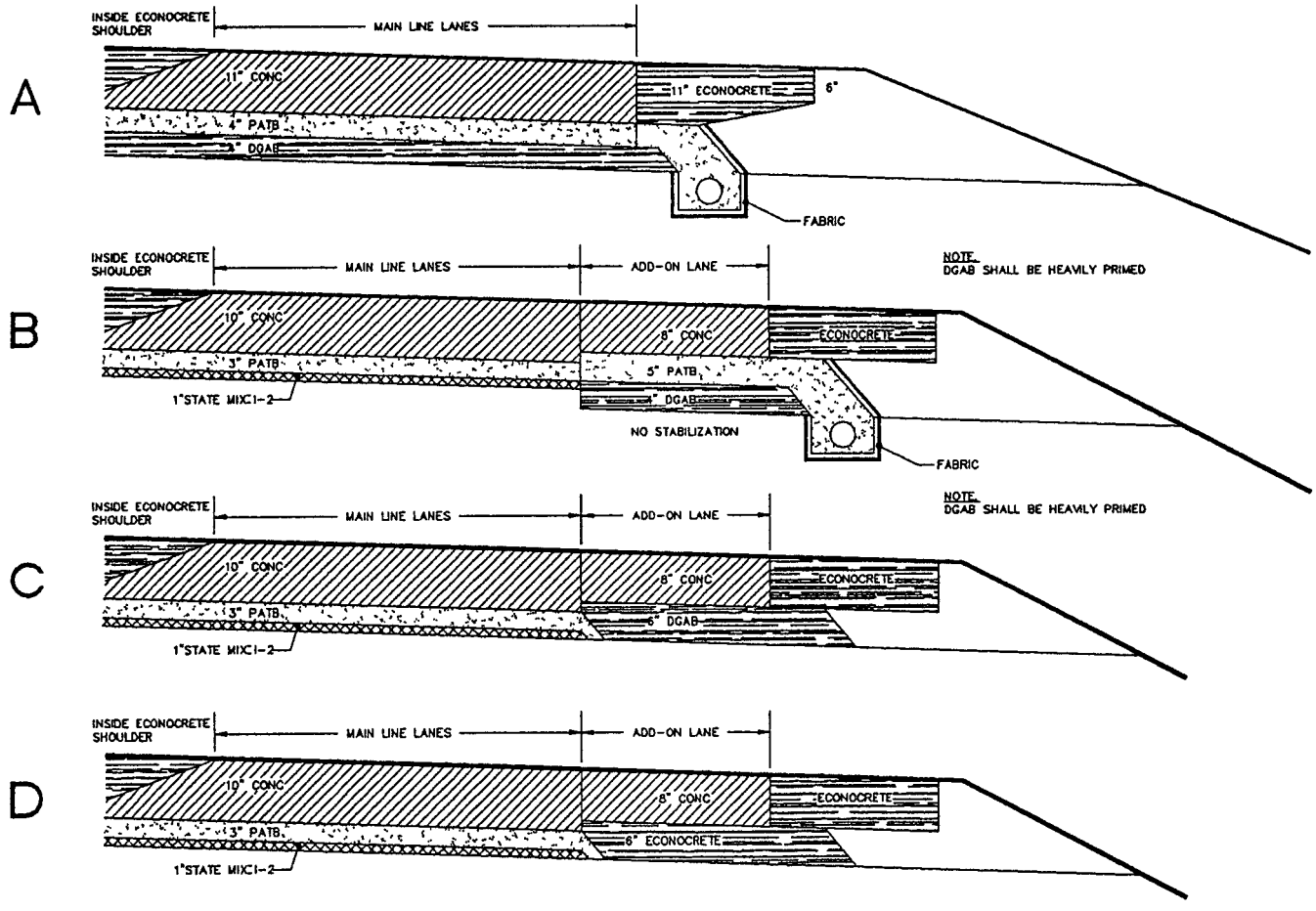
SPS-2-2A

SHRP SPS-2 TEST SECTIONS ONLY
DRAWING NOT INTENDED TO BE USED FOR CONSTRUCTION PURPOSES

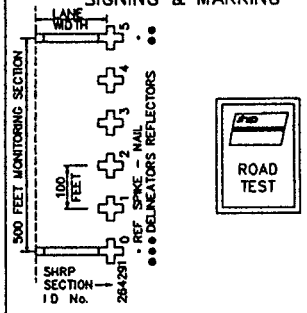
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 16/94

FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 3a - NOTES TO TABLE 1 - TYPICAL SECTIONS

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FHWA–LTPP SPS–2 NORTH CAROLINA
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

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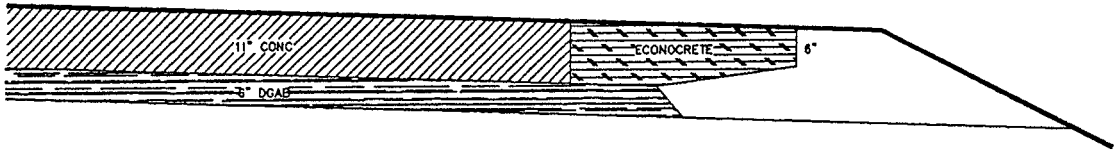
E



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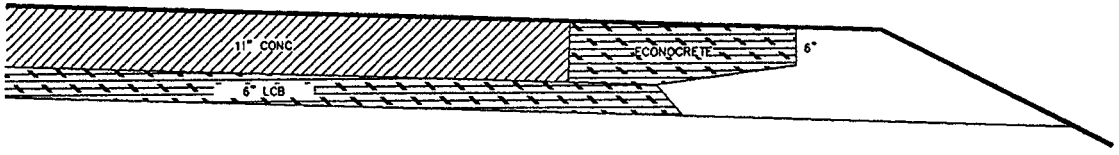

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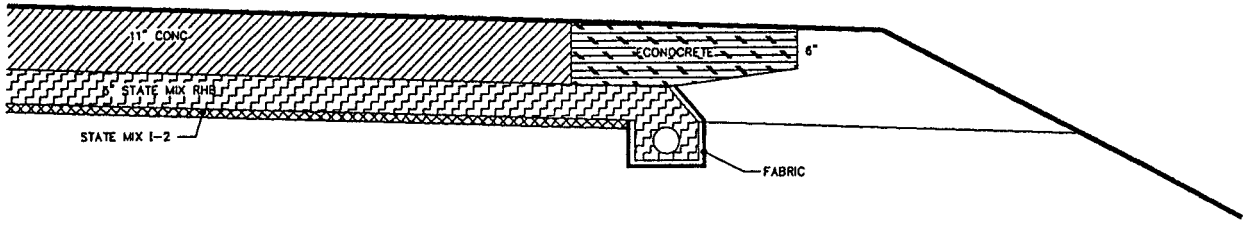
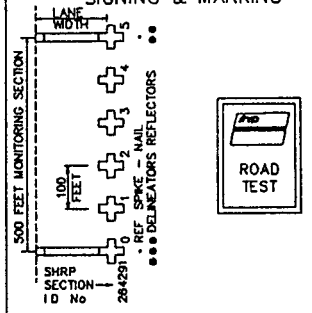


TYPICAL SITE SIGNING & MARKING



NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

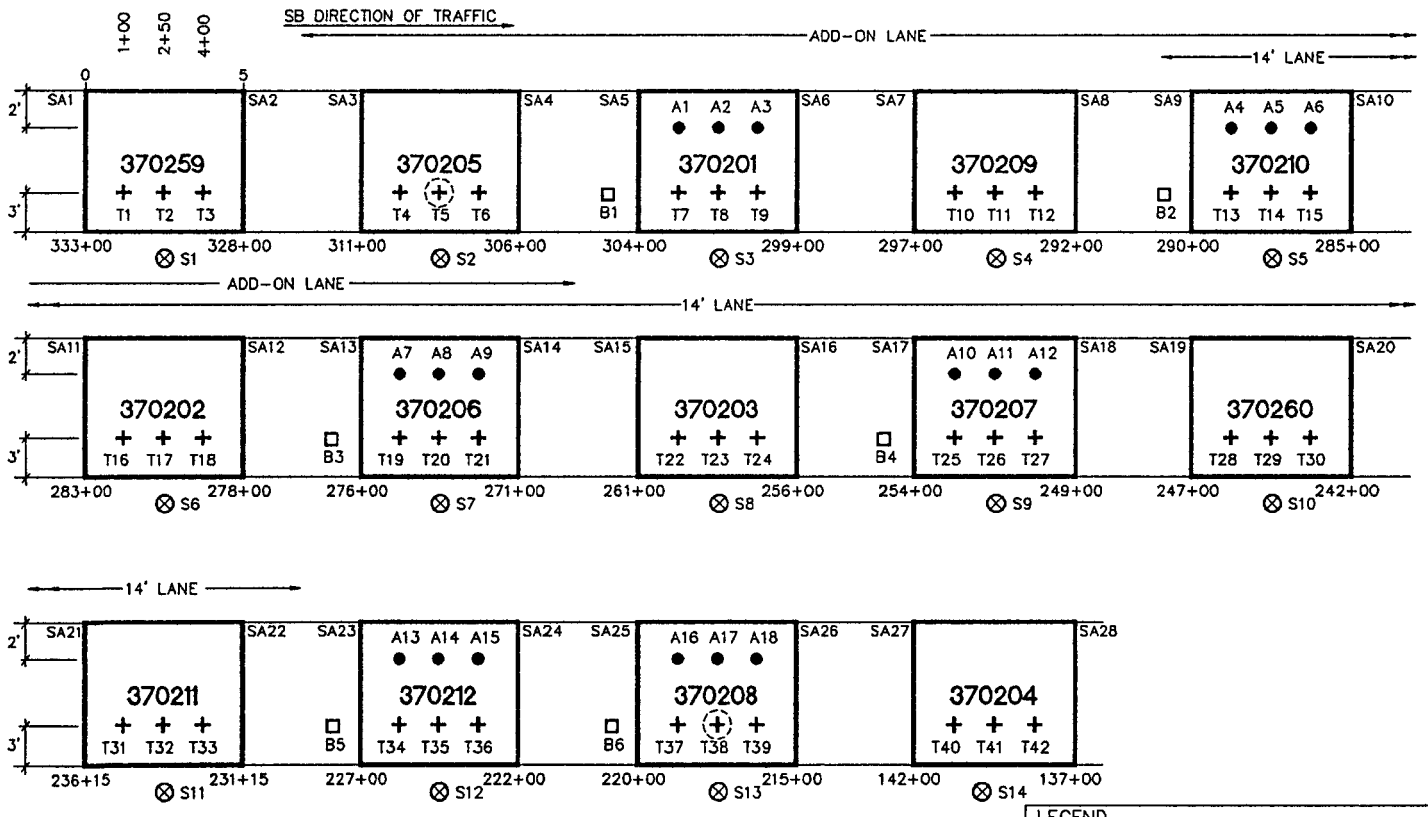
PLOTDATE: AUG 11/94

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 3b - NOTES TO TABLE 1(con't) - TYPICAL SECTIONS

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED



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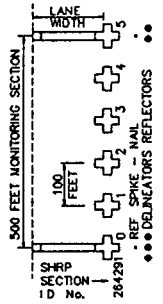


NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE AUG 11/94

SPS–2–1

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 4 – FIELD MATERIALS SAMPLING AND TESTING – SUBGRADE – LAYER 1

SPS-2-1

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED

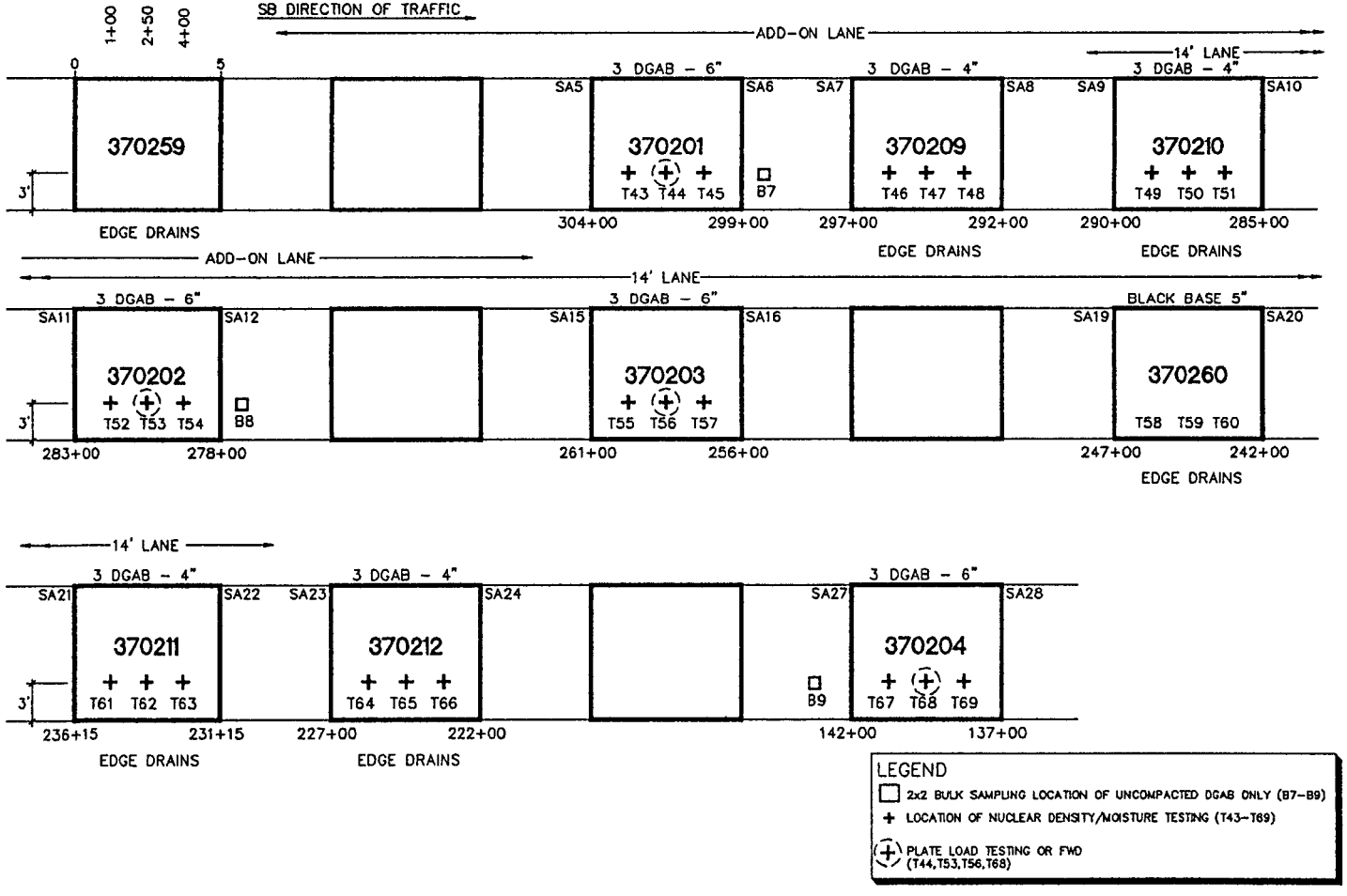
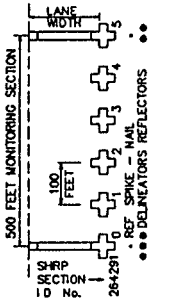


FIGURE 5 - FIELD MATERIALS SAMPLING AND TESTING- DENSE GRADED AGGREGATE BASE - LAYER 3

TYPICAL SITE SIGNING & MARKING



ROAD TEST

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

SPS–2–2

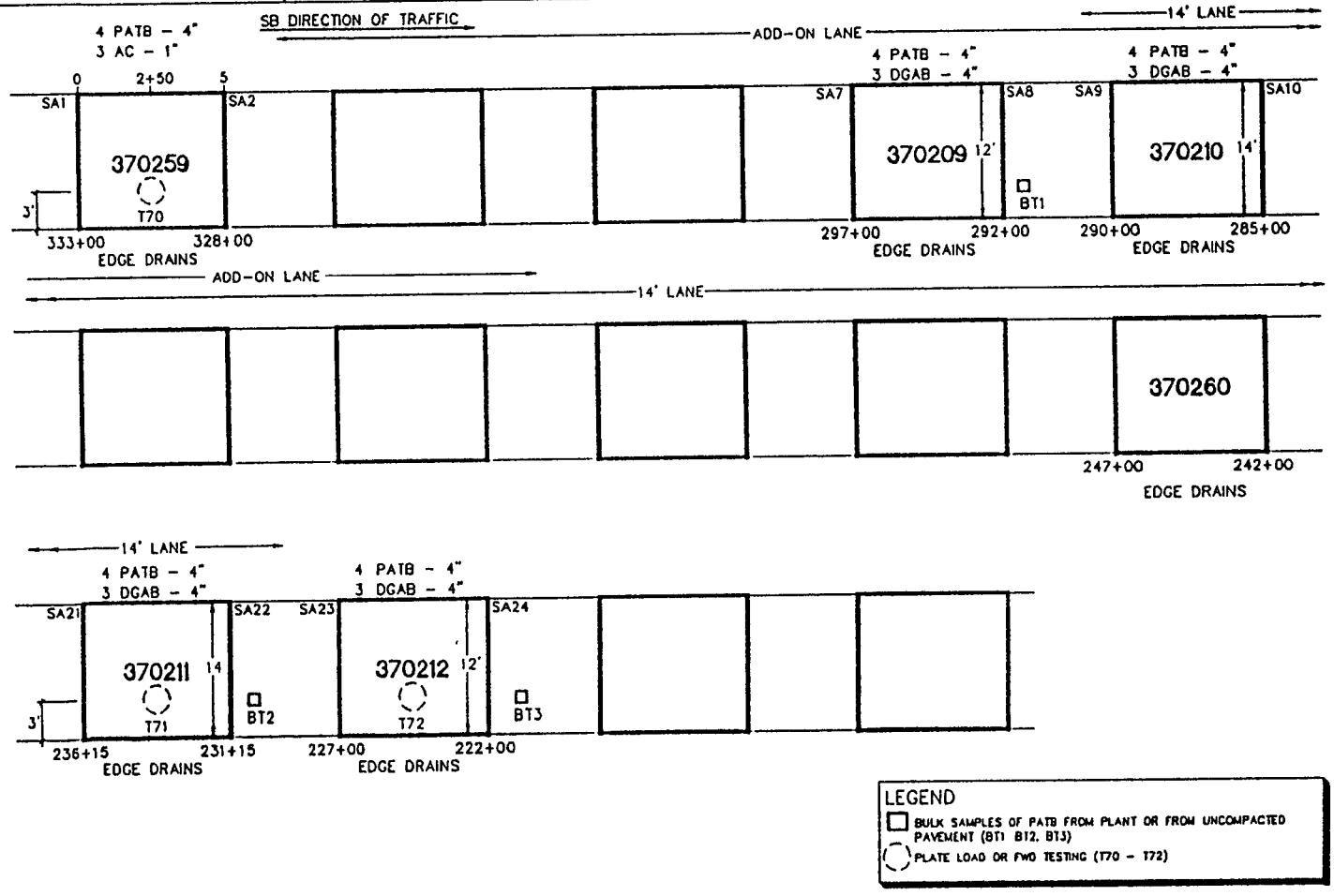
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

SPS-2-2

shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



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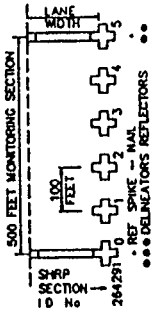


NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: APR 11/94 | FHWA SPS-2 TEST SECTIONS ONLY DIMENSIONAL DETAILS ONLY DRAWING NOT TO SCALE

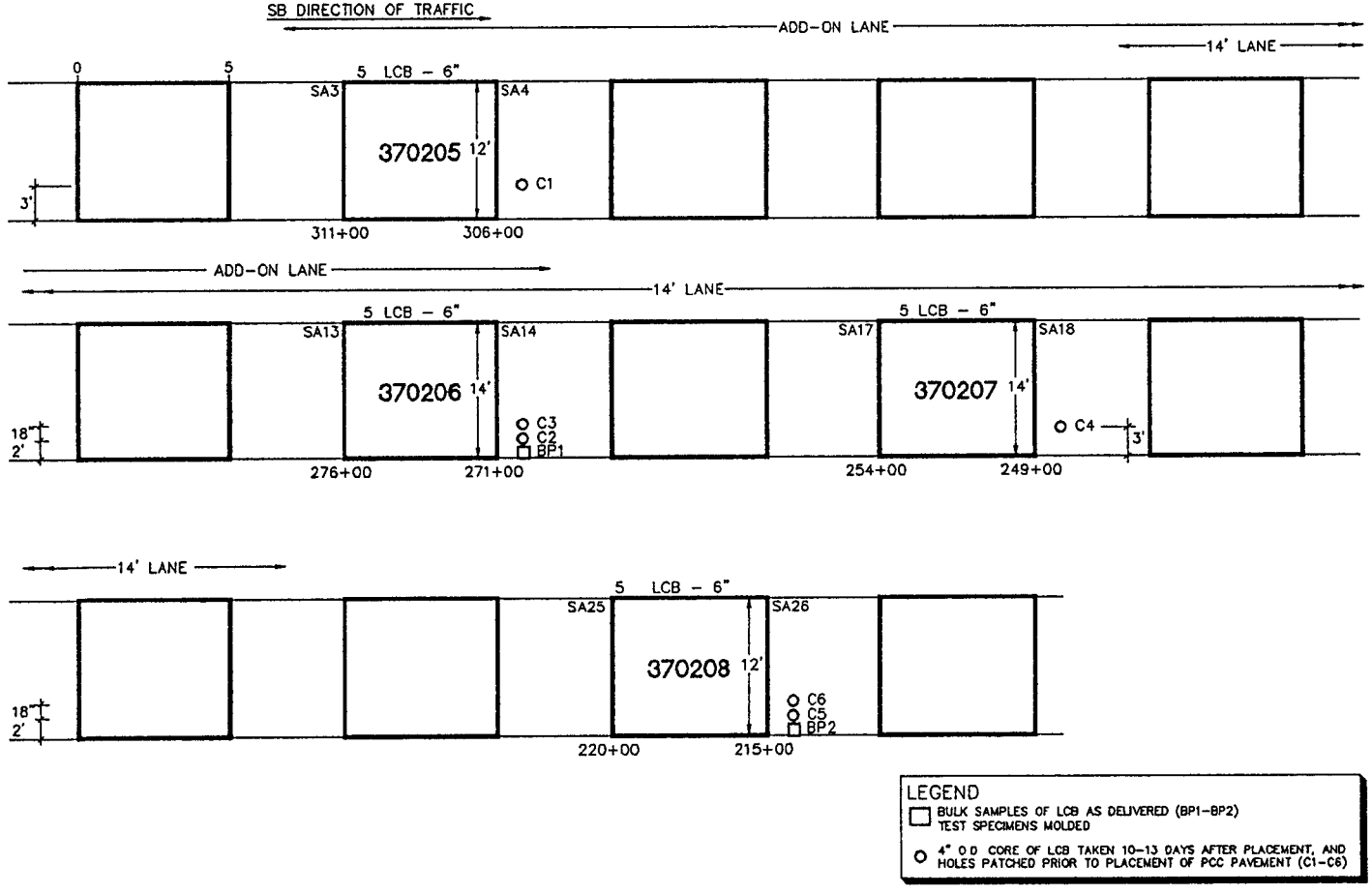
SPS-2-4

FIGURE 6 - FIELD MATERIALS SAMPLING AND TESTING- PERMEABLE ASPHALT TREATED BASE - LAYER 4

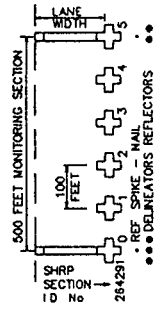
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

SPS–2–3

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 7 - FIELD MATERIALS SAMPLING AND TESTING - LEAN CONCRETE BASE - LAYER 5

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED

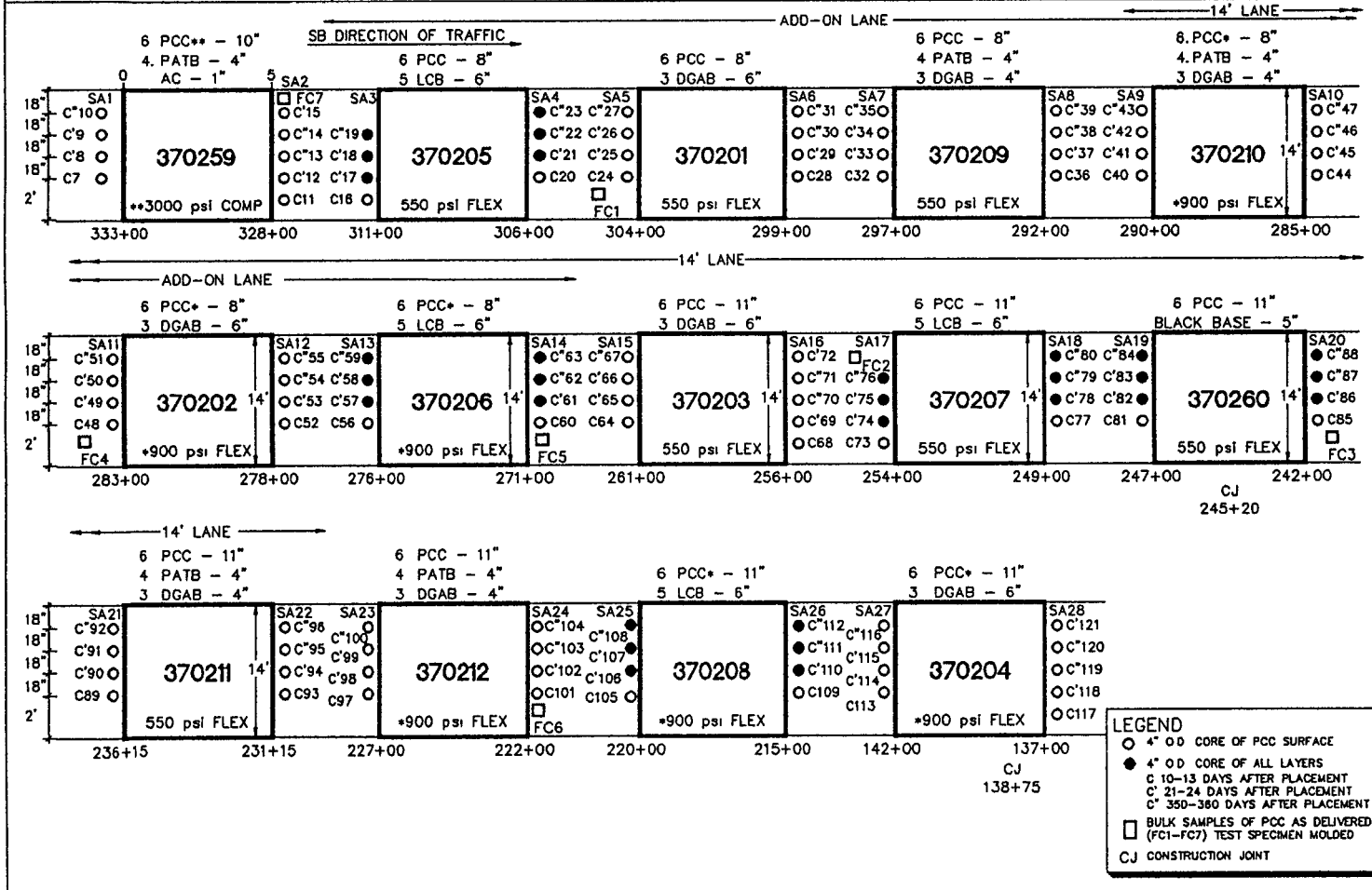
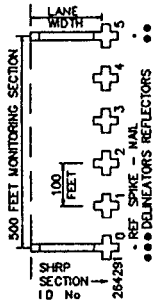


FIGURE 8 – FIELD MATERIALS SAMPLING AND TESTING
PORTLAND CEMENT CONCRETE – LAYER 6

TYPICAL SITE SIGNING & MARKING



ROAD TEST

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94
SPS–2–5

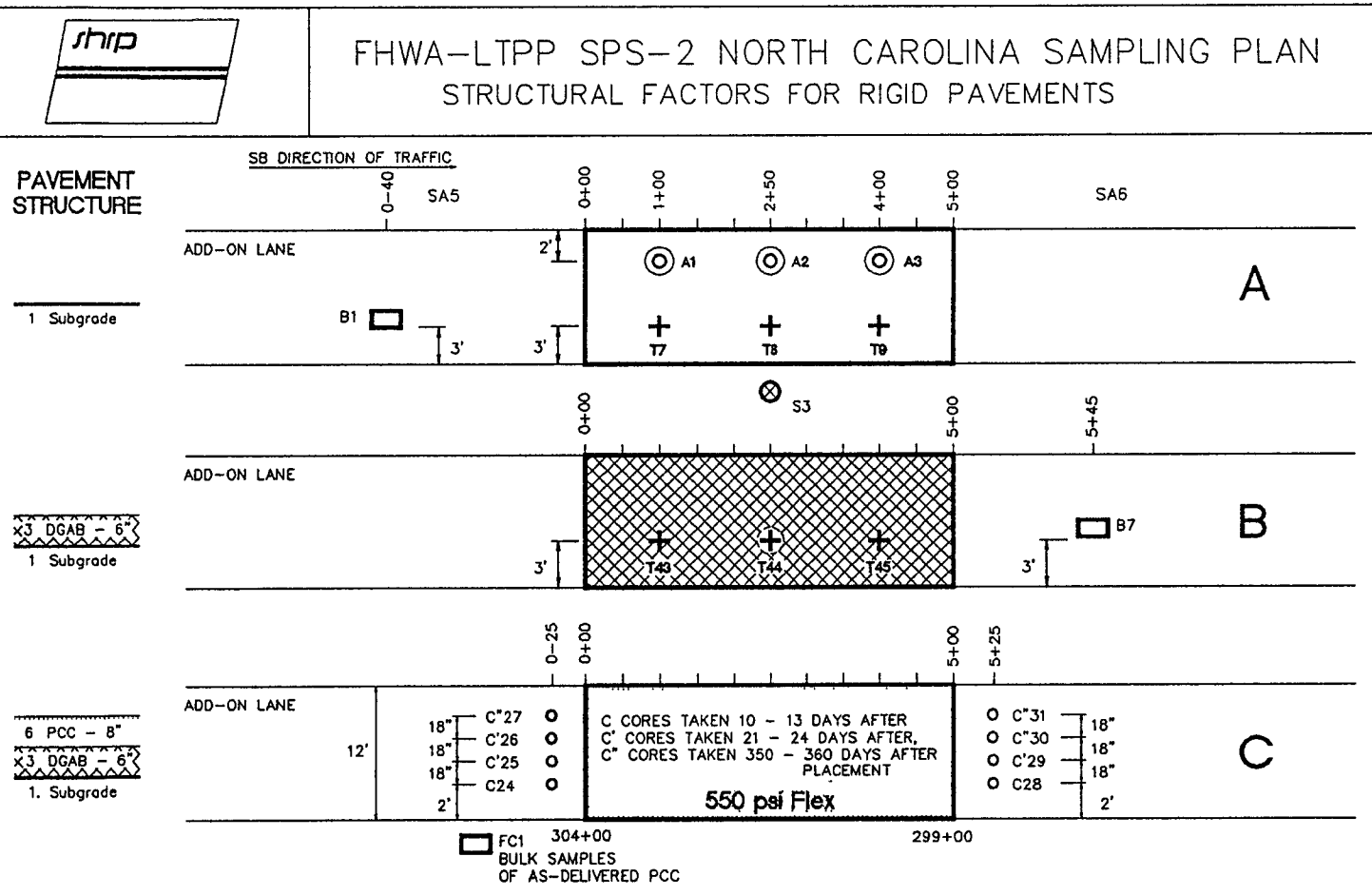
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

SPS-2-5

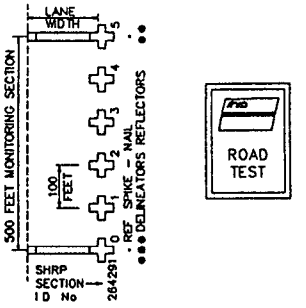
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T7–T9)

◎ SHELBY TUBE/SPLIT SPOON SAMPLES TO 4' DEPTH (A1–A3)

⊗ SHOULDER PROBE (S3)

▭ BULK SAMPLE OF SUBGRADE (B1)

B + NUCLEAR DENSITY/MOISTURE TESTING (T43–T45)

▭ BULK SAMPLE OF UNCOMPACTED DGAB (B7)

◌ PLATE LOAD TESTING (T44)

C ○ 4" O D CORES OF PCC SURFACING ONLY (C24,C28,C'25,C'26,C'29,C"27, C"30,C"31)

▭ BULK SAMPLE OF AS–DELIVERED PCC (FC1) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

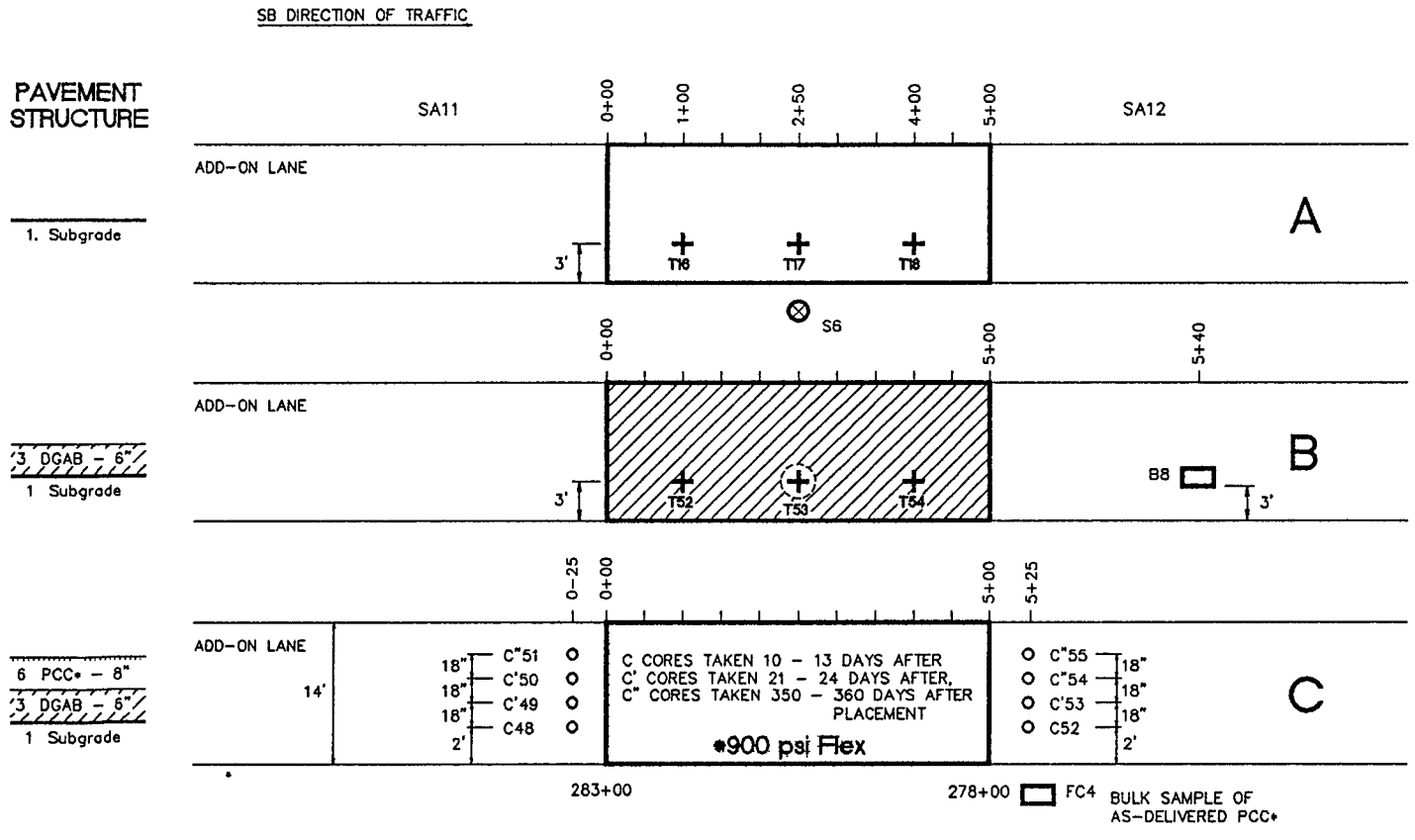
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 9 - SAMPLING AND TESTING PLAN FOR SECTION 370201

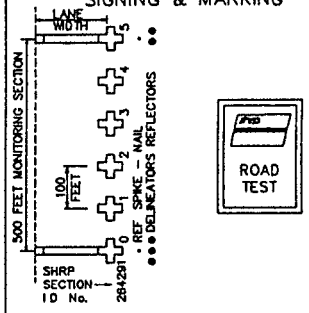
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T16–T18)

⊗ SHOULDER PROBE (S6)

B + NUCLEAR DENSITY/MOISTURE TESTING (T52–T54)
PLATE LOAD TESTING (T53)

▭ BULK SAMPLE OF UNCOMPACTED DGAB (B8)

◌ PLATE LOAD TESTING (T53)

C o 4" O D CORE OF PCC* SURFACING ONLY(C48,C52,C'49,C'50,C'53,C"51,C"54,C"55)

▭ BULK SAMPLE OF AS-DELIVERED PCC* (FC4) TEST SPECIMEN MOLDED

FIGURE 10 - SAMPLING AND TESTING PLAN FOR SECTION 370202

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED

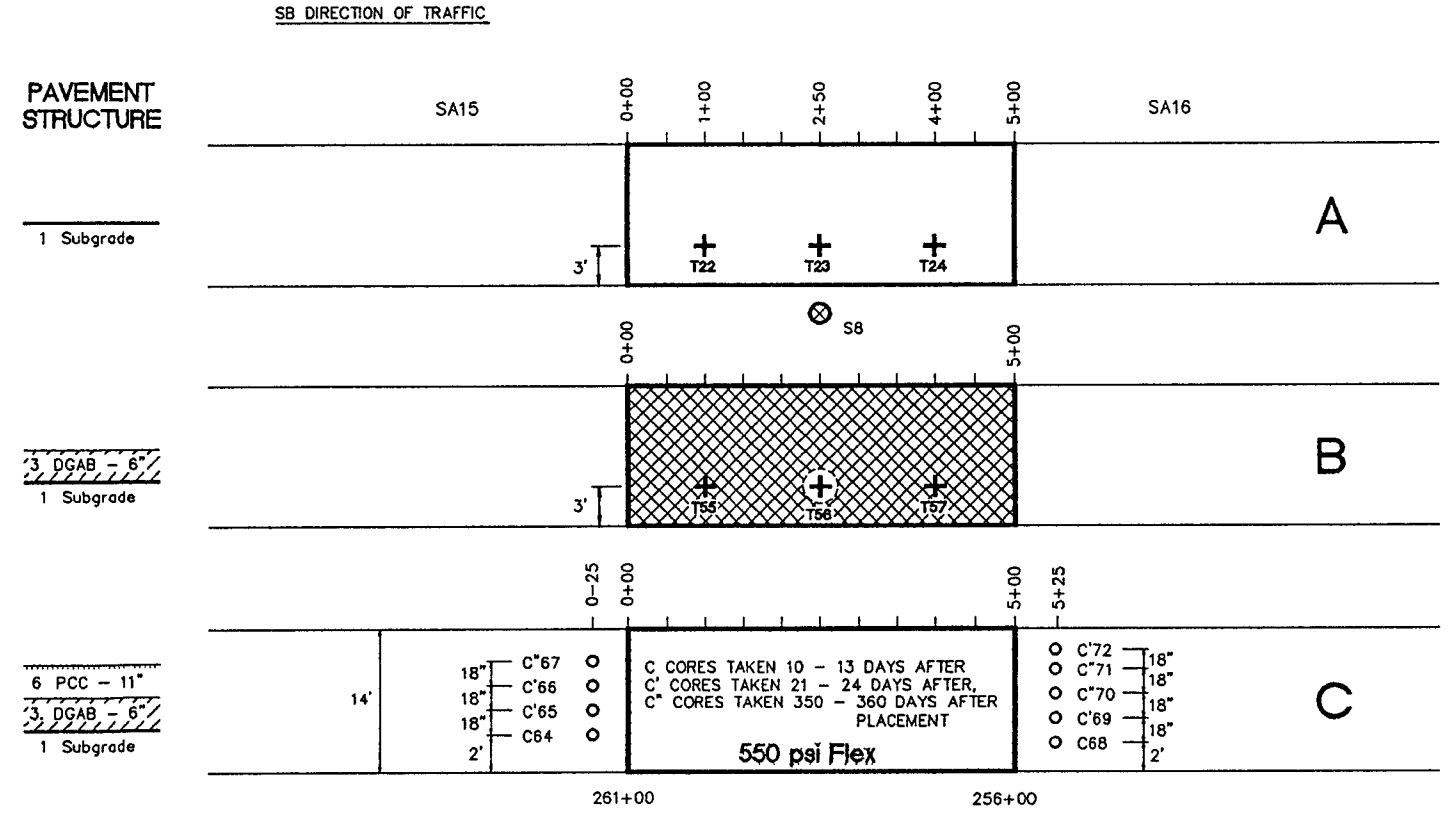
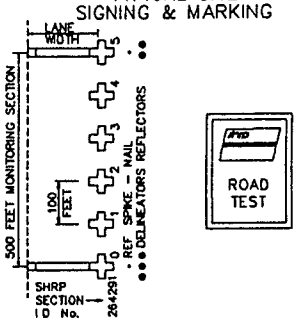


FIGURE 11 - SAMPLING AND TESTING PLAN FOR SECTION 370203

TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T22–T24)

⊗ SHOULDER PROBE (S8)

B + NUCLEAR DENSITY/MOISTURE TESTING (T55–T57)

◯ PLATE LOAD TESTING (T56)

C o 4" O D CORE OF PCC SURFACING ONLY (C64,C68,C'65,C'66,C'69,C'72,C"67,C"70,C"71)

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

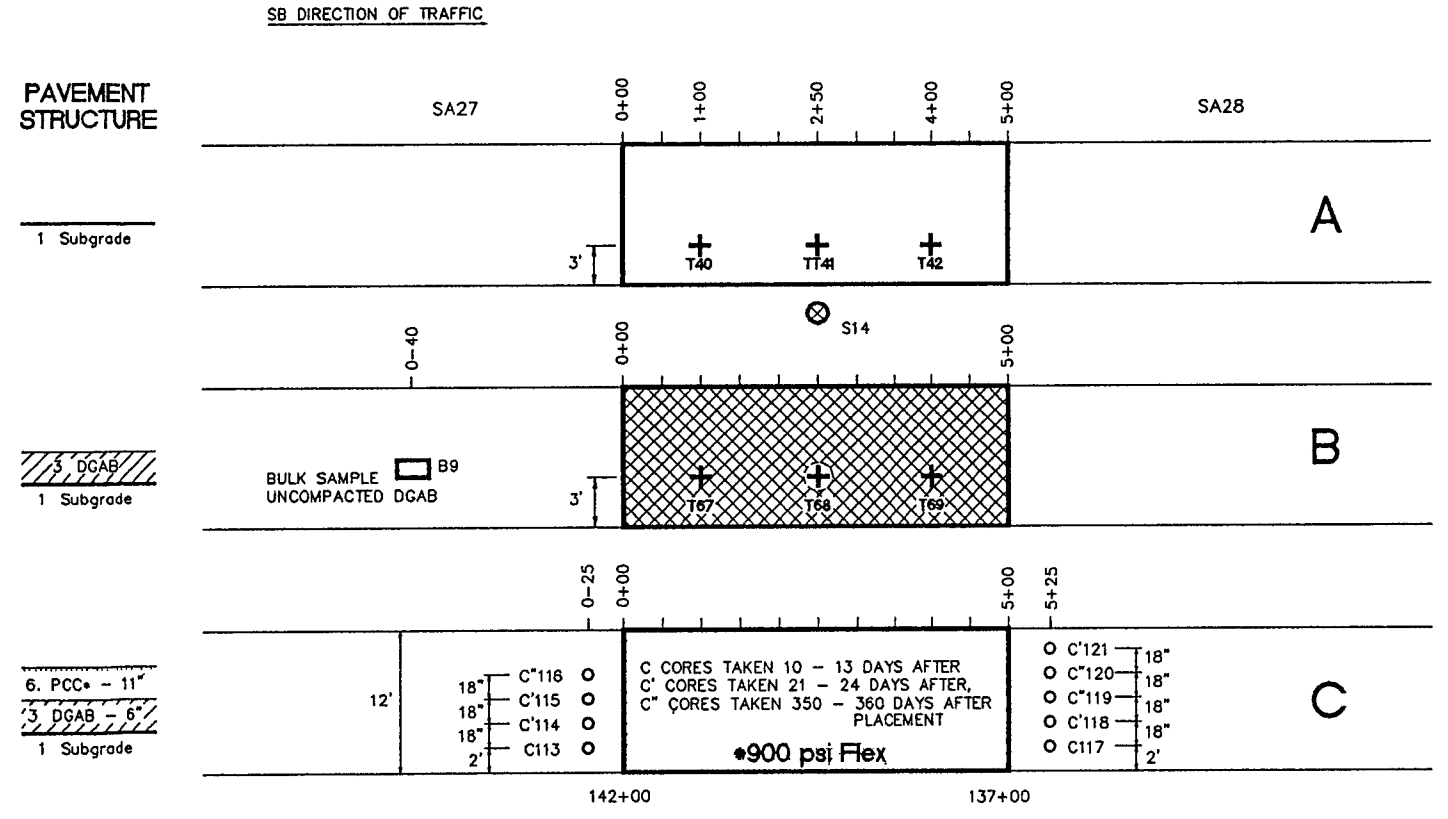
PLOTDATE: AUG 11/94

FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

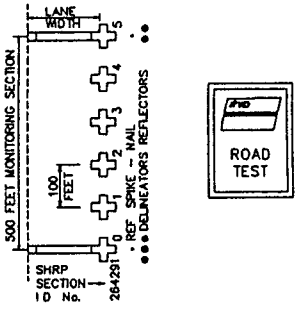
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T40–T42)

⊗ SHOULDER PROBE (S14)

B + NUCLEAR DENSITY/MOISTURE TESTING (T67–T69)

◌ PLATE LOAD TESTING (T68)

▭ BULK SAMPLE OF UNCOMPACTED DGAB (B9)

C o 4" O D CORES OF PCC* SURFACE ONLY (C113,C117,C'114,C'115,C'118,C'121,C"116, C"119,C"120)

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

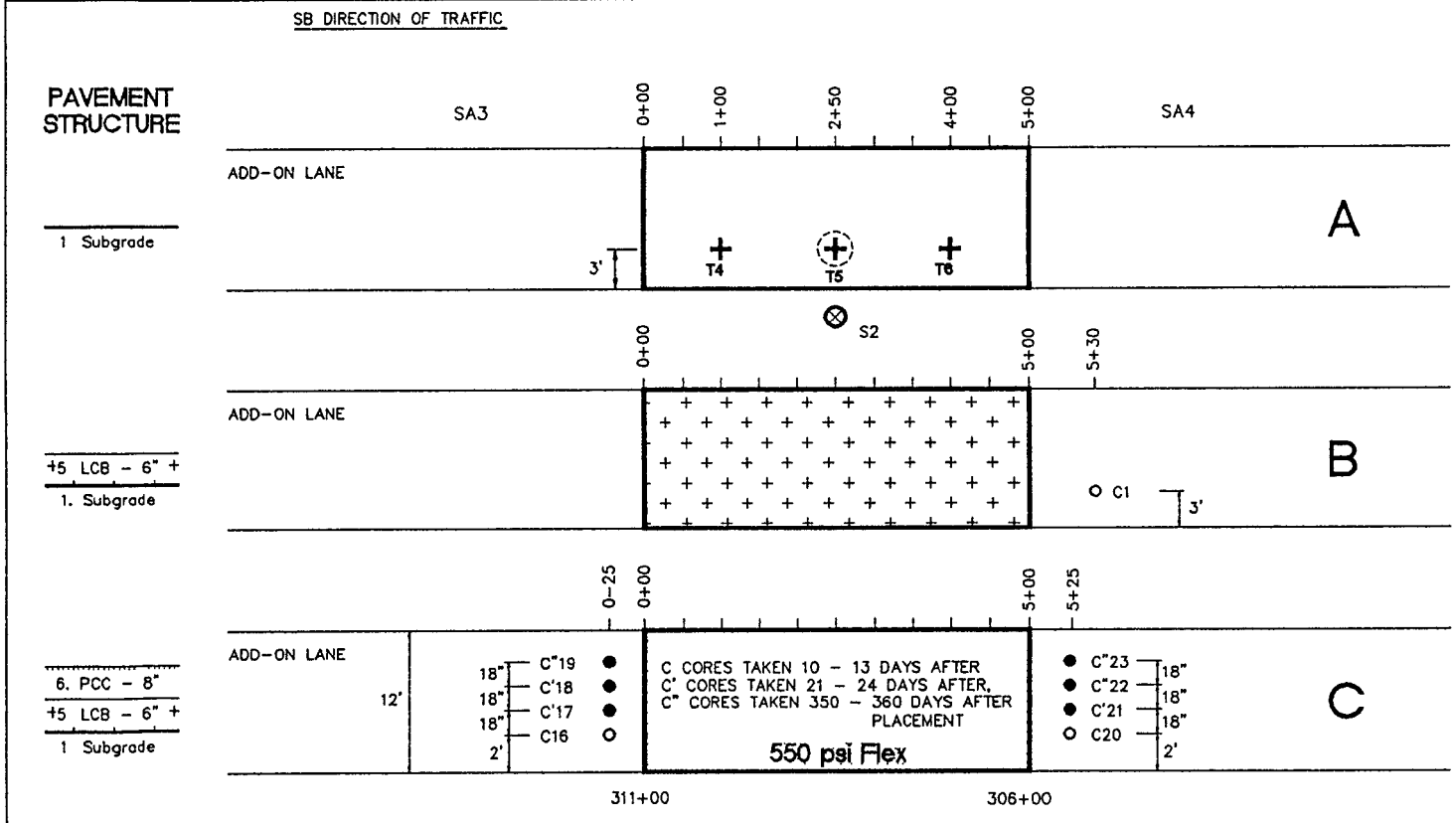
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 12 - SAMPLING AND TESTING PLAN FOR SECTION 370204

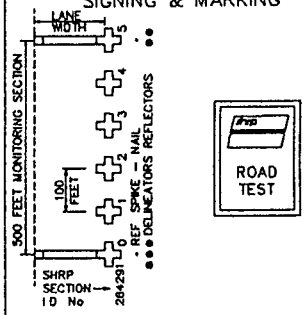
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T4–T6)
◯ PLATE LOAD TESTING OR FWD (T5)
⊗ SHOULDER PROBE (S2)

B ○ 4" O D CORE OF LCB TAKEN 10–13 DAYS AFTER PLACEMENT (C1)

C ○ 4" O D CORE OF PCC SURFACING ONLY (C16,C20)
● 4" O D CORE OF PCC WITH ATTACHED LCB (C'17,C'18,C'21,C'19,C"22,C"23)

FIGURE 13 - SAMPLING AND TESTING PLAN FOR SECTION 370205

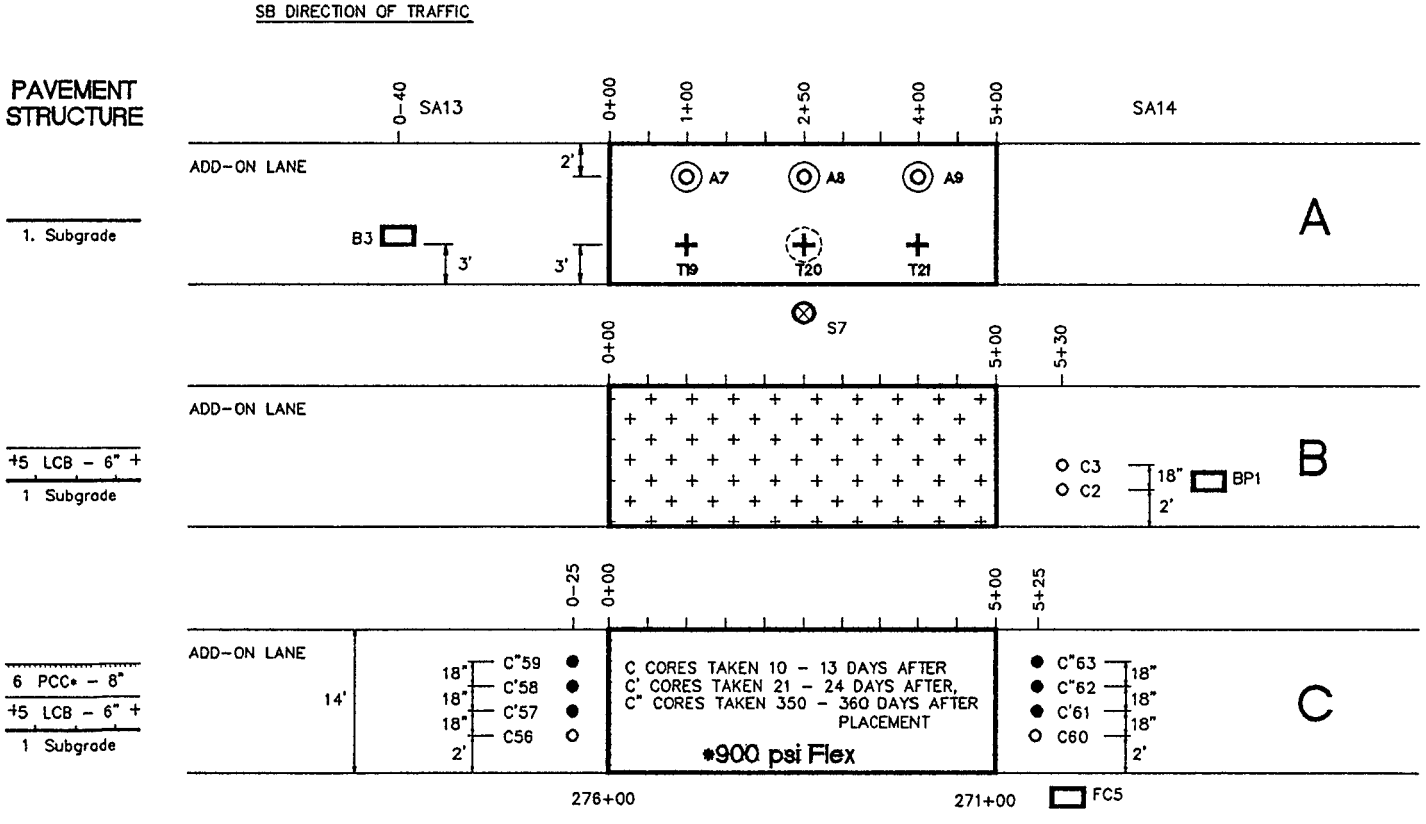
NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

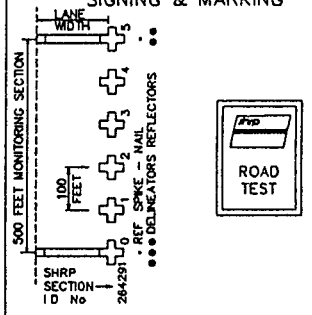
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T19–T21)

◎ SHELBY TUBE/SPLIT SPOON SAMPLES TO 4' DEPTH (A7–A9)

⊗ SHOULDER PROBE (S7)

▭ BULK SAMPLE OF SUBGRADE 2'x2'x12" DEPTH (B3)

B ○ 4" O D CORES LCB TAKEN 10–13 DAYS AFTER PLACEMENT(C2,C3)

▭ BULK SAMPLE OF AS–DELIVERED LCB TEST SPECIMEN MOLDED (BP1)

C ○ 4" O D CORE OF PCC• SURFACING ONLY (C56,C60)

● 4" O D CORES OF PCC• AND LCB (C'57,C'58,C'61,C"59,C"62,C"63)

▭ BULK SAMPLE OF AS–DELIVERED PCC• (FC5) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 14 - SAMPLING AND TESTING PLAN FOR SECTION 370206

shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED

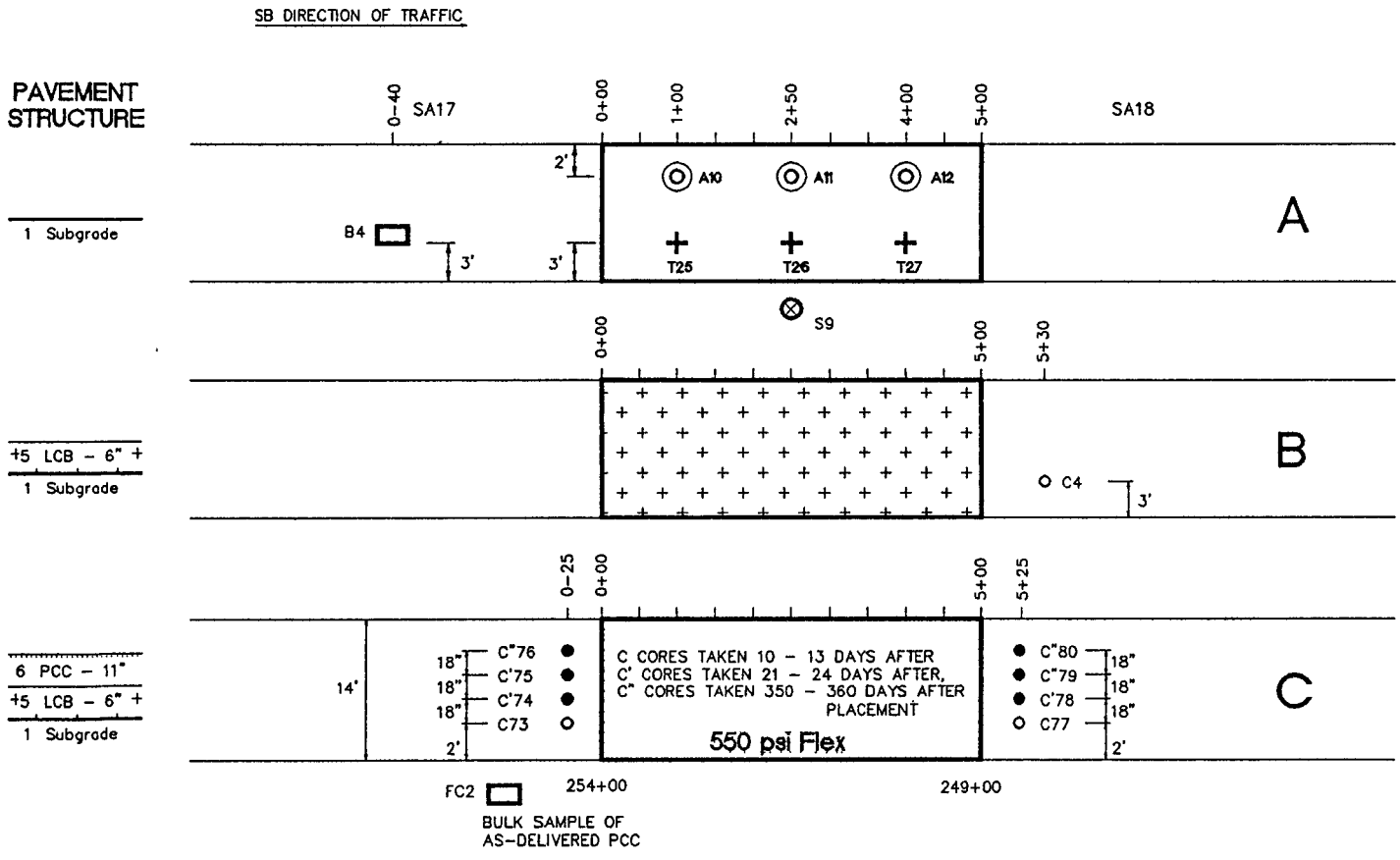
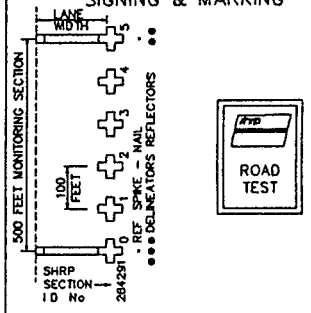


FIGURE 15 - SAMPLING AND TESTING PLAN FOR SECTION 370207

TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T25–T27)
◎ SHELBY TUBE/SPLIT SPOON SAMPLES TO 4' DEPTH (A10–A12)
⊗ SHOULDER PROBE (S9)
▭ BULK SAMPLING OF SUBGRADE SOIL 2'x2'x12" DEPTH (B4)
B ○ 4" O D CORE IN–PLACE LCB TAKEN 10–13 DAYS AFTER PLACEMENT (C4)
C ○ 4" O D CORE OF PCC SURFACING ONLY (C73,C77)
● 4" O D CORE OF PCC WITH ATTACHED LCB (C'74,C'75,C'78,C"76,C"79,C"80)
▭ FC BULK SAMPLE OF AS–DELIVERED PCC (FC2) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

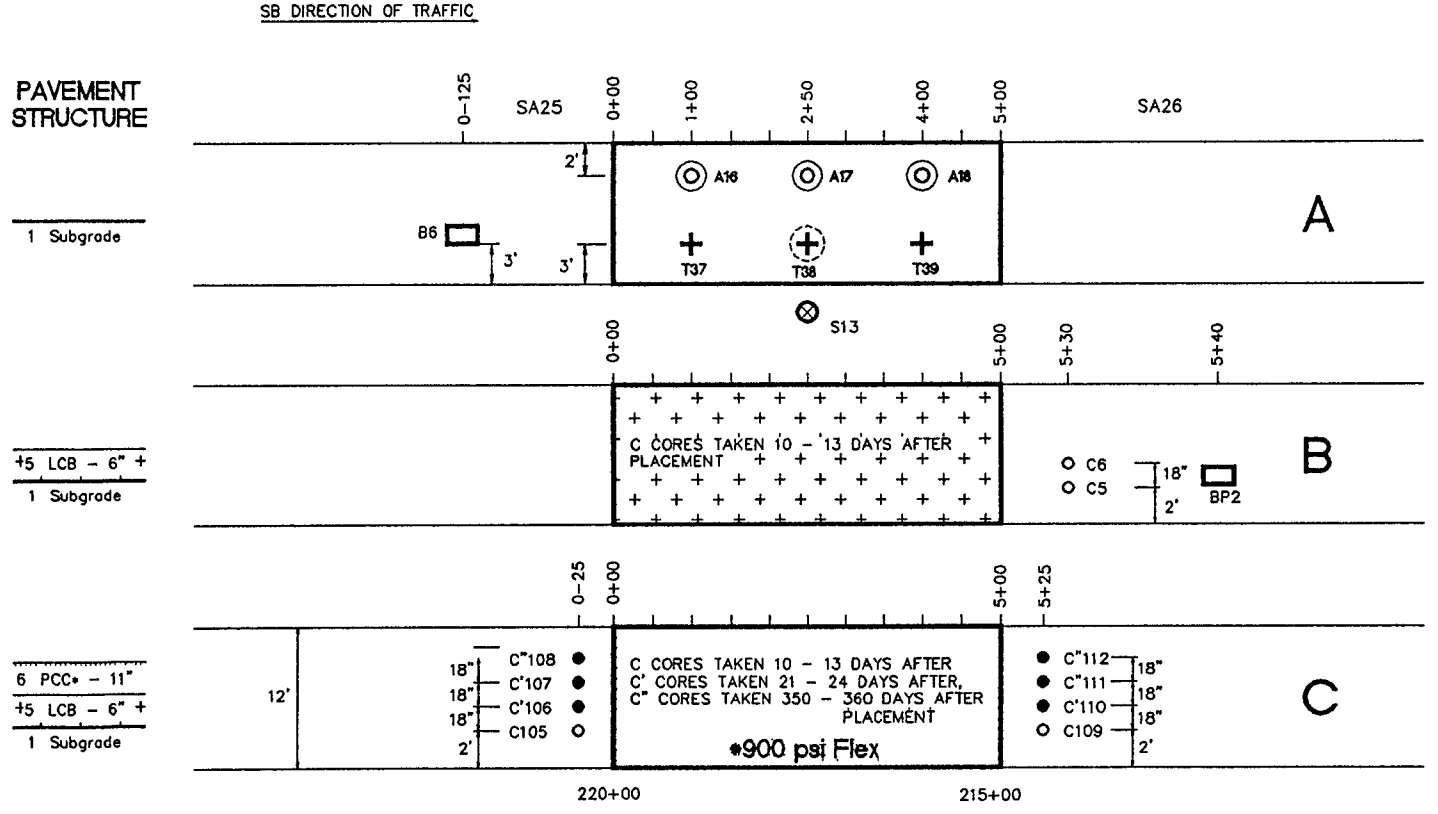
PLOTDATE: AUG 11/94

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

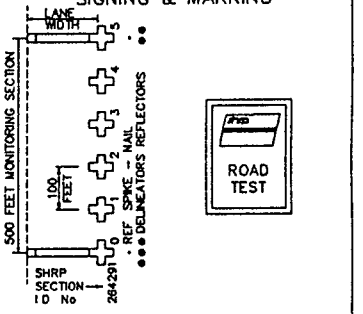
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T37–T39)
PLATE LOAD TESTING OR FWD (T38)
SHELBY TUBE/SPLIT SPOON SAMPLES TO 4' DEPTH (A16–A18)
SHOULDER PROBE (S13)

B ○ 4" O D CORES IN–PLACE LCB TAKEN 10–13 DAYS AFTER PLACEMENT AND HOLES PATCHED PRIOR TO PLACEMENT OF PCC (C5,C6)

BULK SAMPLE OF AS–DELIVERED LCB TEST SPECIMEN MOLDED (BP2)

C ○ 4" O D CORE OF PCC* SURFACING ONLY (C105,C109)
● 4" O D CORES OF PCC* AND LCB (C'106,C'107,C'110,C"108,C"111,C"112)

FIGURE 16 - SAMPLING AND TESTING PLAN FOR SECTION 370208

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

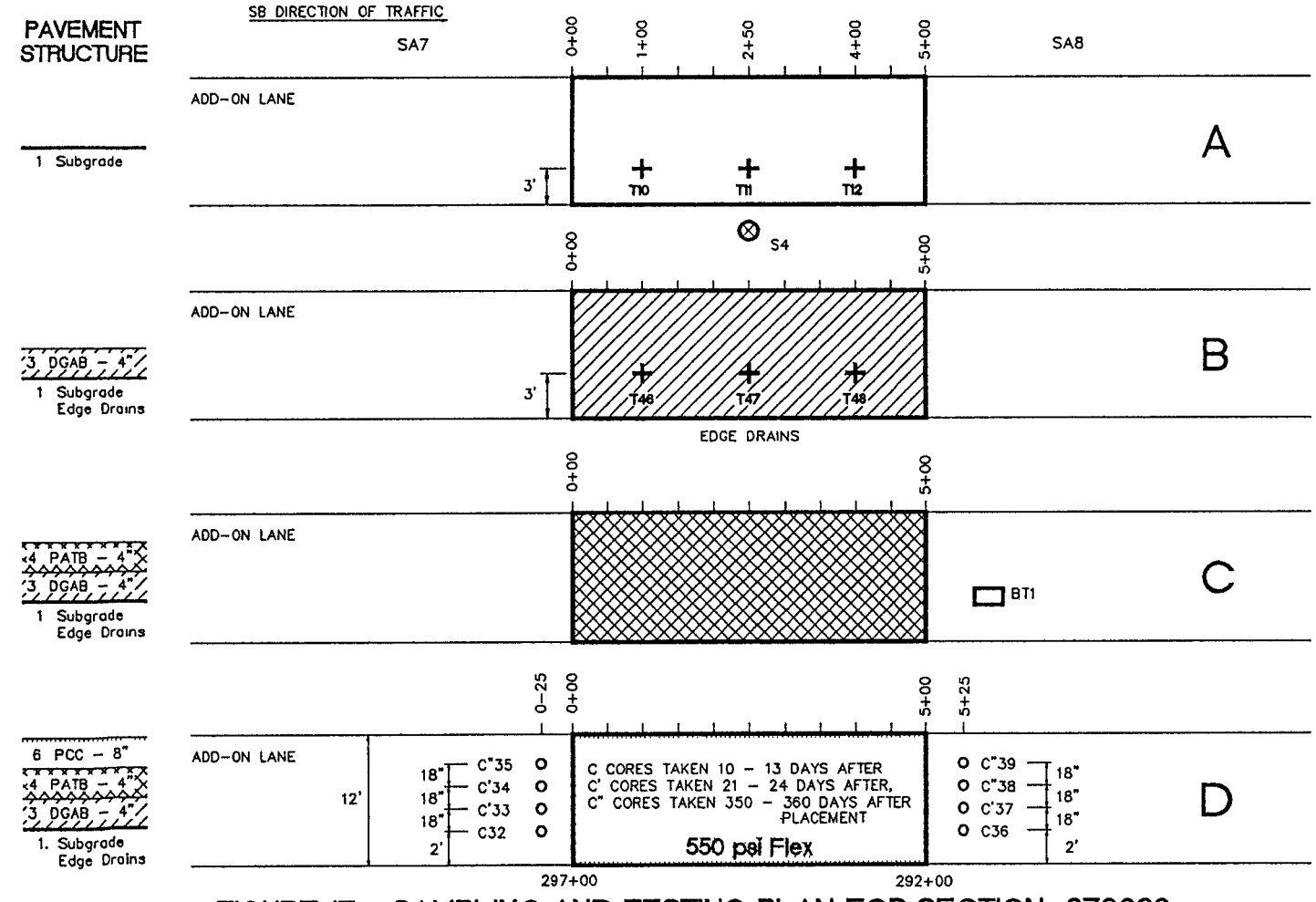
PLOTDATE: AUG 11/94

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

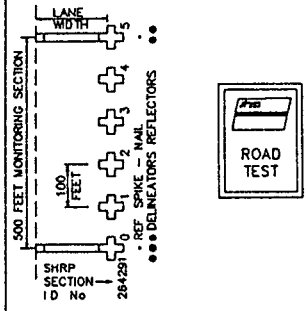
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T10–T12)

⊗ SHOULDER PROBE (S4)

B + NUCLEAR DENSITY/MOISTURE TESTING (T46–T48)

C ▭ BULK SAMPLE OF PATB FROM PLANT OR FROM UNCOMPACTED PAVEMENT (BT1)

D o 4" O D CORES OF PCC SURFACE ONLY (C32,C36,C'33,C'34,C'37,C"35,C"38,C"39)

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 17 - SAMPLING AND TESTING PLAN FOR SECTION 370209

shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED

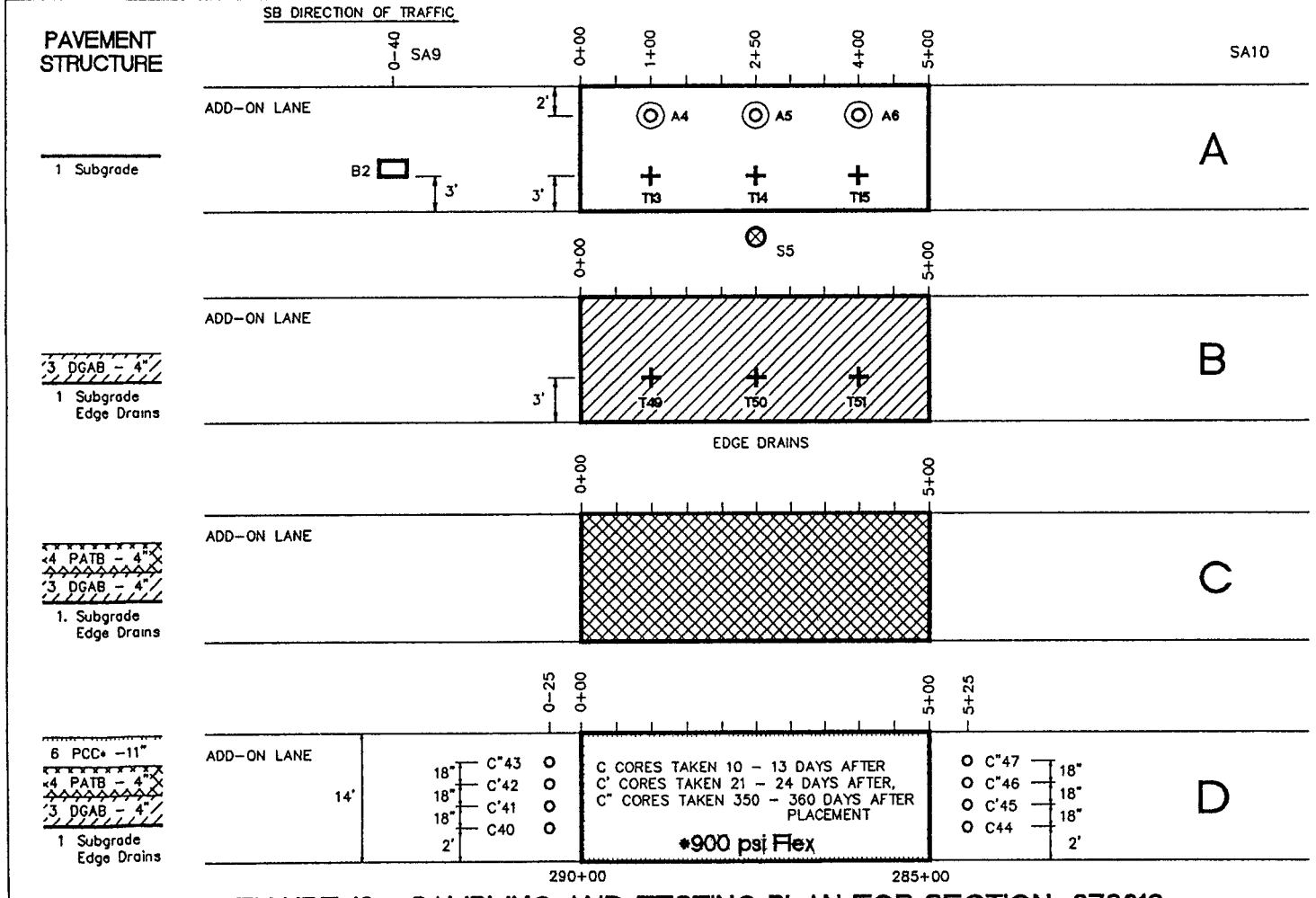
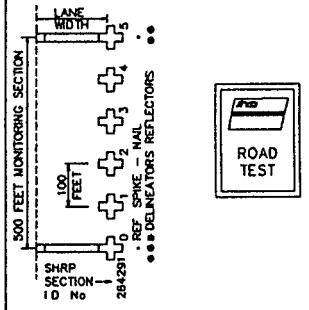


FIGURE 18 - SAMPLING AND TESTING PLAN FOR SECTION 370210

TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T13–T15)

◎ SHELBY TUBE/SPLIT SPOON SAMPLING TO 4' DEPTH (A4–A6)

⊗ SHOULDER PROBE (S5)

▭ BULK SAMPLE OF SUBGRADE 2'x2'x12" DEPTH (B2)

B + NUCLEAR DENSITY/MOISTURE TESTING (T49–T51)

D ○ 4" OD CORES OF PCC* SURFACING ONLY (C40,C44,C'41,C'42,C'45,C"43,C"46,C"47)

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

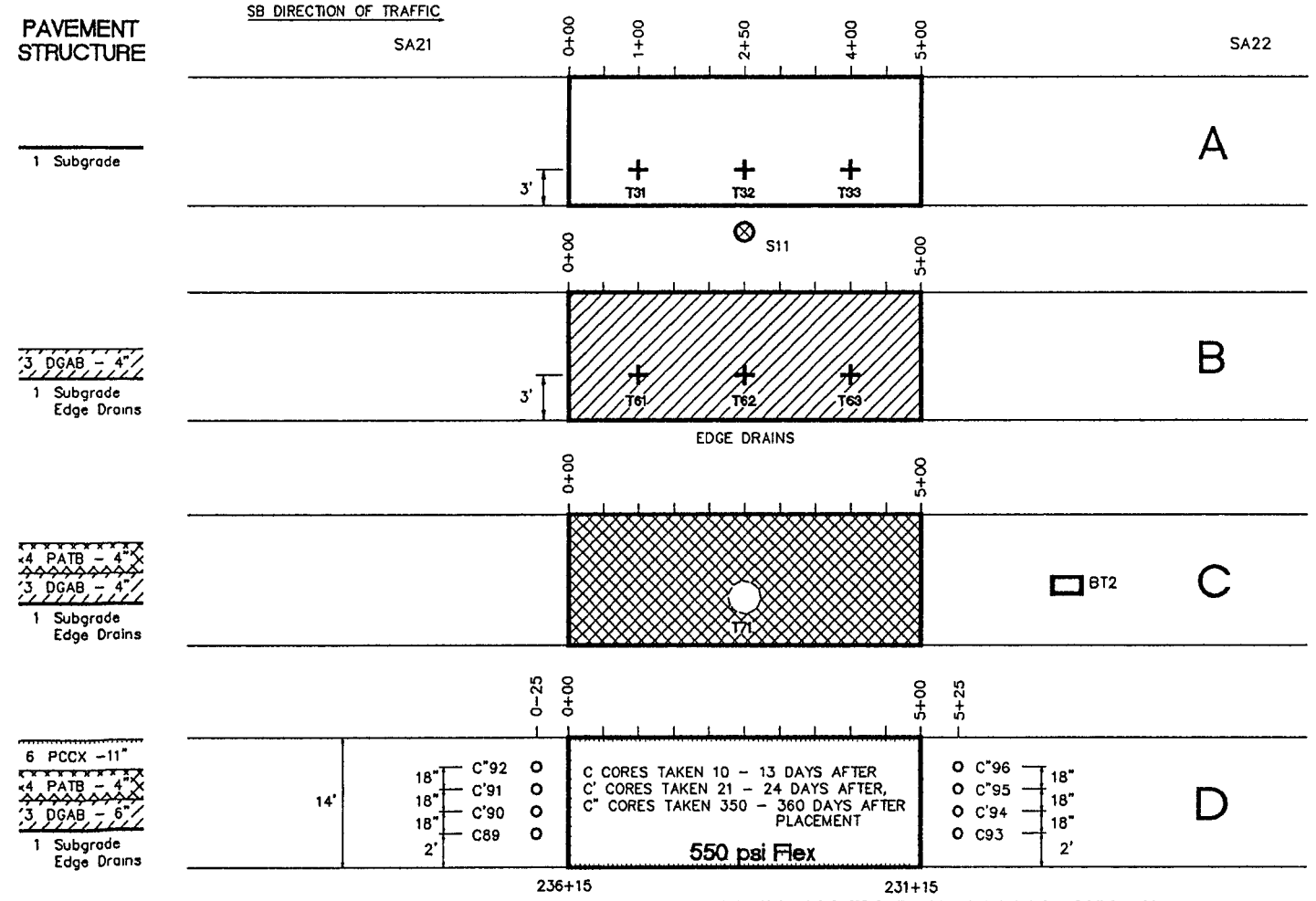
PLOTDATE: AUG 11/94

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

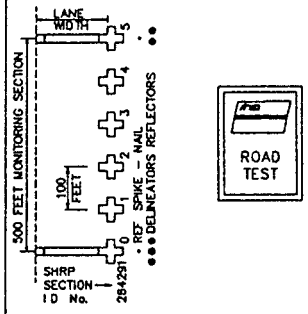
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T31–T33)

⊗ SHOULDER PROBE (S11)

B + NUCLEAR DENSITY/MOISTURE TESTING (T61–T63)

C ▭ BULK SAMPLE OF PATB FROM PLANT OR FROM UNCOMPACTED PAVEMENT (BT2)

◯ PLATE LOAD TESTING (T71)

D o 4" O D CORES OF PCC SURFACE ONLY (C89,C93,C'90,C'91,C'94,C"92,C"95,C"96)

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

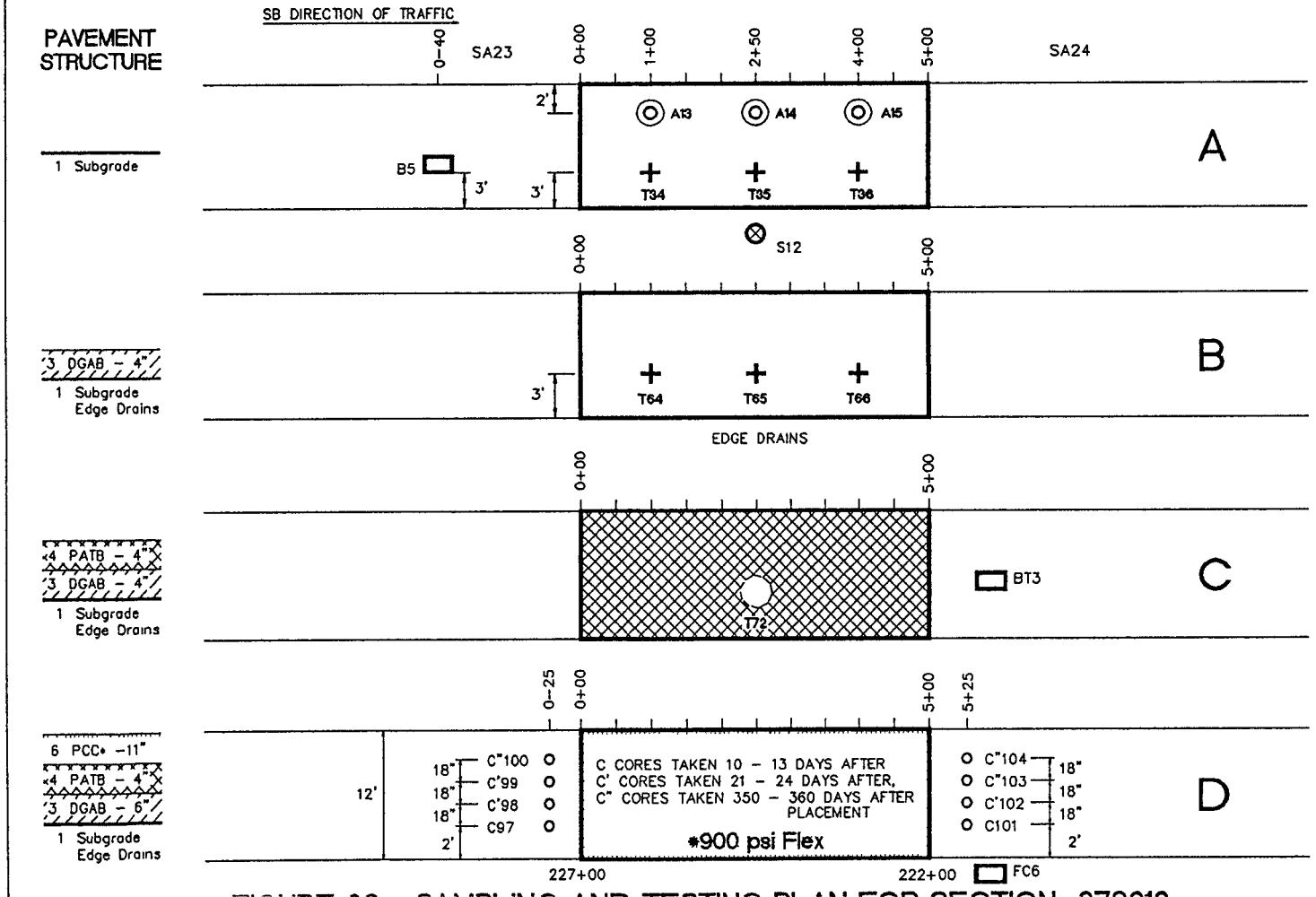
FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 19 - SAMPLING AND TESTING PLAN FOR SECTION 370211

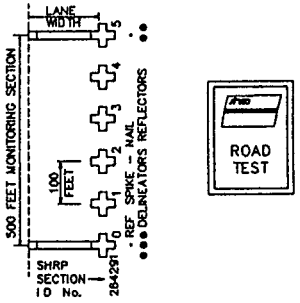
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T34–T36)

◎ SHELBY TUBE/SPLIT SPOON SAMPLING TO 4' DEPTH (A13–A15)

⊗ SHOULDER PROBE (S12)

▭ BULK SAMPLE OF SUBGRADE (B5)

B + NUCLEAR DENSITY/MOISTURE TESTING (T64–T66)

C ◌ PLATE LOAD TESTING (T72)

▭ BULK SAMPLE OF PATB FROM PLANT OR FROM UNCOMPACTED PAVEMENT (BT3)

D ○ 4" O D CORES OF PCC* SURFACE ONLY (C97,C101,C'98,C'99,C'102,C"100,C"103,C"104)

▭ BULK SAMPLE OF AS–DELIVERED PCC* (FC6) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

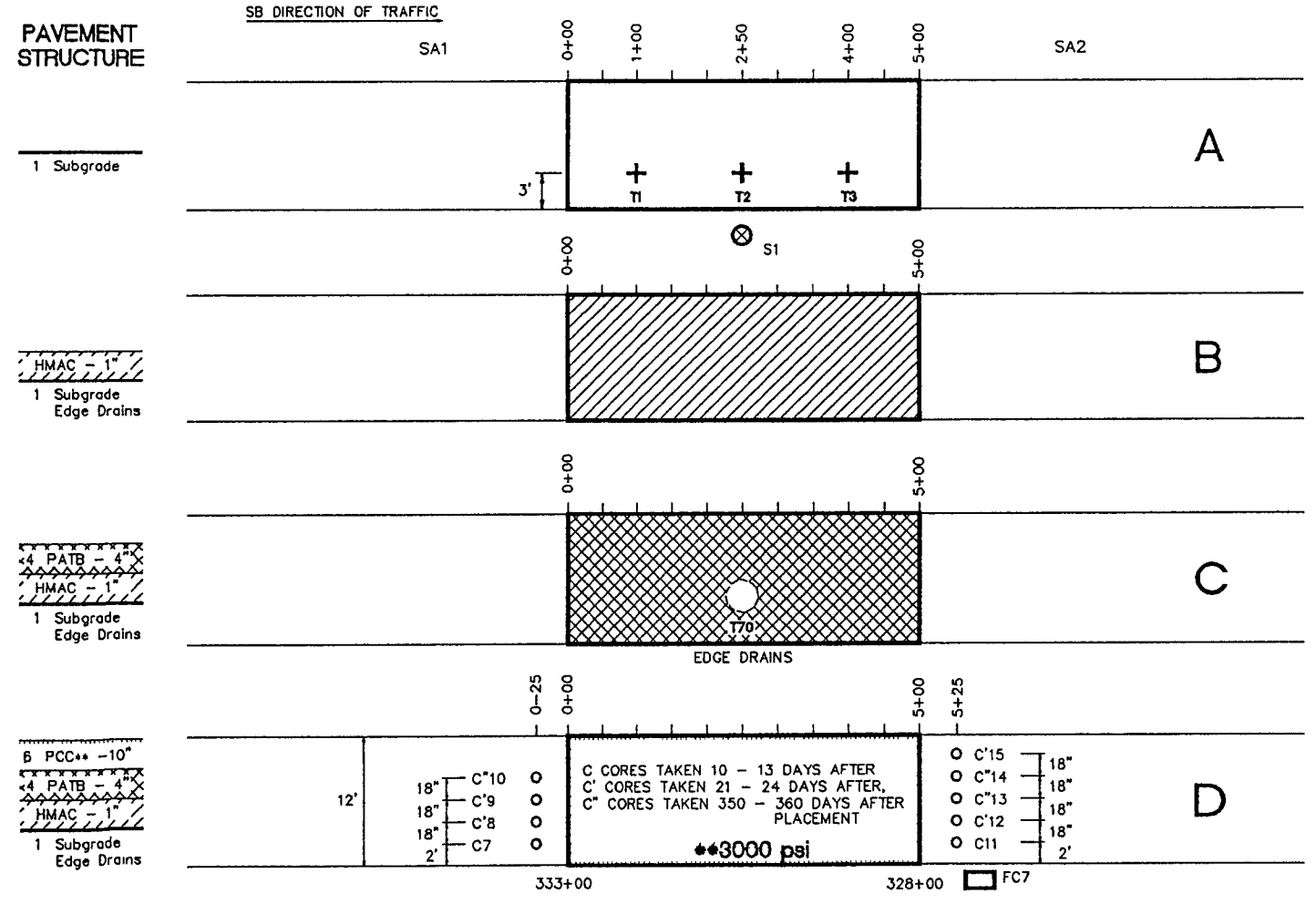
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 20 - SAMPLING AND TESTING PLAN FOR SECTION 370212

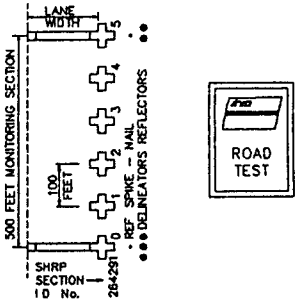
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T1–T3)

⊗ SHOULDER PROBE (S1)

C ◌ PLATE LOAD TESTING (T70)

D ○ 4" O D CORES OF PCC** SURFACE ONLY (C7,C11,C'8,C'9 C'12,C'15,C"10,C"13,C"14)

▭ BULK SAMPLE OF AS–DELIVERED PCC** (FC7) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

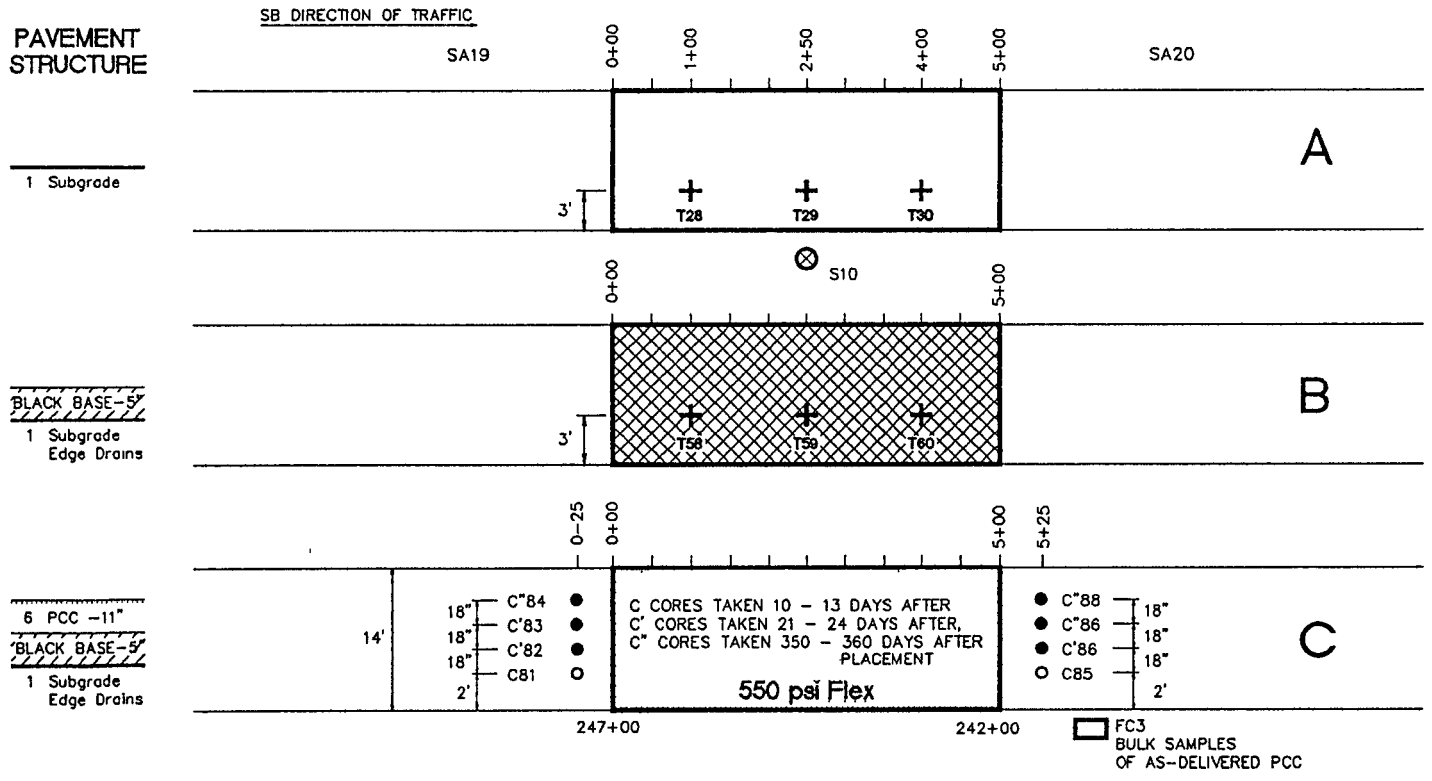
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 21 – SAMPLING AND TESTING PLAN FOR SECTION 370259

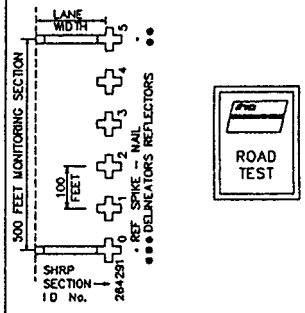
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA SAMPLING PLAN
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



A + NUCLEAR DENSITY/MOISTURE TESTING (T28–T30)

⊗ SHOULDER PROBE (S10)

B + NUCLEAR DENSITY OF BLACK BASE LAYER (T58–T60)

C ○ 4" O D CORES OF PCC SURFACING ONLY (C81,C85)

● 4" O D CORES OF PCC SURFACE AND BOUND LAYERS(C'82,C'83,C'86,C"84, C"87,C"88)

▭ BULK SAMPLE OF AS–DELIVERED PCC (FC3) TEST SPECIMEN MOLDED

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

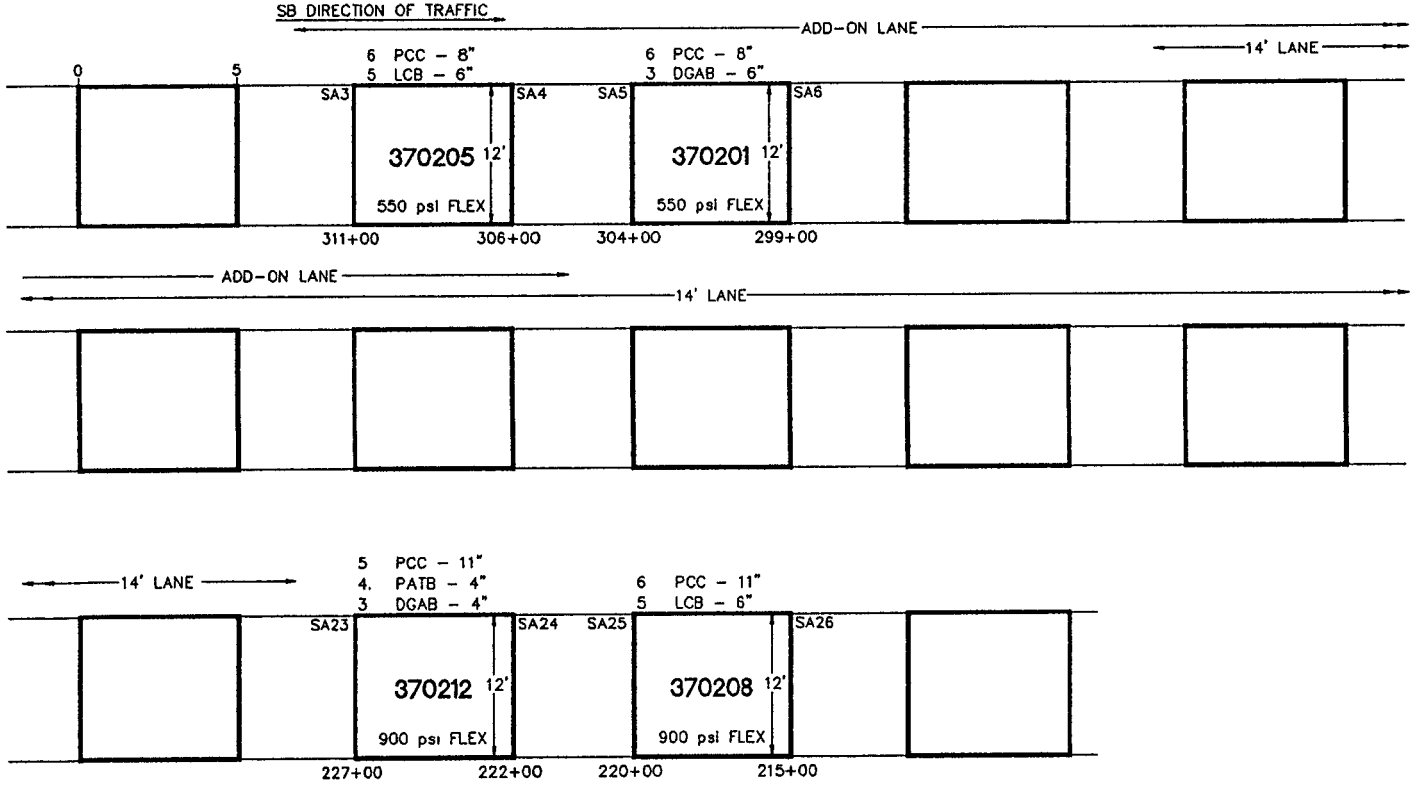
FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 22 - SAMPLING AND TESTING PLAN FOR SECTION 370260

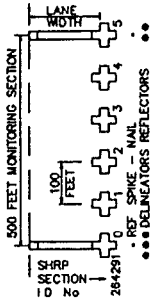
FHWA–LTPP SPS–2 NORTH CAROLINA SEASONAL INSTRUMENTATION

STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PAVEMENT MANAGEMENT SYSTEMS LIMITED



TYPICAL SITE SIGNING & MARKING



NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 11/94

SPS–2–23a

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

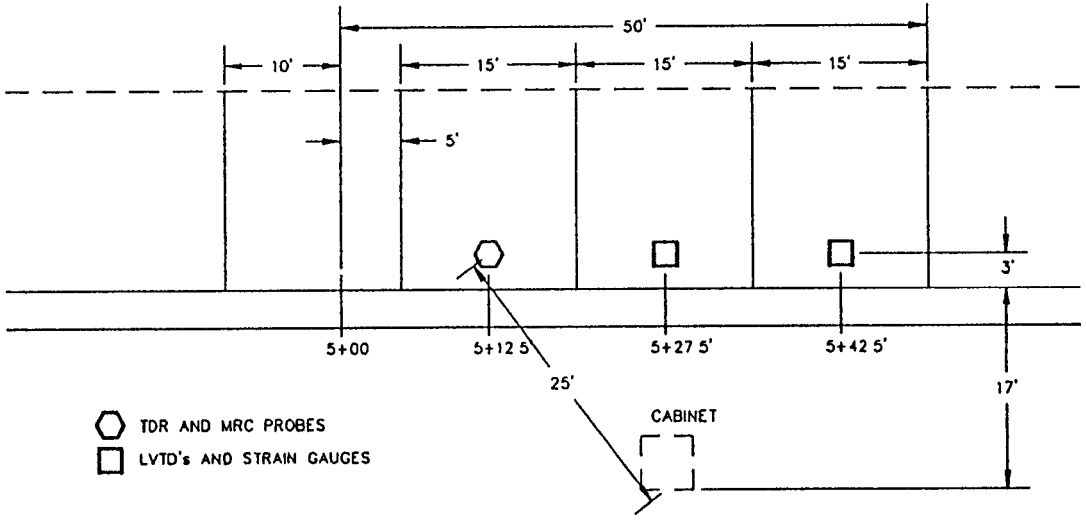
FIGURE 23a - SPS-2 TEST SECTIONS SELECTED FOR LOAD INSTRUMENTATION

shrp

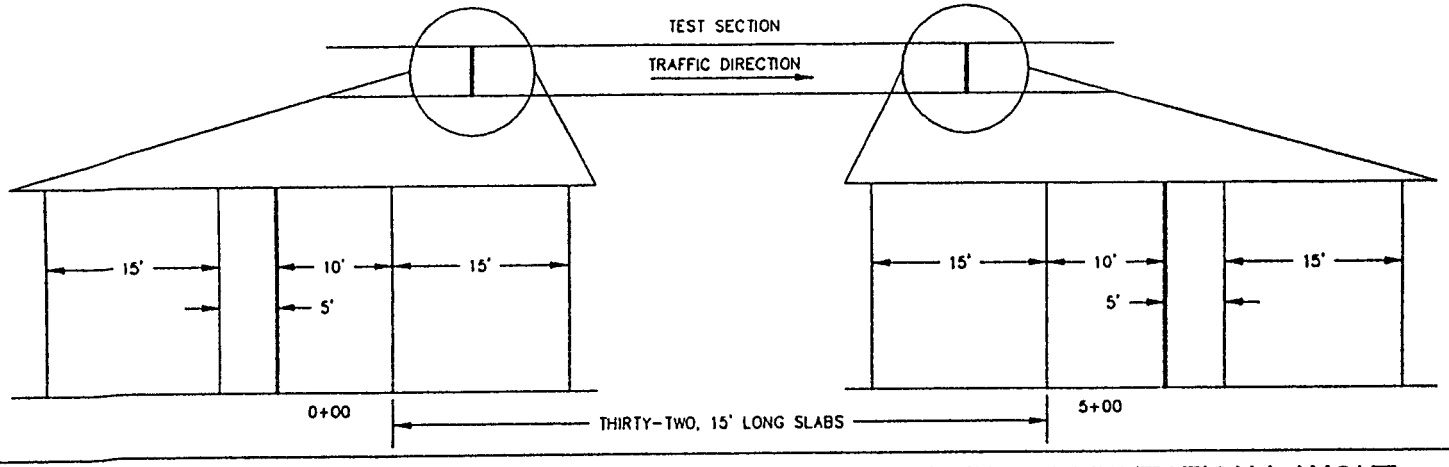
FHWA–LTPP SPS–2 NORTH CAROLINA SEASONAL INSTRUMENTATION

STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



INSTRUMENTATION AT 370205,370201,370212 and 370208



NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

FHWA SPS–2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 23b - TYPICAL SPS-2 TEST SECTION JOINT AND INSTRUMENTATION LAYOUT

shrp

FHWA–LTPP SPS–2 NORTH CAROLINA MDD INSTRUMENTATION

STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED

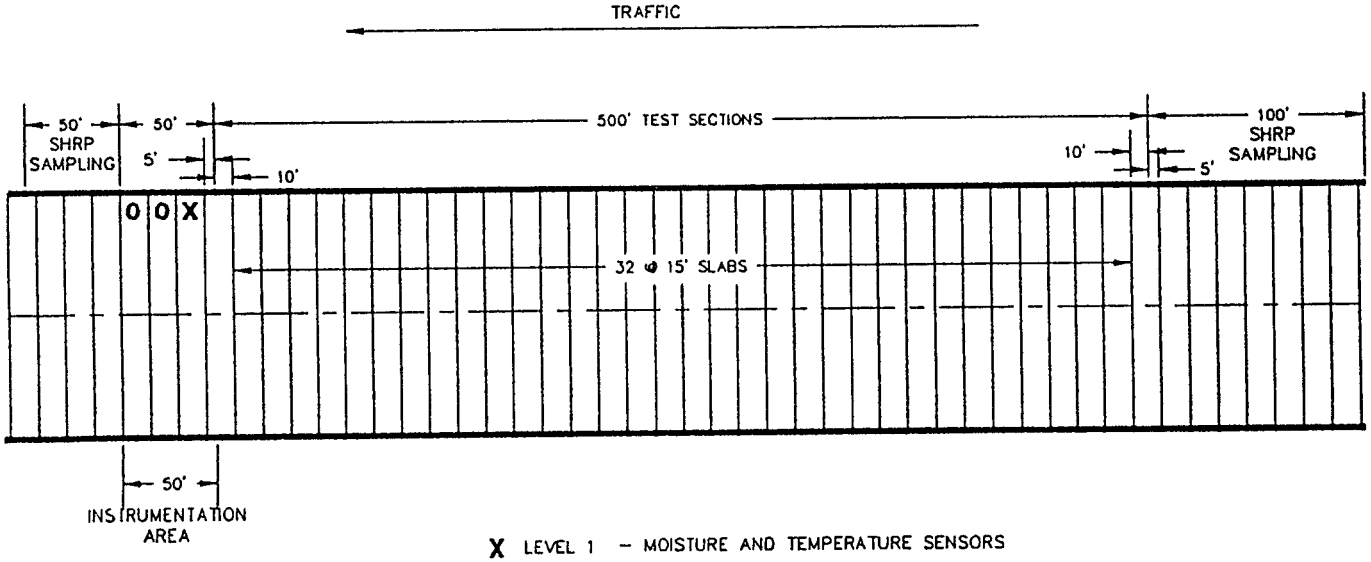


FIGURE 24a - LOCATION OF FHWA LOAD RESPONSE INSTRUMENTATION

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTTED: MAR 14/94	FHWA SPS-2 TEST SECTIONS ONLY
SPS-2-24a	DIMENSIONAL DETAILS ONLY DRAWING NOT TO SCALE

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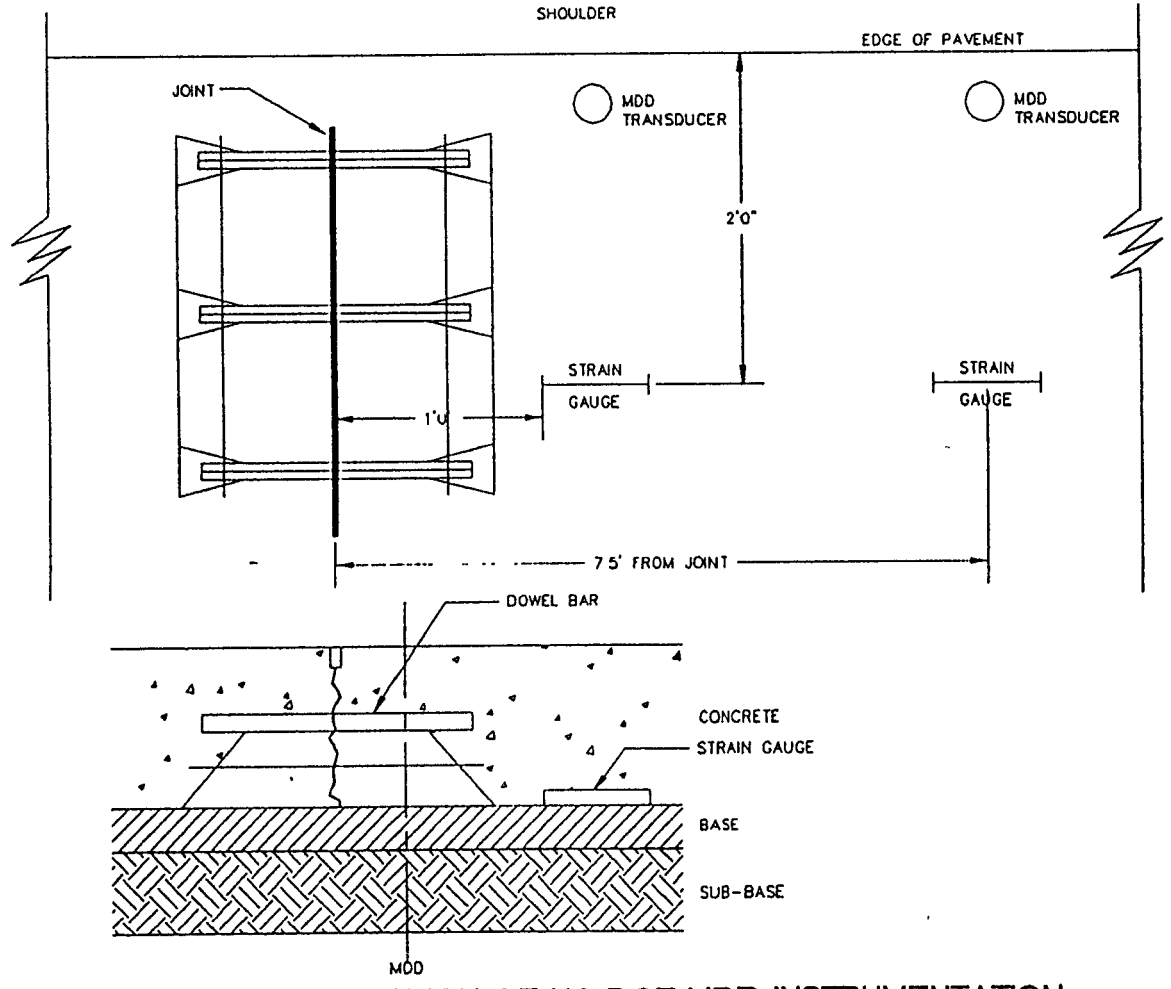
FHWA–LTPP SPS–2 NORTH CAROLINA
MDD INSTRUMENTATION
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



MDD
MULTIPLE DEPTH DISPLACEMENT TRANSDUCER

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

PLOTTED: MAR 15/94

FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

FIGURE 24b - LOCATION OF NC DOT MDD INSTRUMENTATION

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FHWA–LTPP SPS–2 NORTH CAROLINA
MDD INSTRUMENTATION
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED

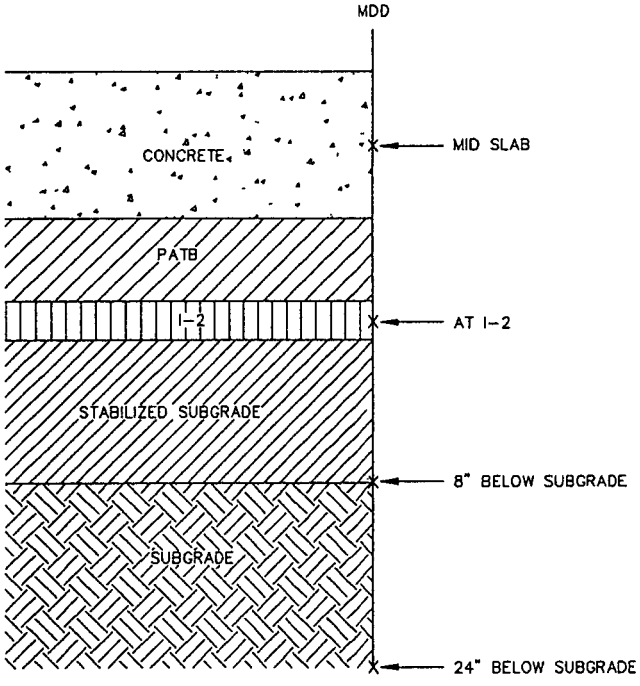


FIGURE 24c - LOCATION OF NC DOT MDD SENSORS

NORTH CAROLINA DOT SPS-2
US 52 SBL LEXINGTON BYPASS

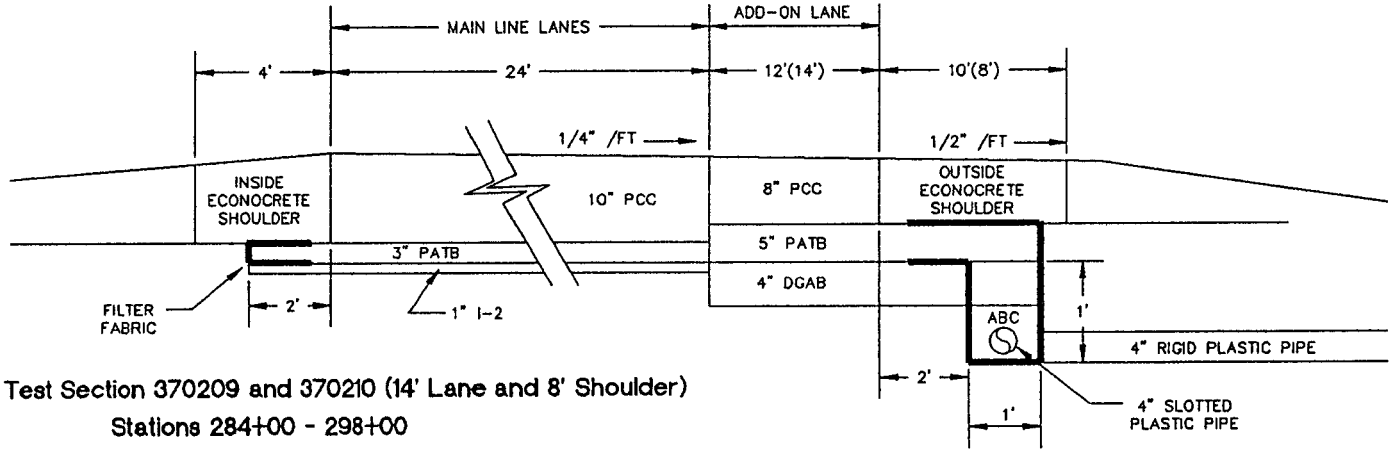
PLOTDATE: AUG 11/94 | FHWA SPS-2 TEST SECTIONS ONLY
DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

SPS-2-24c

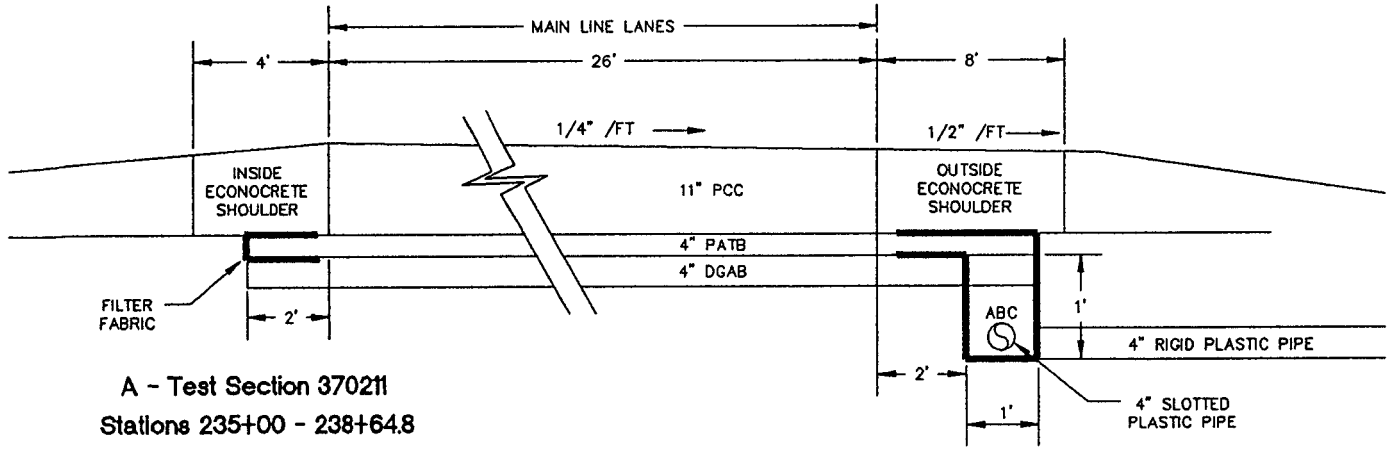
shrp

FHWA–LTPP SPS–2 NORTH CAROLINA
STRUCTURAL FACTORS FOR RIGID PAVEMENTS

PMS PAVEMENT MANAGEMENT SYSTEMS LIMITED



B - Test Section 370209 and 370210 (14' Lane and 8' Shoulder)
Stations 284+00 - 298+00



A - Test Section 370211
Stations 235+00 - 238+64.8

FIGURE 25 - TYPICAL SECTION - EDGE DRAINS

NORTH CAROLINA DOT SPS–2
US 52 SBL LEXINGTON BYPASS

PLOTDATE: AUG 16/94 | FHWA SPS–2 TEST SECTIONS ONLY
SPS-2-22 | DIMENSIONAL DETAILS ONLY
DRAWING NOT TO SCALE

PHOTO #1 Mixing Lime into the Subgrade

PHOTO #2 Capping the bottom of a Shelby Tube Sampler

PHOTO #3
Primed Subgrade for Add-On Lane at Sections 370209, and 370210, is 3 inches below level for mainline lanes

PHOTO #4
Monitoring Dial Gauges During Plate Load Tests on Subgrade

PHOTO #5
The 14 foot lane dowel baskets require two more dowels to be added

PHOTO #6 Spreading 900 psi PCC for Add-On Lane

PHOTO #7
Fabric Wrapped Edge Drains at 12 ft. and 14 ft. Lanes